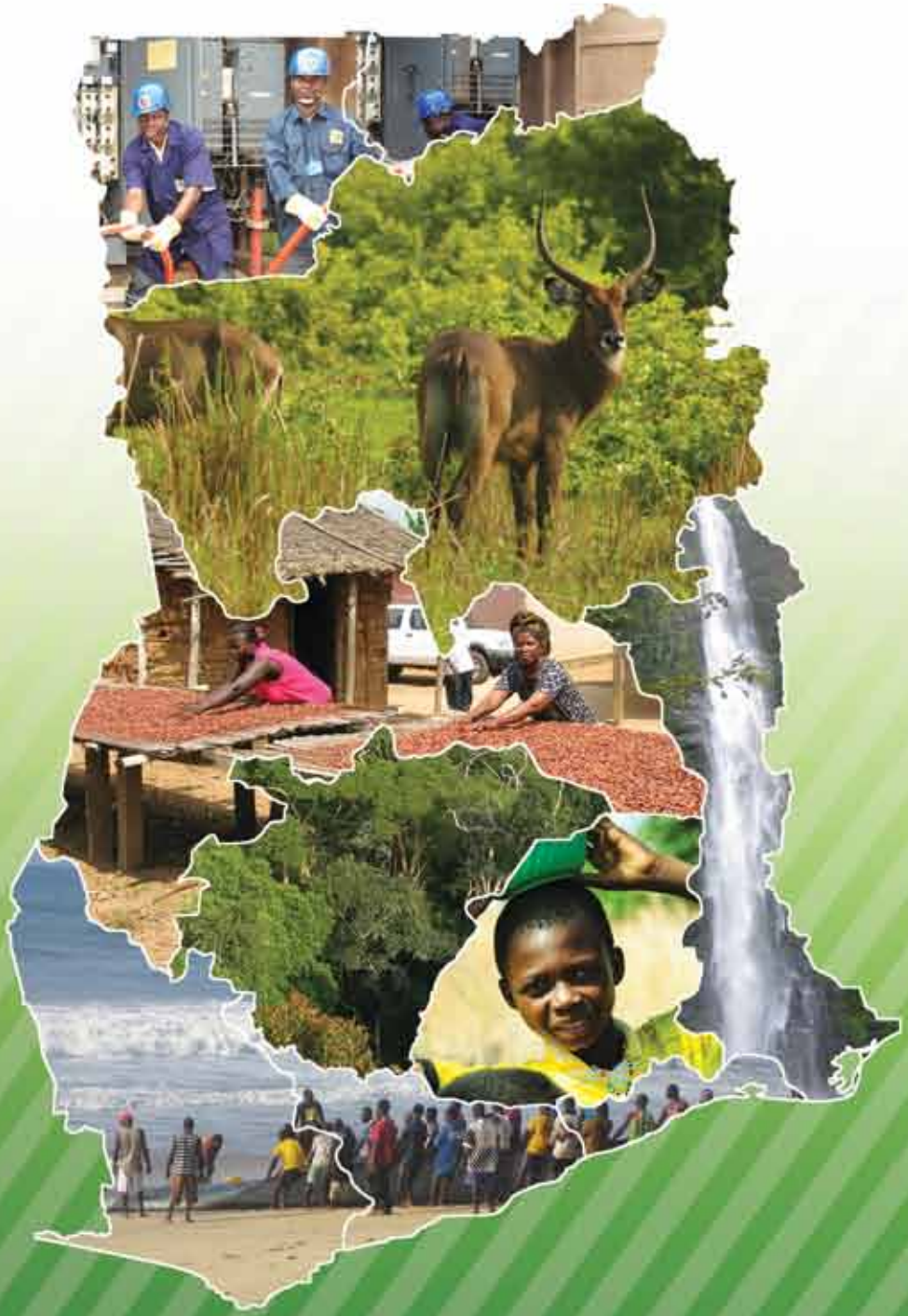
GREEN economy

Scoping Study

Ghana



UNEP

Citation
UNEP, 2013, Green Economy Scoping Study: Ghana

Disclaimer
The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the United Nations Environment Programme concerning the legal status of any country, territory, city or area or of its authorities, or concerning delimitation of its frontiers or boundaries. Moreover, the views expressed do not necessarily represent the decision or the stated policy of the United Nations Environment Programme, nor does citing of trade names or commercial processes constitute endorsement.

Photo credits

Front cover page:
Technicians holding electric cables. *© Courtesy www.ecgonline.info*
Ghana is endowed with forests and wildlife. *© Walter Callens*
Women drying cocoa beans in Ghana. *© IITA Image Library*
Ankasa Forest canopy. *© Courtesy www.carboafrica.net*
Fishermen with their catch. *© John and Clare*
School life expectancy (primary to tertiary education) in Ghana is 10 years. *© CGIAR Climate*
A scenic waterfall in Ghana. *© John and Clare*

Back cover page:
Man holding millet cobs. *© Robert Grossman/IFAD*
Woman opening cocoa fruit. *© Fjona Hill/www.urbantimes.co*

Green Economy Scoping Study

Ghana

Contents

List of figures

List of tables

List of acronyms

AfDB	African Development Bank
CDM	Clean Development Mechanism
CIA	Central Intelligence Agency
CO_2	Carbon dioxide
EPA	Environmental Protection Agency
FASDEP	Food and Agriculture Sector Development Policy
FAO	Food and Agriculture Organization of the United Nations
FCG	Forestry Commission of Ghana
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GoG	Government of Ghana
GSGDA	Ghana Shared Growth and Development Agenda
GSS	Ghana Statistical Service
GEF	Ghana Energy Foundation
IISD	International Institute for Sustainable Development
ISSER	Institute of Statistical, Social and Economic Research
LUCF	Land-Use Change and Forestry
MDGs	Millennium Development Goals
METASIP	Medium Term Agriculture Sector Investment Plan
MESW	Ministry of Employment and Social Welfare
MLNR	Ministry of Lands and Natural Resources
NTFPs	Non-Timber Forest Products
MoE	Ministry of Energy and Petroleum
MW	Megawatt
NDPC	National Development Planning Commission
OECD	Organisation for Economic Co-operation and Development
PPPs	Public-Private-Partnerships
PV	Photovoltaic
REDD+	Reducing Emissions from Deforestation and Forest Degradation plus
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change

Acknowledgements

This Green Economy Scoping Study was commissioned by the United Nations Environment Programme (UNEP), at the request of the Ministry of Environment, Science, Technology and Innovation, Government of Ghana (GoG). The aim of the study was to review economic assessments and policy options for a green economy transition, focusing on a few selected economic sectors in Ghana. The study was conducted by the Institute of Statistical, Social and Economic Research (ISSER) at the University of Ghana. The United Nations Development Programme (UNDP) supported the implementation of this project with stakeholder consultations.

UNEP is grateful for the financial support provided by the European Commission and the Government of the Netherlands.

Representatives of the following institutions led the project:

Ministry of Environment, Science, Technology and Innovation
Raymond Babanawo, Nicholas K. Iddi, Sampson Madana, Emelyne Eggley

United Nations Environment Programme
Kofi Vondolia, Moustapha Kamal Gueye, Patrick Mwesigye

United Nations Development Programme
Tim Scott

Institute of Statistical, Social and Economic Research, University of Ghana
Research fellows: Simon Bawakyillenuo, Felix Asante, Clement Ahiadeke

United Nations University – Institute for Natural Resources in Africa
Timothy Koomson, Elias Ayuk

Delegation of the European Union to the Republic of Ghana
Herve Delsol

International Institute for Sustainable Development
Julie Dekens

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)
Stefan Csordas

Representation on the Steering Committee of the Ghana Green Economy Programme:
Energy Commission
Environmental Protection Agency
Forestry Commission
Ghana Statistical Service
Ministry of Energy and Petroleum
Ministry of Environment, Science, Technology and Innovation
Ministry of Finance
Ministry of Food and Agriculture
Ministry of Lands and Natural Resources
Ministry of Trade and Industry
Ministry of Transport
Ministry of Water Resources, Works and Housing
National Development Planning Commission
Water Resources Commission

The following stakeholders participated in the technical workshop and provided inputs that directed the project:

Bank of Ghana
Chris Kedze

Canadian International Development Agency
Romeo Adomah Darteh

Centre for Urban Transportation
Mammie H.

Department for International Development
Sean Doolan

Energy Commission
Joseph Essandoh

Environmental Protection Agency
John Leonard Doghle, Audrey Quarcco, Helen Asianah, Julius Caesar Adamu, E. Siisi-Wilson, Emmanuel Cofi, Kwame B. Fredua, Christine O. Asare, Adiza Awudu

Forestry Commission
Yaw Kwange

GIZ
Ouasima Chami

Green Earth Organization
George Ahadzie, Emmanuel K. Oteng

HATOF Foundation
Vanessa Sena Awadzi, Samuel Dotse

Ministry of Energy and Petroleum
Alex Kyei

Ministry of Environment, Science, Technology and Innovation
Rudolph S. Kuuzegh, Nana Ama O Asonte, Peter Acquah, Fredua Agyeman, Ahmed Bukari, Zulait K. Englih, Duncan Dorris

Ministry of Finance
Irene Addo-Dankwah, Robert Mensah

Ministry of Food and Agriculture
Kingsley K. Amoako

Ministry of Health
Edith Clarke

Ministry of Lands and Natural Resources
Joe Abeey

Ministry of Roads and Highways
Efua Effah

Ministry of Trade and Industry
Edward Agbodjan

Ministry of Water Resources, Works and Housing
Mark Ankrah

National Development Planning Commission
Sandra Amankwah

Norwegian Embassy
Reidar Grevskott

Private Enterprise Foundation
Dzisem Daniel, Wisdom Adongo

Delegation of the European Union to the Republic Of Ghana
Emmanuel B. Ansong, Bart Missinne

United Nations University – Institute for Natural Resources in Africa
Harris Andoh, Kwabena O. Asubonteng

University of Ghana
Michael Kaku Minlah, Water Resources Commission, Adura Paintsil

Finally, UNEP would like to thank Steven Stone, Chief of the Economics and Trade Branch, and Desta Mebratu, Deputy Director, Regional Office for Africa, along with Joy Kim, Asad Naqvi, Mamadou Diakhite and Diwata Hunziker for their substantive contributions to the report. UNEP would also like to thank Désirée Leon, Fatma Pandey and Rahila Somra for valuable administrative support; Qurratul-Ain Haider for editing the report; Thomas Gianinazzi for the cover design and original layout; and Michel Favre of Le Cadratin for the final layout and preparation of the report.

Foreword

Ghana has one of the largest and fastest growing economies in sub-Saharan Africa, which can be attributed to political stability, good governance and increasing export revenues from cocoa, gold and, more recently, oil production. However, the continuous exploitation of the country's rich natural resources and the resulting environmental liabilities have the potential to jeopardize the ability of the country to sustainably support the livelihoods of local communities.

The Government of Ghana recognizes that sound environmental management and sustaining healthy ecosystems are pivotal to the country's socio-economic development. Consequently, using science, technology and innovation, the government has put in place policies to reverse environmental deterioration and to increase resilience to climate change. These decisions are embodied in Ghana's Medium-Term National Development Policy Framework, Ghana Shared Growth and Development Agenda (GSGDA, 2010-2013).

In order to take the next steps to move the country towards a low-carbon green economy, Ghana's Ministry of Environment, Science, Technology and Innovation, together with the United Nations Environment Programme (UNEP), has undertaken a Green Economy Scoping Study. The overall objective of this study, conducted in collaboration with the University of Ghana's Institute of Statistical, Social and Economic Research, is to support and complement national initiatives on green economy through a macroeconomic review and policy analysis to understand better how government policies and public and private investment can help achieve income growth, economic development/diversification and job creation and, at the same time, contribute to social equity and environmental improvement.

The study has identified three initial sectors that should receive increased strategic investment to strengthen the country's transition to a green economy: agriculture; forestry; and industry. Although largely qualitative, the study outlines key policy instruments that can be brought into play to enhance the overall sustainability of the economy; and provides a platform for further work, particularly with respect to modelling different green economy scenarios and identifying relevant policy and investment options.

The partnership between the Government of Ghana and UNEP has provided another opportunity to integrate environmental dimensions into the economic and social development agenda of the country; and to leverage public and private capital for sustainable development and poverty eradication. It is our mutual hope that this Green Economy Scoping Study will pave the way for further in-depth assessment to illustrate how a transition to a green economy can accelerate the attainment of national development goals in Ghana.

Achim Steiner
UNEP Executive Director
United Nations Under-Secretary General

Honourable Akwasi Opong-Fosu (MP)
Minister of Environment, Science, Technology and Innovation
Republic of Ghana

Key messages

An economic success story and the 'hidden' costs.

Ghana is an economic success story in Africa. Since the last two decades, the country has experienced a positive growth rate generally attributed to political stability, improved governance and increasing export revenues from cocoa, gold and, more recently, oil production. However, environmental degradation is taking place at an alarming rate and costs the nation a fortune every year — almost 10 per cent of the country's Gross Domestic Product (GDP). The high cost of environmental degradation and its toll on the economy stand in sharp contrast to the low public expenditure on the environment in the past few years. In addition, the economic growth has been largely based on the exports of cocoa and mineral resources (mainly gold and, more recently, oil) with limited value-addition and in-country job creation. Combined with an increasing population, this has led to high unemployment (10.4 per cent of the labour force in 2000 and down to 3.6 per cent in 2005/2006). Poverty is declining but is still pervasive in certain parts of the country, especially in rural areas and in the northern regions; and among certain categories, especially food-crop farmers.

Current challenges reinforce the need for the country to transition to a green economy to simultaneously integrate all three pillars of sustainable development.

Even as the economy grows and aggregated human welfare improves, social equity and environmental sustainability lag behind. The overall objective of the Ghana Green Economy Scoping Study was to identify options and opportunities for Ghana to transition to a green economy pathway. A qualitative approach, through literature review and stakeholder consultations, was utilized for the primary research. While an official definition of a green economy does not yet exist in Ghana, the term has started to be used at the national level. Furthermore, various relevant policies and strategies in line with the requirements of a green economy are already in place. Implementation, however, remains a challenge.

What needs to be done.

Based on the findings, a number of priority actions have been recommended in various sub-sectors in order to design the roadmap for Ghana's transition to a green economy. These measures include:

Cocoa and fisheries

– Promote large-scale adoption of conservation agriculture, and reform the land tenure system;
– Increase the value-addition of agricultural products through investments in agricultural infrastructure, technologies and strong farmers/fishermen organizations;
– Invest in sustainable agricultural research and capacity development; and
– Develop finance and fiscal instruments to green the agriculture sector.

Forestry and logging

– Implement and intensify/scale up existing programmes of Sustainable Forest Management (SFM);
– Invest in research and capacity development for SFM; and
– Develop fiscal policy/regulatory instruments for SFM.

Electricity

– Intensify renewable energy investments and dissemination;
– Intensify energy efficiency and conservation measures;
– Invest in research and capacity development in energy diversification and conservation;
– Develop green energy finance; and
– Develop and enforce policy instruments to support the dissemination of renewable energy.

Waste

– Invest in waste reduction, reuse and recycling;
– Develop fiscal policy instruments and regulatory framework; and
– Ensure a strong regulatory framework.

The implementation of these priority actions require various enabling conditions, including regulations and standards (e.g., intensify and scale up existing efforts such as Forest Certifications and FairTrade for cocoa); economic and fiscal policy instruments (e.g., removal of international trade barriers and subsidies reform); financing mechanisms (e.g., annual budgetary allocation for green investments); and relevant institutional and policy processes (e.g., finalize, implement and monitor the policy on sustainable public procurement).

Potential benefits

Ghana is already making positive steps towards a transition to a green economy through a set of national policies, strategies and programmes in line with sustainable development objectives. If properly managed, the recent exploitation of oil and gas fields could provide the necessary revenues to support the implementation process. The transition to a green economy calls for sustained political will and good governance. Such a transition could contribute to: sustained growth in income and employment, driven by investments that reduce carbon emissions and pollution; enhanced energy and resource efficiency; reduced loss of biodiversity and ecosystem services; and reduced poverty, especially among the poorest segments of society.

1 Towards a green economy

Introduction

The impact of the global triple-F crises (fuel, food and finance) between 2006 and 2009 led to a growing interest in the concept of a green economy in an attempt to 'get the economy right' to achieve sustainable development.[1] The United Nations Environment Programme (UNEP) defines a green economy as one that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities.[2] It entails essentially a low-carbon, resource-efficient and socially-inclusive economy.

Green economy requires the transformation of production and consumption or lifestyles towards economic activities that enhance and preserve environmental quality, while using energy, water and natural resources more efficiently; and reduce social inequalities. At the operational level, in a green economy, growth in income and employment is driven by investments that reduce carbon emissions and pollution; enhance energy and resource efficiency; prevent loss of biodiversity and ecosystem services; and reduce unemployment and poverty, especially among the poorest segments of society. The approach is based on sound economic analysis of current trends, risks and opportunities, as well as on taking stock of national experiences in applying more integrated policy tools, effectively. In fact, there could be several operational definitions of the green economy at the national level, where the national context shapes priorities and goals for greening the existing (often unique) economic structure of a country.

While the Government of Ghana does not yet have an official definition of 'green economy', the term is increasingly being used at the national level and the country's development priorities are consistent with the green economy objectives. The country's long-term vision, or Ghana-Vision 2020, is to achieve a balanced economy and a middle-income country status and standard of living, with a level of development close to the present level in Singapore.[3] The national development strategy is based on five key themes: human development; economic growth; rural development; urban development; and an enabling environment. Economic development, poverty reduction, social justice and equity, and environmental sustainability have been some of the fundamental goals of past and present governments of Ghana. Undertaking a transition from business-as-usual (BAU) to a green economy now can allow the country to take advantage of the growing revenues from the new oil and gas industries and invest in a development pathway that puts people and livelihoods at the forefront.

The aim of this scoping study is to identify how Ghana can transition to a green economy. The study focuses on agriculture (cocoa and fisheries); forestry and logging; and industry (electricity, water and sewage) as initial sectors for greening the economy in Ghana.[a] This is based on their overarching importance to the overall national development and in line with the government's medium-term development strategy for enhanced investment. The study is based on a desk review of literature and stakeholder consultations. A technical workshop was held in Accra on 19 April 2012 to review the first draft of the study and deepen the analysis.

This report provides a country profile in terms of the economy, environment, policy landscape and socio-economic context. The report also investigates initial sectors for greening the economy; discusses policy-enabling conditions; and identifies key findings and a roadmap for moving towards a green economy.

[a] After a thorough discussion of the first draft of the scoping report from ISSER, stakeholders ranked the various sectors that should be considered for greening the economy, with agriculture (cocoa and fisheries subsectors), forestry and logging, and industry (electricity and waste subsectors) being given the highest priority for Ghana.

About two million people depend on the fisheries sub-sector for their livelihood, with mostly women involved in the processing and marketing activities.
© Nana Kofi Acquah / IFAD

2 Country profile and overarching challenges to the economy

2.1 Macroeconomic profile

Ghana is often seen as a West African success story. For some analysts, the country is the model of economic reform in sub-Saharan Africa and "a prime candidate to champion economic transformation in Africa".[4] The country benefits from a stable macroeconomic environment. Between 2010 and 2011, Ghana moved from a low-income country to a lower middle-income country[5] in line with its long-term vision to become a middle-income country by 2020. Ghana has experienced a positive GDP growth rate since the 1980s mainly as a result of political stability, good governance and traditional exports (cocoa, minerals and timber).[6] In 2011, the country recorded a GDP of US$39.2 billion[7] and a real GDP growth rate of 14.4 per cent[8] – a trend which is expected to amplify in the future with the recent large-scale exploitation of oil and gas fields.

Cocoa, gold and oil are the major contributors to the country's GDP. From 1880 until recently, the economy was largely based on cocoa and, to a lesser extent, gold and timber. With the beginning of oil production in 2011, the country is now transitioning into an emerging oil economy. Whether the country will manage to turn oil production into an opportunity for sustainable and equitable development is yet to be demonstrated.

Gold and cocoa continued to be the country's top export earners in 2011, accounting for 54.24 per cent of export receipts (US$3.7 billion and US$ 1.7 billion for gold and cocoa, respectively). Crude oil exports accounted for 22 per cent of total export receipts (US$1.97 billion) in 2011.[9] However, Ghana faces relatively high trade and fiscal deficits. Between 2010 and 2011, the trade deficit increased from 9.2 per cent to 10 per cent because strong growth

Figure 1 **Export and import levels between 2004 and 2010[11] (in US$ million)**

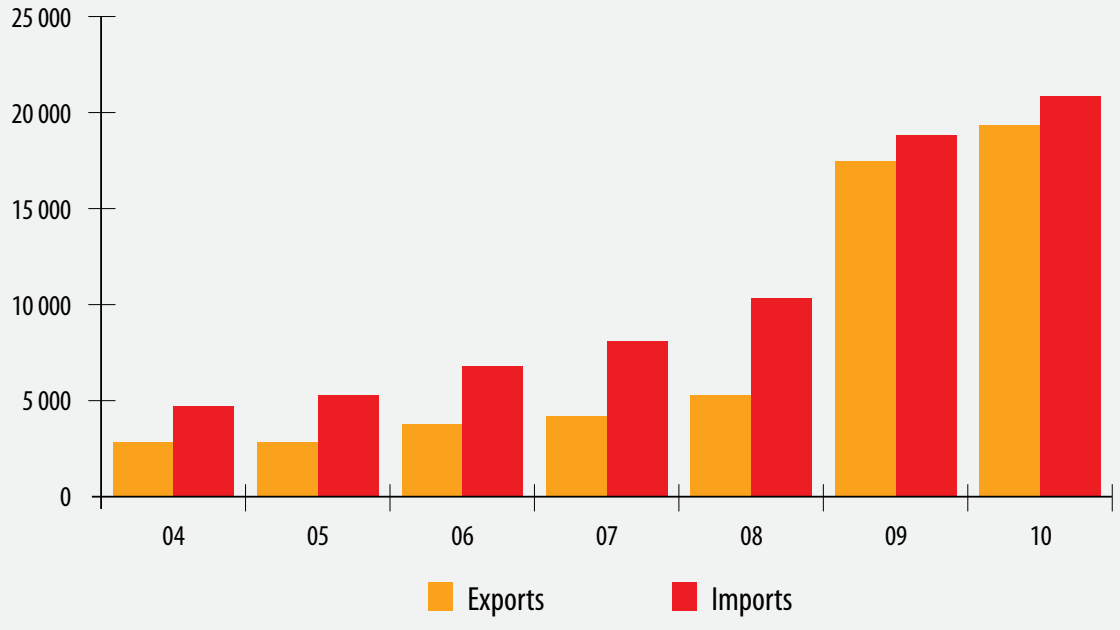
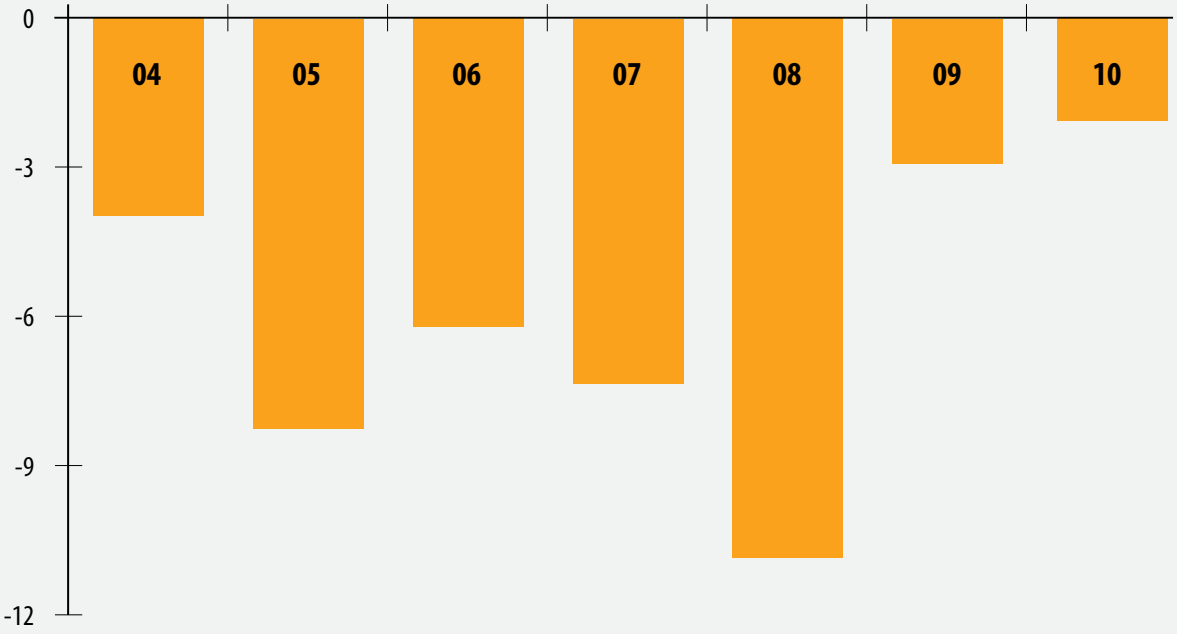


Figure 2 Current account balance to GDP (%)[12]



during this period caused a need for increased imports, particularly in the oil sector (see Figures 1 and 2).[10]

The country remains dependent on external aid, with low domestic savings. The total public debt between 2005 and 2011 has been fluctuating. The government developed a Debt Management Strategy in 2010 to recover from this situation.[13] In 2005, the total public debt stood at US$8 345 million (equivalent to 78 per cent of GDP). In 2011, public debt further increased to US$14 625 million (39 per cent of GDP).

Table 1 provides an estimate of sectoral breakdown of Ghana's economy in 2010 and 2011. It shows that the services sector is the engine of growth, contributing about half of GDP in the country. Industry grew from the third largest sector in 2010 to the second largest sector in 2011. The agriculture sector was the second largest sector in 2010, but slipped to third position in 2011. Provisional estimates for 2012[14] confirm this trend and especially the increasing role of the industry sector, which should continue to outperform the agriculture sector (27.6 per cent of the GDP for the industry sector compared to 23.1 per cent for the agriculture sector in 2012) mainly due to the beginning of oil production and the long-term decline of the cocoa sub-sector.

Table 1 GDP composition by sector (est.)[15]

Sectors	% in 2010	% in 2011
Services	51.1	48.5
Agriculture	30.2	25.6
Industry	18.6	25.9

The GDP growth rate of the service sector has remained relatively stable, between 2008 and 2011, at an average rate of 8 per cent. The information and communication sub-sector contributed the most to the growth of this sector, with an average growth rate of 13 per cent between 2008 and 2012.[16] The growth rate of the industry sector has fluctuated but has generally increased from 15.1 per cent in 2008 to 41.1 per cent in 2011. This performance can mainly be attributed to the growth of the mining and quarrying sub-sector (which grew at an estimated 206.5 per cent in 2011), followed by the construction sub-sector (which grew at 17 per cent on average between 2008 and 2012), and the electricity sub-sector (10 per cent on average between 2008 and 2012). Growth in these sub-sectors helped to cushion the industrial sector from the impact of the dismal growth rates of water and sewage (3 per cent average growth rate between 2008 and 2012) and manufacturing (5 per cent on average between 2008 and 2012). The

Women drying cocoa beans in Ghana. © IITA Image Library

Fishermen with their catch. © John and Clare

decreasing and low growth rate of the manufacturing sector, combined with the decreasing contribution of the agriculture sector, may not lead to the structural transformation needed for sustainable development.[17] (See Annex 1 for details of GDP per economic activity between 2008 and 2012.)

Ghana's decent economic growth has been largely based on the exploitation of mineral resources with limited value addition and, combined with the 5.8 per cent annual growth of the labour force, has translated into high unemployment and underemployment. Although the unemployment level fell by about one per cent during the 1987 to 1989 period, it has increased over the years and reached 10.4 per cent of the labour force in 2000 and declined again to 3.6 per cent in 2005/2006, according to the latest population census.[18] No updated employment data are available and labour statistics remain poor in the country.[19] The unemployment rate among youth aged 15 to 24 has been estimated at 25.6 per cent; twice that of the 25-44 age group and three times that of the 45-64 age group.[20] Unemployment rate is more pronounced in urban areas (6.3 per cent), especially Accra (8.9 per cent), than in rural areas (1.6 per cent)[21] and this is exacerbated by large-scale migration from northern Ghana to the coastal cities.[22]

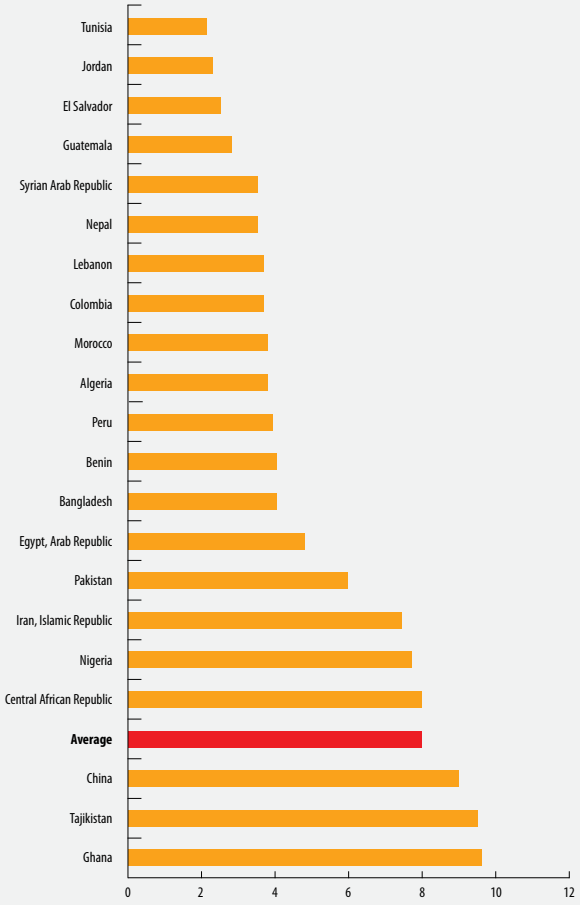
The agriculture sector remains the largest employer even though its share of employment has been declining over the years. Agriculture and its related activities employed more than 50 per cent of the Ghanaian workforce in 2000, down from 61 per cent in 1984.[23] The informal sector is by far the biggest employment segment of the labour market. Between 1984 and 2000, the sector increased by about 46 per cent at an annual growth average of 2.7 per cent (see Annex 2). The oil and mining sector tends to generate few domestic jobs due to lack of indigenous capital and expertise. In fact, taking into account externalities, the economic benefits from the mining industry to the country might be minimal. For example, only 22 per cent of the US$3 billion earned from gold mining may have benefited the Ghanaian economy in 2009; a percentage roughly corresponding to the environmental and social costs.[24]

2.2 Environmental footprint

Ghana is endowed with significant natural resources, such as minerals and petroleum, freshwater resources, a coastal zone, and forest and wildlife, which constitute a major pillar of Ghana's socio-economic development. Gold, manganese, bauxite, diamond and, in recent times, oil have been commercially exploited. Various other mineral resources, such as kaolin, salt, clay, marble, mica and limestone, have yet to be fully exploited. From the early 1990s, mineral resources have been Ghana's major export revenue earners. The country further benefits from abundant water resources. The catchment of the Volta River alone accounts for nearly 70 per cent of the total land area of the country.[25] Wetlands constitute about 10 per cent of the country.[26] However, spatial and temporal water distribution is not uniform.[27] Forest area covered over 22 per cent of the total surface area of the country in 2009[28] including about 5.3 per cent as national wildlife reserves.[29] While data is lacking on all the biological resources of the country, existing records indicate a high level of biodiversity.[30]

Nevertheless, the country faces numerous environmental challenges, such as land degradation and coastal erosion; desertification; deforestation; loss of biodiversity; air and water pollution; waste management problems in major urban areas; overfishing; a reduced water volume in Lake Volta; and the negative impacts of climate variability and change.[31] The start of large-scale oil production could further aggravate environmental degradation. The annual cost of Ghana's environmental degradation is alarmingly high and has already been estimated at almost 10 per cent of the country's GDP — one of the highest in the world (see Figure 3).[32] In 2005, the World Bank estimated the total cost of lost productivity due to damage to agricultural land; forest and savannah woodlands; coastal fisheries and wetlands; wildlife; and Lake Volta at

Figure 3 Cost of environmental degradation as percentage of GDP equivalent[39]



US$516 million.[33] Land degradation alone is estimated to cost 5.3 per cent of the GDP.[34] Nearly 65 per cent of the total land area of the country is said to be prone to desertification[35] while deforestation is estimated at around 65 000 ha per year, resulting in an annual cost of degradation of about 3.5 per cent of Ghana's GDP.[36] Out of Ghana's 7.4 million hectares of forest cover in 1990, only 4.9 million hectares remain today. The country has less than 20 per cent of forest with a canopy cover over 60 per cent — one of the lowest in the world (see Figure 4).

At the same time, public expenditure on the environment sector in Ghana has been fluctuating from nearly 20 million (2006) to nearly 78 million (2008), with an average of more than US$48 million (see Table 2). Implementation of the trade liberalization policy could foster more private investments in environmentally-related business opportunities compared to the past. However, data on private investment on the environment could not be found, from any of the state ministries and agencies, for this study.

Figure 4 Percentage of forest with canopy cover >60 per cent[46]

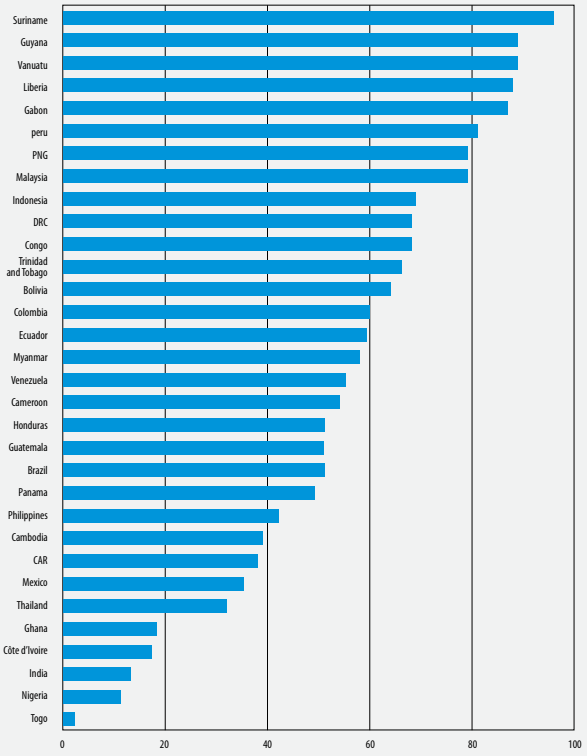


Table 2 [49]

Year	Ministry of Food and Agriculture	Ministry of Water Resources, Works & Housing	Ministry of Energy	Ministry of Lands & Natural Resources	Ministry of Environment, Science, Technology & Innovation	Ministry of Local Government	Total
2006	1.11	8.71	0.02	3.57	0.83	5.71	19.95
2007	0.10	21.30	0	3.90	6.33	1.80	33.43
2008	0.22	28.42	0	7.86	4.24	37.03	77.77
2009	0	40.44	0	6.85	0	0	47.29
2010	0	32.52	0	5.46	0	0	37.98

2.3 Economic and social profile

In 2011, Ghana ranked 135 out of 187 countries (just below India) on the Human Development Index (HDI). This means that the country falls within the medium development category in terms of global measurement of well-being, based on indicators of life expectancy, education and income. Ghana's HDI is above the regional average HDI of sub-Saharan Africa. However, adjusted for inequality, the HDI drops from 0.541 to 0.367 (32.2 per cent loss).[37] The latest 2008 progress report on the achievement of the Millennium Development Goals (MDGs)[38] showed mixed results. Ghana is largely on track with MDG 1: reducing by half the proportion of the population living in extreme poverty; and MDG 2: achieving universal primary education by 2015. However, MDG 3: ensuring gender parity and empowering women; MDG 6: combat HIV/AIDS, malaria and other diseases; and MDG 7: ensuring environmental sustainability, are likely to be only partially achieved. Finally, the goals of reducing child mortality; and improving maternal health are unlikely to be achieved by 2015.

The proportion of the population defined as poor fell from 51.7 per cent in 1991/1992 to 28.5 in 2005/2006.[40] Despite the general decrease in the number of poor people, the reduction was not spread equally across the country. Poverty varied significantly by geographical regions, especially between urban and rural areas and between the north and south.[41] Food crop producing areas and fishing communities are more prone to poverty than communities in forest and cocoa producing areas.[42] The poorest and those living in the northern regions have benefited the least from the economic growth.[43] The dry savannah region that covers roughly two-thirds of Ghana's northern territory is drought-prone and faces chronic food insecurity. In this region, poverty rates are estimated two to three times the national average.[44] In fact, inequalities in income have worsened since the mid-1990s.[45]

While women represent more than 50 per cent of the population of Ghana, gender disparities remain in the sectors of health, education and labour market[47] Health expenditures are relatively high with 10.6 per cent (2009) of the GDP and rank 69 among 189 countries after the Netherlands. The total population life expectancy is 61.45 years (2012 est.). The government is also prioritizing education and spent 5.4 per cent of the country's GDP (2005) in this sector (rank 46 among 163 countries). On average, the total school life expectancy (primary to tertiary education) is 10 years (2009) and 67.3 per cent of the total population is literate (age 15 and over can read and write; 2010 census). However, inequalities exist between men (73.2 per cent) and women (61.2 per cent).[48]

2.4 Policy landscape

The country's long-term vision, or Ghana-Vision 2020, as set out in the 1995 National Development Policy Framework[50], is

School life expectancy (primary to tertiary education) in Ghana is 10 years. © CGIAR Climate

to achieve a balanced economy and a middle-income country status and standard of living, with a level of development close to the present level in Singapore. The national development strategy is based on five key themes: human development; economic growth; rural development; urban development; and an enabling environment. So far, this policy framework has been translated into five successive Five-Year Plans. The Ghana Shared Growth and Development Agenda (GSGDA) identifies medium-term objectives for the country and represents the government's development blueprint for the period 2010-2013. Within this period, accelerated agricultural modernization and effective natural resource management are seen as the pre-conditions for economic growth and poverty reduction.

Specifically, the key objectives identified for the environment and natural resource sector in the medium-term are as follows[51]:

- Improved cross-sectoral environmental management, including the consideration of global issues such as climate change and loss of biodiversity, as well as the opportunities of initiatives such as Reducing Emissions from Deforestation and Forest Degradation plus (REDD+);
- Strategic Environmental Assessment applied to inform decision-making and mainstream environment into all sectors of the economy, especially regarding the cost of environmental degradation;
- Improved Environmental and Social Impact Assessment processes and compliance.
- Decentralized environmental management, including the enforcement of laws on waste, illegal mining and chainsaw logging at the local level;
- Improved environmental monitoring and reporting; and
- Strengthened functional partnership and participation in environmental management with civil society, development partners, industry and research bodies.

Ten key areas of focus have been identified for the environment sector as part of the GSGDA:

- Climate variability and change
- Protected areas
- Biodiversity
- Land degradation and land use
- Marine and coastal ecosystems
- Mineral extraction (including oil and gas)
- Wetland and water resources
- Waste pollution and noise
- Community participation
- Natural disaster, risk and vulnerability

Various policy strategies and programmes have been formulated under each focus theme. In addition, as a cross-cutting theme, environmental policy objectives have been identified in other sectors, such as the need to protect the environment in the context of oil and gas development; increase the proportion of renewable energy; and ensure that energy is produced and utilized in an environmentally sound manner.[52]

Overall, the national priorities as identified in the GSGDA implicitly address many of the requirements of a green economy. These include the empowerment of rural populations through the reduction of structural poverty, exclusion and vulnerability; development of social and economic infrastructure and services in rural areas and urban communities; fair and balanced allocation of national resources across ecological zones, gender and income groups; the pursuit of low-carbon growth; improvement of private sector access to resources through partnerships with the public sector; removal of trade and investment obstacles to expand the space for private sector investment and participation; protection of the environment (including enforcement of environmental standards); climate change mitigation and adaptation; and mainstreaming sustainable land and environmental management practices in agricultural planning and implementation.

The GSGDA is the overarching policy framework for the country and other key policies and strategies in Ghana have to align to this framework. Table 3 shows a list of state programmes, strategies and actions plans that should have an influence on a green economy transition – sector-specific policies and strategies will be described in more detail in Chapter 3. The table illustrates that the GoG has already various policies and strategies in place and has ratified global conventions to achieve sustainable development. However, a lot more remains to be done. A draft national assessment report[53] on achievement of sustainable development goals and targets for the Rio+20 conference prepared in 2011 identifies a number of challenges in the transition to a green economy including: lack of political commitment to sustainable development; lack of coordination with other strategies; inadequate participation and ownership of programmes and plans; weak monitoring and evaluation and institutions; and lack of technical capacity for the formulation and enforcement of national strategies on sustainable development.[54]

Table 3 Main national and international policy frameworks to support sustainable development in Ghana

	State programme/Strategy/ Action plan	Implementation period (years)	Main implementation agency
Development			
1.	Medium-Term National Development Policy Framework: Ghana Shared Growth and Development Agenda (GSGDA) (2010)	2010-2013	National Development Planning Commission (NDPC)
2.	Ghana Growth and Poverty Reduction Strategy (2005)	2006-2009	National Development Planning Commission (NDPC)
3.	National Employment Policy (2012)	2012-2016	Ministry of Employment and Social Welfare
4.	National Health Policy	2007	Ministry of Health
5.	Health Sector Gender Policy	2009	Ministry of Health
6.	National Gender and Children Policy (2004)	Under review	Ministry of Women and Children's Affairs
7.	National Disaster Management Organization act	1996	National Disaster Management Organization
Energy			
8.	National Energy Policy of Ghana	2010	Ministry of Energy
9.	Renewable Energy Act	2011	Ministry of Energy
Agriculture (incl. Forestry)			
10.	Food and Agriculture Sector Development Policy (FASDEP II) (2007)	2009-2015	Ministry of Food and Agriculture
11.	Medium Term Agricultural Sector Investment Plan (METASIP)	2011-2015	Ministry of Food and Agriculture
12.	Tree Crops Policy	2012	Ministry of Food and Agriculture
13.	Fishery Act	2002	Ministry of Food and Agriculture
Environment			
14.	National Environmental Policy	1992, revised in 2010 (draft)	Ministry of Environment, Science, Technology and Innovation
15.	National Environmental Action Plan	1991	Ministry of Environment, Science, Technology and Innovation
16.	National Forest and Wildlife Policy	1994; revised in 2011	Ministry of Lands and Natural Resources
17.	National Land Policy	1999	Ministry of Lands and Forestry
18.	National Water Policy	2007	Ministry of Water Resources, Works and Housing
19.	National Biodiversity Strategy and Action Plan	2002	Ministry of Environment, Science, Technology and Innovation
UN submissions			
20.	Ghana's Second National Communication to the United Nations Framework Convention on Climate Change	2011	Environmental Protection Agency
21.	Fourth National Report to the UN Convention on Biological Diversity	2009	Ministry of Environment, Science, Technology and Innovation
22.	National Action Program to Combat Drought and Desertification	2002	Environmental Protection Agency
23.	National progress report on the implementation of the Hyogo Framework for Action (2010)	2009-2011	National Disaster Management Organization

3 Initial key sectors identified for a transformation to a green economy

The agriculture and industry sectors have significant potential for greening the economy. More specifically, the sub-sectors of cocoa and fisheries; forestry and logging; and electricity and waste management can have important impacts on the economy, as a whole, with implications for poverty reduction and environmental protection. These sub-sectors are discussed in more detail in this section.

3.1 Agriculture (cocoa and fisheries sub-sectors)

Ghana's agriculture is rain-fed and dominated by smallholder farmers. The sector is characterized by low productivity; limited inputs (low use of fertilizers); underdeveloped infrastructure; low degree of industrialization; weak linkages to the industry and service sectors; and low competitiveness.[55] The average fertilizer nutrient consumption is 6 kg/ha. The fertilizer application rate (based on total fertilizer use and arable land area) is 40 kg/ha and has increased by 10 per cent between 2006 and 2010. It is estimated that about 50 per cent of fertilizer imports (Ghana does not produce fertilizers) are consumed by cocoa.[56] Although agriculture has been the backbone of the Ghanaian economy for many years, its contribution to the country's GDP is gradually waning. The growth rate in the sector has declined from 7.4 per cent in 2008 to 0.8 per cent in 2011.

Agriculture is currently the second largest contributor of GHG emissions, after the energy sector.[57] The total GHG emissions from the agriculture sector increased, by 44 per cent between 1990 and 2006, mainly due to emissions from agricultural soils, enteric fermentation of domestic livestock, rice cultivation and manure management. The country is food-sufficient (except for rice), with the exception of the northern regions that remain food-insecure.[58] Agriculture also continues to employ nearly two-thirds (60 per cent) of the population.[59] The crop sub-sector stays the largest contributor to the economy, with 19.3 per cent of the GDP in 2011. The performance of the cocoa sub-sector remains strong but the performance of livestock, fisheries and food crop sub-sectors is relatively low.[60]

The world's second largest producer of cocoa, after Ivory Coast, Ghana positions itself as a reliable supplier of top quality cocoa.[61] The sub-sector currently remains the backbone of the country's economy, with a notable growth since 2000 due to favourable world prices and strong government support.[62] Important investments in the cocoa sub-sector have focused on tree-crop management, infrastructure and research programmes, and the provision of incentives to investors (price discounts, extended payment credit and special zone-related tax breaks).[63] The contribution of the cocoa sub-sector to the GDP increased from nearly 10 per cent to over 14 per cent between 2006 and 2011.[64] More than 800,000 smallholders are employed in cocoa production, mainly in the forest agro-ecological zones of Ghana.[65]

Foreign exchange earnings from agriculture increased from US$2 639 million in 2010 to US$3 334 million in 2011. Cocoa alone contributed to 23 per cent of the total foreign exchange earnings from the agriculture sector in 2011.[66] However, the growth of the cocoa sector has mainly been achieved through land expansion (such as deforestation) instead of improved management, raising concerns about environmental sustainability.[67]

Child labour in cocoa plantations is also a major issue. According to estimates 997,357 children were working in cocoa-related activities in Ghana in 2007.[68] Additional challenges facing the cocoa sub-sector include: poor yields; low incomes; limited farmer access to credit; poor availability of affordable and timely inputs; weak organizational capacity of farmers; and lack of technical extension support.[69]

The contribution of the fisheries sub-sector to the total GDP of the country decreased from about 2.5 to 2.3 per cent between 2006 and 2010. In 2008, the sub-sector contributed 8.59 per cent to the total agriculture GDP, a figure that decreased to about 7.58 per cent in 2011 (see Annex 1). According to the GoG (2002 est.), about 2 million people depend on the fisheries sub-sector for their livelihood, with mostly women involved in the processing and marketing activities.[70] This sub-sector is a key to food security as fish is the main affordable source of protein and part of Ghanaian staple diet. However, the current production does not meet the demand even with imports – a trend expected to worsen due to depleting stocks.[71] Indeed, the fisheries sub-sector faces various challenges including, but not limited to: over-exploitation; weak compliance with laws and regulations;

inadequate fishing infrastructure and weak collaboration among fishing communities; and lack of alternative livelihood opportunities for coastal/fishing communities.[72] The degradation of the Volta Lake — one of the world's largest reservoirs and coastal fisheries are estimated to have cost 0.16 and 0.27 per cent, respectively, of the annual GDP in 2005.[73]

Several policies and strategies have been developed to stimulate the growth of the agriculture sector, including cocoa and fisheries sub-sectors. Key policies and strategies include:

- **The Medium-Term National Development Policy Framework: Ghana Shared Growth and Development Agenda, 2009-2015 (GSGDA).** The country's medium-term development strategy focuses on the modernization of the agriculture sector with cocoa as one of the priority cash crops. Development strategies for cocoa include encouraging the promotion of organic cocoa; and introducing incentives to stimulate investments in local processing. The promotion of fisheries development for food security and income generation is also an objective of the GSGDA. Specific measures for fisheries focus on preventing over-exploitation; promoting responsible fishery; establishing co-management mechanisms with local communities and effective monitoring, control and surveillance systems; enforcing applicable laws and regulations; strengthening capacities of extension officers and farmer associations; improving infrastructures for storage, processing and exports; diversifying livelihoods; supporting private sector investments in aquaculture; and enhancing fish species management.

- **The Food and Agriculture Sector Development Policy 2009-2015 (FASDEP II).** In line with the GSGDA, the FASDEP II (2007) provides the current policy framework for the agriculture sector in Ghana. The country's vision for the sector is "a modernised agriculture culminating in a structurally transformed economy and evident in food security, employment opportunities and reduced poverty".[74] The policy targets an agricultural growth rate of 6 to 8 per cent per annum; crops and livestock leading the growth at an average annual growth rate of 6 per cent; forestry and logging, and fisheries, each growing at 5 per cent per annum; and with cocoa to remain robust in support of other sectors. FASDEP II emphasizes food security; improved income growth; increased competitiveness and sustainable management of the land and environment; application of science and technology; and improved institutional coordination.

  The cocoa strategy aims at increasing the proportion of locally processed cocoa. A specific focus is on the promotion of commercialization, marketing improvement, rehabilitation of roads and the maintaining of quality control. The fisheries policy focuses on inland fisheries

In the industrial sector, Ghana generally performs better than the sub-Saharan African regional average. © IFAD/ Nana Kofi Acquah

and aquaculture development. The objectives are geared towards increasing fish production, raising incomes and employment, protecting the fisheries resource and environment, and building capacity of relevant institutions. FASDEP II is supported by the Medium Term Agriculture Sector Investment Plan (METASIP) 2011-2015.

- **The 2012 Tree Crops Policy (TCP).** Also in line with the FASDEP II, is the recent TCP that recognizes the importance of tree crops (such as cocoa) for food security and social and environmental benefits. Some aspects of TCP include avoiding the clearing of land; improving working conditions on plantations (including the issue of child labour); and fostering pro-poor approaches in tree crop management through feeder road development in remote areas; adult education; micro-credit and micro-project programmes; and water and sanitation programmes, for instance.[75]

The implementation of these key agricultural policies and strategic plans could contribute to the greening of the cocoa and fisheries sub-sectors in Ghana by preserving and creating jobs for the poorest segments of the population, ensuring food security and preserving the environment. Various programmes and projects have already been implemented under those strategies (e.g., National Cocoa Rehabilitation Programme). However, further progress is required for the achievement of sustainable agriculture through the enforcement of existing rules and regulations; and intensification of existing strategies and programmes.[76]

The following are some examples of specific measures to encourage the greening of the cocoa and fisheries sub-sectors in order to bring greater socio-economic and environmental benefits to the country:

- **Conservation agriculture.** Conservation agriculture refers to agronomic practices that focus on minimum soil disturbance; maintenance of permanent soil cover; and the diversification of crop rotation to support resource conservation.[77] In East Africa, it has already been demonstrated that organic farming could lead to a 30 per cent increase in jobs per hectare.[78] Conservation agriculture can also reduce emissions as a result of reduced land disturbance and deforestation. As already indicated, cocoa production has had a relatively high ecological footprint because the increase in production has largely been achieved through land expansion rather than increase in productivity and land rehabilitation. As a result, Ghana's average annual cocoa yield over the last 30 years remains low (330 kg/ha)[79] and cocoa farming directly contributes to deforestation through the clearing of land.[80] About 1.3 per cent of the country's forests could be lost each year to unsustainably grown cocoa.[81]

The organic sector remains relatively limited in Ghana, with only a small number of organic cocoa groups. Organic farming is, by default, widespread due to the low level of fertilizer application.[82] While the promotion of organic cocoa production is mentioned in the GSGDA, FADSEP and METASIP are silent on this aspect. Progress is being made: the country has an active Ghana Organic Agriculture Movement (GOAN) and has recently established a Desk for Organic Agriculture at the Ministry of Agriculture.[83] The large-scale adoption of conservation and organic agriculture could support job creation; and balance productivity and resource-conservation needs through efficient and appropriate crop management and fertilizer use. A prerequisite for conservation agriculture is also reform of the land tenure system because existing land tenure issues prevent farmers from planting and maintaining shade trees in cocoa production fields.

- **Value addition and value chain development.** Most of the cocoa produced in Ghana is exported as raw beans, thereby limiting the economic returns to small-scale producers. Various measures could contribute to increase value addition in cocoa and fish production to improve farmers' livelihoods and increase the number of jobs in those sub-sectors. Investments in agricultural infrastructures and technologies (e.g., processing, storage), especially in remote areas, should be pursued and intensified. Examples of such investments include: production plants that provide value addition to cocoa beans; enhancing post-harvesting technologies; construction of road networks linking cocoa producing centres and fish products to market areas; new industrial set-ups to provide ready markets for aquaculture industry; and promotion of efficient and clean technologies for marine fishing activities. In addition, strong farmer and fishermen organizations are a prerequisite for accessing and benefiting from extension services and product certifications to maximize socio-economic benefits.[84] Increasing profitability could be an incentive for the young generation to invest in cocoa trees – thereby also increasing GHG removal by increasing the amount of tree plantations. Increasing value addition and promoting value-chain development can contribute to the greening of the cocoa and fishery sub-sectors by maximizing socio-economic benefits at all levels of the commodities' chain.

- **Agricultural research, development and capacity development.** Specific efforts should be made to develop the technical capacity of cocoa farmers and fishermen for sustainable cocoa production and fishing. The greening of aquaculture also requires development of the technical capacity of individuals and corporate organizations involved in the industry. Specific research programmes on sustainable coffee production (e.g., improved shade and

fertilizer management) should be supported. Innovative approaches to improve data collection and monitoring in the fisheries sub-sector should be developed.

- **Green agriculture finance and fiscal instruments:** In 2008, only 8 per cent of rural households in Ghana reported receiving credit for agricultural purposes.[85] Access to finance could be facilitated through the creation of financial institutions (banks) to provide credit facilities to cocoa farmers and fishing communities. Fiscal instruments to green the cocoa and fisheries sub-sectors could include: subsidized loans for groups or individuals keen to engage in either cocoa production or aquaculture following green economic paths; payment of environmental bonds (debt security) by corporate organizations undertaking aquaculture within the country's river basins; enhanced capital access for the modernization of fisheries and cocoa activities; measures to overcome the financial averseness of banks to lending to the agriculture sector; and the upgrade and strict implementation of all regulations enshrined in the fisheries policy.

3.2 Forestry and logging

The contribution of the forestry and logging sub-sector to the country's total GDP decreased from 3.7 per cent in 2008 to 2.8 per cent in 2011.[86] Tropical forest resources and Non-Timber Forest Products (NFTPs) have long underpinned livelihoods and employment opportunities in the country for commercialization and domestic purposes. The forestry sub-sector remains among the largest contributors of foreign exchange to the country. About 15 per cent of the population depends on forest resources for its livelihood.[87] However, the sub-sector growth rate has fluctuated over the years. Trends indicate a negative average growth rate of -5 per cent between 2008 and 2012.[88] The sub-sector is dominated by the timber industry. The formal supply of timber is essentially oriented toward exports and does not meet the domestic demand, leading to a high level of informal timber activities (especially illegal chainsaw activities).[89] Wood fuel and charcoal account for more than 70 per cent of the energy source in Ghana. While data is lacking in order to fully assess the importance of the informal forestry sub-sector, the economic value of NTFPs, for both commercial and household purposes, may outweigh that of timber.[90]

At least 50 per cent of the forest reserves and 70 per cent of the forest outside the reserves are degraded primarily because of the following reasons, cited in order of significance: agricultural expansion (especially for cocoa production); harvesting of wood; population and development pressures; and mineral exploitation and mining.[91] Various policy and governance issues (weak enforcement of regulations, weak regulatory mechanisms and rights regimes, excessive central control, conflicting government policies – such as cocoa price support); and economic forces (growing domestic demand, relatively inefficient logging and milling industry, market failures, forest royalty system that does not price trees at the real economic value) are further driving these processes.[92] From 1990 to 2000, the net GHG removals from the Land-Use Change and Forestry (LUCF) sector decreased from about 96 per cent.[93]

Deforestation – a consequence of conversion of forest and grassland for agriculture; poor agricultural practices; illegal logging; expansion of settlements; and surface mining and bush burning – was one of the major causes for the decline in the capacity of forests to remove CO_2, or, in other words, for the increase in CO_2 emissions from the sector. In 2006, Land Use, Land-Use Change and Forestry (LULUCF) accounted for 25 per cent of GHG emissions compared with 40 per cent from the energy sector, 24 per cent from agriculture, 10 per cent from waste and 1 per cent from industrial processes.[94]

The forestry sub-sector has primarily been guided by the 1994 National Forest and Wildlife Policy and the 1996 Forestry Development Master Plan (1996-2020). The 1994 policy aims at "conservation and sustainable development of the nation's forest and wildlife resources for maintenance of environmental quality and perpetual flow of optimum benefits to all segments of society."[95] However, the overall goal of sustainable forestry development has not been achieved, in view of the

Ghana is endowed with forests and wildlife. © Walter Callens

Ankasa Forest canopy. © Courtesy www.carboafrica.net

alarming trends in deforestation and forest degradation. Policy formulation and regulation have mainly been guided by economic concerns (i.e. timber exports versus other aspects of the forestry sector such as NTFPs crucial to livelihoods).[96] A reform of the sub-sector is currently underway. The 1994 policy was reviewed in 2011 but the document is yet to be officially released. The revised document is said to focus on the rehabilitation and restoration of degraded landscapes; the promotion of good governance; and the promotion of forest enterprise development as a means of wealth creation.[97] The revised policy also includes a special focus on climate change adaptation and mitigation.

The Forestry Commission of Ghana (FCG), responsible for the management of forest and wildlife resources and the coordination of related policies, is engaged in various actions – such as the National Forest Plantation Development Programme; and the five-year Natural Resources and Environmental Governance Programme – to support sustainable development of the forestry sector. Efforts are also increasingly linked to climate change adaptation and mitigation.

Since 2008, Ghana has been engaged in the process of developing a national strategy on REDD+ based on multi-stakeholder participation.[98] The piloting of the REDD+ programme in some localities of the forest belt is expected to create alternative employment opportunities; enhance livelihoods of many forest communities; and offer various environmental co-benefits for biodiversity, forests and fresh water body conservation/protection. Some of the key challenges to the success of REDD+ include community satisfaction with incentives in lieu of logging; and the control of illegal logging activities. Ghana is also a pilot country of the World Bank's Forest Investment Program of the Climate Investment Fund. The government's draft Forest Investment Plan focuses on the sustainable management of forest reserves; restoration of off-reserve areas; promotion of sustainable climate smart cocoa and agriculture farming; and the diversification of livelihoods to reduce pressure on forests.[99]

Keeping in mind that Ghana has one of the highest deforestation rates across Africa – more than 2 per cent annually between 2005 and 2010[100] – and that the annual cost of degradation is estimated to be 3.5 per cent of Ghana's GDP[101], green investments in the forestry and logging sub-sector are much needed to bring social, economic and environmental returns. Measures for greening this sub-sector include:

- **Implementation and intensification/scale-up of existing programmes on sustainable forest management:** Many more green policies and programmes for the forestry and logging sub-sector are needed, especially in areas where REDD+ will not be implemented. A specific focus could be made on extensive woodlot plantations and afforestation of the northern region, prone to desertification; implementation/intensification of existing programmes on the protection of forest reserves, reforestation of degraded forest areas to support rural livelihoods and carbon sequestration; and intensification of forest certification.

- **Research and capacity development:** Research should focus on assessing the real economic, social and environmental value of forest products and the appropriate ways for markets to capture all ecosystem services provided by forests (natural resource accounting). The government should invest in capacity development of all stakeholders, involved formally and informally in the forestry sector, in the sustainable use of forest resources.

- **Fiscal policy/regulatory instruments.** Instruments that could foster the greening of the forestry sector include:
  – criminalization of illegal logging with tough sentences;
  – provision of incentives, such as payments to communities and individual forest landowners for provision of ecosystem services, including watershed protection, biodiversity, recreation and carbon storage;
  – putting an economic price on all timber products;
  – effective land regulatory instruments to facilitate land acquisition for private afforestation projects and plantations;
  – taxation of timber products, with part of the taxes ploughed into reforestation and afforestation activities;
  – subsidized loans and incentives for the private sector to invest in forest restoration and conservation; and
  – removal of perverse and conflicting financial incentives (e.g., cocoa input subsidies) that currently encourage forest land conversion.[102]

Informed trade-offs need to be made to balance the need for funding without placing too-high taxes on goods such that could hamper economic development.

3.3 Industry (electricity and waste sub-sectors)

In 2011, the industrial sector contributed 25.9 per cent to the total GDP.[103] The sector is dominated by many Micro, Small and Medium Enterprises (MSMEs) with limited competitiveness and only a few large multinational companies. In 2011, Ghana stood at 104 in the ranking of 183 economies on the ease of starting a business. The country generally performs better than the sub-Saharan African regional average.[104]

3.3.1 Electricity sub-sector

In 2000, the bulk of energy consumed in Ghana was sourced from wood fuel and charcoal (60 per cent), followed by petroleum (29 per cent) and electricity (11 per cent).[105] Currently, nearly half of the grid electricity supply is distributed to the industry, particularly towards the production of aluminium, gold, and oil and gas.[106] Access to reliable and affordable electricity is crucial to Ghana's industrial development. For example, the drop in gold production in 2011 to about 83 tonnes (from 84 tonnes in 2010) was largely attributed to power supply shortages and increasing production costs.[33]

Globally, Ghana stands at 68 in the ranking of 183 economies on the ease of getting electricity in 2012 – a position largely above the regional sub-Saharan average of 122.[107] The electricity sub-sector is an important source of employment and foreign exchange earnings through exports of power to neighbouring countries. In 2011, Ghana exported more than 5 per cent (610 GWh) of the total energy produced.[108] Between 2008 and 2012 (provisional figures), the sub-sector achieved a growth rate of 10 per cent of the GDP.[109]

With a growing population and energy-intensive mining activities, Ghana faces a tight electricity supply-demand balance. The current supply comes from hydropower (two electric power plants) and thermal power plants – 67.5 and 32.5 per cent in 2011, respectively – and is dependent on uncertain rainfall, water inflows and fluctuating fuel prices. At the same time, the country faces a rapidly increasing electricity demand, projected at about 10 per cent per annum.[110] Furthermore, while on average more than half (66 per cent) of the country has access to grid electricity, access is reduced to less than half (30 per cent) in the northern region and the majority (80 per cent) of the energy is consumed in urban areas.[111]

Currently, the energy sector is the leading contributor of all GHG emissions (without LUCF) (see Annex 3 for details of GHG sector-wise emissions in 1990 and 2006). Energy industries are one of the major sources of GHG emissions within the sector. The contribution of energy industries to all GHG emissions increased from about 4.14 per cent in 1990 to about 26 per cent in 2006. Thermal plants also rely heavily on either natural gas or crude oil in order to generate electricity and are major sources of GHG emissions. In 2011, electricity production consumed 20 per cent (2 million barrels) of the total imported crude oil consumption (the rest was consumed for primary refinery operations).[112]

The development of the energy sector in Ghana is guided by the 2010 National Energy Policy. The government's vision for the energy sector is the creation of an "Energy Economy" that provides secure, reliable and affordable energy for all sectors of the Ghanaian economy, while becoming a net exporter

of oil and power by 2012 and 2015, respectively".[113] The main goals of the power sub-sector are twofold: to increase installed power generation capacity from the current 2 000 to 5 000 megawatts (MW) by 2015; and to increase access of electricity (by households and industries) from the current level of 66 per cent to universal access by 2020.[114] In addition, the power sub-sector recognizes the importance of renewable energy in supporting the creation of universal access to electricity in Ghana by 2020.

It is estimated that renewable energy technologies could provide at least 5 per cent of the country's current electricity requirements.[115] The recent 2011 Renewable Energy Law further aims at improving access to electricity through the use of renewable energy sources (particularly solar, wind, mini-hydro and waste-to-energy). The law establishes two important measures in line with the requirements of a green energy sector:[116]

- the Renewable Feed-in-Tariff Scheme aims at encouraging investments in renewable energy by guaranteeing the sale of electricity generated from renewable energy sources; and
- the Renewable Energy Fund provides financial resources for the promotion, development and utilization of renewable energy sources.

The foci of the current electricity sub-sector policy goals could have positive impacts on all three pillars of sustainable development provided they are efficiently and vigorously implemented. The objective of achieving the universal supply of electricity should support the establishment of industries and the creation of jobs. The incorporation of renewable energy sources will likewise create employment opportunities and benefit the environment. The objective to reduce the use of fossil fuels, especially kerosene and biomass in most rural areas, should reduce the GHG emissions levels and contribute to improving the health status of people and reducing the level of deforestation. These objectives are also in line with the Ghana Industrial Policy. The policy recognizes the importance of adequate, efficient and cost-competitive electricity and water supplies for industrial development while ensuring environmental sustainability. The policy also supports the development and implementation of energy and water efficiency; and conservation programmes.[117] Finally, the Ghana Energy Commission has already developed and is developing different code of practices and regulations on electricity (e.g., 2010 National Electricity Grid Code, Electricity Distribution Code).[118]

3.3.2 Waste sub-sector

The waste sub-sector is represented by the water and sewage sub-sector, for the purpose of this scoping study. In 2006, the water and sewage sub-sector contributed about 1.3 per cent to the total GDP of Ghana, while slumping to 0.9 per cent in 2010. Ghana generates about 4.5 million metric tonnes of solid waste a year.[119] Waste management provides employment for the population in both urban and rural areas. For example, the need for proper waste management has led to the emergence of waste management companies, such as Zoomlion Ghana Limited. In 2011, this company had a core staff of 3 000 and ground staff of 65 000, together with other waste contractors.

However, improper waste management can have significant impact on water quality and public health. The prevalence of untreated waste in the urban areas has already contributed to cholera outbreaks and an increase in mosquito breeding sites. GHG emissions from the waste sector have been increasing since the 1990 levels mainly because of increasing per capita solid waste generation and population increases, especially in urban areas. On average, the waste sector contributed to 10 per cent of all GHG emissions (without LUCF) between 2000 and 2006. Solid waste disposal on land constituted the major (over 72 per cent) source of GHG emissions in 2006.[120]

Waste management in Ghana falls under various acts and regulatory instruments. However, the main policy framework governing waste management in the country is the revised 1999 Environmental Sanitation Policy (ESP). This policy especially aims at improving access to hygienic toilets; implementing active sanitary inspection and vector control programmes to control the incidence of vector-borne diseases; and at enforcing all environmental standards and sanitary regulations. The revised ESP also promotes public-private-partnerships (PPPs) for waste management. In addition, the 2007 National Water Policy seeks to "achieve sustainable development, management and use of Ghana's water resources to improve health and livelihoods, reduce vulnerability while ensuring good governance for present and future generations". Overall, the targets and provisions of these two policies have the potential to enhance sanitation and water resource improvements in the country, leading to a reduction in health challenges, and also to the creation of employment opportunities. Interestingly, one of the key objectives of the Ghana Industrial Policy is to ensure environmentally sustainable industrial production: However, the issue of waste management is not mentioned.

Various opportunities exist for green investments – in the industry and electricity sub-sectors – to bring more social, economic and environmental benefits to the country:

- **Intensification of renewable energy investments and dissemination.** The achievement of universal access to electricity in Ghana by 2020 will depend on the capacity of the country to diversify its energy sources; and, in particular, on the enhancement of renewable energy dissemination (taking into account the numerous remote settlements in the country). The current national energy policy goal is to increase renewable energy supply from the current abysmal level of under 1 per cent (excluding

large hydropower plants) to 10 per cent of the national energy mix in 2020.[121] This calls for the enhanced and gradual dissemination of renewable energy by taking advantage of the provisions established in the 2011 Renewable Energy Law (i.e. Feed-in-Tariff Scheme including the Renewable Energy Purchase Obligation and biofuel promotion without compromising food security). Biomass (firewood and charcoal) should be gradually replaced by solar photovoltaic, wind farms, biogas energy technologies, and biofuels. This will require investments in infrastructure and technology.

- **Intensification of energy efficiency and conservation measures.** In 2011, the total power transmission losses represented 4.9 per cent of the gross electricity transmitted.[122] Conservation measures and programmes (e.g., ban on the importation of incandescent filament lamps; and programmes such as Refrigerator Energy Efficiency project) have resulted in a significant reduction in energy consumption in Ghana.[123] Further efforts are required to help mitigate the current spiral growth rates of electricity demand, hovering between 6 and 7 per cent per annum.

- **Research and capacity development.** To complement the investment and dissemination processes of renewable energy technologies and to create jobs, opportunities for investment include building of human and institutional capacity to handle these technologies. Investments can be channelled to support research and development on renewable energy and to train students in renewable energy technologies. Transitioning to a green economy will also require finding the appropriate mix of conventional and renewable energy types; and developing appropriate infrastructures for the generation, transmission and distribution of energy.[124]

- **Green energy finance.** In general, access to credit facilities from local financial institutions to finance activities in the industrial sector has been limited in Ghana. The government should establish financing schemes to help lower the high initial costs of renewable energy technologies and encourage the development of renewable energy markets through tax support, insurance and loans that support investments in renewable energy.[125]

- **Policy instruments.** Policy instruments to support green energy development and especially to increase the renewable energy levy, should include: strict implementation of the renewable energy Feed-in-Tariff (FiT) policy; *legislations* that ban the production/importation and use of inefficient electrical appliances, especially old appliances; *standards and regulations* such as Renewable Portfolio Standards to require electricity producers to generate a certain percentage of their electricity needs from renewable energy technologies (e.g., solar PV or wind turbines); *subsidies* for households purchasing renewable energy technologies; *tax waivers and other incentives* for all renewable energy technologies imported into the country for electricity generation to reduce their selling prices; introduction of high taxes on non-renewable electricity generation sources such as diesel generators, mini-thermal plants; removal of fossil fuel subsidies; and *national reward schemes* for individuals and organizations utilizing renewable energy sources for the bulk of their electricity needs.

Given the huge amount of municipal, industrial and agricultural waste generated each year in Ghana, many opportunities abound within the waste sub-sector for green investments, employment creation and health benefits, such as the following:

- **Invest in waste reduction, reuse and recycling.** The Renewable Energy Law aims at promoting the use of waste-to-energy resources as a significant part of the national sanitation programme.[126] Investments can be channelled to energy technologies (e.g., combustion, gasification, pyrolysis, anaerobic digestion, fermentation, esterification) to convert waste into electricity, heat and fuel. Waste recycling will require the development and implementation of integrated land use management and urban plans and investments in appropriate urban services (e.g., recycling plants and factories for the production of organic (composting) and inorganic fertilizers); and training in waste recycling and waste engineering. The promotion of venture capital funds could support innovative initiatives in this field.[127] This should contribute to minimizing the negative impacts of waste on the environment; increasing the number of jobs; and improving health and sanitation, especially in the urban area.

- **Fiscal policy instruments and regulatory tools.** The following fiscal instruments can help green the waste sub-sector: high fees for waste collection; heavy fines for indiscriminate disposal of wastes; eco-labelling certain items; high taxes on non-degradable plastic materials, especially plastic bags; provisions of incentives to entrepreneurs to establish recycling plants; and introduction of a Volume-Based Waste Fee system.

- **Ensure a strong regulatory framework.** Regulatory policies to green the waste sub-sector should include strict implementation of existing policy instruments. In addition, all buildings, including prospective ones should be mandated to incorporate water harvesting technologies in their architectural systems.

4 Discussion of policy-enabling conditions

This sub-section considers the different enabling conditions imperative for the aforementioned sectors in Ghana to transition to a green economy. These recommended enabling conditions have also benefited from the inputs from various stakeholders, who participated in a technical workshop held in Accra on 19 April 2012.

4.1 Regulations and voluntary initiatives

4.1.1 Adapt and enforce standards to key sub-sectors

The 1992 National Environmental Policy of Ghana, with its accompanying 10-year National Environmental Action Plan (NEAP), provides a host of environmental standards. While these general standards are important, more specific ones focusing on both environmental and social aspects (e.g., labour standards) and adapted to the key sub-sectors can enhance their greening process. The enforcement of sound regulations and standards (environmental but also social standards) can facilitate the transitioning of cocoa, fisheries, forestry and logging, electricity and water and sewage sub-sectors to a green economy.

4.1.2 Voluntary sustainability initiatives

Voluntary Sustainability Initiatives (VSI) can be defined as "any non-obligatory initiative explicitly designed to promote the objectives of sustainable development, including eco-labels, certification initiatives, corporate social responsibility programmes, business-to-business initiatives and other collaborative or multi-stakeholder initiatives".[128] Eco-labelling can contribute to providing more transparent information about the sustainability of a product (e.g., chocolate, fish and timber wood) to consumers; and ensure that a certain degree of sustainability is achieved in production, distribution or use. Standards create awareness among stakeholders of the product's value chain on the need to transition to a green economy.

The eco-labelling of chocolate, fisheries, timber wood and electricity produced from renewable energy can contribute to reducing environmental impact. This can be achieved, for instance, through the use of cleaner technologies; efficient use of natural resources; and use of more organic fertilizers and less of pesticides while maintaining productivity and increasing the product's market. For example, in 2010, Ghanaian farmers tripled the amount of FairTrade certified cocoa sold to Cadbury to 15,000 tonnes.[129] Another example includes renewable portfolio standards that require electricity generators to ensure that a certain percentage of generated electricity comes from renewable sources. VSI should be supported by cogent regulatory instruments and their implementation should be strictly monitored to ensure desired effects.

4.1.3 Intensify and scale up existing efforts

Some progress and success stories already exist, especially in the fields of responsible management of forests and timber resources (e.g., ensuring reforestation and proper harvesting of forest products); energy conservation; and, to some extent, in sustainable crop management. In the forestry sector, forest certification initiatives in Ghana started in 1997 and the National Forest Management Certification Standard has been reviewed and updated. The process of developing forest certification standards is supported by a national Working Group on Forest Certification comprising various stakeholders. Ghana has also signed the Voluntary Partnership Agreements (VPAs) with the EU to ensure that only legal timber and products are exported to the EU.[130] Products derived from legal and environmentally-friendly managed forests can be certified under the Ghanaian National Forest Stewardship Standard (FSS), approved by the Forestry Stewardship Council (FSC) Policy and Standard Committee.[131]

In the electricity sub-sector, the government also approved, in 2005, the Energy Efficiency Standards and Labelling Regulations for room air conditioners and compact fluorescent lights. A bill was passed in 2007 to ban the

A scenic waterfall in Ghana. © John and Clare

sale of incandescent bulbs.[132] Further green certification standards should be set for industries and multinational companies for the use of renewable energy as part of their energy consumption mix. In the cocoa sub-sector, a few certification schemes/voluntary standards are already operating in Ghana (FairTrade, Rainforest Alliance, Organic and UTZ Certified) to support a more ethical and sustainable cocoa production system. However, progress in this sector remains in the early stages.[133] Currently, Ghana together with Ivory Coast, Dominican Republic and Peru produces more than half (53 per cent) of the world's conventional cocoa for export, yet, it accounts for only three per cent of sustainable cocoa production.[134] VSI should be pursued and expanded to other sectors and products (e.g., standards for disaggregating wastes).

4.2 Economic and fiscal policy instruments

Green economic and fiscal policies (in the form of taxation, subsidy or market mechanism) are indispensable to boosting the transition of the selected sub-sectors to a green economy. Growth in oil and gas revenues also provides a major opportunity for the government to finance the transition to a green economy. Under the current Medium-Term National Development Policy Framework of Ghana, some of the fiscal policy instruments identified by the GoG to achieve fiscal policy objectives underscore the greening of the sub-sectors under consideration. These include: taxation of natural resources and reduction in tax exemptions; institutionalization of tax reforms with emphasis on indirect taxes and enhancing tax incentives; and improvement of import/export regime.[135] Other critical fiscal policy instruments to drive green growth in the selected sub-sectors are discussed in the following sections of this chapter.

4.2.1 Removal or reduction of international trade barriers

The removal or reduction of international trade barriers can enhance the transfer of novel and appropriate green technologies, such as solar PV, wind turbines, aquaculture, waste-to-energy and waste-to-fertilizer technologies. It can also boost the confidence of investors and small-scale entrepreneurs, prepared to tailor their activities to a green economy. While further in-depth analysis is required to understand the impact of removing trade barriers on environmental and economic fronts, it is important for Ghana to liaise with the international community to explore market access opportunities for green goods, especially through the 2000 African Growth and Opportunity Act (AGOA) that offers a platform for trade and investment between the US and sub-Saharan Africa.

4.2.2 Subsidy reform

Perverse subsidies in energy and agriculture, among other sectors, should be progressively removed to encourage environmentally-friendly and pro-poor investments. Previous experience in Ghana shows that this requires investment in awareness campaigns backed by independent assessments and a strong political will. The government's fossil-fuel subsidies reforms have not been successful, despite several attempts between 2001 and 2005. Fossil fuel subsidies continue to form an important part of the budget expenditure. However, evidence shows that such subsidies have not benefited the poorest segment of the Ghanaian population and that funds spent on fossil fuel subsidies could be diverted to finance social development.[136]

In the agriculture sector, the government has also been subsidizing the cost of fertilizers since the 1980s, leading to an increase in fertilizer consumption. The fertilizer subsidy programme represented 21.3 per cent (approx. US$10.7 million or GHC 20.6 million) of the public agriculture budget in 2008, down to 11.7 per cent (approx. US$15.6 million or GHC 30 million) in 2010.[137] However, the benefits of the different fertilizer subsidy programmes (including the cocoa fertilizer subsidy) to smallholder farmers have yet to be fully assessed.[138] Cocoa input subsidies have encouraged forest land conversion.[139] Perverse subsidies should be redirected to green investment opportunities.

Finally, it should be noted that fiscal policy instruments (particularly market mechanisms) must be implemented in a transparent manner and closely monitored for the effect they have on the economy. Ensuring that the economy can bear an increased cost (such as increased taxes on fossil fuels) is essential to prevent economic recession and its resultant negative effects on employment and standard of living.

Market interventions must be transparent and frequently evaluated to ensure continued market confidence and to prevent negative side effects, such as production shutdowns when companies cannot meet high carbon taxes.

4.3 Financing – potential sources and partners

Considering the often high initial investment costs involved, innovative financing is imperative for the effective and successful transition to a green economy in Ghana. The existing financing climate, in which most banks are averse to lending to the agriculture sector because of perceived risks, does not augur well for a green economy transition in Ghana. However, there are several instruments for stimulating investment in a green economy:

4.3.1 Green budgeting and finance initiatives

Ghana should include annual budgetary allocation for green investments in the various sub-sectors. The country should also embrace and implement the "green finance" paradigm, which can be defined as market-based investment and lending schemes that incorporate environmental factors. This financing method can cover numerous green economy activities in Ghana. For instance, green agricultural loans with modest interest rates from banks; environmental bonds in the fisheries, cocoa and forestry and logging sub-sectors; venture capital for renewable energy projects in the electricity sub-sector; and certified emissions reductions.

Green finance initiatives can be funded by the government, the private sector and the donor community. Examples of national initiatives to finance renewable energy in Ghana include: the Business Development Services (BDS) Fund, which contributes to renewable energy development under the Ghana Energy Development and Access Project (GEDAP); the Renewable Energy Fund, which has supported research and development of environmentally-friendly technologies; and participation in the Clean Development Mechanism (CDM) to reduce GHG emissions in the country. In 2012, the government registered its first CDM project, which focuses on the composting of municipal solid waste in the Accra area.[140] Ghana has also produced a list of Nationally Appropriate Mitigation Actions (NAMAs) that mainly target the energy sector to attract international funding for low carbon development.

4.3.2 Favourable investment climate and risk reduction instruments

The creation of a favourable investment climate, required to bolster the financing of a green economy, can be addressed from different angles. For instance: reduction of financing barriers imposed by the local economy; intensification of capacity building and knowledge transfer to increase awareness of green economy opportunities across the various sectors; and development of PPPs to enhance private sector investment. Moreover, financial institutions are usually well-experienced in addressing business risks. They could inform and advise the private sector to mitigate risks in green economy-related investments. Currently, for many investors, barriers to low carbon investment do exist, such as the lack of policy predictability and absence of transparent rules and procedures needed to provide stable conditions for investment in low-carbon technologies. To overcome these uncertainties, mechanisms including credit-risk guarantees and other risk-sharing instruments should be strengthened in Ghana.

4.4 Institutional and policy processes

Supporting institutional arrangements and policy processes is a prerequisite for the effective implementation of the aforementioned enabling conditions. The achievement of a green economy in the various sectors of Ghana can only occur with the presence of strong, effective and vibrant institutions that are result-oriented and have the technical expertise required for the transition. The following conditions are indispensable for institutions to support the green economy drive in Ghana:

4.4.1 Sustainable public procurement

Governments are major consumers of goods and services and can greatly influence purchases. In Ghana, more than half (52 per cent) of the government budget is spent on procurement.[141] Ensuring that public funds are spent responsibly can, therefore, offer a substantial push to transitioning towards a green economy. At the international level, the Marrakech Process, launched in 2003, provides a platform to support sustainable consumption and production. One of the Marrakech Task Forces that support the implementation of this process focuses on Sustainable Public Procurement (SPP). Ghana is the only African country participating in this initiative.

The objective of sustainable procurement is that "organisations meet their needs for goods, services, works

and utilities in a way that achieves value for money on a whole life basis in terms of generating benefits not only to the organisation, but also to society and the economy, whilst minimising damage to the environment".[142] Some initiatives are already on-going, especially in the public procurement of wood and paper-based products and it is expected that it will contribute to reducing over-exploitation of timber resources and support climate-change mitigation.[143]

The government has reviewed its 2003 Public Procurement Act and is finalizing a policy and action plan on SPP to include environmental and social safeguards such as conditions and methods of production with respect to the environment – avoiding illegal logging, workers' rights, health and safety requirements – that are associated with the goods and services bought. So far this is the first initiative of its kind in Africa.[144] The government should finalize and implement the SPP policy, which should support the implementation of important programmes and strategies, such as the Ghana Sustainable Action Plan/ National Programme on Sustainable Consumption and Production for Ghana (2011-2016) and the National Climate Change Adaptation Strategy (NCCAS).

4.4.2 Capacity development and awareness campaigns

Capacity development across various green economy issues is critical to academic and government institutions as well the private sector. Academic institutions should be supported to undertake courses and trainings (for example, quantitative modelling) that will equip them with the requisite technical expertise to design relevant courses and to initiate cutting-edge research that will inform the transition towards a green economy and create a skilled workforce equipped with necessary qualifications for work in green sectors. Government institutions should organize workshops to explore the implications of a green economy for their institutions. For example, many government workers in Ghana are unable to distinguish the differences among the concepts of green economy, sustainable development and climate change. The private sector should be trained on corporate social responsibility and the role of private financing for a green economy transition. In parallel, awareness campaigns related to green economy, its benefits and challenges in the short- and long-term are needed. How well green economy is understood at all levels including at the grassroots is one of the great determinants of its success.

4.4.3 Monitoring and evaluation

The monitoring and evaluation of green economy policies by using economic, environmental and social indicators is paramount to assessing progress towards sustainable development. A major key finding in this study is the dearth in reliable and up-to-date scientific data on all natural resources in Ghana. The non-availability of such relevant data impedes rigorous economic and scientific analyses, which are fundamental to Ghana's transition process to a green economy. The country should take steps to improve the collection of data on environmental and social indicators. Specifically, the country should promote environmental auditing and accounting.

Another aspect to monitoring and evaluation relates to policy effectiveness. The government should be monitoring the implementation of enabling actions (i.e. regulations, standards, economic instruments) to ensure that they are having the desired effects and not creating undue side effects. Monitoring and evaluating policy implementation and effectiveness is essential to ensuring that the transition is proceeding in the direction desired. Where needed, policies may need to be re-evaluated, modified and perhaps replaced to ensure desired outcomes.

4.4.4 Institutional collaboration and stakeholder engagement

A vibrant and sustained institutional collaboration between and among various government institutions, the private sector, academic institutions and communities is needed to facilitate the transition towards a green economy. Various government institutions still need to harmonise their activities to avoid duplications and potential contradictions and for informed trade-offs. Strong collaborations with international agencies, such as UN agencies and the World Bank, on improving environmental accounting should be encouraged. In addition, eliminating unfair international trade practices concerning products from Ghana is very salient to boosting international trade and investments in sectors that will propel the green economy. A Ghana International Trade Commission should be established to engage the international community through lobbying and negotiation.

4.4.5 Good governance and strong political will

Underlying all the institutional measures for a green economy is the need for good governance and political stability in Ghana. A strong political will with respect to implementing policies designed for a green economy; and the fight against corruption in institutions concerned with green economy activities will pave the way for success. For example, the rapid removal of a 20 per cent environmental tax on plastic packaging materials and products in 2010 failed to demonstrate a strong political will for greening the environment.

5 Conclusion

The objective of this scoping study was to map out how Ghana can transition to a green economy; and to provide a framework for this process. Since the past two decades, the economy of the country has grown steadily and human welfare has improved. A review of the country's development vision and priorities shows that various relevant policies and strategies are already in place and global conventions have been ratified to achieve sustainable development. However, implementation of relevant policies and strategies remains a challenge and economic growth is associated with increased social inequalities and environmental degradation. It is clear that while progress has been made in improving conditions in the country, more work is needed and greater balance can be achieved between economic, social and environmental development. It is for this reason that a green economy framework can be beneficial for Ghana's long-term development.

Historically, there has been a pattern where economic development has come at the expense of resource depletion, environmental degradation and exacerbated social challenges. The fisheries sub-sector, crucial to food security, is facing a problem of resource over-exploitation. The growth of the cocoa sector has largely been achieved through land expansion and deforestation; and child labour on the plantations remains widespread. The growth of a vibrant green cocoa sector and fisheries industry could provide various co-benefits in other key sectors of Ghana's economy, such as better forest management, energy production, GHG reduction and waste management. The greening of the agriculture sector is a prerequisite to Ghana's sustainable development considering that:

- the sector currently remains the main source of employment;
- fewer people in rural areas need to produce food for a growing urban population; and
- the government aims at modernizing the sector in order to increase agricultural productivity, essential to food security.

While women represent more than 50 per cent of the population of Ghana, gender disparities remain in the sectors of health, education and the labour market. © IFAD/ Nana Kofi Acquah

Even as the forestry and logging sub-sector provides employment and livelihoods through timber exports; and fuel wood and NTFPs, respectively, the long-term health of the sector is at risk as Ghana has one of the highest deforestation rates in Africa. While access to electricity is crucial to Ghana's industrial development and growing population, the current supply depends on a few hydropower and thermal power plants, and biomass. Production is marked by high uncertainties because of a reliance on uncertain rainfall and water flows, and the fluctuation of fuel prices. The sector is also a major contributor to GHG emissions. The rapid population growth in urban areas has also led to improper waste management with impacts on water quality and human health.

The following priority actions for each sector have been recommended as part of this study in order to pursue the transition to a green economy and facilitate the realization of the goals of Ghana Vision 2020:

Cocoa and fisheries	↘ Promote large-scale adoption of conservation agriculture; and reform land tenure system; ↘ Increase value addition of agricultural products through investments in infrastructure and technology and strong farmer organizations; ↘ Invest in sustainable agriculture research and capacity development; and ↘ Develop green agriculture finance and fiscal instruments.
Forestry and logging	↘ Implement and intensify/scale up existing programmes on Sustainable Forest Management (SFM); ↘ Invest in research and capacity development in SFM; and ↘ Develop fiscal policy/regulatory instruments for SFM.
Electricity	↘ Intensify renewable energy investments and dissemination; ↘ Intensify energy efficiency and conservation measures; ↘ Invest in research and capacity development on energy diversification and conservation; ↘ Develop green energy finance; and ↘ Develop and enforce policy instruments to support the dissemination of renewable energy.
Waste	↘ Invest in waste reduction, reuse and recycling; ↘ Develop fiscal policy instruments and regulatory tools; and ↘ Ensure a strong regulatory framework.

Implementation of these priority actions requires various enabling conditions – with regard to regulations and standards, fiscal policy instruments, institutional and policy processes to support reforms and financing – such as the following:

Regulations and standards	↘ Adapt and enforce standards to key sub-sectors ↘ Intensify and scale up existing efforts (e.g., Forest Certification, FairTrade certified cocoa)
Fiscal policy instruments	↘ Removal of international trade barriers ↘ Reduced tariffs and taxes ↘ Green subsidies (remove perverse subsidies such as fossil fuel subsidies)
Financing instruments	↘ Include green investments in annual budgetary allocation (green budgeting) ↘ Support and participate in green finance initiatives ↘ Create a favourable investment climate and risk-reduction instruments
Institutional and policy processes to support reforms	↘ Support Sustainable Public Procurement (SPP) ↘ Develop capacities and awareness campaigns for green economy ↘ Monitor and evaluate progress towards a green economy ↘ Foster institutional collaboration and stakeholder engagement ↘ Ensure good governance and strong political will

The green economy approach offers concrete measures to protect the environment and reduce social inequalities, while enhancing economic development. With its current positive economic outlook, Ghana's transition to a green economy can start from a position of strength. The national vision that already subscribes to many green economy principles is also representative of the motivation that the government has to enact the transition. The key national policies, strategies and programmes are also in line with sustainable development objectives. If adequately managed, the recent exploitation of oil and gas fields could provide the necessary revenues to support the implementation process. The transition calls for sustained political will and good governance.

References

AfDB, OECD, UNDP, UNECA. (2012). *African Economic Outlook 2012: Ghana.* OECD. Available at: http://www.keepeek.com/Digital-Asset-Management/oecd/development/african-economic-outlook-2012_aeo-2012-en [Accessed: 16/12/12]

Agyepong, J. S. (2011). *Barriers to Private Sector Participation in Sustainable Waste Management – Experiences of Private Operators and Waste Service Providers in Ghana. Presentation at the UN Conference on Building Partnerships for Moving Towards Zero Waste.* Zoomlion Ghana Limited, Accra. Available at: http://www.uncrd.or.jp/env/spc/docs/plenary3/PS3-e_Ghana_JOSEPH per cent20SIAW per cent20AGYPONG.pdf

Allotey, J (2007). *Status of Biodiversity and Impact Assessment in Ghana.* Accra, Ghana.

Appiah, F.K. Donkor, R. (2011). *Renewable Energy Development in Ghana.* Accra, Ghana. Available at: http://www.ics.trieste.it/media/831506/10_ per cent20Ghana per cent20-per cent20Appiah.pdf [Accessed: 07/05/12]

Bank of Ghana (BoG). (2012). *Annual Report 2011.* Available at: http://www.bog.gov.gh/index.php?option=com_content&view=article&id=1006 per cent3Aannual-report-2011&catid=102 per cent3Aannual-reports&Itemid=172 [Accessed: 11/01/12]

Bonsu Osei-Asare, Y. (2009). *Status of Organic Agriculture in Ghana: A Survey of Consumers, Producers, and Marketers. An FAO/GOAN/MOFA Project on Organic and Fair Trade Export from Africa.*

Breisinger, C., Diao, X., Kolavalli, S., Al Hassan, R., Thurlow, J. (2011). *A New Era of Transformation in Ghana. Lessons from the Past and Scenarios for the Future.* International Food Policy Research Institute. Washington D.C.

Carrall, S. (2010). *Cadbury takeover raises doubts over Kraft's business ethics.* Guardian Unlimited. Available at: http://www.guardian.co.uk/business/2010/jan/20/cadbury-kraft-takeover-fair-trade (Accessed: 14/01/13)

Central Intelligence Agency (CIA). (2013). *Ghana. The World Factbook.* Washington, D.C. Available at: https://www.cia.gov/library/publications/the-world-factbook/geos/gh.html (Accessed: 15/01/13)

Crawford, G. (2012). *Ghana's Fossil Fuel Subsidy Reform.* Case Study 09. Institute of Development Studies (IDS), London

Dorm-Adzobu, C. (2010). *Draft National Environmental Policy of Ghana.* March, 2010. Accra, Ghana.

Ecoecon Consult LTD. (2011). *Draft National Assessment Report on Achievement of Sustainable Development Goals and Target for Rio+20 Conferences.* Accra.

Environmental Protection Agency (EPA). (2011). *Ghana's Second National Communication to the United Nations Framework Convention on Climate Change (UNFCCC),* Republic of Ghana, Accra, Ghana.

Eshun, J. F., Potting. J., Leemans, R. (2010). *Sustainability of Forestry and Timber Industry in Ghana.* International Forestry Review, 12(4):383-395.

FAOSTAT website. (2012). Available at: http://faostat3.fao.org/home/index.html#HOME

Food and Agriculture Organization (FAO). (2010). *The Global Forest Resources Assessment 2010.* Rome: FAO. Available at: http://www.fao.org/docrep/013/i1757e/i1757e.pdf

Forestry Commission of Ghana website. *Forest and Wildlife Policy.* Available at: http://www.fcghana.com/ [Accessed: 11/01/13]

Forest Stewardship Council website. *Ghana.* Available at: http://ic.fsc.org/ghana.479.htm [Accessed: 11/01/13]

Ghana Energy Commission. (2012). *2012 Energy (Supply and Demand) Outlook for Ghana.* Republic of Ghana, Accra.

Ghana Energy Foundation. (2006). *Energy in Ghana.* Available at: http://www.ghanaef.org/energyinghana/energyinghana.htm [Accessed: 12/01/13]

Ghana Energy Foundation website. Available at: http://www.ghanaef.org/

Ghana Statistical Service (GSS). (2012). *Provisional Gross Domestic Product 2012.* Government of Ghana: Accra.

Ghana Statistical Service (GSS). (2011a). Ghana's Economic Performance 2011 in Figures. Accra.

Ghana Statistical Service (GSS). (2011b). *2010 Population and Housing Census.* Provisional Results.

Ghana Statistical Service (GSS). (2008). *Ghana Living Standards Survey. Report of the Fifth Round GLSS5.*

Accra, Ghana. [Online]. Available at: http://www.statsghana.gov.gh/docfiles/glss5_report.pdf (Accessed: 10/03/12).

Government of Ghana (GoG). (2012). *Ghana: MEST Registers First Ever Clean Development Mechanism in Ghana.* Press Release. 9 July 2012. All Africa. Available at: http://allafrica.com/stories/printable/201207100403.html [Accessed: 11/01/13]

—. (2010a). *Medium-Term National Development Policy Framework: Ghana Shared Growth and Development Agenda (GSGDA), 2010-2013.* Vol. 1. National Development Planning Commission, Accra, Ghana.

—. (2010b). *The Coordinated Programme of Economic and Social Development Policies, 2010-2016. An Agenda for Shared Growth and Accelerated Development for a Better Ghana.*

—. (1995). *Ghana-Vision 2020. The First Step: 1996-2000. Presidential Report on Coordinated Programme of Economic and Social Development Policies.*

http://www.ghana.gov.gh/. (2011). *Workshop on Sustainable Wood Products Procurement.* Available at: http://www.ghana.gov.gh/index.php?option=com_content&view=article&id=4828:workshop-on-sustainable-wood-products-procurement&catid=28:general-news&Itemid=162 [Accessed 13/01/13]

http://www.ghana.gov.gh/. (No date). *Ghana Industrial Policy.* Available at: http://www.ghana.gov.gh/index.php/information/policy-documents/6108-ghana-industrial-policy [Accessed 12/01/13]

IFAD Rural Poverty Portal. *Rural Poverty in Ghana.* Available at: www.ruralpovertyportal.org/country/home/tags/ghana [accessed 17/12/12]

International Institute for Sustainable Development (IISD). (2012). *Procurement, Innovation and Green Growth: The Story Continues…* IISD: Winnipeg.

Institute of Statistical, Social and Economic Research (ISSER) (2012). *State of the Ghanaian Economy in 2011.* University of Ghana, Legon, Accra.

—. Social and Economic Research (ISSER) (2003). *State of the Ghanaian Economy in 2002.* University of Ghana, Legon, Accra.

Laan, T., Beaton, C., Presta, B. (2010). *Strategies for Reforming Fossil-Fuel Subsidies: Practical Lessons from Ghana, France and Senegal.* The Global Subsidies Initiative (GSI). International Institute for Sustainable Development (IISD): Geneva. Available at: www.globalsubsidies.org/files/assets/strategies_ffs.pdf

Laven, A., Boomsma, M. (2012). *Incentives for Sustainable Cocoa Production in Ghana. Moving from Maximizing Outputs to Optimizing Performance.* Royal Tropical Institute.

Liebert, T. (2012). *Swiss-Ghana Project on Sustainable Public Procurement.* International Institute for Sustainable Development (IISD), Geneva.

Milder, J.C., Majanen, T., Scherr, S.J. (2011). *Performance and Potential of Conservation Agriculture for Climate Change Adaptation and Mitigation in Sub-Saharan Africa. An Assessment of WWF and Care Projects in Support of the WWF-CARE Alliance's Rural Futures Initiative.* EcoAgriculture Partners, CARE, WWF and World Agroforestry Centre.

Ministry of Employment and Social Welfare (MESW). (2012). *National Employment Policy.* Republic of Ghana, Accra.

Ministry of Energy (MoE). (2011). *Renewable Energy Bill.* Republic of Ghana, Accra.

Ministry of Energy (MoE). (2010). *National Energy Policy.* Republic of Ghana, Accra.

Ministry of Food and Agriculture (MFA). (2012). *Tree Crops Policy.* Republic of Ghana, Accra.

—. (2010). *Medium-Term Agriculture Sector Investment Plan (METASIP) 2011-2015.* Government of Ghana, Accra.

—. (2007). *Food and Agriculture Sector Development Policy (FASDEP II)* Republic of Ghana, Accra.

Ministry of Lands and Natural Resources (MLNR). (2012). *Ghana Forest Investment Plan (GFIP).* Republic of Ghana, Accra.

National Development Planning Commission (NDPC), Government of Ghana, United Nations Development Programme (UNDP) Ghana. (2010). *2008 Ghana Millennium Development Goals Report.*

Organic World website. Global Organic Statistic and News. (2010). *Ghana: Organic Sector Now Represented in the Ministry of Food and Agriculture.* Available at: http://www.organic-world.net/news-organic-world.html?&tx_ttnews per cent5Btt_news per cent5D=245&cHash=952dbd11686a2f00533887bdad4f6f63

Payson Center for International Development and Technology Transfer, Tulane University. (2009). *Third Annual Report: Oversight of Public and Private Initiatives to Eliminate the Worst Forms of Child Labour in the Cocoa Sector in Cote d'Ivoire and Ghana.* Available at: www.childlabor-payson.org/Third per cent20Annual per cent20Report.pdf

Potts, J., van der Meer, J. Daitchman, J. (2010.) *The State of Sustainability Initiatives Review 2010: Sustainability and Transparency. A Joint Initiative of IISD, IIED, Aidenvironment, UNCTAD and ENTWINED.* International Institute for Sustainable Development (IISD), Winnipeg.
Available at: http://www.iisd.org/pdf/2010/ssi_sustainability_review_2010.pdf

Throup, D.W. (2011). *Ghana. Assessing Risks to Stability.* Center for Strategic and International Studies (CSIS). Washington D.C.

United Nations. (2012). *Statistical Annex in World Economic Situation and Prospects 2012.* Department of Economic and Social Affairs. New York.
Available at: http://www.un.org/en/development/desa/publications/world-economic-situation-and-prospects-as-of-mid-2012.html [Accessed: 11/01/13]

—. New York. Available at: http://www.un.org/en/development/desa/policy/wesp/wesp_archive/2011wesp.pdf

United Nations. (2008). *The Marrakech Process. Issues - Integrating SCP in Public Procurement & Other Government Operations.*
Available at: http://esa.un.org/marrakechprocess/issuespubprocgov.shtml [Accessed 13/01/13]

UNDP. (2011). *Human Development Report 2011. Sustainability and Equity: A Better Future for All.*
Available at: http://hdr.undp.org/en/reports/global/hdr2011/

UNEP. (2011). *Towards a Green Economy. Pathways to Sustainable Development and Poverty Eradication.* UNEP, Nairobi. Available at: www.unep.org/greeneconomy/greeneconomyreport/tabid/29846/default.aspx [Accessed: 11/12/12].

—. (2008). *Africa: Atlas of Our Changing Environment.* Division of Early Warning and Assessment (DEWA) and United Nations Environment Programme (UNEP). Nairobi: Kenya.
Available at: http://www.unep.org/dewa/africa/africaAtlas/PDF/en/Africa_Atlas_Full_en.pdf

UNEP website. (2008) *"Global Green New Deal" - Environmentally-Focused Investment Historic Opportunity for 21st Century Prosperity and Job Generation.* Available at: http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=548&ArticleID=5957 [Accessed: 11/01/13]

United Nations Framework Convention on Climate Change (UNFCCC). (No date). *Emissions Summary for Ghana.* Accessible at:http://unfccc.int/files/ghg_data/ghg_data_unfccc/ghg_profiles/application/pdf/gha_ghg_profile.pdf

World Bank. (2012a). *Ghana at a Glance.*
Available at: http://devdata.worldbank.org/AAG/gha_aag.pdf

—. (2012b). *Agribusiness Indicators: Ghana.* Washington D.C.

—. (2012c). *Economy Profile: Ghana. Doing Business 2012: Doing Business in a More Transparent World.*

—. (2012d). Inclusive Green Growth: The Pathway to Sustainable Development. Washington, U.S.A. [Online].
Available at: http://siteresources.worldbank.org/EXTSDNET/Resources/Inclusive_Green_Growth_May_2012.pdf [Accessed: 30/05/12].

—. (2011). *Supply Chain Risk Assessment. Cocoa in Ghana.* Washington D.C.

—. (2007). *Ghana country environmental analysis.* Accra, Ghana.
Available at: http://siteresources.worldbank.org/INTRANETENVIRONMENT/363584211756960874921919456/Ghana_CEA.pdf [Accessed: 19/04/11]

World Bank website. (2013a). *Ghana. World Development Indicators.*
Available at: http://data.worldbank.org/country/ghana

World Bank website. (2013b). *Data.*
Available at: http://data.worldbank.org/indicator/SP.DYN.TFRT.IN

Zaney, G.D. (2011). *Sustainable Forest Management and Responsible Public Procurement – Weapons against Deforestation.* Government of Ghana official website.
Available at: http://www.ghana.gov.gh/index.php/news/features/5861-sustainable-forest-management-and-responsible-public-procurement-weapons-against-deforestation [Accessed 14/01/13]

Man holding millet cobs. © IFAD/Robert Grossman

Annexes

Annex 1. **Gross Domestic Product (GDP) at current market prices by economic activity**[145]

		2008	2009	2010*	2011**	2012***
1.	**Agriculture**	**8 875**	**11 343**	**12 910**	**14 155**	**15 547**
1.01	Crops o.w. cocoa	6 435 706	8 425 874	9 422 1 392	10 650 1 996	11 932 2 261
1.02	Livestock	606	729	873	1 004	1 165
1.03	Forestry and logging	1 072	1 314	1 614	1 549	1 418
1.04	Fishing	762	874	1 001	952	1 033
2.	**Industry**	**5 855**	**6 776**	**8 294**	**14 308**	**18 592**
2.01	Mining and quarrying o.w. crude oil	693 0	740 0	1 013 178	4 690 3 746	5 956 4 645
2.02	Manufacturing	2 277	2 478	2 941	3 711	4 490
2.03	Electricity	115	167	266	325	332
2.04	Water and sewage	229	246	368	467	495
2.05	Construction	2 500	3 144	3 706	5 114	7 319
3.	**Services**	**13 935**	**17 543**	**22 184**	**26 837**	**33 237**
3.01	Trade, repair of vehicles, household goods	1 710	2 109	2 701	3 470	3 955
3.02	Hotels and restaurants	1 716	2 196	2 593	3 007	3 632
3.03	Transport and storage	3 262	3 758	4 578	5 581	7 274
3.04	Information and communication	622	657	831	989	1 120
3.05	Financial intermediation	1,089	1 547	2 240	2 466	3 066
3.06	Business, real estate and other service activities	1 185	1 462	1 945	2 591	3 291
3.07	Public administration and defence, social security	1 799	2 479	3 024	3 540	4 812
3.08	Education	1 132	1 506	1 877	2 307	2 704
3.09	Health and social work	381	513	674	728	827
3.10	Other community, social and personal service activities	1 039	1 318	1 722	2 159	2 557
	GDP at basic prices	**28 664**	**35 662**	**43 388**	**55 300**	**67 377**
	Net indirect taxes	1 514	936	2 654	3 964	4 470
	GDP in purchasers' value	**30 179**	**36 598**	**46 042**	**59 264**	**71 847**

* 2010 finalized, ** 2011 revised, *** 2012 provisional.

Annex 2. **Growth Rates of GDP by sector at 2006 constant prices**[146]

		2008	2009	2010*	2011**	2012***
1.	**Agriculture**	**7.4**	**7.2**	**5.3**	**0.8**	**2.6**
1.01	Crops o.w. cocoa	8.6 3.2	10.2 5.0	5.0 26.6	3.7 14.0	5.0 3.0
1.02	Livestock	5.1	4.4	4.6	5.1	5.5
1.03	Forestry and logging	-3.3	0.7	10.1	-14.0	-18.0
1.04	Fishing	17.4	-5.7	1.5	-8.7	2.3
2.	**Industry**	**15.1**	**4.5**	**6.9**	**41.1**	**7.0**
2.01	Mining and quarrying o.w. crude oil	2.4 --	6.8 --	18.8 --	206.5 --	5.0 --
2.02	Manufacturing	3.7	-1.3	7.6	13.0	4.3
2.03	Electricity	19.4	7.5	12.3	-0.8	12.0
2.04	Water and sewage	0.8	7.7	53	2.9	0.0
2.05	Construction	39.0	9.3	2.5	20.0	11.8
3.	**Services**	**8.0**	**5.6**	**9.8**	**8.3**	**8.8**
3.01	Trade, repair of vehicles, household goods	9.5	5.4	13.3	17.9	4.1
3.02	Hotels and restaurants	9.1	-3.8	2.7	3.6	13.6
3.03	Transport and storage	3.8	4.4	8.0	3.3	11.4
3.04	Information and communication	19.5	3.9	24.5	17.0	12.1
3.05	Financial intermediation	10.8	9.3	16.7	1.0	11.4
3.06	Business, real estate and other service activities	0.0	0.2	13.9	14.0	13.5
3.07	Public administration and defense, social security	12.7	11.7	3.4	7.4	2.9
3.08	Education	13.0	12.4	5.3	3.8	5.6
3.09	Health and social work	4.4	15.2	11.2	5.0	2.3
3.10	Other community, social and personal	9.2	7.5	10.7	13.0	6.7
	GDP at basic prices	**9.3**	**5.8**	**7.9**	**13.4**	**6.7**
	Net indirect taxes	x	x	x	x	x
	GDP in purchasers' value	**8.4**	**4.0**	**8.0**	**14.4**	**7.1**

* 2010 finalized, ** 2011 revised, *** 2012 provisional.

Annex 3. **GHG emissions by sector in 1990 and 2006 (without LUCF)**[147]

Sector/Year	1990 (%)	2006 (%)
Agriculture	**48.70**	**35.57**
*Enteric fermentation	30.28	26.59
Manure management	4.45	2.43
Rice cultivation	9.16	16.19
Agricultural soils	55.88	54.41
Prescribed burning of savannahs	0.00	0.00
Field burning of agricultural residues	0.23	0.38
Energy	**35.34**	**50.66**
Energy industries	4.14	26.03
Man. industries and construction	14.03	9.91
Transport	47.46	33.79
Other sectors	34.38	30.27
Waste	**6.88**	**12.43**
Solid waste disposal on land	61.94	72.09
Wastewater handling	38.06	27.91
Industrial processes	**9.08**	**1.34**

Notes

1 UNEP, 2008.
2 UNEP, 2011.
3 GoG, 1995.
4 Breisinger et al. 2011.
5 United Nations 2012, 2011.
6 Ecoecon Consult LTD, 2011: 23-24.
7 World Bank website, 2013a.
8 Bank of Ghana, 2011.
9 AfDB et al. 2012: 7-8.
10 AfDB et al. 2012: 8.
11 World Bank, 2012a.
12 World Bank, 2012a.
13 AfDB et al. 2012: 9.
14 GSS, 2012.
15 World Bank, 2012a.
16 GSS, 2012.
17 Ecoecon Consult LTD, 2011: 24-25.
18 MESW, 2012; GSS, 2008.
19 MESW, 2012.
20 AfDB et al. 2010: 2.
21 GSS, 2008.
22 Throup, 2011.
23 ISSER, 2003.
24 Tutu 2011 cited in Ecoecon Consult LTD, 2011: 24.
25 EPA, 2011: 51.
26 GoG, 2010a.
27 EPA, 2011: 51.
28 FAOSTAT website, 2012.
29 GoG, 2010a.
30 Allotey, 2007.
31 EPA, 2011; UNEP, 2008.
32 World Bank, 2012d: 12.
33 Ghana Energy Commission, 2012 Energy Outlook for Ghana, April, 2012.
34 World Bank, 2012d: 110.
35 Dorm-Adzobu, 2010.
36 World Bank, 2007.
37 UNDP, 2011.
38 NDPC et al., 2010.
39 World Bank, 2012d: 12.
40 GSS, 2008.
41 GSS, 2008.
42 GoU, 2010a: 4.
43 GoU, 2010a: 11.
44 IFAD Rural Poverty Portal.
45 AfDB et al. 2010: 12.
46 UNEP-WCMC, 2010 cited in FAO, 2010 : 35.
47 UNDP, 2011.
48 CIA, 2013.
49 Ghana Statistical Service's compilation of various ministries' yearly actual expenditure on the environment, 2006-2010.
50 GoG, 1995.
51 GoG, 2010a: 49-50.
52 GoG, 2010a.
53 Ecoecon Consult LTD, 2011.
54 Ecoecon Consult LTD, 2011: 22.
55 GoG, 2010a: 38; MFA, 2010: 14.
56 World Bank, 2012b: 9-10.
57 EPA, 2011.
58 World Bank, 2012b: 1.
59 Breisinger et al. 2011: 48.
60 GoG, 2010a: 9.
61 World Bank, 2011.
62 Breisinger et al. 2011: 48.
63 World bank, 2011: 7.
64 World bank, 2011: 5.
65 Breisinger et al, 2008; EPA, 2011.
66 ISSER, 2012.
67 Breisinger et al., 2011: 48.
68 Payson Center for International Development and Technology Transfer, 2007.
69 World Bank, 2011: 5.
70 MFA, 2010: 10.
71 MFA, 2010: 10.
72 GoG, 2010a.
73 World Bank and DFID, 2005 cited in Ecoecon, 2011: 44.
74 MFA, 2007: 20.
75 MFA, 2012.
76 Ecoecon Consulting LTD, 2011: 45.
77 Milder et al., 2011.
78 Ecoecon Consulting LTD, 2011: 45.
79 World Bank 2011: 4.
80 UNEP, 2008.
81 Conservation International, 2008.
82 Bonsu Osei-Asare, 2009: 1.
83 Organic World website, 2010.
84 Laven and Boomsma 2012: 14.
85 World Bank, 2012b: 24.
86 GSS, 2011a.
87 MLNR, 2012: 4.
88 GSS, 2012.
89 Eshun et al. 2010: 392.
90 MLNR, 2012: 17.
91 MLNR, 2012: 19.
92 MLNR, 2012: 19.
93 EPA, 2011.
94 EPA, 2011: 68.
95 Forestry Commission of Ghana website.
96 MLNR, 2012: 17.
97 MLNR, 2012: 31.
98 Forestry Commission of Ghana website.
99 MLNR, 2012.
100 FAO, 2010.
101 World Bank, 2006 cited in World Bank, 2007 (no updated figure found as part of this study).
102 MLNR, 2012: 21.
103 ISSER, 2012.
104 World Bank, 2012c
105 Ghana Energy Foundation, 2006.
106 Ghana Energy Commission, 2012: 2.
107 World Bank, 2012c: 32.
108 Ghana Energy Commission, 2012: 1.
109 GSS, 2012.
110 MoE, 2010: 10.
111 MoE, 2010:11; Ghana Energy Foundation, 2006.
112 Ghana Energy Commission, 2012: 16.
113 MoE, 2010:5.
114 MoE, 2010: 5.
115 Ghana Energy Commission, 2012: V.
116 MoE, 2011
117 http://www.ghana.gov.gh/
118 Ghana Energy Commission, 2012.
119 Agyepong, 2011: 3.
120 GoG, 2011: 69.
121 Appiah and Donkor, 2011.
122 Ghana Energy Commission, 2012: 1.
123 Ghana Energy Commission, 2012: 13.
124 Ecoecon Consulting LTD, 2011: 41.
125 Ecoecon Consulting LTD, 2011: 41.
126 MoE, 2011: 1.
127 Ecoecon Consulting LTD, 2011: 48.
128 Potts et al., 2010.
129 Carrall, 2010.
130 Zaney, 2011.
131 Forest Stewardship Council website.
132 Ghana Energy Foundation website.
133 Laven and Boomsma 2012: 16; 7-8.
134 Potts et al., 2010: 95.
135 GoG, 2010a: 20.
136 Lan et al., 2010; Crawford, 2012.
137 World Bank, 2012b : 14 (Note: for the conversion into US$, GHS used instead of GHC currency).
138 World Bank, 2012b: 14.
139 MLNR, 2012: 21.
140 GoG, 2012.
141 IISD, 2012: 6.
142 United Nations, 2008.
143 http://www.ghana.gov.gh/
144 Liebert, 2012.
145 GSS, 2012: 4.
146 GSS, 2012: 7.
147 EPA, 2011; UNFCCC, no date.

Ministry of Environment, Science, Technology and Innovation
P.O. Box M 232
Accra, Ghana
Tel.: +233 302 660 005
Email: xxx@xxx.gov.gh
Website: www.ghana.gov.gh xxx

www.unep.org
United Nations Environment Programme
P.O. Box 30552 Nairobi, 00100 Kenya
Tel: (254 20) 7621234
Fax: (254 20) 7623927
E-mail: uneppub@unep.org
web: www.unep.org

UNEP

JOB NUMBER DTI/1595/GE