Achieving Sustainable Development in Africa through Inclusive Green Growth

Agriculture, Ecosystems, Energy, Industry and Trade

The Sustainable Development Report on Africa

Fifth Edition

United Nations
Economic Commission for Africa

UNEP

FAO

UNIDO

UNDP

Achieving Sustainable Development in Africa through Inclusive Green Growth

Agriculture, Ecosystems, Energy, Industry and Trade

The Sustainable Development Report on Africa

Fifth Edition

United Nations
Economic Commission for Africa

UNEP

FAO

UNIDO

UNDP

Ordering information

To order copies of *Achieving Sustainable Development in Africa through Inclusive Green Growth* by the Economic Commission for Africa, please contact:
Publications
Economic Commission for Africa
P.O. Box 3001
Addis Ababa, Ethiopia

Tel: +251 11 544-9900
Fax: +251 11 551-4416
E-mail: ecainfo@uneca.org
Web: www.uneca.org

First printing June 2015

Language: English
ISBN: 978-99944-61-71-4
eISBN: 978-99944-62-71-1

The designations employed in this publication and the material presented in it do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations Economic Commission for Africa concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

Designed and printed by the ECA Publishing and Distribution Unit. ISO 14001:2004 certified.

Table of Contents

List of tables

List of boxes

List of figures

Abbreviations and acronyms

AfDB	African Development Bank
AGDI	African Gender and Development Index
AGOA	African Growth and Opportunity Act
AIDA	Accelerated Industrial Development of Africa
AMCEN	African Ministerial Conference on the Environment
APRM	African Peer Review Mechanism
ASM	artisanal and small-scale mining
AUC	African Union Commission
CAADP	Comprehensive Africa Agriculture Development Programme
CBNRM	community-based natural resource management
CDM	clean development mechanism
CFL	compact fluorescent lamp
CIS	Commonwealth of Independent States
ClimDev-Africa	Climate for Development in Africa
CSA	Climate Smart Agriculture
DMC	domestic material consumption
DRR	disaster risk reduction
ECA	Economic Commission for Africa
EGS	environmental goods and services
FAO	Food and Agriculture Organization of the United Nations
FDI	foreign direct investment
GDP	gross domestic product
GII	Gender Inequality Index
GNI	gross national income
ICT	information and communications technology
IEA	International Energy Agency
ILO	International Labour Organization
IPCC	Intergovernmental Panel on Climate Change
IRENA	International Renewable Energy Agency
ISIC	International Standard Industrial Classification
IUCN	International Union for Conservation of Nature
MVA	manufacturing value added
NAMA	nationally appropriate mitigation action

NAPA	national adaptation programme of action
NCPC	national cleaner production centre
NEPAD	New Partnership for Africa's Development
NGOs	non-governmental organizations
ODA	official development assistance
OECD	Organization for Economic Cooperation and Development
PES	payment for ecosystem services
PFM	participatory forest management
PPP	purchasing power parity
R&D	research and development
REDD	Reducing Emissions from Deforestation and Forest Degradation
REFIT	renewable energy feed-in-tariff
ROA	Regional Office for Africa
SADC	Southern African Development Community
SDRA	Sustainable Development Report on Africa
SLM	sustainable land management
TEEB	The Economics of Ecosystems and Biodiversity
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
UNFPA	United Nations Population Fund
UNICEF	United Nations Children's Fund
UNIDO	United Nations Industrial Development Organization
WfWet	Working for Wetlands programme
WGI	Worldwide Governance Indicators
WHO	World Health Organization
WTO	World Trade Organization

Acknowledgements

The fifth issue of the Sustainable Development Report on Africa (SDRA-V) is a joint publication of the Economic Commission for Africa (ECA), the Food and Agriculture Organization of the United Nations (FAO), the Regional Office for Africa of the United Nations Environment Programme (UNEP/ROA), the United Nations Industrial Development Organization (UNIDO) and the Regional Bureau for Africa of the United Nations Development Programme (UNDP/RBA).

The report team benefited from the overall guidance of: Josué Dioné, former Director of the then Food Security and Sustainable Development Division of ECA; Fatima Denton, Director of the Special Initiatives Division; Steven Karingi, Director of the Regional Integration and Trade Division; Dimitra Sanga and Chukwudozie Ezigbalike, former Director and Officer-in-Charge, respectively, of the African Centre for Statistics of ECA; Maria Helena Semedo, Assistant Director General and Regional Representative of the FAO Regional Office for Africa; Heinz Leuenberger, Director of Environmental Management Branch; Ludovico Alcorta, Director of Research, Statistics and Industrial Policy Branch; and Pradeep Monga, Director of Energy and Climate Change Branch of UNIDO; Desta Mebratu, Deputy Director of UNEP/ROA; and Pedro Conceicao, Chief Economist and Head of the Strategic Advisory Unit of UNDP/RBA.

The report's substantive team comprised Isatou Gaye (team leader), Benjamin Banda, Charles Akol, Richard Osaliya, Andrew Allieu, Yacouba Gnegne, Somlanare Romuald, Mathilde Closset, Alessandra Sgobbi[1], Nnamdi Nnadozie[2], Greg Gong, Negussie Gorfe, Simon Mevel and Jane Karonga, of ECA; James Tefft, Jean Boroto, Koffi Amegbeto, Foday Bojang, Benjamin De Ridder, Atse Yapi, Edwards Kilawe, Martin Ager, Sebastian Grey, and Joan Nimarkoh of FAO; Richard Munang, Mohamed Abdel Monem, Jessica Andrews and Joachim Monkelbaan, of UNEP; Patrick Nussbaumer, Ludovico Alcorta, Diego Masera, Alois Mhlanga and Sunyoung Suh, of UNIDO; and Seonmi Choi, Angela Lusigi and Sallem Berhane of UNDP.

Background papers were commissioned from Dr. Washington Odongo Ochola; Mekonnen Tadesse of Addis Ababa University; Francis Mulangu of the African Center for Economic Transformation; Patrick Karani of BEA International; and Peter P. Zhou, Philip Acquah, Tichakunda Simbini, Nozipho Wright, and Tracy Sonny of EECG Consultants Pty.

The team is grateful for the comments on, and inputs to, the SDRA-V indicator framework provided by Adam Elhiraika, Stephen Maxwell Donkor[3], Yacob Mulugetta[4 5], Youssouf Camara, Hassan Yousif, Elizabeth Eilor, Mongameli Mehlwana, Kaleb Demeksa, Guy Ranaivomanana, Louis Lubango, Marieme Bekaye, Daya Bragante, and Enoch Ombagi Okara of ECA; Almami Dampha and Leah Naess Wanambwa of the African Union Commission (AUC); Siham Muhammed and Yogesh Vyas of the African Development Bank (AfDB); Frank Turyatunga of UNEP; Nina Zetsche of UNIDO; and Laura Recuero Virto of the Organization for Economic Cooperation and Development (OECD).

The report also benefited from the constructive comments and inputs provided by participants of the Expert Group Meetings on the SDRA-V Indicator Framework, and in the review of the draft report, which were held in December 2012 and December 2013 respectively, as indicated in annex 3 of the present report.

1 Presently with the European Commission, Joint Research Centre, Institute for Energy and Transport.
2 Presently with Weston Group, Ghana.
3 Presently with Holland Africa Research & Development Ltd.
4 Presently with the University of Surrey.
5 Presently with the Technical Centre for Agricultural and Rural Cooperation, ACP-EU Cotonou Agreement.

The team is also grateful for the valuable administrative and organizational support extended by Rahel Menda, Martha Messele, Meskerem Melaku, Asnakech Megersa, Tsigereda Assayehegn, and Gezahegn Shiferaw of ECA.

Lastly, Demba Diarra, Chief of the ECA Publications Section, and his team, including Marcel Ngoma-Mouaya, Teshome Yohannes and Charles Ndungu, are acknowledged for their efficient handling of the editing, text processing, proofreading, design and printing processes.

Executive summary

Introduction

The Sustainable Development Report on Africa (SDRA) is produced by the Economic Commission for Africa in collaboration with partner institutions. It serves as a tool for monitoring and assessing progress on sustainable development, and for engagement on topical issues relevant to the region's development aspirations. Four issues of the report have been produced to date. The first issue of the report was produced under the theme "Managing land-based resources for sustainable development". The theme of the second issue was "Five-year review of the implementation of the World Summit on Sustainable Development Outcomes in Africa". The theme of the third was "Sustainable consumption and production for sustainable growth and poverty reduction", and the fourth, "Managing Africa's natural resource base for sustainable growth and development".

This fifth issue of the report (SDRA-V), produced under the theme "Achieving sustainable development in Africa through inclusive green growth", is a joint publication of ECA, FAO, UNEP, UNIDO and UNDP. The report explores a theme that has a particular significance for Africa, inclusive green growth, in the light of its implications for the region's transformation and sustainable development.

SDRA-V is expected to enhance awareness and appreciation among policymakers of the need for a balanced integration of the three dimensions of sustainable development (economic, social and environmental) in the development and implementation of policies, strategies and programmes. It examines the challenges and opportunities for inclusive green growth in selected sectors of the economy, in which targeted investments with accompanying enabling measures could spur inclusive green growth to contribute to transformative objectives and sustainable development. The report is targeted at African countries, regional and subregional organizations, the nine major groups recognized by the United Nation Conference on Environment and Development, which was held in Rio de Janeiro, Brazil, in 1992, and development partners.

Methodology

The preparation of part I entailed the refinement of the indicator set used for SDRV-IV. In this regard, ECA organized a meeting in December 2012 on "Measuring sustainable development: sustainable development indicators". Participants included experts from member States representing a cross-section of institutions in the economic, social, environmental, governance and statistics fields, as well as regional and subregional institutions and United Nations agencies (see annex 3). The resulting sustainable development indicator set for SDRA-V is organized based on themes and sub-themes identified as critical to measure progress towards achieving sustainable development in Africa. For use in SDRA-V, 16 priority thematic areas and 98 indicators were selected. The indicators under each theme and sub-theme were kept to a manageable number and one headline indicator was identified for each theme in order to give an overall picture of progress in the region under the specific sustainable development theme (see annex II).

For part II of the report, the partners took the lead in preparing the various thematic chapters, as follows: agriculture – FAO; ecosystems goods and services – UNEP; energy and industry – UNIDO; trade – ECA; and enabling measures – UNDP. The analytical framework that guided the assessment in Part II assumed that sustainable management of resources in all sectors has intertwined eco-

nomic, social and environmental goals. Activities in the agriculture, industry, trade and energy sectors are supported by environmental goods and services and largely controlled by an enabling environment that facilitates sustainable transformation and development through inclusive green growth. These inextricable interlinkages dictate the choices that are made and the outcomes of the production and consumption activities.

Key findings

Part I. Assessing the state of, and trends towards sustainable development

Governance

Africa continues to show gradual improvements in governance. The continent is slowly but steadily strengthening institutions and relevant governance mechanisms for realizing development imperatives in the economic, social and environmental spheres. However, challenges remain with regard to the consolidation of gains in public administration and the creation of integrated policymaking capacity to respond to the complex and interlinked challenges of sustainable development. Peace and security remain a concern, as conflicts have continued in some countries, while new ones have emerged, especially in Central, West and North Africa. Threats of terrorism continue to create uncertainty in some countries. Commitments on environmental governance embodied in the three Rio Conventions – the Convention on Biological Diversity, the United Nations Convention to Combat Desertification and the United Nations Framework Convention on Climate Change – are progressively being implemented, but capacity challenges persist. Steady progress is being made on governance for sustainable development at the regional and subregional levels, but more needs to be done at the national level. The post-2015 development agenda and the follow-up processes of the United Nations Conference for Sustainable Development provide opportunities for revamping sustainable development governance at all levels.

Economic transformation and macroeconomy

Africa continues to record high economic growth, making the continent an increasingly major player in the global economic arena. Although there is promise for even more robust economic growth, trends in adjusted net savings and other indicators of macroeconomic change have shown mixed results and minimal or negative changes. No significant changes have been reported on trade and market access or on financial status (sustainable public finance). While the share of agricultural exports in total exports has been rising, value addition in manufacturing, agriculture and service sectors continues to decline. Although the outlook is positive for the economic transformation of Africa, many downside domestic and external risks, and youth unemployment, may overshadow this projection. This is because the recent economic growth has relied too heavily on agriculture and other nature-based sectors without much value addition and employment-generating opportunities. The stepping up of inclusive green growth approaches, support for a vibrant private sector and adoption of information and communications technology (ICT) innovations remain potential areas of focus for harnessing positive aspects of economic growth.

Sustainable consumption and production

Progress towards achieving sustainable consumption and production is mixed. Resource productivity still remains low and the slight improvements in production trends have been offset by a decline in sustainable consumption, due to the unsustainable consumption patterns of an increasingly affluent middle class. This emerging phenomenon increasingly threatens environmental integrity through increased production of waste and increasing demand for environmentally sensitive goods and services. The progress that continues to be registered in sustainable production is attributed to efforts by Governments, commu-

nities and the private sector in improving social and environmental accountability for production processes. Pollution intensity has shown an appreciable improvement, with greenhouse gas emissions declining between 2002 and 2009 as Governments stepped up campaigns and awareness of pollution reduction in all sectors. Sustainable transportation remains an area of concern. Although there has been an increase in infrastructural development, many challenges remain with regard to road fatalities, poor transport governance, connectivity and increasing greenhouse gas emissions from cars. To increase the pace towards sustainable consumption and production, more coherent policy frameworks that tackle both the supply and demand side of natural resource use are needed, together with improved implementation and enforcement of existing policies. Achieving sustainable consumption and production requires action and responsibility across sectors and urgent action should be taken with respect to capacity-building.

Energy

There has been a general improvement in the energy sector as measured by substantial infrastructural development and diversity of energy sources, as well as by the investment from local and external sources. Despite the abundant energy resource potential of the region, many countries have yet to create an environment conducive to attracting investments in the development of the energy sector. This is further complicated by the small size of African energy systems and markets that make it difficult to establish profitable business ventures. There is a general increase, albeit low, in the use of renewable energy sources, as more countries increase investment in, and access to, solar power, wind power and hydropower. Energy security remains a challenge as, increasingly, energy imports rely less on local production, with a net increase in energy imports in many countries. Between 2002 and 2010, there were varying trends in terms of energy consumed per unit of output, and the share of fossil fuels in total energy consumption remained the same. Africa's energy prices remain high. Insufficient generation capacity keeps the average electricity tariff higher than the global average, owing to the high cost of production and low investments. Much remains to be done to further develop the energy sector in Africa.

Poverty

Little progress has been made in eradicating poverty; and Africa is not on track towards achieving the Millennium Development Goal of halving the number of people living in extreme poverty by 2015. Income inequality persists, with the poor and vulnerable still unable to access opportunities for poverty eradication. Although the proportion of the population served with improved water increased by 16 per cent from 1990 to 2008, Africa remains the most deprived region in terms of access. Disparities continue between rural and urban areas. Despite the continent's great endowment of both fossil fuels and renewable resources, energy poverty is still rife in the region, with 650 million people having no access to electricity. Today, some 25 countries in sub-Saharan Africa have perpetual crisis or frequent power blackouts. The region continues to be predominantly energy poor, with an increasing reliance on biomass and fossil fuels as primary sources of energy for cooking and lighting for the poor in rural areas.

The proportion of the urban population living in slums has declined, although absolute numbers continue to grow. The limited progress made in eradicating poverty in Africa calls for more institutional and governance reforms to enhance the accountability of the State, raise the quality of service delivery, and improve the overall economic and social environment. Building capacity to manage economic shocks, such as food, fuel, or financial crises, and natural and climate change-related disasters, would contribute significantly to eradicating extreme poverty. Enhancing innovation for productivity and sustainability in all sectors will boost such efforts and open up opportunities for economic transformation and inclusive green growth.

Demographic changes

The changing population structures provide an opportunity to leverage the benefits arising from the demographic dividend. The demographic dividend is the accelerated economic growth that may result from a rapid decline in a country's fertility and the subsequent change in the population age structure. The emerging trends in fertility rate decline will create a scenario in which fewer births and a growing working-age population reduce the dependency ratio. This opportunity can be exploited for rapid economic growth if the right policies are put in place, and effective social and economic investments are made. Lessons can be learned from Asia and Latin America, where countries have responded to similar challenges by improving health and education, attracting foreign investments, and enacting economic policies that have spurred job creation and resulted in accelerated economic growth – in other words, the demographic dividend. In addition, efforts are needed to sustain the dividend to motivate people and countries to accumulate greater wealth and increase investments in human capital.

Gender

Progress has been made on gender equality and the empowerment of women, the share of parliamentary seats held by women and the share of women in non-agricultural wage employment. However, no significant progress has been made in closing the global gender pay gap. Change in access to land by women has been insignificant. There have been improvements in access to credit by women, especially in microcredit programmes, albeit in only a few countries. Despite this progress, the achieving gender equality in Africa remains a challenge. Significant gaps between rhetorical commitment to gender equity and actual action is still pervasive in the policy and development arena. Many African countries still rank low on the Gender-related Development Index. This has elevated the extent of social inclusion both for women and young people in development processes. Countries must work at generating greater economic opportunities for women and young people by creating conditions for greater control over their lives and enhancing their participation and decision-making. Continued improvement of education for women and young people would provide immense opportunities by expanding their choices. This would also enhance health and fertility outcomes for women and children. Strategic policies to enhance women's and young people's income must take into account gender differences within households as perpetuated by cultural practices. Also important are political and social reforms that enhance women's human rights, including freedom, dignity, participation, autonomy and collective action.

Education

The education sector in Africa has seen steady improvements over the years. There is an increasing level of public and private expenditure on education per capita. A higher proportion of pupils starting grade 1 reach the last grade of primary education, indicating an enhanced primary completion rate. The adult literacy rate is also improving, owing to improved access to education facilities in the region. This is attributed to programmes, such as universal primary and secondary education and the provision of subsidies and incentives at different levels. A higher gender parity index is being recorded in most subregions and countries. Achieving sustainable development, including the capacity to innovate, depends on a critical mass of educated and skilled people, hence the gains made in the education sector must be consolidated.

Health

Despite steady progress on the health front,Africa is confronting the world's most dramatic public health crisis (WHO 2014). The WHO (2014) report indicates that HIV/AIDS continues to devastate the region, which is home to 11 per cent of the world's population, but 60 per cent of the people living with HIV/AIDS. Additionally, more than 90 per cent of the estimated 300 million – 500 million malaria cases that occur worldwide every year are in Africa, mainly in children under the age of

five, although most countries are implementing better treatment policies. Most African countries are making good progress on preventable childhood illness, including polio and measles, through increased immunization coverage. However, some hurdles remain, including the high rate of maternal and newborn mortality and the strain on African health systems from life-threatening communicable diseases, coupled with increasing rates of non-communicable diseases, such as cancer, hypertension and coronary heart disease. Strengthening the fragile health systems and addressing basic hygiene and health education are best-bet strategies for tackling the continent's health challenges. Sustainable development programmes that improve or preserve the quality of water, air and other environmental goods and services will allow for lowering the national health budgets and contribute to ensuring a healthy labour force.

Agriculture and food security

Agriculture remains a key driver of the transformation of Africa because of its expansive opportunities for value-addition, increased labour, land productivity and inclusive green growth. Attention must be placed on boosting yields of staples and tackling the challenges faced by smallholders to improve the food security situation and lower food prices. As diets change in Africa in line with greater affluence, the share of staples, such as cereals, roots and tubers, will continue to decline, while that of meat, dairy products and oil crops will continue to rise, and livestock production will become important for attaining food security. Increased production needs to be facilitated with lower growth in animal numbers and a corresponding decrease in environmental degradation from grazing or wastes. Crop production can be raised though: expanding the land area, increasing the frequency of harvesting (often through irrigation), and boosting yields through intensification. New technology is needed for areas with shortages of land or water, or with particular problems related to the soil or climate. It must be noted, however, that raising the level of productivity must be accompanied by environmental protection or restoration. Biotechnology could also help tackle challenges related to resistance to drought, waterlogging, soil acidity, salinity and extreme temperatures. In particular, pest-resistant crop varieties can reduce the need for pesticides, thereby increasing the prospects of green agriculture. Many other promising technologies that help boost production with improved environmental protection are emerging. Some of these are ICT-based and should be adopted.

Natural resources

Progress on the sustainable management of the natural resource base in Africa is mixed. The rate of loss of forest cover is decreasing and the overall change in forest cover is positive, but remains insignificant. More land area has been affected by desertification and the proportion of people living on degraded land, overall, and in urban and rural areas, is increasing. There has been a marked improvement in biodiversity conservation, with more nationally designated protected terrestrial areas, resulting in a reduction in the percentage change in wetland areas and threatened species. Water abstraction by industry, agriculture and domestic use is increasing due to increasing demand coupled with insignificant change in water-use efficiency. The number of threatened species of fish is increasing and more fish stocks are being exploited outside their safe biological limits. The application of inclusive green growth principles provides an opportunity for the rational use and management of those natural assets for current and future generations. This requires good governance, institutions and policies for value addition to promote forward and backward linkages with the rest of the economy, thereby engendering diversification, reducing vulnerabilities and increasing competitiveness with a view to achieving desirable economic, social and environmental outcomes.

Climate change

Africa remains the continent with the least greenhouse gas emissions per capita, including and

excluding land use, land-use change and forestry. Both adaptation and mitigation efforts are gaining ground in the continent through national and international initiatives. The number of countries implementing national adaptation programmes of action (NAPAs) is increasing steadily with clear estimates of the costs of adaptation. The number of countries that have developed nationally appropriate mitigation actions (NAMAs) in a sustainable development context is also increasing, although the greenhouse gas emissions from Africa, both absolute and as a percentage of global emissions, remain insignificant. The impact of climate variability and change affect a country's ability to meet its sustainable development goals. The pursuit of low carbon development trajectories would minimize greenhouse gas emissions and contribute to inclusive green growth and the achievement of sustainable development objectives. This calls for the strengthening of global partnerships for development in the United Nations Framework Convention on Climate Change (UNFCCC) and other global forums.

Natural disasters

There has been an increase in human and economic losses due to natural hazards, such as earthquakes, volcanic activity, landslides, tsunamis, tropical cyclones and other severe storms, tornadoes and high winds, river floods and coastal flooding, wildfires and associated haze, drought, sand/dust storms and insect infestations. The extent of losses and level of preparedness varies across subregions and countries of Africa. Losses resulting from disasters have been increasing due to the increased frequency of natural disasters and vulnerability, especially of the poor, to disasters. An increasing number of countries have established national platforms for disaster risk reduction and preparedness, but the proportion of people living in disaster-prone areas has been increasing. Disaster risk management and reduction is a must if sustainable development is to be achieved.

Means of implementation

Financing the sustainable transformation and development of Africa will increasingly be based on domestic public and private resources. Consequently, the continent must explore untapped approaches to raise capital to meet its development agenda. Only a small proportion of remittances received have been directly channelled to sustainable development investments, while the cost of remittance continues to be high. The official development assistance (ODA) received by African countries as a proportion of their gross national income has been above the global average. And ODA received by sub-Saharan African countries was higher than the average received by all ODA receiving countries of the world. Foreign direct investment (FDI), especially those targeting environmental goods and services, are declining. Expenditure on research and development as a percentage of gross domestic product (GDP) remains low, while the increase in patents in environmentally related technologies remains insignificant, with only a few countries registering new patents. Furthermore, only a few countries have developed national capacity development strategies.

To advance sustainable development, both State and non-State actors will have to adopt policies and mobilize resources (from local and external sources). Funding-related efforts must build on current commitments and relevant governance mechanisms, while new innovative financing alternative must be employed to scale up previous successes. Above all, improved governance, including zero tolerance of corruption, stronger accountability and provision for multi-stakeholder engagement in funding, technology development and transfer and capacity-building, and effective collaboration will remain paramount for the realization of sustainable development in Africa.

Part II. Promoting inclusive green growth in selected sectors

Agriculture

The critical role of agriculture in Africa's social and economic development underlines the importance of promoting inclusive green growth in the sector. Inclusive green growth interventions directed at the sector are needed to improve food security, which remains a major problem on the continent. Other factors that warrant urgent efforts to foster inclusive green growth in the sector are its high dependence on natural resources and the associated negative impacts on environmental sustainability. The growing trend of integrating inclusive green growth approaches and practices in the sector is a move in the right direction. Those approaches and practices have already provided benefits, such as increased productivity, job creation and improved natural resources management and if combined with the opportunities identified, can be capitalized upon to scale up inclusive green growth in the sector. This, however, would require urgent attention to the challenges confronting the sector, which could be addressed by mainstreaming inclusive green growth principles in agricultural development and investment policies and strategies. This would also contribute to the attainment of sustainable and inclusive transformation and development in Africa, including achieving climate change mitigation and adaptation objectives.The following policy recommendations are proffered to enhance the application of inclusive green growth principles in the sector.

Countries should:

- Strengthen land tenure and the functioning of African land markets to encourage equitable access to productive assets, sustainable land management and other long-term investments, such as irrigation, that are necessary to increase and sustain agricultural productivity and production;
- Transform agriculture input subsidies aimed at improving agriculture productivity into market-smart and sustainable systems. These include subsidies aimed at dealing with market failures in the input market, crop and livestock insurance, and the micro-finance sector;
- Promote smart subsidy for index insurance premium. In order to increase farmers' willingness to pay, the premium would need to be subsidized in the initial stages to give farmers time to understand the worth of the product and develop a taste for it;
- Address post-harvest losses through the introduction and promotion of better post-harvest handling techniques;
- Foster a conducive environment for agribusiness clustering and create jobs. Connecting all the agricultural value chain actors can improve the agricultural sector's efficiency by reducing the cost of operation and free up money for investment in higher value activities to create more jobs;
- Strengthen farmer-based organizations or village-based grass-roots institutions to promote peer learning on inclusive green growth;
- Develop a carbon project extension service to upscale and outscale inclusive green growth practices and approaches in the agriculture sector;
- Increase investments in agriculture and make the sector attractive to young people, as a profitable enterprise;
- Strengthen technical and institutional capacity by, among other things, establishing a dedicated and highly skilled green growth promotion team from Governments and

non-governmental institutions to drive the process.

Ecosystems goods and services

Vast potential exists in harnessing ecosystems goods and services (EGS) for achieving inclusive green growth, and ultimately sustainable development, in Africa. This is underscored by the fact that at 1.4 global hectares (gha), Africa's per capita "ecological footprint" (a measure of a population's use of renewable resources) is below, not only the global average of 2.7 gha, but also the globally available biocapacity of 1.8 gha per person (WWF/AfDB 2012). Africa is poised to implement inclusive green growth by advancing innovative approaches. From disaster risk reduction, to energy generation, to water security, Africa is in a great position to seize the benefits of EGS for inclusive green growth. The provisioning and regulating services provided by ecosystems directly and indirectly link to every aspect of inclusive green growth socially inclusive and environmentally conscious economic growth. Thus, harnessing ecosystems services will spur inclusive green growth and lead to sustainable development. Most of the challenges related to achieving ecosystems-based inclusive green growth also provide opportunities that could be leveraged to spur this form of growth. Those opportunities must be exploited and good practices up-scaled and outscaled to attain beneficial economic, social and environmental outcomes. Lessons learned are synthesized into the following policy recommendations.

Countries should:

- Support research to ensure that the development and management of environmental goods and services are guided by the best available science;

- Promote the application of environmental assessment tools in national development plans and strategies, and in decisions and actions affecting environmental goods and services;

- Promote knowledge exchange and the development of practical tools and guidelines for implementing EGS management approaches as part of broader inclusive green growth and sustainable development planning strategies;

- Develop education, training and communication capabilities to, among other things, increase awareness of the role of ecosystems and ecosystem management for inclusive green growth and sustainable development in Africa;

- Mobilize funding and promote value addition for ecosystem goods and services in order to consolidate gains and to upscale and outscale good practices;

- Strengthen capacity to implement multilateral environmental agreements, enhance institutional effectiveness and promote regional cooperation.

Energy

Amid an abundance of energy resources, Africa is facing an energy crisis. Existing production capacity does not meet the growing energy demand to power and grow the economy, drive local development and tackle poverty. The high cost of electricity generation arising from the high dependence on fossil fuels for electricity generation, poor energy infrastructure, and low investments in the sector, among other things, are affecting various facets of economic and social development. Low energy supply and consumption in key sectors of the economy, such as agriculture and industry, is affecting outputs and growth. The unmet demand for energy has further resulted in high dependence on unsustainably harvested traditional biomass energy in the form of charcoal and firewood as cooking fuels, with associated environmental and health problems. The continent's current approaches to energy development and deployment have not, therefore, delivered the de-

sired level of energy services and security – and therefore, must be reexamined.

Current generation levels, policy initiatives and reforms in improving energy efficiency, deployment of renewable energy, reducing energy intensity, increasing energy access, social, environmental and cross cutting/sectoral considerations, suggest that there is high potential for inclusive green growth-related practices in the sector. While a number of challenges, such as low investments, high upfront costs and low economies of scale, still need to be tackled, opportunities abound. In particular, its renewable energy potential presents prospects for dealing with energy-related challenges, creating jobs and enhancing human welfare. International and regional cooperation, and technology development and transfer also present opportunities that Africa could tap to enhance the application and realization of inclusive green growth in the energy sector. The following policy recommendations are intended to upscale inclusive green growth in the energy sector of Africa.

Countries should:

- Unlock the full potential for inclusive green growth in the energy sector. In order to fully realize the inclusive green growth potential in the sector, it should be ensured that the policy process starts with the identification of opportunities in the broad context of inclusive green growth objectives;

- Ensure that energy reforms being introduced benefit all. While policy reforms need to attract and ensure returns on investments, the extent to which they deal with the energy needs of the whole country, including the energy poor, is crucial;

- Ensure that policies aimed at attracting investments are evidence-based, and take into account the following: all policy options; the country's overall development strategy; and energy resource potentials. This would help accelerate and enhance efforts to achieve inclusive green growth in the energy sector;

- Address the issue of scale and low investments, national energy strategies, and, as far as possible, closely align theme with regional and continental regional integration initiatives;

- Strategize to benefit optimally from the financial, technology and capacity development resources offered by global initiatives;

- Enhance capacities to develop domestic innovation and local manufacturing of technologies. This requires coordinated support from the private sector, Governments and donor/international partners;

- Track success and failures by putting in place a robust framework for measuring progress and success against agreed indicators.

Industry

Most African countries continue to export raw materials with low manufacturing value added (MVA) and value chain, resulting in low industrial competitiveness and human well-being. Inclusive green growth presents a unique opportunity to bring multiple and integrated solutions to the numerous challenges facing the African industrial sector. The renewed drive to accelerate the structural transformation of African economies, supported by the various industrial development frameworks and programmes, can provide the much-needed push to increase and sustain productivity, ensure productive employment, job security, income and wealth generation and shared prosperity.

In addition to enabling conditions, such as a well-functioning market economy, adequate infrastructure and efficient energy systems, African Governments are enacting local content policy and legislation that explore opportunities to drive

local investment, develop manufacturing value chains, support the development of an advanced services sector and leverage opportunities for innovation, including upstream, downstream and side-stream linkages. This is expected to increase the participation of local businesses (including small and medium-sized enterprises) and industry associations in the value chain to maximize the social and economic benefits of the industrial sector. The emerging industrial policies on manufacturing value added, complemented by voluntary and mandatory sustainability frameworks of project financing institutions that address the environment and social impact challenges in the extractive industry and manufacturing value chains, can help drive inclusive green growth in the sector. Lessons learned are synthesized into the following key policy recommendations.

Countries should:

- Ensure that structural transformation and industrial policies and strategies mainstream inclusive green growth to further expand economic growth potential, and help facilitate the crafting of a low carbon and resource efficient development path that creates jobs, generates wealth and income, improves human welfare and reduces inequalities;

- Be cognizant that, while national industrial development frameworks should be tailored to each country's circumstances, they should also comply with relevant frameworks of the Conference of African Ministers of Industry;

- Promote value addition, increase industrial competitiveness and share of global value chains. This calls for, among other things, developing local capacities in industry value chains such as skills, expertise and know-how.

- Pursue the objective of increasing the number and diversity of local businesses securing economic benefit from government contracts, thus increasing local participation, job creation and shared prosperity in the supply chain management;

- Align artisanal and small-scale mining operations with relevant development priorities to ensure that the sector provides an opportunity for inclusive green growth that benefits women, young people and marginalized communities;

- Subscribe to international sustainability frameworks and promote national initiatives aimed at building consensus and setting voluntary standards on responsible production and processing;

- Support research and governance mechanisms for industrial innovation and competitiveness in order to promote the adoption of technologies that will help open up opportunities for developing green products, such as organic food and responsibly mined and processed mineral and metal commodities;

- Sustainably exploit African energy resource endowments to drive the continent's quest for structural transformation and industrialization. Energy-efficient measures should therefore be adopted, to complement the production of green energy.

Trade

There are several important policy interventions that can promote inclusive green growth in Africa, and, depending on a country's openness to trade and global markets, there are important interactions that need to be considered in designing country-level strategies for inclusive green growth. The transition to an inclusive green economy will require a broad set of reforms and institutional innovations to catalyse and nurture sectoral innovations that are consistent with the vision. The extent to which these reforms are carried out will largely determine whether they can encourage trade and openness to global markets

without having negative effects on the environment and societies of Africa. There are challenges and opportunities, but, overall, progress towards a greener and more inclusive path of sustainable social and economic development in Africa can be fostered through trade if supported by an appropriate combination of policy reforms.

- African Governments should foster the comparative advantages of African producers in producing and exporting sustainably produced products to ensure that trade drives inclusive green growth and the transition to a green economy in Africa;

- Africa should ensure adequate governance of natural resources to prevent the unsustainable extraction of resources that undermine inclusive green growth efforts;

- Resource-rich countries should consider establishing mineral revenue stabilization funds to improve the stewardship of resource-based revenues;

- Countries with favourable agricultural potential should aim at maintaining the natural resource base on which production depends;

- African Governments should not only focus on attracting more investment funds, but also deliberately target those investments that will spur inclusive green growth and benefit the green economy transition;

- Africa should further explore opportunities in the carbon market by taking advantage of the huge potential in the renewable energy market. Additionally, the removal of price distortions is critical when implementing fiscal reforms as part of an inclusive green growth strategy;

- There is a need to reduce tariff and non-tariff barriers to further promote intra-Africa trade;

- African Governments should recognize and leverage the significant contribution of the private sector to economic growth through innovation, technology transfer and diffusion and the strengthening of trade linkages in global value chains to spur inclusive green growth;

- African countries should take advantage of the renewed political commitment to accelerating regional integration and economic transformation.

Enabling measures

The impetus for addressing development challenges and for driving structural transformation of African economies is presenting new opportunities for Africa's development. Inclusive green growth policies and approaches can contribute to achieving a transformation towards a more diversified, value-added, sustainable and equitable economic system. Inclusive green growth requires an optimal combination of measures to enable growth through increased productivity, value addition and competitiveness. It also generates social benefits with decent jobs, improves livelihoods and welfare; and enhances natural capital and environmental resilience. Enabling conditions need to be established at the subnational, national, subregional, regional and global levels to maximize positive synergies that can exist between environmental sustainability, human development, equity and economic growth. The following are important enablers that should be considered in fostering inclusive green growth in selected sectors, and driving the transition to inclusive green economies.

- The institutional framework that enables cross-sectoral approaches at the whole of government level, with high-level political commitment, is fundamental to spur inclusive green growth and drive the transition. Coherence between different sectoral poli-

cies, as well as between economic, fiscal, social and environmental policies, is crucial for achieving resource efficiency and inclusiveness, taking into account issues of gender, climate change, employment creation and innovation.

- The application of policy instruments that foster positive synergies among economic growth, social equity and environmental sustainability and address potential trade-offs should be promoted. Both market and non-market-based approaches are required to facilitate cost-effective and equitable growth and transition.

- Market-based instruments alone are not sufficient to spur inclusive green growth. Complementary instruments are necessary. These include regulations, certification systems, standards, information-based tools, voluntary compliance measures and sustainable public procurement policies. These non-market instruments are required especially when there are information asymmetry, high monitoring and enforcement costs and risk of enforcement failure of market mechanisms, and lack of technical, financial, administrative capacity of market mechanisms.

- Targeted public spending and investment in key pro-poor sectors with high inclusive green growth potential can trigger and leverage private investment. Agriculture, fisheries and forestry are, for instance, the sectors that the poor depend on heavily for their livelihoods, especially in rural areas. Public support should be provided for technological and social innovations that deliver low-cost products and services which reach the poor and disadvantaged people in essential areas such as agriculture, energy, water and waste management.

- There is a need for capacity development at individual, organizational and enabling environment levels in order to enable inclusive green growth and ensure an effective transition. Capacity development is necessary to enhance awareness and understanding, and behavioural change. The development of employable skills in the green jobs labour market also requires investments in effective capacity development.

- While it is important to establish appropriate institutional mechanisms and policy instruments at the national level, international coordination and cooperation is necessary to complement domestic efforts. Additionally, international and intraregional trade have the potential to spur inclusive green growth and drive the transition, if an adequate enabling environment is established for African countries to allow them to benefit equitably from global and regional trade.

1. Introduction

1.1 Sustainable Development Report on Africa

The Sustainable Development Report on Africa (SDRA) is produced by the Economic Commission for Africa (ECA) in collaboration with partner institutions. It serves as a tool for monitoring and assessing progress on sustainable development, and for engagement on topical issues relevant to the region's development aspirations. Four issues of the report have been produced to date. The first issue of the report was produced under the theme "Managing Land-Based Resources for Sustainable Development". The theme of the second issue was "Five-Year Review of the Implementation of the World Summit on Sustainable Development Outcomes in Africa (WSSD+5)". The theme of the third was "Sustainable Consumption and Production for Sustainable Growth and Poverty Reduction", and the fourth, "Managing Africa's Natural Resource Base for Sustainable Growth and Development".

The SDRA process occupies a unique and important niche in sustainable development implementation in Africa. The SDRA process has contributed to fostering partnerships among United Nations agencies, African regional and subregional institutions to support African countries in implementing sustainable development commitments, preparing for and following up on the outcomes of sessions of the then United Nations Commission on Sustainable Development. The report enabled the former ECA Committee on Food Security and Sustainable Development to undertake a critical analysis of current and emerging challenges to meeting the region's sustainable development aspirations, and to identify effective policy and programmatic responses. The report has contributed to raising the profile of, and promoting dialogue on, Africa's sustainable development priorities at the regional and international levels.

In order to enhance data availability and reliability to enable more robust tracking of progress over time, ECA in 2010 and in collaboration with partners embarked on the development of a sustainable development indicator framework and a compendium of indicators for the production of SDRA-IV. The indicators cover the economic, social and environmental dimensions of sustainable development, as well as the governance aspects. That set of indicators, while not covering all the relevant themes and sub-themes, captured pressing sustainable development concerns and priorities of the region.

1.2 Purpose and scope of SDRA-V

This fifth issue of the report (SDRA-V), produced under the theme "Achieving sustainable development in Africa through inclusive green growth", is a joint publication of ECA, the Food and Agriculture Organization of the United Nations (FAO), the United Nations Environment Programme (UNEP), the United Nations Industrial Development Organization (UNIDO) and the United Nations Development Programme (UNDP). The report explores a theme that has a particular significance for Africa, inclusive green growth, given its implications for the region's transformation and sustainable development. The choice of the theme is timely: firstly, the green economy in the context of sustainable development and poverty eradication was one of the themes focused onat Rio+20. African countries, in their common position on the objective and themes of Rio+20, recognized that the transition to a green economy could offer new opportunities to advance the achievement of sustainable development objectives through employment creation, economic growth and poverty eradication, while underlining the need for the green economy to be rooted in national objectives. Secondly, there is an increasing rec-

ognition that inclusive green growth could accelerate structural transformation in Africa and that there is a need to showcase good practices in selected sectors of the economy from which countries can learn.

Inclusive green growth deliberately seeks to reduce poverty and inequality within a framework of growth that is environmentally sustainable (World Bank, 2012c; UNDESA, 2012). For the purpose of the present report, inclusive green growth is defined as economic growth that is inclusive, creates jobs, improves human welfare (including poverty reduction), is resource efficient and enhances environmental assets, thus contributing to sustainable development. An inclusive green growth approach provides an opportunity for an equitable and sustainable transformation in Africa. Such a transformation can be achieved through various strategies, including commodity-based industrialization that leverages comparative advantages in terms of resource endowment. Inclusivity and the maintenance of environmental integrity are central to the successful implementation of this transformation agenda.

The high dependence of Africa's economies on natural resources means that there will be sustained and increased pressure on these resources. Therefore, minerals, forests, land, water and marine resources need to be harnessed sustainably. The increased demand for resources and infrastructure, particularly energy and transport for industrial development, should be decoupled from social inequalities, environmental degradation and climate change, which are already posing serious limitations to growth. An inclusive green growth pathway employs green economy principles to realize optimal economic, social and environmental outcomes from targeted interventions in key sectors of the economy. The process should generate good practices and lessons to inform the transition to a green economy and foster sustainable development.

SDRA-V is expected to enhance awareness and appreciation among policymakers of the need for a balanced integration of the three dimensions of sustainable development (economic, social and environmental) in the development and implementation of policies, strategies and programmes. It examines the challenges and opportunities for inclusive green growth in selected sectors of the economy, where targeted investments with accompanying enabling measures could spur inclusive green growth to contribute to transformative objectives and sustainable development. The report is targeted at African countries, regional and subregional organizations, the nine major groups recognized by the Rio Conference in 1992 and development partners.

1.3 Methodology and analytical framework

1.3.1 Methodology

The preparation of part I entailed the refinement of the indicator set used for SDRV-IV. ECA held a meeting in December 2012 on "Measuring sustainable development: sustainable development indicators". Participants included experts from Member States representing a cross-section of institutions in the economic, social, environmental, governance and statistics fields, as well as regional and subregional institutions and sister United Nations agencies (see annex 3). The resulting sustainable development indicator set for SDRA-V is organized around themes and sub-themes identified as critical to measure progress towards sustainable development in Africa. For use in SDRA-V, 16 priority thematic areas and 98 indicators were selected. The indicators under each theme and sub-theme were kept to a manageable number and one headline indicator was identified for each theme in order to give an overall picture of progress in the region under the specific sustainable development theme (see annex II).

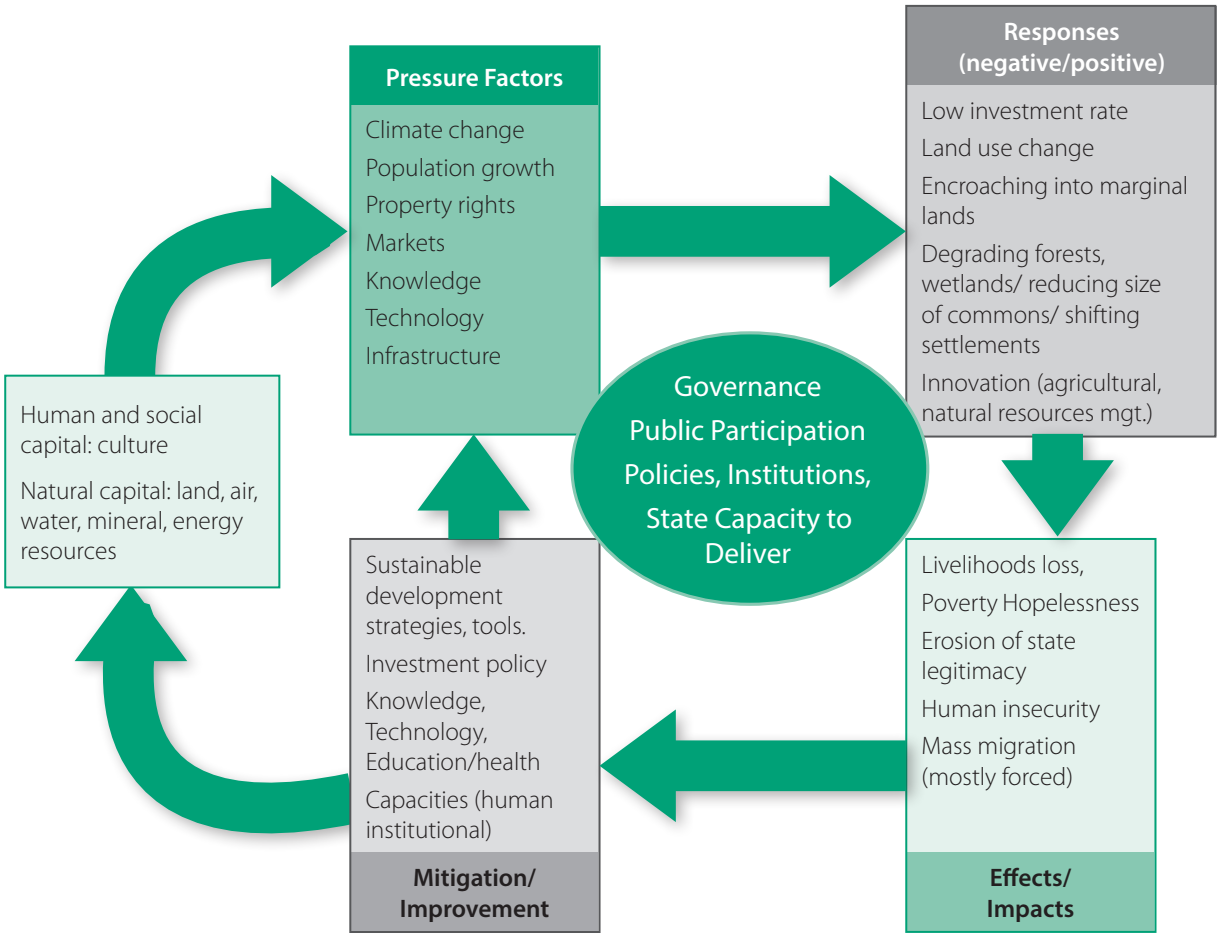
1.3.2 Analytical framework for the indicator-based assessment

For the assessment, the same analytical framework was adopted as for SDRA-IV: the pressure-response-effect-mitigation framework (see figure 1). Under the framework it is assumed that, in highly natural resource-dependent economies, "the manner in which people use and manage natural resources for livelihoods is influenced by pressure factors such as climate change, population growth, property rights, markets, knowledge, technology and infrastructure (both economic and social)" (ECA, 2013). The framework underpins sustainable development progress and its assessment through a systematic process of identifying, defining and composing the indicators, then applying an integrated assessment.

In view of the theme "Achieving sustainable development in Africa through inclusive green growth", a number of green growth-related indicators were included in the indicator set. Some of the indicators relevant to inclusive green growth include adjusted net savings, exports of environmental goods, exports of dirty products, resource productivity, population using biomass for energy, energy use per unit of products, renewable versus non-renewable energy, food production index, land area affected by desertification, number of countries implementing NAPAs Foreign Direct Investment (FDI in environmental goods and services), and papers/ publications related to eco-innovation.

The assessment used data from various sources to enable appropriate comparison of trends across different subregions, and where relevant, specific

Figure 1: Pressure-response-effect-mitigation conceptual framework for indicator definition and sustainable development assessment



Source: ECA 2013 (SDRA-IV)

national level examples are presented. Although the bulk of the data was collected from secondary sources, 15 pilot countries were identified for a questionnaire survey for the purpose of collecting primary data to populate the sustainable development indicators. These were Botswana, Burkina Faso, Cameroon, Ethiopia, Gabon, Ghana, Kenya, Morocco, Namibia, Nigeria, Rwanda, Senegal, South Africa, Tunisia and Uganda. With the exception of Gabon and Namibia, all countries completed the questionnaire. However, a significant percentage of responses received contained no data for some indicators or data for only a few years. The more complete data sets were analysed and presented in the report.

For part II of the report, the partners took the lead in preparing the various thematic chapters, as follows: agriculture – FAO; ecosystems goods and services – UNEP; energy and industry – UNIDO; trade – ECA; and enabling measures – UNDP. Under the analytical framework that guided the assessment in part II it was assumed that sustainable management of resources in all sectors has intertwined economic, social and environmental goals. Activities in the agriculture, industry, trade and energy sectors are supported by environmental goods and services and largely controlled by an enabling environment that facilitates sustainable transformation and development through inclusive green growth. These inextricable interlinkages dictate the human choices and outcomes of production and consumption activities.

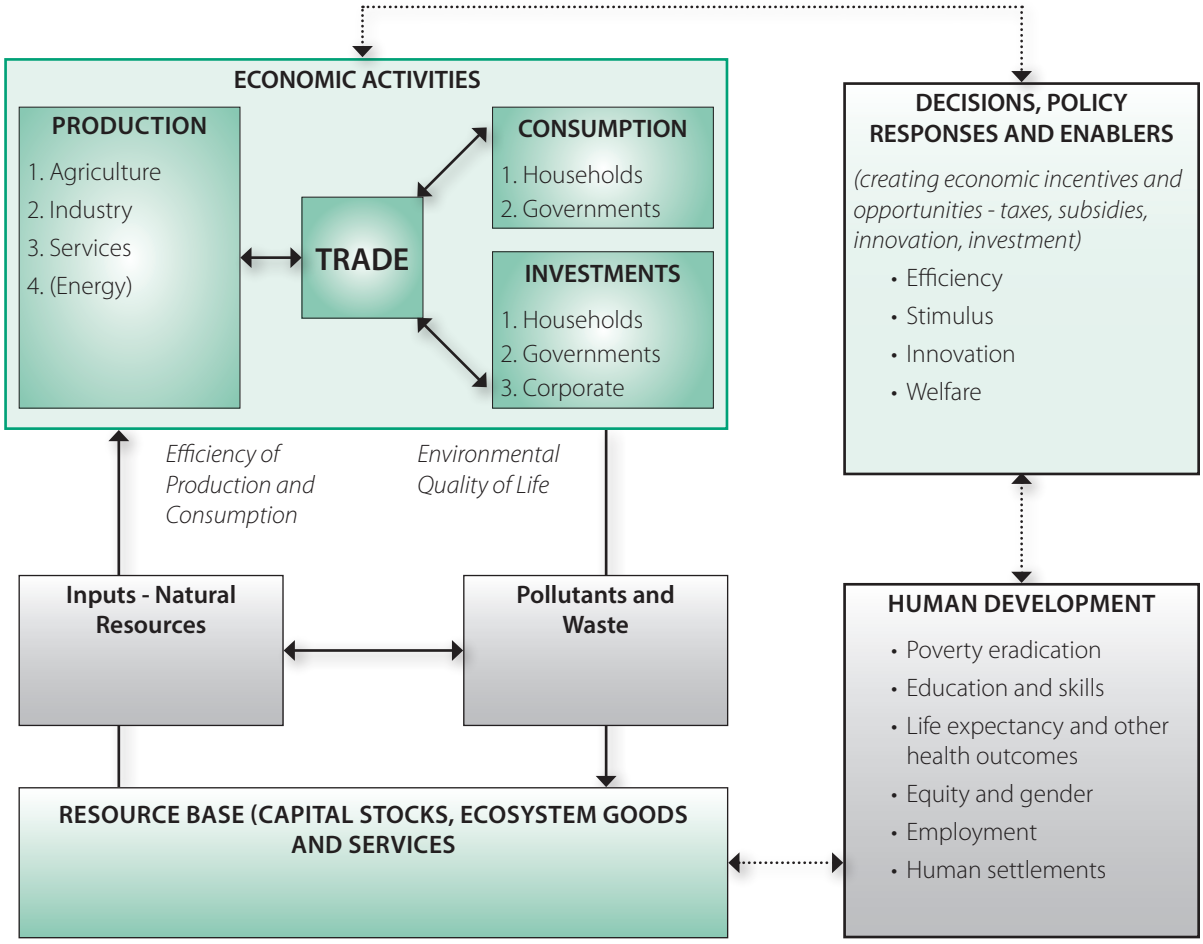
These interactions arise through four effects: (a) an input effect: (increasing production factors); (b) an efficiency effect (bringing production closer to the production frontier); (c) a stimulus effect (stimulating the economy in times of crisis); and (d) an innovation effect (accelerating development and adoption of technologies). Welfare outcomes via direct environmental benefits are also generated by inclusive green growth; through distributional effects (including poverty reduction and job creation); and through increased resilience to shocks (including natural disasters and commodity price volatility) (GGGI, OECD, UNEP & World Bank, 2013; OECD, 2012; UNDESA, 2012; World Bank 2012c). These welfare impacts are greatest if development policies and actions are made inclusive and safeguard environmental integrity. They should also relate to human development outcomes such as life expectancy and other health outcomes, education, poverty eradication, women's and youth empowerment and employment. Therefore, managing the three dimensions of sustainable development – economic growth, social equity, and environmental protection – while reducing poverty and enhancing growth opportunities remains a priority for Africa's sustainable transformation and development (World Bank 2012c; AfDB and others, 2012; AfDB, OECD, UNDP and ECA, 2013; OECD, 2012).

The thematic chapters in part II were prepared using quantitative and qualitative data from desk reviews and case studies of good practices from four countries – Ethiopia, Ghana, Morocco, and South Africa. The drafts of part I and the thematic chapters were tabled at an expert group meeting held in November 2013 and revised on the basis of comments and recommendations provided at the meeting. The list of participants is provided in annex 3. ECA then consolidated the report and circulated it for further internal and external peer review. The report was finalized taking into account the comments and inputs provided through the final peer review process.

1.4 Limitations

Although data paucity continues to be addressed at different levels, securing good quality and comprehensive data for measuring progress towards sustainable development remains a challenge. The introduction of inclusive green growth indicators has further complicated the challenge as relevant data has only just begun to be assembled in many countries. The introduction of primary data from the 13 pilot countries was intended to overcome this weakness and to showcase individual

Figure 2: Analytical framework for part II of the report



Source: Constructed at the SDRA review meeting in November 2013, with adaptations from GGGI, OECD, UNEP and the World Bank (2013 and OECD 2011)

country data as a first step towards improvement in country-level sustainable development reporting and data compilation. However, a significant percentage of responses received contained no data for some indicators or had data for only a few years. Additionally, with a few exceptions, the data reported were not for the same set of indicators. Many indicators continue to lack complete data at the national, subregional and regional levels. Some of the available data had not been adequately disaggregated to allow for comparison between spatial scales, time periods and even special grouping by gender and other social structures, thus constraining in-depth assessment.

Some of the data were still stored in sectoral formats and may blur an integrated assessment owing to overlap. Both national and international databases were used to present a complete picture in the assessment. This presented an additional challenge of exclusively assessing trends using indicators that fully capture any overlaps between some sectors and issues. For instance, "agricultural value added as a proportion of GDP" and "agricultural sector gross value added at current price" do not adequately capture the expansion of GDP as a result of agricultural value addition only. It may also include non-agricultural value addition and other elements of manufacturing value addition. For a full picture to emerge, a comparative assessment of the two sectors (agriculture and manufacturing) has been adopted. Going forward, data collection and indicator choices should be streamlined to address such inherent indicator anomalies. These gaps presented challenges in enabling comparison and presentation of complete trends between countries and subregions.

As regards presentation, the ECA subregional groupings were used for those figures where country disaggregated data were available and, where this was not available, the aggregate data from the source documents were used and the grouping used in such cases indicated. To allow for a more comprehensive assessment in future SDRA issues, it is necessary to continue investing in data generation and related capacity-development initiatives.

1.5 Organization of the report

SDRA-V comprises two parts. Part I contains an assessment of progress towards sustainable development in Africa based on key indicators covering the economic, social and environmental dimensions of sustainable development, as well as governance aspects. In part II an analysis is presented of the trends, challenges and opportunities for promoting inclusive green growth in selected sectors in Africa. The selected economic sectors were deemed to offer opportunities to drive inclusive green growth and contribute to the realization of sustainable transformation and development. The aim is to guide countries in making long-term choices for the transition to a green economy. The selected sectors are: agriculture; ecosystems goods and services; energy; industry; and trade. The good practices showcased are intended to promote learning, as well as upscaling and outscaling. Part II also contains an exploration of enabling measures that could foster inclusive green growth in the region. Issues such as climate change, gender, employment, science and technology and poverty are analysed as cross-cutting issues in the report.

Part I: Assessing the state and trends towards sustainable development in Africa

2. Key messages

Progress on governance in Africa has been mixed. While countries have made appreciable progress in establishing democratic governance systems, concerns about insecurity remain. Commitments on environmental governance are progressively being implemented, but capacity challenges persist. Steady progress is being made on governance for sustainable development at the regional and subregional levels, but more needs to be done at the national level. Considerable efforts and country-level commitments are needed to consolidate good governance and build lasting peace in the region. The post-2015 development agenda and the Rio+20 follow-up processes provide opportunities for revamping sustainable development governance at all levels.

Africa continues to record robust economic growth, but this has not translated into tangible sustainable development outcomes. The performance of African countries in terms of adjusted net savings continues to show negative trends and most countries continue to run trade deficits. The share of agricultural exports in total exports has been rising, but value addition in manufacturing, agriculture and service sectors continues to decline. The stepping up of inclusive green growth approaches, support for a vibrant private sector and the adoption of ICT innovations remain potential areas of focus for harnessing positive aspects of economic growth.

Progress towards sustainable consumption and production has shown mixed results. Through the actions of Governments and other stakeholders, sustainable consumption and production practices are gradually being adopted. However, the level of resource and material productivity remains low, and there are declining trends in sustainable consumption due to the changing consumption patterns of an increasingly affluent middle class. Although there has been an increase in infrastructural development, many challenges remain with regard to road fatalities, poor transport governance, connectivity and increasing greenhouse gas emissions from vehicles. To increase the pace of progress towards sustainable consumption and production, more coherent policy frameworks and improved implementation of the existing frameworks are needed.

Progress has been registered in terms of energy infrastructure and diversity of sources, but the region continues to suffer from energy insecurity. While there has been an increase in renewable energy, energy security remains a challenge and prices remain high. There is a need for a substantial increase in the rate of investment in the energy supply infrastructure to meet the ever-growing energy demands, and to deliver access to electricity and clean cooking facilities to the millions without it. Regional integration to create economies of scale and reduce the costs of generation and distribution will contribute to enhancing energy security in the region.

Progress towards poverty eradication in Africa has been slow. Africa is not on track to achieving the Millennium Development Goal target of halving the number of people living in extreme poverty by 2015. Income inequality persists, with the poor and vulnerable still unable to access opportunities for poverty eradication. Africa's performance regarding access to clean water, sanitation, energy and decent housing remains inadequate. Disparities continue between rural and urban areas. Addressing poverty in all its forms in Africa will require complex institutional and governance reforms to enhance the accountability of the State, raise the quality of service delivery, and improve the overall economic and social environment, including in education, health, energy and housing.

Africa's population is projected to reach the 1.6 billion mark in 2030. There will be a steady increase in the working-age population and in urban dwellers. Further challenges arising from demographic changes will include a high dependency ratio and increased pressure on natural resources. Urban areas will account for more than 90 per cent of future population growth. However, the changing population structure provides an opportunity to leverage the benefits arising from the demographic dividend. This can be exploited for rapid economic growth if the right policies are put in place, and the right social and economic investments are made. Lessons can be learned from Asia and Latin America, where countries responded to similar challenges by improving health and education, attracting foreign investments, and adopting economic policies that created jobs and resulted in accelerated economic growth.

Gender equality and women's empowerment is gradually improving in Africa but the challenge is still real. The percentage of parliamentary seats held by women is increasing in all subregions of Africa. With the exception of North Africa, the percentage of women in non-agricultural wage employment is increasing. Gender parity in primary, secondary and tertiary education has improved over the past 10 years. Other gender issues that need attention include the gender wage gap and women's ownership of land and access to credit. Countries must take measures to generate greater economic opportunities for women and young people by creating conditions that enhance their participation in decision-making and development endeavours. Also important are the political and social reforms that enhance women's human rights, including those related to freedom, dignity, participation, autonomy and collective action.

Africa's performance in the education sector has been improving. The increasing level of public and private investment in education is already yielding results. Completion rates in primary and secondary schools are improving. Literacy levels are also improving as access to education facilities increases. Gender parity has improved at primary and secondary school levels, but remains a concern at tertiary level, and in adult education programmes. A higher gender parity index is being recorded in most subregions and countries. Achieving sustainable development, including the capacity to innovate, depends on a critical mass of educated and skilled people, hence the need to consolidate gains made in the education sector.

Africa has been making steady progress on the health front. Life expectancy at birth has improved markedly as health facilities and access to health services for a broad section of the population improve. There is a substantial decline in the prevalence of key diseases such as malaria, HIV/AIDS and tuberculosis. There has been a reduction in the mortality rate of children under five, and of pregnant mothers. This is attributed to improved health care, immunization coverage, education, preventative measures and treatment. Despite the progress in the health sector, Africa is confronted with the world's most dramatic public health crisis; hence the need to further strengthen its health systems to consolidate gains through, among other things, enhanced public and private investments.

Agricultural productivity is increasing but food security remains precarious. The food production index has increased in almost all countries in Africa. However, Africa still lags behind other regions in attaining food security and this may worsen, as the population is set to double by 2050. Sustainable intensification and wider adoption of improved technologies will spur agricultural transformation. The greening of agriculture is necessary to contribute to reducing the risks associated with agricultural intensification. The sector also presents other important opportunities for climate change mitigation and adaptation.

Progress on the sustainable management of Africa's natural resource base has been mixed. Africa is increasingly leveraging its natural resources

endowment for wealth creation and livelihood sustenance. The rate of loss of forest cover has declined. However, while the overall change in forest cover is positive, it remains insignificant. The number of threatened species of birds, mammals and fish remains high and 25 per cent of Africa's land resources are categorized as "wasteland", with a significant number of people still living on degraded land. Water abstraction is increasing due to increasing demand coupled with insignificant change in water use efficiency. The number of threatened fish species is increasing and more fish stocks are exploited outside their safe biological limits. Inclusive green growth opportunities abound for natural resources management, use efficiency and conservation.

Climate change impacts on Africa are exacerbating the challenges in natural resource management and overall sustainable development. While Africa's greenhouse gas emissions still remain relatively low, both adaptation and mitigation efforts are gaining ground in the region. Efforts put into implementing adaptation measures are encouraging, with more countries implementing their national adaptation programmes of action. The number of countries that have developed nationally appropriate mitigation actions in a sustainable development context is also increasing. The cost of adaptation is projected to increase fourfold to about 4 per cent of Africa's GDP under presently planned and implemented mitigation measures, assuming that all necessary adaptation measures are taken. The pursuit of low carbon development trajectories will minimize greenhouse gas emissions, and contribute to inclusive green growth and the achievement of sustainable development.

The severity and frequency of natural disasters is increasing. The human and economic losses due to disasters are increasing. An increasing number of countries have established national platforms for disaster risk reduction and preparedness, but capacity issues continue to constrain preparedness and response measures. The percentage of the population living in natural disaster/hazard prone-areas is increasing, thus making them more vulnerable. Disaster management must be made a priority to avoid decades of setback in development gains and secure a sound sustainable development pathway.

Progress on means of implementation has been mixed. In many countries, there has been an improvement in the indicator for the percentage of the budget from domestic resources. There has also been a surge in remittances received from the African diaspora, but little has been directly channelled to sustainable development investments, while the cost of remittance continues to be high. The net official development assistance (ODA) as a percentage of gross national income is declining in relation to the rest of the world but is higher on average compared with all other developing regions of the world. Foreign direct investments, especially those targeting environmental goods and services, are declining. Expenditure on research and development continues to be low, while the increase in patents in environmentally-related technologies remains insignificant. Most countries do not have national capacity development strategies. Coherence in policies, coupled with an innovative mix of the various means of implementation, will ensure the success of sustainable development initiatives.

3. State and trends towards sustainable development

3.1 Governance

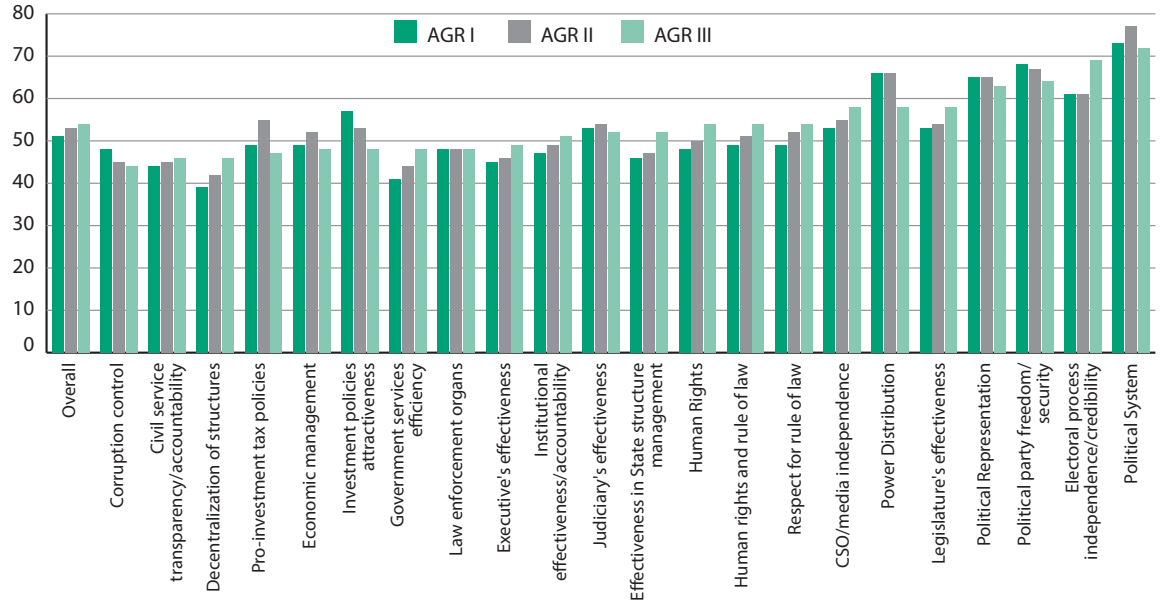
Good governance undoubtedly drives the achievement of sustainable development results. The importance of effective governance to the achievement of sustainable development centres on institutional structures, policy processes and regulations, and the rule of law, as they support poverty eradication, economic growth and resource use in ways that consolidate economic development, social wellbeing and environmental integrity. The quality of governance is tracked in this issue of SDRA using indicators that relate to control of corruption, political stability and absence of violence/terrorism, regulatory quality, government effectiveness, rule of law and number of active conflicts. Further, the participation of countries in the African Peer Review Mechanism (APRM) is used to gauge their governance performance.

3.1.1 African Governance Index

Progress in governance has been mixed with positive results achieved on several fronts, while other aspects have stagnated or even declined. Based on the third African Governance Report (AGR-III), progress on governance in Africa has not been significant since the 2005 baseline study (AGR-I). However, the aggregate index for all the indicators of the 2011/12 expert survey indicated a marginal increase of 3 percentage points from the 2005 study (from 51 to 54 per cent). While the overall index on political representation revealed a decline of 2 percentage points (from 65 to 63 per cent), the overall index on independence of civil society organizations and the media revealed an increase of 5 percentage points (from 53 to 58 per cent). Progress has been recorded in human rights and the rule of law in Africa, from 48 per cent in AGR–I, to 54 per cent in AGR-III for human rights, and 49

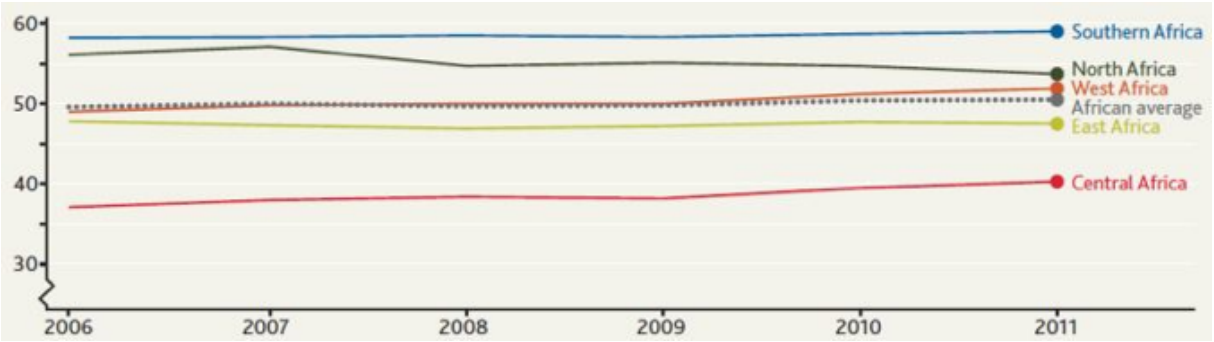
Indicator	Sustainability trend	Remarks on trends
African Governance Index	→←	Marginal positive change in AGI, and little progress on political governance and institutional reforms
Peace and security	→←	Although many countries remained stable, conflicts escalated in several countries in North, Central and Eastern Africa, and terrorism continues to gain ground
Political governance	→←	Mixed trends. Improvement in public administration, but corruption, transparency, accountability and capacity challenges persist
Business governance	→←	Mixed trends for business regulatory environment ratings in the various subregions
Environmental governance	↗	Countries are steadily implementing commitments in the Rio Conventions and have taken various measures to improve natural resource governance
Governance for sustainable development	→←	Steady progress is being made on governance for sustainable development at the regional and subregional levels, but more needs to be done at the national level

Figure 3: Comparison of survey results in AGR I, AGR II and AGR III on key governance indicators



Source: ECA (2013). African Governance Report III

Figure 4: Overall governance performance, 2006-2011



African Development Bank subregional grouping

Source: Mo Ibrahim Foundation (2012).

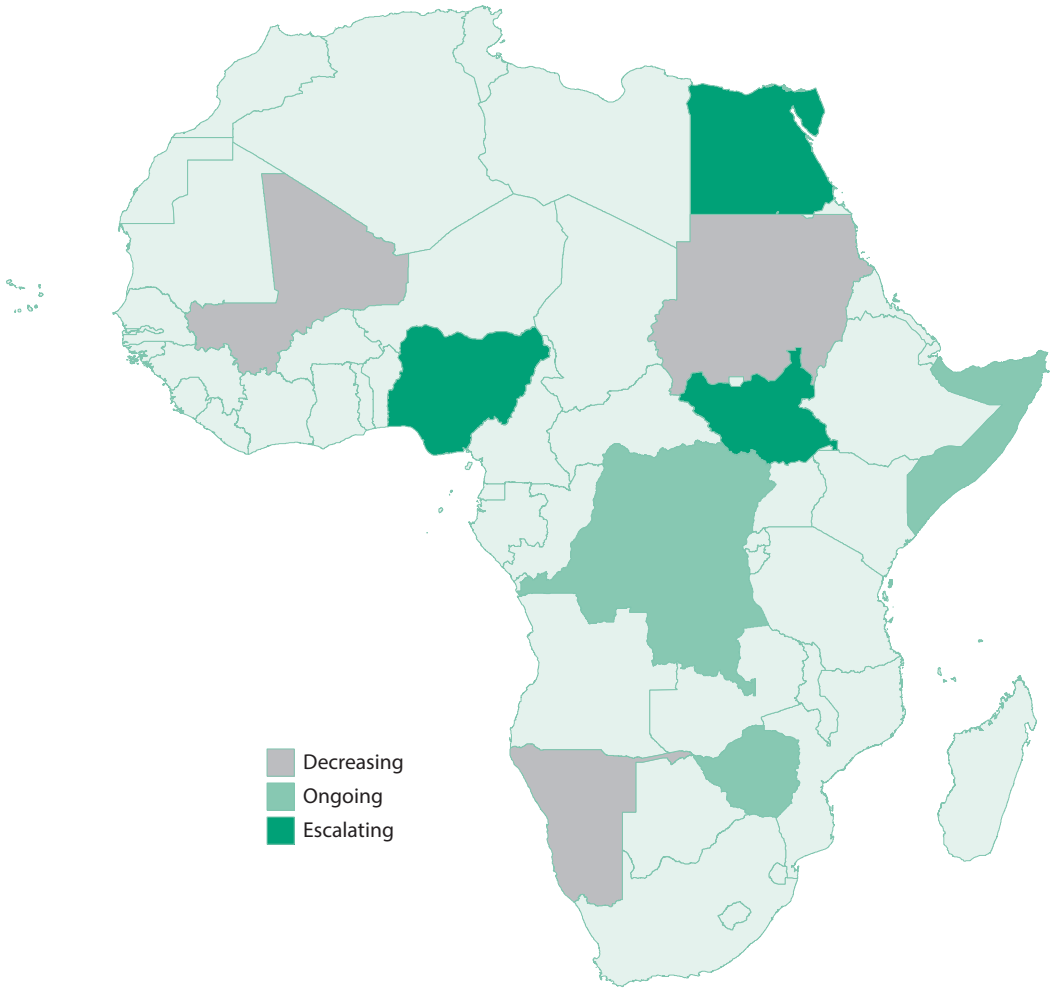
per cent to 54 per cent for rule of law (ECA and AU, 2011; ECA, 2012b). A comparison of the results of a survey conducted by ECA in 2011/12 on the AGR I, II & III is presented in figure 3.

The Ibrahim Index of African Governance (IIAG) covers governance outcomes such as participation and human rights; sustainable economic opportunity and human development; and others including investment and rule of law. Compared to their overall governance performance level in 2006, West Africa, Central Africa and Southern Africa have slightly improved their overall governance level, while North Africa and Eastern Africa have registered slight declines, more markedly in North Africa (see figure 4).

In the 2012 IIAG, Southern Africa ranked first in overall governance, followed by North Africa. Central Africa and Eastern Africa scored below the continental average, with Central Africa recording the worst performance in overall governance.

Corruption remains a major challenge in Africa, with a decline of 4 percentage points (from 48 per cent in 2005 to 44 per cent in 2011) in the overall corruption control index. The AGRIII report (ECA, 2013) captured this as well, with the executive, the legislature, the judiciary and the civil service

Figure 5: Status of conflicts in African countries as at 2013



Source: ACLED (2013)

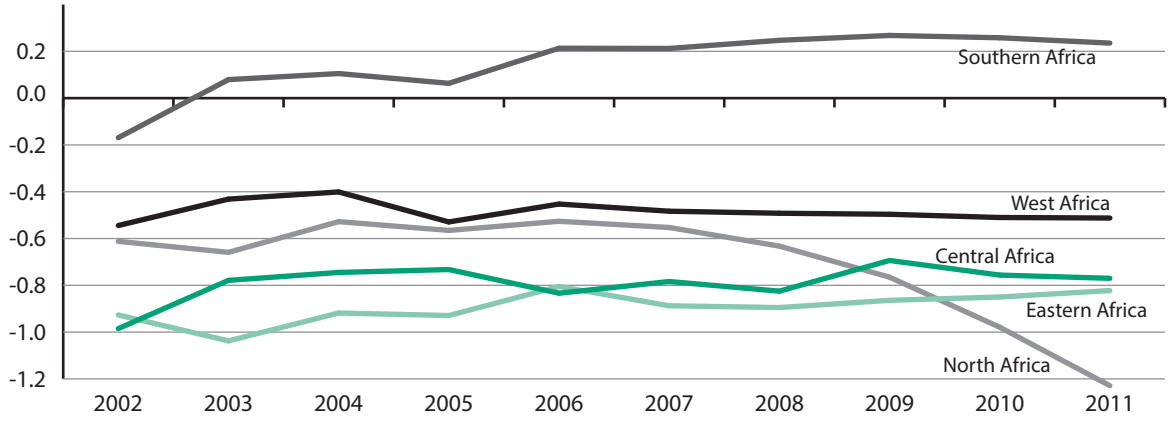
perceived as fairly/largely or completely corrupt. Corruption exists to varying degrees in all countries. Countries in Southern Africa have performed better with regard to corruption control.

3.1.2 Peace and security

Peace and security are not only enablers of sustainable development but are also inherent development outcomes. In Africa, there is evidence that peaceful, stable, well-governed nations exhibit higher levels of growth, more jobs, lower levels of poverty and higher rates of investment, and use various mechanisms to address inequalities. Sustainable development is also an important building block for a peaceful and stable society. Over recent decades, the number of conflicts has declined slightly, although events in the last year have changed this trend, with intra-State conflicts escalating in the Central African Republic, Mali, South Sudan, Somali and the Democratic Republic of the Congo. Egypt, Tunisia and Libya also continue to witness internal conflicts.

In terms of scores for political stability and absence of violence, the estimates for 2011 averaged positive only for Southern Africa. Southern Africa had the strongest governance performance, while North Africa had the weakest governance performance in 2011, owing to the unrest seen in Egypt, Tunisia and Libya. Recent unrest in some countries in West and Central Africa has negatively affected this indicator in those subregions. Overall, however, the change in governance performance of African countries as measured by political stability and absence of violence scores between 2002 and 2011 was not significant. The scores were positive for 14 out of the 54 countries in Africa. The trend

Figure 6: Trends in scores for political stability and absence of violence



Data source: Sub-regional average scores computed on the basis of the Worldwide Governance Indicators (WGI) of the World Bank http://info.worldbank.org/governance/wgi/index.aspx#home. Accessed on January 12, 2013

in scores for political stability and absence of violence indicates that governance performance in Southern Africa was getting stronger while that in North Africa was getting weaker, as shown in figures 5 and 6.

3.1.3 Political governance

For political governance, the best performance was recorded in Southern Africa and the worst in Central Africa. Only six countries (Mauritius, Botswana, South Africa, Ghana, Namibia and Cabo Verde) had positive scores for this measure. There has been a general stagnation in the overall government effectiveness in terms of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the Government's commitment to such policies. There is continued unsatisfactory performance in all subregions on governance effectiveness. Southern Africa continues to perform better than all other subregions, while North Africa has registered continued decline over the last decade.

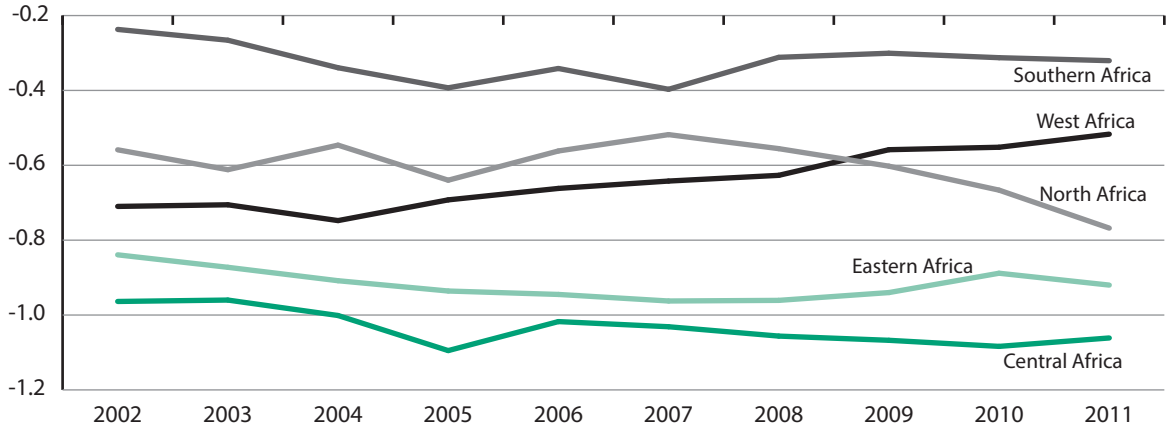
The ability of Governments to formulate and implement sound policies and regulations that permit and promote private sector development is important for sustainable development. This is reflected by regulatory quality, for which Africa registered mixed results between 2002 and 2011 (see figure 7).

Many African countries participate in the African Peer Review Mechanism (APRM), a mutually agreed instrument, voluntarily acceded to by member States of the African Union as a self-monitoring mechanism. It is intended to bolster African ownership and leadership and facilitate peer support in governance improvement. As at July 2012, 31 countries (about 57 per cent of the 54 countries) had signed the Memorandum of Understanding acceding to APRM. APRM provides Governments with a platform to benchmark on quality of governance. It is considered as a vehicle for "better governance for sustainable growth and development in Africa".

3.1.4 Business governance

The World Bank's Country Policy and Institutional Assessment business regulatory environment rating is an indicator used to assess the extent to which the legal, regulatory and policy environments help or hinder private businesses in investing, creating jobs and becoming more productive. The business regulatory environment rating ranges from 1 (low) to 6 (high). The trends in business regulatory environment rating in the subregions

Figure 7: Regulatory quality measure scores for subregions (2002-2011)



Data source: Sub-regional average scores computed on the basis of the World Bank's, Worldwide Governance Indicators (WGI). Available from http://info.worldbank.org/governance/wgi/index.aspx#home. Accessed January 12, 2013

of Africa (ECA classification – annex I) are shown in figure 8. At the country level, Ghana recorded the highest business governance rating, of 4.5.

3.1.5 Environmental governance

Africa continues to improve structures for better environment and natural resource governance. African countries and subregions are at various stages of implementing relevant commitments contained in the Rio Multilateral Environmental Agreements (MEAs), namely, the Convention on Biological Diversity, the United Nations Convention to Combat Desertification (UNCCD); and the United Nations Framework Convention on Climate Change (UNFCCC). To fulfil the commitments, improved structures are needed to ensure that the public, especially people living in natural resources rich areas, participate in ensuring and guaranteeing strategic and sustainable exploitation and access to benefits from the resources, in a democratic environment devoid of coercion and conflicts.

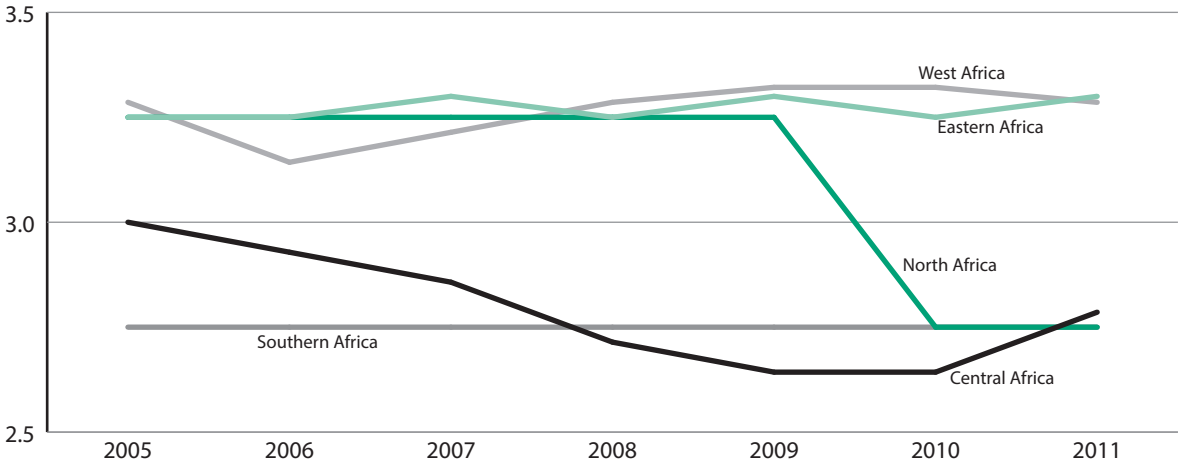
Sustainable management of natural resources is, of necessity, reflected in the extent to which the local communities around the resource enjoy peaceful and direct benefits in the long term through improvement of their livelihoods and enjoyment of proceeds, even as natural resources are used for national economic development. The importance of active, effective and fair governance demands the existence ofdeliberate, targeted, and pro-active planning and support for citizens, with governing institutions which are capable of delivering reliable and quality services where and when they are needed.

3.1.6 Governance for sustainable development

Governance for sustainable development should entail the improvement of the enabling environment and institutional arrangements to ensure desirable outcomes in all three dimensions (economic, social and environmental). At the regional level, the New Partnership for Africa's Development (NEPAD) of the African Union continues to provide the framework for sustainable development. The African Union through various Summit decisions has committed to strengthening institutional frameworks for sustainable development. Planning and coordination is facilitated by AUC, the NEPAD Planning and Coordination Agency (NCPA) and the regional economic communities with the support of ECA, the African Development Bank (AfDB) and various development partners.

However, the African Union must ensure that institutional collaboration goes beyond the de-

Figure 8: Trends in subregional business regulatory environment rating



Data source: World Bank, Worldwide Governance Indicators (WGI). Available from http://info.worldbank.org/governance/wgi/index.aspx#home.

sign phase of programmes. AUC should scale up its coordination function and establish effective outreach and communication channels with the Regional Economic Communities. There is a need to build synergy through greater programme coordination, linkages with other structures such as African diplomatic missions in Addis Ababa, New York, Geneva and Brussels, and with the newly established High-level Political Forum (HLPF) on Sustainable Development. A regional chapter of this global body should be established, taking into account existing institutions that provide a forum for addressing Africa's pressing development challenges.

The regional economic communities have put in place various programmes, plans and strategies, with varying degrees of success. These have encouraged multi-stakeholder participation, built institutional linkages and sought balanced integration of the three dimensions of sustainable development. However, the communities face a number of challenges, including effectively integrating all three dimensions in a balanced manner, and the mobilization of adequate financial resources. There is a need to build the capacity of the communities on integration tools and methodologies, effective mechanisms for mobilizing financial resources, and to promote institutional coherence and programme harmonization.

At the Africa Regional Implementation Meeting for the Rio+20 follow-up processes held in November 2012, countries underscored the Rio+20 call for more coherent and integrated planning and decision-making at the national, subnational and local levels, and called for the strengthening of national, subnational and/or local institutions or relevant multi-stakeholder bodies and processes dealing with sustainable development, including coordinating and enabling the effective integration of the three dimensions of sustainable development. They stressed that the coordinating bodies should consolidate and ensure the mainstreaming of sustainable development at the highest level of decision-making organs of Governments, the private sector and civil society organizations (CSOs).

The ECA evaluation of sustainable development bodies conducted in the run up to Rio+20, indicated that, in most countries, national coordinating bodies for sustainable development were either dormant or not functioning optimally as regards the integration of the three dimensions. The subregional and Africa reports on the sustain-

able development goals that informed the Africa Regional Consultative Meeting on the Sustainable Development Goals held in October-November 2013, recommended the strengthening of institutional frameworks for sustainable development. The establishment of the global HLPF, the recognition that sustainable development should be at the core of the post-2015 development agenda and efforts being made in that regard will provide an opportunity to strengthen sustainable development governance and institutions at the regional, subregional, national and local levels.

3.1.7 Conclusion

Africa continues to show gradual improvements in governance. The region is slowly but steadily strengthening institutions and governance mechanisms for realizing development imperatives in the economic, social and environmental spheres. However, challenges remain with regard to consolidation of gains in public administration, and the creation of integrated policymaking capacity to respond to the complex and interlinked challenges of sustainable development. Peace and security remain a concern, as conflicts have continued in some countries, while new ones have emerged, especially in Central, West and North Africa. Threats of terrorism continue to create uncertainty in some countries. Commitments on environmental governance embodied in the three Rio Conventions are progressively being implemented, but capacity challenges persist. Steady progress is being made on governance for sustainable development at the regional and subregional levels, but more needs to be done at the national level. The post-2015 development Agenda and the Rio+20 follow-up processes provide opportunities for revamping sustainable development governance at all levels.

3.2 Economic transformation and macroeconomy

The high economic growth in Africa continues to place the continent as a major player in the global economic arena. Africa has registered unprecedented economic growth over the past decade as reported in the 2013 and 2014 Economic Reports on Africa. There is promise for even more strides in overall economic transformation. On the basis of existing standard indicators Africa continues to show overall progress in economic transformation and macroeconomic performance, including improvements in individual incomes and equity. The headline indicator of adjusted net savings showed mixed results, with continuous negative trends in many countries.

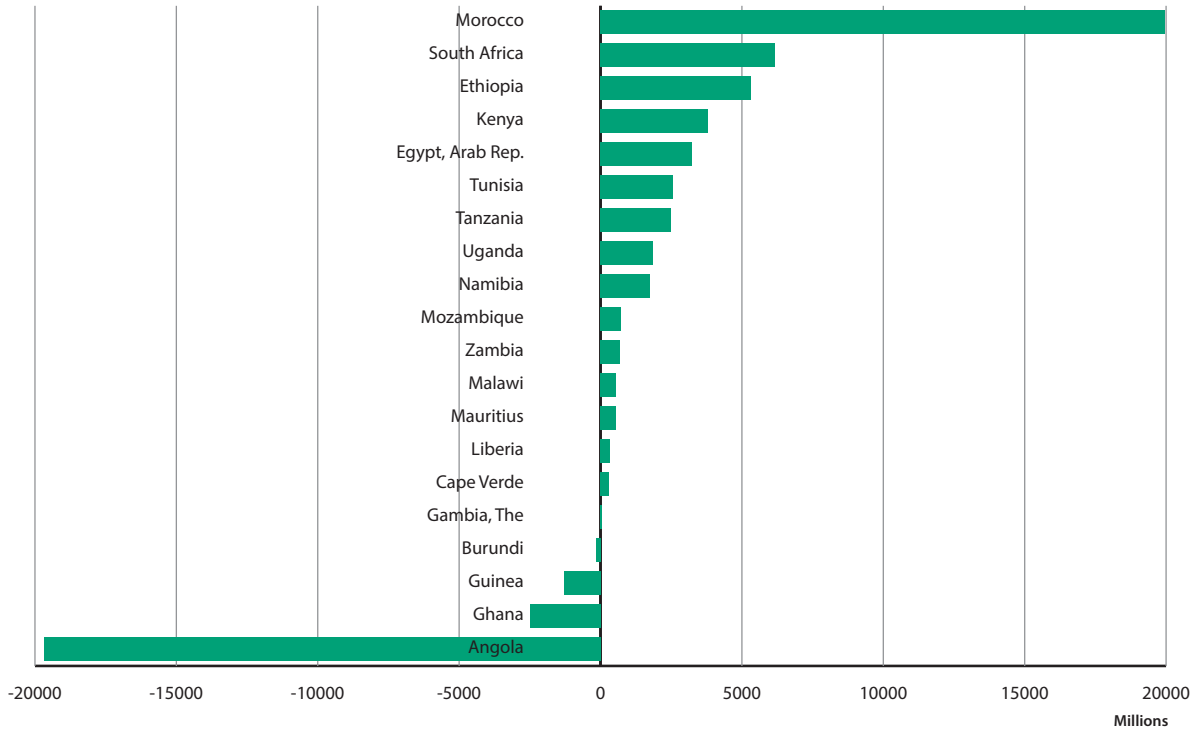
3.2.1 Adjusted net savings

Mixed results have been realized in terms of adjusted net savings (genuine savings), a sustainability indicator building on the concepts of green national accounts. This indicator captures the savings in an economy after taking into account investments in human capital, depletion of natural resources and damage caused by pollution. Excluding particulate emissions damage, the adjusted net savings of some African countries are presented in figure 9.

For the 18 African countries with data on this indicator, the change between 2002 and 2010 was not significant and the continuous negative adjusted net savings in many countries is a sign of the inadequacy of sustainability policies. Policies are thus needed to reverse the trends in total wealth of countries considering inclusive green growth outcomes defined by equitable, fair, inclusive and environmentally sustainable economic gains. The application of green economy/growth principles in development initiatives would contribute to reversing this trend.

Indicator	Sustainability trend	Remarks on trends
Adjusted net savings	↔	Mixed results with continuous negative trends in many countries
Trade and market access	↔	Mixed results – vary significantly across countries and subregions Balance of trade in goods and services has been rising, but remains negative
Shares of manufacturing exports in total exports	↘	Has been on a declining trend
Shares of agricultural exports in total exports	↗	Increased exports of largely unprocessed agricultural products
Value addition	↘	Has been on a declining trend
Financial status/Sustainable public finance	↔	Mixed results in overall status of public finance. GDP is increasing in most countries, debt sustainability shows mixed results and fiscal balance is generally negative
Employment	↔	Employment to population ratio is rising steadily, but youth unemployment worsening
Information and communication	↗	Great strides made in ICT application for development with mobile and internet penetration improving over the last decade

Figure 9: Adjusted net savings, excluding particulate emission damage (current US$) in 2011



Data source: World Bank, Data, Adjusted net savings, excluding particulate emission damage (current US$). Available from http://data.worldbank.org/indicator/NY.ADJ.SVNX.CD.

3.2.2 Trade and market access

Progress on enhancing trade and market access has been mixed although limited data has been captured in the countries and subregions to show trends towards green trade (UNEP, 2011). Balance of trade in goods and services varies significantly across countries and subregions in Africa. Generally, most countries continue to register trade deficits. Out of 27 countries in Africa for which data were available for 2011, only four countries (Angola, Algeria, Nigeria and Zambia) had trade surpluses. The general trend in balance of trade increased marginally from 2002 to 2008, but has since been declining and in deficit (see figure 10).

Kenya, one of the 13 pilot countries from which primary data was collected, had a trade surplus in 2003 but a trade deficit and a declining trend from 2004 to 2011 (see figure 12).

The main destinations of exported agricultural products from Africa in 2011 were Europe, Africa, Asia, Middle East, North America, the Commonwealth of Independent States (CIS) and South and Central America. The highest proportion of agricultural products from Africa was exported to Europe while the lowest went to CIS countries. The origins of Africa's imported agricultural products are Europe, Asia, North America, CIS countries, and the Middle East and Africa itself. The average preferential tariff paid by the United States for agricultural goods, clothing and textiles continues to be the highest in Africa.

3.2.3 Exports of environmental products

Environmental products are goods and services that have been produced for the purpose of preventing, reducing and eliminating pollution and other forms of environmental degradation. The exports of environmental goods in 2010 were highest in Southern Africa, followed by North Africa (see figure 12). The proportion of environmental goods in total exports was highest in Southern Africa and lowest in West Africa.

Africa, through initiatives such as the African Growth and Opportunity Act (AGOA),[6] continues to promote trade and investment in environmental goods. Efforts are now geared towards fostering a common understanding of this dynamic sector and its importance to the region's future trade objectives. The AGOA initiative is giving impetus to negotiations with other trade and economic blocs within the continent. Like their counterparts in the Asia-Pacific Economic Cooperation Forum, the region and its trade partners are moving forward to reach consensus on the list of environmental goods and services and propose tariffs cuts by 2015.

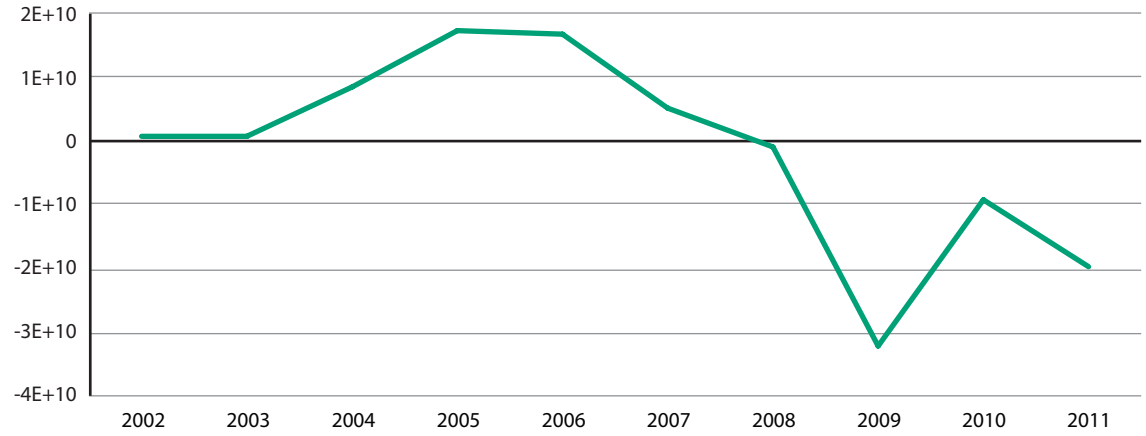
The United States alone exported US$ 15 billion worth of environmental goods to Africa in 2011 (WTO, 2011), of which $1.2 billion was subject to tariffs above 5 per cent. Intra-African trade on environmental goods and services totalled $94 billion, making up 43 per cent of total trade in the region. The goal of the reduction of tariffs on such commodities is to facilitate access by Africans to these goods and technologies at lower cost and thus produce environmental benefits and equitably improve the quality of life and people's living standards. Increased availability of cheaper and better-quality environmental goods helps countries pursue their national environmental policy objectives and counter environmental degradation and climate change, facilitating the transition to a green economy (UNEP, ITC and ICTSD, 2012).

3.2.4 Export of dirty products

Sustainable development objectives also include the reduction of the exports of "dirty" products. The share of exports of "dirty" products", also referred to as environmentally sensitive products, of total exports in Africa in 2010 was highest in

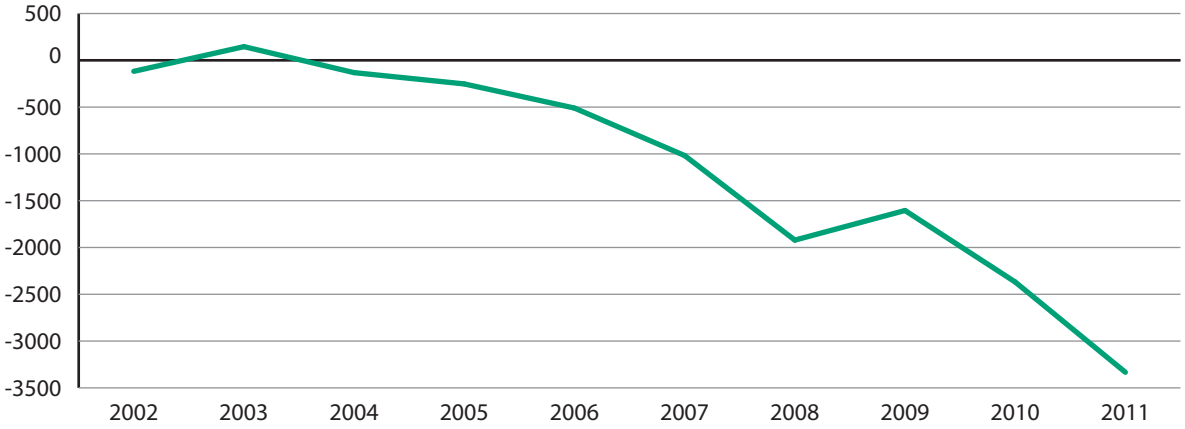
6 AGOA is legislation that was approved by the United States Congress in May 2000. The purpose of this legislation is to assist the economies of sub-Saharan Africa and to improve economic relations between the United States and the region. AGOA provides trade preferences for quota and duty-free entry into the United States for certain goods, expanding the benefits under the Generalized System of Preferences (GSP) program.

Figure 10: Trends in balance of trade in goods and services of sub-Saharan Africa



Data source: WDI, World Bank, available from http://data.worldbank.org/indicator/Accessed on April 17, 2013

Figure 11: Balance of trade in goods and services in Kenya (million US$)



Data source: ECA computation based on data from Kenya National Bureau of Statistics (2013)

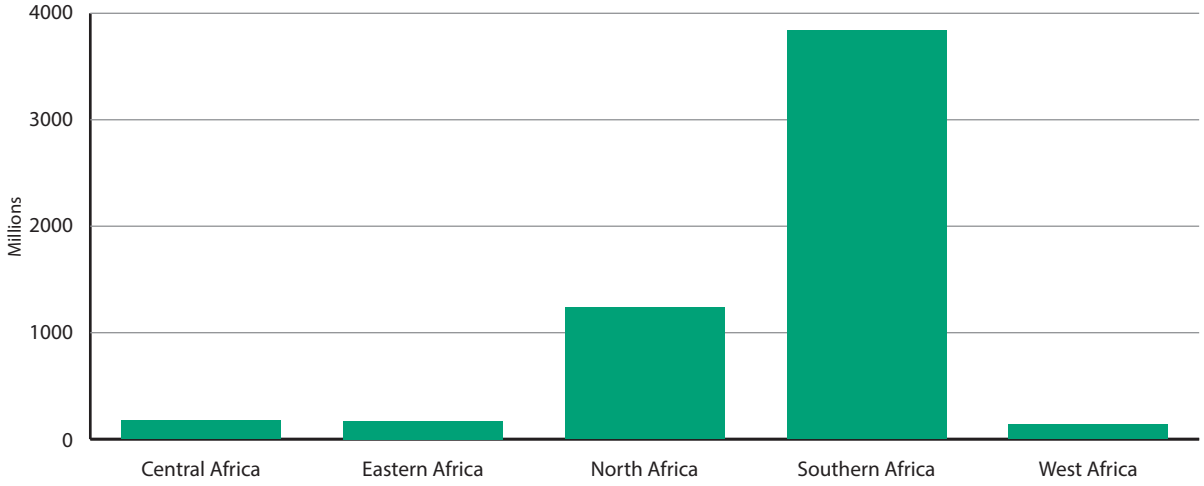
Southern Africa and lowest in Central Africa (see figure 13).

Aware of the danger of masking environmental issues raised at various multilateral forums being marginalized or ignored by free trade agreements, African countries are putting in place safeguards to limit negative environment effects from global trade (UNDESA, 2012). An indicator on export of environmentally sensitive goods has been composed to track such safeguards. The three categories of environmentally sensitive goods are based on criteria for reducing environmental degradation: (1) abatement criterion, such as reduction of pollution; (2) emission intensity criterion; and (3) multiple criteria, such as degradation of natural reserves, ecosystems and biodiversity. African countries are aware of the negative consequences to the environment, society and economy of such goods and as a result, are putting export restrictions on them (UNEP, ITC and ICTSD, 2012). Across Africa, different types of export restrictions are being used. The real outcome of such policies has yet to be established through empirical investigation and sound data.

3.2.5 Share of manufacturing exports of total Exports

The share of manufacturing exports of sub-Saharan Africa in total exports has been declining, decreasing from 61.7 per cent in 2005 to 41 per cent in 2009, as shown in figure 14. Moreover, the share of manufacturing exports in total exports in sub-Saharan Africa was higher than that of sub-Saharan Africa, excluding South Africa.

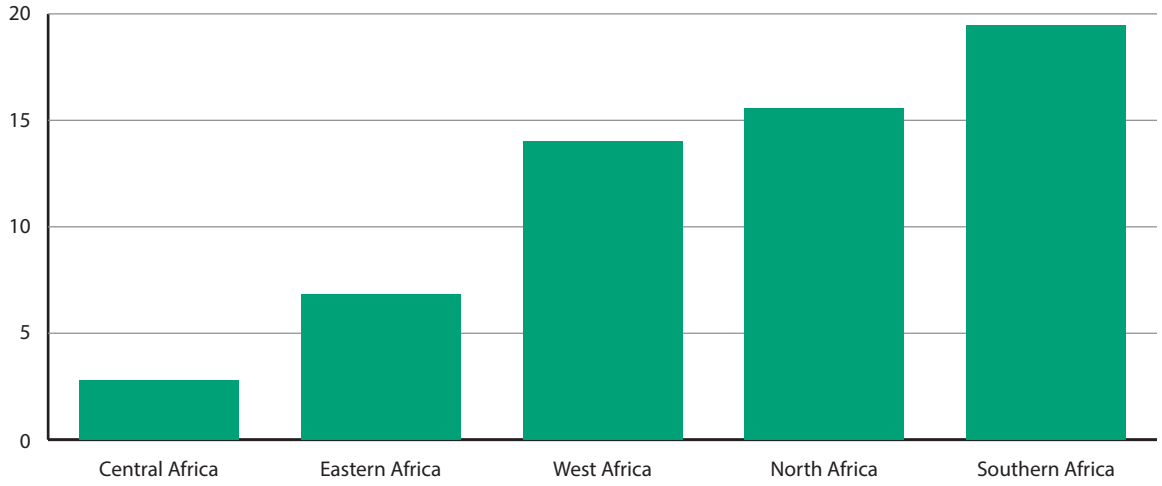
Figure 12: Exports of environmental goods in 2010 (USD)



ECA subregional grouping

Data source: OECD Development Centre based on COMTRADE database - http://comtrade.un.org/dband WTO (2010).

Figure 13: Exports of dirty products (% of total exports) in 2010



Economic Commission for Africasubregional grouping
Data source: OECD Development Centre based on COMTRADE, World Bank and Murillo (2007)

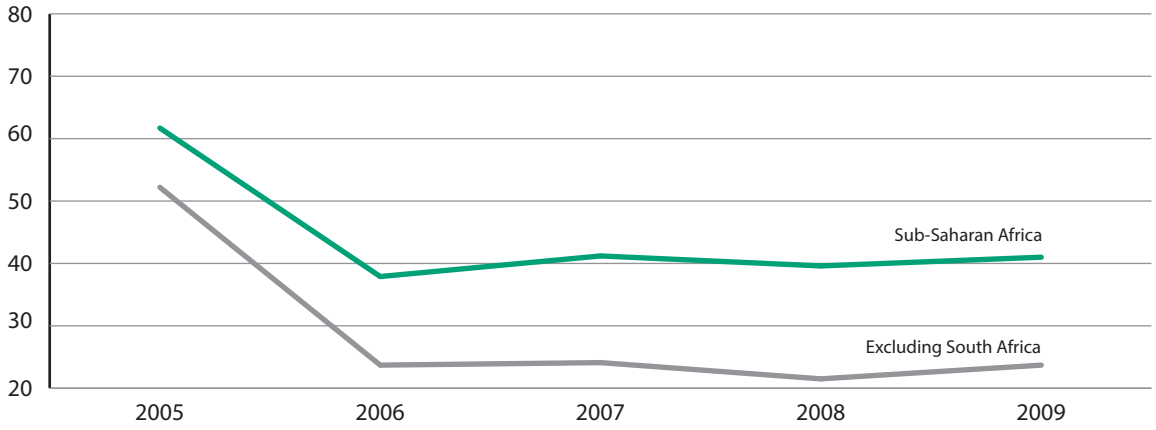
New opportunities are emerging for African manufactured output, which was reported to have doubled over the past decade, especially through exports to emerging markets. Some challenges still remain even as Africa increases its share of global trade and economic diversification remains suboptimal despite increasing opportunities in global value chains. An increase in African manufacturing exports enhances the welfare of Africans, especially with the reduction of dirty goods. In 2000, Africa exported 3.4 per cent of such products to China and 14.8 per cent to other emerging partners. By 2009, those shares had risen to 11.3 per cent and 22.7 per cent respectively, largely at the expense of the European Union and to a lesser extent to the United States of America.

3.2.6 Value addition

3.2.6.1 Agricultural value added

Value addition in agriculture, which includes forestry, hunting and fishing, as well as cultivation of crops and livestock production, is important in promoting inclusive green growth and sustainable development. Figure 15 shows that the trend of value added for agriculture as a percentage of GDP of sub-Saharan Africa has been declining in sub-Saharan Africa, decreasing from 19.6 per cent

Figure 14: Trends in share of manufacturing in total exports (2005 – 2009)



Source: Data compiled from WTO industrial trade statistics (WTO 2012)

in 2002 to 10.8 per cent in 2011. However, the share of agricultural value added in GDP varied significantly across African countries and subregions. Out of the 29 countries for which data were available for both 2002 and 2011, the value added as a percentage of GDP for agriculture decreased in 2011 compared to 2002 in 23 countries and increased in six (Angola, Botswana, the Gambia, Mozambique, Senegal and Togo).

For some countries, the value added as a percentage of GDP for agriculture decreased in 2011 compared to 2002, but the agricultural sector gross value added at current price increased. This, should be clearly distinguished from any expansion of GDP from other non-agricultural value added to obtain a real value of the contribution of agriculture to overall GDP. Among those countries were Ethiopia, Ghana, Kenya, Mauritius and Rwanda, with increasing agricultural sector gross value added at current price. Between 2002 and 2011, the agricultural sector gross value added at current price in Mauritius increased by about 38 per cent (from 7.629 billion rupees ($240 million) in 2002 to 10.555 million rupees in 2011 (see figure 16). This had also been increasing in Cameroon (see figure 17).

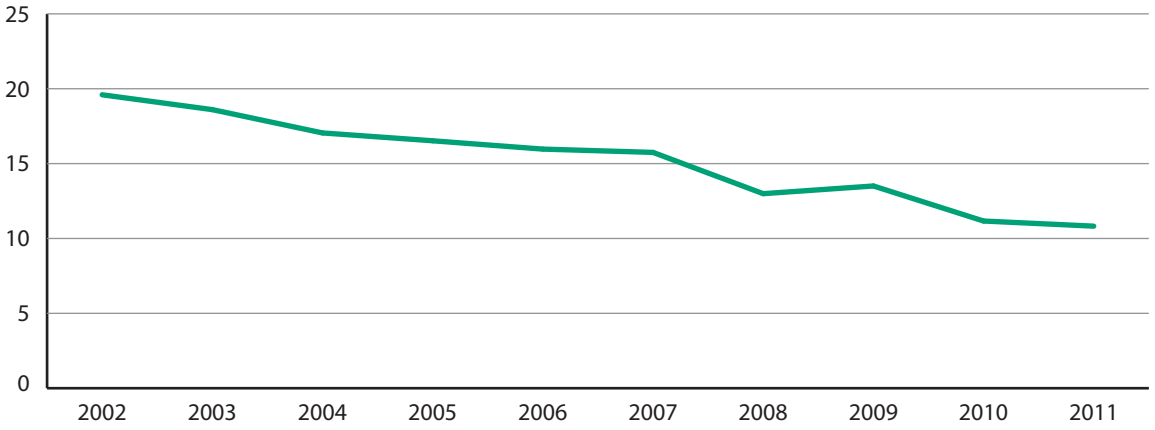
The imperative of agricultural value addition in sustainable development in general and inclusive green growth in particular is evident at all levels. Local communities, Governments, intergovernmental agencies, regional trade blocks and subregional economic communities are putting emphasis on promoting value addition of all agricultural commodities. The rising middle class and burgeoning population continue to drive food requirements of Africa, which will be met through importing processed food and local food production. A clear signal is being raised on need to change the trends of rising import of capital goods – even with increasing productive capacity. The continent's attention is now turning to greater domestic processing of agricultural resources to ensure that raw products can reach a finished form within African markets. This demonstrates the need for improved agricultural value addition technologies to promote the contribution of agriculture to poverty eradication.

3.2.6.2 Manufacturing value added

Manufacturing value added (percentage of GDP) encompasses the income generated from the manufacturing sectors of an economy. For the African countries for which data were available, there was a significant decline in manufacturing value added between 2002 and 2011 (see figure 18).

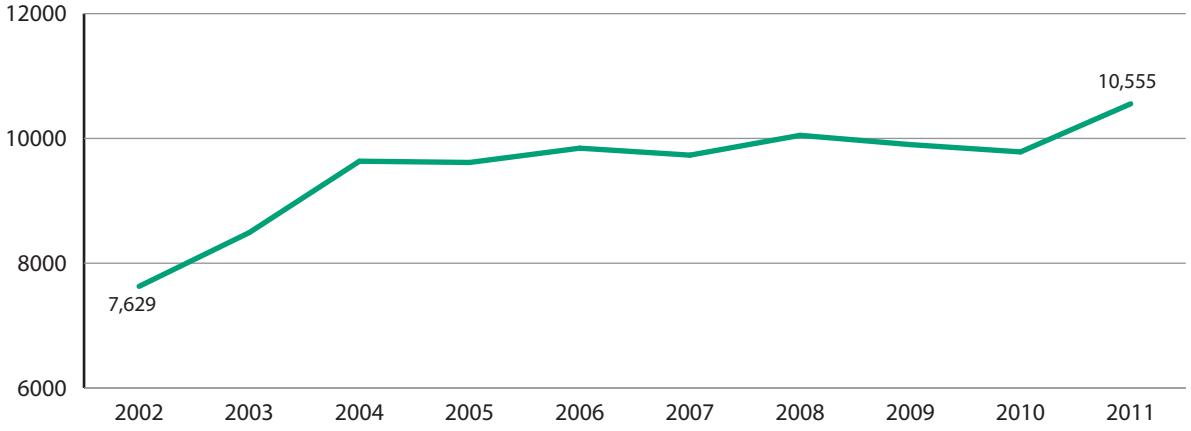
For some countries, although the value added in manufacturing as a percentage of GDP had decreased in 2011 compared to 2002, the manufacturing sector gross value added at current price had been increasing. Among those countries

Figure 15: Trends in value added of agriculture (% of GDP) in sub-Saharan Africa



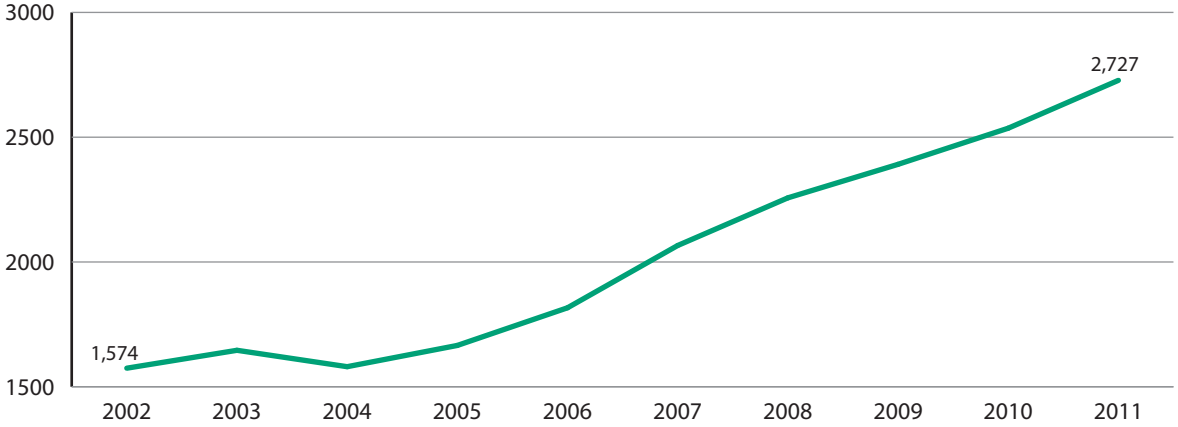
Data source: World Bank, Data, Agricultural and rural statistics. Available from http://data.worldbank.org/indicator. . Accessed November 11, 2012

Figure 16: Agricultural sector gross value added at current price (million rupees) for Mauritius



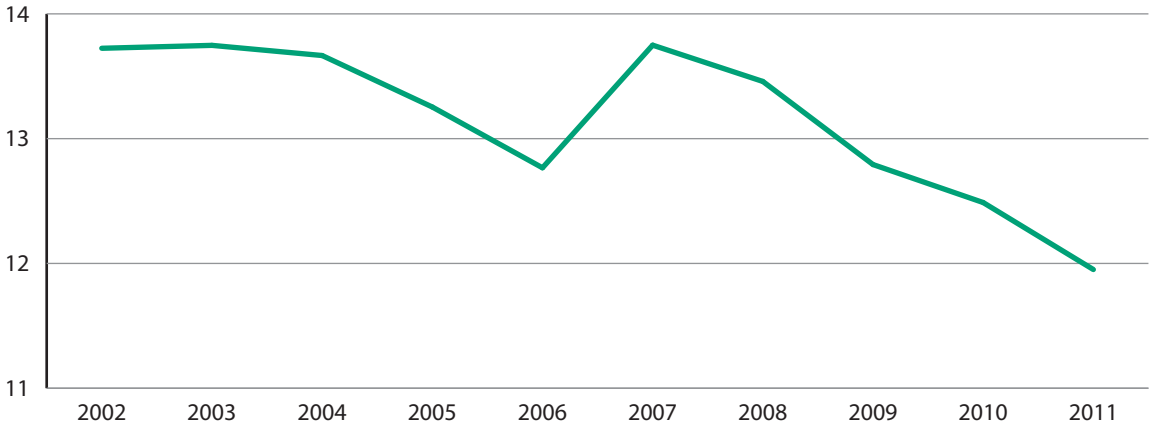
Data source: Statistics Office, Mauritius (2013) and World Bank Indicators: Accessed from http://data.worldbank.org/indicator/NV.AGR.TOTL.ZS/countries

Figure 17: Agriculture gross value added at current price in Cameroon (local currency)



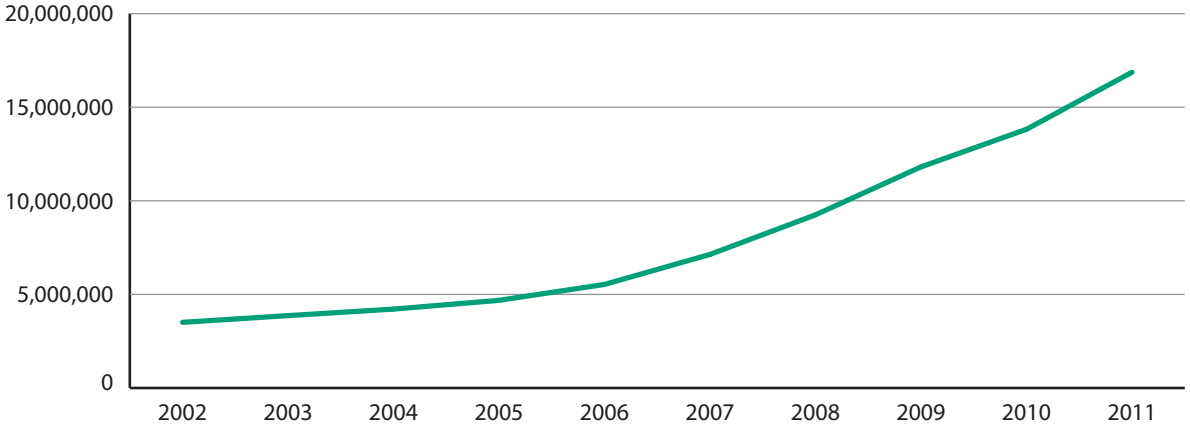
Data source: Institut National de la Statistique, Cameroon (2013)

Figure 18: Manufacturing value added (% of GDP) in sub-Saharan Africa



Data source: World Bank, Data, Manufacturing, value added (% GNP). Available from World Bank. data.worldbank.org/indicator/NV.IND.MANF.ZS. Accessed Nov 2012

Figure 19: Manufacturing sector gross value added at current price (local currency) in Ethiopia



Data source: Survey questionnaire completed by the Central Statistical Agency of Ethiopia, 2013

were Ethiopia (see figure 19), Ghana, Mauritius and Senegal.

According to UNCTAD/UNIDO (2011) Africa still accounts for a very low share of global MVA and global manufacturing exports (1.1 per cent and 1.3 per cent, respectively, in 2008). Unexpectedly, the African share of global low-technology manufacturing exports is also low and declined from 1.5 per cent in 2000 to 1.3 per cent in 2008. In East Asia and the Pacific, it rose from 17 to 26 per cent over the same period. In recent years, however, Africa has made some progress in boosting medium and high technology manufacturing activities with its share of such activities in total MVA increasing from 25 per cent in 2000 to 29 per cent in 2008. The share in total manufacturing exports rose from 23 per cent in 2000 to 33 per cent in 2008.

African countries are highly dependent on resource-based manufacturing. In 2009, for instance, resource-based manufacturing accounted for about 49 per cent of both total MVA and manufacturing exports. This exposes the continent to risks related to resource extraction and may undermine sustainability principles. The relatively low value-addition related to resource-based manufacturing exposes African countries to the vulnerabilities of price shocks, lower productivity growth and limitations in link to other sectors of the economy. Despite these challenges, develop-

ment in MVA addition should be seen as an opportunity for Africa to reduce its dependence on natural resources and promote economic diversification. Value addition depends on: the application of appropriate scientific and technological innovation; focused linkages in the domestic economy to ensure that the promotion of industrial development yields positive spill-over benefits in other sectors; promotion of entrepreneurship; and stronger regional integration.

3.2.6.3 Services value addition

The African countries with the relevant data recorded a non-significant change in value added in services between 2002 and 2011.The share of value added in services as per cent of GDP varies significantly across countries in Africa (see figure 20). Namibia recorded the highest share of services value added (% of GDP) between 2002 and 2011 of 16.36 per cent while the Congo registered the highest reduction of 10.98 per cent over the same period. Progress in Africa has been restricted to capacity-building and entrance of new actors (through especially small and medium-sized enterprises and corporate investors) in tourism, education, health care, government, hospitality, transport, public/government services, real estate, professional and personal services, social services and financial sectors.

For some countries, both the services value added and the service sector gross value added at current price had shown a rising trend. Among those countries was Ghana, which recorded an increasing service sector gross value added (see figure 21).

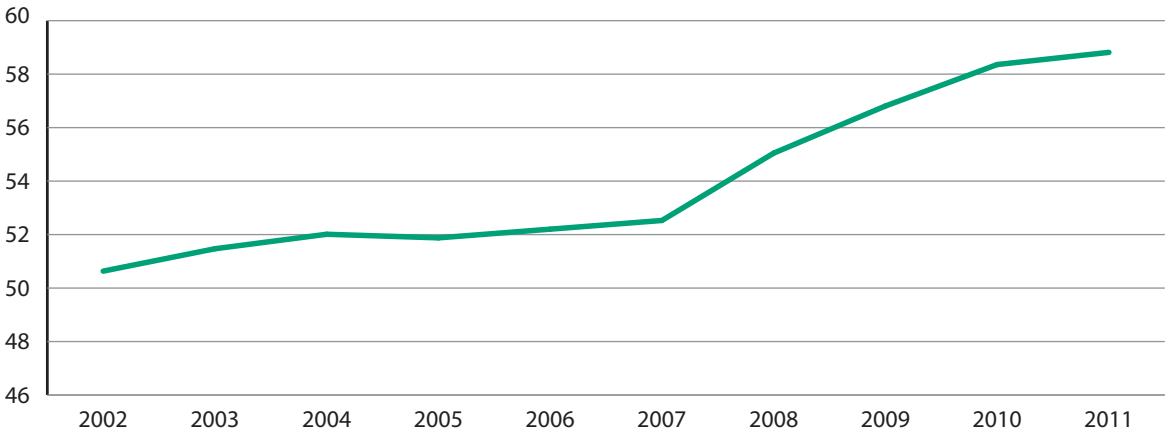
3.2.7 Financial status/sustainable public finance

3.2.7.1 GDP per capita Growth

Over the past decade, economic growth in Africa has been robust. Figure 22 shows the trends in GDP in Africa between 2000 and 2012, with projections for 2013 and 2014. Since 2000, economic performance has been impressive, averaging more than 5 per cent. Sub-Saharan Africa maintained an average growth rate of 5.6 per cent, higher than the 4.5 per cent registered in Growth in North Africa, which was weighed down by the Arab uprising. It rebounded in 2012 to a strong rate of 10 per cent, lifting continental growth to nearly 7 per cent. Projections show that the growth rate will remain solid between 2013 and 2014.

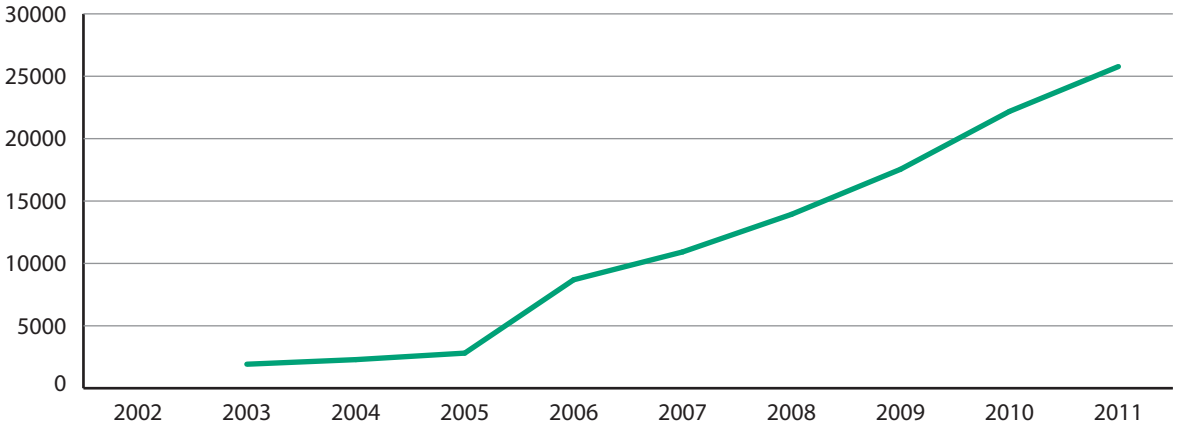
The weaknesses in the GDP per capita measure can be attributed to its inability to capture non-economic progress. Much of the economic growth is unfortunately coming at the expense of the natural resource wealth, which is largely unmeasured. A systematic way of measuring the

Figure 20: Trends in services value added (% of GDP) in sub-Saharan Africa



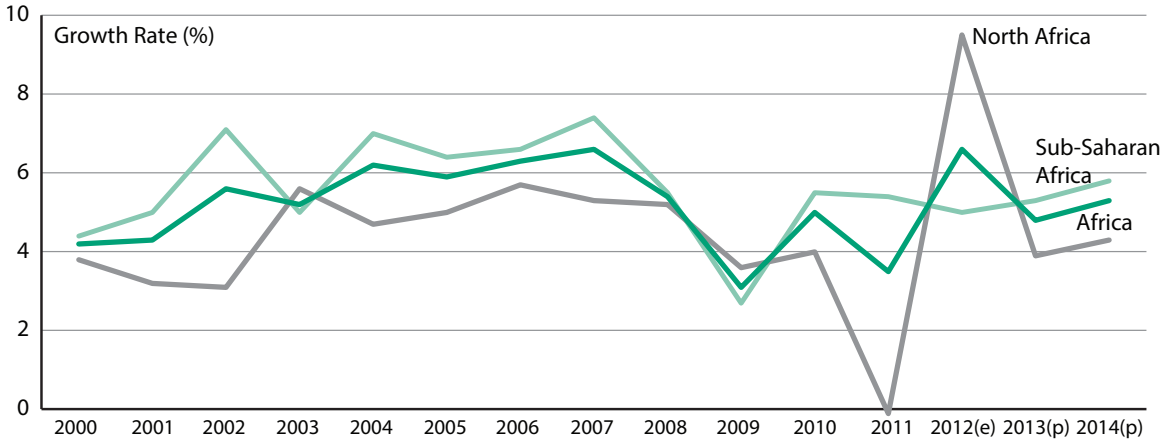
Data source: World Bank, Data, Services, etc., value added (% of GDP) Available from . data.worldbank.org/indicator/NV.SRV.TETC.ZS. Accessed Nov 2012

Figure 21: Service sector gross value added at current prices (local currency) in Ghana



Data source: Survey questionnaire completed by the Ghana Statistical service, 2013. COUNTRYStat:- http://www.countrystat.org/home.aspx?c=GHA

Figure 22: Economic Growth in Africa (2000-2014)



Source: African Development Report 2012 team based on data sourced from the AfDBdatabaseAccording to AfDB and others (2013), GDP in Africa grew by 6.6 per cent in 2012 from 3.5 per cent in 2011 partly due to a considerable rebound in Libya, where the economy expanded by 96 per cent in 2012, after contracting by 60 per cent in 2011 following the revolution. The annual percentage growth rate of GDP per capita in 2011 based on constant local currency of countries in Africa is presented in table 1. Ghana registered the highest GDP per capita growth rate.

ensuing depletion even as economic growth is tracked will be positive towards realizing a more inclusive green growth model. It would be prudent to collect data and report the true value of natural wealth and its contribution to the economy, society and environment in order for countries to make sound, informed choices to ensure cross-generational prosperity. In the outcome document of United Nations Conference on Sustainable Development, which was held in Rio de Janeiro, Brazil from 20 to 22 June 2013, the heads of State and Government representatives recognized "the need for broader measures of progress to complement gross domestic product in order to better inform policy decisions".[7]

In addition to GDP per capita changes, African oil and mineral rents as a percentage of GDP showed progress in relation to input/resource conservation. The Congo registered the highest oil rents as a percentage of GDP (71.54 per cent) while Morocco had the lowest value. The mineral rent (percentage of GDP) of sub-Saharan Africa had been rising (see figure 23) and was higher compared to the global average.

7 See resolution A/RES/64/236, para 38.

Table 1: GDP growth (%) in Africa

Subregion	2011	2012(e)	2013(p)	2014(p)
Africa	3.5	6.6	4.8	5.3
Central Africa	5.2	5.7	5.7	5.4
Eastern Africa	6.3	4.5	5.2	5.6
North Africa	-0.1	9.5	3.9	4.3
Southern Africa	4.0	3.7	4.1	4.6
West Africa	6.8	6.6	6.7	7.4
Oil-exporting countries	2.8	8.7	5.2	5.6
Oil-importing countries	4.3	3.9	4.3	4.8
Africa excluding Libya	4.3	4.2	4.5	5.2

Note: (e) estimates; (p) projections.
Source: Statistics Department, AfDB and AfDB, OECD, UNDP and ECA (2012).

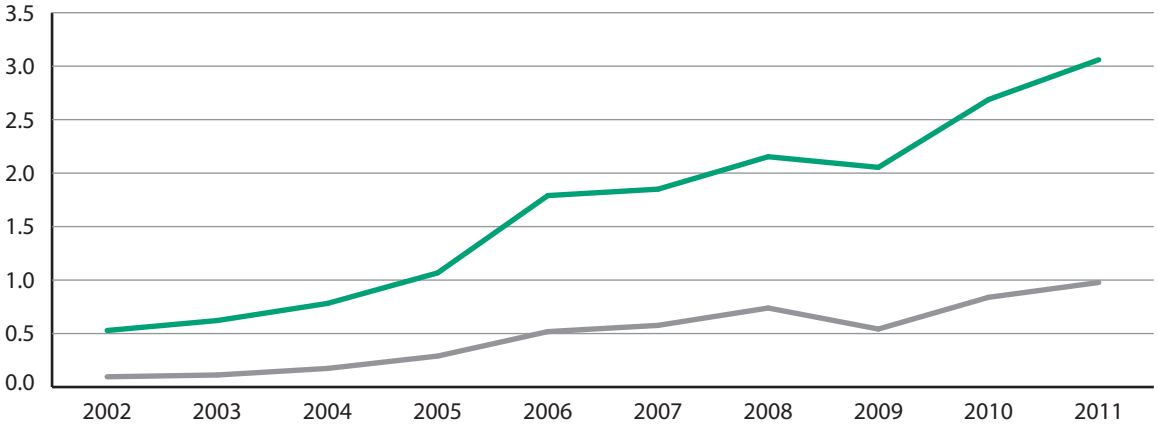
3.2.7.2 External debt stocks (% of GNI)

External debt stocks to gross national income has varied across countries in Africa as shown in figure 24. The highest external debt stocks (percentage of GNI) in 2011 were registered for Seychelles followed by Sao Tome and Principe. The total external debt stocks as a percentage of gross national income was at least 50 per cent in eight countries (Cabo Verde, Côte d'Ivoire, Guinea, Mauritania, Sao Tome and Principe, Seychelles, Tunisia and Zimbabwe). High external debts expose countries to risk of importation of dirty goods and services. The possibility of a debt swap for nature could be explored as long as it guarantees the rights of local communities while steering countries towards green development.

Fiscal balance as a percentage of gross domestic product(cash surplus/deficit, % of GDP)

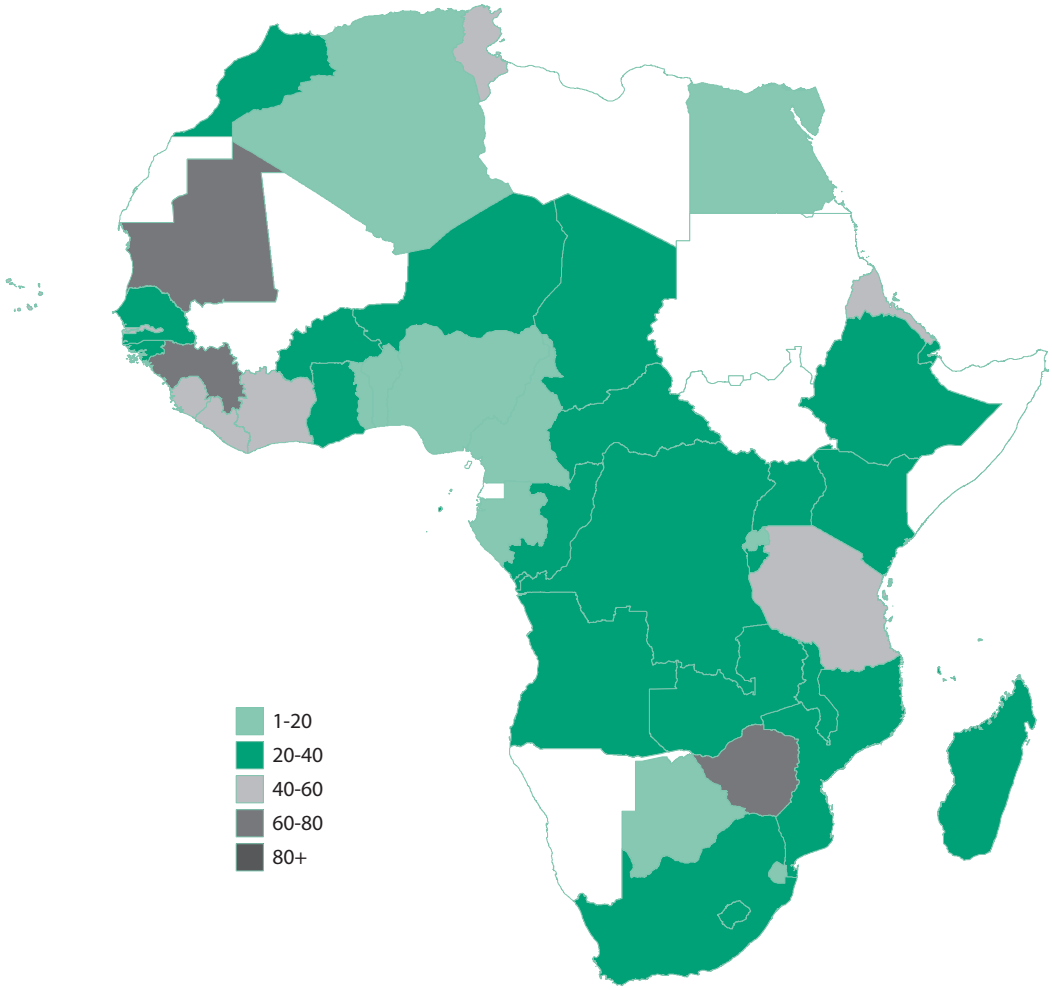
Data on fiscal balance/cash surplus or deficit for 2011, which are presented in figure 25, were available for 17 countries. Only Seychelles recorded a positive fiscal balance as a percentage of GDP. The highest negative fiscal balance as a percentage of GDP was registered by Egypt, owing to a large part to the recent destabilizing unrest in the country.

Figure 23: Trends in mineral rents (% of GDP)



Source: Estimates based on sources and methods described in "The Changing Wealth of Nations: Measuring Sustainable Development in the New Millennium"" (World Bank, 2011).

Figure 24: Distribution of external debt stocks (% of GNI) of countries in Africa



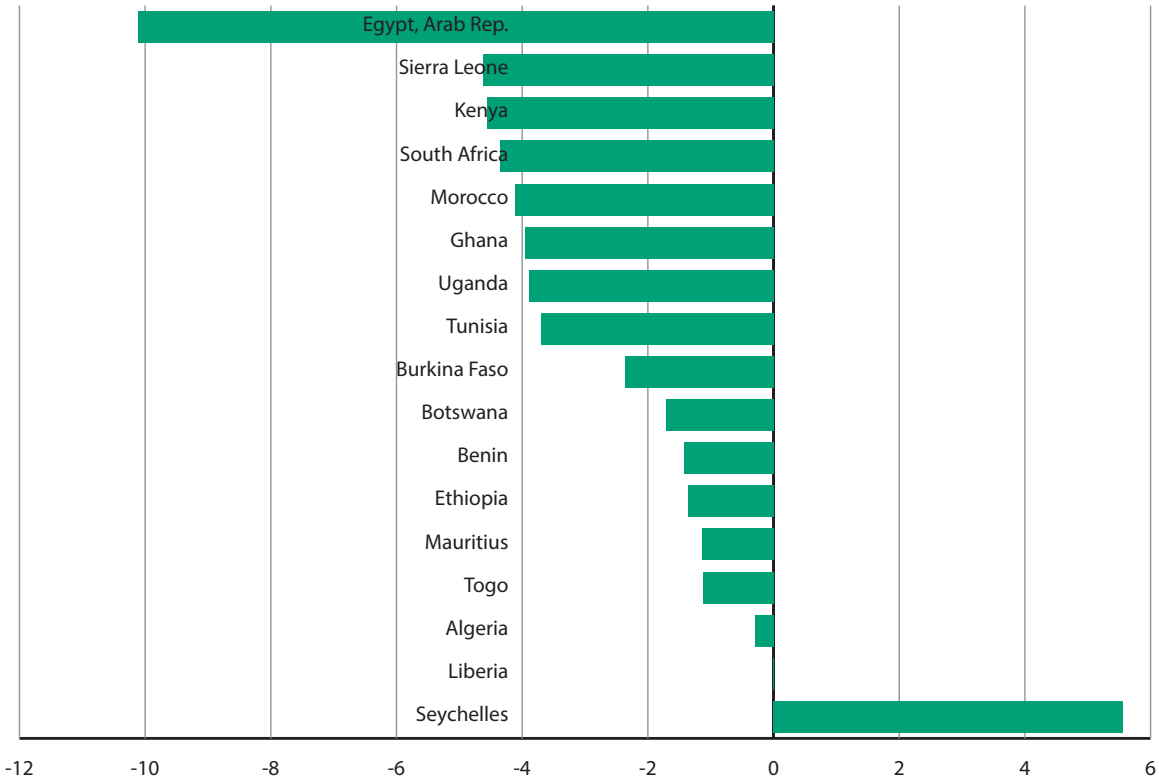
Data source: World Bank. Data. External debt stocks (% of GNI) Available from http://data.worldbank.org/indicator/DT.DOD.DECT.GN.ZS. Accessed Nov 21, 2012

The outlook for the African economic transformation is upbeat. (AfDB, 2011). However many downside risks, domestic and external, may overshadow this projection. Even with some global and country-specific challenges, the medium-term economic outlook for Africa has been favourable. The African economy was projected to grow by 4.8 per cent in 2013 and accelerate to 5.3 per cent in 2014 (AfDB and others, 2013), with the main engines of growth being expansion in agricultural production, increased mining, value added service sector growth and a rise in oil production. These factors will present special challenges in the effort to remain on course for achieving inclusive green growth given the extractive nature of the sectors they are associated with and their potential environmental and human risks.

3.2.8 Employment

Africa is facing a rising population and unprecedented levels of youth unemployment. The effect of this two-fold population challenge is reflected in both rural and urban settings in many countries with associated environmental and social impacts. Human resource development, utilization and retention in productive sectors are critical to nurturing the creative spirit of young people and harnessing the demographic dividend. The present report tracks employment as a sub-theme of economic transformation through: the unemployment rate by gender and age group; and the employment-to-population ratio and employment in the informal sector as a percentage of total employment.

Figure 25: Fiscal balance/cash surplus or deficit (% of GDP) in 2011



Data source: World Bank. Data. Cash surplus/deficit (% of GDP). Available from http://data.worldbank.org/indicator/GC.BAL.CASH.GD.ZS..Accessed January 2, 2013

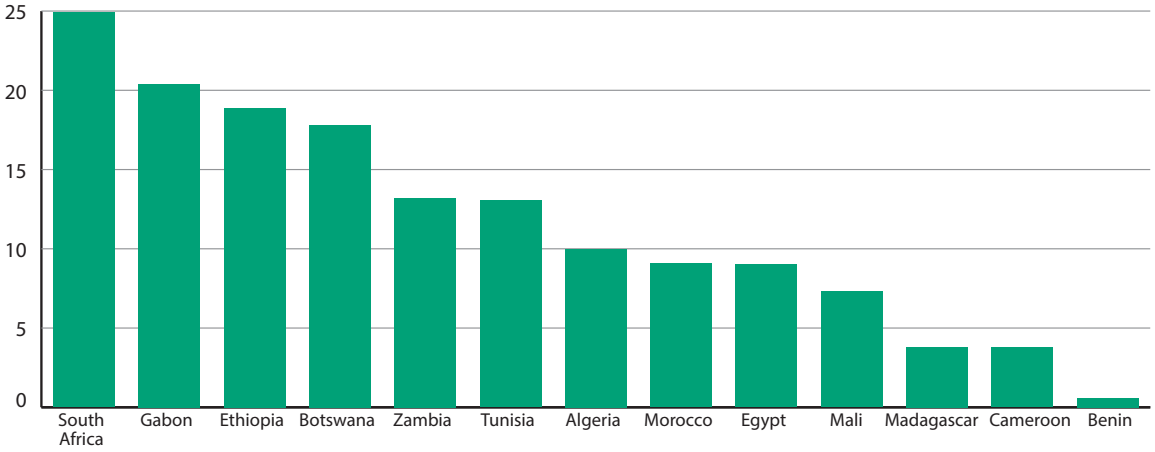
3.2.8.1 Unemployment rate

Figure 26 shows the total unemployment rate of 13 countries with available data while figures 27 and 28 present unemployment by gender and age groups disaggregated. The female unemployment rate was higher in all countries and the disparity was highest in Egypt followed by Ethiopia and Gabon.

According to UNESCO (2012a) and the World Youth Data Sheet (2013), the population of young people in sub-Saharan Africa is increasing rapidly with one in three people living in the region, or about 297 million, in the 10 and 24 years age bracket. This age group is expected to double by 2050. The young people of the region are also becoming better educated (see figure 29) but cannot find suitable employment. There is obviously potential for economic growth and development in the continent as the workforce becomes larger and better educated. Recent estimates show that the proportion of 20-to-24-year-olds who complete secondary education will increase from 42 per cent to 59 per cent over the next 20 years.

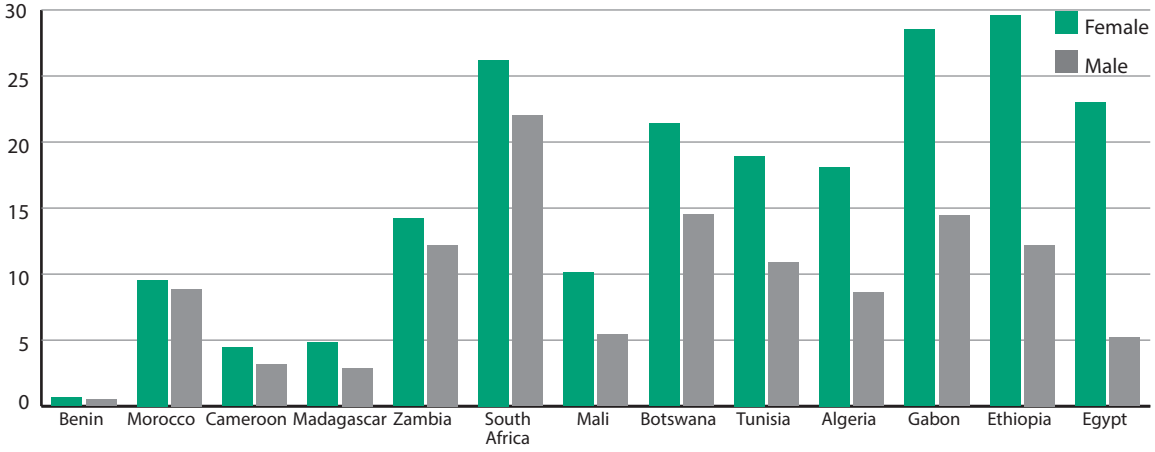
Although many jobs have been created in Africa over that past decade, not enough of them have been created to accommodate increasing number of young people and increasingly educated people in search of work. The International Labour Organization (ILO) estimates that between 2000 and 2008 Africa created 73 million jobs, but only 16 million of them were for young people aged between 15 and 24. As a result, many young Africans find themselves unemployed or, more frequently, underemployed in informal jobs with low productivity and pay. Of those who are unemployed in Africa, 60 per cent are young people and youth unemployment rates are double those of adult unemployment in most countries. About two million people are expected to enter the labour market annually until 2015 (UNESCO, 2012a). More comprehensive education-to-employment strategies are thus needed for Africa to make the

Figure 26: Unemployment rate, total (% of total labour force)



Data source: International Labour Organization, ILOStat database. Available from http://www.ilo.org/ilostat/faces/home/statisticaldata;jsessionid=NXQHJPGCJ9b9ybTb0LPtVPnMxDLTJJzP78PLJpTP91NmPGGNJYW7!395581755?_afrLoop=353913630259217#%40%3F_afrLoop%3D353913630259217%26_adf.ctrl-state%3D48lvfvnzc_4.. Accessed on April 2013

Figure 27: Unemployment rate by sex in 2009/10



Data source: International Labour Organization, ILOStat database. Available from http://www.ilo.org/ilostat/faces/home/statisticaldata;jsessionid=NXQHJPGCJ9b9ybTb0LPtVPnMxDLTJJzP78PLJpTP91NmPGGNJYW7!395581755?_afrLoop=353913630259217#%40%3F_afrLoop%3D353913630259217%26_adf.ctrl-state%3D48lvfvnzc_4. Accessed on April 20, 2013

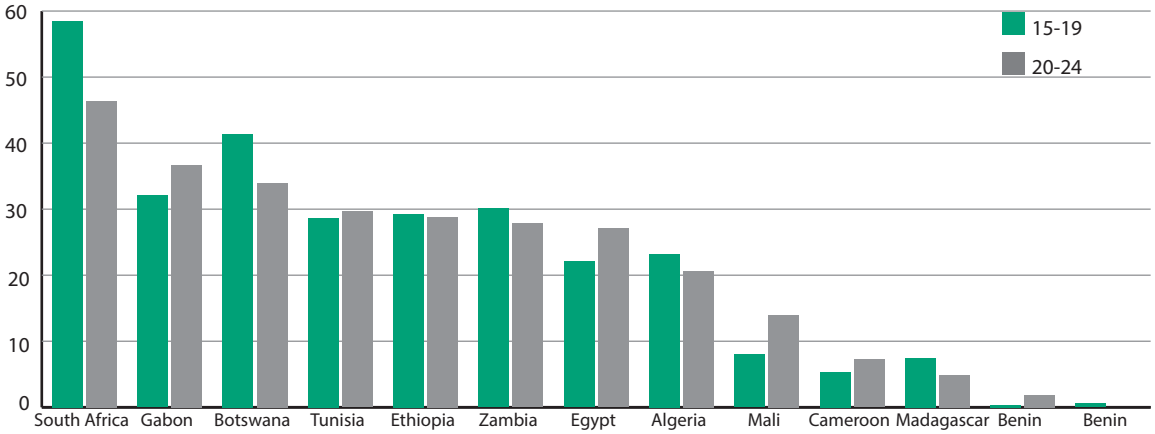
most of this opportunity for sustainable development.

3.2.8.2 Employment-to-population ratio

The employment-to-population ratio, which measures the proportion of a country's working-age population that is employed, rose by at least 5 per cent in North Africa and 2 per cent in Southern, Eastern, Central and West Africa (see figure 30).

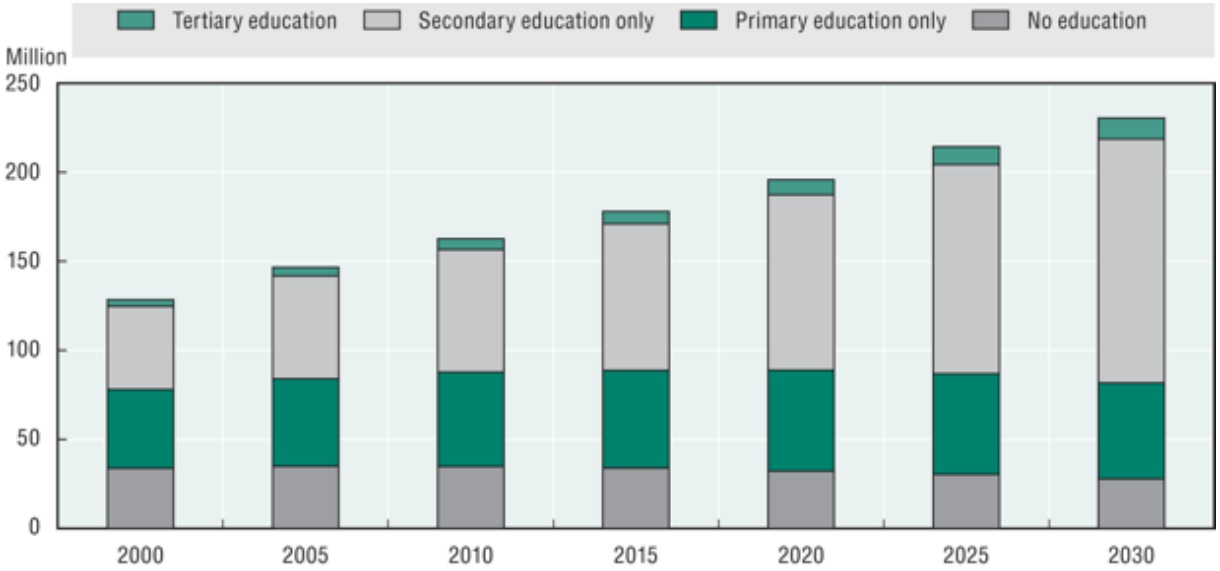
The employment to population ratio in sub-Saharan Africa had been on the rise. In Burkina Faso, Equatorial Guinea, Madagascar, Rwanda and Zimbabwe, it is above 80 per cent, indicating that a large proportion of the population is gainfully employed. On the contrary, figures from Algeria, Mauritania and South Africa, indicate that large proportions (more than 60 per cent) are not involved directly in market-related activities or were out of the labour force altogether. Overall, the change between 2002 and 2011 in the employment to population ratio throughout Africa was significant. Part of the employment figures represented those employed in the informal sector in unregistered and/or small unincorporated private

Figure 28: Youth unemployment rate in 2009/10



Data source: International Labour Organization, ILOStat database. Available from http://www.ilo.org/ilostat/faces/home/statisticaldata;jsessionid=NXQHJPGCJ9b9ybTb0LPtVPnMxDLTJJzP78PLJpTP91NmPGGNJYW7!395581755?_afrLoop=353913630259217#%40%3F_afrLoop%3D353913630259217%26_adf.ctrl-state%3D48lvfvnzc_4. Accessed on April 20, 2013

Figure 29: Rapid growth of educated young people (20-24 year-old cohorts by education, 2000-2030) in Africa



Data source: World Bank, Data, EdStats: education Statistics. Available from http://datatopics.worldbank.org/education. Accessed on 21 December 2013

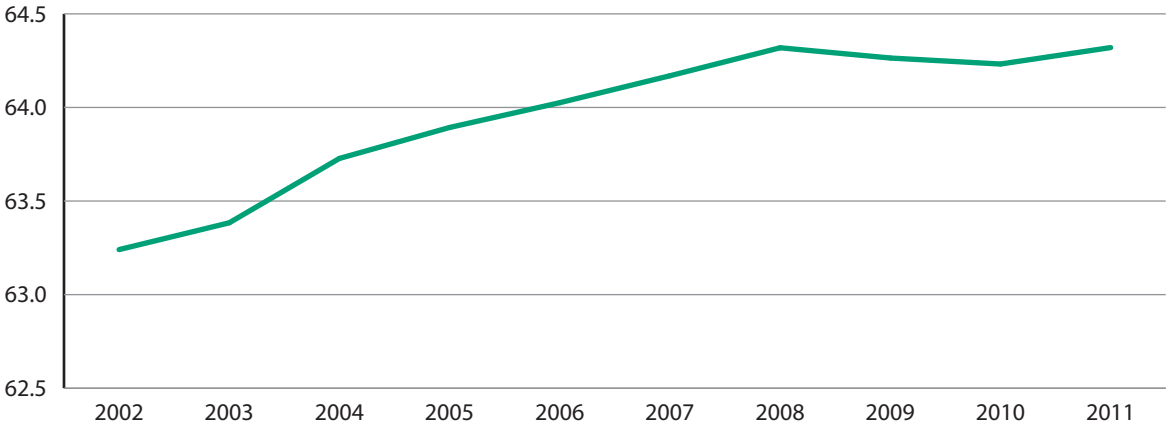
enterprises engaged in the production of goods or services for sale or barter. Only 11 countries had data on this indicator.

Inclusive green growth is intended to create jobs or promote development initiatives that do not compromise jobs. Investments in recycling, clean energy, information communications technology (ICT), organic agriculture and other environmentally conscious development areas offer extensive opportunities for young people. In many countries, the fear of diminished competitiveness and job losses is a major push in pursuing inclusive green growth.

3.2.9 Information and communications

The potential of ICT in fostering sustainable development is through interaction and other possibilities that promote transformative development.

Figure 30: Employment to population ratio in sub-Saharan Africa



Source: International Labour Organization, Key Indicators of the Labour Market database. Available from http://www.ilo.org/empelm/what/WCMS_114240/lang--en/index.htm. Accessed on April 2013

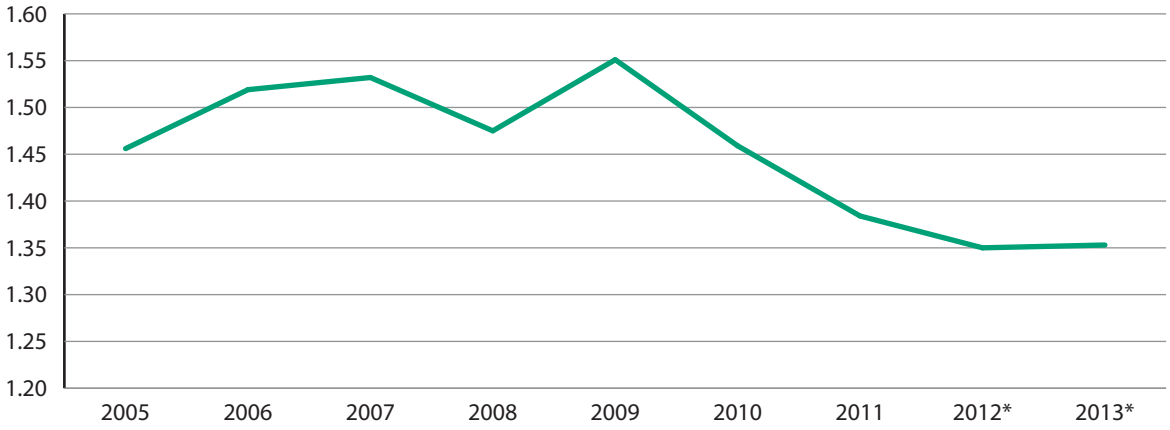
Over the past two decades Africa has leapfrogged the ICT infrastructure divide through a vast cellular network and application of innovative ICT systems in different sectors. With this progress has come rapid spread of secure mobile banking services, and disease diagnosis and reporting as well as tracking of other health issues. Farmers can now track market prices and receive valuable agricultural information and best practices with evident outcomes in productivity, food security, incomes and health promotion. The cost of ICT installation and access still remains prohibitive in many countries, making the realization of full utility of ICT for sustainable development a pipe dream, especially in rural and poor communities. Innovations should continue to be deployed to cut costs of ICT use and monetization of applications.

With regard to achieving sustainable development, both negative and positive aspects of ICT abound in Africa. Among the challenge are e-waste and security and intellectual property rights issues. Nonetheless, ICT will arguably propel the sustainable development agenda as more and more people get affordable access to technologies and applications with profound information base as more sustainable consumption and production options become available.

3.2.10 Conclusion

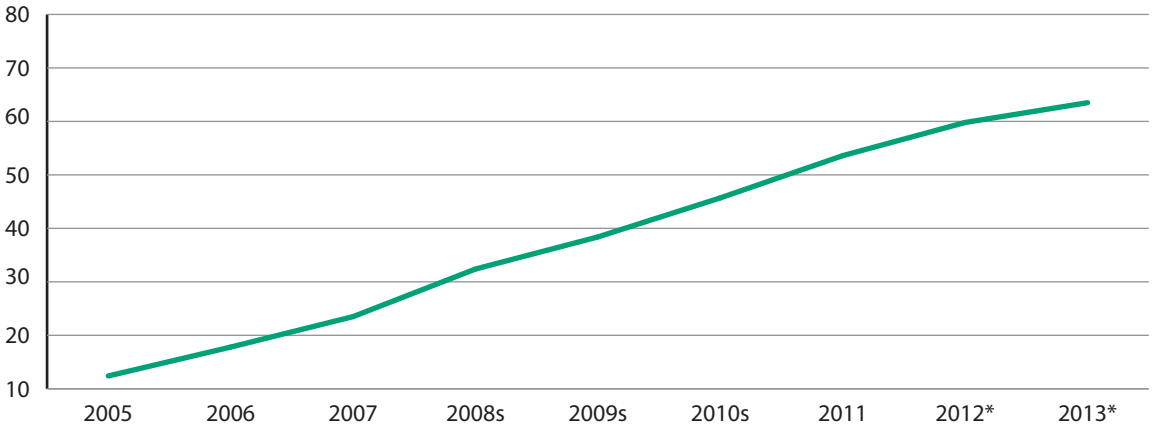
Africa continues to register high economic growth, making the continent an increasingly major player in the global economic arena. Although the prospect for even more robust economic growth is good, trends in adjusted net savings and other indicators of macroeconomic change have shown mixed results and minimal or negative changes. No significant changes have been reported on trade and market access as well as on financial status (sustainable public finance). While the share of agricultural exports in total exports has been rising, value addition in the manufacturing, agriculture and service sectors continues to decline. The outlook for the African economic transformation is good, however, many downside domestic and external risks and the high rate of youth unemployment may weigh on this projection. This is because recent economic growth has relied too heavily on agriculture and other nature-based sectors without much value addition and employment-generating opportunities. Intensification of inclusive green growth approaches, support for a vibrant private sector and adoption of ICT innovations remain potential areas to focus on in the efforts to harness positive aspects of economic growth.

Figure 31: Fixed telephone subscriptions per 100 inhabitants in Africa



Note: * 2012 and 2013 figures are estimates
Data source: International Telecommunications Union, World Telecommunication/ICT Indicators database. Available from http://www.itu.int/en/ITU-D/Statistics/Pages/publications/wtid.aspx. Accessed August 28, 2013

Figure 32: Mobile-cellular subscriptions per 100 people in Africa



Data source: International Telecommunications Union, World Telecommunication/ICT Indicators database. Available from http://www.itu.int/en/ITU-D/Statistics/Pages/publications/wtid.aspx. Accessed on August 28, 2013

3.3 Sustainable consumption and production

Over the past decade, some progress has been made towards achieving sustainable consumption and production, which as a concept and as a practice, is important for realizing inclusive green growth and sustainable development. Gains made are the result of action taken by African Governments and a wide range of other stakeholders that complement other global initiatives, such as the Marrakech Process, which was launched in 2003 in response to the call of the World Summit on Sustainable Development. African countries are engaging stakeholders through the region's 10-year framework of programmes on sustainable consumption and production. Initiatives under way include the adoption and implementation of national sustainable consumption production policies and action plans, capacity-building, training and design and use of sustainable consumption and production tools in such sectors as tourism, buildings and construction, procurement, products, education and lifestyles. Stakeholders are also producing and disseminating communication and awareness products.

3.3.1 Resource productivity

The levels of resource productivity as of 2008 are presented in figure 33. Resource/material produc-

Indicator	Sustainability trend	Remarks on trends
Resource productivity	↗↘	Slight increase in decoupling the unsustainable use of natural resources and economic growth, but the level of resource/material productivity remains low
Consumption pattern	↘	Declining trends due to unsustainable consumption patterns from an increasingly affluent middle class.
Production pattern	↗	Efforts by government, communities and the private sector in improving environmental and social accountability of production processes
Pollution intensity	↗	Green gashouse emissions declined between 2002 and 2009 and governments are intensifying awareness campaigns on pollution reduction in all sectors.
Sustainable transport	↗↘	There is an increase in infrastructural development, but many challenges remain, including poor transport governance, poor connectivity and road safety issues.

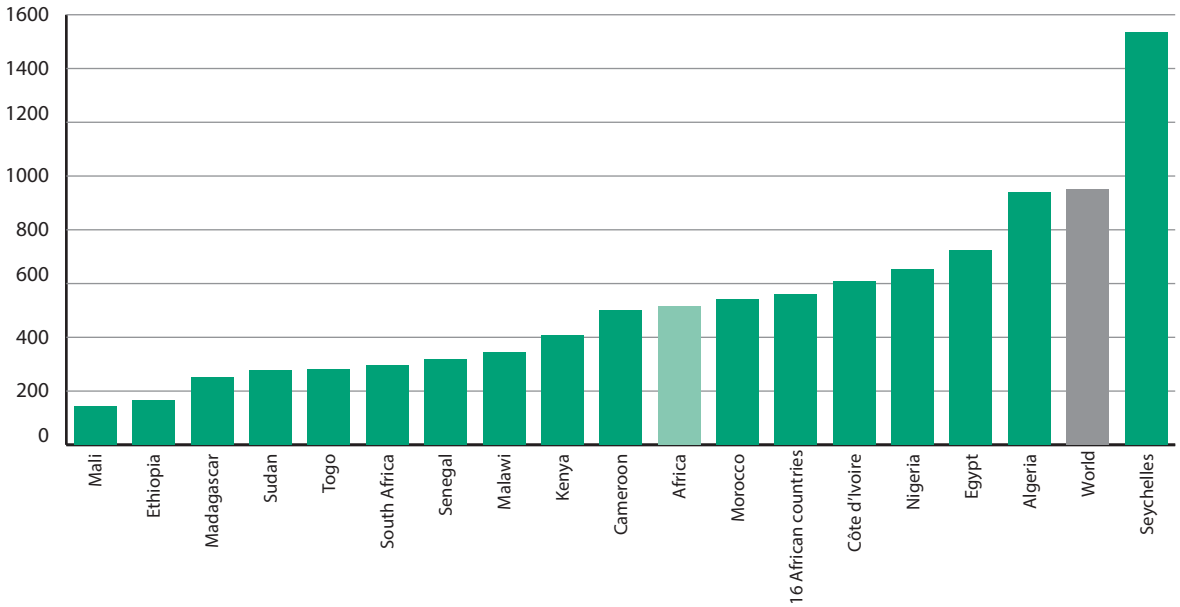
tivity is a measure of the total amount of materials directly used by an economy (measured as domestic material consumption (DMC)) in relation to economic activity (GDP is typically used). There has been a slight increase in the decoupling of the use of natural resources and economic growth as indicated by resource productivity. The level of resource/material productivity in Africa (also simply defined as GDP/DMC) has been very low (about $516 per ton of material) compared to the global average of $950 per ton of material in 2008.

Disparities in resource productivity exist in absolute terms and trends at the subregional, and country levels. Generally, industry- and service-oriented economies have higher material productivities than resource-based economies (Dittrich and others, 2012). For instance, Seychelles, which has a service-based economy, posted the highest level of material productivity, of about $1534/ton of material (above the global average of $950/ton of material) in 2008. Algeria reported the second-highest level of material productivity, of about $940/tonne, followed by Nigeria ($652/tonne), which has an economy that relies heavily on oil and metal exports. Economies dominated by agriculture- and natural resource-based production continue to record relatively lower levels of material productivity. Notable examples are Ethiopia and Sudan, with material productivities of about $166/ton and $276/ton respectively, compared to Côte d'Ivoire and Malawi, where the material productivity stood at about $610/ton and $344/ton respectively. The application of inclusive green growth principles in the natural resource sector provides an opportunity for increasing resource productivity with outcomes in terms of green jobs and environmental protection.

3.3.2 Consumption patterns

There are marked differences in the level of household final consumption expenditure (private consumption) as a measure of the market value of all goods and services, including durable products, such as cars, washing machines, and home computers, purchased by households based on 2000 constant prices. In 2011, Equatorial Guinea had the highest annual per cent growth in household final consumption per capita. Meanwhile, this indicator was negative in the following African countries – the Congo; Cameroon; Egypt; the Gambia; Togo; Tunisia; and Zambia – out of the 26 countries for which data were available for both 2002 and 2011. There was a direct relationship between changing consumption patterns and environmental protection in terms of waste control and demand on environmentally sensitive goods and services.

Figure 33: Resource/Material productivity in 2008



Data source: UNCTAD (2012)Resource use and resource efficiency in Africa: A pilot study on trends over the past 28 years. Written by Dittrich M and Giljum S, Lugschitz B, Polzin C and Lutter S from the Sustainable Europe Research Institute (SERI) of Vienna. Paper commissioned by UNCTAD. Geneva.

There continues to be a heavy reliance on solid fuels with the percentage of the population using solid fuels, such as wood, charcoal, crops or other agricultural waste, dung, shrubs and straw, and coal, as the primary source of domestic energy for cooking and heating varying among countries in Africa. More than 90 per cent of the population in 21 countries used solid fuels in 2010. Only in seven countries was the figure as low as 5 per cent: Algeria; Egypt; Libya; Mauritius; Morocco; Seychelles; and Tunisia. Household final consumption expenditure (local currency) has been trending higher at the country level. For instance, based on primary data from the pilot countries, the household final consumption expenditure rose in Ghana and Senegal (see figures 34 and 35).

3.3.3 Production patterns

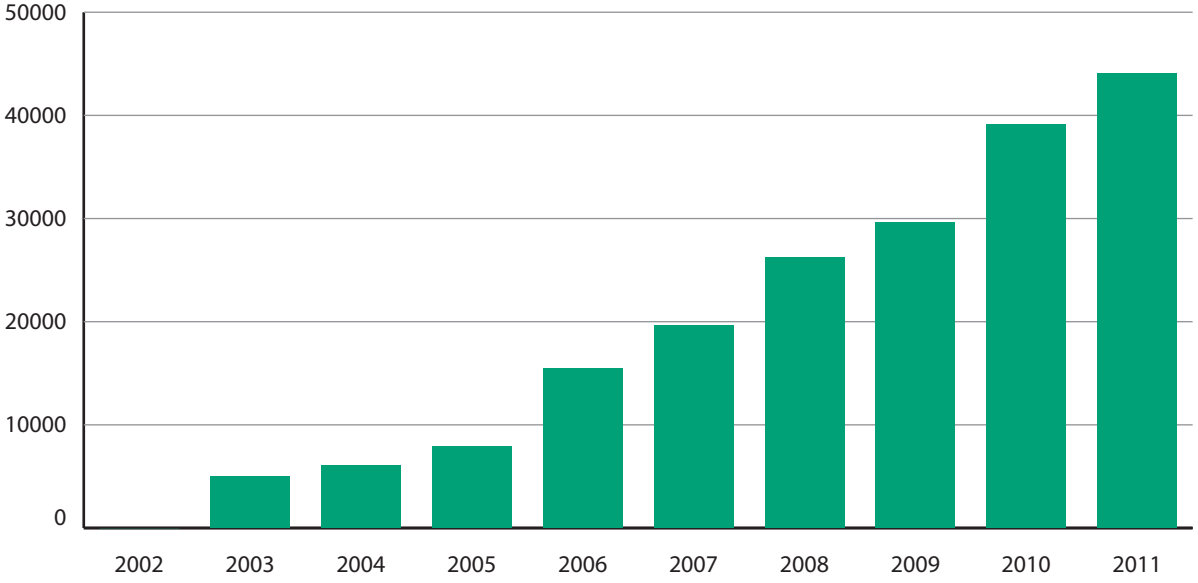
The promotion of cleaner and efficient production in Africa has been intensified with the formation and strengthening of institutions to oversee and coordinate implementation. Both public and private entities are involved. At the national level, national cleaner production centres have been established. Eight African countries (14.8 per cent of them have national cleaner production centres, namely Ethiopia, Kenya, Morocco, Mozambique, South Africa, the Untied Republic of Tanzania, Tunisia, Uganda and Zimbabwe. This represents 33.33 per cent of the 24 such centres established under a joint initiative of the United Nations Industrial Development Organization and UNEP.

With the manufacturing sector being a major consumer of energy, production patterns in Africa are also discernible through energy use per unit of products as a measure of intensity of energy use in the industrial sector. In 2009, energy consumption by the industry sector was highest in North Africa and lowest in Eastern Africa (see figure 36).

3.3.4 Pollution intensity

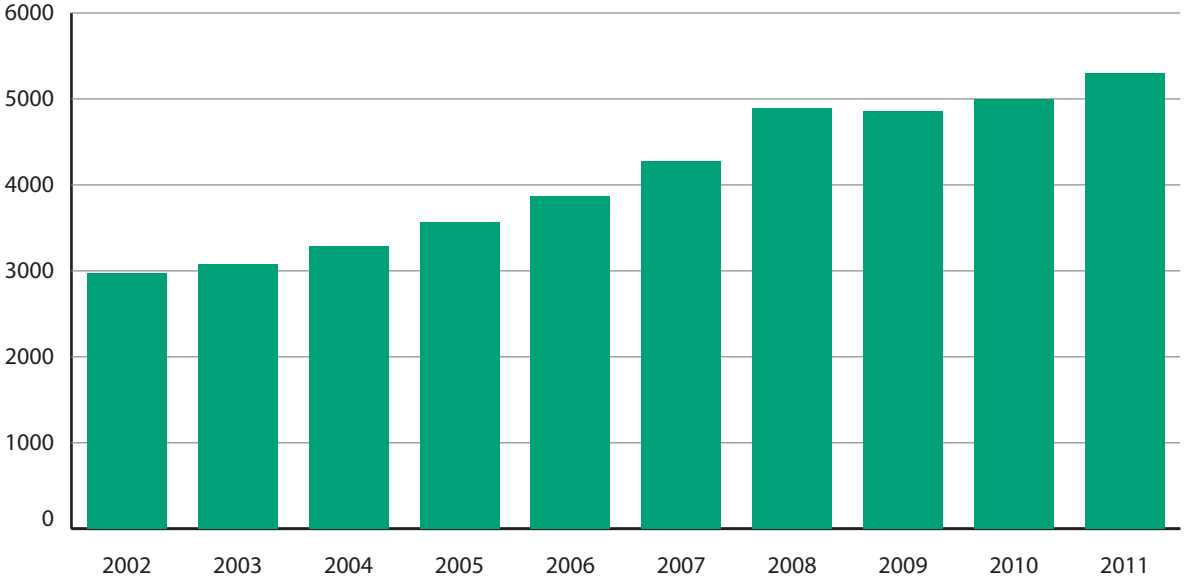
The global measure of pollution intensity is the greenhouse gas emissions per unit of GDP. The carbon dioxide (CO2) emissions (kg per PPP $ of GDP) in sub-Saharan Africa remain significantly lower than the global average. At the country level, CO2 emissions in 2009 were highest in South Africa and lowest in Chad. The CO2 emissions from manufacturing industries and construction

Figure 34: Household final consumption expenditure (local currency) in Ghana



Data source: Survey questionnaire completed by the Ghana Statistical Service (2013) – based on data from: http://www.statsghana.gov.gh/docfiles/GDP/revised_GDP_2012_v4_P+E.pdf. Direction de la Prévision et de la Statistique du Sénégal (DPS)

Figure 35: Household final consumption expenditure (local currency) in Senegal (billions, CFA franc)

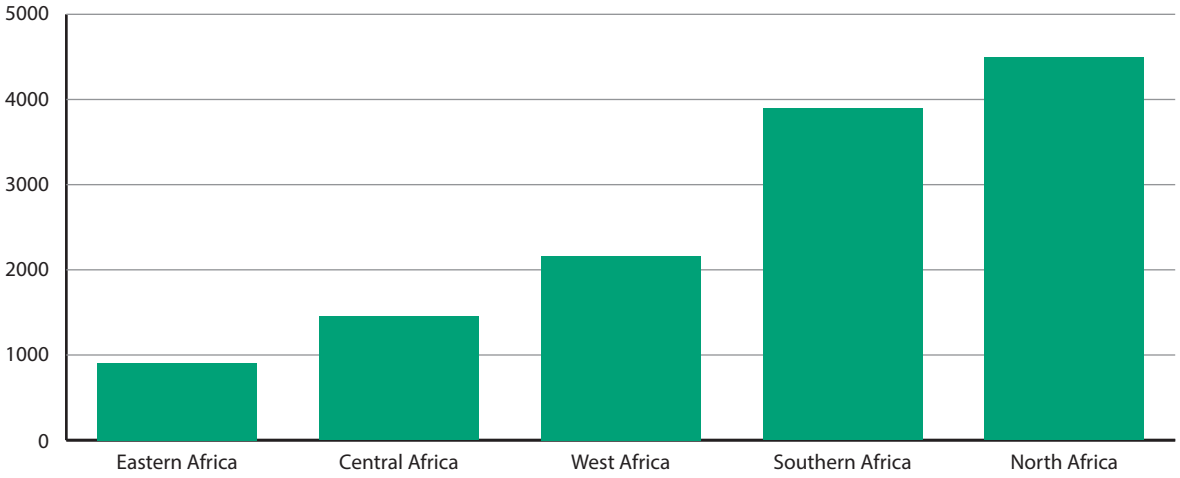


Data source: Survey questionnaire completed by the Senegal National Statistics and Demography Agency

(million metric tons) in North Africa increased from 9.83 million metric tons in 2002 to 11.5 million metric tons in 2008 (see figure 37). CO2 emissions (kg per PPP $ of GDP) decreased globally (from 0.55 in 2002 to 0.44 in 2009). In sub-Saharan-Africa, CO2 emissions (kg per PPP $ of GDP) had decreased from 0.54 in 2002 to 0.40 in 2009.

CO2 emissions stem from following: burning of fossil fuels; manufacturing of cement; and consumption of solid, liquid, and gas fuels and gas flaring. The application of inclusive green growth principles in the manufacturing sector should be explored as a way to promote resource-use efficiency, minimize pollution and create decent jobs.

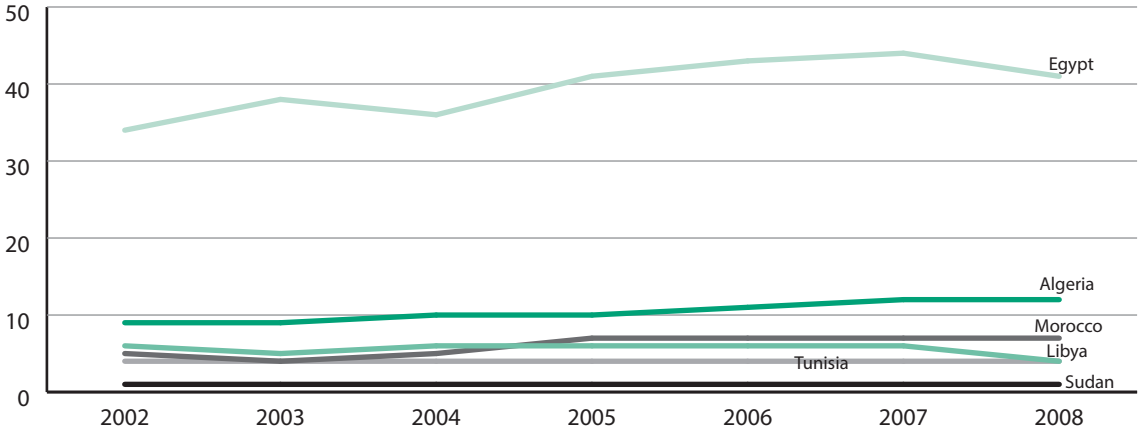
Figure 36: Energy consumption ('000 tonnes of oil equivalent) by the industry sector in 2009



ECA subregional grouping

Data source: OECD Development Centre based on IEA (2009)

Figure 37: CO_2 emissions from manufacturing industries and construction (million metric tons) in North Africa



Source: OECD Development Centre based on World Bank database: http://data.worldbank.org/indicator/EN.ATM.CO2E.PC

3.3.5 Sustainable transport

Transport policies that promote inclusion and sustainability, support public health and ecosystems, and minimize the generation of greenhouse gas emissions are essential for long-term economic growth. To ensure this, the Sub-Saharan Africa Transport Policy Programme was created, comprising 38 African countries, regional economic communities, AUC, ECA, public and private sector organizations, and international development agencies and organizations. The Programme is intended to help African countries strengthen their policies and strategies aimed at promoting sustainable transport for economic growth and poverty reduction. Road safety continues to be a priority challenge in the continent while sustainable use of other forms of transport, including waterways and railway lines and improved infrastructure connectivity is occupying the transportation debate in the region.

3.3.6 Conclusion

Progress towards achieving sustainable consumption and production is mixed. Resource productiv-

Box 1: Road safety in Africa: some facts and strategies

Due partially to population growth and changing lifestyles, the number of motorized vehicles on African roads is steadily increasing, compounding the likelihood of road traffic fatalities. Africa is the continent with the highest road fatality rates in the world. A report by the World Health Organization (WHO) issued in 2013 shows that the estimated road traffic death rates was 24.1 per 100,000. In comparison, this rate was 18.5 in Asia and 10.3 inEurope. The estimated number of deaths is about 200,000, a figure that represented 16 per cent of the global deaths. This figure was particularly high when considering that only 12 per cent of the world population lived in Africa and that the number of cars on the continent accounted for only 2 per cent of world's total vehicles. Among those deaths, 62 per cent of them affected people between the ages of 15 and 44 years and most of the victims were men (based on data available for 20 countries, they accounted for 75 per cent of the deaths). Half of the fatalities (52 per cent) were vulnerable road users: motorized 2- or 3-wheelers, cyclists, and pedestrians (37 per cent of the deaths). This figure was first reported in 2007 and has since been on the rise.

Motorbike accidents in Uganda are placing increasing strain on the country's limited health budgets. Photograph: Barbara Gonget/Alamy

To deal with these crises, the Sub-Saharan Africa Transport Policy Programme recommends establishing and empowering national road safety lead agencies. Between 2008 and 2011, Burundi, Guinea-Bissau and Madagascar established a road safety lead agency. However, the mere existence of these agencies is not enough to prevent accidents. Among the 42 countries that claimed to have established such an agency, only 28 of them had developed a road safety strategy and in some countries the strategy did not have specific targets or was not appropriately funded. There is need to consider vulnerable road users, such as pedestrians, users of bicycle and motorized two-wheels modes of transport in the design of roads and national policies on public transport. The report shows that an increasing part of the death of vulnerable road users were pedestrians, who accounted for 38 per cent of all deaths in 2010 compared to 35 per cent in 2007. Countries should implement voluntary policies to define national road safety strategies and strengthen the capacity of lead agencies to implement them. Essential to these strategies are education and the institutional framework for law enforcement. The policies must protect vulnerable road users, who represent a plurality of road traffic fatalities.

Source: Based on article by Pierre Bertrand, SSATP and WHO report 2012.

ity still remains low and the slight improvements in production trends have been offset by a decline in sustainable consumption, due to the unsustainable consumption patterns of an increasingly affluent middle class. This emerging phenomenon increasingly threatens environmental integrity through increased production of waste and increasing demand for environmentally sensitive goods and services. The progress that continues to be registered in sustainable production is attributed to efforts by governments, communities and the private sector in improving social and environmental accountability of production processes. Pollution intensity shows an appreciable improvement, with greenhouse gas emissions declining between 2002 and 2009 as governments intensify campaigns and awareness on pollution reduction in all sectors. Sustainable transportation remains an area of concern. Although there has been an increase in infrastructural development,

many challenges remain with regard to road fatalities, poor transport governance, connectivity and increasing greenhouse gas emissions from cars. To increase the pace towards sustainable consumption and production, more coherent policy frameworks that tackle both the supply and demand side of natural resource use are needed, together with improved implementation and enforcement of existing policies. Achieving sustainable consumption and production requires action and responsibility across sectors, with special attention needed with respect to capacity-building.

3.4 Energy

Clean energy sources constitute a primary requirement for inclusive green growth, while access to modern energy services is an important driver of economic growth and social development (IEA, 2012; UNEP 2013). The provision of basic services, such as health, education and water, are supported by modern energy sources, which greatly ease the daily lives of women by diverting their time, energy and effort away from fetching firewood and cooking with highly polluting stoves. Renewable and modern forms of energy also enhance productivity and living standards, environmental protection, climate change mitigation and adaptation. Harnessing the continent's renewable energy potential provides an opportunity to realize inclusive green growth outcomes. Energy access and poverty is treated under the poverty section below.

3.4.1 Renewable versus non-renewable total primary energy supply mix

Renewable energy is an essential contributor to the energy supply portfolio, as it contributes to energy security, reduces dependency on fossil fuels and other forms of biomass and provides opportunities for mitigating greenhouse gases. The share of renewable energy in total primary energy supply for the five subregions of Africa is presented in figure 38.

The percentage of total energy consumption supplied from renewable energy sources has been rising in Africa. The increased used can be attributed to higher investment in and greater promotion of and access to hydropower, solar, wind and other forms of renewable energy. Use of renewable energy sources promotes efficiency in the use of energy sources and encourages the transition towards sustainable energy production. Energy is a key aspect of consumption and production. Overreliance on non-renewable resources can be regarded as unsustainable in the long term. Renewable resources, on the other hand, can supply energy continuously under sustainable manage-

Indicator	Sustainability trend	Remarks on trends
Renewable versus non-renewable total primary energy supply mix	→ ←	Increase in the use of renewable energy generally across the continent as investments increase, but share of fossil fuels in total energy had not changed between 2002 and 2010
Energy security	↘	Increase in energy imports in many countries continues to undermine energy security
Energy intensity	→ ←	Varying trends in energy consumed per unit output
Sustainability of energy sources	↗	Increase in renewables in several countries
Energy prices	↘	Insufficient generation capacity, among other factors, keeps the average electricity tariff higher than global average

ment practices and their use generally puts less pressure on the environment.

The share of renewables in total primary energy supply for the subregions of Africa ranged from about 15.6 per cent in North Africa to about 80 per cent in Eastern Africa (see figure 39). The shares for Central, Eastern and West Africa are higher than the average for the continent. Among individual countries, the shares ranged from 0.2 per cent in Algeria to 96.7 per cent in Mozambique.

3.4.2 Energy security

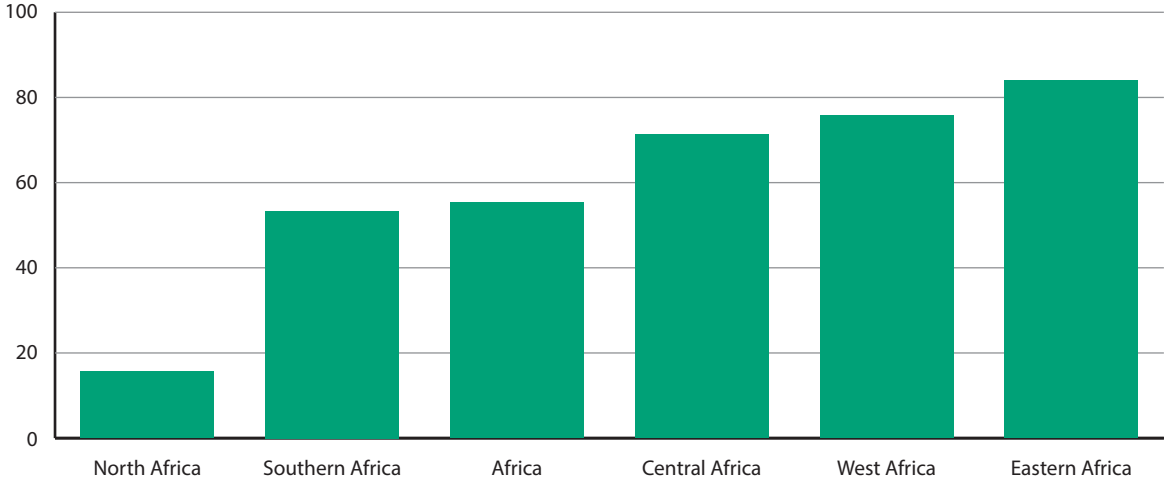
The change in net energy imports based on energy use less local production had been significant between 2002 and 2010. Some 13 countries in Africa were net importers of energy. This exposed them to importation of non-clean energy sources while eroding their stock of foreign exchange and reducing the benefits from local production of renewable energy. The net energy imports of Angola, Côte d'Ivoire, Eritrea, Ethiopia, Ghana, Libya, Nigeria, Morocco, Mozambique, Sudan , and Zimbabwe and Morocco decreased in 2010 as compared to 2002 while it increased in 16 countries. The highest increase in net energy imports was observed in the Congo followed by Gabon. In all of the African subregions, the proportion of biofuels and waste was highest in total renewable energy usage.

Energy insecurity continues to hamper sustainable development efforts in Africa, although a few countries have initiated plans to boost their energy sectors through investment in power generation. Notable examples include the 6000-megawatt Great Renaissance Dam on the Blue Nile in Ethiopia, oil refining in a planned 200,000 bbl/day refinery in Lobito, Angola and aggressive prospecting for fossil fuels, especially in Eastern and Southern Africa. To achieve energy security, African countries must pursue regional approaches as the increasing amount of intra-African trade requires greater integration of energy markets.

3.4.3 Energy intensity

The intensity of energy use has varied among subregions and countries. Energy intensity was highest in the Democratic Republic of the Congo followed by Mozambique between 2002 and 2009. When using fossil fuels in relation to total energy used as a measure of energy intensity, the share of fossil fuel in total energy use was almost constant between 2002 and 2010 but it remained lower in sub-Saharan Africa compared to North Africa and the world. It was highest (above 90 per cent) in Algeria, Egypt, Libya and Morocco; and least (less

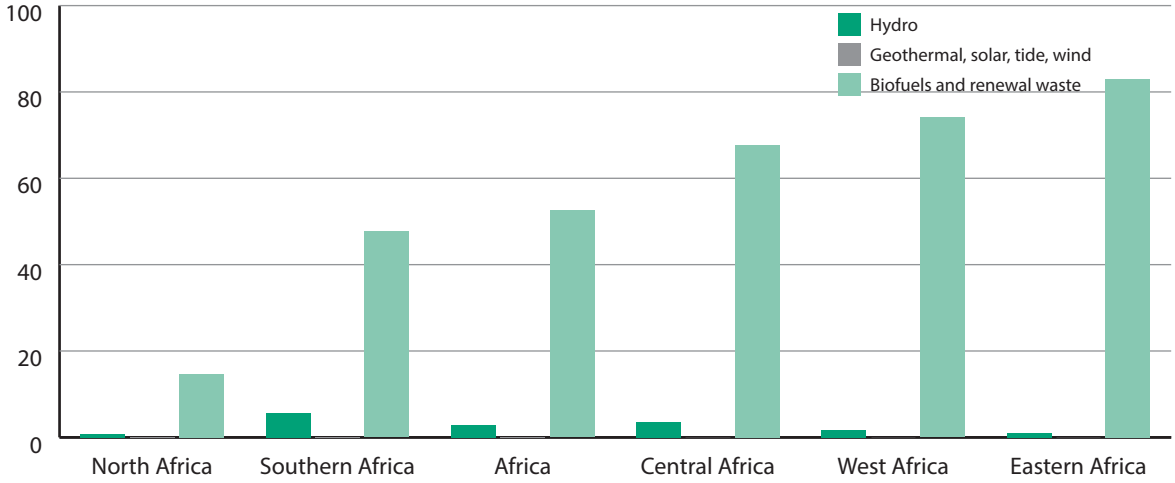
Figure 38: Share of renewable energy in total primary energy supply (%) in 2009



Economic Commission for Africa subregional grouping

Data source: OECD Development Centre based on IEA (2009)

Figure 39: Share of main fuel categories in total renewables (%) in 2009



ECA subregional grouping

Data source: OECD Development Centre based on IEA (2009)

than 10 per cent) in the Congo, Ethiopia, Mozambique and Zambia. Through the application of inclusive green growth principles, energy use efficiency can be enhanced, thus potentially mitigating deforestation and increased consumption of unclean sources of energy.

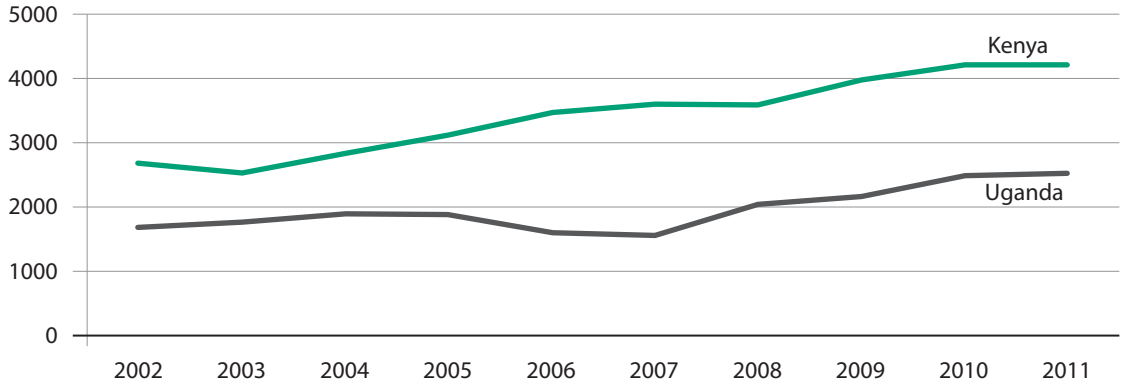
There are varying trends at the country level as shown by primary data collected from the two pilot countries, Kenya and Uganda. There was a rising trend in hydropower and geothermal energy use in Kenya during the period 2002-2011. The total final consumption of energy in Kenya and Uganda had been increasing with the consumption in Kenya being greater than in Uganda (see figure 40).

3.4.4 Sustainability of energy sources

The global share of new investments in renewable energy in Africa continues to be minimal, but has increased significantly over the past few years. The sustainability of energy sources directly relates to resource productivity. Although developing countries raised their share of global renewable energy investment to a record 46 per cent in 2012, up from 34 per cent in the previous year, the African share remained low. The total invested by developing countries in 2012 was $112 billion, up from $94 billion in 2011 and continuing an unbroken eight-year growth trend. There were, however, higher capital commitments in especially Kenya, Morocco and South Africa. In 2012, South Africa was the highest among developing countries, excluding Brazil, China and India, in raising investment in renewable energy. The total investment was $5.7 billion, which included $1.5 billion in wind farms and $4.2 billion in solar projects. During that year, Ethiopia, Kenya and Morocco made appreciable investment in renewable energy (see figure 41).

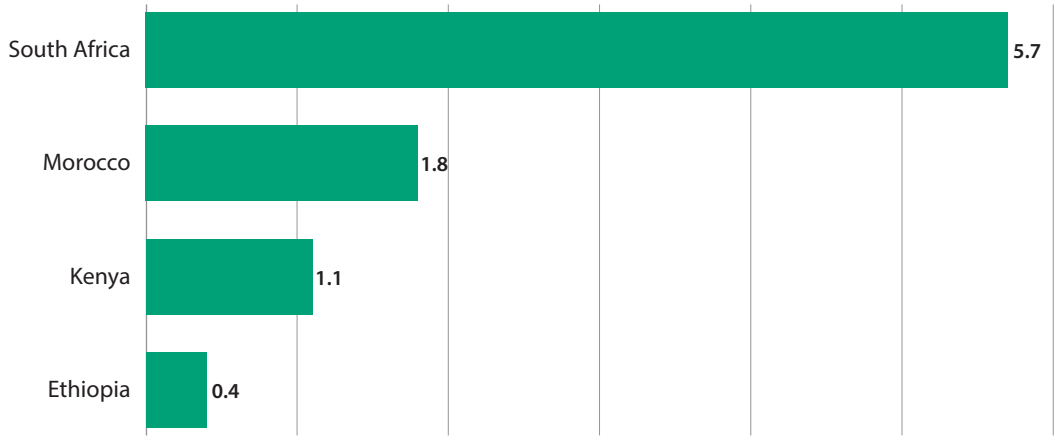
The requisite policies to support sustainable generation of and investment in renewable energy are becoming more flexible and responsive as technology costs and availability improves. It is important for countries to set renewable portfolio standards and ensure greater application of environmental regulation, emissions monitoring and application of tax-efficient structures for clean energy investment. There is also need for stable regulatory frameworks to support long-term investments and correct market failures in a way that levels the playing field for clean technologies and encourages investment in public-private partnerships for research and development for innovation in clean energy investment. The potential for sustaining energy development in Africa lies in the continent's vast renewable sources.

Figure 40: Total final consumption of energy (megajoules) in Kenya and Uganda



Data source: Survey questionnaire completed by the Kenya National Bureau of Statistics, 2013 (http://www.knbs.or.ke/index.php?option=com_phocadownload&view=category&download=581:economic-survey-2014&id=107:economic-survey-publications&Itemid=1181) and Uganda Bureau of Statistics 2013 (http://www.ubos.org/onlinefiles/uploads/ubos/pdf%20documents/2012StatisticalAbstract.pdf)

Figure 41: Total venture capital/private equity, public markets, and asset finance investment in renewable energy in Africa by country, 2012, $bn



Source: UNEP, Bloomberg New Energy Finance (Global Trends in Renewable Energy Investment2013, http://www.fs-unep-centre.org)

3.4.5 Energy prices

The energy sector in Africa faces many challenges. This results from insufficient generation capacity due to the high cost of producing electricity and investment in new renewable energy sources, forcing Governments to subsidize consumption. In 2010, the average effective electricity tariff in Africa was $0.14 per kilowatt-hour (kWh) against an average of $0.18 per kWh in production costs. Among African countries, there were significant disparities in energy consumption due to varying levels of subsidies. For example, electricity tariffs in South Africa and Zambia were among the lowest in the world, while prices in Djibouti and Gabon were among the highest globally. More efficient pricing schemes are needed in order to foster the development of a viable and well-functioning energy sector. The average tariffs in Africa are also much higher than in other developing areas, such as South Asia ($0.04/kWh) and East Asia ($0.07/kWh).

Both national power systems and geographical constraints are to blame for the high cost of power generation and hence pricing of electricity, as the power generation industry is dominated by costly small-scale power systems. In countries where electricity is mainly generated through hydroelectric power stations, availability and relia-

bility of power is highly dependent on weather conditions, which contribute to the cost of generating and transmitting electricity in the region. The high cost of electricity is also attributed to the heavy reliance on expensive fossil fuel-based power generation, which is the single largest source of electricity generation in Africa. Electricity pricing is also affected by limited demand. Although the demand for electricity is growing rapidly in sub-Saharan Africa, with estimates that it will rise from the current level of 153 kWh per capita to 235 kWh in 2020, it is low compared to the global average of 2,730 kWh recorded in 2009.

Increasing energy supply in Africa requires a drastic reduction in the cost of generating electricity, which, in turn, would require a multi-pronged policy intervention. Interventions, such as exploiting renewable energy sources and improving the state of power infrastructure, are likely decrease transmission leakages and the attendant costs. IEA (2012) has projected that Africa will need to add up to 250 GW between 2012 and 2030 in order meet demand. This will require African Governments to scale up resource allocation for development of power infrastructure, which currently consumes an estimated $40 billion annually. Of great importance to this end will be regional integration to create economies of scale and reduce costs of generation and distribution.

3.4.6 Conclusion

There has been a general improvement in the energy sector as indicated by the substantial infrastructural development, the diversity of energy sources and investment from local and external sources. Despite the abundant energy resource potential of the continent, many countries have yet to create a conducive environment to attract investments in the development of the energy sector. This is further complicated by the small size of African energy systems and markets, which makes it difficult to establish profitable business ventures. There is a general increase, albeit, low in the use of renewable energy sources as more countries increase investment and access to solar, wind and hydropower. Energy security remains a challenge as increasingly, energy imports rely less on local production with a net increase in energy imports in many countries. There were varying trends in terms of energy consumed per unit of output and the share of fossil fuels in total energy remained the same between 2002 and 2010. Energy prices in Africa remain high. Insufficient generation capacity keeps the average electricity tariff higher than global average due to high cost of production and low investments. Much remains to be done to further develop the energy sector in Africa.

3.5 Poverty

Poverty is both a measure and determinant of sustainable development. Poverty is the pronounced deprivation of well-being, and comprises many dimensions. It includes low incomes and the inability to acquire the basic goods and services necessary for survival with dignity. Poverty also encompasses low levels of health and education, poor access to clean water and sanitation, inadequate physical security, lack of voice, and insufficient capacity and opportunity to improve one's life. There are two main forms of poverty – absolute and relative poverty. Absolute poverty or destitution refers to the deprivation of basic human needs, which commonly includes food, water, sanitation, clothing, shelter, health care and education. Relative poverty relates to economic inequality in the location or society in which people live. As growth and poverty are linked, efforts towards achieving inclusive green growth should have positive outcomes for poverty eradication. Despite robust economic growth for more than a decade, eradication of poverty in Africa is not progressing at a rapid enough rate. Indeed, the recent impressive growth in African countries has reduced poverty only marginally (ECA, 2012).

Indicator	Sustainability trend	Remarks on trends
Poverty- proportion of people living below $1.25 per day	➔➔	Improvement on this indicator, but at least 50 per cent of the population in sub-Saharan Africa still lives below $1.25 a day
Income inequality	➘	Income inequality persists with the poor and vulnerable still unable to access opportunities for poverty eradication
Access to water and sanitation	➔➔	Although the proportion of the population served with improved water has increased, Africa remains the most deprived region, and disparities between rural and urban areas persist
Access to electricity and modern energy services	➘	Access to electricity continues to be low despite the continent's great endowment of fossil fuels and renewable resources
Access to decent housing	➔➔	The proportion of urban population living in slums has declined although the absolute numbers continue to grow

3.5.1 Proportion of population living below $1.25 a day

The proportion of the population living below $1.25 has been declining steadily (see figure 42). At least 50 per cent of the population in 16 countries lives in extreme poverty. Egypt, Morocco and Tunisia from the North Africa and Gabon had significantly lower poverty rates during the period 2006-2011 with the proportion of people living on less than $1.25 a day being less than or equal to 5 per cent of the population. The only country in Africa with no one living on less than $1.25 a day was Seychelles. More than 80 per cent of the population in Burundi, the Democratic Republic of the Congo, Liberia and Madagascar was living in extreme poverty conditions.

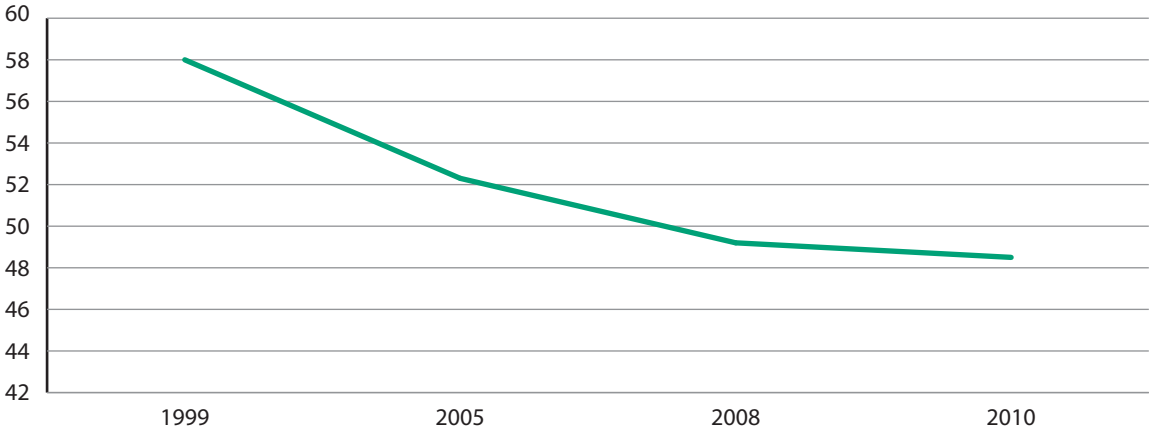
Eight countries in Africa (Burundi, the Democratic Republic of the Congo, the Central African Republic, Liberia, Madagascar, Malawi, Nigeria and Zambia) registered the highest magnitude of poverty of more than 30 per cent. Stronger progress was recorded in Egypt, Gabon, Morocco, Seychelles and Tunisia, with the poverty gap ratio less than 1 per cent. Poverty has decreased in 20 of the 24 countries (ECA, AfDB, the African Union and UNDP, 2013). All in all, poverty in sub-Saharan Africa fell by an average 0.84 percentage points annually. The countries with higher rates of poverty eradication are Burkina Faso, Ghana, Malawi, Mali, Mozambique, Rwanda, Senegal and Uganda. An increase in poverty levels has been recorded in Chad, Côte d'Ivoire, Egypt and Zimbabwe.

3.5.2 Income inequality

Africa continues to record one of the highest income inequalities among the regions of the world as indicated by the Gini coefficient and the proportion of the national income or consumption associated with different segments of the population. For instance, according to ECA, the African Union, AfDB and UNDP (2013), the poorest quintile's share in national income or consumption show skewed distribution for countries with data. Among African countries, the highest share of income (or consumption) of the poorest 20 per cent of the population was registered in Ethiopia (9.26 per cent) followed by Egypt (9.24 per cent) and Burundi (8.96 per cent).

The Gini index ranged between 29.8 per cent (Ethiopia) to 65.8 per cent (Seychelles), indicat-

Figure 42: Proportion (%) of the population living below $1.25 a day in Africa (excluding North Africa)



Data source: (United Nations, 2013) The MDG report 2013

ing high inequality in the distribution of income or consumption expenditure among individuals or households within countries (see figure 43). It was above 50 per cent in 10 countries. The data obtained from pilot countries, such as Mauritius, indicate that the distribution of income or consumption expenditure among individuals or households improved in 2006/07 compared to 2001/02.

In line with the high income inequalities in Africa, basic services are not accessed equally among the population. The worst affected include the poorest 20 per cent in most countries, making it difficult to tackle poverty and reduce vulnerabilities of this population segment. Integrating inclusive green growth principles in poverty eradication programmes will ensure that the concerns of the poor are appropriately addressed through equitable access to opportunities, including employment, reducing their vulnerability and ensuring livelihood improvements through the sustainable use and management of ecosystems goods and services.

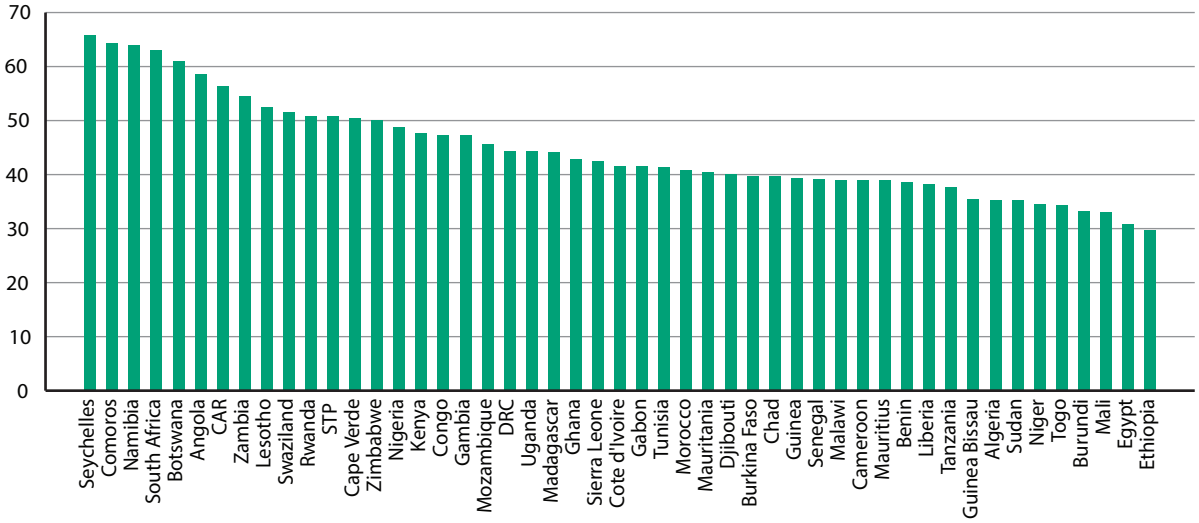
3.5.3 Access to water and sanitation

Water and sanitation, which previously had not been adequately addressed in many national poverty reduction strategies, is gaining importance in sustainable development-related programmes in Africa. The Millennium Development Goal commitment of halving the proportion of people without sustainable access to safe drinking water by 2015 was met globally in 2010, five years ahead of the target date, but the situation still threatens quality of life in many rural and urban areas in Africa (ECA and others, 2013). The target for basic sanitation is, however, far from being achieved, with a staggering 650 million people lacking access to adequate sanitation.

The proportion of the population using improved sanitation facilities and adequate excreta disposal facilities is low in sub-Saharan Africa compared to the global average. Access to improved sanitation facilities in North Africa was much better than in sub-Saharan Africa (see figure 44).

In 2010, 330 million people in sub-Saharan Africa lacked access to clean water and nearly 590 million lacked access to proper sanitation facilities. People living in rural areas continued to be disproportionately underserved, with only 23 per cent of the rural population having access to proper sanitation (ECA, the African Union, AfDB and UNDP, 2013). Also in 2010, the proportion of rural population with access to an improved sanitation facility in 44 countries was much less than in urban areas. In the Democratic Republic of the

Figure 43: GINI Index for selected African Countries



Source: AfDB and others, (2012) - based on the latest Demographic and Health Survey of the respective countries.

Note: STP is Sao Tome and Principe; DRC is the Democratic Republic of the Congo; CAR is the Central African Republic.

Congo, Kenya and Uganda, there were no disparities between urban and rural areas with respect to this indicator. Conversely, the proportion of the rural population that had access to an improved sanitation facility in Malawi and Rwanda was higher than that in urban areas. The worst situation was in Togo where, the percentage of rural population with access to an improved sanitation facility was only 3 per cent. The rural population in most of the countries in Africa had access to an improved sanitation facility.

The proportion of the population with access to improved water sources by subregion is presented in table 2. Between 1990 and 2008, the proportion of the African population that had access to improved drinking water sources increased by 16 per cent from 56 per cent in 1990 to 65 per cent in 2008. Ten African countries are home to two thirds of the global population that lacked access to an improved drinking water source.

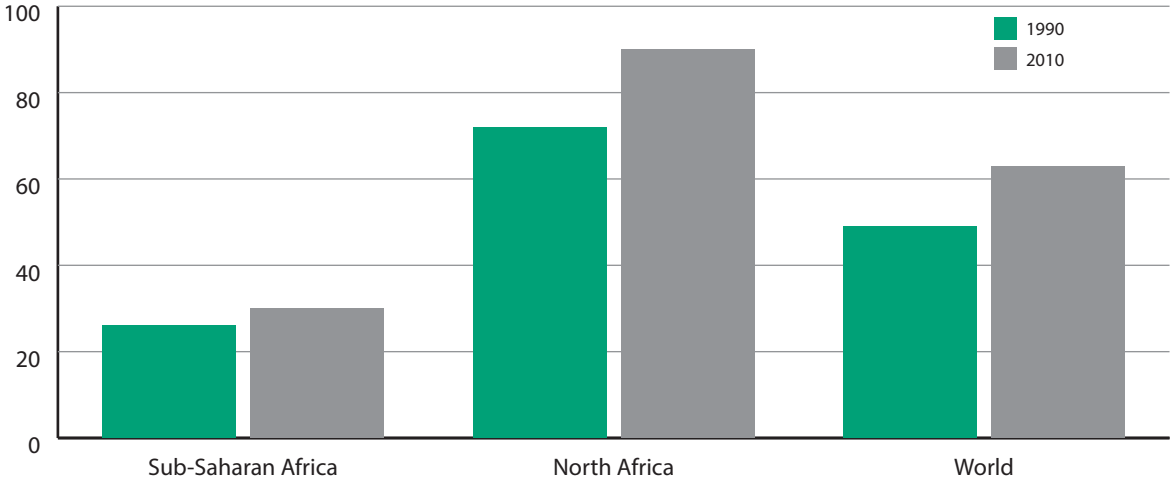
Notably, some countries in sub-Saharan Africa have performed above the regional average (nearly 26 per cent) in increasing access to improved drinking water (table 3).

Lack of basic sanitation undermines efforts to end extreme poverty and disease among the poorest communities in Africa, especially in rural and informal urban settlements. Safe water and sanitation are vital for human health and social dignity, as well as for healthy ecosystems and productive livelihoods. Lack of clean water and poor sanitation are lead causes of child mortality, with over 2,000 daily deaths of children from diarrhoeal diseases, largely spread through poor sanitation and hygiene. In Africa, women and girls are disproportionately affected by the rampant scarcities of clean water and adequate sanitation. From an education perspective, lack of separate sanitation facilities causes more than half of the primary school dropouts among girls.

3.5.4 Access to electricity and modern energy services

Energy poverty is still rife in Africa, with 650 million people having no access to electricity (IEA, 2012). 2012 was declared the International Year for Sustainable Energy for All, focusing on reducing energy poverty. The energy poverty situation is characterized by a large number of people, especially in rural areas and slums, affected by very low consumption of energy, use of dirty or polluting fuels, and excessive time spent collecting fuel to meet basic needs. In 2010, wide variations ranging from 5 to 95 per cent were observed in the percentage

Figure 44: Access to improved sanitation facilities



Source: United Nations (2013). The MDG Report.

of population using solid fuels among countries in Africa (IEA, 2012). According to the International Renewable Energy Agency (IRENA) (2013), in 2010, about 57 per cent of the population had no access to electricity, and 68 per cent were living without clean cooking facilities. IRENA and IEA estimate that "if these current energy access trends continue, in 2030, there will still be 655 million people in Africa (42 per cent of the population) without access to power, and 866 million (56 per cent of the population) without clean cooking facilities, depriving the majority of the population of the opportunity".

Energy poverty is holding back development in many sectors. Some 25 countries in sub-Saharan Africa have a perpetual crisis or frequent power blackouts despite the continent's great endowment of fossil fuels and renewable resources. In 2009, the proportion of the population with access to electricity was highest (greater than 95 per cent) in Algeria, Egypt, Libya, Mauritius, Morocco and Tunisia, and less than 10 per cent in Malawi and Uganda (see figure 45).

Inclusive green growth opportunities exist in expanding access and increasing supply in an efficient, clean, and cost-effective manner. Efforts under the Lighting Africa initiative are lowering the entry barriers to the off-grid lighting market by establishing quality standards, developing a good investment climate, and supporting product development, while educating consumers on the benefits of renewable energy, such as so-

Table 2: Proportion of total population served with improved water (%)

Subregion	1990	1995	2000	2005	2008
West Africa	49	54	58	61	64
Southern Africa	63	65	68	72	74
North Africa	81	82	83	84	84
Eastern Africa	38	40	44	49	51
Central Africa	46	48	51	53	54
Africa	56	58	61	64	65
World	77	80	83	86	87

Source: WHO/UNICEF Joint Monitoring Programme for Water and Sanitation. Available from www.wssinfo.org/data-estimates

Table 3: Selected countries in sub-Saharan Africa that have performed above the regional average in terms of the proportion of their 2010 population that gained access to improved drinking water sources since 1995

Country	Population in 2010 (millions)	Water supply coverage in 2010 (%)	Population that gained access to improved sources of drinking water since 1995	Millennium Development Goals progress	Proportion of 2010 population that gained access to improved drinking water sources since 1995 (%)
Malawi	14.9	83	7.2	on track	48.4
Burkina Faso	16.5	79	7.5	on track	45.5
Liberia	4.0	73	1.7	on track	42.8
Ghana	24.4	86	10.3	on track	42.3
Namibia	2.3	93	0.9	on track	40.6
Gambia	1.7	89	0.7	on track	37.7
Rwanda	10.6	65	3.3	not on track	30.7
Sierra Leone	5.9	55	1.6	not on track	27.0
Togo	6.0	61	1.6	not on track	26.1
Sub-Saharan Africa	856	61	221	not on track	25.8

Source: UNICEF (2012). Progress on drinking water and sanitation: An update. http://www.unicef.org/media/files/JMPreport2012.pdf

lar lighting products. In 2010, more than 134,000 solar portable lamps that had passed Lighting Africa quality tests were sold in Africa, providing more than 672,000 people with cleaner, safer, better lighting and improved energy access (World Bank, 2012c).

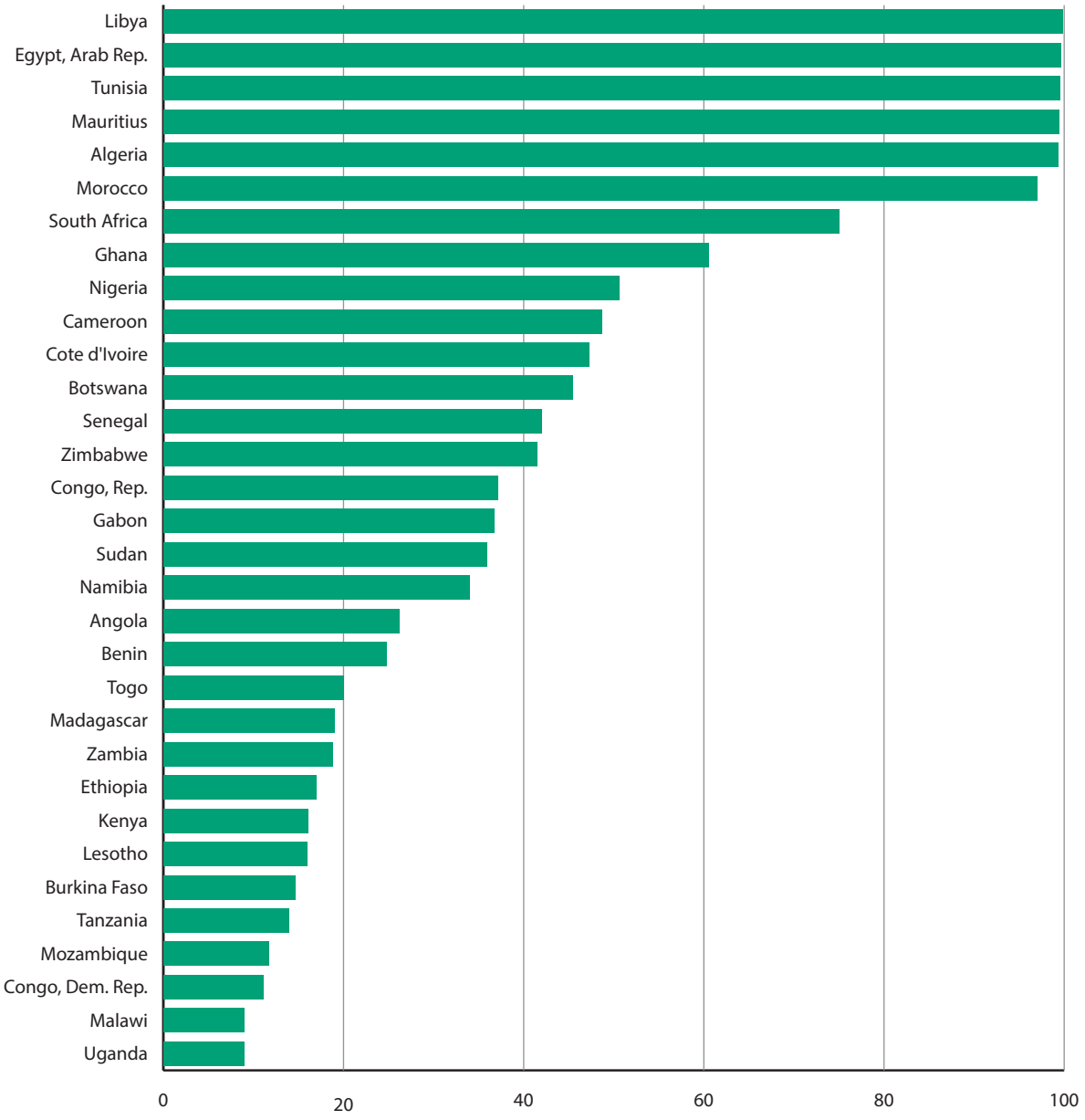
3.5.5 Access to decent housing

In general, progress has been made in reducing the proportion of the urban population of Africa living in slums. This rate declined by 13.45 per cent (from 70 per cent in 1990 to 61.7 per cent) in 2010 (UN-Habitat 2014). Across North Africa, the proportion of city dwellers living in slums fell to 13.3 per cent in 2010 from 34.4 per cent in 1990, as shown in figure 46. Despite the reduction in the proportion of urban population living in slums, the absolute number of slum dwellers continues to grow, driven largely by demographic changes and the acceleration in the pace of urbanization.

3.5.6 Conclusion

Limited progress has been made in eradicating poverty across Africa. The continent is not on track towards achieving the Millennium Development Goal of halving the number of people living in extreme poverty by 2015. Income inequality persists with the poor and vulnerable still unable to access opportunities for poverty eradication. Although the proportion of the population with improved water sources increased by 16 per cent from 1990 to 2008, Africa is still the most deprived region in terms of access. Disparities continue between rural and urban areas. Despite its vast endowment of fossil fuels and renewable resources, energy poverty is still rife in Africa, with 650 million people

Figure 45: Electrification rate in 2009

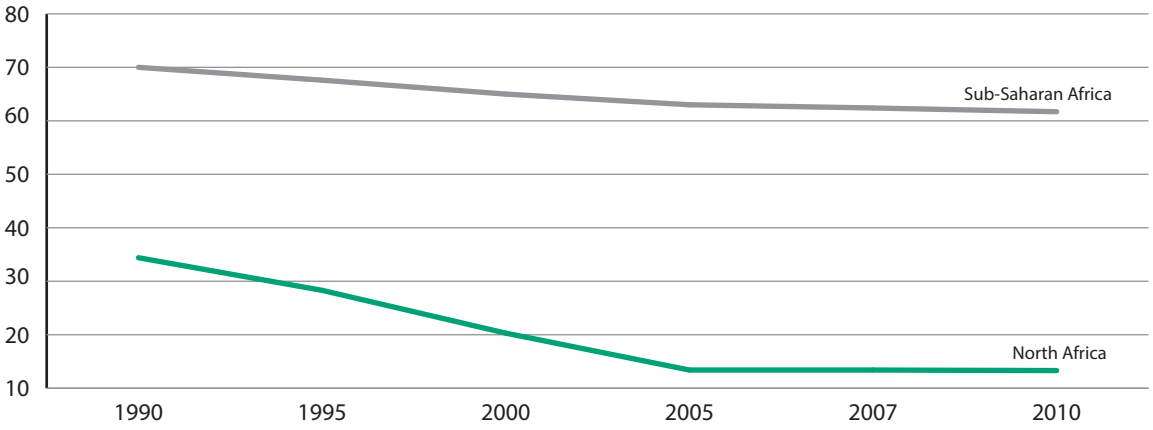


Data source: Data source: World Bank. Data, Access to electricity (% of population). Available from http://data.worldbank.org/indicator/EG.ELC.ACCS.ZS. Accessed on January 1, 2013

having no access to electricity (IEA, 2012). Some 25 countries in sub-Saharan Africa currently have a perpetual crisis or frequent power blackouts. The continent continues to be predominantly energy poor with an increasing reliance on biomass and fossil fuels as primary sources of energy for cooking and lighting by the poor in rural areas.

The proportion of the urban population living in slums has declined, although absolute numbers continue to grow. The limited progress made in eradicating poverty in Africa calls for more institutional and governance reforms that enhance the accountability of the State, raise the quality of service delivery, and improve the overall economic and social environment. Building capacity to manage economic shocks, such as food, fuel, or financial crises, as well as other natural and climate change-related disasters will greatly contribute to eradicating extreme poverty, while enhancing innovation for productivity and sustainability in all sectors will boost such efforts and open up opportunities for economic transformation and inclusive green growth.

Figure 46: Proportion of urban population living in slum (%)



Source: UN-Habitat, Global Urban Indicators – Selected Statistics. Available from http://ww2.unhabitat.org/programmes/guo/guo_indicators.asp. Accessed on january 18, 2014

3.6 Demographic changes

Over the past decade, the trends in demographic changes in Africa have been mixed for rural and urban areas and for different subregions. Demographic changes are important drivers of sustainable development and have direct implications for implementing inclusive green growth (UNDESA, 2013). Africa has witnessed significant changes in its population structure due to increases in dependency ratio, absolute population and urbanization. The rates of urbanization and population growth have, however, been declining since 2011. Sustainable development must include efforts to counter the negative impacts of the burgeoning population on economic, social and environmental development imperatives.

3.6.1 Age dependency ratio

The proportion of dependents per 100 working-age population increased between 2002 and 2011 in sub-Saharan Africa, but at a level that was less than the global average. The age dependency ratio for 2012 is presented in figure 47.

Demographic changes reflected in an increase in dependency ratio has has an adverse impact on sustainable development. Due to increasing unemployment levels, the ability to provide the dependent population with basic socioeconomic needs is decreasing. This may erode the capacity to save and make long-term investments. A higher dependency ratio implies lower tax revenues as more retired and unemployed people pay lower or no income tax, putting a heavy burden on the

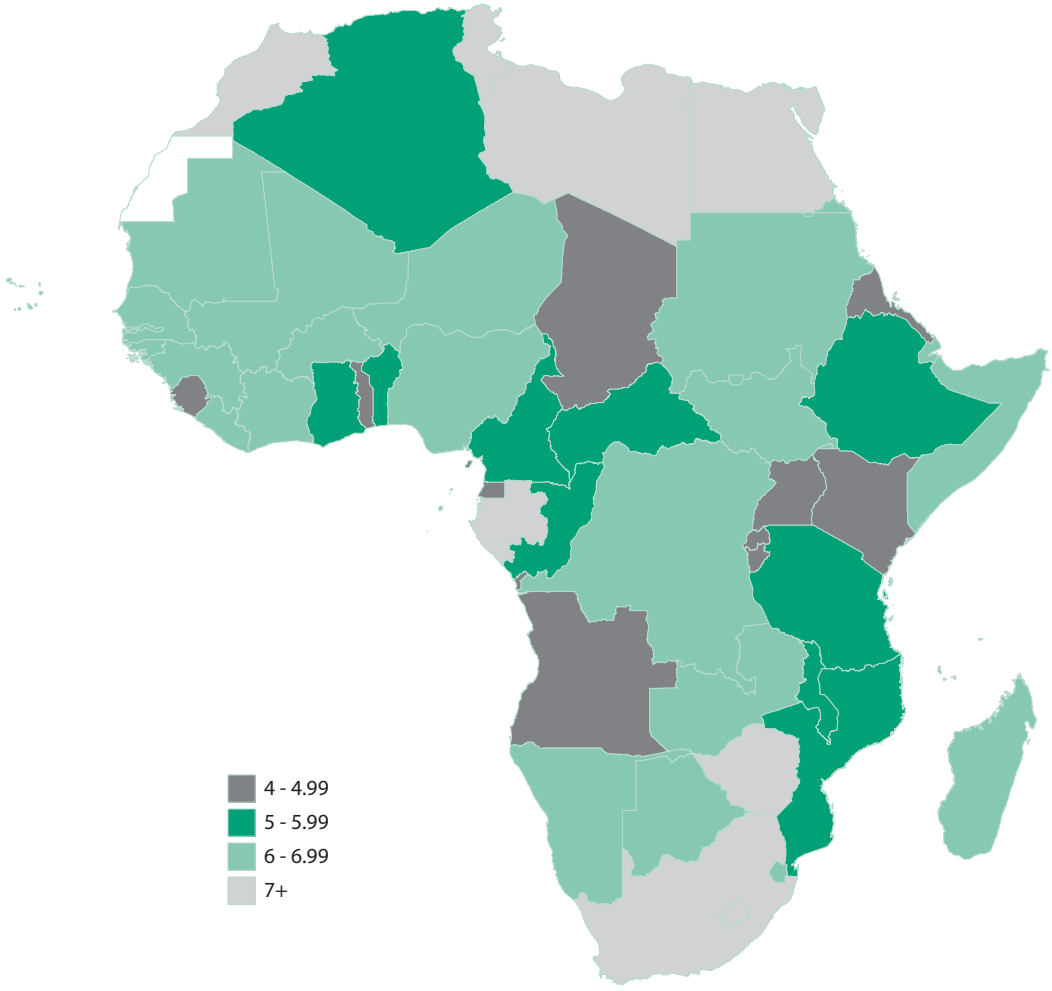
Indicator	Sustainability trend	Remarks on trends
Demographic changes: age dependency ratio	↘	The proportion of age-dependent population is rising due to higher unemployment levels among young people
Population growth	→←	The population of Africa continues to rise in absolute terms, but the population growth rates are declining. However, there are significant variations among subregions and even among countries within the same subregion
Human settlement: urbanization	→←	Although the rate of urbanization is generally declining, the urban population in Africa continues to rise and is expected to reach a 50 per cent urbanization rate in 2035

working-age population. This, in turn, is reflected in higher government spending, which puts pressure on government finances and often results in higher tax rates on a declining working population. It further complicates poverty eradication efforts. Inclusive green growth can offer opportunities for creating green jobs that target the unemployed youth.

3.6.2 Population growth

The population of Africa is projected to rise from its current level 1 billion to 1.6 billion by 2030 and by 2050, it is expected to double (AfDB 2011). This trend is accompanied by an increase in the working-age and urban populations. The population growth rates vary significanttly among subregions and even among countries within the same subregion. Between 2002 and 2011, the average population growth rate for sub-Saharan Africa countries increased by 0.01 (from 2.52 to 2.53) while it decreased globally. In 2011, the highest population growth rate of at least 3 per cent was registered in Zambia (4.16 per cent), South Sudan (3.61 per cent), the Niger (3.53 per cent), Liberia (3.31 per cent), Uganda (3.19 per cent), Malawi (3.17 per cent), Eritrea (3.03 per cent), the United Republic of Tanzania (3.03 per cent) and Mali (3.01 per cent). Conversely, the least population growth rate of at most 1 per cent was registered in Seychelles (-0.61 per cent) (negative growth), Mauritius (0.4 per cent), Cabo Verde (0.92 per cent) and Morocco (1 per cent). There were major disparities in the annual population growth rates between

Figure 47: Proportion of dependents per 100 working-age population during the period 2002-2011



Data source: World Bank. Data. Agriculture and rural development. Available from http://data.worldbank.org/indicator/SP.POP.DPND.OL 2013.

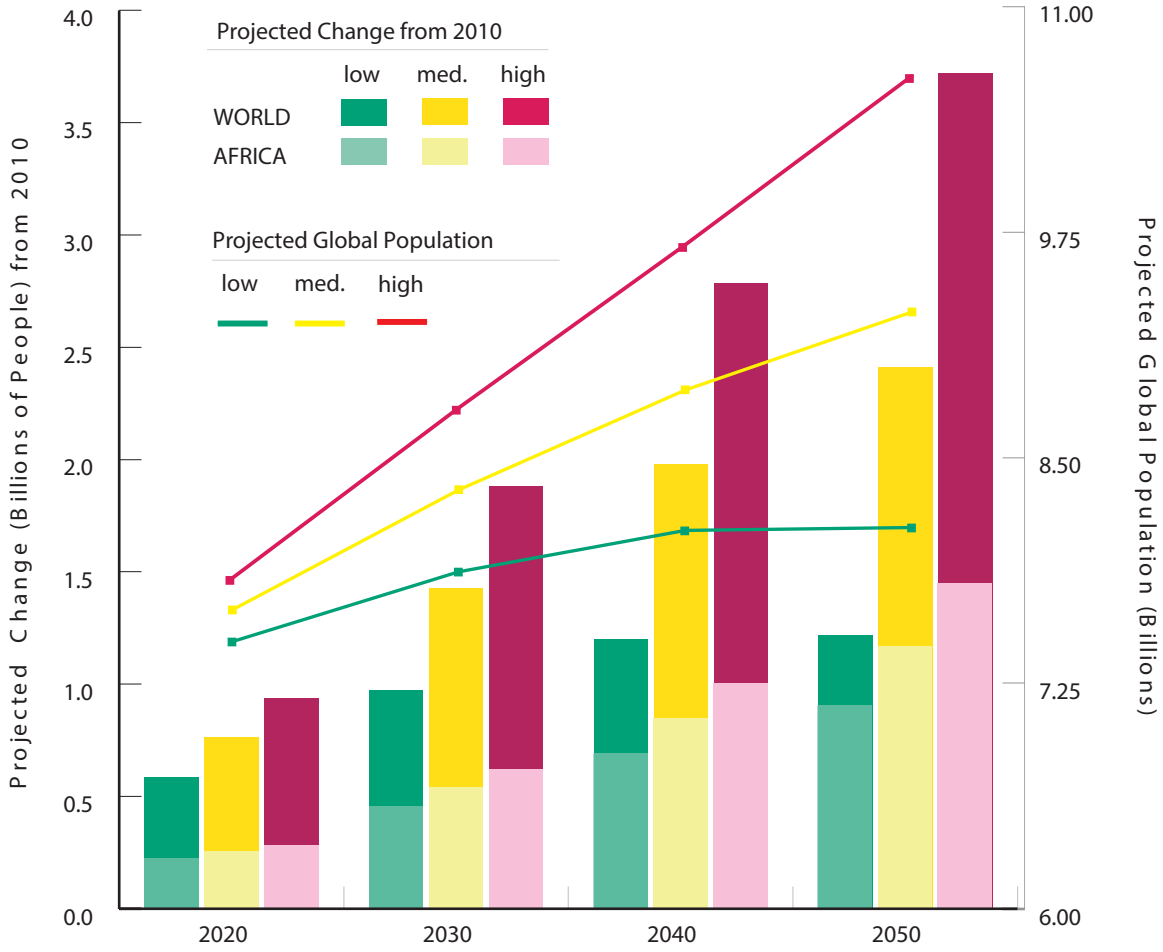
urban and rural areas, with the rural population growth rate being much less than in urban areas for all countries except Swaziland. Overall, there has been an increase in absolute population, with countries, such as the Democratic Republic of the Congo, Egypt, Ethiopia, Nigeria and South Africa having populations that exceed 50 million.

High population puts pressure on the natural resource base and tilts the balance between consumption and production in an unsustainable manner. While policy and institutional settings are key in shaping the prospects of sustainable development and poverty reduction, the rate of population growth is also important (Gupta and others, 2011). Inclusive green growth offers clear opportunities for addressing the implications of a growing population through job creation and the reduction of environmental degradation (AfDB and other, 2012).

3.6.3 Urbanization

More than 90 per cent of future population growth will take place in the large cities in developing countries (AfDB 2011). Africa is experiencing an urban growth rate of 3.23 per cent. This rate os expected to rise to 3.44 per cent during the period 2045-20 50. According to the 2011 revision of the World Urbanization Prospects (UNDESA,

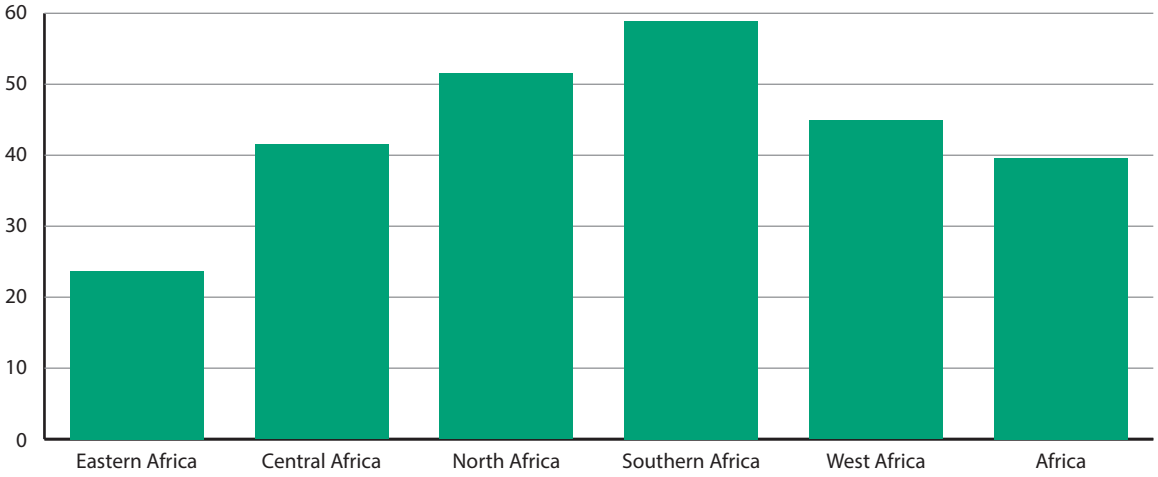
Figure 48: Projected population growth in Africa, 2010-2050



Population growth is occurring more rapidly in Africa than in other regions of the world. As such, this is increasing vulnerability to climate change impacts and undermining sustainable development efforts in the region. Indeed, most sub-Saharan development policy statements note that the subregion's rapid population growth inhibits efforts to eradicate poverty, ensure food security, preserve the environment, and improve well-being.

Source: Created using data from UN Population Division 2011 and UNDESA 2013

Figure 49: Proportion of urban population in African subregions (2011)



Source: UNDESA (2012).

2012), the urbanization rate in Africa is expected to reach a 50 per cent in 2035. The share of the African urban population is currently about 39.6 per cent. Among the subregions of Africa, the share of the urban population is highest (58.9 per cent) in Southern Africa and lowest (23.7 per cent) in Eastern Africa (UNDESA, 2012). In all subregions, despite a continous rise in the proportion of the urban population, the annual rate of change in urbanization has been steadily declining (see figure 49). At the national level, the highest urban population growth rate of 6.21 per cent in 2011 was registered for Burkina Faso, while the highest rural population growth rate of 3.43 per cent was recorded for Zambia (UNDESA, 2012).

3.6.4 Conclusion

There are opportunities in the changing population structures emanating from the benefits of the demographic dividend, which is the accelerated economic growth that may result from a rapid decline in a country's fertility and the subsequent change in the population age structure (UNDESA 2012). The emerging trends in fertility rate decline will create a scenario in which fewer births and a growing working-age population reduce the dependency ratio. This opportunity can be exploited to gain rapid economic growth if the right policies and social and economic investments are made. Lessons can be learned from experiences in Asia and Latin America where countries responded by improving health and education, which attracted foreign investments, and enacting economic policies that spurred job creation and resulted in the accelerated economic growth the demographic dividend so to speak. In addition, efforts are needed to sustain the dividend to motivate people and countries to accumulate greater wealth and increase investments in human capital.

3.7 Gender

Gender equality affects sustainable development outcomes in all sectors. Sustainable development is best achieved through focus on people-centred development that prioritizes the expansion of capabilities, the eradication of poverty and the reduction of all types of inequalities, and promotes the rights of all gender groups, especially women and young people.

3.7.1 African Gender and Development Index

The African Gender and Development Index (AGDI) is a tool for mapping the extent of gender inequality in Africa and assessing government performance in that area. Of the 12 countries where the Index was piloted: Benin; Cameroon; Egypt; Ghana; Mozambique; South Africa; United

Republic of Tanzania; Tunisia and Uganda, scored 50 per cent out of possible maximum score of 102, while Burkina Faso, Ethiopia and Madagascar obtained less. Performance by other countries was ranked lower on AGDI.

The 20-year review of the implementation of the Beijing Platform for Action for 20 years indicates that African countries strived to create awareness about the Platform and reduce gender inequality, but the results were mixed. There are still large variations in the subregions and countries on performance in gender inclusiveness, but the continent as a whole performed better than South Asia and Arab States in 2012 based on Gender Inequality Index (GII) values, with a score of 0.577 for sub-Saharan Africa, compared with 0.568 for South Asia and 0.555 for the Arab States (0.555). Despite this, female representation in parliament was still low, gender imbalances in educational achievement (28 per cent of women had completed at least secondary education, compared with 50 per cent of men) and low labour force participation (31 per cent of women were in the labour force, compared with 81 per cent for men). Between 2002 and 2012, progress was made in reducing the GII value across the continent, but gains were uneven (UNDP 2012a).

There is only limited evidence about the impact of the policies introduced to narrow the gap between men and women in education, agriculture, health, politics and all other sectors of the economy. In education, however, the improvements in gender parity at different levels provide evidence of the impact of gender equality policies.

3.7.1.1 Percentage of parliamentary seats held by women

The percentage of parliamentary seats held by women is increasing globally. However, in Africa, there is greater representation of women in parliament in sub-Saharan Africa compared with North Africa (see figure 50).

Overall, the proportion of parliamentary seats occupied by women increased in 2012 as compared to 2002 in African countries, with the exception of Botswana, Egypt, Eritrea, Namibia and Zambia. For the period starting in 2003, Rwanda had the highest percentage of parliamentary seats occupied by women. In 2012, it was ranked number one for this indicator, with 56.3 per cent of its parliamentary seats occupied by women, followed by Seychelles (43.8 per cent), Senegal (42.7 per cent), and South Africa (42.3 per cent). Also during that year, ten countries: Algeria; Angola; Burundi;

Indicator	Sustainability trend	Remarks on trends
African gender and development index	→←	Mixed results with progress in awareness but persisting gender inequalities in employment, education, access to resources as well as formal and informal political representation
Percentage of parliamentary seats held by women	→←	There has been an increase in parliamentary seats held by women in all regions between 2002 and 2012, but female representation is still low
Proportion of women in non-agricultural wage employment	→←	Women's share in wage employment in the non-agricultural sectors increased in sub-Saharan Africa, but was mostly unchanged in North Africa
Gender gap in payment of earnings	→←	No significant progress has been made in closing the gender pay gap for more than a decade
Women ownership of land	→←	Women's ownership of land is slowly increasing, but still low compared to men
Access to credit facilities	→←	Women's access to formal credit sources remains very low, but an increase in microcredit schemes for poor women through non-governmental organizations and community-based organizations

Mozambique, Rwanda, Seychelles, Senegal, South Africa; United Republic of Tanzania; and Uganda reached the target of having at least 30 per cent of their national parliaments being represented by women. Four other countries: Ethiopia; Lesotho; Tunisia and South Sudan came close to that target, scoring between 26.5 and 27.8.

3.7.1.2 Proportion of women in non-agricultural wage employment

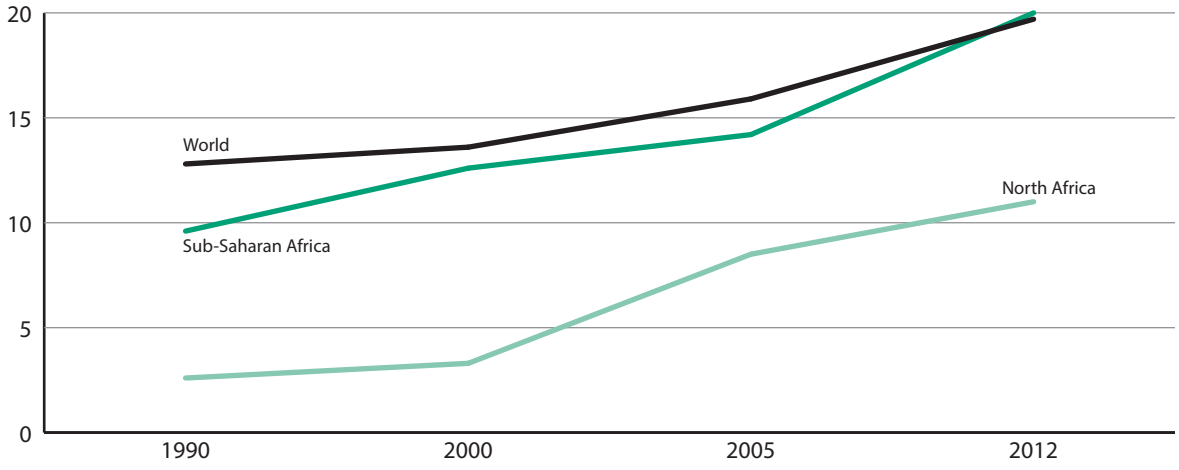
The percentage of women employees in non-agricultural wage employment is increasing globally. Specifically in Africa, notable gains were recorded in 2012 in sub-Saharan Africa, while the in North Africa they were negligible (see figure 50). Women in Botswana, Ethiopia and South Africa comprised a good share (more than 40 per cent) of employment in the non-agricultural sector, while the share in Algeria, of 15 per cent was the smallest in Africa. The degree to which women have equal access to paid employment in the industry and service sectors is important for meeting sustainable development objectives. Opportunities in terms of green jobs in sustainable development programmes should be monitored to ensure that women get their fair share of decent jobs. Women and young people are vulnerable to exploitation in low-paying agricultural and non-agricultural sectors as unskilled labourers working under poor conditions.

3.7.1.3 Gender pay gap

Limited data that provides evidence of progress in narrowing the gender gap in payment of earning are available. Gender disparities against women continue to persist in wages from the formal sector (civil service, public and private) and wages and income from the informal sector and from small agricultural enterprises. Regarding the differences in wages, women are disadvantaged in all income sources, including wages and income in agriculture; civil service; the formal sector, both public and private; informal sector employment; informal sector enterprises; small agricultural household enterprises; and remittances or inter-household transfers. The trends pertaining to gender labour disparities have remained unchanged in Africa. When such data are available, the gender pay gap during the periods 1999-2007 and 2008–2011 was negative but improved slightly (Arbache and others, 2013; Tijdens and Van Klaveren, 2013). Botswana, however, registered a positive five-point change in the gender pay gap (ILO 2013). All in all, no significant progress had been made in closing the global gender pay gap over the past decade (see figure 52).

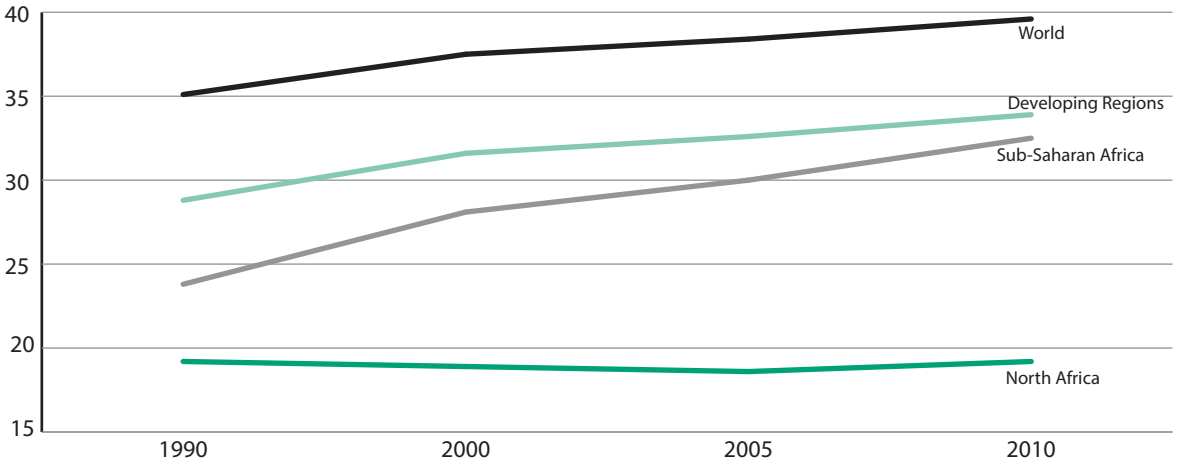
In sub-Saharan Africa, key drivers of gender earnings disparities are labour force education, work allocation with gender selection and different unemployment rates by gender (Arbache and others, 2010). In Ethiopia, for instance, education

Figure 50: Percentage of parliamentary seats occupied by women



Data source: United Nations (2012).The MDG Report

Figure 51: Share of women in wage employment in the non-agricultural sector (%)



Source: United Nations (2012)The MDG Report 2012.

accounts for about one-fifth of pay differences (Tijdens and Van Klaveren, 2012). Women also tend to be working for no pay in family enterprises. Sustainable development and inclusive green growth initiatives must also provide green jobs, which by definition should not unduly worsen the already significant gender wage gaps. Tackling gender disparities in wages requires strategic investments aimed at achieving gender parity in education and reforms in labour laws that are intended to remove discrimination and provide education and raise awareness on gender concerns and opportunities in the labour market.

3.7.1.4 Ownership of land by women

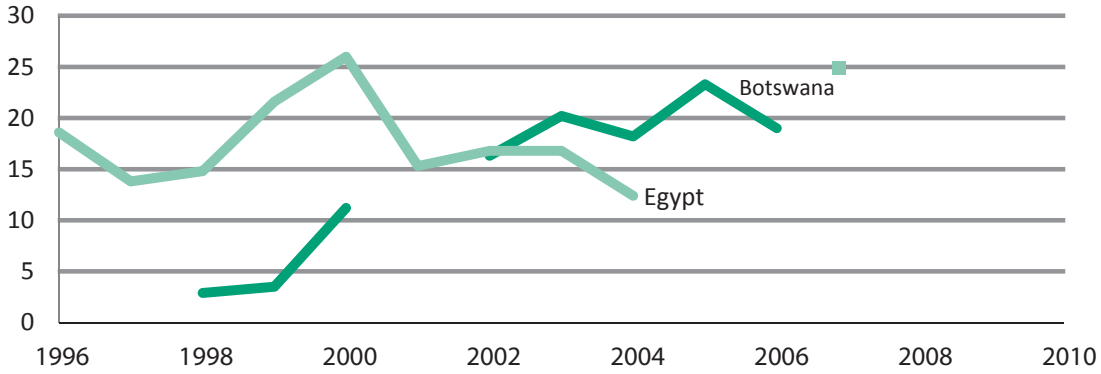
Land as a factor of production is critical to equitable distribution of the benefits of sustainable development. The significance of rights to land and other resources by women, who comprise the majority of smallholder farmers in Africa, determines their access to economic opportunity, improved living standards, food and nutrition security, resilience to shocks, social status, decision-making and political power, and ability to support family health, education and other basic needs. Ownership of land as a special indicator of women's empowerment is very critical for securing the opportunity to translate sustainable development outcomes to the household level. Dealing with land rights contribute to efforts towards achieving many sustainable development goals that ultimately result in poverty reduction. Evidence from Malawi (Bhaumik, Dimova and Gang, 2014) indicates that women's ownership of assets can improve intra-household allocation of income and consumption in a way that augments welfare.

Findings from AGDI studies have revealed that women's access to land is, on average, less than half of that enjoyed by men (ECA, AUC, and AfDB, 2013). This is despite the fact that women contribute 60-80 per cent of the labour used to produce food for both household consumption and sale. The situation remains gloomy despite the many multi-dimensional efforts to tackle gender inequality. Both formal law and customary practice are to blame for the restrictions on women's access, control and ownership of land. Reforms to enact laws protecting the land and property rights of women must be developed and implemented. Proper dissemination and education should accompany the implementation of the laws while enforcement of positive laws should be improved and women should be involved at all stages of national land policy development.

3.7.1.5 Access to credit

Credit is a key determinant of investment in all sectors. Women's access to credit is of special im-

Figure 52: Unadjusted gender pay gap over time in Africa



Source: International Trade Union Confederation (ITUC) Report 2012

portance to sustainable development due to the benefits in brings to households in the form of well-being, education, investment in agriculture, health and other socioeconomic and environmental improvements. It is, however, tied to many gender issues and concerns that limit access, especially in the formal financial markets. Microcredit schemes, which primarily target poor women, are becoming common in Africa.

Despite legal reforms, the AGDI report of 2013 indicates that Africa had little success in securing women's access to and control over economic resources, including credit, with the results showing that the success rate for women is less than half that for men. Access to credit by women, especially in the informal sector, is increasing through microcredit programmes run by NGOs that often combine financial benefit with broader educational and social goals. Limited progress has been made on access to credit by women in the formal business -oriented financial sector. Notably, the institutional framework affecting the effective operations of both forms of credit to women is weak. In recent years, however, women's access to credit has improved more rapidly than access to other economic resources, due to the intensive work done by various organizations and Governments in establishing special credit schemes and programmes targeted at women. However, women's access to formal credit sources, such as bank loans, remains extremely low compared to men's due to lack of regular income, inability to guarantee the loans and limited access to information. While valuable work is being done by community-based organizations and NGOs in improving women's access to credit, more substantial gains and benefits from sustainable development perspectives may not be realized unless Governments take actions to ensure women's access to credit in the formal sector. Building on progress in access to other resources, such as land, will boost women's access to credit and lead to an increase in long-term investments made by women.

3.7.2 Conclusion

Progress has been made on gender equality and empowerment of women, the share of parliamentary seats held by women and the share of women in non-agricultural wage employment. However, there has been no significant success in closing the global gender pay gap. Change in access by women to land has been insignificant. There have been improvements on access by women in accessing credit, especially in microcredit programmes, albeit in a few countries. Despite this progress, the challenge of achieving gender equality is still real in Africa. Significant gaps between rhetorical commitment to gender equity and actual actions still pervade the policy and development arena. Many African countries still rank low on the Gender-related Development Index (UNDP, 2012a). This has elevated the extent of social inclusion of both women and the young people in development processes. Countries must

work towards generating greater economic opportunities for women and young people by creating conditions for them to have greater control over their lives and enhancing their participation in decision-making. Continued improvement in the provision of education for women and young people would provide immense opportunities for them as it would expand the number of options available to them. This would also enhance the health and fertility outcomes of women and children. Strategic policies aimed at enhancing women's and young people's income must take into account gender differences within households perpetuated by cultural practices. Also important to this end are political and social reforms that enhance women's human rights, including freedom, dignity, participation, autonomy and collective action.

3.8 Education

Africa continues to make progress in improving access to education, which is important for enhancing capacity for sustainable development. However, current levels of numeracy and literacy skills are insufficient to meet demands for the rapidly advancing and diversifying economies (Gauci, and Temah, 2011). Human capital must keep pace with economic growth to supply the much needed human resources and bridge the technology and innovation divide needed to facilitate continent's growth and development. Marked progress in meeting the various education targets has been made, although clear outcomes need to be consolidated.

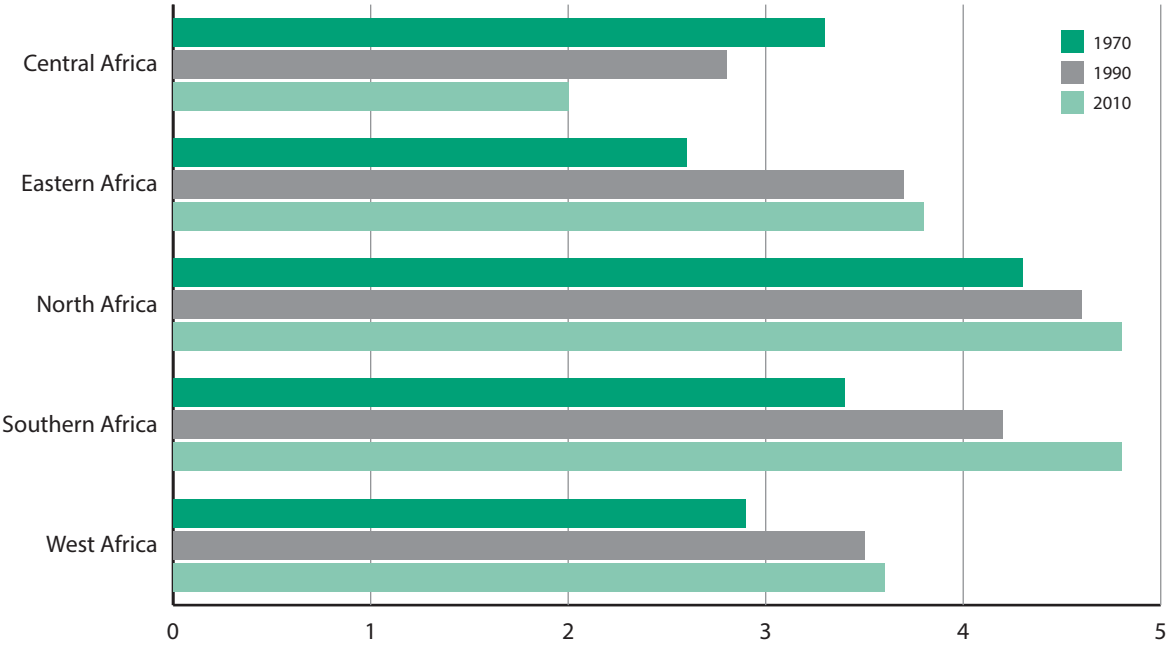
3.8.1 Public and private expenditure on education per capita

Expenditure on education is important in that it heavily complements other investments in sustainable development. Central and North Africa have spent a higher proportion of their gross national income on education relative to other subregions. Their figures are comparable to those of North America, Europe and Central Asia. This indicates a remarkable departure from the past low level of expenditure in education. However, despite the significantly greater proportion of national income spent on education, many African countries (excluding those in North Africa) still register a lower performance in terms of education indicators and their outcome, such as retention, completion and gender parity. Therefore, more effective investment by both public and private entities in education is imperative.

There are wide variations among subregions in the proportion of gross national income (GNI) devoted to education (see figure 53). Spending is highest in North and Southern Africa followed by Eastern and West Africa and lowest in Central Africa. Current levels of numeracy and literacy skills are insufficient to meet demands of the rapidly advancing and diversifying economies (Gauci and Temah, 2011). For education to fully support sustainable development, UNESCO (2012a) recommends that more than 5 per cent of GNI must be devoted to education and the education system must be modelled to emphasize both problem-solving and cognitive development in ways

Indicator	Sustainability trend	Remarks on trends
Expenditure in education	↗	Increasing level of public and private expenditure on education per capita
Education level	↗	Enhanced primary completion rate, as more pupils starting grade 1 reach the last grade of primary schooling
Literacy	↗	Generally positive trend in literacy levels as access to education improves in the region
Gender parity in education	→←	Progress made in both primary and secondary education, but much remains to be done to ensure parity at tertiary levels

Figure 53: Education expenditure as a proportion of gross national income (%)



Source: African Economic Outlook 2013

that deal with current and future development challenges.

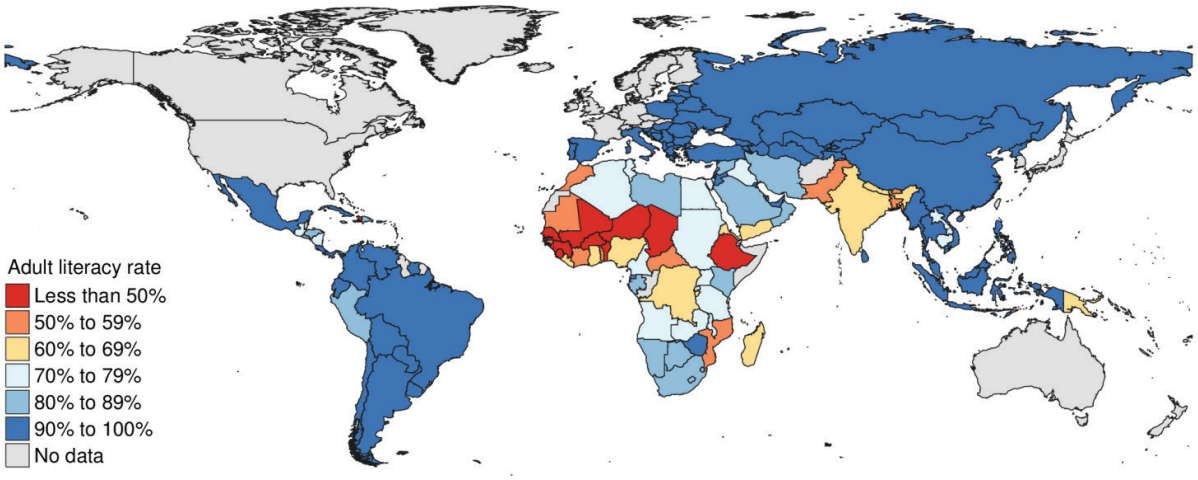
3.8.2 Education level

The primary completion rate has been increasing in sub-Saharan Africa, although it is less than the global average. The gross intake rate at the last grade of primary school in North Africa was higher than in sub-Saharan Africa. Among the 28 countries for which data were available for 2009, only six countries recorded that 80 per cent of students reached the last grade of the primary level, with the rest indicating a lower rate. The worst performer in this indicator was Chad with only 27.8 per cent of its students reaching the last grade of the primary level. According to UNDP (2012a), in African countries, excluding those in North Africa, a child spends an average of 4.7 years in school. This ranges from 1.2 years in Mozambique to 9.4 inSeychelles (UNDP 2012a). As a consequence, the population as a whole is likely to acquire only basic numeracy and literacy from a primary level education, instead of the much needed advanced problem-solving and entrepreneurship skills crucial for technological transformation. Moreover, in many African countries, only 50 per cent of the girls and boys of secondary age are enrolled in school and they record even lower completion rates (UNESCO, 2012a). This situation complicates poverty eradication and youth employment problems, with the low-skilled workforce forced to engage in subsistence activities and work in low-productive sectors.

3.8.3 Literacy

In general, the trend in literacy levels in Africa has been increasing as access to education improves on the back of programmes, such as universal primary and secondary education and provision of subsidies at different levels. However, according to a 2012 report of the UNESCO Institute for Statistics, the lowest literacy rates in 2010 globally were observed in sub-Saharan Africa (see figure 54). Among the 11 countries in the world for which adult literacy rates were below 50 per cent, 10 were in Africa. They were: Benin; Burkina Faso; Chad; Ethiopia; Gambia, Guinea; Mali; Niger; Senegal; and Sierra Leone. The adult literacy rate for sub-Saharan Africa in 2010 was 63 per cent, but wide disparities were recorded at the country level, with the rate ranging from 29 per cent in the Niger and Burkina Faso to 94 per cent in Equatori-

Figure 54: Adult literacy rate



Source: UNESCO Institute for Statistics. Available from www.uis.unesco.org/Pages/default.aspx, September 2012.

al Guinea. The challenge of achieving sustainable development is worsened by low literacy levels. Illiterate adults are less likely to enjoy the benefits of sustainable development, such as green jobs and access to technologies, which would raise their living standards.

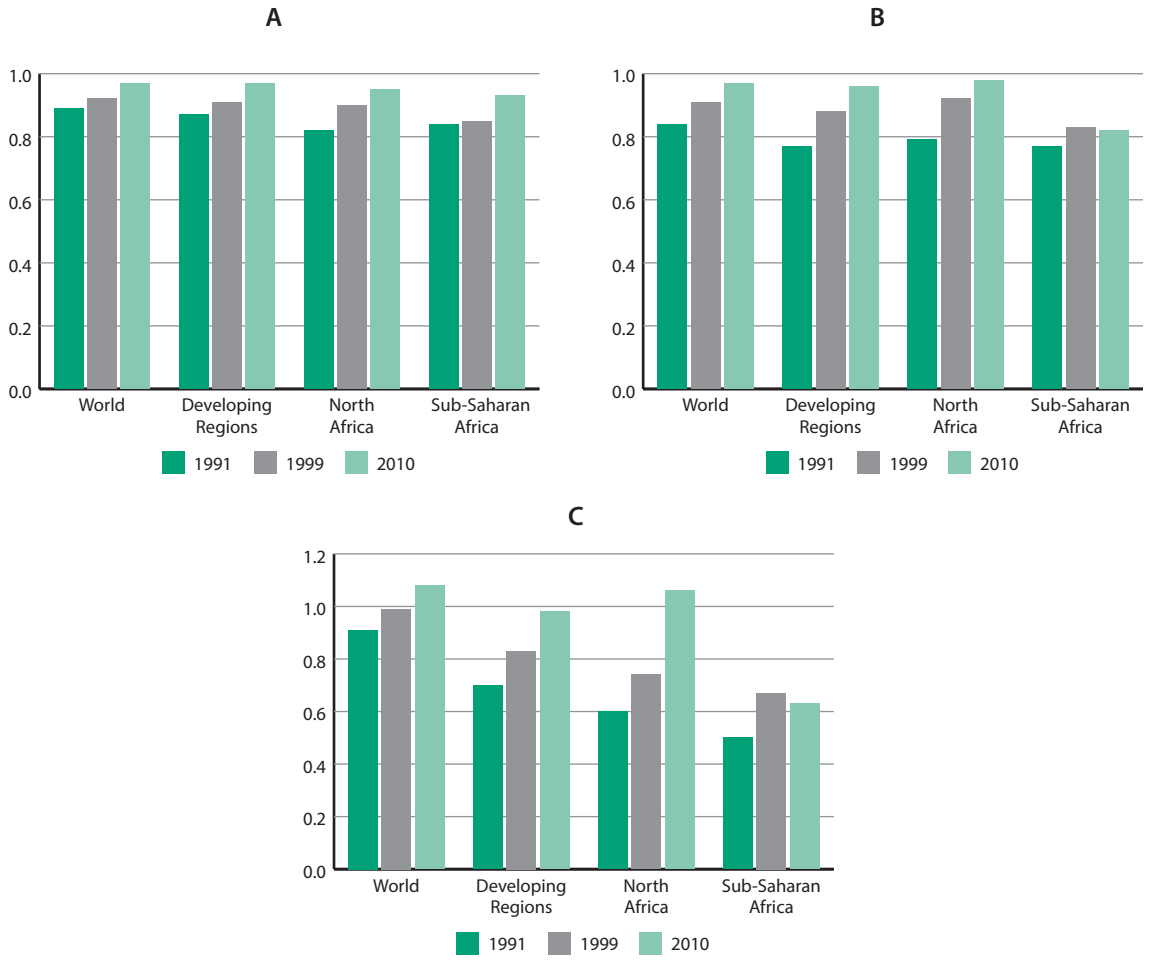
3.8.4 Gender parity in education

Africa would have registered remarkable success in the education sector if key outcomes, such as gender parity were realized at all levels. The continent has made progress in both primary and secondary education, but much remains to be done to ensure parity at tertiary levels. Gender parity in primary, secondary and tertiary education increased between 1990 and 2010 in all subregions (see figure 55). However, between 1999 and 2010, the ratio of girls to boys in terms of gross enrolment in tertiary education declined in sub-Saharan Africa. In 2011, gender disparity in education narrowed in the 15 countries from which data were available data for both 2002 and 2011. Between 2002 and 2011, Ethiopia recorded the highest reduction in gender disparity, followed by Burkina Faso and Senegal. It is encouraging to note that data for 2011 showed that Cabo Verde, Malawi, Mauritius, Rwanda and Senegal posted a gender parity level above 1.0 in primary and secondary education, indicating that in those countries, more girls than boys were enrolled in primary and secondary schools. Ghana and Mozambique had achieved a gender parity index of at least 0.9 in 2011.

3.8.5 Conclusion

Over the years, the education sector in Africa improved steadily with public and private expenditure on education per capita increasing, the proportion of pupils starting grade 1 and completing the last grade of primary school rising, indicating an enhanced primary completion rate, and the adult literacy rate increasing in line with improved access to education facilities. This is attributed to such programmes as universal primary and secondary education and provision of subsidies and incentives at different levels. An enhanced gender parity index is being recorded in most subregions and countries. Achieving sustainable development, including the capacity to innovate, depends on a critical mass of educated and skilled population. Thus, there is a strong need to consolidate gains made in the education sector.

Figure 55: Gender parity index in (A) primary, (B) secondary and (C) tertiary education



Data source: United Nations (2012). The MDG Report

3.9 Health

Human health is both a determinant and an outcome of sustainable development interventions. Health has direct linkages with production and consumption of safe foods. Respecting ecological limits and maintenance of environmental quality also offer human health outcomes. Investment in health programmes for the workforce will enhance labour productivity. The health status of citizens is determined by a country's policy and initiatives for improving access to water and sanitation, clean and modern energy sources, education and reduction of exposure to health risks from poor environmental quality, including polluted water and air. According to WHO (2014), developments in all sectors including pollution-free transport systems, climate-proof housing and settlements, safe drinking water from sustainable water resources, clean energy for all and putting health at the heart of strategies ensure broad public benefits, particularly for the poor and vulnerable. Appreciable progress has been made in various facets of human health in Africa.

3.9.1 Life expectancy at birth

There are many determinants of average life expectancy at birth. Many are related to purposeful intervention by States in all dimensions of sustainable development. The determinants include pollution levels and ambient air conditions such as per capita carbon dioxide emissions, gross domestic product per capita, per capita health expenditure, average years of school, existence of an effective national health-care system, percentage of adults living with HIV, number of physicians per 1,000 people, and existence or absence of ex-

Indicator/theme	Sustainability trends	Remarks on trends
Life expectancy at birth, by gender	↗	Rising due to general improvement in health, awareness and reduction in early deaths from HIV&AIDS
Morbidity/health status and risk	↗	Declining incidences/prevalence of tuberculosis, HIV/AIDS and malaria
Mortality (under 5)	↗	Significant reduction in under 5 mortality and death of pregnant mothers due to improving health care, immunization and prevention and treatment
Prevention and treatment	↗	Increased access by populations to preventive and treatment services due to increasing coverage and access to medical facilities and personnel
Atmosphere/air quality	↗	Declining incidences of air pollution related health problems due to increased awareness and prevention
Public expenditure on health per capita	→←	Low, but improving health sector investment level

tended periods of conflict. Life expectancy is also a reflection of other sustainable development interventions in education, agriculture and food security and the overall levels of both public and private expenditure in health programmes. Generally, Africa is witnessing a positive trend in life expectancy. Life expectancy at birth in both 2002 and 2011 was higher for female than for males in all countries except Botswana, Zimbabwe, Lesotho and Swaziland (see figure 56).

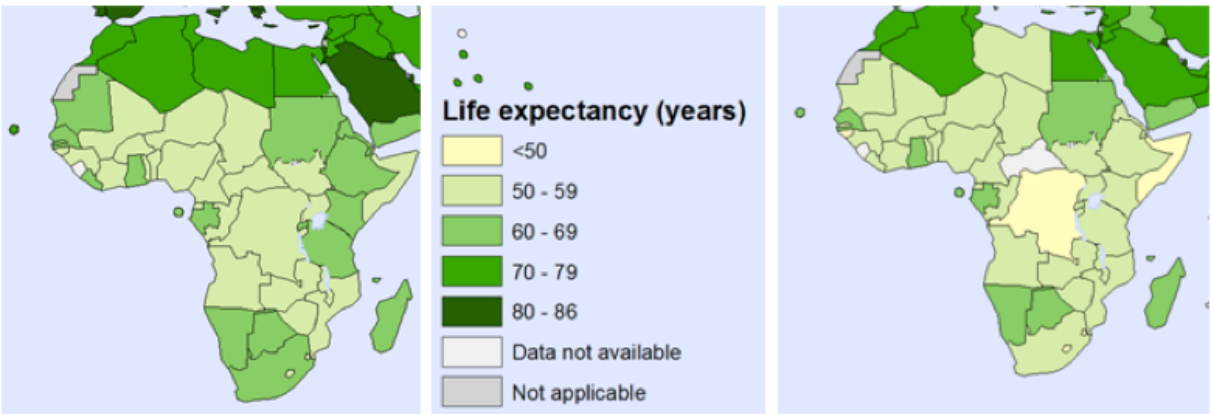
Based on data from pilot countries, as shown in figure 57, life expectancy at birth has been on the rise. The life expectancies at birth for Tunisia, Morocco and Mauritius are higher than those for Cameroon, Senegal, Rwanda and Botswana.

The positive trend in life expectancy in Africa is the result of improved health facilities, more awareness about disease management and reduced early deaths from HIV/AIDS due to improved access to anti-retroviral drugs. The increasing availability of antiretroviral therapy has reduced the spread of the epidemic and mortality due to HIV/AIDS has been decreasing since around 2005, allowing life expectancy at birth to increase again: average life expectancy at birth in Africa was 50 years in 2000, whereas it was 56 years by 2011.

3.9.2 Morbidity/health status and risk

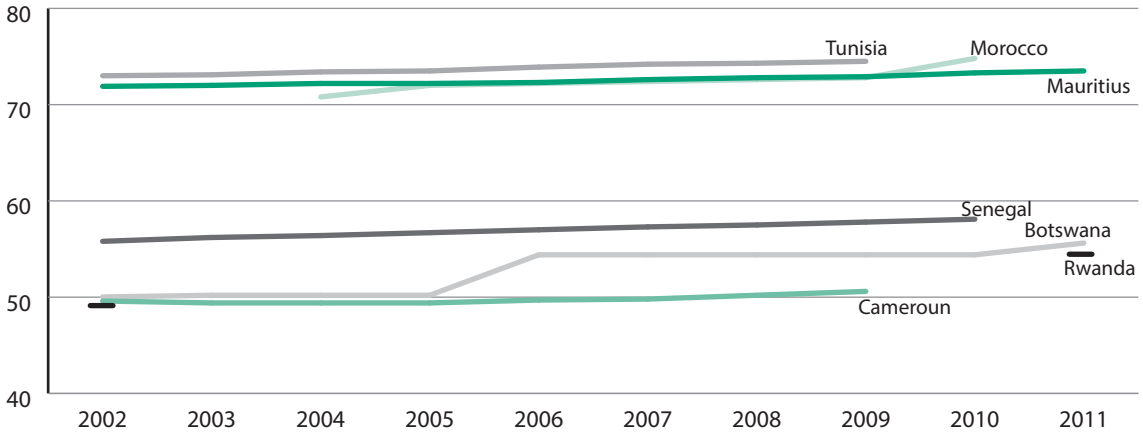
Although sub-Saharan Africa continues to have the highest HIV prevalence rate than any other

Figure 56: Life expectancy at birth for females (left) and males (right)



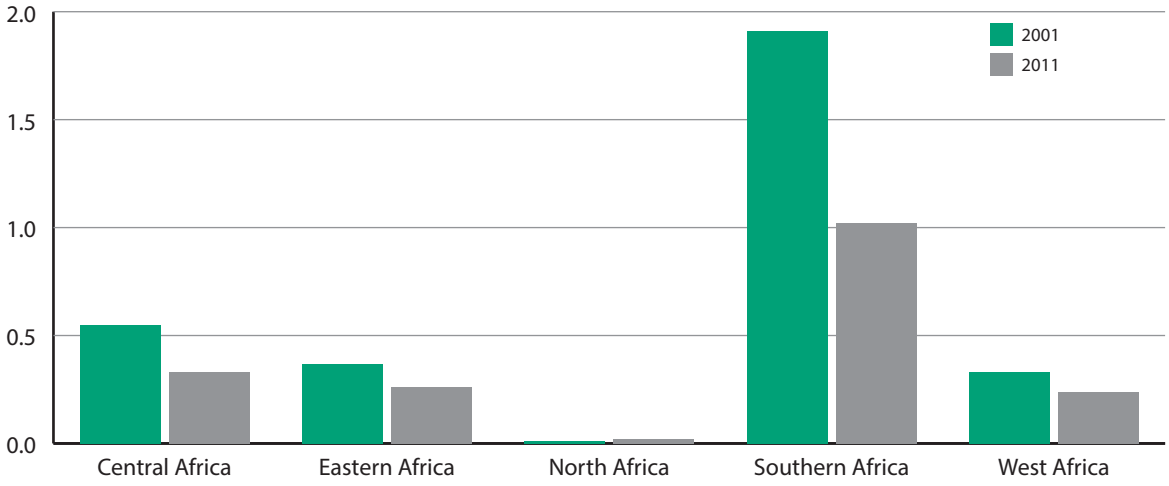
Source: World Health Organization, Global Health Observatory Map Gallery. Available from http://gamapserver.who.int/mapLibrary/app/searchResults.aspx.

Figure 57: Trends in life expectancy at birth in selected countries



Data source: Statistical Offices of the respective countries, 2013.

Figure 58: HIV incidence rate (estimated number of new HIV infections per year per 100 people aged 15-49)

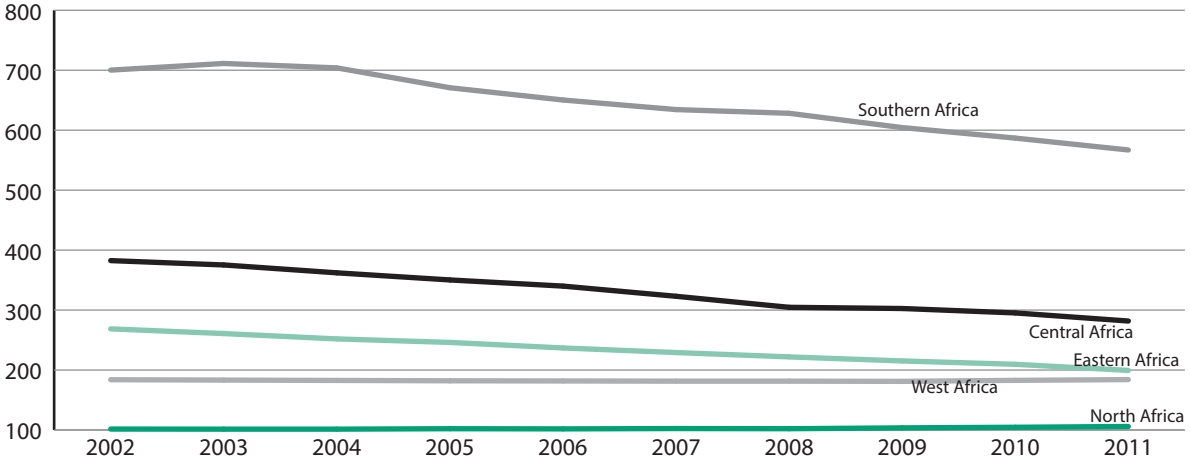


Data source: United Nations (2013). The MDG Report 2013

subregion, this has been on the decline. The estimated number of new HIV infections per year per 100 people aged 15-49 in 2011 was less than in 2001 in all subregions (see figure 58). The proportion of new HIV infections per year was highest in Southern Africa and lowest in North Africa. There were variations in HIV prevalence rates between African countries, with prevalence estimates ranging from 0.1 per cent to more than 20 per cent in some countries. In Tunisia, Egypt and the Comoros, HIV prevalence in 2011 was 0.1 per cent of the adult population, while around 10-15 per cent of adults in Malawi, Mozambique, Zambia, Namibia, and Zimbabwe were infected with HIV. Lesotho, Botswana and Swaziland were the worst affected by HIV, with prevalence rates of 23.3, 23.4 and 26.0 per cent respectively. Adult HIV prevalence in Eastern Africa exceeded 5 per cent in Tanzania, Kenya and Uganda in 2011.

There has been a decline in the incidence of tuberculosis (see figure 59) in most subregions of Africa. Between 2002 and 2011, the incidence of tuberculosis per 100,000 people decreased in 37 countries and increased in 14 countries. Many countries have enacted legislation to make tuberculosis treatment free and mandatory.

Figure 59: Trends in the incidence of tuberculosis (per 100,000 people)



Data source: World Bank, Data, Incidence of tuberculosis (per 100,000 people). Available from. data.worldbank.org/indicator/SH.TBS.INCD..Accessed June 1, 2013

3.9.3 Maternal mortality rate

The trends in maternal mortality rate based on 1990, 2000 and 2010 estimates presented in figure 60 showed declining trends in all subregions. The figure also shows that maternal deaths per 100,000 live births has been highest in sub-Saharan Africa. The maternal mortality rate was highest in sub-Saharan Africa, with 850 deaths per 100,000 live births and lowest in North Africa with 230 deaths per 100,000 live births. Between 1990 and 2010, North Africa reduced its maternal mortality ratio by 66 per cent, developing regions by 45 per cent and sub-Saharan Africa by 41 per cent. At the country level, Nigeria, with 40,000 deaths, accounted for 14 per cent of global maternal deaths in 2010 and was among the two countries in the world that accounted for one third of the global maternal deaths. Moreover, the Democratic Republic of the Congo, the Sudan, Ethiopia and the United Republic of Tanzania accounted for 3 to 5 per cent of global maternal deaths each. Maternal mortality was high (more than 300 deaths per 100,000 live births) in 32 countries and extremely high (more than 1,000 deaths) in Chad and Somalia.

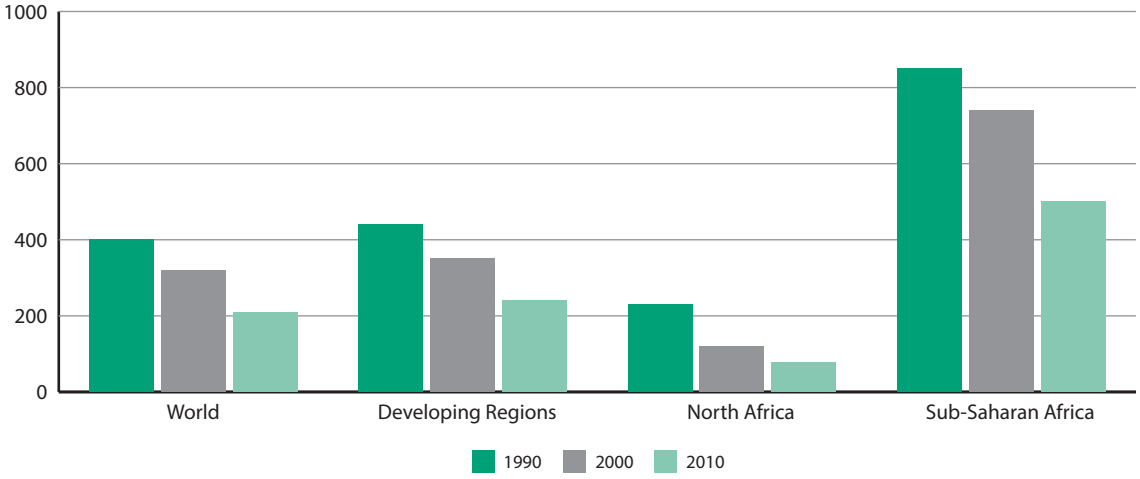
3.9.4 Under-five mortality

There has been a significant reduction in child mortality rates across the region (see figure 61). Between 2002 and 2012, the under-five mortality rate was lowest in North Africa and it fell by 34 per cent in Southern Africa, 27 per cent in Eastern Africa, 23 per cent in West Africa and 21 per cent in North Africa. The most progress was recorded in North Africa, where the under-five mortality rate declined by 54 per cent (from 89 deaths per 1,000 live births in 1990 to 41 deaths per 1,000 live births in 2011). The general improvement in health status in Africa is attributed to concerted efforts to improve investment in the health sector targeting prevention and strengthening health systems. The incidences of malaria, which were on the decline, can be attributed to preventive measures, including the increasing proportion of children under five sleeping under treated mosquito nets and a general increase in levels of awareness and education, especially of young mothers, about malaria management and immunization, health education and postnatal care practices.

3.9.5 Prevention and treatment

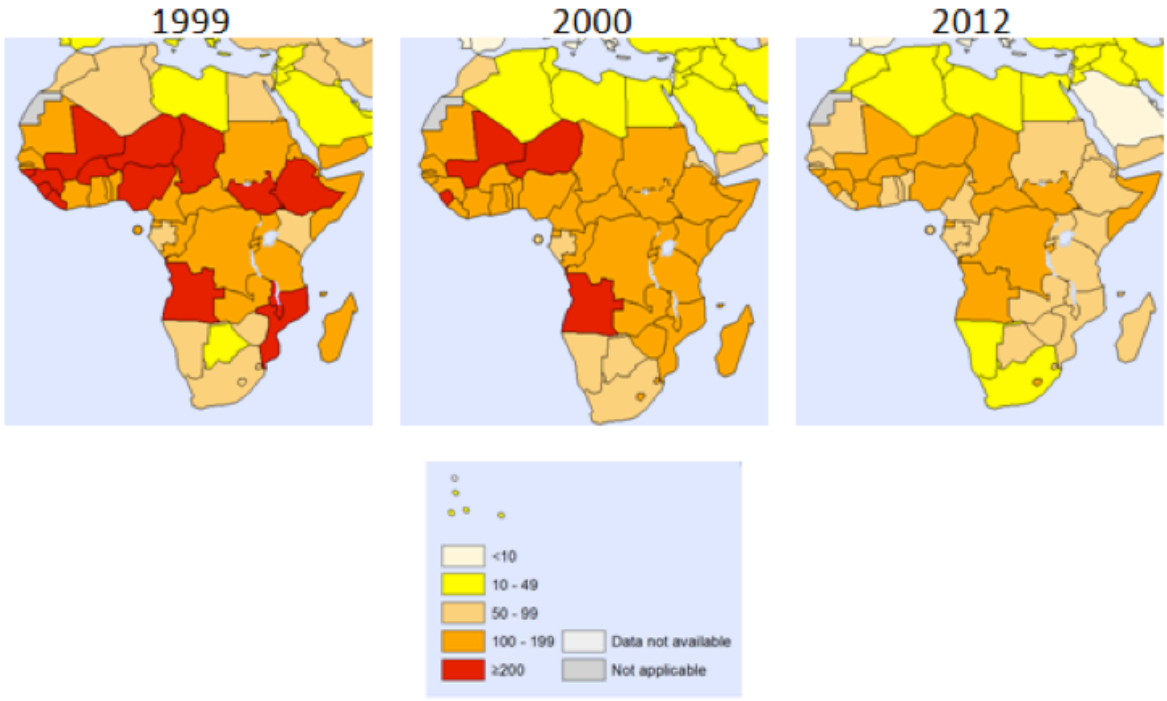
There is remarkable progress on immunization coverage of major childhood diseases, including measles. The other diseases preventable by child immunization include diphtheria, haemophilus influenza type b (HiB), hepatitis A and B, pertussis (whooping cough), polio and varicella (chicken pox). The measles immunization coverage, often

Figure 60: Maternal deaths per 100,000 live births



Data source: United Nations (2013). The MDG Report 2013.

Figure 61: Under-five mortality rate (probability of dying by age 5 per 1,000 births) in 1999, 2000 and 2012



Source: UNICEF and others (2013), UNICEF, 2013

considered as proxy to immunization coverage for the other diseases, among 12-23 month olds increased in 2010 compared to 2000 in all subregions, and globally. The highest increase of 36.36 per cent (or 20 percentage points) was observed in sub-Saharan Africa. In 2010, all regions had measles vaccine coverage among 12-23 month olds of at least 75 per cent, and North Africa had coverage of 96 per cent. The measles immunization coverage among one-year olds increased in 2010 compared to 2002 in 40 countries and declined in 5 countries while there was no change in 3 countries out of the 48 for which data were available for both 2002 and 2010. The highest increase of 136.7 per cent (or 41 percentage points) was observed in Nigeria. In 2010, 24 countries had

measles vaccine coverage of over 80 per cent, and 16 countries had coverage of 90 per cent or more. However, Chad and Somalia achieved low measles coverage of less than 50 per cent in 2010. As of 2010, Seychelles, Mauritius, Eritrea, Gambia, and Cabo Verde had achieved national vaccination targets of 95 per cent of one-year old children while Swaziland, Burkina Faso, Botswana, Malawi, Ghana, Angola, the United Republic of Tanzania, Sao Tome and Principe, Burundi, Zambia and the Sudan – with at most 5 percentage points adrift – are also on track.

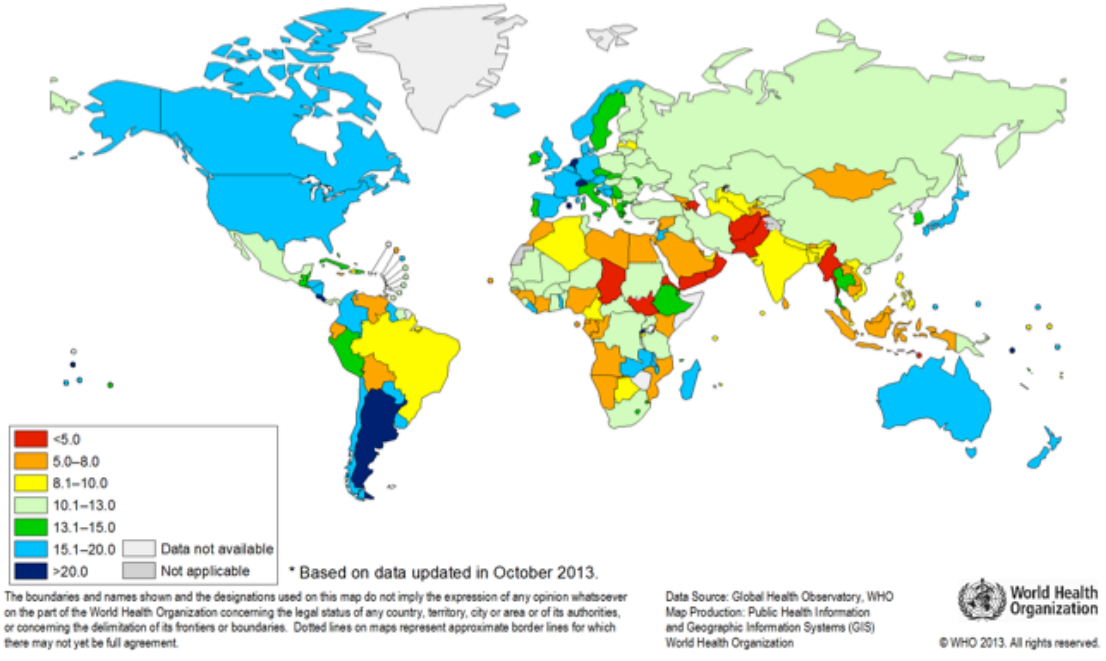
3.9.6 Atmosphere and air quality

Indoor and outdoor air quality (as measured by annual mean concentration of fine particulate matter, PM10 and PM2.5 – particulates smaller than 10 or 2.5 microns respectively) is an important determinant of health. The sources of this fine particulate matter include emissions from the industrial and transportation sectors, and dust storms. It is linked to prevalence of respiratory infections. PM10 concentration was decreasing in sub-Saharan Africa, and globally. Between 2002 and 2010, average PM-10 concentrations decreased by 45 per cent in sub-Saharan Africa (from 97.27 in 2002 to 34.77 in 2010) and by about 32 per cent globally. Between 2002 and 2010, average PM-10 concentrations had decreased in all countries. The state of a country's technology and pollution control is an important determinant of particulate matter concentrations.

3.9.7 Health-care access and delivery

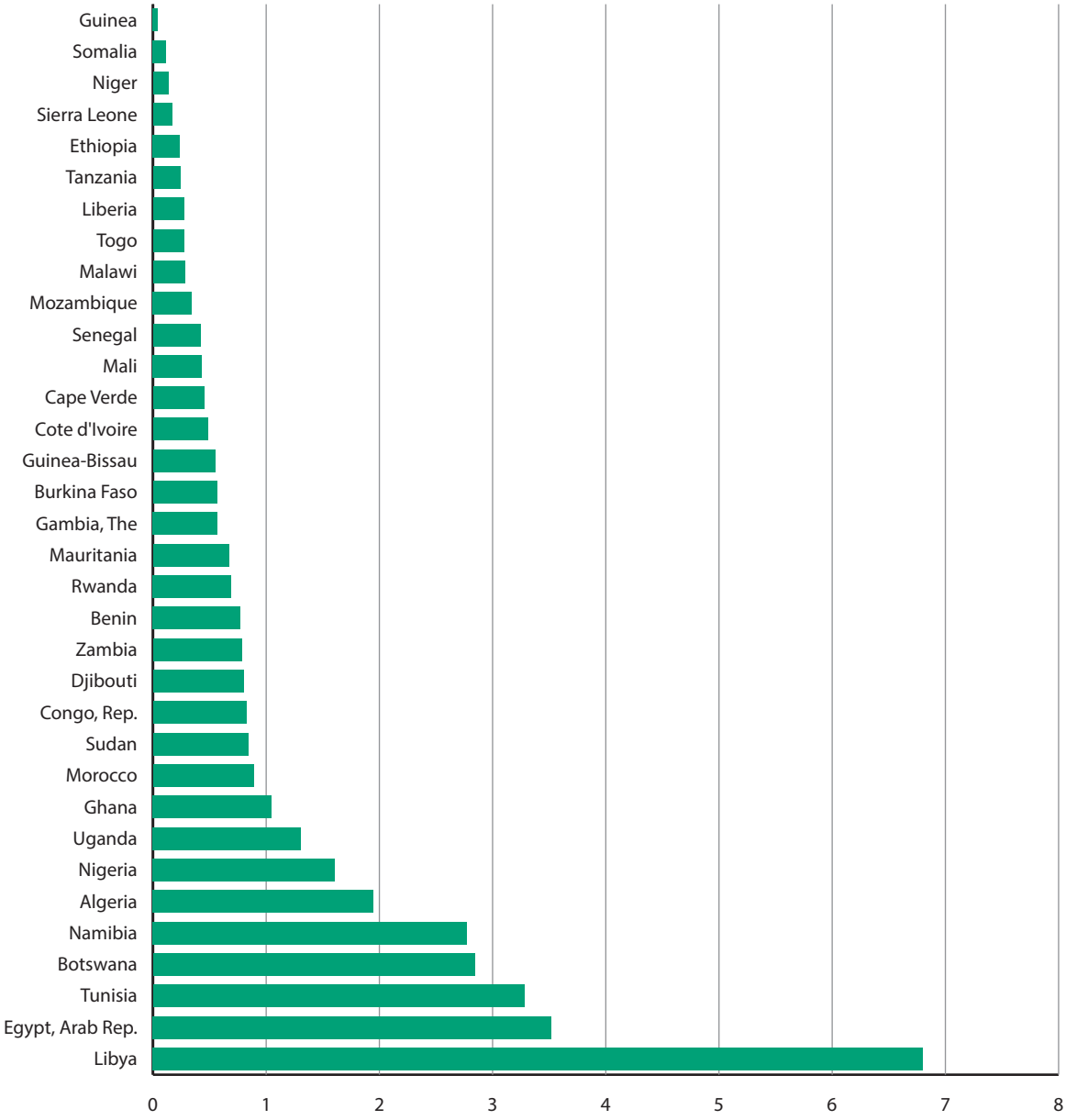
Arguably improved health status as a result of increased investment in the health sector has direct benefits for sustainable development. It results in enhanced labour productivity, improved educational outcomes, increased savings and investments and demographic dividends due to reduced dependency ratio. Compared to the rest of the world, Africa has a low but improving health sector investment level. The general public expenditure in health as a percentage of total expenditure in 2011 is shown in figure 62. Total health expenditure covers the provision of health

Figure 62: General public expenditure as a percentage of total expenditure (in US$), 2011



Source: WHO, Global Health Observatory, General government expenditure on health as a percentage of total government expenditure. Available from www.who.int/gho/health_financing/government_expenditure/en/. Accessed on December 15 2013

Figure 63: Nurses and midwives per 1,000 people in 2010



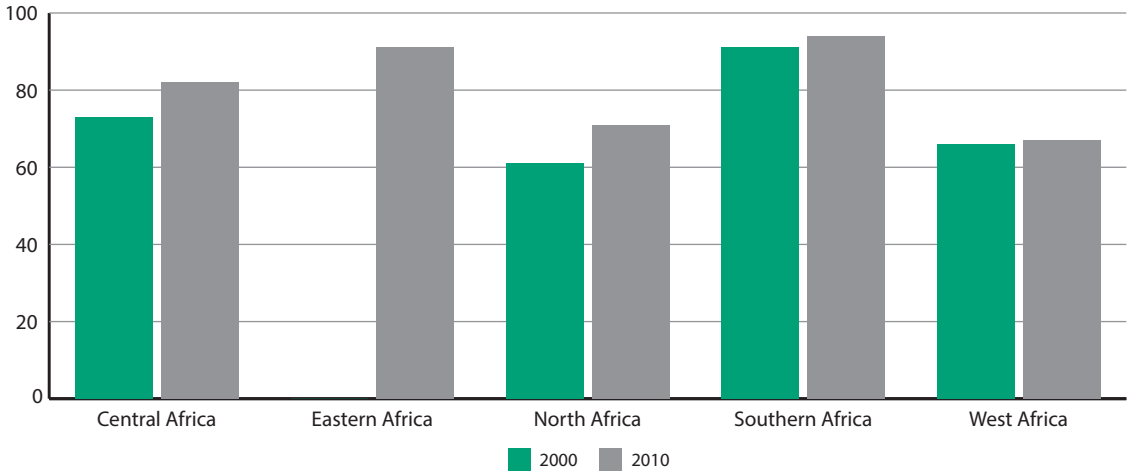
Data source: World Bank, Data, Nurses and midwives (per 1,000 people) Available from data.worldbank.org/indicator/SH.MED.NUMW.P3..Accessed June 7, 2013

services (preventive and curative), family planning activities, nutrition activities, and emergency aid designated for health, but does not include provision of water and sanitation. Health expenditure per capita (current US$) has been rising globally and in sub-Saharan Africa, but remains much less than that the global average.

3.9.7.1 Number of nurses and midwives

The investments have been targeting specific aspects of health systems including human resource capacity. Figure 63 shows how the number of nurses and midwives (per 1,000 people) varies by country in Africa in 2010. Libya had the highest number of nurses and midwives with 6.8 per 1,000 people while Guinea had the lowest with just 0.043. In 2010, 25 countries out of the 34 countries for which data were available had an average of less than one nurse and midwife for every 1,000 people. Primary data collection from 13 pilot countries showed an increasing trend for Botswana and Ethiopia and a declining trend in Kenya and Mauritius.

Figure 64: Percentage of women (15-49) who received antenatal care during pregnancy from skilled health personnel, at least once



Economic Commission for Africa subregional grouping

Data source: MDG indicators database. Accessed on June 6, 2013

3.9.7.2 Antenatal care coverage

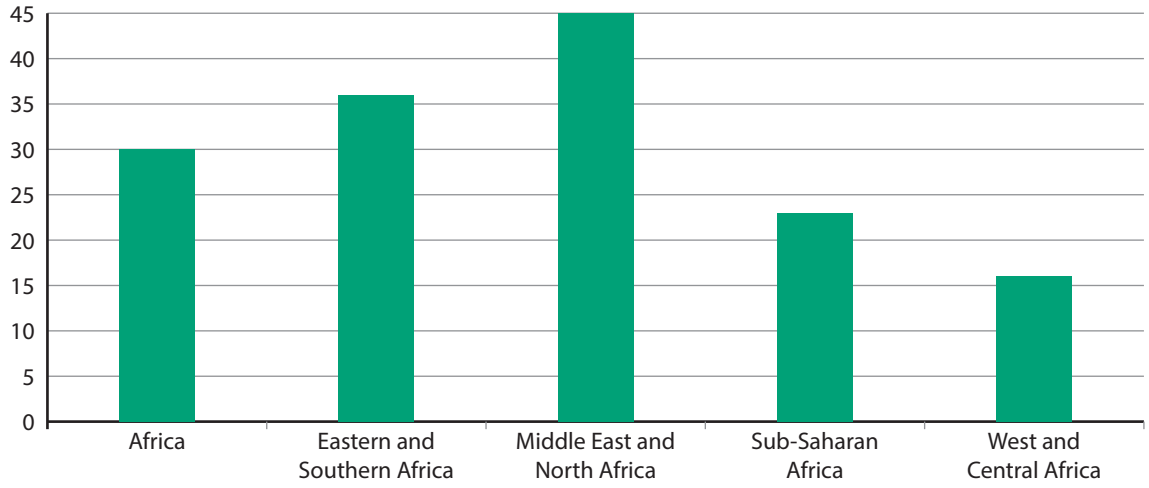
The percentage of women who received antenatal care during pregnancy from skilled health personnel at least once has increased in all the subregions (see figure 64). In 2010, 94 per cent of women in Southern Africa had at least one antenatal visit with a skilled provider during pregnancy while the indicator was lowest in West Africa where only 67 per cent of women had at least one antenatal visit with a skilled provider during pregnancy.

The World Health Organization (WHO) recommends a minimum of four antenatal visits, comprising interventions such as tetanus toxoid vaccination, screening and treatment for infections, and identification of warning signs during pregnancy. In sub-Saharan Africa, during the period 2000-2009, fewer than 50 per cent of pregnant women received the recommended minimum four visits while in North Africa 66 per cent of pregnant women received the recommended minimum four visits in 2009. Since 2000 at least 90 per cent of women in 27 countries and between 53 and 89 per cent of women in 20 countries had at least one antenatal visit with a skilled provider during pregnancy. In Somalia, South Sudan, Ethiopia and the Niger, the coverage was less than 50 per cent. Antenatal care coverage in Burundi was extremely high, with 99 per cent of women having at least one visit. In 21 of the 40 countries for which data were available, at least 50 per cent of women had four or more antenatal care visits. On the other hand, at least 70 per cent of women in South Africa, Ghana, Swaziland, the Congo, Botswana, Sao Tome and Principe, Cabo Verde, Namibia, Lesotho and Guinea Bissau had at least four visits. There are major disparities between urban and rural areas in respect to this indicator, with the percentage of urban women aged 15-49 years who received antenatal care during pregnancy at least once significantly higher than for rural women.

3.9.7.3 Contraceptive prevalence rate

As an indicator of health, population, development and women's empowerment, contraceptive prevalence rate serves as a proxy measure of access to reproductive health services that are essential for meeting many of the Millennium Development Goals, especially the child mortality, maternal health, HIV/AIDS and gender related goals. Contraceptive prevalence rates had a rising trend in all regions and globally. Contraceptive prevalence in sub-Saharan Africa is much less than the rate for North Africa. Figure 65 shows that the percentage of women aged 15-49 using

Figure 65: Percentage using contraception among women aged 15-49 (2006-2010)



Source: United Nations Statistics Division, UNdata, Contraceptive prevalence rate – modern method. Available from http://data.un.org/Data.aspx?d=GenderStat&f=inID%3a18. Accessed on Jauary 1, 2013.

contraception during 2006-2010 is lowest in West and Central Africa.

During 2006-2010, contraceptive prevalence rate (the proportion of women aged 15-49 who were using contraception varied widely across the countries in Africa. Among women of reproductive age, contraceptive prevalence rates ranged from 5 per cent in Chad to 76 per cent in Mauritius.

3.9.8 Conclusion

Despite steady progress on the health front,Africa confronts the world's most dramatic public health crisis (WHO, 2014). The WHO 2014 report indicates that HIV/AIDS continues to devastate region, which has 11 per cent of the world's population, but 60 per cent of the people with HIV/AIDS. Additionally, more than 90 per cent of the estimated 300-500 million malaria cases that occur worldwide every year are in Africa, mainly in children under five years of age; however, most countries are moving towards better treatment policies. Most African countries are making good progress on preventable childhood illnesses, including polio and measles, through increased immunization coverage. Some hurdles still remain, including the high rate of maternal and newborn mortality and the strain on African health systems from life-threatening communicable diseases coupled with increasing rates of non-communicable diseases such as cancer, hypertension and coronary heart disease. Strengthening the fragile health system and addressing basic hygiene and health education are the best strategies for addressing Africa's health challenges. Sustainable development programmes that improve or preserve the quality of water, air and other environmental goods and services will lower the national health budgets and contribute to ensuring a healthy labour force.

3.10 Agriculture and food security

Most people in Africa derive their livelihood from the use of natural resources and this is linked to the main economic sector, agriculture, which employs about 60 per cent of the total population. Agriculture contributes an average of one-third to the continent's GDP (AfDB, 2013[8]; UNDP, 2012b) and is the basis for food security. The rate at which Africa's growth is consuming natural resources (i.e. forests, topsoil, and fish stocks) is alarming. Given this trend, the challenges of climate change and rapid population growth, agriculture like other sectors must pursue a sustainable development

8 AfDB Transforming Africa's Agriculture for inclusive growth and food security.http://www.afdb.org/en/news-and-events/article/afdb-transforming-africas-agriculture-for-inclusive-growth-and-food-security-12391/posted on 23/10/2013.

Indicator	Sustainability trends	Remarks on trends
Food Production Index	↗	General improvement in food production largely from cereals and live-stock production
Agricultural production	↗	Increasing agricultural production due to intensification and expansion of area under arable and irrigated farming
Agricultural practices	→←	Not much progress, but opportunity for green agriculture technology as well as modern biotechnology
Food security	↘	Africa's food security and nutrition situation is worsening and progress has been slow in meeting the Millennium Development Goal target on hunger
Nutritional status	→←	Overall improvement in nutritional status, but challenges with child nutrition, malnourishment and disease persist

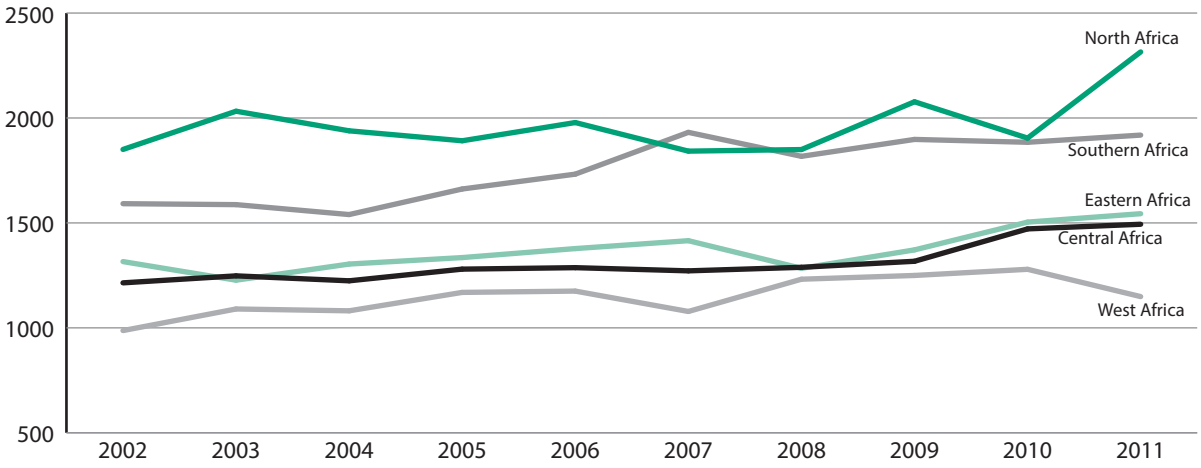
pathway, including through inclusive green growth for optimal outcomes.

3.10.1 Food Production Index

Globally, food productivity is increasing. The global cereal yield (kg per hectare) increased from 3079.52 in 2002 to 3708.16 in2011. In sub-Saharan Africa, average yield in kilogram per hectare of cereal increased from 1139.32 in 2002 to 1361.45 in 2011 (see figure 66). Cereal yield (kg per hectare), during 2002- 2011, in West Africa was lower while it was higher in North and Southern Africa than in the other subregions of Africa (FAO, IFAD and WFP, 2013).

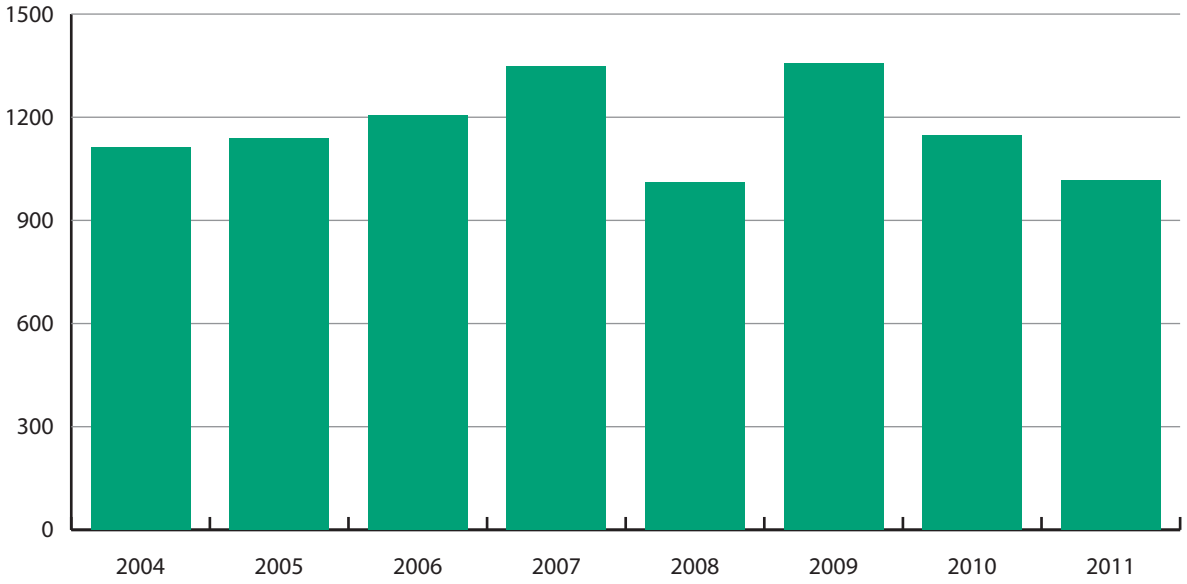
Food production index increased in all countries in Africa except Seychelles. The increase ranged from 1.76 inMauritius to 104.99 in Angola. In 2011, food production index was greater than 100 indicating that food production in 2011 increased compared to 2004-2006 in all countries except the Gambia, Seychelles, Namibia and Mauritius. Countries with a relatively high food production index (>150) in 2011 were Angola, Malawi, Rwanda and Cameroon. Between 2002 and 2011, cereal yield (kg per hectare) decreased in 13 countries and increased in 37 countries. Moreover, average yield in kilograms per hectare of cereal in 2011 was highest (7441.9) in Mauritius and lowest (177.8) in Cabo Verde.

Figure 66: Trends in cereal yield (kg per hectare)



Data source: World Bank, Data, Cereal yield (kg per hectare). Available from data.worldbank.org/indicator/AG.YLD.CREL.KG..Accessed June 7, 2013

Figure 67: Average yield in kilogram per hectare of cotton in Burkina Faso



Data source: Survey questionnaire completed by the Burkina Faso Statistical Office, 2013.

3.10.2 Agricultural production

Between 2002 and 2011, the average yield of legumes (including beans, peas, lentils, peanuts and soybeans), measured as kilograms per hectare of harvested land, increased by 9.8 per cent in Mauritius and by 27.5 per cent in Morocco. Although cotton production in Africa is not significant on a global scale, a large number of African countries remain heavily dependent on cotton. The trend in average yield in kilograms per hectare of cotton in Burkina Faso is presented in figure 67 showing an increase between 2002 and 2007, but a decrease between 2009 and 2011.

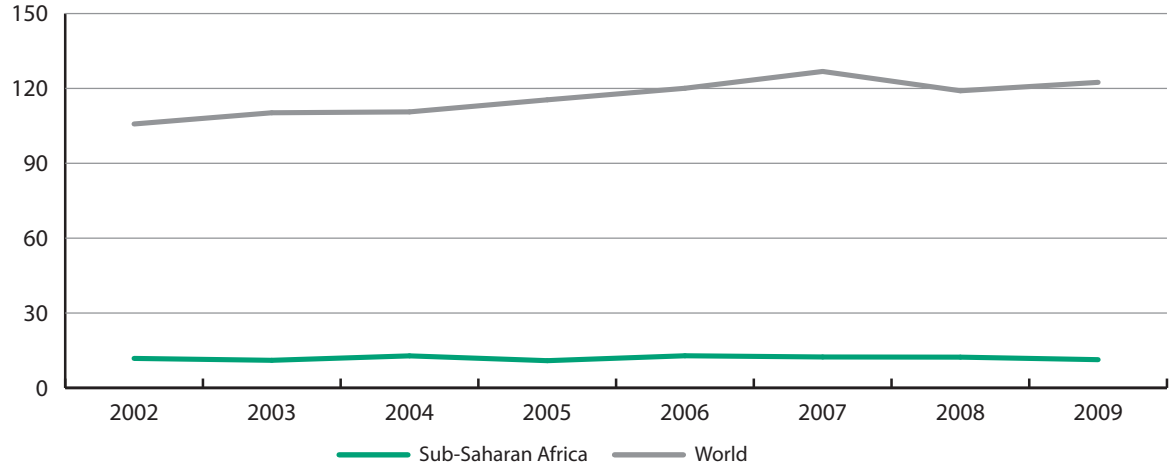
3.10.3 Agricultural practices

Agricultural productivity is dependent on improved practices, technologies and other inputs such as fertilizer use. From 2002 to 2009, fertilizer consumption in sub-Saharan Africa was much lower than the global average (see figure 68). In 2009, the most recent year for which data were available, the average fertilizer consumption in sub-Saharan Africa was only 11.31 kilograms per hectare of arable land, much lower than the global average of 122.45 kilograms per hectare.

Fertilizer use

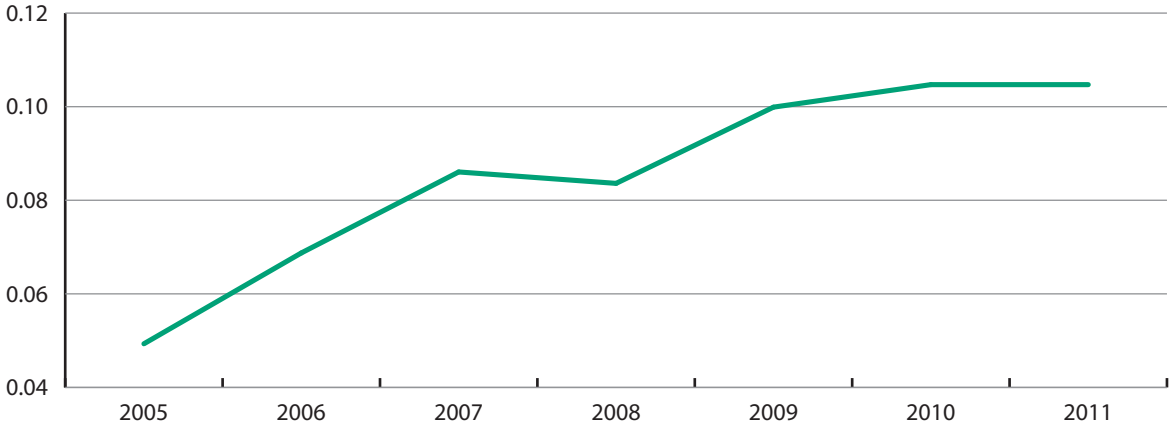
Among the countries with data for both 2002 and 2009, the amount of fertilizer consumed in Egypt and Mauritius was much higher than in other countries. From 2002 to 2007, the amount of fertilizer consumed in kilograms per hectare decreased in 19 countries, the highest decrease in kg/hectare of 88.81 was Mauritius followed by Libya (26 kg/hectare). The amount of fertilizer consumed by another 19 countries increased in 2009 compared to 2002. The highest increase in kg/hectare of 70.29 was registered in Egypt (from 432.53 kg/hectare in 2002 to 502.82 kg/hectare in 2007). The decrease in fertilizer in some countries is linked to reduced subsidies and increased cost of fertilizer. Fertilizer may have negative implications for sustainable development especially when improper use exposes ecosystems to pollution and downstream effects of erosion and eutrophication of water bodies at levels that threaten aquatic biodiversity. The effect of fertilizer use on land and water resources is taking centre stage in the debate on sustainable intensification of agricultural production in Africa.

Figure 68: Fertilizer consumption (kg per hectare of arable land)



Data source: World Bank, Data, Fertilizer consumption (kilograms per hectare of arable land). Available from data.worldbank.org/indicator/AG.CON.FERT.ZS.. Accessed June 9, 2013

Figure 69: Area under organic farming, as a percentage of total area under farming in Africa



Data source: Research Institute of Organic Agriculture FiBL and International Federation of Organic Agriculture Movements IFOAM. http://www.organic-world.net,

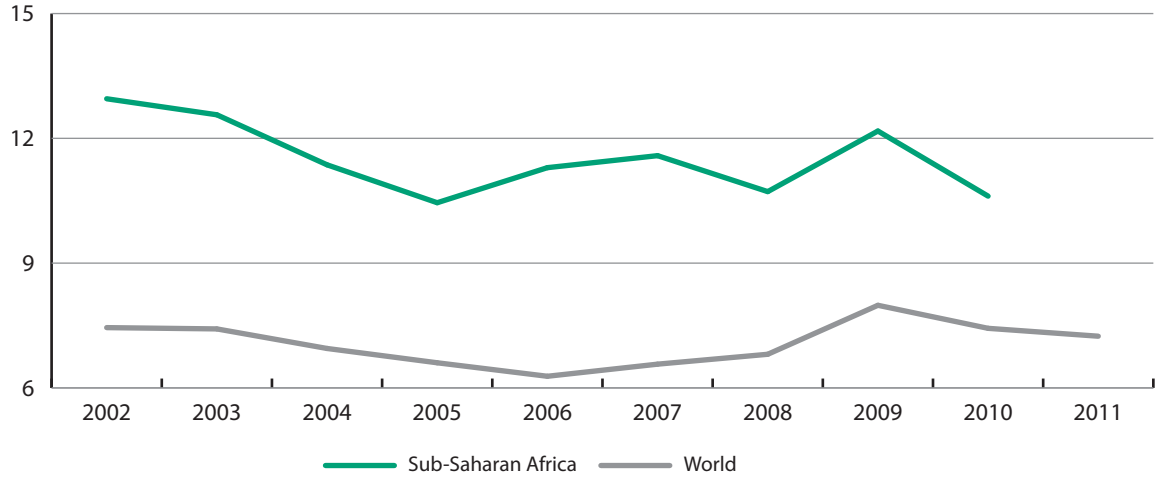
Organic farming

The total share of organic agricultural land in Africa had been increasing, although the share was not significant, as shown in figure 69. The highest shares of organic land in 2011 were in Sao Tome and Principe (7.98 per cent) followed by Egypt (2.23 per cent), Tunisia (1.70 per cent) and Uganda (1.64 per cent). The share in the remaining countries was less than 1 per cent. Adoption of inclusive green growth can promote expansion of environmentally benign agricultural production including increase in the share of land under organic agriculture.

3.10.4 Food security

In terms of food security, Africa still lags behind other regions. Food availability from local production and imports are inadequate to meet the increasing demand and changing consumption patterns. Africa's food security and nutrition situation is worsening despite the general worldwide reduction in food insecurity (FAO, IFAD and

Figure 70: Food imports (% of total merchandise imports)



Data source: World Bank, Data . Food imports (% of merchandise imports) Available from data.worldbank.org/indicator/TM.VAL.FOOD.ZS.UN.. Accessed on January 17, 2013

WFP, 2013). Frequent incidences of acute food insecurity leading to loss of life, productive time and worsening health situations have been witnessed over the past decade. Progress has been slow in achieving the goal of reducing by half the proportion of the population living in chronic hunger by 2015. The situation is grave in the Sahel and Horn of Africa regions. Up to 23 million people in 11 countries in the two regions were affected by acute food insecurity and are facing malnutrition. Many factors are responsible for this situation, with high population growth rates, frequent political and resource-based conflicts, climate change and the endemic poverty high on the list. In future, food insecurity may worsen as the population is projected to double by 2050. In order to address the situation, there is a need to recognize that the causes of food insecurity and malnutrition in Africa are diverse, multi-faceted and interlinked.

3.10.4.1 Share of food in total imports

The proportion of food imports (including food and live animals; beverages and tobacco; animal and vegetable oils and fats; and oil seeds, oil nuts, and oil kernels) in total merchandise imports in sub-Saharan Africa was greater than the global average, as shown in figure 70. Between 2002 and 2012, the share of food imports in total merchandise imports decreased in 12 countries and increased in 6 out of the 18 countries for which data were available for 2002 and 2011. In 2011, the highest (32.16 per cent) share of food imports in total merchandise imports was observed in the Gambia and the least (6.11 per cent) in South Africa.

3.10.4.2 Level of food demand versus supply

As a measure of food security the ratio of food demand and supply strongly indicates the contribution of agriculture, food production dynamics and distribution to sustainable development. The declining trends in food security in Africa are largely due to demand (occasioned by increasing population) surpassing supply from domestic production and imports. West Africa, for example, depends on food imports of 40 per cent, mainly from Thailand (Elbehri and others, 2013). The total volume of cereal imports in Africa was around 66 million tons in 2010 (FAO, IFAD and WFP, 2013). This means that for the whole of Africa, 30 per cent of all cereals consumed were imported. Further, despite increasing domestic production and import efforts, there were 239 million undernourished people in Africa in 2012. The number of undernourished people in Africa has increased by more than 35 per cent over the last two decades (FAO, IFAD and WFP, 2013).

Table 4: Children under five years of age who are underweight (%)

Achieved (50 per cent or more decline)		Appreciable progress (20-49 per cent decline)		Slow progress (0-20 per cent decline)		Setback (rising trend)	
Algeria	-67.39	Malawi	-43.44	South Africa	-19.44	Gambia	0.56
Mauritania	-67.21	Ghana	-40.42	Namibia	-18.60	Madagascar	2.25
Uganda	-61.18	Mali	-38.83	Tanzania	-16.75	Dem. Rep. of the Congo	2.54
Angola	-56.10	Togo	-35.46	Eritrea	-15.93	Burundi	7.98
Gabon	-51.00	Egypt	-35.24	Kenya	-15.03	Libya	16.67
		Mauritius	-33.56	Guinea	-14.75	Central African Republic	20.83
		Morocco	-32.10	Sierra Leone	-14.57	Comoros	34.57
		Congo	-31.79	Ethiopia	-11.73	Somalia	43.86
		Zambia	-29.72	Niger	-10.73	Côte d'Ivoire	44.62
		Mozambique	-28.24	Swaziland	-9.38	Djibouti	50.50
		Burkina Faso	-27.58	Cameroon	-7.78	Zimbabwe	75.00
		Botswana	-26.32	Sudan	-7.20		
		Rwanda	-25.93	Liberia	-5.88		
		Nigeria	-23.93	Guinea Bissau	-4.74		
		Senegal	-23.68	Lesotho	-4.35		
		Chad	-23.06				
		Tunisia	-22.79				
		Benin	-22.31				

Source: ECA and others (2013)

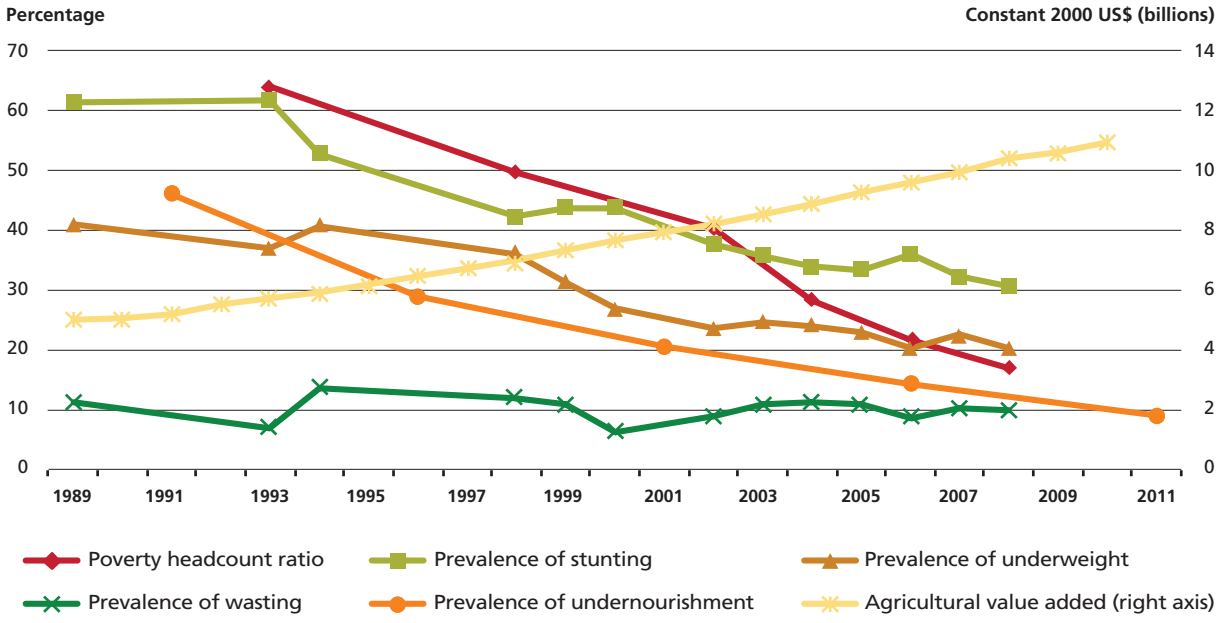
Climate change is also causing water stress, leading to declining water availability for agricultural purposes. There is a need to increase domestic food production by addressing current low soil quality, reducing rate of deforestation that cause soil loss to wind and water erosion and increasing agricultural efficiency (Fader and others, 2013). Adoption of climate-smart agriculture and overall agricultural efficiency improvements will be necessary if Africa is to offset the negative effects of climate change while still increasing agricultural productivity.

3.10.5 Nutritional status

Between 2002 and 2011, the proportion of undernourished population declined in 35 countries and increased in 11 others while there were no changes in 5 out of the 51 countries of the continent for which data were available. In 2011, Burundi, the Comoros and Eritrea had more than 60 per cent of their population undernourished while Ethiopia and Zambia had prevalence rates of between 40 and 50 per cent. On the other hand, Algeria, Egypt, Ghana, Libya, South Africa and Tunisia had only 5 per cent of their population undernourished. The proportion of underweight children also declined in all regions (see table 4).

In the United Republic of Tanzania, for instance, the trends in poverty headcount ratio, prevalence of stunting, wasting, underweight, malnutrition and agricultural value added are related (see figure 71).

Figure 71: Trends in population poverty ratio, stunting and malnutrition in children under the age of five



Note: Data on prevalence of stunting, underweight and wasting refer to children under five years of age.
Source of raw data: FAO and World Bank.

Source: Based on summaries of FAO, IFAD and WFP (2013). (http://www.fao.org/docrep/018/i3434e/i3434e.pdf)

3.10.6 Conclusion

Agriculture remains a key driver of Africa's transformation because of the opportunities it offers in terms of value-addition, increased labour, land productivity and inclusive green growth. Attention is needed on increased yields of staples and to address the challenges faced by smallholders to improve the food security situation and lower food prices. As diets change in Africa due to affluence, the share of staples such as cereals, roots and tubers will continue to decline, while that of meat, dairy products and oil crops will continue to rise, and livestock production becomes important for food security. There is a need to facilitate increased production with lower growth in animal numbers, and a corresponding decrease in environmental degradation from grazing or waste. There is a possibility of growth in crop production: expanding the land area, increasing the frequency with which it is cropped (often through irrigation), and boosting yields through intensification. New technology is needed for areas with shortage of land or water, or with particular problems of soil or climate. Even though productivity increases are important, they must be accompanied by environmental protection or restoration. Biotechnology could also help to address challenges related to resistance to drought, water logging, soil acidity, salinity and extreme temperatures. In particular, pest-resistant varieties can reduce the need for pesticides, thereby increasing prospects of green agriculture. Many other promising technologies continue to emerge which can increase production with improved environmental protection. Some of these are ICT-based and need to be adopted.

3.11 Natural resources

Africa's sustainable development largely depends on goods and services derived from its natural resource base. The land, soil, water, forest, biodiversity, marine ecosystems and mineral resources form the basis of primary production and support most of the sectors that drive socio-economic development in Africa. Agriculture, tourism, industry,

Indicator/theme	Sustainability trends	Remarks on trends
Forests	→ ←	Rate of loss of forest cover is decreasing. The overall change in forest cover is positive, but insignificant
Land	↘	More land area has been affected by desertification and the proportion of people living on degraded land is increasing.
Biodiversity	↗	Improvement in biodiversity conservation with more nationally designated protected terrestrial areas, reduction in percentage change in wetland areas and threatened species
Mineral resources	↗	Africa's share of world production and reserves of leading mineral resources increasing due to more exploitation and new discoveries
Freshwater resources	↘	Proportion of total water resources used with respect to renewable water available, and by sector, increasing
Marine ecosystem	↘	The number of threatened species of fish increasing and more fish stocks are exploited outside their safe biological limits

mining and many forms of local, national, regional and international trade thrive on the goods and services provided by natural resources. The consumption and production patterns based on these resources also determine the pace of sustainable development (SDSN, 2013). As Africa pursues sustainable growth pathways, the management of natural capital is critical. This will require innovative strategies for sustainably maximizing social, economic and ecological benefits from these resources.

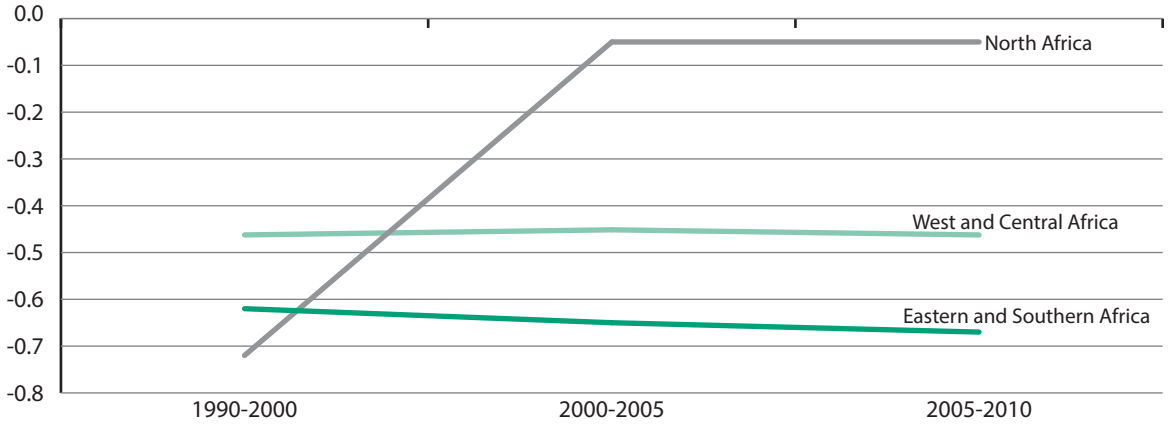
3.11.1 Forests

Forests and woodlands are an integral part of the African landscape, occupying 674.4 million ha, or 23 per cent of the land area (FAO, 2010 and FAO, 2011). A significant percentage of Africa's population relies on forest resources for their livelihoods and other social, economic and cultural benefits. African forests and tree resources directly provide not only food, fuel for cooking and heating, medicine, shelter and clothing. Many vital ecosystem services are drawn from forests such as erosion control, water quality preservation, biodiversity conservation, shade and windbreak; to crops, livestock and infrastructure, carbon sequestration for combating climate change. About 90 per cent of energy requirements in the region were met from fuel wood. Forests are also valued as beautiful natural settings for recreation and spiritual reflection. The extent of terrestrial forest cover measures how well these benefits are captured and maintained for future generations.

Deforestation, mainly due to the conversion of tropical forests to agricultural land, shows signs of decreasing in several countries, but continues at high rates in others. Between 2000 and 2010, the annual rate of change in forest area had slightly decreased in Eastern and Southern Africa as well as in West and Central Africa, while there was no change in North Africa (see figure 72).

Africa has made steady progress towards sustainable forest management in the past decade compared to the period 1990-2000. The net loss of forest area has slowed down, and the areas of forest designated for the conservation of biological diversity and included in protected areas have slightly increased (FAO, 2010). The percentage change in forest area was positive in eight countries while it was negative in 37 countries both during 2000-2005 and 2005-2010. There was no change in forest area in six countries both during 2000-2005 and 2005-2010. Inclusive green growth approaches can contribute to preserving forest resources and their ecosystems services. African countries must intensify efforts towards realizing the 10 per cent forest cover target through sustainable forest and land use management as part of inclusive green growth initiatives.

Figure 72: Annual forest area change rate (%)



Data source: FAO (2010).

3.11.2 Land

Land in Africa is crucial for sustainable development. It is integral to the livelihoods of hundreds of millions of people. Sustainable use of Africa's land resources continues to be affected by insecure tenure rights. It is an important natural resource, serving as the foundation for many household livelihood strategies and food security. It attracts investment and can be significantly affected by activities targeting other natural resources.

Africa has 25 per cent of wasteland (the highest proportion of any continent), 12 per cent lightly or moderately degraded land and 4 per cent extremely degraded land (also the highest proportion). The main type of degradation by far is the loss of topsoil (76 per cent of the degraded area) followed by the loss of soil nutrients (9 per cent). Burkina Faso, Burundi, Ethiopia, Madagascar, Lesotho, Morocco and Rwanda are particularly affected (UN Population Information Network, 2013). There are limitations in the availability of reliable data on the extent of land degradation in Africa but data on the proportion of population living on degraded land are available. In Burkina Faso, Ethiopia, Lesotho, Mali and Eritrea more than 50 per cent of the population live on degraded land while between 30 to 50 per cent of the population in the Sudan, Chad, Morocco, Tunisia and Kenya were living on degraded land in 2010. On the other hand, none of the population in the Congo, Swaziland, Equatorial Guinea, Gabon, Sierra Leone, the Central African Republic, Liberia, the Democratic Republic of the Congo and Madagascar was living on degraded land in 2010. The challenges of sustainable land management are exacerbated by insecure land tenure systems and a recent surge in competition for land in Africa by multinationals and foreign Governments.

The governance of land resources, including transparency in the land tenure system and government decision-making processes related to investments with implications on land tenure, should cater for citizen consultation and participation (De Schutter, 2009).

3.11.3 Biodiversity

The sustainable management of natural resources is also reflected in the conservation of biological diversity. Based on the Red List of Threatened Species published by the International Union for Conservation of Nature (IUCN), in 2011, the number of threatened species of birds, mammals and fish was highest in Eastern Africa followed by West Africa. The least number of threatened species of birds, mammals, fish and higher plants was observed in Southern Africa. Figure 73 shows the

Box 2: Land tenure and large-scale land acquisitions in Africa: implications for sustainable development

Land tenure

The land tenure system is intricately linked to food security and sustainable natural resource management and overall development in Africa. Land tenure is a critical determinant of natural resource management and food security through specific aspects of land management, namely, land distribution, land utilization, land tenure security, land administration and land adjudication. Further, the relationship of livelihoods and land tenure stems from effects on livelihood options, land distribution and ownership patterns, land markets and sustainable livelihoods, land tenure and poverty, and the impact of HIV/AIDS.

The difficulties in land tenure that complicate food security, livelihoods and sustainable natural resource management relate to political issues encouraging illegal settlements; disregard for boundaries and land titles or agreements in pursuit of survival strategies; marginalization of some social groups leading to social defiance; and armed conflicts, which often result in the wanton destruction of the environment and loss of property and lives.

Large-scale land acquisitions

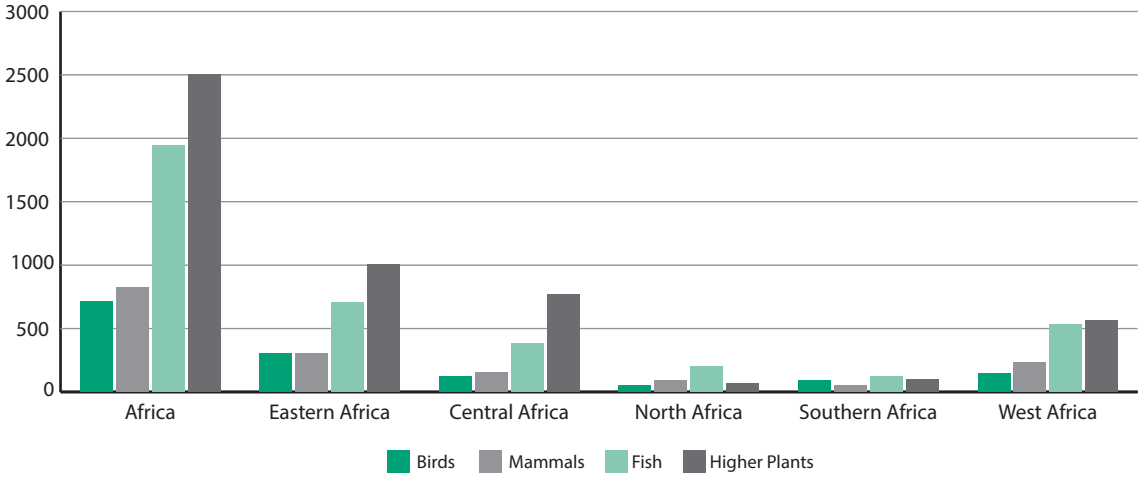
Many reports are providing evidence of the effect of the heightening of global scramble to acquire African land. Two-thirds of the 203 million hectares of land deals reported worldwide between 2000 and 2010 were in Africa (Anseeuw and others, 2012). The most disadvantaged are the millions of Africans who are disenfranchised from accessing land that is being converted into industrial installations, mining sites and foreign owned plantations.

What is worrying is that most of the large-scale acquisitions occur in environmentally sensitive areas, which tend to be maintained by local communities and are owned under traditional customary-tenure law. Rangelands, mountains, wetlands and forests are mostly affected. This land rush is replacing agricultural expansion as the main threat to sustainable land management. Even initiatives such as the voluntary carbon market also dispossess local custodians of their lands. This further threatens the food security and livelihoods of local populations. Large-scale acquisitions have increased markedly since the global food and oil crises of 2007.

Source: Summarized from De Schutter (2009)

number of critically endangered animal species in the subregions. With regard to critically endangered and vulnerable animal species, the number was highest in Eastern Africa followed by Southern Africa, while it was least in North Africa. The decline in the status of biodiversity may erode the benefits that accrue from the continent's biodiversity resources. Sustainable development efforts should target preservation of habitats, reduc-

Figure 73: Threatened species in 2011



Data source: FAO (2013).

tion of threatened species and halting of further extinction of species.

3.11.3.1 Nationally designated protected terrestrial areas

There have been efforts to reduce biodiversity loss through terrestrial forest protection. Terrestrial protected areas are totally or partially protected areas of at least 1,000 hectares that are designated by national authorities as strategic reserves with limited public access, national parks, natural monuments, nature reserves or wildlife sanctuaries, protected landscapes, and areas managed mainly for sustainable use. The proportion of terrestrial protected areas has been increasing in sub-Saharan Africa and globally as shown in figure 74.

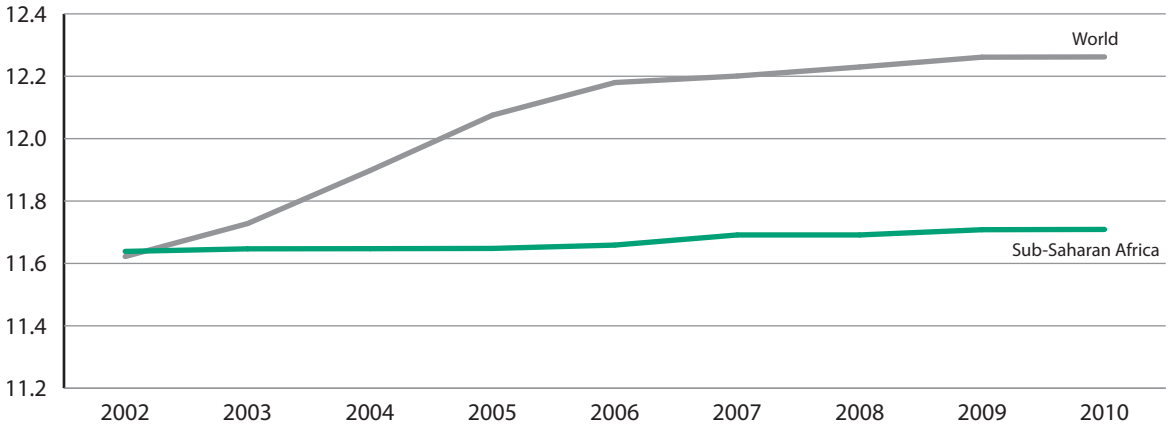
3.11.4 Mineral resources

Africa is rich in many types of mineral deposits. It has the highest potential for precious metals, base metals, and diamonds, and produces tons of metal and mineral products. Several of the renowned strategic minerals and metals including gold, platinum, diamond, uranium, tantalum, manganese, chromium, nickel, bauxite and cobalt are produced in Africa.

Although Africa is still under primary exploration, it hosts about 30 per cent of the planet's mineral reserves, including more than 80 per cent of the global platinum, chromium, and tantalum; and more than 40 per cent of gold, diamond, cobalt, manganese and phosphate. These reserves make Africa a strategic producer of these valuable metals. Metallic deposits are concentrated in Central and Southern Africa. In 2010, the exports of fuels and mining products accounted for about 58 per cent of total African exports (US Geological Survey, 2012). Figure 75 illustrates the extent of mineral production and reserves of Africa.

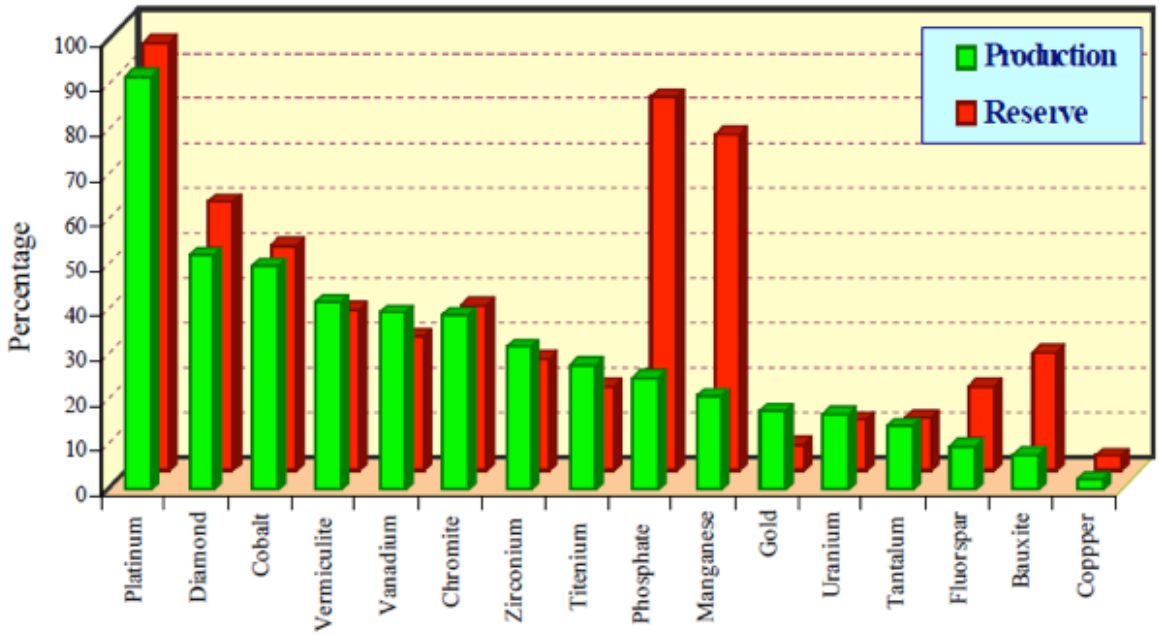
The mining industry accounts for a substantial proportion of the GDP in several African countries although many countries are yet to fully benefit from mineral riches due to conflicts that destabilize development and constrain new investment in mineral exploration and development in some subregions. The enormous mineral resource endowment of Africa continues to provide limited contribution to poverty eradication. Discovery of oil and mineral resources are reported to be doing little to improve prospects for poor people. In response to critical sustainable development issues in the mining sector, the African Union created the African Minerals Development Centre in December 2013 at the Mineral Resources Ministers' Conference in Maputo, Mozambique to enhance the capacity of African mining countries to derive economic and social benefits from implementing the Africa Mining Vision.

Figure 74: Terrestrial protected areas (% of total land area)



Data source: World Bank, Data, Terrestrial protected areas (% of total land area) Available from data.worldbank.org/indicator/ER.LND.PTLD.ZS Accessed on Sept. 9, 2013

Figure 75: Production and reserves of African minerals

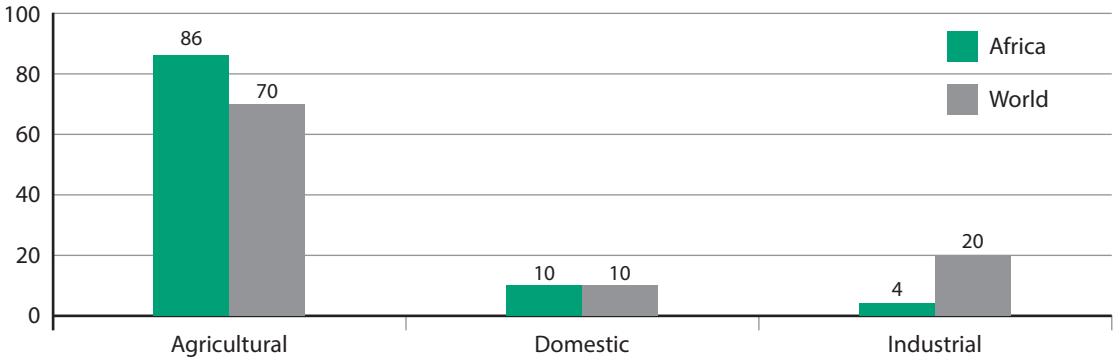


Source: British Geological Survey (2012).

3.11.5 Freshwater resources

The interconnected system of Africa's inland freshwater and marine water resources is critical for human activities. Water is vital for all sectors and serves as an input to industry and is integral to hydropower generation vital for tourism, subsistence and commercial agriculture, fisheries and livestock production. The agricultural sector remains the biggest user of water resources in Africa with 85 per cent of the total annual water withdrawals (ADP, 2013) while domestic and industrial withdrawals stand at 10 per cent and 5 per cent respectively. The rapid population growth has re-

Figure 76: Proportion of water withdrawal by sector (as % of total water withdrawal)



Data source: FAO. Irrigation in Africa in figures: AQUASTAT Survey 2005. http://www.fao.org/nr/water/aquastat/countries_regions/africa/tablessummary.pdf

sulted in a tripling of water withdrawals over the past three decades due to food demands and escalating industrial growth, thus causing increasing water scarcity in the region. This hampers development by limiting food production, health and industrial development. Climate change is exacerbating these negative trends.

The proportion of water withdrawal by sector, agriculture (irrigation and livestock), communities (domestic water supply) and industries, as a percentage of total withdrawal is presented in figure 76. In Africa, 86 per cent of the water withdrawal was directed towards agriculture. Of the total amount of water withdrawn, only 4 per cent was for use in industry.

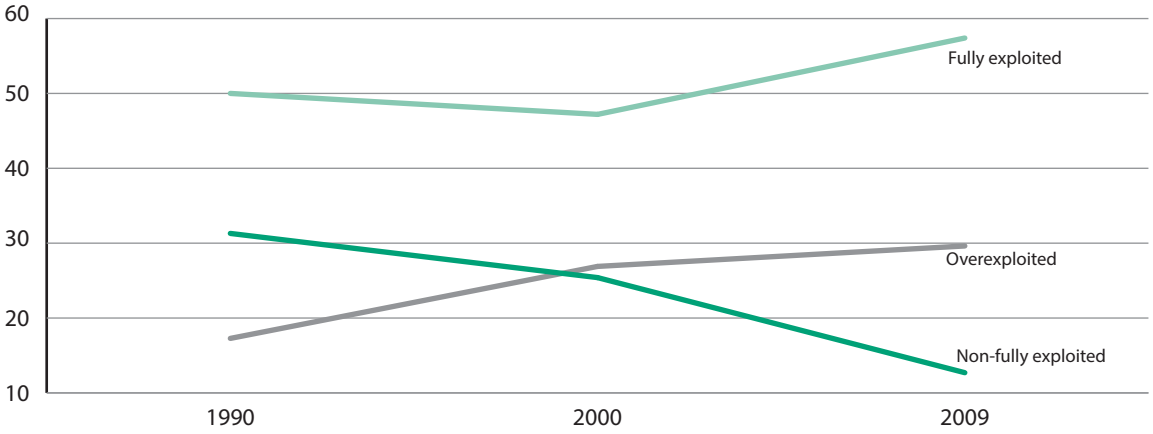
Water withdrawal trends continue to be the same and efforts to conserve water as a renewable resource must focus on sustainable consumption, maintenance of water quality, reduction of waste and improvement in water use efficiency in all sectors. Of utmost importance is agricultural water use efficiency improvement since the sector is the largest consumer of water in the region. This should encompass the delivery and application of water in ways that enhance crops, livestock and aquaculture water productivity in order to meet the rising food demand and competition from non-agricultural users. In terms of inclusive green growth, water harvesting, water conservation and demand management, and water governance and institution strengthening are crucial strategies which also serve as climate change adaptation measures.

3.11.6 Marine ecosystems

Africa's marine ecosystems include oceans and seas, estuaries, coral reefs, mangrove forests, wetlands and dunes. These are important for several aspects of sustainable development and services such as coastal stabilization from severe weather and sea level rise, regulation of water quality and quantity, biodiversity, and spawning habitat for many aquatic species. Sustainable management of these marine resources is crucial to livelihoods of coastal communities as they seldom have other livelihood alternatives. Fish resources in particular provide livelihoods and contribute to food security. Up to 10 million people are employed in the fisheries sector in Africa and fish provide up to 70 per cent of the daily animal protein intake in some coastal countries in Africa. The sector also generates foreign exchange and public revenues. In Mauritania or Guinea-Bissau, for instance, the marine fisheries sector contributes 25 to 30 per cent of government revenue.

The extent of sustainable use of marine ecosystems is captured by trends in the proportion of fish stock within their safe biological limits as an indicator that provides an important reference for policy making related to sustainable management of fish stocks at the national level, regionally and at the global level. About 57.4 per cent of fish

Figure 77: Percentage of fish stocks within safe biological limits



Data source: UN(2012). The MDG Report).

stocks were estimated to be fully exploited in 2009. On the other hand, the percentage of marine fish stocks that were overexploited and outside their safe biological limits had been increasing while the proportion of non-fully exploited stocks has been declining. From 1990 to 2009, the percentage of marine fish stocks that was overexploited outside their safe biological limits was higher than the percentage of marine fish stocks that were fully exploited outside their safe biological limits. Further, 29.9 per cent of marine fish stocks in 2009 were overexploited and outside their safe biological limits, compared to 18.6 per cent in 1990 (see figure 77).

All natural resource assets relevant to the fisheries sector mutually benefit each other hence the interlinkages therein need to be harnessed through especially inclusive green growth. Strategies to reduce deforestation and agricultural externalities have positive spillovers for inland and marine fisheries. Likewise the protection of offshore fisheries has positive spillovers for coastal ecosystems.

3.11.7 Conclusion

Progress on the sustainable management of Africa's natural resource base is mixed. The rate of loss of forest cover is decreasing and the overall change in forest cover is positive, but remains insignificant. More land area has been affected by desertification and the proportion of people living on degraded land, overall and in urban and rural areas is increasing. There has been a marked improvement in biodiversity conservation with more nationally designated protected terrestrial areas, reduction in percentage change in wetland areas and threatened species. Water abstraction by industry, agriculture and domestic use is increasing due to increasing demand coupled with insignificant change in water use efficiency. The number of threatened species of fish is increasing and more fish stocks are exploited outside their safe biological limits. The application of inclusive green growth principles provide an opportunity for the rational use and management of these natural assets for current and future generations. This requires good governance, institutions and policies for value addition that promote forward and backward linkages with the rest of the economy engendering diversification, reducing vulnerabilities and increasing competiveness for desirable economic, social and environmental outcomes.

3.12 Climate change

Achieving sustainable development necessitates addressing climate variability and change as an inevitable and urgent global challenge with long-

Indicator/theme	Sustainability trends	Remarks on trends
Greenhouse gas emissions, per capita	↗	Low greenhouse gas emissions per capita, including and excluding land use and land-use change and forestry
Adaptation	↗	The number of countries implementing NAPAs steadily increasing
Adaptation costs	↘	Adaptation costs are projected to increase for all emission scenarios
Mitigation	↗	The number of countries that have developed NAMAs is increasing and greenhouse gas emissions from Africa remain insignificant
CDM projects	→←	The number of CDM projects is increasing, but insignificant compared to other regions

term implications for human and ecological systems. According to IPCC (2007), a warming climatic system is expected to impact the availability of basic necessities like freshwater, food security, and energy, while efforts to address climate change, both through adaptation and mitigation, will also inform and shape the sustainable development agenda. The effect of climate change in Africa is becoming more apparent and policy processes, investments and efforts at addressing this challenge are intensifying. Steady progress is being made but the task is huge given the magnitude of the impacts and related uncertainties.

3.12.1 Greenhouse gas emissions

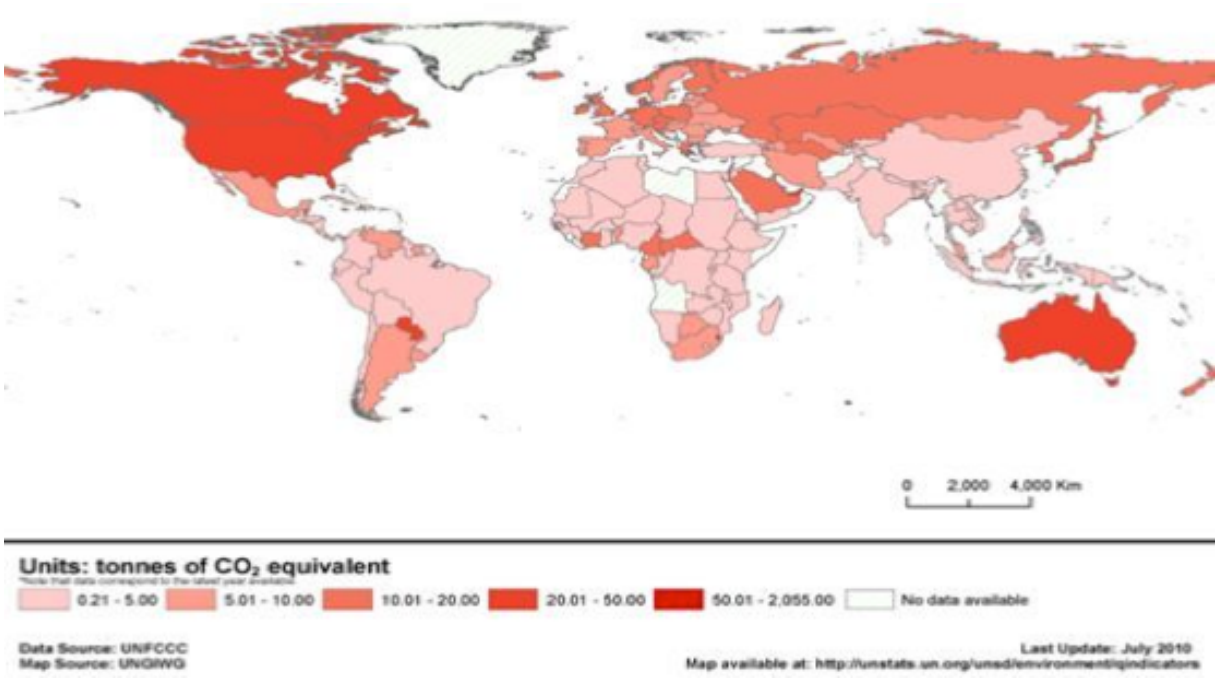
There is a two-way causal relationship between sustainable development and climate change. In Africa, this is more apparent due to the general reliance on natural resources for development activities. Climate change influences key natural and social assets and practices, and is in turn influenced by them. Development activities and the pattern of production and consumption influence both the rate and magnitude of greenhouse gas emissions that cause global warming. Figure 78 illustrates the level of greenhouse gas emissions per capita from African countries in relation to other parts of the world.

Africa's level of greenhouse gas emissions remained lowest in the world, but there were national disparities. Côte d'Ivoire had the highest per capita emissions of greenhouse gases in Africa followed by Cameroon; and Eritrea had the least per capita emissions of greenhouse gases followed by Rwanda. These differences were due to varying levels of forest cover, agricultural and industrial activities that reduce forest cover and escalate emissions and incentives for clean technologies. Out of the 15 pilot countries from which primary data was collected, only four (Botswana, Mauritius, Rwanda and Senegal) provided data on the total greenhouse gas emissions, excluding emissions due to land use, land-use change and forestry (see figure 79). The highest emissions were reported by Botswana. Comparing emissions in Mauritius, Rwanda and Senegal, CO2 emission excluding emissions due to land use, land-use change and forestry was highest in Mauritius and lowest in Senegal. Moreover, the emissions in Mauritius and Rwanda were increasing while they remained constant in Senegal.

3.12.2 Adaptation

Many regions of Africa are projected to suffer from the impacts of climate change, including droughts and flood with greater frequency and intensity (IPCC 2007; IPCC, 2012). There is relatively limited knowledge on some aspects of climate change effects in Africa in relation to risks, vulnerabilities and specific impacts. Therefore, there is an urgent need for more research into the dynamics

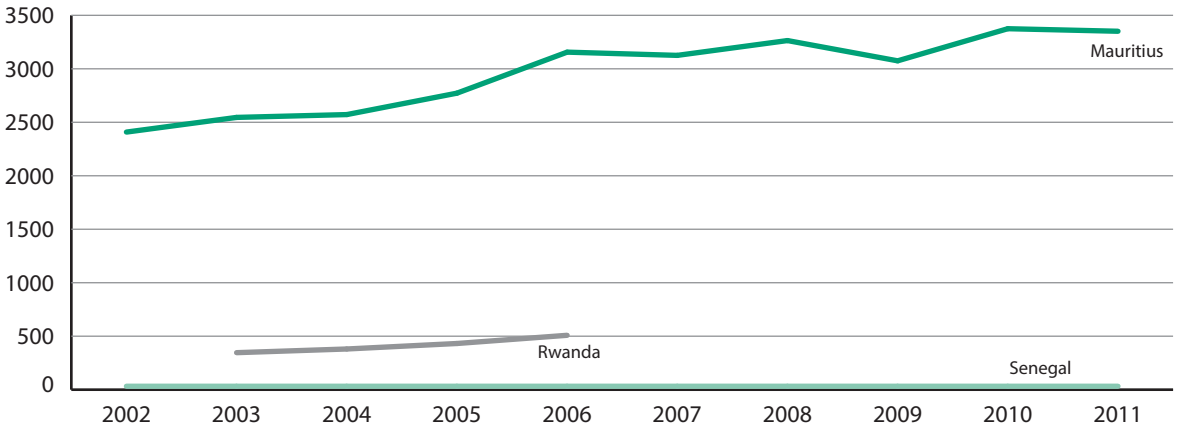
Figure 78: Greenhouse gas emissions per capita



Source: UNFCCC

Map Source: UNGIWG. Map available at http://unstats.un.org/unsd/environment/qindicators

Figure 79: CO_2 emissions excluding emissions due to land use, land-use change and forestry (metric tons)



Data source: Survey questionnaires completed by the national statistic offices of the respective countries, 2013

of the global drivers and consequences at local levels. There is also a need to continuously design adaptation plans and other measures to deal with the inherent uncertainty.

African countries continue to design and implement NAPAs to guide country-level adaptation strategies. By December 2013, a total of 34 African Countries had developed and submitted their NAPAs to the UNFCCC Secretariat - an increase from 28 in 2008. Countries that have submitted their programmes are eligible for adaptation funding for least developed countries from the Global Environment Facility (GEF). To design adaptation measures, there is need to: strengthen systematic and local context-based approach-

Box 3: Climate change and agriculture

Agriculture is undoubtedly the most important sector in the economies of most non-oil exporting African countries constituting about 30 per cent of Africa's GDP and 50 per cent of the total export value. Adaptation strategies continue to target the sector and especially vulnerable smallholder farmers and agro-ecosystems. Impacts on water, health systems and other sectors have negative implications input productivity in agriculture. Climatic hazards like prolonged drought and floods affect the agricultural sector especially the already arid parts of the region, climate change is projected to worsen desertification and cause loss of forest cover. Intense dry periods and shorter wet seasons are expected to affect most water systems (wetlands, lakes and rivers with serious water shortages and adverse consequences for the agriculture and forestry sectors).

Agricultural capacity is expected to continue declining in Eastern and Central Africa. In coastal areas the expected rising sea levels and intrusion of salt water into inland freshwater resources will affect any form of agriculture and other human activities. Particularly susceptible is the main staple food crops such as maize with a resultant deterioration of food security and poverty in the region. More specifically the impacts are expected to result in: reduced crop yields and agriculture productivity; increased incidence of pest attacks; water scarcity; longer drought periods; reduction in soil fertility; low livestock productivity and high production cost; and human health challenges.The level of vulnerability of communities and general lack of adaptation strategies exacerbate the climate change impacts. Adaptation strategies in agriculture are therefore critical though expensive and the inability of countries to access adequate financing opportunities keeps them from adopting appropriate technologies and reducing risks, vulnerability and the magnitude of impacts.

Source: Summarized from IPCC (2007); IPCC (2012), and AMCEN, UNEP and Climate Analytics (2013)

es of anticipation and preparedness; development of preventive measures and structures for tolerance, recovery and restoration capacities; mainstream risk management in sustainable development processes; and carry out cost-benefit assessment of adaptation options. Institutional learning is important at all stages of the adaptation planning process. These should be reflected in NAPAs. Agriculture remains an important sector where impacts of climate change, adaptation and mitigation measures are best reflected in Africa (see box 3).

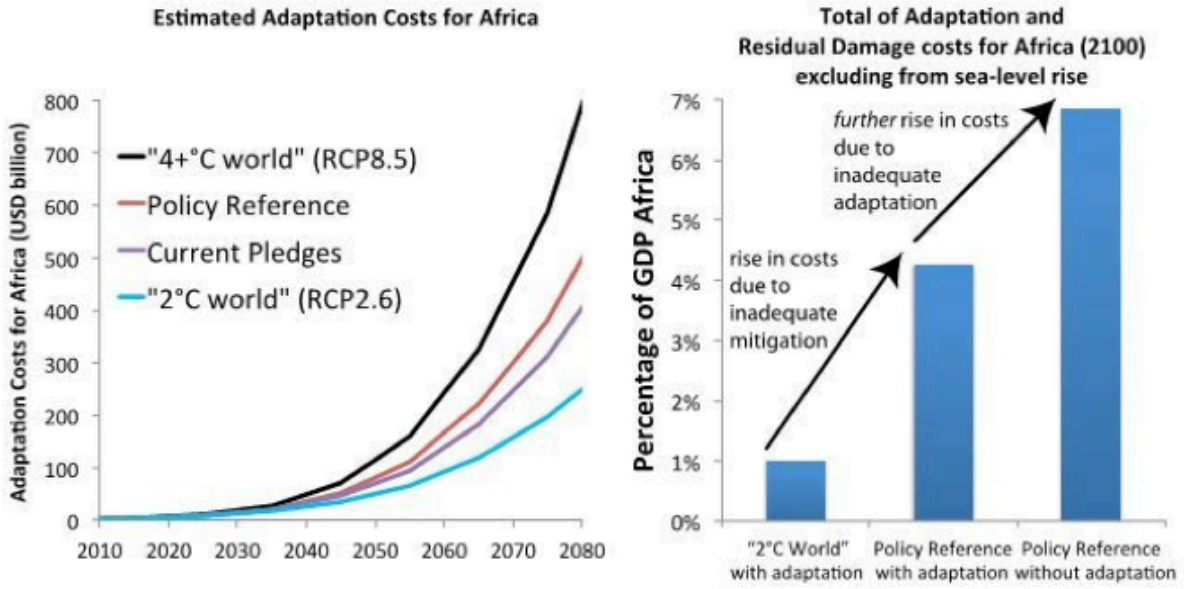
3.12.2.1 Estimates of the cost of adaptation

According to the African Ministerial Conference on the Environment (AMCEN), UNEP and Climate Analytics (2013), Africa faces a significant challenge in adapting to climate change with cost and damages rising rapidly with warming. How well Africa deals with the impacts of climate change, now and in the future, will be by among other things, the funding levels accessible to countries and communities. Adaptation measures such as early warning systems and coastal zone management to counter sea-level rise offer a possibility of minimising climate change impacts, but Africa's capacity to adapt depends critically on access to funding.

The cost of adaptation is projected to increase for all emission scenarios (IPCC, 2007). Although the process of estimating adaptation cost is complex and involves many uncertainties, estimates are available from many studies. Estimates by the World Bank (2012b) offer a useful breakdown across sectors for the near term, noting that for the sub-Saharan Africa and North Africa/Middle East regions, annual adaptation costs by 2020 for a warming of about 1°C globally above pre-industrial amount to about USD 13 and 2 billion, respectively. The highest adaptation cost in Africa is projected to be needed in the water supply, coastal zone protection, infrastructure, and agriculture sectors. Figure 80 presents more estimates under different climate scenarios.

The cost of adaptation is projected to increase fourfold to about 4 per cent of Africa's GDP under presently planned and implemented mitigation

Figure 80: Estimated adaptation costs for Africa for four scenarios and the estimated total annual adaptation costs and residual damages (part of damages not avoided by adaptation) expressed as a percentage of GDP for Africa by 2100



Source: AMCEN, UNEP and Climate Analytics (2013).

measures, assuming full adaptation effort. The importance of adaptation is reflected in the total damages projected to reach 7 per cent of Africa's GDP if no adaptation efforts are implemented significantly. Traceable funding disbursed in Africa for climate change adaptation through bilateral and multilateral channels for the years 2010 and 2011 amounted to USD 743 and 454 million. The report on Africa's adaptation gap (AMCEN, UNEP and Climate Analytics, 2013)) indicates that to meet the adaptation costs required in 2020s, annual disbursement must grow 10-20 per cent a year from 2011 to the 2020s. No mechanisms to provide these resources exist even with the commitment of up to $100 billion by the UNFCCC's developed country parties annually by 2020. Negotiations are on-going for modalities for the Green Climate Fund and the UNFCCC. Funding levels for Africa will still need to rise a further 7 per cent a year even if commitments are met and global temperatures are kept below 2°C. The funding challenge considerably escalates if both adaptation and mitigation efforts were stalled requiring a 10 per cent scaling of funding annually after the 2020s.

3.12.3 Mitigation

African countries, like other developing regions, are keen to contribute to reducing emissions in a sustainable development context. Under the UNFCCC, countries are increasingly implementing NAMAs, supported and enabled by technology, financing and capacity-building. This is aimed at achieving a reduction in emissions relative to "business as usual' emissions in 2020. By December 2013, 27 African countries were among 57 countries that had submitted their NAMAs to the UNFCCC Secretariat (UNFCCC 2013). The NAMAs are diverse and range from project based mitigation actions to economy-wide emission reduction initiatives. If implemented effectively, NAMAs are bound to contribute to the sustainable development of the countries and further propel the adoption of inclusive green growth principles through, among others, clean development mechanisms (CDM) (see box 4).

Box 4: CDM Projects in Africa

The main aim of clean development mechanisms (CDM) is to support sustainable development. The CDM initiative, one of several mechanisms under the Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC) aims to help developed countries meet their agreed emission reduction targets through certified emission reductions in developing countries. The emission reductions achieved in the developing country are traded with the developed country. By so doing this is expected to contribute towards sustainable development in the host country, while enabling the buyer of the emission credits (the developed country) to meet its emissions reduction targets. This is via additionality principle that the activity would not otherwise be implemented if it were not a CDM project. In Africa, many of the CDM projects relate to afforestation and reforestation (sink) projects that address severe land degradation and heavy reliance on biomass for livelihoods. Other "additional" benefits with respect to CDM in African include transfer of technology, community-level development benefits, enhanced private-sector investment and market development.

However, the number of CDM projects in Africa compared to other regions is low. The number is now picking up as bottlenecks to project development, registration and management are systematically being addressed. There are remaining challenges of complexity with the current systems for approving, verifying and validating projects and accruing emission reductions. The role of the private sector in Africa remains minimal due to the fact that the majority of CDM projects are in sectors such as forestry that have traditionally not been managed through private investment. Other factors limiting participation by African countries include the prohibitive costs and lack of investment capital required over many years before income from emission trading starts to accrue and the uncertain markets for emission reductions. There is also inadequate capacity to develop methodologies without reliance on expensive international technical support.

To accrue carbon credits and contribute to sustainable development, CDM projects in Africa need to address these obstacles and include capacity-building as an important component. There is need to restrict objectives to national level sustainable development agenda to keep the project simple. The projects in whatever design should not displace existing benefits from African forests which include wood and non-wood products and other ecosystems services. Despite these challenges, the contribution of forests towards coping with and adapting to climate change in Africa is emerging strongly in the context of sustainable land management.

Source: Based on Desanker (2005)

3.12.4 Conclusion

Africa remains the continent with the lowest greenhouse gas emissions per capita, including and excluding emissions from land use, land-use change and forestry. Both adaptation and mitigation efforts are gaining grounds in the region through national and international initiatives. The number of countries implementing NAPAs is increasing steadily with clear estimates of the costs of adaptation. The number of countries that have developed NAMAs in a sustainable development context is also increasing although greenhouse gas emissions from Africa, absolute and as a percentage of global emissions, remain insignificant. The impact of climate variability and change affect a country's ability to meet its sustainable development goals. The pursuit of low carbon development trajectories would minimize greenhouse gas emissions contribute to inclusive green growth and achievement of sustainable development objectives. This calls for strengthening global partnership for development in the UNFCCC and other global fora.

3.13 Natural disasters

The African population and the natural ecosystems are highly prone to natural disasters. The vulnerability of the population to natural disasters is heightened by the interaction with natural resources in the pursuit of livelihoods and development, even in risky ecosystems. Natural

Indicator/Theme	Sustainability Trends	Remarks on trends
Human and economic losses from disasters	↘	Human and economic losses resulting from disasters are increasing due to increasing frequency and severity of natural disasters
Disaster preparedness and response	→←	The number of countries with established and operational National Platform on Disaster Preparedness/Disaster prevention and mitigation instruments is increasing, but capacity issues continue to constrain preparedness and response measures
Vulnerability to natural disasters	↘	The percentage of population living in natural disaster/hazard prone areas increasing and the number and frequency of disasters that have occurred in Africa is on the rise

hazards such as earthquakes, volcanic activity, landslides, tsunamis, tropical cyclones and other severe storms, tornadoes and high winds, river floods and coastal flooding, wildfires and associated haze, drought, sand/dust storms, and insect infestations cause major loss of human lives and livelihoods, the destruction of economic and social infrastructure, as well as general environmental damage.

3.13.1 Natural disasters

Between 1960 and 2011, all countries in Africa had experienced some form of disaster and the number of disasters (drought, earthquake/seismic activity, epidemic, extreme temperature, flood, insect infestation, mass movement dry, mass movement wet, storm, volcano and wildfire) that occurred during 1960-2011 was high in most countries. Between1960 and 2011, more than 100 disasters of different kinds occurred in the Congo, Ethiopia, Nigeria, Kenya, Mozambique, South Africa, the United Republic of Tanzania and the Sudan. During this period, the number of disasters was between 50 and 90 in 20 countries and between 10 and 50 in 25 countries. Countries with fewer than 10 disasters between 1960 and 2011 were Equatorial Guinea, Libya, Sao Tome and Principe, Seychelles and Eritrea. Figure 81 illustrates the number of disasters that have occurred in Africa since 1960. The cost of the damage from disasters since 2002 has been highest in Algeria.

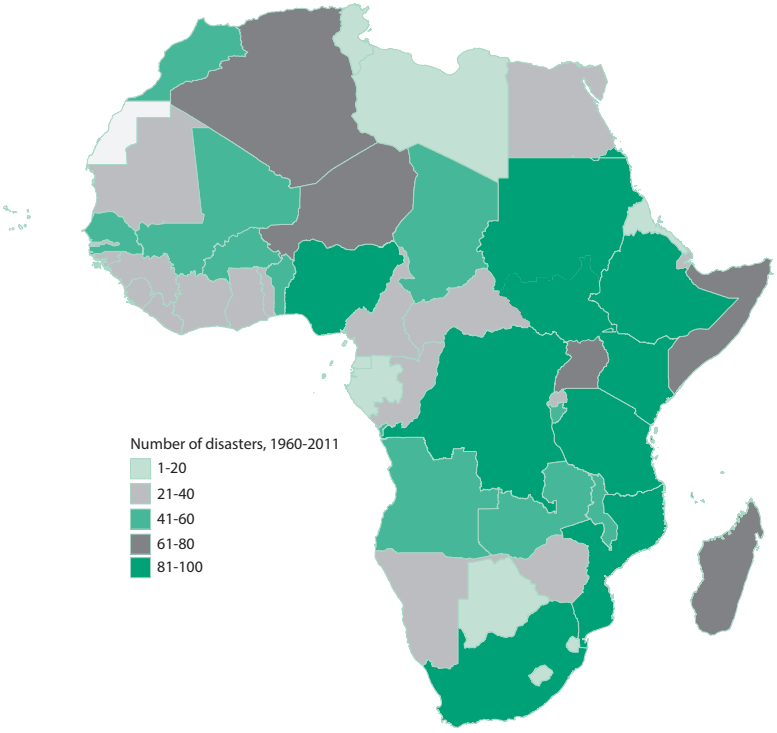
3.13.2 Human and economic losses due to disasters

In Africa, the overall human and economic losses due to disasters has been increasing due to the increased frequency of natural disasters and vulnerability of especially the poor to cases of drought, earthquake, epidemic, extreme temperature, flood, insect invasion, storm, wild fire, volcanic eruption, landslides, among others.

According to Guha-Sapir and others (2013), the distribution of disaster frequency in Africa in 2012 did not change significantly from the profile of the last decade. Hydrological disasters represented 52.6 per cent of occurrence, followed by climatological (28.1 per cent) and meteorological disasters (19.3 per cent). Guha-Sapir and others (2013) also reported the following: "The number of victims increased in 2012 by 43.4 per cent compared to the annual average number of disaster victims during 2002-2011, due to the impact of climatological and hydrological disasters; The number of reported climatological disaster victims in 2012 (28 million) surpassed their 2002-2011 annual average (23.9 million) and the number of reported hydrological disaster victims (9.3 million) was far above their 2002-2011 annual average (2.1 million).

It is very difficult to measure damage due to natural disaster in Africa due to poor data capture and reporting. Guha-Sapir and others (2013) reported damages from hydrological disasters ($0.83 bil-

Figure 81: Number of disasters, 1960-2011



Data source: The OFDA/CRED International Disaster Database. Accessed on August 16, 2013

lion) to have increased in 2012 compared to their annual average reported damages during 2002 to 2011 ($0.3 billion) and that damages from meteorological disasters ($0.1 billion) surpassed also their 2002-2012 average ($0.07 billion).

3.13.3 Disaster preparedness and response

The level of preparedness to natural disasters has not changed significantly in Africa. Efforts to reduce fatalities and manage the disasters are improving with, for instance, the number of countries with established and operational national platforms on disaster preparedness/disaster prevention and mitigation instruments increasing, but capacity issues continue to constrain preparedness for and response. The establishment of national platforms for disaster risk reduction (DRR) has been considered a good instrument for dealing with the intractable problems faced by many African countries from disasters triggered by natural hazards. It is further bolstered by the creation and strengthening of national integrated mechanisms including multi-sectoral national platforms to address DRR as a national and local priority (UNISDR, 2011). By 2010, 15 national platforms for DRR had been established and were operational. Many more countries had established the platform but are yet to strengthen its operations. The objectives of achieving sustainable development goals are clearly under threat if the national platforms established are not fully functional in Africa. Country expenditure on DRR in Africa increased from barely 20 per cent of the global total in 2004 to 40 per cent, by 2009. Mechanisms such as the national platforms encourage and streamline funding in DRR through development and humanitarian aid, external or domestic (Kellet and Caravani, 2013).

3.13.4 Vulnerability to natural disasters

The percentage of population living in natural disaster/hazard prone areas has been increasing and the number and frequency of disasters that have occurred in Africa have also been on the rise. This complicates the disaster management strategies even in areas where early warning systems are being established. There are eminent risks especially

for the poor living in areas prone to significant risk of prominent hazards: cyclones, drought, floods, earthquakes, volcanoes and landslides. Disaster prone areas include steep mountains, low-lying flood plains and dry areas. The risk of death in a disaster caused by natural hazards is a function of physical exposure to a hazardous event and vulnerability to the hazard. Disasters caused by vulnerability to natural hazards have a strong negative impact on the development process in both industrialized and developing countries. There is a need to ensure that exposure to natural hazards due to dependence on disaster prone ecosystems is reduced through early warning and preparedness as well as building the resilience of communities to disasters. Exploration and support of alternative less risky livelihoods would reduce the losses due to natural disasters.

3.13.5 Conclusion

There has been an increase in human and economic losses due to natural hazards such as earthquakes, volcanic activity, landslides, tsunamis, tropical cyclones and other severe storms, tornadoes and high winds, river floods and coastal flooding, wildfires and associated haze, drought, sand/dust storms, and insect infestations. The extent of losses and level of preparedness varies across subregions and countries of Africa. Losses due to disasters have been increasing due to the increased frequency of natural disasters and vulnerability of especially the poor to disasters. An increasing number of countries have established national platforms for disaster risk reduction and preparedness, but the proportion of people living in disaster prone areas has been increasing. Disaster risk management and reduction is a must if sustainable development is to be achieved.

3.14 Means of implementation

Means of implementation for sustainable development include domestic and external financial resources, education and capacity development, regional integration, trade and market access, development and transfer of environmentally-sound technologies, good governance and effective institutions, south-south cooperation and reform of international financial and development institutions, among others. Africa relies on both do-

Indicator/theme	Sustainability trends	Remarks on trends
Percentage of budget from domestic resources	↗	Increase in percentage of budget of many countries coming from domestic resources
Remittances	↘	Remittances have been declining and little channelled to sustainable development related investments
External Financing	↘	Net Official Development Assistance (ODA) as % of GNI declining in relation to the rest of the world, but higher on average to all regions Decline in the proportion of total bilateral, sector-allocable ODA of OECD/DAC donors Declining Foreign Direct Investment including those targeting environmental goods and services
Green Technology/ Eco-Innovation	→←	Increasing but insignificant expenditure on research and development as % of GDP Insignificant increase in patents in environmentally-related technologies. More papers/publications related to eco-innovation
Capacity-building	↘	Few countries with national capacity development strategies yet capacity-building needs for implementing SD is growing

mestic and external sources to support her development. According to ECA and the African Union (2014) and ECA and AUC (2014), it is essential to scale up both domestic and external financial resources to cover the large financial gap for Africa's industrialization. An adequate means of financing, from different sources and targeting different aspects and sectors is a pre-requisite to sustainable development. Africa has over the years employed various means of implementation for sustainable development, and more and more, the share of domestic resources has been increasing.

3.14.1 Domestic financing

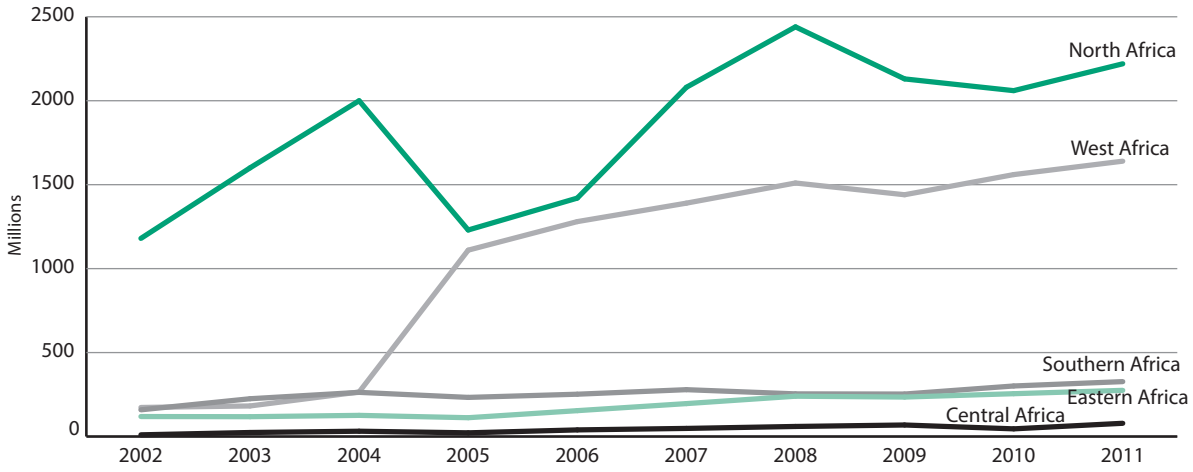
Africa's gross domestic savings had been lower than in all regions of the world in the last decade, but reached a decade-high of 24.4 per cent of GDP in 2008 (ECA, 2012a). The figure declined to 20.7 per cent by 2010, and has remained much lower than other regions. Low per capita incomes in African countries has also kept private savings low. The mobilization of domestic resources is critical for Africa's industrialization and transformation. In addition to other policy options, including private financing, tax revenue, innovative financing schemes, illicit capital flight, there is a need for massive increases in domestic savings in order to boost domestic investment in different aspects of sustainable development.

3.14.2 Remittances

The total remittances received (as a percentage of GDP) in sub-Saharan Africa between 2005 and 2011 had been declining, but remained significantly higher than the global average. While the remittances and compensation of employees had been increasing in all subregions of Africa, the remittances received in North Africa had been the highest between 2002 and2011. From 2005 to 2011, the remittances received in West Africa were significantly higher than the remittances received in Central, Eastern and Southern Africa (see figure 82).

Workers' remittances have, since 2010, become Africa's largest external source of finance, with an estimated inflow of $62.5 billion in 2012, up from only $13.5 billion in 2001 (ECA and the African Union, 2014). Despite this growth in remittances, Africa remained the most expensive region to remit funds to at 12.4 per cent per transaction in 2012 (World Bank, 2012b). It is important to look for ways to reduce the remittance transaction costs in order for the targets to be met and save up to $4 billion a year. Three countries in North Africa (Egypt, Morocco, and Tunisia) received the

Figure 82: Remittances received (current US$)



Economic Commission for Africa subregional grouping

Data source: World Bank, Data, Personal remittances, received (current US$). Available from data.worldbank.org/indicator/BX-.TRF.PWKR.CD.DT. Accessed January 18, 2013

Box 5: Innovative ways to finance sustainable development

- To ensure availability of long-term financing for sustainable development, African countries should deploy more innovative resource mobilization approaches. Some innovative ways include sovereign wealth funds (SWFs), pension funds, insurance savings, private equity funds, diaspora and sovereign bonds, remittances, public-private partnerships – as well as the curtailment of illicit financial flows.
- SWFs cannot only fund current national and cross-border development projects but may be used as savings for future generations. In Africa only 10 countries have SWFs as part of the Programme for Infrastructure Development in Africa (PIDA) of NEPAD.
- Even more reliable financing schemes are the pension funds although the pension market in Africa is still under-developed except in Botswana, Kenya, Mauritius and South Africa. Despite the risks involved in pension funds channelled through capital markets it has the potential to provide capital for longer-term projects
- The expansion and use of insurance markets can increase welfare and be a steady source of capital especially with reforms in risk diversification, solvency, consumer protection and taxation (ECA and the African Union, 2014).
- Private equity can also play an important role in Africa's transformation especially if constraints are identified and the relevant regulatory, tax and other policy measures are redesigned to boost private equity investments.

Other innovative approaches to mobilizing external sources include diaspora bonds, remittances and sovereign bonds such as Eurobonds. Ethiopia, for instance, issued diaspora bonds to finance its Renaissance Dam project in 2011. Other countries such as Cabo Verde, Ghana and Kenya are already considering similar bonds. Public-private partnerships remain largely unexploited although they are good risk-sharing mechanisms. Such partnerships can be used, for instance, to engage the private sector in public service delivery and infrastructure development.

Source: Adapted from ECA and the African Union (2014).

most remittance in the subregion. The highest recipient in the region was Nigeria and the least, Angola.

Remittances continued to exceed ODA for Africa as a whole and in many countries, they also exceed FDI. However, Africa is yet to reach the full potential of remittance receipts and data gaps have made it difficult to comprehensively capture receipts. In addition, local remittance within and between African countries are grossly under-quantified. AUC has established the African Institute for Remittances to help track remittance flows and thus fill the data gaps in order to leverage remittances for Africa's social and economic development.

3.14.3 External financing

3.14.3.1 Official development assistance

The official development assistance (ODA) received by African countries as a proportion of their gross national income has been above the global average. And ODA received by sub-Saharan African countries was higher than the average received by all ODA receiving countries of the world. However, ODA received in African countries as a percentage of GNI increased in 2011 only in 18 countries compared to 2002 while it decreased in 32 others. There was also a positive and increasing net inflow (new investment inflows less disinvestment) in the reporting economy from foreign investors. The total financial flows to Africa are presented in Figure 83.

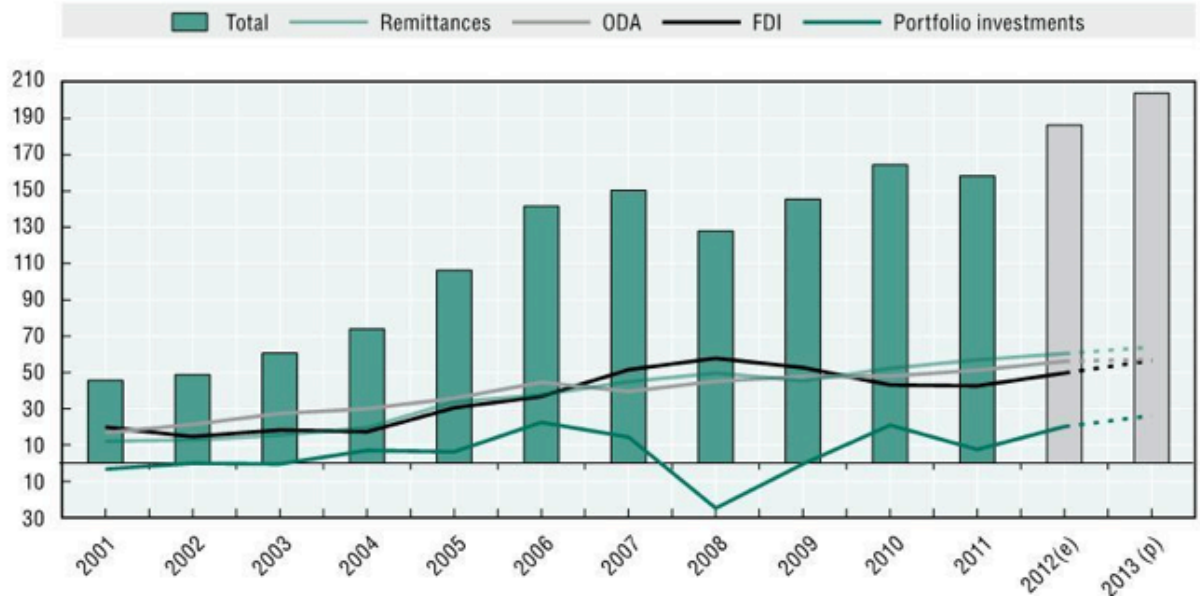
Despite the continuing global financial crisis and euro zone turmoil, total ODA to Africa increased

Box 6: Stemming capital flight in Africa

Even as Africa attempts to mobilize domestic and external finances for sustainable development, the continent should address illicit flows from the region. Africa lost around $854 billion in illicit financial flows (IFFs) over the period 1970-2008, equivalent to $22 billion a year or 70 per cent of Africa's current infrastructure financing deficit. IFFs take the form of proceeds of commercial tax evasion by multinational corporations, corruption and other criminal activities including e-fraud. During 2001-2010 alone, Africa lost more than $409 billion via trade mispricing (or mis-invoicing) alone. The loss to IFFs is greater than all ODA disbursements to the continent ($357 billion) or FDI flows ($344 billion) over the same period (UNCTADStat). It is nearly equivalent to Africa's current external debt of $413 billion. Urgent action is needed in especially policy reforms to tackle IFFs. This may include regulations to improve the disclosure of financial data by companies and individuals. African Governments should also implement the recommendations of the Extractive Industries Transparency Initiative that are meant to oblige firms to disclose information on taxes, dividends and royalty payments, and to make that information public. It is important to seal loopholes in loss of capital through IFFs which have been a huge drain on Africa by denying the continent access to development funds and jeopardizing economic governance.

Source: Adapted from ECA and the African Union (2014)

Figure 83: Total external financial flows to Africa (billion US$, current)



Note: ODA includes both bilateral and multilateral flows: (e) estimates, (p) projections.

Source: UNCTAD (2012a); IMF (2012); and ; OECD/DAC; World Bank.12 http://dx.doi.org/10.1787/10.1787/888932807189 as reported in AfDB, OECD, UNDP & ECA (2013)

from $51.3 billion in 2011 to US$56.1 billion in 2012 (ECA and the African Union, 2014). The commitments on ODA in 2011 mainly targeted social infrastructure (health and education sectors, nutrition) to the tune of 40 per cent. Only about 2 per cent of the total ODA targeted industry, mining and construction. There is also a continued decline in the proportion of total bilateral, sector-allocable ODA of OECD/DAC donors.

To cover the shortfall in some sectors, African countries resorted to external borrowing to bridge the funding gap. This has raised foreign debt as a share of GDP from 22.7 per cent in 2010 to 24 per cent in 2013 (World Bank 2012b). Eastern and Southern Africa have the highest debt-to-GDP ratios (31.8 per cent and 33.5 per cent in 2013 respectively (ECA and the African Union, 2014)). Countries such as Ghana and Nigeria in

West Africa; Angola and South Africa in Southern Africa; Tunisia, Morocco, the Sudan and Egypt in North Africa; and Kenya and Ethiopia in Eastern Africa have experienced sharp increases in foreign debt. Accessing alternative funding schemes will also be useful. More global funding opportunities are becoming available such as the Global Environment Facility's new commitment of $4.43 billion pledged by donor countries to support developing countries' efforts over the next four years.[9] The funds aim at supporting projects in more than 140 countries to tackle a broad range of threats to the global environment, including climate change, deforestation, land degradation, extinction of species, toxic chemicals and waste, and threats to oceans and freshwater resources.

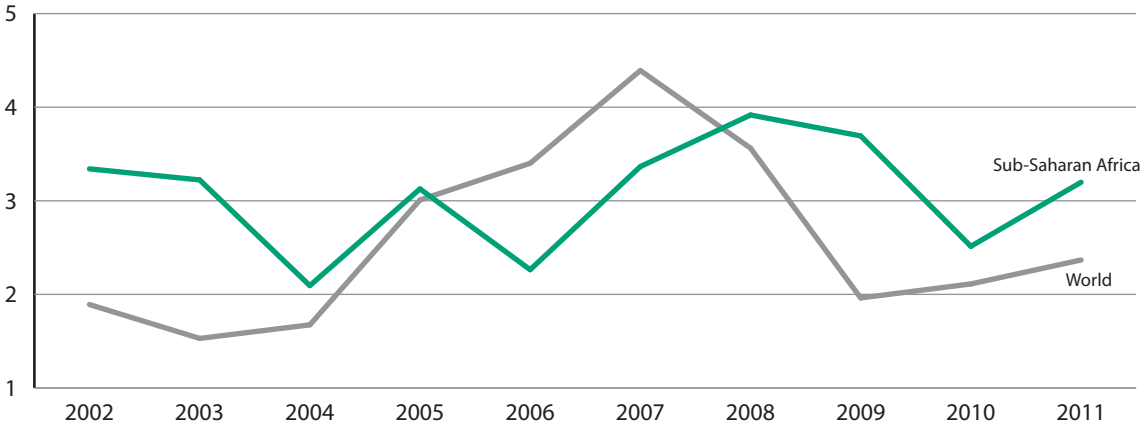
3.14.3.2 Foreign direct investment

FDI net inflows (BoP, current US$) varies by country in Africa. Net inflows (new investment inflows less disinvestment) from foreign investors have decreased in nine countries while it increased in 44 others in 2011 compared to what it was in 2002. Sub-Saharan Africa received more FDI than the average global inflows (see figure 84). In 2012, the country with the highest FDI inflow in the region was Nigeria, with a value of $22,429,824,487 followed by South Africa, while Angola and Egypt had negative inflows, with a value of -$9,722,100,376 and -$5,703,900,000 respectively (World Bank, 2012c). FDI flows to Africa have been steadily increasing over the last few years, from $20 billion in 2001 to $50 billion in 2012, a rise of 5 per cent from the previous year. The inflows are concentrated on extractive industries. There are however good examples of market-seeking investments and in manufacturing FDI. For instance, investments in the automotive sector in South Africa, leather in Ethiopia, pharmaceuticals in Eastern Africa and services (such as information and communications technology) (ECA and the African Union, 2014). FDI is poised to increase. Already the BRICS and other emerging economies have started to explore the potential of Africa's manufacturing (UNCTAD, 2013).

3.14.4 Green technology and eco-invention

Sustainable development can be realized with the deployment of appropriate science and technology innovations. Policies that aim to streamline inclusive green growth should focus on design, support, generation, dissemination and wider use of green technology and various aspects of eco-innovation. In terms of sustainable develop-

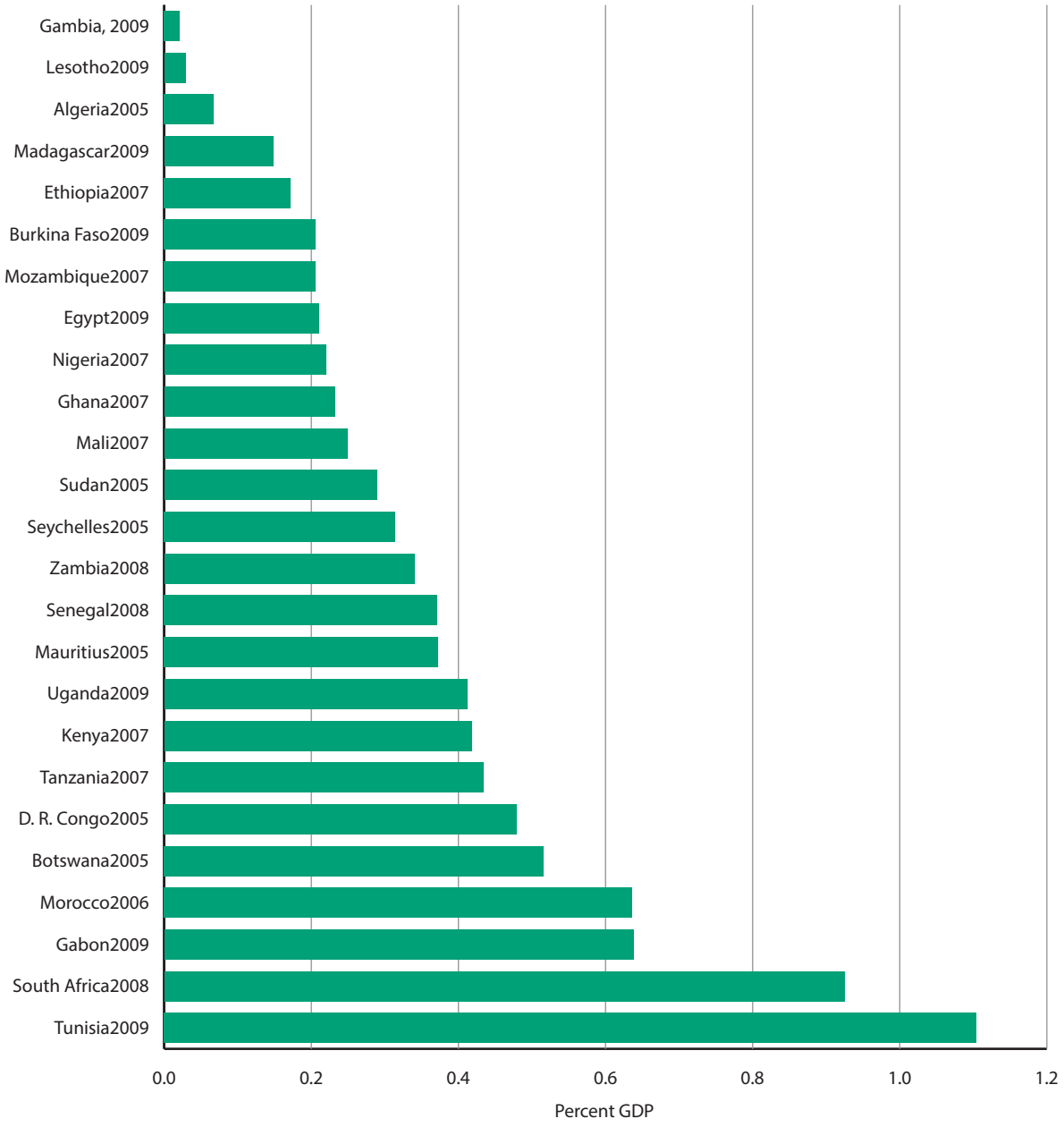
Figure 84: Foreign direct investment, net inflows (% of GDP)



Data source: World Bank, Data. Foreign direct investment, net inflows (% of GDP). Available from. data.worldbank.org/indicator/BX.KLT.DINV.WD.GD.ZS. Accessed on July 7, 2013

9 Global Environment Facility 2014, available fromwww.thegef.org/gef.

Figure 85: Research and Development Expenditure (% of GDP)



Data Source: World Bank, Data, Research and development expenditure (% of GDP). Available from http://data.worldbank.org/indicator/GB.XPD.RSDV.GD.ZS/countries/1W?display=default. Accessed on March25,2014

ment, these have been tracked using three main indicators: Expenditure on research and development as a percentage of GDP; number of countries that have been granted patents on environmental technologies; and number of papers and other publications related to eco-innovation.

3.14.4.1 Expenditure in research and development

Expenditures for research and development (R&D) are current and capital expenditures (both public and private) on creative work undertaken systematically to increase knowledge, including knowledge of humanity, culture, and society, and the use of knowledge for new applications. R&D covers basic research, applied research, and experimental development. The level of financial resources devoted to R&D as a percentage of the GDP in African countries is shown in figure 85. Many countries have increased their share of GDP dedicated to financing of R&D in many sectors but the share remains insignificant across all

subregions except North Africa. Tunisia has continued to dedicate over 1 per cent of its GDP to R&D efforts.

3.14.4.2 Patents on environmental technologies

Between 2002 and 2010, only five African countries had been granted patents in environmental technologies. These were South Africa (108), Morocco(11), Egypt(6), Senegal(2) and Mali(1). Africa continues to lag behind other regions in registering environmental innovation and new technologies. There had been a net negative change in patents granted between 2011 and 2012 (Table 5). The regional share of South Africa remained highest in patent grants (71.1 per cent).

3.14.4.3 Papers/publications related to eco-innovation

Access to sustainable development-related technologies and success stories promoted through scientific and other forms of publications on eco-innovation is also a measure of the level of technology innovation and access. Africa still lags behind the rest of the world in the number of publications related to eco-innovation. This is also reflected in other global knowledge systems. The deployment of eco-innovations in developing countries is a key driver of their contribution to efficiently addressing global environmental challenges and it is also a key driver of markets for eco-innovation and sustainable economic development (Ockwell and others, 2010).

There is limited data to show the trends in this indicator. A number of reasons explain the minimal contribution of African countries to the global knowledge base through publications in eco-innovation: lack of international policy focus on indigenous eco-innovation capabilities; existence of many eco-innovations less commercial stages with high risks to investors, lack of available sources of venture capital, lack of knowledge of operation (particularly in new geographical and cultural contexts) and higher incremental costs (Ockwell and others, 2010). There are also concerns with operationalizing intellectual property rights as few countries have eco-innovation policies that protect local innovators. For effective integration of eco-innovation processes in sustainable development programming, there is need to build capabilities for adapting, developing, deploying and operating relevant sustainable development technologies effectively within specific contexts in local, national, subregional and regional settings.

3.14.5 Capacity-building

Capacity-building is critical to achieving sustainable development. This is both in terms of human resource capacity and institutional strengthening. Human resource capacity is required with skills and techniques to interpret and implement policies and practices in different sustainable development sectors. The existence of stronger institutions boosts a country's ability to implement

Table 5: Patent grants in environmental technology by origin (2011 – 2012)

Country of origin	International filing year		2012 middle-income regional share (%)	Change compared to 2011 (%)
	2011	2012		
South Africa	319	302	71.1	-5.3
Egypt	33	41	9.6	24.2
Morocco	19	31	7.3	63.2
Namibia	19	12	2.8	-36.8
Seychelles	3	9	2.1	200.0
Others	38	30	7.1	-21.1
Total	431	425	100.0	-1.4

Data source: WIPO statistics database. Last updated: October 2013 - http://www.wipo.int/ipstats/en/statistics/country_profile/

sustainable development, mobilize and manage finances and other means of implementation for sustainable development.

3.14.5.1 Number of countries with capacity development strategies

National capacity development strategies articulate the goals, approaches and outcomes of capacity development. It helps Governments to fully own, achieve, and account for the priorities in national development frameworks. The African Union/NEPAD capacity development strategic framework outlines approaches to country level capacity development under the APRM. It has six main cornerstones: leadership transformation; citizen transformation; knowledge-based and innovation-driven decision and development processes; utilizing African potentials, skills and resources for development; capacity of capacity builders; integrated planning and implementation approaches and continuous improvement processes:

Only a few countries have national capacity development strategies. There is a growing need for capacity-building for implementing sustainable development. The strategies already developed in countries pay attention to designing, funding, implementing and monitoring capacity-building initiatives in different aspects of sustainable development. Other enabling factors including the social, political, cultural, institutional, regulatory and legal contexts form part of these strategies. These are geared towards addressing a variety of capacity constraints manifested at the human, institutional and organizational levels. To achieve sustainable development, national capacity-building strategies should go beyond development of human skills and institutions, to encompass ownership, partnership and networking, integration of knowledge and information, and involvement of non-state actors such as communities, private sector and NGOs.

3.14.6 Conclusion

The various means of implementation for sustainable development are crucial for ensuring effective implementation. The financing of Africa's sustainable transformation and development will increasingly be based on domestic public and private resources. And Africa must explore untapped approaches to raise capital to meet its development agenda. Only a small proportion of remittances received have been directly channelled to sustainable development investments while the cost of remittance continues to be high. The net ODA as a percentage of GNI is declining in relation to the rest of the world, but higher on average to all regions. FDI, especially those targeting environmental goods and services, are declining. Expenditure on research and development as a percentage of GDP remains low, while the increase in patents in environmentally-related technologies remains insignificant with only a few countries registering new patents. Furthermore, only a few countries have developed national capacity development strategies.

Both state and non-state actors will be required to adopt policies and mobilize resources (from local and external sources) to advance sustainable development. Efforts must build on current commitments and governance mechanism for funding sustainable development while innovatively seeking new financing alternatives that scale up previous successes. Above all, improved governance, including zero tolerance to corruption, stronger accountability and provision for multi-stakeholder engagement in funding, technology development and transfer and capacity-building will remain paramount for the realization of sustainable development in Africa.

Additionally, development cooperation must be made effective. CABRI (2014) recommends the following to achieving this: focusing develop-

ment co-operation on results that meet recipient countries' priorities; strengthening public finance management institutions; untying aid; inclusive development partnerships with civil society and private sector engaged appropriately; transparency and accountability for development results; mutual accountability among co-operation actors; and specific country actions to implement commitments such as South-South initiatives.

References

ACLED (2013). Armed Conflict Trends (No. 13): Real-Time Analysis of African Political Violence,April 2013., Accessed available from www.acleddata.com/dataon August 16 2014

AfDB, OECD, UNDP and ECA (2013), African Economic Outlook 2013, Structural Transformation and Natural Resources. African Development Bank, Organisation for Economic Co-operation and Development.

AfDB, OECD, UNDP and UNECA (2012). African Economic Outlook 2012: Promoting Youth Employment. Paris and Tunis: AfDB and OECD.

AfDB, OECD, UN, World Bank. (2012). A Toolkit of Policy Options to Support Inclusive Green Growth (pp. 1--61).

African Development Bank (AfDB) (2011). Africa in 50 Years' Time - The Road Towards Inclusive Growth. Tunis: African Development Bank.

Akpalu, W. and K. Vondolia (2012). "Bioeconomic Model of Spatial Fishery Management in Developing Countries."Environment and Development Economics 17 (2): 145-161.

AMCEN, UNEP and Climate Analytics (2013). Africa Adaptation Gap Technical Report: Climate-change impacts, adaptation challenges and costs for Africa.

Anseeuw, W., Wily, L.A., Cotula, L. & Taylor, M. Land Rights and the Rush for Land (InternationalLand Coalition, 2012).

Arbache, J.S., Kolev, A. &Filipiak, E, (Eds).(2010). Gender Disparities in Africa's Labor Market. African development Forum and The World Bank.

Bhaumik, S.K., Dimova, R., Gang, I.N. (2014). Is Women's Ownership of Land a Panacea in Developing Countries? Evidence from Land-Owning Farm Households in Malawi.IZA Discussion Paper Series No. 7907.

Bowen, A. 2012. "Green Growth, Green Jobs, and labor Markets." Policy Research Working Paper 5990, World Bank, Washington, DC.CABRI (2014), Towards a Greater Use of Country Systems in Africa – Trends and Approaches, Collaborative African Budget Reform Initiative, Pretoria.

Center for Universal Education, Africa Learning Barometer (Washington: Brookings, 2012).

De Schutter, O. (June 2009). Large---scale land acquisitions and leases: A set of core principles and measures to address the human rights challenge. Accessed on 12 January 2014Available from: http://www.srfood.org/images/stories/pdf/otherdocuments/20090611_large--scale--land--acquisitions_en.pdf

Desanker, P.V. (2005). The Kyoto Protocol and the CDM in Africa: a good idea but … Unasylva - No. 222 - Forests, Climate and Kyoto.

Disdier, A-C., Fekadu, B., Murillo, C., Wong, S., (2008). Trade Effects of SPS and TBT Measures on Tropical and Diversification Products. ICTSD Project on Tropical Products, Issue Paper no.12, International Centre for Trade and Sustainable Development, Geneva, Switzerland.

Dittrich M., Gilju, S. Polzin, C. Lutter. S. (2011). Material flows around the world: A global assessment.

Dittrich, M, Stefan Giljum, Christine Polzin, Stephan Lutter, Stefan Bringezu (2011). Resource Use and Resource Efficiency in Emerging Economies Trends Over the Past 20 Years. Sustainable Europe Research Instiotute (SERI). Working Paper No. 12.

ECA &AUandAfrican Union. (2014). Economic Report on Africa: Dynamic Industrialization in Africa: Innovative Institutions, Effective Processes and Flexible Mechanisms. ECA.

ECA (2011), Workshop on Institutional and Strategic Frameworks for Sustainable Development, Final Report, (United Nations Economic Commission for Africa), Addis Ababa.

ECA (2012a), Economic Report on Africa 2012. Unleashing Africa's Potential as a Pole of Global Growth, (United Nations Economic Commission for Africa), Addis Ababa.

ECA (2012b), Institutional and Strategic Frameworks for Sustainable Development, (United Nations Economic Commission for Africa), Addis Ababa.

ECA (2013), Outcome Document of the Africa Regional Implementation Meeting for the Post Rio+20 Follow up Processes, (United Nations Economic Commission for Africa), Addis Ababa.

ECA, AUand others African Union, AfDB, UNDP (2013). Assessing Progress in Africa towards the Millennium Development Goals - MDG Report 2013. Food security in Africa: Issues, challenges and lessons.

ECA, AUC and AfDB (2013), Africa Regional Consultative Meeting on the Sustainable Development Goals, Outcome Document, (United Nations Economic Commission for Africa), Addis Ababa.

ECA, AUC and AfDB (2013), Africa Regional Consultative Meeting on the Sustainable Development Goals, Outcome Document, (United Nations Economic Commission for Africa), Addis Ababa.

Elbehri, A., J. Kaminski, S. Koroma, M. Iafrate, and M. Benali (2013), West Africa food systems: An overview of trends and indicators of demand, supply, and competitiveness of staple food value chains, In: Rebuilding West Africa's Food Potential, A. Elbehri (ed.), FAO/IFAD.

Fader, M. et al., 2013. Spatial decoupling of agricultural production and consumption: quantifying dependences of countries on food imports due to domestic land and water constraints. Environmental Research Letters.

FAO (2010).Global Forest Resources Assessment 2010. Food and Agriculture Organization of The United Nations (FAO) Forestry Paper 163, Rome

FAO (2011), The State of World's Forests. Food and Agriculture Organization of the United Nations, Rome

FAO (2012).Identifying opportunities for climate-smart agriculture investments in Africa. Food and Agriculture Organization of the United Nations. Rome, April 2012

FAO, IFAD and WFP (2013).The State of Food Insecurity in the World 2013.The multiple dimensions of food security. Rome, FAO.

FAO, IFAD and WFP. 2013. The State of Food Insecurity in the World 2013. The multiple dimensions of food security. Rome, FAO.

ForthcomingSDSN (2013).Harnessing natural resources for sustainable development: Challenges and solutions. Report of the SDSN (Sustainable Development Solutions Network) Thematic Group 10 on the Good Governance of Extractive and Land Resources. United Nations

Gauci, A. and C. TsafackTemah (2011), "Resilient human capital a precondition for structural transformation".

GGGI, OECD, UNEP & World Bank. (2013). Moving towards a Common Approach on Green Growth Indicators. A Green Growth Knowledge Platform Scoping Paper.

Giljum, S., Dittrich, M., Bringezu, S., Polzin, C., Lutter, S., (2010). Resource use and resource productivity in Asia: Trends over the past 25 years. Sustainable Europe Research Institute Vienna.

Guarcello, L., and Rosati. (2007). Child Labor and Youth Employment: Ethiopia Country Study. SP Discussion Paper No. 0704

Guha-Sapir D., Hoyois Ph. , Below. R. (2013). Annual Disaster Statistical Review 2012: The Numbers and Trends. Brussels: CRED; 2013.", Accessed on 12January 2014available from http://www.cred.be/sites/default/files/ADSR_2012.pdf

Gupta Das, M, J Bongaarts, J Cleland. 2011. Population, Poverty, and Sustainable Development: A Review of the Evidence. Policy Research Working Paper # 5719.The World Bank. Washington, D.C

IEA (2009). World Energy Outlook 2009. International Energy Agency (IEA).

IEA (2012), World Energy Outlook 2011.International Energy Association.

ILO (2013). Global Wage Report 2012/13. International Labour Organization (ILO).

IPCC (2007), Climate change 2007 – impacts, adaptation and vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the IPCC. Cambridge, UK, CambridgeUniversity Press.

IPCC (2012).Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation. A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change. Cambridge and New York: Cambridge-University Press.

IRENA (2013).Renewable energy and jobs. International Renewable Energy Agency (IRENA).

Kellet, J., and Caravani, A. (2013). Financing Dsisater Risk reducation: A 20 year story of international aid. Global Facility for Disaster Risk Reduction (GFDRR) and ODI

Ockwell, D. and others (2010), "Enhancing Developing Country Access to Eco-Innovation: The Case of Technology Transfer and Climate Change in a Post-2012 Policy Framework", OECD Environment Working Papers, No. 12, OECD Publishing. http://dx.doi.org/10.1787/5kmfplm8xxf5-en. Accessed January 18 2014.

OECD (2011), "Towards Green Growth: Monitoring Progress - OECD Indicators", OECD, Paris, Update.

OECD (2012), 2012 Social Institutions and Gender Index: Understanding the Drivers of Gender Inequality, OECD Publishing, Paris.

OECD (2012), Greening Development: Enhancing Capacity for Environmental Management and Governance, OECD Publishing., Accessed on 10th September 213available from http://dx.doi.org/10.1787/9789264167896-en

Tijdens, K.G., Van Klaveren, M. (2012). Frozen in time: Gender pay gap unchanged for 10 years. Brussels, ITUC

U.S. Geological Survey, (2012). Mineral commodity summaries 2012: U.S. Geological Survey, 198 p.

UNCSD (2012). The Future we want, outcome of the United Nations Conference on Sustainable Development (Rio+20).

UNCTAD (2012). Resource use and resource efficiency in Africa: A pilot study on trends over the past 28 years. Written by Dittrich M and Giljum S, Lugschitz B, Polzin C and Lutter S from the Sustainable Europe Research Institute (SERI) of Vienna. Paper commissioned by UNCTAD. Geneva.

UNCTAD/UNIDO (2011). Economic Development in Africa Report 2011: Fostering industrial development in Africa in the new global environment. UNCTAD/UNIDO.

UNCTAD/UNIDO Economic Development in Africa Report 2011: Fostering industrial development in

Africa in the new global environment., Accessed on November 12th 2013available from:http://ictsd.org/i/news/tni/121365/#sthash.6Vf49U5j.dpuf

UNDESA (2011).'World population prospects: The 2010 revision', United Nations, 2011, www.esa.un-.org.

UNDESA (2012); "World Economic and Social Survey 2012: In Search of New Development Finance". UNDESA; New York.

UNDESA (2013). World Population Policies. UNDESA

UNDESA (2013).A guidebook to a green economy. UNDESA.

UNDP (2012a). African Human Development Report 2012: Towards a Food Secure Future, UNDP, New York, NY.

UNDP (2012b)."Towards a food secure future", Africa human development report 2012, United Nations Development Programme, 2012.

UNDP (2013). Human Development Report 2013: The Rise of the South, (United Nations Development Programme), New York, NY.

UNEP (2011). "Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication – A Synthesis for Policy Makers." Available online at: http://www.unep.org/greeneconomy/Portals/88/documents/ger/GER_synthesis_en.pdf(Accessed 12 November 2013).

UNEP (2013). Moving towards a Common Approach on Green Growth Indicators: A Green Growth Knowledge Platform Scoping Paper. UNEP.

UNEP (2013).The Emissions Gap Report 2013. A UNEP Synthesis Report .United Nations Environment Programme. Nairobi.

UNEP, ITC and ICTSD; (2012); Trade and Environment Briefings: Trade in Environmental Goods; ICTSD Programme on Global Economic Policy and Institutions; Policy Brief No. 6; International Centre for Trade and Sustainable Development, Geneva, Switzerland, www.ictsd.org

UNESCO (2012a). Education for All Global Monitoring Report: Youth and Skills—Putting Education to Work. UNESCO, Paris.

UNESCO (2012b), World Atlas of Gender Equality in Education 2012, UNESCO, Paris.

UN-Habitat (2014).State of African Cities 2014: Re-imagining sustainable urban transitions RegionalState of the Cities Reports. United Nations Human Settlements Programme (UN-Habitat).

UNICEF, WHO, World Bank, United Nations (2013). Levels & Trends in Child Mortality Report 2013. Estimates Developed by the UN Inter-agency Group for Child Mortality Estimation.

UNISDR (2011). Hyogo Framework for Action – Building resilience of nations and communities to disasters, Mid-term review, 2011. UN International Strategy for Disaster Reducation. Geneva, Switzerland. http://www.unisdr.org/files/18197_midterm.pdf.Accesed April 11th 2014

United Nations (2012), United Nations Conference on Sustainable Development, Outcome of the Conference, Rio de Janeiro, Brazil, 20-22 June, 2012.

United Nations Conference on Sustainable Development (UNCSD) (2012). The Future We Want. Outcome Document of the Rio+20 Summit. Available at: http://daccessods.un.org/TMP/8219975.82912445.html (Accessed November 2013).

United Nations Conference on Trade and Development. (2010). Promoting poles of clean growth to foster the transition to a more sustainable economy.

United Nations Division for Sustainable Development (UNDESA) (2012). A guidebook to the Green Economy.UNDESA. Accessed September 10th 2013Available from http://www.uncsd2012.org/content/documents/528Green%20Economy%20Guidebook_100912_FINAL.pdf

WHO (2014). The African Regional Health Report: The Health of the People, Bulletin of the World Health Organization. Bulletin Volume 92, March 2014. WHO. Accessed Available from -http://www.who.int/bulletin/africanhealth/en/ on March 15th 2014.

WHO, UNICEF, UNFPA and The World Bank (2010). Trends in maternal mortality: 1990 to 2010.

WHO, UNICEF, UNFPA and The World Bank estimates

World Bank (2011). The Changing Wealth of Nations: Measuring Sustainable Development in the New Millennium. The International Bank for Reconstruction and Development / The World Bank. Washington, D.C.

World Bank (2012). Inclusive Green Growth: The Pathway to Sustainable Development. Washington, DC: World Bank.

World Bank (2012a). African Development Indicators, World Bank, Washington, DC.

World Bank (2012b). African Pulse: An Analysis of Issues Shaping Africa's Economic Future, Vol. 6,

World Bank, Washington, DC, October.

World Bank (2012c). Inclusive Green Growth: The Pathway to Sustainable Development. World Bank. WashingtonDC.

World Bank (2012d). Remittance Prices Worldwide, Issue No. 4, World Bank, Washington, DC., November.

World Bank (2012e). The Changing Wealth of Nations: Measuring Sustainable Development in the New Millennium, World Bank, Washington, DC.

WTO (2011), "The Negotiations on Environmental Services in the CTS - SS." WTO

WTO (2012). Industrial Trade Statistics 2012. WTO.

Part II: Promoting Inclusive Green Growth in Selected Sectors

Agriculture, Ecosystems, Energy, Industry and Trade

4. Key messages from the thematic chapters

4.1 Agriculture

Agricultural productivity in Africa has been increasing, but has not translated into food security for most Africans, and environmental degradation continues unabated. While agricultural GDP has been growing at an annual average rate of 3.3 per cent, setbacks such as food insecurity, soil degradation, loss of vegetation cover, including forests, grasslands and rangelands, remain widespread. For that reason, inclusive green growth in the agriculture sector needs to be fostered by the adoption and implementation of policies that promote agricultural development activities and enhance social inclusion and environmental sustainability.

Improving the functioning of African land markets could be a trigger for inclusive green growth in agriculture. For farmers to be able to invest in their land and adopt sustainable agricultural practices, legal ties to land need to be recognized without discrimination as to gender. Such ties need to be clearly defined, identifiable on the ground, and enforceable at low cost.

The creation of a conducive environment for agribusiness should be promoted. This can be achieved by, for example, connecting all the actors in the agricultural value chain in order to improve the efficiency of the agricultural sector. This would reduce the cost of operation and free up money for investment in higher value activities, thereby creating more jobs.

Transforming wasteful subsidies into market-smart and sustainable systems would increase agricultural productivity. These subsidies include those for addressing market failures in the input market, crop and livestock insurance, and the microfinance sector. They should be designed to build markets by providing input vouchers that are redeemed through private input dealers. The vouchers should be targeted as far as possible to those who do not currently use a particular product due to lack of credit, knowledge, or ability to withstand risks. The subsidy should be modest in relation to other critical public expenditure such as research and development, and there should be a clear exit strategy.

Developing carbon project extension services for agroforestry and crop production would increase carbon revenue and create jobs. Extension experts could be selected from existing government employees with training in forestry and/or agroforestry or could be hired from an existing successful carbon project in the country. The selected experts could then be trained to ensure that they are equipped with the requisite knowledge and expertise for extension services.

Technical and institutional capacity to promote inclusive green growth in the sector should be strengthened. Inclusive green growth should be integrated into agricultural development policies and programmes at all levels. To ensure good leadership and quick delivery, a dedicated and highly skilled delivery team must be established. The delivery team should have sufficient stature and experience to effectively engage in dialogue with government entities and the private sector, including multinational firms.

4.2 Ecosystems goods and services

The role of ecosystem goods and services in advancing sustained and inclusive green growth is

now recognized at the global, regional and national levels. Trends throughout Africa and elsewhere highlight the intrinsic link between environmental goods and services (EGS) and inclusive green growth initiatives. National Governments are investigating ways to include natural capital in gross domestic product measurements; private and public sector relationships to promote ecosystem services are growing; and key international institutions have begun to establish mechanisms for investing in EGS. Several decisions of the African Ministerial Conference on the Environment clearly indicate the centrality of EGS in fostering inclusive green growth and the green economy in achieving sustainable development.

Ecosystems goods and services-based inclusive green growth can support the livelihoods of the poor and promote the realization of sustainable development in Africa. Millions of people in Africa earn most of their income from EGS. Inclusive green growth realized through EGS would enhance water quality and provision; promote the development of clean and renewable energy sources; enhance food security; improve gender integration; promote sustainable use of natural resources; and stimulate innovation, employment creation and sustainable economic development. Other potential benefits include natural disaster risk reduction, climate change adaptation and mitigation, and human security.

There is a need to focus on value addition for upscaling ecosystem services. Enhancing the benefits that rural dwellers and the urban poor are able to derive from natural resources can promote inclusive green growth and address inequality and unemployment. Examples include promoting policies that encourage urban gardening and urban water harvesting to provide for basic needs; and, in rural areas, promoting higher quality production methods to generate additional income.

Enhancing ecological integrity and productivity is fundamental to sustained provision of ecosystem goods and services. Payment for ecosystem services schemes should be developed, enforced and scaled up. Sustainable water resources development and management should be reinforced through integrated water resources management. Efficient and effective land-use management should be encouraged in order to reduce deforestation, land degradation and soil erosion, and enhance resilience to climate change. In addition, policies and legislation on sound natural resources development and management should be strengthened and enforced to enhance ecological assets and benefits derived from ecosystem goods and services.

Sustainable management and sound governance of natural resources should be accorded a high priority to enhance the benefits derived from ecosystems goods and services. Weak governance and "business as usual" policies undermine the potential of EGS to enhance inclusive green growth. Policy decisions on effective governance of EGS should be based on sound scientific evidence, provide tangible benefits to people and be relevant to overall development. Supportive policies and incentives, and evaluation systems such as strategic environmental assessment, would allow higher-order or strategic decisions to be subjected to environmental and social scrutiny.

4.3 Energy

Fostering inclusive green growth can contribute to addressing Africa's energy-related challenges. Despite Africa's abundant fossil and renewable energy potential, severe energy-related challenges persist, suggesting that current approaches to energy development and deployment have not delivered the desired levels of energy services and security. Inclusive green growth policies and practices can contribute to meeting the challenges of energy insecurity and poverty; reducing energy intensity; enhancing the clean energy mix; increasing energy access and consumption; reducing energy prices; and reducing environmental impacts, while improving human welfare.

Trends in energy efficiency, deployment of renewable energy, supply of modern energy services, and efforts to address social and environmental concerns all point to the application of inclusive green growth principles in the energy sector, but more needs to be done. Energy efficiency and demand side management practices need to be enhanced. Renewable energy deployment has received significant attention but not enough for it to displace conventional fossil energy sources. Energy supply to the productive and social sectors of the economy is low compared to that in other regions of the world and the low energy consumption in the agriculture and industry sectors has translated into low agricultural outputs and low levels of industrialization.

Positive results are emerging from mainstreaming inclusive green growth principles in the energy sector. Emerging policies and strategies, for example, feed-in tariffs, as well as reforms such as fossil fuel subsidy removal, the creation of cost-reflective tariffs and the liberalization of the sector to involve independent power producers, have demonstrated positive results across Africa. However, adequate measures need to be put in place to mitigate the potential political and social impacts. The cost savings and benefits to all should be analysed and disseminated widely.

Enhancing development of the renewable energy sector presents considerable opportunities for inclusive green growth. Africa's considerable renewable energy potential, which could be a major contributor to clean energy, improved social well-being and jobs, remains largely untapped. Renewable energy can create up to 25 per cent more jobs than coal and 90 per cent more jobs than nuclear energy, per unit of energy generated. However, the development of renewable energy is constrained by low investments in the sector, and aggravated by the high cost of technologies and small markets for products. Exploiting economies of scale through regional power pools can remove the constraints and increase the share of renewable energy in the total energy mix.

Inclusive green growth in the energy sector will require, among other things, an understanding of cross-cutting and cross-sectoral linkages. Development in the energy sector has significant implications for growth and employment creation in other sectors such as industry, transport and agriculture. Improvements in energy efficiency will lead to reductions in greenhouse gases, but extreme weather and climatic events also affect energy infrastructure and resources. The application of clean, modern energy services can positively impact on cross-cutting social development indicators such as gender, health, education and employment creation.

4.4 Industry

African countries largely continue to export raw materials with low value added, resulting in low industrial development. This situation has prompted the current drive for the structural transformation of African economies through accelerated industrialization. The application of inclusive green growth principles and practices in the implementation of national and regional industrial development frameworks, supported by adequate sustainable infrastructure, could contribute to transforming African economies from agrarian and resource-based to more industrialized economies, and lead the continent towards a sustainable development pathway.

Inclusive green growth opportunities are emerging in the agribusiness/agro-processing, mineral and metals regional, south-south and global value chains. However, energy challenges threaten the development and sustainability of these activities. African Governments should capitalize on the under-tapped renewable energy and energy efficiency opportunities, to meet sustainable energy requirements for increased valorization of its natural resource endowment and generate productive employment and income for its citizens, particularly the young.

African Governments are increasingly recognizing the enhanced benefits that can accrue from the extractive industry through manufacturing value addition and value chain development. Governments are enacting local content policy and legislation to drive full participation, employment creation, wealth generation and shared prosperity. Their successful implementation in several countries has resulted in an increase in the number and diversity of local businesses securing economic benefit from government contracts with transparent indicators, including sustainable public procurement. Governments should consider extending the practice to the manufacturing subsector.

Existing and emerging voluntary and mandatory international and national sustainability frameworks are facilitating and integrating responsible production and processing in industry and contributing to inclusive green growth. Among these are national regulations on environmental and social impact assessment and mitigation measures and the relevant performance standards of international financing institutions, the United Nations Global Compact, corporate social responsibility, and the Equator Principles. However, compliance promotion, monitoring, evaluation and enforcement need strengthening. The capacities of environment and other enforcement agencies should therefore be enhanced to allow for the effective implementation of the various sustainability frameworks that could foster inclusive green growth.

Artisanal and small-scale mining (ASM) is increasingly being acknowledged as a source of livelihood for rural communities in many African countries and as a significant contributor to economic growth. This acknowledgement has led to the alignment of ASM operations with relevant national development priorities, and to support for ASM as an income-generating activity, especially for women and young people, and as a vehicle for reducing poverty in marginalized communities. The effective implementation of national and international instruments relevant to the mining sector provides an opportunity for inclusive green growth in ASM.

4.5 Trade

Trade has the potential to spur inclusive green growth in Africa and support the transition to an inclusive green economy. However, this can only be achieved if comparative advantages in sustainably produced goods and services are exploited. The identification of inclusive green growth opportunities and niche markets should be prioritized. Overspecialization in a small set of "staple" activities that tend to be driven by the forces of international trade should be avoided. The creation of markets for renewable energy and of the infrastructure to transfer energy from regions of surplus to regions with expanding energy demands or growing deficits in supply is a promising means of exploiting natural comparative advantages.

Infrastructure investments are also critical, to keep down transaction costs and ensure the trade competitiveness of African "green" goods in a globalized marketplace. Upgrading and expanding ports and cargo-handling capacity and improving national and subregional rail networks are a key part of this strategy, and go a long way in themselves towards enhancing inclusive green growth. Transportation by rail, for example, has been shown to reduce the carbon emissions associated with transporting goods across countries and borders, and tends to be more resilient to water and heat stresses than roads – this is important when considering the future impacts of climate change.

Aside from eliminating trade-distorting tariffs and taxes, trade-driven inclusive green growth also requires fiscal reforms that should include removal of unproductive subsidies such as those on energy and energy-intensive products. In order for renewable sources of energy to become competitive within the local and international markets, any artificial advantage given to fossil-based energy must be removed. Such subsidies are often very

expensive for African countries, and reduce the fiscal resources that could otherwise be spent on "greening" the economy through improvements in infrastructure, technologies and human capital – which are key to the success of an inclusive green growth strategy.

Given the broad range of challenges that various African countries face, no one set of trade-promoting reforms, policies or strategies would apply to every region. Resource-rich countries need to spend their resource-generated revenues on well-targeted investments that maintain productivity and trade competitiveness in the non-resource sectors. Landlocked countries face challenges related to market access that can erode trade competitiveness across a number of sectors with export potential. Countries with high agricultural potential should strengthen management of land and water resources to maintain competitiveness of their products on world markets and improve environmental and social outcomes.

The drivers of the green economy transition in Africa are the same forces that would reinforce Africa's comparative advantage in trading green goods. The process of transformation would move Africa from being an exporter of primarily resource-intensive goods with low value-added to being a resource-efficient producer of "green" goods. These processes are self-reinforcing and require that green growth-oriented policies take into account, and are adaptive to, the forces of a highly globalized marketplace.

4.6 Enabling measures

Political economy analysis should be carefully undertaken to inform decisions and actions to drive and manage the process of the green economy transition, in view of the attendant shift of resources and the likely winners and losers that would result from the transition. In particular, poor and vulnerable groups should be identified, and the direct and indirect impacts of the green economy measures on their well-being would need to be carefully assessed, and corresponding complementary and mitigation measures developed and implemented. An optimal mix of policy measures is required to correct market failures, spur investments in greener growth opportunities and ensure an equitable green economy transition process.

Good governance, a robust institutional framework, and the capacity to develop and implement coherent policies are fundamental to all relevant enabling measures for inclusive green growth, and a well-managed transition. Effective institutional frameworks and cross-sectoral coordination that is government-wide can promote coherence across economic, fiscal, social and environmental policies. This should be complemented with education of the masses and targeted skills development to engender public participation, meet skills needs in green trades, and enable Africa's young and growing population to participate in the job market associated with the new green value chains that would be established.

Targeted public spending and investment in key pro-poor sectors, especially in agriculture, energy, infrastructure, water and waste management should be strategically used. This targeted support can enhance the natural resource base of poor and vulnerable women and men and increase their resilience to multiple risks, including climate change. In order to enhance inclusion, such investments should also be targeted at pro-poor smart infrastructure systems. The use of public resources should be designed to trigger and leverage private investment to deliver low-cost products and services to poor populations.

Well-developed local innovation capacity, enhanced technology transfer, innovative financing solutions and regional integration are key to driving inclusive green growth, and the transition. Local innovation capacity should be strengthened through targeted investment in research and development, and through encouraging universities

and research institutions to take part in the innovation requirements of inclusive green growth. In addition, green technologies and knowledge from the global market should be effectively diffused and adapted throughout Africa. Innovative financing solutions at national level, as well as coordinated and targeted financing efforts at regional and international levels, would be required for Africa to meet the upfront costs of the transition. Finally, strengthening Africa's regional cooperation and integration is crucial in enabling effective coordination of efforts to achieve and scale up inclusive green growth and drive the transition in the region.

5. Agriculture

5.1 Introduction

Agriculture has been the engine of economic growth in most developing countries (Timmer, 1988 and Gollin and others, 2002). As discussed in Part I of the present report, agriculture contributes an average of one-third to the region's GDP. Although employment in agriculture is declining globally, the sector still accounts for more than half of the total employment in sub-Saharan Africa.[10] Agriculture employs about 70 per cent of the labour force in Africa (ECA, 2007). It is estimated that growth in agricultural employment accounted for half of all employment growth between 1999 and 2009.[11]

The crucial role of the agriculture sector in Africa's social and economic development underlines the importance of promoting inclusive green growth in the sector. Inclusive green growth interventions are needed in the sector to address food security which remains a major problem on the continent as already highlighted in Part I. It is estimated that 25 per cent of the undernourished people live in Africa, a figure which is projected to increase due to the growing threats of climate change (UNDP, 2012). Furthermore, while agricultural GDP experienced a 3.3 per cent[12] annual growth rate in the past decade, this growth was far from inclusive and/or green as African farmers still make up the largest share of the poor and most of this growth is associated with environmental degradation (World Bank, 2008).[13] Other additional factors that warrant urgent efforts to foster inclusive green growth in the sector are its high dependence on natural resources and the associated negative impacts on environmental sustainability; and the need for climate change adaptation and mitigation in the sector.

Agriculture is a major cause of environmental degradation in Africa. It contributes to soil degradation, loss of biodiversity, pollution, siltation of water bodies, and greenhouse gas emissions, mainly through deforestation and poor agricultural practices. At the same time because Africa's agriculture is mostly rain-fed, climate change is set to have significant negative impact on agricultural productivity in the region. It is projected to reduce crop production, rarify feedstock, increase the probabilities of forest fire, and reduce the marine oxygen levels as a result of increased temperature and rainfall variability. These factors would negatively affect food security and push farmers to seek alternative livelihood means in the forestry value chain such as charcoal making, which can accelerate deforestation.

This chapter discusses how inclusive green growth can be promoted in the agricultural sector in Africa. For the purpose of the present report, the chapter focuses on the crop production, livestock and agroforestry subsectors. The chapter provides an overview, and highlights the potential for inclusive green growth in these subsectors, discusses trends in inclusive green growth practices in the agriculture sector, and showcases good practices. It also highlights key challenges and opportunities and provides policy recommendations towards advancing inclusive green growth in the sector.

5.2 Potential for inclusive green growth in the crop, livestock and agroforestry subsectors

The crop, livestock and agroforestry subsectors hold significant potential for inclusive green

10 www.fao.org/docrep/015/i2490e/i2490e01b.pdf
11 www.fao.org/docrep/015/i2490e/i2490e01b.pdf
12 This is estimated using agricultural value added per worker from WDI from between 2001 and 2011.
13 Most of the agricultural growth that Africa recently experienced has been associated with agricultural land expansion as opposed to productivity improvement (World Bank 2008)

growth. Performance in each of the subsectors is far below the Pareto efficiency curve. This means that inclusive green growth in the sector requires the development and implementation of policies and initiatives that enhances productivity and adds value to primary products in a manner that promotes economic growth, creates jobs and reduces poverty, while enhancing environmental protection and ecosystems integrity.

5.2.1 Crop Production

While there are some variations across the region, crop production in Africa is generally characterized by low productivity with little application of science and technology, low use of external inputs, low application of sustainable practices, and little linkages with the rest of the value chain. Most farmers produce food crops mainly for home consumption. The growth rate of these crops between 2000 and 2010 was 3.4 per cent per year- a rate which has been associated with a change in the human development index from 0.405 in 2000 to 0.468 in 2010 (UNDP 2012). Some farmers are engaged in the production of high-value cash crops, including tobacco, coffee, cocoa, cotton, or tea. These crops are a major source of export revenue for a large number of African countries, and the livelihood basis for rural households. Between 2000 and 2010, the combined export revenue of coffee, cocoa, cotton, and tobacco grew at an annual rate of 7.6 per cent. This rate could have been 50 per cent higher if the yield gap of these crops could have been closed.[14]

Very little value addition is currently taking place in the subsector. Apart from very rudimentary post-harvest processing, the majority of agro-processing occurs outside the continent except for countries such as South Africa and Morocco. For example, whereas Ghana produces more than 20 per cent of the world's supply of cocoa beans, it only captures less than 5 per cent of the value of its intermediary products and an insignificant share of the global chocolate industry, which constitutes a missed opportunity for job creation (ACET, 2014). Farmers also experience high post-harvest loses. For example in Malawi, post-harvest loses for maize are estimated at 18 per cent before marketing (Kaminski and Christiaensen, 2014). Inclusive green growth approaches and practices have the potential to enhance productivity and value addition in the subsector, thereby creating jobs and addressing post-harvest losses.

5.2.2 Livestock

There are different types of livestock systems in Africa. These include pastoral, intensive peri-urban production, commercial ranching and mixed crop/livestock farming systems each of which has its own geographic domain as well as economic, social and environmental impacts. Eastern and West Africa account for 56 and 26 per cent of the total livestock wealth respectively, whereas Southern Africa accounts for 12 per cent and Central Africa for 6 per cent (Winrock, 1992).

Meat exports help Africa to generate more than $400 million in revenue annually, and this value has been growing by an annual rate of 5 per cent since the early 2000s. In addition, livestock produces commercially viable products such as eggs, hides and skin, manure, and milk. However, these by-products are sold locally with perhaps the exception of hides and skins, which are an important source of export revenue for Ethiopia. Although most bovine produced in combination with crops are considered as buffer stock for farmers living in areas where both credit and insurance markets are weak, they are also considered as major assets for fulfilling dowry payment or bride price. Uncontrolled foraging by livestock has major negative impacts including overgrazing, which contribute substantially to land degradation and desertification. Plant removal reduces protective plant cover, vigour and regrowth capacity, the effects of which increase exponentially with removal rates as in the case of arid regions (Belsky, 1986; Hiernaux and others,1994). The inclusive green growth potential

14 This was estimated by the authors using data from FAOSTAT Online

of the subsector can be harnessed through value addition that creates decent jobs enabled by the application of green technologies, adherence to environmental standards and regulations, and adoption of sustainable rangeland management.

5.2.3 Agroforestry

Agroforestry is indigenous to Africa's agricultural system and has been passed on from generation to generation. Agroforestry has increased cocoa productivity in Côte d'Ivoire by more than 30 per cent, and cereal production by more than 10 per cent in Niger. Agroforestry provides farmers with benefits such as fodder for livestock, fuel wood, soil fertility, wind breakers, and biodiversity, which, together, reduce the cost of farm operations and improve household welfare. One of the major benefits of on-farm trees is their ability to replenish nutrient-depleted soils. Sileshi and others (2012) showed how the planting of a particular tree variety – Gliricidia – as a fertilizer tree alongside maize improved the stability of its production. In addition, agroforestry has in recent years become an important alternative source of wood fuel for households. In South Africa for example, it has been used to establish small plantations around natural forests in districts where land is communally owned to create alternative wood fuel for households (Nceba, 2002).

The growing threats of climate change could make agroforestry and conservation agriculture practices more necessary, and contribute to increasing their viability and affordability to African farmers. As the threats of climate change grow, the demand for ecological goods such as soil organic carbon will increase. While planting trees in farmland reduces the need for inorganic fertilizers, the carbon sequestered from these practices would provide further ecological services, and Africa's soil is well positioned to serve as a sink. The large gap between soil maximum carbon sink capacity[15] and current low carbon stock levels can render carbon sequestration projects profitable. The cost associated with adopting agroforestry practices can be covered by the revenue gained from the carbon market. This however requires that adequate policies, including those that foster inclusive green growth and climate resilient development are put in place to make the necessary linkage.

5.3 Trends in fostering inclusive green growth in the agriculture sector

There is a growing trend towards adoption of practices and initiatives to advance inclusive green growth in the agricultural sector in the region. The following section provides illustrations of such trends and highlights some good practices.

5.3.1 Evergreen Agriculture (Agroforestry)

Evergreen Agriculture is now emerging as an affordable and accessible science-based solution to regenerating the land on small-scale farms and increasing family food production and cash income. Evergreen Agriculture is a form of more intensive farming that integrates trees into crop and livestock production systems at the field, farm, and landscape scales (Garrity and others, 2010). Evergreen farming systems feature both perennial and annual species (trees and food crops) planted to build a healthy soil and environment and increase the resilience of the farm enterprise to a variety of shocks. It has been adopted and now being scaled-up in Ethiopia, Rwanda, Senegal and a number of other countries, building on the successful scaling-up in Malawi, Zambia and the Niger (Garrity and others, 2010).

15 Maximum carbon sink capacity is soil carbon stock under natural vegetation conditions.

Box 7: Zimbabwe Precision Conservation Agriculture Program

Since 2004 precision conservation agriculture (PCA) approach has been promoted to more than 50,000 farm households through a combination of partnerships with NGOs and national agricultural research and extension departments in Zimbabwe.

The program was a major success. Over the three seasons after its implementation, average cereal yields increased by 15 per cent to 300 per cent in more than 15,000 farm households, with the yield increase varying by rainfall regime, soil types and fertility. As a consequence, in the 2007–2008 cropping season, the PCA package was promoted to more than 50,000 communal/ smallholder farmers by NGOs working in Zimbabwe

For inclusive green growth to take off in crop production, it is important to coordinate crop production policies in a way that takes account of the fact that farmers produce both cash crops and food crop to satisfy economic and social needs to the detriment of environmental needs. It is important for agriculture to leverage farm management practices such as conservation agriculture which can improve productivity while promoting soil regeneration.

5.3.2 Conservation agriculture and soil carbon credit

Conservation agriculture has been identified as one of the methods to both increase agricultural productivity and address the land degradation threatening Africa. However, the initial low rates of return have resulted in a low uptake of this practice. Today, it is estimated that only 0.05 per cent of agricultural land in Africa is under conservation agriculture. Targeted extension services could help in understanding major constraining factors with a view to addressing them. Proper implementation of conservation agriculture would improve the organic material in the soil, increase soil water retention capacity, and consequently relax the water constraint that many small scale farmers face. Through case studies in countries like Zimbabwe (see box 7), conservation agriculture has increased agricultural productivity in spectacular ways (Twomlow and others, 2008). The majority of conservation agriculture models have focused on rural development, gender issues, poverty alleviation and even climate change adaptation, demonstrating broad applicability for inclusive green growth (see box 8).

Beyond increased productivity, conservation agriculture can also contribute to the fight against climate change through carbon sequestration (see box 9).

5.3.3 Managed cattle grazing

The Savory institute's solution to recover degraded grassland soil is to concentrate grazing in small areas and move the cattle frequently. This is a method already practiced in the Cape Province of South Africa. The setup consists of establishing a central water source and encircles it with six to eight relatively small, wedge-shaped pastures enclosed with barbed wire. Cattle are grazed in one or two of the wedges and moved frequently. This short-term, intense grazing helps to restore the grasslands in this area because it will allow for the cattle to graze, defecate, and stomp it into the soil, which is a process that enriches the soil. This can be applied in conservation agriculture to enhance inclusive green growth in the sub-sector.

5.3.4 Index insurance for livestock and crops

Index-based insurance contracts have been considered as a potential vehicle to help farmers cope with covariate shocks (Mulangu and Ulimwengu, 2010). Such contracts can be sold at the farm, district, or national level to help speed up the relief efforts after a covariate shock (Chantarat and others, 2007) and make poor farmers attractive to micro-finance products. Using indexes such as rainfall, area yield, or forage conditions capture via satellite imageries, these types of insurance are

Box 8: Sustainable farming/agriculture in Zambia and Uganda

a. Sustainable farming in Zambia

In Zambia, over 80 per cent of the labor force depends on agriculture, with mono-cropping as the predominant approach. Mono-cropping is not beneficial to the soil and overall production in the long term. When crops are not varied, soil nutrients deplete and farmer vulnerability to market volatility, climatic variations, and environmental impacts increase. To address this downward spiral, an EGS (with inclusive green growthIGG considerations) approach was used to introduce conservation agriculture.

The project implemented soil and water conservation, soil fertility improvement practices and natural pest and disease management. It relied on locally available resources, and improved crop diversity. It incorporated social considerations by building the capacity of smallholder farmers in Zambia through workshops and training sessions, attended by men and women in equitable ratios.

At the local level, the Zambian project provides hard numbers. Zambian farmers who reported an increase in production grew in numbers from 2.3 per cent to 75 per cent and mono-cropping of Maize reduced from 78 per cent to 6 per cent. Additionally, 51 per cent of the project's respondents had begun growing drought-tolerant varieties (one or more of the crops: sorghum, millet, local maize, cassava and cowpeas), which constituted an overall increase of 40.5 per cent. These drought resistant varieties contributed to an increase in crop yields for three consecutive seasons from 0 to 60 per cent (Kalala, 2013). Intercropping has contributed to overall soil and ecosystem health while the planting of drought resistant varieties has complimented ecosystem management measures which are challenged by climate change.

b. Sustainable and commercially viable agriculture in Uganda

The Uganda Crop Industries Limited is working in partnership with small farmers, local and international public bodies, other private Ugandan enterprises, and a worldwide clientele to develop sound, sustainable, and commercially viable agriculture business in the country. It is working to raise the standards of local agriculture by developing new plant varieties and introducing new crops by; actively partnering with international donor agencies and experts; running numerous training programmes for farmers and workers; financing small farmers and guaranteeing markets for their crops; and implementing a certified-organic production chain.

sold to crop producers in Ghana (see box 10) and cattle herders in Northern Kenya.

5.3.5 Micro-irrigation infrastructure

Micro-irrigation technologies, commonly used in water-scarce areas of developed countries can provide farmers with the ability to use water more efficiently in irrigated agriculture. These technologies can improve productivity, raise incomes through crop yields and outputs, and enhance food security of households. Numerous studies have established gains from the adoption of micro-irrigation adoption, and several non-governmental organizations supported by the International Water Management Institute are engaged in actively promoting these technologies (Namara and others, 2005). The use of micro-irrigation technologies generally results in a significant yield improvement over traditional irrigation practices such as flood irrigation.

5.3.6 Sustainable land management

Countries are also adopting sustainable land management practices to improve agricultural practices as shown in the case of Ethiopia. About 70 per cent of Ethiopia is highland and an area of over 40 million ha is affected by land degradation. In 2009, the Ethiopian Government implemented the sustainable land management (SLM) project. The objective of the project was to reduce land degradation in agricultural landscapes and to improve the agricultural productivity of smallholder farmers. The project promotes best management practices in sustainable land management practices and technologies for smallholder farmers in the high potential and food secure areas and it is

Box 9: The Kenyan Agricultural Carbon Project

In 2010, the Kenyan Agricultural Carbon (KAC) project, funded by the World Bank, became the first soil carbon sequestration project that credit farmers for sequestering carbon in Africa. The project is located in an area dominated by subsistence farming on highly degraded farmlands with an average farm size of less than one hectare

The project is developing and piloting the adoption of conservation agriculture practices under the Voluntary Carbon Standard (Shames and others, 2012). Farmers can choose form a range of conservation agriculture practices which include improved crops, soil, and water management practices as well as agroforestry innovations, restoration and rehabilitation of degraded land, and improved livestock management (Lager, 2011).

The carbon contract will operate for nine years while the monies for the credit will flow for 20 years until 2029. The project is expected to reduce 1.2 million tons of CO2 over 20 years or 1.37 tons per ha per year. However, one of the big criticisms of the project is on the payment that farmers will get from their provision of environmental service. According to analysis conducted by the Center for Agriculture and Trade Policy, the carbon payments are negligible in the Kenya Project: at most a little over $1 per farmer per year for 20 years.

Box 10: Rainfall insurance in Ghana

The Ghana Agricultural Insurance Program was launched in May 2010 with 19 Ghanaian insurance companies providing their capacity under a pool coinsurance agreement, with a technical management unit responsible for creating, designing, rating and implementing crop insurance products in Ghana. The Program launched its first crop insurance product in 2011, a rainfall deficit (drought) weather index insurance product marketed to commercial and rural banks that lend to maize farmers. In the first year, over 3,000 farmers purchased drought insurance through five lenders, including three banks and two NGOs.

The Program sells vouchers that entitle the insured to a predetermined payment depending on rainfall volume. The voucher is similar to a lottery ticket or coupon that the insured redeems to receive his or her seasonal indemnity payment at a predetermined due date.

In late 2012, one hundred and thirty-six farmers in the Northern Region were the first beneficiaries of claims. Preliminary results showed that insured farmers tended to invest 30 per cent more in their activities than un-insured ones (Osei and others, 2013).

being implemented in six regional states for the period 2009- 2023. According to EthiOCAT (2010), 35 technologies and eight approaches have been selected for out-scaling. These approaches are physical land management practices (stone-bands and terraces, soil-bunds); vegetated structural land management practices (perennial crop strips, area closure, vegetated fanyajuu, broad basin ridge and multiple cropping); hillsides and gully rehabilitation; runoff water harvesting; grazing land management; agroforestry systems and vetiver hedge establishment.

The implementation of the SLM project has resulted in several economic, environmental and social outcomes.First, results show that the economic gains of farmers that have implemented SLM technologies were twice higher than those that did not use them (Table 6). Secondly the project improved environmental quality through the increase of vegetation cover, soil rehabilitation and soil fertility and the reduction of flood hazards, sedimentation among others. Thirdly, SLM practices have enhanced social protection and gender equity in watersheds where they have been implemented. In Ethiopia, male headed households usually own more livestock than female headed households, and in the free and uncontrolled grazing systems, female headed households do not benefit as much from grazing lands. In SLM

Table 6: Economic analyses of some selected SLM technologies (in terms of gross production value in US$ per hectare per year) in Ethiopia

	SLM Technology	Gross production value in USD/ha yr^{-1}	
		Without SLM	With SLM
1	Stone terraces	100	300
2	Konso bench terrace	<100	200
3	Sweet potato ridges	257	450
4	Crop residue and stone mulch (Konso)	<100	150
5	Ridge basin (Konso)	<100	150
6	Chat Ridge bund	3000	6000
8	Area enclosure management	<100	116
9	Soil bund	160	240
10	Vegetated Fayajuu	200	500
11	Terrace (soil bund and fanyajuu on cultivated land	<100	176
12	Soil stone bund (vegetated stone-face bunds	260	400
13	Stone-faced trench bund	<100	250
14	Stone terraces	<100	300
15	Stone bund	200	460
16	Graded soil bund	150	250
17	Paved and grasses waterways	150	250
18	Stone-faced soil bund	150	312
19	Gully control	<100	200
20	Hillside terraces combined with area closure	100	160
21	Microbasin with trenches for area enclosure	200	400
22	Runoff/floodwater farming	200	500

Source: ECA. Forthcoming a, Selected case studies of inclusive green growth in Ethiopia

intervention watersheds, female headed households received the same benefits as male headed households, in the form of conservation tillage, cut-and-carry systems, access to credit for water harvesting structures and other SLM activities.

5.3.7 Support for improved marketing of agricultural produce

Support for marketing initiatives is instrumental in boosting production and profitability, thus enhancing livelihoods and job creation in the agriculture sector. This is important for most agricultural produce but in particular for those products that have little market profile and penetration. This has been successfully carried out in Ghana with respect to roots and tubers. In 2007, the Ministry of Food and Agriculture implemented the Root and Tuber Improvement and Marketing Programme. The objective was to enhance the food security and incomes of poor rural households in the country. The project was implemented across 90 districts for the period 2007- 2014. Results show positive impact on the economic, social and

environmental fronts. There was an increase of output and income as a result of substantial value addition at the various stages of the value chain. For instance, at Asuogya GPC, sales volumes rose from 180 tons/year of gari before upgrading, to 360 tons/year of gariafter upgrading. Moreover, the Root and Tuber Improvement and Marketing Programme awareness programmes and advertisements have helped in educating and providing technical information to a wide range of stakeholders in the roots and tuber industry. Additionally, implementation of the Programme has reduced consumption of fuel wood in the processing of raw materials and land clearing for agriculture (ECA, forthcoming)b.

5.4 Challenges and opportunities

While the adoption of inclusive green growth principles and practices has a high potential of promoting the sustainable development of the agriculture sector in Africa, there are challenges that must be overcome to yield optimal benefits. However, opportunities abound that could spur inclusive green growth, including those that may arise in the process of addressing the potential challenges. These are discussed below.

5.4.1 Challenges

Demographic pressures. High population growth and migration in response to the shortage of land resources are important factors that contribute to the degradation of agricultural land in sub-Saharan Africa. As the population of sub-Saharan Africa continues to grow, more pressure will be imposed on the land. This growing population pressure will also impact the demand for forestry products, and livestock. In the Congo, for example, the growing urban population coupled with the low supply of electricity has increased the demand of fuel-wood for cooking. As a consequence, forest cover has been slowly receding. Similar correlations can be drawn for livestock, and fisheries. Higher population growth put pressure on the limited resources and creates competition, which undermine any efforts toward promoting sustainable growth.

Lack of formal land markets and poor land tenure in Africa. Access to land is often cited as one of the key constraints to green growth (Byamugisha, 2013). The situation varies by country depending on local land policies but may involve protracted negotiation with local traditional leaders, who may or may not represent local community interests. More often, large land transactions are mediated through government agencies using non-transparent processes that often neglect the rights of local communities. Consequently, large-scale agricultural investments in Africa have too often failed, resulting in lasting damage to communities and the environment (World Bank, 2013). At the smallholder level, it is often argued that poor land tenure systems discourage farmers from investing in their land. As land is regarded as a public good in some communities, the problems associated with the provision of public goods become prevalent and therefore undermine the potential value land could generate. Additionally women and other marginalized group have access rights to productive assets including land thus could seriously undermine inclusion of such groups in green growth in the sector.

Decreasing agricultural labour. Currently most men in Africa find agriculture unattractive because of their present poverty condition and the inability of the sector to adequately contribute to poverty reduction. Agriculture also suffers from entrenched negative perceptions among African youth because of its subsistence, as well as low-income nature. In view of this, the youth from rural populations migrate to urban and peri-urban areas in search of employment and greener pastures. Urban youth are also not interested in agriculture because of this negative connotation. The loss of male labour in these areas has placed additional responsibilities on the women and invariably decreased the land productivity, as land cultivated by women has been shown to be less productive (Udry, 1996).

Low adoption rate of conservation agriculture by smallholder farmers. In general, farmers' rates of adoption of soil and water conservation in Africa are low today (Ajayi, 2007). Though national land-use policies, investment in research, and extension programs can influence adoption of soil and water conservation indirectly, the main deterrent to adoption of conservation is a set of economic and social constraints that cannot readily be eliminated by law and regulations. One of them is the lower return that conservation agriculture generates in its first year of adoption. As a new technology that requires judicious application of its practices, farmers do not often get it right the first time. This may result in lower returns and demotivation.

Lack of formal soil carbon market. There is no market for soil carbon. Most of the carbon sequestered is traded via markets setup by projects with limited sustainability. Furthermore the clean development mechanism (CDM)[16] has not yet allowed carbon sequestered from agricultural activities in its protocols. For this reason, it will be difficult for African farmers to participate in the trading of soil carbon. While there is a volunteer market funded by the World Bank, it is yet to offer the level of incentives necessary for farmers to the effectively engaged in carbon sequestration practices.

Low capacity. The low capacity of stakeholders engaged in the agriculture sector can impede the effective implementation of inclusive green growth approaches and practices in the sector. For example, while Africa has one of the highest zoonotic disease burdens, the capacity of veterinary services to track and control outbreaks is lagging behind livestock intensification.

5.4.2 Opportunities

The following opportunities that can be leveraged to further advance inclusive green growth in the agriculture sector in Africa.

The NEPAD Comprehensive Africa Agriculture Development Programme (CAADP). Adopted in 2003 by the African Union, CAADP is the agricultural programme of the New Partnership for Africa's Development (NEPAD). CAADP focuses on improving food security, nutrition, and increasing incomes in Africa's largely farm-based economies. It aims to do this by raising agricultural productivity by at least 6 per year and increasing public investment in agriculture to 10 per cent of national budgets per year.[17] Various initiatives have been adopted to support African countries to realize CAADP objectives which are line with the principles of inclusive green growth. They include:

- Grow Africa, a partnership platform that seeks to accelerate investments and transformative change in African agriculture;[18]
- TerrAfrica, a program which is a vehicle for implementing land related strategies of UN Conventions and NEPAD, CAADP pillar 1 and Environment Initiative.[19]
- Adaptation of agriculture to climate change project.[20] The project provides support to selected regional economic communities and African Union member States in implementing climate change adaptation strategies in the context of agricultural development. The focus is on adaptation measures for poor people in rural areas, and activities that promote the inclusion of climate change issues in national policies.

16 The Clean Development Mechanism is a regulatory market created under the auspices of the Kyoto Protocol where Annex I (Industrial) countries can accumulate carbon credits by financing carbon reduction projects in Non-Annex I (Developing) countries (Hamilton and others, 2009).

17 www.nepad-caadp.net/about-caadp.php
18 http://growafrica.com/about
19 www.terrafrica.org/about/#sthash.cQ9DsuHZ.dpuf
20 www.giz.de/en/worldwide/15891.html:

Frameworks and guidelines to promote secure land tenure and sustainable land management. The African Union has adopted The Framework and Guidelines on Land Policy in Africa. The objective is to promote and support African Member States in the formulation and operationalization of sound land policies as a basis for sustainable human development. Key elements include assuring social stability, maintaining economic growth and alleviating poverty and protecting natural resources from degradation and pollution.[21] In addition, countries have adopted the FAO Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security. These Guidelines are intended to contribute to the global and national efforts towards the eradication of hunger and poverty, based on the principles of sustainable development. The principles recognize the centrality of land to development by promoting secure tenure rights and equitable access to land, fisheries and forests.[22] The adoption and effective implementation of these guidelines would play an important role in promoting inclusive green growth in agriculture.

Agriculture and carbon sequestration activities. Soil carbon sequestration activities (reduced tillage, cover crops, residue management, mulching, composting, green manure, targeted application of fertilizers, reduced biomass burning, and agroforestry) can contribute to restoring agricultural production and fertilizer absorption capacity. They can reduce vulnerability of agriculture to extreme weather events and improve the revenues of households. Even if sequestering carbon through agriculture has not yet been adopted in the clean development mechanism (CDM), the growing body of knowledge on African soil structure may facilitate the implementation of SLM practices. The recent Soil Atlas of Africa could help revive the necessity for including soil carbon sequestration in the CDM. Introduced in April, 2013, the Soil Atlas of Africa – the first such book mapping this key natural resource – helps farmers, land managers and policymakers understand the diversity and importance of soil and the need to manage it through sustainable use (Jones and Spaargaren, 2013). With this new tool at hand, there are reasons to reconsider debating the inclusion of soil carbon sequestration in the CDM, especially considering that the atmospheric CO2 level has reached the alarming milestone of 400 ppm.

Programmes and other initiatives for inclusive green growth in Africa. There are various on-going and emerging programmes and initiatives that provide a wide range of opportunities for inclusive green growth in Africa. These include the following:

- The Alliance for a Green Revolution in Africa (AGRA). The initiative was established in 2006 through an alliance between the Rockefeller and the Gates Foundation. Seventeen countries in sub-Saharan Africa are already benefiting from programmes of the Alliance. These programmes combine scientific research with the dissemination of new seeds and financing. Results include the development and dissemination of 380 new crop varieties and drought resistant seeds, the rejuvenation of 380,000 hectares of depleted soils, introduction of new approaches to fertilizer management, and training of over one million smallholders in improved storage systems and strategies for reducing post-harvest losses (APP, 2014).

- Climate for Development in Africa Programme (ClimDev-Africa Programme). The Programme is a joint the African Union Commission (AUC), the United Nations Economic Commission for Africa (ECA) and the African Development Bank (AfDB). the African Union Commission (AUC), the United Nations Economic Commission for Africa (ECA) and the African Development Bank (AfDB). initi-

21 www.uneca.org/sites/default/files/publications/fg_on_land_policy_eng.pdf
22 www.uneca.org/sites/default/files/publications/vggt_english.pdf

ative the African Union Commission (AUC), the United Nations Economic Commission for Africa (ECA) and the African Development Bank (AfDB). the African Union Commission (AUC), the United Nations Economic Commission for Africa (ECA) and the African Development Bank (AfDB). of AUC, ECA and AfDBthat is supporting countries of the region to respond to climate change and variability challenges that have potential adverse impacts on Africa's development. The main focus is climate sensitive sectors, mainly agriculture, food security, water resources, energy and health.[23]

- Climate Smart Agriculture (CSA). FAO, UNDP and World Bank are collaborating on Climate Smart Agriculture. Climate Smart Agriculture (CSA) is agriculture that sustainably increases productivity, resilience (adaptation), reduces/removes greenhouse gases (mitigation), and enhances achievement of national food security and development goals.[24] In support of this initiative, the Alliance for CSA was launched in September 2014.[25]

Technology innovation and access. There is widespread access to mobile telephones in Africa today. Through mobile telephony, farmers are increasingly getting access to agricultural extension services as well as direct market information without middlemen. The associated mobile banking when merged with traditional banking is also likely to enhance farmers' access to credit (Kinyanjui, 2010). This will increase the possibility of introducing agricultural practices that spur inclusive green growth.

23 www.climdev-africa.org/
24 (UN-FAO-http://www.fao.org/climatechange/climatesmart/en/).
25 www.un.org.vn/en/fao-agencypresscenter1-96/3196-fao-prepares-for-launch-alliance-for-climate-smart-agriculture.html

5.5 Conclusion and Policy Recommendations

5.5.1 Conclusion

The crucial role of the agriculture sector in Africa's social and economic development underlines the importance of promoting inclusive green growth in the sector. Inclusive green growth interventions are needed in the sector to address food security which remains a major problem on the continent. Other factors that warrant urgent efforts to foster inclusive green growth in the sector are its high dependence on natural resources and the associated negative impacts on environmental sustainability. The growing trend of integrating inclusive green growth approaches and practices in the sector is a move in the right direction. These have amply demonstrated benefits such as increased productivity, job creation and improved natural resources management. These, together with the various opportunities discussed, can be capitalized upon to scale up inclusive green growth in the sector. However, this would require urgent attention to the challenges confronting the sector, which could be addressed by mainstreaming inclusive green growth principles in agricultural development and investment policies and strategies. This would also contribute to attaining sustainable and inclusive transformation and development in Africa, including achieving climate change mitigation and adaptation objectives.

5.5.2 Policy recommendations

Strengthen land tenure and the functioning of African land markets: In order for farmers to be able to invest in their land, ties to land and natural resources need to be recognized, clearly defined, identifiable on the ground, and enforceable at low cost. Land tenure security, including entitlements and rights of women and other marginalised groups should therefore be strengthened so as to encourage equitable access to productive assets, sustainable land management and other long-term investments such as irrigation that are

necessary to increase and sustain agricultural productivity and production.

Transform agriculture input subsidies aimed at improving agriculture productivity into market smart and sustainable systems: Increasing agricultural productivity and production in the region is crucial. The use of fertilizers and other inputs is an important factor for improving production. However, Governments are often obligated to subsidize them to make them accessible and affordable. While there are good arguments for providing modest subsidies on strategic inputs such as fertilizers, the way those subsidies are administered matters a lot. First, they should be designed to build markets by providing input vouchers that are redeemed through private input dealers. Second, the vouchers should be targeted as far as possible to those who do not currently use fertilizers due to lack of credit, knowledge, or ability to withstand risks. Third, the subsidy should be modest in relation to other critical public expenditure such as research and development and there should be a clear exit strategy. This may entail strengthening financial and risk markets to reduce the costs and risks of commercial use of fertilizer.

Promote smart subsidy for index insurance premium: Uptake of index insurance by farmers has proven to be very low. This is due to the limited understanding and appreciation of the concept by many farmers who are unwilling to pay for a service that they may not be able to receive. Farmers' willingness to pay has mostly been below the actuarially fair premium rate, and this undermines the sustainability of this product. For this reason, the premium would need to be subsidized to allow farmers time to appreciate the product and develop a taste for it. The subsidy can then gradually be removed.

Capitalize on a growing body of knowledge on African soil structure to push for carbon payments: The implementation of sustainable land management practices with the goal of increasing soil carbon sequestration in Africa has faced many challenges. Sequestering carbon through agriculture has not yet been adopted in the clean development mechanism (CDM) and one of the reasons behind this is that the nutrient content of the African soil was previously unknown. The recent Soil Atlas of Africa could help revive the necessity for including soil carbon sequestration in the CDM.

Address post-harvest losses through the introduction and promotion of better post-harvest handling techniques. Such techniques and methods include adoption of adequate storage infrastructure, such as hermetic bags, which have increased revenue by 14 per cent, but the main issue is affordability of these instruments. Governments can intervene by subsidizing the cost of acquisition of this instrument in a smart and sustainable way.

Foster a conducive environment for agribusiness clustering to create jobs: Connecting all the agricultural value chain actors can improve the agricultural sector's efficiency by reducing the cost of operation and free up money for investing in higher value activities that would create more jobs. This should involve individual farmers, farmer-based organizations, relevant ministries and extension. Other important actors that should be engaged in this connection include insurance firms, warehouses, cold stores and transporters.

Strengthen farmer-based organizations or village based grassroots institutions: It is important to strengthen local farmer-based organizations to promote peer learning in inclusive green growth. With often meagre resources and limited organizational and technical capacities, many farmer-based organizations need external support to start-up and/or expand their operations. The primary challenge lies in striking the right balance between reliance on external and internal resources and accountability to avoid creating an interventionist culture. In a market-driven economy, such organizations must operate in a business-like fashion. For that reason, it is important to promote policies that foster farmer-to-farmer

extension programs, such as farmer field schools to create opportunities for mutual learning and knowledge sharing, mutual monitoring, as well as developing platforms for collective and joint researcher-farmer experimentation.

Develop a carbon project extension service: A critical component of a successful national carbon program is expertise. Government carbon project extension experts can assist project designers and ensure positive project implementation. Extension experts could be selected from existing government employees with training in forestry and/or agriculture or could be hired from an existing successful carbon project in the country. Training will guarantee extension officers have current and complete knowledge of carbon sequestration projects.

Increase investments in agriculture and make it attractive to youth, as a profitable enterprise. In this regard African countries should accelerate the implementation of the Maputo Declaration commitment to spend at least 10 per cent of national budgets on agriculture and rural development. Moreover an enabling policy environment for private sector investment should also be promoted.

Strengthen technical and institutional capacity: One of the hallmarks of inclusive green growth is its multidimensional nature, thereby calling for a multi-sectoral and multidisciplinary approach. One strategy to bring both leadership and quick delivery in green growth policies is to set up a dedicated and highly skilled green growth promotion team from government and non-governmental institutions, located in the office of the agriculture minister. This delivery team should have sufficient stature and experience to effectively dialogue with the private sector, including multinational firms, and influencing budget allocation. The coordination of donor efforts is also an important role for such a team.

5.6 References

ACET, 2014. African Transformation Report. African Center for Economic Transformation: Accra, Ghana

Africa Progress Panel (2014). Grain, Fish and Money. Africa Progress Report 2014.

Ajayi, O.C., 2007. User Acceptability of Soil Fertility Management Technologies: Lessons from Farmers' Knowledge, Attitude and Practices in Southern Africa. Journal of Sustainable Agriculture 30(3): 21–40.

Belsky A.J. 1986. Does Herbivory Benefit Plants? A Review of the Evidence. American Nat. 127:870-892

Byamugisha, F. K. 2013. Securing Africa's Land for Shared Prosperity: A Program to Scale up Reforms and Iinvestments. Africa Development Forum Series. Washington DC ; World Bank

Chantarat, S., Barrett, C.B., Mude, A.G., Turvey, C.G. 2007. "Using Weather IndexInsurance to Improve Drought Response for Famine Prevention." American Journalof Agricultural Economics 89 (5): 1262-1268.

ECA, 2007.Economic Report on Africa 2007. Accelerating Africa's Development through Diversification.

ECA, Forthcoming a. Selected Case Studies on Inclusive Green Growth in Ethiopia

ECA, Forthcoming b. Selected Case Studies on Inclusive Green Growth in Ghana

EthiOCAT, 2010. Sustainable land management technologies and approaches in Ethiopia. The Federal Democratic Republic of Ethiopia, Ministry of Agriculture and Rural Development, Editor Daniel Danano Dale, Addis Ababa, 2010

Garrity D.P., Akinnifesi, F.K., Ajayi, O.C, Weldesemayat, S.G., Mowo, J.G., Kalinganire, A., Larwanou, M., Bayala, J. 2010. EverGreen Agriculture: A Robust Approach to Sustainable Food Security in Africa, Food Security, 2 (3) pp. 197-214.

Gollin, D., Parente, S., Rogerson, R. 2002. "The Role of Agriculture in Development," American Economic Review, American Economic Association, vol. 92(2), pages 160-164, May.

Hamilton, K., Sjardin, M., Shapiro, A., Marcello, T. 2009. Fortifying the Foundation: State of the Voluntary Carbon Markets 2009, New York: New Carbon Finance; D.C.: Ecosystem Marketplace.

Kaminski. J. and Christiaensen, L. 2014. Post-Harvest Loss in Sub-Saharan Africa .What Do Farmers Say? The World Bank, Africa Region Office of the Chief Economist, April 2014

Kinyanjui, K. (2010). M-Kesho Tipped to Boost Equity Earnings by Sh4 Billion. Business Daily, August 5, Money Market section. In Kariuki, J. 2011. The Future of Agriculture in Africa. The Frederick S. PardeeCenter for the Study of the Longer-Range Future, Boston University.

Hiernaux P., de Leeuw, P.N., Diarra, L. 1994. Modelling Tillering of Annual Grasses as a Function of Plant Density: Application to Sahelian Rangeland Productivity and Dynamics. Agric. Syst. 46: 121-139.

Jones, A., Spaargaren, O. 2013. Soil Atlas of Africa. European Commission – Joint Research Centre Institute for Environment and Sustainability. (available at: http://eusoils.jrc.ec.europa.eu/library/maps/africa_atlas/

Kalala, 2013. Promotion of Sustainable Organic Agriculture as an Ecosystem based Approach in Zambia.

Lager, B. 2011. Kenya Agricultural Carbon Project. Climate Change and Sustainable Agricultural Land Use Management. Tokyo, Japan, March 9, 2011. Power Point presentation. Vi Agroforestry.

Gudeta W. Sileshi, LegesseKassa Debusho and Festus K. Akinnifesi. 2012. Can Integration of Legume Trees Increase Yield Stability in Rainfed Maize Cropping Systems in Southern Africa? Agronomy Journal. Vol. 104 No. 5, p. 1392-1398

Ministry Of Food and Agriculture (2011). Root and Tuber Improvement and Marketing Programme-Status Report. Programme Coordination Office, Kumasi, July 2011

Namara, R. E., Upadhyay, B., Nagar, R. K. 2005. Adoption and Impacts of Micro irrigation Technologies: Empirical Results from Selected Localities of Maharashtra and Gujarat states of India. Research Report 93. Colombo, Sri Lanka: International Water Management Institute.

Mulangu, F., Ulimwengu, J. 2010. Optimal Rainfall Insurance Contracts for Maize Producers in Northern Ghana: A Mathematical Programming Approach, IFPRI Discussion Paper 1016

Nceba, N. 2002. State of Forest and Tree Genetic Resources in South Africa. Prepared for the SADC Regional Workshop on forest and tree genetic resources, 5-9 June 2000, Arusha, Tanzania. Forest Genetic Resources Working Papers, Working Paper FGR/28E. Forest Resources Development Service, Forest Resources Division. FAO, Rome (unpublished).

Osei, R., Osei-Akoto I, Karlan, D., Udry, C. 2013. Agricultural Decisions after Relaxing Credit and Risk Constraints (December 2013) Quarterly Journal of Economics, (2014) 129 (2): 597-652.

Shames, S, Wollenberg, E, Buck, LE, Kristjanson, P, Masiga, M and Biryahwaho, B. 2012. Institutional innovations in African smallholder carbon projects, Copenhagen: CGIAR Research Programme on Climate Change, Agriculture and Food Security

(CCAFS). CCAFS Report No. 8 Available from: www.ccafs.cgiar.org

Timmer, P., 1988. The Agricultural Transformation. In: Chenery, H.B., Srinivasan, T.N. (Eds), In: Handbook of Development Economics, vol. 1. North Holland, Amsterdam.

Twomlow, S.J., Urolov, J.C., Jenrich, M., Oldrieve, B. 2008. Lessons from the Field – Zimbabwe's Conservation Agriculture Task Force. Journal of SAT Agricultural Research, 6 (1). Pp. 1-11.

Udry, C. 1996. "Gender, Agricultural Production, and the Theory of the Household," Journal of Political Economy. 104(5): 1010-46.

UNDP. 2012. African Human Development Report: Towards a Food secured Future. United Nations Development Program. New York, USA

Winrock, (1992). Assessment of Animal Agriculture in Sub-Saharan Africa. Winrock International: Morrilton, USA.

World Bank, 2013. Growing Africa: Unlocking the Potential of Agribusiness. AFTFP/AFTAI, Washington, D.C.

World Bank, 2008. World Development Report 2008, Agriculture for Development. World Bank, Washington D.C.

6. Ecosystems goods and services

6.1 Introduction

Promoting inclusive green growth will help Africa's transition to sustainable development (AfDB, 2013) and support livelihoods; enhance water quality and provision; develop clean and renewable energy sources; ensure food security; foster gender integration; promote sustainable use of natural resources; and stimulate innovation, employment creation and sustainable economic development. AfDB also highlighted that inclusive green growth, which focuses on environmental and ecosystem sustainability, can provide opportunities for the future of Africa's economy and society. Ecosystems goods and services-based inclusive green growth can also contribute to natural disaster reduction, climate change resilience and human security.

The Millennium Ecosystem Assessment 2005 defines ecosystems goods and services (EGS) as the benefits people obtain from ecosystems, and distinguishes four categories of ecosystem services. These include:

- Provisioning services: tangible provisions directly obtained from the ecosystem, such as water, food, fibre and energy production (hydropower and biomass fuels);
- Regulating services: benefits obtained from interaction with the ecosystem, including carbon sequestration, climate regulation, waste decomposition, pest and disease control, and the purification of water and air;
- Cultural services: include scientific discovery, and recreational and spiritual benefits; and
- Supporting services: the fundamentals of a healthy ecosystem – such as soil formation, photosynthesis and nutrient cycling – that are necessary for the functioning and supply of all the other services.

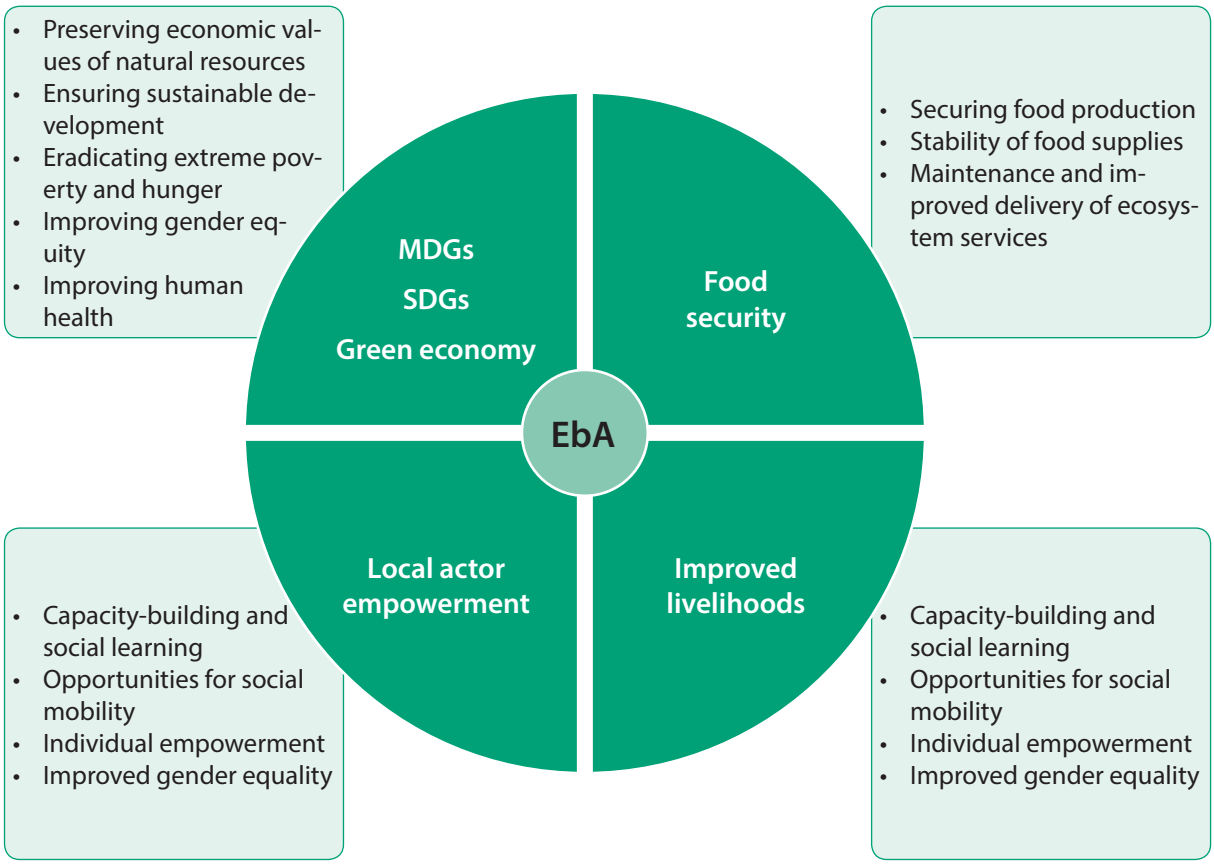
Ecosystems goods and services and inclusive green growth

The potential of ecosystems goods and services to promote inclusive green growth is now being recognized at the global, regional and national levels. Practices throughout Africa and elsewhere highlight the intrinsic connection between ecosystems goods and servicesand inclusive green growth initiatives and outcomess. Environmental goods and services in Africa are often particularly sensitive to the effects of ecosystem health and climate change on food security, social vulnerability, poverty reduction and environmentally-conscious economic growth.

The development and management of ecosystems goods and serviceshave provided the opportunity to create jobs, improve human welfare and reduce poverty by using resources efficiently and enhancing environmental assets, thus promoting inclusive green growth towards sustainable development in Africa.

Efforts to utilize ecosystems goods and services in inclusive green growth include cost-effective ways to achieve the Millennium Development Goals 1 ("eradicate extreme poverty and hunger") and 7 ("ensure environmental sustainability"). If properly implemented, ecosystem management efforts can also indirectly improve gender equality (Goal 3) and human health (Goals 5 and 6). They can also help to drive the transition to an inclusive green economy and contribute to achieving the sustainable development goals that will eventually be adopted as part of the post-2015 development framework.

Figure 86: Social impacts of an ecosystem-based approach (EbA) at national, regional and local community levels



By maintaining healthy ecosystems and increasing their resilience, ecosystems goods and services management preserves the economic values of natural resources and can utilize these natural capitals for improving social outcomes, reducing poverty and reversing environmental degradation. This underlines inclusive green growth, which amplifies the contribution of natural capital to economic and social development. Figure 86 depicts the many cross-cutting objectives that appropriate ecosystems goods and services management can achieve.

As is evident from figure 84, Africa's various ecosystem services are the bedrock of livelihoods, gender empowerment, employment creation, income generation and support to research and development, science and technology application and climate change moderation. Profound linkages to specific industries are illustrated in box 11 (WWF/AfDB, 2012).

6.2 Trends in fostering inclusive green growth in the development and management of ecosystems goods and services

6.2.1 Livelihoods diversification and industry spin-off

Efforts aimed at developing and managing ecosystems goods and services can diversify livelihoods and generate spin-off industries. They can also increase the diversification of production, creating greater food security and climate change resilience that ultimately lead to poverty reduction (box 12). Efforts that are properly designed to empower local community actors can challenge traditional socioeconomic structures, provide for social inclusion, further community-led innovations, build capacities, and improve the lives and livelihoods of socially vulnerable groups (women, youth, HIV/AIDS populations).

Box 11: Linkages of ecosystems goods and services to specific industries in Africa

(a) Kenyan coral reefs underpin regional fisheries: The reefs protect the coastline, sequester carbon dioxide, and provide recreation and tourism. It is estimated that the reefs stretch over 12,000 km2 in the Western Indian Ocean, contributing an economic value of $7.3 billion per year to the region.

(b) Madagascar's rich biodiversity is globally recognized for contributing to pharmaceutical research and tropical medicine: Long used in traditional medicine, the Madagascar periwinkle (Catharantusroseus) is used in the treatment of numerous illnesses, including diabetes and cancer, and has made a significant contribution to the survival rates for childhood leukaemia, from 20 to 80 per cent;

(c) Malawi, the United Republic of Tanzania, Uganda, Kenya, the Democratic Republic of the Congo and the Republic of the Congo inland waters: These States have contributed to the growth of global fishery by generating 2.5 million tons (about 25 per cent of the global total in 2008);

(d) Uganda Mountain Gorillas are a major tourist attraction: Each mountain gorilla generates about $1 million in yearly revenue (WWF, 2011);

(e) Forests in Cameroon and the Democratic Republic of the Congo constitute Africa's largest forest stock, estimated at 98 billion tons of carbon, equivalent to 145 tons per hectare (ha): Meanwhile, these forests contribute to food provisions, water purification, watershed erosion, carbon sequestration and soil fertility; and

(f) Guinea watersheds in the Fouta Djallon highlands are the source of half of West Africa's rivers: Likewise, Kenyan watersheds are the main sources of water for the Nile River. These watersheds contribute to the provision of fish, soil nutrients and sanitation, and provide a continual water supply to large populations.

Box 12: Ecosystem services project in Burkina Faso

An ecosystem services-based project in Burkina Faso trained women producers of Shea Butter to produce higher quality butter. The all-female cooperative is now earning a greater income as a result of the improvements, with members trained in accounting and different management practices. The women not only sustainably utilize Shea trees (vitellariaparadoxa) to generate inclusive green growth-appropriate livelihoods, but are also incentivized to protect the Shea trees upon which their livelihoods depend. The women now earn $18.36 per month and protect 5 ha of Shea trees. Their protection contributes to the health of the overall ecosystem and the betterment of ecosystem services received by the surrounding communities.

Source: Harnessing Ecosystem-based Approaches for Food Security and Adaptation to Climate Change Conference(www.foodsec.aaknet.org/index.php/widgetkit/item/download/63_b72e13bcd22c12e6d41708f0bfb5ceae)

6.2.2 Sustainable management of forests

Ecosystems-based inclusive green growth can contribute to addressing the deforestation challenge mentioned above. Deforested watersheds offer a good example of how the immediate value of timber is often wrongly perceived as the most beneficial of forest resources. A report from The Economics of Ecosystems and Biodiversity (TEEB, 2010) demonstrates that, while the extractable value of Cameroon's tropical forests was valued at approximately $700 per hectare per year (for timber, fuel wood and non-timber products), this was far less than the forests' climate and flood related benefits, which added up to about $900-$2,300 per hectare per year. Inclusive green growth can ensure that the value of forests would be intrinsically harnessed and comprehensively accounted for. For example, inclusive green growth in the form of Payment for Ecosystem Services (PES), could provide livelihoods for impoverished local communities committed to protecting the forest resource.

Box 13: Participatory forest management in Ethiopia

In Ethiopia, deforestation is contributing to environmental degradation with implications for food security and community livelihoods. Rapid deforestation between 1955 and 1979 resulted in a 77 per cent loss of forested area and continues at 8 per cent annually. To help reverse this trend and enhance the commercial value of timber and non-timber forest products, the Government, in the late 1990s, introduced PFM.

The underlying principle of the PFM projects is to balance forest resource conservation and utilization by empowering the communities to take over the forest management responsibility – making use of and strengthening already present traditional systems. Government partners with communities in the preparation and implementation of the programme with clearly defined roles, rights and responsibilities specified in legal documents. PFM activities include planting and reforestation or rehabilitation of degraded lands; forest protection and utilization; monitoring of the forest; and evaluation of the management approach. Important components of PFM implementation include the introduction and creation of forest management associations, community-based organizations or cooperatives, and transferring ownership (rights) to participating communities.

The project has involved about 369 farmer's user groups covering about 30,000 households, managing a total area of more than 546,939 ha. The project links income generation to forest management as well as improving market access for forest products. The private sector is involved in the collection of forest products such as incense and gum, thus providing seasonal job opportunities and improving household incomes. Government retains the right to repossess the forest areas in the contractual agreements signed between the farmer's user groups, but the communities have been empowered through their involvement in preparation of legal documents, and have more secure ownership. Benefits derived include access to fuel wood, construction materials, controlled grazing and beekeeping, which provide alternative livelihoods.

Source: ECA, Forthcoming a, selected case studies on inclusive green growth in Ethiopia.

To reduce deforestation and degradation, and provide alternative livelihood opportunities, measures such as Reducing Emissions from Deforestation and Forest Degradation (REDD+) that foster conservation, sustainable management of forests and enhancement of forest carbon stocks could be promoted. Community-based natural resource management, social forest management and participatory forest management (PFM) promote practices that include social enterprises and local community efforts on a micro-scale basis. This can contribute to empowering otherwise excluded groups in ensuring the resilience of ecosystems goods and services (forest and forest biodiversity).

PFM also promotes social and gender equity and equality through the equal participation of marginalized groups and women. Both husbands and wives are equally considered as members of farmer's user groups. In the case of polygamy, wives are considered as independent members. Women also occupy leadership positions, despite incidents of cultural and illiteracy limitations. Social benefits can be further enhanced if the grievances of non-PFM members excluded from access to demarcated forests areas, and the inadequacies in credit services delivery are addressed. In addition, the project has increased access to agricultural technologies by some members of the farmer's user groups; and contributed to climate change mitigation efforts. Communities in non-forested areas are encouraged to plant trees individually or collectively to be able to benefit from Reducing Emissions from Deforestation and Forest Degradation (REDD) and clean development mechanism (CDM) project opportunities.

In addition to continued Government and development partners' technical and financial support, political commitment and favourable policies that facilitate the dissemination of PFM to various parts of the country, self-financing mechanisms are key to sustainability.

Box 14: Woodlots in the United Republic of Tanzania

In Makete, United Republic of Tanzania, forest, woodland and grassland resources are essential to the local economy, as well as for the conservation of vital watersheds and the environment, for agriculture and livestock production. Widespread unsustainable land use has produced serious ecological losses and limited farm productivity. These problems have also been aggravated by a lack of institutional, legislative and fiscal capacity for effective natural resources management and consequently for the stability of the Makete ecosystem.

Using smallholder woodlot management practices, an ecosystem-based inclusive green growth project undertaken by the Climate Change and Development – Adapting by Reducing vulnerability (CC DARE) unit of the United Nations Environment Programme (UNEP) created a new stream of income for local communities and revenues for the city, while enhancing resilience to climate vulnerability. Building on indigenous weather forecasting knowledge, the project trained 27 technicians on forecasting indicators, and disseminated data on silvicultural management practices, training disadvantaged women and girls who work in woodland management and the marketing of wood products with empowering knowledge relating to species selection, land preparation, field planting and spacing, management for forest regeneration and marketing channels for wood products.

This was an incredibly innovative advancement that provided financial credits to low-income people who could then use their woodlots as collateral for microloans. The built-in incentive to maintain the woodlots created new sources of income and triggered the setting up of community savings and credit societies. The regeneration of the forest for the benefit of the watershed succeeded in promoting inclusive green growth and sustainable ecosystem management.

Source: Woodlot Management in Tanzania (www.unep.org/greeneconomy/SuccessStories/WoodlotManagementinTanzania/tabid/29893/Default.aspx).

A recent report from the Food and Agriculture Organization of the United Nations (FAO) found that "4-5 million women in West Africa earn about 80 per cent of their income from the collection, processing, and the marketing of nuts harvested from Shea trees" (FAO, 2013). In other words, promoting women's access to forests is hugely beneficial for their income. They are also organically incentivized to protect forest services. Therefore, promoting the preservation of forest that continues to enhance the beneficial use of the forest services is imperative to the economic well-being of a large, often marginalized segment of African society.

6.2.3 Biodiversity conservation and ecotourism

Biodiversity conservation is an important component of ecosystems goods and services. Biodiversity underscores much of what is thought of as ecosystem productivity. One study determined that the project "Building local capacity for sustainable use of biodiversity in the Okavango Delta" was able to generate access to natural resources which resulted in the Delta's households' ability to improve their incomes (Millennium Ecosystem Assessment Board, 2005). The ecosystems goods and services available as a result of healthy biodiversity included fish, fresh water, reeds and grass for thatching and basket-making, fertile grazing for cattle in the flood plain, and nutrients for river-bed farming for a population of about 60,000. Some also worked for cash in the nature tourism industry. Many examples of biodiversity conservation underpinning ecotourism exist as is highlighted in Box 15.

Community-based natural resource management (CBNRM) programmes have demonstrated that, by empowering rural communities and sharing benefits from tourism and sustainable use of wildlife, it is possible to achieve the joint objectives of biodiversity conservation and improved livelihoods. Similarly, agricultural programmes which

Box 15: Ecosystems goods and services management in Southern Africa

By joining forces through CBNRM programmes, five countries – Angola, Botswana, Namibia, Zambia and Zimbabwe – were able to more effectively combat international wildlife trade and poaching through information sharing, joint patrols and surveillance, and harmonized law enforcement policies. Wildlife movements may be facilitated by removal of some of the thousands of kilometers of fences that impede the historical movement of animals. Critically, this will depend on attracting investors to provide an economic boost to the people who live within the conservation areas and sharing tourism benefits among the local communities.

The results have been impressive – with wildlife populations having recovered to healthy numbers across large areas and revenues from CBNRM ventures both in and outside conservancies amounting to more than 45 million Namibia dollars or US$ 6.4 million in 2010. With growing investments in joint venture tourism between private companies and communities, local people are enjoying a range of social and economic opportunities and benefits from the wildlife resource – including development of skills and livelihoods, employment and improved nutrition. Initiatives in many areas are now self-sustaining and the programme is expanding into new areas, including across Namibia's borders to South-western Zambia and Botswana.

CBNRM has contributed to conservation, ecological restoration and environmental management. Jobs have also been created by engaging local communities as conservationists, wildlife rangers, tourist guides and other related activities.

Source: Organizations and their Approaches in Community-Based Natural Resources Management in Botswana, Namibia, Zambia and Zimbabwe (www.cbnrm.bw/publications/CBNRM%20Support%20Programme%20paper%201.pdf).

promote ecosystems goods and services through biodiversity have accomplished parallel goals.

Biodiversity can also underscore agricultural productivity. One study found that "increasing the efficiency of pollination (through the introduction of bees) represents a way of increasing crop yield without any increase in agricultural intensity or area" (Brittain and Others, 2013a). This was supported by another study (Brittain and others, 2013b) which found that honey bees preferred to pollinate top parts of almond trees while wild pollinators more frequently pollinated the lower parts of the same trees, and also operated in high winds when honey bees did not. In other words, simply by promoting biodiversity, agricultural productivity was increased, which in turn provides added economic and social (food) benefits with almost no increase in cost of inputs.

6.2.4 Improving water services

Erosion barriers, rainfall catchment systems, drought-tolerant crops, building clean water supply and sanitation facilities, and building human capacity related to water resource management are all opportunities to improve water services-related practices. In addition, efforts to safeguard water through ecosystems infrastructure promote inclusive green growth that can contribute to improving opportunities for other income-generating activities, agricultural yields and health (box 16).

The World Bank (2012) indicates that the agriculture sector accounts for 85 per cent of Africa's water withdrawals for irrigation while domestic use accounts for 10 per cent and industrial use 5 per cent. An inclusive green growth approach promotes water harvesting, which includes storage and distribution infrastructure that employs informal sector and water governance institutions, thus constituting a larger work force. Studies have shown that irrigation can directly contribute to poverty reduction (Smith, 2004). Poverty estimates reported by FAO range from 17 to 64 per cent in irrigated settings, and from 23 to 77 per cent in non-irrigated settings, further strengthening the understanding that water services are related to livelihoods (FAO, 2008).

Box 16: Working for Wetlands programme in South Africa

Wetlands provide valuable ecosystems goods and services such as habitat for flora and fauna, including species for food and medicinal plants, water flow regulation and purification. In South Africa, however, wetlands are the most threatened of all ecosystems, with 48 per cent of wetland ecosystem types critically endangered, and many already irreversibly lost. To avert this trend, the departments of Environmental Affairs, Agriculture, Forestry and Fisheries and Water Affairs, initiated the Working for Wetlands programme (WfWet) as a partnership for the rehabilitation, protection and sustainable use of wetlands, as a vehicle for both poverty alleviation and wise use of wetlands. Partnership involves Government, landowners, communities, civil society and the private sector.

The WfWet programme is based on key interlinked concepts that ensure effective and sustainable wetland rehabilitation. These are wetland protection, wise use and rehabilitation; skills and capacity development; cooperative governance and partnerships; research and knowledge sharing; and communication, education and public awareness. WfWet is designed to create employment opportunities and capacity to earn income while rehabilitating and protecting wetlands. WfWet provides vocational skills and life skills, including in health and agriculture. Field visits with decision makers and distribution of resource material are some of the channels used to influence the programme's diverse stakeholders. Over the previous 12 years, the WfWet programme has invested R530 million (approximately $60 million) in the rehabilitation of 906 wetlands, improving or securing the health of more than 70,000 ha of wetland area.

WfWet is part of the Expanded Public Works Programme and seeks to maximize employment creation. It creates and supports small businesses and transfers relevant and marketable skills to beneficiaries. Subsequently, about 12,848 employment opportunities have been created, with 2.2 million person days worked to date. In addition, the WfWet programme has provided 168,400 days of training in both vocational and life skills. Beneficiary teams are made up of a minimum of 60 per cent women, 20 per cent youth and 1 per cent people with disabilities. Engagement of various stakeholders facilitates research as well as sharing and active demand of technologies and research outputs. Benefits from rehabilitated wetlands include improved livelihoods, protection of agricultural resources, enhanced biodiversity, cleaner water, reduced impacts from flooding and increased water security – thus contributing to climate change adaptation. Frameworks especially in the environment and water sectors, together with the funding for the WfW programme, facilitate implementation. Stakeholder involvement, together with the interlinked concepts mentioned above, provides opportunities for sustainability for the programme which has been running for more than 12 years.

WfWet demonstrates that inclusive green economy-related approaches generate benefits from vital ecosystems. WfWet uses wetlands conservation as a vehicle for poverty alleviation. The design structure of WfWet and its intended outcomes provide an important framework both for addressing social and economic challenges facing communities as well as environmental concerns.

Source: Working for Wetlands (http://wetlands.sanbi.org/index.php).

6.2.5 Increasing fish production

Africa's fish production is estimated at 7.6 million tons per year. The sector provides jobs for about 10 million people in sub-Saharan Africa (AfDB, 2012). Inclusive green growth practices provide an opportunity for regulating fishing and eliminating the problem of overfishing, promoting investment in development of fisheries and promoting aquaculture in Africa as depicted in the Mozambique case study in box 17. This approach has broad applicability to all 36 African countries with coastal access.

6.2.6 Enhancing disaster risk reduction

Disaster impacts undermine development goals. Such events seriously threaten social and economic development. The poor are disproportionately burdened by disasters, often resulting in massive displacements and refugee movements. Indeed, the 2009 Global Assessment Report on Disaster Risk Reduction (UNISDR, 2009) identified

Box 17: Rehabilitation of Mangroves in Mozambique

XaiXai, Mozambique harnessed a unique ecosystems goods and servicesEGS-based inclusive green growth integrated approach to recuperating the local water-based ecosystem. Mangroves that once protected the community from rising waters and soil erosion had been almost completely destroyed. The This destruction, and other factors, plummeted caused the fish catch to plummet, which significantly impacted impacting on the food security of the fishing community.

By reforesting the mangroves, and constructing fish ponds and crab cages, the community was also able to improve the local ecosystem, prevent soil erosion and increase coastal resilience to sea level rise, while diversifying their its food supply. As a result of the project, 98 households (including 490 people) directly benefited. The beneficiaries included ten 10 households which that diversified into crab farming and twenty 20 households which that diversified into fish farming. Sixty-eight households contributed to mangrove reforestation and four (of these households are permanently involved in maintaining mangrove nurseries (Menomussanga, 2013).

The community-led initiative designed the project with technical and financial support from UNEP and the United Nations Development Programme (UNDP), and the national Government undertook to establish an inclusive process by which previously marginalized sectors of the community would be included in both the project implementation and productivity outputs. By restoring the water services, those implementing the project were able to secure long-term food security, social inclusion and water access. The project also incorporated spin-off industries, such as brickmaking, that primarily trained and benefitted women and youth, and left behind a PES framework for mangrove services maintenance.

Source: Menomussanga, 2013.

ecosystems decline as one of four major drivers of risk while the succeeding 2011 Global Assessment Report (UNISDR, 2011), specifically highlighted that "ecosystem-based disaster risk management often realizes highly attractive cost–benefit ratios".

Past and projected future disaster events have drawn global interest in utilizing ecosystem management approaches as disaster risk reduction techniques. For example, much of the African coast is protected from sea-storm surges by mangroves. However, sea level rise is expected to constitute the biggest threat facing the future of mangroves (Gilman and others, 2008). Mangroves are also responsible for providing habitat to almost 80 per cent of the global fish catch (Ellison, 2008) and up to 25.5 million tons of carbon sequestration per year (Dittmar and others, 2006), yet they continue to face pollution and deforestation, frequently attributed to coastal clearing for tourism. Their value in disaster prevention, food security and climate change mitigation is clearly not adequately valued.

As sea levels rise, the reach of waves will become higher, generating greater coastal and soil erosion. Studies have determined that relatively small ocean waves can be reduced in height from 12 per cent to 66 per cent by passing through 100 m of mangroves and 50 per cent to 99 per cent over 500 m (McIvor and others, 2012). Estimates regarding the cost of maintaining mangroves have shown that $946 per hectare is necessary for restoration, while the cost for protecting existing mangroves was only $189 per hectare (Ramsar secretariat, 2001). This context clearly demonstrates that, by promoting management of ecosystems goods and services in disaster-prone and climate risk areas, human and economic well-being can be protected from disaster risks and indeed is economically justified.

6.3 Challenges and opportunities

6.3.1 Challenges

Ecosystems are rapidly becoming constrained by global impacts resulting from continuous loss of biodiversity, land degradation, population increase, high levels of hunger, water scarcity, rising temperatures and changing weather patterns (Santarias, 2012). At the same time, the World Bank's 2013 African Competitiveness Report applauds the continent's impressive growth rate of 5 per cent on average over the previous 10 years. However, the Report cautions that "decisions and actions today will have a strong bearing on whether Africa places itself on an inclusive and sustainable growth path" (World Bank, 2013b). An urgent response is required to ensure that future actions can achieve multiple benefits for current and future populations through the incorporation of inclusive green growth principles in decision and actions.

Governance. Weak governance often means that there is no effective system in place for planning and guiding land and resource use. Other aspects of weak governance can include limited accountability, corruption, highly centralized decision-making, unequal application of rules, inadequate information and encroachment on communal lands. The absence of effective governance can also allow space for the illegal extraction of natural resources, illegal logging, or illegal poaching of endangered species for commercial gain. In addition, weak governance can also mean weak land rights, thus undermining a fundamental requirement for the establishment of working frameworks for land usage, owner compensation and accountability.

The absence of effective valuation systems for making and implementing decisions on matters affecting biodiversity and ecosystems is also a governance issue. The failure of markets to reflect the real value of ecosystems goods and services – or the real costs of losing them – may undermine efforts to establish and implement ecosystem accounting mechanisms. Decisions on the use of land and natural resources are often taken by owners and users of resources based on their own short-term interests, without taking into account the loss of biodiversity and ecosystem functioning that will result, and the impacts on society as a whole. Inclusive green growth initiatives then would benefit from the implementation of ecosystems goods and services valuation systems (such as those put forth by TEEB). In order for such systems to be effective, it is highly desirable for Governments to incorporate ecosystem valuation systems into national accounting systems.

Because of this, while a forested piece of land may provide enormous value to society, the owner of the land may not be able to realize significant economic profits without cutting down the trees and possibly converting the land, for example, to agriculture. Natural resources that appear to be free and owned by no one may be so over-utilized that nobody can benefit from them anymore, as happens when fish stocks are overexploited to the point of collapse. Current methods of accounting for national wealth usually fail to reflect the value of biodiversity and ecosystem services to the economy, and the potential cost of replacing these if they are lost or damaged – for example, if a water purification plant needs to be built to replace the services provided by a destroyed wetland.

Scientific research. Information and research into ecosystems goods and services are absolutely necessary to promote their appropriate use.Profoundly linked to other sectors, ecosystems goods and services are not only a necessary building block for most industries, but moreover improperly managed ecosystems goods and services can impose great risks on nearly all other economic activities. To this end, further scientific research into ecosystems goods and services – especially in the context of inclusive green growth – is

absolutely essential. For example, to harness the ecosystem services provided by biomass (fuel) in a way that promotes human well-being (health), it is imperative that more research is conducted in developing better technologies to improve biomass fuel production as a healthy and sustainable alternative energy.

Further research is needed in three areas:

i) Global change, which includes the ecological consequences of natural and human-caused changes in climate, soil properties and water quality;

ii) Biological diversity, which includes the natural basis for the distribution and abundance of species and habitats, including human-caused alterations; and

iii) Sustainable ecological systems, which include the response of ecological systems to exploitation and disturbances, the restoration of ecosystems, and the interface between ecological processes and human social systems.

Research must then be brought to the attention of policymakers in these areas and across sectors, including private industry. Regulations, policies and laws should be updated to reflect this information. Finally, citizens must be made aware of the results of such research at the local level so that they are better able to individually respond and demand action from their Governments. The interaction between the scientific community and policymakers, the private sector and communities is highly encouraged and necessary. Interaction will include the use and encouragement of scientific advisors to officials and science-policy institutes or curricula, for example, within the university setting.

Population growth and rapid urbanization. According to World Bank estimates (2008) the sub-Saharan population is growing at a rate of 2.5 per cent per year as compared to 1.2 per cent in Latin America and Asia. Currently estimated at 1.033 billion, Africa's population will likely double to 2 billion by 2050, according to the Population Reference Bureau. Rapid population growth has severely stressed Africa's ecosystems. Problems such as food insecurity, insecure land tenure, environmental degradation and inadequate water supply are often related to high rates of population growth.

The majority of Africa's population growth is expected to take place in urban areas, largely due to rural-urban migration. Rapid urbanization in Africa has been accompanied by new and challenging environmental problems. A sizeable proportion of urban dwellers in sub-Saharan Africa lives in slum conditions, without durable housing or legal rights to their land. At least one quarter of African city dwellers do not have access to electricity. Despite efforts to improve access to drinking water, a large number of people in Africa are still without access. Waste disposal also presents a tremendous health hazard in many urban areas. Clearly, current patterns of urbanization affect the development and management of ecosystems and are not consistent with the desire to have ecologically friendly sustainable development in Africa.

Deforestation. Forests provide invaluable ecosystem services, the extent of which has only recently begun to come to light. Africa has 17 per cent of the world's forests, or about 675 million ha, which cover 23 per cent of the land area of the continent (FAO, 2010 and 2011). While Africa has made solid progress towards protecting its forests through national forest programmes in the previous two decades – with more than 60 per cent of forests now covered (FAO, 2010) – more should be done to protect valuable forest services for future generations. Africa suffered a net loss of 3.4 million ha annually between 2000 and 2010, representing the second highest in the world. If Africa is to maintain forest services – such as the protection of soils, recycling of nutrients and regulation of the quality as well as the maintenance of the live-

lihoods of the 4 million-5 million women who depend on forests for their livelihoods – then it must protect its forests. As the forest disappears, so do the goods and services it can offer.

Climate change. Climate change presents a challenge as it directly impacts the composition of individual ecosystems, necessitating the need to adapt current practices (unproductive or productive) to changing future circumstances. A study by the Intergovernmental Panel on Climate Change suggests that Africa will be one of the regions mostaffected by the impacts of climate change. Projections include the decrease in rainfall in the already arid areas of Eastern and Southern Africa, and increasing drought and desertification in the north of Central Africa. West Africa may see decreases in groundwater recharge rates of 50–70 per cent (World Bank, 2013). Estimates put crop yield reductions at 15–20 per cent as temperatures rise to 3°C above pre-industrial levels, resulting from a shrink in the total area of grasslands, and a sea level rise of 50 cm, encroaching on coastal ecosystems (World Bank, 2013). Africa needs to step up its response, by rehabilitating, preserving and ensuring resilient ecosystems services with respect to climate change impacts.

Desert encroachment, floods and droughts are natural disasters driven by climate change. These events impact human, economic and food security as well as wildlife populations and distribution. Maintaining a resilient ecosystem for promoting inclusive green growth will require mitigation and adaptation to climate change on small and large scales. Much work has been undertaken to promote the preservation of biodiversity, forest, water and landscape resources, and to protect these resources from climate change throughout Africa (Devisscher, 2010). However, this needs to be upscaled for the maintenance of the integrity of ecosystems that promotes inclusive green growth.

Water insecurity. Water security, access, and land and wetland management are central elements in stimulating inclusive green growth. Challenges caused by governance, urbanization and climate change are affecting water availability and subsequent land productivity. Drought and ecosystem degradation are among the major causes of water insecurity in many parts of Africa. The decline of ecosystems has affected their capacity to provide services – resulting in reduced water quality and quantity, and land productivity – and has undermined their ability to provide cost-effective natural infrastructure.

Existing sector top-down approaches of managing water and land are no longer adequate, making it necessary to develop innovative strategies for future development and better understand areas where land and water resources are integrated with other development sectors. As early as 1992, at the International Conference on Water and the Environment in Dublin, water was recognized as an ecosystem service providing an essential economic value essential to development (WMO, 1992). Furthermore, the statement includes recommendations on water use that have yet to be fully implemented. Current challenges to utilizing ecosystems goods and services for inclusive green growth include valuing and provisioning water in development schemes. The Dublin Statement provides a good starting point to address these challenges.

Extractive industries. Current patterns of extraction of non-renewable resources such as gold, diamonds and crude oil have had a great impact on the environment. In Nigeria, oil spills and gas flares have polluted the environment significantly. In Southern Africa, abandoned mine sites constitute an environmental menace. The loss of productive land, surface and groundwater pollution, and soil contamination are part of the legacies of oil and mineral exploration. In many ways, Africa is reliant on its extractive industries to spur development, but it cannot afford the current approach to resource extraction. If this trend of unsustainable oil and mineral extraction is allowed to continue, attaining sustainable development in Africa will continue to be a formidable challenge.

6.3.2 Opportunities

Vast potential exists to harness ecosystems goods and services for the successful achievement of inclusive green growth, and ultimately sustainable development in Africa. Opportunities range from existing international frameworks and initiatives to regional and national efforts to promote sustainable economic growth and use of natural ecosystems to overcome development challenges.

Harnessing opportunities presented by the climate change challenge. Although climate change presents a challenge, the need for climate change mitigation and adaptation actions linked to natural infrastructure – such as maintenance of natural forests promoted through REDD+ and ecosystems-based adaptation initiatives – provide opportunities for enhancing ecosystems goods and services. African countries can leverage international support, investments and local knowledge for climate change mitigation and adaptation, while at the same time promoting ecosystems based inclusive green growth.

Promoting payment for ecosystems services. PES and rewards for positive externalities – such as carbon sequestration, environmentally-friendly goods and services, and watershed services – will not only allow for ecosystem accounting, but also provide opportunities for private sector investment in the restoration and provision of ecosystems goods and services. Such initiatives are being supported by an increasing number of institutions such as TEEB, which is working to develop methods for ecosystem accounting, including methods for private corporations. TEEB has reported that 45 per cent of chief executive officers working in African businesses see declines in biodiversity as a challenge to business growth (TEEB, 2012).

Certification of environmental goods and services. There is growing recognition by the private sector of the profitability or competitiveness of investment in the provision of ecosystems goods and services. This is further being enhanced by certification or eco-labelling of ecosystems goods and services, which has the potential to enhance consumer demand for their sustainable management as well as fostering sustainable consumption and production (UNEP, 2009). Certification can be attained for forest and fisheries products, as well as ecotourism. Initiatives such as the African Eco-Labelling Mechanism and Eco Mark Africa provide the opportunity for up-scaling certification of ecosystems goods and services. It will, however, be imperative to work out ways of ensuring that eco-labelling of ecosystems goods and services for trade does not undermine, but instead enhances, the benefits derived by the rural poor whose livelihoods depend on them.

Learning from ecosystem conservation initiatives. There are many initiatives for the restoration, conservation and utilization of vital ecosystems being supported by a number of international agencies and non-governmental organizations across the continent. Examples of such initiatives include the Regional Coastal and Marine Conservation Programme for West Africa, which is jointly implemented by international non-governmental organizations, including World Wide Fund for Nature (WWF), as well as Governments to deliver on targets of the Convention on Biological Diversity; WWF's Coastal East Africa Initiative; and IUCN's Water and Nature Initiative International Union for Conservation of Nature, which manages and protects water reserves and heritage in some African river and lake basins (such as the Nile Valley, Volta, Tana, and Limpopo) and elsewhere (International Union for Conservation of Nature, Water and Nature Initiative, available from https://www.iucn.org/about/work/programmes/water/wp_our_work/wp_our_work_wani/). Best practices and lessons learned from such initiatives have been documented extensively, and provide an opportunity for up-scaling and out-scaling.

Leveraging international agreements and platforms. Existing international environmental agreements to which African counties are parties – such as the Convention on Biological Diversity, the United Nations Framework Convention on Climate Change, the United Nations Convention to Combat Desertification, and the Convention on Wetlands of International Importance, especially as Waterfowl Habitat (Ramsar) – provide important policy backstopping for promoting sustainable use of ecosystems. They also provide opportunities for attracting ecosystem management assistance to Africa. At the continental level, the African Ministerial Conference on the Environment provides a strategic platform for building policy consensus for promoting ecosystems goods and services-based inclusive green growth.

Promoting a true measure of wealth. Countries are investigating ways to include natural capital in gross domestic product measurements in order to reflect a true valuation of national wealth. Campaigns such as the 50:50 Initiative – initiated by the World Bank at the Summit for Sustainability in Africa in Gaborone, Botswana on 25 May 2012 to support the inclusion of natural capital accounting in economic decisions – received the support of 62 countries and 90 corporations by the time of the United Nations Conference on Sustainable Development (Rio+20). Efforts are currently underway in 24 countries, including Botswana and Madagascar, to develop methods of valuation for ecosystem services. Inclusion of natural capital into valuation of national income and well-being will facilitate the consideration of ecosystems goods and services provision and consumption in economic development decisions.

Leveraging regional initiatives. Opportunity abounds in regional initiatives, such as the African Minerals Development Centre, that aim to enhance the capacity of African mining countries to derive economic and social benefits from implementing the Africa Mining Vision, while mitigating environmental damage. Likewise, the African Climate Policy Centre, which is an integral part of the Climate for Development in Africa (ClimDev-Africa) programme, provides demand-driven support to countries in climate-sensitive sectors, such as agriculture and water that are closely linked to ecosystems goods and services. The Land Policy Initiative supports countries in formulating and implementing policies that aim at positive economic, social and environmental outcomes. Countries can leverage support from such initiatives for ecosystems-based inclusive green growth.

Leveraging international financing initiatives. International financing initiatives provide many opportunities for the sustainable development and management of ecosystems goods and services. The World Bank, through the Climate Investment Funds, has supported initiatives in many African countries to enhance resilience to the effects of climate change that positively impact on ecosystems goods and services. Similarly, AfDB has invested funds in the African Water Facility, which seeks to strengthen intergovernmental water governance. The Global Environment Facility also provides funding for sustainable management of natural resources, particularly of a transboundary nature including water resources and associated wetlands.

6.4 Conclusion and policy recommendations

6.4.1 Conclusion

Vast potential exists to harness ecosystems goods and services for inclusive green growth, and ultimately sustainable development in Africa. This is underscored by the fact that, at 1.4 global hectares (gha), Africa's per capita "ecological footprint" (a measure of a population's use of renewable resources) is below not only the global average of 2.7 gha but also below the globally available biocapacity of 1.8 gha per person (WWF/AfDB, 2012). Africa is well poised to implement inclusive green growth by moving forward with innovative approaches. From disaster risk reduction to ener-

gy generation to water security, Africa has ample opportunity to seize the benefits of ecosystems goods and services for inclusive green growth. The provisioning and regulating services provided by ecosystems directly and indirectly link to every aspect of inclusive green growth: socially inclusive and environmentally conscious economic growth. Thus, harnessing ecosystems services will spur inclusive green growth and lead to sustainable development. Most of the challenges to ecosystems-based inclusive green growth also provide opportunities that could be leveraged to spur this form of growth. These opportunities must be seized and good practices up-scaled and out-scaled for beneficial economic, social and environmental outcomes. Lessons learned are synthesized into the following policy recommendations.

6.4.2 Policy recommendations

Support research to ensure that the development and management of environmental goods and services are guided by the best available science. Research and development is the first step towards protecting, managing and conserving ecosystems and promoting inclusive green growth. Research is also needed to better quantify the costs and benefits, and enhance evidence on the role of ecosystem services in reducing vulnerability to climate change. The New Partnership for Africa's Development has recognized the need to provide adequate funding for various ecosystems goods and services-based research priorities, including the African Biosciences and Environment initiatives. Research in these areas could greatly spur ecosystems goods and services-based inclusive green growth.

Promote the application of environmental assessment tools in national development plans and strategies, and in decisions and actions affecting environmental goods and services. Although there is progress on project level Environmental Impact Assessment, there is a need for its application across the board. Furthermore, the application of Strategic Environmental Assessment at the decision-making and policy-formulation levels should be enhanced to ensure that local communities and the broader society derive maximum benefits from ecosystems, thus enhancing resource governance.

Promote knowledge exchange and the development of practical tools and guidelines for implementing ecosystems goods and services management approaches, as part of broader inclusive green growth and sustainable development planning strategies. Best practices and experiences from the implementation of ecosystem-based approaches across a range of ecosystems and geographical regions, with a particular focus on sustainable projects, should be shared. These integrate local traditional knowledge into research and planning, engage local stakeholders to instil a sense of ownership and responsibility in local populations for long-term sustainability, and empower local stakeholders by promoting adequate capacity-building, transferring power in decision-making and encouraging leadership.

Develop education, training and communication capabilities. Increasing awareness of the role of ecosystems and ecosystem management for inclusive green growth and sustainable development in Africa is essential to increasing communities' adaptive capacity. Increased awareness, attitude reorientation and the provision of alternatives, and individual and communal action, are vital forces in the long run for achieving ecologically friendly sustainable development. At the community level, the message of environmental management ought to be repackaged to reflect African values. The imperative of not depleting resources that future generations need for their development should be an incentive to use resources in a more sustainable way, given the importance that Africans place on inheritance.

Mobilize funding and promote value addition for ecosystems goods and services. There is a need to secure long-term funding for ecosystem-based

management approaches to ensure that gains made are consolidated and good practices are up-scaled and out-scaled. Thus, the development and management of ecosystems goods and services should be mainstreamed into national development plans and sustainable development interventions at subnational, national and regional levels. Value addition will be promoted through public-private partnerships and other instruments, such as economic and fiscal incentives. This, in turn has the potential to create employment, increase income generation and reduce poverty, thus fulfilling inclusive green growth objectives.

Strengthen capacity to implement multilateral environmental agreements, enhance institutional effectiveness and promote regional cooperation. African countries are signatories to most multilateral environmental agreements, but there is a need to enhance their implementation capacities to enable them to honour their commitments under the various agreements. This calls for, among other measures, strengthening and enhancing the effectiveness of institutions, policies and regulatory frameworks not only to implement multilateral environmental agreements, but to enforce national legislation on the environment and related matters. Furthermore, regional cooperation on transboundary environmental issues relevant to ecosystems development and management, such as climate change, should be enhanced.

6.5 References

African Development Bank (2012). African Development Report 2012 – Towards Green Growth in Africa". Tunis.

African Development Bank (2013). At the Center of Africa's Transformation – Strategy for 2013-2022.Tunis.

BirdLife International (2013). While UNFCCC parties debate, BirdLife Project shows ecosystem-based adaptation inaction. Available from http://www.birdlife.org/worldwide/news/while-unfccc-parties-debate-birdlife-project-shows-ecosystem-based-adaptation-action.

Brittain, Claire, Claire Kremen and Alexandra-Maria Klein (2013a). Biodiversity buffers pollination from changes in environmental conditions. In Global Change Biology, vol. 19, No. 2, pp. 540–547 (February).

Brittain, C., Williams, N. Kremen, C. and Klein, A. (2013b). Synergistic effects of non-Apis bees and honey bees for pollination services. Proc. R. Soc. B 2013 280, 20122767.

Devisscher, Tahia (2010). Ecosystem-based Adaptation in Africa: Rationale, Pathways, and Cost Estimates. Sectoral Report for the AdaptCost Study. Stockholm Environmental Institute.

Dittmar, Thorsten and others (2006). Mangroves, a major source of dissolved organic carbon to the oceans. In Global Biogeochemical Cycles, vol. 20, No. 1 (March).

Ellison, Aaron (2008). Managing mangroves with benthic biodiversity in mind: Moving beyond roving banditry. In Journal of Sea Research, vol. 59(1-2), pp. 2–15.

Food and Agriculture Organization of the United Nations (2008). Water and the Rural Poor: Interventions for improving livelihoods in sub-Saharan Africa. FAO Land and Water Division. Rome.

FAO (2010). Global Forest Resources Assessment. FAO Forestry Department. Rome.

FAO (2011). The State of the World's Forests 2011. FAO Forestry Department. Rome.

FAO (2013). Climate change guidelines for forest managers. FAO Forestry Paper No. 172. Rome.

Gilman, Eric and others (2008). Threats to mangroves from climate change and adaptation options: a review. In Aquatic Botany, vol. 89(2), pp. 237–250.

McIvor, Anna and others (2012). Reduction of Wind and Swell Waves by Mangroves. Natural Coastal Protection Series: Report 1: The Nature Conservancy and Wetlands International. Available from http://www.wetlands.org/LinkClick.aspx-?fileticket=fh56xgzHilg%3D&tabid=56.

Menomussanga, Manuel (2013). Fish and Crab Farming in Mozambique. First Africa Food Security and Adaptation Conference 2013. Nairobi.

Millennium Ecosystem Assessment Board (2005). Ecosystems and Human Well-being: Synthesis. Island Press, Washington, DC.

Santarias, Timan (2012). Green Growth Unravelled: How rebound effects baffle sustainability targets when the economy keeps growing. Heinrich Böll Foundation and the Wuppertal Institute for Climate, Environment and Energy. October.

Smith, Laurence E.D. (2004). Assessment of the contribution of irrigation to poverty reduction and sustainable livelihoods. InInternational Journal of Water Resources Development, vol. 20, No. 2, pp. 243–257.

TEEB (2010). The Economics of Ecosystems and Biodiversity: Mainstreaming the Economics of Nature: A synthesis of the approach, conclusions and recommendations of TEEB. UNEP. Geneva.

TEEB (2012). The Economics of Ecosystems and Biodiversity (TEEB) in Business and Enterprise. Edited by Joshua Bishop. Earthscan, London and New York.

United Nations Environment Programme (2009). Certification and Sustainable Fisheries. Division of Technology, Industry and Economics. Nairobi.

United Nations International Strategy for Disaster Reduction Secretariat (2009). Global Assessment Report on Disaster Risk Reduction: Risk and poverty in a changing climate. United Nations, Geneva.

United Nations International Strategy for Disaster Reduction Secretariat (2011). Global Assessment Report on Disaster Risk Reduction: Revealing Risk, Redefining Development. United Nations, Geneva.

World Bank (2012). Inclusive Green Growth: The Pathway to Sustainable Development. Washington, DC. Available from http://siteresources.worldbank.org/EXTSDNET/Resources/Inclusive_Green_Growth_May_2012.pdf.

World Bank (2013). Fact Sheet: The World Bank and Agriculture in Africa. Washington, DC. Available from http://go.worldbank.org/GUJ8RVMRL0.

World Bank (2013a). Disaster Risk Management in Africa. Washington, DC. Available from http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/AFRICAEXT/0,,contentMDK:23199686~pagePK:146736~piPK:146830~theSitePK:258644,00.html.

World Bank (2013b). The Africa Competitiveness Report 2013. Washington, DC. Available from

www.worldbank.org/content/dam/Worldbank/document/Africa/Report/africa-competitiveness-report-2013-main-report-web.pdf.

World Meteorological Organization (1992). The Dublin Statement on Water and Sustainable Development. Geneva. Available from www.wmo.int/pages/prog/hwrp/documents/english/icwedece.html.

World Wide Fund for Nature (2011). Count of mountain gorillas begins in Uganda. Gland, Switzerland. Available from http://wwf.panda.org/?uNewsID=201576.

World Wide Fund for Nature and the African Development Bank(2012). African Ecological Footprint Report: Green Infrastructure for Africa's Ecological Security. Gland, Switzerland; Tunis. Available from http://d2ouvy59p0dg6k.cloudfront.net/downloads/africa_efr_english_high_res.pdf

7. Energy

7.1 Introduction

Energy is an engine of economic growth and poverty eradication. Energy can support businesses, wealth and employment creation, thus improving the welfare of the majority of Africa's population (African Union/NEPAD, 2013). Access to modern[26] energy services and sustainability of energy systems are recognized to be instrumental in the achievement of the Millennium Development Goals, and there is a positive correlation between per capita electricity use, per capita gross domestic product and an improvement in the human development index (Pasternak, 2000). The Open Working Group on the Sustainable Development Goals established by the General Assembly as an integral part of the follow-up processes to the United Nations Conference on Sustainable Development (Rio+20), has proposed as Goal 7, "Ensuring access to affordable, sustainable and reliable modern energy services".

Africa is rich in energy resources. The region has 9.6 per cent of global reservesof oil, totaling 12.1 per cent of global production (Katsouris, 2011), or around 127.6 billion barrels, which are estimated to last another 40 years; 6.8 per cent of global production of natural gas[27] in 2013, which is estimated to last over 70 years; and 4.2 per cent of global production of coal in 2008, with over 30 billion barrels of recoverable reserves, estimated to last even longer at current production levels.

With regards to other energy sources, only 5 per cent of Africa's hydropower potential of 1620 gigawatts (GW) in sub-Saharan Africa has been exploited (AfDB, 2012Mo Ibrahim Foundation, 2013). Although the largest producers of uranium are in Africa (613,100 metric tons in South Africa, Namibia and Niger), nuclear power has an uncertain future due to the risk associated with recent disasters and the constant fear of managing nuclear waste. The resource estimates for biomass,[28] apart from bagasse[29] (28,438,000 tons with 50 per cent humidity and 50 per cent dry matter) is uncertain, but all non-renewable sources of energy have untapped technical potential sufficient to meet Africa's energy demand. The known potential of geothermal power is of the order of 14GW, solar 10,000GW and wind 1,000GW (Hermann and Fichuax, 2014; AfDB, 2012; RESAP, 2012).

There is a need to transform this resource endowment into modern energy forms to drive Africa's transformation and sustainable development agenda. This can be achieved through catalysing investments for exploration and exploitation of the abundant energy resources. The application of inclusive green growth principles and practices could drive the required transformation in the energy sector with beneficial economic, social and environmental impacts.

In addition to the resource endowment discussed above, this chapter presents the region's energy challenges in terms of supply and demand, and analyses the current status and trends in promoting inclusive green growth in the sector. It presents challenges and opportunities to promote this form of growth in the sector, then makes concluding remarks and policy recommendations on the basis of the findings.

26 Modern energy excludes traditional biomass.

27 There is significant migration to using natural gas for electricity: 3 per cent between 2000 and 2010 for Africa (http://en.wikipedia.org/wiki/World_energy_consumption#Fossil_fuels).

28 The various assessments indicate a potential for energy crops of up to 13,900 petajoules (PJ)/year, 5,400 PJ/year for forestry biomass and up to 5,254 PJ/year for residues and waste in Africa by 2020, in addition to 20 exajoules of traditional biomass/year (Stecher and others, 2013).

29 Sugar cane waste.

7.2 Africa's energy sector

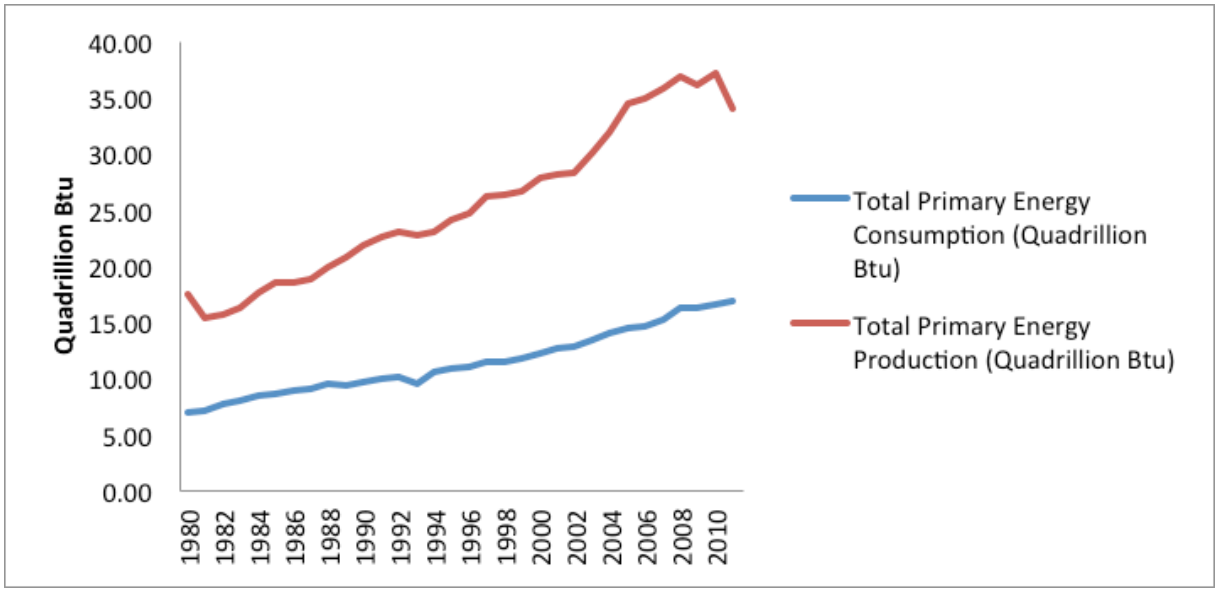
Africa currently faces many energy-related challenges. More than 75 per cent of the African population is without electricity and 81 per cent depends on solid traditional biomass fuels for cooking. Per capita electricity consumption levels in Africa are much lower (535.7 kilowatts per hour (kWh) per capita)[30] compared to the global average of 3,044.4 kWh per capita (World Bank, 2011). The population growth in sub-Saharan Africa between 1990 and 2010 outstripped increases in access to electricity and modern cooking fuels, resulting in more people lacking electricity and relying on solid fuels in 2010 than there were in 1990.

Figure 87 shows that total primary energy production in Africa was about 17 quadrillion British Thermal Unit (Btu) in 1980 and that increased to about 37 quadrillion Btu in 2010.. Consumption has persistently been about half of the energy production, with the balance largely exported.

The residential sector is the largest consumer of energy. Two-thirds of total energy use in Sub-Saharan Africa occurs in the residential sector – mostly biomass used in an inefficient and hazardous way for cooking – compared with an average of 25% in other developing countries outside Africa. Energy consumption in other end-use sectors is much lower than in other world regions, reflecting the very low availability of energy services. (International Energy Agency, 2014)

More than 30 sub-Saharan African countries have experienced power shortages in the last 5 to 10 years, which have affected various facets of development as a result of load shedding and inadequate supply. The power sector in sub-Saharan Africa is facing a supply-demand deficit due to delayed and low investments in generation and low levels of plant and operation efficiency. On energy intensity (i.e. the energy used per unit of GDP), Africa is among the underperforming regions compared with other regions – such as Europe, North America, and Central and South America – that are using lower energy per GDP produced. The region has, however, performed better than Asia/Oceania, the Middle East and Central and Eastern Europe.

Figure 87: Africa energy production and consumption



Source: Data from International Energy Statistics (2012), United States Energy Information Statistics.

30 There are exceptions. For example, South Africa consumes 4,694,2 kWh/per capita, although this is also skewed towards the rich population.

The sector is also characterized by high costs of electricity generation, partly emanating from high dependence on fossil fuels for electricity generation. This situation has resulted in Africa's high dependence on unsustainably harvested traditional biomass energy in the form of charcoal and firewood as cooking fuels, both of which result in health problems and associated deaths from indoor air pollution. Firewood is becoming increasingly scarce, as evidenced in longer collection times for women and children. The dependence on firewood for cooking has also contributed greatly to land and forest degradation.

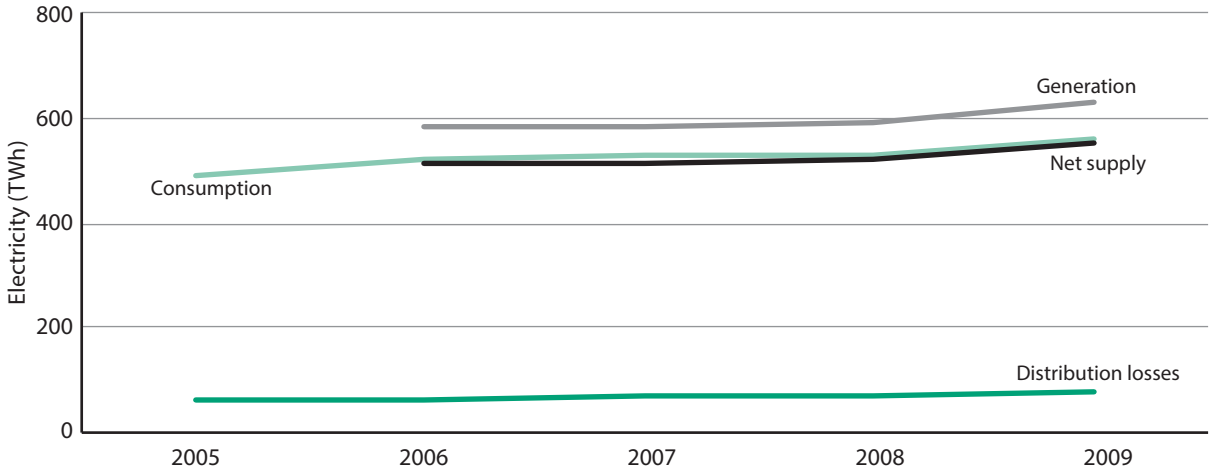
Africa produces 3 per cent of global electricity. More than 70 per cent of electricity produced in Africa is from fossil fuels and 15 per cent from hydropower. The contribution of other new and renewable sources of energy[31] is still low (typically <5 per cent). Since 2007, net electricity supply for the continent was outstripped by consumption, resulting in power shortages on a continent that also has high system losses (> 50 per cent). The population without access to electricity is projected to increase to 655 million (a 44 per cent increase), and those without clean cooking facilities to 883 million (a 59 per cent increase) by 2030 out of an estimated population of 1.5 billion under the business as usual scenario (IRENA, 2012).

These challenges occur despite Africa's abundant fossil and renewable energy resources; thus, the existing paradigm of energy development has not delivered the desired level of energy services. Promoting inclusive green growth in the sector holds promise for Africa's energy challenges.

7.3 Trends in promoting inclusive green growth in the energy sector

Inclusive green growth-related principles and practices are increasingly being integrated into various facets of energy production and deployment. These include energy efficiency and demand side management (EE/DSM), renewable energy deployment, availing adequate modern

Figure 88: Electricity supply and demand



Source: United States Energy Information Administration, International Energy Statistics, available from www.eia.gov/cfapps/ipdbproject/iedindex3.cfm?tid=2&pid=alltypes&aid=12&cid=r6,&syid=2007&eyid=2011&unit=BKWH.

31 Wind, solar, modern biomass, small hydropower and geothermal.

Box 18: Replacement of incandescent bulbs with compact fluorescent lights in Ghana

Ghana has banned the importation of incandescent bulbs as a load reduction measure to achieve energy efficiency. The replacement of incandescent bulbs with CFLs and the ban on importation of incandescent bulbs were some of the measures taken by the Government of Ghana to solve the acute energy crisis over the period from August 2006 to September 2007. Under this policy, the Government of Ghana imported and distributed for free about 6 million CFLs to residential consumers in exchange for incandescent lamps in 2007. The objective was to reduce household expenditures on electricity, eliminate brownouts and transformer overloads, as well as reducing the domestic peak load of between 200 to 220 megawatts (MW).

The total energy saved as a result of the transition to energy-efficient lighting in residential, commercial, industrial and outdoor sectors was about 375.0 gigawatt-hours in annual electricity consumption, which is equivalent to the power output of three small (20 MW) power plants. The project is expected to generate carbon dioxide emission savings of about 112,320 tons per annum. Such energy and investment savings conform to the inclusive green growth attributes of resource efficient and low-carbon emissions, and an economic benefit from avoided costs of investments in additional power plants to meet future demands. Although the bulb replacement campaign did not provide energy savings at the household level, the use of CFLs saved up to 80 per cent of energy used for lighting.

Significant electricity savings have been made through the campaign and households where the CFLs have been deployed saved money in consumption costs. Energy efficiency measures can reduce greenhouse gas emissions by 30 per cent (0.3 tCO2/MWh) of a coal power station (1 tCO2/MWh), evidenced the bulb replacement campaign in Ghana.

Source: ECA, 2014b.

energy to various economic sectors and addressing cross-sectoral issues. EE/DSM and deployment of renewable energy result in resource efficiency and reduction or elimination of environmental harm arising from the use of fossil fuels. A certain critical amount of modern energy to economic sectors and for cross-cutting usage will improve economic growth and human welfare.

7.3.1 Energy efficiency and demand side management

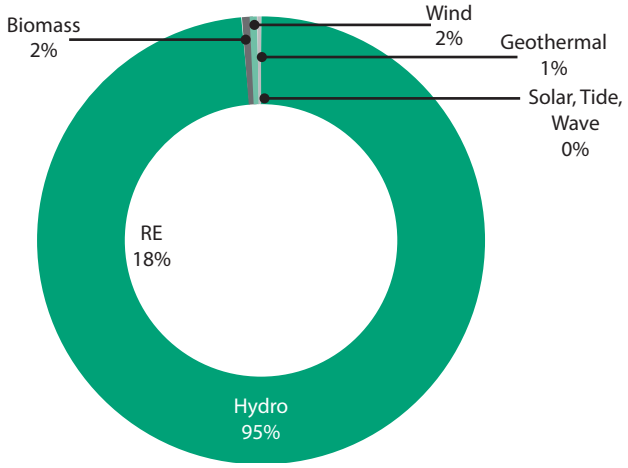
In the last five years, EE/DSM has been vigorously pursued in various African countries, largely responding to power shortages rather than as a deliberate application of inclusive green growth principles and practices. Most of the EE/DSM measures are in the electricity sector and include energy audits, power factor correction, distribution of compact fluorescent lamps (CFLs), time of use tariffs, installation of prepayment meters in residential and commercial premises, solar geysers, power alert systems and ripple control systems for electric water heaters. The replacement of incandescent bulbs with CFLs in Ghana presents a good example of an inclusive green growth-related practice (box 18).

7.3.2 Renewable energy

Renewable energy is a major contributor to clean energy and the creation of jobs, which are important elements of inclusive green growth. Apart from providing clean modern energy, renewable energy technologies can create as much as 25 per cent more jobs than coal, and 90 per cent more jobs than nuclear per unit of energy generated. Figure 89 shows how much renewable energy has so far been deployed on the continent.

The 18 per cent contribution of renewable energy to the African energy mix continues to be dominated by large hydropower (95 per cent) while the other renewable energy sources still remain low (figure 89).

Figure 89: Current share of renewable energy in electricity mix



Source: United States Energy Information Administration, International Energy Statistics, available from http://www.eia.gov/cfapps/ipdbproject/IEDIndex3.cfm?tid=6&pid=29&aid=12.

Total hydropower capacity in Africa in early 2011 was around 26 GW (IRENA, 2011). The untapped potential for large hydropower projects is mainly concentrated in the lower Congo River (44 GW) and the upper Nile River (30 GW). Of the geothermal potential of 14,000 MW currently estimated, the exploited capacity is 172 MW for electricity and another 130 MW for heat (World Energy Council, 2013). Current exploited solar power is of the order of 22 MW solar photovoltaic (PV), 65 MW other solar, with a planned capacity of about 3,000 MW. Wind current capacity is of the order of 1,104 MW and the planned capacity is 10907 MW (Mukasa and Others, 2013). Africa has 588 small hydropower plants (SHP) in operation, with an average size of 2.5 MW (a total of about 1.5 GW). Further prospects for SHP potential exist in Africa, with around 4.7 GW of potential in 13 West African countries where surveys have been done.

Bioenergy

Bioenergy is being consumed in various forms. Apart from solid traditional woodfuel (charcoal and firewood), modern bioenergy is derived from residues from crops, forests and animals – as well as municipal and industrial residues – for various energy uses, including generating electricity and biogas, and more recently as liquid biofuels. Dissemination of domestic and institutional biogas units is currently under implementation in a number of African countries.[32],[33]

Sustainable liquid biofuels production constitute a source of clean energy supply to the transport sector, including motorization of traditional farming, or the fuelling of multifunctional platforms.[34]Production of ethanol from sugar cane is widely practiced in sugar-producing countries of Africa (for example, Mauritius and South Africa), and jatropha is being promoted as a source of biodiesel fuel in most African countries. First-generation biofuels feedstocks are generally cultivated on good quality farmlands, and create competition for land and food (reducing availability and driving up prices), which results in displacements of communities, a situation that has already received global attention. Bagasse residue from ethanol production is being used for electricity production, mostly through combined heat and power production.

In spite of these efforts, there is limited renewable energy in the continent's energy mix. This is constrained by low investments in the sector, ag-

32 Burkina Faso, Ethiopia, Kenya, Rwanda, Senegal, Uganda and the United Republic of Tanzania, with the support of the Government of the Netherlands, aim to develop a mature market for domestic biogas.

33 ECA, 2012.

34 Currently disseminated mainly in Burkina Faso, Mali and Senegal by the United Nations Development Programme.

Box 19: Bujagali hydroelectric power plant in Uganda: Financing through public-private partnerships

Despite being one of Africa's fastest growing economies, Uganda has had one of the lowest electrification rates in the world. Only 2 per cent of its rural population had access to electricity, and the country suffered from frequent rolling blackouts – requiring expensive emergency generation, costing $9 million per month. In 2007, to meet these shortfalls, the Government decided the lowest-cost option was a $860 million hydroelectric power plant in Bujagali, 8 km down the Nile River from Lake Victoria. However, it needed financiers and large hydropower developers to implement the project.

The Government established a public-private partnership called Bujagali Energy Limited, which would own the plant on a concessionary basis for 30 years before transferring it to Uganda. Multilateral lenders – including the World Bank, the European Investment Bank, and AfDB – joined with private financiers, such as South Africa's ABSA Capital and Standard Chartered Bank. The dam was commissioned in August 2012. Today, the 250 MW hydropower plant meets half of Uganda's energy needs. The project's construction created over 3,000 local jobs. Bujagali was registered in 2012 as a Clean Development Mechanism project, making it the largest-ever such project registered in a Least Developed Country.

Source: IRENA, 2012.

gravated by high costs of technologies and small markets for these products. To address this situation, both national Governments and regional economic communities in Africa are developing EE/DSM and renewable policies and strategies. The communities have established regional power pools, electricity regulators and strategies aimed at increasing energy access to modern energy services in their member States. But there is a need to accelerate the harmonization of policies, strategies and institutional models of member States. Local renewable energy initiatives are supported largely through donor funding with non-governmental organizations as implementers. Private sector participation is widespread but in the form of small decentralized/off-grid/off-shelf systems, whose impact is still limited compared to deployed centralized conventional systems.

7.3.3 Cross-sectoral energy deployment

The inclusive green growth aspect of cross-sectoral energy deployment relates to whether the economic sectors are supplied with adequate clean, modern and efficient energy services to increase production to levels that contribute substantially to employment and wealth creation for the continent. The supply of modern energy services to the development sectors is currently varied, and in some sectors inadequate to advance significant growth and decent employment.

In the industry sector, apart from mining, manufacturing is not significant in African countries except for South Africa. In per capita energy terms, Africa consumed 90 ktoe per capita compared to China at 580 ktoe per capita, and the United States at 920 ktoe per capita.[35] Some African countries are below 15 ktoe per capita, for example, Benin and Zambia. South Africa, on the other hand, is comparable to China (510 ktoe per capita). Globally, the industrial energy intensity between 1990 and 2008 was 0.35 toe of energy per $1,000 of MVA. Sub-Saharan Africa's industrial energy intensity has remained more or less constant, hovering between 3.48 toe in 1990 and 3.37 toe in 2008

35 Source: IEA, available from www.iea.org/statistics.

Box 20: National Biogas Programme Ethiopia

The Government of Ethiopia, as part of the Growth and Transformation Plan and Climate Resilient Green Economy Strategy, launched the National Biogas Programme Ethiopia to promote the uptake of domestic biogas, and to develop and disseminate a commercially viable market biogas sector in the country. The goal of the programme is to improve health, livelihood and quality of life of rural households through the exploitation of market and non-market benefits of domestic biogas.

The programme comprises eight major components: promotion and marketing, training, quality management, research and development, monitoring and evaluation, institutional support, extension, and gender mainstreaming. The first phase of the programme (2008–2012) involved 5,000 biogas plants of 4, 6, 8 and 10 m3 in 18 selected districts (Woredas) in the regional states of Tigray; Amhara; Oromiya; and Southern Nations, Nationalities and Peoples.

The biogas plants generate sufficient energy for household consumption, in some cases much beyond demand. The excess energy generated was used to cover the energy demand of the nearby communities and institutions, including schools and health centres. By supplying energy at affordable prices, biogas plants contributed to reducing health problems associated with smoke from fuel and cow dung burning, thereby reducing household health expenditures. At the same time, it has reduced the time women and children spend on collecting fuel wood from long distances. The National Biogas Programme implementation package also includes training on biogas maintenance, installation, and a credit association. The programme provided more jobs for technical and vocation training graduates, as well as for construction cooperatives and small and medium-sized enterprises.

By substituting commercial fertilizers (inorganic) by bio slurry (organic matter), the project saved farmers an estimated BR 4,772,130 (household saving of BR 950) through fertilizer substitution. The bio slurry also improved soil conditions and maintained sustainable soil fertility by increasing moisture retention capacity and levels of other soil nutrient elements that cannot be substituted by commercial fertilizer.

By replacing biogas for wood and charcoal, the project saved standing forest stocks of 35.9 tons and 20.8 tons from being harvested for woodfuel and charcoal, respectively. This is estimated to offset emission of 65.7 tons of carbon dioxide equivalent (CO2e) from direct wood burning or 53.4 tons CO2e from charcoal burning. Additionally, replacing the fossil fuel energy sources such as kerosene and liquefied petroleum gas by biogas has resulted in a modest emission reduction of 13.5 and 40.5 tons CO2e, respectively.

Source: ECA, 2014a.

(UNIDO, 2011). Some energy audits to guide EE/DSM are being practiced in a number of countries, including Egypt, South Africa, Tunisia and Zambia. In South Africa, about 3,000 MW are being realized through demand-side energy management, which includes cogeneration. Sugar industries, particularly those in South Africa and Mauritius, also generate their own renewable energy, with the surplus being exported to the national grid.

The transport sector is more than 98 per cent dependent on oil and most of the oil products (70 per cent) are consumed by the road sector, hence providing the subsector good potential for inclusive green growth, specifically targeting public transport.[36] Other measures include the introduction of clean fuels, such as biofuels and non-motorized transport systems. Currently, there is an unprecedented increase in motor vehicles in Africa and the trend is expected to continue for another 30 years.[37] Public transport is poor in Africa and rail systems are dysfunctional due to lack of recapitalization. Biofuels are being introduced but their percentage contribution to the transport energy is insignificant. Use of non-mo-

36 Considering energy intensity diesel-powered rail transportation accounts for about 25–30 per cent of the diesel fuel used by road transportation (per net ton-km) (Pearson and Giersing, 2011).

37 Available from www.who.int/indoorair/publications/energy-healthbrochure.pdf.

Box 21: National Railway and Bus Rapid Transport projects in Ethiopia

The transport sector is one of the largest sources of greenhouse gas emissions in Ethiopia. Transport emissions are expected to grow from 5 metric tons of CO2e in 2010 to 40 metric tons of CO2e in 2030, driven by emissions from freight transport (+13 per cent/year) and passenger transport (+9 per cent/year).

The National Railway, Light Rail Transport and Bus Rapid Transport projects were initiated by the Government of Ethiopia as part of the Climate Resilient Green Economy strategy towards achieving the economic growth targets of the Growth and Transformation Plan, with zero increase in greenhouse gas emissions. The projects comprise: the construction of an electric rail network-powered by renewable energy to substitute road freight transport on the major import-export corridor; improvement of urban transport in the capital Addis Ababa by introducing urban electric rail and enabling fast and efficient bus transit; and introducing stricter fuel efficiency standards for passenger and cargo transportation, and promoting the purchase of hybrid and electric vehicles to counter the low efficiency of the existing vehicle fleet.

When fully operational, the projects will provide employment for more than 300,000 citizens, particularly women and youth. The Light Rail Transport and Bus Rapid Transport transit lines are intended to cater to 72 per cent of public transport activity in the capital and provide transportation service to about 60,000 people per hour. The shift in the transport system from road to rail and conversion of all public transport vehicles to electric vehicles would result in the lowering of traffic congestion, pollution and accidents. It is also anticipated that the replacement of diesel-powered public transport by electric rail and electric-operated vehicles would lower transport costs and improve the efficiency and affordability of public transport services, thus facilitating sustainable access to public transport.

The projects have huge abatement potentials. Converting all public transport-fossil fuel vehicles to electricity-driven vehicles and diesel generator power to electricity power are anticipated to considerably reduce emissions. The Light Rail Transport and Bus Rapid Transport are expected to reduce CO2e by an estimated 33,500 tons per year and an additional 3,000 tons of CO2e per year from the introduction of three-wheeled vehicles. Such a significant emission reduction potential would bring health benefits through reduced concentration of toxic gases.

Transport costs on the import-export corridor will be significantly reduced by the railway connecting Addis Ababa with the seaport of Djibouti, and translate into savings of $0.03 per ton per kilometre in 2030, in addition to the lower energy costs that would result from the expansion of renewable energy sources for electric power generation.

Source: ECA, 2014a.

torized systems such as cycling and walking require investment in infrastructure.

Shortage of energy affects availability of waterand vice versa. Energy is used for large-scale water supply pumping and sanitation, and for productive and consumptive uses. Renewable energy is expected to provide water pumping solutions, but such energy is currently not adequate for use in both water for sanitation, and water for irrigation. The threat of climate change may also change the availability of water for hydropower and thermal power cooling.

Africa's commercial sector used about 3 per cent of final energy consumption in 2010. In addition to electricity, Africa's commercial sector also consumes a significant amount of liquids and coal, and to a lesser extent natural gas. The liquids and coal account for, respectively, 20 and 10 per cent of the final energy consumption by the commercial sector (EIA, 2013). Energy efficiency initiatives in this sector include the establishment of building codes (for example, in Botswana, Egypt and South Africa), and energy audits and financing of energy efficiency in buildings (for example, South Africa).

Box 22: Energy Efficiency and Demand Side Management programme – South Africa

Municipalities consume substantial amounts of energy both in their own offices and in the process of delivering services. As a result of this and the growing energy demand, the Department of Energy of South Africa initiated in 2009 the Energy Efficiency and Demand Side Management (EE/DSM) programme. It initially focused on public lighting, but now includes traffic signals, buildings, waste water treatment and water purification plants.

EE/DSM is one of the various energy efficiency improvement programmes that have been implemented in addition to the Public Building Energy Efficiency Programme, Industrial Energy Efficiency Programme and other private sector initiatives. The expected outcomes of EE/DSM is to assist municipalities reduce their electricity bills by optimizing energy use, improving delivery of services and reducing greenhouse gas emissions, undertaking retrofitting of existing facilities such as street lighting, traffic signals, municipal buildings, water pumping and a waste water treatment plan.

The impact of EE/DSM energy efficiency includes contributing to international competitiveness of local industries as more energy becomes available, and through the uptake of efficient technologies. Productivity gains from energy efficiency are expected to lead to general cost reductions across sectors in the economy. Attractive green jobs and businesses can be created from accelerated energy efficiency programmes.

EE/DSM also enhances access to modern energy services for the poor, and is expected to contribute to social benefits that include improved health and education for the local communities. The energy cost savings from EE/DSM could support social and other municipal services. EE/DSM, by promoting energy efficiency, also contributes to the country's climate change mitigation and adaptation strategies.

Source: ECA, 2014d.

Energy is required to increase productivity in agriculture, but irrigation is still limited in the region at both commercial and small productive enterprises. To date, the larger population of Africa depends on animal and human power for agriculture, compared with developed countries, where agriculture is highly mechanized. In 2012, Africa consumed 9 ktoe per capita, compared with China at 25 ktoe per capita and the United States at 47 ktoe per capita. South Africa, which has highly mechanized commercial farming, consumed 38 ktoe per capita, while the less developed countries of Africa consumed less than 5 ktoe per capita. Apart from providing food, agriculture is a source of energy in the form of agricultural waste for power generation, for example, bagasse and biofuels as substitutes for petroleum products. Zero tillage provides an opportunity to increase yields while reducing the consumption of fossil fuels for mechanized ploughing. An estimated 368,000 ha (0.3 per cent of the global total) are under zero tillage in Africa (Rolf Derpsch and others, 2010).

The current state of energy andhealth hinges on the exposure of consumers of traditional biomass-based energy to indoor air pollution. To that effect, efforts are being made to design and disseminate improved cook stoves that can limit such air pollution. The prevalence of motor vehicles in urban areas, thermal power plants, gas flaring and refineries also cause atmospheric air pollution. There is still limited application of regulatory frameworks to curb these sources of pollution.

Energy for productive use is often considered on a large scale (e.g. industry and agriculture), but can also make a significant difference on a small scale, particularly in rural areas, where it can be used to provide several agricultural services or water pumping, farming activities and processing of agricultural products. Where modern energy services have been targeted for such productive uses, jobs and incomes have been generated and the burden of rural communities, particularly women, is alleviated. The multifunctional platform that is

Box 23: Multifunctional platforms for local agro processing in Burkina Faso and Mali

The multifunctional platform consists of a source of mechanical and electrical energy, typically provided by a diesel engine of 8 to 12 horsepower, equivalent to 6 to 9 kW, mounted on a chassis providing a variety of end-use equipment such as grinding mills, battery chargers, electric water pumps, vegetable or nut oil presses, welding machines, carpentry tools and mini electricity grids for lighting. The multifunctional platform is flexible and can be adapted to the specific needs of each application. The concept of the multifunctional platform for rural energy access was first introduced in West Africa by the United Nations Industrial Development Organization/Fiber Industry Development Authority (UNIDO/FIDA) from 1993 to 1995, and the United Nations Development Programme (UNDP) from 1996 to 1998. Burkina Faso and Mali were the first countries with pilot projects. Today, there are ongoing full-scale and pilot programmes in other West African countries.

The Mali programme restructured its operations in 2008 to install 1,300 platforms, creating 10,400 jobs, as one multifunctional platform creates 6 to 10 permanent jobs. Burkina Faso installed 235 multifunctional platforms, benefiting more than 800,000 people. In Mali, about 1,000 women have been trained in running the mill and 64 artisan repairers have also been trained. One artisan, on average, takes care of the maintenance and repair of 17 multifunctional platforms.Where Jatropha seeds are used as a feedstock for the multifunctional platform, additional income opportunities are opened up to local farmers, who can plant Jatropha or sell seeds from the existing Jatropha plants often used as fencing. It is estimated that the multifunctional platform programme of Mali saves on average 2.5 hours per day each for 10,000 women for manual cereal grinding and water pumping, time which can be spent on other income-generating livelihoods, leisure or family activities.*

* Whether such savings are reallocated to employment depends on a range of factors.

widely practiced in West Africa is a good example of such initiatives (box 23).

7.4 Challenges and opportunities

7.4.1 Challenges

The low penetration of inclusive green growth principles and practices in the energy sector is influenced by a number of challenges, including those discussed below.

Low investment in the sector due to perceived risks and low economies of scale, as individual countries do not offer a significant market for investors. Investment in the energy sector has been slow and the reasons are associated with high political and market risk for investors, as well as low tariffs. Markets are also small unless the economies of scale of regional cooperation are exploited. The policy of national self-sufficiency that is still strong among countries has presented a challenge for regional planning and cooperation in the energy sector as Member States tend to give priority to their own national energy plans rather than regional projects.

African countries are introducing new policies to attract investment, for example through special tariffs for renewable energy, but the success of these policies has not been fully tested. There are also many variations of attracting investments, for example through renewable energy feed-in-tariffs (REFITs) and competitive bidding. The regional economic communities need to work with Member States to harmonize policies in order to attract more investments that are beneficial to the region.

The majority of African energy consumers are poor and cannot afford clean energy services. Liberalization of the energy market has prompted the introduction of unscrupulous players who have introduced high tariffs, making access to modern energy even more difficult. The operators of emergency diesel generators are typical examples. This is also aggravated by corruption where independent power producers are brought in by influential national figures to exploit countries.

Pro-poor policies are being talked about but hardly implemented, as reflected in the low access to clean and modern energy services.

High up-front costs of inclusive green growth-related technologies and inadequate capacity for propagating inclusive green growth technologies and practices. Africa is not the source of most of the clean energy technologies that are being deployed. Also, energy industries (apart from national utilities) are informal, small and cannot provide credible services. Although global renewable energy prices have come down, the challenge is that most of the technologies are imported, thus the high costs. The level of technical expertise for the design and maintenance of renewable energy systems is also low, thus impacting the final prices paid by consumers.

Dependence on donor support for projects, hence compromising on sustainability. Most previous renewable energy projects, in particular those that benefitted from donor support, tended to collapse soon after support was withdrawn, thus limiting sustainability and the opportunity to build on results. However, if projects are designed in the framework of a good regulatory environment, they can continue to be sustainable by attracting investments.[38] National Governments need to budget for and provide adequate funding for renewable and energy-efficient projects to ensure continuity and consolidation of results after donor funds dry up.

Inadequate capacity to promote inclusive green growth practices. The capacity of African countries to support inclusive green growth in the energy sector is limited. For example, capacity is inadequate for policy and strategy formulation, development of bankable projects, engagement with potential financiers, technology absorption, entrepreneurship, and even credible installation and maintenance of new technology systems. Capacity for systems designs that can suit all levels of consumers is largely lacking the ability to cater to the majority of the African population that cannot afford clean and modern energy services.

7.4.2 Opportunities

Opportunities abound to support inclusive green growth in the energy sector in Africa. The following show how inclusive green growth in the energy sector can be up-scaled and what is being done in this regard.

The emergence of new policies and strategies for renewable energy. The emergence of new policies and strategies for the promotion of renewable energy is yielding positive results. Foreign direct investment flows to Africa are on the rise, buoyed in part by South–South investment from Asia. These are expected to rise further, driven by Africa's natural capital (mainly oil and extractive minerals). South Africa, for example, under competitive bidding, has attracted investment of nearly 4 GW of renewable energy. Kenya introduced a feed-in tariff on electricity from wind, biomass and small hydropower in 2008, and extended the policy in 2010 to include geothermal, biogas and solar energy resource-generated electricity. Revised REFIT policy in 2012 has resulted in increased interest in renewable energy investment in the country. However, Africa could do more to increase its share of the pie, given the increasing attention that renewable energy/energy efficiency systems are receiving. Global investment for renewable energy grew from $22 billion in 2002 to $155 billion in 2008 and $211 billion in 2010.

Other policy options that can enhance renewable energy uptake include renewable portfolio standards or quotas; tradable renewable energy certificates; net metering; public investment, loan or financing of capital subsidies, grants and rebates; investment or other tax credit; and sales, energy or excise tax or value added tax reduction and energy production payments or tax credits. Kenya is working on introducing net metering and the positive results and lessons learned from such an initiative can be disseminated to other countries.

38 Uganda Case Study – Mabuku I Power Station.

Public–private partnership policies are also promising. Private sector participation, however, requires that countries charge cost-reflective tariffs, as the current low tariffs in most countries have discouraged investment.

Energy sector reforms. Liberalization of the energy sector has seen the involvement of independent energy or electricity regulators in many African countries. This has prepared countries to open the sector to private participation and so far independent power producers have started participating in the power sector, albeit on a small scale compared to national utilities. While unbundling of the sector is still slow, there are a few examples that have shown positive results.

Namibia and South Africa have part of their electricity distribution under regional electricity distributors and municipalities respectively (World Bank, 2007). The rest of the Southern African Development Community (SADC) member States have opened the electricity sector mainly to independent power producers, in an effort to attract investment in power generation. Nigeria unbundled the national utility into 15 privately owned companies responsible for the generation, transmission and distribution of electricity throughout Nigeria (Anuforo, 2013).

Other types of reforms, such as removing fossil fuel subsidies and creating cost-reflective tariffs, tend to face opposition from labour movements and consumers in general, for example in Zambia and Ghana on removal of petroleum subsidies. It is, however, important to have cost-reflective tariffs to attract the required investment to increase supply, so as to meet the growing energy demand. Where subsidies are to be removed, it is important to highlight cost savings and benefits to all concerned.[39] Removal of subsidies would also engender behavioural change and raise capital to support investments in inclusive green growth. Part of the resources from "green taxes" could be directed towards social expenditures.

Business and energy delivery models. Lucrative business solutions to propagate clean energy solutions that can be either grid-connected or decentralized but with built-in cost recovery are needed to serve all categories of society and create affordable and sustainable energy solutions. For example, D-light developed a range of solar-powered systems that can provide up to 12 hours of light after charging in sunlight for one day, with a price as low as $5 to make it universally affordable.

Smart subsides that enable low-income groups to access modern energy and still allow for cost recovery provide good business solutions – for example, the Rural Electrification Collective Scheme[40]in Botswana. Systems design and packaging for various categories of consumers can be achieved by learning from the mobile phone industry model. This model can be combined with the provision of financing, e.g. in the form of micro and Clean Development Mechanism financing to promote technologies (e.g. Clean Development Mechanism Programme of Activity for cook stoves in Uganda),[41]hence opening opportunities for widespread adoption of sustainable energy solutions.

Technology development. Renewable energy technologies have traditionally been considered more expensive than conventional fossil and hydropower systems. The fact that technology costs are coming down offers an opportunity for intensive deployment of renewable energy, which from a clean resource efficiency point of view will enhance inclusive green growth. Investment costs of some renewable technologies (biomass combined heat and power, $430-$500/kW; other biomass, $1,800-$6,200/kW; wind onshore, $1,200-$2,100/kW; geothermal, $1,800-$5,200/kW; and

39 Industrial energy efficiency improvement case study, South Africa.

40 5 per cent deposit, 15 years to pay at prime interest rate.

41 Up Energy Improved Cookstove Programme, Uganda, available from https://cdm.unfccc.int/ProgrammeOfActivities/poa_db/WRL90IO62SKX4BD5CYJT8E1HVZ7QUM/view.

solar PV, $2,700-$7,300/kW) have become comparable to those of fossil fuels ($1,000–$3,000/kW) and large hydropower ($1,000-$3,000/kW). The reduction in investment costs coupled with low operating costs creates an opportunity for deployment of renewable energy technologies in the African energy market. Local manufacturing of the bulk of technologies – and skills development for renewable energy support – is, however needed to make systems affordable. Such technology changes are to be accompanied by strengthening technical skills in the technology value chain to ensure value for money to the end user.[42]

Innovative and new financing models. There are various sources of financing that African countries can tap to support inclusive green growth in the energy sector. These include the Green Climate Fund[43] and other new financing options to improve investments in energy efficiency and renewable energy. Other funding options include the World Bank's "Scaling Up RE" in low-income countries, the Clean Technology Fund, The Global Environment Facility Special Climate Fund, and credit lines by organizations such as the Global Energy Efficiency and Renewable Energy Fund, the French Agency for Development and KreditanstaltfürWiederaufbau (KfW–German Development Bank). Domestic sources of funding can also be used to enhance inclusive green growth in the energy sector. These include, for example, public pensions and local bond markets.[44]

New sustainable energy regional centres being established in Africa. The new sustainable energy regional centres being established by regional economic communities are encouraging and would further spur inclusive green growth in the energy sector in Africa.

The East African Centre for Renewable Energy and Energy Efficiency was formally approved by the Ministers of Energy during the Ninth Meeting of the East African Community Sectoral Council on Energy, on 21 April 2014 in Nairobi. The Centre is expected to be operational by the end of 2014 (www.eacreee.org/).

The South African Centre for Renewable Energy and Energy Efficiency is expected to be formally approved by SADC Ministers of Energy and become fully operational in 2014.

Regional cooperation. Africa has made great strides in enhancing energy-related regional cooperation through regional power pools and electricity regulators. Although challenges still exist, some of the opportunities are that African countries can share the risk and costs of investment and extend energy access to the rest of the continent from countries with excess generation capacity to countries with chronic deficits. There is also an opportunity to share green energy from countries endowed with renewable energy resources (for example, hydropower from the Democratic Republic of the Congo), evacuated through regional interconnectors to countries with supply deficits or whose energy sources are largely fossil-based, such as Zimbabwe and South Africa. The regional cooperation approach also provides an opportunity for improving intraregional relations and sharing of experiences in project implementation. The regional economic communities can share experiences on the development of the required institutional framework, such as with the Economic Community of West African States Regional Centre for Renewable Energy.

International cooperation. The selected initiatives demonstrate the financial and technical support that African countries can receive to foster inclusive green growth in the energy sector. Africa should align with global and regional initiatives that can avail significant financial and technical resources to promote inclusive green growth in the energy sector, particularly through enhanced energy efficiency, renewable energy and energy access. Typical examples that specifically target

42 Green Fund of South Africa Case Study.

43 The World Bank serves as the interim trustee of the Green Climate Fund, with Songdo, Incheon, Republic of Korea, as the host of the Fund.

44 Green Fund Case Study-South Africa

Africa, or include African countries in their portfolio include the following:

- The Africa-European Union Energy Partnership is a European Union initiative that aims to "Ensure the delivery of improved, affordable, and climate-conscious energy security and access in Africa";

- Lighting Africa is a joint International Finance Corporation and World Bank programme that aims to catalyse and accelerate the development of sustainable markets for affordable, modern, off-grid lighting solutions for low-income households and microenterprises in Africa;

- Power Africa is a multi-stakeholder partnership among the Governments of Ethiopia, Ghana, Kenya, Liberia, Nigeria, the United Republic of Tanzania and the United States of America, as well as the United States and African private sector and the AfDB;

- The SE4ALL initiative supports universal modern energy access to all by 2030 and doubling the global rate of energy efficiency and renewable energy by 2030;

- IRENA, the International Renewable Energy Agency, is an initiative that is providing financial and technical support to countries to develop action plans to enhance renewable energy by establishing investment priorities;

- The Global Alliance for Clean Cook mobilizes high-level national and donor commitments toward the goal of universal adoption of clean cook stoves and fuels; and

- The Global LPG Partnership aims to enable Governments, the private sector and consumers to implement a systemic approach to scale-up access to and use of clean-burning liquefied petroleum gas for cooking in Africa, Asia and Latin America.

7.5 Conclusion and policy recommendations

7.5.1 Conclusion

Amidst the abundance of energy resources, Africa is facing an energy crisis. Existing production capacity has not met the growing energy demand to power and grow the economy, drive local development and tackle poverty. The high cost of electricity generation emanating from the high dependence on fossil fuels for electricity generation, poor energy infrastructure and low investments in the sector, among others, is affecting various facets of economic and social development. Low energy supply and consumption in key sectors of the economy such as agriculture and industry is affecting outputs and growth. The unmet demand for energy has further resulted in high dependence on unsustainably harvested traditional biomass energy in the form of charcoal and firewood as cooking fuels, with associated environmental and health problems. Africa's current energy development and deployment approaches have, therefore, not delivered the desired level of energy services and security – and requires a rethink.

The following all suggest a high potential for inclusive green growth-related practices in the sector: current generation levels, policy initiatives and reforms in improving energy efficiency; deployment of renewable energy; reducing energy intensity; increasing energy access; and social, environmental and cross-cutting, cross-sectoral considerations. While a number of challenges – such as low investments, high up-front costs and low economies of scale – still need to be met, opportunities abound. In particular, Africa's renewable energy potential presents prospects to meet energy-related challenges, create jobs and enhance human welfare. International and regional cooperation, as well as technology development and transfer, also present opportunities Africa could tap to enhance the application and realization of inclusive green growth in the energy sector.

The following policy recommendations are intended to up-scale inclusive green growth in the energy sector of Africa.

7.5.2 Policy recommendations

Unlock the full potential for inclusive green growth in the energy sector. In order to fully realize the inclusive green growth potential in the energy sector, the policy process should start by identifying opportunities in the broad context of inclusive green growth objectives in the energy sector. For example, rather than being just a way of increasing investments and ensuring guaranteed payment for production of sustainable electricity, REFIT can be an effective tool for promoting rural development and tackling poverty, with positive spillover effects on other sectors. Energy programmes such as REFIT, should, to the extent possible, be integrated with national, rural development and poverty reduction strategies to leverage cross-cutting and cross-sectoral linkages.

Institute appropriate energy reforms. Governments should ensure that energy reforms being introduced are to the benefit of all. While policy reforms need to attract and ensure returns on investments, the extent to which they address the energy needs of the whole country, including the energy poor, is crucial. Short-, medium- and long-term costs, potential benefits and social impacts should be analysed and made public. To ensure transparency and accountability, Governments must work closely with all stakeholders in the formulation and implementation of reforms and build the requisite capacities to negotiate with investors. Reforms must also actively seek to level the playing field to allow, for example, renewable energy to compete with fossil fuels, by reviewing existing subsidy regimes.

Adopt and implement appropriate and coherent policies and strategies. To speed up and deepen inclusive green growth in the energy sector, policies aimed at attracting investments should be evidence-based, taking into account all policy options, the country's overall development strategy and energy resource potentials. In the case of REFIT or competitive bidding, for example, some countries have opted for competitive bidding where the priority is building large-scale renewable energy plants. Others have gone for the REFIT option to liberalize electricity production and to reduce demand on the national grid. Countries seeking to stimulate smaller projects have introduced differentiated tariffs, which ensure that smaller installations are also feasible. Policymakers should therefore be clear on where their priorities lie and integrate inclusive green growth principles into policy design and implementation.

Promote regional cooperation to address low economies of scale and investment in the energy sector. To be effective and address the issue of scale and low investments, national energy strategies should, as far as possible, be closely aligned with regional and continental integration initiatives. Regional policies and strategies already developed under the regional economic communities, for example, can create the appropriate institutional framework for propagating and supporting renewable energy/energy efficiency initiatives. Countries should also take advantage of wider regional markets as a means of facilitating linkages and spreading out risks, while providing opportunities for domestic markets and developing capacities gradually. Regional frameworks also provide platforms for knowledge and experience sharing.

Make the most of global energy initiatives. African countries should strategize to benefit optimally from the financial, technological and capacity development resources offered by global initiatives such as SE4All and the Africa-European Union Energy Partnership. Access to such resources and sustainability of programmes/projects will, however, require appropriate actions at political levels and enhanced institutional capacities. Governments will need to create the enabling environment and allocate adequate national resources to

ensure continuity and consolidation of gains beyond international support and projects.

Boost capacities for innovation and technology development. Technology capacity shortages are a binding constraint in enhancing inclusive green growth in the energy sector. Most renewable energy/energy efficiency technologies are imported, at high costs, since local technical expertise for innovation, development and adaptation is limited. Countries should enhance capacities to develop domestic innovation and local manufacturing of technologies. Building necessary skills and capacity requires coordinated support from the private sector, government and donor/international partners. Government support may include creating the right incentives for local markets, as well as establishing and supporting technology training institutes. Local development and manufacturing of technologies should, however, be guided by market surveys and supported by policy and regulatory frameworks. Innovations, research, development and manufacturing capacity could be at the regional level, not necessarily at the country level.

Track success and failures. Many energy policies and projects are faced with the challenge of developing reliable, cost-effective and credible means for measuring their effectiveness. Given the importance of energy for economic growth, structural transformation and poverty eradication, it is crucial that energy projects incorporate a robust framework for measuring progress and success against agreed indicators. Such a framework could also be a means of dissemination of good practices and experiences – institutionalized at AUC/NEPAD, regional economic communities and national levels – with adequate allocation of both financial and human resources.

7.6 References

African Development Bank (2012). African Development Report 2012 – Towards Green Growth in Africa. Tunis.

African Union/New Partnership for Africa's Development (2013). Guidelines for Developing National Sustainable Energy for All Action Plans in Africa. Availablefrom http://www.nepad.org/sites/default/files/SE4All%20African%20SE4ALL%20Guidelines%20Final%20Draft.pdf.

Anuforo, Emeka (2013). Electricity Reforms: A Bumpy Road to Privatising Nigeria's Power Utilities. The Guardian. Nigeria, 25 August.

Economic Commission for Africa (2012). Africa Bioenergy Policy Framework and Guidelines. Addis Ababa.

_____ (2014a). Selected case studies on inclusive green growth in Ethiopia (forthcoming).

_____ (2014b). Selected case studies on inclusive green growth in Ghana (forthcoming).

_____ (2014c). Selected case studies on inclusive green growth in Morocco (forthcoming).

_____ (2014d). Selected case studies on inclusive green growth in South Africa (forthcoming).

Energy Information Administration (IEA) (2013) International Energy Outlook 2013 US DOE

Hermann, AsamiMiketa, Nicolas Fichaux (2014), Estimating the Renewable Energy Potential in Africa, IRENA-KTH working paper, International Renewable Energy Agency, Abu Dhabi.

International Renewable Energy Agency (IRENA) (2011). Prospects for the African Power Sector. Abu Dhabi. Available from http://www.irena.org/

menu/index.aspx?mnu=Subcat&PriMenuID=36&CatID=141&SubcatID=244.

_____ (2012). Renewable Energy Jobs and Access. Abu Dhabi. Available from http://www.irena.org/documentdownloads/publications/renewable_energy_jobs_and_access.pdf.

International Energy Agency (2014). World energy outlook, 2014 Factsheet: Energy in sub-Saharan Africa today

Katsouris, Christina (2011). Africa's oil and gas potential. Chatham House. Available from https://www.chathamhouse.org/sites/files/chathamhouse/public/Research/Africa/161111katsouris.pdf.

Mo Ibrahim Foundation (2013). Ibrahim Forum Facts and Figures – Africa Ahead: The Next 50 Years. Addis Ababa. Available from http://www.moibrahimfoundation.org/downloads/publications/2013/2013-facts-&-figures-an-african-conversation-africa-ahead-the-next-50-years.pdf.

Mukasa, Alli D.; Mutambatsere, Emelly; Arvanitis, Yannis; and Triki, Thouraya (2013), Development of Wind Energy in Africa, Working Paper Series N° 170 African Development Bank, Tunis, Tunisia.

Pasternak, Alan (2000). Global Energy Futures and Human Development: A Framework for Analysis. United States Department of Energy. National Technical Information Service. United States Department of Commerce, 5285 Port Royal Rd., Springfield, VA 22161.

Pearson, Mark and Bo Giersing (2011). Revamping the Regional Railway Systems in Eastern and Southern Africa. RIRN Discussion Paper. Available from http://www.trademarksa.org/publications/revamping-regional-railway-systems-eastern-and-southern-africa-rirn-discussion-paper.

Rolf Derpsch, Theodor Friedrich, Amir Kassam, Li Hongwen. (2010). Current status of adoption of no-till farming in the world and some of its main benefits. Int J Agric&BiolEng Open Access at http://www.ijabe.org Vol. 3 No.1 1.

Stecher, K., A. Brosowski and D. Thrìn (2013). Biomass Potential in Africa. International Renewable Energy Agency. Available from http://www.irena.org/DocumentDownloads/Publications/IRENA-DBFZ_Biomass%20Potential%20in%20Africa.pdf.

United Nations Industrial Development Organization (UNIDO) (2011). Industrial Development Report 2011 Industrial energy efficiency for sustainable wealth creation. UNIDO.

United States Energy Information Statistics (2013). International Energy Statistics (2012),

Van der Wat, Seline (2013). Hydro in Africa: Navigating a Continent of Untapped Potential. Hydro Review Worldwide. Available from http://www.hydroworld.com/articles/print/volume-21/issue-6/articles/african-hydropower/hydro-in-africa-navigating-a-continent.html.

.World Bank (2007). Current and Forthcoming Issues in the South African Electricity Sector. World Bank Policy Research Working Paper 4197, April 2007

World Energy Council (WEC). World Energy Resources: 2013 Survey. World Energy Council, London

8. Industry

8.1 Introduction

Africa's natural resources endowment can propel a commodity-based industrialization and economic structural transformation that could shift the sectoral composition in favour of high-productivity activities, especially manufacturing and modern services (ECA, 2013a&b). Such industrialization can be oriented to promote inclusive green growth that fosters resource use efficiency and ecosystems integrity, creates jobs, generates income and wealth, lifts millions out of poverty and improves human welfare.

Africa is estimated to have about 12 per cent of the world's oil reserves, 42 per cent of its gold reserves, 80 to 90 per cent of its chromium and platinum group metals, and 60 per cent of its agricultural land, as well as vast forest and timber resources (ECA, 2014). Africa's natural resources endowment has accounted for about 35 per cent of the continent's growth since 2000.The average industry sector contribution to GDP from 2005 to 2009 was estimated at 30.6 to 32.5 per cent, of which manufacturing contributed from 12.6 to 14.0 per cent. The services subsector for the period ranged from 51.7 to 56.6 per cent. The high industry contribution to the economies of resource-rich countries was attributed to high commodity prices, and an improved governance and business environment (World Bank, 2013a).

The oil and gas industry subsector is the leading exporter for eight African countries. The subsector's contribution to total merchandise exports was estimated as follows: Gabon, 81 per cent; Sudan, 77 per cent; Nigeria, 70 per cent; Democratic Republic of the Congo, 65 per cent; Algeria, 41 per cent; Cameroon, 37 per cent; Tunisia, 13 per cent; and Egypt, 10 per cent. The non-oil resource-rich economies on the other hand, were principally driven by mineral and metal commodities: gold, copper, platinum, manganese and uranium. Significant mining growth rates reported in 2010 were: Namibia, 924.6 per cent; Malawi (80.2 percent), Ghana (225.2 per cent), Burkina Faso (57.7 per cent), Rwanda (40 per cent) and Uganda (36.7 per cent).[45]Foreign direct investment to Africa increased from $9 billion in 2000 to $62 billion in 2009 and is expected to continue to increase in the near future (World Bank, 2013b). These investments primarily target metals and mining, and oil and gas industries. The trend indicates increased mining and mineral processing activities in Africa during the period from 2005 to 2013, which is projected to increase from 2014 to 2018, transforming Africa from the world's lowest-growing region of the past to one of the world's fastest-growing regions (USGS Minerals Year Book, 2011).

Africa accounted for $54 billion of MVA to global GDP in 2011, representing less than a 1 per cent share and recording a very marginal increase from 1990 to 2011. Eighty per cent of Africa's exports in 2011 were raw materials and semi-processed, compared with 60 per cent in Brazil, 40 per cent in India and 14 per cent in China (AfDB and others, 2013). The raw material-based commodity exports led to a loss of much-needed productive employment, jobs, income generation and shared prosperity that can be achieved through MVA and value chain development. Africa's untapped domestic market, emerging markets in the South and high commodity prices are potential drivers of MVA and value chain development in the industrial sector. The specific MVA identified with global value chains are agribusiness and agro-processing commodities (cocoa, coffee, tea and agro-products); industrial commodities covering textile and clothing; leather; mineral and metal commodities; and energy (oil). Nine country case studies (Algeria, Cameroon, Egypt, Ethiopia, Ghana, Kenya,

45 African Statistical Yearbook /AnnuaireStatistique pour l'Afrique (2012).

Nigeria, South Africa and Zambia) undertaken by ECA showed that countries are making progress in developing local MVA in the hard, soft and energy commodity sectors (ECA, 2013), but efforts are limited.

There is evidence of a correlation between industrialization (represented by MVA), and economic growth that increases productivity, generates income, reduces poverty and provides opportunities for social inclusion. MVA also brings about productive employment (more than agriculture) and improves not only the number of jobs but also their quality in all countries (UNIDO, 2013). This chapter presents trends in inclusive green growth in the industry sector in Africa and showcases good practices that could be up-scaled and out-scaled. It examines challenges and opportunities for enhancing this form of growth for optimal benefits from the sector. Next, it presents conclusions and advances policy recommendations for leveraging the continent's resource endowments for sustainable transformation and development through inclusive green growth.

8.2 Trends in inclusive green growth in the industry sector

8.2.1 Manufacturing value addition of mineral and metal production

The increasing valorization of limestone for clinker production is driving subregional and regional value chain development, supporting the building and construction industry for infrastructure development. The limestone processing, clinker production and cement terminals in Africa are being pursued vigorously by the Nigerian private sector. Similarly, Africa's alumina-aluminium-aluminium metal fabrication MVA in West Africa, Central Africa, and South-East Africa provide lessons for strategically increasing MVA and value chain development to contribute to inclusive green growth. The subsector offers opportunities of technology transfer skills development and on-the-job training, encourages technology adoption and adaptive capacity to increase job creation.

8.2.2 Inclusive green growth in the agro-industry subsector

The Food and Agriculture Organization of the United Nations (FAO) notes that countries with higher growth rates in agriculture perform better in poverty and hunger reduction, as recorded by Algeria, Botswana, the Democratic Republic of the Congo, Equatorial Guinea, Ghana, Liberia, Rwanda, Tunisia and South Africa. ECA's analysis of African agriculture value chain linkages concluded that promoting agriculture and agro-industry as agri-business and manufacturing industry value chain development can greatly enhance job creation, agricultural transformation and broad-based growth on the continent (ECA, 2012).Thus, strengthening agriculture, agribusiness and agro-based MVA and value chains, including market

Box 24: Value chain development and MVA contribution to the mineral and metal industry

Dangote Cement Plc operates three large limestone-clinker processing plants in Nigeria, with combined installed capacity of 20 mineral trioxide aggregate (MTA). The company plans to add 10 Mta by 2014 to meet the emerging national and regional market for cement in the housing and construction sectors. The company has expanded operations into 13 other African countries, including, among others, the Democratic Republic of the Congo, Ethiopia, Gabon, Senegal, South Africa, the United Republic of Tanzania and Zambia. The expansion includes packaging plants in five other African countries. The Dangote Cement MVA is creating more than 3,000 jobs, which hitherto would have been exported overseas through clinker imports by African countries. The operations mainstream inclusive green growth principles through youth empowerment, disaster relief, community welfare, education and health care. Private sector capital and the untapped African

regional market are major driving forces for improving the manufacturing value addition and industry competitiveness of the mineral subsector in Africa.

The Dangote Cement company minimizes the environmental impacts of its operations, from mining to cement production, through:

(a) Utilization of state-of-the-art bag filters at all its plants to ensure minimal dust emissions. Pollution is controlled and addressed through regular monitoring and action plans, and compliance with national and international statutory control guidelines;
(b) Utilization of natural gas to generate most of the captive energy for the plants, reducing gas flaring, and utilization of other fuel options to minimize its dependence on fossil fuels and also reduce emissions of greenhouse gases;
(c) Completely covered raw materials and process conveyors, and covered conveyor belts for limestone, which ensure dust-free manufacturing and minimize vehicle movement;
(d) Utilization of impounded and completely recirculated rainwater around plant areas for cooling, while wastewater is efficiently treated for further use or safe disposal.

For more information on this topic, see http://dangcem.com/index.php?page=65.

In 2005, ECA studied and quantified the benefits of Hillside, Mozal and Bayside operating smelters. The combined capacity of 850,000 tons per year or 4.4 per cent of the world's primary aluminium, utilizes 2,500 MW of power supply. The socioeconomic benefits of the Hillside smelter include the contribution to value added, investment, local purchases, direct and indirect employment, training, fiscal revenues, the balance of payments, training, and social programmes. Specifically, the sector delivered over 7 billion rand in contribution to GDP in 2000, representing 0.9 per cent of total GDP; the creation of 57,355 jobs in 2000, of which 2,750 were direct employment in the smelters; 5,201 backward linkages through outsourcing; 17,397 forward linkages; and 32,007 induced through multiplier effects. The key multiplier effect included 61 per cent of vendors from South Africa and 32 per cent from Richards Bay in the service sector; and 45 accredited small and medium-sized enterprises as vendors through its development programme. Hulamin Limited, South Africa's largest fabricator of aluminium semis, proceeded with a 2.4 billion rand upgrade of its facilities in Pietermaritzburg, largely due to the availability of primary aluminium from Hillside and Bayside, which generated an estimated 31,000 jobs throughout South Africa, largely in aluminium finished products. An amount of 8,346,364 rand was invested in community development activities in 1999.

The Government of Guinea has signed a recent agreement to develop the bauxite-alumina value chain, attracting an estimated $5 billion of foreign direct investment by 2022 to build an alumina refinery with an initial capacity of 2 million tons per year. The project will contribute substantially (an estimated 15 per cent) to Guinea's GDP, driven by industrial demand for the aluminium metal. The value addition will increase the revenue from bauxite by around $19–20 per ton to alumina at US$ 400 per ton. The project would improve infrastructure, building a bauxite export mine to be operational by 2017 in Sangaredi, a mining area in the West of the country. The deal also includes the development of a port by 2017 in Kamsar, a coastal city connected to Sangaredi by railway. The port will be open to other mining and refining projects in the region, as well as to local users. The company is a signatory to the United Nations Global Compact. It entered into a public-private partnership with the United Nations Development Programme (UNDP) in September 2005 in an effort to develop a programme to help integrate inclusive green growth to contribute to the Millennium Develop Goals of the country. The project owner is working with numerous local non-governmental organizations to help provide skills training to enable the local population to take full advantage of the jobs and business opportunities that the refinery will generate. The development plan is expected to create at peak 14,000 direct and indirect jobs. Two new replacement villages are being built from scratch at a cost of $1 million, providing new, modern housing, schools, dispensaries and wells. The project will build a 10,000 ha new town housing development for the 2,000 permanent factory workers and their families.

Disposal of the bauxite residue is a challenging aspect of alumina production due to relatively large volumes, occupying land areas, and the alkalinity of the residue and run-off water. The industry is moving away from storage of the residue in slurry form in lagoons towards dry stacking. Dry stacking allows the residue to be stored in higher piles, using less land and eliminating the risk of flooding adjacent areas. Modern bauxite residue stockpiles are lined with high-density polyethylene liner and enough buffer capacity to manage run-off, avoiding uncontrolled spills and leakages to the environment. The run-off water from the stockpile is either neutralized before discharge, or recycled for the process. Dry stacking allows for better recovery of the caustic liquor entrained in the residue. (See www.hydro.com/upload/Aluminium/Download/Aluminium_environment-and-society.pdf.)

access, will not only increase contribution to GDP and economic growth, but also transform agribusiness to address poverty and hunger effectively, reduce high unemployment rates of women and youth who are predominantly engaged in agriculture, and create wealth and shared prosperity, all of which are pertinent to inclusive green growth.

There are emerging private and public partnerships in the agribusiness, agro-industry and services (including markets) value chain development approaches delivering very successful outcomes in Africa. They include Dangote, Nigeria; East Africa Breweries; and Nestle (UNDP, 2012). These successful value chain approaches are transforming subsistence agriculture to agribusiness, developing effective agro-processing industry and sustainable subregional, regional and international markets. Good practices are presented in box 24.

8.2.3 Emerging national local content policy and legislation

Limited local content and the potential positive impact of extractive industry and manufacturing value chains in Africa have been recognized under the programme Accelerated Industrial Development of Africa (AIDA). Consequently, domestic content agreements with the private sector are endorsed under AIDA to ensure African host countries derive optimum benefits from foreign direct investment and industry supply chains through the maximization of downstream and upstream linkages, participation and shared prosperity. African countries such as Ghana and Nigeria have subsequently enacted local content policy and legislation that mandate first considerations to services provided within the country, goods manufactured in the country (subject to meeting product standards) and employment of qualified

Box 25: Innovative financing and technology transfer integrating inclusive green growth in private and public partnerships in the agribusiness, agro-industry, and services value chain development

Cassava value chain and value addition development and operation in Nigeria, Ghana, and Mozambique

Cassava value chain and value addition development and operations with markets have been established in Nigeria, Ghana and Mozambique for the production of raw material for breweries, flour mills and cassava starch end users. The programme targets emerging markets for substitution of agro-food inputs in the brewery and flour mill sectors. FAO estimates the cassava products market value by 2015 in Nigeria at 350,000 tons of starch, 340,000 tons of flour to replace 35 to 40 per cent of malted barley in the flour mills, and 1.5 million tons of bio-ethanol to meet Nigeria's NAMA to achieve 10 per cent renewable energy penetration in the transport fuel. In Mozambique, the demand is estimated at 40,000 tons per annum and in Ghana 30,000 tons, all for replacement of up to 70 per cent of malted barley for beer production.

The effective mobilization of credits, extension services to smallholder cassava farmers, and mobile agro-industry technology for on-site processing of the cassava tuber is achieving economies of scale and delivers high-capacity utilization of the processing plants. The downstream linkages with stable national, regional and international markets in Europe have also created stable markets and income for the smallholder farmers. The value chain operations are estimated to achieve income generation for 1,500 smallholder farmers in Mozambique, another 1,500 smallholder farmers in Ghana and in excess of 1.5 million jobs in Nigeria (www.dadtco.nl/partnerships).

Fresh fruit value chain and value addition in Ghana, Egypt and South Africa

Fresh fruit value chain and value addition in Ghana, Egypt and South Africa for supply of quality fresh juice and cut fruits is another good example of transforming the fruit industry value chain. Blue Skies was established in Ghana in 1998. The company processes fruits and prepares them into ready-to-eat salads and juices, using a wide range of fruits that include pineapple, mango, passion fruit, papaya and coconut sourced from Ghana, melon and pomegranate from Egypt, melon from South Africa and mango from Brazil. The company has expanded its operation to Egypt, South Africa and Brazil, targeting the emerging markets in regional eco-

nomic communities of Africa, South-South cooperation and Europe (United Kingdom, France and Portugal). The production has grown to 5,354 tons in 2010 with a total market value of 25.771 million pounds, while employment doubled from 1,000 in 2008 to 2,000 people in 2010 in the three African countries and Brazil.

The fresh fruit case also represents African value addition, tapping into global value chains, competing and sustaining international markets through meeting stringent national, regional and international environmental and quality certification standards. The company has 2,000 employees, with 45 to 70 per cent of women in the managerial staff in Ghana, South Africa and Brazil; but less than 1 per cent in Egypt, which is attributed to cultural norms. Significantly, over 90 per cent of the employees are recruited from the local communities and trained to ensure inclusiveness.

Fish processing value addition in Uganda

Greenfields Uganda Limited is among the first companies to set up a fish processing plant in Uganda to contribute to export diversification of the Ugandan economy. The company processes a range of Nile perch and Tilapia for export markets in Europe, the United States of America, South America, Japan, Australia and the Middle East. The company has created up to 150 direct productive jobs sustained by skills development and continuous training of its staff. The company has an aggressive marketing strategy to meet shareholders' interests, ensure sustainability, and reduce employment vulnerability and poverty. It also encourages sustainable fishing and good environmental practices to meet the regulatory requirements.

The export markets, especially in the developed countries, are key drivers of inclusive green growth. The challenges include imposition and enforcement of minimum standards as a prerequisite for market access. The other major challenge to inclusive green growth is weak regulatory and compliance enforcement, leading to illegal fishing activity on Lake Victoria.

The case studies indicate the following: standards required by export markets are important for sustainability of the enterprises; corporate social responsibility is important for integrating inclusive green growth into the industry; a strong regulatory framework is urgently needed to build reputable industries, especially those targeting international markets; out-growers' models spread the benefits to many beneficiaries and allow sharing of know-how and wealth generation. Presently, under the Comprehensive Africa Agriculture Development Programme Pillar 2, GIZ-Kenya is currently collaborating with the Ministry of Agriculture to scale up best practices of eight value chain commodities. The Agribusiness Trade Promotion of the United States Agency for International Development is also developing five value chains commodities in West Africa. The Common Market for Eastern and Southern Africa is developing its agro-food strategic around value chains. The role of value chain champions and facilitating institutions is critical to realizing value chain activities and attracting private investment in the agro-food industry (UNDP, 2012).

nationals. The legislation further requires development of local capacities in the industry value chain through education, skills transfer, expertise development, transfer of technology and know-how. Other countries– including Angola, Niger, South Africa, Uganda and the United Republic of Tanzania – motivated by the initial success of the Nigerian programme, are introducing similar local content legislation to protect and enhance manufacturing value addition, and ensure full participation of nationals in order to expand employment capacity and jobs creation.

Box 26: Application of local content policy

Ghana has promulgated the local content Act 821, 2011 (Act 821) for its oil and gas industry. The Act is intended to maximize the use of local expertise, goods and services in the sector to drive jobs and wealth generation. The Act seeks to enforce the submission of local content plan for approval before commencement of oil and gas activities in the country. The Act mandates 5 per cent equity participation of an indigenous Ghanaian company and ensures development of local capacities in the industry value added chain through education, skills transfer, expertise development, transfer of technology and know-how.

The Nigerian local content legislation, enacted in April 2010, grants first consideration to indigenous companies that demonstrate adequate technical, human resource, and organizational competence and capacity. Prospective operators submit a Nigerian Content Plan to comply with the local content provisions of the Nigerian Content Development (NCD) Act. Three years on, the promulgation and enforcement of the NCD Act, it is observed the NCD has improved the competitiveness of Nigerian companies with their foreign counterparts and, more importantly, has attracted capacity-building support from foreign counterparts and financial institutions. It is reported that the Act has led to the engagement of skilled and unskilled Nigerians, and helped to reduce unemployment and unrest in the Niger Delta State of Nigeria. By 2009, Nigeria had reached 39 per cent compared to Brazil, Malaysia, Norway and the Bolivarian Republic of Venezuela with 45 to 75 per cent (ECA, 2013). The outcome is driving replication in other Africancountries – including Angola, Niger, South Africa, Uganda, and the United Republic of Tanzania – to develop its manufacturing value addition and services sector with upstream, downstream and side-stream linkages.

8.3 Challenges and opportunities

8.3.1 Challenges

Challenges to inclusive green growth in the industry sector are related to low industrial competitiveness. This negatively impacts the realization of inclusive and green growth in the industry sector, thus compromising the potential to generate adequate employment and improve the human development index in Africa.

Low manufacturing value added and share of global value chains in the mineral and metal industry. Cement plants in Africa, except for those in Egypt and Nigeria,[46]are largely grinding plants utilizing imported clinker (semi-finished product). This is despite Africa's abundant limestone deposits. International capital has tended to favour investment in grinding plants rather than the limestone resource-based and value addition. The integrated iron and steel sector remains a major jobs creation industry in developed and major developing economies, including South Africa. Africa accounts for more than 7.6 billion metric tons of high-grade metallurgical bauxite ore, representing 26.1 per cent of global reserves (29 billion metric tons). However, the total African bauxite and aluminium metal production in 2011 represented only 7 per cent of world production.

Unavailability of adequate and reliable electricity generation and supply. Africa is endowed not only with non-energy resource commodities, but also with abundant energy resources. However, the power generation from non-carbon and low-carbon sources is currently inadequate to meet Africa's energy requirements for inclusive green growth in the industry sector. The inadequate power generation has threatened the sustainability of industries such as the aluminium smelters in West and Central Africa, and created job insecurity in Ghana and Cameroon. This presents a risk for harnessing the opportunities of highly productive jobs, income generation and poverty reduction from structural transformation with strong value addition and value chain development in the industry sector.

Low local content limiting downstream and upstream linkages. Limited local content is recognized as a major contributory factor to low MVA and local impact of industry value chain oper-

46 The global cement report, ninth edition, world overview.

ations in Africa. The lack of development of upstream and downstream industry linkages limits the development of local capacities in the industry value chain. Skills transfer, expertise development, transfer of technology and know-how are necessary to create jobs, provide alternative income sources and reduce poverty.The implementation of the emerging local content policy and legislation to address the issue has, however, raised questions of perceived protectionism and nationalization.

Weak enforcement, compliance monitoring and promotion of national environmental legislation and sustainability frameworks. The key drivers of Africa's GDP growth necessary to meet the livelihood needs of its growing population are also the very activities that degrade and deplete natural resources upon which its ecological capital is based. The critical environmental impacts attributed to the industrial sector include air pollution, water pollution with high "biological oxygen demand" loading, agrochemicals, siltation, persistent organic pollutants and mercury. Although environmental legislation exists in most African countries, enforcement and monitoring of compliance to the national environmental legislation and sustainability frameworks are inadequate due to technical and institutional capacity constraints.

Environmental degradation and mercury pollution in artisanal and small-scale mining. Artisanal and small-scale mining (ASM) and mineral processing have largely been practiced by local people who do not have capacities to acquire concessions, or to register and regularize their operations in accordance with countries' mining and environmental regulations. Consequently, they are generally characterized as illegal, making their activities criminal and estranged from any recognition for appropriate environmental management support. The result is forest degradation and loss of biodiversity, soil fertility loss, and contamination and degradation of water quality, with high sediment loading and hazardous mercury deposition

Vulnerability of agricultural productivity and agro-processing manufacturing value chain to climate change impacts. The vulnerability of crops and water resources to climate change impacts will affect productivity of agro-based raw materials, MVA and the value chain. The Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report projects agriculture losses of 2 to 7 per cent of GDP for the Sahel; 2 to 4 per cent for West and Central Africa; and minimum impact losses of 0.4 to 1.3 per cent of GDP for North and Southern Africa (IPCC, 2007). The impact on water resources as well as crop yields will be exacerbated, particularly for rain-fed agriculture practices, with serious consequences for the agro-industry subsector.

Inadequate financing, infrastructure, technology transfer and capacity-building for manufacturing value addition and value chain development. Low investment and productivity, poor infrastructure, lack of funding for agricultural research, inadequate use of yield-enhancing technologies, and unfavourable policy and regulatory environments have been identified by emerging MVA and global value chains as key challenges to regional and global manufacturing value chains development in the agribusiness and agro-processing industry. Other challenges include lack of consistency of supply quantities and low quality of produce to meet the requirements of stable markets of multinational companies, and limited institutional support to provide requisite capacity-building and know-how of sustainable environmental management and social support systems. Poorly funded extension services have also hindered support to women and youth in small-scale industries and smallholder farms to integrate best productivity and environmental practices.

8.3.2 Opportunities

Improving industrial competitiveness to contribute to improved well-being. High industrial competitiveness is generally associated with improved well-being. For instance, the Competitiveness In-

dustrial Performance Index, which is a reflection of MVA growth and share of MVA in exports,[47] is generally positively correlated with the human development index. Therefore, enhancing MVA growth in Africa driven by the current environment of high global demand and commodity prices can absorb the millions of new entrants to the labour force every year to reduce high unemployment, particularly among youth and women.[48] It is estimated that an agricultural growth rate of 6 per cent per year can potentially provide the needed raw materials for MVA in key agro-processing industries (CAMI, 2013), which is considered one of the most relatively developed manufacturing sectors in Africa, and could open up major possibilities for value addition and commodity-based industrialization, but requires large and resource-intensive interventions to expand and upgrade agricultural output (ECA, 2013). Furthermore, Africa should seize the opportunity presented by its commodity boom, the outsourcing of energy and labour-intensive MVA to developing economies by developed countries to mainstream inclusive green growth principles and practices into its industrialization process for an improved Competitiveness Industrial Performance Index and human development index.

Recognition of artisanal small-scale mining as a significant contributor to gross domestic product. ASM is increasingly being perceived as a sector with many beneficial entry points that can advance inclusive green growth. It can create jobs, and generate income and wealth, by enhancing local communities' access to natural capital (assets and resources) and financial capital essential for poverty reduction and socioeconomic development. For instance in the Democratic Republic of the Congo, the mining sector was reported to contribute about 71 per cent of the country's GDP, with 50 per cent from ASM.About 100 million people depend on ASM directly or indirectly for their livelihoods. In Africa, ASM provides a source of livelihoods for many rural communities in 36 African countries (ECA, 2009). It is estimated that, in Africa, up to 31 per cent of industrial minerals, 20 per cent of coal, 12 per cent of metallic minerals, 10 per cent of diamonds and 75 per cent of non-diamond gemstones come from ASM. ASM is also estimated to provide direct employment for between 13 million and 20 million people in at least 55 countries worldwide. It is estimated that 600,000 adults operate ASM in Burkina Faso, 500,000 in Ghana (ISSER, 2012), 550,000 in the United Republic of Tanzania, 30,000 in Zambia and 350,000 in Zimbabwe (Hentschel and others, 2002). The contribution of ASM to GDP and poverty reduction should therefore be leveraged to enhance inclusive green growth in the mining subsector. TheMinamata Convention, adopted in 2013, has provided a critical window for the international community and development partners to formally support the development of national action plans for the recognition, formalization, certification and regulation of ASM, thus enhancing the mainstreaming of inclusive green growth in the ASM sector.

Industrial policies that drive innovation, technology transfer, adaptive capacities, and regional markets. Appropriate industrial policies that drive technology transfer and integrate social and environmental concerns are potentially useful tools to spur inclusive green growth. Green technologiesshould enable clean, resource-efficient and resilient growth. They include technologies needed to reduce pollution and achieve greater resource efficiency in production processes – for instance, the use and reprocessing of tailing dams accumulated over a century of mining due to innovative technologies of gold recovery (adsorption and desorption technologies). The technologies for high carbon-intensive and energy-intensive industries contribute to mitigating climate change through reducing greenhouse gases when low-carbon or zero-carbon energy systems are used. The technologies further integrate inclu-

47 MVA per capita, manufactured exports per capita, share in global MVA, share in global exports, share of MVA in GDP and share of medium- and high-tech component, share of manufactured exports in total exports.

48 The Executive Secretary of ECA, in his speech at the Third Annual Conference on Climate Change and Development in Africa (CCDA-III) in October 2013, reiterated this need.

siveness by addressing the environmental burden of disease and water, forest and biodiversity loss; and support wealth creation through the more productive and sustainable uses of biodiversity such as natural cosmetics, pharmaceutical products.

Integration of existing and emerging national and international sustainability frameworks. The existing performance standards on environment and social sustainability frameworks of the World Bank, Extractive Industry and Transparency International, the United Nations Compact and the implementation of the Equator Principles are key sustainability frameworks that could facilitate the mainstreaming of inclusive green growth. The Equator Principles are a risk assessment management system adopted by financing institutions for deterring, assessing and managing environmental and social risks in project financing (www.equator-principles.com). The Equator Principles Financing Institutions include international banks in Africa, namely the Access Bank (Nigeria), Arab African International Bank (Egypt), BMCE Bank (Morocco), Ecobank Transnational Incorporated (Togo), Fidelity Bank Plc (Nigeria), First Rand Ltd. (South Africa), Nedbank Limited (South Africa), and the Standard Bank of South Africa (South Africa).

The implementation of Equator Principles in the Equator Principles Financing Institutions project financing is judged to have greatly increased the attention and focus on community standards and responsible investment operations, which include standards for indigenous peoples and locally affected communities within project areas of influence, thus mainstreaming sustainability management issues in their business finance to foster inclusive green growth. The existing and emerging opportunity platforms of sustainability frameworks address the environment and social impact challenges in the extractive and manufacturing industry value chain. This has greatly increased the attention and focus on community standards and responsible investment operations, which include standards for indigenous peoples, labour standards and consultations with locally affected communities within project areas of influence.

8.4 Conclusion and policy recommendations

8.4.1 Conclusion

African countries largely continue to export raw materials with low MVA and value chain, resulting in low industrial competitiveness and human well-being. Inclusive green growth presents a unique opportunity to bring multiple and integrated solutions to the numerous challenges facing the African industrial sector. The renewed drive to accelerate the structural transformation of African economies, supported by the various industrial development frameworks and programmes, can provide the much-needed push to increase and sustain productivity, and ensure productive employment, job security, income and wealth generation, and shared prosperity.

In addition to enabling conditions such as a well-functioning market economy, adequate infrastructure and efficient energy systems, African Governments are enacting local content policy and legislation that explore opportunities to drive local investment, develop manufacturing value chains, support the development of an advanced services sector and leverage opportunities for innovation, including upstream, downstream and side-stream linkages. This is expected to increase the participation of local businesses (including small and medium-sized enterprises) and industry associations in the value chain to maximize the social and economic benefits of the industrial sector. The emerging industrial policies on manufacturing value added – complemented by voluntary and mandatory sustainability frameworks of project financing institutions that address the environment and social impact challenges in the extractive industry and manufacturing value chains – have the potential to drive inclusive green growth in the sector.

8.4.2 Policy recommendations

Mainstream inclusive green growth in structural transformation and industrial policies and strategies. Structural transformation and industrial policies and strategies should mainstream inclusive green growth to further expand economic growth potential, craft a low-carbon and resource-efficient development path that creates jobs, generates wealth and income, improves human welfare and reduces inequalities. Countries should ensure effective implementation and scaling up of industrial policy frameworks and action plans.The industrial policies need to strengthen tertiary education institutions, polytechnics, technical and vocational education, training and competence-building to readily meet industry skills requirements and reduce skills mismatch.

Align national industrial development policies with the frameworks of the Conference of African Ministers of Industry. While national industrial development frameworks should be tailored to each country's circumstances, they should also comply with relevant frameworks of theConference of African Ministers of Industry. These include the African Mining Vision, AIDA, and the Accelerated African Agribusiness and Agro-industries Development Initiative, all of which incorporate inclusive green growth and sustainable development principles.

Promote value addition, increase industrial competitiveness and share of global value chains. The expanding African market, increasing South-South trade and high commodity prices provide a favourable environment for manufacturing value addition and value chain development. Countries should develop local capacities in industry value chains such as skills, expertise and know-how. However, enhanced market access and meaningful participation in global value chains require systematic investment and support.. Government support should allow firms to be competitive in "critical success factors" such as price, quality, lead times, dynamic capabilities, marketing and compliance with technical, private, health and environmental standards, as well as global tastes. Governments need to engage in linkages development in the form of a progressive and cumulative process that requires continuous investment in technologies, research and development.

Enhance the adoption and implementation of local content legislation. Local content legislation is proving to be quite effective in ensuring that nationals benefit from the exploitation of resources. However, the negative perceptions associated with such legislation should be dispelled by the National Offices of Industry Advocate. The Offices should, among other interventions, reform procurement policies and practices to integrate sustainable public procurement indicators that consider the benefits of buying locally when assessing the relative value of applications from local businesses, and build the capacity of local businesses to improve the competitiveness of tenders for Government contracts. Such advocacy is expected to pursue the objective of increasing the number and diversity of local businesses securing economic benefit from government contracts, thus increasing local participation, job creation and shared prosperity in the supply chain management.

Align artisanal and small-scale mining operations with relevant development priorities. ASM is increasingly being perceived as a sector with many beneficial entry points that can advance inclusive green growth. The effective implementation of national and international instruments relevant to the mining sector provides an opportunity for inclusive green growth in ASM, especially for women, young people and marginalized communities. Countries should adopt a more flexible strategy and address the environmental and social problems associated with the subsector. Countries should also ratify, domesticate and implement the provisions of the Minamata Convention, particularly the development and implementation of national action plans to address the negative

impacts of mercury on human health, natural resources and the environment.

Implement voluntary and mandatory sustainability frameworks. Countries should subscribe to international sustainability frameworks such as Extractive Industry and Transparency International, the United Nations Compact and the emerging Equator Principles, which could facilitate the mainstreaming of inclusive green growth. Countries should also promote national initiatives aimed at building consensus and setting voluntary standards on responsible production and processing, along with proven management practices for realizing set targets that facilitate industry participation and political buy-in.

Support research and governance mechanisms for industrial innovation and competitiveness. Appropriate industrial policies and governance mechanisms can address the needs for technology transfer and innovation to spur inclusive green growth. African countries (with limited technological capacity) can focus on adopting, adapting and disseminating already-developed inclusive green technologies for developing exports of green products such as organic food and responsibly mined and processed mineral and metal commodities. Hard policies for technology transfer should be supported by "soft" industrial policies that increase the supply of skilled workers, encourage technology adoption and adaptive capacity, and improve regulation and infrastructure. African countries can focus their limited resources on adopting, adapting and disseminating those technologies that have already been developed and demonstrated for global manufacturing value addition and value chains. Such technologies create opportunities for developing green products such as organic food and responsibly mined and processed mineral and metal commodities.

Ensure adequate and reliable electricity generation and supply. There is a need to sustainably exploit Africa's energy resource endowments to drive its quest for structural transformation and industrialization. To that end, African countries should adopt energy-efficient measures to complement the production of green energy. An inclusive green growth approach provides the opportunity to generate an adequate and sustainable supply of clean energy.The implementation of sustainable energy policies, programmes and projects in response to the United Nations Declaration of Sustainable Energy for All by 2030 should drive adequate supply to sustain the development of mining and manufacturing value addition towards higher productivity and growth, jobs and productive employment.

8.5 References

African Development Bank, Development Centre of the Organization for Economic Cooperation and Development, United Nations Development Programme, and the Economic Commission for Africa (2013). African Economic Outlook 2013. Special Theme: Structural Transformation and Natural Resources. Available from http://www.undp.org/content/dam/rba/docs/Reports/African%20Economic%20Outlook%202013%20En.pdf.

Conference of African Ministers of Industry (2013). Accelerating Industrialization for Africa within the Post-2015 Development Agenda. The Twentieth Ordinary Session of the Conference of African Union Ministers of Industry. Report, Meeting of Ministers. AU/TI/ID/CAMI-20/RPT.MIN. 13-14 June. Available from http://ti.au.int/en/sites/default/files/TI10433%20_E%20Original.pdf.

ECA (2009). Mineral Exploitation, Environmental Sustainability and Sustainable Development in EAC, SADC and ECOWAS Regions. African Trade Policy Centre, Work in Progress No. 79.

_____ 2012. Regional Integration: Agricultural Value Chains to Integrate and Transform Agriculture in West Africa. ECA Subregional Office for West Africa. Niamey, Niger.

_____ 2013a. Economic Report on Africa 2013. Making the Most of Africa's Commodities: Industrializing for Growth, Jobs and Economic Transformation. Addis Ababa.

_____ 2013b. Report on International and Intra-African Trade. Eighth Session of the Committee on Trade, Regional Cooperation and Integration. E/ECA/CTRCI/8/3. Addis Ababa.

_____ 2014. Making Natural Resources Work for Inclusive Growth and Sustainable Development in Southern Africa. Twentieth Meeting of the Intergovernmental Committee of Experts of Southern Africa (ICE), 13-14 March 2014. Livingstone, Zambia.

Food and Agriculture Organization of the United Nations (2010). Global Forest Resources Assessment 2010. FAO Forestry Department. Rome.

Hentschel, Thomas, Felix HruschkaandMichael-Priester (2002). Global Report on Artisanal and Small-Scale Mining. Commissioned by the Mining, Minerals and Sustainable Development project of the International Institute for Environment and Development. Available from http://pubs.iied.org/pdfs/G00723.pdf.

Institute of Statistical and Economic Research (2012). The State of the Ghanaian Economy Report, 2012. Legon, Ghana.

Intergovernmental Panel on Climate Change (2007). Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (Core Writing Team, Pachauri, R.K and A. Reisinger, A. (eds.). Geneva.

United Nations Development Programme (2012). The Roles and Opportunities of the Private Sector in Africa's Agro-food Industry. UNDP African Facility for Inclusive Markets. Addis Ababa.

United Nations Industrial Development Organization (2013). Competitive Industrial Performance Report 2012/2013. The Industrial Competitiveness of Nations: Looking back, forging ahead. Vienna.

World Bank (2013a). Africa's Pulse. Vol. 8, October, Washington DC.

World Bank (2013b). The Africa competitiveness report 2013. Washington, DC. Available from http://documents.worldbank.org/curated/en/2013/01/17688638/africa-competitiveness-report-2013.

9. Trade

9.1 Introduction

Trade plays an important role in the world economy and can spur economic growth on the African continent. International trade can expand and diversify the set of production possibilities within economies; and in the context of inclusive green growth, the growing demand for green and eco-friendly goods in the rest of the world could potentially be met by African producers in key sectors, including agriculture, extractives and renewable energy. Since trade reflects preferences of firms and consumers in the world market, the environmental and social outcomes of international trade are a major concern for the green economy. Trade can have a positive environmental impact and can therefore make an important contribution towards sustainable development (UNCTAD, 2010). The increasing environmental and social consciousness of wealthier consumers in developed and emerging economies gives African producers more leverage in demanding a greater share of the revenues from their products sold on the world market and deploying the realized export revenues to infrastructure and social development for improving inclusiveness and equity within the economy.

The General Assembly, in its resolution 66/288 ("The future we want") affirms that "international trade is an engine for development and sustained economic growth, and also reaffirm[s] the critical role that a universal, rules-based, open, non-discriminatory and equitable multilateral trading system, as well as meaningful trade liberalization, can play in stimulating economic growth and development worldwide, thereby benefiting all countries at all stages of development as they advance towards sustainable development". However, in the run-up to the United Nations Conference on Sustainable Development (Rio+20), many developing countries, including those in Africa, expressed concerns about the potential for the green economy transition being used to impose barriers to trade. Indeed, this concern is reflected in their common position for Rio+20, which states "The green economy should not be used as a trade barrier or to impose conditionalities on developing countries". Developing countries, particularly those in Africa, need to be assured of the gains that the green economy could bring through trade. The patterns of trade that Africa engages in must also help the "greening" process, and lead to socio-economical dynamics that are broadly beneficial and promote inclusiveness.

There are a number of important ways in which trade can foster inclusive green growth in Africa. Through trade, countries can expand the goods and services produced, create decent employment opportunities and enhance economic ties with the rest of the world within African economies, so that the growing demand for green and eco-friendly goods in the rest of the world can be met through African producers, across a variety of sectors. The green growth strategies being adopted by African countries could accelerate investment in resource-efficient technologies and new industries, while managing costs and risks to domestic taxpayers, businesses, communities and consumers (GGBP, 2014). African countries can achieve inclusive green growth within a highly globalized and competitive world market by harnessing the abundant natural resources that also provide a broad range of benefits across the various sectors of society. Trade in a green economy will promote production efficiency not just via specialization, but also via resource efficiency, building on economies of scale and enhanced competition.

The range of goods that can satisfy the demands of environmentally-conscious consumers includes both agricultural products and non-agricultural products, ranging from eco-friendly

household goods to clean and renewable forms of energy. Africa has tremendous biophysical potential for producing various feeds, foods and fibres – all of which can fall into the category of "green" and "fair-trade" goods.

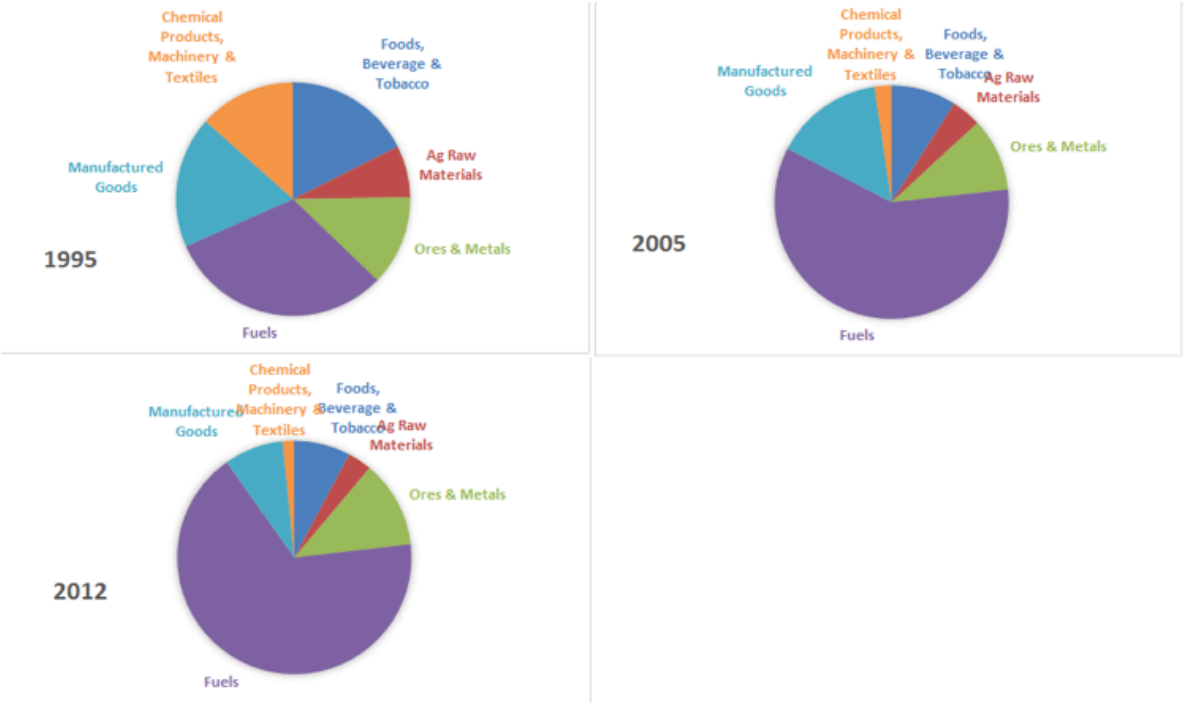
This chapter discusses the role that trade can play in fostering inclusive green growth and the transition towards an inclusive green economy in Africa. It discusses trends in promoting inclusive green growth in selected sectors through trade, while highlighting good practices. It presents challenges and opportunities, and proffers policy recommendations for strengthening the role of trade in driving inclusive green growth and the transition to a green economy.

9.2 Potential for fostering inclusive green growth and the green economy transition through trade

Extractives, particularly fossil fuels, raw ores and metals, dominate Africa's exports to the rest of the world. The composition of African exports shifted very strongly towards fossil fuels between 1995 and 2012 (figure 90). Greening of trade flows in Africa will require significant reduction of material intensities (increase efficiency in resource use) and carbon emissions associated with trade flows. For Africa to achieve inclusive green growth within a highly globalized and competitive world market, it must create a strong comparative advantage in producing goods that are green and provide a broad range of benefits across the various sectors of society.

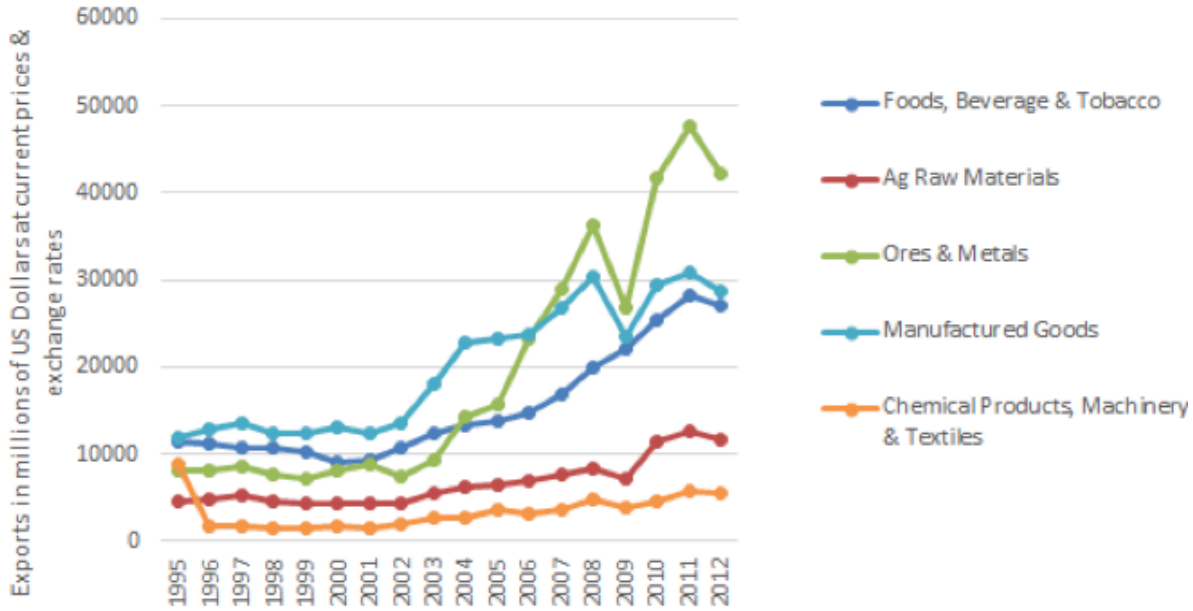
The material intensity of trade is greatest for African countries that rely on extractives for exports. The value of exports in non-fuel commodities from Africa to the rest of the world has grown

Figure 90: Share of African exports to the rest of the world across various categories over time



Source: UNCTADstat, available from unctad.org/en/pages/Statistics.aspx.

Figure 91: Value of exports to the rest of the world for sub-Saharan Africa (minus fuels)



Source: UNCTADstat, available from unctad.org/en/pages/Statistics.aspx.

over time. Ores and metals have also overtaken manufactured goods in terms of export value in recent years (see figure 91). This illustrates the fact that the majority of Africa's trade is heavily biased towards unprocessed raw materials, with little or no value added. Within the context of structural transformation, African countries can benefit from inclusive green growth, and participation in global green production and trade value chains. Trade can stimulate economic diversification, and attract new investments in manufacturing and value addition services. These investments could create decent jobs that are needed for poverty eradication.

Trade in agricultural commodities is also important for most African countries. This is reflected in the pattern of trade by the more advanced economies (such as South Africa and Morocco) and the less advanced ones (such as Malawi, Mozambique and Rwanda). South Africa contributes 72 per cent of Africa's (excluding North Africa's) total export value in machinery and transport equipment, more than half of its export values in manufactured goods and chemical products, and slightly under half of its ores and metals.

Further analysis shows that Africa (excluding North Africa) is a net exporter of raw agricultural products, ores and metals, and fuels to the rest of the world, while remaining a net importer in all other categories. The goods for which Africa remains a net importer are those with greater value addition, in comparison to the semi-finished goods for which Africa has been a significant exporter. The import of capital goods, such as machines and equipment, entails technology transfer, as such goods embody technologies which can then bring productivity benefits and knowledge spillovers in the recipient countries (Glachant, 2013).

The fact that there are significant net imports for some of the basic foods indicates that the agricultural economy, which is the mainstay and key employer of labour in Africa, is underperforming on the whole, and missing an opportunity to generate revenue and wealth for the rural economy, and opportunities for value added in the rest of the economy. Under-performance in agriculture is also an indicator of low productivity and inefficient use of resources – which are the entry points for kick-starting inclusive green growth in mainly resource- and agriculturally-dependent African economies.

While a few African countries trade mineral and petroleum products between themselves, there is also significant trade in consumer goods across African borders. Total intra-African trade reached $130.1 billion in 2011, representing 11.3 per cent of African trade with the world. Intra-African trade as a share of world trade has usually been higher among non-fuel exporters (16.3 per cent from 2007 to 2011) than among fuel exporters (5.7 per cent in the same period) (UNCTAD, 2013). However, the dependence on primary commodities is a major impediment to intraregional trade in Africa. Diversified production and trade away from fuels towards non-fuels, including manufacturing, could provide an impetus to a deepening of regional trade in Africa (UNCTAD, 2012a; UNCTAD, 2013). If supported by a well-organized structural transformation and manufacturing development, and greater economic diversification, inclusive green growth can reinforce developmental gains for Africa, including the gains from boosting intra-African trade.

For categories such as raw agricultural materials, metals and ores, and fuels, Africa as a region exports much more than what it trades among its economies. If Africa is to realize benefits from inclusive green growth, then its pattern of trade (both intra-Africa and with the rest of the world) must also shift. If properly integrated in national development plans, restructuring of trade and investment could significantly reduce externalities associated with trade and raise earnings of local companies with ties to global value chains. However, there must be deliberate policy efforts to identify the drivers of inclusive green growth in Africa. Rather than relying heavily on the export of raw, unprocessed materials with little value added – be they agricultural or mineral/fossil in nature – an inclusive green growth approach would foster conditions in which low-carbon and resource-efficient production patterns could emerge, thereby strengthening the comparative advantage that Africa can exploit through trade. The trade opportunities that can be created from an inclusive green growth strategy must be assessed and actions taken to realize the potential.

9.3 Trends in fostering inclusive green growth through trade

Inclusive green growth is being promoted through sectoral reforms aimed at creating new opportunities for trade in sustainably produced goods and services. Countries are also promoting carbon trading and the direct trade of renewable energy. Examples exist where sectoral reforms lead to the removal of wasteful distortions that allow for a reallocation of resources, resulting in resource-efficient production patterns and more trade. The enhanced trade flows could further reinforce the reallocation of resources, particularly when trade revenues are accessible by the poor – making economic growth broad-based and inclusive.

Sectoral reforms can also spur growth in the economy generally, as costs associated with wasteful resource use are eliminated. This is important for competitiveness in a highly globalized commercial environment. This has been seen to occur in Africa, where a reduction in environmentally harmful and wasteful production practices, improvement of resource management and environmental stewardship, and increase in energy and resource efficiency had positive impacts on the economy. Examples include the adoption of conservation agricultural practices in Zambia, improved forest management in Ethiopia, improved marine resource management in South Africa and Senegal, and reform of energy subsidies in Morocco (table 7).

Table 7: Selected examples of potential for greening growth with trade

Regions	Sector reforms that help to "green" trade	New trade opportunities in eco-goods	Greening growth through trading energy and carbon
Eastern and Southern Africa			
Kenya		Eco-labelling of goods Eco-tourism	Carbon credit trading
Zambia	Conservation agriculture		
Ethiopia	Re-greening highlands	Eco-labelling	
South Africa	Marine fishing sector reforms	Trade in environmental goods Eco-tourism	Carbon credit trading
Mauritius		Greening export-oriented manufacturing	
West and Central Africa			
Burkina Faso	Reforms in cotton sector		
Nigeria		Re-manufacturing	
Democratic Republic of the Congo			Exports of hydropower
North Africa			
Morocco	Removing energy subsidies		Solar energy exports to the European Union

Sources: World Bank 2012; UNEP 2012; Reij and others, 2009.

9.3.1 Trading in renewable energy

Renewable energy is perhaps the second most important sector after agriculture for inclusive green growth and green economy transition in Africa. The global market in low-carbon and energy-efficient technologies, which include renewable energy supply products, is projected to nearly triple, to $2.2 trillion, by 2020 (UNEP, 2013a). The growing market for renewable energy products and carbon credits holds potential for expanding trade in the region. The case of solar energy exports to the European Union region, or that of hydropower and other renewable energy exports within the region, fall into this category. Moroccan renewable energy projects, which encompass the Moroccan Solar Plan and Morocco's Wind Energy and Hydropower Development Project, illustrate how clean energy development could reduce energy costs and turn a country's economy around.

Box 27: Tapping the trade potential in the renewable energy subsector in Morocco

Morocco is the only North African country with no natural oil resources and is the largest energy importer in the region, with about 96 per cent of its energy needs being sourced externally. The country imports most of its electricity from Spain (15 per cent) and Algeria. Spain and Morocco are connected through a 400 kV submarine AC cable that can transfer up to 700 MW. Algeria and Morocco share three connections: a 400 kV circuit overhead line and two 220 kV overhead lines that transport up to 1,400 MW (GDI, 2013).

With electricity demand projected to quadruple by 2030, the country has turned to implementing a number of strategies for the promotion of renewable energy. In 2008, it launched the National Renewable Energy and Energy Efficiency Plan, which aims to develop alternative energy to meet 15 per cent of the country's domestic energy needs and increase the use of energy-saving methods. By 2009, Morocco's energy bill had reached DH 62 billion (approximately US$ 7.3 billion).

As part of the National Renewable Energy and Energy Efficiency Plan, in 2009 Morocco introduced the Solar Plan, one of the world's largest solar energy projects. The project aims at producing energy sustainably using concentrated solar technologies and photovoltaic systems with a total installed output of 2,000 MW by 2020. Morocco's solar projects, along with a string of planned wind farms along its Atlantic coast, is expected to raise renewable energy production to 42 per cent of its total power supply mix by 2020.The solar project is expected to reduce dependence on energy imports and reduce energy costs an estimated $750 million per year (for wind) and $500 million per year (for solar) (ECA, 2014).

In addition, the project is expected to establish an industrial infrastructure for solar technologies so that, over time, Moroccan companies will also be involved in constructing and exporting solar power technologies. Hence, the project includes training and industry-orientated, applied research activities. The project will contribute to preservation of the environment by limiting emissions of greenhouse gases and the fight against climate change. The Solar Plan is estimated to reduce greenhouse gas emissions by 9.1 million tons per year (ECA, 2014).

The target is for Morocco to have 42 per cent of the installed electrical capacity based on renewable sources, including 2 GW of solar energy from five large plants, 2 GW of wind energy and 2 GW of hydropower. The Government has committed $9 billion and the sector is heavily financed by investment loans from multilateral institutions such as the World Bank, the European Union and AfDB. Apart from the expected shift in the energy mix of the country as well as creating business for distribution and bringing the cost of energy down, the investments in the renewable sector are expected to create between 13,000 and 35,000 new jobs, depending on technology deployed, and will transform the country to a net energy exporter (GDI, 2013).

9.3.2 Promoting ecotourism for enhanced trade

A green economy creates trade opportunities for goods and services that embody "green" attributes. Ecotourism in Eastern and Southern Africa provides a niche product that is attractive to many tourists and facilitates trade and tourism revenue that raises the in situ environmental value of the landscape they visit, and strengthens its stewardship. Box 27 provides an example of ecotourism ventures in Eastern Africa.

Box 28: Ecotourism in East Africa

East Africa has demonstrated mixed results as far as sustainable tourism development is concerned. In Kenya, for instance, overdevelopment with attendant negative environmental impacts has predominated in parts of the coast, and despite the importance of wildlife tourism to the national economy, the link between tourism and conservation has often failed to materialize.For example, despite the tremendous economic value of the Maasai Mara National Reserve in Southern Kenya, conservation is struggling, with resident large mammal populations declining as wheat farming in the lands surrounding the Mara increases (Nelson, 2007). This is largely due to the fact that economic benefits from tourism do not sufficiently translate into local incentives to conserve wildlife on private and communal lands.

On the other hand, Laikipia and Samburu Districts, in the central part of Kenya, north of Mount Kenya, give a more positive example of how well-designed tourism investments can lead to major conservation gains. In this area, tourism investments have been structured as jointly owned ventures, in the form of lodges or tented camps, between private investors and the local land-owning communities. More than 400,000 ha of land have been set aside since the late 1990s by local communities for conservation and ecotourism developments in locally-managed "conservancies".[1] Tourism development has been the main rationale for these land-use decisions, and facilitation and leadership from private sector and non-governmental organization actors have played key roles.[2]

In the savannahs of the North of the United Republic of Tanzania, effective models for community-based ecotourism have also emerged as a result of private sector leadership and engagement at the local level, notably the contractual model. This has seen a range of tour operators lease community lands for either permanent lodges or non-permanent campsites in at least two dozen different villages in the northern part of the country, mostly areas near or adjacent to Serengeti and Tarangire National Parks, where community lands offer high-quality tourism products. This contractual model integrates tourism with indigenous pastoralist land-use patterns and provides payments directly to elected village Governments, which are corporate entities capable of entering into contracts and managing financial resources on behalf of their constituent community.

Sources: ECA and others, 2013.

1 A good example of these is the Il Ngwesi Lodge on Il Ngwesi Group Ranch, started in 1996. This model was also applied in the Shompole Lodge on Shompole Group Ranch in southern Kajiado District. For more information on the north-central Kenyan conservancies, refer to the Northern Rangelands Trust website: www.nrt-kenya.org.

2 These include the Laikipia Wildlife Forum and Lewa Wildlife Conservancy. The Kenya Wildlife Service also provided strong support to development of these ventures.

9.3.3 Greening growth through carbon trading

The continent has a comparative advantage for reducing emissions from fossil fuels and can increase trade in renewable and environmentally sustainable energy sources. More than $2 billion has been invested in African carbon projects with projected annual revenue of $1 billion for projects registered by the end of 2012. Most of these projects are in the clean development segment of the carbon market, which is estimated to attract investments valued at $150 billion.[49] Box 28 shows the case of South Africa and Kenya.

49 Available from www.unep.org/climatechange/Portals/5/cop17/docs/Carbon_Markets_and_Afria_Resource_Guide_for_Journalists.pdf.

Box 29: Carbon trading in South Africa and Kenya

South Africa's carbon market was born out of the voluntary commitment the country made at the 2009 United Nations Climate Change Conference to reduce greenhouse gas emissions from projected "business-as-usual scenarios" by 34 per cent in 2020 and 42 per cent in 2025, subject to certain conditions. This was followed by several policy pronouncements, including the Carbon Tax Policy Paper in May 2013. There are currently 111 registered carbon offset projects in South Africa, developed either under the Clean Development Mechanism of the Kyoto Protocol or under one of the voluntary carbon offset market standards (Verified Carbon Standard; Gold Standard; and Climate, Community and Biodiversity Standard). The South African Carbon Tax Policy envisages a domestic-oriented but vibrant carbon market, where carbon credits will be exchanged between projects and tax-liable entities within the scope of the South African carbon tax legislation. It is further expected that a credible trading facility could be appointed to enhance liquidity in the carbon-offset market and enable third-party investment in carbon-offset projects (South Africa Department of National Treasury, 2014).

Although at a small scale compared to the global value of carbon credits,estimated at $176 billion, Kenya is actively developing its carbon markets through various ventures. For instance, the Kenya Agricultural Carbon Project, which involves 60,000 farmers on 45,000 ha, earned the first credits worldwide issued under the sustainable agricultural land management carbon accounting methodology. The credits represent a reduction of 24,788 metric tons of carbon dioxide, which is equivalent to emissions from 5,164 vehicles in a year. The World Bank's BioCarbon Fund will purchase a part of the carbon credits generated by the project by 2017, estimated at $600,000 (World Bank, 2014). Other projects that could earn Kenya carbon credits are the 300 MW Lake Turkana Wind Power project, which is expected to earn K Sh 26 billion from the carbon market over the life of the project; and the 80,000-acre Rukinga forest reserve in South-eastern Kenya which, in addition to carbon credits, is important for conserving the endangered forest area.[1] The Africa Carbon Exchange in Kenya is expected to bridge the gap in terms of providing a trading platform. Unlike the South African carbon market, which is formally legislated and supported by the fiscal policy framework of the country, the Africa Carbon Exchange aims to first open as a futures marketto accumulate its initial capital, and could become a fully-fledged carbon market for the entire region.

1 Available from www.kenyaforestservice.org/index.php?option=com_content&view=article&id=458:forest-carbon-credits&catid=223:hict&Itemid=98.

9.3.4 Promoting inclusive green growth in the agriculture sector through trade

Africa can capitalize on increased awareness of environmental and fair trade issues among consumers to exploit the increasing demand for organically produced food, which can be enhanced through inclusive green growth approaches. Apart from being a prospective niche market, the overall returns for organic products versus conventional farmers has proven to be, in addition to environmentally sound and sustainable, more inclusive in relation to production and process methods, and more economically profitable. What makes Africa a suitable candidate to secure this niche is that significant shares of agricultural land are still under traditional or "alternative" production methods, with little to no use of agrochemicals. Box 29 illustrates how inclusive green growth can open trade opportunities in the agriculture sector while addressing climate change.

Box 30: Promoting inclusive green growth in the agriculture sector in Rwanda through trade

Given the prominence of agriculture in Rwanda's economy, it has made the sector a central part of its green growth strategy. As discussed in its own policy document (Government of Rwanda, 2011), promoting a green growth strategy and building resilience to climate change are synonymous and closely linked in their national policies towards the agricultural sector. The country's strategy is aimed at identifying the exportable agricultural and manufactured products that can best compete in the regional and world markets, and whose productivity can be enhanced by the implementation of technologies and practices geared towards sustainable intensification and the building of climate resilience in small-scale farms (OECD, 2012). A key element of this strategy is the targeting of niche crops that can be marketed under the "organic" and "fair-trade" labels, thereby taking advantage of the premiums placed on products branded for sustainable and pro-farmer practices, on international markets, and attracting the investments needed to make those sectors competitive. Coffee, tea and sugar are included in this strategy, and were targeted in the recognition that they would be subject to increasing environmental stresses from climatic change that might erode their future productivity and competitiveness if not addressed with new investments and better agricultural technologies and practices. Climate-stress effects are already noticeable in the coffee production of its neighbours, such as Kenya, and have served as an incentive for the Government of Rwanda to mobilize resources and policies around this issue. Given the high costs of transportation that Rwanda already faces, as a landlocked country, any efforts to increase productivity and enhance value on international markets is critical to its future as an exporter of high-value products – both to its immediate neighbours, as well as to the rest of the world.

9.4 Challenges and opportunities

9.4.1 Challenges

While trade can be a driver of inclusive green growth, there are some forces that trade can exert on African economies that might undermine or create incentives that go against green economy principles. The interaction between trade and the transition to a greener economy is complex, and at the very least bidirectional, since trade has the potential to facilitate the transition to a green economy and the transition to a green economy has the potential to create new trade opportunities (UNEP, 2013). However, trade can accelerate the depletion of natural resources and contribute to greenhouse gas emissions. The impacts of natural resource depletion will further accelerate in the future, even for resources outside or only partially within the marketplace, such as water, soil, ecosystem services and climate. The quest to promote inclusive green growth should be pursued, taking into account these challenges, some of which are highlighted below.

Trade openness and wage competitiveness. Environmental sustainability measures imposed on trade flows may cause disparity among countries, depending on differences in commitment to implement sustainable development measures. For instance, the Kyoto Protocol raised debates about competitiveness and economic impacts due to disparity in commitments of countries (World Bank, 2007). Countries that are open to trade face pressure to keep production costs low, so as not to lose comparative advantage in a globalized marketplace. Workers would prefer rising wages even if that comes at the risk of losing jobs to more competitive industries abroad. Those who are endowed with the skills to produce green goods for export would receive the highest reward, while those without such skills would be more vulnerable to forces of globalized competition. The challenge therefore is finding the balance between paying a fair wage and staying competitive. Governments should also balance the need to use market mechanisms such as taxes and tradable permit schemes to put a price on pollution or on the over-exploitation of natural resources, and the need to maintain competitiveness of industries (WTO, 2011).

The social ills of "staples trap" and the "resource curse". Some countries in Africa have encountered problems that arise when economic growth is based on a resource boom, such as high inequalities and concentration of wealth that impose economic hardships (and political economic distortions) across a broad section of the population. The "staples trap", or having abundant natural resources, is not a sufficient (or even necessary) condition for achieving greater levels of overall welfare in an economy. The fundamental problem lies in the lack of diversified growth in the economy, such that the employment and earnings generated from the resource are concentrated in a few sectors, or in the hands of a limited share of the population – leading to inequalities and lack of inclusiveness in the overall growth process. The challenge is therefore for African countries to further diversify through value addition in the "staples" sector and to add a dimension of manufactured goods to the export profile and promote inclusive green growth in the process.

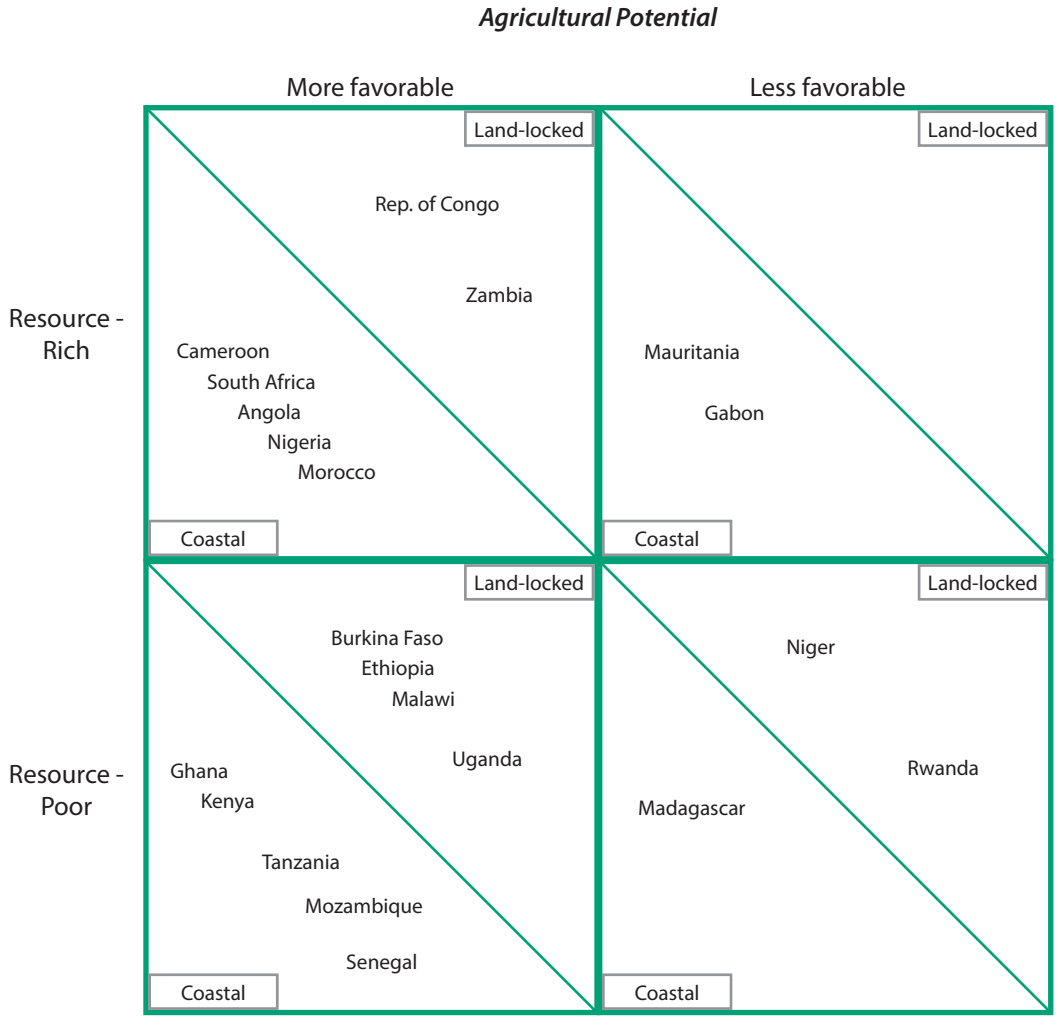
Low productive capacity limiting Africa's engagement in global value chains. The gap in private sector development is obvious in most developing countries. Capital and expertise to grow businesses and address development needs are lacking, linkages with global value chains are weak, and innovation and productivity are low. A dynamic, competitive private sector is needed to spearhead the diversification of the economy in the green economy transition. The private sector contributes to economic growth through job creation and income generation. It can enhance trade with the rest of the world by linking into global value chains, and will be critical in tempering the effects that trade could have on the environment and the economy.

One indicator of the low level of participation of the African private sector in global value chains is the low share of investment in environmental goods and services (EGS), currently dominated by large corporations that control significant shares of the world market. Developing countries were found to be net importers of these EGS – a key challenge being low productive capacity occasioned by, inter alia, low level of technological development. International transfers of green technologies to developing economies have been increasing over recent years, but have remained marginal compared to transfers that have occurred between developed countries (OECD, 2013a).

Systemic challenges for Africa. The diversity of African countries implies that the application of inclusive green growth approaches and practices will not be uniform across countries. African countries can be categorized according to several key characteristics that are relevant to their growth potential – agro-ecological suitability and agricultural potential; resource endowment; and, finally, whether the countries are landlocked or not (see figure 92) (Thorbecke, 2009). These imply that the challenges faced by countries will also differ accordingly. For example, landlocked countries face a special set of challenges in terms of access to world markets and keeping open channels of communication and commerce. The key challenge of maintaining the competitiveness of landlocked African regions on world markets is in improving their infrastructure – as well as that of the neighbouring countries on which they depend (World Bank, 2010).

Some of the countries included in Figure 92 (e.g. Burkina Faso) fall into the category of "resource-poor", which means they do not necessarily face political economy challenges that arise when rents from fossil- and mineral-based resources are captured by the elite to exert influence and leverage – but have a different set of challenges in meeting their national development goals. For these countries, inclusive green growth approaches and practices are particularly important in maintaining the resilience of the natural resource base, given that they lack the bounty of other exploitable resources that resource-rich countries can fall back on as sources of national revenue. For the resource-rich countries, the

Figure 92: Growth typologies of African countries



Note: This is not inclusive of all countries in Africa, but is merely illustrative.

strengthening of institutions, improvement of accountability and discipline in public spending, and the strategic targeting of resource revenues towards efficiency-enhancement and diversification of the economy are critical for overcoming the challenges in achieving inclusive green growth through trade.

Balancing trade policy and inclusive green growth. Protectionism due to infant industry often seems like a tempting argument, particularly for value addition projects yet to attain economies of scale in green sectors. Investors in high-risk industries – for example, unproven green technologies, green products with uncertain market returns, or highly regulated industries – may lobby for trade protectionism, which may contravene World Trade Organization (WTO) rules. African countries will therefore face a dilemma in managing priority investments in inclusive green growth sectors, nurturing the investments to assure returns and the need to have unfettered market access within Africa and the rest of the world.

Government-imposed trade barriers have generally been higher within Africa than in East Asia and Latin America (Rodrik, 1998). African exports face an average applied protection rate of 2.5 per cent outside the continent, compared with 8.7 per cent in the intra-African market. Non-tariff barriers – in the form of price controls, product standards, discriminatory foreign exchange allocation, imposition of quotas, non-automatic licensing, administrative hurdles, excessive and unnecessary

document requirements and unnecessary delays – are also common impediments to trade in Africa (UNCTAD, 2013). Investors will be wary of such institutional impediments to trade and this could further reduce private sector interest in green economy sectors that have significant technical challenges requiring higher capital investments.

9.4.2 Opportunities

Inclusive green growth and the transition to a green economy should provide opportunities for African countries to take control of sustainable economic development and to increase trade with the rest of the world. It should also be an opportunity for African countries to increase trade among themselves and with other developing countries. This is an opportune time for Africa to strategize on how to approach green transformation, with trade focusing on other emerging markets and new products and value chains. Emerging economies such as China, India and Brazil are important for future economic growth compared to the volatile Eurozone market, which has been in near recession over the last five years. By contrast, South-South exports reached US$ 3.5 billion in 2011, or 23 per cent of the value of world trade. As from 2008, developing countries as a whole exported more to the South than to the North (UNEP, 2013).

Strong political support for regional integration. At the African Union Summit, held in Addis Ababa in January 2012, African Heads of State and Government endorsed an Action Plan for Boosting intra-African trade and establishing a Continental Free Trade Area by the indicative date of 2017. In the same vein, the recent political pronouncements by the African Union, such as Agenda 2063, characterize the political commitment that exists to renew and catalyse development and strengthen African regional integration. Agenda 2063 is heralded as a programme of social, economic and political rejuvenation that links the past, present and future. It is expected to be a source of inspiration for development of national and regional sustainable development plans.[50] African countries should therefore take the opportunity to honour their commitment to regional integration with a particular focus on intra-Africa trade, whose main driver remains trade in manufactured products. Sustainability of industrial development strategies will become critical due to the importance of natural resources in African economies, while trade that embodies inclusive green growth remains a major booster for sustainable industrial development generally.

Higher trade returns on sustainably managed natural resources. Inclusive green growth and the transition to a green economy provide an opportunity for African countries to diversify production, and trade and reap higher returns for investment on natural resources. The agriculture sector has the greatest potential to foster inclusive green growth and accelerate the green economy transition in Africa. The sector presents the greatest link with both the environment, due to the nature of production systems, and with the global value chains, due to the strong influence that only a few agriculture commodities have on the world economy and the environment. Sustainable farming methods can increase productivity, facilitate access to international supply chains, and respond to the rising global demand for more sustainable and organic produce.

An opportunity to correct the negative effects of trade on the environment. The multilateral trading system is a transmitter of resource and environmental costs, both directly and indirectly. The direct flows consist of materials embodied in the traded goods that have to be moved around the world and the indirect flows consist of the resources expended in the production and distribution of traded goods (UNCTAD, 2010; UNEP; 2011). Inclusive green growth and the transition bring to the fore the environmental and resource depletion costs of these materials, and could support countries' efforts to better account for the effects of trade on the environment, economy and

50 Available from http://agenda2063.au.int/en/about.

social welfare. Greening the economy is therefore important for correcting the negative impacts of trade on the environment. By targeting the few commodities and in particular, the less than 500 companies that control about 70 per cent of the market for these 15 commodities, sustainable production and consumption patterns can be enforced quite quickly, and benefits spread to the majority that do not really benefit from the value chains in agricultural commodities which they produce (WWF, 2012; OECD, 2013b).

Enhanced benefits from global value chains. Global value chains will continue influencing the linkages with the natural resources sector in Africa and the direction of trade between Africa and the rest of the world. As more and more companies perceive sustainability to be of significant importance to their business and to be vital for future growth, Africa needs to strengthen linkages with global players in order to influence the value of their natural resources. Large corporations and companies are increasingly reporting larger earnings and economic benefits from products that have a better environmental performance over their full life cycle compared to mainstream products (Kamp-Roelands, 2013).

The green economy can be used to modernize agriculture and help countries reap meaningful proceeds from the global market for organic food and beverages, which is projected to grow to $105 billion by 2015, from the total value of $62.9 billion in 2011 (UNEP, 2011).

The role of foreign direct investment. FDI into Africa plays a significant role in influencing trade, and social and environmental outcomes of recipient economies. FDI inflows to Africa grew to US$ 50 billion in 2012, an increase of 5 per cent over the previous year (UNCTAD, 2012b). These inflows are important for other aspects of sustainable development, including technology transfer and capacity development. FDI associated with multinational enterprises is key in the transfer of initially firm-specific technology to their foreign affiliates or partners in joint ventures, and has important knowledge spillover effects in the implementation of projects (Glachant, 2013).

FDI induces more knowledge transfer than trade in goods, for it aims at investing directly in a local subsidiary of the source company or in a joint venture (Glachant, 2013). Capacity development and knowledge spillovers are especially important for new ventures and greenfields that are mushrooming around the continent. These investments are inclusive in that even African investors are actively involved in mobilizing investment funds and implementing projects. There are significant intra-African greenfield investments taking place around natural resource-based activities in the region. African investors represented 7.7 per cent of total announced greenfield projects in Africa in 2012, and there are many significant home-grown investors in many other sectors as well. For the transition to an inclusive green economy in Africa, public sector-led investments in the natural resources sector and other potential green economy sectors would be critical for leveraging private sector investment, particularly in those sectors that have peculiar challenges in attracting private sector participation alone.

Strong support for green projects from multilateral financial institutions and financial markets. As seen from the Moroccan example, financing for large-scale infrastructure with significant economic, environmental and social benefits is relatively accessible from multilateral institutions and from regional development banks. Development finance institutions, and other stakeholders in the region, are beginning to attract long-term financing through green bonds and other innovative instruments, implement financial regulatory reforms, and promote green investment practices. These funds are critical as they also include components of capacity-building to bring new skills, unlock innovation and achieve more sustainable management of resources. In addition, there has been strong Government and private sector collaboration in mobilizing the resources and exper-

tise, but Governments need to increasingly take an innovative leadership role to achieve green growth goals (GGBP, 2013).

A supportive multilateral trading system. WTO offers a powerful supporting framework for sustainable development and a green economy. It provides an enabling environment through its objectives, institutions and monitoring of potential trade protectionism, enforcement mechanism, toolbox of rules, and growing case law that can be related to environmental and renewable energy issues (WTO, 2011). The Doha Round of trade negotiations could be particularly relevant for the green economy transition, as it aims to address issues of concern to developing countries as well as specific environmental and green economy objectives comprehensively, including through the removal of trade barriers and distortions and promotion of green goods and services. However, delays in concluding negotiations on key issues such as trade in environmental goods and services, and some sectoral trade matters, are of grave concern to developing countries.

There is renewed optimism that some of the Doha Round deadlocks could be circumvented by multilateral negotiations such as those launched recently by a group of 14 WTO members including the United States; the European Union; China; Australia; Canada; Costa Rica; Hong Kong, China; Japan; the Republic of Korea; New Zealand; Norway; Singapore; Switzerland; and Taiwan Province of China. The group has formally launched multilateral negotiations aimed at liberalizing trade in environmental goods (ICTSD, 2014). Since these talks are at an early stage, African countries should be encouraged to join, as they could benefit in different ways, including getting technical support, improving their own access to EGS and influencing the agenda at the WTO level.

9.5 Conclusion and policy recommendations

9.5.1 Conclusion

There are several important policy interventions that can promote inclusive green growth in Africa and, depending on a country's openness to trade and global markets, there are important interactions that need to be considered in designing country-level strategies for inclusive green growth. The transition to an inclusive green economy will require a broad set of reforms and institutional innovations to catalyse and nurture sectoral innovations that are consistent with the vision. The extent to which these reforms are carried out will largely determine whether they can encourage trade and openness to global markets without having negative effects upon the environment and societies of Africa. There are challenges and opportunities but, overall, progress towards a greener and more inclusive path of sustainable social and economic development in Africa can be fostered through trade if it is supported by an appropriate combination of policy reforms.

9.5.2 Policy recommendations

African Governments should foster the comparative advantages of Africans producing and exporting sustainably developed products to ensure that trade drives inclusive green growth and the transition to a green economy in Africa. This requires concerted and focused efforts on the part of African Governments to mobilize the investments needed to create the skills and human capital of the workers who produce these goods, as well as the technologies that can produce them more efficiently and sustainably than other international competitors. Building this kind of capacity cannot happen instantaneously, and is a process that must be maintained through targeted and sustained policy actions.

Africa should ensure adequate governance of natural resources to prevent the unsustainable extraction of resources that undermine inclusive green growth efforts. This calls for strengthening institutions, enforcement and monitoring of regulations that protect the environment and natural resources. One of the most important aspects of governance is strengthening property rights, which is key to ensuring equity and inclusiveness in the exploitation and use of natural resources – especially when they are of a common property nature. The strengthening of property rights is particularly pertinent to women, who usually do not have explicit titling of land and rights of access to many of the resources that are crucial to their own livelihood and that of the families that they nurture and support.

Resource-rich countries should consider establishing mineral revenue stabilization funds to improve the stewardship of resource-based revenues. This will help the economy to weather the swings in prices that occur over time, thereby avoiding huge swings in national income as a result of fluctuations in the export earnings of key sectors. Further, countries should adopt transparent means of reinvesting resource rents in human development so that more inclusive development can occur in line with the principles of inclusive green growth.

Countries with favourable agricultural potential should aim at maintaining the natural resource base on which production depends Without maintaining the integrity of their ecosystems and the quality of their natural resource base, these countries will gradually undermine the productivity that is necessary to spur inclusive green growth. In addition, there is need to invest in productivity-enhancing technologies and methods, which can serve to avoid land use conversion and generate employment in a variety of sectors, thereby reinforcing the trends in inclusive green growth.

African Governments should focus not only on attracting more investment funds, but should also deliberately target those investments that will spur inclusive green growth and benefit the transition to a green economy. Integrated trade and industrial policies should be appropriately designed to attract investment in key green growth sectors. Among the criteria for selection of prospective investors should be technological capabilities such as availability of skilled technical personnel, information on available technologies while, as destination countries, Governments must provide social institutions that reduce transaction costs and improve the ability to successfully innovate and absorb foreign technologies.

Africa should further explore opportunities in the carbon market by taking advantage of the huge potential in the renewable energy market. Additionally, the removal of price distortions is critical when implementing fiscal reforms as part of an inclusive green growth strategy. In the case of energy subsidies, the distortion to consumer prices leads to overuse of energy resources and is a disincentive to investors. However, the subsidy removal needs to be handled strategically to avoid resistance and social unrest. Savings made from subsidy removal could be invested in renewable energy and social sectors such as health and education.

There is a need to reduce tariff and non-tariff barriers to further promote intra-Africa trade. This includes improving transport infrastructure to lower transaction costs, improve connectivity to accelerate delivery times while generating carbon savings. Countries must balance the need to maintain competitiveness with the need to manage resources and maintain environmental sustainability. Landlocked countries must prioritize improvements in infrastructure to lower transaction costs, enhance market access and expand the opportunities for inclusive green growth-oriented enterprises to flourish. Investments to improve resource efficiency can contribute to inclusive green growth.

African Governments should recognize and leverage the significant contribution of the private sector to economic growth through innovation, technology transfer and diffusion, and strengthen trade linkages in global value chains to spur inclusive green growth. There is a need to strengthen public-private partnerships in mobilizing resources, identifying and nurturing investments in key green growth sectors, and developing productive capacity to strengthen Africa's engagement in global value chains.

African countries should take advantage of the renewed political commitment towards accelerating regional integration and economic transformation. Agenda 2063, which seeks to refocus attention on regional integration and the developmental aspects of trade, especially intra-Africa trade, is particularly relevant in this regard.

9.6 References

Economic Commission for Africa (2014). Selected case studies on inclusive green growth in Morocco (forthcoming).

Economic Commission for Africa and others (2014). Sustainable Development Report on Africa V (forthcoming).

German Development Institute (2013). Achieving Inclusive Competitiveness in the Emerging Solar Energy Sector in Morocco. German Development Institute Studies. Bonn. Available from http://www.die-gdi.de/en/studies/article/achieving-inclusive-competitiveness-in-the-emerging-solar-energy-sector-in-morocco/.

Glachant, M. (2013). Greening Global Value Chains: Innovation and the International Diffusion of Technologies and Knowledge. Organization for Economic Cooperation and Development. Green Growth Papers, No. 2013/05, OECD Publishing. Paris.

Government of Rwanda (2011). Green growth and climate resilience: National strategy for climate change and low carbon development. Document reflecting a collaborative effort between the Government of Rwanda and the Smith School of Enterprise and Environment. Kigali.

Green Growth Best Practices(2014). Green Growth in Practice: Lessons from Country Experiences. Green Growth Best Practices, Available from www.ggbp.org.

International Centre for Trade and Sustainable Development (2010). "Green Goods" Trade Talks Kick Off in Geneva. Environmental Goods and Services (EGS) Bridges, vol. 18, No. 25. Available from www.ictsd.org/bridges-news/bridges/news/green-goods-trade-talks-kick-off-in-geneva.

Kamp-Roelands, Nancy (2013). Private Sector Initiatives on Measuring and Reporting on Green Growth. Organization for Economic Cooperation and Development Green Growth Papers, No. 2013/06, OECD Publishing. Paris.

Organization for Economic Cooperation and Development (2012). Aid for trade and green growth: State of Play. Agenda item 7 under the joint meeting of the Development Assistance Committee and the Working Party of the Trade Committee on Aid for Trade. COM/DCD/TAD(2012)/REV1. Organization for Economic Cooperation and Development, Paris.

_____ (2013a). What Have We Learned from Attempts to Introduce Green-Growth Policies? Organization for Economic Cooperation and Development Green Growth Papers, No. 2013/02, OECD Publishing. Paris

_____ (2013b). Building Green Global Value Chains: Committed Public-Private Coalitions in Agro-Commodity Markets. Organization for Economic Cooperation and Development Green Growth Papers, No. 2013/03, OECD Publishing. Paris.

Reij, Chris, Gray Tappan and Melinda Smale (2009). Agroenvironmental Transformation in the Sahel: Another Kind of "Green Revolution". International Food Policy Research Institute Discussion Paper 00914. November. Available from www.ifpri.org/sites/default/files/publications/ifpridp00914.pdf.

Rodrik, Dani (1998). Trade Policy and Economic Performance in sub-Saharan Africa. National Bureau of Economic Research Working Paper No. 6562. Available from www.nber.org/papers/w6562.

South Africa Department of National Treasury (2014). Carbon offsets paper. Paper published for public comment. Available from www.treasury.gov.za/public%20comments/CarbonOffsets/2014042901%20-%20Carbon%20Offsets%20Paper.pdf.

Thorbecke, Erik (2009). The anatomy of growth and development in sub-Saharan Africa. Framework paper prepared for the African Economic Research Consortium. Collaborative project on Growth and Poverty, presented at AERC Conference. 20-22 April, Accra.

United Nations Conference on Trade and Development (2010). The green economy: Trade and sustainable development implications. UNCTAD/DITC/TED/2010/2.

_____ (2012a). Economic Development in Africa Report 2012 – Structural Transformation and Sustainable Development in Africa. Sales No. E.12.II.D.10.

_____ (2012b). World Investment Report 2012 – Towards a New Generation of Investment Policies. Sales No. E.12.II.D.3.

_____ 2013. Economic Development in Africa Report 2013 – Intra-African Trade: Unlocking Private Sector Dynamism. Sales No. E.13.II.D.2.

United Nations Environment Programme (2011). Towards the Green Economy: Pathways to Sustainable Development and Poverty Eradication. Nairobi.

_____ (2012). Measuring Progress towards an Inclusive Green Economy. Nairobi.

_____ (2013). Green Economy and Trade – Trends, Challenges and Opportunities. Nairobi. Available from www.unep.org/greeneconomy/GreenEconomyandTrade.

World Bank (2007). International trade and climate change: Economic, legal and institutional perspectives. Poverty and the Environment: Understanding Linkages at the Household Level. Washington, DC. Available from https://openknowledge.worldbank.org/bitstream/handle/10986/6831/41453optmzd0PA101OFFICIAL0USE0ONLY1.pdf?sequence=1.

_____ (2010). Africa's Infrastructure: A Time for Transformation. Foster, Vivien and Cecilia Briceño-Garmendia(eds.). AgenceFrançaise de Développement and the World Bank. Washington DC.

_____ (2012). Inclusive Green Growth: The Pathway to Sustainable Development. Washington DC.

_____ (2014). Kenyans Earn First Ever Carbon Credits From Sustainable Farming. Press release. Available from www.worldbank.org/en/news/press-release/2014/01/21/kenyans-earn-first-ever-carbon-credits-from-sustainable-farming.

World Trade Organization (2011). Harnessing Trade for Sustainable Development and a Green Economy. Geneva.

WWF (2012). Better production for a living planet. Gland, Switzerland.

10. Enabling measures

10.1 Introduction

African Member States, in their common position for the United Nations Conference on Sustainable Development (Rio+20), emphasized that, in order for Africa to benefit from the transition to a green economy, its promotion in the region should be underlined by national development imperatives and the attainment of internationally agreed sustainable development commitments, including the Millennium Development Goals. Member States also stressed that the transition to a green, efficient and inclusive economy in Africa would require increased investments, access to technologies and capacity-building.

During the Africa Regional Implementation Meeting held in 2012, Member States requested ECA and partners to support Africa's sustainable development efforts, including by supporting the development of inclusive green growth policies and strategies in the context of sustainable development and poverty eradication. Countries committed to put in place an enabling environment that would strengthen partnerships with civil society, the private sector and other stakeholders – and enable business and industry – to ensure that green growth would contribute to the overarching goal of poverty eradication. They also called upon the international community "to mobilize additional financial resources to support African countries develop and implement inclusive green growth strategies and plans".

The seventh AUC–ECA joint Conference of Ministers, held in March 2014, called upon AUC, ECA, AfDB and other partners to support African countries in strengthening their capacity to formulate, adopt and implement inclusive green economy policies in the context of accelerating structural transformation in the region. Earlier in 2011, at its fourth annual Joint Meeting, the Ministerial body resolved to spearhead "the transition to a green economy in Africa, by inter alia, supporting the necessary systemic and institutional transformations to ensure that green economies contribute to sustainable development and poverty reduction objectives, including improving welfare and the quality of life of Africa's citizens".

Efforts to make the transition towards an inclusive green economy are, however, still at the early stages, and there is lack of empirical evidence of a successful transition towards an inclusive green economy at an economy-wide scale in Africa and other regions. The dynamic and uncertain process of the transition calls for an assessment of enabling conditions, including governance mechanisms that could spur inclusive green growth in selected sectors of the economy to inform economy-wide transitions in Africa. This chapter outlines selected key enabling measures that could foster inclusive green growth and are relevant to the transition to an inclusive green economy. These include a mix of policy instruments, institutional frameworks, capacity development, financing, and regional and international cooperation. The chapter takes into account the findings, including challenges and opportunities for inclusive green growth discussed in the preceding chapters.

10.2 Assessing the potential for inclusive green growth in Africa

The impetus for addressing development challenges and for driving structural transformation of African economies is presenting new opportunities for Africa's development. Inclusive green growth policies and approaches can contribute to achieving a transformation towards a more diversified, value added, sustainable and equitable economic system. Rigorous assessments of inclusive green growth potential in key sectors should

be undertaken to understand development opportunities and possible trade-offs of different measures across different sectors that are bound to exist due to factors and know-how distribution, and geographical and temporal gaps of intended policies and investments. For this, countries should enhance their analytical capacity to assess the economic efficiency, environmental sustainability and social development impacts of existing sectoral policies.

Existing sectoral policies should be reviewed in light of the need to achieve higher efficiency gains, especially in terms of output increase, resource efficiency, pollution reduction, income generation and job creation. More analysis is also required to understand the environmental determinants of poverty and drivers of inequality. This should take into account equitable access to environmental assets, rights to a clean environment, and resilience to natural disasters and adaptation to climate change. Also pertinent to the economic and social dimensions are value addition and job creation of economic sectors, status and trends in poverty and inequality (urban and rural), demographics and the labour market.

Beyond these sector-focused assessments, cross-sectoral integrated assessments are important to identify key challenges and opportunities from economic, social and environmental aspects that are interconnected. These assessments include both qualitative and quantitative assessments such as macroeconomic modelling, systems dynamic, integrated economic-environment-social analysis, strategic environmental assessments, and ex post empirical and econometric analysis. For example, Kenya's 2014 green economy assessment argues that, under a green economy scenario, real per capita income is expected to double by 2030, which is higher than under the business as usual scenario. The assessment also highlights that green economy investments can produce significant positive returns even in the short term, and could generate positive development impacts across sectors in the economy in the long run.

The South African green economy modelling exercise in 2013 showed the added benefits of green economy investments in the long term, compared to business as usual scenarios, including sustained economic growth, reduction of emission intensity, water stress and reduced energy and water demand. The specific green economy interventions in the South African exercise did not allow the achievement of all the targets set by the Government simultaneously. There are some investment allocations that provided more employment while others were able to reduce emissions more. The modelling exercise in South Africa showed that this experience can be used to test several different investment allocations options.

Across all sectors, understanding the value of natural capital is important to assess the full economic benefits of investing in restoring, managing or conserving environmental assets such as biodiversity and soil, which are critical for the long-term sustainability of economic growth and poverty reduction, especially for nature-dependent sectors such as agriculture and ecotourism. Economic valuations of ecosystems goods and services can be further promoted at the country level to reflect the true value of ecosystems and understand the costs of pollution and ecosystem depletion and degradation for economic growth and people's well-being. It is also essential to look at risks from natural disasters and climate change, and find opportunities to strengthen resilience to these shocks and to mitigate the risks.

Experiences from the United Nations Development Programme (UNDP)-United Nations Environment Programme (UNEP) Poverty Environment Initiative suggest that economic analysis has proven to be a very useful tool to understand the linkages between environmental sustainability and poverty reduction. Types of analyses can include the analysis of the cost of environmental degradation on agricultural production and pub-

lic health, or more specific cost-benefit analysis of sectoral investment options or valuation of ecosystem services. Public expenditure reviews have also proven to be useful to establish a baseline of expenditure, identify financing and investment gaps, and allow tracking expenditures over time. These various tools for diagnostics would need to be tailored to specific national contexts and targeted policy cycles.

The various integrated assessment tools and methodologies could be adapted for the purpose of assessing the economic, social and environmental outcomes of inclusive green growth interventions to inform decisions and actions related to the green economy transition.

10.3 Enabling measures

Inclusive green growth requires an optimal combination of measures to enable growth through increased productivity, value addition and competitiveness; generate social benefits with decent jobs, improved livelihoods and welfare; and enhance natural capital and environmental resilience. Enabling conditions need to be established at the subnational, national, subregional, regional and global levels to maximize positive synergies that can exist between environmental sustainability, human development, equity and economic growth.

10.3.1 Institutional framework for integration, coherence and inclusion

The institutional framework that enables cross-sectoral approaches at the whole of government level, with high-level political commitment, is fundamental to spur inclusive green growth and drive the transition. Policy coherence between different sectoral policies – as well as between economic, fiscal, social and environmental policies – is crucial for achieving resource efficiency and inclusiveness, taking into account issues of gender, climate change, employment creation and innovation. Experiences to date highlight the importance of engaging key development planning and financing bodies, such as ministries of planning and finance, that have the mandate and influence for resource reallocation, expenditure patterns and investment decisions across various sectors, but also ministries of social affairs and other stakeholders in the private sector, such as small and medium-sized enterprises and informal businesses.

Many national, sectoral and subnational policies and strategies relevant to inclusive green growth exist but often fall short of implementation. Inadequate ownership, formulation and financing of those policies and plans result in limited progress in the implementation of existing strategies and policies. Analyses of the constraints in key sectors such as energy indicate the lack of dedicated policies and strategies at the national level. Even when there are already some national and sectoral policies in place, these are yet to be properly prioritized, costed and budgeted for. To ensure adequate budgetary allocation and investments from different sources of funds, priority interventions identified in policies and plans will need to be costed in quantifiable terms with time-bound targets.

The costed interventions should consider both hard elements such as infrastructure and soft elements such as information, institutions, policy reforms and human resources. A few "inclusive green growth scenarios" can be considered, with differentiated assessments of short-, medium- and long-term impacts on households, communities and vulnerable groups. This costing and investment planning will inform budgeting processes and help identify and sequence different sources of funds from public and private, international and domestic financial mechanisms. These prioritized and costed plans should form an integral part of the main national development plans and budgets. There are several examples from African countries, including Ethiopia's Climate Resilient Green

Box 31: The Green Fund in South Africa

The Government of South Africa, through its Department of Environmental Affairs, has made available R 1.1 billion over three years to initiate a Green Fund. The Fund is aimed at facilitating investment in green initiatives to transition South Africa to a greener economy and support socioeconomic development. The establishment of the Fund is a collaboration between the Development Bank of Southern Africa, as the implementing agency, and the Department of Environmental Affairs. In terms of supporting inclusive green growth in the country, the Green Fund is designed to:

(a) Deliver positive environmental, economic and social returns;
(b) Promote innovative and high-impact green programmes through catalytic finance that enables them to scale up and eventually be replicated elsewhere in the country;
(c) Strengthen capacity to mainstream green and climate issues into the South African economy and society;
(d) Build an evidence base of projects to inform future green programmes; and
(e) Attract additional resources through leveraging and blending of resources (financial and otherwise).

Growth strategy, which is costed and prioritized, and Malawi's Climate Change Investment Plan, which has estimated costs in a quantifiable manner. South Africa has established its Green Fund to facilitate investments in green initiatives (box 30).

Another critical element in the institutional framework in Africa is the strengthening of institutional capacity to ensure transparency, inclusiveness and consensus-building between multiple stakeholders. Civil society should be part of this institutional framework to ensure accountability and drive changes of behaviour of consumers and firms. To ensure private sector participation in promoting inclusive green growth and the transition, general interactions and discussion between the Government and the private sector are essential. The private sector should be engaged directly as stakeholders and beneficiaries of the opportunities in the national inclusive green growth strategy.

Local stakeholders and community-based institutions are also important actors in the institutional framework. Multi-stakeholder engagement was considered an essential element of national Rio+20 preparations and the national, subregional and regional reports to Rio+20 show that countries have developed different mechanisms for citizen participation, consultation and information-sharing, but require further strengthening in this area. There are numerous lessons learned from involving stakeholders in the Rio+20 process and sustainable development issues in general. Managing inclusive green growth processes must build on these lessons and strengthen the existing multi-stakeholder consultation and engagement processes. The institutional framework that has been established through various efforts to achieve sustainable development, including Rio+20, should now be consolidated and strengthened to provide a platform for promoting inclusive green growth and driving the transition.

Finally, due to its novelty and highly experimental nature, a successful inclusive green growth strategy will be one that adopts a gradual, incremental approach, and establishes a governance body capable of assessing potential risks and addressing failures before and when they materialize.

10.3.2 Appropriate mix of policy instruments

This section highlights selected policy instruments that are applicable to promote positive synergies among economic growth, social equity and environmental sustainability, and address potential trade-offs. Both market- and non-market-based approaches are required to facilitate cost-effective and equitable growth and transition. They complement each other, and their applicability and appropriateness will depend on national contexts, capacity and circumstances.

Market-based instruments correcting market failures. Market-based mechanisms are critical for correcting market failures that lead to overuse and inefficient use of resources, generation of environmental externalities such as pollution, and disincentives to cleaner and more sustainable technologies and services. Such mechanisms can help mobilize private sector financing for less-polluting, low-emission and climate-resilient investment opportunities, and provide incentives for the innovation and diffusion of clean, low-carbon and pro-poor technologies. Among market-based instruments, instruments influencing prices have proven to be cost-effective in reducing pollution. Taxes put a price on pollution and allow the market to determine the level of pollution. Taxes can be an important source of public revenues to finance inclusive green growth and sustainable development needs. Taxes such as those on commercial fishery in Guinea-Bissau or forestry extraction in Cameroon also serve as disincentives to overextraction of resources.

Instruments targeting quantitiesinclude permit systems that are rights- or quantity-based –designed to control the quantity of the emissions or environmental goods or services, and allow the market to determine the price. These include, for instance, individual transferrable quotas in marine fisheries in South Africa and quota fees in Namibia, which are based on total allowable catches set for all the major species, and form an important part of revenues for the Government. They also serve as incentives for the sustainability of the marine fish resource base and for using local labour. The overall cost-effectiveness of such instruments depends on the administrative costs of implementation and monitoring and compliance costs. The selection of such instruments will also depend on the political acceptability and the social costs and benefits of different measures. Different environmental fiscal instruments are still to be tested in African countries.

Environmental fiscal reforms can potentially increase fiscal revenues through pollution charges or taxes, and reduce fiscal expenditures through the removal of counterproductive subsidies for environmentally unsustainable activities. In particular, fossil fuel subsidies cost a lot to the public revenue, crowding out public spending, and their benefits to poor people are often questionable. These subsidies make innovation and development of cleaner and low-emission energy sources less competitive, reducing the profitability of clean energy services. They also encourage inefficiency and overallocate resources to energy-intensive sectors, leading to the depletion and degradation of finite resources and other environmental externalities such as greenhouse gas emissions. According to the International Monetary Fund (2013) study on global energy subsidies, these amounted to 1.5 per cent of regional GDP and 5.5 per cent of total Government revenues in sub-Saharan Africa.

Reforms of these energy subsidies are necessary for enabling green growth, given their economy-wide impacts beyond the energy sector. But the reform processes are complex and challenging, and can be politically unacceptable in the short term. Case studies of fossil fuel subsidy reforms in several African countries such as Ghana and Senegal show that removal of fossil fuel subsidies calls for extensive consultations with stakeholders in designing and implementing a reform plan. The plan should include the assessment of costs and benefits of the likely effects of their removal, articulation of common objectives, a time frame for implementation, an effective public communications strategy, and a system for monitoring, evaluation and adjustment.

A phased approach can be considered to allow affected stakeholders to adjust and Governments to develop social safety nets to address any negative impacts on poor households. Throughout the reform process, particular attention must be paid to the uneven distribution of costs and benefits of subsidy reform. Low-income households typically spend a large proportion of their incomes on food, water and energy, so the subsidy reform in

these basic services should include measures to compensate the losses and impacts on low-income households. Targeted cash transfers and other mitigation measures, such as skills development in the clean energy sector, can be designed as complementary measures in this regard. Governments will also have to strengthen transparency and accountability to build public trust in their capacity to wisely use the savings from removing energy subsidies for meeting development needs of the country. Reforms of subsidies in the agriculture sector are also important. Subsidies for strategic inputs such as fertilizers should be designed to build markets and target those that lack credit, knowledge and ability to manage risks, and with complementary innovation efforts with an exit strategy, as illustrated in chapter 5. Smart subsidies can also serve as instruments to enhance resilience of the poor to the impacts of natural hazards and climate change, as seen in the case of drought index insurance developed by the Ghana Agricultural Insurance Programme and the R4 Rural Resilience Initiative in Ethiopia.

Cost-reflective tariffsare an important policy instrument to ensure efficient allocation of resources and attract investment in inclusive green growth investments in key sectors. Undistorted and full cost-reflective prices are essential for the efficient functioning of the market. In the energy sector, distorted energy prices cause market distortions and discourage more sustainable and efficient energy investments. The International Energy Agency, in its review of energy policies in 2004, recommends that social policy objectives designed to address the needs of vulnerable and low-income households may be better addressed through direct support to the target population rather than distorted energy prices.

Feed-in tariffs, which are elaborated in chapter 7, are a common policy mechanism globally used to promote renewable power generation. Of the 83 countries that currently have renewable energy policies, at least 50 – both developed and developing – have feed-in tariffs (REN21, 2010). In Africa, a number of countries have renewable energy feed-in tariffs policy. For instance, in Kenya, feed-in tariffs policy provides guaranteed priority purchase to selected firms to generate energy from wind, small hydro, biomass, biogas and solar. It is targeted at promoting the generation of electricity from renewable energy sources by reducing transaction costs and providing investment security and market stability. It is expected that a recently revised feed-in tariffs policy will contribute to enhancing energy supply security in the country and also stimulate the development of renewable energy infrastructure. There are still many challenges to unlock the potential of the feed-in-tariffs policy in Africa. These include lack of data to inform the level of tariffs for different technologies, lack of clear guidelines on power purchase negotiations, limited technical and financial capacity of local stakeholders and lack of an institutional capacity to drive renewable energy development. There are also shortcomings to this instrument, which mainly stem from the fact that the prices are administratively determined, rather than on market competition. It is also difficult to provide incentives for cost reduction.

Payment for ecosystem services (PES) is one market-based approach that has demonstrated its potential for enhancing local livelihoods and ecosystems management. PES schemes establish markets for ecosystem services and provide payments for ecosystem services such as carbon sequestration, watershed protection and biodiversity conservation. PES provides direct economic incentives for better stewardship of environmental resources and can complement indirect means of financing and regulation. Experiences in the application of PES demonstrate that property rights and tenure security and the availability of PES-related information are essential elements for facilitating the successful implementation of PES schemes. In most countries in Africa, there is a critical need for new and additional sources of financing for managing ecosystems goods and services. In this regard, there is a growing interest in PES in the region, but efforts are fragmented,

leading to development of many single isolated projects without a strong link with core national development policy frameworks and budgeting processes.

PES could be one of the innovative financing mechanisms that can drive inclusive green growth in Africa, but its strategic and wider application will require concerted efforts to overcome existing challenges to developing PES. Most pressing challenges include, among others, inadequate legal and regulatory framework, lack of experience and technical and market information, and high transaction costs involved in developing and monitoring PES deals. Another critical point is to make PES work for the poor, ensuring that they have access to buyers for the ecosystem services they provide and have equitable bargaining power and capacity. Reducing Carbon Emissions from Deforestation and Forest Degradation (REDD+) is a type of PES scheme that is emerging as a promising market-based instrument for carbon sequestration services from sustainable forest management in Africa, as evidenced by the "Joint Declaration of Intent on REDD+" to create a viable REDD+ infrastructure in the Congo Basin. The latest global climate negotiations at the nineteenth session of the Conference of the Parties (COP 19)of the United Nations Framework Convention on Climate Change have made progress in establishing the global REDD+ scheme, and African countries will need further technical and financial support to fully benefit from this global instrument.

The review of more than 100 pro-poor environmental finance case studies by UNDP shows that, while financial tools are promising mechanisms to finance pro-poor and inclusive green growth, significant capacity-building is required for any successful financing tools, especially in developing countries. Financing tools – including taxes, fees, loans, subsidies and other market-based mechanisms – require initial capacity-building investments to support accessible financial institutions, strong management structures, proven supply chains and mature markets to provide viable social, environmental and financial returns. Support from non-governmental organizations, development agencies and government are crucial during the early phase. From growing a supply chain to building an environmental trust fund, complex support structures, financial literacy and significant stakeholder buy-in should be established before financial tools are introduced.

Policy measures complementing market-based instruments. Market-based instruments alone are not sufficient to spur inclusive green growth. Complementary instruments are necessary. These include regulations, certification systems, standards, information-based tools, voluntary compliance measures and sustainable public procurement policies. These non-market instruments are required especially when there are information asymmetry, high monitoring and enforcement costs and risk of enforcement failure of market mechanisms, and lack of technical, financial, administrative capacity of market mechanisms.

Regulations are among the main policy instruments required to foster inclusive green growth and the transition to a green economy. The effectiveness of regulatory measures will depend on the existence of transparent, accountable and effective regulatory institutions and compliance mechanisms. However, this needs to take into account the large informal economy, especially in the agriculture and extractives sectors. Many informal sectors will be better regulated and can contribute to more decent jobs and income-generating opportunities for the poor if they are legalized. As elaborated in chapter 8, one of the priority sectors with a predominantly informal economy in Africa is that of artisanal and small-scale mining. This sector often provides the poor with precarious jobs and degrades the ecosystems on which many rural poor communities depend. The artisanal and small-scale mining sector will need to be legalized to ensure adequate capacity development of the sector and environmental management. Overall, regulations in the management of extractive industries need to be urgently de-

veloped and enforced in the context of extractive industries' boom in Africa, in order to prevent the loss of productive land, water pollution and soil contamination from extractive industries.

Local content promotion, through appropriate legislation and regulations, can increase the local proportion of value chains in the manufacturing and industry sectors, facilitate the development of local capacity development, maximize the use of local expertise and resources, and increase the competitiveness of local companies. An increasing number of countries in Africa are applying local content policy, including Ghana, with its local content act for the oil and gas industry, and the Nigerian Content Development Act. Local value addition should also be proactively promoted for goods and services that facilitate more resource efficiency, more decent job creation and economic competitiveness, especially in sectors such as clean energy and sustainable agriculture, fisheries, forestry and land management. This is discussed in more detail in chapter 8.

Another priority area for a stronger regulatory framework in Africa is access to land and property rights, often cited as one of the main constraints to inclusive green growth. This has been highlighted in some of the preceding chapters. Clear rights over a resource also serve as effective incentives to sustainably manage the resource. Especially in the case of agriculture, poor and disadvantaged men and women would be more encouraged to undertake sustainable land management if they have clear property rights. Lack of land tenure systems discourages farmers from investing in their land management and has undermined the potential value of the land. In large land transactions, local communities' land rights risk being easily neglected due to non-transparent processes. Clear property rights would also help address inequality in access to natural resources, including agricultural land, communal lands, forests and fisheries, as well as access to credits, markets and decision-making processes. Low-cost technologies and participatory tools that are now available should be strategically used for improving land governance and property rights in Africa, as demonstrated in the case of Ethiopia.

Sustainable public procurement is another good example of supply-driven incentives for driving innovation and the development and transfer of greener technologies. Government procurement is usually a significant part of public spending and is often higher in developing countries than in developed countries. The magnitude of central Government purchases ranges between 9 and 13 per cent of GDP in Africa. Given its importance in the economies of African countries, public procurement can help create favourable market conditions for more sustainable products and services.

Voluntary approaches can also be applied to facilitate better informed decision-making by consumers and users, for instance in labelling and rating programmes.

Targeted public spending and investment in pro-poor sectors. Targeted public spending and investment in key pro-poor sectors with high inclusive green growth potential can trigger and leverage private investment. Agriculture, fishing and forestry are, for instance, the sectors that the poor depend on heavily for their livelihoods, especially in rural areas. Public support should be provided for technological and social innovations that deliver low-cost products and services that reach the poor and disadvantaged people in essential areas such as agriculture, energy, water and waste management.

Development of the agriculture sector, which employs over 70 per cent of the rural poor in many African countries, is often proven to be a multiplier for poverty reduction, especially rural poverty and food security. Targeting agriculture in a gender-sensitive manner, particularly smallholder women farmers, can allow delivery of services such as access to food, income, security and shelter. Conservation agricultural practices and agroforestry among smallholder farmers have proven

to increase soil productivity and resilience to the impacts of climate variability and change, but the uptake of these practices on a larger scale requires significant financial and technical support. Examples of cotton sector reforms in Burkina Faso, as well as that of conservation agriculture in Zambia, showed the importance of promoting sustainable production practices and revitalizing the growth of the sector in partnership with farmer associations. Particular attention needs to be paid to strengthening local community-based organizations, such as farmer-based organizations. These organizations need external support for resources and organizational and technical capacity development to drive innovations and scale-up sustainable natural resource management practices, while ensuring sustainability through peer-to-peer learning and support systems. Rwanda's green growth strategy is a good example of mobilizing targeted support for developing niche products that can be competitive in global organic or fair trade markets. Another promising case of targeted public spending is the application of a public works approach for environmental activities that generate local employment and improve rural communities' resilience to natural hazards and climate change impacts. These activities include removal of invasive species, soil erosion control, watershed management, weather index insurance and social safety net programmes.

Infrastructure development is another key sector for targeted investment to enable African countries to realize the potential for job creation and income generation from environmentally and socially sustainable consumption and production processes. Beyond large-scale infrastructure for transportation, communication and energy, it is also important to invest in developing infrastructure that provides services to poor and excluded populations, for instance, decentralized energy services using renewable sources of energy and more efficient fuel technologies and micro-irrigation infrastructure that can help smallholder farmers improve productivity, and raise incomes through crop yield increase and efficient use of water.

More direct public support through targeted public investment and spending in pro-poor green innovation and technology development is another powerful policy measure. The need for up-front investment for enabling green growth is different from the conventional model of development in most developing countries, where innovation comes at later stages of economic development. Green growth requires intensive investment in initial innovation and deployment of green technologies. Twenty-six per cent of international green growth innovation initiatives in developing countries target sub-Saharan Africa, but actual green growth innovation activities and the absolute levels of investment remain low in the region (Hultman and others, 2012). Currently, investment in R&D remains critically low in Africa, and should be increased.

It is also important that Africa not depend solely on imported technology, but strengthen local innovation capacity to apply research and technology, adopt evidence-based approaches more systematically, and produce marketable products and services locally. Education and training programmes need to emphasize development of technical skills. Direct and indirect public support for education and skills training targeting poor and disadvantaged people will be important to enable them to benefit from and contribute to inclusive green growth and the transition to a green economy. National systems of innovation need to be established and strengthened, and their coordination ensured. Further, at the regional and country levels, a mechanism is needed to track proven technologies and solutions that facilitate the transition towards inclusive green growth.

As for sustainable agriculture development, the low level of agricultural R&D is one of the key challenges for Africa, together with underinvestment in an enabling environment such as infrastructure development and adequate policy frameworks.

Africa needs massive investment and sustained funding for agricultural R&D. Agricultural R&D is inherently long-term and is often fragmented and isolated without clear links to market development. African countries should further accelerate the current positive upward trend, prioritize investment in agricultural R&D and ensure sustained funding, and strengthen regional and international cooperation, to overcome fragmented and typically small research efforts. Furthermore, green revolution experiences in Asia show that technology is important, but only when it is supported by enabling policies, institutions and infrastructure development.

The use of information and communications technology for increasing access to financial and other development services for the poor – such as credit and insurance services for climate-smart agricultural practices – is another important area for targeted public investment. Mobile financial services for the poor have high growth potential in emerging markets of Africa. However, for this to be scaled-up at the level required to drive sectoral transformations, initial targeted public investment is required to help reduce and mitigate the risks through support for market analysis and capacity development.

Social protection is an important policy measure in managing distributional impacts and reaching the poorest and most vulnerable. Social protection can support workers, enterprises and communities in their efforts to seize the opportunities offered by an inclusive green growth approach or the transition by providing access to training and education in new green business skills and sustainable livelihood options. The United Nations Social Protection Floor initiative could provide an overall framework for the design of more targeted social protection measures that improve geographical and financial access to essential services and provide minimum income security and access to essential services through a basic set of social transfers in cash or in kind. All-inclusive green growth-related mechanisms should incorporate social safeguards to protect and promote the interests of the poor as well as gender equity to strengthen women's property rights, access to capital and finance, and their participation in economic and investment decision-making processes.

However, non-market instruments can also have distributional impacts on different groups of populations. Standards may make it difficult for domestic small and medium-sized firms to get market access. Regulations and standards should be used considering any potential negative impacts on poor and disadvantaged groups. It is also important to note that behavioural changes from consumers and firms are not only affected by prices, but also by social norms and cultural values.

10.3.3 Capacity development

The need for and importance of capacity development at the individual, organizational and enabling environment levels in order to enable inclusive green growth and ensure an effective transition is recognized at the international, regional and national levels (General Assembly resolution 66/288 ("The future we want"); ECA, AUC, AfDB, 2013). Capacity development is necessary to enhance awareness, understanding and behavioural change. The development of employable skills in the green jobs labour market also requires investments in effective capacity development. Capacity development should support effective policy formulation, planning and implementation, technology innovation and transfer, as well as green financing, investment and trade. In addition, capacity development plays an important role in strengthening the overall policy, legislative and social norms environment within which individuals, organizations and institutions operate at national, subregional and regional levels.

In order to foster inclusive green growth and drive the transition, countries in the region such as Ethiopia, Mozambique, Rwanda, and South Africa have identified some capacity-building areas as

part of their inclusive green growth/economy strategies or plans (Government of Ethiopia, 2011; Government of Mozambique, 2012; Government of Rwanda, 2011; Government of South Africa, 2011). One of the challenges is to ensure that capacity development strategies and plans are comprehensive and enhance implementation. This challenge is linked to the huge financial implication of developing and implementing such plans.

The number of initiatives that are providing capacity development support, particularly at the international level, is growing. Such initiatives include platforms and forums; partnerships; programmes; and funds, facilities and mechanisms (United Nations Division for Sustainable Development, 2013). Examples of such initiative include the UNEP Green Economy Initiative, the Partnership for Action on Green Economy, and the Green Growth Knowledge Platform. Many of these target their services at developing countries and thus present a huge opportunity for addressing some of the capacity development needs of African countries. The multiplicity of these initiatives, however, calls for enhancing synergy and ensuring coordination of efforts.

Enhancing and scaling-up capacity development in the region will require strengthening in-house capacity at the national and regional levels to tailor and deliver capacity development that responds to the specificities at these levels. This underlines the importance of operationalizing the African Green Economy Partnership, which is aimed at facilitating synergy and cooperation on support to African countries, furthering their inclusive green growth/economy objectives.

10.3.4 International and regional cooperation

While it is important to establish appropriate institutional mechanisms and policy instruments at the national level, international coordination and cooperation are necessary to complement domestic efforts. This international dimension is especially critical for addressing the international inequities observed between developing and developed countries, for instance, in terms of greenhouse gases accumulated, causing additional development burdens to developing countries in Africa. International cooperation is essential to allow African countries to invest in environmental sustainability while pursuing their development rights to grow in a rapid and sustainable manner. The need for international cooperation is pressing for investing in climate change, conservation of biodiversity and ecosystems that have global benefits beyond African countries' national borders. The international dimension of inclusive green growth is also fundamental, given the central role of technological innovation fostering this type of growth and in the transition that will inevitably be driven by global market forces and international public policies and investments.

Interconnectedness of changes and measures that are required in the transition process is another important international dimension. For instance, domestic businesses may lose competitiveness compared to other countries without similar measures and standards of other countries and regions. Many social and environmental challenges that should be addressed for green growth/economy, including climate change, require strong international and regional cooperation to reduce leakage effects and to promote national actions that can contribute to global benefits.

Coordinated and targeted financing efforts at the regional and international levels are required for Africa to meet the up-front transition costs in a changing climate. International financial mechanisms will need to be strengthened, with priority given to the poorest and most vulnerable among developing countries, and with allocation of resources to public goods that are critical for facilitating inclusive green growth and the transition. Adequate financial resources are needed to foster inclusive green growth in key strategic sectors in Africa. Global financing mechanisms should generate synergies with domestic efforts and facilitate

access to green technology and knowledge as a global public good, while considering intellectual property rights. There is need to address fragmentation in international funding mechanisms towards sustainable development, and for greater commitment in fulfilling funding pledges to developing countries.

The scale of the financial challenge required to increase the resilience of African countries to climate-related risks and to leapfrog to low-emission and resource-efficient development is huge. Despite increasing international investment in clean energy, many African countries have not been able to benefit from this investment. In 2010, over 90 per cent of clean energy investments went to Group of 20 (G-20) countries. A recent report by UNEP on the Africa Adaptation Gap estimates that climate adaptation costs due to past emissions will be between $7 billion and $15 billion annually by 2020. Without aggressive climate mitigation efforts, the present emissions trends and policies are projected to lead to warming of 3.5 to 4 degrees Celsius by 2100 and, in this scenario, the costs for climate adaptation are estimated to reach up to $50 billion per year by 2050. Yet, the current global climate finance regime has not matched Africa's financing needs.

Given the large scale of investment required for the transition and climate change in the coming decades, limited public funds should be used in a well-targeted manner to direct private investment flows to inclusive green growth initiatives and to drive the transition in Africa. Experiences from "fast-start financing" in the framework of the global climate change negotiations and clean energy investment provide valuable lessons for shaping long-term, predictable, sustained financing mechanisms for inclusive green growth. Various financing sources, including domestic public and private funds and international concessionary, grants and guarantees for de-risking can be blended and channelled through adequate national, regional and international mechanisms. Africa's domestic revenues – especially from the extractive industries, which have the potential to transform economies – will need to be considered when blending mechanisms in the areas of climate change, clean energy and other green growth-related sectors, to maximize adequate financing flows to Africa in a resource-constrained global economy. There is also a need to strengthen the domestic resource mobilization from fiscal sources, and this should be undertaken to strengthen the whole tax administration system to eliminate leakages and inefficiencies in the existing taxes.

It is also important to recognize that the capacity of countries to access and absorb available resources varies greatly across countries. International technical and financial support should be delivered to African countries to help them strengthen their national systems of financing and be ready to access, absorb and manage climate and green growth-related finance effectively. The support of UNDP to climate finance readiness is an example of how the international community can assist developing countries in Africa to strengthen the institutional, policy and technical systems and skills to be ready to manage climate finance effectively alongside the country's own public expenditure management and budgeting systems. The United Nations Secretary-General's Sustainable Energy for All Imitative is also an example of coordinated efforts at the global, regional and national levels, for achieving the common targets on energy access, energy efficiency and renewable energy among multilateral financial institutions, United Nations agencies, bilateral donors, civil society and the private sector.

International support and financing is critically needed for the development and diffusion of technology and innovation. Technological innovation is one of the most important elements of transition to inclusive green growth. International and regional cooperation can stimulate and promote the transfer of existing and emerging technologies through collaboration with the private sector and public institutions, as well as via North–South, South–South, and triangular cooperation

opportunities. While it is important to strengthen intellectual property rights as incentives for developing new and innovative technologies, African countries need the international community's support to have access to new technologies and innovative approaches through stronger collaboration on science, technology and innovation, leveraging intellectual property rights.

As chapter 9 highlighted, international and intraregional trade have the potential to spur inclusive green growth and drive the transition, if the adequate enabling environment is established for African countries to benefit equitably from global and regional trade. The international trade regime must ensure that the inclusive green growth approach and the transition will not be used to impose trade barriers or conditionalities. African countries need to strengthen their regulatory framework and governance system, as well as innovative financial mechanisms, such as a mineral revenue stabilization fund, to reduce their vulnerability to trade-mediated influences in market prices and trade-related shocks and price volatilities. It is important to avoid intensification of the exploitation of Africa's abundant natural resources and low-cost labour without much value addition. Human capital needs to be enhanced through public support for re-skilling and re-tooling so African economies can have comparative advantages for higher value addition and benefit from increased trade, and diversify beyond a few growth sectors. At the continental level, regional and subregional policy frameworks should be reviewed and strengthened to redirect foreign direct investment flows from outside, to Africa and within Africa, to greener growth areas, including in the areas of agriculture, ecotourism, clean energy and clean technologies and production.

There are critical knowledge gaps concerning many aspects of inclusive green growth and the transition, ranging from the design of strategies to the development and diffusion of the most cost-effective and locally appropriate green technologies. Inclusive green growth planning is based on robust and integrated scientific, institutional, financial and socioeconomic assessments. However, many countries face critical challenges in terms of scientific data and analytical capacity as well as in planning, financing, implementation and evaluation. The international community can support capacity development initiatives in developing countries for pro-poor green growth planning and implementation,in partnership with the United Nations system and other international and regional development partners and centres of excellence. International cooperation should also focus on enhancing linkages and interactions between national inclusive green growth planning efforts and international processes linked to broader climate and environmental policy, finance and trade regimes.

Another important area for international cooperation is a common framework for measuring progress on sustainable development. The limitations of measuring progress and prosperity by relying solely on economic indicators such as gross national product are globally recognized. There are international initiatives that support alternative measurement of growth and development such as the Wealth Accounting and Valuation of Ecosystem Services, Integrated Environmental and Economic Accounting, and human development index. A number of countries in Africa have also initiated efforts to develop alternative measurement frameworks, as evidenced by the Gaborone Declaration of the Summit for Sustainability in Africa in 2012. The Gaborone Declaration demonstrates African countries' commitment to integrating the value of natural capital into national accounting and corporate planning and reporting processes, policies and programmes. These global and regional initiatives need to be built into a new measurement framework that can capture sustainable development in all its dimensions, and help ensure that environmental imperatives and human well-being are no longer depicted as trade-offs to short-term economic growth.

The discussions on the Sustainable Development Goals in the context of Rio+20 and the post-2015 framework can also accelerate movement away from GDP as our main measure of progress, and encourage the search for an alternative framework that better captures the three dimensions of sustainable development. At the regional level, Africa should use its own mechanisms, such as the Sustainable Development Indicator Framework for Africa, supported by ECA and partners, the African Peer Review Mechanism and the emerging monitoring and evaluation framework for the African Union Agenda 2063. These regional level standards and benchmarks may help establish a clearer common understanding of sustainability criteria, and enable a cross-country and subregional comparison for advancing the transition and sustainable development in the region.

Finally, stronger and more effective regional cooperation is necessary for driving the transition and sustainable development in Africa. Currently, African countries are often losing the opportunities for cost savings due to lack of effective regional cooperation and dedicated institutional frameworks through which they can pool regional resources and risks, and implement regional investment initiatives related to inclusive green growth and the transition. The Africa Economic Conference of 2013 highlighted the need for deepening regional integration, including investments in regional infrastructure, trade and labour mobility, as well as in harmonizing regulations and standards for effective management of shared natural resources for sustainable poverty reduction and structural economic transformation. Africa has a lot to gain from deeper regional integration by jointly investing in regional infrastructure, managing climate-related risks and cross-border environmental infrastructures such as river basins and protected areas. Regional trade bodies and groupings have an important role in facilitating the flow of goods and services that contribute to more sustainable production and consumption processes such as renewable energy infrastructure development and trade within Africa.

In addition to regional cooperation in Africa, South–South cooperation is a framework for collaboration to drive investment and trade flows into pro-poor greener goods and services. For instance, South-South investment from the BRICS countries (Brazil, Russian Federation, India, China and South Africa) is becoming an engine of growth for private capital flows to sub-Saharan Africa. While most foreign direct investment to sub-Saharan Africa still originates from Organization for Economic Cooperation and Development countries, BRICS countries over the years have increased their presence in the region, with a potential for an advantageous mutually beneficial relationship and an alternative form of financing.

10.4 References

African Development Bank (AfDB), the OECD, the UN and the World Bank (2012), A Toolkit of Policy Options to Support Inclusive Green Growth, Submission to the G20 Development Working Group.

African Development Bank (AfDB) (2013), Special Feature Article on: Facilitating Green Growth in Africa: Perspectives from the African Development Bank

AfDB and WWF (2012), Africa Ecological Footprint Report

African Development Bank (AfDB) and Global Financial Integrity (GFI) (2013), Illicit Financial Flows and the Problem of Net Resource Transfers from Africa: 1980-2009

AMCEN (2012), Arusha Declaration by the African Ministerial Conference on the Environment on Africa's Post Rio+20 Strategy for Sustainable Development

Bhorat, Haroon. Foresight Africa: Top Priorities for the Continent in 2014. Washington, D.C.: Africa Growth Initiative at Brookings, 2014. Print.

CDKN (2013), Drivers and challenges for climate compatible development

Charles W Stahl and Fred Arnold (1986), 'Overseas Workers' Remittances in Asian Development', International Migration Review, XX (4), Winter, 899-925

Climate change 2013: the physical science basis: working group I contribution to the fifth assessment report of the Intergovernmental Panel on Climate Change. Cambridge, U.K: Cambridge University Press, 2014. Print.

Danielle Resnick, Finn Tarp, and James Thurlow. (2012), The Political Economy of Green Growth: Illustrations from Southern Africa, UNU-Wider Working Paper

De Serres, A., F. Murtin and G. Nicoletti.(2010). "A Framework for Assessing Green Growth Policies", OECD Economics Department Working Papers, No. 774, OECD Publishing.

ECA (2011), A Green Economy in the Context of Sustainable Development and Poverty Eradication: What are the Implications for Africa.

ECA, 2013.Outcome document of the Africa Regional Implementation Meeting for the Post-Rio+20 follow-up processes.

Federal Democratic Republic Of Ethiopia (FRDE) (2011).Ethiopia's Climate-Resilient Green Economy strategy.

FAO 2002, Information on fisheries management in Namibia, www.fao.org

GIZ (2013), Green Economy in Sub-Saharan Africa, Lessons from Benin, Ethiopia, Ghana, Namibia and Nigeria.

IISD (2010), Strategies for Reforming Fossil-Fuel Subsidies: Practical lessons from Ghana, France and Senegal.

IMF (2013), Energy subsidy reform: lessons and implications.

Isabel Ortiz & Matthew Cummins, 2011."Global Inequality: Beyond the Bottom Billion—A Rapid Review of Income Distribution in 141 Countries," Working papers 1102, UNICEF, Division of Policy and Strategy.

KoenRademaekers, Jeroen van der Laan, Matthew Smith, Christina van Breugel, Hector Pollitt. (2011), The role of market-based instruments in achieving a resource efficient economy, Ecofys.

Mark Huberty, HuanGao, and Juliana Mandell with John Zysman. (2011). SHAPING THE GREEN GROWTH ECONOMY, The Berkeley Roundtable on the International Economy.

Michael Jacobs. 2012. Green Growth: Economic Theory and Political Discourse, Centre for Climate Change Economics and Policy Working Paper No. 108, Grantham Research Institute on Climate Change and the Environment Working Paper No. 92.

Mozambique Government, 2012.Towards a Green Economy. Roadmap for a Green Economy in Mozambique: accelerating sustainable economic, social, and environmental development

OECD (2013), Green Growth Papers, What have we learned from attempts to introduce green-growth policies.

OECD (2012), Development at a glance, statistics by region, Africa.

OECD (2005), Environmental Fiscal Reform for poverty reduction

Ratha, Dilip, and Sonia Plaza.""Finance & Development, September 2011 - Harnessing Diasporas."" IMF -- International Monetary Fund Home Page. Web. 28 Nov. 2011. <http://www.imf.org/external/pubs/ft/fandd/2011/09/ratha.htm>.

Republic of Rwanda (2011), Green Growth and Climate Resilience, National Strategy for Climate Change and Low Carbon Development.

South Africa Government, 2011.New Growth Accord 4. Green Economy Accord

Stiglitz, Joseph E. (2006): Making Globalization Work. New York and London: Norton.

The Berkeley Roundtable on the International Economy (2011), Shaping the green growth economy.

The Brookings Institute (2012), Green Growth Innovation: New Pathways for International Cooperation.

The Katoomba Group, Forest Trend (2011), Creating new values for Africa: Emerging ecosystem service markets.

The Pew Charitable Trusts (2010), Who's winning the clean energy race?

Todaro, Michael P., Stephen C. Smith (2011): Economic Development, 11th ed. Harlow: Pearson.

United Nations."United Nations Office for South-South Cooperation - What Is SSC?"United Nations Office for South-South Cooperation - What Is SSC?N.p., n.d. Web.

UN (2011), Working towards a balanced and inclusive green economy, a UN system wide perspective. UN (2013), The SE4ALL Global Tracking Framework Report.

UN. 2012. The future we want. Outcome Document of the Rio+20 United Nations Conference on Sustainable Development

United Nations Division for Sustainable Development, UNDESA (2013): A Guidebook to the Green Economy. Issue 4: A guide to international green economy initiatives.

UN Secretary-General's High-level Panel on Global Sustainability (2012), Resilient People, Resilient Planet: A future worth choosing.

UNDP (2011), Human Development Report 2011, Sustainability and Equity: A Better Future for All.

UNDP (2012), Synthesis of Rio+20 National Reports.

UNDP (2011), International Guidebook of Environmental Finance Tools.

UNEP (2011), Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication.

UN-DESA, UNEP and UNCTAD (2012), The Transition to a Green Economy: Benefits, Challenges and Risks from a Sustainable Development Perspective

Oxfam, WFP (2011), R4 Rural Resilience Initiative, 5 Year Plan, Global Strategic and Operational Framework

Walter Odhiambo and Paul Kamau (2003), OECD Working Paper No. 208, Public procurement: lessons from Kenya, Tanzania and Uganda

World Bank (2011), Policy Research Working Paper, From Growth to Green Growth, A Framework.

World Bank (2011), Africa Development Indicators 2011.

ANNEXES

Annex 1: Subregional groupings of ECA countries

ECA Subregional office	Number and names of countries covered
Southern Africa	10 – Angola, Botswana, Lesotho, Mozambique, Malawi, Namibia, South Africa, Swaziland, Zambia, Zimbabwe
Eastern Africa	15 – Burundi, Comoros, Democratic Republic of the Congo, Djibouti, Eritrea, Ethiopia, Kenya, Madagascar, Mauritius, Rwanda, Seychelles, Somalia, South Sudan, Uganda, United Republic of Tanzania
Central Africa	7 – Cameroon, Central African Republic, Congo, Equatorial Guinea, Gabon, Chad, Sao Tome and Principe
West Africa	15 – Benin, Burkina Faso, Cabo Verde, Côted'Ivoire, the Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone, Togo
North Africa	7 – Algeria, Egypt, Libya, Mauritania, Morocco, Sudan, Tunisia
Total	54

Annex 2: Indicator set for SDRA V

THEME/ SUB-THEME	INDICATOR	DEFINITION OF THE INDICATOR
Governance	*Headline indicator: African Governance Index*	The African Governance Index (AGI) is a combination of 85 indicators of governance, spanning political representation, institutional effectiveness and accountability, effectiveness of the executive, human rights and rule of law, economic management, corruption management and civil society organization and media independence. The index reflects only the perceptions of opinion leaders in each country. NOTE: The AGI includes elements of political and economic governance, as well as participation. It does not include environmental governance nor active conflicts.
Peace and security	*Number of active conflicts*	Number of active conflicts in the country
	Control of corruption	Reflects perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the State by elites and private interests.
	Political stability and absence of violence/ terrorism	Reflects perceptions of the likelihood that the Government will be destabilized or overthrown by unconstitutional or violent means, including politically-motivated violence and terrorism.
Political governance	*Countries participating in the African Peer Review Mechanism (APRM)*	Countries that participated in the APRM
	Regulatory quality	Reflects perceptions of the ability of the Government to formulate and implement sound policies and regulations that permit and promote private sector development.
	Government effectiveness	Reflects perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the Government's commitment to such policies.
	Rule of law	Indicate predictability of public administration. This predictability has implications on sustainability. Reflects perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.
Business governance	*Business regulatory environment rating*	Business regulatory environment assesses the extent to which the legal, regulatory, and policy environments help or hinder private businesses in investing, creating jobs, and becoming more productive (World Bank Development Indicators).
Governance for sustainable development	*Countries with national multi-stakeholder bodies and processes dealing with sustainable development*	Number of countries with national multi-stakeholder bodies and processes dealing with sustainable development, including to coordinate on matters of sustainable development and to enable effective integration of the three dimensions of sustainable development operational National Councils for Sustainable Development or similar institutions/coordination mechanisms, as called for by the United Nations Conference on Sustainable Development Outcome Document – the Future we want.

THEME/ SUB-THEME	INDICATOR	DEFINITION OF THE INDICATOR
Environmental governance	*Level of implementation of the Rio Multilateral Environmental Agreements*	The degree to which countries in Africa are implementing at the national level commitments contained in the Rio Multilateral Environmental Agreements, namely: Convention on Biological Diversity, the UN Convention to Combat Desertification; the UN Framework Convention on Climate Change.
Economic Transformation and Macro economy	*Headline Indicator: Adjusted net savings*	Adjusted net savings are equal to net national savings plus education expenditure minus energy depletion, mineral depletion, net forest depletion, and carbon dioxide (including or excluding particulate emissions damage).
Trade and market access	*Balance of trade in goods and services.*	The difference between the value of exported goods and services and the value of imported goods and services. The indicator shows the relation of an economy with other economies in the world. The components of the indicator (exports and/or imports) are reflecting the change in economic behavior of the domestic trade enterprises, the change in exchange rate, the effect of the change in exchange rate, and international competitiveness. The change can imply economic policy changes. The components of the indicator show how an economy is participating in international co-operation. Its components show the openness of an economy if it is compared to the value of GDP and can also reflect an economy's dependence and vulnerability.
	Destination of exported agricultural products, textile and clothing	
	Origin of imported agricultural products, textile and clothing	
	Average tariff imposed on exported agricultural products and textiles clothing, by destination (within and outside Africa)	Millennium Development Goal indicator: Average tariffs are the simple average of all applied ad valorem tariffs (tariffs based on the value of the import) applicable to the bilateral imports of developed countries. Agricultural products comprise plant and animal products, including tree crops but excluding timber and fish products. Clothing and textiles include natural and synthetic fibers and fabrics and articles of clothing made from them.
	Exports of environmental goods (in absolute terms and as a % of total exports and of manufacture exports) and by destination	Exports of goods defined as "environmental goods" in the OECD list of environmental goods (Trade that Benefits the Environment and Development: Opening Markets for Environmental Goods and Services), expressed in absolute terms and as a percentage of total exports and as a percentage of exports of manufactured goods.

THEME/ SUB-THEME	INDICATOR	DEFINITION OF THE INDICATOR
	Exports of "dirty" products – otherwise called environmentally sensitive products– (in absolute terms and as a % of total exports and of manufacture exports) and by destination	Exports of goods defined as "dirty" by the OECD, expressed in absolute terms and as a percentage of total exports and as a percentage of exports of manufactured goods.
	Shares of manufacturing exports in total exports	
	Shares of Agricultural exports in total exports	
Value Addition	*Agriculture, services, manufacturing (Value added as % of GDP)*	The net output of the manufacturing sector after adding up all outputs and subtracting intermediate inputs. It is calculated without making deductions for depreciation of fabricated assets or depletion and degradation of natural resources. The origin of value added is determined by the International Standard Industrial Classification (ISIC). Services correspond to ISIC divisions 50-99 and they include value added in wholesale and retail trade (including hotels and restaurants), transport, and government, financial, professional, and personal services such as education, health care, and real estate services. Also included are imputed bank service charges, import duties, and any statistical discrepancies noted by national compilers as well as discrepancies arising from rescaling. Value added is the net output of a sector after adding up all outputs and subtracting intermediate inputs. It is calculated without making deductions for depreciation of fabricated assets or depletion and degradation of natural resources. The industrial origin of value added is determined by ISIC, revision 3. Note: For VAB countries, gross value added at factor cost is used as the denominator.
	Concentration Index	The concentration index is defined with reference to the concentration curve (q.v.), which graphs on the x-axis the cumulative percentage of the sample, ranked by living standards, beginning with the poorest, and on the y-axis the cumulative percentage of the health variable corresponding to each cumulative percentage of the distribution of the living standard variable. It provides a means of quantifying the degree of income-related inequality in a specific health variable.
	Oil and mineral rents as % of GDP	Oil rents are the difference between the value of crude oil production at world prices and total costs of production. Mineral rents are the difference between the value of production for a stock of minerals at world prices and their total costs of production. Minerals included in the calculation are tin, gold, lead, zinc, iron, copper, nickel, silver, bauxite, and phosphate.

THEME/ SUB-THEME	INDICATOR	DEFINITION OF THE INDICATOR
Financial status/Sustainable public finance	*GDP growth per capita*	Millennium Development Goal indicator: GDP refers to the market value of all final goods and services produced within a country in a given period. It is often considered an indicator of a country's standard of living. GDP growth rate is the annual rate of change in GDP expressed as percentage. Levels of GDP per capita are obtained by dividing annual or period GDP at current market prices by population. A variation of the indicator could be the growth of real GDP per capita which is derived by computing the annual or period growth rate of GDP in constant basic producers' or purchasers' prices divided by corresponding population.
	Debt to Gross National Income ratio	The indicator can be defined as the total amount of outstanding debt issued by the general government divided by gross national income. Total debt consists of external debt (debt held by non-residents) and internal debt (held by residents). For countries where external debt is a major concern, the indicator can alternatively or additionally be defined as total external debt (private and public) divided by GNI. With regard to public debt, the indicator is a standard measure of public finance. Debt constitutes a burden for future generations as it reduces the amount available for their consumption and investments. High and increasing debt ratios can be seen as an indication of unsustainable public finances. With regard to external debt, this is one of the indicators that measures the burden of servicing the external debt of a country in relation to its total income (GNI). While external borrowing is a method of supplementing savings and financing the investment gap in a country, an unsustainable external debt burden will choke development.
	Fiscal balance as a % of GDP	The fiscal balance is the difference between government revenues and spending.
Employment	*Unemployment rate by Gender and Age group (15-24, 24-40, 55-64)*	Millennium Development Goal indicator: Unemployed persons (females, males) aged 15-74 as a share of the total (females, males) active population in the same age group.
	Employment-to-population ratio	Millennium Development Goal indicator: Population of working age covers people ages 15–64. Employment is defined according to international definitions and refers to being engaged in an economic activity during a specified reference period, or being temporarily absent from such an activity. Economic activity covers all production of goods and services for pay or profit or for use by own household. Working age is usually determined on the basis of national circumstances, such as the age at which most children have completed compulsory education and the age at which any general old age pension system can be claimed. The United Nations recommends that population census tabulations on the employed distinguish those 15 years and older from those younger than 15 years old.

THEME/ SUB-THEME	INDICATOR	DEFINITION OF THE INDICATOR
	Informal sector employment as a percentage of employment	Millennium Development Goal indicator: Informal sector employment includes all people who, during a given reference period, were employed in at least one informal sector enterprise, irrespective of their status in employment (employer, own-account worker, contributing family worker, employee or member of a producers cooperative) or whether it was their main or second job. Informal sector enterprises are defined by the following criteria: they are household unincorporated enterprises (excluding quasi-corporations corporations) as defined by the System of National Accounts 1993; they produce at least some of their goods or services for sale or barter; they are engaged in non-agricultural activities (including secondary non-agricultural activities of enterprises in the agricultural sector); and their size (in number of employees) is below a specified threshold, determined according to national circumstances, or they are not registered under specific forms of national legislation, or none of their employees is registered.
Information and communication	*Subscribers to fixed and mobile telephone lines (per 100 people)*	Millennium Development Goal indicator: Fixed line and mobile cellular subscriptions are total telephone subscriptions (fixed line plus mobile). Fixed telephone lines are those that connect a subscriber's terminal equipment to the public switched telephone network and that have a port on a telephone exchange. Integrated services digital network channels ands fixed wireless subscribers are included. Mobile cellular telephone subscriptions are subscriptions to a public mobile telephone service using cellular technology, which provide access to the public switched telephone network. Post-paid and prepaid subscriptions are included.
Sustainable consumption and production	*Headline Indicator: Resource Productivity (Ratio between GDP and DMC)*	The ratio between GDP and domestic material consumption (DMC). DMC measures the total amount of materials directly used by an economy and is defined as the annual quantity of raw materials extracted from the domestic territory of the focal economy, plus all physical imports minus all physical exports. It is important to note that the term "consumption" as used in DMC denotes apparent consumption and not final consumption. DMC does not include upstream hidden flows related to imports and exports of raw materials and products.
Consumption Pattern	*Proportion of consumed food that is produced locally*	The percentage of the food consumed in the region which is produced locally. This indicator has implications for food security but also for macro-economic stability and sustainability.
	Proportion of population using biomass for energy (Kj/Capita/year)	Percentage of population using solid fuels as source for energy. Solid fuels include biomass fuels, such as wood, charcoal, crops or other agricultural waste, dung, shrubs and straw, and coal. The indicator covers multiple sustainable development issues.

THEME/ SUB-THEME	INDICATOR	DEFINITION OF THE INDICATOR
	Household consumption expenditure versus population	This indicator is the ratio of household consumption expenditure (Household final consumption expenditure (formerly private consumption) is the market value of all goods and services, including durable products (such as cars, washing machines, and home computers), purchased by households. It excludes purchases of dwellings but includes imputed rent for owner-occupied dwellings. It also includes payments and fees to governments to obtain permits and licenses. Here, household consumption expenditure includes the expenditures of nonprofit institutions serving households, even when reported separately by the country. This item also includes any statistical discrepancy in the use of resources relative to the supply of resources. Data are in current U.S. dollars.) and population size (Total population is based on the de facto definition of population, which counts all residents regardless of legal status or citizenship--except for refugees not permanently settled in the country of asylum, who are generally considered part of the population of their country of origin). It shows how those consuming the most have the weakest population size.
Production patterns	*Countries with established Cleaner Production Centres*	This indicator represents the number of African countries with national cleaner production centres and networks (NCPCs). The NCPCs were established to deliver services to business, government and other stakeholders in their home country and to assist them with the implementation of Cleaner Production methods, practices, policies and technologies. Moreover, the NCPCs were expected to act as public advocates for CP. Each NCPC was initially set up as project that was hosted by a national industry association, technical institute or university.
	Energy use per unit of products (intensity of energy use in industrial sector)	Energy consumption per unit of manufacturing output. It is measured in megajoules per US$ (mJ/$) or megajoules per square meters (mJ/m2). The manufacturing sector is a major consumer of energy. This indicator is a measure of the efficiency of energy use in the sector that can be used for analysing trends and making international comparisons in energy efficiency, particularly when the indicator can be disaggregated to specific branches of manufacturing. The service sector is less energy intensive than manufacturing, and the growth of the sector relative to manufacturing contributes to the long-term reduction in the ratio of total energy consumption to GDP. The sector, however, is a large consumer of electricity, generation of which contributes to many local or global environmental problems.
Pollution Intensity	*Greenhouse gas emissions per unit of GDP, including and excluding land use and land-use change and forestry*	Emissions of six greenhouse gases, weighted by their global warming potentials, excluding and including emissions and removals related to land use, land-use change and forestry, and expressed per unit of GDP. The indicators do not it include emissions from international aviation and international maritime transport. CO2 emissions from biomass with energy recovery are reported as a Memorandum item according to UNFCCC Guidelines and not included in national greenhouse gas totals.

THEME/ SUB-THEME	INDICATOR	DEFINITION OF THE INDICATOR
Sustainable Transport	*Box: Road safety in Africa*	Road safety has been identified as a priority in the Future we want. This box would therefore explore the issue for countries where data is available.
Energy	*Renewable versus non renewable total primary energy supply mix (consumed not produced)*	The percentage of a country's total energy consumption supplied from renewable energy sources. It is measured in %. This indicator measures the proportion of energy mix between renewable and non-renewable energy resources. It calls for an improvement of efficiency in the use of energy sources and for a transition towards the environmentally friendly use of renewable resources. Energy is a key aspect of consumption and production. Dependence on non-renewable resources can be regarded as unsustainable in the long term. Renewable resources, on the other hand, can supply energy continuously under sustainable management practices and their use in general create less environmental pressure. The ratio of non-renewable to renewable energy resources represents a measure of a country's sustainability.
Energy security	*Energy imports, net*	This is estimated as energy use less production, both measured in oil equivalents, and is measured as a percentage of total energy use. A negative value indicates that the country is a net exporter. Energy use refers to use of primary energy before transformation to other end-use fuels, which is equal to indigenous production plus imports and stock changes, minus exports and fuels supplied to ships and aircraft engaged in international transport
	Energy diversification – sources of energy as % of total energy consumed	Diversification indicates level of resilience and security in situations where availability of one form of energy sources is volatile or dependent on other factors beyond the control of the individual country that could change without notice such as drought with hydropower or shortage of supply in case of oil or gas. E.g. Shares of energy fuels in total primary energy supply, total final consumption and electricity generation and generating capacity in percentage
Energy intensity	*Energy consumed per unit of output in industry and GDP (Kg of oil equivalent)*	Ratio of total energy use to GDP. GDP per unit of energy use is nominal GDP in purchasing power parity (PPP) U.S. dollars divided by apparent consumption, which is equal to indigenous production plus imports and stock changes minus exports and fuels supplied to ships and aircraft engaged in international transport. GDP per unit of energy use is the PPP GDP per kilogram of oil equivalent of energy use. PPP GDP is gross domestic product converted to 2005 constant international dollars using purchasing power parity rates. Trends in overall energy use relative to GDP indicate the general relationship of energy consumption to economic development and provide a rough basis for projecting energy consumption and its environmental impacts with economic growth. For energy policymaking, however, sectoral or sub-sectoral energy intensities should be used. it is usually measure in Megajoules (mJ) per $.
Sustainability of energy sources	*Box on policies to support renewable energies (regulatory, fiscal and public financing incentives)*	Case studies on public support measures that the government can use/promote, in order to influence the specific risk/returns profile of renewable energy technology
	Greenhouse gas intensity of energy used	The energy used in relation to the GHG emissions coming from the energy sector

THEME/ SUB-THEME	INDICATOR	DEFINITION OF THE INDICATOR
	Use of fossil fuels in relation to total energy used	Share of fossil fuel from total energy used by a country
	Efficiency of the energy system	Energy lost in transmission, as % of total energy produced
Energy Access	*Percentage of population relying on traditional biomass for cooking and heating by income quintile*	This indicator shows the level of equity in energy access, use and consumption among population in the country
Energy Prices	*Energy prices to industrial/commercial and domestic customers including relevant taxes.*	Price of energy, including taxes and levies, determines the intensity, affordability, etc. This indicator should assess and measure price fluctuation over time and impact on energy use both for the commercial and domestic users.
Poverty	*Headline Indicator: Proportion of population living below $1 a day*	Millennium Development Goal indicator: Proportion of population below $1 per day is the percentage of the population living on less than $1.08 a day at 1993 international prices. The one dollar a day poverty line is compared to consumption or income per person and includes consumption from own production and income in kind. This poverty line has fixed purchasing power across countries or areas and is often called an "absolute poverty line" or measure of extreme poverty.
Income poverty	*Proportion of people living below the national poverty line*	The proportion of the population with a standard of living below the poverty line as defined by the national government. National estimates are based on population-weighted subgroup estimates derived from household surveys. The most important purpose of a poverty measure is to enable poverty comparisons. These are required for an overall assessment of a country's progress in poverty alleviation and/or the evaluation of specific policies or projects. An important case of a poverty comparison is the poverty profile which shows how the aggregate poverty measure can be decomposed into poverty measures for various sub-groups of the population, such as by gender region of residence, employment sector, education level, or ethnic group. A good poverty profile can help reveal a number of aspects of poverty-reduction policies, such as the regional or sectoral priorities for public spending. Poverty comparisons are also made over time, in assessing overall performance from the point of view of the poor.
	Poverty gap ratio	Millennium Development Goal indicator: Poverty gap ratio is the mean distance separating the population from the poverty line (with the non-poor being given a distance of zero), expressed as a percentage of the poverty line.
Income inequality	*Poorest quintile's share in national income or consumption percentage*	Millennium Development Goal indicator: The percentage share that accrues to the bottom fifth (quintile) of the population. It is the share of income (or consumption) of poorest 20% of the population.

THEME/ SUB-THEME	INDICATOR	DEFINITION OF THE INDICATOR
	Inequality of income distribution – Gini Index	A summary measure of the extent to which the actual distribution of income, consumption expenditure, or a related variable, differs from a hypothetical distribution in which each person receives an identical share. A dimensionless index scaled to vary from a minimum of zero to a maximum of one; zero representing no inequality and one representing the maximum possible degree of inequality. The Gini Index provides a measure of income or resource inequality within a population. It is the most popular measure of income inequality.
Sanitation	*Proportion of population using improved sanitation facilities and adequate excreta disposal facilities*	Millennium Development Goal indicator: Proportion of population with access to and using a private sanitary facility for human excreta disposal in the dwelling or immediate vicinity. Improved sanitary facilities range from simple but processed pit latrine to flush toilet with sewage.
Access to energy	*Proportion of population with access to electricity and modern energy service*	Millennium Development Goal indicator: Share of household with access to electricity. Electrification data are collected from industry, national surveys and international sources.
Drinking water	*Proportion of population using improved drinking water sources*	Millennium Development Goal indicator: Proportion of population with access to an improved drinking water source in a dwelling or located within a convenient distance from the users dwelling. Improved drinking water source include bottled water; rain water; protected boreholes springs and wells; public stand pipes and piped connections to houses.
Access to decent housing	*Proportion of population living in slums*	Millennium Development Goal indicator: The proportion of urban population lacking at least one of the following five housing conditions: Access to improved water; access to improved sanitation facilities, not overcrowded, living area; structural quality/durability of dwelling; security of tenure.
Demographic changes	*Headline Indicator: Dependency Ratio*	The indicator is defined as the ratio between the (projected) total number of elderly persons (aged 65 and over) and the (projected) number of persons of working age (from 15 to 64). This indicator is used to monitor changes in population structure. It is an approximation of the ratio between the retired and working age populations and as such provides an insight into the potential future financial burden of care for the elderly, and especially pensions.
Population growth	*Population growth rate (annual %), urban and rural*	The average annual rate of change of population size during a specified period, expressed as a percentage. The population growth rate measures how fast the size of the population is changing. Population growth, at both national and subnational levels, represents a fundamental indicator for national decision-makers. Its significance must be analysed in relation to other factors affecting sustainability. However, rapid population growth can place strain on a country's capacity for handling a wide range of issues of economic, social, and environmental significance, particularly when rapid population growth occurs in conjunction with poverty and lack of access to resources, or unsustainable patterns of production and consumption, or in ecologically vulnerable zones
Human Settlement	*Urbanization rate*	The rate of urbanization, describes the projected average rate of change of the size of the urban population over the given period of time.

THEME/ SUB-THEME	INDICATOR	DEFINITION OF THE INDICATOR
Gender	*Headline indicator: The Africa Gender and Development Index*	The African Gender and Development Index (AGDI) a tool that ECA has developed to measure the performance of Member States in meeting their commitments and obligations towards the international and regional conventions on gender equality and women's advancement they are signatory to. It is intended to address the lack of sex-disaggregated data at the national and regional levels and to overcome the technical challenges for tracking progress achieved for the advancement of women and gender equality. In addition, the tool is meant to streamline reporting on various instruments such as the Beijing and Dakar Platforms for Action on Women, the Convention on the Elimination of All Forms of Discrimination Against Women and its optional Protocol, the African Charter on Human and People's Rights, the ICPD Plan of Action Plus Five, the MDGs and Africa Peer Review Mechanism. It incorporates the Gender Status Index (GSI), which captures quantitatively measurable issues related to gender equality. And the African Women's Progress Scoreboard (AWPS), which measures government policy performance regarding women's advancement and empowerment.
Gender equality and the empowerment of women	*Seats held by women in parliament*	Millennium Development Goal indicator: It is the percentage of parliamentary seats in a single or lower chamber held by women.
	Share of women in wage employment in the non-agricultural sector	Millennium Development Goal indicator: The share of women in wage employment in the non-agricultural sector is the share of female workers in the non-agricultural sector expressed as a percentage of total employment in the sector. The non-agricultural sector includes industry and services. Following the International Standard Industrial classification (ISIC) of all economic activities, industry includes mining and quarrying (including oil production), manufacturing, construction, electricity, gas and water. Services includes wholesale and retail trade; restaurants and hotels; transport, storage and communications; financing, insurance, real estate and business services; and community, social and personal services. Employment refers to people above a certain age who worked or held a job during a reference period. Employment data include both full-time and part-time workers whose remuneration is determined on the basis of hours worked or number of items produced and is independent of profits or expectation of profits.
	Women ownership of land	Number of land ownership titles to women (individual and business), as percentage of total
	Gender Gap in payment of earnings	The difference between male and female earnings expressed as a percentage of male earnings
	Access to credit facilities	Percentage of credits granted to women (absolute number, as % of total, value, and as % of total value)
	Ratios of girls to boys in primary, secondary and tertiary education	Millennium Development Goal indicator: Ratio of girls to boys in primary, secondary and tertiary education is the ratio of the number of female students enrolled at primary, secondary and tertiary levels in public and private schools to the number of male students.

THEME/ SUB-THEME	INDICATOR	DEFINITION OF THE INDICATOR
Education	*Headline Indicator: Public and Private expenditure on education per capita*	The indicator represents the total public expenditure per student on education as a percentage of GDP per capita. Public expenditure (current and capital) includes government spending on educational institutions (both public and private), education administration as well as subsidies for private entities (students/households and other private entities).
Education level	*Proportion of pupils starting grade 1 who reach last grade of primary*	Millennium Development Goal indicator: The proportion of pupils starting grade 1 who reach grade 5, known as the survival rate to grade 5, is the percentage of a cohort of pupils enrolled in grade 1 of the primary level of education in a given school year who are expected to reach grade 5.
	Primary completion rate	Millennium Development Goal indicator: Primary completion rate is the ratio of the total number of students successfully completing (or graduating from) the last year of primary school in a given year to the total number of children of official graduation age in the population.
Literacy	*Adult literacy rate, total, and ratio male to female (% of people aged 15 and above)*	Millennium Development Goal indicator: Adult literacy rate is the percentage of people (both male and female) aged 15 and above who can, with understanding, read and write a short, simple statement on their everyday life. The ratio of literate women to men, 15–24 years old (literacy gender parity index) is the ratio of the female literacy rate to the male literacy rate for the age group 15–24.
Gender parity in education	*Gender parity index*	The Gender Parity Index (GPI) is a socioeconomic index usually designed to measure the relative access to education of males and females. In its simplest form, it is calculated as the quotient of the number of females by the number of males enrolled in a given stage of education (primary, secondary, etc.). It is used by international organizations, particularly in measuring the progress of developing countries.
Health	*Headline Indicator: Life expectancy at birth, by gender*	The average number of years that a newborn could expect to live, if he or she were to pass through life subject to the age-specific death rates of a given period.
Morbidity/ Health status and risk	*Prevalence of HIV/ AIDS, malaria, tuberculosis total (% of population age 15-49)*	Millennium Development Goal indicator: Prevalence of HIV refers to the percentage of people aged 15-49 who are infected with HIV. Prevalence of malaria/tuberculosis is the number of cases of malaria per 100,000 people.
	Prevalence of over weight and obesity among women	Refers to the percentage of women age 24-xx who suffer from being over weight and obesity
	Proportion of population sleeping under insecticide-treated bed nets	Millennium Development Goal indicator: Malaria prevention is measured as the percentage of children ages 0–59 months sleeping under insecticide-treated bed nets. Malaria treatment among children is measured as the proportion of children ages 0–59 months who were ill with fever in the two weeks before the survey and who received appropriate antimalarial drugs.
Mortality	*Maternal mortality ratio*	Millennium Development Goal indicator: Maternal mortality ratio is the number of women who die during pregnancy and childbirth, per 100,000 live births and vary from country to country. It is a measure of the risk of death once a woman becomes pregnant.

THEME/ SUB-THEME	INDICATOR	DEFINITION OF THE INDICATOR
	Under-five mortality rate	Millennium Development Goal indicator: The under-five mortality rate is the probability (expressed as a rate per 1,000 live births) of a child born in a specified year dying before reaching the age of five if subject to current age-specific mortality rates.
Prevention and treatment	*Child immunization rate*	Millennium Development Goal indicator: It is the rate by which a child becomes protected against a disease. This term is often used interchangeably with the rate of vaccination or rate of inoculation. Child immunization measures the rate of vaccination coverage of children under one year of age
Atmosphere/ Air quality	*Ratio of ambient concentration to WHO guideline in selected urban areas in Africa*	Ambient air pollution concentrations of ozone, particulate matter (PM10, and PM2,5, if those are not available: SPM, black smoke), sulphur dioxide, nitrogen dioxide, lead. Additional: carbon monoxide, volatile organic compounds including benzene (VOCs) as ratio to the WHO recommended maximum. The priority is collection of the indicator in large cities (over 1 million inhabitants).
Health care access and delivery	*Antenatal care coverage (at least one visit and at least four visits)*	Millennium Development Goal indicator: Antenatal care coverage (at least one visit) is the percentage of women aged 15-49 with a live birth in a given time period that received antenatal care provided by a skilled health personnel (doctors, nurses, or midwives) at least once during pregnancy, as a percentage of women age 15-49 years with a live birth in a given time period.
	Contraceptive prevalence rate	Millennium Development Goal indicator: The contraceptive prevalence rate is the percentage of women who are practising, or whose sexual partners are practising, any form of contraception. It is usually reported for women ages 15–49 in marital or consensual unions.
	Number of nurses (per 1000 people)	Nurses and midwives include professional nurses, professional midwives, auxiliary nurses, auxiliary midwives, enrolled nurses, enrolled midwives and other associated personnel, such as dental nurses and primary care nurses.
	Public expenditure on health per capita	Public health expenditure consists of recurrent and capital spending from government (central and local) budgets, external borrowings and grants (including donations from international agencies and nongovernmental organizations), and social (or compulsory) health insurance funds. Total health expenditure is the sum of public and private health expenditure. It covers the provision of health services (preventive and curative), family planning activities, nutrition activities, and emergency aid designated for health but does not include provision of water and sanitation.
Agriculture and food security	*Headline Indicator: Food Production Index*	Food production index covers food crops that are considered edible and that contain nutrients. Coffee and tea are excluded because, although edible, they have no nutritive value.
Agricultural production	*% change in average yield per hectare of selected food crop*	Percentage change in yield, measured as kilograms per hectare of harvested land, includes the following crops identified in the Resolution of the Abuja Food Security Summit (2006) as strategic for Africa: rice, legumes, maize, cotton, oil palm, as strategic commodities at the continental level. If relevant, cassava, sorghum and millet, considered as strategic at subregional level, may also be considered for the analysis at the subregional level. Average yields per hectare of the selected commodities will be compared with global averages.

THEME/ SUB-THEME	INDICATOR	DEFINITION OF THE INDICATOR
Agricultural practices	*Fertilizer use intensity as ratio to optimal fertilizers use (based on soil fertility test and crop demands) units: Kilograms per hectare (Kg/Ha)*	Measured in kilograms per hectare (kg/Ha), fertilizer use intensity is the amount of fertilizer consumed for agriculture per hectare of temporary and permanent cropland, compared to the level of fertilizer use that would be optimal for the crop type and soil type. Data are in terms of kilograms per hectare and reported on an annual basis. This indicator shows the potential environmental pressure from inappropriate fertilizer application. Intensive fertilizer application is linked to nutrient losses that may lead to eutrophication of water bodies, soil acidification, and potential contamination of water supply with nitrates. In many countries, intensification of agricultural production is a response to increases in food demand and in the scarcity of agricultural land. It is necessary that this intensification keeps negative impacts to the resource base and the wider environment within bounds so that the sustainability of the system is not threatened.
	Area under organic farming, % of total area under farming	Ratio of total utilized agricultural area occupied by organic farming to total utilized agricultural area. Organic farming involves holistic production management systems, for crops and livestock, emphasizing the use of management practices in preference to the use of off-farm inputs. The indicator may be extended to cover organic forestry and aquaculture. This indicator shows the importance of organic farming. Organic farming contributes to reducing environmental loading on soil and water resources and pressure on biodiversity. The reduction of use of pesticides, herbicides and other chemicals, combined with enhanced management of natural resources, not only improves the health of ecosystems but also fosters the health of animals and people and increases income generation and communities' self-reliance.
	Use of selected agricultural technologies	Uptake of this technologies (agricultural land where they are used as % of total land under cultivation): (1) conservation agriculture - management of natural resource base supporting agriculture (especially soil and water); (2) improved genetic varieties of crops and animals; (3) reduction of biotic constraints (such as disease, pests, and weeds); and (4) efficient irrigation technologies;
Food Security	*Share of food in total import*	Food comprises the commodities in SITC sections 0 (food and live animals), 1 (beverages and tobacco), and 4 (animal and vegetable oils and fats) and SITC division 22 (oil seeds, oil nuts, and oil kernels).
	Prevalence of underweight children under-five years of age	Millennium Development Goal indicator: Prevalence of (moderately or severely) underweight children is the percentage of children under five years old whose weight for age is less than minus two standard deviations from the median for the international reference population ages 0–59 months. The international reference population was formulated by the National Center for Health Statistics (NCHS) as a reference for the United States and later adopted by the World Health Organization (WHO) for international use (often referred to as the NCHS/WHO reference population).
	Level of food supply versus food demand	This could be measured in terms ratio: demand /supply. A ratio of 1 meaning there is food security

THEME/ SUB-THEME	INDICATOR	DEFINITION OF THE INDICATOR
Nutritional status	*Proportion of population living below minimum level of dietary energy consumption*	Millennium Development Goal indicator: Proportion of the population below the minimum level of dietary energy consumption is the percentage of the population whose food intake falls below the minimum level of dietary energy requirements. This is also referred to as the prevalence of under-nourishment, which is the percentage of the population that is undernourished.
Land Based Natural Resources	*Headline Indicator: Forest cover areas*	MDG Indicator: share of the terrestrial covered by forests - FAO definitions
Quality of Land	*Land area affected by desertification*	The proportion of land in drylands that is affected by desertification. Desertification is defined as land degradation in arid, semiarid, and dry sub-humid areas resulting from various factors, including climatic variations and human activities. The indicator describes the extent and severity of desertification at the national level. For dryland areas, desertification is a central problem in sustainable development. While many dryland ecosystems have generally low levels of absolute productivity, maintenance of that productivity is critical to the present and future livelihood of many hundreds of millions of people. Combating desertification is, therefore, a central sustainable development goal for large areas of the world. Its is measured in Area (Km 2) and % of land area affected
	Proportion of people living on degraded land, overall and in urban and rural areas	Refers to the percentage of people living on degraded land. Degraded land is land which due to natural processes or human activity is no longer able to properly sustain an economic function and/or the original ecological function. Land is degraded when the soil is impoverished or eroded, water runs off or is contaminated more than is normal, vegetation is diminished, biomass production is decreased, or wildlife diversity diminishes.
	Agricultural land affected by improper practices, as % of total agricultural land	Improper practices in terms of land are the inappropriate use of fertilizers; improper irrigation; logging; soil salinity;
	BOX: Land tenure system	The type of land tenure systems existing in each country, with particular reference to security of tenure (qualitative analysis)
Forest	*Deforestation rate (annual % change)*	This refers to the clearing of forested habitats to be converted to non-forested areas such as pastures, agriculture, bare soil, human settlement
Biodiversity	*Nationally designated protected terrestrial areas*	Millennium Development Goal indicator: The indicator is defined as the share of terrestrial area that has been reserved by law or other effective means to protect part or all of the enclosed environment. It can be calculated separately for different terrestrial ecological regions. The indicator may also be disaggregated by management category of the protected areas. The indicator represents the extent to which areas important for conserving biodiversity, cultural heritage, scientific research (including baseline monitoring), recreation, natural resource maintenance, and other values, are protected from incompatible uses. It shows how much of each major ecosystem is dedicated to maintaining its diversity and integrity. Protected areas are essential for maintaining ecosystem diversity in countries and ecological regions, in conjunction with management of human impacts on the environment.

THEME/ SUB-THEME	INDICATOR	DEFINITION OF THE INDICATOR
	% change in wetland areas	Wetlands generally include swamps, marshes, bogs, and similar areas. Destruction or alteration of wetlands can have wide-ranging biological, chemical, and hydrological impacts. The percentage annual change in a floodplain (Hydrology indicators) during the growing season; the percentage annual change in plant communities (Vegetation indicators) that commonly occur in areas having standing water for part of the growing season (e.g., cypress-gum swamps, cord grass marshes, cattail marshes, bulrush and tule marshes, sphagnum bogs, willows, mangroves, sedges, rushes, arrowheads, water plantains and several types of oak and pine trees); the percentage annual change in soils (soil indicators) that are called peats or mucks.
	Species threatened	Millennium Development Goal indicator: Threatened species are the number of species classified by IUCN as endangered, vulnerable, rare, indeterminate, out of danger, or insufficiently known.
Mineral resources	*Africa percent of world production of leading mineral resources*	Africa production of leading mineral resources (platinum group metals, phosphate, gold, chromium, manganese, vanadium, cobalt, diamonds, aluminium) expressed as percentage of world production of these resources.
	Africa percent of world known reserves of leading mineral resources	Africa known reserves of leading mineral resources (Platinum group metals, phosphate, gold, chromium, manganese, vanadium, cobalt, diamonds, aluminum), expressed as percentage of total known mineral resources.
Marine and freshwater resources	*Proportion of total water resources used with respect to renewable water available, and by sector (industry, domestic, agriculture)*	MDG Indicator: The total annual volume of ground and surface water abstracted for water uses as a percentage of the total annually renewable volume of freshwater, and by sector (industrial, domestic, agriculture). The purpose of this indicator is to show the degree to which total renewable water resources are being exploited to meet the country's water demands. It is an important measure of a country's vulnerability to water shortages. The indicator can show to what extent freshwater resources are already used, and the need for adjusted supply and demand management policy. When the indicator is calculated by sector, it can reflect the extent of water resource scarcity with increasing competition and conflict between different water uses and users. Scarce water could have negative effects on sustainability constraining economic and regional development, and leading to loss of biodiversity. Sustainability assessment of changes in the indicator is linked to total renewable water resources. The indicator's variation between countries as well as in time is a function of climate, population, and economic development, as well as the economic and institutional capacity to manage water resources and demand.
Marine ecosystem	*Number of threatened species of fish*	Millennium Development Goal indicator: Fish species are based on Froese, R. and Pauly, D. (eds). 2008. Threatened species are the number of species classified by IUCN as endangered, vulnerable, rare, indeterminate, out of danger, or insufficiently known.

THEME/ SUB-THEME	INDICATOR	DEFINITION OF THE INDICATOR
	Proportion of fish stock within their safe biological limits	Percentage of fish stocks exploited within their level of maximum biological productivity, i.e., stocks that are either "Underexploited", "Moderately exploited" or "Fully exploited" according to formal stock assessments based on a FAO procedure. Stocks that are "Overexploited", "Depleted" and "Recovering" are outside their maximum biological productivity. The indicator provides information on the state of exploitation of fishery resources at the global, regional and national levels. It measures the level of sustainable production from capture fisheries, an important element of food security. It is based on formal stock assessments, derived from national and, for shared fish stocks, regional catch and effort statistics.
Climate change	*Headline Indicator: GHG emission per capita, including and excluding land use and land-use change and forestry*	Emissions of six greenhouse gases (GHG), weighted by their global warming potentials, excluding and including emissions and removals related to land use, land-use change and forestry, and expressed per capita. The indicators do not it include emissions from international aviation and international maritime transport. CO2 emissions from biomass with energy recovery are reported as a Memorandum item according to UNFCCC Guidelines and not included in national greenhouse gas totals.
Adaptation	*Number of countries implementing NAPAs*	This indicator represents the number of African countries currently implementing or that have implemented national adaptation programme of action (NAPAs). NAPAs provide a process for least developed countries to identify priority activities that respond to their urgent and immediate needs to adapt to climate change – those for which further delay would increase vulnerability and/or costs at a later stage.
	Estimates of the costs of adaptation	This indicator represents the estimated investment needs for implementing adaptation measures in Africa, that intend to reduce the vulnerability of human or natural systems to the impacts of climate change and climate-related risks, by maintaining or increasing adaptive capacity and resilience. Assessment of the funding gap
	BOX: Agriculture and climate change	
Mitigation	*Number of countries that have developed NAMAs*	Nationally appropriate mitigation action
	GHG emissions from Africa, absolute and as percentage of global emissions	
	BOX: CDM projects in Africa	This box will discuss the number of clean development mechanism projects in Africa. The CDM allows emission-reduction projects in developing countries to earn certified emission reduction credits, each equivalent to one tonne of CO2. These credits can be traded and sold, and used by industrialized countries to a meet a part of their emission reduction targets under the Kyoto Protocol. The mechanism stimulates sustainable development and emission reductions, while giving industrialized countries some flexibility in how they meet their emission reduction limitation targets.

THEME/ SUB-THEME	INDICATOR	DEFINITION OF THE INDICATOR
Natural disasters	*Headline Indicator: Human and economic losses due to disasters*	Human and economic loss due to disaster refers mostly to the number of persons deceased, missing, and/or injured as a direct result of a disaster involving natural hazards; and the amount of economic and infrastructure losses incurred as a direct result of the natural disaster. It is measure in number of fatalities; $US. This indicator contributes to a better understanding of the level of vulnerability to natural hazards in a given country, thus encouraging long-term, sustainable risk reduction programs to prevent disasters. High vulnerability means higher exposure to natural catastrophes in the absence of disaster reduction measures. Disasters caused by vulnerability to natural hazards have a strong negative impact on the development process in both industrialized and developing countries. To provide estimates of the human and economic impact of disasters in order to measure the trends in population vulnerability and to determine whether a country or province is becoming more or less prone to the effects of disasters.
Disaster preparedness and response	*Number of countries with established and operational National Platform on Disaster Preparedness/Disaster prevention and mitigation instruments*	Level at which disaster prevention is ensured and mitigation instruments in place. With the increasing population living in urban areas, the impact of natural or human-made disasters on people and human settlements is becoming greater. These disasters require specific prevention, preparedness and mitigation instruments which often do not exist in disaster-prone areas because of economic and technical reasons. Major instruments are the existence and application of appropriate building codes, which prevent and mitigate impacts of disasters, and hazard mapping, which inform the policy-makers, population and professional of disasters-prone areas.
Vulnerability to natural induced disasters	*Percent of population living in natural disaster/hazard prone areas*	The percentage of national population living in areas subject to significant risk of prominent hazards: cyclones, drought, floods, earthquakes, volcanoes and landslides. The indicator may be calculated separately for each relevant prominent hazard. The risk of death in a disaster caused by natural hazards is a function of physical exposure to a hazardous event and vulnerability to the hazard. The indicator measures the risk at subnational scale by using historical and other data on hazards and on vulnerability. The sub-national risk levels are then aggregated to arrive at national values. This indicator contributes to a better understanding of the level of vulnerability to natural hazards in a given country, thus encouraging long-term, sustainable risk reduction programs to prevent disasters. High vulnerability means higher exposure to natural catastrophes in the absence of disaster reduction measures. Disasters caused by vulnerability to natural hazards have a strong negative impact on the development process in both industrialized and developing countries.
	Number of disasters that have occurred in Africa	This indicator represents the number of natural disasters that have occurred in a country within a given period (within 1 year and 5 years)
Means of Implementation	*Headline Indicator: Percentage of country budget coming from domestic resources*	Contribution to government budget from domestic sources, as percentage of the total government budget. (Specify the domestic sources)
Domestic financing	*Remittances*	Flow of remittances - absolute value

THEME/ SUB-THEME	INDICATOR	DEFINITION OF THE INDICATOR
	Box: Innovative sources of funding in Africa	This box will look at example where innovative sources of funding (e.g. national sovereign funds, carbon trading, REDD+) have been used to finance sustainable development in the region.
	Box: Capital flight	
External Financing	*Net official Development assistance (ODA) as % of GNI*	Millennium Development Goal indicator: Net official development assistance (ODA) consists of disbursements of loans made on concessional terms (net of repayments of principal) and grants by official agencies of the members of the Development Assistance Committee (DAC), by multilateral institutions, and by non-DAC countries to promote economic development and welfare in countries and territories in the DAC list of ODA recipients.
	Proportion of total bilateral, sector-allocable ODA of OECD/ DAC donors to basic social services (basic education, primary health care, nutrition, safe water and sanitation) and to the implementation of the Rio Convention	Millennium Development Goal indicator: Official development assistance comprises grants or loans to developing countries and territories on the OECD Development Assistance Committee list of aid recipients that are undertaken by the official sector with promotion of economic development and welfare as the main objective and at concessional financial terms (if a loan, having a grant element of at least 25 per cent). Technical cooperation is included. Grants, loans and credits for military purposes are excluded. Also excluded is aid to more advanced developing and transition countries as determined by DAC. Bilateral official development assistance is from one country to another. Also ODA flow supporting the implementation of the three Rio convention (Rio Markers)
	Foreign direct investment	The value of net flows of foreign direct investment. This indicator is defined as the share of FDI net inflows and of FDI net outflows in GDP. FDI is investment made to acquire a lasting interest in or effective control over an enterprise operating outside of the economy of the investor. FDI net inflows and net outflows include reinvested earnings and intra-company loans, and are net of repatriation of capital and repayment of loans. The indicator shows the provision of external financing resources in the form of direct investments at home from foreign investors and abroad from domestic investors. For many developing countries, FDI inflows are a major and relatively stable source of external financing and thereby provide important means of implementation of sustainable development goals. In many cases, FDI also contributes to the transfer of technology and management skills. Conversely, FDI outflows have the potential to improve sustainable development in receiving countries. Sustained increases in FDI inflows are often a sign of an improved general investment climate
	FDI in environmental goods and services (lower bound proxy)	Foreign direct investment are the net inflows of investment to acquire a lasting management interest (10 percent or more of voting stock) in an enterprise operating in an economy other than that of the investor. In this case, the investment is to environmental goods and services (as defined by the OECD). It is the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital as shown in the balance of payments. This series shows net inflows (new investment inflows less disinvestment) in the reporting economy from foreign investors, and is divided by GDP.

THEME/ SUB-THEME	INDICATOR	DEFINITION OF THE INDICATOR
Green Technology/ Eco-Innovation	*Expenditure on research and development as percent of GDP*	Total domestic expenditure on scientific research and experimental development (R&D) expressed as a percentage of GDP. This ratio provides an indication of the level of financial resources devoted to R&D in terms of their share of the GDP. This indicator is required to assess the level and patterns of R&D expenditure in relation to GDP, at a given point of time, as well as its trends. Adequate R&D funding that is commensurate with economic growth and national income is necessary for ensuring sustainable development. Scientists are improving their understanding on policy-relevant issues such as climate change, growth in resource consumption rates, demographic trends, and environmental degradation. Changes in R&D investments in these and other areas need to be taken into account in devising long-term strategies for development. Scientific knowledge should be applied to assess current conditions and future prospects in relation to sustainable development.
	Patents in environmentally-related technologies	Energy generation from renewable and non-fossil sources + combustion technologies with mitigation potential + emission abatement and fuel efficiency in transportation + energy efficiency in buildings and lighting)
	Papers/publications related to eco-innovation	Energy efficient/efficiency, materials efficient/efficiency, resource efficient/efficiency, energy productivity, material productivity, resource productivity
Capacity-building	*Countries with national capacity development strategies*	Number of countries that have elaborated national capacity development strategies that should not only address the issues of education, capacity development and institutional strengthening, but also take a broader perspective, embodying all aspects of capacity development, including human resource development, organizational development and institutional development.

Annex 3- Participants at the Expert Group Meetings on the SDRA-V Indicator Framework; and on the Review of the Draft Report

A- Participants at the Expert Group Meeting on Measuring Sustainable Development: Sustainable Development Indicators, held in December 2012

Mr. KakanyoFaniDintwa, Statistics Botswana, Gaborone, Botswana

Mr. DikemeKgaodi, Ministry of Environment Wildlife, Tourism, Gaborone, Botswana

Mr. W. AppolinaireOuedraogo, Ministere de l'Economie et des Finances, Ouagadougou, Burkina Faso

Mr. Bernard Bere, Institut national de la Statistique et de la démographie, Ouagadougou,

Burkina Faso

Mr. Saidou Adama, Sous-Directeur du Developpement Durable et de l'Encadrement, Yaounde Cameroun

Mme. Marie Antoinette FomoTeulawo, Chef de Cellule de la Cartographie et des Statistiques Environnementales, Yaounde Cameroun

Mr. DawitBerhanuMamo, Central Statistical Agency, Addis Ababa, Ethiopia

Mr. Solomon Assefa, Ministry of Women, Children and Youth Affairs, Addis Ababa, Ethiopia

Ms. Mary Mildred Wanyonyi, Kenya National Bureau of Statistics, Nairobi, Kenya

Mr. Jean Nestoz Nguema, Ingenieur-Statisticien-Economiste en Chef, Ministere de l'Economie, Direction Generale de la Statistique, Libreville, Gabon

Mr. Johnson KagyaOwusu, Head, M & E Information System Unit, Ghana Statistical Service, Accra, Ghana

Mr. Peter TakyiPeprah, Senior Statistician, Head of Survey Organization Team, Ghana Statistical Service, Accra, Ghana

Ms. Sandhya Deena-Jowahir, Ministry of Environment and Sustainable Development, Port-Louis, Republic of Mauritius

Mr. Anand Sookun, StatisticsMauritius, Port-Louis, Mauritius

Mme Karima Bensouda, Chef de Service, Haut Commissariat au Plan Direction de la Comptabilite Nationale, Rabat, Maroc

Mme. Sakina Kada, Chef de Service des Publications Generales, Haut Commissariat au Plan, Rabat, Maroc

M. Fahd Ndiaye, Chef du Bureau des Syntheses et Etudes Analytiques, Dakar, Senegal

M. AladjiColy, Ministere Sante et Action Sociale, Dakar, Senegal

Ms. Leonne Hart, Department of Environment Affairs, Pretoria, South Africa

Mme. FethiaOuechtati, Chef de Service et point focal pour la transmission des donnes, Tunis, Tunisie

M. Hamza Youssef Abderrazak, Cadre Technique Principal, Ministere de l'Environnement,

Direction General du Developpement Durable, Tunis, Tunisie

Dr. Albert. A. Musisi, Commissioner, Economic Development Policy and Research Department, Ministry of Finance, Planning and Economic Development, Kampala, Uganda

Mr. Joseph Enyimu, Senior Economist, Ministry of Finance, Planning & Economic Development, Kampala, Uganda

Mr. Thomas Rutaro, Senior Officer, Statistical Coordination, Uganda Bureau of Statistics

Statistics House, Kampala, Uganda

Mr. AlmamiDampha, Policy Officer, Forestry, Land Management, African Union Commission

Addis Ababa, Ethiopia

Ms. Leah NaessWanambwa, Senior Policy Officer, African Union Commission, Addis Ababa

Mr. YaredBeyeneKidanemariam, Environment and Natural Resource Expert, African Union Commission, Addis Ababa, Ethiopia

Mr. FodayBojang, Senior Forestry Officer, FAO Regional Office for Africa, Accra, Ghana

Mr. Jeremy Lissouba, UNEP Liaison officer, Addis Ababa, Ethiopia

Mr. Eugene Leger NkolloNdongo, Intern, UNEP Liaison Office, Addis Ababa, Ethiopia

Ms.YohaminTeshomeKumbi, Intern, UNEP Liaison Office

Ms. Isatou Gaye, Chief, Environment and Sustainable Development Section, Food Security and Sustainable Development Division, ECA, Addis Ababa, Ethiopia

Mr. Xiaoning Gong, Chief, Economic Statistics and National Accounts Section, African Centre for Statistics, ECA, Addis Ababa, Ethiopia

Mr. Charles Akol, Environmental Affairs Officer, Environment and Sustainable Development Section, Food Security and Sustainable Development Section, ECA, Addis Ababa, Ethiopia

Ms. Alessandra Sgobbi, Economic Affairs Officer, Environment and Sustainable Development Section, Food Security and Sustainable Development Section, ECA, Addis Ababa, Ethiopia

Mr. YoussoufCamara, Economic Affairs Officer, Agricultural Marketing Systems Section, Food Security and Sustainable Development Section, ECA, Addis Ababa, Ethiopia

Mr. NegussieGorfe, Statistician, African Centre for Statistics, ECA, Addis Ababa, Ethiopia

Mr. Elias Fisseha, Statistics Assistant, African Centre for Statistics, ECA, Addis Ababa, Ethiopia

Mr. Steve Gui-Dilby, Statistician, African Centre for Statistics, ECA, Addis Ababa, Ethiopia

Mr.AyenikaGodheart, Statistician, African Centre for Statistics, ECA, Addis Ababa, Ethiopia

B- Participants at the Expert Group Meeting on the Review of the Draft SDRA-V Report held in December, 2013

Mr. EboBotchway, Department of Economics, University of Ghana, Accra, Ghana

Dr. Ali Amasha, the Arab Academy for Science, Technology and Maritime Transport, Cairo, Egypt

Mr. Mitcharis Chapman Kodam, Agribusiness Research Consultant, Ghana

Prof. Christopher A. Shisanya, Dean, School of Humanities and Social Sciences, Kenyatta University, Nairobi, Kenya

Prof. PantaleoMunishi, Sokoine University of Agriculture, Tanzania

Dr. Essam Hassan Mohamed Ahmed, Climate Change and Sustainable Development consultant, Nubian for Community Services (NGO), Egypt

Mr. MamadouDianka, Sustainable Energy Expert, Burkina Faso

Mr. MoussaAgarya, UniversiteAbdouMoumouni, Niamey

Ms. HaddijatouJallow, Executive Chair, Environment Protection Agency, Sierra Leone

Mr. Lahai Samba Keita, Deputy Director, Environment Protection Agency, Sierra Leone

Mr. Jean de DieuMirukiro, University of Rwanda/ College of Agriculture, Kigali, Rwanda

Mr. RigobertNtep, Ministry of Environment, Protection of Nature and Sustainable development, Cameroun

Dr. BothwellBatidzirai, Energy Research Centre University of Cape Town, South Africa

Dr. Thomson Kalinda, Department of Agriculture Economics and Extension, University of Zambia, Lusaka, Zambia

Dr. Ebenezer Tabot-Tabot, Centre for Environment and Human Development, Yaoundé, Cameroun

Dr. Benjamin DelaliDovie, Department of Geography and Resource Development, University of Ghana, Accra, Ghana

Dr. Jacques AndreNdione, Centre de suivi Ecologique, Dakar, Senegal

Prof. Rufin Willy Mantsie, University Brazzaville, Congo

Dr. Albert Makochekanwa, Department of Economics, University of Zimbabwe, Harare, Zambia

Dr. Peter P. Zhou, EECG Consultants Pty Ltd, Gaborone, Botswana

Mr. MekonnenTadesseAchamyeleh, Addis Ababa University, Ethiopia

Prof. ZewduEshetuAsfaw, Director Addis Ababa University, Climate Science Center, Addis Ababa, Ethiopia

Dr. EriaHisali, School of Economics, Makerere University, Kampala, Uganda

Dr. Washington OdongoOchola, Consultant, Kampala, Uganda

Dr. Charles Nhemachena, Human Sciences Research Council, Economic Performance Department, Pretoria, South Africa

Ms. Seonmi Choi, Environment and Climate Change Policy Specialist, Regional Bureau for Africa, UNDP, New York

Dr. M. Mohamed Abdel Monem, UNEP, Nairobi, Kenya

Mr. Edward Kilawe, FAO, Addis Ababa, Ethiopia

Mr. Martin Ager, FAO, Harare, Zimbabwe

Mr. AtseYapi, FAO, Accra, Ghana

Ms. Isatou Gaye, Chief, Green Economy and Natural Resources Section, Special Initiatives Division, ECA, Addis Ababa, Ethiopia

Mr. Charles Akol, Green Economy and Natural Resources Section, Special Initiatives Division, ECA, Addis Ababa, Ethiopia

Mr. Benjamin Mattondo Banda, Green Economy and Natural Resources Section, Special Initiatives Division, ECA, Addis Ababa, Ethiopia

Mr. Andrew Allieu, Green Economy and Natural Resources, Special Initiatives Division, ECA, Addis Ababa, Ethiopia

Mr. GhituMundunge, Economic Affairs Officer, ECA Subregional office for Central Africa, Yaounde, Cameroun

Mr. Richard Osaliya, Fellow, Green Economy and Natural Resources Section, ECA, Addis Ababa, Ethiopia