



GREEN ^{economy} and TRADE

Trends, Challenges and Opportunities



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GREEN **economy** and **TRADE**

Trends, Challenges
and
Opportunities





Foreword

What does a transition to a green economy imply for international trade? In turn, what does international trade imply for a green economy? This report, *Green Economy and Trade – Trends, Challenges and Opportunities*, explores the critical and, indeed, exciting nexus between trade and the green economy.

In today's increasingly interconnected world, where trillions of dollars worth of goods and services are traded annually, greening trade is not only an opportunity, it is an imperative. If we are to reverse the global decline of biodiversity, mitigate the release of greenhouse gases, halt the degradation of lands, and protect our oceans, then international trade must become sustainable and responsible. Further, if we are to succeed in eradicating poverty, we will need to ensure that trade benefits the poor. The report illustrates that greening trade is an important element of the pathway to a sustainable world without poverty.



This is precisely what world leaders envisioned at the Rio+20 conference in June 2012. They reaffirmed "international trade [as] an engine for development and sustained economic growth", and identified the green economy as "an important tool for achieving sustainable development". As this report makes clear, developing countries in particular are likely to benefit from implementing green economy policies that scale up sustainable trade.

The report focuses on six economic sectors – agriculture, fisheries, forests, manufacturing, renewable energy and tourism – all of which are particularly promising in a transition to a green economy. A range of practical enabling conditions is identified that could help overcome hindrances to the achievement of sustainable development objectives through trade. By assessing the trends, opportunities and challenges for more sustainable trade practices, the report aims to stimulate governments to harness and seek further opportunities in these and other sectors.

In producing this report, UNEP has benefited from the inputs of many partner organisations, notably the International Centre for Trade and Sustainable Development (ICTSD) and the International Trade Centre (ITC) as well as many experts, government representatives and stakeholders. We are most grateful to all our partners, reviewers and contributors, as well as to the European Commission which has provided generous support for this project.

The report is a key output of UNEP's Green Economy and Trade Opportunities Project, which provides policy analysis and outreach activities on trade-related opportunities associated with a transition to a green economy. It supports the design and implementation of sustainable trade policies and tools, particularly in developing countries. With this report in hand, UNEP and our partners will move forward with assisting countries to capture the benefits of greening trade at a national level.

I am sure that national policy makers and other stakeholders will find inspiration in this report as a way of seeking and promoting new trade opportunities that arise from the transition to a green economy.

Achim Steiner,

UN Under-Secretary General
and Executive Director,
UN Environment Programme (UNEP)

A handwritten signature in black ink that reads "Achim Steiner". The signature is fluid and cursive.

About this Report

This report has been prepared by the Trade, Policy and Planning Unit of the United Nations Environment Programme (UNEP). It is a key component of the “Green Economy and Trade Opportunities Project” (GE-TOP), funded by the European Commission, with a financial contribution from GIZ. GE-TOP aims to:

- Identify a range of international trade opportunities in various key economic sectors associated with the transition to a green economy;
- Identify policies and measures that may act as facilitators and overcome hindrances to seizing trade opportunities arising from the transition to a green economy; and
- Assist governments, the private sector and other stakeholders to build capacity to take advantage of sustainable trade opportunities at the national, regional or international level.

The report has been reviewed and discussed by more than 200 experts in their respective fields. The first draft was prepared as an input to the United Nations Conference on Sustainable Development in June 2012 (Rio+20), and has been discussed at three conferences organized under GE-TOP:

- A workshop on Environment and Trade in Africa (May 2012, Windhoek, Namibia);
- A Multi-Stakeholder Dialogue in Rio (June 2012, Rio de Janeiro, Brazil); and
- A workshop on Green Economy and Trade Opportunities in Latin America (July 2012, Heredia, Costa Rica).

Participants to these events provided significant feedback on the drafts and commented in detail on the role of trade in facilitating the transition to a green economy, as well as on green economy measures creating trade opportunities. They noted that significant sustainable trade potentials already exist in some sectors, and that assistance will be needed to fully capture them. The participants particularly highlighted the importance of support of intergovernmental organisations and the need for regional and international coordination and cooperation to benefit from new opportunities.

Against this backdrop, the report, through real life examples and a review of available literature, aims to provide governments, investors, private sector representatives and civil society with an overview on how the transition to a greener economy can create sustainable trade opportunities particularly for developing countries. While illustrating how green economy policies and investments in trade-related sectors are means to achieve economic, social and environmental objectives in a mutually supportive manner, the report also considers some of the main trade-related challenges faced by developing countries to take advantage of the benefits arising from the transition to a greener economy. It explores how addressing these challenges can present opportunities to advance economic and social development in a sustainable way.

This report adopts a case-based approach with a view to stimulating further analytical work and policy dialogue, particularly at the national and regional level. It is composed of an introduction, six sectoral chapters on agriculture, fisheries, forests, manufacturing, renewable energy, and tourism, and a conclusion. The introduction provides an overview of the context, synergies and potential challenges of the nexus between international trade and the transition to a green economy. Each of the sectoral chapters reviews the environmental and economic context for greening the economy; presents green economy measures and assesses how they can and do create new trade opportunities particularly for developing countries; and finally discusses enabling conditions, policy tools and actions that can help support the creation of trade opportunities in connection with green economy reforms. Each chapter includes case studies prepared by field experts and academics, as well as a list of resources for further information.

Acknowledgments

This report has been prepared by UNEP's Trade, Policy and Planning Unit of the Economics and Trade Branch (ETB), Division of Technology, Industry and Economics (DTIE). It is a key component of the "Green Economy and Trade Opportunities Project" (GE-TOP), funded by the European Commission, with a financial contribution from GIZ. It has been a concerted team effort that would not have been possible without the contributions of many internal and external experts.

Steven Stone, as Chief of the Economics and Trade Branch (ETB), provided the overall supervision. Benjamin Simmons, former Head, Trade, Policy and Planning Unit, conceived and initiated this project and provided substantive contributions. Anja von Moltke, current Head, Trade, Policy and Planning Unit, was responsible for project management, substantive and technical contributions, and overall guidance to the trade unit.

Giles Chappell undertook research and drafted individual chapters of the report. Fabrizio Meliado made a key contribution to its finalisation. Kristin Dypedokk provided technical input, compiled case studies and managed the production process. Lennart Kuntze and Diako Makhmalbaf also significantly contributed to the report. Further reviewers and contributors from the trade unit included Anna Autio, Mamadou Diakhite, Sara Lynette Hogan, Jasmin Hundorf, Tanaka Tabassum and Neil Teller.

Additional UNEP staff members who provided technical input include Nicolas Bertrand (TEEB), Jacinto Coello (UNEPFI), Dustin Miller (TEEB), Asad Naqvi (ETB), Richard Scotney (ETB), Fulai Sheng (ETB), and Kofi Vondolia (Regional Office for Africa).

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In addition, over two hundred governmental and non-governmental experts offered their views and perspectives on the draft report as participants of three major GE-TOP events: the African Workshop on Environment and Trade (May 2012, Windhoek, Namibia); the multi-stakeholder dialogue in Rio (June 2012, Rio de Janeiro, Brazil); and the Latin America Workshop on Green Economy and Trade Opportunities (July 2012, Heredia, Costa Rica). Although they are too numerous to mention individually, their contributions are appreciated.

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Executive Summary

Executive Summary

Green Economy and International Trade

Trade, when accompanied by appropriate regulation, can facilitate the transition to a green economy by fostering the exchange of environmentally friendly goods and services (including environmentally sound technologies) and by increasing resource efficiency and generating economic opportunities and employment. In order to contribute to poverty eradication, the additional wealth generated by international trade should provide income opportunities to reduce inequalities, rather than exacerbate them.

The transition to a green economy, in turn, has the potential to create enhanced trade opportunities by opening new export markets for environmental goods and services, by increasing trade in products certified for sustainability and promoting certification-related services, and by greening international supply chains. The adoption of more resource- and energy-efficient production methods as part of green economy measures has an important role to play in securing access to, and long-term competitiveness in, international markets.

The meeting of global environmental leaders at Rio+20 has initiated a shift of focus, from the potential risk of trade protectionism associated with green economy policies, towards improving the trade performance of developing countries as an additional effect of, and motivation for, the implementation of green economy policies. As a result, a green economy is increasingly seen as a gateway to new opportunities for trade, growth and sustainable development.

Yet, while a shift to more sustainable trade practices may advance economic and social development, achieving such a shift will also require effective policies to mitigate the adverse impacts that often arise from trade, including pollution and emissions from transport, increased pressure on natural resources for production and processing, and social marginalisation. Addressing these effects, reducing income inequalities and improving the livelihoods of local populations, as well as using environmentally sound technologies and processes are key elements for improving the sustainability of international trade.

Current Trends

Trade is a vital element of the global economy. The sum of world exports of goods and commercial services amounted to US\$ 22.3 trillion at the end of 2010, growing at an average five per cent rate per year between 2000 and 2011. In addition, merchandise and commercial services exports provide an increasingly important share of world gross domestic product (GDP), rising from 14 per cent in 1970 to 29.3 per cent in 2011. In developing countries, this share reached peaks of 45 per cent before the financial and economic crisis of 2008. In addition, trade between developing countries, or “South-South” trade, has recently been assessed as the most dynamic segment of global trade in the last decade, increasing from 39.2 per cent of total developing country exports in 2002, to 50 per cent in 2010.

While creating economic growth, increasing volumes of trade have also put additional stress on natural resources and increased greenhouse gas (GHG) emissions. Increased demands by emerging economies for natural resources, coupled with the already unsustainable levels of resource consumption and use registered in more developed countries, led to an unprecedented surge in resource consumption and trade in the period 1995-2010. In addition, a trade-driven expansion in the scale of production and transport has resulted in significant increases in GHG emissions. Emissions from international maritime and aviation transport, for example, have increased by 88 per cent over a period of 25 years.

World trade patterns show that least developed countries' exports are still dominated by natural resource-based products and raw materials. Many developing countries, and particularly the least developed ones, are faced with an urgent need to diversify their economies and move towards more sustainable practices. In the past fifteen years, pressure on natural resources, largely driven by international demand, has escalated and resulted (with very few exceptions) in detrimental environmental and social impacts, such as biodiversity loss, environmental degradation and inequitable income distribution.

Opportunities to counter these trends can be found in the growth of existing sustainable trade markets and in the opening of new markets for green goods and services. These markets grow faster than conventional markets. Pioneering producers, service providers and exporters are already taking advantage of new trade opportunities driven by increasing consumer awareness and more sustainable consumption and production patterns. Developing countries with abundant natural capital, as well as competitive production costs and human capital have, in some cases, a comparative advantage for capturing these opportunities.

Sustainable trade practices – such as trade in certified products or in environmental goods and services – are on the rise in absolute terms. There is, indeed, an important move towards mainstreaming sustainability in production and trade at the global level. However, it is important to note that sustainable trade practices currently represent only a small fraction of total trade.

The transfer of environmentally sound technologies, through trade- and investment-related channels, is also promoting economic and social development in developing countries. These channels allow the results of investments in research and development (R&D) to benefit a larger number of producers and consumers while facilitating natural resource protection and climate change mitigation and adaptation efforts. At the same time, it remains crucial for developing countries to build or reinforce R&D capacity, particularly related to environmentally sound technologies. In addition, technological advancements and spillovers facilitated by international trade can lead to further specialisation in the production of more energy- and resource-efficient goods and services.

Emerging Opportunities

This report analyses, through case studies and a review of available literature, emerging opportunities and persistent challenges in six economic sectors of particular interest for developing countries: agriculture, fisheries, forestry, manufacturing, renewable energy and tourism. The following sub-sections provide a very brief summary of the opportunities that green economy policies generate for sustainable trade, and the incentives that international trade can create to advance a greener economy.

In the agricultural sector:

- **The future of agriculture is threatened by a series of adverse environmental outcomes,** including the continuing loss of biodiversity and ecosystem services, depletion and erosion of top soil nutrients, increasing scarcity of freshwater, aggravated water pollution caused by poor nutrient management, hazardous chemical release, disposal, emissions and waste, and rising GHG emissions. Whereas trade conducted on a business-as-usual scenario largely exacerbates these trends, sustainable trade has the potential to maintain or increase agricultural output in the medium- and long-term while reducing resource use, preserving the natural environment and promoting food safety.
- **Sustainable farming methods can increase productivity, facilitate access to international supply chains, and respond to the rising global demand for more sustainable and organic produce.** Many large multinational companies have also made sustainability commitments, which will have an impact on the business choices of upstream supply chain partners. In

addition, the global market for organic food and beverages is projected to grow to US\$ 105 billion by 2015, from the total value of US\$ 62.9 billion in 2011. The production of tea in line with sustainability standards, for example, has grown by 2000 per cent between 2005 and 2009.

In the fisheries & aquaculture sectors:

- **Globally, fish and fish products are the most extensively traded food commodity**, and exports have expanded greatly over the past 35 years, rising from US\$ 8 billion in 1976 to an estimated US\$ 125 billion in 2011. 80 per cent of world fish resources are overexploited or at their biological limit, and the top ten commercial species are still being harvested far beyond science-based sustainability levels. While a reduction of fishing effort remains a necessity, increased trade in fish and fish products certified for sustainability can improve the overall fisheries management systems, while increasing productivity of the resource and adding value to final products.
- **Increased export revenues can arise from the sustainable management of wild-capture fisheries, including through certification.** The sale of certified fish products in markets in developed countries and, increasingly, in some developing countries has changed from a niche market to a mainstream one. Trade opportunities for sustainably produced fish can create incentives for better management and capture some of the lost revenue of poorly managed fisheries, which are globally estimated at US\$ 50 billion annually.
- **In aquaculture, global demand for seafood that has been farmed in line with organic and/or broader sustainability standards has grown steadily in the last 15 years.** Currently, aquaculture production that has been certified against various types of sustainability standards is estimated to cover five per cent of total production. In the aquaculture sector, the total value of the demand for seafood that has been farmed according to certified sustainability standards is forecasted to increase from US\$ 300 million in 2008 to US\$ 1.25 billion by 2015.

In the forestry sector:

- **The world's forested area is declining and pressures on forests are expected to continue.** Underlying this deforestation trend is weak governance, including lack of forest law enforcement, corruption and bribery. Worldwide, the economic value of global illegal logging, including processing, is estimated to be worth between US\$ 30-100 billion per year. More sustainable trade in timber and non-timber forest products can significantly increase transparency and ensure traceability in the forestry sector, in particular through certification schemes.
- **Sustainable forest management, including through certification, has the potential to expand the relative share of trade in sustainable wood products and non-timber forest products.** As of early 2013, the total area of certified forest worldwide stands at close to 400 million hectares, amounting to approximately ten per cent of global forest resources. Sales of certified products are worth over US\$ 20 billion per annum. Depending on the operation, price premiums for certified wood, particularly from the tropics, can range from 15 to 25 per cent. In addition, non-timber forest products fit niche trading strategies, particularly those that have a long shelf life, a high per-unit value, and are simple to process, store and handle without major investments. Developing countries are also selling forest carbon offsets in international markets, including through international mechanisms such as the Clean Development Mechanism and REDD+.¹

¹ Reducing Emissions from Deforestation and Forest Degradation (REDD+) is a set of policy approaches and positive incentives designed to reward developing countries for strengthening the mitigation potential in forests.

In the manufacturing sector:

- **Manufacturing is energy- and resource-intensive.** The sector is responsible for around 35 per cent of global electricity use, over 20 per cent of global CO₂ emissions, and over a quarter of primary resource extraction. Furthermore, poisonings from industrial and agricultural chemicals are among the top five leading causes of death worldwide. Without decoupling natural resource use and environmental impacts from economic growth, as well as mainstreaming sustainability in global supply chains, growing international demand, trade and investment flows exacerbate the negative impacts connected to the growth of the sector.
- **Products with environmentally friendly designs and companies that comply with sustainability standards for products and processes have an advantage in international markets.** Many suppliers are rendering their practices more sustainable in order to secure their positions within international supply chains. This is illustrated for example by the 1,500 per cent increase in global ISO 14001 certifications on environmental management awarded between 1999 and 2009. In addition, some developing countries are taking the lead in investing in sustainable manufacturing practices (e.g. remanufacturing) and products with an environmentally friendly design (e.g. ecolabelled textiles and energy efficient electronics).

In the renewable energy sector:

- **Renewable energy resources can address many of the challenges faced by conventional energy today.** While 20 per cent of the world population lacks access to electricity, energy from fossil fuel combustion caused global CO₂ emissions to increase to a record high of 31.6 gigatonnes in 2011, estimated to further increase to 37 gigatonnes by 2035. The promotion of renewable energy can decisively limit carbon emissions from energy use, bearing the potential to save an equivalent of 220-560 gigatonnes of CO₂ between 2010 and 2050. In addition, the production of and trade in energy from renewable sources can increase access to clean and cheap electricity and fuel, but need to account for potential environmental and social adverse effects.
- **The global market in low-carbon and energy efficient technologies, which include renewable energy supply products, is projected to nearly triple to US\$ 2.2 trillion by 2020.** Even though their industrial policies have sometimes raised controversies, developing countries have significantly increased their exports of renewable energy equipment such as solar panels, wind turbines and solar water heaters. For instance, in the wind energy sector, an Indian company is the world's third largest supplier of components to operators, with over six per cent of global market share. In the solar sector, China has exported over US\$ 10 billion worth in solar panels and cells, almost 80 times the value it exported only ten years earlier. Apart from exporting components of new technologies, various developing countries are also expanding their potential to export electricity from renewable sources.

In the tourism sector:

- **Tourism, as a major export sector, has a large potential to harness new opportunities by proactively addressing environmental and social impacts.** In 2012, for the first time, the number of international tourists reached over one billion. Yet the tourism sector largely contributes to CO₂ emissions, water and air pollution, increased pressure on waste management, biodiversity loss, and potential conflicts with the social, economic and cultural interests of local communities. The economic potential of sustainable tourism activities, particularly for developing countries, depends directly on the ability of countries to preserve their natural environments, as environmental degradation erodes the attractiveness of tourism destinations. As a consequence,

sustainable and certified tourism activities can be a driver in reducing potentially negative environmental and social impacts of tourism, while increasing the attractiveness and the economic value of existing or potential destinations.

- **The fastest growing sub-sector in sustainable tourism is ecotourism, which focuses on nature-based activities.** Many developing countries appear to have a comparative advantage in ecotourism, due to their natural environments, cultural heritage and opportunities for adventure holidays. In addition, certification in the tourism sector is also experiencing increasing trends, as many tourism structures and sites recognise the attractiveness and potential price premiums that may follow the achievement of sustainability certification. Protected areas in Costa Rica, for example, receive more than one million visitors each year, generating entrance-fee revenues of over US\$ 5 million, while Mexico's protected areas record 14 million visitors per year, creating more than 25,000 jobs.

Addressing Challenges

Even when there is a strong economic, environmental and social case for investing in greening trade, a number of important obstacles remain. These relate mostly to limitations in financial and human resources, weak regulatory frameworks, lack of enforcement mechanisms, and poor economic infrastructure. Illiteracy as well as limited access to energy, for example, are key barriers to the further development of sustainable and certified trade. These issues need to be addressed through concerted efforts at the international, regional, national and local community levels.

In addition, reducing trade-related emissions is another key challenge for achieving more sustainable trade and mitigating climate change. Hence, the transition to a greener economy will necessitate greater fuel efficiency in the transport sector and the use of alternative energy sources across all sectors as part of wider domestic, regional and global measures. The development of new markets in carbon credits and carbon offsets may also offer additional opportunities to reduce emissions and increase revenues.

This report identifies a number of **enabling conditions** that can facilitate sustainable trade opportunities. Clearly, the ambitions and potential green economy strategies vary significantly based on a country's circumstances, natural resources as well as political and economic conditions. Generally, however, the enabling conditions required for greater coherence between green economy policies and trade opportunities encompass:

- **Investment and spending.** Public investments in key economic infrastructure, technical assistance, targeted education programmes and access to sustainable resources, such as electricity from renewable energy sources, are crucial for increasing the success rate of developing country suppliers in accessing greener international markets.
- **Market-based instruments.** The gradual elimination of subsidies that encourage unsustainable production and trade – in particular fossil fuel, agricultural and fisheries subsidies – and the introduction of pricing policies that take fully into account environmental and social costs of production and consumption are essential pre-conditions for enabling sustainable trade. Further, creating incentives for effective supply chain partnerships with international exporters promoting sustainability would particularly benefit small producers.
- **National regulatory frameworks.** Policies and actions to support the greening of industries need to be incorporated into national sustainable development strategies and overarching legal frameworks. Strategies that more specifically address the greening of industries, such as national sustainable consumption and production plans, green procurement programmes,

and sector- and issue-based approaches, such as resource use, safe waste disposal, energy, education, and health and safety are also important policy tools.

- **International frameworks.** The rules-based multilateral trading system provides transparency and predictability for promoting the trade-related aspects of a green economy. The development of new multilateral rules under the World Trade Organization (WTO), for example on fisheries subsidies, as well as further liberalisation of trade in environmental goods and services, provide opportunities for effective collective actions to solve global problems. Furthermore, regional trade agreements, if properly designed, can offer important opportunities to promote sustainable practices and be a driver of policy reforms, increased capacity development, strengthened environmental regulation and better cooperation among relevant ministries. Multilateral Environmental Agreements (MEAs) have a critical role to play in ensuring also the mutual supportiveness of green economy and sustainable trade.
- **Dialogue and capacity building.** Regulatory cooperation and capacity building are amongst the most important means to overcome challenges in a proactive manner. Scaling up support for developing countries to harness green export opportunities requires coherent support from international governmental organisations – including UN agencies, MEAs, and the WTO – as well as the private sector and non-governmental organisations. South-South cooperation is also essential to support developing countries seeking to sustain and deepen their participation in international trade for sustainable goods and services. In this context, a key challenge is to inter-connect producers in developing countries and to link them to regional and global markets.

Conclusion

There are positive signs that trade-related practices are moving towards more environmental, social and economic sustainability. These trends have to be encouraged as well as fully informed by the Rio+20 mandate to advance the green economy in the context of sustainable development and poverty eradication.

Overall, this report shows that growing trade in environmental goods and services, the implementation of sustainability standards, and the greening of global value chains can increase the share of sustainable trade and have the potential to significantly influence world trade patterns. The report stresses that there are economic gains to be made from making trade more socially and environmentally sustainable. Indeed, there are clear instances where the opportunities to increase revenues through trade fully coincide with the objectives of a green economy. However, given the current small proportion of sustainable trade in relation to the overall volume, there is a need to significantly scale-up and expand capacity building efforts to both harness existing opportunities and create new ones.

A meaningful transition to a greener economy strengthened by international trade will require extensive technical and financial support. UNEP is committed to assisting governments and other stakeholders in identifying and creating these sustainable trade opportunities, and transforming risks and challenges into new pathways to sustainable development and poverty eradication.

Introduction



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Acronyms

APEC	Asia-Pacific Economic Co-operation
EGS	Environmental goods and services
GATT	General Agreement on Tariffs and Trade
GDP	Gross domestic product
GER	Green Economy Report
GE-TOP	Green Economy and Trade Opportunities Project
GPA	The plurilateral Agreement on Government Procurement
GSCs	global supply chains
ISO	International Organization for Standardization
OECD	Organisation of Economic Co-operation and Development
SCM	Agreement on Subsidies and Countervailing Measures
SMEs	Small- and medium-size enterprises
SPS	Agreement on the Application of Sanitary and Phytosanitary Measures
TBT	Agreement on Technical Barriers to Trade
TRIPS	Agreement on Trade-Related Aspects of Intellectual Property Rights
UNFSS	United Nations Forum on Sustainability Standards
VSS	Voluntary sustainability standards
WTO	World Trade Organization

1 Introduction

1.1 Rio+20: A turning point for trade and the green economy?

Twenty years after the first Rio Conference on Environment and Development, Heads of State clearly recognised that the transition to a Green Economy – backed by strong social provisions – offers a key tool and pathway towards a more sustainable 21st century. Governments were also clear about the key role that international trade can play in this context. The Rio+20 Outcome Document, “The Future We Want”, states:

“We reaffirm that international trade is an engine for development and sustained economic growth, and also reaffirm the critical role that a universal, rules-based, open, non-discriminatory and equitable multilateral trading system, as well as meaningful trade liberalization, can play in stimulating economic growth and development worldwide, thereby benefiting all countries at all stages of development as they advance towards sustainable development...” (UN 2012, paragraph 281).

In addition, it was clearly stated that green economy policies should not amount to unjustifiable restrictions on international trade. Nevertheless, it can be argued that deliberations before, during and after Rio+20 initiated a shift of focus from the risks of using green economy policies for protectionist purposes, to the opportunities that the transition to a greener economy can present to create new markets and improve market access, thus enhancing economic and social development through sustainable trade. Particular emphasis was placed on achieving progress on environmentally harmful subsidies and trade in environmental goods and services and on establishing enabling environments for the transfer of environmental technology (see Box 1).

Box 1. Rio+20 Decisions on the role of trade

The Rio+20 Outcome Document sets out broad recommendations for transitioning to greener economies, and defines the role that trade can play in this context. It stresses the importance of several factors, including:

- Achieving progress on trade-distorting subsidies and trade in environmental goods and services (UN 2012, paragraph 281);
- Establishing enabling environments for the development, adaptation, dissemination, and transfer of environmentally-sound technologies, while noting the role of foreign direct investment, international trade and international cooperation in the transfer of environmentally-sound technologies (UN 2012, paragraph 271); and
- Achieving an ambitious, balanced and development-oriented conclusion of the Doha Round of multilateral trade negotiations, while respecting the principles of transparency, inclusiveness and consensual decision-making, with a view to strengthening the multilateral trading system (UN 2012, paragraph 282).

Source: Summary based on UN (2012)

Overall, there is no doubt that Rio+20 was not the turning point needed to prevent the world economy reaching critical environmental thresholds and tipping points. It did, however, offer a paradigm shift in the international discourse on sustainable development by pointing to the green economy as “one of the important tools available for achieving sustainable development”. Accordingly, green economy policies “should contribute to eradicating poverty as well as sustained economic growth, enhancing social inclusion, improving human welfare and creating opportunities for employment and decent work for all, while maintaining the healthy functioning of the Earth’s ecosystems” (UN 2012, paragraph 56).

Governments also called on the international community, including UN agencies, to support countries interested in transitioning to an inclusive green economy and provide assistance in developing national green economy strategies that will generate new jobs and skills, promote clean technologies, and reduce environmental risks and poverty.

The degree of flexibility inherent in the formulation and application of green economy policies is expressed through the consideration that such policies “provide options for policymaking but should not be a rigid set of rules” (UN 2012, paragraph 56), and by acknowledgment of the need for supporting developing countries through technical and technological assistance (UN 2012, paragraph 74).

By addressing the critical nexus between a transition to a green economy and international trade, this report responds to the calls made by world leaders at Rio+20 for supporting a green economy that contributes to poverty eradication and sustainable economic growth. The objective of the report is to provide an overview and examples on how the transition to a greener economy can create sustainable trade opportunities for developing countries. At the same time, the report considers some of the main trade-related challenges faced by developing countries to take advantage of the benefits arising from the transition to a greener economy. It explores how addressing these challenges can present opportunities to advance economic and social development in a sustainable way. The report adopts an analytical and case-based approach with a view to stimulating further analytical work and policy dialogue, particularly at the national or regional level.

This report builds on UNEP’s report “Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication” (GER) (UNEP 2011a) and reviews particularly six of the ten economic sectors covered by the GER. These are: agriculture, fisheries, forests, manufacturing, renewable energy, and tourism. These six sectors have been selected because they present both existing and potential trade opportunities for developing countries.

Rio+20 calls for action in each of the six economic sectors, as summarised in Box 2, highlighting the need to implement strategies to assist developing countries in their efforts to achieve sustainability, including in trade-related practices.

Box 2. Rio+20 calls for a green economy transition in the six economic sectors addressed by this report

The Rio+20 Outcome Document highlights the importance of the six economic sectors addressed in this report for achieving sustainable development objectives. In addition, it adopts a ten-year framework of programmes on sustainable production and consumption that determines the pathway for achieving those objectives (paragraphs 224-226). The following paragraphs summarise the recommendations of the Outcome Document most relevant to these chapters.

- **Agriculture:** The Outcome Document stresses the critical importance of agriculture for poverty reduction, food security, livelihoods and the achievement of sustainable development. It places special emphasis on the situation of developing countries. In this context, the Outcome Document affirms the need to improve the functioning of international markets and trading systems, including managing the risks connected with high price volatility. In addition, it calls for national, regional and international strategies that promote the participation of farmers, and in particular small landholders (paragraphs 108-118).
- **Fisheries:** The Outcome Document puts a strong emphasis on the need to identify, by 2014, strategies to assist developing countries, and in particular least developed countries and small island developing states, in their effort to develop national capacity to conserve, sustainably manage and realise the benefits of sustainable fisheries. It also stresses the importance of combating illegal, unreported and unregulated fishing activities, and of phasing out subsidies that contribute to overcapacity and overfishing (paragraphs 52 and 168-177).
- **Forests:** The Outcome Document highlights that the wide range of products and services that forests provide creates opportunities to address some of the most pressing challenges of sustainable development. Sustainable forest management, the promotion of trade in legally harvested forest products, and the fight against illegal logging and illegal trade have been stressed as crucial preconditions for realising those opportunities. In addition, the Outcome Document addresses policy makers committed to improving the livelihood of forest communities (paragraphs 193-196).

- **Manufacturing:** The Outcome Document recognises the need for energy efficiency improvements in the production of goods and services as well as in the design of products (paragraph 128), and calls for the sound management of chemicals and waste (paragraphs 213-223). Moreover, it acknowledges the importance of an active engagement of the private sector in achieving the full implementation of sustainable development. In particular, the document expresses support for national regulatory frameworks that take into account the importance of corporate social responsibility (paragraph 46).
- **Renewable Energy:** The Outcome Document supports the transition towards the use of sustainable and renewable energy sources in a way that should be tailored to countries' specific situations and levels of development. While recognising that an increased use of renewable energy sources is an important tool for addressing climate change, the Outcome Document also encourages a more sustainable use of traditional energy sources, and re-affirms the commitment to phase out harmful and inefficient fossil fuel subsidies, taking into account the special situation of developing countries (paragraphs 127-129 and 225). This mandate is in line with the engagement expressed in the Sustainable Energy for All initiative, which aims at ensuring universal access to modern energy services, doubling the global rate of improvement in energy efficiency, and doubling the share of renewable energy in the global energy mix by 2030 (paragraph 129).
- **Tourism:** The Outcome Document acknowledges that well-designed and managed tourism can make an important contribution to all the three dimensions of sustainable development and generate trade opportunities, particularly in developing countries. In addition, the document calls for enhanced support for sustainable tourism activities and relevant capacity building in developing countries in order to contribute to the achievement of sustainable development. It also recognises that tourism activities such as ecotourism should be encouraged (paragraphs 130-131).

Source: Summaries based on UN 2012

1.2 The concept of a green economy

According to UNEP's working definition, a green economy is one that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities. This definition has been utilised to develop and test alternative investment scenarios using economic models and applied policy analysis in the GER.

The GER found that allocating up to 2 per cent of global gross domestic product (GDP) (approximately US\$ 65 trillion in 2011) over the next 40 years to jump-start a green transformation of the global economy would generate as much growth and employment as a brown economy, and outperform the latter in the medium and long run, while yielding significantly more environmental and social benefits and reducing the risks of global climate change. The three main findings of the GER are as follows:

- The transition to a green economy not only generates increases in wealth, in particular a gain in ecological commons or natural capital, but also, over a period of six years, produces a higher rate of GDP growth.
- There is an inextricable link between poverty eradication and better maintenance and conservation of the ecological commons, arising from the benefit flows from natural capital that are received directly by the poor. The role of natural capital and especially "living" natural capital (i.e. the planet's ecosystems and biodiversity) cannot be overstated in this context.
- In a transition to a green economy, new jobs are created that over time exceed the losses in brown economy employment. Achieving this net gain, however, requires investment in re-skilling and re-educating the workforce.

In addition to these findings, the GER identifies five key areas of policy-making that create the enabling conditions to support a green economy transition. These are:

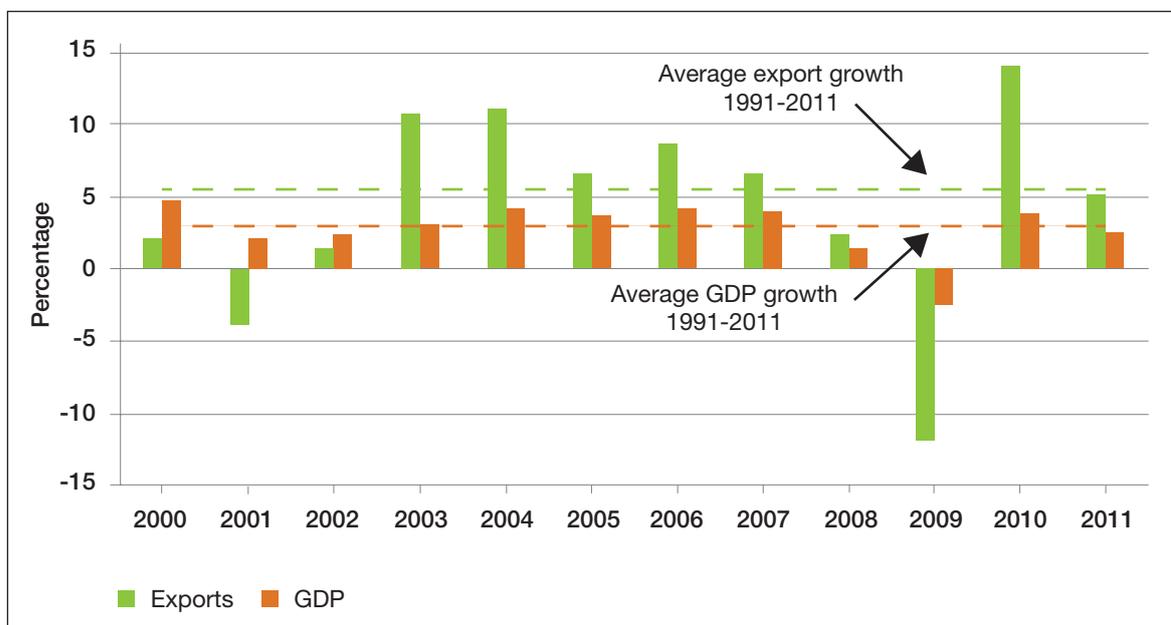
- Using **public investment and spending** to leverage private investment, including public infrastructure projects, green subsidies and sustainable public procurement;
- Using **market-based instruments**, such as taxes and tradable permits to level the playing field and provide market incentives in order to promote the greening of key sectors;
- Implementing **subsidy reform** in areas that deplete and degrade natural capital;
- Designing a country's **regulatory framework** of legislation, institutions and enforcement to channel economic energy into environmentally and socially valuable activity; and
- Using and improving **international frameworks** that regulate economic activity, including the international trading system, in driving a green economy.

This report, which is part of the Green Economy and Trade Opportunities Project (GE-TOP), builds on the key findings of the GER, and uses these categories of enabling conditions to identify means for seizing trade opportunities arising from the transition to a green economy.

1.3 International trade and the green economy

Trade remains a key indicator of the state of the world economy. The sum of world exports of goods and commercial services amounted to current US\$ 22.3 trillion at the end of 2010. Between 2000 and 2011, the volume of world merchandise exports grew at a 5 per cent average rate per year, *vis à vis* an average 3 per cent growth of GDP (Figure 1).

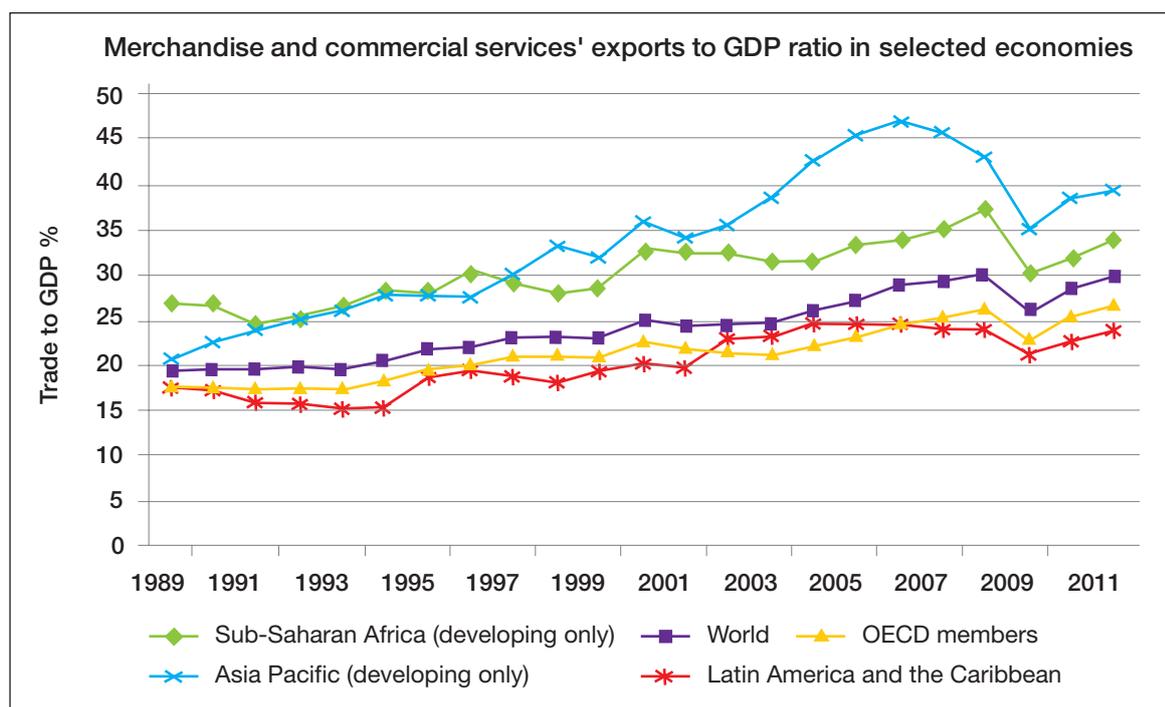
Figure 1. Growth in volume of world merchandise trade and GDP, 2000-2011



Source: WTO 2012a

Merchandise and commercial services' exports provide an increasingly important share of world GDP from 19 per cent in 1989 to 29.3 per cent in 2011 (Figure 2). Remarkably, the share of exports to GDP appears to be even larger in sub-Saharan African countries (33.5 per cent) and in the Asia Pacific region (39.1 per cent).

Figure 2. Exports-to-GDP ratio, 1989-2011

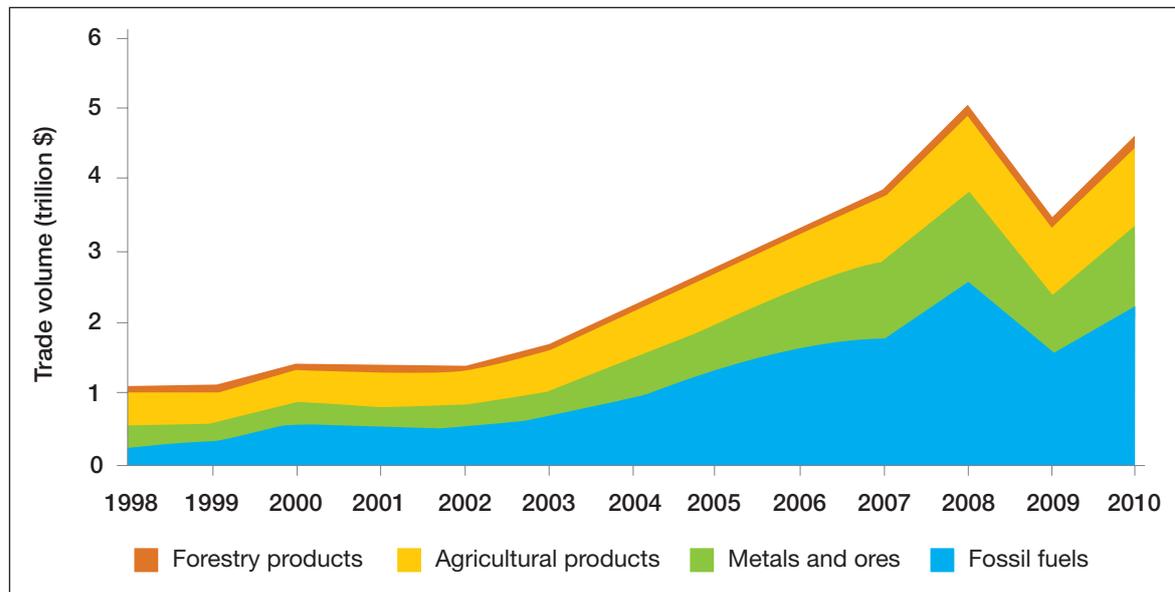


Source: Author's elaboration on the basis of World Bank and OECD national accounts data (2012)

Trade between developing countries, or “South-South” trade, has recently been assessed as “the most dynamic segment of global trade in the last decade” (World Bank 2013). According to the United Nations Conference on Trade and Development (2012), South-South exports reached US \$3.5 billion in 2011, or 23 per cent of the value of world trade. As from 2008, developing countries as a whole exported more to the South than to the North. Between 2001 and 2010, South-South exports grew on average by 19 per cent per year, and after the 2008 downturn they rebounded much faster than global export growth, increasing by 30 per cent between 2009 and 2012. The composition and direction of South-South trade suggest, respectively, that manufactures are at the forefront (over 60 per cent of total South-South trade), and that Asia is a major exporter, claiming over 80 per cent of all South-South exports.

While creating economic growth, increasing volumes of trade have also put additional stress on natural resources, including those that are traded internationally such as agricultural products, fish and forestry products, fossil fuels, and metals and ores. Increased demands by emerging economies for natural resources, coupled with the already unsustainable levels of resource consumption and use registered in more developed countries, led to an unprecedented surge in resource consumption and trade in the period 1995-2010. Figure 3 illustrates the growth of trade in global resources.

Figure 3. Global resource trade by value (1995-2010)



Source: Chatham House Resource Trade Database, BACI, COMTRADE (Lee et al. 2012)

Notes: *Agricultural products include fish, meat and dairy; **A significant surge in oil prices has been recorded in the period under review.

The interaction between trade and the transition to a greener economy is also complex and can be seen as bidirectional: trade has the potential to facilitate the transition to a green economy, and the transition to a green economy has the potential to create new trade opportunities.

Sustainable trade, in fact, can facilitate the transition to a green economy by fostering the exchange of environmentally friendly goods and services, including environmentally sound technologies, by increasing resource efficiency, by generating economic opportunities and employment, and by contributing to poverty eradication. To do so, the additional wealth generated by international trade should provide opportunities to reduce income distribution inequalities, rather than exacerbate them.

The transition to a green economy, in turn, has the potential to create sustainable trade opportunities. In particular, this can occur by opening new export markets for environmental goods and services, by trading certified products and certification-related services, and by greening international supply chains. The adoption of more resource- and energy-efficient production methods as part of green economy measures has an important role to play in securing long-term competitiveness in international markets.

However, realising this potential depends on a number of factors. Both increased pressure on natural resources and increased GHG emissions, in connection with trade activities, bring elements of caution when trying to achieve sustainable development objectives through trade. Flanking policies targeted at sustainable consumption and production, in particular, are needed for global trade to become more sustainable. Technological advancements to offset the increase in GHG emissions that follow a trade-driven expansion in the scale of production are also necessary. While trade activities usually result in more GHG emissions, technological advancements and spillovers favoured by international trade can lead to a further specialisation in the production of more energy- and resource-efficient goods and services (WTO and UNEP 2009).

The transition to a greener economy – being by definition a holistic approach to the orderly reform of existing economic models in a way that maximises social, economic and environmental gains – offers a real opportunity to harness trade for sustainable development. In addition, trade may serve as a channel for the transfer of environmentally sound technologies and services, and provide consumers with access to a greater variety of environmental goods and services at a lower cost.

Green economy policies, and specific measures taken to implement those policies, have in the past raised concerns of protectionist purposes or outcomes. Box 3 lists various WTO agreements that are especially relevant to green economy measures.

Box 3. Green economy policies and the WTO

The following paragraphs list the WTO agreements that appear to be most relevant for green economy measures. Some of those agreements contain exceptions that grant WTO members the possibility of implementing green economy measures where they pursue a legitimate objective.

General Agreement on Tariffs and Trade (GATT), Article XX

The GATT is the core agreement relating to trade in goods. GATT Article XX on General Exceptions specifies a number of instances in which members' trade measures may be exempted from GATT rules that would otherwise have applied. The provision seeks, among other things, to ensure that green economy measures are not applied arbitrarily and are not used as disguised protectionism.

Agreement on Technical Barriers to Trade (TBT) and Sanitary and Phytosanitary Measures (SPS)

Rules such as the TBT Agreement, dealing with technical regulations and product standards, and the SPS Agreement, dealing with food safety and human, animal and plant health, provide scope for WTO members to put in place regulatory measures to protect the environment and advance a green economy, while at the same time imposing disciplines to ensure that such measures are not unnecessary restrictions on international trade.

Agreement on Subsidies and Countervailing Measures (SCM)

The SCM Agreement seeks to prevent members from providing subsidies that distort international trade. Provided certain basic disciplines are respected, the agreement leaves members with policy space for, among other things, supporting the deployment and diffusion of green technologies.

Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS)

The TRIPS Agreement provides a framework for applying the intellectual property system to promote access to and dissemination of green technologies, and provides policy space to promote public interest in sectors of vital importance to socio-economic and technological development, as well as specific incentives for technology transfer and exclusions of environmentally damaging technologies from intellectual property (IP) protection.

The plurilateral Agreement on Government Procurement (GPA)

The plurilateral GPA applies only to the WTO members who have ratified it. It aims at opening up procurement markets to international competition on a transparent and non-discriminatory basis. Under the agreement, parties and their procuring entities may prepare, adopt or apply technical specifications aimed at promoting green procurement.

In addition to the enforceable WTO rules, world leaders recognised in the **Doha Ministerial Declaration** (WTO 2001) that "...under WTO rules no country should be prevented from taking measures for the protection of human, animal or plant life or health, or of the environment at the levels it considers appropriate, subject to the requirement that they are not applied in a manner which would constitute a means of arbitrary or unjustifiable discrimination between countries where the same conditions prevail, or a disguised restriction on international trade, and are otherwise in accordance with the provisions of the WTO Agreements". This language, which is drawn from GATT Article XX, can also be found in Principle 12 of the Rio Declaration 1992: "Trade policy measures for environmental purposes should not constitute a means of arbitrary or unjustifiable discrimination or a disguised restriction on international trade". Similarly, it is present in Article 3.5 of the UN Framework Convention on Climate Change, whereby: "Measures taken to combat climate change, including unilateral ones, should not constitute a means of arbitrary or unjustifiable discrimination or a disguised restriction on international trade". This language is also reflected in paragraph 58(h) of the Rio+20 Outcome Document (UN 2012).

Source: Adapted from WTO 2012b

As discussed in this section, sustainable or green trade has a key role to play in the interface between international trade and the transition to a green economy. While there is no universally agreed definition of sustainable trade, it broadly refers to trade that does not deplete natural resources, harm the environment or deteriorate social conditions while promoting economic growth. Sustainable trade can be closely associated with the following elements: positive social, economic and environmental outcomes from the international exchange of goods and services; the generation of economic values; the reduction of poverty

and inequalities; the reduction of environmental impacts from trade-related economic activities; and the restoration of natural resources.

1.4 Trade opportunities arising from the transition to a green economy

This report identifies several opportunities to create or consolidate sustainable development through trade. Sustainable trade opportunities may arise, for example, from trading environmental goods and services (EGS), by complying with sustainability standards and from the greening of global supply chains. Realising these opportunities is often challenging, particularly for developing countries. Consequently, this report also discusses those challenges and some means to address them.

1.4.1 Trade in environmental goods and services

There is currently no universal agreement on the definition of environmental goods and services (EGS). A number of bodies have proposed definitions, but these have not been universally adopted. For instance, the Organisation of Economic Co-operation and Development (OECD) has defined the EGS industry as “activities which produce goods and services to measure, prevent, limit, minimise or correct environmental damage to water, air and soil as well as problems related to waste, noise and ecosystems” (OECD 2005).

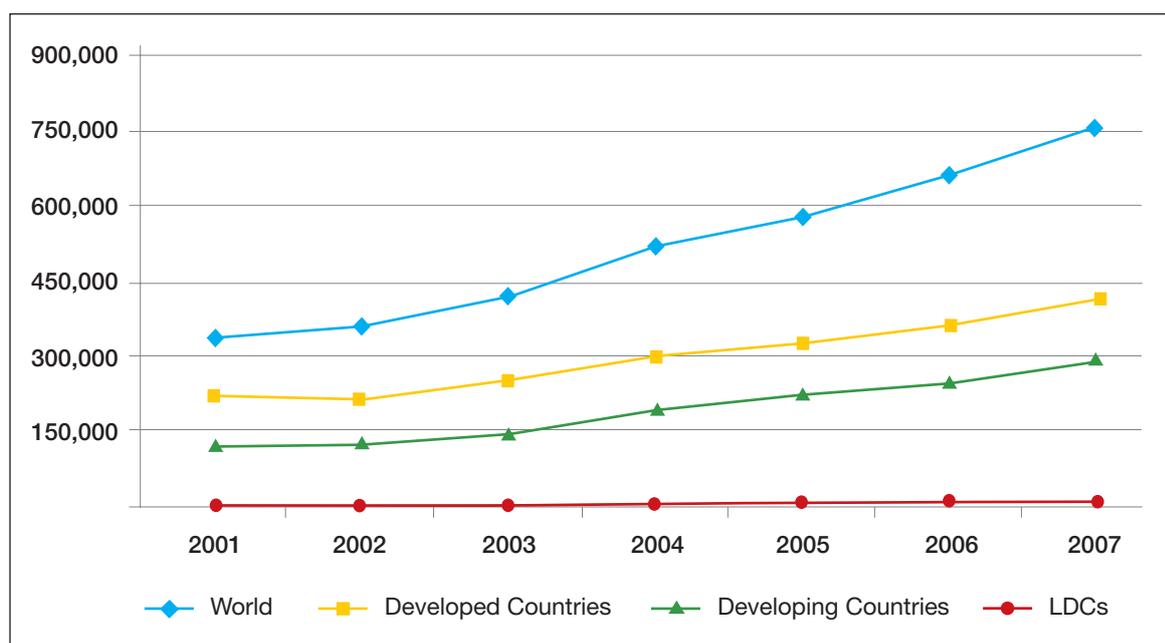
Negotiations on liberalising trade in EGS are part of the WTO Doha Round. The objective of paragraph 31(iii) of the Doha Ministerial Declaration (WTO 2001) is to create a “triple-win” situation for trade, the environment and development through “reduction or, as appropriate, elimination of tariff and non-tariff barriers to environmental goods and services”. This mandate, however, defines neither EGS nor the speed or depth of EGS trade liberalisation to be achieved.

In parallel, certain regional initiatives such as that of the Asia-Pacific Economic Co-operation (APEC) forum are providing new opportunities for regional or plurilateral dialogue and agreement. In September 2012, APEC leaders agreed on a list of 54 environmental goods for which tariff rates would be reduced to five per cent or less by 2015. The list includes for example machines for the production of heat and power on the basis of renewable biomass fuels, components of industrial air pollution control plants, and gas turbines for electrical power generation from recovered landfill gas (APEC 2012). APEC members account for over 70 per cent of world exports in the goods on the 54-item list (ICTSD 2012).

Environmental goods

This report shows that significant growth potential for trade in environmental goods is found in developing countries. Many are now beginning to realise the opportunity for investing in environmental infrastructure and are supporting this trend by putting in place supporting regulatory frameworks. These trends – combined with increasing environmental awareness internationally and investments in research and development (R&D) – are creating dynamic opportunities for trade in environmental goods. Between 2001 and 2007, as shown in Figure 4, the total export value of environmental goods (based on a combination of the OECD and APEC lists) more than doubled, with both developed and developing countries experiencing similar levels of growth.

Figure 4. Growth of environmental goods export, 2001-2007



Source: UNDP 2010 based on a combination of the OECD and APEC classifications

However, if compared with the value of global trade in materials and resources reported in Figure 3, trade in EGS in the period 2001-2007 shows lower growth rates, while also representing only a small fraction of total merchandise trade.

As national priorities shift towards mitigating environmental damage, emerging economies have become significant players in the production and trade of various clean technologies. This is also due to significant investments in R&D. An important margin to liberalise trade in environmental goods still exists in "South-South" trade, where environmental goods face higher bound and applied tariffs. While tariff revenue represents an important source of income for many developing countries, lowering tariffs on EGS may significantly increase consumers' welfare, while contributing to sustainable development.

In addition, non-tariff measures also have significant impacts on trade flows, and potentially even more than tariffs. For environmental goods, non-tariff measures most commonly take the form of standards and technical regulations with product characteristics requirements, licensing, certification, testing, inspection and quarantine requirements.

Some developing countries have, however, also expressed concern that enhanced competition from cheaper imports could have an adverse effect on their own new green industries. In addition, the margins for improving market access for environmental goods exports from least developed countries (LDCs) and developing countries to developed countries through tariff reduction are somewhat limited, whereas much more could be done in the field of non-tariff measures. This is particularly the case for exports to OECD countries that maintain complex regulatory frameworks and impose lower tariffs on goods from developing countries under their Generalised Systems of Preferences.

Considering the above, technical and financial support for developing countries, especially for LDCs, will play a key role in helping them to capture opportunities arising from a green economy and to increase trade in environmental goods relative to conventional merchandise trade.

Environmental services

The global market for environmental services is substantial and growing, driven in part by increasing environmental regulation and by changing consumer preferences. While industrialised countries represent a larger share in this growth, there are also increasing opportunities for developing countries.

Environmental services can be categorised as either infrastructure or non-infrastructure environmental services. Infrastructure environmental services include waste, water and refuse collection and disposal, and services that typically require significant investments, such as the construction and maintenance of physical facilities. Such services are usually characterised as public goods and are often either managed or regulated by governmental bodies (WTO 2010).

Non-infrastructure environmental services, such as the prevention and remediation of pollution, have emerged as a response to environmental problems inherent in modern industrial economies. Unlike infrastructure services, non-infrastructure environmental services are primarily supplied on a business-to-business level. They focus on the need to comply with government regulation on pollution or environmental degradation. Comparatively, the market for non-infrastructure environmental services is a highly liberalised and competitive one, given the lower level of social policy or political sensitivities involved (WTO 2010).

If well managed, the liberalisation of trade in environmental services can provide significant benefits to the private sector as well as the general public through enhanced market opportunities and improved health and environmental sustainability, notably in developing countries. Investment and expertise brought in by foreign firms can create jobs and skills, and facilitate technology transfers. Domestic firms in sectors such as engineering, construction and tourism can also benefit from know-how resulting from the growing environmental services trade.

1.4.2 Standards and certification

International trade in goods and services has encouraged the development and implementation of international standards. The development of standards is the normative part of a complex process that may lead to the certification of products or services. Participation in this process offers important opportunities for achieving sustainable development, but also presents a series of challenges.

Standards are non-tariff measures aimed at setting requirements related to, for example, products' quality and safety; they frequently pursue objectives such as environmental protection, the avoidance of deceptive practices and the reduction of transaction costs. However, standards and technical regulations may also be used to orient trade flows in a way that would favour the competitive position of a specific producer or country (World Bank 2008).

The WTO Agreement on Technical Barriers to Trade, under Annex 1.2, defines a standard as a:

"document approved by a recognized body, that provides, for common and repeated use, rules, guidelines, or characteristics for products or related processes and production methods, with which compliance is not mandatory. It may also include or deal exclusively with terminology, symbols, packaging, marking or labelling requirements as they apply to a product, process or production method".

Standards are based on state-of-the-art technology, including environmentally sound technologies and management practices, and are often developed by international technical committees composed of leading experts in their respective fields. The International Organization for Standardization (ISO), for example, is a non-governmental federation of national standardisation bodies from more than 160 countries.

Box 4. ISO standards and the green economy

ISO has developed several green economy-relevant standards. Examples of such standards include ISO 19011 on auditing of environmental management systems, ISO 14031 on the evaluation of environmental performance, ISO 14020 on environmental labels and declarations, and ISO 14064 on greenhouse gas accounting and verification. As a significant indicator of the uptake of these standards, it should be noted for example that the implementation of ISO 14001 on environmental management systems increased exponentially in the period 1999-2009.



Source: ISO 2009; UNEP 2011b

Properly implemented standards can facilitate sustainable trade by contributing to improving the quality of traded goods, increasing productivity and efficiency of manufacturing by specifying product characteristics, and by favouring the transfer of environmentally sound technologies. Consumers, large manufacturers and retailers can put pressure on suppliers worldwide through the introduction of voluntary standards, and thus transform business practices in profound and greener ways.

In addition, when the process of implementation of international standards includes a labelling or certification scheme, there can be additional advantages for complying producers and service providers. Such schemes offer opportunities for companies from developing countries to access new global markets and enhance sustainable consumption and production patterns. Labels provide consumers with information about product externalities, leveraging on their values, thereby creating market-based incentives to produce environmentally and socially beneficial products (UNEP 2012).

Labelling schemes indicate the environmental or social advantages of a product within a particular product category, often based on life-cycle considerations. They thus encourage manufacturers to produce goods with a reduced impact on the environment, and to address concerns about raw material scarcity, landfill space and the impact of pollutants on air and water quality.

Box 5. Examples of labels appearing on products



Abiding by certification criteria can help producers and service providers satisfy or anticipate regulatory requirements in more than one market simultaneously, as certification criteria often exceed regulatory requirements. Improvements in efficiency may also arise from reviewing production processes and waste management in conformity with certification requirements, while cost reductions can be achieved, for example, through efficient water and energy uses or smart product designs.

Standardisation, labelling and certification also pose a number of challenges, particularly to developing countries. Demand for compliance can, for example become especially challenging for small-scale producers or suppliers that are not able to meet the costs or simply lack the technical knowledge or capacity for compliance. Furthermore, while compliance with standards can help build or maintain market share, there is concern that standards gradually become an access precondition. Compliance generally requires know-how, risk management strategies, equipment and investments that smaller and less sophisticated producers often lack.

Another category of challenges relates to the inclusiveness of standard-setting processes and modalities. Developing countries, and particularly small-scale producers, often find that achieving effective participation in international standard setting is costly or requires unavailable skills. In light of the proliferation of both technical regulations and standards, further harmonisation and recognition of equivalence between different standards and labels would reduce, in the longer term, the potential of creating trade barriers. Although regulatory cooperation arrangements are being explored more frequently than they were in the past, higher priority should be given to harmonisation, equivalency, mutual recognition of sustainability standards, and conformity assessment.

Considering these challenges, technical assistance is needed, particularly for developing countries' participation in both standard setting processes and compliance-related issues. In this connection, five UN agencies¹ joined efforts in 2013 to create the United Nations Forum on Sustainability Standards (UNFSS). The UNFSS is a platform created to provide information and analysis on voluntary sustainability standards.

1. The Food and Agriculture Organization of the United Nations (FAO), the International Trade Centre (ITC), UNCTAD, UNEP and the United Nations Industrial Development Organization (UNIDO).

The UNFSS has a particular focus on the potential value of voluntary sustainability standards (VSS) as tools for developing countries to achieve their sustainable development goals. At the same time, the UNFSS addresses the potential trade or development obstacles these standards may create, with particular emphasis on their impact on small-scale producers and less developed countries. The UNFSS aims to facilitate a dialogue for the exchange of knowledge on these issues and provide a forum for intergovernmental actors to communicate among each other and engage with key target groups (producers, traders, consumers, standard setters, certification bodies, trade diplomats, relevant NGOs and researchers).²

1.4.3 Greening global supply chains

Supporting a green economy transition will require that public and private actors address existing market and policy failures and set prices that account for the true costs and benefits of the economic activity. Economic activities often do not reflect their real costs, including their negative effects on society as a whole and the common natural environment. The internalisation of negative externalities requires also re-thinking and reforming the way in which production and distribution is organised across global supply chains (GSCs).

During the last three decades, supply chains have expanded from a country-centred model to an international network of production units. This trend is correlated with the general decrease in trade-related costs, including for example transport and tariffs, and the information and communication technology revolution, which has progressively lowered communication costs while facilitating cross-border coordination of production processes (Baldwin 2011). At present, the reality of international trade has become one of inter- and intra-industry exchanges of intermediate goods that cross the same borders more than once. This is the so-called “trade in value added”.³

As GSCs expand and the linkages within and across value chains increase in number and depth, many multinational companies have adopted sustainable supply chain standards, and implement them through inspection and compliance regimes, such as requiring their suppliers to use a certified environmental management system. This is leading to both the creation of new trade opportunities and the consolidation of the position of compliant suppliers in international markets.

In the case of manufacturing, for example, options for greening the supply chain include the selection of recycled materials, equipment and design on the basis of environmental compatibility, the use of manufacturing methods that reduce impacts, as well as enhancing sustainability in transport, production, use, maintenance and end-of-life cycling. In addition, increasing international competitiveness through the greening of GSCs can be considered a major trade opportunity, given incentives for greater resource efficiency, innovative products, better product design, all creating medium-to-long term competitive advantages.

However, there are also risks of segregation, particularly for small producers, and there are challenges related to start-up and maintenance costs and know-how needed for upgrading production methods to meet sustainability standards. Adding environmental and social aspects to the traditional quality requirements in the production process – both upstream and downstream – means that suppliers have to adapt to a larger number of requirements, while businesses need increased control over the production chain. Compliance can be costly, notably for small- and medium-size enterprises (SMEs), and can necessitate technologies and know-how that may not yet be available in some developing countries.

While developing countries’ enterprises can streamline coordination and communication from increased participation in traceability schemes related to GSCs (UNCTAD 2011), it is important to highlight that SMEs, in particular, may require external support and capacity building to fully participate in sustainable suppliers’ networks (UNIDO 2011). Integrating into greener GSCs presents, therefore, both challenges and opportunities for developing countries to build their industries according to the tenets of sustainable development, so as to ensure long-term international competitiveness (WEF 2012).

2 Further information is available at <http://unfss.org>

3. The WTO and the OECD are exploring methodologies to measure “trade in value added” (TiVA). In 2013, the two international bodies jointly released the first set of TiVA indicators for 40 countries and 18 industries.

1.5 This report

Before Rio+20, the focus of the debate on trade and the transition to a green economy was largely on the risks related to the creation of new barriers for developing countries' exports of goods and services. In that connection, Rio+20 has been able to initiate discussions on improving the trade performance of developing countries' economic operators as an additional effect of, and motivation for, the implementation of green economy policies.

International trade, which is a recognised catalyst of growth and economic development, if accompanied by appropriate regulation, may lend itself to the role of facilitator of a green economy transition. Given the impressive surge in international trade witnessed in the last two decades, sustainable trade should lead to a relative increase of production of and trade in, for example, EGS and goods and services that are certified for sustainability. In other words, trade can become more sustainable if it leads to a shift from the production and consumption of conventional goods and services, to the production and consumption of environmentally, socially and economically sustainable goods and services.

Consumers are increasingly demanding products that are not only organic or chemical free but that are also produced sustainably without harm to the environment. Moreover, international travelers are increasingly interested in tourism and travel-related services that are certified as being environmentally and socially sound.

This report maintains that sustainable and responsible trade in the six sectors under consideration, though still limited when compared with conventional trade, has become much more prominent in recent years. Trade in EGS, the implementation of sustainability standards, and the greening of GSCs play a major role in this process across all the covered sectors. The report stresses that there is a clear economic case to make trade more socially and environmentally sustainable. Indeed, there are clear instances where the opportunities to increase revenues through trade fully coincide with the objectives of a green economy. However, even if appealing and characterised by ascending trends, those instances are still limited and support is needed to facilitate replication and improvement of the use of trade as a mechanism for transitioning to greener economies.

The following chapters present some of the main trade opportunities and their related challenges in the transition to a green economy in the following economic sectors: agriculture, fisheries & aquaculture, forests, manufacturing, renewable energy and tourism. The chapters begin with an introductory section outlining the importance of the sector and referring to calls made at Rio+20 for improving sustainability. After reviewing the environmental and economic context for greening the economy, the chapters present green economy measures and assess how they can and do create new trade opportunities, particularly for developing countries. The chapters then assess enabling conditions, policy tools and actions that can help support the creation of trade opportunities in connection with green economy reforms.

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Agriculture



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Acronyms

AoA	Agreement on Agriculture
AROS	Asian Regional Organic Standard
CADO	Consortium of Agro-Artisanal Organic Sweets
CBI	Centre for the Promotion of Imports from Developing Countries
CODA	Consortium of Agro-Artisanal Organic Sweets
CRACYP	Network Corporation for Rural Reforestation and Progress
EEA	European Economic Area
ETP	Ethical Tea Partnership
EU	European Union
FAO	Food and Agriculture Organization
FiBL	Research Institute of Organic Agriculture
FLO	Fairtrade International
GAP	Good Agricultural Practice
GER	Green Economy Report
GHG	Greenhouse Gas
HACCP	Hazard Analysis and Critical Control Point
IFAD	International Fund for Agricultural Development
IFOAM	International Federation of Organic Agriculture Movements
INDOCERT	Indian Organic Certification Agency
IOAS	International Organic Accreditation Service
IROCB	International Requirements for Organic Certification Bodies
ITC	International Trade Centre
ITF	International Task Force on Harmonization and Equivalence in Organic Agriculture
ISO	International Organization for Standardization
MT	Metric Tonnes
NGO	Nongovernmental Organization
NOP	National Organic Program
NTCD	Nepal Tea Development Corporation
OECD	Organisation for Economic Co-operation and Development
OIE	World Organisation for Animal Health
OTA	Organic Trade Association
PCF	Product Carbon Footprinting
PGS	Participatory Guarantee System
PPP	Public-Private Partnership
POS	Pacific Organic Standards
R&D	Research & Development
UNCTAD	United Nations Conference on Trade and Development
UNDESA	United Nations Department of Economic and Social Affairs
UNEP	United Nations Environment Programme
USDA	United States Department of Agriculture
WTO	World Trade Organization

2 Agriculture

2.1 Introduction

Sustainable agriculture, a key aim of the Rio+20 Outcome Document “The Future We Want” (UN 2012a), has a significant role to play in encouraging a move to a greener economy. Paragraph 111 states:

“We reaffirm the necessity to promote, enhance and support more sustainable agriculture, including crops, livestock, forestry, fisheries and aquaculture, that improves food security, eradicates hunger and is economically viable, while conserving land, water, plant and animal genetic resources, biodiversity and ecosystems and enhancing resilience to climate change and natural disasters”.

International trade can facilitate the transition to a green economy by helping to create and strengthen global markets for sustainable agriculture and improve food security. Trade policies as well as trends in domestic and international consumer demand are important factors that lead to changes in agricultural practices. This is notably applicable to certified farming practices such as organic and fair trade production.

This chapter identifies trends and trade opportunities in the agriculture sector associated with a transition to a green economy. It explores how developing countries can respond to international demand for sustainable goods and services in this sector. Some promising green trade opportunities that are highlighted in this chapter include:

- Increasing international competitiveness by greening agriculture;
- Accessing sustainable global supply chains, particularly through business-to-business certification of sustainable farming practices;
- Creating new markets from sustainably produced crops;
- Responding to overseas consumer demand for sustainably produced products;
- Exporting organic products;
- Exporting fair trade products;
- Producing and exporting inputs for sustainable agriculture products;
- Providing cross-border technical and managerial support services for sustainable agriculture and certification; and
- Providing agro-tourism services.

2.2 Environmental and economic context for greening the economy

2.2.1 The agricultural sector and its impacts

Agriculture is considered a key sector in the transformation of societies to greener economies.¹ On the one hand, global crop production has more than doubled over the last 40 years and the world now produces enough food to feed six billion people, although the distribution of food is uneven (UNEP 2010). Furthermore, for many countries, the production of agricultural commodities, both for domestic use and for export, are an important source of economic growth and livelihoods. Approximately 2.6 billion people depend on agriculture for their livelihood, a majority of who are small holder farmers in rural areas (UNEP 2011a). The agricultural sector, through proper land management and agricultural innovation, is instrumental in shaping and protecting the natural environment upon which it depends.

On the other hand, the agricultural sector is the source of many negative environmental and social impacts. As set out in the Green Economy Report (GER) (UNEP 2011a), current unsustainable agricultural practices include heavy reliance on agro-chemical inputs such as fertilisers and pesticides, inefficient irrigation

1. Although agriculture generally refers to crop and animal husbandry, the focus of this chapter is on crops. Forestry and fisheries & aquaculture are covered in separate chapters.

techniques, fossil fuel consumption, and continuous, often flawed, land use policies that have driven conversion of forests and wetlands into sprawling farm lands. These unsustainable practises have led to many negative impacts on the environment:

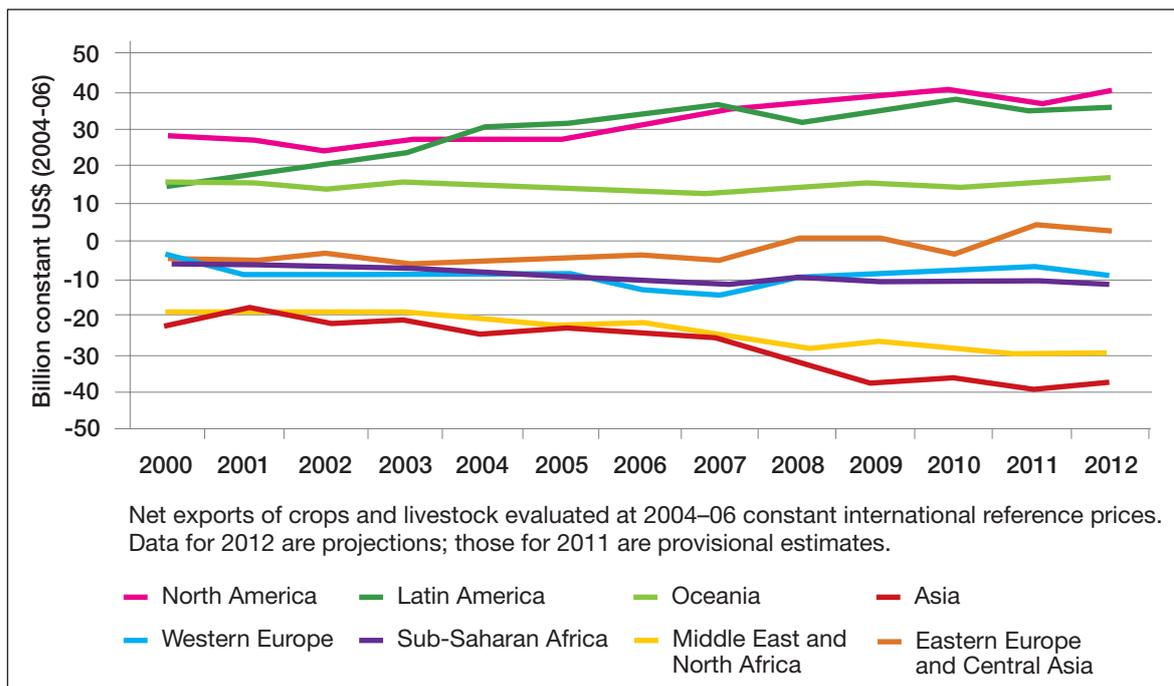
- A continuous loss of biodiversity and degradation of ecosystem services;
- A constant depletion and erosion of top soil nutrients;
- An increasing scarcity of freshwater – agriculture uses about 70 per cent of freshwater globally (UNEP 2012a);
- Rising tensions over traditional land rights; and
- Aggravated water pollution caused by poor nutrient management.

Moreover, agriculture accounts for about 13-15 per cent of greenhouse gas (GHG) emissions (Hoffman 2011). Adopting a more holistic approach, food systems as a whole contribute 19-29 per cent of global anthropogenic GHG emissions (Vermeulen et al. 2012). This includes GHG emissions from pre-production activities, agricultural production activities (including land cover change as a result of agriculture) and post-production activities (CGIAR 2012). Furthermore, GHG emissions are widely expected to increase under most of the forecasts of agricultural production and food consumption patterns. Further challenges for agriculture include the impacts of climate change on agricultural productivity, the rising demand for meat in diets, and a growing world population that depends on limited natural resources.

2.2.2 Agriculture and trade

During the period between 2000 and 2012, the agricultural sector underwent significant changes in terms of specialisation and production, experiencing also highly volatile international prices and important shifts in trade patterns. As shown in Figure 1 and commented by the United Nations Food and Agriculture Organization (FAO) (2012a), the Middle East and North Africa region, as well as Asia, have consolidated their position as net importers of food. Eastern Europe and Central Asia are gradually becoming net exporters, while Latin America has experienced the highest export growth rate in the period under review. North America remains the largest net exporter, while Western Europe’s trade pattern remains stable as a net importer.

Figure 1. Net exports of food by region

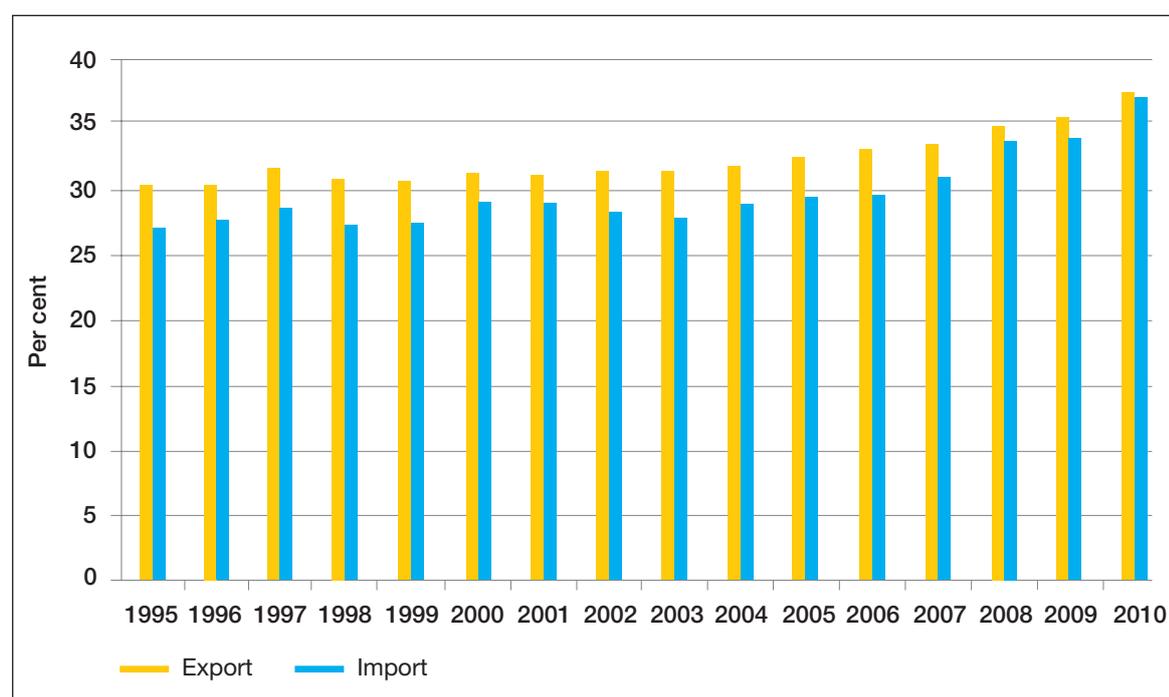


Source: FAO 2012

Even though agricultural trade has been growing in the period under consideration, its growth rates have been significantly lower than those recorded in the manufacturing sector (see the Manufacturing chapter of this report). Thus, the share of agricultural trade proportional to total merchandise trade has declined. Today, agricultural trade accounts for approximately 10 per cent of total merchandise trade, compared with 30 per cent 40 years ago (Cheong et al. 2013).

Nevertheless, agricultural trade remains particularly significant for developing countries, given the links between agricultural production, rural development and poverty alleviation (UNEP 2011a). In 2010, developing countries had a share of 37 per cent in world exports of agricultural products, up from 30 per cent in 1995 (Figure 2).

Figure 2. Share of developing country agricultural exports and imports in world exports and imports



Source: Cheong et al. 2013

Most of the growth in agricultural trade is attributable to an increase in trade in processed agricultural products. This shift can be observed in both developed and developing countries. It implies that there has been greater specialisation in the process of value addition. Countries with a very low share of processed products in their agricultural exports tend to be low-income countries (Cheong et al. 2013).

The OECD and FAO (2012) have projected the changes to the value of trade in agriculture by the year 2021 relative to the base period 2009-11. The Asia-Pacific and the Middle East and North Africa regions together are projected to account for the majority of the increase in the value of agricultural imports. With regard to exports, Latin America, East Europe and Central Asia and North America are forecasted to account for a combined 70 per cent share of the total gain by 2021.

South-south trade in agricultural commodities has experienced declining growth rates, from an average 15 per cent in the period 1991-2001 to an average 4.5 per cent in the period 2001-2007. Similarly, developing countries' exports towards industrialised countries have grown on average by 4.4 per cent in the period 1991-2001, and 1.1 per cent in the period 2001-2007 (Aksoy and Ng 2010).

Agricultural trade is highly regulated by governments for reasons of food security and food safety, as well as the desire to protect sub-sectors where producers may be less competitive on international markets. Another key aspect of today's agricultural commodity chains, particularly those of high value crops and processed products, is the increasing domination by a few transnational enterprises and distribution companies with

significant market power. While providing potential opportunities, this development can marginalise small-scale producers and sellers, particularly in remote areas (UNEP 2012b).

2.2.3 Greening of the agricultural sector

Sustainable and green agriculture

There is no official definition for sustainable agriculture. However, the term has been described by the FAO (2002) as follows:

“Sustainable agriculture involves the successful management of agricultural resources to satisfy human needs while maintaining or enhancing environmental quality and conserving natural resources for future generations”.

The greening of agriculture, as set out in the GER (UNEP 2011b), refers to the increasing use of farming practices and technologies that simultaneously:

- Maintain and increase farm productivity and profitability while ensuring the provision of food and ecosystem services on a sustainable basis;
- Reduce negative externalities, such as soil erosion, inorganic agro-chemical pollution, and agricultural GHG emissions; and
- Rebuild ecological resources, such as soil fertility, water, air and biodiversity including animal and plant-genetic diversity.

In addition, the longer term effect of greening agriculture can result in greater crop and livestock resilience to negative climate impacts. Farming practices and technologies that are instrumental in greening agriculture include:

- Restoring and enhancing soil fertility through the increased use of naturally and sustainably produced nutrient inputs, diversified crop rotations, and livestock and crop integration;
- Reducing soil erosion and improving the efficiency of water use by applying minimum tillage and cover crop cultivation techniques;
- Reducing chemical pesticide and herbicide use by implementing integrated and other environmentally friendly biological pest and weed management practices; and
- Reducing food spoilage and loss by expanding the use of post-harvest storage and processing facilities.

The various shades of green agriculture are exemplified by a diverse, locally adaptable set of agricultural techniques, practices and market branding certifications such as Good Agricultural Practices (GAP), organic farming, fair trade, conservation farming, precision farming, integrated pest management, and diversified farming. Organic farming and fair trade are discussed in greater detail below.

Box 1. Key messages from the Green Economy Report (GER)

Green agriculture is capable of nourishing a growing and more demanding world population at higher nutritional levels up to 2050. It is estimated that an increase, from today's 2,800 Kcal availability per person per day to around 3,200 Kcal by 2050, is likely with the use of green agricultural practices and technologies. It is possible to gain significant nutritional improvements from increased quantity and diversity of food (especially non-cereal) products. During the transition to greener agriculture, although food production in high-input industrial farming may experience a modest decline, significant positive responses may be triggered in more traditional systems run by small farmers in the developing world and lead to increases in production of the majority of staple crops needed to feed the world population. Public, private and civil initiatives for food production and social equity will be needed for an efficient transition at farm level and to assure sufficient quality nutrition for all during this period.

Green agriculture will reduce poverty. Environmental degradation and poverty can be simultaneously addressed by applying green agricultural practices. The majority of the approximately 2.6 billion people depending on agriculture for their livelihood live on small farms and in rural areas on, less than US\$ 1 per day. Increasing farm yields and return on labour while improving ecosystem services, on which the rural poor and small holder farmers depend most directly for their food and livelihoods, will be key to achieving the environmental and poverty goals. Evidence shows that the application of green farming practices can increase yields. For example, estimates suggest that for every ten per cent increase in farm yields, there has been a seven per cent reduction in poverty in Africa, and more than five per cent in Asia. The potential is especially high for small farms, where green farming can increase yields by between 54 and 179 per cent.

Greening agriculture requires investment, research and capacity building. This is needed in the following key areas: soil fertility management, more efficient and sustainable water use, crop and livestock diversification, biological plant and animal health management, an appropriate level of mechanisation, improving storage facilities especially for small farms and building upstream and downstream supply chains for businesses and trade. Capacity building efforts include expanding green agricultural extension services and facilitating improved market access for smallholder farmers and cooperatives. The aggregate global cost of investments and policy interventions required for the transition towards green agriculture is estimated to be US\$ 198 billion per year from 2011 to 2050. The value added in agricultural production increases by 9 per cent, compared with the projected BAU scenario. Studies suggest that return on investments in agricultural knowledge, science and technology across commodities, countries and regions on average are high (40-50 per cent) and have not declined over time. They are higher than the rate at which most governments can borrow money. In terms of social gains, the Asian Development Bank (ADB) Institute concluded that investment needed to move a household out of poverty, in parts of Asia, through engaging farmers in organic agriculture, could be as little as US\$ 32 to US\$ 38 per capita.

Green agriculture has the potential to be a net creator of jobs that provides higher return on labour inputs than conventional agriculture. Additionally, facilities for ensuring food safety and higher quality of food processing in rural areas are projected to create new and better quality jobs in the food production chain. Modelled scenarios suggest that investments aimed at greening agriculture could create 47 million additional jobs in the next 40 years, compared with the BAU scenario.

Source: UNEP 2011a

The "business case" for greening agriculture includes improving a company's brand image and the possibility of securing price premiums for sustainably produced products. Furthermore, agriculture experts generally accept that the more diversified the agricultural land, the more resilient it is to climatic and other disturbances, and the more it can produce relative to energy, water and other inputs (UNEP 2012b). A recent study compared diversified farming with simpler conventional farming systems by examining 12 ecosystem services, including biodiversity, soil quality, water use efficiency, control of weeds, diseases and pests, pollination services, carbon sequestration, energy efficiency/greenhouse warming potential, resistance and resilience to climate change, and food production. The result of this study shows that diversified farming systems are capable of supporting substantially greater biodiversity, soil quality, water and energy use efficiency, carbon sequestration, and resistance and resilience to climate change than simplified farming systems (Kremen and Miles 2012).

Conversion to greener farming methods, however, may carry a number of risks including the management of weeds, pests and diseases, and effectively addressing regulatory and administrative burdens in accessing new markets. At the same time, greening agriculture can improve trade balances in developing countries through reducing the volume of imported inputs (e.g. fertilisers, pesticides, hybrid seeds) and increasing exports of sustainable agricultural products. Greening agriculture may also have positive effects on the incomes of women, who make up a large share of smallholding farmers. This is particularly the case in sub-Saharan Africa and Asia.

It is important to acknowledge that field production systems are only one part of a green agriculture economy. Other factors that play a key role in greening agriculture include water management, protection of habitats, managing emissions in the processing and transport sectors and sustainable consumption.

Organic Agriculture

The FAO recognises organic agriculture as one of several approaches to sustainable agriculture where almost all synthetic inputs are prohibited, and soil investment and crop rotation are mandated. The International Federation of Organic Agriculture Movements (IFOAM) (2012a) has defined “organic farming” as:

“...a production system that sustains the health of soils, ecosystems and people. It relies on ecological processes, biodiversity and cycles adapted to local conditions, rather than the use of inputs with adverse effects. Organic agriculture combines tradition, innovation and science to benefit the shared environment and promote fair relationships and a good quality of life for all involved”.

Organic farming covers, among other things, organic food and vegetables, organic dairy, organic meats, and organic beverages. Key characteristics of organic agriculture include:

- Increased reliance on local and renewable resources;
- Efficient use of solar energy and greater potential for the production of biological systems;
- Preservation and improvement of soil fertility;
- Greater retention and recycling of plant nutrients and organic matter;
- Non-use of foreign or artificial organisms or substances (e.g. chemical fertilisers or pesticides);
- Maintenance of biological diversity in the production system and agricultural landscape; and
- Conditions for farm animals, in accordance with their natural and ecological role (Rundgren 2006).

Reports have illustrated that organic systems have an enhanced ability to withstand droughts and floods and provide a high resilience in the face of unpredictable impacts of climate change (FAO 2012a). Furthermore, a widespread conversion to organic farming could mitigate 40 to 65 per cent of the world’s agricultural GHG emissions (Müller-Lindenlauf et al. 2010). Nevertheless, the percentage of agricultural land managed under certified organic practices is still less than one per cent globally. In ten countries, however, including Austria, French Guiana, Estonia and Samoa, more than ten per cent of the farmland is already organic (FiBL & IFOAM 2013).

Fair trade

The term fair trade usually refers to trading partnerships between producers in developing countries and market partners in consuming countries, based on conditions that enable producers to improve their livelihoods. A trade relationship does not necessarily need to be certified in order to be fair, but certification provides third-party verification, which helps to ensure the integrity of the trading relationship and inform consumers (Elzakker et al. 2010).

The basic Fairtrade International (FLO) standard includes requirements for environmentally sound agricultural practices relating to integrated crop management, pesticides and other hazardous products, forests, water, soil erosion, ecosystems of high ecological value and waste management. Organic certification is encouraged.

2.3 Green economy measures

Green economy measures that can lead to the production and trade of more sustainable agriculture include:

- Certification by private bodies;
- Technical regulations, e.g. labelling, sanitary and phytosanitary measures;
- Phasing out of harmful subsidies; and
- Investments in green technology.

This section illustrates examples of these and other green economy measures that have a potential to create or consolidate sustainable trade opportunities.

2.3.1 Technical regulations

Commercial quality and labelling regulations

Most regulations focus on grade, size, weight, and package labelling. Regarding labelling, information often includes the country of origin, product name, variety and quantity. Requirements relating to commercial quality furthermore include grade, sanitary compliance verification, variety, colour, expiration date, external damage and shape (FAO n.d).

Food safety regulations

The regulatory framework for food safety of agriculture addresses, in particular, the maximum residue limits of pesticides and product traceability:

- **Maximum residue limits of pesticides:** Producers need to ensure the quality and safety of the produce and avoid all potential hazards such as risks from contaminated water. Regulations concerning maximum residue limits of pesticides address herbicides, insecticides and fungicides. They are effective both at national and international levels requiring producers and exporters to comply with the regulations of their country and the regulations of import countries. They may only use chemicals that are registered for use on a particular crop and must strictly follow the directions indicated in the instructions leaflet or on their containers.²
- **Product traceability:** In response to recent challenges for food safety (e.g. BSE or “mad cow disease”, bird flu, and E. coli in bean sprouts), many governments are increasing control over all stages of food production, processing and distribution. The aim is to protect consumers against the biological, chemical and environmental contamination of food. Product traceability is the ability to follow the movement of food through specified stages of production, processing and distribution. It also facilitates efficient recall in case of contamination. Further, product traceability helps determine the origin of a food safety problem, comply with legal requirements and meet consumers’ expectations for the safety and quality of purchased products.

Regarding food safety, Hazard Analysis Critical Control Point (HACCP) is a tool used widely by governments and retailers for managing food. In the EU, for example, regulation on the hygiene of foodstuffs requires food business operators to put in place, implement and maintain a permanent procedure based on HACCP principles. Companies that supply food to EU Member States are required to have a documented HACCP system (EC 2005).

2. The following links contain comprehensive information on food safety regulations at the international level (e.g. Codex Standards and WTO rules) and national level: www.ipfsaph.org/En/default.jsp , www.fao.org/ag/agn/agns/index_en.asp , Home page of the Codex Alimentarius Commission: www.codexalimentarius.net/web/index_en.jsp , Procedural Manual of the Codex Alimentarius Commission: www.codexalimentarius.net/web/procedural_manual.jsp.

Box 2. Hazard Analysis and Critical Control Point (HACCP) principles

The concept of Hazard Analysis and Critical Control Points (HACCP) is a preventive system to guarantee the safety of food for the consumer. It focuses on the prevention of physical, chemical and biological hazards rather than on carrying out inspection of the finished products.

The HACCP concept requires a company:

- To analyse all risks within its control related to the safety of its products
- To identify critical points for control of the quality of food
- To define critical limits for relevant parameters at the critical points
- To establish procedures for continuous control of food safety
- To define corrective measures for deviations
- To regularly check whether this system is appropriate and effective
- To document all measures taken

Sources: UNIDO (n.d.), FAO 2012b

Sanitary and phytosanitary measures

Producers must comply with sanitary and phytosanitary (SPS) measures that exist to protect human, animal and plant life or health within the national territory of the country implementing them. These measures are designed to prevent the entry and spread of animal and plant diseases and pests. The major importing countries around the world implement pest risk analysis in order to determine the risk level of an imported product and inspect products on arrival to ensure that a certain level of risk is not exceeded. Phytosanitary certificates can be required for regulated articles such as plants, seeds, fruits and vegetables, and cut flowers.³ Phytosanitary certificates may also be used for certain plant products that have been processed where such products (e.g. wood, cotton), by their nature or that of their processing, are at risk of infestation or infection. A phytosanitary certificate may also be required for other regulated articles where phytosanitary measures are technically justified (e.g. empty containers, vehicles, and organisms). The SPS Agreement under the World Trade Organization (WTO) regulates the extent to which countries may adopt SPS measures.

The Standards and Trade Development Facility – set up under the auspices of the WTO, FAO, the World Bank, the World Organisation for Animal Health (OIE) and the World Health Organization (WHO) – is a funding and technical assistance mechanism that helps developing countries meet international SPS standards (STDF 2012). Implementation of the SPS standards and improved SPS capacity would support sustainable agriculture exports in the context of a transition to a green economy. Similarly, the SPS Agreement can help countries align their response to new types of pest and disease outbreaks as a result of climate change (WTO-UNEP 2009).

Organic agriculture is often considered as one effective way to respond to increasingly stringent food safety and quality requirements, such as the EU regulations on food safety and the private standards imposed by major European supermarkets on their suppliers of food products. Since organic agriculture excludes the use of synthetic agrochemicals, organic products would not, for example, be affected by stringent maximum residue levels for these chemicals (OFRF 2012).

2.3.2 Certification

In recent years, there has been a substantial growth in voluntary certification schemes for agricultural products as a mechanism for encouraging and enforcing sustainable production and sourcing. Certification schemes for agricultural products provide assurance that certain characteristics or attributes of the product or its production method or system, laid down in specifications, have been observed. They cover a wide range of different initiatives that function at different stages of the food supply chain (pre- or post-farm gate; covering all or part of the food supply chain; affecting all sectors or just one market segment, etc.). Certification schemes can

3. For detailed information on phytosanitary certificate content, see IPPC (2012).

operate at business-to-business (B2B) level, where the supermarket or processing business is the intended final recipient of the information, or at business-to-consumer (B2C) level, where they are intended to demonstrate to consumers that the products they are purchasing have been produced according to the highest ethical and environmental standards. Companies can also use logos to indicate certification, although many, especially the B2B schemes, do not (EC 2010).

According to the Ecolabel Index, in 2013, over 435 sustainability labels exist worldwide.⁴ These include B2B schemes (see further Section 2.4.2) and B2C schemes (e.g. organic and fair trade labels, as discussed in Sections 2.4.5 and 2.4.7 respectively). As a consequence, sustainability labels and certification schemes have created new trade opportunities for developing countries. In particular, third party certification of farm products can provide a means for small-scale farmers to enter international markets. For some producers, however, the financial costs of obtaining certification are a significant obstacle to profitable trade. Collaboration between cooperatives or other associations dealing with certification can help overcome some of the cost issues, for example, group certification via an internal control system (IFOAM 2012b).

Box 3. Cooperative certification

Farmers organised in cooperatives can access organic or fair-trade certification more easily by creating a partnership with a buyer. For example the Copabo cooperative, based in Cote d'Ivoire, has set up a partnership with Ethiquable, a French company trading fair trade products. Ethiquable assists in the pre-financing of cashew nuts for the Copabo to deal with the extra cost of the certification as well as the cash advance necessary for the de-shelling process.

Source: IFOAM 2012c

An additional problem, however, for sustainable farming is that the use of labels such as organic or fair trade may mean different things in different export markets. The variation in standards from country to country can cause export markets to be complex and fragmented. In terms of international trade, the proliferation of standards may be detrimental if it increases the cost and complexity of trade, thus making it more inefficient (UNFSS 2013).

There are a number of efforts to assist with harmonisation or mutual recognition. For example, the International Task Force on Harmonization and Equivalence in Organic Agriculture (ITF) has developed a normative guidance document, "International Requirements for Organic Certification Bodies". This document enables governments and certification and accreditation bodies to recognise certification bodies outside of their own systems. Thus, it facilitates the international acceptance of organic products certified by these bodies (FAO et al. 2012).

The ISEAL Alliance has also developed consensus-based Codes of Good Practice that provide clear road maps for standards systems in designing credible and effective sustainability standards on issues such as standards setting, impact assessment and assurance.⁵ These Codes of Good Practice are expected to become an international reference for credibility in sustainability standards (Jackson 2012).

Many developing countries also have their own domestic sustainable agriculture standards and certification schemes that can act as stepping stones to certification for international markets. Relevant bodies in Vietnam, for example, have developed national food safety standards that could help firms meet the production requirements of industry certification bodies, such as the Global Good Agricultural Practise (GLOBALG.A.P.) (Lockie 2010).⁶ Despite many challenges, certification presents an opportunity for exporters to differentiate their products from their competitors.

4. <http://www.ecolabelindex.com/>

5. Full Members of the ISEAL Alliance include: 4C Association, Accreditation Services International (ASI), Fairtrade Labelling Organizations International (FLO), Forest Stewardship Council (FSC), International Organic Accreditation Service (IOAS), Marine Stewardship Council (MSC), Rainforest Alliance/Sustainable Agriculture Network (RA/SAN), Roundtable for Sustainable Biofuels (RSB), Social Accountability Accreditation Services (SAAS), Social Accountability International (SAI), Union for Ethical BioTrade (UEBT) and UTZ Certified. Associate Members include: Alliance for Water Stewardship (AVWS), Bonsucro.

6. Global Footprint Network (GFN), GoodWeave, People 4 Earth (P4E), Responsible Jewellery Council (RJC), WWF Aquaculture Dialogues.

Given the rapid growth in certification, the United Nations Forum on Sustainability Standards (UNFSS) was launched in March 2013. The UNFSS is a joint effort of five UN bodies – UNCTAD, UNEP, FAO, UNIDO and the International Trade Centre (ITC). As a response to rapidly expanding sustainability markets and the establishment of new and diverse standards by a large number of actors, including private sector players, the UNFSS is an information platform for developing country decision makers and other stakeholders, such as the private sector and NGOs, to better understand the role and implications of voluntary sustainability standards, and to maximise their utility to create sustainable development.⁷

2.3.3 Regulations governing organic products

For an agricultural product to be exported and sold as organic in another market, it must generally be certified by a third party as having met the organic production standards of the importing country's organic regulations. These third-party certifying bodies must, in turn, have been approved by a standard setting body or a relevant government authority of the importing country. In 2011, the number of certification bodies worldwide was 576, and for the first time, Asia had more certification bodies than Europe (Willer et al. 2013).

In addition, all relevant administrative and import procedures in the organic regulations must be followed. According to a survey on organic rules and regulations by the Research Institute of Organic Agriculture (FiBL), 86 countries currently have organic standards. There are also 26 countries that are in the process of drafting legislation (FiBL & IFOAM 2013). Together, the EU⁸ and the US represent around 95 per cent of the world's organic sales. A brief overview of their respective import requirements is set out in Boxes 4 and 5.

Box 4. EU organic requirements

In the EU, Regulation 834/2007 on the production, control and labelling of organic products includes provisions and harmonised procedures for importing organic products on the EU market. This can be done through either compliance with the EU's organic legislation, or based on equivalence between standards and control systems.

Under the compliance regime a non-EU operator has to fulfill the requirements of EU legislation, including all detailed production rules and labelling. In contrast to the equivalence regime, the rules followed must be identical, and not merely equivalent, to the ones applicable in the EU. The operator must be subject to controls by a control body or a control authority recognised for the purpose of compliance by the European Commission. The Commission fixed the deadline for the receipt of the first applications from control authorities and control bodies at 31 October 2014, thus giving time for the equivalence regime to develop.

For imports under the equivalence regime, the EU has a list of third countries (i.e. non EU/EEA countries) recognised as providing equivalent guarantees. At the time of drafting this report, this list comprised eleven countries. In addition, for imports of organic products from third countries that are not recognised, a list of control bodies recognised by the Commission as implementing equivalent organic standards and control measures in third countries entered into force in July 2012 (Regulation 508/2012). The list includes more than fifty control bodies from all over the world.

According to a European Commission report of May 2012 (EC 2012):

“The Commission considers that once the initial assessment has been successfully finalised, this list of third countries offers the most stable and reliable approach to organic imports, and also **contributes to stimulate developing countries to engage in setting up their own rules and control system**. It is the Commission's intention to continue examining the existing requests and possible new ones with a view to promote the equivalence concept at world level.” [emphasis added]

7. For more information on the UNFSS, see <http://unfss.org/>

8. In the EU, the specific Codex Alimentarius guidelines on organic food constitute the international point of reference intended to facilitate the harmonisation of requirements for organic products worldwide. Codex CAC/GL 32 - 1999 Guidelines for the production, processing, labelling and marketing of organically produced foods (FAO 2007).

Concerning processed organic products, in order to label a product as organic, at least 95 per cent of total weight of ingredients must be of organic origin. Otherwise, it is possible to mention organic in the list of ingredients under certain conditions (Onofre 2012).

A recent consultation launched by the EU on organic agriculture covers, among other things, future reforms to ensure the smooth functioning of the organic import trade.

Source: http://ec.europa.eu/agriculture/consultations/organic/2013_en.htm

Box 5. US organic requirements

The United States National Organic Program (NOP) develops the laws that regulate the creation, production, handling, labelling, trade, and enforcement of all US Department of Agriculture (USDA) organic products. Imports labelled organic must be produced, certified and labelled in accordance with the NOP rules. In particular, certifiers must be accredited or approved by the USDA. For foreign certifiers, there are three ways of achieving this:

- Direct accreditation by the USDA (the most common option);
- Accreditation by a foreign government upon request of that government; and
- Equivalency agreement between the US Government and a foreign government (NOP 2012).

For processed products in the US, the following rules apply:

- Products labelled as "100% Organic" – foods made with 100 per cent organic ingredients may display the USDA Organic seal;
- Products labelled as "Organic" – these products contain at least 95-99 per cent organic ingredients (by weight). The remaining ingredients are not available organically but have been approved by the NOP. These products may display the USDA Organic seal;
- Products labelled as "Made With Organic Ingredients" – these products must contain at least 70 per cent organic ingredients. These products do not display the USDA Organic seal; instead, they may list up to three ingredients or ingredient categories on the packaging (USDA n.d.).

In a major development for the mutual recognition of organic standards, in February 2012, the US and the EU signed a bilateral organic-equivalency agreement (Alonso and Mattsson 2012). Organic products may now be traded between the US and the EU without double conformity assessment procedures.

The agreement is, however, currently restricted to agricultural products produced and/or processed or packaged within the US and EU. The US-EU agreement does not provide market access for producers from developing countries. UNCTAD suggests, nevertheless, that, while an agreement providing direct access to both markets for finished products from developing countries would have been preferable, this new agreement will still boost sales in organic products in developing countries. Since exports from developing countries are mostly organic ingredients or bulk goods, such goods, once packaged or processed through intermediaries in either the EU or the US, would qualify for automatic acceptance in the other market. For example, coffee originating from Ethiopia, but certified "organic" under US regulations, could be sent to a trade partner in the US and packaged for sale in both the US and EU markets. This illustrates an export opportunity for developing countries, even more so if other countries join this agreement in the future. As UNCTAD notes, however, it will take time for organic traders to adjust their supply lines to correspond with the new framework (UNCTAD 2012a).

Several regional initiatives are also contributing to new export opportunities for more environmentally sustainable farm products. These include the following:

- The East African Organic Production Standards (EAOPS) was adopted in April 2007 as the official organic standard of the East African Community (EAC), applicable to its Member States: Burundi, Kenya, Rwanda, Tanzania and Uganda.
- The Pacific Organic Standards (POS) (in 2008) became the third regional standard to be adopted. On 14 April 2012, the International Federation of Organic Agriculture Movements (IFOAM) accepted the POS into their Family of Standards, which promotes the concept that one standard is sufficient to access several markets.
- The African Ecological Organic Agriculture (EOA) Initiative was established in 2009 to mainstream ecological organic agriculture into national agricultural policies, production systems and practices. The initiative's actual pilot focus (2013 - 2020) on six East African countries (Ethiopia, Kenya, Nigeria, Tanzania, Uganda, Zambia) will (up to 2020) be expanded to a long term engagement in eight countries in East and West Africa.
- The organic standards in the Harmonized Organic Regulation for Central America and Dominican Republic was set up in 2010, and includes Costa Rica, Guatemala, Honduras, Nicaragua and El Salvador. Together with Panama and the Dominican Republic, they are driving a process to develop a harmonised regional regulation on organic agriculture.
- The Asian Regional Organic Standard (AROS) was developed by a public-private group in 2010, under the auspices of the Global Organic Market Access project. AROS was established to harmonise organic standards and serve equivalence purposes in the region of East, Southeast and South Asia.⁹

2.3.4 Reforming subsidies in agriculture

Agriculture is one of the most distorted sectors in international trade through high levels of import tariffs, high levels of domestic support and export subsidies. In particular, much agricultural production is subsidised in many developed countries. Due to a lack of transparency and accountability, precise information on global subsidies for agriculture is not readily available. The OECD has data on producer support in OECD economies, as illustrated in Box 6.

Box 6. Producer support in OECD countries

In 2011, support to producers across the OECD area amounted to US\$ 252 billion as measured by the Producer Support Estimate (PSE). This is equivalent to 19 per cent of farm gross receipts in OECD countries. This is the lowest level observed since the OECD began measuring support in the mid-1980s, when the PSE as percentage of gross farm receipts was almost twice as high (37 per cent).

The recent decline in producer support was in many countries driven by developments on international markets, rather than by explicit policy changes. With higher world prices, policies to support domestic prices generated smaller transfers. As a result, the market price support component of the PSE declined to around 40 per cent in 2011. In some countries budgetary support increased, primarily as a result of payments to help farmers cope with exceptional circumstances, such as droughts or floods.

However, the reform process towards more decoupled forms of income transfers to farmers has been unequal across countries and, overall, price support remains the largest form of support in many OECD and emerging economies. Market price support is provided through tariffs and other border measures, and government interventions in the domestic market. In 2011, there was some movement to reduce these interventions, but export subsidies and other trade distorting measures are still in place.

Source: Extract from OECD 2012

Discussions on subsidies can be complex, in part because individual countries are subject to domestic political pressures on issues ranging from food-production sovereignty to overall food prices. At the

⁹. For further information on regional standards, see: <http://www.goma-organic.org/>

same time, it is now recognised that subsidies for the agricultural sector in developed economies have artificially reduced global prices for agriculture products and led to overproduction, and thereby set back the development of agriculture in developing countries (UNEP 2012b). Subsidies that directly encourage production by increasing output prices or lowering input costs are considered particularly harmful due to their production and trade-distorting effects.

An enabling environment for greening agriculture includes the reform of agricultural subsidies, while allowing developing countries to protect some domestic food crops (special products) from international competition when they are particularly important to food security and rural livestock (UNEP 2011a). The benefits of a transition to a green economy could be particularly significant where existing policy distortions are large, as noted by the WTO (2006):

“Trade-distorting subsidies grant an artificial price advantage to the subsidised commodities; they hinder the ability of foreign producers to export in the national market of the subsidising country as well as to compete in third-country import markets”.

In agriculture, removing subsidies and tariffs to cotton alone would increase real incomes in sub-Saharan Africa by US\$ 150 million per year (Canuto 2009). Similarly, the removal of trade-distorting support for biofuels could eliminate perverse incentives that introduce complex distortions into markets for biofuel feedstock, animal feed and livestock (Babcock 2012, Earley 2009).

Recent studies have looked into whether the various sorts of new farm subsidy programmes being introduced by China and India are effective in addressing domestic environmental challenges and other public policy goals such as improving food security, or reducing poverty and inequality (ICTSD 2012a, ICTSD 2012c). While farm subsidies may have a role to play in boosting productivity in these and other developing countries, there is no automatic connection between increasing farm support and achieving the types of increases in yields on developing country farms that will be needed in order to help rural communities move out of poverty and respond effectively to growing demand (ICTSD 2012b).

Channeling environmental harmful subsidies towards supporting more sustainable agricultural practises is a key element of greening the economy. Government support for agriculture increasingly involves direct payments for environmental services or compensation to farmers for avoiding particular activities that could adversely affect groundwater or biodiversity. Other payments, more directly related to production, are often contingent on the recipient complying with best-practice rules for agriculture. Many countries also promote agriculture through conversion payments, certification assistance, and marketing and promotion assistance.

The extent to which countries can provide agricultural subsidies is part of the WTO’s ongoing Doha Round of multilateral trade negotiations. The Doha mandate for agriculture, and the mandate built in Article 20 of the existing WTO Agreement on Agriculture (AoA), provide for “substantial improvements in market access; reductions of, with a view to phasing out, all forms of export subsidies; and substantial reductions in trade-distorting domestic support” (WTO 2004). The mandate mirrors the structure of the AoA, which is based on three pillars of market access, export competition and subsidies to domestic production. The WTO distinguishes between subsidies based on their effects on production and trade.¹⁰

2.3.5 Investing in green innovation

Attracting investments and advocating public and private support for research and development (R&D) can be singled out as key policy options to improve sustainability and resilience in agricultural production systems. Furthermore, the experience of several developed countries shows that – driven by policy incentives such as organic export promotion from Uganda – recent productivity improvements have occurred with lower levels of external input use, and thus more sustainably. Indeed, several international development agencies have found that “sustainable production intensification requires a major shift from the supply-driven innovation model to knowledge-specific and often location-specific farming systems which conserve and enhance natural resources” (FAO et al. 2012).

10. For detailed information on the categories, refer to the WTO webpage at: http://www.wto.org/english/tratop_e/agric_e/agboxes_e.htm.

A sustainable investment policy framework in the agricultural sector can help to attract foreign investments and efficiently manage internal financial resources. To enable developing countries to achieve this objective, the FAO, the International Fund for Agricultural Development (IFAD), UNCTAD, and the World Bank developed The Principles for Responsible Agricultural Investment, as set out in Box 7.

Box 7. The Principles for Responsible Agricultural Investment

These principles include the following sustainability criteria:

- Principle 1: Existing rights to land and associated natural resources are recognized and respected.
- Principle 2: Investments do not jeopardise food security but rather strengthen it.
- Principle 3: Processes for accessing land and other resources and then making associated investments are transparent, monitored, and ensure accountability by all stakeholders, within a proper business, legal, and regulatory environment.
- Principle 4: All those materially affected are consulted, and agreements from consultations are recorded and enforced.
- Principle 5: Investors ensure that projects respect the rule of law, reflect industry best practice, are viable economically, and result in durable shared value.
- Principle 6: Investments generate desirable social and distributional impacts and do not increase vulnerability.
- Principle 7: Environmental impacts due to a project are quantified and measures taken to encourage sustainable resource use while minimising the risk/magnitude of negative impacts and mitigating them.

Source: UNCTAD 2012b

Public-private partnerships (PPPs) are another means to boost innovation and increase farmers' access to green technologies. Given the existence of high returns to investments in agricultural R&D, private investors can be involved in contractual arrangements where both profits and risks are shared with the public sector for a certain period of time (Castle and Ferroni 2011). The seven principles presented above could also be applied to PPPs.

2.4 Trends and trade opportunities

An analysis of trends in international trade in agriculture has identified several green trade opportunities. Some of these opportunities such as increased economic competitiveness through greening of agriculture apply to the sector in general, whereas other opportunities, such as organic agriculture apply to only certain markets. The nature of the opportunities also varies, depending on whether the focus is on other companies in the value chain or on the final consumer.

2.4.1 Increasing international competitiveness by greening agriculture

International trade offers opportunities to expand demand for sustainable agriculture. Increasing demand creates incentives for improving resource efficiency. With a view to maintaining or expanding production in the long run, the focus of this expansion needs to be on both the resilience and the long-term sustainability of the food production system (Naylor 2008). Greening the agricultural food supply chain has the potential to lead to the development of a more sustainable industry, which will ultimately drive competitiveness and economic gains within the sector (Rao and Holt 2005).

Ways in which to build a sustainable supply chain for the agricultural industry are illustrated in Figure 3.

Figure 3. Building a sustainable supply chain



Source: Campbell's 2012

The agricultural supply chain involves a diversity of stakeholders and operations, ranging from inputs to the farming process, to the packaging and processes necessary to reach consumers. As global businesses increasingly seek to implement environmentally sound policies, all the various operations across the agriculture supply chain will need to be considered. Agricultural businesses in developing economies can use this new approach as an opportunity to develop sustainable agricultural production methods and position themselves competitively to take advantage of emerging sustainable trade opportunities.

With respect to the overall food production system, the biggest potential for sustainability improvements lies in influencing primary production, particularly through the enhancement of sustainable methods applied at the production level. These include methods for fertiliser and water use.¹¹ By using sustainable farming methods, productivity can be increased, especially in developing countries where the potential for increasing yields is large. A study of nearly 300 agriculture projects covering 37 million hectares in poor countries documented an average yield increase of 79 per cent, substantial carbon sequestration, more efficient water use, reduced pesticides, and increased ecosystem services as a result of resource-conserving practices (Pretty et al. 2005). Other studies have found that ecologically sound agricultural practices enhanced both species richness and abundance in a variety of agricultural landscapes (Batáry et al. 2011), and that high biodiversity is compatible with high yields (Clough et al. 2011). Further, according to the International Labour Organization (ILO), investments enabling farmers in developing countries to use more sustainable farming practices have been successful in providing greater market access in countries such as Uganda and Madagascar (ILO 2012).

As such, it is increasingly evident that sustainable farming practices are compatible with high yields, and should be considered as a viable alternative for developing economies as they transition to modern green agricultural production methods. This is especially important as consumers and policy makers in developed economies are increasingly paying attention to food production methods, with a preference towards promoting the consumption of sustainably produced foodstuff. Another important issue of greening the supply chain relates to avoiding food waste, as illustrated in Box 8.

Box 8. Think, Eat, Save: UNEP- FAO Campaign to reduce 1.3 Billion Tonnes of Food Wasted or Lost Each Year

About one third of all food production world-wide gets lost or wasted in the food production and consumption systems, amounting to 1.3 billion tonnes. In industrialised nations, retailers and consumers discard around 300 million tonnes that is fit for consumption, around half of the total food squandered in these regions. This is more than the total net food production of Sub-Saharan Africa and would be sufficient to feed the estimated 900 million people hungry in the world.

UNEP and FAO with a range of other partners launched in January 2013 the Think.Eat.Save campaign in support of the UN Secretary-General's Zero Hunger Challenge, to galvanise widespread global, regional and national actions, catalyze more sectors of society to be aware and to act, including through exchange of inspiring ideas and projects between those players already involved and new ones that are likely to come on board.

"If we can help food producers to reduce losses through better harvesting, processing, storage, transport and marketing methods, and combine this with profound and lasting changes in the way people consume food, then we can have a healthier and hunger-free world," FAO Director General Graziano da Silva said.

Source: <http://www.thinkeatsave.org/>

2.4.2 Accessing sustainable global value chains

Key trade opportunities in the agricultural sector for farmers in developing economies can be derived from accessing sustainable global agricultural value chains or by remaining in existing value chains that are becoming more sustainable. Also referred to as responsible sourcing or ethical sourcing, sustainable sourcing requires that stakeholders throughout a supply chain meet economic, environmental, and social standards that will ensure a healthy food and agriculture system (UNGC 2012). This is becoming important as businesses within developed economies are increasingly requiring that their suppliers, including those from developing countries, meet their sustainability requirements.

B2B certification schemes, as mentioned earlier in Section 2.3.2, that promote agricultural practices with reduced environmental impacts and higher efficiency are key tools used in ensuring sustainable agricultural value chains. Desired agricultural practices include integrated farm management, integrated pest

¹¹ See further SAI Platform (2012).

management, and good agricultural practice. Examples of certification programmes are GLOBALG.A.P, the RainForest Alliance and UTZ Certified.

Further, agricultural businesses are increasingly using certification systems, and have established commodity roundtables for a number of key export products, such as biofuels, cocoa, palm oil, rice, and sugar, as a first step in developing their own sustainability policies to meet customers' demands and to protect the production and supply chains. Large businesses that have developed their own corporate sustainability policies are increasingly applying such policies to their suppliers throughout their supply chains. For instance, some multinational coffee and chocolate companies have incorporated environmentally friendly certified products into their supply chains as part of their own corporate sustainability approach (Starbucks 2012, Kraft 2012). Other companies have included sustainable commodities including biofuels, cocoa, rice, and sugar.

The sourcing of certified sustainable products as part of corporate sustainability policies has evolved from a niche market catering specific consumers to an increasingly entrenched component of international business and trade. A 2011 study of global business leaders conducted by the ISEAL Alliance found that the businesses were using an average of four sustainability standards each. They were relying on these standards to manage their approach to sustainability and operational efficiency (ISEAL 2011). Environmental standards are increasingly becoming a sustainability tool in international business, and this trend is likely to continue (Milder et al. 2012). Standards are also now used as criteria for international lending and investment, as well as the implementation of trade policies and legislation.

Integration into a global value chain can help local suppliers to meet international standards, if and when international buyers in the chain transmit knowledge that is valuable to the local suppliers (Swinnen and Maetens 2007). In addition, as highlighted by Colen et al. (2012), infrastructure and training of workers to comply with GlobalG.A.P. requirements improve employment conditions at certified firms (see Box 9).

Box 9. Global Good Agricultural Practise (GLOBALG.A.P)

GlobalG.A.P. is a non-profit organisation with the objective to promote safe and sustainable agriculture worldwide. This is done by setting up voluntary standards and certification schemes for producers, suppliers and buyers throughout the agriculture industry.

Currently GlobalG.A.P. offers 16 standards for agricultural produce across crops, livestock and aquaculture. There are over 130,000 certified producers across 110 countries, and the certificates are issued by independent and accredited third party certification bodies, auditors and inspectors.

Source: GlobalG.A.P 2012

There is a range of advantages that standards can provide, including improving food quality and safety, and facilitating market access and reducing non-compliance risks regarding pesticides, residues and other contamination hazards. Implementing standards, however, does pose some challenges including certification compliance and the related costs of auditing and testing.

At the global level, food systems are becoming more integrated both vertically and horizontally. The presence of large companies in developing countries can give local farmers the opportunity to become part of national and international food value chains, especially through contract farming (UNEP 2012b). Contract farming, however, presents a number of potential challenges including dependencies and uneven trading relationships. Further, not all farmers are in a position to benefit from the increasing presence of transnational supermarket chains or food processors in their countries' markets. Small-scale farmers in remote areas are particularly ill-equipped to cope with the changing nature of the value chain. For farmers who fail to meet the requirements of agribusiness firms, market conditions can become increasingly difficult. Additionally, such farmers may miss opportunities to apply sustainable farming practices to their operations, losing additional competitiveness to other farmers (UNEP 2012b).

Some multinational food corporations, however, such as Walmart and Unilever have pledged to increase their reliance on small-scale producers to assist them with their farming practices. Such actions are often motivated by a strategy to diversify the sources of raw products in order to develop more resilient and secure supply chains. Unilever, for example, intends to link 500,000 smallholder farmers into their supply

network, while Walmart has plans to train one million agricultural producers, half female, in areas such as crop selection and sustainable agriculture techniques by 2015 (UNEP 2012b). B2B standards, which were originally developed for large-scale farm operations and to ensure food safety, have since 2002 begun to evolve to include smallholder farmer groups and strengthen their environmental criteria.

Besides the responsible actions of companies, governments and other organisations have a key role to play in enabling an investment climate conducive to more sustainable and inclusive supply-chain practices. Regulatory bodies and other stakeholders (such as the Forum for Sustainable Agriculture in Africa illustrated in Box 10) can help strengthen the linkage between large processors and retailers and small-scale farmers.

Box 10. The Forum for Sustainable Agriculture in Africa

The Forum for Sustainable Agriculture in Africa (FOSAA) aims to promote empowerment of local farmers to become actors in the agricultural sector's value chains (especially apiary, mushroom, rice and maize value chains). FOSAA strives to foster functional linkages between farmers, technology generators, technology transfer agents, financial institutions, and markets (local or foreign), within the agriculture value chains. FOSAA aims to:

- Enable the rapid prototyping of new innovations;
- Support rigorous evaluation that allows for the rapid termination of those innovations that fail to deliver on their promise of significant benefits; and
- Provide mechanisms to bring those innovations that succeed to scale.

One example of such an innovation is the production of the kitchen wood ash plant in Uganda. FOSAA, with support from the private firm Evergreen International Limited, has commissioned studies of the kitchen wood ash plant as a soil nutrient resource. Adopting this innovation has great potential for sustainable crop production since every rural farming family has this resource free of charge and efforts are being made to ensure that their produce is bulked so as to raise sufficient volumes to tap into, for Uganda, the lucrative South Sudan Market. Examples of related activities include training for farmers across the country in making and using homemade compost and the establishment of Organic with good internet facilities to inform local farmers, all supported, by the National Organic Agricultural Movement of Uganda.

Source: Kenneth Senkosi, Co-Founder/Chief Executive Officer of Forum for Sustainable Agriculture in Africa (FOSAA)

Box 11. Examples of initiatives to improve the sustainability of agricultural value chains

AgriFood task-force – a joint FAO/UNEP programme to green global supply chains through market mechanisms.¹²

Rainforest Alliance – a non-profit conservation organisation that develops environmental and social standards and certification for tropical crop, livestock and forest production systems and links producers to consumers.

Sustainable Agriculture Initiative (SAI) Platform – founded by international food companies to facilitate sharing at a precompetitive level, and promotes knowledge and initiatives to support development and implementation of sustainable agricultural practices by different stakeholders of the food chain.

ISEAL Alliance – A global association for social and environmental standards, working with voluntary standards systems to help strengthen their effectiveness and impact.

12. For more information on the AgriFood task-force, see: <http://www.unep.org/resourceefficiency/Home/Business/SectoralActivities/AgricultureFood/SustainableFoodSystems/FAOUNEPAgrifoodTaskForceonSCP/tabid/78955/Default.aspx>

International agencies are also beginning to link small producers within developing countries to growing urban markets (particularly export markets) in order to promote greater resource efficiency. For example, UNEP, in partnership with the International Rice Research Institute, key governments, NGOs and companies in the global rice sector, has convened the Sustainable Rice Platform (UNEP 2012b). This Platform is working to set standards for more resource-efficient production and to encourage links of producers to markets. Another initiative is the “Purchase for Progress” action of the World Food Programme (WFP), as explained in Box 12.

Box 12. Purchase for Progress pilot initiative

WFP’s Purchase for Progress (P4P) pilot initiative offers smallholder farmers opportunities to access agricultural markets and invest in sustainable production in 20 countries. A major buyer of staple food, WFP bought US\$ 1.23 billion worth of food in 2011 – more than 70 per cent in developing countries. Since 2008, through P4P, WFP has contracted over US\$ 80 million worth of food commodities either directly from farmers’ organisations or through structured trading platforms such as warehouse receipt systems. Over 133,000 farmers, warehouse operators and small and medium traders have been trained by WFP and partners in marketing, food quality and storage, organisation management, sustainable farming techniques, quality control and post-harvest handling. The P4P initiative also encourages other buyers of staple commodities, including governments and the private sector, to buy from smallholders.

Source: WFP 2012

2.4.3 Creating new markets for sustainably-produced low-value crops

Another export opportunity in the sustainable agriculture sector is the creation of new revenue streams by introducing innovative products and services.

Traditional farming in developing countries is adapted to local conditions and usually requires minimal inputs to grow crops. As such, it can often be the more environmentally friendly option for the sector than the introduction of new product types. The issue with this approach is that income from well-adapted, local crops is typically lower than crops that are in demand in developed markets, and as such, traditional farming can also reinforce rural poverty and food insecurity (UNEP 2012b).

Box 13. A case study of cassava exports

Processed cassava exports have increased over the last few years from developing to developed country non-food markets. According to the FAO, over 55 per cent of the world annual production (233 million tonnes) comes from only five countries, Nigeria, the largest producer (36.8 million tonnes), followed by Thailand, Indonesia, the Democratic Republic of Congo and Brazil.¹³

Thailand is the largest exporter of cassava products, channelling about 50 per cent of its annual production to the starch industry. However, the processed cassava has not replaced maize in the production process mainly due to uncertain quality standards and supply.

Increased adoption of cassava as a starch source addresses directly the three key aspects of sustainable development:

- **Environmental:** Substituting crops such as maize with cassava for starch production can reduce the burden of farming on the local environment and can reduce the risk of clearing forests for agricultural use.
- **Social:** The processing of cassava increases local job opportunities and may lead to more stable revenues for the community.
- **Economic:** Developing an export market for cassava supports local economic development and has the potential of lowering costs for starch in importing countries.

Source: UNEP 2012b

13. Data from FAOSTAT: <http://faostat.fao.org/>.

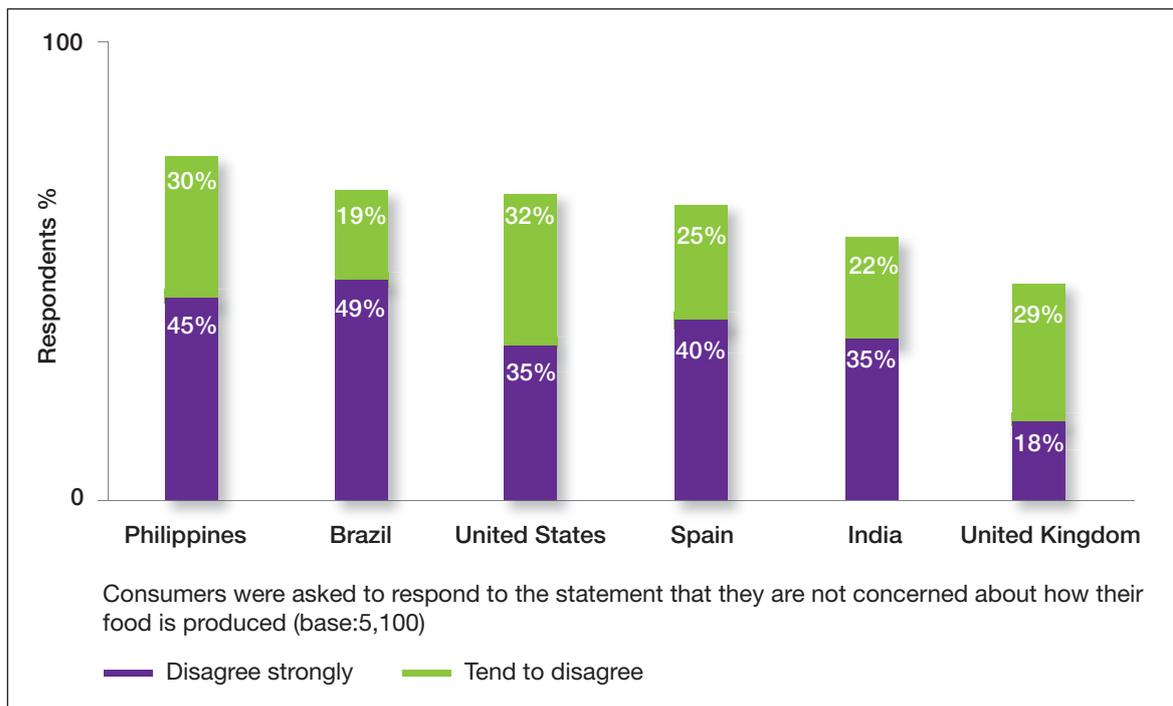
One particular solution to this issue is to develop a market for crops that are traditionally considered of low or no value as alternative sources of raw materials for industry. For example, sorghum is increasingly being substituted for barley in the beverage industry, and cassava for wheat in flour production (as illustrated in Box 13) and for maize in starch production. Benefits include the production of relatively environmentally friendly crops and the creation of an export market for excess crops (UNEP 2012b).

2.4.4 Responding to growing consumer demand for sustainable products

Consumers are increasingly concerned about sustainability issues within company supply chains, and are showing growing readiness to back up their convictions with purchases (Oxfam 2013). A 2011 poll of more than 28,000 online responses from 56 countries around the world showed that 46 per cent of global consumers are willing to pay extra for products and services from companies that can be considered socially responsible. Strikingly, consumers in the Asia Pacific (55 per cent), the Middle East and Africa (53 per cent) and Latin America (49 per cent) indicated that they are more willing to pay extra for products and services from socially responsible companies than consumers in North America (35 per cent) and Europe (32 per cent) (Nielsen 2012).

Many consumers have also expressed concern about how the food they buy is produced (see Figure 4). This all adds up to significant potential trade opportunities for producing and selling sustainable products, including to emerging markets.

Figure 4. Consumers are concerned about how their food is produced



Source: Oxfam 2013

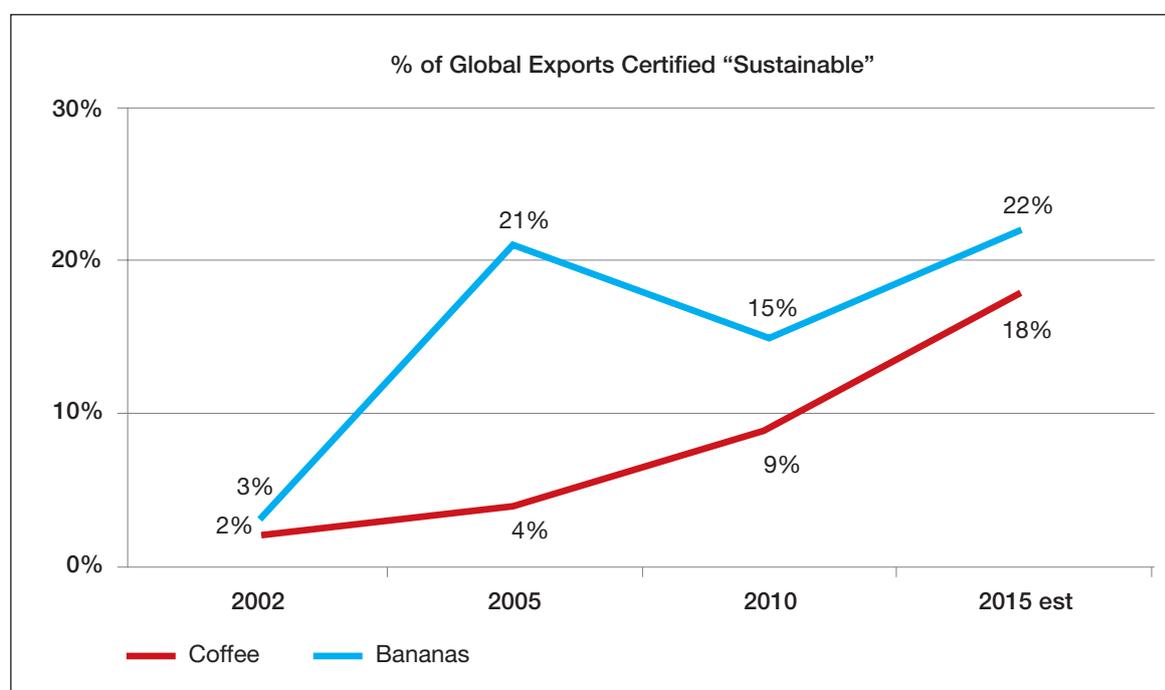
The rise in consumer demand for sustainable food in both developed countries and among middle income consumers in developing countries is driven by many factors, including:

- **Personal health concerns and food scares:** Surveys repeatedly show that health is the main reason why consumers buy organic foods (Byers et al. 2008). After exposure to news about the presence of toxic, even carcinogenic substances in food, consumers demand a safety guarantee on their food, particularly for the health of children. Certified products provide a way of responding to these concerns.

- **Environmental concerns:** People are becoming aware of the impact their consumption has on the environment. This creates a tendency for consumers to prefer sustainably produced products over conventional ones and organic farming is seen as being more environmentally friendly.
- **Availability:** The rise in consumption of sustainable products can also be partly attributed to their greater availability. The original consumer outlets for organic and fair trade food (farmer's markets, on-farm sales and mail order) have been joined by health food stores and large supermarkets. In the US in 2010, 54 per cent of total organic food sales were handled through mainstream grocers, club stores and retailers (OTA 2011). In addition, the sale of sustainably produced products via the Internet, box schemes and home delivery services are also experiencing an increase in demand.

Growing consumer demand has, among other things, led to a growth in exports of certified bananas and coffee, as illustrated in Figure 5. The production of tea in line with sustainability standards also increased by 2000 per cent between 2005 and 2009 (SCSKASC 2012).

Figure 5. Growth in global exports of certified bananas and coffee



Source: UN 2012b

For many farmers, the adoption of certified farming practices can also mean gaining access to new domestic and international markets that may have not been previously accessible. Numerous consumers in these markets pay premium prices for produce that has been certified as meeting improved phytosanitary, organic or fair trade standards.¹⁴ Such premium pricing reflects the fact that consumers are becoming more interested in the way their food is produced and show an increased willingness to pay extra for food that is produced in an environmentally balanced and ethical way. Farmers, wholesale intermediaries, and exporters, however, should be aware that premium price differentials could decline if consumer demand changes or more suppliers of certified products enter the marketplace.

2.4.5 Organic production

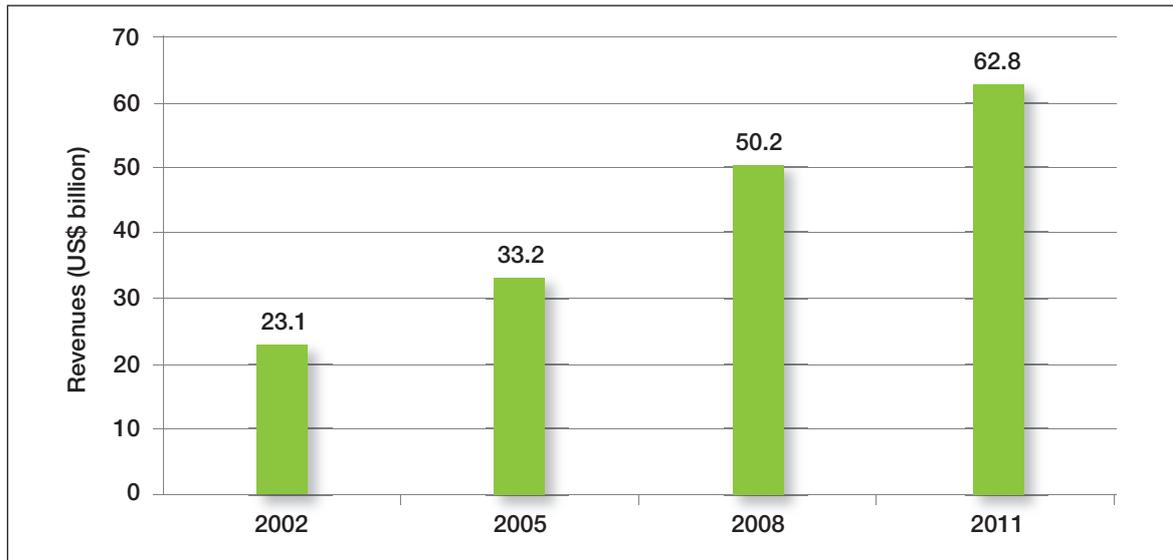
Organic farming is one approach to a sustainable farming system for which certification can offer opportunities at the national level and through international trade.

¹⁴. See section 2.3.1 for an explanation of phytosanitary and organic standards.

Overseas and domestic consumer markets

Before the start of the global economic downturn, markets for organic products in developed countries were growing between 10 and 20 per cent every year. The market has grown since, albeit at a slightly slower pace (Willer and Kilcher 2012, Sahota 2012). In 2011, the global organic market increased to US\$ 62.8 billion from US\$ 59 billion in 2010 (IFOAM 2013), as illustrated in Figure 6. The global organic market is projected to climb to US\$ 105 billion by 2015 (Sahota 2012). This year-on-year increase represents significant trade opportunities for developing countries.

Figure 6. Development of global organic market



Source: *Organic Monitor 2013*

While the majority of organic producers (approximately 80 per cent) are based in developing countries, (Willer and Kilcher 2012, Sahota 2012), most of the consumption (approximately 96 per cent of global revenues) is in North America and Europe. Moreover, although the main destination for exports is the US and the EU, other areas have established growing organic markets. Kleinman (2012) asserts:

“According to government statistics, the Chinese market for organic products has a value of some 1.55 billion US dollars and will develop rapidly in the coming years. High two-digit growth rates will not be uncommon for sales in the trade. For example, the Lohao City chain reported sales up by 35% in the first half of 2011”.

Further, there are established or emerging markets in Asia (e.g. Japan, Singapore and South Korea), the Middle East (e.g. Egypt, Israel, Kuwait, Saudi Arabia and the United Arab Emirates), Oceania (Australia and New Zealand), Africa (South Africa) and South America (Argentina and Brazil) (Sahota 2012). Thus, there are additional growth opportunities for developing countries in the near future, both on a global and regional level.

Many sectors of the organic market have witnessed strong consumer demand leading to supply side constraints. For example, there is increasing demand for high value and value-added organic products such as dried fruits, pulp, juices, semi-processed vegetables, textiles, coffee, spices, nuts, etc. (UNEP et al. 2012). Particular export opportunities for developing countries include fresh and processed tropical products, counter-seasonal fresh produce, and other products with demand-supply gaps (UNCTAD n.d.). In addition, demand for wild harvested products and cosmetics made from organic ingredients is also experiencing a significant increase in demand (see the Forests chapter in this report). Furthermore, while consumers of organic foods have previously focused on relatively unprocessed products, there is a growing demand for processed products, including convenience foods and snacks (OTA n.d., ITC 2011). Market opportunities for exporters could also include ingredients for the organic food processing industry (CBI 2005).

Demand for organic food in the developed world is also being driven by distributors and retailers who increasingly include corporate social responsibility into their management principles and public relation strategies. Selling certified foods is a visible and credible means of showing their commitment to social responsibility. Other growth factors include the higher involvement of conventional and specialised supermarket chains in the marketing of organic foods and the development of organic product lines by conventional food manufacturers (Byers 2008).

According to the Organic Agriculture Centre of Canada, organic farms in developing countries have greater yields and higher prices than their non-organic counterparts (Wallace 2012). A study conducted in 2007 of Ugandan farmers illustrates that they earned up to 100 per cent more for organically produced vanilla exports, as opposed to conventional vanilla products (Agro Eco and Grolink 2008). The case for organic farming is compelling, especially where increased yields are possible.

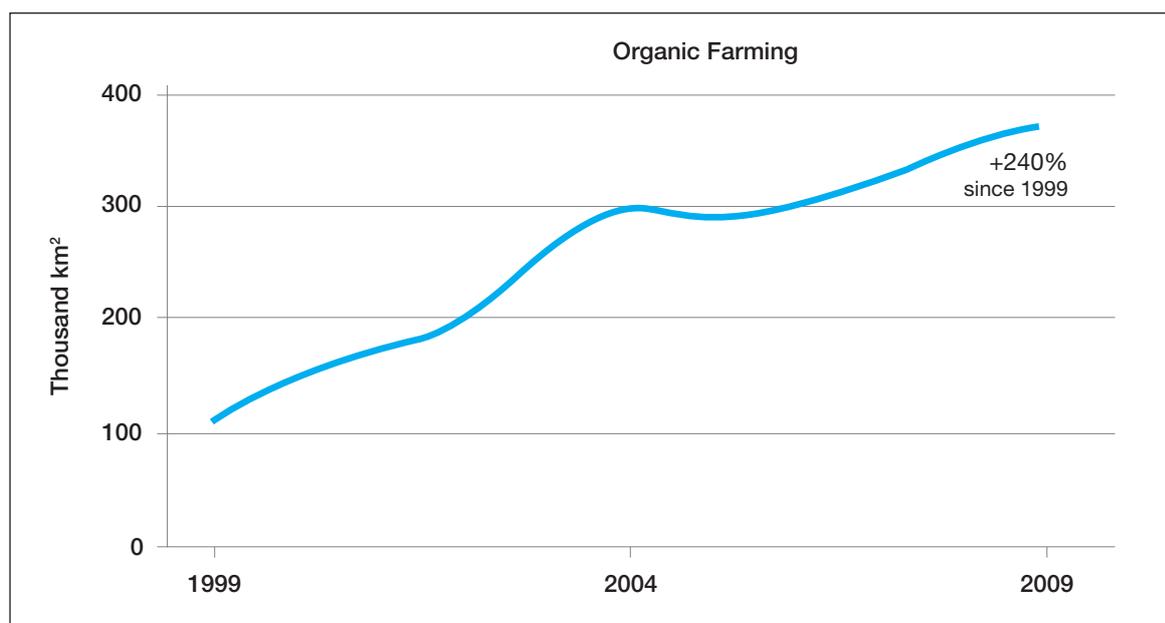
Domestic markets for both certified and uncertified organic agriculture products are also of particular importance to developing country organic producers. These markets serve as useful outlets for producers just starting out in organic production enabling them to gain experience before going for certification and export markets. Domestic market entry costs for farmers can be relatively low, although training in integrated organic farming practices is needed and a transition phase before certification could be a barrier to adoption, since farmers may not be able to label their crops as organic during a certain time period after switching from conventional farming.

Even where only one organic product is successfully exported, farmers can sell the other crops produced on the organic farm in domestic markets. Such farms are by their very nature based on inter-cropping and multi-cropping, as opposed to mono-cropping. Domestic markets also provide a fallback option when export opportunities become more challenging due to international market fluctuations or modifications to import market regulations or procedures.

Production and export potential in developing countries

As shown in Figure 7, organic agriculture has expanded significantly from a very low baseline of around 110,000 km² in 1999, to covering an area of over 370,000 km² in 2009. This represents an increase of nearly 240 per cent, an area that equals the size of a country such as Japan or Germany (UNEP 2011b).

Figure 7. Growth of organic farming, 1999-2009



Source: UNEP 2011b

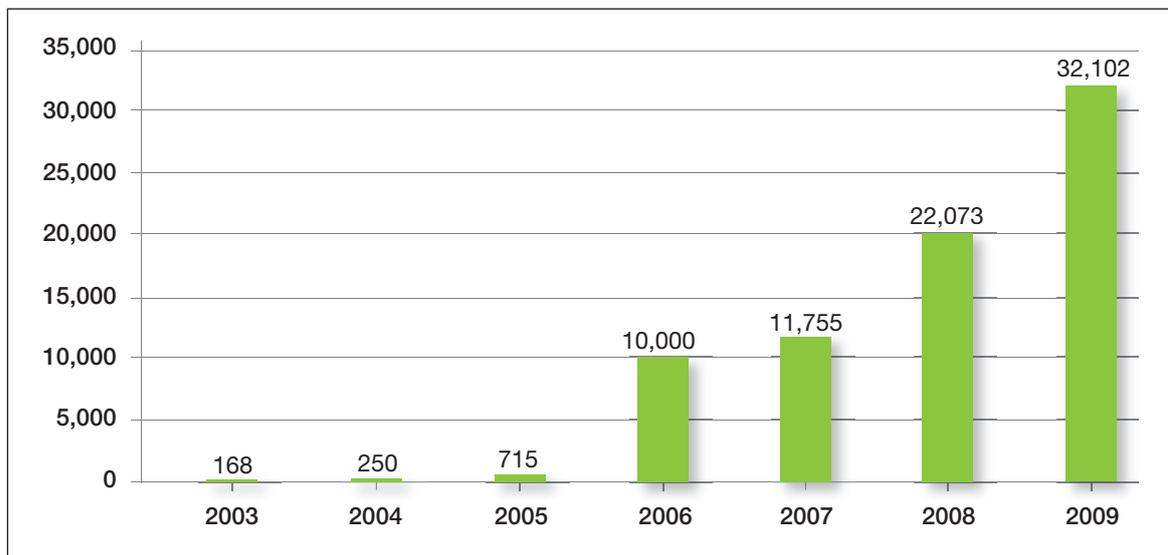
In 2011, there were 1.8 million farmers in 162 countries growing organic products on more than 37 million hectares of agricultural land worldwide. Approximately 80 per cent of farmers were from developing

countries (IFOAM 2013). Largely due to their comparative advantage in many agricultural products (e.g. suitable climatic conditions), developing countries are well placed to seize the opportunities of organic agriculture. The greening of agriculture is expected to lead to increased trade exports from developing to developed countries. Furthermore, there is already potential for exports of organic products in many developing countries, particularly because much of the subsistence sector currently farms without chemical input. This production may provide a basis for subsequent adherence to certification requirements for export (UNCTAD 2006).

In 2011, the countries with the highest number of organic producers were India, Uganda, Mexico and Tanzania (IFOAM 2013). Thailand also has a significant organic agriculture export industry, with most of its products exported to EU Member States, followed by Japan, the US, and Singapore. Rice is the biggest export crop, followed by vegetables, fruits, corn, herbs and spices.¹⁵

Opportunities also exist for other developing countries to build up an international reputation for the quality of their organic products. For example, as illustrated in Figure 8, from 2005 until 2009 Moldova showed impressive growth with an increase in organic exports from 715 tonnes to 32,374 tonnes of organic products. In 2009 this amounted to US\$ 46 million, representing 11 per cent of the country's total agricultural export value (UNEP 2011c).

Figure 8. Moldova's organic exports



Source: UNEP 2011c; UNEP and IFOAM 2011

At the regional level, the World of Organic Agriculture 2013 highlighted the following market indicators for 2011:

- Africa:** There are slightly more than one million hectares of certified organic agricultural land (about three per cent of the world's organic agricultural land) in Africa. The countries with the most organic land are Uganda (0.22 million hectares), Tunisia (0.18 million hectares), and Ethiopia (0.14 million hectares). The highest shares of organic land are in Sao Tome and Prince (7.9 per cent), Sierra Leone (1.9 per cent), and Tunisia (1.8 per cent). The majority of certified organic produce in Africa is destined for export markets. In Uganda, the export value for organic products was US\$ 42 million in 2010/2011; in Ethiopia it was US\$ 33.9 million in 2010. Key crops are coffee, olives, cocoa, oilseeds and cotton.
- Asia:** The total organic agricultural area in Asia is nearly 3.7 million hectares (about 10 per cent of the world's organic agricultural land). Leading countries, by area, are China (1.9 million hectares) and India (1.1 million hectares); Timor-Leste has the most organic agricultural area as a proportion of total agricultural land (almost seven per cent). Many countries have export-oriented organic food sectors whereby organic crops are cultivated for other regions.

15. See: http://www.thaitradeusa.com/home/?page_id=5649

- **Latin America:** The total organic agricultural area is nearly 6.9 million hectares (about 18 per cent of the world's organic land and 1.4 per cent of the region's agricultural land). Leading countries are Argentina (4.2 million hectares), Uruguay (0.9 million hectares) and Brazil (0.7 million hectares). The highest shares of organic agricultural land are in the Falkland Islands/Malvinas (35.9 per cent), the Dominican Republic (8.5 per cent), and French Guyana (7.8 per cent). In the Latin American and Caribbean region, organic production is mostly export-oriented. On average, 85 per cent of what is produced organically is exported to organic markets, such as the EU, the US and Japan. For countries with tropical and mountain ecosystems, the main organic export products are coffee, cocoa, banana and quinoa. For countries with extensive land areas with pastures for animal grazing, the main products are meat and wool.
- **Oceania:** The total organic agricultural area is 12.2 million hectares (which constitutes 2.9 per cent of the agricultural land in the area and 33 per cent of the world's organic land). More than 98 per cent of the organic land is in Australia, followed by New Zealand and Samoa. The highest shares of all agricultural land are in Samoa (7.9 per cent), followed by French Polynesia (3.8 per cent), and Niue (3.1 per cent). The majority of the organically certified products from the Pacific Islands are produced for export. Key products are vanilla, coconut and tropical fruit. The main international markets are Australia and New Zealand, due to their proximity. Japan is also a growing market, and other markets include North America and the EU (Willer et al. 2013).

Box 14 exemplifies some of the opportunities and challenges in Asia, describing experiences from Nepal's production and export industry.

Box 14. Nepal – organic tea exports

Tea is one of the largest agricultural exports for Nepal. The tea sector employs more than 100,000 people, the majority of them being rural women (ITC 2007). The sustainable and socially equitable development of the Nepali tea industry is considered to be pivotal for poverty alleviation and the empowerment of rural women.

Sector overview and trade opportunities: There are currently many orthodox tea factories in Nepal, including 24 large ones, which are estimated to produce approximately 3,500 metric tonnes (MT) of tea annually. Of this total production, only around nine per cent is certified and exported as organically produced orthodox tea by four of the organic certified orthodox tea factories (Palikhe 2012).

The Nepali organic tea industry has the potential to significantly build rural employment. Expected growth in the overall sector is estimated to be 15-20 per cent annually (Palikhe, 2012). This will also cater to the consistent growth in the organic market for tea products, and encourage private companies to invest in partnerships within Nepal such as the GIZ PPP project, on organic production of high quality tea in rural areas of Nepal (GIZ 2012). The objective of this project was to establish a group of tea farmers and processors in eastern Nepal who would produce high quality tea that complies with international organic tea production standards.

The project focused on improving their access to services related to cultivation, processing and marketing of organic tea. After its launch by 131 farmers, who reaped health and economic benefits from the shift to organic farming, additional farmers joined the project (GIZ 2012). In 2011, the Institute for Market-ecology certified a total of 166 farmers as "organic", and a further 64 were poised to join (GIZ 2012).

In total, these certified farmers accounted for approximately 250 MT of organic green leaves, which were processed into approximately 53 MT of tea (GIZ 2012). This organic tea was then purchased by a German company and sold worldwide as organic tea from Nepal, with labels such as Suderpaani tea (Palikhe 2012). Farmers that have switched to organic processes also received double the return of the national average for orthodox tea green leaves in Nepal. Additional economic gains were realised through the replacement of commercial chemical fertilisers and pesticides with homemade manure.¹⁶

¹⁶. Based on the author analysis of the project.

Although Nepal produces and exports high quality orthodox tea, indiscriminate use of chemicals and pesticides by some producers has caused all Nepali tea to be scrutinised by importing markets (Warakaulle et al. 2007). Producers switching to organic production methods hope to overcome these market concerns.

However, there are several challenges: One is the lack of government and private sector R&D in the Nepalese tea industry. Specifically, there is limited investment in the identification of new feasible locations for high quality orthodox and bio-organic tea cultivation; a lack of improvement and development of new plant varieties; and limited market research and analysis to identify new markets and diversify products, as per the demand (GIZ 2012). All the factors are pivotal to the long term growth of the organic tea industry in Nepal and its suitability for exports.

Ways forward: Measures that can be implemented to support the Nepalese organic tea industry include access to credit, better infrastructure, the provision of up-to-date market information and trends, human resource development and the promotion of auxiliary industries.

In terms of direct governmental support, the Government of Nepal exempts companies from taxation for up to five years if they specialise in the packaging and export of organic tea products. The government also provides cash reimbursements to producers of tea for the cost of organic certification (GIZ 2012). Both of these initiatives present considerable incentives to the tea sector to exploit trading opportunities and invest in organic production.

Further, the tea sector may also benefit from the improvement of quality assurance, a national policy focus on increased organic tea production, the introduction of an auction market and the retention of labour in tea estates, by ensuring that additional income opportunities such as tea tourism are provided to the population working in the industry.

Source: Ms Himadri Palikhe of Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH 2012

2.4.6 Natural inputs for organic products

Another export opportunity for many developing countries lies in special inputs that are required for organic farming practices and products. These inputs include natural pesticides such as neem, nicotine sulphate, pyrethrum rotenone and sabadilla, and natural fertilisers such as alfalfa meal, bat guano, blood meal, bone meal and gypsum. Tropical developing countries have a unique potential in the field of botanical pesticide industries because many of the important plants providing such pesticides are indigenous in the tropical areas such as pyrethrum (see Box 15).

Box 15. Pyrethrum insecticide in Kenya

Globally, pyrethrum is viewed as an ideal pesticide in the current environmentally conscious climate and Kenya is well positioned to take advantage of this interest by exporting these products. The trend away from synthetic ingredients in pesticide formulations in favour of natural plant derived product has increased because, when used, natural pyrethrum breaks down easily leaving no residues, as opposed to parathyroid (synthetic) products.

The regulatory framework in Kenya has recently been modified in order to assist the pyrethrum industry. In 2006, a draft Pyrethrum Amendment Bill was developed, and in January 2013, the bill was signed into law. It is expected that the new law will lead to competitive pricing and attract new investors, especially in value addition.

Source: Agriterra 2011, Business Daily 2013

The benefits of locally produced and naturally derived pesticides may be significant not only for a developing country but also for other countries seeking alternatives to hazardous pesticides. In particular, foreign trade balances could be improved if there is a reduced dependence on foreign suppliers for the purchase and transportation of inputs. Further, as supported by the existence of several exporters of organic inputs

particularly in Asia, there is also the potential to export some of these natural pesticides and fertilisers to developed countries and other developing countries.¹⁷

Importantly, however, many of these natural inputs need to be certified in order to be considered suitable for organic farming. Furthermore, while natural pesticides are for the most part safer and more ecologically sound than their synthetic alternatives, they might also have some harmful effects.

2.4.7 Fair trade products

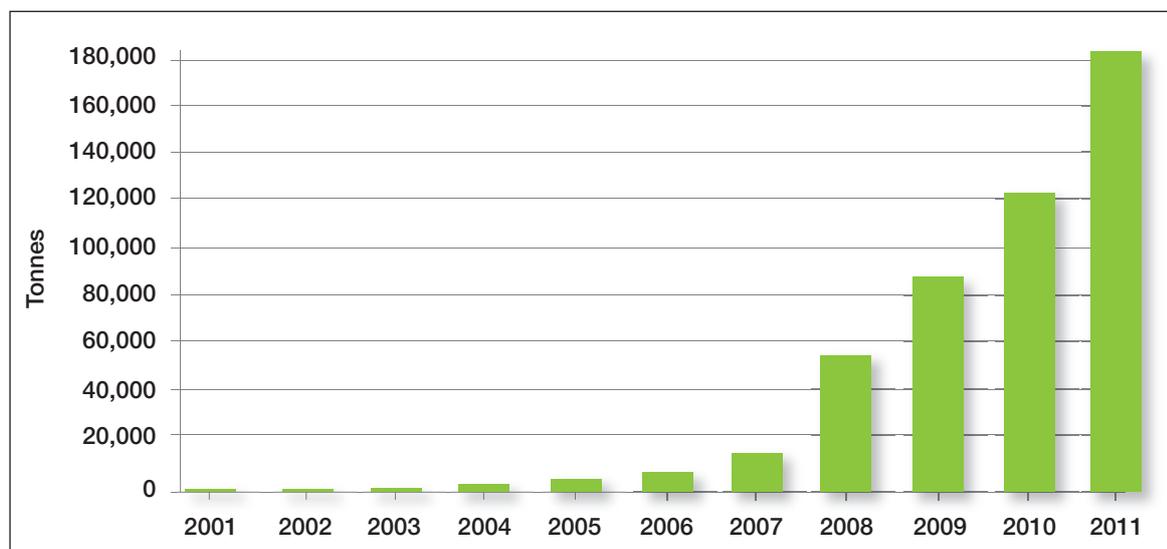
Box 16. Examples of fair trade labels



Fair trade products are another key export opportunity, particularly in the agriculture sector. According to the FLO report "Monitoring the Scope and Benefits of Fairtrade 2012", by the end of 2011, the total number of small-scale farmers in the Fairtrade system reached 1.24 million with a 26 per cent increase in sales revenues on Fairtrade terms from 2010. The overall number of producer organisations increased by 10 per cent, and the total number of farmers and workers in the system increased 13 per cent between 2010 and 2011. Smallholder organisations reported a 30 per cent increase in sales revenues on Fairtrade terms, and a 26 per cent increase Fairtrade Premium in the time period under review (FLO 2012). Another fair trade producer, Equal Exchange, grew by 29 per cent in 2011.¹⁸

Between 2011 and 2011, Fair Trade products showed increases for sugar (66 per cent), fresh fruit (62 per cent), tea (17 per cent), quinoa (33 per cent), and herbs, herbal tea and spices (44 per cent) (FLO (2012). The growth of fair trade sugar since 2001 is illustrated in Figure 9.

Figure 9. Global sales of Fairtrade cane sugar



Source: Fairtrade International 2013

17. For a list of exporters of organic inputs, see: <http://www.tradingbiz.com/exporters/organic-fertilizers.htm?offset=0&pageno=1>.

18. For further information, see: <http://equalexchange.coop/fast-facts>

Consumer demand for fair trade products is driven by social fairness concerns, notably concern over improving socio-economic conditions of farm workers in developing countries. An empirical study conducted through surveys in a chain of major US grocery stores revealed that fair trade labels have positive effects on sales, and found that consumer demand for certain fair trade products does not react to price fluctuations to the extent it does for non-fair trade products (Hainmueller et al. 2011). Thus, fair trade agricultural products such as bananas, cocoa, coffee, honey and tea present another valuable opportunity for developing countries.

The organic and fair trade movements sometimes converge in a common concern for sustainable and equitable development. However, obtaining simultaneous certification for fair trade and organic farming may not be easy; fair trade standards concentrate on products, whereas organic production standards concentrate on the production unit. Fairtrade International, for example, prohibits the use of certain chemicals, though it does not necessarily prohibit the use of chemical pesticides or fertilisers in general (Makita 2011). Nevertheless, a growing number of entities do certify products for both fair trade and organic standards (see Box 17).

Box 17. Ecuador – Fair trade organic sugarcane and cocoa production

There are several certified organic exporters of cocoa and chocolate products, as well as cocoa growers' cooperatives throughout Ecuador. The Network Corporation for Rural Reforestation and Progress (CRACYP), for example, is an Ecuadorian NGO that seeks to address environmental challenges through promoting green agriculture. CRACYP provides administrative assistance to help farmers, many of whom are illiterate, to take advantage of export opportunities and acquire organic and fair trade farming skills and certifications. It also helps farming cooperatives add value to traditional products, in order to attract niche, organic and fair trade markets. Currently, CRACYP focuses on two primary projects, Consortium of Agro-Artisanal Organic Sweets (CADO) and the cooperative Comocofia.

Established in 2003, CADO has grown to become a cooperative of 200 farmers in the Andean foothills in the provinces of Cotopaxi and Bolívar. Members grow sugarcane and distil aguardiente, a traditional drink, in micro-distilleries on their small family farms. After being further processed in a contracted distillery to industrial-grade alcohol, CADO sells the alcohol to two cosmetics manufacturers, the Body Shop and Dr Bronner's. CADO has organic (BCS Öko-Garantie) and fair trade (IMO Fair for Life) certifications that enable it to charge between US\$ 3.07 and US\$ 3.68 per kg for industrial alcohol, of which US\$ 1.15 per litre goes directly to farmers, while the rest covers shipping and administration costs. Farmers benefit from stable prices, and are not subjected to fluctuations in the local commodity market. In 2011, CADO exported 152,901 kg of industrial alcohol, becoming the only aguardiente cooperative in Ecuador and the only certified organic, fair trade producer of industrial alcohol in the world.

Comocofia, a cooperative of 400 cocoa growers in the province of Los Rios, grows a traditional variety of cocoa in the category "fino de aroma" (high-quality aromatic) in ancestral groves. Comocofia farmers use traditional techniques to ferment the cocoa beans and dry them in the sun. In 2011, they exported their first sale of 1.5 shipping containers of whole beans at US\$ 15.00 per kg. Farmers of the more commonly grown low-quality cocoa typically receive around US\$ 4.00 per kg, and are subject to price fluctuations. "Fino de aroma" accounts for 5 per cent of the global cocoa market; therefore, farmers benefit from having a unique product. Like CADO, Comocofia holds a BCS Öko-Garantie organic certification and sells to two companies – Domori and Ecoland – both Italian chocolate makers.

In 2011, CRACYP began to experiment with prototypes of an organic, fair trade crème de cocoa liqueur for export. The NGO hopes to facilitate cooperation between the cooperatives producing each ingredient in the drink. They see this as an opportunity to promote more organic, fair trade agriculture in Ecuador. CRACYP plans to encourage diversification within CADO and Comocofia by finding buyers for other organic, fair trade commodities, such as sugar, molasses, and cocoa paste, or exploring other creative options like using CADO's alcohol for camping stoves. Export markets for consumer products such as aguardiente, rum, other crème flavours, chocolates, and paper made from bagasse will also be evaluated. CRACYP is constantly searching for opportunities to promote organic, fair trade agriculture and to help small farmers engage in the global economy.

Cultural, logistical and financial barriers threaten the growth of businesses like CADO and Comocofia. Members often have difficulties navigating the complex certification rules and exportation process, while cultural attitudes toward women's rights, child labour, and workplace safety can jeopardise group conformity to client and certifier standards. Processes of local administration and decision making can be time consuming and complicate sales to clients. The Ecuadorian landscape also presents a challenge: moving shipments from remote mountain villages causes delays and can be dangerous.

For both cooperatives, financial roadblocks present the biggest challenge. As client payments can take up to two months to be available to farmers, many CADO members sell their alcohol to free market middlemen who pay upon purchase. This limits the quantity of alcohol available for the cooperative and therefore inhibits their ability to expand the market. The very aspect of the exports that makes them desirable to clients can also be a barrier, as artisanal, organic and fair trade products are expensive, and small-farmers can seldom take advantage of economies of scale.

If these challenges can be met, the opportunities for development are numerous. Alcohol is an essential component of hundreds of products in various industries worldwide. As these industries continue to include more organic and fair trade products, being a producer of this indispensable raw material will allow CADO to continue to add more families to its cooperative, thus strengthening rural communities and creating local opportunities for advancement. Although there are many organic and fair trade cocoa producers worldwide, the production of a high-quality heirloom variety helps ensure higher prices for Comocofia growers. The farming cooperative model provides farmers the advantages of economies of scale – such as eliminating the need to sell to intermediate buyers and the ability to publicise and gain political recognition – while maintaining the autonomy of a small farm.

Various steps can be taken to enable Ecuadorian farmers to overcome challenges and take advantage of opportunities. Providing technicians in rural areas with tools to train farmers on methods to prevent soil erosion, control pest problems without the use of chemicals, and assist rural communities with sustainable forest management, are essential steps. This could help lead towards encouraging Ecuadorian agribusinesses to shift from engaging in environmentally risky practices to providing and or using services such as pest management consulting and products necessary for renewable energy production.

Source: Margot Conover, Sustainable Development Coordinator (CRACYF), and Nicholas Ohde, Sierra Internship Programme Coordinator (CRACYF) 2012

2.4.8 Technical and managerial services for sustainable agriculture

For developing countries, particularly emerging economies, that already have an established sustainable or organic agriculture sector, additional export opportunities may arise in the segment of professional services. For example, companies could provide technologies and technical skills needed by other countries that want to invest in building improved agricultural infrastructures and capabilities.

Particular technologies represent promising product and service categories for South-South supply chains and technology partnerships. These include, for instance, direct seed planter systems used in "conservation agriculture" and no-till farming practices, equipment for high capacity compost manufacturing facilities, precision agriculture input delivery systems, and small scale irrigation systems. In this respect, apart from increased trade in the enabling technologies and products, technical services are needed to improve phytosanitary and value-added processing infrastructures and to build the sustainable agriculture supply chains, at the domestic and international levels.

The OECD has carried out research that shows limited, but advancing, opportunities for companies in developing countries to market overseas their technical and managerial services for certification and inspection of sustainable agricultural products. Countries active in this sector include Argentina, Egypt, India, South Africa and Thailand. For example, the Argentine company Argencert certifies production in several countries including Belgium, Chile and Paraguay (Rundgren 2006).

2.4.9 Agro-tourism

Agro-tourism, and the development of sustainability linkages between the agriculture and tourism sectors, offers great potential for trade opportunities, particularly by attracting tourists to farms for cultural visits. For further information on agro-tourism, refer to the Tourism chapter of this report.

2.5 Enabling conditions

This section outlines the main categories of policy tools that governments and other stakeholders in developing countries may use to harness trade opportunities that arise from the transition to a green economy in the agriculture sector. It is worth noting that green economy strategies and ambitions vary significantly based on a country's circumstances, natural endowments as well as political and economic conditions. The mix of policy tools, and the timeframes for their implementation, vary between countries. The list below offers suggestions for action by governments, the private sector and other stakeholders to create enabling conditions conducive to creating and taking advantage of existing and potential trade opportunities in agriculture that arise from or are associated with a transition to a greener economy.

2.5.1 Government investment and spending

- **Identify certification and labelling potential.** Stakeholders in developing countries can identify new export opportunities in sustainable agriculture by reviewing the sustainability of existing exports, based on the criteria for certified products, and by analysing the capability and capacity to produce new products for certification. Opportunities should be identified to enable more small scale farmers to participate in ecolabelling programmes and to be more competitive in domestic, regional and international markets (Elzakker et al. 2010).
- **Tailor export market practices to the organic agricultural industry.** When formulating export promotion programmes for organic products, particular attention needs to be paid to the special nature of organic markets. For example, exporters accustomed to selling bulk commodities are often less willing or able to understand the more demanding and quality-conscious organic markets. Appropriate handling practices and treatments must be used and personal contacts between sellers and buyers of sustainable organic products need to be fostered; one avenue is through local, regional and international trade fairs (Rundgren 2008).
- **Invest in sustainable production practices and infrastructure development and R&D in sustainable agricultural technologies.** Connecting local farmers to national and international markets requires investment in infrastructure and information mechanisms. Furthermore, as trade opportunities for green agricultural products increase, it will be necessary to provide domestic actors with the tools necessary to take advantage of this growing sector. Infrastructure investments can enhance and expand supply-side capacities, for instance through training, extension services, and demonstration projects aimed at green farming practices appropriate for specific local conditions. Further investment opportunities include scaling up the production and diffusion of green agricultural inputs, such as organic fertilisers, in order to help avoid any organic production input bottlenecks, and no-tillage cultivation equipment (UNCTAD 2012c).

2.5.2 Subsidy reform and other market-based instruments

- **Reduce trade-distorting support.** Economic strategies consistent with the green economy approach are fundamental to scaling up sustainable agriculture. These strategies include leveraging investment by rationalising and eliminating export subsidies and redirecting cash flows to encourage more diverse crop production with long-term soil health and improved environmental impacts. A major shift of subsidy priorities is needed in which governments would help reduce the initial costs and risks of farmers' transition efforts to implement sustainable farming practices. At the same time, an enabling environment for greening agriculture could also allow developing countries to protect some domestic food crops (special products)

from international competition when they are particularly important to food security and rural livelihoods (UNEP 2011a).

- **Develop sustainable value chain finance.** In value chain finance, traders, processors, input suppliers and exporters supply short-term loans to growers, with credit linked to the subsequent sale of produce. Value chain finance can assist many subsistence and smallholder farming communities in developing countries to invest in capital infrastructure required to access international markets. It is important that value chain finance is developed sustainably and can be expanded to local and regional agricultural value chains that may be more stable than international markets (Rainforest Alliance & Citi Foundation 2011).

2.5.3 National regulatory frameworks

- **Create, maintain and enforce a strong domestic regime.** Carefully crafted environmental rules and regulations addressing risk management and certification labelling help strengthen private sector capacity. Establishing transparent and verifiable standards and guidelines for quality and safety of products and processes within the domestic industry would allow exporters to prosper in increasingly demanding export markets. Simultaneously, it would avoid overregulation that could inhibit domestic producers from obtaining certification. Furthermore, targeted policies and measures can be implemented to facilitate trade and reduce trade costs for sustainable goods and services by simplifying procedures, improving efficiency and overcoming export challenges.

2.5.4 International frameworks

- **Focus on WTO opportunities.** New WTO rules, if designed properly, could support the greening of the agricultural sector and stimulate new trade opportunities. Among the most prominent issues for environmental goods and services in the agricultural sector from developing countries are the reform of trade distorting and environmentally harmful subsidies, and better market access for agricultural products.
- **Facilitate market access by harmonising of standards and establishing equivalencies.** Standard-setting bodies and processes need to ensure that standards and labelling schemes for sustainable agriculture do not effectively exclude developing country producers from export markets. International support could be provided to enhance developing country participation in standard setting processes and enable producers in developing economies to meet sustainability standards in international export markets. Establishing equivalencies between standards will further reduce the costs for developing country exporters to enter developed country markets.

2.5.5 Enhancing dialogue and capacity building

- **Build supply chain partnerships with farmers that support sustainable agriculture practices.** Private sector initiatives can be designed to create supply chain models that promote collaboration among key suppliers, farmers and their wholesale customers. Marketing and selling sustainable and organic agricultural produce could be an integral part of developing a sustainable supply chain.
- **Foster integration of small farmers into sustainable global value chains.** Various actions could enhance integration of small scale farmers into sustainable global value chains. These include:
 - Developing new partnership models between organic farmers and modern markets;
 - Creating value chain infrastructure;
 - Revitalising extension services with sustainable agricultural practices;
 - Increasing understanding of product quality and enhancing knowledge of emerging market requirements;
 - Promoting new models of organic farming; and
 - Developing sustainable value chain finance.

- **Facilitate access to and awareness of certification services.** Supporting the development of local service providers and encouraging foreign certification bodies to open local offices within the country would facilitate access of farmers to certification services. In some countries it may be appropriate for the government to consider establishing a governmental certification service (ISO 2012). Stakeholders within the agricultural industry need to be well informed about sustainable practices and certification.
- **Increase public awareness at all levels.** Information campaigns, education initiatives and consumer-orientated programmes that focus on the economic, health and environmental benefits of sustainable agriculture can further encourage existing local and global demand for sustainably-produced food, and in turn drive production and fair trade in sustainable agricultural products.
- **Build capabilities of domestic firms to meet voluntary standards and legal requirements in export markets.** Capacity building increases understanding of complex sustainability standards and know-how, and escalates the prospects for small scale farmers and producer communities to export their products to international markets.
- **Support international and national technical assistance and capacity building programmes.** Technical and capacity building support for greening agricultural practices could focus on high value products, including projects aimed at, for example, developing appropriate policy frameworks and improving market intelligence. In particular, developing countries could benefit from greater assistance by the Aid-for-Trade Initiative¹⁹ as well as the Enhanced Integrated Framework.²⁰ Assistance programmes can also facilitate R&D in sustainable agricultural technologies in order to foster national capacity for finding technical solutions to local sustainability issues in developing countries.

This chapter highlights the key trends, challenges and opportunities at the intersection of agriculture, trade and the transition to a green economy. In line with the Rio+20 Outcome Document (UN 2012a), a global increase in sustainable agricultural production and productivity is needed. This can translate into several trade opportunities for both business-to-business and business-to-consumer relationships. These include increased international competitiveness by greening agriculture and accessing supply chains for sustainable products. Furthermore, organic and fair trade sales are continuing to show strong growth. There are clear commercial benefits for companies to carry organic or fair trade labels.

However, in order for developing countries to be able to fully participate in these opportunities and also ensure that demand is broadened, particularly for market segments such as organic and fair trade, certain obstacles need to be overcome. In particular, meeting standards and regulations in export markets remains challenging for producers and economic operators in developing countries. However, this chapter provides a number of successful examples illustrating where progress is being made in organic and fair trade certification of sustainable agricultural products.

The cost and know-how needed for achieving compliance with certification requirements can act as a barrier for more sustainable trade. Sustainable agriculture depends heavily upon capital investments and R&D, which in turn depend on the availability of human and financial resources. Thus, investment and support is required for stakeholders in developing countries to improve the functioning of green markets and trading systems and to strengthen international cooperation.

19. Aid-for-Trade aims to help developing countries, particularly LDCs, to develop the trade-related skills and infrastructure needed to implement and benefit from WTO agreements and to expand their trade.
 20. The Enhanced Integrated Framework (EIF) for trade related assistance to least-developed countries is a multi-donor programme that supports LDCs to become more active players in the multilateral trading system.

2.6 Further resources

2.6.1 Websites for further information

Green Economy Report's Agriculture chapter:

http://www.unep.org/greeneconomy/Portals/88/documents/ger/2.0_Agriculture.pdf

Green Economy Success Stories: Organic agriculture in Uganda. UNEP:

<http://www.unep.org/greeneconomy/SuccessStories/OrganicagricultureinUganda/tabid/29866/Default.aspx>

Organic Agriculture for a Green Economy. UNEP:

<http://www.unep.org/roe/OrganicAgricultureforaGreenEconomy/tabid/54613/Default.aspx>

Organic Agriculture: Opportunities for Promoting Trade, Protecting the Environment and Reducing Poverty Case Studies from East Africa. UNEP:

<http://www.unep.ch/etb/publications/Organic%20Agriculture/OA%20Synthesis%20v2.pdf>

United Nations Forum on Sustainability Standards:

<http://unfss.org/>

Standards harmonization tracker:

<http://www.goma-organic.org/equivalence-tracker/>

Successful experience of smallholder farmers in the Tigray district of Ethiopia to adopt organic and ecological farming practices:

<http://www.fao.org/docrep/014/i2230e/i2230e09.pdf>

The evolving structure of world agricultural trade – Implications for trade policy and trade agreements (FAO):

http://www.fao.org/fileadmin/templates/est/PUBLICATIONS/Books/FINAL_PDF_EVOLVING_WITH_COVER_LOW_RES.pdf

The Committee on Sustainability Assessment (COSA):

<http://www.thecosa.org/>

The Future of Trade: The Challenges of Convergence Report of the Panel on Defining the Future of Trade convened by WTO Director-General Pascal Lamy (24 April 2013):

http://www.wto.org/english/thewto_e/dg_e/dft_panel_e/future_of_trade_report_e.pdf

International Trade Centre's Trade Map:

www.standardsmap.org

Export Promotion of Organic Products from Africa:

<http://www.grolink.se/epopa/Publications/Epopa-end-book.pdf>

U.S. – European Union Organic Equivalence Arrangement Questions and Answers:

<http://www.ams.usda.gov/AMSV1.0/getfile?dDocName=STELPRDC5097061>

Agri-business and NGO initiatives to promote sustainable agriculture certification programs:

http://www.iisd.org/pdf/2010/ssi_sustainability_review_2010.pdf

Committee on Sustainability Assessment:

<http://sustainablecommodities.org/cosa>

TIPI - the Technology Innovation Platform of the International Federation of Organic Agriculture Movements:

<http://www.organic-research.net/?id=1903>

Sustainable Agriculture Network's monthly list of farms and certified operations:

<http://sanstandards.org/sitio/subsections/display/16>

Forum for Sustainable Agriculture in Africa:
<http://sustainableagricultureafrica.webs.com/>

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Fisheries & Aquaculture



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Acronyms

ACP	African Caribbean and Pacific
ASC	Aquaculture Stewardship Council
BAP	Best Aquaculture Practices
CoC	Chain of Custody
CGPL	Lobster Management Commission
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
DARD	Department of Agriculture and Rural Development
ECOWAS	Economic Community of West African States
FAO	Food and Agriculture Organization
FoS	Friend of the Sea
FIP	Fisheries Improvement Project
GER	Green Economy Report
GDP	Gross Domestic Product
IATA	International Air Transport Association
IFOAM	International Federation of Organic Agriculture Movements
IUU	Illegal, unreported and unregulated
JICA	Japanese International Cooperation Agency
LABOMAR	Institute of Marine Sciences
LAR	Live Animals Regulations
MAC	Marine Aquarium Council
MSC	Marine Stewardship Council
MSY	Maximum Sustainable Yield
NGO	Non-governmental Organization
OIE	World Organisation for Animal Health
RFMO	Regional Fisheries Management Organisations
R&D	Research and Development
SFP	Sustainable Fisheries Partnership
TEEB	The Economics of Ecosystems and Biodiversity
UN	United Nations
UNEP	United Nations Environment Programme
UNCLOS	UN Convention on the Law of the Sea
US	United States
US\$	United States Dollar
WTO	World Trade Organization
WWF	World Wildlife Fund

3 Fisheries & Aquaculture

3.1 Introduction

Enhancing the welfare of fishing communities, achieving sustainable management of fish resources, and sustainable trade in fish and fish products are critical development goals reaffirmed in the Rio+20 Outcome Document (UN 2012, paragraphs 52, 111, 113-115, and 168-176). By transitioning to a green economy, through measures such as the elimination of harmful subsidies and the use of greener production and processing methods, fisheries resources will be managed more sustainably for the benefit of present and future generations. In addition, better information management and conservation measures, including monitoring, control and surveillance systems need to be developed and implemented with a view to changing awareness and incentives for economic operators with regard to the exploitation of fishery resources.

In this context, trade can both support and benefit from the transition to a green economy by encouraging better long-term management of global fish resources and improved sustainability along the supply chain.

This chapter identifies general trends and trade opportunities associated with the transition to a green economy in the fisheries and aquaculture sectors. It explores ways of responding to the international demand for sustainable fish and fish products and how they could be better integrated into relevant markets. Growing international demand for the integration of sustainability considerations offers increased trade opportunities in:

- Exports of sustainably and legally produced fish and fish products;
- Exports of certified wild-capture fish and processed fish products;
- Exports of certified aquaculture and processed aquaculture products;
- Exports of sustainable aquarium fish; and
- Promotion of non-consumptive uses such as tourism.

3.2 Environmental and economic context for greening the economy

3.2.1 Current state of world fisheries and aquaculture

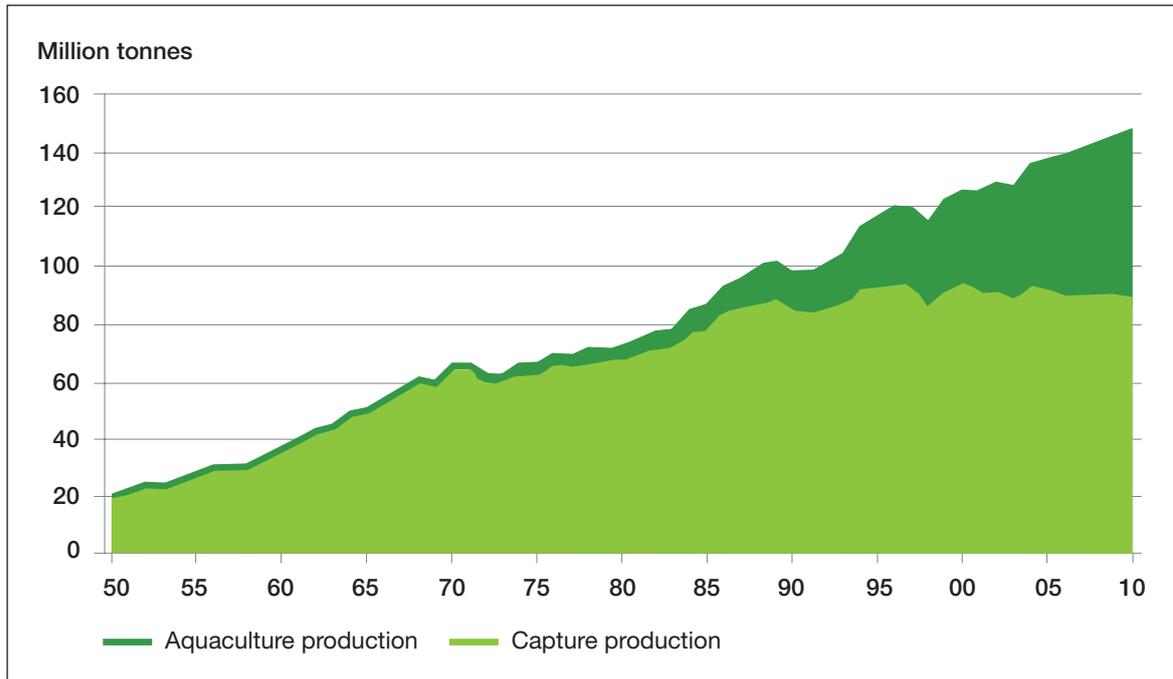
Fish and fish products constitute a major source of income, food and recreation in the global economy. Fish products originate from two main modes of production: harvesting of wild fish (marine and freshwater) and aquaculture. The latter is defined by the Food and Agriculture Organization of the United Nations (FAO) as "the farming of aquatic organisms including fish, molluscs, crustaceans and aquatic plants" (FAO 2012b).¹

In 2010, wild capture fisheries and aquaculture supplied the world with about 148 million tonnes of fish, worth US\$ 217.5 billion. Approximately 128 million tonnes – or 86 per cent – were used for human consumption. Preliminary data for 2011 indicates that production has increased to 154 million tonnes, of which about 131 million tonnes, or 85 per cent, were consumed as food (FAO 2012a, World Bank 2010).

Even though wild fish capture represented 60 per cent of total fish production in 2010, total catch from wild fisheries has remained relatively stable throughout the last three decades. The source of significant growth in the global production of fish since the late 1980s has been aquaculture (see Figure 1); since then, it has increased almost twelvefold, at an average annual rate of 8.8 per cent. Aquaculture now accounts for almost half of total fish supply for human consumption (FAO 2010a). In 2010, global production of farmed fish was 59.9 million tonnes, compared to 55.7 million tonnes in 2009 and 32.4 million tonnes in 2000. When farmed aquatic plants and non-food products are included, world aquaculture production in 2010 was 79 million tonnes, with a market value of US\$ 125 billion. Aquaculture is also the world's fastest-growing food production activity based on animal protein (FAO 2012a).

1. The definition goes on to explain that "farming implies some form of intervention in the rearing process to enhance production, such as regular stocking, feeding, protection from predators, etc. Farming also implies individual or corporate ownership of the stock being cultivated."

Figure 1. World capture fisheries and aquaculture production, 1950-2010



Source: FAO 2012a

Fish products are essential to food security, providing over 1 billion people with their main source of protein and more than 4.3 billion people with about 15 per cent of their average per capita animal protein intake (FAO 2012a). Fish proteins are particularly important for preschool-aged children and pregnant women (World Fish Centre 2011).

World fish resources also have a key role in maintaining and expanding employment levels. Over 140 countries have marine fisheries that provide employment for local and foreign workers. In 2010, wild fisheries and aquaculture provided incomes and livelihoods for an estimated 54.8 million people engaged in the primary sector of fish production. Artisanal fisheries, or small-scale near-shore fishing, comprise 90 per cent of all fishing jobs worldwide, approximately 45 per cent of the world’s fisheries and nearly 25 per cent of the world’s catch (ILO 2003).

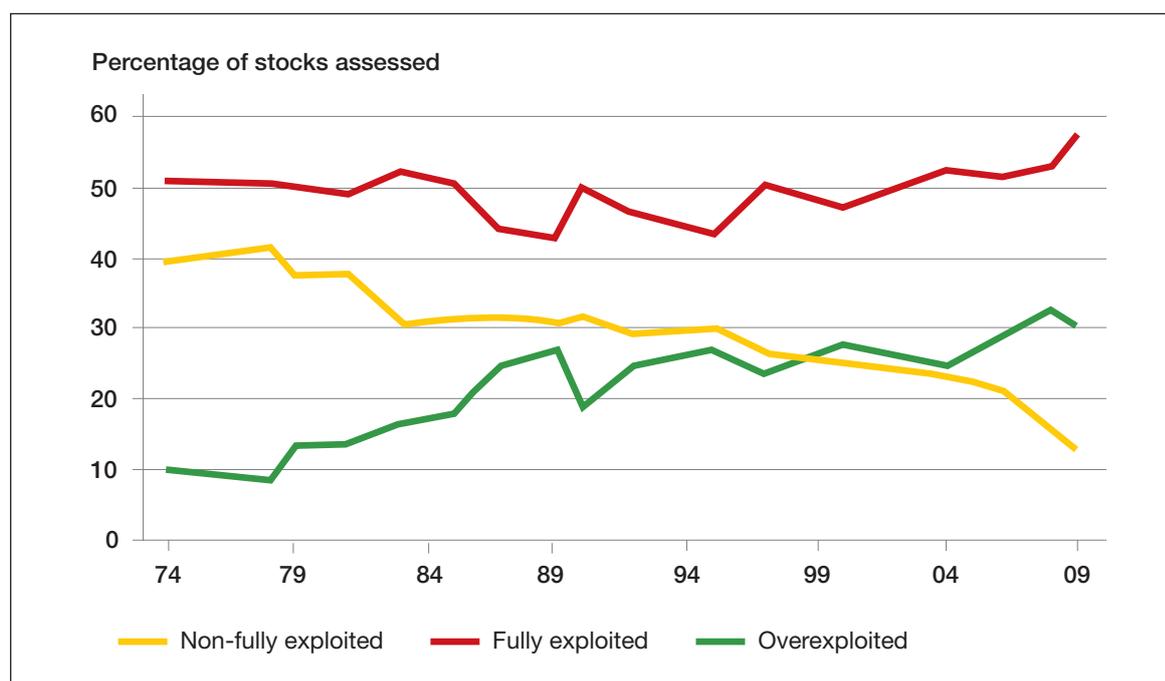
Apart from the primary production sector, fisheries and aquaculture provide numerous jobs across the supply chains, in activities such as processing, packaging, marketing and distribution, manufacturing of fish-processing equipment, net and gear making, ice production and supply, boat construction and maintenance, management, research and administration. This is estimated to support the livelihoods of 660 to 820 million people, or 10 to 12 per cent of the world’s population (FAO 2012a).

According to data collected by the FAO (2012a), however, a huge proportion of the world’s fish stocks are being overfished. In its latest report on the State of World Fisheries and Aquaculture, the FAO states that almost 30 per cent of the world’s fish stocks are overexploited – a slight decrease from the previous two years. About 57 per cent are fully exploited (i.e. at or very close to their maximum sustainable production), and only about 13 per cent are not fully exploited.

In 2005, the FAO already warned, that virtually every commercial fish species in every ocean or sea is “over-exploited,” “fully exploited,” or “depleted”, nine of the world’s 17 major fishing regions are in serious decline, and that production from most of the world’s fisheries had reached or exceeded the levels at which fish stocks can regenerate (FAO 2005).

Intensive fishing practices, supported in part by large-scale subsidisation of the fisheries sector, have led to the depletion of many fish stocks including tuna, cod, haddock, flounder, halibut and red hake. The FAO estimates that more than 80 per cent of the world’s fish stocks assessed have been fished to their biological limits or beyond, as indicated in Figure 2.

Figure 2. Global trends in the state of global marine fish stocks since 1974



Source: FAO 2012a

“Overexploitation not only causes negative ecological consequences, but it also reduces fish production, which leads to negative social and economic consequences,” the 2012 report cautions. FAO suggests: “To increase the contribution of marine fisheries to the food security, economies and the well-being of coastal communities, effective management plans must be put in place to rebuild overexploited stocks”. Strengthened governance and effective fisheries management are required. The report argues that promoting sustainable fishing and fish farming can provide incentives for wider ecosystem stewardship and advocates enabling mechanisms, such as the adoption of an ecosystem approach to fisheries and aquaculture with fair and responsible tenure systems (FAO 2012a).

Fortunately, measures at the international level are being taken to help stocks to regenerate, recognising that the process can take up to a century, or even more. For example, in 2012, 48 member countries of the International Commission for the Conservation of Atlantic Tuna (ICCAT),² agreed to maintain eastern and western Atlantic Bluefin tuna (*Thunnus thynnus*) quotas in line with the scientific advice. However, the endangered population in the western Atlantic is still severely depleted, being only 36 per cent of what it was in 1970. It is encouraging that ICCAT heeded the recommendation of scientists and kept the western catch limit at 1,750 metric tonnes. According to Jorge (2013), this should allow the population to continue to increase and give biologists time to address major uncertainties in the stock assessment that may be artificially inflating the estimates of western Bluefin.

At its 16th meeting, held in March 2013, the Conference of the Parties to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) included five commercially valuable shark species in Appendix II. Trade in species listed under Appendix II requires a CITES permit or certificate whose conditions for issuance and acceptance ensure that such trade is legal, sustainable and traceable. The five shark species listed on Appendix II include the oceanic whitetip (*Carcharhinus longimanus*), scalloped hammerhead (*Sphyrna lewini*), great hammerhead (*Sphyrna mokarran*), smooth hammerhead (*Sphyrna zigaena*) and the porbeagle (*Lamna nasus*), all of which are harvested in huge numbers for their valuable fins and, in some cases, meat. The Porbeagle has suffered serious population declines, notably in the northern Atlantic Ocean and the Mediterranean, owing to unsustainable fishing for its high-value meat and fins (CITES 2013). According to the Pew Environment Group, scientists project that, under the current rate of exploitation, this stock would need a minimum of several decades, and possibly more than 100 years, to fully recover (PEW 2012). Other populations of shark species listed, including the ocean whitetip, have declined by more

2. The ICCAT convention area is 24.8 per cent of the global ocean surface.

than 90 per cent (document CoP16 Prop. 42). The global value of trade in the shark fin industry alone is estimated by the FAO to be around US\$ 478 million per year (as reported by TRAFFIC 2013a).

These new shark listings mark a milestone in the involvement of CITES in marine species (CITES 2013). Manta rays – slow-growing, large-bodied migratory animals, which survive in small, highly fragmented populations – were also listed on Appendix II of CITES. Manta gill plates fetch high prices in international markets and have been traded in significant numbers in recent years (CITES 2013).

Just prior to the CITES meeting, in February 2013, a major reform of the European Union's (EU) Common Fisheries Policy was approved by the European Parliament. The new policy aims to halt overfishing by stopping fish discards dumped at sea, respecting maximum sustainable yield limits, and basing long-term planning on sound scientific data. Data from the European Commission – indicating that 80 per cent of fish stocks in the Mediterranean and 47 per cent in the Atlantic have been overfished – helped trigger an overhaul of EU's fisheries policy (EC 2012).

Climate change also poses threats to marine and freshwater species and habitats. Fluctuations in water temperature, ocean currents, upwelling and biogeochemistry are leading to productivity shocks for fisheries (Sumaila et al. 2011; Diaz and Rosenberg 2008). The Fisheries and Aquaculture Department of the FAO (n.d.) predicts that the impact of climate change may magnify natural variations and intensify current pressure on marine fish stocks. The effects could include increased pressure on fish stocks, shrinking wetlands and nursery areas and UVB radiation. The department's scientists forecast: "Change is expected to result in elevations in sea surface temperature, global sea level rise, reductions in sea-ice cover and changes in salinity, wave conditions and ocean circulation. On land, climate change will affect the availability of water, river flow regimes (particularly in flood plains), size of lakes, etc. and the needs of water for other activities competing with fisheries" (FAO n.d.).

Further, illegal, unreported and unregulated (IUU) fishing represents a serious threat to global food security, causing also economic loss while undermining efforts to sustainably manage fish resources (Agnew et al. 2009).

Aquaculture has the potential to take some of the strain off wild capture fisheries, but presents specific challenges. These include reliance on wild-caught fish as feed for farming carnivorous fish, which could further contribute to the depletion of fish stocks; the impossibility of cultivating certain fish species; the generation of waste; and the spread of disease and genetic material, particularly if there is interaction between farmed and wild fish (FAO 2010b, Khan et al. 2011).

Regarding biodiversity impacts, conversion of mangroves for coastal aquaculture is one of the foremost drivers of mangrove loss. Since 1980, the world has lost about one-fifth of its mangrove forests and what remains is degraded. An estimated 38 per cent of global mangrove loss can be attributed to the clearing of mangroves for shrimp culture, while another 14 per cent can be attributed to other forms of aquaculture. A number of countries have lost more than 40 per cent of their mangrove area over a 25-year period and many remaining areas are degraded (Van Lavieren et al. 2012).

In a literature review of world shrimp farming in Bangladesh, India, Thailand and Vietnam, Raux et al. (2002) describe selected environmental and social issues of shrimp farming, including deterioration of mangrove systems, salt water intrusion, feed and pollution/food insecurity, disused ponds, seeds and brood stock/biodiversity, disease, unfair trade, restricted access to resources, forced displacement, and the negative impact on commercial fish stocks. The authors conclude that all of these "contribute to the unsustainable nature of shrimp farming".

Concerning aquarium trade, if managed sustainably, the trade could support jobs in predominantly rural, low-income coastal communities and so provide strong economic incentives for coral reef conservation in regions where other options for generating revenue are limited. However, damaging techniques occasionally used to collect the animals, possible overharvesting of some species and the high levels of mortality associated with inadequate handling and transport of sensitive living organisms undermine this potential and continue to pose significant challenges to achieving sustainability. Consequently, trade in aquarium fish has often been a controversial topic (Wabnitz et al. 2003).

3.2.2 Trade and fisheries

Fish and fish products are the most extensively traded commodities in the food sector. As shown in Figure 3, approximately 40 per cent of fish output is traded internationally (FAO 2012a). Furthermore, fishery exports are increasing significantly. The share of total fishery production exported in the form of various food and feed items rose from 25 per cent in 1976 to about 38 per cent or 57 million tonnes in 2010. In the same period, world trade in fish and fish products grew significantly also in value terms, rising almost thirteen-fold from US\$ 8 billion to US\$ 102 billion. In 2011, despite the economic instability experienced in many economies, increasing prices and strong demand in developing countries pushed trade volumes and values to the highest levels ever reported. Despite some softening in the second half of the year, preliminary estimates indicate that in 2011 exports exceeded US\$ 125 billion (FAO 2012a).

Figure 3. World fisheries production and quantities destined for export



Source: FAO 2012a

Due to the high perishability of fish products, 90 per cent of trade in terms of quantity (live weight equivalent) comprises processed products such as frozen food and prepared and preserved fish (FAO 2012a).

Even if not comparable with volumes of fish traded for consumption, there is also considerable trade in aquarium or ornamental fish and supplies. An estimated one billion ornamental fish are exported annually (Dykman 2012). The world export value in 2010 was over US\$ 350 million. The main exporting countries include Singapore, Malaysia and Thailand. Brazil and Columbia are also significant exporters. The main importing countries include Germany, Japan, Singapore, the US and the UK. The figures for Singapore also include re-export, from imports from all surrounding countries (Ploeg 2013).

Trade in fish products can play a key role in the growth strategies of many developing countries. In particular, fish trade represents a significant source of foreign currency earnings. Developing countries' net exports of fish products have been increasing rapidly in recent years. There was a seven-fold increase from 1980 to 2010 – from US\$ 3.7 to 27.7 billion. Fish exports of US\$ 27.7 billion represented twice the value of exports of other key commodities such as coffee from the same group of countries. In 2010, 48 per cent of fish consumed in developed countries was imported from developing countries. This share has increased by 10 per cent between 2000 and 2010, and is expected to further rise in the near future due to the steady demand in developed countries coupled with a declining domestic fish production (FAO 2012a).

3.2.3 Greening the fisheries and aquaculture sectors

The Green Economy Report (GER) (UNEP 2011a) stressed the importance of greening the fisheries and aquaculture sectors so as to ensure their medium- and long-term profitability. As shown in Box 1, the GER predicts that an investment of US\$ 100 to 300 billion in strengthening fisheries management and vessel decommissioning would lead to a significant increase in catch. It would also increase resource rents from a negative US\$ 26 billion to a positive US\$ 45 billion annually.

Box 1. Key findings of the Green Economy Report

The GER predicts that a single investment of US\$ 100-300 billion would significantly reduce excessive capacity. In addition, it should result in an increase in fisheries catch from the current 80 million tonnes a year to 90 million tonnes in 2050, despite a drop in the next decade as fish stocks recover. The present value of benefits from greening the fishing sector is about three to five times the necessary additional costs. In a scenario of larger and deeper spending of 0.1 to 0.16 per cent of GDP over the period 2010-2050, to reduce the vessel fleet, relocate employment and better manage stocks to increase catch in the medium and longer term, 27 to 59 per cent higher employment would be achieved, relative to the baseline by 2050. In this same scenario, around 70 per cent of the amount of fish resources in 1970 would be available by 2050 (between 50 million tonnes and 90 million tonnes per year), against a mere 30 per cent under a business-as-usual (BAU) scenario, where no additional stock management activities are assumed.

Source: UNEP 2011a

The value of fisheries ecosystems has been assessed by The Economics of Ecosystems and Biodiversity (TEEB), as illustrated in Box 2.

Box 2. The Economics of Ecosystems and Biodiversity

The Economics of Ecosystems and Biodiversity (TEEB) is a global initiative focused on drawing attention to the economic benefits of biodiversity. Its objective is to highlight the growing cost of biodiversity loss and ecosystem degradation. TEEB presents an approach that can help decision-makers recognise, demonstrate and capture the values of ecosystems and biodiversity, including how to incorporate these values into decision-making.

TEEB highlights the economic importance of fisheries by considering the impacts of overfishing, fish stock collapse and environmental damage on food and job security and economic efficiency. One example in Argentina illustrates that continued overfishing of Argentinean hake threatens their long term ecological and economic viability. Ecological models project that if existing quota were met, no-fishing zones in the nursery grounds were respected, and the current 120 per cent over-capacity of fishing vessels were reduced by 25-50 per cent, the stock of hake would recover leading to significant economic gains, possibly increasing the net present value from US\$ 65.7 to US\$ 118.5 million for fresh fish, and from US\$ 263 to more than US\$ 460 million for frozen fish, over the period 2010-2030 (Villasante et al. 2009).

Source: TEEB 2012

Greening the world's fisheries will help restore damaged marine ecosystems. Further, the adoption of green technologies such as low-impact fuel-efficient fishing methods and investments in alternatives to the use of fossil fuels could help reduce the carbon footprint of the fisheries sector (UNEP 2012a).

When managed sustainably, fisheries support a great number of communities and enterprises. They generate employment and raise household income, particularly for those engaged in artisanal fisheries. Sustainably managed fisheries can over time generate more income than unsustainably managed fisheries due to more secure and larger fish stocks and better quality (Sumaila et al. 2012).

Aquaculture production, on the other hand, has the potential to take some of the pressure off wild fish stocks while supporting livelihoods and food production. This is particularly the case in developing countries, which currently present the largest share of world aquaculture production by volume.³

Sustainably managed coastal aquaculture, freshwater aquaculture and mariculture⁴ offer significant scope for green growth and employment opportunities for local communities. To harness this green growth potential, further green technologies for aquaculture are being developed, including innovative production systems that use environmentally friendly feeds (UNEP 2012a).

The involvement of local communities is a key tenet of the transition to a greener economy. In this respect, the sustainable management of artisanal fisheries may also yield significant benefits, particularly where local communities form part of integrated approaches to fisheries management.

In the community-based ecosystem approach to fisheries management, the local community manages fish resources in close cooperation with the government and other partners (SPC 2010). This applies, for example, to the “Piaba” (Brazil) and “Seahorse” (The Philippines) in their aquarium fish projects.

The marine aquarium trade, in fact, supports jobs in predominantly rural, low-income coastal communities. Where resources are managed sustainably, aquarium trade provides strong economic incentives for coral reef conservation in regions where other options for generating revenue are limited, as the relevant products are among the highest value-added products originating in the reef (Wabnitz et al. 2003).

3.3 Green economy measures

There are a variety of measures that can lead to more sustainable production, trade and consumption of fish and fish products including:

- Adopting, implementing, improving and respecting effective fisheries management and conservation measures, such as output controls, input controls and auxiliary measures, using both market-based and command and control policies;
- Building monitoring, control and surveillance infrastructure;
- Phasing out harmful subsidies;
- Introducing incentives to change the behaviour of consumers and economic operators;
- Creating marine protected areas;
- Supporting sustainable artisanal fisheries;
- Investing in innovation of fishing and aquaculture techniques;
- Ensuring transparency and sustainability in transfers of fishing rights; and
- Reducing by-catch, discards and postharvest losses.

Some of the measures that have the potential to create trade opportunities will be discussed in this section.

3.3.1 Trade-related technical regulations

Fish trade is governed by the general national regulations applying to trade in goods. They include customs procedures and health-related legislation, in particular sanitary measures, origin and catch certification requirements (see Box 3).⁵ In specific cases, trade in fishery products is also subject to national IUU certification schemes, sustainable management requirements, and regional fisheries management organisations' catch documentation schemes.

3. Asia, for example, accounted for 89 per cent of world aquaculture production by volume in 2010. The majority of this production was in China, although other significant producers in Asia include Bangladesh, India, Indonesia, Japan, Myanmar, the Philippines, Thailand and Vietnam. Other countries that experienced production growth include Brazil, Peru and countries in sub-Saharan Africa (FAO 2012a).

4. Mariculture refers to aquaculture practiced in marine environments and in underwater habitats.

5. See further the Agriculture chapter, section 2.3.1.

Box 3. Sanitary measures for fish trade - a variety of actions involved in Senegal

Sanitary certification of fish exports from Senegal began with the European Commission sanitary regulation on fish products in the early 1990s. The delivering of catch certification, became more complex since 1 January 2011, due to the obligation for export countries to provide certificates which state the origin of fish. For that reason, many units within the Ministry of Fishery and Marine Affairs are involved in the export certification scheme. The Division of Inspection and Control is the authority responsible for verifying that products have followed sanitary and hygienic standards equal to those in Europe. Moreover, the Directorate of Maritime Fishery delivers sanitary and origin certification, while the Direction of Protection and Surveillance of Fisheries provides the catch certificate.

Source: Excerpt from a case study prepared by Moustapha Deme, Economist, Oceanographical Research Center of Dakar-Thiaroye (CRODT/ISRA), Senegal, and Pierre Failler, Senior Research Fellow, Centre for the Economics and Management of Aquatic Resources (CEMARE), University of Portsmouth, England.

For trade in live fish, animal welfare regulations may also be applicable. The Conference of the Parties (COP) to CITES recommends in Resolution Conf. 10.21 (Rev. CoP16) that the Live Animals Regulations of the International Air Transport Association (IATA/LAR) and the *CITES guidelines for the non-air transport of live wild animals and plants* in their most recent edition be deemed to meet CITES transport requirements for living specimens. IATA/LAR regulations include specifications for containers used to transport live animals applicable to a list of over 1,000 species, including fish.

In addition to the five shark species and the manta rays mentioned above, CITES regulates trade in a number of aquatic species including aquarium fish, giant clams, queen conch, hard and soft corals, seahorses, other sharks, sawfishes, marine turtles, freshwater rays, freshwater turtles, sturgeons, invertebrates and live rock (CITES Appendices). At CITES CoP16, more than 30 freshwater turtles were given strengthened protection from overharvesting for the international pet and meat trades (TRAFFIC 2013b).

3.3.2 Phasing out harmful subsidies

Subsidies to the fisheries sector can fall within a wide array of government support measures, including support for fisheries infrastructure, management services and research, subsidies for access to foreign countries' waters, decommissioning of vessels and license retirement, subsidies to capital costs and variable costs, income support, unemployment insurance, and price support (UNEP 2004a). Depending on how fisheries subsidies are defined and calculated, global estimates range from US\$ 15 to 34 billion (UNEP 2011b).

Fisheries subsidies have gained worldwide attention because of their complex role in trade, ecological sustainability and socio-economic development (Schorr 2004, UNEP 2004b, UNEP 2004c, UNEP 2005, UNEP 2011b). After many years of debate in different international fora on the nature of subsidies in the fisheries sector, there is a global consensus now that by reducing the operating costs and enhancing the profitability of the fishing industry, subsidies are one of the key driving factors behind overcapacity and overfishing (von Moltke 2007, 2011). At the same time, fisheries subsidies influence a country's production of and trade in fish products and affect competitiveness of the fishing industry (UNEP 2011b).

In the short term, supply of subsidised fish and fish products can cause lower prices compared to those that would prevail in an undistorted international market. This implies a potential decline in export earnings, often in developing countries. In the medium to long term, however, increased pressure over the resource leads to reduced supply and consequent increases in international prices, which create a perverse incentive to overexploit the resource (Asche and Smith 2010).

Figure 4 shows the impact of different types of subsidies under different management conditions. It can be argued that, under certain conditions, fisheries subsidies would not lead to overcapitalisation and overexploitation. These conditions include an effective fisheries management system which eliminates incentives for overexploitation and prevents the circumvention of quotas, while enforcing severe sanctions against IUU and outlawing destructive fishing practices. Such management regimes are, however, still very rare today.

Figure 4. Impact of eight categories of fisheries subsidies on fish stocks

	Effective Management			Catch Controls			Open Access		
	Over-capacity	Full capacity	Less than full	Over-capacity	Full capacity	Less than full	Over-capacity	Full capacity	Less than full
Fisheries Infrastructure	NH	NH	NH	H	H	NH	H	H	NH
Management Services	NH	NH	NH	NH	NH	NH	NH	NH	NH
Access to Foreign Waters	NH	NH	NH	H	H	NH	H	H	NH
Decommissioning	NH	NH	-	PH	PH	-	H	PH	-
Capital Costs	NH	NH	NH	H	H	H	H	H	H
Variable Costs	NH	NH	NH	H	PH	PH	H	H	PH
Subsidies to Income	NH	NH	NH	PH	PH	PH	H	H	PH
Price Support Subsidies	NH	NH	NH	H	H	PH	H	H	H

(UNEP 2004a) – NH= Not Harmful; PH = Potentially Harmful; H = Harmful

UNEP and the World Wide Fund for Nature (WWF) have developed sustainability criteria for the use of fisheries subsidies. These criteria fall into three categories: stock-related criteria, capacity-related criteria and management-related criteria. At a very basic level, the criteria indicate that subsidies should be limited only to fisheries where science-based assessments reveal that stocks are underexploited, where the fishery is operating far below full capacity, and where effective fisheries management measures are in place to ensure long-term sustainability (UNEP and WWF 2007).

In addition, subsidies that support R&D, effective management systems, retraining of workers, or withdrawal of capacity from overcapitalised waters, could help reduce pressure on the resource, restore marine biodiversity, reduce the dependence of fishermen on fossil fuels and reduce the GHG impact of fishing activities. These would create the conditions for some new sustainable trade opportunities.

3.3.3 Conforming with certification criteria for wild-caught fish

In recent years, there has been an increase in the number of voluntary certification programmes that seek to help consumers make informed decisions in terms of sustainability about their consumption of wild-capture fish products. Examples of such schemes are illustrated in Box 4.

Box 4. Examples of wild-capture fish standards

- Marine Stewardship Council (MSC)
- Friend of the Sea Criteria (FoS)
- Monterey Bay Aquarium's Seafood Watch
- U.S. National Oceanic and Atmospheric Administration's Fish Watch
- Dolphin-Safe

In addition, major retail chains and their suppliers may carry out their own procedures to ensure that they source fish sustainably.

Certification requirements for wild-caught fish generally apply to two separate stages of production, processing and distribution of fish products: activities that happen at the fishery level, and activities that happen from port to shelves.

Certification of a fishery can require the use of technologies such as vessel monitoring systems, radio frequency identification, bar code management, DNA analysis and electronic log books, most of which require capital investments (UNEP 2009a).

Certification applying to activities that happen from port to shelves relates to the so-called chain of custody (CoC) measures; these are designed to guarantee that the product put on the market and bearing an ecolabel is really a product coming from the certified fishery concerned. Therefore, these measures should normally cover both the traceability of the product all along the processing, distribution and marketing chain, as well as the proper tracking of the documentation (UNEP 2009b).

Although the various wild-capture fish standards and certification schemes share a focus on sustainability issues, they set different criteria, in some cases cover different lists of species, and may place different emphasis on the conservation methods to be used. The schemes also vary in their costs, which are generally higher for the certification of fisheries as compared to CoC certification. Furthermore, some schemes focus on single environmental issues, such as the Dolphin-Safe label, which addresses the issue of marine mammals' by-catch in tuna fishing (FAO 2009).

Developing countries face specific constraints in relation to certification requirements. A first set of constraints flagged in a survey carried out by UNEP (2009b) relates to data availability, which is generally poorer in developing countries, posing challenges to the development and implementation of management systems and verification of compliance with certification criteria.

A second set of constraints relates to potential distortions to livelihoods, given that increased prices and demand for certified products may result in higher levels of exports and therefore reduced availability of fish for local consumption. However, whether increased exports of certified products actually have an impact on food security in developing countries depends *inter alia* on the primary species being consumed and on who actually benefits from additional revenues generated by exports. Increased sales to export markets, and potentially higher prices for certified products, could also have significant gender impacts, with larger-scale buyers (typically male) being able to outcompete small-scale female buyers at landing sites. Finally, if certification does have the predicted price effects in developed country markets, it could reward middlemen and the post-harvest supply chain, but not necessarily the fishing community (UNEP 2009b).

A third issue that may hinder the ability of developing countries to comply with certification criteria relates to the costs of certification, particularly for small-scale producers. Small-scale fisheries are less likely to find that any benefits from certification outweigh the costs, especially where the unit of certification may be small and involve few fishermen with a low value of catches. In addition, certification costs must be paid in advance, while benefits may not accrue until after the product is caught and marketed. Few fisheries in developing countries are certified, consequently those that have been certified e.g. under the MSC scheme (which has relatively high costs compared to other schemes) have had to rely heavily on donor and external support to cover certification fees (UNEP 2009b) (Box 5).

Box 5. Examples of costs of certification

Fishery / Scheme	Cost in US\$
Vietnam Ben Tre clam fishery / MSC	Pre-assessment, \$5,000; Full Assessment budget, \$80,000
Azores tuna and demersal fishery / FoS	\$37,000 for the demersal fishery. Tuna fishery certification achieved at no cost in association with Dolphin-Safe programme
Senegal mixed fishery / FoS	\$4,000. \$1,500/year
UK SW mackerel handline / MSC	\$20,000 for pre and full assessment
South African hake fishery / MSC	\$735,000 including all assessment costs and costs incurred with work required to fulfil the conditions of certification
UK Torridon nephrops creel fishery / MSC	\$26,000 assessment. Annual audit \$4,000
Australia Lakes and Coorong fishery / MSC	\$11,628 pre-assessment and \$111,802 full assessment

Source: UNEP 2009b, based on data collected by Poseidon Aquatic Resource Management Ltd.

Although certification schemes face the challenges discussed above, they appear to have increased consumer awareness of marine fishery issues. Furthermore, if properly designed and implemented, certification schemes are an important driver for greening world fisheries, and are expanding into more and more places around the world.

Alongside the development of market-based voluntary certification programmes, the FAO has produced Guidelines for the Eco-labelling of Fish and Fishery Products from Marine Capture Fisheries (FAO 2009). These guidelines suggest minimum requirements for the operation of ecolabelling schemes. Furthermore, they provide institutional and procedural standards for how schemes should be set up and the process and principles against which certifying entities should be assessed.

3.3.4 Conforming with certification requirements for aquaculture

Certification requirements for sustainable aquaculture generally present a wide coverage, ranging from site management to social issues. Some of the existing certification schemes concentrate to a greater extent on so-called “organic” or “bio” requirements, which for example may relate to controls on the use of chemicals in feeds or to the prohibition of artificial induction of the reproduction of aquaculture animals. Sustainability in aquaculture can also be promoted by implementing high health, welfare, environmental, social and consumer protection standards.

For these reasons, it is difficult to draw a clear line between “organic” or “bio” standards and broader sustainability standards; the present chapter discusses sustainability criteria so as to include also the narrower concept of organic criteria, unless otherwise specified.

In light of the proliferation of voluntary standards in aquaculture, the 2011 FAO Technical Guidelines on Aquaculture Certification are important tools to improve the governance and sustainable development of this sector. By setting minimum criteria for developing aquaculture certification standards, these guidelines provide direction for the development, organisation and implementation of credible aquaculture certification schemes (FAO 2012a).

Some of the current voluntary certification schemes covering aquaculture are listed in Box 6.

Box 6. Examples of aquaculture sustainability standards

- AB France
- Bio Suisse
- Best Aquaculture Practices (BAP), as developed by the Global Aquaculture Alliance
- Responsibly farmed seafood, as developed by the Aquaculture Stewardship Council (ASC)
- Friend of the Sea
- GLOBAL G.A.P.
- Fairtrade Foundation
- World Organization for Animal Health
- International Federation of Organic Agriculture Movements (IFOAM)
- Naturland

The initial efforts related to compliance costs and know-how may be ultimately rewarded by the possibility to comply with a multitude of regulatory requirements that exist across various markets (FAO 2011). Certification schemes that apply organic, fair trade and sustainability criteria, for example, could present a significant market opportunity for importers and exporters. Naturland, for instance, maintains that it addresses organic production, social principles and fair trade in one source (Naturland 2012).

The Aquaculture Stewardship Council (ASC) standards, for example, cover a range of highly commercial species, including pangasius, tilapia, bivalves, salmon and freshwater trout. The ASC concentrates on requirements that include compliance with official development plans, conversion of natural ecosystems, water use, and health-related issues. In addition, it covers issues such as compliance with international labour standards, health and safety of workers and child labour (ASC 2012).

The Best Aquaculture Practices (BAP) scheme is one of the most significant aquaculture certification schemes in terms of volume, and it combines site inspections with controls for sanitary requirements (FAO 2011).

Besides voluntary schemes, the introduction of sustainable aquaculture production rules in regulatory frameworks of key export markets, such as the EU, can lead to further market growth (EC 2007, 2009).

3.3.5 Conforming with certification requirements for aquarium fish

Besides the legal obligations set out by CITES for trade in certain aquarium fish species, a voluntary certification system has been developed for aquarium fish under the Marine Aquarium Council (MAC), but is not operational at the time of writing. Certification by MAC covered both practices (industry operators, facilities and collection areas) and products (aquarium organisms).

MAC certification was set up as a third-party certification scheme through the accreditation of independent third-party certification companies. These MAC-accredited certifiers would assess companies for their initial compliance with the MAC standards, and conduct scheduled and unscheduled surveillance visits to monitor continued adherence to the standards by industry operators at any link of the chain of custody, from reef to retail (collectors, culturists and breeders, exporters, importers, retailers).

For fresh water ornamental fish, sustainability certification is an emerging concept, as explained for example in recent guidelines issued by the government of India (MPEDA 2011).

3.3.6 Sustainability certification from a supply chain perspective

Fish supply chains can be generally described as a set of interdependent producers, agents, processors, distributors and wholesalers/retailers/food services, who work to supply a fish product to the consumer. There are differences in supply chains among different countries and regions that correspond to socio-economic and environmental conditions and cultural diversity. Differences also exist in relation to fish species and products, and harvesting techniques (industrial production, artisanal production, aquaculture or capture) (UNEP 2009a).

Most sustainability problems such as open access, unfair fishing, IUU fishing, poor working conditions, the lack of price transparency and the lack of information sharing are concentrated at the level of production and the first intermediaries or processors of the supply chain. The consumers' side of the chain, however, also shares some responsibility for unsustainable production.

A key condition for the sustainability of a supply chain is that information related to socio-economic and environmental sustainability issues can reach intermediary and final buyers. It has been identified that breaks in information flows often happen at the points of highest increase in the fish products' value: between production and first intermediaries and at the time of export (Gudmundssen et al. 2006, as cited in UNEP 2009a).

One of the important effects of labels, for example, is that they help consumers to make informed purchasing decisions. Labels are mechanisms for transferring information from one element of the supply chain to the other in a systematic way. They enable some degree of traceability, which is a crucial and fundamental condition for sustainable supply chains. This is in general provided by certification schemes that include a CoC analysis of the supply chain from port to final buyers.

Organisations willing to implement and demonstrate corporate responsibility programmes rely heavily on traceability systems. Business-to-business relations may be less visible than on-product labelling, but they can create powerful incentives for greening the supply chain. To be effective, however, CoC certification should accompany the certification of the fishery itself.

3.4 Trends and trade opportunities

An analysis of trends in international trade in fisheries has identified several green trade opportunities. The key areas of trade potential are discussed in this section.

3.4.1 Sustainable management of wild-capture fisheries

Increased export revenues can arise from the sustainable management of wild-capture fisheries. The FAO and World Bank “Sunken Billions” report (2009) identifies global marine capture fisheries as an underperforming global asset. The report concludes that 75 per cent of the world’s fisheries underperformed in 2004, mainly due to overexploitation. The lost potential revenue is estimated at US\$ 50 billion annually. Over a thirty-year period up to 2004, this amounted to a loss of approximately US\$ 2 trillion. According to the report, “through comprehensive reform, the fisheries sector could become a basis for economic growth and the creation of alternative livelihoods in many countries. At the same time, a nation’s natural capital in the form of fish stocks could be greatly increased and the negative impacts of the fisheries on the marine environment reduced.”

A report by the Princes Charities’ International Sustainability Unit (2012) also illustrates the potential economic gains to be expected from a transition to sustainably managed fish stocks. A number of developing country case studies compiled in 2012 attempted to measure these economic benefits at a local fishery level. For example, one study on Eastern Pacific tuna stocks demonstrates that the annual revenue of the tuna fleet could rise by US\$ 93 million under better management practices (Sun 2010). Another study concludes that the potential economic gains from restoring the stock of the Hilsa Shad fishery, the largest single species fishery in Bangladesh, are approximately US\$ 260 million annually, in contrast to the almost complete lack of economic benefit in the business-as-usual (BAU) scenario (Mome 2007).

The case of the city of Kayar, in Senegal, is particularly illustrative of the potential economic, social and environmental benefits arising from the sustainable management of fish resources (see Box 7).

Box 7. Concerted management of the sea bream fishery in Kayar, Senegal

Fishing is a key sector of the Senegalese economy. It provides approximately 200 billion FCFA (approximately US\$ 400 million⁶ of annual receipts for nearly one third of total export revenues. Furthermore, fishing engages about 17 per cent of the working population (approximately 600,000 people) and provides 75 per cent of the animal protein requirement of the population. The economic and social performance of the Senegalese fishing industry is directly linked to the dynamics of the artisanal sub-sector, which ensures more than 80 per cent of national production (of a total of 450,000 tonnes a year), and as much as 70 per cent of exports (Deme 2008). This performance is threatened by environmental constraints such as the overexploitation of major demersal fish stocks.

Sea bream (*Pagellus bellotti*) is mainly caught for the European market. The annual total landings of 16,000 tonnes in 1985 showed continuous decrease during the 1990s and reached 3,000 tonnes in the mid-2000s. Over-exploitation of the sea bream in the 1990s was demonstrated by the decrease of fish caught, despite the intensification of fishing efforts, which is estimated at about three times above the maximum limit. Consequently, the size of sea bream landed was lower than that authorised by the Senegalese Fish Act (1987), which corresponds to the size of the first sexual maturity of the species. The renewal of sea bream stocks as well as the future of the fishery was under threat. Under those circumstances, the fishing communities of Kayar decided, shortly after the devaluation of the FCFA currency in 1994, to implement new management measures to reverse the downward trend.

Trade opportunities and challenges: The town of Kayar is a model in Senegal for having established the first fishermen’s professional organisation and initiated the first local management measures of fishery resources. The institution of a quota started in 1994 is still in force. This local management model has been adopted by most countries of the Sub-Regional Fisheries Commission.

6. At an exchange rate of US\$ 0,002 for 1 FCFA.

In 1995, the National Collective of the Artisanal Fishermen of Senegal (CNPS) implemented a policy of daily quotas on sea bream in Kayar, which is regarded as the first co-management process in West Africa. This measure, which limits fishing to three boxes of 13 kilograms of fish each, per canoe, was respected by fishermen. The sanctions were highly dissuasive in cases of non-respect of the quota limit – this included a fine of about EUR 50, confiscation of the catch beyond the limit and the prohibition of fishing in case of recidivism. The immediate commercial effect was reflected through an increase in the price of fish and consequently of fisher's incomes. The landing price was multiplied by ten, increasing from 150 FCFA (US\$ 0,30 in 1995) to 1,500 FCFA (US\$ 3 in 1995) per kilogramme.

At the biological level, the deceleration of the rarefaction process of sea bream resources showed rapid results as the size of landed fish went above the minimum authorised limit, a sign of the recovery process. The effective limitation of catch, and consequently of fishing efforts, also contributed to the increase in the lifespan of fishing gear, making it possible for fishermen to run in parallel other income generating activities. All in all, these reforms of the local fisheries management system have enabled local producers and exporters to consolidate their position in international markets.

Extension of the Kayar experience to other Senegalese fisheries: The Kayar co-management fishery approach has been extended to other fisheries along the coast of Senegal, using the concept of territorial fishing rights and shared responsibility between the states and fishing communities. Several projects, initiated by the Ministry of Fisheries and funded by the World Bank, have developed a co-management system at the national level. For instance, the recent project (2005-2012), "Integrated Management of the Marine and Coastal Resources in Senegal", recommended an immediate delegation of powers to stakeholders and the promotion of local initiatives regarding fish stock management. The concept of traditional centralisation of fishery management is thus under review. A new legal framework is being developed which recognises the authority of stakeholders to take decisions and actions. These recent changes in the governance of fisheries have been implemented in four pilot sites along the Senegalese littoral.

The other notable initiative is the project for "Sustainable Management of Marine Resources", funded by Japanese International Cooperation Agency (JICA) (2009-2013). It adopts the same principles of fish stock management by communities inhabiting areas near fishing grounds. Local initiatives are encouraged with involvements of all stakeholders. Overall, both projects aim to reinforce management capabilities of both fishermen organisations and state administrations.

Pursuing the process of co-management, the Ministry of Fisheries in partnership with fishermen organisations and NGOs, have also developed a national strategy for the immersion of artificial reefs and the creation of a marine protected area network. These fishery management tools are now integrated into the regional planning policy and the general framework of fishing territorial unit rights.

The Kayar experience revealed that it is possible to reverse downward trends of fish stocks. It also shows that involving fishermen organisations is a key factor of success in implementing any fishery management measures. The Senegalese government is taking steps to spread the Kayar experience along the coast of Senegal. On a more global level, the certification of fish exports has contributed to raising the sanitary conditions of all the fish landed in Senegal, with a positive effect for local consumers. Parallel to upgrading of the export fish industry, significant efforts have been made by States authorities to improve the distribution of fish products in the domestic market.

Source: Case study prepared by Moustapha Deme, Economist, Oceanographical Research Center of Dakar-Thiaroye (CRODT/ISRA), Senegal, and Pierre Failler, Senior Research Fellow, Center for the Economics and Management of Aquatic Resources (CEMARE), University of Portsmouth, England.

3.4.2 Eliminating Illegal, Unreported and Unregulated fishing

Trade can facilitate reforms aimed at the elimination of illegal, unreported and unregulated (IUU) fishing activities. This can be observed, in particular, where international demand and standards in foreign markets concerning IUU-free products trigger reactions at the national level, and provide a business case for significant reforms. In this context, the Brazilian spiny lobster fishery is an example of how the prospect of increasing sustainable exports can provide incentives for achieving IUU-free fish production, as illustrated in Box 8.

Box 8. Eliminating IUU in the Brazilian spiny lobster fishery

The Brazilian spiny lobster⁷ fishery constitutes a clear instance where a strong trade-oriented business case creates incentives for the elimination of IUU fishing.

This species is found throughout the western Atlantic (Daves and Noguchi 2007). Brazilian lobster exports to the US are worth US\$ 80 million per year, and the fishery provides for the livelihood of more than 15,000 fishermen (SFP 2012). The US and the EU are the largest markets for lobsters, importing 80 per cent and 17 per cent of the yearly catch, respectively (UNEP 2012c).

The Brazilian spiny lobster fishery faces multiple challenges. The lack of robust and clear regulations in the sector and the use of illegal fishing techniques as well as an active illegal fleet appear to have led to declining yields, impacting not only the fishermen and their families, but also on those dependent on the industry both at the community level and in the processing industry. Weak traceability throughout the supply chain allows a proportion of products from legal boat-owners to originate from illegal fishermen. In addition, the spiny lobster fishery faces the challenge of overfishing; hence, there is pressure to supply sustainable products to the US and EU markets and to meet new import regulations by the EU for sustainable management practices.

Small communities in the northeast of Brazil depend on small-scale lobster fisheries. There are around 3,000 artisanal boats measuring no more than three metres in length. These small fishers are in constant conflict with illegal deep sea inexperienced divers who use illegal, unregulated and dangerous equipment to poach lobsters (UNEP 2010).

Under the Brazilian Lobster Fishery Improvement Programme, the Sustainable Fisheries Partnership CeDePesca manages the interactions between the major market players both from the supply side and the demand. The CeDePesca focus, for example, is on the improvement in the fishing zones especially coordination with the government of Ceará, the Ministry of Fisheries, the Ministry of Environment, and local stakeholders (SFP 2012).

Plans are in place for full implementation of monitoring and research for the lobster fishing sector in Brazil. Stock assessments on maximum sustainable yield recommendations have been conducted with adequate limits and target references identified. A rights-based management system, monitoring system traceability of lobster fishing and beach buyers' registration, output limits and minimisation of illegal gear and improved quality standards have been established.

At a March 2012 workshop held in Boston, USA, Brazilian producers and six important US importers joined the Fishery Improvement Programme. Later in the same year, discussions on the findings of the MSC pre-assessment and the characteristics of the programme in Fortaleza resulted in all Brazilian exporters joining the programme. The Fisheries Lobster Improvement Programme is still at an early stage but it has created momentum to re-establish scientific monitoring and stocks assessment for lobster populations to provide robust advice to policy makers and private sector fishery stakeholders. The project is also encouraging market recognition of those in Brazil that operate legally and transparently in the fishery which, it is expected, will create an incentive to expand such good practices and also create export opportunities.

Source: Case study prepared by James Lomax, UNEP

3.4.3 Certified wild-capture fish and processed fish products

The potential for export growth of certified and ecolabelled products makes certification an attractive business choice for many in the fishing industry. Much of the interest in certification as a voluntary, market-based initiative stems from the fact that certified products can access new markets globally. To be sustainable, however, wild-capture fisheries certification should not have as an objective the increase of trade volumes per se, but rather the valorisation of existing trade opportunities.

Despite recent growth, certified seafood sales are still relatively small in a fishery commodity market reaching more than US\$ 100 billion in annual export sales worldwide (FAO 2012a). For example, in

7. *Panulirus argus* – red lobster, and *Panulirus laeviscauda* – green lobster.

the MSC programme, fisheries already certified or in full assessment have annual catches of nearly 10 million metric tonnes (MSC 2012a, MSC 2012b). This quantity, coupled with the quantity of annual catches certified by other global schemes, represents about 17 per cent of the annual global harvest of wild capture fisheries (FAO 2011).

Nevertheless, the sale of certified fish products in markets in developed countries and also, increasingly, in some developing countries, particularly in China, Namibia, and South Africa has changed from a niche market to a mainstream one. Consumers are becoming more interested in the way their food is produced. An increasing number of consumers are choosing to purchase food including fish that is healthy and socially and environmentally sound (UNEP 2009b).

The potential benefits and opportunities for the fisheries industry to obtain a certified ecolabel include:

- Access to new (international) markets that previously may not have been easily accessible;
- Preservation or expansion of market share in growing existing markets;
- Greater credibility vis-à-vis retail buyers;
- Potential for more value-added products, including through product differentiation (niche markets for environmentally friendly products);
- Reduced production risk through improved stock management; and
- Increased earnings through a potential price premium for eco-labelled fish and seafood (Washington and Ababouch 2011).

Small-scale or artisanal fisheries in particular, due to their predominance in the industry, have potential for sustainable growth through green certification. Thus, even though obtaining international certifications to access these new markets can be a challenging experience for many producers, and in particular small-scale producers, the medium- and long-term economic results are likely to be beneficial and important to secure long-term livelihoods (UNEP 2012a).

Demand for certification is most strongly driven by retailers, many of which have now made public commitments to sustainable sourcing policies. These retailers have significant market power and an ability to influence their suppliers.⁸ Demand already far outstrips the availability of certified products (UNEP 2009b). For example, while there is significant certified supply of species like pollock, salmon and hake, few tropical species are certified (FAO 2009).

The market response to the Vietnamese Ben Tre clam fisheries sector demonstrates that investments in sustainable management, through certification of fisheries resources, can yield substantive returns, as illustrated in Box 9.

Box 9. Ben Tre clam fisheries certification in Viet Nam

The value of international trade has risen significantly in Vietnam in the last few decades. Exports from agro-forestry and fisheries were worth US\$ 25 billion in 2011 (Yuan 2011). In the fisheries sector, production grew at an average rate of 10.25 per cent between 2001 and 2010, creating over US\$ 5 billion in export value for the country in 2010 (Duc 2011). This continuous economic growth has implied significant pressure on Vietnam's natural resources, including concerns about the dwindling state of fish stocks (Vietnamnet 2011).

With growing global concern over the scarcity of natural resources, and international market interest in sustainably produced goods, the notion of harmonisation of economic growth with sustainable use of resources presents both opportunities and challenges to government and private sector operators. Hence, in 2005, the Vietnamese Government signed a Memorandum of Understanding with the MSC, describing its intention to explore and encourage sustainable fishing practices and MSC certification throughout Vietnam.

8. For example, at the time of writing, Wal-Mart, Carrefour, TESCO and Edeka have commitments to sustainable sourcing.

Much of the growth in the fisheries sector has been from the aquaculture sector. The capture sector remains important to the economy, although its growth has slowed down in recent years. The marine capture sector in Vietnam is divided into two parts: the inshore fishermen who exploit near shore resources, and those with medium- to large-scale fishing vessels who concentrate on off-shore resources. Both sectors provide livelihoods to hundreds of thousands of fishermen. It is estimated that approximately 15 per cent of marine finfish production goes into exports (MPI 2010).

The most important capture species include shrimp, tuna, squid, sea bream, snappers, groupers and small pelagics. In the inshore sector, some of the most important commercial species include the Asiatic hard clam (*Meretrix lyrata*).

Trade opportunities and challenges: The Asiatic hard clam is a high value, bivalve mollusc that inhabits intertidal and shallow sub tidal sand flat areas in large parts of Southeast Asia. In the Mekong Delta, the species is widely distributed in sand flat areas, mostly in the provinces of Tien Giang, Tra Vinh, Soc Trang, Kien Giang with the highest density and production of the clam occurring in Ben Tre province. Clams are sold to domestic markets and exported to Europe, the US, Japan, China and Taiwan. Clams are harvested manually using a rake, which in some instances may have a net attached to it, allowing the return of undersized clams (MSC 2009).

In the late 1990s, the Department of Agriculture and Rural Development (DARD) introduced a system of cooperatives in the fisheries sector to help address some of the concerns about the state of the resource. Fishermen in the cooperatives were given rights to exploit defined areas of the sand flats and manage the clam resource. This regulated the number of people involved in the fishery and gave the cooperative a role in managing it. New regulations to manage and control the fishery and specific harvest targets were introduced to address the problem of catch declines and illegal fishing (MSC 2012c).

In 2005, WWF initiated a project to work with the Ben Tre clam fisheries cooperatives, DARD and partner organisations towards achieving MSC certification. The project commenced with a pre-assessment of the fisheries in the Ben Tre province. The pre-assessment served as an initial audit to determine the level of performance of the fisheries against the MSC standard and identify if there were any areas that needed improvements in order to meet the requirements of certification. The strengths of the fisheries with respect to the MSC standard included the low impact capture method, the management measures put in place by the cooperative and DARD to control illegal fishing and the presence of protected areas. Other aspects of the fisheries where improvements were needed included, better and appropriate understanding of mitigating the impact of clam harvest on the sand flat invertebrate community and on marine birds.

In 2009, following a third party independent assessment against requirements for sustainability, the Vietnamese Ben Tre clam received certification to the MSC's standard for sustainable fishing (MSC 2009). The MSC certification of the fishery led to significant interest from new buyers in the US and Europe retailing sustainably-sourced seafood. The prices received for Ben Tre clams increased by 20 to 30 per cent and the total value of landings of clam increased by 165 per cent (Tindall 2012).

Certification of the Ben Tre clam fisheries enabled stakeholders in the industry to expand their markets, boost earnings and improve livelihoods (Vietfish International 2012). In addition to improved profitability due to increased interest from new buyers in the US, certification of the fisheries led to a willingness from buyers to purchase clams with shells on at prices higher than what was received prior to certification. This therefore facilitated higher returns with lower costs of production.

Following the success of the certification of the Ben Tre clam fisheries and the interest from the private sector in purchasing sustainably produced clams, a follow-up initiative to explore opportunities for extending MSC certification to other clam fisheries in the Mekong Delta has commenced. The Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), and a number of other organisations, including the WWF, are supporting the initiative. Initial steps have been undertaken to introduce the MSC certified Ben Tre sustainable clam production model to different coastal provinces, local authorities and relevant national organisations in Vietnam and share lessons learnt during the certification process.

One of the lessons learnt from the experience of the certification of the Ben Tre clam fisheries is the recognition of the role of MSC certification as a tool to help improve the management of fisheries sector and enhance sustainable trade. Another key observation is that certification of the Ben Tre fisheries demonstrates the effectiveness of community based management. Cooperation among fishermen in the sector and support from stakeholders, including local authorities, clam cooperatives and the processing and export sector, is considered important to ensuring successful implementation of the requirements for certification. Such collaborations underpin any future efforts to work towards certification in other clam fisheries in the Mekong Delta. In particular, collaboration between different cooperatives in the Mekong Delta could help to reduce the costs involved in getting MSC certification.

Source: Case study prepared by Olujemisi Oloruntuyi, Programme Manager, MSC

Certification could also provide new opportunities for attracting capital investment and joint ventures in developing countries. Some developing countries hope to enhance their chances for certification through cooperation with others or through joint ventures with fishing enterprises from developed countries. In South Africa, for example, efforts for capacity building and stakeholder cooperation led to hake trawl sustainability certification in April 2004 and March 2010. The main export markets for South African frozen, fresh and chilled hake are Spain, France, Portugal, Italy, Australia, Germany and the US.⁹

Certification enables more direct and stable supply relationships between developing country producers and developed country buyers. Greater credibility for their products can lead to improved market access. However, it is important to ensure that suppliers have the expertise to manage contracts and supply the volumes and stable quality required by buyers (Washington and Ababouch 2011).

There are particular opportunities to exploit the growing demand for frozen ecolabelled products. The proportion of frozen fish grew from 33 per cent of total production for human consumption in 1970 to reach a record high of 52 per cent in 2010 (FAO 2012a). Developed countries could become a lucrative market for exports of frozen ecolabelled fish and fish products (Tsamenyi and McIlgorm 2010). However, developing countries need infrastructure including reliable energy supplies and technical capacities.

As discussed in section 3.3.3, many businesses highlight potential risks related to certification. For example, they are concerned that multiple private labels confuse consumers, leading to potential for fraud, and about educating consumers on certification when there are still relatively few certified products available on the market (UNEP 2009b).

These concerns have prompted regulatory authorities in several jurisdictions to take action in order to prevent abuses and frauds. The regulatory approach to solving this issue has generally been one of establishing minimum requirements to which eco-labelling schemes should conform, enforced through border controls and market surveillance measures.

3.4.4 Certified aquaculture and processed aquaculture products

The last 15 years have witnessed an increase in the demand for seafood that has been farmed according to certified sustainability standards. By 2015, total value is forecasted to be US\$ 1.25 billion (Bergleiter et al. 2009, as cited in Prein et al. 2010). Demand is coming in particular from European countries such as France, Germany, Italy, Switzerland and the United Kingdom. The US market is also considered to have a large potential (USDA 2012).

In the EU, sustainable aquaculture products that meet European standards, for example, are clearly identified for European consumers (EC 2007, 2009). The EU standard has been defined in literature as a consensus "minimum" standard, as other existing standards are stricter in their requirements (Prein et al. 2012). The EU regulations represent an opportunity to increase consumer confidence in certified products, thus fostering the shift to more sustainable production methods (IFOAM 2010).

⁹ For further information on capacity building in three southern African countries (Namibia, South Africa and Tanzania), see the UNEP-The Institute for Security Studies (ISS) project. Available at: http://www.unep.ch/etb/areas/fish_CS_SouthernAfrica.php. See also: Country project Southern Africa on Reforming trade and fisheries policies, re-shaping supply chains and enhancing consumer demand for sustainable fisheries management, UNEP. Available at: http://www.unep.ch/etb/areas/pdf/Fish%20project%20documents/Project%20Document%20Southern%20Africa_web.pdf.

In the specific case of organic fish products, demand appears to be also noticeable among middle classes in emerging economies. Sales of organic seafood are growing in new markets where they are seen as a premium gourmet food, such as in Hong Kong's premium supermarkets, or through a country's tourism and gastronomy sectors as is the case for organic shrimps and oysters in the northeast of Brazil. All in all, the current low global market penetration of organic seafood translates into an opportunity for the aquaculture industry (IFOAM 2010). As reported in Box 10, trends in organic aquaculture production show that these practices are being implemented in several parts of the world.

Box 10. Trends in organic aquaculture production

The most common type of organic aquaculture in China is carp production in polyculture, i.e. in combination with crabs, shrimps or other local species. There are also certified operations producing turtles or sea cucumbers.

In other Asian countries, there is an increasing organic production of Black Tiger Shrimp (e.g. Bangladesh, India, Thailand, and Vietnam), Pangasius catfish (e.g. Vietnam) and micro-algae (e.g. India).

In Latin America, there is a strong dominance of organic western white shrimp operations in Brazil, Ecuador and Peru.

Source: IFOAM 2010

A large proportion of organically certified aquaculture products come from developing countries where they are processed and then exported. In 2008, global organic aquaculture production was around 53,500 tonnes with a total market value of US\$ 300 million. This was produced by 240 certified operations, of which 72 were located in China (FiBL et al. 2009).

The critical factor in organic production and conversion, however, appears to be sourcing certified organic vegetable feedstuff at a reasonable cost and obtaining a supply of certified organic feed (Bergleiter 2011). In some countries, this is developing into a feed bottleneck and needs to be resolved in order to enable international trade in organic aquaculture products to continue to flourish. One solution is by initiating pilot projects fostering the production of certified organic manioc, rice, soy and corn as feed ingredients in developing countries.

Within the spectrum of trends in the uptake of broader sustainability criteria, the Best Aquaculture Practices scheme, for example, reports that in 2012 it had certified 1,004,000 metric tonnes of processed output and 445,000 metric tonnes of raw output. Excluding seaweed, aquaculture produced about 48 million metric tonnes in 2010; BAP thus certifies about 1.6 per cent of processed and 0.9 per cent of raw output. Global-G.A.P., another major global certifier, reports to have certified 2 million metric tonnes of traded produce, but this estimate also includes food safety certification. As a consequence, an estimate of total certified aquaculture produce would not go beyond five per cent, with significant margins for improvement.

According to research from Prein et al. (2012) and Bergleiter (2011), in fact, the prospects for strongly expanding this niche market are good. This is especially the case for bivalve shellfish and seaweed culture which in general are "no input" systems. The areas where the industry is yet to meet sustainability standards are mostly related to the recycling or re-use of ropes and other disposable culture materials, and to appropriate location of farms in areas with the best water quality. Both these issues are increasingly being tackled by national and international legislation, so that group certification of large areas seems within reach.

Even in aquaculture, however, the implications of sustainability certification for fish trade from developing countries are numerous. FAO (2011) identifies a significant potential for value addition in private standards, but highlights the fact that the first concern for developing country producers, processors and exporters should be to achieve compliance with the regulatory requirements of importing countries.

3.4.5 Sustainable aquarium fish trade

The continued development and wider application of aquarium fish certification has the potential to develop the trade in sustainable aquarium fish. Findings of empirical studies have indicated a potential for the continuing development of a green certification scheme within the aquarium fish trade (Bergleiter 2011).

The ornamental fish industry has potential in tropical countries like India. However, to expand trade, new technologies and policies will have to be developed which will help in attaining a sustainable industry (Jayalal and Ramachandran 2012). The case of Indonesia is illustrative of the potential economic and environmental opportunities and challenges that can be achieved by sustainably managed aquarium fisheries.

Box 11. Trade in aquarium fish in Indonesia — use of environmentally-friendly capture techniques

Sustainable fishing for the trade in aquarium fish has become one of the main sources of livelihood for several villages in Indonesia. Les, in particular, is an important village for marine ornamental fish collection, as the fish are exported from here to supply the global aquarium market. The fishermen have been collecting fish for the last three decades, and stopped using destructive fishing techniques in the early 2000s. In particular, ornamental fish were threatened by damage to in-shore coral reefs caused by fishing practices such as cyanide fishing, as well as by practices such as prawn trawlers operating close to reefs. Fishermen now understand the need to use environmentally-friendly capture techniques, because the amount of pristine reefs diminished drastically to the point where there were no more fish to catch. The fishermen can now manage their resources more effectively, and are able to gain financial benefits using this approach. They are now going one step further by restoring the reefs near their village, and can see for themselves how quickly the corals become populated again with many reef organisms.

Sources: Lini 2012, UNEP 2011a, Wicaksono et al. 2001

3.4.6 Marine and coastal tourism

The tourism sector offers great potential for trade opportunities. The Tourism chapter of this report presents the opportunities related to marine and coastal tourism, and recreational activities.

3.5 Enabling conditions

This section outlines policy options that governments may use to harness the trade opportunities discussed in this chapter. In line with the voluntary nature of green economy policies and the recognition that national circumstances are to be assessed on a case-by-case basis, the mix of policy tools for harnessing sustainable trade opportunities in the fisheries sector, and the timeframes for their implementation, vary from one country to another. Moreover, a country's transition strategy may be defined in relation to government decisions at the most senior level, or gradually, from initiatives at lower levels by ministries and local government authorities, as well as in response to initiatives by the private sector.

3.5.1 Public investment and spending

- **Identify certification and labelling potential.** The assessment of export opportunities in wild-capture fish and aquaculture includes reviewing existing production processes to identify those that are already close to meeting the criteria for certification, and analysing the capability and capacity to produce new products that could be certified. Support for, in particular, small-scale fisheries to participate in certification schemes and enter international markets is essential.
- **Raise industry and consumer awareness.** Raising awareness on the current sustainability of wild-capture fisheries and aquaculture, as well as on available approaches for sustainable consumption, is a key element for the transition to a greener economy. Potential target groups include middle-income consumers, retail chains, and children in primary and secondary school in both developed and developing countries.
- **Provide assistance to fisheries and aquaculture farms that wish to adapt their practices in order to fulfil criteria of sustainability and/or organic standards.** Besides benefitting from the provision of technical assistance, fishermen and fish farmers often need to make investments

in sustainability that may be burdensome for smallholders. Support from governments and processing and/or exporting partners could help cover costs.

- **Support development and investment in environmentally sound technologies.** In order to make the fishing industry more environmentally friendly and at the same time more competitive on international markets, greater investments in low impact, fuel-efficient fishing methods, reduced energy use and greener refrigeration technologies, and improved waste management in fish handling, processing and transportation are needed. In addition, investments should aim at raising fisheries management standards to internationally agreed levels. This would include using an ecosystem-based approach for the management of fish resources (UNEP and GPA 2006).
- **Invest further in R&D and resources in sustainable aquaculture, including small-scale aquaculture.** With the rapid pace of technology development and production increase in aquaculture, it is important that resources are invested into developing sustainable aquaculture practices (Asche 2011, UN 2002), including innovative multi-trophic aquaculture production systems using environmentally friendly feeds and ensuring that legislation protects ecosystems and their services, safeguarding the environment and livelihoods.
- **Ensure responsible aquarium trade.** It is important to engage with local communities in order to guarantee environmentally friendly harvesting methods by, for example, minimising stress to the fish during capture. Exporters should also ensure that the fish are transported safely in order to reduce mortality rates. The further development of a green certification scheme that takes into account the small-scale nature of ornamental fishing could be explored. At the same time, more must be done to protect ornamental fish from pollution and other harmful effects caused by other activities and industries.

3.5.2 Market-based instruments

- **Reform fiscal policies and gradually eliminate harmful subsidies.** Introducing fiscal incentives for proper management – which may include restricting access to fishing grounds through the imposition of levies on catches – can be effective in both generating revenue for the country whose fishing stocks are being exploited and providing an incentive to reduce fishing efforts. Furthermore, the elimination of harmful subsidies can fundamentally change incentives and unleash public financial resources to support sustainable fisheries management systems, a better scientific understanding of the oceans, compensation and re-training of workers, vessel buyback programmes, and provision of social security. However, these measures need to be coupled with strong enforcement mechanisms against IUU, in order to avoid creating incentives to under-declare catches and engage in black market trading.
- **Promote sustainability practices by using traceability methods.** Traceability methods should ensure that socio-economic and environmental information on the production process travels with the products from the net to the shelves. The methods should allow for relatively low-tech implementation to enable SME participation (UNEP 2009b).

3.5.3 National regulatory frameworks

- **Establish a functioning fisheries management system.** The essential elements of a fisheries management system should be put in place for every fishery under exploitation. These elements may include science-based stock assessments, measures such as quotas and size limits, licences and other forms of regulated access to fisheries, and a serious programme to fight IUU fishing activities.
- **Involve local communities in the management of fish resources.** Proponents of regulatory initiatives aimed at managing fish resources, particularly in coastal waters, should consult with and take advantage of local communities' expertise. Community-based fisheries management presents benefits both in terms of sustainable off-take and community gains.

3.5.4 International frameworks

- **Eliminate harmful subsidies.** The use of subsidies which contribute to overcapacity and overfishing should be gradually eliminated, whether at the multilateral level, e.g. in the context of the WTO Doha Round or other international agreements, or through other forms of cooperation, including at the regional level. While potential price distortions caused by these subsidies are already regulated under existing WTO rules, their negative effects on productivity, sustainability and livelihoods are not yet covered by international rules (UNEP 2011b, Meliado 2012).
- **Harmonise standards or establish equivalencies.** International standards and labelling schemes provide an opportunity to document and promote good practices. International cooperation and development aid should aim at enabling producers to meet standards in export markets, while applying equivalent standards also for local production and consumption. To contribute to predictability and potential reduction of trade-related costs for developing countries, equivalencies between standards, including at the regional level, should be established.
- **Strengthen regional fisheries management organisations (RFMOs).** RFMOs are the primary bodies responsible for the sustainable management of shared marine resources. Contracting parties work together to put in place and implement management and control measures that allow the achievement of this objective. However, there is scope for improving the effective functioning of RFMOs, in particular through further funding, better science, more compliance and stronger governance. As highlighted by a recent UN General Assembly Resolution on Sustainable Fisheries, systematically conducted performance reviews are an essential tool in that process (UNGA 2012).
- **Implement international law on sustainable fisheries.** Countries should fully implement international laws and guidelines on fisheries including the 1995 Agreement for the Implementation of the Provisions of the UN Fish Stocks Agreement, the 1993 FAO Compliance Agreement, the 2009 FAO Port State Measures Agreement, the FAO Code of Conduct for Responsible Fisheries, and the FAO International Plans of Action and technical guidelines (UN 2012, paragraph 169). In addition, CITES Parties should ensure effective implementation of the Convention and include species in the Appendices in accordance with relevant scientific and trade criteria. The granting of fishing rights to foreign fishing fleets should also be in line with the relevant provisions of the UN Convention on the Law of the Sea (UNCLOS) and subsequent instruments.
- **Strengthen transparency requirements of access agreements.** When access to fish resources is granted through government-to-government or business-to-government access agreements, transparency is a key element for achieving sustainable trade. This facilitates the participation of national, regional and international stakeholders in the decision-making process related to the transfer of fishing rights which often have substantial impacts on resources. (Martin et al. 2001). In addition, transparency is beneficial to all parties involved, as it helps the licensee to become aware of other licenses granted for the same fishery, and the host country to establish a coherent access policy (Mbithi Mwikya 2006). Transparency may also help to determine the value of fish resources (UNEP 2008).
- **Eliminate IUU fishing.** Develop and implement national and regional action plans in accordance with the FAO's international plan of action to combat IUU fishing, identifying vessels engaged in IUU fishing and depriving offenders of profits accruing from IUU fishing. Cooperate with developing countries to systematically identify needs and build capacity, including support for monitoring, control, surveillance, compliance and enforcement systems (UN 2012, paragraph 170).

3.5.5 Enhancing dialogue and capacity building

- **Enable exporters to meet voluntary standards and legal requirements in export markets.** Capacity building and international cooperation between private and public actors can help developing country fisheries understand the content of complex standards and regulations in order to identify market potential and adapt their technologies accordingly. To scale up the impact and ensure that more fisheries can benefit from the growing market preference for sustainably produced seafood, there is a need for support and collaboration from the diverse range of stakeholders involved in the fisheries sector. Baseline studies can help to identify gaps in performance of fisheries with respect to certification standards.

- **Bridge science, policy and communication.** Strengthening of science-policy-communication interfaces can reinforce multi-scale linkages from local to international actors. Close collaboration is needed between researchers, fisheries managers, policy makers, stakeholders and communicators in order to identify gaps and raise environmental performance to ensure sustainable management of fisheries. The role of the government is particularly important as key requirements in sustainability standards relate to fishery governance and management. Awareness and training for fishers and other stakeholders, including the private sector, are crucial to meet sustainability requirements for certification and to facilitate the process of formal engagement in certification programmes.
- **Support capacity building in order to enhance sustainable export capabilities.** Enterprises could be strengthened to build supply-side capacities in order to meet the sustainability and quality requirements of major markets, at all stages of supply chains, but particularly at the production level. Fish processing capacities in developing countries could also be improved. Furthermore, compliance with standards in export markets for fisheries requires well-developed infrastructure, including fish landing centres, processing facilities, refrigeration capacities and efficient transportation (UNEP 2012b).

This chapter illustrates the trends, challenges and opportunities at the intersection of increased pressure on limited fisheries resources, trade, and the transition to a green economy. As highlighted in the Rio+20 Outcome Document, achieving sustainable management of fisheries resources and sustainable trade in fish and fish products are critical development goals. This chapter also describes opportunities in sustainable management and sustainability certification for wild-capture fisheries and aquaculture, as well as in sustainability practices for aquarium fish. The Tourism chapter also highlights how the non-consumptive usage of coastal and marine environments for recreational and tourism services provides opportunities for sustainable development.

However, in order for developing countries to be able to fully participate in these opportunities, many challenges need to be overcome. Meeting standards in export markets remains problematic for producers and economic operators in developing countries. The cost and know-how needed for achieving compliance with certification requirements can act as a barrier for more sustainable trade. In addition, the existence of a functioning and sustainable fisheries management system depends heavily upon capital investments and R&D, which in turn depend on the availability of human and financial resources. Phasing out harmful subsidies and eliminating IUU fishing activities would contribute to ensuring sustainable trade, but this can happen only by focusing efforts and establishing clear priorities at the national, regional and international levels.

3.6 Further resources

3.6.1 Websites for additional information

Green Economy Report's chapter on Fisheries:

http://www.unep.org/greeneconomy/Portals/88/documents/ger/3.0_Fisheries.pdf

UNEP's work on fisheries subsidies:

<http://www.unep.ch/etb/areas/fisherySub.php>

Certification and Sustainable Fisheries (UNEP 2009):

<http://www.unep.ch/etb/publications/FS%20certification%20study%202009/UNEP%20Certification.pdf>

Governing Marine Protected Areas Getting the Balance Right (UNEP, 2011):

<http://www.unep.org/ecosystemmanagement/Portals/7/governing-mpas-final-technical-report-web-res.pdf>

GRID-Arendal:

<http://www.grida.no/>

The UNEP World Conservation Monitoring Centre (UNEP-WCMC):

<http://www.unep-wcmc.org/>

Green Economy in a Blue World:

http://unep.org/pdf/green_economy_blue.pdf

The Economics of Ecosystems and Biodiversity:

<http://www.teebweb.org/>

Statistics and information on Fisheries and Aquaculture:

<http://www.fao.org/fishery/statistics/en>

FAO Globefish:

<http://www.globefish.org/homepage.html>

Fisheries policies and WTO:

<http://www.fao.org/fishery/topic/13275/en>

Information on aquaculture standards:

<http://151.1.154.86/GfcmWebSite/SAC/SCESS/12/GFCM-Aquaculture-Certification-DRAFT.pdf>

Piaba Project:

<http://opefe.com/piaba.html>

UNEP-WCMC. Monitoring of International Trade in Ornamental Fish:

<http://www.unep-wcmc.org/medialibrary/2011/11/02/5fbf9a43/Monitoring%20of%20international%20trade%20in%20ornamental%20fish%20-%20Consultation%20Paper.pdf>

Sustainable Aquarium Industry Association:

<http://www.saia-online.eu/>

Project for Ecosystem Services (ProEcoServ):

<http://www.proecoserv.org/>

Seahorse Project:

<http://seahorse.fisheries.ubc.ca/>

WTO fisheries subsidies negotiations:

http://www.wto.org/english/tratop_e/rulesneg_e/fish_e/fish_e.htm

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Forests



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Acronyms

ABS	Access and Benefit Sharing
ATFS	American Tree Farm System
ATO	African Timber Organisation
BAM	Bosques Amazónicos S.A.C.
BAU	Business-as-usual
CDM	Clean Development Mechanism
CER	Certified Emissions Reduction
CoC	Chain of Custody
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CSA	Canadian Standards Association
EU	European Union
FAO	Food and Agriculture Organization
FLEGT	Forest Law Enforcement, Governance and Trade Action Plan
FSC	Forest Stewardship Council
GEF	Global Environmental Facility
GER	Green Economy Report
GDP	Gross Domestic Product
GFW	Global Forest Watch
GGL	Green Gold Label
IFOAM	International Federation of Organic Agriculture Movements
IGCC	International Green Construction Code
ITTO	International Tropical Timber Organisation
MINAM	Ministry for the Environment
MTCS	Malaysian Timber Certification System
NPPO	National Plant Protection Organisations
NTFP	Non-Timber Forest Product
NWFG	Non-Wood Goods and Services
PEFC	Programme for the Endorsement of Forest Certification
PES	Payments for Ecosystem Services
R&D	Research & Development
REDD	Reducing Emissions from Deforestation and Forest Degradation
REDD+	Reducing Emissions from Deforestation and Forest Degradation “plus” conservation
SPWP	Secondary Processed Wood Products
TFT	The Forest Trust
UN	United Nations
UNECE	United Nations Economic Commission for Europe
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change

4 Forests

4.1 Introduction

The Rio+20 Outcome Document recognises that forest ecosystems make important contributions to sustainable development through the provision of goods and services which are environmentally sound, enhance food security and the livelihoods of the poor, and invigorate production and sustained economic growth (UN 2012, paragraph 52). The Outcome Document also reaffirms the necessity to promote, enhance and support more sustainable forestry that eradicates hunger and is economically viable, while conserving biodiversity and water resources and enhancing resilience to climate change and natural disasters (UN 2012, paragraph 111). Furthermore, the Outcome Document acknowledges that:

“...the wide range of products and services that forests provide creates opportunities to address many of the most pressing sustainable development challenges. We call for enhanced efforts to achieve the sustainable management of forests, reforestation, restoration and afforestation, and we support all efforts that effectively slow, halt and reverse deforestation and forest degradation, **including promoting trade in legally harvested forest products**. We note the importance of such on-going initiatives as reducing emissions from deforestation and forest degradation in developing countries, and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries” (UN 2012, paragraph 193) [emphasis added].

Trade in sustainable forestry products can be an important driver in the transition to a greener economy. Shifting public and private investments towards more sustainable forest management can also create new export opportunities for developing countries.

This chapter identifies the trends and trade opportunities in the forests sector associated with a transition to a green economy. It explores how developing countries can respond to growing international demand for environmentally friendly goods and services in this sector. The chapter also lays out the main challenges with taking advantage of the opportunities and offers suggestions on how to address them. Particular trade opportunities covered in this chapter are:

- Exports of wood and wood-based products from a certified, legally verified and/or sustainable supply chain;
- Exports of sustainable or certified non-timber forest products;
- Exports of agroforestry commodities;
- Exports of deforestation-free products;
- Selling of land, carbon or biodiversity offsets; and
- The provision of forest recreation and tourism services.

4.2 Environmental and economic context for greening the economy

A brief description of some of the key environmental and economic issues in the transition to a greener economy in the forests sector is set out in the following sub-sections.

4.2.1 Overview

Box 1. Key messages from the Green Economy Report (GER)

- Forest goods and services support the economic livelihoods of over 1 billion people, most of which are in developing countries. While timber, paper and fibre products yield only a small fraction of global GDP, public goods derived from forest ecosystems have substantial economic value, estimated in the trillions of dollars.
- Modelling for the GER suggests that an investment of just US\$ 40 billion per year between 2010-2050 in reforestation activities and paying landholders to conserve forests could raise value added in the forest industry by 20 per cent, compared to business-as-usual (BAU). In addition, it could increase carbon stored in forests by 28 per cent, compared with BAU.

Source: UNEP 2011a

Forests and forest-related goods and services are important for all developing and developed countries. In addition to providing a significant share of gross domestic product (GDP) for many countries, the contributions made by forest ecosystem services to human well-being and the role of forests in employment and sustaining livelihoods are significant (UNEP 2011b). According to a recent UNEP study, “biologically-rich forest ecosystems provide shelter, food, jobs, water, medicine and security to more than [one] billion people, as well as regulate our climate” (UNEP 2011b). The value of forest ecosystems to the poor is a subject well-researched by The Economics of Ecosystems and Biodiversity (TEEB) initiative, as illustrated in Box 2.

Box 2. The Economics of Ecosystems and Biodiversity (TEEB)

TEEB is a global initiative focused on drawing attention to the economic benefits of biodiversity. Its objective is to highlight the growing cost of biodiversity loss and ecosystem degradation. TEEB presents an approach that can help decision-makers recognise, demonstrate and capture the values of ecosystems and biodiversity, including how to incorporate these values into decision-making.

The issue of tropical deforestation illustrates vividly the economics of biodiversity loss. By far the greatest use of deforested land is for agriculture, a sector that generates substantial income which shows up clearly in national accounts and trade balances. By contrast, the multiple flows of value generated by standing forest tend to be in the form of public goods that in the past have not been valued in monetary terms or priced in markets.

An important finding of many studies reviewed by TEEB is the contribution of forests and other ecosystems to the livelihoods of poor households, and therefore the significant potential for conservation efforts to contribute to poverty reduction. For example, it has been estimated that ecosystem services and other non-marketed goods account for between 47 per cent and 89 per cent of the so-called “GDP of the poor” (i.e. the effective GDP or total source of livelihood of rural and forest-dwelling poor households), whereas in national GDP agriculture, forestry and fisheries account for only six per cent to 17 per cent.

Research carried out as part of TEEB on the costs and benefits of investing in ecological infrastructure indicates that the rate of return could be very high, with a benefit cost ratio of over 13 to 1 in the case of active restoration of eucalyptus woodlands and dry forest in Australia, and over 30 to 1 for restoration of Atlantic forest in Brazil (Dorrough and Moxham 2005).

Wood is an important raw material and energy source, particularly in developing countries and among rural households. Forests also provide many non-timber forest products (NTFP) that make a significant contribution to local economies and livelihoods. Furthermore, forests have an important role to play in carbon storage and sequestration, in particular by capturing CO₂ and storing it in wood, biomass and soil. Other important services provided by forests include watershed management, coastal protection, and erosion control. When managed sustainably, according to the UN Food and Agricultural Organization (FAO), “[Forests] produce woodfuels as a benign alternative to fossil fuels...they have the potential to absorb about one-tenth of global carbon emissions projected for the first half of this century into their biomass, soils and products and store them – in principle in perpetuity” (FAO n.d).

Sustainable forest management is a dynamic and evolving concept that can address such uses of forests. It aims to maintain and enhance the economic, social and environmental value of all types of forests for the benefit of present and future generations (UN 2007). Sustainable forest management can be an important tool for achieving sustainability in the production and provision of goods and services, not only for traditional forest goods such as timber, but also for emerging uses such as carbon mitigation, water management and access to genetic resources. Criteria and indicators for sustainable forest management include economic, social, cultural, environmental and institutional dimensions based on scientific and technical knowledge of forest systems (UNEP 2011a). Sustainable forest management, however, requires strategic investment and proper management. As such, the application of sustainable forest management criteria and the more binding use of the related indicators are important steps in the transition to a green economy.

As noted in the Green Economy Report (GER), however, there are clear signs that many forests are not being sustainably managed. The world's forested area is declining both in absolute terms (deforestation) and in net terms (taking account of forest planting and natural expansion), although at slower rates than in previous decades (UNEP 2011a). Trends for different types of forests are also significant. Most alarming is the decline in primary forests; up to 40 million hectares were lost or modified from 2000 through 2010 (FAO 2010).

The main causes of deforestation in tropical areas are land use changes and roads for mining and agricultural expansion, including biomass production, cattle ranching and infrastructure development. Illegal logging is an additional problem. Worldwide, the economic value of global illegal logging, including processing, is estimated to be worth between US\$ 30-100 billion or 10-30 per cent of global timber trade (UNEP and INTERPOL 2012).

The pressures on forests are expected to continue. A growing population, rising incomes and shifts to more meat-based diets are forecast to increase the demand for food by 70 per cent (in value terms) by 2050 (Bruinsma 2009). Growing demand for first generation biofuels would mean that they compete with food crops for land, putting further pressure on forests. Underlying this loss of forests is weak governance including lack of forest law enforcement, corruption and bribery. Market factors including lack of information to potential investors in more sustainable land use, and increasing demand for both forest products and agricultural land also render deforestation an economically rational course of action from a short-term perspective.

4.2.2 Wood and wood-based products

In addition to the carbon storage role set out above, wood and wood-based products have a number of other environmental and resource efficiency benefits. For instance, timber can substitute for fossil fuels that have higher carbon emissions than wood. The production of wood-based goods such as houses, furniture, building material and bio-plastics usually requires far less energy or oil input than the processing of steel, metal, concrete and plastic products for similar purposes. Treated properly, wood products can last as long as those based on other more energy-intensive materials.

However, the use of biomass as a source of fuel calls for particular attention as it can cause adverse environmental implications. In particular, the creation of a large new global market for wood for bioenergy could increase overall pressures on forests as well as on other ecosystems, such as grasslands, which are increasingly being converted to new monoculture tree plantations (Ernsting 2012). Furthermore, the industrial process of producing biomass, such as pellets, and the shipping that is required for exports, is likely to decrease the amount of carbon saved by switching to wood (The Economist 2013). A report in 2011 by the European Environmental Agency states that: “Legislation

that encourages substitution of fossil fuels by bioenergy, irrespective of the biomass source, may even result in increased carbon emissions – thereby accelerating global warming” (EEA 2011). In addition, increased demand for biomass may also aggravate land conflicts in developing countries between large corporations and local communities (EJOLT 2012). Thus, it is important to ensure that biomass used for energy is sourced from sustainably managed forests, or from other sustainable sources which may include timber processing residues or biodegradable waste (EC 2013).

4.2.3 Non-timber forest products

As well as wood products, forests are home to many other goods and services. This includes NTFP as well as non-wood goods and services (NWGS), both of which offer key opportunities for international trade.

NTFP include food products (e.g. nuts, fruits, edible fungi, oils, sap syrups and spices), industrial plant oils, plant gums, natural pigments, oleoresins, fibres and flosses, vegetable tanning materials, latex, insect products, incense woods, plant insecticides, medicinal plants and wild plants. They are also often used as an input into modern industries such as pharmaceuticals, cosmetics, agriculture, food additives, industrial enzymes, bio-pesticides and personal care products (Iqbal 1993).

NTFP extraction, however, is not always sustainable. Some sites or species are only suitable for small-scale manual collection, while others lend themselves to larger-scale commercial approaches (FCS 2009). Basic research of the sustainability of NTFP resource extraction in both its ecological and socio-economic considerations is essential to determine the sustainability of extraction (FAO 2001).

NWGS include forest services such as protection (against soil erosion by air or water, avalanches, mud and rock slides, flooding, air pollution, noise, etc.); social and economic values (e.g. hunting and fishing, other leisure activities, including recreation, sport and tourism); and aesthetic, cultural, historical, spiritual and scientific values (including landscape and amenity) (FAO 2000).

Trade in NTFP and NWGS is often marketed under the umbrella of biotrade, which refers to “those activities of collection, production, transformation, and commercialisation of goods and services derived from native biodiversity under the criteria of environmental, social and economic sustainability”.¹

4.2.4 Changing nature of forest types

When assessing trade opportunities in the forestry sector, critical factors are forest resilience and vulnerability (to anthropogenic and natural disturbances), as well as the growth rate and use rate of plantations and agroforestry. There is considerable data to show reduced biodiversity is associated with plantation forests.² However, plantation forests are often controversial. In Southeast Asia, for example, natural rainforests have been cleared to create plantation forests. For these reasons, neither the Programme for the Endorsement of Forest certification (PEFC) nor the Forest Stewardship Council (FSC) allow for the certification of plantations established through the conversion of natural forests. Nevertheless, planted forests coupled with promotion of environmentally and socially responsible trade have the potential to meet rapidly growing demand without degrading protected forest areas (WB 2008).

Another approach is agroforestry, which incorporates multifunctional trees into agricultural systems. Agroforestry is found worldwide and particularly in tropical countries (UNHRC 2010). It encompasses a wide range of practices as illustrated by a recent definition (Zomer et al. 2009):

1. See, for example: <http://www.unep-unctad.org/cbtf/biotrade.asp>. However, currently, there is no globally agreed definition for biodiversity-based business or biotrade, although several definitions have been put forward. For instance, according to the United Nations Conference on Trade and Development (UNCTAD): “Biotrade is concerned with the production or collection and commercialization of goods and services that are derived from native biodiversity: the vast array of plants, species and organisms on our planet. This includes trade in products that come from genetic resources, species and ecosystems and that are used in line with environmental, social and economic sustainability criteria.” (UNCTAD 2012).
2. Calculating net biological or primary production (NPP) is the first step in quantifying the amount of carbon plants fix from the atmosphere and accumulate as biomass. HANPP, the Human Appropriation of Net Primary Production, is an aggregated indicator (introduced by Vitousek et al. in 1986) that reflects both the amount of area used by humans and the intensity of land use (Haberl et al. 2007). While primary forests (low NPP, low HANPP) have been decreasing in size, managed forests (higher NPP and HANPP), including plantation forests, and agroforestry are becoming more widespread.

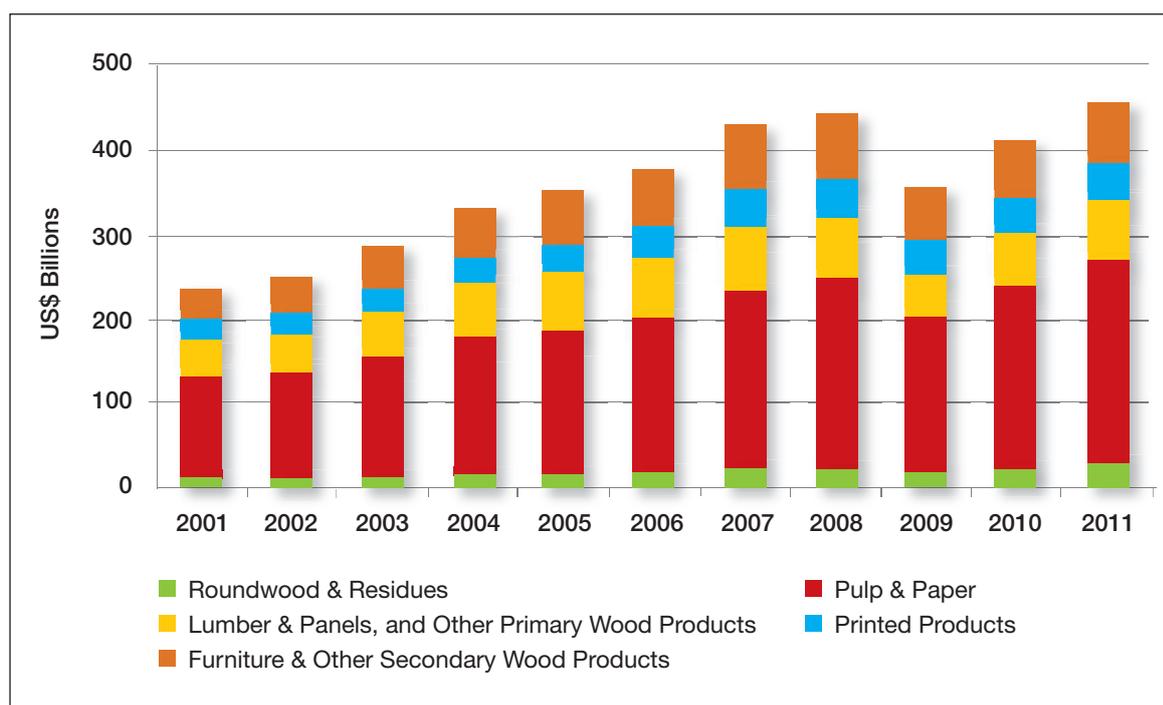
“Agroforestry systems range from subsistence livestock silvo-pastoral systems to home gardens, on-farm timber production, tree crops of all types integrated with other crops, and biomass plantations within a wide diversity of biophysical conditions and socioecological characteristics. The term has come to include the role of trees in landscape level interactions, such as nutrient flows from forest to farm, or community reliance on fuel, timber, or biomass available within the agricultural landscape”.

In Tanzania, for example, 350,000 hectares of land have been rehabilitated in the Western provinces of Shinyanga and Tabora using agroforestry (Pye-Smith 2010). Similar large-scale projects have been developed in other countries such as Malawi, Mozambique and Zambia. The World Agroforestry Centre claims: “[i]f implemented over the next fifty years, agroforestry could result in 50 billion tons of carbon dioxide being removed from the atmosphere, about a third of the world’s total carbon reduction challenge”. The integration of trees in farming systems, however, is still facing constraints, in large part related to economic and policy competition with the agricultural sector (Garrity et al. 2010, Linyunga et al. 2004).

4.2.5 Trade in forest products

The international trade in forest products (wood products), covering the 2001-2010 period, is presented in Figure 1. Since 1983, the total value of forest products traded in the international market increased from approximately US\$ 60 billion to over US\$ 400 billion.

Figure 1. Global trade in forest products and wood furniture



Source: Goetzl 2011, as updated in 2013 (Compiled from the Globe Trade Information Service (GTIS) World Trade Atlas Database)

The FAO has also produced more detailed figures on production and particular types of forest products, as illustrated in Figure 2.

Figure 2. Global production and trade of forest products in 2011

Product	Unit	Production				Exports			
		2011	Change (%) compared to:			2011	Change (%) compared to:		
			2010	2000	1980		2010	2000	1980
Roundwood	million m³	3 469	2%	1%	11%	123	10%	4%	31%
Wood fuel	million m ³	1 891	1%	4%	12%	8	19%	112%	
Industrial roundwood	million m ³	1 578	3%	-3%	9%	115	10%	1%	23%
Sawnwood	million m³	406	4%	6%	-3%	120	5%	5%	71%
Wood-based panels	million m³	288	3%	55%	184%	71	1%	24%	334%
Veneer and plywood	million m ³	97	1%	46%	120%	28	7%	25%	242%
Particleboard and fibreboard	million m ³	191	5%	60%	233%		-2%	24%	423%
Wood pulp	million tonnes	173	1%	1%	38%	53	7%	39%	152%
Other fibre pulp	million tonnes	18	-3%	17%	145%	1	13%	76%	161%
Recovered paper	million tonnes	211	1%	47%	317%	59	8%	140%	976%
Paper and paperboard	million tonnes	403	1%	24%	138%	112	0%	14%	221%
Forest products value	US\$ billion					246	10%	70%	334%

Source: FAOSTAT-Forestry database (FAO 2011a)

Some of the main highlights from these statistics have been documented by the FAO. In particular:

- The recent economic recession appears very clearly in the statistics, but has affected markets and regions differently. Globally, production of industrial roundwood and sawnwood declined in 2007-09 and have not so far recovered, but production of wood-based panels in 2011 is now higher than in 2007 and production of pulp and paper was only affected for one year (2009). Most of the impact of the recession was felt in Europe and North America, while the other three main regions of the world were not affected as much.
- China is very significant for international trade in forest products, being the largest importer in the world of industrial roundwood, sawnwood and fibre furnish and the largest exporter of wood-based panels. Furthermore, China is the fifth largest importer of paper and paperboard, in spite of a huge increase in its domestic production since 2007.
- Production and consumption of wood-based panels appears to be growing relatively strongly in most regions (especially compared to the trends in sawnwood production and consumption). In the markets for pulp and paper, overall growth was modest over the period 2007-11, with a growth trend of about one per cent per year. Nevertheless, this conceals major differences at the regional level, where pulp and paper production and consumption is growing significantly in the Asia-Pacific region, but generally decreasing in Europe and North America (FAO 2011b).

In the last decades, production and trade of wood forest products have been mostly by European and North American markets. Although these traditional players are still important, emerging economies have gained importance in the international market, including Brazil, Chile, China, India, Indonesia, Malaysia, Russia and Vietnam (FAO 2007a).

While the wood bioenergy sector is still small compared to the pulp and paper industry, it is one of the fastest growing markets for wood products (Global Forest Coalition 2010). This includes biomass commodities such as biofuels (discussed in the Renewable Energy chapter of this report) and wood pellets. Many EU Member States, including Italy, the Netherlands, Sweden and the UK, already import growing volumes of wood pellets (Wunder et al. 2012). In the UK, for example, plans to expand bioenergy are expected to raise the demand for biomass to 60 million tonnes per year, which will exceed by five or six times the domestic availability of wood chips and pellet supplies (Cotula et al. 2011). Clegg Consulting estimate that the rising UK demand alone could lead to an almost doubling of world trade in wood chips and pellets (cited in Cotula et al. 2011). As a whole, the EU imports 80 per cent of global pellet production (approximately ten million tonnes produced in 2009), and is the largest importer of wood pellets worldwide (Hewitt 2011).

International trade in all types of forest products has a major impact on the state of forests and, in particular, deforestation. Demand for wood in one country can increasingly be met by imports from other countries through international trade. Consumption in one area can therefore affect land use and land transitions in other areas. In addition, imports can reduce demand for domestic wood and allow local recovery of forests (EC 2011).

A key challenge in combating the global illegal wood trade is the amount of illegal wood that crosses borders as a laundered "legal" product. Transnational crime, or the transnational trade in laundered products, provides a particular law enforcement challenge as national law enforcement authorities have no international jurisdiction, unless through specific operations or special agreements (UNEP and INTERPOL 2012).

However, international trade in sustainably harvested forest products, including NTFP, can foster economic development and create incentives for sustainable forest management. The livelihoods of millions of rural people, including a high percentage of rural women, can be enhanced through investments in small and medium forest-based enterprises that use wood and NTFP to meet demand from local and non-local markets. For example, the value of woodcraft exports (primarily from developing countries) increased from an estimated US\$ 500 million in 2002 to US\$ 1.5 billion in 2010 (FAO 2012a). As the global trade in forest products continues to grow, it is important that policies are created and enforced which guarantee that trade is not linked to unsustainable resource depletion and illegal practices (UNEP and FAO 2009).

Nevertheless, there are a number of trade constraints in the forest sector that may have a disproportionate impact on trade in sustainable timber and NTFP. While many constraints are specific to a particular forest product or service, and the socio-political context in which they are based, there are also a number of more generic hindrances. These include the difficulty to penetrate international markets in order to meet the quality or sustainability standards; lack of business networks; limited or no access to relevant information about sustainable trade and investment trends and overseas consumer demand for specific sustainable products; and the absence of any institutional framework for the management, support and regulation of the NTFP sector (Vantomme 2001).

As well as the significant role of wood in modern society as set out in section 4.2, it is important to highlight the increasing role of wood as a facilitator for international trade itself. With globalisation comes an expansion in the movement of goods around the world, and often these goods are transported on shipping pallets, which are frameworks of flat wooden boards that can carry heavy loads and be easily lifted and moved by forklift (Elias et al. 2012). More than 30 per cent of the total hardwood produced in the US is used to manufacture pallets and wood containers; consequently, the pallet industry is the largest single user of hardwoods in the country (Buehlmann et al. 2009).

Finally, global value chains for the forests sector are complex and involve many sectors. Global value chains can be particularly challenging due to their distance from the end-user market, export requirements, consumer social and environmental concerns and standards and competition (FAO 2006). In addition, in terms of legality verification, in many instances, several levels are involved (e.g. forestry verification, customs verification and phytosanitary checks). These all impact on how economic operators can respond to sustainable trade opportunities in the forests sector.

4.3 Green economy measures

Some of the measures that can lead to positive trade impacts in sustainable forestry identified, *inter alia*, in the GER (UNEP 2011a) include:

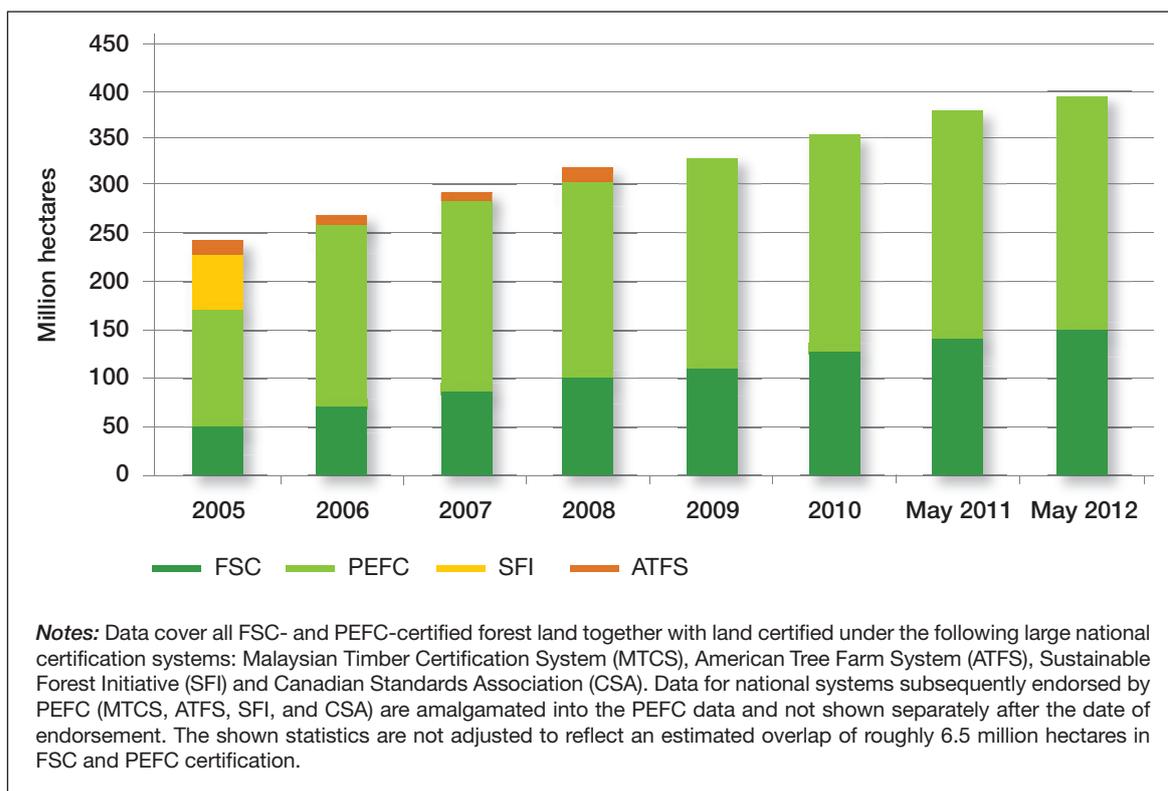
- Investing in improved forest management and certification;
- Improving forest governance, legality and enforcement;
- Reforming the agricultural drivers of deforestation; and
- Promoting payments for ecosystem services (PES) and REDD+.

This section presents examples of these and other green economy measures that have the potential to create or consolidate sustainable trade opportunities in the forests sector.

4.3.1 Certification schemes – wood and wood-based products

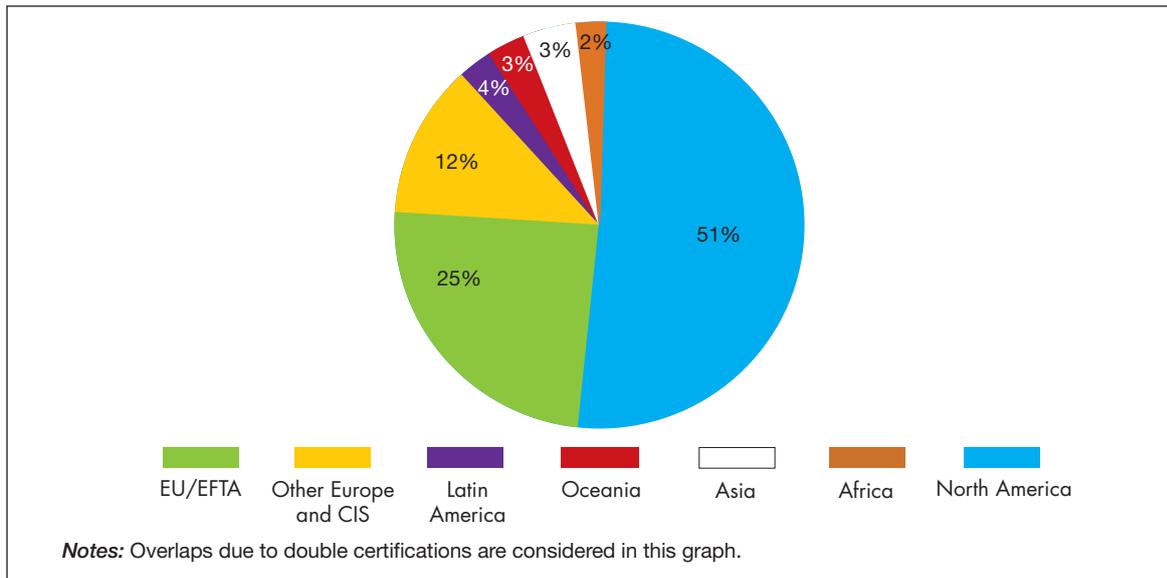
Forest certification schemes are international non-governmental mechanisms for regulating forest product exploitation and trade (CMI 2013). As such, certification schemes act as a major driver in creating trade opportunities in sustainable forestry. A range of forest certification schemes exist, including the Programme for the Endorsement of Forest Certification (PEFC) and the Forest Stewardship Council (FSC). Both schemes offer assurance of well-managed forests, but have different processes and interpretations of forest management criteria (PEFC 2011). By March 2013, the total area of certified forest worldwide was close to 400 million hectares (about 10 per cent of total forest area). Approximately two-thirds, accounting for about 245 million hectares of forests, are managed in compliance with PEFC’s Sustainability Benchmark. An additional one-third is certified by FSC. As of 15 April 2013, over 177 million hectares were certified in 79 countries; 12 per cent of this area (26 per cent of the certificates) is in tropical and subtropical countries. Eight per cent of the FSC certified forests are plantations. The rest are natural forests and semi-natural or mixed plantation and natural forests (FSC 2013). It is estimated that ten per cent of the total certified area is certified under both PEFC and FSC.

Figure 3. Forest area certified by major certification schemes, 2005-2012



Source: UNECE and FAO 2012

Figure 4. Relative shares of total global certified forest area by world region, 2012



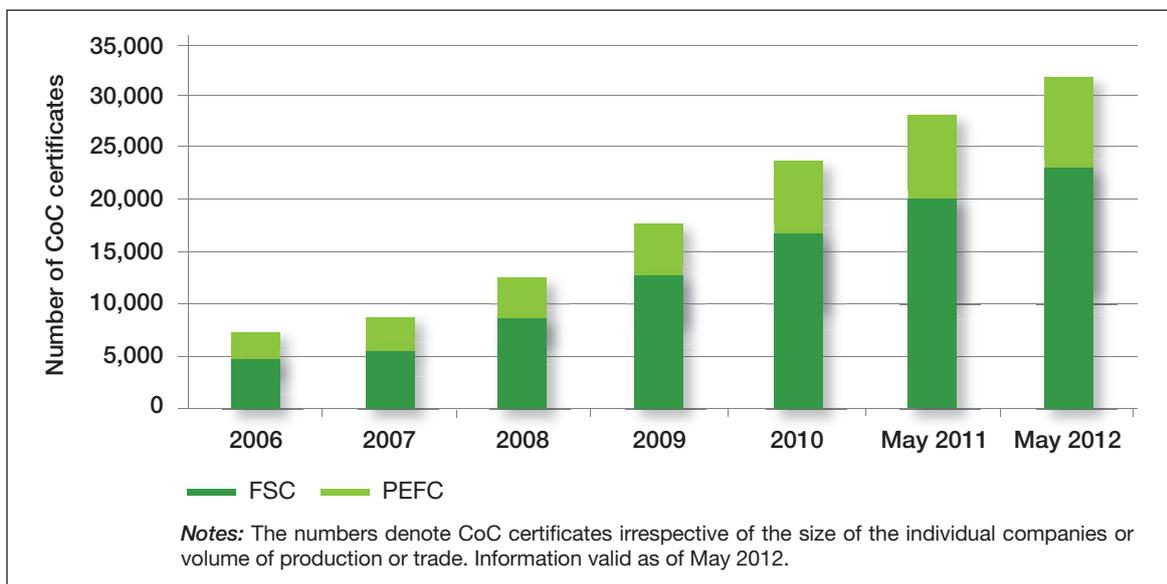
Source: UNECE and FAO 2012

Certification schemes set voluntary standards for sustainable forest management against which forest management practices can be independently assessed and verified by third-party certification bodies. They also provide evidence of good practice, although lack of certification does not necessarily imply poor management and certification standards may not be comparable across borders.

Public and private procurement policies, which are key drivers in the market for sustainable forest products, accept forest certification schemes such as FSC and PEFC as means of proof for sustainability.

In order for certified products to become available on the marketplace, all companies along the value chain are required to obtain a Chain of Custody (CoC) certification. This is a mechanism for tracking certified material from the forest to the final product. As illustrated in Figure 5 below, between May 2011 and May 2012, the total of PEFC and FSC CoC certificates issued worldwide increased to over 30,000.

Figure 5. Chain-of-custody certified trends worldwide, 2006-2012



Source: FSC and PEFC 2012 as cited in UNECE and FAO 2012

Biomass certification, particularly for wood pellets, is still in a limited phase. Some certification systems have been developed especially for the use of energy crops and residues in power plants. These include the Essent Green Gold Label standard (described in Box 3) and the Laborelec Sustainability Certification.

Box 3. Essent Green Gold Label standard

The GGL is a certification system for sustainable biomass covering production, processing, transport and final energy transformation. In this system, mixing or contamination with non-intrinsic or environmentally harmful materials is prohibited. In every link of the chain written proof must be available that the GGL quality system is supported, sustained and maintained (BTG 2008).

Biomass from forestry in the chain should, depending on the origin of the material, comply with one of the following standards: FSC, PEFC, CSA-SFM (Canadian Standards Association's Sustainable Forest Management), SFI (Sustainable Forest Initiative Forest Certification), SFI Certified Sourcing (only with individual chain of custody data), ATFS (American Tree Farm System) certification, approved pre-scope certificate of one of the endorsed forest management certification systems (with the intention of full certification), or GGL5 (Forest management criteria).³

4.3.2 Certification schemes – non-timber forest products

Four main categories of voluntary certification schemes are relevant to the production, processing and commercialisation of NTFP (Walter et al. 2003):

- Forest management certification (e.g. FSC, PEFC, as set out above);
- Social certification ('Fair Trade');
- Organic certification; and
- Product quality certification.

Of these four, organic certification of NTFP is still in its early development phase. Nevertheless, many organic standards provide specific sections on NTFP, such as the International Federation of Organic Agriculture Movements' (IFOAM) basic standards for organic production and processing. There are also some emerging or recently established certification bodies, such as FairWild, which assess the harvesting of and trade in wild plants against various ecological, social and economic requirements. FairWild targets medicinal and aromatic plants that are collected in the wild. The FairWild standard has no restrictions on the geographical scope, type of producer group, or the botanical ingredient, so long as that ingredient is foraged in the wild.

Box 4. PhytoTrade and Bolsa Amazonia

Aside from certification, there have been other initiatives that address similar issues, often for products that fall outside of existing categories. PhytoTrade is a non-profit trade association that helps African rural producers develop and market their natural products. PhytoTrade promotes sustainable production and fair trade, aiming to contribute to the economic development of southern African countries. Phytotrade operates in Botswana, Malawi, Mozambique, Namibia, South Africa, Swaziland, Zambia and Zimbabwe. Although this is not a certification body, Phytotrade has a fair trade charter, similar to a code of ethics, which members have to follow.

Another interesting initiative is Bolsa Amazonia, which is a regional programme operating in Bolivia, Brazil, Columbia, Ecuador and Venezuela and is aimed at the commercialisation of sustainable Amazonian products by involving rural communities and empowering them with capacity building and information.

Source: FAO 2007b

3. See: <http://www.greengoldcertified.org/site/pagina.php?id=9>

4.3.3 Forest regulations and trade

Wood and wood-based products

A key driver creating trade opportunities is the evolving international regulatory environment to protect forests and, in particular, to stem illegal logging. Illegal logging is broadly defined as “logging in violation of relevant national and international laws”. Partly due to the limited success of forest certification to address many of these problems in tropical forests, the EU and the US have recently introduced legislation to eliminate trade in illegally harvested wood. At the same time, measures introduced to control the trade in illegal wood may lead to an increased interest in certification. Certification is commonly regarded as a method for providing evidence for legality requirements (UNECE and FAO 2012).

Legislation making it an offence to trade illegal timber has been in place in the US since 2008.⁴ It is now illegal to take, possess, sell, import or export any illegally-sourced plant.⁵ In May 2012, the US Due Care Standard for the Lacey Act addressing illegally logged wood was approved. This standard provides pathways for using FSC, PEFC or an alternative approach developed by the American Hardwood Export Council for their members (UNECE and FAO 2012).

In the EU, a new regulation on timber products entered into application on 3 March 2013. It requires companies to take appropriate steps to minimise the risk of illegal timber and timber products being placed on the EU market.⁶ The Timber Regulation states that:

“[T]he placing on the market of illegally harvested timber or timber products derived from such timber shall be prohibited. Operators shall exercise due diligence when placing timber or timber products on the market. To that end, they shall use a framework of procedures and measures, hereinafter referred to as a ‘due diligence system’” (Art. 4).

Box 5. FLEGT – The EU action plan to control illegal logging and improve forest governance

The EU’s policy to fight illegal logging and associated trade was defined in 2003 with the Forest Law Enforcement Governance and Trade (FLEGT) Action Plan. The main objectives of the plan are to tackle illegal logging and improve forest governance in timber exporting countries. It recognises the responsibility and role of the EU as a major consumer of imported timber.

In addition to having led to the establishment of the EU Timber Regulation as a demand side measure, the plan also triggered the FLEGT Regulation (Regulation (EC) No 2173/2005) adopted in 2005. This allows for the control of the entry of timber to the EU from countries entering into bilateral FLEGT Voluntary Partnership Agreements (VPA) with the EU. The VPAs represent a supply side measure of the plan. These agreements are being developed through a process of bilateral negotiations with cooperating producer countries, and are to be implemented in the EU through the EU FLEGT implementing regulation (Regulation (EC) No 1024/2008).

Currently, six countries have concluded the VPA negotiations: Cameroon, Central African Republic, Republic of Congo (Brazzaville), Ghana, Indonesia and Liberia. Negotiations to join a VPA are also underway with the Democratic Republic of Congo, Gabon, Guyana, Honduras, Malaysia and Vietnam. To date, none of the VPA partner countries has fully implemented all the requirements of the agreement, so there is no FLEGT licensed timber currently available. It is expected that the first FLEGT licensed timber will be available during 2013.

Source: Email correspondence with the European Forest Institute

4. The Lacey Act of 1900 protects both plants and wildlife by creating civil and criminal penalties for a wide range of violations. The amendment referred to in the text above is Lacey Act (2008) 16 U.S.C. 3372(a).

5. Section 3(a), 16 U.S.C. 3372(a).

6. Regulation (EU) No 995/2010 laying down the obligations of operators who place timber and timber products on the market. Further clarification when certification schemes “may be taken into account” in the risk assessment and risk mitigation procedures is provided for in Commission Implementing Regulation (EU) No 607/2012 of 6 July 2012 on the detailed rules concerning the due diligence system and the frequency and nature of the checks on monitoring organisations as provided for in Regulation (EU) No 995/2010 of the European Parliament and of the Council laying down the obligations of operators who place timber and timber products on the market (EU 2012).

The Timber Regulation covers products that are either domestically produced or exported to the EU, including solid wood products, flooring, plywood, pulp and paper. It does not, however, include recycled products, or printed papers such as books, magazines and newspapers. Both the PEFC and FSC are in the process of aligning their requirements to assist operators in exercising due diligence (PEFC 2011a).

In Australia, on 30 November 2012, the Illegal Logging Prohibition Act 2012 received its assent and has entered into law. Among other things, the Act prohibits the importation of illegally logged timber and the processing of illegally logged raw logs. It also requires importers of regulated timber products and processors of raw logs to conduct due diligence in order to reduce the risk that illegally logged timber is imported or processed (Parliament of Australia 2012, FSC 2012a). In doing so, Australia seeks to align its policies with similar provisions in the US and the EU. The aim of this legislation is to target unfair competition between legitimate and illegitimate suppliers (where the latter normally sell log products for much less than legally sourced ones) and to mitigate the social and environmental costs of illegal logging.⁷

The regulatory requirements in the US, the EU and Australia, as well as other jurisdictions that seek to introduce similar legislation, will affect all companies that export timber products to these markets, since their customers will require assurance of the legality of the products they purchase.⁸

Therefore, it will become increasingly important for importers to demonstrate that they have requested and received adequate evidence of legality, so that they will be deemed to have exercised 'due care' and thus are not liable to criminal prosecution. Enterprises that cannot provide adequate evidence risk losing customers in these markets (Proforest 2010). In contrast, enterprises that have proof of legally produced timber are likely to be able to retain their market access or even gain a competitive advantage compared to enterprises that do not.

Biomass and wood pellet products may also be subject to sustainability criteria in the future, which could drive sustainable trade. For example, although the sustainability criteria of the EU's Renewable Energy Directive only apply to biofuels and bioliquids, but not to biomass, the Directive does mandate the European Commission to assess requirements for a sustainability scheme for energy uses of biomass and, if appropriate, make a proposal (Article 17(9)). Non-governmental organisations (NGOs) and public utilities have been calling for EU-wide binding sustainability criteria (ClientEarth 2011, Eurelectric 2013).

The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)⁹ also regulates international trade in tree species, as set out in Box 6.

Box 6. CITES and international trade in tree species

Before the 16th meeting of the Conference of the Parties (COP) to CITES (Bangkok, March 2013), CITES regulated international trade in about 350 tree species. As an outcome of COP 16, additional species, including a range of rosewoods and ebonyes from Asia, Central America and Madagascar will now be regulated by CITES. Rapidly rising demand for these precious tropical hardwoods has led to serious concerns that unregulated logging is depleting populations of already rare species. Range States (i.e. states that exercise jurisdiction over any part of the range of a species covered by CITES) believe that regulation under CITES will help them manage these valuable resources sustainably. The joint programme between CITES and the International Tropical Timber Organization (ITTO) will support the efforts of the countries concerned to strengthen their capacities to implement the Convention.

Source: UNEP/CITES 2013

Non-timber forest products

International trade in NTFP is subject to a series of regulatory requirements. Some of these are applied in pursuance of national and regional phytosanitary measures (FAO 2011b), whereas others are set forth in compliance with international obligations, notably CITES. In addition, private and public certification

7. There may be WTO implications of the Australian bill. For further reading, see Mitchell and Ayres (2012) and Brack (2012).

8. It is important to note that neither the EU legislation nor the US legislation impose EU and US law respectively on other countries. "Illegally sourced" is defined by the content of a domestic nation's own legislation.

9. By March 2013, 178 countries had ratified or otherwise adhered to CITES.

schemes relate to trade in NTFP. Such schemes generally address both incorporated product characteristics and production and processing methods (Burgener and Walter 2007).

As suggested by the FAO, phytosanitary requirements for NTFP are the same as those that apply to any other similar products. In general terms, a phytosanitary certificate is needed in order to export NTFP to selected countries, where the latter have a specific phytosanitary regulation in place. In this respect, the exporting country's National Plant Protection Organisations (NPPO) should be able to provide exporters with all the information relevant to regulations in place in the importing country. In the absence of an NPPO in the exporting country, the importing country's NPPO or Sanitary and Phytosanitary Measures National Enquiry Point should also be able to provide foreign exporters with the necessary information (FAO 2011b).¹⁰

The cooperation between NPPO of the exporting and importing countries appears to be critical to ensure predictability of trade transactions (FAO 2011b). For example, a major market for NTFP is the US market. To enter this market as a food ingredient, for example, the NTFP needs to be "generally recognised as safe". The food safety agency in the US requires companies to establish the safety of foods before they enter the marketplace (ITC 2012).

In addition, CITES imposes certain regulations on potential trade of NTFP, as set out in Box 7.

Box 7. CITES and trade in NTFP

CITES has three appendices with lists of species that can be commercially traded under specific regulations or, in the case of Appendix I, which are subject to a general prohibition on commercial trade. The most relevant CITES Appendix for trade in NTFP is Appendix II. It lists all species for which an export permit for a NTFP must be issued before shipment by the relevant government authority of the exporting country. In this context, certain international certification schemes include CITES requirements in their standards to help exporters meet those requirements.¹¹

Source: FAO 2005a

At their 10th Conference, which took place in October 2010, the Parties to the Convention on Biological Diversity (CBD) adopted the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization (ABS) to the CBD. This international agreement will come into effect after it is ratified by 50 countries. By March 2013, it had been ratified by 15 countries. Once it becomes operational, the Nagoya Protocol will provide the policy framework for the export of genetic resources from developing countries. The CBD explains that it:

"...aims at sharing the benefits arising from the utilization of genetic resources in a fair and equitable way, including by appropriate access to genetic resources and by appropriate transfer of relevant technologies, taking into account all rights over those resources and to technologies, and by appropriate funding, thereby contributing to the conservation of biological diversity and the sustainable use of its components" (CBD 2010).

4.3.4 Procurement policies and green building initiatives

In addition to governance, there are a variety of other drivers in the transition to a sustainable forest sector such as public and private sector procurement policies, green building initiatives for legal and sustainable timber, FLEGT-licensed or equivalent sources, and recycled timber. All require legality, but some go beyond legality and require sustainability. This usually means that only certified timber and recycled timber are acceptable (Proforest 2010).

Public wood procurement policies have been adopted in some EU Member States including France, Germany, the Netherlands and the UK. Public procurement policies for timber also exist in New Zealand

10. In addition to NPPOs, national Sanitary and Phytosanitary Enquiry Points should also be able to provide traders with relevant information. See WTO (2011), Procedural Step-by-Step Manual for SPS national Notification Authorities and SPS National Enquiry Points.

11. For an example of certification schemes, see <http://www.fairwild.org/internationalLegal-agreements/>.

and Japan, as well as in some states and local authorities in the US. In addition, several private sector initiatives require a demonstration of timber legality. These include responsible purchasing policies of timber trade federations and individual companies. The timber trade federations in several EU Member States require members to source timber from legal sources, and many companies also require suppliers to provide proof of legally and sustainably sourced goods.

The continuing development of green building initiatives is likely to strengthen wood's position as the environmentally sound construction material of choice. In particular, the release of the International Green Construction Code (IGCC) in March 2012, with its emphasis on the use of materials that are recyclable or reusable, and bio-based and certified products, may provide a further boost for wood in construction. The code encourages the use of certified wood products and recognises all major certification programmes (UNECE and FAO 2012).

Proactive procurement policies could also extend to some critical agricultural commodities (such as palm oil, soy, cattle, coffee or cocoa), provided they are not causing deforestation. Conversion of forest to agriculture or ranching is causing 80 per cent of deforestation worldwide, mostly for commercial purposes. Demand side measures would therefore be needed to incentivise more sustainable land use policies and rural development strategies in source countries.

These policies and initiatives also represent potential opportunities for well-prepared suppliers in developing countries to gain market shares by increasing their exports to developed countries.

4.3.5 Payments for ecosystem services (PES) and REDD+

PES

Incentive-based approaches to maintain and enhance the benefits that forests provide have emerged over the past 10 to 15 years. The most high-profile of such initiatives are Payments for Ecosystem Services (PES) schemes which pay forest owners and others on a local or national scale for the provision of services such as watershed protection, carbon storage, recreation and wildlife habitats (Forest Trends et al. 2008).

However, PES have been criticised on a number of fronts. These include potential adverse effects for poor and marginalised groups that may arise if access is limited to traditional users or if benefits are not shared fairly from the payments. Thus, there is a need to establish agreed criteria to enhance PES effectiveness and establish suitable designs of these schemes. An abridged set of criteria proposed by the EU (EC 2012) includes:

1. Removing perverse incentives: Conflicting market distortions, such as environmentally harmful subsidies, should be removed;
2. Defining transparent property rights: The individual or community whose land use decisions affect the provision of ecosystem services must have clearly defined and enforceable property rights over the land;
3. Setting PES goals and objectives clearly: These help to guide programme design and enhance transparency;
4. Developing a robust monitoring and reporting framework for biodiversity and ecosystem services;
5. Identifying buyers and ensuring sufficient and long-term sources of financing;
6. Identifying sellers and targeting ecosystem service benefits;
7. Establishing baselines and targeting payments to ecosystem services that are at risk of loss, or that enhance their provision;
8. Differentiating payments based on the opportunity costs of ecosystem service provision: PES programmes that reflect the cost of an alternative action must be avoided (e.g. deforestation); and
9. Considering "bundling" or layering multiple ecosystem services.

REDD+

Reducing Emissions from Deforestation and Forest Degradation (REDD+) is a set of policy approaches and positive incentives designed to reward developing countries for strengthening the mitigation potential in their forests. It proposes to offer financial incentives to developing countries that slow, halt and reverse emissions from deforestation and degradation, while investing in low-carbon paths to sustainable development. REDD+ also includes the conservation, sustainable management and enhancement of forest carbon stocks, the importance of which was acknowledged in the Outcome Document (UN 2012, paragraph 193). Climate change mitigation through REDD+ is considered to be a cost-effective strategy for a green economy.¹²

More than 50 developing countries are currently supported by bilateral and multilateral initiatives to build capacity to prepare and roll out their national REDD+ strategies including, for instance, the Democratic Republic of Congo, Cambodia, Ecuador, New Guinea, Papua and Tanzania. In addition, the Parties to the United Nations Framework Convention on Climate Change (UNFCCC) are negotiating the inclusion of REDD+ under the new international climate regime to be agreed by 2015. If managed well, PES, notably through REDD+, can offer an important opportunity for countries and landholders to capture the value of their forest ecosystem services.

4.4 Trends and trade opportunities

An analysis of trends in international trade of wood and non-wood products has identified several sustainable trade opportunities. The key ones are discussed in this section.

4.4.1 Wood and wood-based products from a certified or sustainable supply chain

Wood and wood-based products from a certified or sustainable supply chain represent a growing trade opportunity for producers and exporters, including those based in developing countries. Trends point toward a growing environmental awareness globally that has increased the demand in world markets for products originating from sustainably managed forests. Consequently, many companies consider certified timber products as a way to respond to consumer demand, improve their image, reduce supply chain risk from illegally harvested wood, and comply with new regulatory requirements, as illustrated in Box 8 below.

Box 8. Rondobel forestry company and timber certification

In 2010, Rondobel, a timber company operating in the state of Pará, Brazil, became the first company in Latin America to meet Rainforest Alliance standards for Verification of Legal Origin (VLO). Rondobel was assisted by The Forest Trust (TFT) through the Timber Trade Action Plan (TTAP) project to achieve the verification status.

In December 2011, Rondobel was audited by IMAFLORA against the FSC standard, and in June 2012 it was issued with a FSC certificate (RA-FM/COC-005959) for its forest and its sawmill activities.

Achieving certification and the commitment that Rondobel has shown to environmental excellence has opened up new markets for the company. In addition to its domestic business within Brazil, Rondobel is now selling products to Europe, the US and Panama. Furthermore, Rondobel's certification confirms that the company is well placed to maintain market access in light of new international requirements, such as the Timber Regulation that came into force in March 2013, which lead to customers seeking assurances of legality and sustainability.

Source: *The Forest Trust (TFT)*

12. As has been well established by the TEEB initiative, sustainable forest management offers, in addition to mitigation benefits, a number of co-benefits such as soil stability and watershed protection. The risks and opportunities of offset markets for these services are not within the scope of this report.

At the same time, wood products' manufacturing activity is shifting from developed to developing countries. Further, in many market segments, demand for certified timber products outstrips supply (Bowyer 2004; ETTF 2011). Certified products also obtain higher prices, as described in Box 9. Altogether, this creates key incentives, through the potential revenue from exports, to green the wood manufacturing process and produce sustainable finished wooden products.

Box 9. Premium prices for FSC-certified wood and products

Processors, traders and businesses can benefit from higher prices for certified wood and products. Depending on the operation, price premiums for FSC-wood, particularly from the tropics, range from 15 to 25 per cent. For example, FSC-certified sawn hardwood exported to the UK by Malaysia's KPKKT (a timber management company and subsidiary of Golden Pharos) can fetch 30 per cent more than non-FSC certified products, according to Datuk Zakaria Awang, Chief Executive Officer at Golden Pharos. The practice of reduced impact logging at site – a form of sustainable forest management advocated by the FSC – also saves money for forest owners such as the Sabah Forestry Department, as they do not have to repair damage done to the forest from conventional logging.

Source: FSC (2012b)

As a result of the increased demand and potential for increased prices, the number of certified products has increased dramatically, thereby fuelling further demand. However, forest certification has several challenges in particular relating to credibility and integrity in ensuring that companies and the public can have confidence in the legality and sustainability of certified products. As a result, forest certification services work closely with national certification bodies and accreditation services, governments and NGOs to increase awareness of certification requirements, undertake training and organise calibration meetings for auditors (FSC 2012b).

In addition, direct and indirect costs for certification have to be covered which can be challenging for many small-scale economic operators. As a result, alternative approaches such as group certification,¹³ dual certification (e.g. FSC and FairTrade), and joint marketing for certified products are available or are being explored for both forest owners as well as for companies along the supply chain. These alternative approaches can enable many more small-scale producers to partially defray the costs of certification, while allowing them to take advantage of the export opportunities available from producing certified timber and manufacturing certified products.¹⁴

Key areas with increased demand for certified timber products include the construction sector where there is growing consumer demand for environmentally sustainable product choices for homes, office and other buildings. There is also growing demand in the further processing industry and the Do-It-Yourself market (PEFC 2011b).

It is expected that, in addition to the greening of the forestry sector, increasing technical capacity in developing countries, low wages, ample natural resources and policies directed towards value-added processing will continue to drive the shift towards exports from developing countries in processed wood products. Emerging economies such as Argentina, Brazil, Chile, China, Indonesia and South Africa can be expected to become increasingly significant world producers (WB 2008). In this connection, CoC certifications can constitute important methods to ensure environmental sustainability of SPWP.

Manufacturing opportunities also exist for recycled timber products. Recycled timber is commonly defined as "recovered wood that, prior to being supplied, had an end use as a stand-alone object or as part of a structure" (UWE n.d.). The recycled timber sector of the forest industry has grown considerably over the past several years as well as exports of recovered paper. There is potential for further expansion, however, particularly for exporting to growing markets in developed countries.

13. See for example, the FSC, who introduced group certification in 1998 at <http://www.fsc.org/special-options.167.htm>.

14. The concept of group certification has been popularised by PEFC, and it is estimated that more than a million smallholders are already certified by PEFC under the Group Certification concept. See PEFC (2012) for the latest version of international certifications.

Furthermore, greening of the wood manufacturing processes could enable industries in developing countries to bypass less efficient, more expensive or more polluting technologies. Such industries would move directly to more advanced technologies that could enable countries to produce goods at a lower price, thus providing a competitive advantage for exports.

In addition to market opportunities in the EU and the US, the rapid economic growth and rising incomes in Southeast Asia have driven an increase in timber consumption for infrastructure development, building construction and interiors and furniture manufacturing. At the same time, citizens of Southeast Asian countries are becoming more environmentally aware and are demanding the use of sustainable resources. This increased demand from emerging economies for sustainable forest products represents significant export opportunities for companies that adopt sustainable practices, as illustrated in Box 10.

Box 10. Growing demand in developing countries for certified products

China, in particular, has experienced a growing demand for certified wood products. As a result, the area of FSC certified forests in China increased by 54.8 per cent in 2011. This has been complemented by partnerships between NGOs like WWF, government entities, such as the State Forest Administration, and businesses like IKEA, home improvement retailer Kingfisher, and TetraPak. The FSC considers that this partnership strategy makes good business sense as it targets consumers in Asia's fast-expanding middle class.

The other key growth area in the Asia Pacific is domestic demand in the region. Awareness of the FSC label in Hong Kong, for example, doubled in 2011 to 29 per cent and is expected to rise further in the region with the introduction of more FSC-labelled products onto supermarket shelves. In Hong Kong, a number of different brands of office paper and tissue paper are already FSC-certified. There are also a number of paper products, such as posters, envelopes and calendars that feature the FSC product label. There are also more FSC wooden products in the market: FSC furniture is increasingly available and construction companies have started to choose FSC products, such as flooring and doors.

Other key Asia-Pacific markets are also showing growing market awareness of certified products. For example, FSC-labelled TetraPak and SIG packaging, as well as Kimberly Clark tissues and paper towel products, are now available in Australia, China, Hong Kong, Republic of Korea, Singapore, and Taiwan.

Source: FSC (2012b), WWF (2012)

Sustainable bioenergy opportunities

Several opportunities exist to make more effective use of other resources stemming from the forests sector, including the various co-products that are generated during wood processing. This involves, for example, using residues, such as black liquor and bark, from forest industries as a raw material or energy source (FAO 1990, UNECE 2011).

In addition, residues can be compressed into marketable forms such as wood pellets, a major component of the international wood energy trade, for which demand is increasing. Rising global demand is being spurred in part by the EU's target to meet at least 20 per cent of its total primary energy supply from renewable energy by 2020. Countries including Australia, Mozambique and South Africa are set to join the ranks of major wood pellet exporters (UNECE and FAO 2012). However, as set out in section 4.2.2, there are serious concerns as to the sustainability of biomass. Partly to address these concerns, certification programmes for sustainably sound wood pellets have been created (see Box 11 and section 4.3.1).

The growing pressure for more sustainably sourced biomass as well as potential future regulatory frameworks is likely to lead to more producers demanding products that meet sustainability certification. As a consequence, this may become a barrier to trade for companies in countries that have not yet developed formal sustainability standards for wood pellet production. Nonetheless, this also presents an opportunity for companies to gain a foothold in an export market that is likely to expand.

Box 11. Biomass energy exchange

Certification programmes for wood pellet quality and environmental stewardship are expected to be adopted widely. For example, in 2011, the APX-ENDEX (now ICE-ENDEX) energy exchange was launched in the EU, representing the world's first exchange for biomass renewable energy. All wood pellet contracts traded on the exchange are certified for sustainability with either the Green Gold Label (GGL) certification scheme, the Laborelec (2012)-SGS Solid Biomass Sustainability Scheme, or the Drax Power Limited Biomass Sustainability Implementation Process (2011).

Source: ICE-ENDEX website (2013)

4.4.2 Non-timber forest products

Trends show that international demand for NTFP as well as other biodiversity-based products has continued to increase. These recent trends can be attributed to a growing demand in developed countries and also among Asia's middle classes for natural and organic products in sectors such as cosmetics, pharmaceutical and foodstuffs.¹⁵ This demand is further stimulated by the wide variety of product uses available to the consumer, particularly for NTFP (see section 4.2.3), and the greater availability of products, particularly via the Internet.

Key indicators of the current state of the food and beverage market are the widespread use of:

- **Dietary supplements:** in the US, such products have proven to be recession-proof, as the older baby boomer generation has favoured them as a way to stay healthy, as an alternative or supplement to prescription drugs. Any dietary supplements that promise anti-ageing or age-reversing benefits are popular, particularly if the natural ingredients have scientifically documented beneficial activity (Kasterine and Hughes n.d.).
- **'Super foods':** products claiming to contain high volumes of antioxidants, polyphenols, vitamins and minerals, etc. are particularly popular among the younger generations. They represent a group with considerable discretionary income, and are more likely than previous generations to try new foods and drinks. Leatherhead Food International predicts the US functional food market will grow to about US\$ 8.61 billion by 2015, a 21 per cent increase from 2009 levels (Kasterine and Hughes n.d.).

International trade in NTFP is composed of imports and exports of numerous products at different stages of processing (FAO 2004). Modern industries are interested in NTFP because of their properties, as they can provide cheap and effective raw materials (which may substitute existing products) or because they can be marketed as 'exotic' products (FAO 1995). Several NTFP fit niche trading strategies, particularly those that have a long shelf life, a high per-unit value, and are simple to process, store and handle without major investments.

Nepal and Peru both have burgeoning export industries in NTFP, as set out in Boxes 12 and 13.

Box 12. Nepal – exports of medicinal and aromatic plants

About US\$ 10 million of medicinal and aromatic plants are exported from Nepal annually. The Nepal Trade Integration Strategy (2010) identifies medicinal herbs and essential oils as one of the 19 trade sectors with the highest potential for Nepal to develop.

A well-managed increased trade in medicinal and aromatic plants has the potential to help conserve Nepal's valuable biodiversity and address issues of rural unemployment and under-developed trade.

Source: ICIMOD 2012

15. According to Navitas (a marketer of Super Food Products) President, Zach Adelman, "[The] appetite for international food combined with the growing trend for healthier organic options is fuelling the popularity of organic 'power foods' from around the world..." (Navitas 2008).

Box 13. Peru – non-timber forests products and other opportunities

Peru's entire economy has experienced an unprecedented period of growth during the last few years, making it one of the fastest growing economies in the region. Underpinned by the country's political and economic stability, the combined exports of all industries climbed by 28 per cent in 2011 compared to 2010, to a record of US\$ 45.7 billion. Exports of alternative products such as biotrade have jumped higher than the average to 32 per cent compared to 2010, to a total of US\$ 10.2 billion.

Sector overview: Peru possesses one of the most important timber reserves in the world, with approximately 70 million hectares of forests located mainly in the Amazon regions. Forest goods and services have the potential to enable Peru's transition to a green economy. It is an industry that already generates jobs and income for the poor mainly from exports of timber and NTFP based on sustainable and ethical forest development practices. In the region of Madre de Dios alone, there are 864,778 hectares of Brazil nut trees, some of which provide a source of jobs and income for 750 families, including various indigenous communities (MINAM 2011). The country's total timber and NTFP exports for 2010 were approximately US\$ 500 million. The country has a competitive advantage in a number of forest sub-sectors such as wood craftsmanship, and the pulp and paper industry that, if sustainably exploited, could promote Peru's transition to a green economy. The Peruvian Fund for the Promotion of the Forest Development has found that forest businesses can have profit margins ranging from 40 to 300 per cent (FONDEBOSQUE 2010).

Trade opportunities: The area of FSC certified forest in Peru increased from zero in 2005 to 628,000 hectares in December 2008, distributed amongst eight relatively small forest concessions and indigenous communities (the largest is only 120,000 hectares).

There is now a major marketing drive to increase sales of FSC certified Peruvian wood in the European market (TTF n.d.). However, the level of certified timber in the country remains small, representing less than 10 per cent of the productive forest, which reflects trade potential in the sector. Nevertheless, the number of international companies, which require some form of certification within the value chain, is growing and Peruvian companies are increasingly working with sustainability standards such as FSC or the PEFC.

In addition, for Peruvian producers of NTFP, the market trend towards more natural and ecological products is an important incentive. The country has a unique product offering and a rich supply of natural resources that support various markets such as food, cosmetics and pharmaceuticals. Exports of NTFP represented US\$ 163 million in 2010. Products such as tara, algarrobos and brazil nut (representing almost 62 per cent of the total value of NTFP) are the main products traded in Peru's NTFP sector, generating jobs and increasing the production area. The camu-camu alone, a fruit rich in vitamin C from the Amazon forest, reached sales of US\$ 600,000 in 2010.

The global market also has a preference for products that are certified as socially responsible and environmentally friendly. Peruvian producers have taken advantage of this trend by participating in organic, fair trade, and other labelling schemes. This shift has resulted in greater financial benefits for those involved in the supply chain. Furthermore, a recent study by UNEP concluded that there is a high potential for scaling up biotrade in Peru (UNEP 2012).

The Peruvian government has made serious efforts to protect its natural resources and wildlife, while stimulating its forest industry through the allocation of concessions for sustainable forest management under Forestry Law 27308 of 2002.¹⁶

Ways forward: It has been estimated that the potential annual production of Peruvian Amazon raw timber is worth approximately US\$ 1 billion, while transformed timber could reach up to US\$ 5 billion, if favourable conditions are established (MINAM 2011).

Source: Yovita Ivanova, Pontifical Catholic University of Peru, Lecturer and Research Fellow in the Master Degree Programme in Biotrade and Sustainable Development

Another way to add value to NTFP is by the commercial development of products from naturally occurring species. One example would be non-wood products derived from the shea tree such as shea nuts and butter (Master et al. 2004). Thus, NTFP can be an important source of income for developing countries, such as Brazil, as illustrated in Box 14.

¹⁶ The Forestry Law 27308 of 2002 provides for 25 per cent discounts for companies operating under sustainability standards.

Box 14. Non-timber forest products in the Amazon

The third-largest market for *natural* cosmetic products is Brazil where the market for natural cosmetics has been growing at double-digit levels. Growth is not surprising as there is already a culturally-ingrained acceptance of herbs and plants as well as a large and growing middle-class which has the financial ability to purchase such products (Mills 2010).

A Brazilian cosmetics company, Natura, for example, adopted the sustainable use of biodiversity as a key driver of innovation. The company has developed vegetable alternatives to petrochemical raw materials, which enable them to reduce their carbon footprint and create a new product line based on the sustainable use of biodiversity. Their Ekos product line now accounts for a substantial share of the company's sales.

Certified non-timber forest products

Certification can be used to verify that NTFP or other biodiversity-based products adhere to well-defined environmental and social criteria. This offers significant advantages to producers, especially small producers, of these products in international markets. Certification is particularly important because of the smaller quantities needed to supply international trade, when compared to agriculture-based production, and also because of the potential existence of premium prices which can then be offered to producers (Vantomme 2004, as cited in Vincenti et al. 2004).

Box 15. Argan in Morocco – a voluntary benefit-sharing programme

Argan fruit collected from Morocco is the base product for several European cosmetic producers distributed internationally. Currently, in the absence of the entry into effect of the Nagoya Protocol (see section 4.3.3), the institutional partnership along the supply chain of argan cosmetic oil is based on a voluntary benefit-sharing programme, which offers producers shared ownership and payments above market price, based on EcoCert Fair Trade certification rules.

Since 2008, a partnership has been established among Laboratoires Serobiologiques, L'Oreal, the NGO Yamana, and their partners in Morocco – the Targanine cooperatives based in Agadir. Targanine cooperatives supply argan oil and related argan products (e.g. pressed oil cake and argan leaves) to Laboratoires Serobiologiques under fair trade arrangements of product pre-payment (e.g. a 2-year contract for the supply of oil) agreed prices, and a premium price paid (e.g. a 5 per cent premium paid for oil at the end of 2010). L'Oreal receives the processed products, then incorporates them in some cosmetic products that are sold internationally. Yamana cooperatives in Morocco help to ensure that local stakeholder expectations are taken into consideration. Some of the most notable aspects of the supply chain include:

- Purchase of products are specifically from Targanine cooperatives with the purpose of providing not only employment, but also shared ownership in the cooperative and shared decision-making.
- The cost structure of argan oil was assessed to make sure that payment each year has been above market price since 2008 when EcoCert Fair Trade certification was achieved.
- Introduction by Laboratoires Serobiologiques of co-products utilises pressed cake and argan leaves for subsequent use in L'Oreal cosmetics.
- The social fund of each Targanine cooperative noted above receives 50 per cent of the pressed cake payment. It has been spent on eye glasses, literacy programmes, basic hygiene products, etc.
- The partnership enabled the cooperatives to maintain their EcoCert certified organic compliance.
- A traceability programme developed by EIG Targanine and Yamana is in place to ensure that products collected or purchased are organic. There is also a programme to monitor social fund expenditure to ensure that purchases made from it are those agreed upon by the cooperative.

Source: Robinson and Defrenne 2011; Croitoru and Liagre 2013

NTFP are more difficult to certify than wood due to their social and ecological complexity. However, in some instances, NTFP that are found in international markets may be eligible for certification (Burgener and Walter 2007).

Certification requires that producers have the technical sophistication for proper management planning, monitoring, and product tracing and marketing. The level of sophistication required and the associated costs may prevent many NTFP harvesters in developing regions from participating in certification initiatives. They may need sustained technical and financial assistance. The scope for certification of NTFP is, therefore, mostly limited to more developed and internationally traded products that have the financial incentive to develop or apply certification criteria (Burgener and Walter 2007).

Since certified NTFP are not currently widespread, it is difficult to contrast the opportunities available to certified NTFP, as opposed to non-certified NTFP. As consumers become more informed, it is likely that a growing number will opt for products where there are clear guarantees that the production methods employed are environmentally friendly and/or socially equitable. Thus, although in the short term certified NTFP are likely to remain a small niche market, it is a market that is likely to grow.

4.4.3 Agroforestry commodities

Another key export opportunity for developing countries is represented by trade in agroforestry commodities. Some countries, such as Sri Lanka, have undergone a significant change in the composition of agricultural exports from major plantation crops to non-traditional tree crops such as spices, fruits and timber. These mainly originate from small-holder agroforestry systems. In Sri Lanka, further development of supply chain for products that are competitive in the world market could enable small-holder farmers to reap the economic benefits from agroforestry systems and would make such systems economically viable (Thamiam et al. 2011). Box 16 describes a certified agroforestry export commodity.

Box 16. Rainforest Alliance certified cocoa

Farmed on 7.5 million hectares of tropical land, cocoa (*Theobroma cacao*) provides a means of livelihood to an estimated 40 million people worldwide, including five million farmers. Most of these are smallholders, labourers and employees in processing factories. Like coffee, cocoa can be cultivated under the shade of native canopy trees and maintain a landscape similar to a natural forest. This helps conserve the habitat of threatened plant and animal species, protect natural pollinators and predators of cocoa pests and create biological corridors that maintain large-scale ecological and evolutionary processes.

Shade trees in an agroforestry system often include other species of economic value which can reduce risks connected with growing a single crop. In this respect, the Rainforest Alliance, in partnership with cocoa and chocolate companies, public institutions, local organisations and farmer associations, encourages cocoa-farming practices that are sustainable over the long term and maintain a healthy environment and decent working conditions.

Source: Rainforest Alliance 2012

4.4.4 Deforestation-free products

Deforestation-free products – i.e. products that have been produced sustainably without destroying precious woodland¹⁷ – represent an emerging export opportunity for economic operators in developing countries. Depending on the particular circumstances and country, these products can include wood-based products, NTFP and agroforestry commodities.

Certification programmes, such as the FSC and PEFC, discussed earlier in this chapter, and the Roundtable on Sustainable Palm Oil (RSPO), represent the best options to ensure that marketed products have not caused rainforest clearance or destruction. However, such programmes do not always definitively prohibit logging from primary forests (Elias et al. 2012). An alternative or additional scheme is the Deforestation-Free seal

17. See: http://adpartners.org/initiatives_DFseal.html

that is being pioneered by the Avoided Deforestation Partners and which was launched at Rio+20. Thus, in the future, certification under this scheme may be an additional way for economic operators to address growing consumer demand for sustainable products from forests.

As with all products, economic operators that commit to zero deforestation have to develop transparent supply chains and maintain good relationships with suppliers. Economic operators can only be assured that their goods and services have minimal forest and carbon footprints if they have a working knowledge of supply chains and producers that enable them to know the source of their products and ingredients. Furthermore, deforestation-free goods and sourcing policies enable customers to become more aware of sustainability issues, and allows companies to be recognised by other companies up the supply chain and, ultimately, by end consumers (Elias et al. 2012).

Box 17. TFT brokers agreement to end destructive practices

TFT (formerly the Tropical Forest Trust) aims to link businesses to well-managed tropical forests and introduce systems to verify that illegal wood is excluded from their supply chains. Most notably, TFT has shaped “no deforestation” policies for Nestlé and the world’s second-largest palm oil producer, Golden Agri-Resources.

In February 2013, the Asia Pulp and Paper Group (APP) announced an immediate end to all natural forest clearing in its supply chains in Indonesia, in an agreement brokered by TFT. According to Scott Poynton, the Executive Director of TFT, “APP’s commitments are far-reaching... APP’s commitments show other producers worldwide – whether they sell pulp and paper, palm oil, soy, or beef – that it is possible to run a business without destroying humanity’s habitat”.

Source: TFT 2013

4.4.5 Selling forest credits on regulatory or compliance markets

Developing countries could benefit from opportunities to trade and sell forest credits nationally or internationally. In order to attract and increase public and private investment in forests and reward sustainable forest management, several regulatory and voluntary markets have been established. Regulatory markets include countries, states and organisations that are obligated to reduce their GHG emissions as a result of a binding regulatory framework. In contrast, voluntary markets include all forest credits that are driven by organisations or individuals voluntarily seeking to offset their carbon footprint or by those buyers looking to benefit from higher future prices (UNEP 2011c). Some of the most relevant examples are:

- The Clean Development Mechanism (CDM) under the Kyoto Protocol to the UNFCCC enables afforestation and reforestation projects to earn carbon credits called certified emission reductions (CERs). CERs can be traded and sold, and used by industrialised countries to meet part of their reduction targets under the Kyoto Protocol.¹⁸ Due to the complexity of demonstrating additionality and permanence, and of preventing leakage of emissions at project scales, very few afforestation and reforestation CDM projects have been successfully registered by the CDM executive board. The first afforestation/reforestation project was registered in the CDM in November 2006, and it was not until 2009 that the second project was registered. Since that time, there have been small but steady streams of afforestation and reforestation project registrations: ten in 2009, and seven in 2010. Since 2011, 22 new projects have been registered (UNEP and FAO 2012; Peters-Stanley et al. 2012).
- New Zealand’s carbon emissions trading scheme has included forest carbon credits since its inception in 2008. However, only credits from domestic activities are included.
- The Californian emissions trading scheme is the first cap-and-trade system which will allow international forestry credits to be eligible for trading. It is estimated that demand for up to 74 million tonnes of CO₂ equivalent could be created from 2012 to 2020 (TFG 2010), although the exact specifics of the scheme that relate to forestry are still being developed.

18. Due to many countries’ concern that the inclusion of afforestation and reforestation projects into the international carbon market may create loopholes and allow developed countries to very easily “pay off” their emissions instead of effectively reducing the source of pollution, only 1% of a country’s emissions can be generated from sink projects.

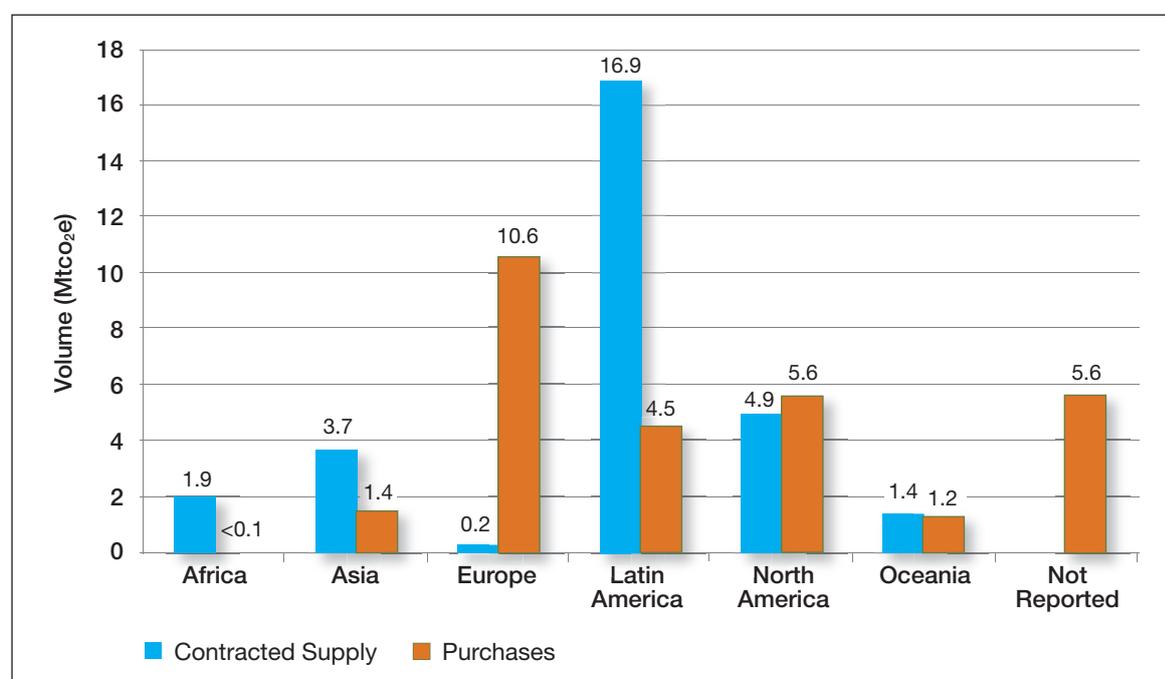
- Afforestation and reforestation and demonstration projects, which may be in the context of national REDD+ Programmes, as well as improved forest management activities, are eligible under various voluntary market standards (UNEP 2011c).
- The new Brazilian forest code (LEI N° 12.651, DE 25 DE MAIO DE 2012) obliges landowners to set aside a share of their land for conservation. Those landowners that do not comply with these provisions must purchase forest offsets from landowners who have set aside more land than required.

Voluntary standards are constantly being developed and these vary in their focus. The Climate, Community and Biodiversity Alliance (CCBA) standard, for example, was developed to support sustainable development and biodiversity conservation. The Verified Carbon Standard (VCS) offers a widely-accepted standard for the voluntary carbon market that is arguably more focused on the integrity of the emissions reductions produced.

The value of global transactions of carbon credits derived from forestry projects rose 34 per cent year-on-year to US\$ 237 million in 2011. According to a report by Ecosystem Marketplace, this is because developers secured high prices for their credits, mostly on the domestic Australian market, even though traded volume of forest credits fell by 20 per cent (to 26 million from 33 million in 2010). Furthermore, more than 90 per cent of trade volumes occurred in the voluntary over-the-counter market.

As demand for forest carbon credits on regulatory markets is still low, investment by private companies and financial institutions is still at an early stage (UNEP 2011c). Nevertheless, in 2010, more than half of the trade volume of forest carbon credits was provided by Latin America, most of which came from 28 forest projects in Peru and Brazil. In 2011, the region reported the highest concentration of projects (Peters-Stanley et al. 2012). In 2011, however, India sequestered the most in CO₂ with 239,000 tonnes (UNECE and FAO 2012). Currently, Africa has not been significantly involved in such markets. Buyers from Europe and the US have in the past dominated the market. Figure 6 provides an overview of buyers and supply in 2010.

Figure 6. Locations of buyers and supply contracted in 2010 (primary market only)



Source: Diaz et al. 2011

However, there is a growing trend in the regions of Oceania, Asia and Latin America, of buying forest carbon credits from their own and neighbouring countries. The portfolio of buyers within regions has diversified as well. While non-profit conservation organisations were involved in the early stages of development, the private sector is increasingly more active. Financial firms such as BNP Paribas and Gazprom Marketing

and Trading have now started to seize emerging opportunities. These developments in the voluntary market are driven by environmental concerns and, in part, by the anticipation of a future regulatory market with an emissions reduction commitment (EcoSecurities 2010).

Thus, market opportunities in both regulatory and voluntary markets exist and may grow if REDD+ is included in the international climate regime. Furthermore, the growing number of countries and provinces adopting cap-and-trade regulations may provide future export opportunities for developing countries, even in the absence of an international agreement. Australia's Parliament passed, on 26 November 2012, legislation implementing key changes to Australia's Carbon Pricing Mechanism (CPM). This establishes a linking arrangement with the EU Emissions Trading System. In Quebec, Canada, the first compliance period of a cap-and-trade scheme began on 1 January 2013. Canada plans to link this scheme to the Californian market. In a similar move, in April 2012, Mexico and the Republic of Korea passed climate bills laying the foundation for future cap-and-trade systems. China is also developing some pilot regional cap-and-trade programmes that may lead to a nationwide scheme (WB 2012).

The establishment of carbon credit markets is not without risks. The potential impacts on forest ecosystems and the communities dependent on these ecosystems have to be assessed carefully and safeguards implemented and respected in order to avoid abuse (UNEP 2011a). Certain enabling conditions are also necessary for developing countries to seize REDD+ opportunities.

According to data from Ecosystem Marketplace (2011), the "most successful forest carbon projects have focused on projects where legal environments are relatively stable and ownership and land tenure are clear" (Peters-Stanley et al. 2012). The clarification of land rights is therefore a precondition for improved forest governance and potential trade benefits. Other factors include the general investment climate and the country's emission-reduction potential (UNECE and FAO 2012).

In addition to the trade opportunities which forest carbon markets may provide for developing countries, REDD+ may be a catalyst to the transition of the forest sector towards a green economy (Sukhdev et al. 2011). For instance, REDD+ activities in Brazil have already opened new opportunities for NTFP management in the Amazon which creates jobs and contributes to poverty reduction (see Box 18). Similarly, the Kasigau Corridor REDD+ project in Kenya, described in Box 19, is a pioneering example of a project that has already benefited from the international investment and the sale of carbon credits.

Box 18. Brazil nut trade opportunities and REDD+

In Madre de Dios, BAM (Bosques Amazónicos S.A.C.) is working with the local Brazil nut producers' federation to promote sustainable management of Brazil nut concessions, which face threats of illegal logging and forest fires, largely because of the development of the Interoceanic Highway through this Brazil nut-producing area. The BAM REDD+ project intends to increase the economic value of these Brazil nut-rich forests by installing a local nut processing plant and helping harvesters develop secondary products, such as Brazil nut oil and soap.

Additionally, BAM intends to enhance local governance through participatory forest monitoring and building the capacity of the local Brazil nut producers' federation to promote forest conservation. This experience is an example of potential ways to bolster the promised conservation and livelihood benefits of NTFP through linking their management to emerging markets for environmental services on a broader scale. It is yet to be seen whether such synergies can actually be achieved.¹⁹

Source: CIFOR 2012

¹⁹ Example based on NON-WOOD NEWS of the FAO: An information bulletin on Non-Wood Forest Products. No. 24 May 2012.

Box 19. Kenya – Kasigau Corridor REDD+ project

The Kasigau Corridor REDD+ project is a pioneering example of a project that has already benefited from the international investment and sale of forest carbon credits. Kasigau is situated in the Taita Taveta District of Kenya, between the Tsavo East and Tsavo West national parks. The area primarily consists of low density forestland, shrub land and grassland savannah which provides habitat for five threatened or vulnerable mammal species: elephant, cheetah, lion, African hunting dog and Grevy's zebra.

The Kasigau project focuses on preventing further loss of tropical forest in 13 blocks of land owned by Indigenous Community Ownership Groups. The landscape has been deforested and degraded with increasing intensity since the late 1980s when growing population pressure caused initial degradation due to charcoal production; deforestation increased as the land was converted to agriculture.

Wildlife Works, a project developer, has been working in the area since 1997. Its current project includes activities, ranging from agroforestry to physically protecting the forest using unarmed rangers to addressing GHG emissions associated with changes in land use. These activities led to the issuing of carbon credits but there is also a significant focus on creating local sustainable development opportunities and protecting valuable ecosystems.

Trade opportunities: The Kasigau project was the first REDD+ project globally to gain the Verified Carbon Standard validation for its carbon credits. It has also been validated to the gold level of the Climate, Community and Biodiversity Standard. These two standards have helped attract investment, as they are generally perceived to be among the higher quality standards currently available for forest carbon credits.

These standards have helped Wildlife Works sign a number of deals with international organisations for the carbon credits generated from Kasigau. The Nedbank Group of South Africa was an early investor with a multi-million dollar purchase (FCP 2011), while BNP Paribas of France signed a deal that is potentially worth up to US\$ 50 million (Ecosystem Marketplace 2010).

Ways forward: There are a large number of factors that make predicting future trade opportunities for REDD+ challenging. Factors at a variety of scales will determine the opportunities. At the country level, for example, a specific set of enabling conditions are required to attract investment; in the case of forest carbon, these can include resolving thorny land tenure issues and establishing the legal status of carbon credits in forest countries. At the international level, a key element that needs to be addressed is the creation of large-scale demand for emission reductions. This might be generated from a number of sources such as through bi- or multilateral results-based deals between countries.

Source: Iain Henderson, UNEP Finance Initiative (FI)

4.4.6 Forest recreation and tourism

The tourism sector offers great potential for trade opportunities. For information regarding ecotourism and agrotourism, refer to the Tourism chapter of this report.

4.5 Enabling conditions

The following sub-sections outline the main categories of policy tools that governments may use to harness trade opportunities that arise from the transition to a green economy assessed in the previous section. It is worth noting that green economy strategies and ambitions vary significantly based on a country's circumstances, national endowments as well as political and economic conditions. The mix of policy tools, and the timeframes for their implementation, will consequently vary from one country to another. The lists below offers concrete suggestions for actions from governments, the private sector, and other stakeholders to create enabling conditions conducive to creating and taking advantage of existing and potential trade opportunities that arise from or are associated with a transition to a greener economy.

4.5.1 Public investment and spending

- **Invest in sustainable forest management.** Mobilisation of green investments by governments, the private sector, and local and regional communities is critical in order to effectively transition

to a green economy in forestry and benefit from export demand for sustainable products and services. Investment in sustainable forest management can target conserving existing areas of primary forest, promoting expansion of forests through regeneration and reforestation, expanding plantation forests for the sustainable production of wood and non-wood products, improving forest management in existing forests of different types and increasing the number of agroforestry systems. Investing in financing schemes by lowering the basic costs of doing green business and leveraging private finance can also benefit green forestry (UNEP 2011d). Some broad categories of green private and public investments can be distinguished for the main forest types, as illustrated in Figure 7.

Figure 7. Green investment categories for main forest types

Forest type	Investment	
	Private	Public
Primary forest	Ecotourism development	Create new, well managed protected areas, ensuring participation of and benefits to local communities
	Private nature reserves	Improve management of protected areas and enforcement of legislation
	Pay landowners to protect watershed	Pay forest landholders to conserve forests
		Buy out logging concessions
Natural modified forest	Reduced impact logging and other forest management improvements	Create incentives for improved forest management
	Certification to sustainable forest management standards	Support establishment and promotion of certification systems
		Stop illegal logging
Planted forest	Reforestation and afforestation for production	Create incentives for reforestation/afforestation
	Improved management of planted forests	Incentives to improve management, including certification of plantation management (due to high risk pesticides, erosion, GMOs, worker abuse, land rights conflicts, etc.)
		Reforestation to protect ecological functions
Agroforestry	Extend the area with agroforestry systems	Incentives to landholders
	Improve management of agroforestry systems	Create incentives to improve management and increase technical assistance

Source: UNEP 2011a

- **Provide information on export opportunities and promotion of certified products.** Identification of new export opportunities in certified timber and NTFP requires a review of production methods, in order to ascertain if they are already close to meeting the criteria for certified products. In addition, analysis of capability and capacity to produce new certifiable

products is required. At the same time, this would provide producers with up-to-date information on forest certification in order to understand its use for sustainable forest production and trade, market access and product promotion.

- **Develop and maintain a presence in export markets for deforestation-free agricultural commodities and NTFP.** In order to increase the chances of producers succeeding in export markets, efforts should be made to attain a strong presence in such markets. Investment in areas such as sales, marketing, warehousing, and technical support are vital. In the absence of warehousing or sales and marketing operations, strategic relationships with well-positioned companies inside the target markets can promote trade in sustainable products (for example, by granting such companies rights to distribute in the target markets their brand of natural ingredients).
- **Invest in research and development in NTFP.** Public investment is required to increase R&D in NTFP. This can support their use as sustainable ingredients in industries such as pharmaceuticals, cosmetics, agriculture, food additives, industrial enzymes, bio-pesticides and personal care.
- **Increase public awareness.** Increased emphasis should be placed by all countries on the importance of public awareness and education initiatives to provide a better understanding of the values that forests provide, and to drive and respond to consumer demand for sustainable food and products. Investments in consumer-orientated programmes that focus on nutritional health and the environmental and social equity implications of dietary behaviours could further encourage existing local and global demand for sustainably produced food and products.

4.5.2 Subsidy reform and market-based instruments

- **Adopt fiscal and economic policies to minimise and eliminate harmful subsidies, and to encourage a sustainable forestry industry.** Focusing on the implementation of smart subsidies and taxes discourages the destruction of forest resources, while encouraging the transition to a green economy in forestry. Governments should eliminate existing subsidies to unsustainable and inefficient forestry practices. New policies that incentivise sustainable forestry should be implemented such as tax credits for reforestation/afforestation activities (UNEP 2011b).
- **Use new and innovative market-based sources of finance.** Market-based programmes are being developed in many countries, including PES schemes, ecotourism, greening commodities and incentives for non-carbon benefits under REDD+. Many of the innovative financing mechanisms require policies that recognise and value the vital environmental services that forests provide. These financing mechanisms also require broader enabling frameworks that ensure reinvestment of monetary benefits back into the forest sector (UNFF 2012).
- **Create public-private partnerships and advanced market commitments.** Public advanced market commitments can decrease the market related risks and ensure the private sector investor a minimum demand and price for services and new products such as forest emission reductions or products developed from genetic resources. This in return can drive new and additional investments in delivering forest services and products for which the market has not yet fully developed. Such partnerships have successfully been used for e.g. the development of vaccines (Edwards 2010).

4.5.3 National regulatory frameworks

- **Improve governance and law enforcement.** Proper governance can decrease considerably the trade in illegal logging and reduce deforestation caused by agricultural clearance and unsustainable aquaculture. Sustainably produced wood products cannot compete with large volumes of like products that are produced illegally or unsustainably, or that take advantage of low production costs, unreported taxes, royalties and unfair prices. At the international level, the UN Non-Legally Binding Instrument on All Types of Forests (UN 2007) provides a multilateral framework to address such issues as policy and legal frameworks that protect community rights over resources; access and proximity to markets; expertise and access to information, especially on markets and prices; and institutional capacity to manage resources, add value to products and services and negotiate with other players (FAO 2005b). However, this needs to be implemented by states (UN 2012, paragraph 194). Initiatives such as the EU FLEGT

action plan are expected to drive further demand for sustainable products. They can make a significant contribution to the promotion of a green economy as legality and sustainability often go hand in hand.

- **Improve testing, processing, marketing and trade of NTFP.** Private enterprises and the government need to adopt international standards to enable NTFP trade to meet sanitary, phytosanitary and other requirements of importing countries. This involves establishing testing laboratories and certification facilities of international standards (FAO 2001).
- **Develop a national strategic forest action plan and a vision of how forests can contribute to sustainable development.** National dialogues that identify areas that undermine a green economy transition and address spending constraints are likely to provide a national roadmap for investing in forests. Clarity on land ownership, benefit sharing mechanisms, acquisition and transfer of forest carbon assets and rights will go a long way in ensuring this process is accessible and acceptable (UNEP 2011b).
- **Implement green government procurement and green building initiatives.** Public procurement policies can require the use of legal and sustainable timber for all government contracts, and promote the harmonisation of technical specifications as well as their implementation and enforcement. Government building standards can also be used to stimulate the use of legal and sustainable building materials. The same recommendations are applicable to private procurement policies.

4.5.4 International frameworks

- **Work towards developing common standards and methodologies of monitoring, reporting and verification.** A key tool in this process is likely to be Global Forest Watch (GFW) 2.0, due to launch in 2013. GFW 2.0 is a near real-time forest monitoring system that aims to combat deforestation by sharing data and uniting satellite technology and human networks around the world. GFW 2.0 will also enable buyers of sustainably sourced commodities – such as certified timber, palm oil, soya and beef – to confirm adherence to or violations of supplier commitments to “deforestation-free,” “no clearing of high conservation value forest,” and related criteria.²⁰
- **Negotiate rules to permit the stacking of biodiversity and carbon credits.** Given the high values of timber and alternate land uses (e.g. for palm oil, soil or cattle) in many tropical regions, initiatives such as REDD+ have the potential to revolutionise the planning and management of tropical landscapes and to facilitate timely action that jointly addresses rapid climate change, livelihoods and biodiversity loss. REDD+ payments for carbon credits alone, however, may not result in optimum forest management practices. The stacking of multiple markets or incentive schemes could help achieve biodiversity, adaptation and resilience benefits under REDD+. Ideally, the implementation of a REDD+ mechanism, potentially under the umbrella of the UNFCCC, would provide investors with more legal certainty.
- **Reduce trade barriers on NTFP and deforestation-free agricultural commodities.** At the level of international trade, NTFP face both tariff and non-tariff trade barriers. The nature of these barriers varies from country to country and from product to product. Excessive tariff rates can be counter-productive as they may encourage illegal trade in products in order to avoid levies (Burgener and Walter 2007). Clarifications are required, depending on the various types of certification systems applicable to NTFP and how they may facilitate access to various markets (FAO 2001).
- **Encourage international finance for sustainable forest management.** It is important to mobilise green investments internationally, as well as nationally. New international investors are often institutional investors such as pension funds and Timber Investment and Management Organizations that invest mostly in pine, eucalyptus and teak plantations in order to sell wood in the open market. These investments are relatively easily identified and quantified, given the magnitude of resources involved. Also, during recent years, forest carbon and forests’ contribution to climate change mitigation and adaptation have been some of the main driving forces behind financing climate change forest-based activities. At the global level, institutions such as GEF, World Bank, UN-REDD, and REDD+ Partnership are active in this process

20. See further: <http://www.wri.org/gfw2>

(UNFF 2012).

- **Promote international cooperation, partnerships and information exchange regarding forest biodiversity.** In this context, the Strategic Plan for Biodiversity 2011-2020, including the Aichi Biodiversity Targets, is playing a significant role in encouraging active involvement of all stakeholders in the conservation and sustainable use of biodiversity. The Nagoya Protocol on Access and Benefit-sharing is promoting access to fair and equitable sharing of benefits arising from the utilisation of genetic resources, with the vision of living in harmony with nature (UN 2012, paragraph 202). These agreements are enabling developing countries to benefit economically with trade from the genetic biodiversity that exists within their forest ecosystems.

4.5.5 Enhancing dialogue and capacity building

- **Promote cooperation and information exchange through value chains from primary producer to end consumer.** There is a need to engage directly with communities and other stakeholders in the value chain of wood products and NTFP, to jointly identify criteria of success and discuss the trade-offs that might be needed (Marshall et al. 2006). In particular, it is essential to include community management of forest resources into any NTFP development programme (FAO 2001). Bringing together private sector operators and policy makers, such as the Global Forest & Trade Network in connection with US and EU timber procurement policies, can increase transparency and cultivate trust between the different stakeholders. In turn, this is likely to provide a better framework throughout the supply chain for the production and export of sustainable forest products and services.
- **Promote and build capacity for certification, tracking and licensing.** Technical assistance with certification and financial support will enable increased participation in international markets for certified products. This needs to include building know-how to apply proven marketing strategies and practices in local situations including green marketing in the low-carbon economy, branding and ethical/fair trade tools.
- **Enable exports to meet regulations in international markets.** Capacity building would enable domestic firms to understand the requirements of complex regulations in order to identify market potential to adapt their technologies as required.²¹
- **Ensure greater use of forest trade statistics.** Policymakers and the private sector would gain from a more extensive coverage and a structured interpretation of forest products trade statistics as well as a higher degree of market transparency supporting forest decision making (FAO 2012b).

This chapter highlights the trends, challenges and opportunities presented to the forests sector by a transition to a green economy. It also examines increased pressures on declining forest resources and ways in which to avert or stop illegal logging and forest degradation, and the growing potential for sustainable trade and development.

This chapter illustrates, further, how trade in sustainable forest goods and services is increasingly influenced by national policies, international processes and voluntary procurement practices, which in turn are creating market opportunities for producers and traders. These include growing and potential export opportunities for certified wood and wood-based products, NTFP, agroforestry commodities and deforestation-free products. Beyond carbon, a green economy also presents opportunities for increased trade in ecosystem services as the flow and contributions to various value-chains are increasingly understood as input factors and included in risk management decision-making.

For these trade opportunities to fully materialise, many challenges need to be overcome. Attracting finance and meeting standards in export markets remains difficult for producers and economic operators in developing countries. The cost and know-how needed for achieving compliance with certification requirements can act as a barrier for more sustainable trade. In addition, sustainable forest management depends heavily upon capital investments and R&D, which in turn rely also on the availability of skilled human resources. Reducing trade barriers for NTFP and deforestation-free commodities would also encourage more sustainable trade, as

21. As well as certification requirements, this can also encompass voluntary industry standards, for example, the European Panel Federation (EPF)'s Industry Standard for delivery conditions of recycled wood, which provides chemical limit values.

would enhanced cooperation through value chains, from primary producer to end consumer, in order to meet growing demand in domestic and international markets.

Currently, sustainable forest products occupy a small share of the global market as it is often difficult to differentiate between products that are produced in a sustainable manner and those from unsustainable operations, and consumers can be reluctant to pay a premium. However, this is likely to change gradually with increasing transparency in the forest sector and the rise in demand for forest services and certified forest products that originate from sustainably managed forests in both developed and developing countries.

4.6 Further resources

4.6.1 Websites for additional information

Green Economy Report, Forests Chapter:

http://www.unep.org/greeneconomy/Portals/88/documents/ger/5.0_Forests.pdf

UNEP and forests:

<http://www.unep.org/forests/>

UNEP Capacity building for biotrade:

<http://www.unep-unctad.org/cbtf/biotrade.asp>

TEEB - The Economics of Ecosystems and Biodiversity:

<http://www.teebweb.org>

Convention on International Trade in Endangered Species of Wild Fauna and Flora:

<http://www.cites.org/eng/prog/ndf/index.shtml>

UN-REDD programme:

<http://www.un-redd.org/>

FAO and non-wood forest products:

<http://www.fao.org/forestry/NTFP/en/>

The Action Plan for the Forest Sector in a Green Economy, prepared under the auspices of the UNECE Timber Committee and the FAO European Forestry Commission:

http://www.unece.org/fileadmin/DAM/timber/meetings/20121015/ECE_TIM_2012_10_E_Action_Plan.pdf

Global Forest Resources Assessments (FRA):

<http://www.fao.org/forestry/fra/en/>

IFOAM basic standards for organic production and processing:

<http://www.ifoam.org/sub/faq.html>

EC FLEGT Action Plan:

http://ec.europa.eu/environment/forests/illegal_logging.htm

Information portal on FLEGT and particularly Voluntary Partnership Agreements, maintained by EFI's EU FLEGT Facility:

<http://www.euflegt.efi.int>

Information portal on REDD+, maintained by EFI's EU REDD Facility:

<http://www.euredd.efi.int>

PEFC:

<http://www.pefc.org/>

FSC:

<http://www.fsc.org/>

FSC online database – a method to find certificates and certified forest products:

<http://info.fsc.org/>

Rainforest Alliance:

<http://www.rainforest-alliance.org/>

Non-Timber Forest Products Exchange Programme for South and Southeast Asia:

<http://www.ntfp.org/>

Bolsa Amazonia – a regional programme operating in Bolivia, Brazil, Columbia, Ecuador and Venezuela aimed at the commercialisation of sustainable Amazonian products by involving rural communities:
<http://www.bolsaamazonia.com.br/indexi.asp>

FairWild Foundation. Certification Guidance for Industry: Frequently Asked Questions on Costs, Fees, Funds, and Pricing:
<http://www.fairwild.org/certification-overview>

International Green Construction Code (IGCC), available on a commercial basis:
<http://shop.iccsafe.org/2012-international-green-construction-codetm-igcctm-1.html>

PhytoTrade – promotes sustainable production and fair trade, aiming to contribute to the economic development of southern African countries:
<http://www.phyotradafrica.com/index.html>

Sustainable forest management criteria by the International Tropical Timber Organisation (ITTO):
http://www.itto.int/policypapers_guidelines

Sustainable Procurement of Wood and Paper-based Products (WBCSD Forest Solutions, World Resources Institute):
http://www.sustainableforestproducts.org/files/forestguide/FULL%20Forest%20Products%20Procurement%20Guide1212_En_low_rez4.pdf

Leveraging the Landscape: State of the Forest Carbon Market. Forest Carbon Portal:
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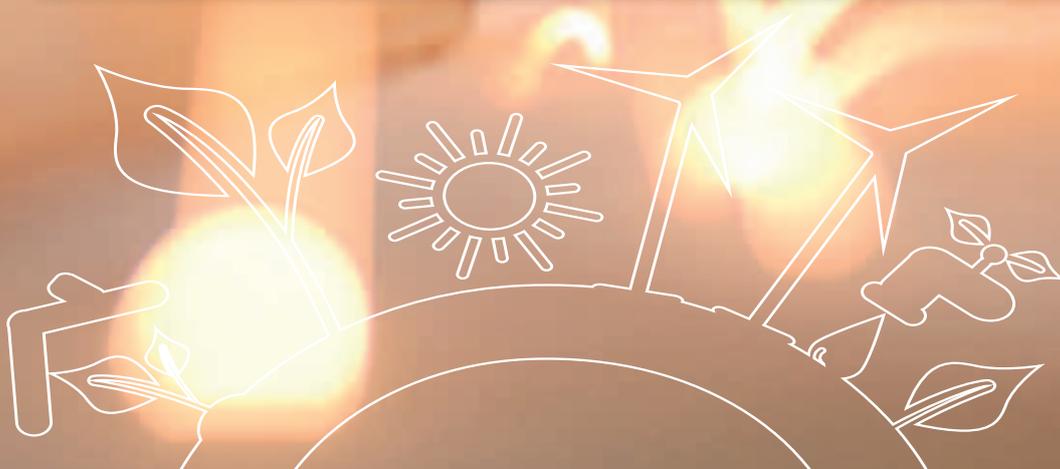
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Manufacturing



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Acronyms

APEC	Asia-Pacific Economic Cooperation
BAU	Business-as-usual
COMESA	Common Market for Eastern and Southern Africa
CSR	Corporate Social Responsibility
EAC	East African Community
EC	European Commission
EGS	Environmental Goods and Services
ETAD	Ecological and Toxicological Association of Dyes and Organic Pigments Manufacturers
EMS	Environmental management systems
EU	European Union
GCO	Global Chemicals Outlook
GDP	Gross Domestic Product
GER	Green Economy Report
GHG	Greenhouse gas
GOTS	Global Organic Textile Standard
GRI	Global Reporting Initiative
ICT	Information and communication technology
IEA	International Energy Agency
IGPN	International Green Purchasing Network
IISD	International Institute for Sustainable Development
IPM	Integrated pest management
IRP	International Resource Panel
ISO	International Organization for Standardization
MVA	Market Value Added
MW	Megawatt
NCPC	National Cleaner Production Center
NDRC	National Development and Reform Commission
NTB	Non-tariff barrier
OECD	Organisation for Economic Co-operation and Development
RSL	Restricted Substance List
RTA	Regional Trade Agreement
SADC	Southern African Development Community
SAICM	Strategic Approach to International Chemicals Management
SCP	Sustainable Consumption and Production
SME	Small and medium-sized enterprise
TEEB	The Economics of Ecosystems and Biodiversity
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
UNEP	United Nations Environment Programme
UNGP	United Nations Global Compact
UNIDO	United Nations Industrial Development Organization
WBCSD	World Business Council for Sustainable Development
WTO	World Trade Organization

5 Manufacturing

5.1 Introduction

The Rio+20 Conference set out a basis for governments and industry to move towards greener manufacturing. In particular, world leaders reaffirmed that promoting sustainable patterns of consumption and production is one of the overarching objectives of sustainable development. They also reiterated that fundamental changes in the way societies consume and produce are indispensable for achieving global sustainable development.

Countries at Rio+20 strengthened their commitment towards accelerating this shift with the adoption of the 10-Year Framework of Programmes on Sustainable Consumption and Production (10YFP)¹ (UN 2012, paragraph 226). The Rio+20 Outcome Document also reaffirms the aim to achieve by 2020 sound management of chemicals throughout their life cycle and of hazardous waste in ways that lead to minimisation of significant adverse effects on human health and the environment, as set out in the Johannesburg Plan of Implementation (UN 2012, paragraph 213).

In addition, UNEP and the United Nations Industrial Development Organization (UNIDO) launched the Green Industry Platform at Rio+20. This provides a global framework for bringing together governmental, business and civil society leaders to secure concrete commitments and mobilise action in support of the green industry agenda, i.e. greening the manufacturing process and creating green industries for production of goods and services for domestic use or export.

This chapter identifies how the transition to a green economy presents trade opportunities for the manufacturing sector in developing countries. For developing countries, facilitating green manufacturing processes can stimulate innovation and enhance international competitiveness, translating into opportunities for increasing trade and global market share. Furthermore, manufacturing green products in specific sectors can enable developing countries to tap into growing international markets for sustainable products.

This chapter first analyses cross-sectoral processes through which green trade opportunities can be realised, including:

- Greening supply chains, including transport;
- Embedding sustainability as a core business strategy, including by investing in renewable energy in industrial applications;
- Utilising energy-efficient technologies throughout business processes;
- Manufacturing environmental goods and providing environmental services;
- Investing in renewable energy in industrial applications;
- Promoting the complete disassembly, recovery and re-use of individual product components (remanufacturing); and
- Considering emerging opportunities such as 3D manufacturing and product-service systems.

Second, the chapter focuses on certain specific manufacturing sectors where opportunities exist for generating gains from trade while reducing environmental impacts. These sectors include chemicals; Information and Communications Technologies (ICT) and electronics; and textiles, clothing and footwear.

5.2 Environmental and economic context for greening the economy

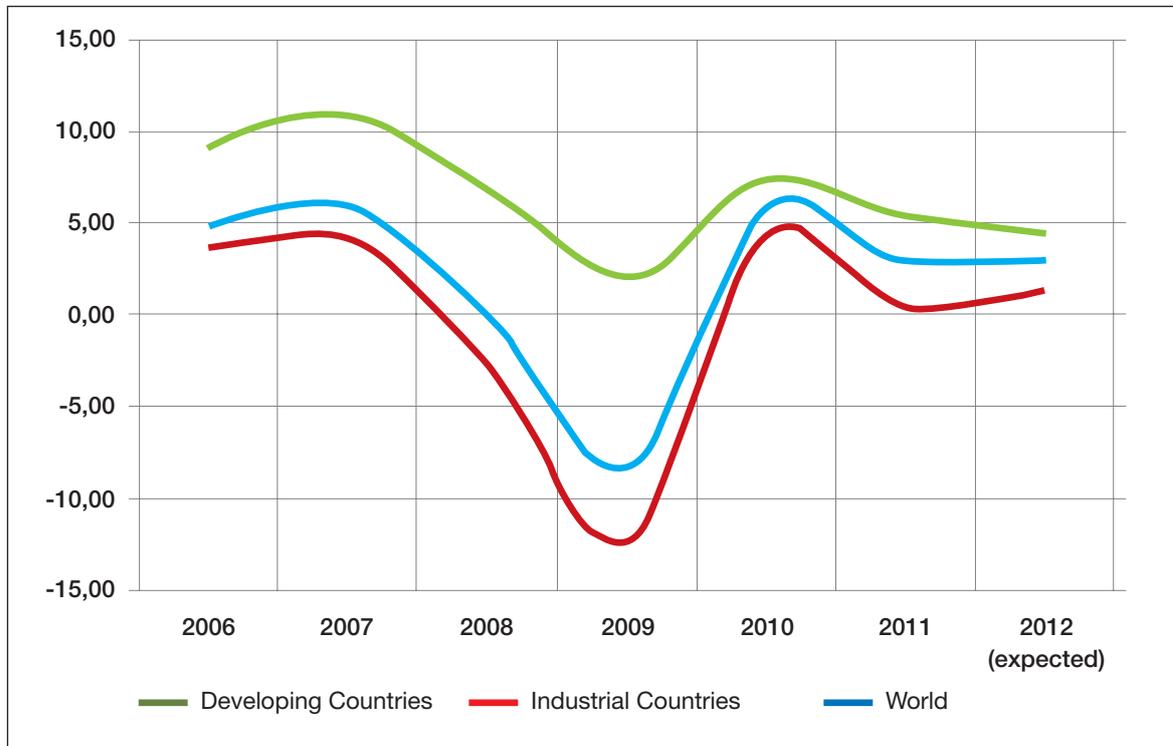
5.2.1 Manufacturing and trade

Manufacturing is one of the main engines of growth in developing countries (Szirmai 2009). According to estimates by UNIDO, Market Value Added (MVA) in industrialised countries was expected to grow

1. The 10YFP is a global framework of action to enhance international cooperation to accelerate the shift towards Sustainable Consumption and Production in both developed and developing countries. For more information, see <http://www.unep.org/resourceefficiency/Portals/24147/scp/10yfp/document/Brochure%2010YFP%20071212%20Final.pdf> and UNCTAD (2012).

by 1.4 per cent in 2012, while growth in developing countries was anticipated to be 4.5 per cent in 2012 (UNIDO 2012). Figure 1 illustrates the evolution of MVA since 2006, contrasting developments in industrialised and developing country contexts.

Figure 1. Estimated annual growth rates of world Market Value Added by years



Source: UNIDO 2012

According to the UN Conference on Trade and Development (UNCTAD), the overall distribution of products exported from developing countries has changed significantly over the last 20 years. In the past, basic commodities accounted for 75 per cent of global exports. Nowadays, an estimated 70 per cent of developing countries' exports are manufactured goods. Emerging Asian economies surpass others in industrial exports, while most African countries have scarcely contributed to the rise in exports of manufactured goods. For example, African exports of manufactured goods represent a mere 30 per cent of total African exports, in comparison with 20 per cent in 1980 (UNCTAD 2008).

Electronics, machinery, automobiles, chemicals, clothing and furniture, among others, make up the largest share of world trade in manufactured goods. A significant portion of this trade involves not the end product itself, but the various component parts that are traded in the supply chain of manufacturing products. As such, global demand for manufactured goods comprises not only the consumer demand for end products but equally the demand for component parts, primarily by other industries, forming global supply chains.

From the point of view of job creation, the growing volume of trade in environmental products is an opportunity for countries specialised in basic commodities to expand their manufacturing industries, integrate in more complex value chains and increase the value added of their products (UNEP 2008). That in turn is an opportunity to create green jobs and increase workers' skills, considering that along with extractive industries and construction, manufacturing accounts for 23 per cent of global employment (UNEP 2011a).

In light of these considerations, there is an immediate need to put in place supportive measures to guarantee that a transition to a greener economy is fair and creates social and economic benefits, particularly in developing countries.

5.2.2 Challenges facing manufacturing

There are many challenges facing the global manufacturing sector, particularly related to its sustainability. These include:

- **Resource scarcity:** Scarcity of fresh water, energy sources, minerals and metals threatens the future economic growth of many manufacturing sectors.
- **Resource inefficiency:** Inefficient uses of scarce resources entail economic losses and accelerate resource depletion. According to the World Business Council for Sustainable Development (WBCSD), by 2050, resource efficiency will need to increase by a factor of 4 to 10 in order to meet targets for sustainable levels of resource use (EC 2011).
- **Pollution:** Industrial facilities release greenhouse gas (GHG) emissions, particulate matter, sulphur dioxide, nitrogen dioxide, lead and chemicals. These accelerate not only climate change and atmospheric pollution, but they also degrade ecosystems and cause health risks. Manufacturing accounts for up to 17 per cent of air pollution-related health problems. Pollution also has an economic effect and incurs economic costs: Estimates of gross air pollution damage range from 1 to 5 per cent of global gross domestic product (GDP) (UNEP 2011a).
- **Hazardous substances and waste:** Global output in the chemicals industry has grown from US\$ 170 billion in 1970 to over US\$ 4.1 trillion today, with a steady shift in the production, use and disposal of chemical products from developed countries to emerging and developing economies, where safeguards and regulations are often limited. Poisonings from industrial and agricultural chemicals are among the top five leading causes of death worldwide, contributing to over 1 million deaths annually and 14 million Disability Adjusted Life Years (UNEP 2013).
- **Energy consumption:** The manufacturing industry accounts for about 25 per cent of global energy consumption (IEA 2011). As industrial production expands, it will put increased pressure on energy supplies.

Box 1. The Economics of Ecosystems and Biodiversity

- The Economics of Ecosystems and Biodiversity (TEEB) is a global initiative focused on drawing attention to the economic benefits of biodiversity. Its objective is to highlight the growing cost of biodiversity loss and ecosystem degradation. TEEB presents an approach that can help decision-makers recognise, demonstrate and capture the values of ecosystems and biodiversity, including how to incorporate these values into decision-making.
- The TEEB in Business and Enterprise report (TEEB 2012) highlights what is called the “impacts and dependencies” of the manufacturing industry on biodiversity and ecosystem services, reflecting the footprint of facilities and the pollution arising from production processes, as well as the role of suppliers of raw materials or semi-finished goods. These linkages are often complex and sector-specific. In the case of direct impact and dependency on biodiversity, the industries most implied include the pulp and paper industry as well as the textile and leather industry. If one considers high dependence on specific ecosystem services, this points to a wider range of industries. What they face is dependencies that pose risks associated with operations, markets, finance, regulations and reputation. A clear operational risk is that of increased scarcity and cost of natural resources.

5.2.3 The transition to a green economy

Box 2. Key messages from the Green Economy Report

- By 2050, projections indicate that industry can practically “decouple” energy use from economic growth, particularly in the most energy-intensive industries.
- Green investment will increase employment in the manufacturing sector. For example, investments allocated to energy efficiency are expected to create an additional 2.9 - 5.1 million jobs by 2050.
- Green manufacturing strategies can help alleviating key resource scarcities, including shortages in conventionally recoverable oil reserves, metal ores and water. For example, remanufacturing operations worldwide already save about 10.7 million barrels of oil each year.
- Tracking progress will require governments to collect improved data on industrial resource efficiency.
- Developing countries have a strong potential to leapfrog inefficient technologies by adopting cleaner production programmes, particularly those that provide support to smaller companies, many of which serve global value chains.

Source: UNEP 2011a

The GER (UNEP 2011a) describes green manufacturing as follows:

“Green manufacturing differs from conventional manufacturing in that it aims to reduce the amount of natural resources needed to produce finished goods through more energy- and materials-efficient manufacturing processes that also reduce the negative externalities associated with waste and pollution. This includes more efficient transport and logistics, which can also account for a significant percentage of the total environmental impact of manufactured products”.

In broad terms, green manufacturing involves the re-design of products, production systems and business models, as well as extended producer responsibility in the form of take-back or reversed supplies, resource-efficient and clean production, remanufacturing, and recycling on a significant scale.

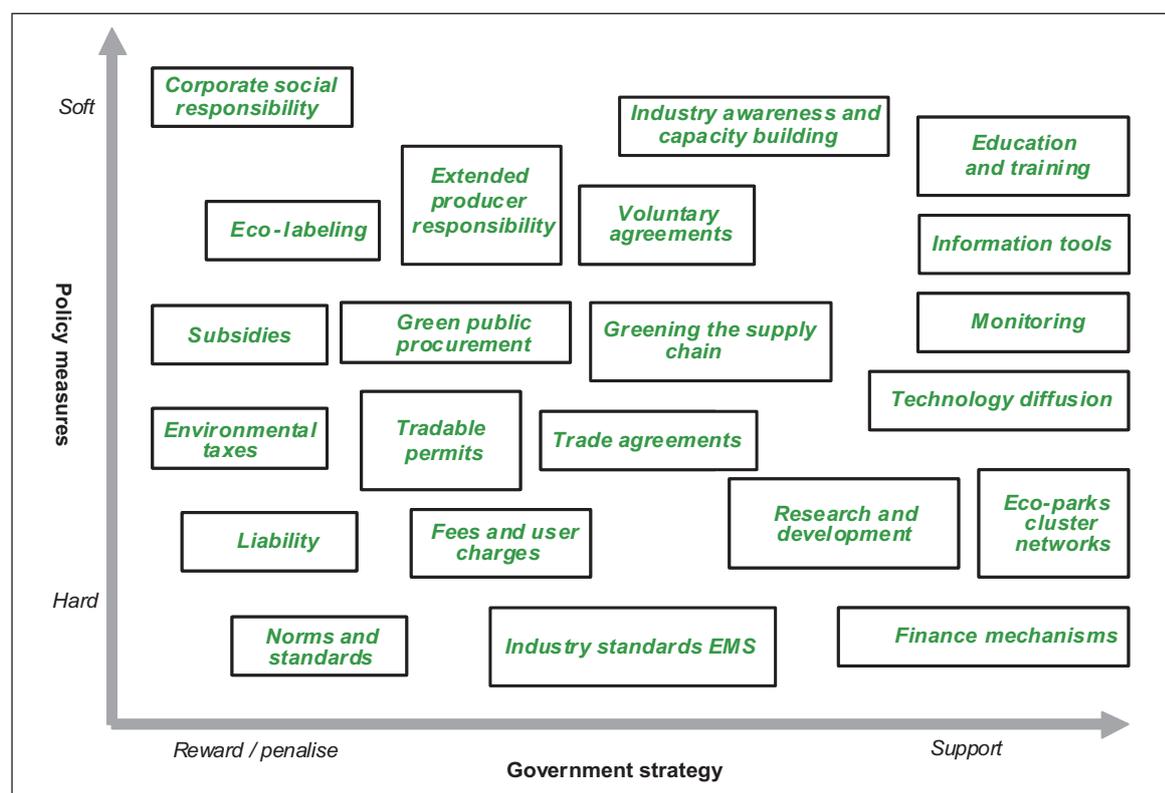
Regulators can use a wide range of measures to orient or discipline the behavior of private actors, so as to promote compliance with sustainability criteria along the supply chain. As depicted in Figure 2, these measures can be “soft”, i.e. leaving private actors with the ultimate choice of full or partial compliance, or more coercive, i.e. imposing certain materials or the use of specific production methods.

Within the realm of these interventions, those that are aimed at sustainable consumption and production are considered as key elements to respond to the challenges laid out above (UNEP 2010). Overall, these include extending the life of manufactured goods through greater emphasis on repair, recondition, remanufacture and recycle. Together, these constitute the core of “closed-loop manufacturing,” whereby the functional life of products is extended (UNEP 2011a).

Further, as illustrated in Box 3, a “circular economy” can build integrated, closed-loop manufacturing systems in which the by-products of one industrial process become the resources for another.² This approach enables even rapidly industrialising economies to decouple environmental impacts from economic growth and to improve their long-term competitiveness.

2. For further information on related concepts, see Sheng, F. (2010).

Figure 2. Policy matrix for the greening of industries



Source: UNIDO 2011

Box 3. The circular economy and Chinese development policy

A circular economy is an economy that balances economic development with environmental and resource protection. It puts emphasis on the most efficient use and recycling of its resources and environmental protection. A circular economy features low consumption of energy, low emissions of pollutants and high efficiency of resource use throughout the economic activity. It involves applying cleaner production in companies, eco-industrial park development and an integrated resource-based planning structure for development in industry, agriculture and urban areas.

The Chinese Government embraced the circular economy concept as its national development model in the 11th Five-Year Plan (2006-2010). The National Development and Reform Commission (NDRC) in China is in charge of leading the circular economy strategy at the national level, providing a range of legislative, political, technical and financial measures such as subsidies and tax breaks. For example, the NDRC has committed to expand China's national remanufacturing industry over the next five years. Current figures estimate that remanufacturing in China could increase from two billion Yuan (approximately US\$ 320 million) in 2011 to 40 billion Yuan (approximately US\$ 6.5 billion) in 2015, which amounts to roughly five per cent of China's manufacturing industry.

Source: UNEP 2012a, Xinhua 2011

Green manufacturing is a core component of a circular economy and can lead to lower raw material costs, production efficiency gains, reduced environmental and occupational safety expenses, little or no waste or pollution, and improved corporate image (Atlas and Florida 1998). Increased trade in non-hazardous recyclable materials could also play a role in the circular economy by reducing the demand for raw materials and by aiding a more efficient use of increasingly scarce resources.

An additional tool for a transition to a green economy in the manufacturing sector is green purchasing. In its "Green Purchasing and Green Public Procurement Starter Kit", the International Green Purchasing Network

(IGPN) defines green purchasing as “the purchase of any product and service that results in a lesser environmental impact while performing a similar function, and while demonstrating social responsibility and ethics, at its comparable price” (IGPN 2010). UNEP contributed to enhancing the sustainability of public procurement through green purchasing strategies by the compilation of eight illustrative national level case studies (UNEP 2012b).

Box 4. International Trade and Resource Decoupling

The International Resource Panel (IRP) was launched by UNEP in November 2007. Hosted by UNEP’s Division of Technology, Industry and Economics, IRP aims at providing independent, coherent and scientific assessments of policy relevance on the sustainable use of resources and their environmental impacts over the full life cycle, to better understand how to “decouple” economic growth from environmental degradation.

The global challenge is to meet the needs of nine billion people in 2050 in terms of energy, land, water and materials supply, while keeping climate change, biodiversity loss and health threats within acceptable limits. The transition process towards a green economy, where patterns of consumption and production are sustainable and enable all citizens to have access to resources while preserving the quality of the global commons, can effectively address this challenge. The links between human well-being, economic growth and environmental degradation can be broken by decoupling economic activity from resource consumption (“resource decoupling”) and from environmental impacts (“impact decoupling”). According to the IRP (2012), the decoupling of future economic growth and the rate of natural resource use is “the most promising strategy for ensuring future prosperity” (IRP 2012).

The global extraction of natural resources amounts to an annual 60 billion tonnes and, without decoupling, would predictably increase to an annual 140 billion tonnes by 2050. In addition, intensified global trade implies an increase in physical trade flows and growing environmental pressures associated with trade activities. In 1970, around 5.4 billion tonnes were internationally traded, increasing to 19 billion tonnes in 2005. Environmental degradation directly and indirectly linked to international trade makes up a significant share of total environmental pressures. This includes direct pressures, in particular due to impacts of transportation, and indirect (or embodied) pressures that also augment with growing trade volumes.

Although most often associated with higher environmental pressure, trade can also make an important contribution to global decoupling when guided by appropriate policies. The UNEP report “Decoupling Natural Resource Use and Environmental Impacts from Economic Growth” (UNEP 2011b) highlights the following key policy principles to inform the policy interface in supporting decoupling:

1. Trade could contribute to reducing global resource use through exploiting transport and physical or geological potentials in a way that minimizes negative environmental impacts;
2. Trade negotiations could consider the full value chain of the commodities being traded, agreeing prices that incorporate environmental factors and social costs that are now considered ‘externalities’; and
3. Trade agreements between countries whose economies are based on exporting primary resources could be accompanied by side agreements that assist these countries in diversifying their economies, including through adding value domestically and supporting impact decoupling.

Such measures could support developing countries in diversifying their economies so that they can reduce dependence on the export of a small number of commodities, support the development of domestic markets, and overall promote sustainable economic development.

Source: UNEP 2011b

In this context, there is growing evidence that systemic ‘eco-innovation’ for sustainability offers an historic opportunity to put decoupling into practice. Eco-innovation focuses on new ways to address environmental problems, while simultaneously promoting economic activity. Eco-innovation is central to helping manufacturers become greener and, at the same time, more resource efficient and competitive (see Box 5).

Box 5. UNEP project on resource efficiency and eco-innovation

From 2012 through 2015, the UNEP project on Resource Efficiency and Eco-Innovation in Developing and Transition Economies will promote Resource Efficient and Cleaner Production (RECP). In detail, the project facilitates the continuous application of an integrated environmental strategy to processes, products and services in order to increase the productive use of natural resources and reduce risks to humans and the environment. Furthermore, it enhances “safer production”, namely ensuring the safety and health of workers in facilities that manufacture, store, handle or use hazardous substances, and facilitates the prevention of accidental releases into the environment and surrounding community.

The project will fund activities in more than 40 developing countries to promote eco-innovation. Priority sectors are agri-food, metals and chemicals, while the planned outputs include an eco-innovation manual and eco-innovation training and workshops.

Source: Clark (2012)

In recent years, the manufacturing industry has focused on investments in sustainable manufacturing processes alongside more traditional expenditure on technological advancement and Research and Development (R&D). Investments in sustainable manufacturing have ranged from minimising pollution to accounting for the manufacturing lifecycle.

There are many obstacles, however, that need to be overcome to encourage more companies to switch towards greener manufacturing processes or developing greener products. These include a lack of necessary tools, insufficient management commitment and skills, shortage of funding, and an overall lack of awareness by both producers and consumers.

5.3 Trends and trade opportunities existing across the manufacturing industry

Greening manufacturing production processes can stimulate innovation and enhance international competitiveness, translating into early opportunities for increasing exports and market share for economic actors in all countries. Manufacturers that are able to implement more resource efficient approaches and life cycle management are likely to have a competitive advantage over global competitors that continue a business-as-usual (BAU) scenario.

The competitive advantage gained through sustainability extends beyond consumer choices. For instance, a study by AT Kearney found that companies that are listed on the Dow Jones Sustainability Index or Goldman Sachs' SUSTAIN Focus outperformed industry averages during economic downturns (Strandberg 2009). The 2011 Sloan Management Review by the Massachusetts Institute of Technology found similar results, demonstrating that companies implementing sustainability at the core of their business strategy not only perform better in strong markets than companies half-heartedly (or not-at-all) adopting sustainable practices, but that they are also more resilient during economic downturns (MIT 2011). Furthermore, a study by Weber Shandwick (2012) found that 60 per cent of a company's market value is attributable to its reputation and over two-thirds of US consumers avoid products made by companies they do not like and check labels to ascertain the identity of the parent company.

The following subsections describe some of the key actions that can be undertaken to create value from compliance with sustainability criteria in production, transport and consumption, with international trade as a crucial driver for these actions.

5.3.1 Greening supply chains

Within the manufacturing industry, a well-managed supply chain optimisation can create value in the form of higher quality materials or manufacturing processes, innovative new goods and services, protection of product and brand reputation, and enhanced customer loyalty.

In this vein, many large multinational companies have adopted green supply chain standards and implemented them through inspection and compliance regimes, such as requiring their suppliers to use a certified environmental management system (EMS).

Industry-based green standards can play a crucial role in the design, manufacturing, packaging and end-of-life stages of a product. Industry management standards, for example, provide guidance for integrating resource and energy efficiency practices into production processes. Such industry standards are often integrated into voluntary environmental management systems, especially those that can be certified under the International Organization for Standardization (ISO) 14001 family of standards.

Companies increasingly demand participation in ISO standards within their supply chains and firms that position themselves accordingly are expected to be at a competitive advantage for export opportunities. Thus, greening enterprises in developing countries is an important means to face the immediate commercial challenges of remaining in key world markets. Specifically, these enterprises have to meet an increasing number of environmentally-related production standards to secure export markets. These standards require enterprises to reconfigure their products and/or supply chain processes to meet the requirements of their international customers or laws of the countries into which they wish to export, and to obtain the respective certification. In other words, enterprises must be able to:

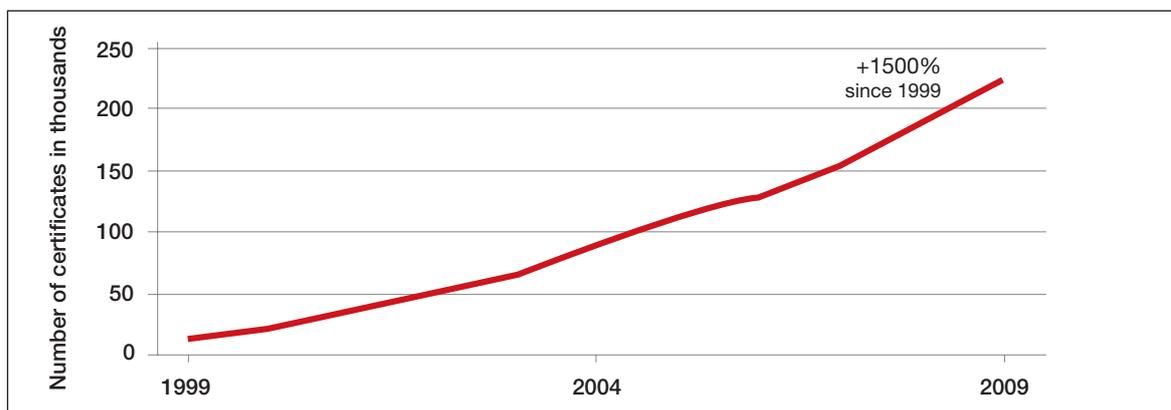
- Redesign their products so that they meet any pertinent environment-related product standards;
- Reconfigure their processes so that they meet any relevant environmentally-related process (technology and management) standards; and
- Certify that their products and/or their manufacturing processes meet these standards (UNIDO 2009).

Implementation of green management systems, certified by independent parties, would help developing country manufacturers comply with requisite standards and to verify their performance against those standards. This is especially relevant in instances where enterprises are meeting process-related standards. In addition, management systems can be useful for complying with specific product-related standards, such as quality management standards, e.g. ISO 9000. ISO 50001, which concerns standards related to energy efficiency, is explained in section 5.3.3.

As of 2009, there were over 230,000 companies in 159 countries with ISO 14001 certified environmental management standards, a significant increase from 1999 (see Figure 3). Over 50 per cent of ISO 14001 companies were based in East Asia compared to 40 per cent in Europe and only three per cent in North America (ISO 2009).

For companies in developing countries, ISO 14001 certification can be an important way to demonstrate environmental responsibility and thereby increase export opportunities. Hence the Egyptian Ministry of Trade and Industry, for example, has encouraged firms to become ISO 14001 certified by paying 85 per cent of the consultancy and certification costs of certified companies (Massoud et al. 2010). Furthermore, an empirical study by the OECD found that the adherence to international standards in most cases leads to a positive effect on export performance for the respective country (Swann 2009).

Figure 3. Increase in number of ISO 14001 certifications



Source: UNEP 2011c

In 2011, a new ISO standard was released: ISO 14006: 2011 Environmental Management Systems — Guidelines for Incorporating Eco-design. This is a non-certifiable guidance standard that deals with how product aspects can be included in manufacturers' environmental management systems (ISO 14001). Since most products cause significant environmental impacts through their use, these eco-design guidelines are an important tool for the transition to a green economy.

There are many other benefits that can result from eco-design, including economic benefits, e.g. through increased competitiveness, cost reduction and attraction of financing and investments; promotion of innovation and identification of new business models; reduction in liability through reduced environmental impacts and product knowledge; and improved public image (both for the organisation and the brand). Such benefits can also lead to global trade opportunities when measured against competing international companies.

It is important, however, that standards adopted by multinational companies are verified by independent and recognised organisations. Some companies offer assistance to suppliers to help them achieve more rigorous standards. In order to take advantage of sustainable trade opportunities, small and medium-sized enterprises (SMEs) in developing countries often need external support and capacity building. This will enable them to participate in and contribute to green supplier networks on a substantive and sustainable basis (UNIDO 2011).

Besides compliance with sustainability product and process standards, there are a number of strategic opportunities for supply chain de-carbonisation (see Figure 4).

Figure 4. Greening opportunities along the manufacturing supply chain



Source: Adapted from APO 2012

Finally, as international trade in the manufacturing industry is largely based on region- or country-specific specialisation and development of products, transportation will continue to play a vital role in the industry.

Transportation enables the movement of raw materials and component parts necessary for the manufacturing process, while also delivering the end product to domestic and international customers. Remarkably, an estimated 37 per cent of worldwide emissions relating to trade are caused by the transport of materials and goods (Avetisyan et al. 2010). As such, greening of transportation throughout the manufacturing process is critical in greening the overall supply chain (Banister and Button 1993).

Measures for greening the transportation sector include the use of alternative fuel sources and an increase in fuel efficiency. Both measures directly contribute to lowering the use of and emissions from fossil fuel based transportation modes. In addition, international consensus and cooperation will be crucial facilitators for achieving global targets of emissions reductions in the transportation sector.

The typology of traded goods also has an effect on the quantity of emissions released in the atmosphere in trade-related transport. According to data produced by Carnegie Mellon's Green Design Institute, carbon emissions (in tonnes of CO₂) per dollar of value is far greater for goods such as extracted resources like coal, compared to high-value goods like consumer electronics (WEF 2009).

5.3.2 Embedding sustainability as a core business strategy

Manufacturers can draw on different approaches to remain competitive and increase market share and export opportunities. These approaches include greening production methods for existing products and changing the actual end products to meet the growing consumer and business demand for more sustainable products.

Considering the first approach of greening production processes, there are many cross-sectoral trade opportunities generated by industries using sustainable approaches to production. The global economy has untapped opportunities for increasing production while using less material and energy resources. These opportunities can be realised by increasing resource efficiency through methods such as, among others, combined heat and power plants (CHP) and closed-cycle manufacturing (i.e. repair, renovation, remanufacturing and recycling). Manufacturers could also use more renewable energy in industrial applications.³ Environmentally sound and safe alternatives to the use of hazardous chemicals in production processes are likewise an important element (UN 2012a, paragraph 220).

In many cases, these measures could reduce extraction and processing costs and also lead to a more sustainable economic growth model.

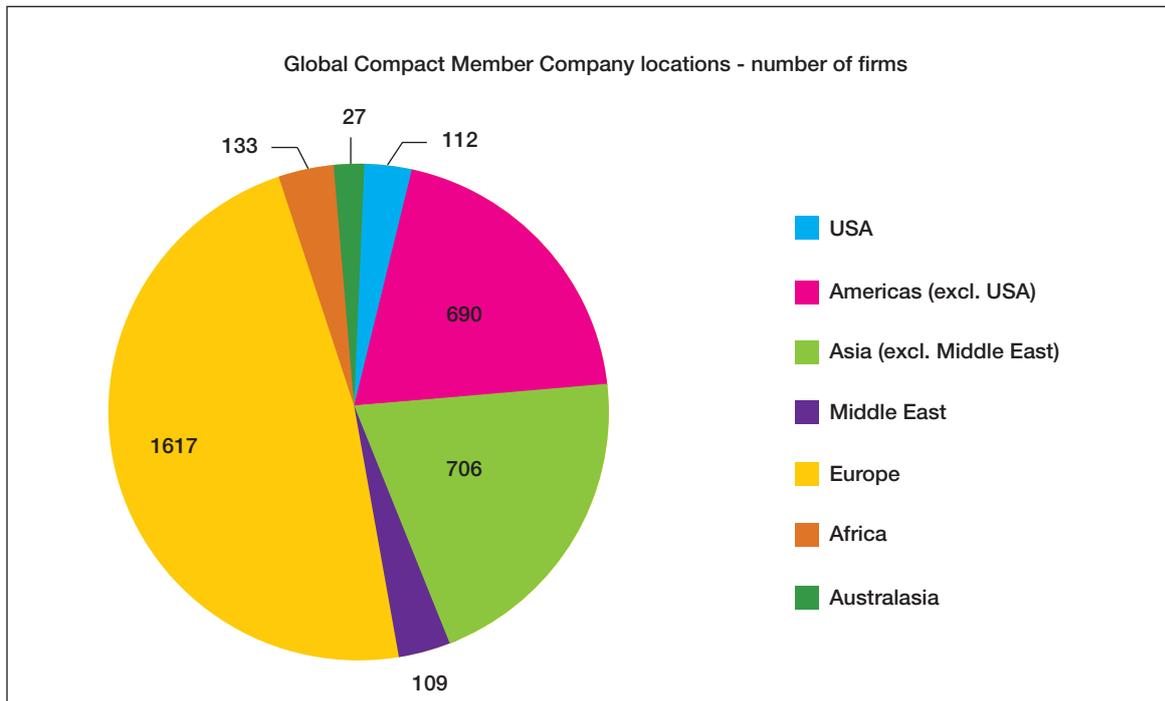
With respect to the second approach, greening through a change of end product, opportunities exist to develop new green markets for products that are either energy-efficient (e.g. hybrid vehicles), or help to decrease GHG emissions (e.g. wind turbines). Manufacturers are increasingly emphasising the environmental performance of their products to meet increasing consumer expectations towards the sustainability of their purchases and to meet increasing demands of international and national environmental regulations. Energy-efficiency labelling and green-manufacturing labels are becoming a common feature of manufactured consumer products (APO 2012). For particular information on greening products in the chemicals, electronics and textiles industries, see section 5.4.

Businesses can develop a competitive advantage by integrating environmental and social considerations into their business models/operations leading to improved business performance to spur innovation and to improve economic results.

Corporate social responsibility (CSR) policies, which can include the adoption of ISO 26000, are becoming increasingly prevalent in the private sector. Over 8,000 businesses worldwide have committed to the ten principles of the UN Global Compact (UNGC) that cover areas such as human rights, labour standards and environmental protection (Wharton 2012). Figure 5 shows the global distribution of firms that have signed up to the UNGC and reveals the strong take-up by firms in developing countries.

3. An analysis of the use of renewable energy in the manufacturing industry is beyond the scope of this report. However, readers may wish to consult the UN report on "Renewable energy in industrial applications: an assessment of the 2050 potential" (UNIDO 2010).

Figure 5. UNGC member company locations



Source: Kimbro and Cao 2011

Furthermore, the increasing interest in CSR has been accompanied by the publication of voluntary nonfinancial corporate reports that communicate the social and environmental impact of corporations. The Global Reporting Initiative (GRI) has provided a comprehensive sustainability-reporting framework that is widely used around the world. While only 44 firms followed the GRI guidelines to report sustainability information in 2000, the number grew to 1,973 by 2010 (Ioannou and Serafeim 2012).

The importance of CSR practices was specifically acknowledged at Rio+20 (UN 2012, paragraph 47) and led to the formation of the “Group of Friends of Paragraph 47”, as illustrated in Box 6 below.

Box 6. UNEP and the Global Reporting Initiative (GRI)

Paragraph 47 of the Rio+20 Outcome Document outlines the importance of corporate sustainability reporting and encourages companies, where appropriate, to integrate sustainability information into their reporting cycle. The Paragraph further encourages industry stakeholders to facilitate action for the integration of sustainability reporting, thereby building on existing frameworks and paying particular attention to the needs of developing countries.

The “Group of Friends of Paragraph 47” (Brazil, Denmark, France, Norway and South Africa) will investigate possible ways for advancing best practice and governmental action on corporate sustainability reporting with the technical advice of UNEP and the Global Reporting Initiative. In addition, this partnership will focus on building capacity in developing countries, thereby expanding on what already exists in terms of policy and practice.

In support of this initiative, UNEP Finance Initiative (UNEP FI) has been calling for more meaningful corporate sustainability information to be used for financial decision making. UNEP FI co-convenes the Sustainable Stock Exchange Initiative which explores the role of stock exchanges in promoting this issue. In addition to the “Group of Friends of Paragraph 47”, UNEP FI also supports the International Integrated Reporting Council, a global coalition developing a framework for financial and sustainability corporate reporting in order to open new ways of communicating businesses’ value creation.

Source: GRI 2012, UNEP FI

The reporting guidelines of the Global Reporting Initiative have been supplemented by sector specific guidelines developed with the mining and metals, automotive manufacturing, telecommunications, apparel and footwear industries. Reporting on strategic management approach by these industries provide an opportunity for investors and other stakeholders to discuss with management what greening the relevant industry entails (UNEP 2011a).

5.3.3 Resource and energy efficiency

The Rio+20 Outcome Document embraced more efficient energy use (UN 2012, paragraph 127). Developing countries with emerging and expanding industrial infrastructure have an opportunity to mitigate GHG emissions, while increasing their competitiveness through the application of energy-efficient best practices. Bypassing less efficient, more expensive and more polluting technologies and industries, and moving towards more sustainable and advanced ones, could enable developing countries to produce goods at a lower cost due to less energy use. Overall, this technological leapfrogging would, in the long term, provide them with both a price advantage and a green advantage in the export sector.

In addition, energy efficiency can be enhanced by updating electricity infrastructure through the use of smart energy grids. However, while the means exist to enhance energy efficiency, these technologies face a number of barriers in the marketplace, such as a lack of public awareness and viable financing models. Furthermore, projects may have high internal rates of return, but have thus far failed to attract investors or commercial banks. Investment in energy-efficient technology is also hampered by the fact that many companies and small-scale users in developing countries may struggle to afford the high initial investment.

Improved energy efficiency is one of the most cost-effective ways to reduce global GHG emissions, enhance energy security and reduce the amount of money spent on energy. For most industries, increasing energy efficiency in production, therefore, is not just a response to environmental concerns or objectives; it has become a core determinant of economic competitiveness and sustainable growth (Giljum and Polzin 2009). Box 7 describes some of the potential gains from an energy-efficient world.

Box 7. The efficient world scenario

The 2012 edition of the International Energy Agency's World Energy Outlook presents the results of an Efficient World Scenario, which shows what energy efficiency improvements can be achieved simply by adopting measures that are justified in economic terms. Greater efforts on energy efficiency would cut the growth in global energy demand by half. Global oil demand would peak before 2020 and be almost 13 mb/d lower by 2035, a reduction equal to the current production of Russia and Norway combined. The accrued resources would facilitate a gradual reorientation of the global economy, boosting cumulative economic output to US\$ 18 trillion by 2035, with the biggest gains in China, Europe, India and the United States.

Source: IEA 2012

Many countries and jurisdictions are implementing resource efficiency policies, a trend which is likely to drive demand for goods produced efficiently and sustainably. For example, the European Union (EU) has recently produced a roadmap towards a more resource efficient Europe, as set out in Box 8 below.

Box 8. EU roadmap for a resource efficient Europe

Strategies aimed at improving resource efficiency are the focus of increasing interest worldwide. The EU is working towards resource efficiency plans and recently launched its flagship initiative "A resource-efficient Europe", which is part of the growth strategy 'Europe 2020'. A "Roadmap for a resource-efficient Europe" published in 2011 aims to help decouple economic growth from resource use, support the transition towards a low carbon economy, increase the use of renewable energy sources, modernise the transport sector and promote energy efficiency.

Source: EC 2011

In order to find effective means of improving resource efficiency, it is worth analysing which areas of consumption are linked to high resource use and thus yield the greatest potential for improving resource efficiency. This may help to set targets for reducing consumption in those particular categories as part of an effective integrated plan. Such studies have been conducted in the EU, while only a few developing countries have, as of yet, initiated related activities (UNIDO 2011). There are, nevertheless, examples of companies in developing countries that have successfully introduced resource efficiency measures, as illustrated in Box 9.

Box 9. Caborca in Mexico

The Caborca company is based in Leon, in the Mexican state of Guanajuato. It is a medium-sized, family-owned company, which manufactures cowboy boots and employs 250 people. Caborca decided to invest in meeting the requirements of the EU ecolabel.

Caborca hired a consulting team, trained by UNEP in the framework of the project "Enabling developing countries to seize ecolabelling opportunities". The team undertook an inventory of the factory and introduced a number of resource efficiency measures such as sourcing new materials, better natural lighting by changing the design of the roof, and techniques for reducing the consumption of materials, which minimised waste and decreased associated costs, with savings across the board.

According to the management of Caborca, the process of adhering to the EU ecolabel requirements decreased production costs, thus significantly improving bottom-line benefits. Although there were some upfront costs in finding suppliers of sustainable materials, these costs were recovered because materials with more sustainable features turned out to cost an average 8 per cent less. It is expected that the costs of materials would continue to decrease as more supplier companies enter the supply chain.

Caborca has also reduced the costs related to worker safety equipment due to the phasing out of toxic materials. Furthermore, the management invested in renovating the factory premises and the introduction of other measures to improve the work environment. Interviewees noted that workers have become happier and more productive as a result.

The management of Caborca mentioned the company's initial hesitation towards participating in such an activity given the financial risks that it might entail. However, the whole managing philosophy of the company has changed with pronounced emphasis on the social well being of employees, the minimisation of resource use, and on marketing the company as a green forerunner. Ecolabelling acted as the door-opener for these changes and the company plans to launch a new line of ecological boots, for sale in Mexico, the United States and European markets in 2013.

Source: UNEP 2012c

Opportunities for improving the efficiency of industrial facilities are substantial, even in markets with mature industries that are relatively open to competition. In terms of the global potential for increased energy productivity, the McKinsey Global Institute has determined that 65 per cent of all available positive return opportunities for investment are located in developing regions (UNIDO 2011).

Most energy efficiency gains in industry are achieved through changes in how energy is managed in an industrial facility, rather than through the installation of new technologies. Energy management systems, like the ISO 50001 Standard, provide a framework for understanding significant energy use and offer applicable best-practice lessons (Matteini 2011).

In brief, ISO 50001 is a system management tool that provides a framework to develop policies to foster energy efficiency within organisations. Consequently, ISO 50001 can provide organisations with a competitive advantage through efficiency savings and improving their brand image vis-à-vis competitors. Since its publication in 2011, implementation of and certification under ISO's new energy management standard is gaining pace around the world. As of January 2012, about 100 organisations in 26 countries had already achieved certification.

5.3.4 Environmental goods and services

Due to increased consumer and business demand, the environmental goods and services (EGS) sector is likely to expand significantly in the future. More stringent legislative requirements, coupled with investments

in infrastructure, have created a growing demand for services and products directed towards cleaner technologies, reductions in environmental risk and resource management (including recycling and resource recovery). Anecdotal research by the OECD has shown that the trade in environmental goods and in environmental services often go hand in hand. For example, there is a fast-growing set of services provided by companies that specialise in monitoring, repairing and even remotely operating renewable-energy facilities such as wind turbines and biogas turbines (GGKP unpublished).

The growing focus on resource and energy efficiency, productivity and competitiveness will increase the demand for “next-generation” environmental services targeted towards renewable energy and resource efficiency. For example, it is estimated that India alone could create some 900,000 jobs in biomass gasification by 2025 (World Watch 2012).

The following case study on trade in environmental goods in Southern and East Africa illustrates how trade in certain types of environmental goods presents margins for regional growth.

Box 10. Trade in environmental goods in Southern and Eastern Africa

To date, trade in environmental goods in Southern and East African countries has been limited. Although there has been significant growth in the trade of environmental goods by some countries, their overall share in world trade is negligible. In 2010, countries in the East African Community (EAC), Common Market for Eastern and Southern Africa (COMESA) and Southern African Development Community (SADC) accounted for only 2.19 per cent of global imports and 0.67 per cent of global exports of environmental goods.

A study by Tralac examined the potential to increase trade in environmental goods in the region. In the absence of international consensus on a list of products that would fall within the definition of “environmental goods”, the analysis was based on a list of 153 products that a group of WTO members, known as the “Friends of Environmental Goods and Services”, proposed in 2007 in the context of the Doha Round of multilateral trade negotiations.

Within each product category, different importers and exporters have been analysed with a focus on Egypt, Kenya and South Africa as exporting countries and Angola, Egypt, Kenya, Libya, South Africa and Tanzania as importing countries.

In an additional category of specific “single-use” environmental goods (wind turbines, solar PV, solar water heaters, biofuels, hydraulic turbines, insulation materials, heat pumps, compact fluorescent lamps (CFLs), electric and certain hybrid vehicles and thermostat), the potential bilateral trade opportunities between South Africa and the Democratic Republic of Congo (DRC), Egypt, Ethiopia, Kenya, Tanzania, Uganda and Zambia were analysed.

Analyses of intra- and inter-regional trade patterns and tariff data of various countries in COMESA, the EAC and SADC show that countries in the region are currently not fully exploiting potential trade opportunities in environmentally friendly goods among each other. The analysis found that only in a small fraction of the trade and tariff patterns analysed, the lack of bilateral trade could be attributed to high tariffs (above 20 per cent Most Favoured Nation (MFN) applied rates).

The results of the data analyses show, indeed, that tariffs have not been the main barrier to trade in environmental goods in the region. The fact that the lack of bilateral trade cannot, in most cases, be attributed to high tariffs, is indicative of the importance of non-tariff barriers (NTBs) as an obstacle to intra-regional trade. These NTBs can include:

- Subsidies on fossil fuels and other conventional energy sources;
- A lack of financial, institutional and manufacturing capacities;
- Technical specifications; and
- Local content requirements.

To facilitate technological development and the diffusion of environmentally sound technologies, existing and potential NTBs need to be assessed, monitored and, where they are not necessary, eliminated to enable countries to harness the potential benefits associated with increased opportunities in the international market for environmental goods.

The analysis also shows that potential exists for Egypt, Kenya and South Africa to increase exports of various environmental goods to countries in the region, especially those products which can be imported duty-free by Angola, Egypt, Kenya, Libya, South Africa and Tanzania, irrespective of the category of environmental goods analysed. Given the value of global imports and exports and the low tariff applied by some countries on the importation of certain goods, there is great potential to increase intra-regional trade.

The analyses further show that Egypt can increase exports of solar PV devices to Kenya, South Africa and Tanzania, which are imported duty-free by the respective countries, whereas Kenya could increase exports of various products, including boards and panels, towers and lattice masts and centrifugal pumps. South Africa has the potential to increase exports of a variety of products to Angola, Egypt, Kenya and Libya.

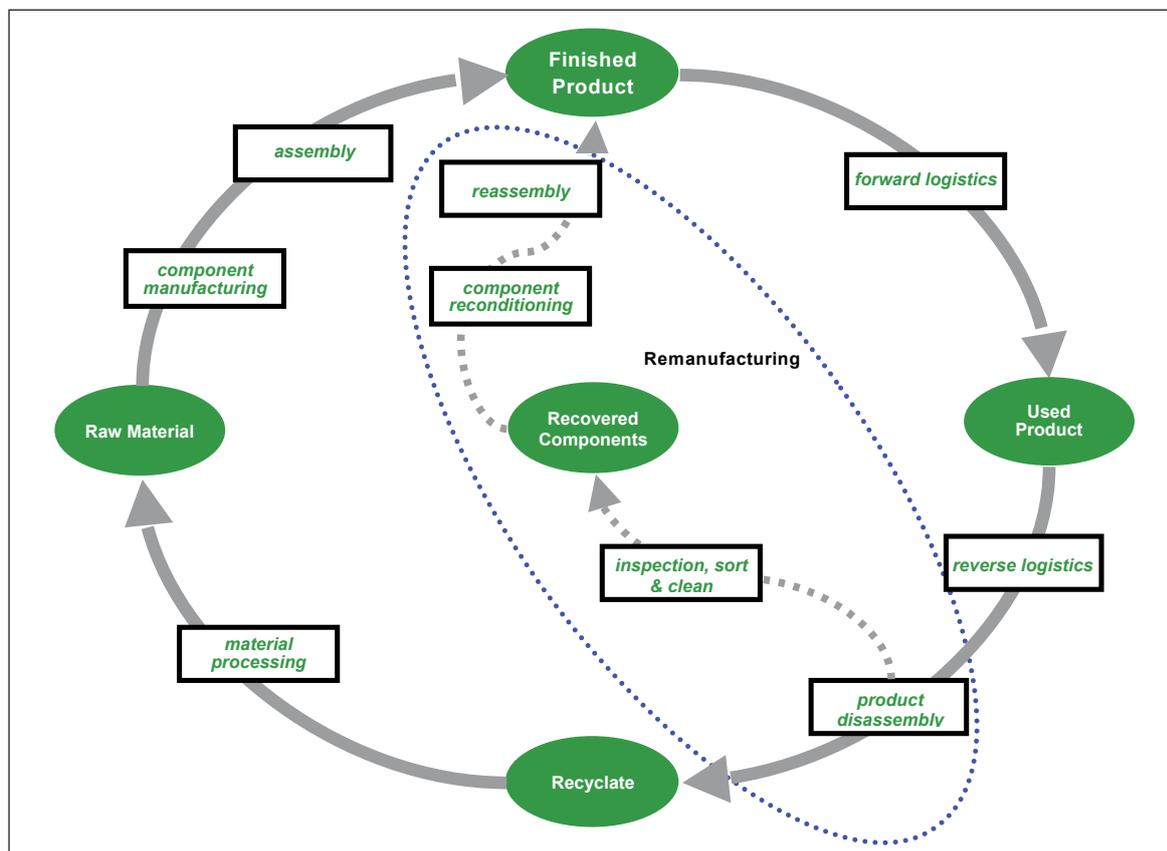
Source: Willemien Viljoen, Researcher, Trade Law Centre for Southern Africa (Tralac)

For further information on EGS, see the Introduction and the Renewable Energy chapter.

5.3.5 Remanufacturing

Remanufacturing is the process of bringing used products and individual product components to a 'like-new' functional state (Ijomah et al. 2004). It recovers a substantial proportion of the resources incorporated into a used product in its first manufactured state, at low additional costs, thus reducing the price of the resulting new product. Remanufacturing is often considered an environmentally preferable end-of-life option in comparison with material recycling or manufacturing new products. This is because, by reducing GHG emissions from product manufacturing or disposal, remanufacturing alleviates the depletion of natural resources, helps reduce global warming and enhances chances to close the loop for safer handling of toxic materials (Sundin and Lee 2011). Figure 6 shows a typical functioning of a remanufacturing loop.

Figure 6. Remanufacturing



Source: Adapted from Shumon et al. 2010

Remanufacturing operations require smaller capital investments than manufacturing operations since no new parts are produced and most of the work has already been undertaken by the original equipment manufacturer. Thus, a large untapped market exists for product remanufacturers (Nnorom and Osibanjo 2010). Michaud and Llerena have observed that:

“...any product can be remanufactured if it can be disassembled and cleaned, if its components can be repaired or replaced so that the original function and performance level are kept, if there is enough demand for the product, and if the whole process is economically viable” (Michaud and Llerena 2006).

Remanufacturing offers potential for new national business ventures within developing countries and new export opportunities. Given the minimal financial and material input into production, remanufacturing services provide lower prices to consumers, typically in the order of 30 to 40 per cent less than comparable new products (Shumon 2010).

The major obstacle to remanufacturing is that strategies for extending the useful life of manufactured products hinge on the active cooperation from original equipment manufacturers. Since no comprehensive end-of-life tax on product disposal exists, the environmental costs of waste disposal from equipment manufacturing are levied on society. This creates incentives for original equipment manufacturers to build obsolescence and replacement into their business model in order to save costs from value chain modernisation. Remanufacturing contributes towards fostering incentives for value chain modernisation by creating new business models that focus on services instead of products (WBCSD 2012). End-of-life or waste disposal taxes on manufacturers can enhance this ‘incentive effect’ of remanufacturing by making component re-use and recycling attractive tools for cost saving.

Remanufacturing is becoming increasingly significant, particularly in areas such as motor vehicle components, aircraft parts, compressors, electrical and data communications equipment, office furniture, vending machines, photocopiers and laser toner cartridges, wind mills and agricultural equipment. Several countries, including China, as illustrated in Box 3, are making remanufacturing a key part of their industrial strategy. Remanufacturing operations worldwide are already saving approximately 10.7 million barrels of oil each year (UNEP 2012d) – they also save significant volumes of water and raw materials. For example, re-using existing metal components preserves virgin natural resources and avoids GHG emissions caused by smelting metal castings. Remanufacturing also prevents metal and plastic components from ending up in landfills. Thus, for governments, remanufacturing is a way to clean up municipal waste, save energy in domestic industries and create jobs (Steinhilper 1998, IEIF 2012).

Another advantage of remanufactured goods is that they can meet the criteria for new goods without additional quality and safety requirements that sometimes apply to refurbished goods. Indeed, in the 2011 Asia-Pacific Economic Cooperation (APEC) Ministerial Meeting, 11 countries including Australia, Japan, Singapore and the United States, agreed in principle to refrain from implementing import restrictions on remanufactured goods, and to apply the same trade measures to such products as they would to new goods (APEC 2011).

Trade in remanufactured products is growing in many developing countries. To boost trade volumes, African companies are seeking to market their remanufactured goods more widely as evidenced by the growing intra-African and increased exports of remanufactured goods. For example, “EbTech Solutions” in Kenya advertises and offers remanufactured toner cartridges at 60 per cent of the price for new toners, and the company ships the goods in Eastern Africa. Also, “ICC Toner”, an Egyptian-US joint venture, remanufactures cartridges in Egypt for export to the United States (UNECA 2010). Box 11 also illustrates remanufacturing in the ICT sector in Nigeria. Above all, there is much untapped growth potential for global trade in remanufactured items.

4. For a list of these companies, see http://www.nigeriafonet.com/Directory/compu_internet.htm.

Box 11. Nigeria – remanufacturing in the Information and Communication Technologies (ICT) sector

Remanufacturing is growing across Africa, most prominently in the production of remanufactured PCs and printer consumables. There has been an increase in intra-African trade of remanufactured goods with some companies increasingly seeking to market their remanufactured goods worldwide (UN ECA 2010).

Nigeria acts as regional frontrunner in remanufacturing, as many national industry sectors are utilising some form of product refurbishment or remanufacturing. As of 2009, 11 out of the 45 Community Microsoft Authorized Refurbishers (MAR) for personal computers were located within Nigeria. This authorisation programme allows refurbishers to re-install Windows for eligible recipients. A secondary PC pilot programme has been launched in four countries including Nigeria, which allows refurbishers to pre-install Windows on refurbished PCs (MAR 2009). Companies in these countries can export products to meet growing demands from neighbouring countries in West Africa. Furthermore, some Nigerian companies are involved in the refilling and sale of refilled printer and ink cartridges. Others are active in importing refurbished computers, photocopiers and printers.⁴

Remanufacturing is a reasonable alternative regarding the end-of-life management of electronics, particularly for devices with short lifespan such as mobile phones (Nnorom and Osibanjo 2010). Remanufacturing of mobile phones and computers in Nigeria, especially within the free trade zone (FTZ), can trigger future green investments in the sector. This will create jobs, meet local demand for cheap electronics and increase prospects for manufacturing exports.

Source: Nnorom Innocent Chidi (PhD), Senior Lecturer, Department of Industrial Chemistry, Abia State University Uturu, Nigeria

5.3.6 3D manufacturing

A new manufacturing process that could lead to the greening of international supply chains is additive manufacturing, also known as 3D printing or 3D manufacturing. 3D manufacturing, which forms part of the “digitalization of manufacturing” (The Economist 2012), provides an opportunity for developing countries to innovate and decisively participate in the development of a nascent international market.

Broadly speaking, 3D manufacturing is defined as the process by which physical objects are joined together and developed, usually layer upon layer, based on a digital prototype design.⁵ Once relegated to the domain of science fiction, 3D manufacturing is emerging as the new frontier in manufacturing with potentially radical effects on patterns of global trade and development. The ability to design a product in one country and transmit it to another for output promises to level at least a fraction of the global labour market and to unlock the creativity of inventors and entrepreneurs all over the world (Hoyle and Neil 2012).

The process of 3D manufacturing converts raw materials such as metal, ceramic or plastic more directly to finished products, avoiding many of the intermediate steps. Managed properly, fewer materials should be needed and waste can be minimised. Further, since 3D printing allows products to be designed and printed with local materials (including recycled materials), developing countries could reduce their reliance on expensive material imports. In addition, developing countries could create their own, more appropriate products domestically and reap the profits from production. This could help develop the basic infrastructure for future trading opportunities (Campbell et al. 2011).

Industries increasingly draw on 3D manufacturing for the development of end-use parts. Some 6,500 industrial additive manufacturing production units were shipped to manufacturing customers in 2011, nearly twice as many as in 2005 (McKinsey 2012). As the technology underpinning 3D manufacturing improves, and the cost of 3D printers (including their input materials) decreases, this new manufacturing process has the potential to dramatically impact traditional manufacturing and trading models by:

5. ASTM F2792-12 a Standard Terminology for Additive Manufacturing Technologies, copyright ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428. A copy of the complete standard can be obtained from ASTM International.

- Reducing or eliminating assembly lines and supply chains, as ‘final’ products are produced in one singular process rather than by the assembly of multiple aggregate parts, originating from multiple processes and locations;
- De-globalising the production and distribution of products by moving the production process closer to the customer (Campbell et al. 2011): Products’ digital design and raw materials are shipped around the world, rather than the product itself, as the production takes place at the required location.
- Eliminating inventories as products are manufactured on-demand;
- Reducing the carbon footprint and overall energy utilisation within the manufacturing process;
- Decreasing packaging waste associated with shipment of manufactured goods; and
- Reducing the need for manual labour within the manufacturing process, potentially leading to significant industry unemployment.

3D manufacturing can provide several opportunities and challenges to developing countries. For instance, it may not be feasible to buy components to repair existing products such as an irrigation pump or a vehicle within developing countries, particularly in rural regions. Thus, a telecommunication centre or another public place equipped with a 3D printer, a scanner and the internet could support the localised manufacturing of products and components. This could range from simple medical aids and replacement components for agricultural vehicles, to parts for generators, pumps or valves (Campbell et al. 2011).

On the other hand, the fact that 3D manufacturing requires much lower input of manual labour could pose significant challenges to developing countries (The Economist 2012). Production jobs currently account for around 40 per cent of manufacturing employment, with most of the remainder in professional occupations (Sissons & Thompson 2012). While leading to a decrease in production jobs, the digitalisation of manufacturing through, inter alia, 3D printing increases demand for professional services of designers, engineers, technicians, software programmers and other such occupations. This re-orientation of the manufacturing sector, towards professional service provisions, could shift many manufacturing processes back to developed countries (The Economist 2012). In order to address labour market challenges from digital manufacturing and avoid outflux of manufacturing jobs, developing countries need to partially re-focus their manufacturing sectors towards the provision of services and the enhanced education of skilled labour.

5.3.7 Product-service systems

Another opportunity for business to tap into the growing market for sustainability is through “product servicising”, also known as integrated product-service offering or a product-service system (PSS). Trade opportunities in relation to PSS arise from the cross-border leasing of manufactured goods. A PSS can be defined as the result of an innovation strategy shifting the business focus from designing and selling physical products to selling a system of products and services which are jointly capable of fulfilling specific client demands (UNEP 2002).

Innovative PSS can improve eco-efficiency over BAU approaches whilst simultaneously meeting the product’s economic functions. Examples of green servicising include leasing and sharing arrangements such as car-sharing and lifecycle solutions for IT equipment; functional procurement; and efficiency services such as chemical management services, resource management, and energy services companies (EPA 2009). Research shows that PSS is environmentally and economically beneficial in comparison to traditional product sales (Lindahl et al. 2013).

Box 12 outlines the essential differences between product selling systems (traditional product sales) and PSS through exemplification:

Box 12. Traits of traditional product sales v. Product-Service System (PSS) sales

Traditional product sales (selling tangible goods)	Innovative alternatives: PSS (selling functionality)	
Consumer buys a vacuum cleaner to clean house/office	Consumer rents a vacuum cleaner to clean house/office	Consumer buys a service from a company to clean house/office (Company determines suitable equipment and methods based on consumer's needs)
The consumer owns, uses and stores vacuum cleaner. Consumer is responsible for maintenance and the 'quality' of the cleaning	Company retains ownership of vacuum cleaner and is responsible for maintenance. Consumer is responsible for use and 'quality' of cleaning	Company owns, maintains and stores the cleaning equipment including vacuum cleaner. Company is responsible for 'quality' of the cleaning
Initial investment for consumer could be considerable	Consumer costs are spread out over time	Consumer costs are spread out over time
Consumer ultimately disposes of vacuum cleaner and buys replacement	Company responsible for disposal and has incentives to prolong use and product recyclability	Company responsible for disposal and has incentives to prolong use and recyclability of cleaning equipment

Source: UNEP 2012e

As Box 12 demonstrates, PSS is a novel product conception that moves away from the product being the end result of the manufacturing process to one where the product is sold to the consumer in its functionality of being a 'service'. This provides the customer with the utility of the product, while allowing the manufacturer to retain ownership. In so doing, the manufacturer has the ability and the incentive to design products that are more easily recycled or remanufactured at the end of their lifecycle, leading to more sustainable manufacturing processes. Additionally, the consumer only pays for the product on an as-needed basis, reducing both waste and costs (UNEP 2012e).

Shifting from a products-based system to PSS enables a company to move progressively towards a new manner of interacting with its clients. What a company or an alliance of companies conceive, produce and deliver, are not simply material products; rather, this shift to a PSS provides a more integrated solution to customer demand, thus producing less waste, and overall, a more sustainable outcome (UNEP 2002).

In the example in Box 12, the company selling a full cleaning service instead of a vacuum cleaner is able to extend its relationships with the customer beyond the sale of the product. The new servicing relationship includes the continuous provision of services, for example maintenance, which leads to a better understanding and knowledge of customer needs. In addition, the company can assume a role in the end-of-life of the vacuum cleaner by remanufacturing the machine or recycling its materials.

For developing countries, PSS may represent a more promising and environmentally sound path to economic development. It enables countries to bypass the development stage associated with individual ownership of goods (UNEP 2012e).

Companies like Dell, HP, IBM and Orange, for example, are leasing out some of their products instead of selling them. Hence, the consumer is allowed to upgrade machines without the cost of purchasing new machines. With existing supply chains in developing countries, these companies can move operations to developing countries and consumers can benefit from these services (Westervelt 2007). Thus, rather than accepting absolute ownership and responsibility through product purchase, customers initiate a continuous dialogue with the company, involving the regular assessment and satisfaction of customer requirements.

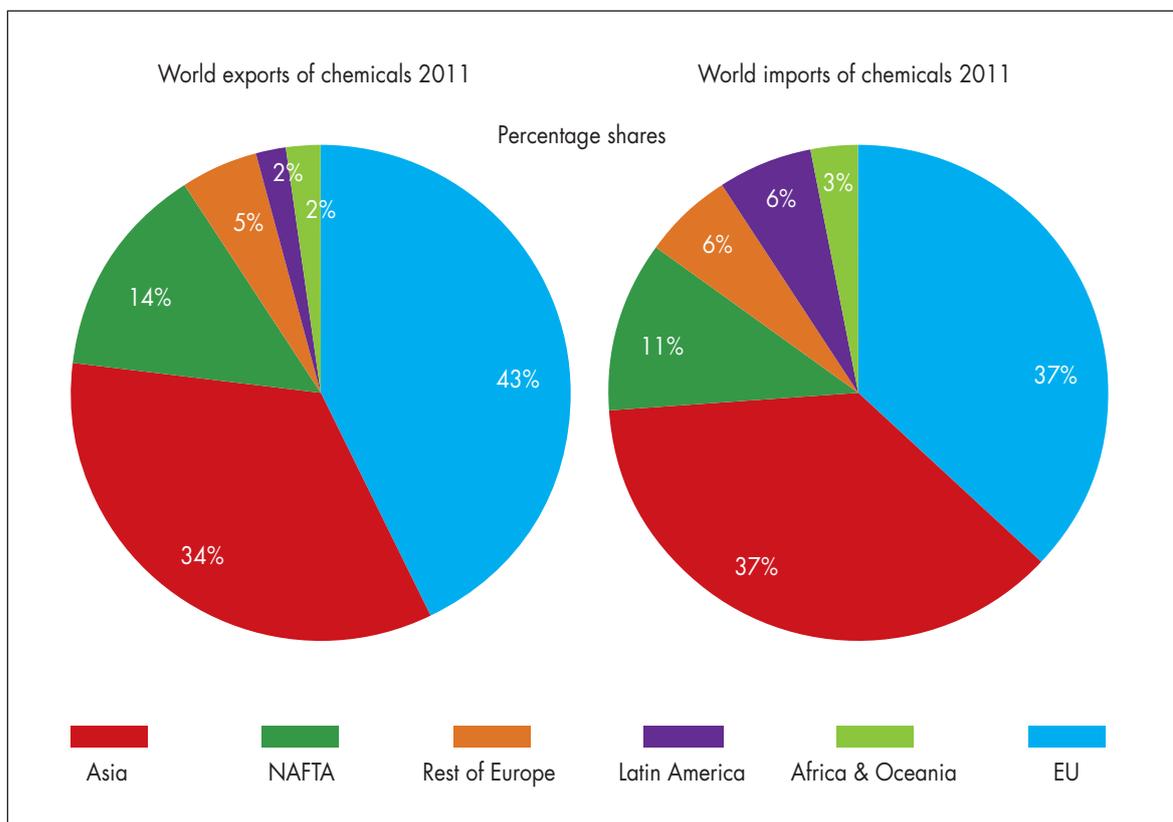
5.4 Trends and trade opportunities in specific subsectors

The manufacturing sector comprises a variety of industries. Their relative importance in terms of greening potential varies by country context. Below is a brief analysis of some of the key industries that offer potential for increasing exports of green products. There are many other trade opportunities arising from more sustainable manufacturing in various sectors such as automobile, pulp and paper, iron and steel, cement, aluminium, mining, renewable energy, food and beverage industries, and handicraft. Some of these sectors are described in the other chapters of this report.

5.4.1 Chemicals

Chemicals play an important part in the world economy and are used in industry, agriculture and incorporated into products that are traded around the globe. Although the number of chemicals on the global market is not known, it is estimated that there are more than 140,000 chemicals on the EU market today; only a fraction has been thoroughly evaluated to determine their effects on human health and the environment, according to UNEP’s Global Chemicals Outlook report (UNEP 2013). UNEP warns that synthetic chemicals are fast becoming the largest constituents of waste streams and pollution, thereby increasing the exposure of humans and habitats to chemical hazards.

Figure 7. World Trade in Chemicals in 2011



Source: CEFIC 2011

Global chemicals sales are projected to grow at an annual 3 per cent until 2050, according to the Organisation for Economic Cooperation and Development (OECD 2012). The OECD countries as a group still account for the bulk of world chemical production. However, production in developing countries is increasingly significant. The OECD notes that, while annual global chemical sales doubled over the period 2000 to 2009, the share of OECD member countries decreased from 77 to 63 per cent and the share of the BRIICS’ economies (Brazil, Russia, India, Indonesia, China and South Africa) increased from 13 to 28 per cent (UNEP 2013, OECD 2012).

The chemicals industry is faced with the urgent challenges of avoiding the production of certain harmful chemicals, and promoting their substitution with greener chemicals to harness its potential in greening the economy. Given the global trend away from the use of environmentally hazardous chemicals, some approaches can translate into export opportunities, particularly for early actors. Hence, sound management of chemicals can deliver major economic benefits and support the transition to a green economy. The benefits of action of sound chemicals management far outweigh the mounting costs of inaction.

The *Global Chemicals Outlook* highlights the growing chemical intensification of the economy. This intensification includes a shift of chemicals production and use from developed to developing countries and countries with economies in transition. The penetration of chemicals into all aspects of production and consumption, and the increasing dependence of the economy on products from the chemical industry, is a growing concern. The failure to manage chemicals soundly, notably safely, will result in huge economic costs. Human health and the environment are already being seriously affected by the current arrangements for managing chemicals and hazardous wastes. According to the *Global Chemicals Outlook*, "...it is necessary to consider policy approaches to ensure that chemicals are produced and used in ways that minimize effects on health and the environment...chemicals in industry, in agriculture and in products – presents its own set of challenges for sound management of chemicals" (UNEP 2013).

Fortunately, some of the challenges facing the chemicals sector are starting to be met. For example, in addition to regulatory drivers such as the EU's Regulation on Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) (EC 2006), some companies are considering that the use of green chemistry⁶ can lead to advancements in innovation, spur economic development and exports, reduce risks to human health and the environment, and deliver compelling returns on investment. Furthermore, using greener chemicals can create value drivers along the supply chain, which can increase the worth of a product by improving its perception.

Major economic gains can be reaped through chemical recycling, the development of safer substitutes, recovery of valuable materials, and sustainable agriculture practices, such as integrated pest management (IPM). In potato farms in Ecuador, for example, IPM was introduced to tackle high pesticide poisoning rates. As a result, IPM plantations yielded equal potato production with less production costs than plots using chemical pesticides; the measure also significantly reduced reported cases of pesticide-related neurological problems (UNEP 2012f).

In many developing countries, in particular in emerging economies, safer chemical and non-chemical alternatives are already available. Some 45 countries have National Cleaner Production Centres (NCPCs) that dispense training and technical assistance in sound chemical practices to small and medium-sized enterprises (SMEs) (Egler 2012). These programmes have been instrumental in reducing the use of those chemicals of high concern, such as ozone-depleting substances, mercury, lead and chlorinated solvents. For example, the South African NCPC provides programmes tailored for the chemical industry while the NCPC in Ethiopia offers a dedicated programme for tanneries (Asfaw et al. 2007). In Egypt and Morocco, NCPCs have promoted new business models like chemical leasing. Green chemistry in Africa is also making rapid advances. It has caught the attention of a number of African chemical producers and the industry is actively pursuing opportunities to exploit resources in their countries, such as sunlight for photochemistry or biomass to produce chemicals (UNEP 2006).

The chemical market in Africa is primarily targeted at meeting local needs rather than being export-orientated. Nevertheless, the import and export of chemicals is on an upward swing. Chemical innovation can support the development of new enterprises and new greener export-oriented products and services. In developing economies, there are many firms that already successfully export greener products such as natural fibre products, organic produce and bio-based formulations. This trend is expected to continue, given the increasing demand for chemicals by Africa's growing economies. For example, Box 13 illustrates the example of a Kenyan company that is exporting a product made from a natural herbal extract that fights drug-resistant malaria.

6. The use of green chemicals in manufacturing processes is an emerging phenomenon that is likely to further increase in the future. Sustainable or green chemistry can therefore become a key driver shaping the world's trading environment. The term green chemistry is defined as: "The design, development, and implementation of chemical processes and manufactured products to reduce or eliminate substances hazardous to human health and the environment". The concept was further defined during the 1990s by Dr. Anastas (US Environmental Protection Agency) and chemistry professor John C. Warner (University of Massachusetts, Boston) when they came up with the 12 principles of green chemistry. These include: waste prevention; safety (low toxicity, minimise accident); using renewable raw materials or feedstock (source of starting material for a chemical reaction); increasing energy efficiency; using safer solvents and reaction conditions; and designing bio-degradable chemicals so that they do not accumulate in the environment (EPA 2012).

Box 13. Botanical Extracts EPZ Limited (BEEPZ)

BEEPZ is based at the Export Processing Zone (EPZ) in Athi River, Kenya. The primary business is the production of artemisinin to fight drug-resistant malaria. BEEPZ was created to develop a sustainable supply chain for quality artemisinin at a price that makes life-saving artemisinin-based malaria treatments affordable to the people who need them most.

The product is based on a herbal extract and is grown and processed locally in East Africa according to international quality standards. Since 2008, the company has been ISO 9001 certified. BEEPZ ships to global producers for further processing and thus is part of a global effort to combat malaria.

Source : BEEPZ 2012

5.4.2 Information and communication technologies and electronics

The information and communication technologies (ICT) and electronics sector currently accounts for nearly two per cent of global CO₂ emissions, roughly the same level as the airline industry. Total emissions from the ICT and electronics sector are expected to increase by 50 per cent by 2020 (Arnaud 2012). Further, due to the relatively short life cycle of ICT and electronics products and the lack of solutions for end-of-life disposals, the sector faces increased energy use and a growing dispersal of toxic chemicals. In greening their manufacturing processes and products, ICT and electronics producers will need to reduce GHG emissions and limit the use of harmful chemicals.

In support of greening the sector, there is a strong growth in voluntary certification schemes both in developed and developing countries. Key examples of ecolabels for ICT and electronics products include:⁷

- Good Environmental Choice Australia (GECA)
- China Environmental Labelling
- EU Ecolabel
- EcoMark (Japan)
- Korean Ecolabel
- EcoLogo (North America)
- Green Label (Thailand)
- Electronic Product Environmental Assessment Tool (EPEAT) (USA)

A UNEP report in 2007 on ecolabelling in Africa found that the market for such goods is growing and that labelling increasingly provides producers with a competitive advantage in international markets (Janisch 2007).

Over the past few years, there has also been growth in energy-efficiency standards and mandatory labelling programmes for ICT and electronic products. These standards and programmes have targeted household appliances, equipment and lighting. In the EU, for example, a key driver of the energy efficiency design of products is the Directive on the Ecodesign of Energy-Using Products (2005/32/EC) and then, as of 20 November 2009, its replacement the Energy-Related Products Directive (2009/125/EC). These Directives put in place a framework for mandatory implementing regulations on the reduction of energy consumption and other negative environmental impacts for manufacturers at the design stage. These implementing regulations determine measures to improve the energy performance of products and appliances including boilers, light bulbs, televisions, fridges, washing machines and air-conditioners (EC 2009).

In Japan, the Top Runner programme is a regulatory scheme that aims to improve energy efficiency of products such as household and office appliances and vehicles. Under the Top Runner programme, the

7. For a comprehensive list of eco-labelling schemes world wide, please see <http://www.ecolabelindex.com/ecolabels/>.

manufacturer with the best efficiency model of production sets the new benchmark for the following year. Manufacturers are then obliged to meet this standard within a four to eight year period (Nordqvist 2006).⁸

Many of the energy efficiency labelling programmes in the ICT industry are mandatory, such as the EU Energy Label. Therefore, in order to export to a specific market, a label may be required to be clearly displayed on the appliance at the point of sale. Figure 8 sets out examples of energy efficiency and labelling programmes around the world.

Figure 8. Examples of energy efficiency and labelling programmes

Country	Programme Name	Target Products
Australia	Energy Rating Programme: Australia	Electronics, energy
China	Certification Centre for Energy Conservation Products (CECP)	Energy
China	China Energy Label	Electronics
EU	EU Energy Label	Washing machines, tumble dryers, washer-dryers, dishwashers, ovens, refrigerators, freezers, lamps and air conditioners
EU	EuP	Electronics, other energy related products
EU/US	Energy Star	Computers, monitors, printers and fax machines
Japan	Energy Saving Labelling Programme: Japan	Appliances, electronics
Canada	Office of Energy Efficiency (OEE)	Automobiles, appliances

In the past 20 years, developing countries in East Asia have become increasingly important manufacturers in the ICT and electronics sector. Many companies in this region are already using their experience to develop greener products for export. Boxes 14 and 15 illustrate key examples, in China and India respectively, of developments in the ICT industry towards more sustainable products.

Box 14. UNEP project on electrical appliances in China

The UNEP project “Enabling Developing Countries To Seize Ecolabel Opportunities” carried out a national level project to increase the uptake of ecolabels in the electrical appliance sector, in particular television systems, in China. Due to rapid technological changes and the rising volumes of export, the electrical appliance sector in China is regarded as a prime sector for benefiting from the use of the EU Ecolabel for exports to Europe. By the end of UNEP project activities in 2012, the EU Ecolabel online catalogue (available at: <http://ec.europa.eu/ecat/>) included a large number of products from Chinese companies, as compared to none at the project’s beginning.

The project found that there is a growing awareness of the EU’s ecolabel within China’s business sector. However, the absence of mutual recognition between the Chinese and EU ecolabels poses a significant challenge for promoting the EU’s ecolabel for products manufactured in China. This inter-regional incompatibility of ecolabels needs to be addressed to further harness opportunities in the trade of ecolabelled products.

Source: UNEP 2012c

8. This was highlighted at Rio +20. See UNCSD (2012).

Box 15. Wipro: “the world’s greenest electronics company”

Wipro is India’s third-largest software exporter and also exports hardware, such as personal computers and laptops. According to the 18th Guide to Greener Electronics, published by Greenpeace in November 2012, Wipro was ranked as “the world’s greenest electronics company”.

How did Wipro achieve this result? Several factors have helped the company become a large export-oriented business. On the energy efficiency and costs reduction front, Wipro has committed to reduce its absolute GHG emissions by an overall 44 per cent by 2015, the highest reduction commitment among leading Indian and international companies. The company aims to achieve 85 per cent of its emissions reduction through renewable energy use.

Moreover, the company has undergone significant improvements in product design, with all of Wipro’s new products currently meeting the latest Energy Star compliance standards, while 52 per cent of products exceed Energy Star 5.0 standards. Wipro also fares reasonably well at phasing out hazardous chemicals from its products, stating that 80 per cent of its products are free of polyvinyl chloride plastic (PVC) and brominated flame retardants (BFRs), although the company missed its goal of being 100 per cent PVC/BFR-free by 2012.

On the waste management front, Wipro continues to receive by Greenpeace the maximum score for its effective take-back policy and performance on the collection and recycling of post-consumer e-waste. It provides a convenient take-back service to its customers through 17 direct and 300 authorised collection centres, the highest in India by any PC manufacturer.

Source: Greenpeace 2012

5.4.3 Textiles, clothing and footwear

The textile industry is concerned with the design and manufacture of clothing as well as the distribution and use of textiles. Textile industry sectors include fibre production (natural and synthetic), raw weaving, dyeing, finishing and printing and final make-up into garments (carpets, fabrics, etc.). Natural fibres include animal wools and cellulose products such as cotton and flax. Synthetic fibres include rayon, acrylic, polyester, polyurethane, polyamide and others. Leather articles are also defined as textile goods (UNEP 2011d).

The global textiles and garments industry is an important component of world trade flows, especially for some developing countries where clothing accounts for a large proportion of exports (infoDev 2008). In 2004, world exports of textiles were valued at US\$ 195 billion and exports of clothing were valued at US\$ 258 billion, representing a respective 2.2 per cent and 2.9 per cent of total global merchandise trade (WTO 2012a).

Developing countries account for approximately half the world’s textile exports and nearly three-quarters of the world’s clothing exports (UNCTAD 2005). Trade patterns in textiles and garments are similar although the textiles business tends to be capital-intensive, while garment making is labour-intensive and usually relies on a low-cost workforce (infoDev 2008).

A distinctive feature of the clothing industry is the group of countries highly dependent on garment exports, whose absolute value of exports, however, is not high in terms of the overall global garment trade. In 2004, clothing provided more than 40 per cent of total merchandise exports for Bangladesh, Cambodia, El Salvador, Lesotho, Mauritius and Sri Lanka (WTO 2012a), whereas their small relative share in global garment trade is highly disproportionate to the national importance of this sector.

However, the textile, clothing and footwear sector faces many sustainability challenges related mainly to pollution and discharge of toxic substances. In particular, textile manufacturing is a very resource-intensive process, requiring significant amounts of water and chemicals to turn fibres into yarn, then into textile fabrics. This process releases toxic substances, including heavy metals such as lead, chromium and mercury into the environment and water systems. Thus, it is important that more sustainable methods and business practices are introduced across the textile, clothing and footwear sector. This can be accomplished by:

- Recycling textile products/inputs;
- Using eco-leather;
- Promoting certification and standards for production methods that conform with ecolabelling regimes worldwide;
- Improving production efficiency;
- Becoming more energy-efficient;
- Reducing water consumption and waste generated; and
- Using fewer chemicals or replacing hazardous chemicals with greener ones.

Textile manufacturers are undertaking environmental initiatives that target the energy efficiency of production methods, renewable energy sources and waste recycling (Environmental Leader 2009). One example is the system of Restricted Substance Lists, which the garment industry has developed to enforce restrictions on certain chemicals within their supply chains (UNEP 2011d).

The export market for eco-friendly textile products is increasing in importance, following the liberalisation of the textile market in 2005.⁹ Assisting this export growth opportunity are the development and use of industry and supplier-driven certification schemes. These are seen to offer a potential market advantage for those seeking to maintain and enhance exports to developed countries by providing evidence of sound ecological processing.

9. The Multifibre Arrangement ended on 1 January 2005 and the sector was fully integrated into the rules of the General Agreement on Tariffs and Trade (GATT). See WTO (2012b).

Increasingly, many actors/brands in the textiles sector are raising the visibility of diverse topics of product sustainability and CSR in relation to their products. Different actors stress different elements, but, in general, a widespread dialogue on sustainability is underway. Some of the existing certification schemes are set out in Box 16.

Box 16. Examples of certification schemes

- **bluesign®**
The declared objective of the independent bluesign® standard is to offer a reliable and proactive tool for the entire textile production chain from raw material and component suppliers to textile manufacturers, to retailer and brand companies, and to consumers.
- **Oeko-Tex**
Oeko-Tex is an international testing and certification system for textiles regarding limiting the use of certain chemicals that may be harmful to consumers. It also serves as an additional quality assurance tool for the manufacturer.
- **Global Organic Textile Standard (GOTS)**
GOTS is the leading textile processing standard for organic fibres. It aims to define world-wide recognised requirements to ensure organic status of textiles throughout the life cycle of the product, from harvesting the raw materials through environmentally and socially responsible manufacturing, to labelling.
- **EU Ecolabel**
The EU Ecolabel is a voluntary scheme jointly developed between representatives of industry, commerce, environmental and consumer organisations, and trade unions. It is found throughout the EU as well as in Norway, Liechtenstein, and Iceland (EC 2012). The ecolabel is reserved for use by manufacturers that exhibit the lowest environmental impact in their production and processing methods, based on the entire life cycle of the product, from the extraction of raw materials to the finished product.
- **Ecological and Toxicological Association of Dyes and Organic Pigments Manufacturers (ETAD)**
ETAD member companies coordinate their efforts to minimise adverse impacts of organic colorants on health and the environment.
- **The Worldwide Responsible Accredited Production (WRAP)**
WRAP certifies compliant manufacturing and service facilities to a 12-point labour and environmental code. The programme looks at RSLs as part of its certifications.
- **China Environmental Labelling**
This scheme is managed by the Chinese Government and is a voluntary third-party certification system based on labelling procedures developed in OECD countries. So far, China's labelling programme has increased consumer awareness of labelled products and encouraged some enterprises to adopt cleaner technologies in products that are closely related to consumers' health.

Source: Jimin and Qing 1999

Over the last two decades, consumers, particularly those in developed economies, have become increasingly concerned with the environmental impacts of their purchasing decisions, and have increasingly demanded environmentally-friendlier products (Jahnke 2000). Demand for eco-friendly textile, clothing and footwear products is particularly rising. Consequently, consumer preferences for natural fibres such as organic cotton, wool, hemp and silk are providing new income opportunities in developing countries. For example, the International Institute for Sustainable Development (IISD) estimated that the production of goods compliant with major voluntary standards systems is now reaching significant levels of market penetration, already accounting for over 10 per cent of global production (Potts et al. 2010). The Oeko-Tex Standard reported an increase in certified production companies of about 20 per cent in 2011 alone.

The increasing demand for eco-friendly textiles, clothing and footwear creates export opportunities for manufacturers in developing countries that green supply chains and produce green products, as illustrated below in Box 17.

Box 17. Mauritius – greening export-orientated manufacturing

Since its independence in the late 1960s, Mauritius has recognised the importance of an export-oriented strategy as a driver for economic growth and to generate foreign exchange. However, Mauritius' export-oriented textile and clothing manufacturers realised in recent years that they could not compete on international markets while remaining heavily reliant upon conventional technologies that are fossil fuel and water intensive.

In 2008, the Mauritian Prime Minister, partly out of recognition of the need to revitalise the economy to remain competitive and within the objectives of transitioning to a green economy, announced the Maurice Ile Durable project (<http://www.gov.mu/portal/goc/mpu/file/ile.pdf>). Essentially, this is an overarching mechanism to finance projects aimed at the preservation of natural capital and the promotion of renewable energy sources in both consumption and production at the household and business level. A key component of the scheme has been the creation of investment-related risk-transferring mechanisms (from private to public).

In 2010, the Mauritius Export Association (MEXA), the national association of private exporters, introduced the Blue Carbon Award, with the aim of enhancing the recognition of companies adopting green economy practices.

These public and private initiatives, by creating incentives for innovating towards the use of more energy-efficient technologies, have enabled companies in the textile and clothing manufacturing sector in Mauritius to remain competitive in international markets. For instance, RT Knits Ltd has focused its efforts on reducing energy and water consumption and realised a drop in fuel consumption by 30 per cent while also improving the working conditions of 1,600 employees. Likewise, Tamak Ltd has pursued green policies by focusing on ecobuilding, which has allowed the company to save about 20 per cent on electricity costs. Tamak Ltd is also working with the Mauritius government to perform audits on the building to help further reduce energy consumption.

Management in several companies decided that adopting a sustainable model through energy-efficient practices and technologies would provide the edge they required to maintain long-term competitiveness in international markets. Indeed, greening the export-oriented textile and clothing sector has produced impressive results in terms of improved efficiency and sustainability. While the government incentivises green practices, early business adaptors have made the transition to greener production as part of a business strategy, rather than for political or reputational reasons.

Source: Riad Sultan of the University of Mauritius

Eco-friendly creations are also starting to be seen on fashion runways. Even large fashion retail chains, such as H&M, have raised public awareness of the eco-fashion sector (Dörre 2008). Levi's made headlines with its offer of eco-jeans made from organic cotton and dyed with natural indigo (Osborne 2006). Emerging economies also account for an increasing share in demand for eco-friendly textiles, particularly among Chinese and Indian consumers (National Geographic 2009).

Many developing countries have already harnessed opportunities emerging from new niche markets, such as for eco-leather products (Janisch 2007), as illustrated in Box 18.

Box 18. UNEP project on ecolabelling in the footwear industry in Kenya and Ethiopia

As part of UNEP's project on "Enabling Developing Countries To Seize Ecolabelling Opportunities", as set out in Box 14, UNEP also considered opportunities to use the EU Ecolabel in the footwear industry in Kenya and Ethiopia.

In Kenya and, to a certain extent, in Ethiopia, the footwear industry contains a high percentage of workers in the informal sector. This means workers are dispersed and ecolabels cannot be easily applied, as they are based on evaluation within more organised production systems. In Kenya, there is not a single enterprise large enough and interested in applying to the EU ecolabel and there is a lack of developed infrastructure. In Ethiopia, on the other hand, the footwear sector enjoys strong government support, being one of the strategic sectors of the industrial development programme orientated toward quality improvement and trade expansion.

In Ethiopia, the issue of tanneries not complying with the requirements of chemical oxygen demand (COD) levels remains a challenge. In Kenya, the government needs to understand the structural problems of the industry. In both cases, government support is critical to adopting the EU's ecolabel in order to secure increased footwear exports.

Source: UNEP 2012c

5.5 Enabling conditions

The sections below outline the main categories of policy tools that governments and private actors may use to harness trade opportunities that arise from the transition to a green economy assessed in this chapter. It is important to recall that green economy strategies and ambitions vary significantly based on a country's circumstances, their national endowments as well as political and economic conditions and priorities. The mix of policy tools, and the timeframes for their implementation, will consequently vary from one country to another. The list below offers concrete suggestions for actions from governments, the private sector, and other stakeholders to create enabling conditions conducive to trade opportunities that arise from or are associated with a transition to a greener economy in the manufacturing sector.

5.5.1 Public investment and spending

- **Foster green public private partnerships.** Investing in green partnerships can promote the implementation of green manufacturing, for example, through the promotion of sound chemical management policies and strategic cooperation between the business community and government (UNEP 2012d).
- **Invest in a skilled workforce.** Education and training investments should be made to develop a workforce capable of applying novel, more resource-efficient technologies and production systems in new or changed industries. Engagement of unions, employers and labour market institutions will ensure that the creation of trade opportunities in a green economy is fair and decent (UNEP 2011a).
- **Support green manufacturing initiatives.** Institutional support can include financial support and loans and the provision of goods and services. It can also involve the implementation of appropriate systems for efficient and more responsible uptake of resources, waste recovery, recycling and distribution. The increase of voluntary initiatives by manufacturing industries over the last decade has illustrated a growing willingness to measure and communicate relevant performance with investors and other stakeholders.

5.5.2 Business strategies

- **Green existing industries.** The manufacturing sector can, regardless of size or location of facilities, continuously reduce the environmental impacts of manufacturing processes and products through:
 - Taking increased producer responsibility;
 - Meeting all environmental standards set by the government;
 - Performing a material, energy and water audit;
 - Using energy and other resources (more) efficiently;
 - Substituting fossil fuels with renewable energy sources;
 - Phasing out toxic substances including heavy metals, obsolete pesticides and insecticides, and asbestos;
 - Promoting the sound management of chemicals;
 - Improving occupational health and safety;
 - Looking for superior solutions to waste minimisation;
 - Establishing environmental management systems;
 - Upgrading and green retrofitting;
 - Obtaining certifications such as ISO 9001, ISO 14001 and ISO 50001;
 - Using Life Cycle Analysis tools; and
 - Minimising emissions through the concept of industrial ecology.¹⁰
- **Encourage manufacturers and service providers to disclose their carbon footprint.** Manufacturers can be encouraged to provide verifiable and easily available, comparable and understandable information on the carbon footprint of their products and/or services and to support the public dissemination of this information (WEF 2012).
- **Identify opportunities to collaborate on the use of sustainable transportation processes and technologies.** Collaboration with actors in other parts of the value chain, including both suppliers upstream and customers downstream, can help to develop and scale up the use of sustainable transportation processes and technologies (WEF 2012).
- **Create new green industries.** Stimulating the development and creation of manufacturing industries that deliver green products can help build up new capabilities in green sectors. This includes companies that manufacture and install renewable energy equipment and companies that develop and produce clean technologies.
- **Advocate and ensure suppliers' adherence to green codes of conduct.** In response to growing consumer demand for sustainable business practice, multinational companies are increasingly developing and implementing codes of conduct for their suppliers. Some of these codes are directed towards manufactured goods such as clothing, toys and industrial products. A number of EGS have been developed to ensure responsible business practices and labour relations of suppliers within developing economies (Jenkins 2001). By demonstrating adherence to such codes of conduct, businesses in developing economies can significantly improve their export opportunities. Principles that often inform the development of these codes can be found in the UN Global Compact's ten principles (UNGC 2012).

5.5.3 Market-based instruments and reform of harmful subsidies

- **Implement market-based incentives for green products.** Domestic tax policies could be adopted that offer tax rebates for green products, while applying fees to products that do not meet the standards. A "feebate" system (i.e. one that awards fees or imposes rebates, depending on the criteria) could be constructed in which rebates and fees are scaled according to the eco-efficiency,

10. For more information see the presentations and background papers presented at the "Third meeting of the 3R regional forum", 5-7 October 2011, see UNCRD (2011).

durability and environmental-friendliness of a product. Such a system has been used in the energy sector, but the concept has not yet been implemented in the manufacturing sector (UNEP 2012d).

- **Facilitate the use of economic and financial instruments for green chemicals.** Economic instruments can be used to internalise the environmental, health and social costs of chemicals use and create financial incentives for developing sound chemicals management strategies, eliminating hazardous chemical and waste and promoting safe chemical use in all economic sectors. Further, the financial sector could evaluate the inherent risks of chemicals in the activities and corporations in which it finances, and collaborate with other stakeholders to mitigate those risks (UNEP 2012f).
- **Reform harmful subsidies.** According to the International Energy Agency (2011), global fossil fuel subsidies amounted to US\$ 523 billion in 2011 and thus exceeded subsidies to renewable energy resources six-fold. OECD countries alone spend an annual US\$ 400 billion in subsidies, often supporting environmentally harmful technologies (OECD 2005). The subsidies on fossil fuels and other environmentally harmful technologies create a global abundance in cheap and mispriced hydrocarbons. To accelerate the growth of more sustainable methods and thereby encourage increased trade in green manufactured products, countries need to eliminate subsidies that benefit carbon-intensive industries. Financial resources that thereby become available could be used to enhance the development and use of environmentally sound technologies.

5.5.4 National regulatory frameworks

- **Develop national strategies and frameworks for greening manufacturing.** National strategies, programmes and frameworks are a primary means through which government efforts to green new and existing industries can be integrated, resourced, coordinated and implemented. Policies and actions to support the greening of industries can be incorporated into a variety of national-level strategies, including: high-level, cross-government strategies such as National Sustainable Development Strategies; overarching legal frameworks (e.g. China's Circular Economy Promotion Law); strategies that more specifically address the greening of industries, such as national sustainable consumption and production strategies; and sector- and issue-based strategies, such as resource use, waste, energy, education, and health and safety (UNIDO 2011).
- **Undertake green regulatory reform.** Regulatory reform, combined with market-based approaches, can pave the way for green manufacturing industries to innovate and compete on a fair basis. Policy action is often required, for example, to enable efficiency improvements in energy use through the greater use of cleaner technologies, like combined heat and power plants. Recent history shows that the introduction of taxes can be a strong driver for cleaner technology innovation and enhanced energy efficiency (UNEP 2011a). Furthermore, the public sector can assist in fostering demand for domestic and imported green products and technologies through sustainable public procurement (SPP). Public procurement accounts for 1.5 – 30 per cent of GDP in a given country and, if fostering environmentally sound developments, can be an important facilitator of sustainable trade (UNEP 2012b).

5.5.5 International frameworks

- **Promote new international resource efficiency standards.** These standards will help to avoid competition from countries not bound by the same resource efficiency gains. In this respect, international cooperation needs to ensure that developing countries have an active role in setting these standards.
- **Harmonise international standards and establish equivalencies.** Ensure that international standards and labelling schemes for sustainable products, due to their complexity and/or diversity, do not effectively exclude developing country producers from international markets. Establishing equivalencies between standards, for example, will further reduce barriers for exporters.
- **Foster export of second-hand energy-efficient technologies.** Countries could include more energy-efficiency and minimum health and safety requirements in the work of ISO's technical committees on cross-border trade of second-hand goods. Developing countries could also be encouraged to set minimum energy performance standards and remove trade barriers on the import of used and new equipment (EGEE 2007).

- **Open up trade in remanufactured goods.** Since remanufactured goods are not the same as used goods, economies should not restrict their importation based on grounds commonly used to prohibit or limit trade of used goods (APEC 2011).
- **Develop trading conditions for sustainable chemistry.** International and national chemical control activities could be strengthened by legislation to address the gaps in current chemicals-related. Sound chemicals management should be mainstreamed into multilateral and bilateral economic assistance programmes (UNEP 2012f). For example, the Rio+20 Outcome Document, under paragraph 214, calls for the implementation and strengthening of the Strategic Approach to International Chemicals Management (SAICM).
- **Leverage benefits from trade agreements.** Trade agreements such as Regional Trade Agreements (RTAs) can help strengthen the enforcement of environmental laws while raising the level of industry standards. For some countries, the negotiation of RTAs has been a driver of policy reforms, increased capacity development, and better cooperation among trade and environmental officials (UNIDO 2011).

5.5.6 Enhancing dialogue and capacity building

- **Promote the circular economy.** Large manufacturers can play a key role in taking greater responsibility for the management of materials throughout the supply chains and across the product lifecycles to ensure the greening of overall production processes. The main objective should be to make manufactured goods last longer through emphasis on re-design, repair, reconditioning, re-manufacturing, recycling and leasing. Extended Producer Responsibility laws, refundable deposit schemes and an improved functioning of markets for secondary raw materials are promising starting points.
- **Promote green manufacturing training.** Education and training, including for government officials and the private sector, in areas such as cleaner production could contribute significantly to making the manufacturing sector more sustainable.
- **Assist manufacturers requiring green certification.** Many companies in developing countries may require support to attain a certification for their products and assist them in accessing international markets for green products.
- **Build the capacity of certification bodies.** Increasing exports of green products places high demand on certification bodies that must service these exports with certificates and forward inspection reports. Certification agencies in exporting countries must also respond to queries from importers, authorities or certification bodies in importing countries, and may be required to seek direct accreditation for specific export markets. In order to become efficient service providers, bodies must invest into training staff and establishing procedures.
- **Organise trade fairs for green products.** Trade fairs and exhibitions of green products for exports and sustainable merchandise are important venues for raising awareness among consumers in both developed and developing countries, profiling green products for export and reaching new markets.
- **Facilitate the development of sustainable international supply chains.** A major rationale for value chain facilitation is to link suitable stakeholders including manufacturers, producer organisations, processors, buyers, certification agencies, and financial intermediaries. Facilitators are available to mediate between the different interests of the chain actors and ensure that the concerns of all relevant stakeholders are taken into consideration (IFOAM 2010).
- **Create energy-efficiency loan guarantee funds in developing countries.** Developed countries could provide funds through multilateral banks, such as the International Finance Corporation, to enable them to guarantee energy-efficiency loans. These banks could also provide technical assistance to develop a pipeline of bankable energy-efficiency projects (EGEE 2007).

This chapter has illustrated the manifold challenges and opportunities at the intersection of the manufacturing industry, trade, and the transition to a green economy. The manufacturing industry significantly contributes to environmental degradation and the primary challenges for greening the sector are industrial efficiency and innovation. Furthermore, while manufacturing is foremost a domestic concern, international trade can have

a significant impact on manufacturing, not least through decisions about responding to export demand for green manufactured products and about how products can be manufactured in order to enhance competitiveness globally.

There are several trade opportunities for promoting a green economy in manufacturing, including increased economic efficiency, and thus global competitiveness, improved relationships between suppliers and purchasers, and better and new market access through providing greener goods and services. These opportunities can be realised by one or several of the following methods: greening supply chains (including transport), implementing energy-efficient technologies throughout business processes, manufacturing environmentally friendly and ecolabel goods, promoting EGS, investing in renewable energy in industrial applications, promoting remanufacturing and considering emerging opportunities such as 3D manufacturing and product servicing.

However, before developing countries can fully benefit from these opportunities, many challenges, particularly relating to the lack of responsible investments and infrastructure in many manufacturing sectors, need to be overcome. Investing in a skilled workforce capable of applying novel, more resource-efficient technologies and production systems in new or existing industries is one critical element for future economic growth. At the same time, governments need to facilitate the development and creation of manufacturing industries that deliver green products so as to help build up new capabilities in all economic sectors. At the international level, opening up and promoting trade in environmental goods, remanufactured goods, and energy efficiency technologies can lead to greater exports of these products.

5.6 Further Resources

5.6.1 Websites for additional information

Green Economy Report: Chapter on Manufacturing:

http://www.unep.org/greeneconomy/Portals/88/documents/ger/7.0_Manufacturing.pdf

Global Chemicals Outlook: Synthesis Report for Decision-Makers:

http://www.unep.org/pdf/GCO_Synthesis%20Report_CBDTIE_UNEP_September5_2012.pdf

UNEP Finance Initiative: A New Angle on Sovereign Credit Risk: E-RISC - Environmental Risk Integration in Sovereign Credit Analysis (2012):

http://www.unepfi.org/fileadmin/documents/ERISC_Phase_1.pdf

UNECE: Promoting Energy Efficiency Investments for Climate Change Mitigation and Sustainable Development (2012-2014):

http://www.unece.org/energy/gee21/promoting_eei.html

United Nations Conference on Trade and Development (UNCTAD), Commodities Section:

<http://unctad.org/en/Pages/Statistics/AboutUNCTAD-Statistics.aspx>

The Global Apparel Value Chain: What Prospects for Upgrading by Developing Countries:

http://www.unido.org/fileadmin/media/documents/pdf/Services_Modules/Apparel_Value_Chain.pdf

DESA Department of Economic and Social Affairs:

<http://www.un.org/en/development/desa/climate-change/energy-efficiency.shtml>

ILO/WTO. (2011). *Making Globalization Socially Sustainable*. Available at:

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The OECD Sustainable Manufacturing Toolkit (designed to help businesses around the world, particularly supply chain firms and small and medium-sized enterprises, develop a more viable, socially responsible business approach and make the most of green growth opportunities):

<http://www.oecd.org/innovation/green/toolkit/48704993.pdf>

OECD-WTO Database on Trade in Value added:

http://www.wto.org/english/res_e/statis_e/miwi_e/miwi_e.htm

Trade in value added: concepts, methodologies and challenges (joint OECD-WTO note):

<http://www.oecd.org/sti/ind/49894138.pdf>

Trade Policy Implications of Global Value Chains (OECD):

<http://www.oecd.org/sti/ind/tiva-policy-implications.pdf>

APEC: Concepts and Trends in Global Supply, Global Value and Global Production Chains:

http://publications.apec.org/publication-detail.php?pub_id=1283

WEF: The Shifting Geography of Global Value Chains: Implications for Developing Countries and Trade Policy:

http://www3.weforum.org/docs/WEF_GAC_GlobalTradeSystem_Report_2012.pdf

ISO Energy Management Standards:

http://www.iso.org/iso/home/news_index/news_archive/news.htm?refid=Ref1537

Business for Social Responsibility:

<http://www.bsr.org/>

Global Reporting Initiative:

<http://www.globalreporting.org>

Remanufacturing Studies at Boston University:
www.bu.edu/reman/

Textile Exchange — a business network of the organic fibre and textile industry:
www.textileexchange.org

The Ecological and Toxicological Association of Dyes and Organic Pigments Manufacturers:
<http://www.etad.com/>

The Higg Index of the Sustainable Apparel Coalition:
<http://www.apparelcoalition.org/>

The Sustainable Energy for All Initiative:
<http://www.sustainableenergyforall.org/>

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Acronyms

BAU	Business-as-usual
CDM	Clean Development Mechanism
CER	Certified Emission Reductions
CET	Clean energy technologies
CSP	Concentrated solar power
DII	Desertec Industrial Initiative
DRC	Democratic Republic of Congo
ECT	Energy Charter Treaty
EGS	Environmental Goods and Services
EPO	European Patent Office
EST	Environmentally sound technologies
ETS	Emission Trading System
EU	European Union
FDI	Foreign Direct Investment
FIT	Feed-in tariff
GATT	General Agreement on Tariffs and Trade
GER	Green Economy Report
GHG	Greenhouse Gas
HS	Harmonised System
HVDC	High voltage direct current
ICTSD	International Centre for Trade and Sustainable Development
IEA	International Energy Agency
IPRs	Intellectual Property Rights
IPCC	Intergovernmental Panel on Climate Change
IRENA	International Renewable Energy Agency
LDCs	Least Developed Countries
MENA	Middle East and North Africa
MWp	Megawatt Power
OECD	Organisation for Economic Co-operation and Development
PV	Photovoltaic
RED	Renewable Energy Directive
RES	Renewable Energy Supply
R&D	Research & Development
SCM Agreement	Agreement on Subsidies and Countervailing Measures
TRIMs Agreement	Agreement on Trade Related Investment Measures
TRIPS Agreement	Agreement on Trade Related Aspects of Intellectual Property Rights
UfM	Union for the Mediterranean
UNCTAD	United Nations Conference on Trade and Development
UNECE	United Nations Economic Commission for Europe
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNOPS	United Nations Office for Project Services
WBCSD	World Business Council for Sustainable Development
WTO	World Trade Organization

6 Renewable Energy

6.1 Introduction

The challenges posed to the global community and national governments, in terms of energy security, climate change, health impacts and poverty are pressing, making the greening of the energy sector an imperative. The shift to renewable energy — along with major energy efficiency improvements — plays a critical role in addressing some of the most prominent challenges the world is faced with today. The Rio+20 Outcome Document, “The Future We Want” (UN 2012a, paragraphs 125-129), highlights the importance of this transition and emphasises

“the need to address the challenge of access to sustainable modern energy services for all... [including through] increased use of renewable energy sources and other low emission technologies”.

International trade can play a significant role in greening the energy sector. In particular, trade is an important vehicle for renewable energy technology transfer. The Rio+20 Outcome Document (UN 2012a, paragraph 271) also highlights “the role of foreign direct investment, international trade and international cooperation in the transfer of environmentally sound technologies”.

This chapter identifies the trends and trade opportunities in the renewable energy sector associated with a transition to a green economy. It explores how developing countries can respond to international demand for sustainable goods and services in this sector.

Some promising trade opportunities in the renewable energy sector that are highlighted in this chapter are:

- Exports of raw materials or components for renewable energy supply products, or of finished renewable energy supply products (e.g. solar panels, wind turbines, and hydrogen fuel cells);
- Exports of energy produced from renewable resources (e.g. solar or wind power);
- Exports of renewable natural resources to produce energy (e.g. feedstock for biofuels, biogas and biomass);
- Cross-border provision of renewable energy services; and
- Selling carbon credits on international markets.

The chapter also reviews some of the challenges that developing countries face in order to participate in the regional and global energy markets and offers suggestions on how to address them.

6.2 Environmental and economic context for greening the economy

This section provides background on the context and current state of renewable energy and reviews current trade patterns in the energy sector.

6.2.1 Context

Energy is the lifeblood of the world economy. Energy interacts with all other goods and services that are vital for economies and the economic and functional reliance on energy is expected to further increase. In particular, global energy demand has been estimated to grow by more than one-third until 2035, with China, India and the Middle East accounting for 60 per cent of this demand increase (IEA 2012a).

As highlighted in the Green Economy Report (GER) (UNEP 2011), the global community and national governments are faced with several challenges with respect to the energy sector. These include:

- **Access to energy:** Currently 1.3 billion people – one in five globally – lack any access to electricity. Twice that number – nearly 40 per cent of the world’s population – relies on wood, coal, charcoal, or animal waste to cook their food (IEA 2010a).

- **Climate change and emissions:** Energy-related greenhouse gas (GHG) emissions are the main drivers of anthropogenic climate change, exacerbating patterns of global warming and environmental degradation. Global carbon dioxide (CO₂) emissions from fossil-fuel combustion are reported to have reached a record high of 31.6 gigatonnes (Gt) in 2011 (IEA 2012b).
- **Health and biodiversity:** The processing and use of energy resources pose significant health challenges, pertaining to increased local air pollution, a decrease in water quality and availability, and increased introduction of hazardous substances into the biosphere (UNEP 2010a). For example, the inhalation of toxic smoke from biomass combustion can cause lung disease and is estimated to kill nearly two million people a year (IEA 2010a). Adverse health effects from energy use are aggravated by increasing instances of land degradation and deforestation, leading to a simultaneous loss of biodiversity.
- **Energy security:** The growth in global population and rising incomes will increase energy demand and result in upward pressures on energy prices and growing risks of importer dependency on a limited range of energy suppliers.

Greening the energy sector, including by substantially increasing investment in renewable energy and the share of renewable energy in all economic sectors, provides an opportunity to make a significant contribution to addressing these challenges. This was recently highlighted in the UN's launch of the "Sustainable Energy for All" initiative, as set out in Box 1.

Box 1. The UN's initiative on Sustainable Energy for All

The UN Secretary-General launched in January 2012 the "Sustainable Energy for All" initiative. The importance of the initiative was emphasised in the Rio+20 Outcome Document (UN 2012a, paragraph 129).

The objectives of the initiative are to (i) ensure universal access to modern energy services, (ii) double the share of renewable energy in the global energy mix (from 15 to 30 per cent) by 2030, and (iii) reduce global projected electricity consumption from buildings and industry (energy efficiency) by 14 per cent.

The key for meeting these objectives is to provide sustainable energy for all – energy that is more accessible, cleaner and more efficient. A High-level Group, composed of representatives from business and public service, will mobilise commitments from governments, the private sector, and civil society partners to take actions that will make sustainable energy a reality for all over the next two decades. Under this initiative, more than US\$ 50 billion have already been mobilised from the private sector and investors.

Source: UN 2012b

6.2.2 Current state of renewable energy

There are various definitions of renewable energy. The IEA, for example, defines renewable energy as follows:

"Renewable energy is derived from natural processes that are replenished constantly. In its various forms, it derives directly or indirectly from the sun, or from heat generated deep within the earth. Included in the definition is energy generated from solar, wind, biomass, geothermal, hydropower and ocean resources, and biofuels and hydrogen derived from renewable resources" (IEA n.d.).

The share of renewable energy is close to 20 per cent of global final consumption. As capacity continues to grow and prices for renewable energy and its equipment continue to fall, this share is likely to further increase. Along with measures to promote energy efficiency, the increase in renewable energy will provide many benefits to both the global economy and individual countries.

The adoption of renewable energy technologies can help reduce the carbon intensity of growth (Sims et al. 2007). By leapfrogging extensive use of conventional energy systems, developing countries can avoid the challenges of unsustainable energy infrastructures and processes that face the developed world.

With the right policy and financial frameworks, a wide range of renewable energy technologies can become accessible to a large potential market, including decentralised populations in developing countries.

Technologies such as solar water heaters, solar photovoltaic (PV) panels, wind turbines, heat pumps, mini-hydro generators, and biogas digesters all have the potential to make a significant contribution towards securing modern energy services for the poor as well as for nascent industries in developing countries. In areas without direct connection to an electricity grid, decentralised energy solutions provide a way to increase access to basic services such as heating, lighting, refrigeration and communication without incurring high infrastructure costs. The use of renewable energy technologies for such off-grid applications can often be a cost-effective approach to increasing energy access.

Furthermore, shifting from fossil fuels to renewable energy sources can contribute to meeting GHG reduction targets. Emissions in 2012 are projected to have been 58 per cent above 1990 levels (Le Quéré et al. 2012). Under business-as-usual conditions, global GHG emissions are predicted to increase to an annual 37 gigatonnes by 2035 (IEA 2012c). The promotion of renewable energy can decisively limit carbon emissions from energy production and use, bearing the potential to save an equivalent of 220–560 gigatonnes of CO₂ between 2010 and 2050 (IPCC 2011).

The IEA's most ambitious mitigation scenario, the "450" Scenario, sees the CO₂ content of the atmosphere restricted to 450 parts per million (IEA 2011a). This would involve CO₂ emissions peaking before 2020 and then falling to 1990 levels by 2035. This projection estimates that 44 per cent of the emissions abatement by 2035 would be realised from energy efficiency measures, 21 per cent from the use of renewable power, four per cent from the adoption of biofuels, nine per cent from the use of nuclear power, and 22 per cent from the use of carbon capture and storage (UNEP 2012a).

The IEA's *Energy Technology Perspectives 2012* illustrates that already the integrated use of existing technologies would make it possible to reduce dependency on imported fossil fuels or on limited domestic resources, decarbonise electricity, enhance energy efficiency, and reduce emissions in the industry, transport and buildings sectors (IEA 2012a). Furthermore, the reduction in GHG and criteria pollutant emissions (such as nitrogen dioxide, sulphur dioxide, and particulate matter) associated with the widespread use of hydrogen fuel cell vehicles is anticipated to result in significant societal benefits by mitigating climate change and reducing health impact costs (OICA 2012).

Investing in renewable energy technologies also creates new employment opportunities. In 2010, more than 3.5 million people worldwide were estimated to be working, either directly or indirectly, in the renewable energy sector and further growth is expected. Estimates suggest that by 2030, 12 million people could be employed in the biofuels sector, 2.1 million in the wind sector and 6.3 million in the solar PV sector (UNEP 2008a).

One of the most significant developments in the renewable energy sector in recent years has been the decline in the cost of various renewable energy technologies. Under these trends, renewable energy prices are increasingly challenging fossil-fuel alternatives. In particular, the cost of generation from solar PV and onshore wind declined 31-35 per cent and 9 per cent respectively between 2011 and 2012. Of the main renewable energy technologies, only offshore wind saw costs increase in 2011 (UNEP 2012a).

In many cases, renewable energy production can already be more cost-effective than fossil fuel alternatives. This is especially the case in locations where fossil fuel reserves are not extractable and countries are therefore forced to import energy to fulfil domestic needs. Once sufficient demand for renewable energy allows for economy-of-scale production in developing countries, its price-effectiveness is likely to further increase (UNEP 2012a).

Technology is key to both increasing access to energy supplies and also decreasing the world's carbon footprint. However, while many renewable energy technologies have witnessed recent technological advancements and cost reductions, renewable energy is not the only unconventional form of energy that has come to the forefront in recent years. Hydraulic fracturing, an upstream gas extraction technology also known as 'gas fracking', enables operators to unlock vast shale gas resources and congests natural gas markets with cheap and abundant supplies, mainly from the United States. Gas fracking has expanded dramatically and unconventional gas is predicted to account for half of the increase in global gas production until 2035 (IEA 2012c). While contributing to global energy security, gas fracking can carry numerous environmental and health challenges, as highlighted in a recent UNEP report (UNEP 2012b).

Even in the renewable energy sector, some technological advancements may have environmental and social impacts. For example, the potential adverse effects from hydropower projects are illustrated in Box 2.

Box 2. Trade-offs that countries face with large hydropower plants

Large hydropower projects have in many instances resulted in villages disappearing under reservoirs, adversely affecting inhabitants and local livelihoods. When making proposals for large hydropower projects, countries have to balance these negative effects with the positive environmental and supply effects of providing electricity from a renewable source.

In Laos, for example, the construction of the Xayaburi hydropower dam puts the Mekong River's rich biodiversity and abundant fisheries and livelihoods – vital to nearly 60 million people – in grave danger (WWF 2012, The Economist 2012).

In Brazil, the world's third biggest dam is due to be constructed on the Xingu River, in the Amazon. While the dam contributes a planned installed capacity of 11,233 megawatts (MW) to the national electricity supply, it could result in the displacement of thousands of indigenous people and have adverse impacts on tropical forests (Fearnside 2012).

In order for hydropower generation to be sustainable and negative impacts to be addressed, careful planning and thorough social and environmental assessments and mitigation are necessary (UNCSD 2011). There are a variety of guidelines available, including from the World Commission on Dams and the International Finance Corporation on social and environmental performance criteria for dams and other renewable energy projects (IFC 2012).

Some renewable energy sources, such as biofuels, are under increasing scrutiny for their potentially adverse impacts on the environment and food security (UNEP 2009). At times of rising food prices and persistently high rates of hunger, the production of biofuels from food crops or use of arable land has become more controversial. Biofuels produced from food crops are often considered as 'first generation biofuels' while biofuels produced from feedstocks that do not create an additional demand for land can be referred to as 'second-generation' or 'advanced' biofuels (EC 2012a). The further development of second-generation biofuels, produced from a wider range of raw materials including waste from pulp and paper mills, is expected to play an important role in addressing the negative impacts of biofuel production on the environment and food supplies. The development and implementation of sustainability criteria, new measurements and guidelines are essential in the increasingly open markets for biofuels.

Furthermore, for the manufacture and trade of rare earths (which can be an input for renewable energy products), it is important that environmental, and health and safety regulations are in place and implemented in order to ensure that extraction of rare earths has neither a negative impact on miners nor on ecosystems surrounding the mines.

6.2.3 Trade, energy and the environment

Energy is critically important to international trade. In particular, energy has a key role in extracting, transforming, manufacturing and transporting for the distribution of goods and services throughout the economy. The price of energy ranks among the main shaping factors of international trade. Furthermore, the interrelationship between energy, trade rules and the environment is rising in prominence in view of climate change, higher energy costs, and new technological developments.

Trade in the energy sector encompasses several different types of trade in goods and services. Distinctions can, for example, be made between trade in energy itself (such as trade in electricity), trade in natural resources needed to produce energy (e.g. trade in fuels such as biofuels, coal, gas and oil and nuclear materials), trade in manufactured products to produce energy (e.g. wind turbines), trade in the raw materials or components to produce energy related manufactured products (e.g. rare earths), cross-border provision of energy services (e.g. providing technical know-how), and trade in carbon credits on international markets.

Trade in energy and energy products is estimated to account for more than 20 per cent of world trade by value (CEPR 2010). In terms of trade in the whole energy sector, the biggest market segment is trade in natural resources needed to produce energy. In particular, coal, oil, and increasingly also natural gas are traded around the world, being shipped huge distances by sea to reach markets. Oil as well as natural gas are also traded via pipelines that often cross several borders. In contrast, in the renewable energy sector,

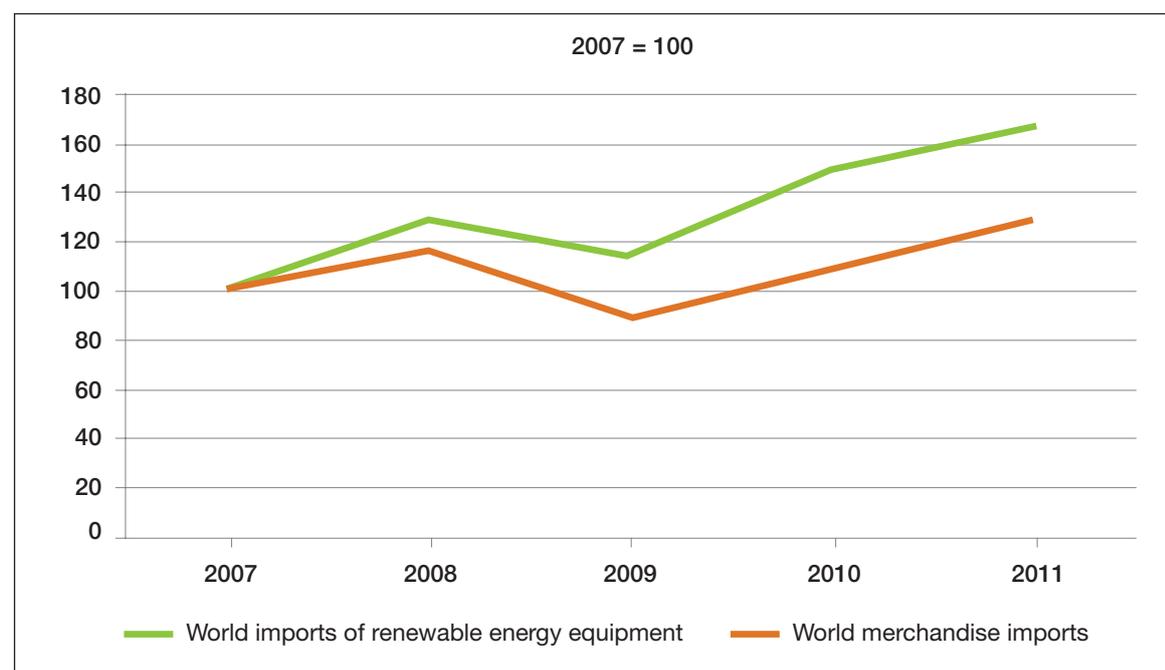
trade in natural resources is limited largely to trade in biofuels and biodiesel, mainly due to the problems of transporting and effectively storing renewably sourced energy (see section 6.3). Instead, the bulk of trade in the renewable energy sector is made up of trade in manufactured products and components for manufactured products. As Figures 1 and 2 illustrate, markets and trade in renewable energy products and biofuels have shown significant growth rates.

Figure 1. Markets for renewable energy (RE) technologies (in US\$ billions)

	2004	2008	2009	2010	2011
Solar PV (modules, system components, and installation)	7.2	29.6	36.1	71.2	91.6
Wind (new installation capital costs)	8.0	51.4	63.5	60.5	71.5
Biofuels (global production and wholesale pricing of ethanol and biodiesel)	n/a	34.8	44.9	56.4	83.0

Source: Clean Edge, *Clean Energy Trends 2012*, March 2012

Figure 2. Growth in trade of renewable energy equipment v. merchandise products



Source: OECD (2013) based on data obtained from the UN Comtrade database and the WTO. Imports of renewable energy equipment comprise all products included under "Renewable energy plant" in the WTO's Friends list of environmental goods. The underlying data are nominal US dollars that have been normalised so that 2007=100.

The two most significant national markets for trade in manufactured renewable energy products are the United States and China. Solar energy product exports are the largest component of US-China clean energy trade for both countries. Combined, firms based in the two nations are estimated to have traded more than US\$ 6.5 billion worth of products and services in 2011. More than US\$ 923 million worth of wind energy goods and services were exchanged between the two countries in 2011. In addition, trade in energy smart technology, such as smart metering and lithium-ion batteries, constitutes more than US\$ 1.1 billion worth of equipment traded (The Pew Charitable Trusts 2013).

To a large extent, cross-border trade in energy and related investment is subject to bilateral treaties. However, in order to ensure predictability and legal certainty, enforceable multilateral rules have an important role to play (Trebilcock et al. 2012). Manufactured products for energy production, cross-border energy services

and natural resources, to the extent that they may be traded, are covered by the obligations contained in the World Trade Organization (WTO) agreements such as the General Agreement on Tariffs and Trade (GATT) (WTO 2010). These obligations include the most favoured nation principle (i.e. obligation not to discriminate between “like products” imported from different WTO Members) and the national treatment principle (i.e. obligation not to discriminate between domestic and imported “like products.”)

The WTO disciplines on subsidies are also very important as the energy sector is heavily subsidised. Indeed, imbalances in the availability of appropriate services and technologies, along with market protections such as subsidies and tariffs, distort international trade in this sector (Jha 2011). In the context of renewable energy, support schemes, which may include local content requirements, have led to disputes at the WTO, as illustrated in Box 3.

Box 3. Renewable energy support programmes and the WTO

Renewable energy support programmes and, in particular, associated local content requirements can be of contentious nature *vis à vis* international trade rules. Indeed, the dispute settlement system of the WTO has recently been addressed by various requests for consultation concerning national renewable energy support programmes and connected local content requirements. Renewable energy support programmes can take various forms, such as for instance feed-in tariff schemes, while local content requirements generally appear as pre-conditions for accessing support programmes, creating incentives to source renewable energy equipment from the domestic market.

In February 2013, for example, the United States requested consultations with India concerning certain measures relating to domestic content requirements and prohibited subsidies under the Indian Jawaharalal Nehru National Solar Mission for solar cells and solar modules. The request for consultations contained allegations of breaches of various WTO provisions, including the Agreement on Subsidies and Countervailing Measures (SCM Agreement) as well as national treatment obligations under the General Agreement on Tariffs and Trade (GATT) and the Agreement on Trade Related Investment Measures (TRIMs Agreement).

In late 2012, a WTO panel found a Canadian feed-in tariff scheme, set-up to incentivise national renewable energy production, to be consistent with the SCM Agreement, as the measures at issue did not constitute a “subsidy” within the meaning of that agreement. At the same time, however, the local content requirements included in the Canadian programme were found to be inconsistent with the national treatment obligations included in the GATT and the TRIMs Agreement. The subsequent appeal decision, circulated on 6 May 2013, did not reverse the panel’s findings on these issues.

The controversial nature of renewable energy subsidy programmes and related local content requirements is also witnessed by further proceedings on-going at the WTO, including a request for consultations filed by China against the EU in relation to the feed-in tariff schemes of certain EU Member States, and a request for consultations filed by the United States against certain Chinese support programmes in the wind power sector.

Source: World Trade Organization (WTO), Website

Besides posing regulatory issues, trade in the energy sector also presents specific operational challenges. In particular, energy trade is often linked to fixed infrastructure (e.g. transportation pipelines and transmission grids) that is needed to transport oil, gas, and electricity. This necessitates high upfront investments in capital-intensive infrastructure projects and conditions of access to energy transportation networks. In addition, uneven geographical distribution of resources means that some countries are dominated by resource production, while others have none; more than 90 per cent of proven oil reserves are in just 15 countries (WTO 2012). Furthermore, national energy sectors are often dominated by government-owned or government-controlled companies that perform regulatory functions (Selivanova 2007).

Another distinguishing factor for trade in the energy sector is that energy itself and materials to produce energy products do not usually encounter market access problems in their export markets (Selivanova 2007). Trade restrictions in the energy sector tend to be directed more to export barriers and export taxes. Nevertheless, in the renewable energy field, both market access issues and export restrictions have been subject to international consultations. Several market access cases in the WTO have concerned solar

panels and biofuels. Concerning export restrictions, the WTO case on rare earths provides an example of how some countries are using export restrictions for public policy reasons, as illustrated in Box 4.

Box 4. WTO consultations on rare earth exports

The shift to an increasing share of renewable energy supply products will have a significant impact on trade in rare earths minerals or metals. Rare earths are important inputs for the manufacture of several renewable energy supply products such as wind turbines and energy efficient lighting. Global demands for rare earth elements have been increasing, with demand (134,000 tonnes per year) largely exceeding global production (124,000 tonnes per year). Global demand is projected to exceed 200,000 tonnes per year by 2014 (UNEP 2012a). This has given rise to international consultations.

On 23 July 2012, at the request of the United States, the European Union (EU) and Japan, the Dispute Settlement Body of the WTO established a Panel to consider China's export restrictions on rare earths as well as tungsten and molybdenum. Complainants argue that China has placed export restrictions, through e.g. licences and minimum export price requirements, on the products at issue in breach of certain WTO provisions as well as China's WTO Accession Protocol (WTO website). In response, in its White Paper Situation and Policies of China's Rare Earth Industry, China claims that its policies concerning the products at issue are aimed at protecting natural resources and achieving sustainable economic development, and that an annual export quota is needed (MIT 2012).

This case disputes the right of WTO members to limit exports of natural resources for various policy objectives, including environmental protection. This right is safeguarded by WTO rules, but the accession protocols of some members may include so-called "WTO plus" requirements limiting the policy space of such members. As a result, WTO members enjoy different degrees of freedom for regulating exports of natural resources and the relevant rules, including those contained in accession protocols, may need significant improvement (Quin 2012).

As well as the WTO, the Energy Charter Treaty (ECT) plays a role in energy trade governance. In fact, the ECT is the only international treaty setting legal norms specific to energy trade and investment. Comprising over 50 member states, it includes in its membership countries across Eurasia from the EU to former Soviet Union republics to Japan. The ECT incorporates the major rules of the WTO with respect to trade in goods in the energy sector. Moreover, the ECT's trade regime applies WTO rules by reference to trade between its members that have not yet acceded to the WTO. The ECT also deals specifically with issues of transit of energy materials and products via fixed infrastructure (ECT 2001).

Trade also has a key role to play in technology transfer of environmentally sound technologies, as is discussed in section 6.3.5.

6.3 Green economy measures

There are a variety of green economy measures that can lead to enhanced trade in renewable energy or its equipment. Potential measures include fiscal reform of the energy sector, including phasing out subsidies for fossil fuels and providing fiscal incentives for renewable energy, investments in renewable energy and infrastructure, regulations on renewable energy, and the transfer of technology.

The following subsections illustrate examples of green economy measures that present the potential to create or consolidate sustainable trade opportunities in the renewable energy sector.

6.3.1 Investments

Box 5. Key messages from the Green Economy Report (GER)

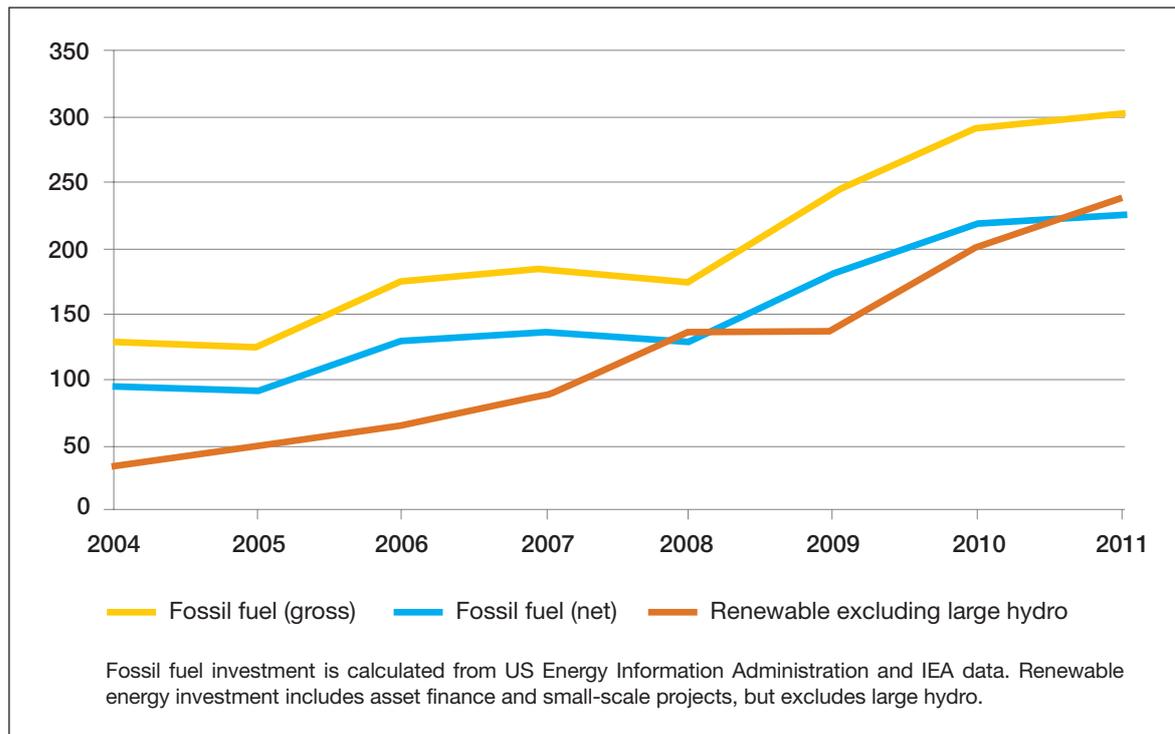
Modelling studies carried out for the GER project estimated that an average annual investment of approximately US\$ 650 billion over the next 40 years in power generation, using renewable energy sources and second-generation biofuels for transport, could raise the share of renewable energy sources in total energy supply to 27 per cent by 2050, compared with less than 15 per cent under a business-as-usual (BAU) scenario. Increased use of renewable energy sources could contribute more than one-third of the total GHG reduction of 60 per cent achieved by 2050, relative to BAU.

Source: UNEP 2011

Investments are driving the increasing share of renewables in total energy supply. Hence, investment statistics provide an indicator as to which countries are likely to be strong exporters in the future. Renewable energy investment could be fostered by fiscal incentive measures and preferential grid access measures such as feed-in tariffs which offer investors more stable returns through price guarantees.

Different categories of investment include venture capital and private equity, public markets, asset finance and mergers & acquisitions (UNEP SEFI 2012). Under this conception, global gross investment in fossil fuel generating capacity in 2011 amounted to US\$ 302 billion, compared to investments of US\$ 237 billion in renewables. If spending on fossil fuel replacement plants is excluded and investment in large hydro included, the investment in renewable power capacity amounts to about US\$ 262.5 billion; this is US\$ 40 billion higher than the same measure for fossil fuel (UNEP SEFI 2012). When additionally accounting for government and corporate research and development in the renewable energy sector, clean energy investments in 2011 amounted to US\$ 302.3 billion. Even though this figure decreased to US\$ 268.7 billion in 2012, investments still exceeded the 2004 figures by five times (BNEF 2013a). The global trends from 2004-2011 are shown in Figure 3.

Figure 3. Investment in clean energy v. conventional capacity



Source: FSFM 2012

Developing economies made up 35 per cent of this total investment in 2011. The largest shares of investments in renewable energy have occurred in Brazil, China and India, which together account for almost US\$ 60 billion, or 90 per cent, of developing country investments. In 2011, India displayed the fastest expansion rate for investment in any large renewable energy market, with a 62 per cent increase to US\$ 12 billion (UNEP SEFI 2012).

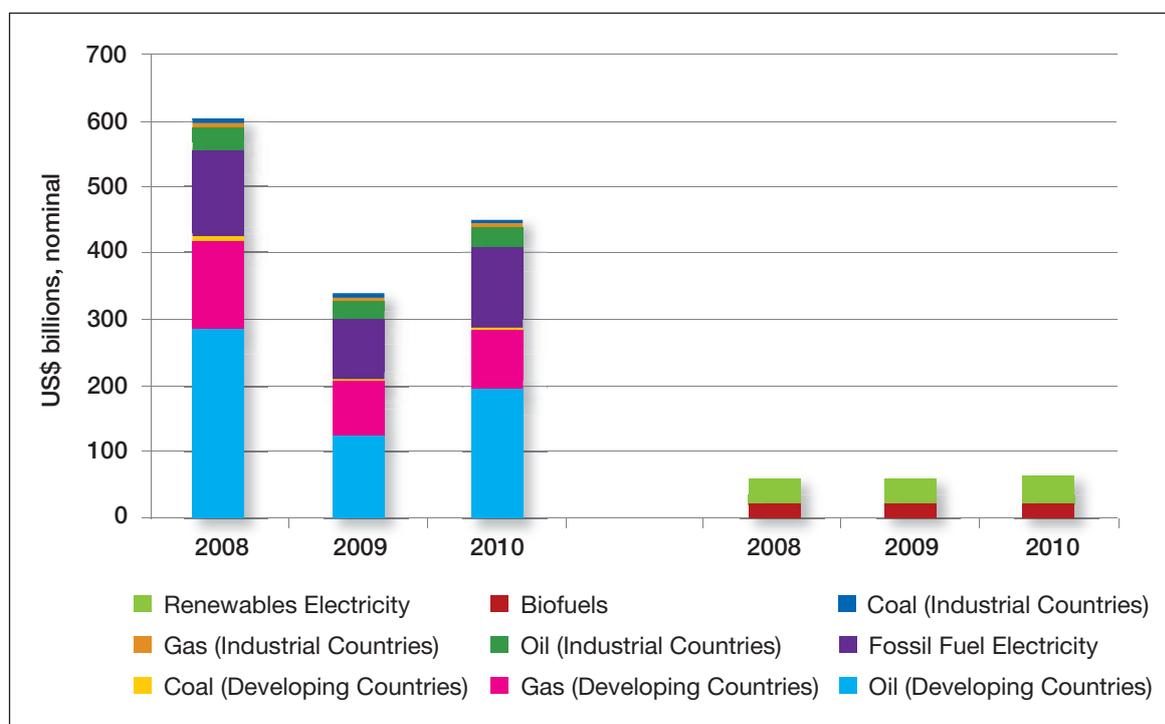
Some 13 per cent of total investment in 2011 took place outside emerging and developed economies. This proportion has been above 10 per cent in each of the last eight years. In 2011, total investment in the Americas, excluding Brazil and the United States, was US\$ 7 billion, while in the Middle East and Africa, it was US\$ 6.5 billion. In Asia-Oceania, outside China and India, investment amounted to US\$ 21.1 billion (UNEP SEFI 2012).

Enhanced cost-effectiveness of renewable energy technologies is promoting accessibility to household and small business markets. This is reflected by the growing demand for small-scale renewable energy finance, particularly in developing countries, which according to the Climate Policy Initiative accounted for approximately 24 per cent of global climate financial flows in 2010-11 (CPI 2011).

6.3.2 The removal of environmentally harmful energy subsidies

A major source of investment for renewable energy can arise from a reform of fossil fuel subsidies. These have, for many years, demonstrated to artificially lower energy prices, encouraging wasteful energy consumption and making renewable and more efficient technology less competitive. According to the IEA 2012 World Energy Outlook, fossil fuel subsidies amounted to US\$ 523 billion in 2011, almost 30 per cent more than in 2010 and six times more than subsidies to renewables. It is estimated that phasing out all fossil fuel consumption and production subsidies by 2020 could reduce global primary energy demand by 5 per cent and energy-related CO₂ emissions by 5.8 per cent (IEA 2011a). Figure 4 illustrates the large gap between fossil fuel and clean energy subsidies.

Figure 4. Estimated global energy consumption subsidies for fossil fuels and for renewables in industrial and developing countries, 2008-10



Source: Worldwatch Institute 2013 (compiled from IEA and OECD data)

6.3.3 Regulations and policies affecting renewable energy

Market development in the renewable energy sector, including in export markets, is largely driven by domestic policies and regulatory requirements. According to the Renewable Energy Policy Network, by early 2011, at least 119 countries had some type of national policy target or support scheme for renewable energy (REN 2011). The targets generally range from a share of 5-20 per cent of renewable energy in the national energy mix.

National energy strategies can draw on different policy tools and regulations to facilitate the deployment of renewable energy and attain specified targets. EU Member States have led the way among developed countries, with the 2009 EU Renewable Energy Directive (RED). The RED mandates a joint share of 20 per cent share for renewable energy in the EU energy mix by 2020 (EC 2009). Since the EU is – and is likely to remain for the foreseeable future – a net importer of energy, the RED has also sparked renewable energy trade cooperation, such as the Desertec initiative.¹ Within the EU, Denmark, has assumed particular leadership in the renewable energy sector. The Danish wind industry employs 25,000 people and wind energy supplies 25 per cent of the country’s electricity, with plans to extend this share to 50 per cent by 2050. Denmark also exports renewable energy supply products, namely wind turbines.

In China, renewable energy is the focus of the current Five-Year Plan (2011-2015). The government has pledged to meet 15 per cent of its energy needs from non-fossil fuels by 2020 (KPMG 2011). There is also ambition for renewable energy in Southeast Asian countries. For example, Indonesia, Vietnam, Thailand, Malaysia and the Philippines have targets to install a total of 32GW of renewable power in the period 2011-25, with Indonesia being one of the most ambitious at 12GW, and Thailand and Malaysia offering significant subsidies (FSFM 2012). Geothermal, biomass and waste-to-power are the most predestined renewable energy sectors to benefit from this investment drive in Southeast Asia.

The Chilean government has announced a 20 per cent target for energy from “non-conventional” sources by 2020. Accordingly, Chile has assigned US\$ 950 million to a five-year plan, which generates an additional 9 GW of renewable energy until 2020 (Renewable Energy World 2012). South Africa released an Integrated Resource Plan in May 2011. The plan includes a call for the development of 40GW of new electricity generation capacity up to 2030, including 17.8GW from renewable energy. Figure 5 presents the national renewable energy targets for selected states in Africa.

Figure 5. Renewable energy targets in Africa

Country	Renewable energy target	Target year
Cameroon	50% / 80%	2015 / 2020
Cape Verde	50%	2020
Ghana	10%	2020
Madagascar	75%	2020
Mauritius	65%	2028
Niger (the)	10%	2020
Nigeria	7%	2025
Rwanda	90%	2012

Source: UNEP 2012c

1. For further details see section 6.4.

At the international level, the creation of the International Renewable Energy Agency (IRENA) in 2009 indicates a willingness of governments to work collaboratively on expanding the role of renewable energy. Continued international climate negotiations provide a further driver for greening the energy sector. For example, several developing countries have submitted Nationally Appropriate Mitigation Actions (NAMAs) under the United Nations Framework Convention on Climate Change (UNFCCC). NAMAs are voluntary country engagement proposals aimed at reducing or limiting GHG emissions and to facilitate the transition to low-carbon growth for different sectors of the economy. The submissions of NAMAs by developing countries include significant plans for wind, geothermal, biomass and solar projects.²

There are also specific requirements for renewable energy in subsections of the economy, for example transport. The EU RED, for instance, requires a ten per cent share of renewable energy in the transport sector by 2020 and the EU's Fuel Quality Directive sets a target to reduce GHG emissions from fuels used in the transport sector by 6 per cent until 2020. The contribution from biofuels to these targets is expected to be significant. To avoid possible negative side effects, such as those discussed in section 6.2.2, both Directives impose sustainability criteria that biofuels and bio liquids need to meet in order to be counted towards the targets and receive support. These sustainability criteria aim to prevent the direct conversion of forests and wetlands and areas with a high biodiversity value for biofuel production. The sustainability criteria also require minimum GHG reductions for biofuels compared to the fossil fuels they replace (up to 50 per cent in 2017, and up to 60 per cent in 2018 for installations that started operating in 2017 or later).³

The EU and Japan have furthermore implemented legislation to govern the manufacture of hydrogen vehicles in the transport sector. On hydrogen/fuel-cell vehicles, the United Nations Economic Commission for Europe (UNECE) also has an informal working group that is currently developing proposals for a Global Technical Regulation on hydrogen fuel cell vehicles (UNECE 2012). In addition, there are several voluntary codes and standards developed by international standards-setting organisations, including the International Standards Organization (ISO) (OICA 2012).

6.3.4 Infrastructure for renewable energy trade

A key stumbling block to trade in renewable energy are the technical difficulties of electricity storage and transmission. In view of the mostly intermittent nature of renewable energy supplies and a lack of significant transmission capacities, the location of renewable energy infrastructure is crucial. Being situated near a large consumer base is vital to the success of building up a domestic power generating industry, which could then also serve as the basis for electricity exports.

In respect of storability and transmission, trade in renewable-energy-based electricity is different from trade in tangible goods. Storage technologies are a critical solution for the national integration and trade in energy from variable renewable energy sources, especially wind, solar PV, and some marine-energy technologies. Electricity trade also often requires investment in new transmission lines (interconnectors), particularly if expensive high voltage direct current (HVDC) transmission links are required. Other potential measures to increase renewable energy trade include grid interconnection, demand side management, the diversification of energy portfolios and the availability of back-up capacities.

Despite current issues, the technology to store and transfer electricity is developing. Technological improvements can act as a key driver to exports of renewable energy. For example, so-called "supergrids", which can reach up to 500 km or further, have been proposed by analysts to update and extend transmission grid capacities.

Hydrogen, which can be in two forms – stationary (e.g. in an electric grid connection to provide supplemental power) or portable (e.g. hydrogen fuel cells for the transportation sector) – presents particular infrastructure issues. Hydrogen could become a major component of clean sustainable energy systems in the longer term, particularly as it can provide storage options for intermittent renewable technologies such as solar and wind. Nevertheless, the hydrogen economy remains in its nascent stages and its market is limited to very few countries across the world. So far, only a few developing countries are participating in the hydrogen technology development (Mytelka and Boyle 2008). Building the infrastructure required to make hydrogen

2. See list of NAMAs at http://unfccc.int/meetings/cop_15/copenhagen_accord/items/5265.php.

3. In addition, following a review on the impact of indirect land use change on GHG emissions, in October 2012, the European Commission proposed further legislation to minimise the climate impact of biofuels (EC 2012a).

fuel cell vehicles a feasible alternative to conventional vehicles will entail significant investment costs for both the private and public sector, depending on the country.

6.3.5 Technology transfer of environmentally sound technologies

In many developing countries, the national renewable energy sector faces many barriers to development, due partly to a lack of expertise and limited access to appropriate technologies and knowledge. Especially least developed countries (LDCs) are severely challenged with respect to the science, technology and innovation of renewable energy. LDCs also face the challenge of having to bridge the digital divide and technology gap in support of sustainable development and poverty eradication (UN 2012c).

The Intergovernmental Panel on Climate Change (IPCC) defines technology transfer as:

“a broad set of processes covering the flows of know-how, experience and equipment for mitigating and adapting to climate change among different stakeholders such as Governments, private sector entities, financial institutions, non-governmental organisations (NGOs) and research/educational institutions” (IPCC 2000).

Environmentally sound technologies (ESTs) are technologies that have the potential for significantly improved environmental performance as relative to other technologies. These potentials include polluting less, using resources in a more sustainable manner, recycling more of their wastes and products, and handling residual wastes in a more environmentally acceptable way than the technologies for which they are substitutes. ESTs are not just individual technologies. They can also be defined as total systems that include know-how, procedures, goods and services, and equipment, as well as organisational and managerial procedures for promoting environmental sustainability (UNEP 2008b).

Technology development of ESTs and its rapid diffusion are considered crucial for tackling climate change and other environmental challenges. Enhancing technology transfer towards developing countries is an integral part of the UN Framework Convention on Climate Change (UNFCCC), as stated in its Article 4. In particular, the UNFCCC Conference of the Parties (COP)-16 in 2010 established a Technology Mechanism, which includes a Climate Technology Centre and Network (CTCN). The CTCN aims to stimulate technology cooperation and to enhance the development and transfer of climate-sound technologies that support climate change mitigation and adaptation. To pursue these aims, the Network will provide technical assistance and support, especially to developing countries. With the designation in 2013 of UNEP as host institution of the CTCN, the mechanism became fully operational.

World leaders at Rio+20 reaffirmed the importance of transferring ESTs to developing countries, as illustrated in Box 6.

Box 6. Rio+20 and technology transfer

Rio+20 recognised, in particular, the important contribution of science and technology to sustainable development. The Rio+20 Outcome Document calls for improving clean technology transfer and diffusion, research and development (R&D), capacity building and stakeholder participation. In particular, paragraph 273 requests relevant UN agencies to identify options for a facilitation mechanism that promotes the development, transfer and dissemination of clean and environmentally sound technologies by, among other things, assessing the technology needs of developing countries, the options to address those needs and the required capacity building efforts.

In response to paragraph 273 of the Outcome Document, the UN Secretary-General made recommendations to the General Assembly for a technology facilitation mechanism. His report provides an overview of proposals and outlines recommendations on the mechanism's functions, format and working methods, as well as a potential global way forward, with a view to achieving an operational technology facilitation mechanism before the end of 2013 (UN 2012d).

Trade and patterns of technology flows

Trade can play a key role in technology transfer. An OECD study concluded that international technology transfer through trade occurs when a country imports higher-quality intermediary goods (i.e. than it can produce itself) to use in its own production processes and that trade indeed serves as a channel for international technology transfer to developing countries. The study also underlined that developing countries enjoy relatively less technology transfer from trade than developed countries (OECD 2005). The role of trade in technology transfer is further illustrated by Glachant (2013) in Box 7.

Box 7. Examples of market channels for technology transfer

- **International trade in intermediate goods.** The import of capital goods, such as machines and equipment, entails technology transfer where such goods embody technologies which can bring productivity benefits in the recipient countries. Although international trade induces little cross-border transfer of knowledge there may be knowledge spillovers in the recipient country. Local firms can reverse-engineer imported products, or acquire knowledge through business relationships (e.g. as customer or distributor) with the source company. As an illustration, China has acquired production technologies to develop a highly performing solar photovoltaic industry by purchasing turnkey production lines from German, US and Japanese suppliers (de la Tour et al. 2011).
- **Foreign direct investments (FDI), including joint ventures.** FDI is an important channel for technology diffusion, such as in the wind industry (Kirkegaard et al. 2009). Several studies find evidence that multinational enterprises transfer firm-specific technology to their foreign affiliates or partners in joint-ventures (e.g. Branstetter et al. 2006). FDI can induce more knowledge transfer than trade in goods, since investment often comprises apart from the technology, also support services, such as management experience and entrepreneurial abilities which can be transferred by training programmes and learning-by-doing. Further, many technologies and other know-how used by affiliates of multinationals are not always available in the open market. Some technologies, even if available in the market, may be more valuable or less costly when applied by the firm that developed them rather than by an outsider (OECD 2005). Local firms may also increase their productivity by learning from nearby foreign firms or becoming their suppliers or customers.
- **Licensing.** Licensing occurs when corporations or public research bodies grant a patent license to a company abroad that uses this license to upgrade its own production. In other words, a firm may license its technology in order to carry out a full knowledge transfer to the licensor so as to enable it to exploit the technology directly. Accordingly, knowledge leaves both the source country and the source company, and remains in the hands of a local third party.

Source: Glachant 2013

It is important to highlight the changing patterns of technology flows and transfers and the growing importance of South-South technology transfer in ESTs. Today's technology flows and transfer differ greatly from those in the early 1990s, when technology flows were mainly between developed countries and the key challenge was to promote greater technology transfer to developing countries. While these flows remain important, South-South clean technology transfer has gained in prominence over recent years. Clean technology flows among technology intensive developing country industries and from developing countries to developed countries have grown faster. Highly publicised examples include ceramic cookstoves, biogas digesters, cement board and jatropha biofuels, and a range of Chinese and Indian FDI activities. In addition, capacity building constitutes an integral part of technology transfer, as it ensures the successful transfer of clean technologies (UN 2012d).

Not only the overall magnitude, but also the nature of cross-border technology flows has changed. Technology flows are increasingly embedded in global trade and FDI flows, thus forming part of international production systems, even though there are significant regional differences. Environmental services, such as waste and water management and the reduction of air pollution and GHG emissions, are also becoming a major source of technology transfer. In terms of the manufacturing and export of clean technology, several developing countries have become world leaders, and some are also emerging as key users (UN 2012d).

Box 8. World leaders in selected climate-relevant technologies

<i>Technology</i>	<i>World leaders</i>	
	<i>Production and exports</i>	<i>Technology use</i>
Ethanol (from sugar cane)	Brazil	USA, Brazil
Biodiesel (from jatropha)	India	India, Indonesia, EU
Wind energy	China, India	China, Germany
Solar photovoltaic	China	Germany
Compact fluorescent lamps	China, Indonesia	EU
Solar water heaters	Mexico	China
Coal gasification	China	China, USA
Heat pumps	China	Switzerland, EU
Hybrid fuel vehicles	Japan	USA, EU, Japan
Wood waste use	Sweden	Sweden

Source: Brewer 2008, UN 2012d

Nevertheless, participation of the poorest economies in technology flows is as yet negligible. The majority of developing countries continue to face significant technology gaps and barriers to access. A number of policies continue to constrain South-South technology transfer, including market access barriers and intellectual property rights (IPRs). Concerning market access, one recent survey found that import duties and other non-tariff barriers in large developing countries for solar photovoltaic products range from 12 to 18 per cent and 41 to 63 per cent (tariff equivalent), respectively (UN 2012d).

Green patents

The role of technology transfer, and in particular IPRs, in climate change technologies has emerged as a particularly contentious issue in the past few years (UNEP, EPO & ICTSD 2010). Many developing countries argue that IPRs can be a barrier to the transfer of ESTs and have proposed addressing elements of the IPRs regime under international agreements on climate change (Correa 2013). While acknowledging possible exclusionary effects of IPRs, other countries see IPRs as essential to fostering both innovation and the transfer of technologies (Zhuang 2011).

An effective regime of IPRs can balance the different country concerns and enhance transfers of technology internationally. The WTO Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS Agreement) sets out minimum standards for the protection and enforcement of IPRs. In particular, Article 66.2 of the TRIPS Agreement states that:

“developed country Members shall provide incentives to enterprises and institutions in their territories for the purpose of promoting and encouraging technology transfer to least-developed country Members in order to enable them to create a sound and viable technological base.”

EST transfers can lead to a faster and cheaper adoption of new technologies for the benefit of developing countries’ innovation and long-term competitiveness in the international market for renewable energy production. In the market for renewable energy supply products, companies – which in some developing countries may be state-owned enterprises or joint ventures between a local and a developed-country firm – must generally obtain a license to use a given patent-protected technology. Alternatively, countries can develop the national capacity to research and develop the relevant products independent from a foreign licensor (ICTSD 2007, UNCTAD 2011a).

The number of patents registered in the renewable energy sector in different countries could provide an indication of the dissemination of EST across borders. According to the World Bank, which analysed increases of patents in Asia and Latin America, “the importance of green patenting as measured in absolute numbers in developing regions is rising” (Dutz and Sharma 2012).

Box 9. The role of patents in the transfer of clean energy technologies

Given the importance of the role of IPRs in green growth and development of developing countries, UNEP joined forces in 2010 with the European Patent Office (EPO) and the International Centre for Trade and Sustainable Development (ICTSD) to undertake an empirical study on the role of patents in the transfer of clean energy technologies (CETs) including solar PV, geothermal, wind and carbon capture.

The study provides evidence and key insights towards a better understanding of the challenges related to the massive scale-up of the use and diffusion of CET needed to combat climate change. The study found that five countries – Germany, Japan, the Republic of Korea, the United Kingdom and the United States - are the source of almost 80 per cent of all innovation developed in the field of CET. In addition to the review of 400,000 patent documents, the study contains the first ever survey on licensing.

Source: UNEP et al. 2010

Prominent in the discussion on pro-sustainable development licensing strategies is the debate on patent pools. A patent pool may exist where a given technology is composed of various items whose patents belong to different rights holders, and the latter are willing to pool their rights and licence the use of the patented item through a single agreement (WIPO 2012). This bears important implications for the transfer and the diffusion of EST. The most likely scenario would be that of a producer who intends to conform to a standard through the use of the patented items, and would be incentivised by the possibility of filing a single application for obtaining a license over a variety of patented items. This would facilitate the transfer and diffusion of EST.

Box 10. Pooling green patents

The World Business Council for Sustainable Development (WBCSD) launched a technology-sharing initiative, known as the Eco-Patent Commons, in January 2008. Inspired by the success of the open source software community in pooling knowledge to stimulate innovation, the scheme encourages companies to donate patents for inventions that, while not essential to their own business development, provide “environmental benefits”. The registered patents are published on a searchable website and made available for use by anyone free of charge.

Among the first patents to be donated were a recyclable protective packaging material for electronic components from IBM, and mobile phones recycled into calculators and personal digital assistants from Nokia. Since the launch of the Eco-Patent Commons in January 2008, 100 eco-friendly patents have been pledged by 13 companies representing a variety of industries worldwide.

Source: WBCSD 2011, WIPO 2009

6.4 Trends and trade opportunities

The following section addresses trends in international trade in the renewable energy sector and identifies several green trade opportunities. As technology develops in the forthcoming years, further trade opportunities are expected to arise.

6.4.1 Renewable energy supply equipment and its inputs and components

A key and growing market opportunity in the renewable energy sector is the export of renewable energy supply equipment, inputs or components. The global market in low-carbon and energy efficient technologies, which includes renewable energy supply products among other technologies, is projected to nearly triple to US\$ 2.2 trillion by 2020 (UNCTAD 2011b). Within the energy sector, global growth in renewable energy sources contributing to world primary energy supply now greatly exceeds growth in fossil fuel based energy sources. Since 1990, annual global growth in solar PV, wind and biofuel supply capacity has averaged 42, 25 and 15 per cent respectively, compared to the rate of only 1.3 per cent for oil. In 2010, US\$ 211 billion was invested in renewable energy supply, more than five times the amount invested in 2004, with more than half of these investments in developing countries (UNCTAD 2011c).

Developing countries have seen significant growth in exports of renewable energy supply products – in particular, solar panels, wind hydraulic turbines and solar water heaters – and a number of developing country firms have already gained significant market shares. In 2009, China exported over US\$ 10 billion worth in solar panels and cells, more than twice as much as the second biggest exporter and almost 80 times the value China exported only ten years earlier, when it was not even among the top five world exporters (UN 2012e). China is now the world’s largest producer and exporter of solar photovoltaics (REN 2011). In 2011, China exported solar panels and key components worth around € 21 billion to the EU (EC 2012b).

India hosts several large solar manufacturers such as Moser Baer Photovoltaic Ltd, Tata BP Solar, Central Electronics Ltd and Reliance Industries. Indian firms manufactured solar PV modules and systems with a total generating capacity of 335 megawatt power (MWp) up to March 2007, of which 225 MWp were reportedly exported (Kalmbach 2011). In the wind energy sector, the Indian company Suzlon Energy is the world’s third largest supplier of components to operators, with over six per cent of global market share. For further details on renewable energy trade opportunities and challenges in India, see Box 11.

Box 11. India – exports of renewable energy supply components

India has the world’s fifth largest national electricity demand and is expected to become the third largest consumer in the world by 2030 (IEA 2011b). To meet elevated national electricity demands with abundant and sustainable supply, India enforced its national Electricity Act 2003, aimed to increase industry investments in renewable energy supply technology and to grow the national manufacturing sector. In addition, the Central Electricity Regulatory Commission has established tariff orders designed to support renewable energy development while balancing investment interests, electricity needs and climate change issues. These measures have led to an extensive growth in the national production and use of renewable energy.

India’s most mature renewable energy sector is wind energy, accounting for 70 per cent of domestic renewable installations, with an annual compound growth rate of 26 per cent (REN 2011). Indian wind power installations make up an increasing share of seven per cent of global wind capacity. While contributing to climate change mitigation and national electrification, renewable electricity generation from wind technology has created 13-15 jobs per megawatt, adding to an overall 15,000 direct jobs.

The nascent Indian exports of wind turbines and components account for 12.2 per cent of global trade in wind technology. The largest wind-related Indian export item is wind-powered electric generating sets⁴, the key single-use item identified as being used exclusively for the production of wind energy. The sets featured as India’s single largest export item for three consecutive years (2006-08) and reached a total export volume of US\$ 651 million in 2008. Overall, exports in renewable energy for the period 2004-08 have witnessed faster average annual growth rates (51.9 per cent) than imports (33.2 per cent). This signals the steady diminution of India’s trade deficit (e.g. US\$ 810 million in 2008) for products related to renewable energy (EXIM-Bol 2011).

While mainly focusing on wind-related exports, India’s renewable energy sector has also achieved strong growth in the export of other renewable energy technologies. For example, between 2004 and 2008, the value of Indian photovoltaic appliance⁵ exports grew from US\$ 85 million to US\$ 529 million, accounting for approximately 40 per cent of overall global PV system and component exports in 2008.

The recent growth in India’s renewable energy sector and the enacted policy support schemes and tariff orders for renewables have placed India among the best investment destinations for renewable energy equipment manufacturers and service providers, third only to China and the United States (Ernst & Young 2011). While much has been achieved in terms of national renewable energy facilitation, India faces further challenges and untapped opportunities, especially concerning trade in renewable energy technology. Facilitative renewable energy policy has primarily focused on the needs of India’s domestic market while further action is needed to foster exports by yielding the necessary financial guarantees that allow manufacturers to expand investments.

Source: Gaurav Gandhi and Chintan Shah of Suzlon Energy Ltd

4. HS 850231 (Harmonized Commodity Description and Coding System)..

5. HS 854140 (Harmonized Commodity Description and Coding System).

Despite the growing number of renewable energy supply products that can generate new income and enhance trade opportunities, only a few countries have so far benefited to a significant extent. China, Chinese Taipei, India, Republic of Korea, Malaysia and Singapore account for over 90 per cent of developing countries' exports in renewable energy supply technology. While exports from Brazil, Mexico, Philippines, South Africa, Turkey and Vietnam are increasing, exports from most other developing countries are minimal or absent (UNCTAD 2011b). Nevertheless, there are signs that more developing countries are acquiring the capacity for manufacturing renewable energy supply products (see Box 12).

Box 12. Solar Panels manufactured in Mongolia exported to Japan

The Mongolian company Sankou Solar Mongolia LLC was officially established on 1 January 2011. It manufactures solar panels according to international standards, such as IEC 61215 (Crystalline silicon terrestrial photovoltaic (PV) modules), IEC 61730 (Photovoltaic (PV) module safety qualification), and ISO 9001 (quality management systems).

On 27 November 2012, Sankou began exporting PV modules to Japan. Since then, Sankou has exported 427 kW in PV modules to Japan and received a total order for 2 MWs of solar module technology. In the future, Sankou plans to increase its manufacturing capacity so as to expand exports abroad to Japan as well as the EU and other countries of the world.

Source: Interview with Sankou Solar Mongolia LLC, 11 March 2013

Furthermore, some countries in the Middle East and North Africa (MENA) may also have opportunities to enter regional and world markets in renewable energy supply products. The German Development Institute's report on Egypt, for example, states that:

"As indicated by the large increases in global trade in the last few years, there is profit to be made in exporting wind turbines and components ... [t]his suggests that if Egypt could develop a comparative advantage in wind energy manufacturing, it could service the regional emerging markets; Egypt's wind industry could play an important role in the MENA market (and for regions in Africa), where manufacturing capabilities for wind energy components are limited" (Vidican 2012).

However, MENA states are, as yet, largely dependent on technology and knowledge transfers from developed states. They will need to build up domestic industrial capabilities for renewable energy technology in order to play a more significant and autonomous role in international renewable energy trade.

In any case, it is important to note that renewable energy supply products and services are a heterogeneous group. For example, biofuels, solar thermal and geothermal are all lower-tech technologies or lower-tech energy sources in which several developing countries have either existing expertise, or good chances of developing competitive export streams (Cosbey 2011). Box 13 describes the potential for exports of solar-thermal water heaters by developing countries.

Box 13. Potential for exports of solar-thermal water heaters

There are hundreds of manufacturers of solar-thermal water heaters in the world, including in Argentina, Armenia, Barbados, Brazil, Bulgaria, Chile, China, Cuba, Dominica, Egypt, India, Indonesia, Iran, Jordan, Libya, Lithuania, Macedonia, Malaysia, Mexico, Morocco, Nepal, Pakistan, Philippines, Saudi Arabia, Sri Lanka, Thailand, and the United Arab Emirates.

There is also potential to export these solar-thermal water heaters to other markets that demand such renewable energy supply products. Libya, for example, has planned the development of a joint venture with local and foreign investors for the manufacture of solar water heaters (40,000 units/year), for local and export markets (UNECA 2012). Penetration of solar thermal water heaters into some markets, however, is hampered by subsidised prices for electricity or natural gas, the main energy sources used for water-heating appliances.

Source: Steenblik 2006

Renewable energy supply products are often produced in developed and more industrialised developing countries using intermediate inputs sourced from developing countries. Therefore, trade in intermediate goods is an important entry point into the green economy for developing countries. For example, whereas wind-powered electric generating sets are mostly produced in the developed world and emerging economies, several developing countries are starting to emerge as important suppliers of components (Steenblik 2006).

As well as exports from developing countries to developed countries, there are increasing opportunities for trade between developing countries ('South-South trade'). Many are now adopting renewable energy targets, and accordingly need products and technologies that may not be locally available. Furthermore, developing countries are becoming some of the world's largest and fastest growing markets for environmental goods whereas the markets in most developed countries are mature by comparison (Vossenaar 2010).

A 2011 report from UNCTAD further elaborates on the advantages and opportunities of South-South trade of renewable energy supply products:

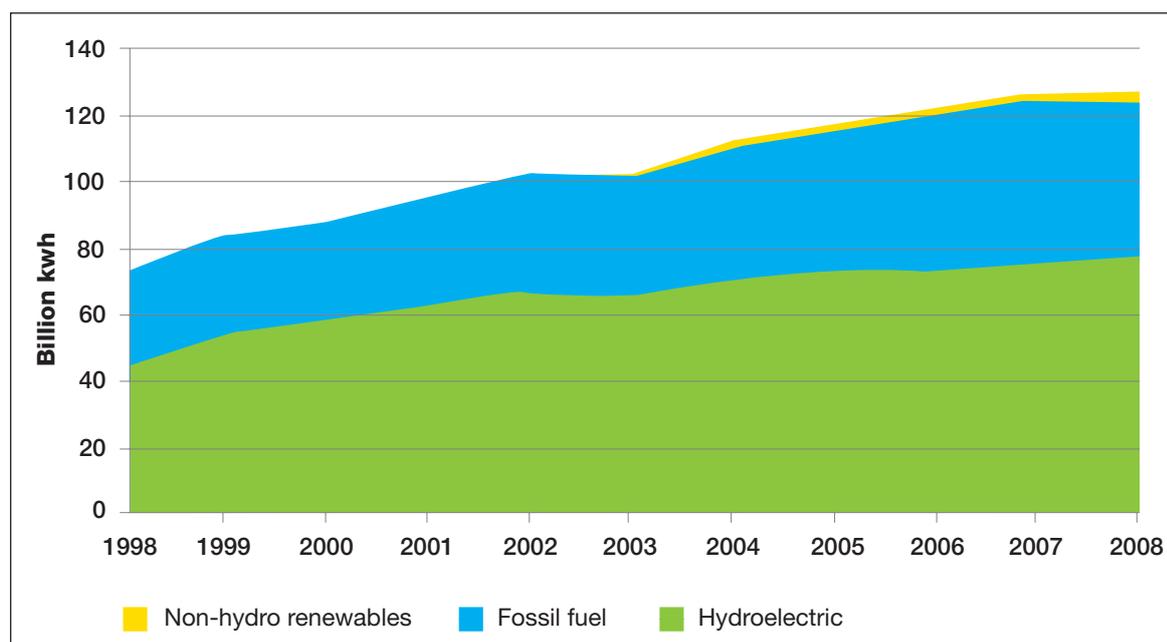
"...developing-country partners have similar needs for many technologies, at least more so compared with developed-country markets. Solar cooking stoves, for example, are an innovation well suited to developing-country contexts, where there is generally ample sunshine, and they are uniquely adapted to the needs of developing-country consumers, many of whom have been forced to rely on traditional biomass for cooking. The same may be said for solar PV-powered lights and lanterns, the biggest markets for which are poor rural locations without grid access. As such, developing country partners can provide a market for [renewable energy technologies] that have been developed to serve domestic needs or for non-indigenous technologies that have been adapted to serve local needs. Of course this is not equally valid for all [renewable energy technologies]; installation of wind turbines, for example, does not vary among developed and developing countries" (UNCTAD 2011d).

Furthermore, hydrogen fuel cells are emerging as viable renewable energy equipment and are even a potential export opportunity for certain developing countries. While hydrogen fuel cells are labelled as "post-2020 transportation technology" (Meyers 2008), there is great potential for developing countries to engage in green inter-state trade of hydrogen fuel technology and know-how. Brazil and South Africa exemplify different approaches to harnessing trade opportunities. For example, South Africa holds 75 per cent of global platinum reserves and therefore naturally assumes a key role as raw material exporter for fuel cell manufacturing. The country has also announced plans to export high-value products to growing international hydrogen fuel cell markets (Perrot 2013). Furthermore, Brazil invested a considerable sum of US\$ 70 million into hydrogen-related technology between 2001 and 2007. In the near future, Brazil aims to scale-up these national investments and export hydrogen fuel buses (Antunes 2010). Hence, hydrogen fuel cells represent a feasible green trade opportunity for developing states. However, in order to become a widely disseminated renewable energy technology, the fuel cells' current cost disadvantage must be mitigated and the technology's durability improved.

6.4.2 Electricity produced from renewable energy sources

In recent years, renewable-energy technologies have grown increasingly competitive with conventional energy supply technologies in terms of electricity generation capacity and unit cost. Many developing countries have a comparative production advantage as they possess abundant renewable energy resources, including solar energy, wind power, geothermal energy, biomass and hydroelectric power (see Figure 6). By scaling up renewable electricity generation, developing countries can therefore enhance national energy access while reducing their dependence on oil and natural gas. This leads to more diversified energy portfolios that are less vulnerable to supply fluctuations and price rises in energy markets.

Figure 6. Electricity generation by source in sub-Saharan Africa



Source: UNEP 2012c

Technology improvements and related cost reductions in renewable electricity generation yield large opportunities for developing countries to tap their vast national resources, not only to meet their domestic energy needs but also to export electricity. In the short term, electricity exports to neighbouring countries are more feasible particularly in view of the high costs of transmitting electricity over long distances. This is especially the case where the necessary electricity transmission infrastructure is currently inadequate (see section 6.3.4). In the medium- and long-term, inter-regional long distance exports of electricity from developing countries could also become an increasingly viable option (see Box 14).

In the following sub-sections, the potential for trade in individual renewable energy sources is outlined.

Hydropower exports

A notable example of national hydropower development can be found in Laos. According to the Lao Department of Energy and Mines, hydropower exports amounted to about 30 per cent of Laos' total exports in 2008 (DEM 2012). Another example is from the Democratic Republic of Congo (DRC), where the Inga Dam is expected to generate more electricity than the DRC could use, thus enabling significant amounts to be exported to neighbouring countries. There is also significant hydropower potential that could be developed in the Nile Basin, elsewhere in the DRC, and Guinea's Fouta Djallon (OECD 2012). There is a growing market for electricity generated from hydro plants as highlighted by research from IRENA on South Africa's future energy needs:

"In addition to indigenous renewable production, South Africa will import significant amounts of renewable electricity. The Lesotho Highlands Power Project will generate 6 GW of wind power and 4 GW of hydropower, mainly for export to South Africa. This is equivalent to nearly one-quarter of South Africa's total current energy supply. The Grand Inga and other large projects will also find a large export market in South Africa in the coming decades" (IRENA 2012).

However, in several cases hydropower development has come with serious environmental risks and social costs, as discussed in Section 6.2.2.

Wind energy and solar power exports

A key example of the future potential of wind energy exports in Asia is Mongolia's first 50 MW wind farm. This is currently under construction and is set to generate an estimated 5 per cent of the country's

electricity needs, while reducing air pollution linked with coal-fired electricity generation. Mongolia could act as a “supergrid” in the Eastern and Central region, supplying neighbouring countries with clean energy (UNEP 2012d). It has the potential to generate 2.6 terawatts of renewable energy per year (Khashchuluun 2012). In Ethiopia, the Adama Wind Power Project, financed by the Export-Import Bank of China, will power Ethiopia’s development and also provide a source of revenue from sales to neighbouring countries (Tekleberhan 2012).

The potential amount of power that could be generated by PV systems, concentrated solar power (CSP) plants and other solar energy technology is practically unlimited, especially in developing countries with high solar radiation. Existing CSP plants produce most of the world’s energy derived from direct radiation. A decisive advantage of CSP, as compared to other renewable energy technologies such as PV, is the large-scale storability of CSP-captured heat, which allows for base load electricity generation. Solar power, especially CSP, also provides significant economic diversification and trade opportunities in the transition to a green economy for many countries in the Middle East and North Africa (MENA) region that are currently exporting or importing oil. Box 14 gives a detailed account of the potential for solar and wind energy exports from MENA.

Box 14. MENA – green energy exports to Europe

The DESERTEC Foundation aims to create a global renewable energy plan based on the concept of harnessing sustainable power from sites where renewable sources of energy are more abundant, and transferring it through high-voltage direct current transmission to consumption centres. All kinds of renewable energy sources are envisioned, but the sun-rich deserts of the world play a special role. In the EU-MENA region, the intention would be to supply energy from MENA’s deserts both to MENA countries and to EU countries.

The pioneering study “Trans-Mediterranean Interconnection for Concentrating Solar Power” (German Aerospace Centre 2006) substantiated that solar electricity imports from CSP produced in MENA countries could provide a renewable energy base load and balance power for a sustainable European energy mix (Trieb et al. 2012). The large potential for solar (and wind) energy in the MENA region is evidenced by the need of a sole 0.2 per cent of MENA territory for CSP plants to supply 15 per cent of the expected European electricity demand in 2050.

In light of this vast natural energy potential, industrial initiatives such as the DESERTEC Industrial Initiative (DII) (DII 2012a) and MedGrid (MedGrid 2012) have started to develop strategic business plans for the MENA region. In addition, the Union for the Mediterranean (UfM) has proposed a Mediterranean Solar Plan to assist with the development of a strategic road map for energy market integration between the two regions. Moreover, Directive 2009/28/EC of the European Parliament on the promotion of the use of renewable energy from renewable sources stipulates that physical imports of clean energy from MENA can count towards the renewable energy targets of EU countries. However, green electricity exports from the MENA region are not expected to begin before 2020 (Trieb et al. 2012).

For MENA countries, the use of widely available renewable energy (i.e. high solar insolation and wind resource) could result in benefits such as enhanced energy security, technology transfer, and income from exports of electricity as well as parts, components and services, private sector development and job creation. Moreover, large-scale deployment of renewable energy in the MENA region is likely to contribute towards reducing costs and increasing the economic competitiveness of renewable energy relative to conventional fuels (DII 2012b). Energy demand in the MENA region is increasing at an annual rate of 6-8 per cent and expected to double by 2020 and to triple by 2030 (IEA 2010a). While covering this increasing domestic demand, electricity generation from renewable sources is estimated to allow for exports to Europe.

Trade opportunities: Due to its large renewable energy resource availability and its relatively smaller domestic market, Morocco has the potential to act as frontrunner for renewable energy development in the MENA region. In June 2011, the Moroccan Agency for Solar Energy signed a Memorandum of Understanding with the DESERTEC Industrial Initiative, agreeing on the development of a large solar project aimed at demonstrating the feasibility of exporting solar electricity to Europe. DII also cooperates with UfM in advancing the Mediterranean Solar Plan, with an emphasis on stimulating electricity exports (DII 2012a). Morocco is estimated to have the capacity to produce almost five times the amount of power needed to satisfy its domestic demand. As a result, the potential for energy exports is sizable.

Egypt is also developing export capabilities of renewable energy parts, components and services for the African market. Egypt's capacity for green electricity exports is limited by a high domestic electricity demand due to large population and economic growth. An optimal energy system in Egypt would require the country to import power when needed and export it when the production exceeds domestic demand (DII 2012b). In view of domestic demand constraints and the substantial national manufacturing potential, Egypt focuses on developing capabilities for exports of renewable energy supply technologies (Vidican 2012).

As a result of these prospective developments, European countries could import up to 20 per cent of their electricity needs from North Africa, at a significantly lower cost (DII 2012b). Aside from electricity exports, renewable energy developments also offer opportunities for building capabilities in manufacturing energy system parts and components and in service provision along the value chain for solar and wind energy technologies, as exemplified by Egypt (Vidican 2012, World Bank 2011).

Challenges: The process of facilitating cross-regional electricity trade faces many challenges in terms of infrastructure needs, investment costs, know-how and technology development, and political agreement at the regional and cross-regional level.

Perhaps the most pressing challenges relate to the clarification of political and institutional framework conditions, necessary for enabling exports of green electricity from MENA to Europe. These include the import price of electricity, the establishment of a new inter-regional feed-in-tariff for green electricity from the MENA region, and the share of electricity generated in MENA assigned for exports to Europe. Moreover, the harmonisation of policy regimes for renewable sources of energy across the region, along with robust national strategies for renewable energy development, is critical for enabling such an unprecedented cross-regional project.

The infrastructure for electricity exports is critical. This includes the HVDC lines that will need to be built and the lines for overland transmission. In addition, the development and upgrade of regional grid connections within the MENA region is crucial with regard to the export of renewable energy (Fritzsche et al. 2010). The costs of such large-scale cross-regional project are high and require the use of innovative financing instruments.

Another set of challenges relate to technology transfer and acquisition of know-how on renewable energy technology in the MENA region. As knowledge on renewable energy technologies is concentrated mostly in Europe, technology transfer mechanisms are needed, for example, through joint ventures, technology acquisitions, or public-private partnerships. In addition, training programmes at the professional and vocational levels will have to be put in place to support the process of national capability building.

While assessments of gaps in the provision of skills for the renewable energy sector exist (MEMEE 2012), a thorough assessment of the job creation potential is largely missing in these countries. Job creation from localising manufacturing and services and technological upgrading in the private sector is critical for improving economic development and competitiveness objectives in the MENA region. The Moroccan Energy Strategy presents a relatively conservative job creation scenario, whereby 13,300 jobs in the renewable energy sector could be created by 2020 (MEMEE 2011). In Egypt, the implementation of the national wind energy targets is estimated to generate 75,000 green jobs by 2020 (El Sewedy 2009). Overall, rough estimates show that, by 2050, up to one million jobs could be created as a result of large scale renewable energy developments in the MENA region (DII 2012b).

Ways forward: From a technical point of view, the export of green electricity from MENA to Europe appears realistic. Solar and wind energy potentials are high enough, costs and environmental impacts are limited, and the technology and materials are available. Yet, several challenges need to be overcome. As a priority, it is necessary to put in place the political and institutional framework conditions in both MENA and Europe to enable large investments and to develop a consistent regulatory framework for green energy imports from MENA that would ultimately offer higher security to investors.

Besides enabling electricity exports, investments in renewable energy developments also offer opportunities for socio-economic developments in the region, integrating measures to expand energy access, increase local value added in terms of jobs, private sector competitiveness, and technological upgrading.

Investments in technological adaptation of mature technologies to local environmental conditions also offer entry points for MENA countries to acquire and enhance innovation and entrepreneurial capabilities. As such, renewable energy deployment projects offer vast possibilities for technology transfer and upgrading and for the integration of domestic companies in the supply chain of solar and wind energy technologies. In addition, harnessing renewable energy potential can largely contribute to CO₂ emissions reductions in those MENA countries that are, currently, heavily reliant on fossil fuel combustion.

Partnerships across different actors within and across the MENA and EU region are critical for realising the identified benefits from clean energy trade. Inter-regional cooperation can address many crucial aspects, from finance and knowledge development to policy harmonisation and regulation in order to foster green energy exports.

Source: Dr Georgeta Vidican (Senior Researcher German Development Institute, Bonn; Assistant Professor Masdar Institute of Science and Technology, Abu Dhabi)

Geothermal energy

Another source that may be exploited for export opportunities is geothermal energy. Although development is still in an early stage, Kenya is hoping to become the first African country to export geothermal energy (UNEP 2010b). In the Caribbean, West Indies Power Holdings is developing a geothermal site in Nevis and is negotiating with the World Bank regarding the Caribbean Interconnect Project, which would supply other islands with geothermal power via submarine cables (Cleantech 2009). The European Investment Bank is also backing a Caribbean geothermal energy scheme. This includes a EUR 1.1 million grant to enhance detailed planning and to study the feasibility of exporting electricity generated by geothermal energy from Dominica to its neighbours, Martinique and Guadeloupe. This scheme has the potential to develop a 20 MW geothermal power generation plant for local use and a subsequent plant of up to 120 MW for electricity export (EU 2012).

6.4.3 Biofuels

Notwithstanding the potential negative impacts of biofuels on land-use patterns and food security (see section 6.2.2), several green trade opportunities exist for countries producing biofuels, particularly when biofuels adhere to 'second-generation' criteria.

Many developing countries are well placed to seize trade opportunities in the biofuel sector due to more advantageous climate conditions and lower labour costs. Biofuel production costs are relatively low in many developing countries, where tropical conditions prevail. Biofuels, unlike most forms of renewable energy, can be produced and then traded on a large scale, as they require relatively minor technological know-how.

Given the expanding demands for transport fuels of a growing and increasingly wealthy world population, demand for sustainable biofuels is likewise expected to grow and create export opportunities for some developing countries (UNCTAD 2009). In 2007, more than seven billion litres of bioethanol were traded internationally, up from 1 billion litres in 2000 (Oosterveer and Mol 2010). Until now, however, the contribution of many developing countries to the global biofuels trade has remained fairly small. This is partly due to the technological and institutional challenges in producing these goods but also because of import requirements and tariffs in developed countries limiting market access of many developing countries (Steenblik 2007, FAO 2008, Coelho 2005).

Second generation fuels technology uses agricultural and forestry residues, rather than food products or produce from agricultural land, for fuel production and could therefore avoid many of the adverse consequences of first generation biofuels. This will require that second generation fuels use only moderate amounts of agricultural residues, or are based on crops such as halophytes that do not compete for arable land. A recent survey by the Bloomberg New Energy Finance (BNEF 2013b) estimates cellulosic ethanol, a specific variant of second generation biofuels, to reach cost parity with conventional biofuels by 2016. This could substantially relieve the current shortage in arable land for food production.

It has been estimated that by 2030, ten per cent of the world's agricultural and forestry residues could cater roughly 50 per cent of global biofuel demand (IEA 2010b). The IEA notes that in developing countries such as Cameroon and Tanzania there is a high potential for using residues from agriculture and forestry for the production of second-generation biofuels; the major limiting factors are scattered smallholders that complicate logistics, limited financing, poor infrastructure, and a shortage of skilled labour. To help overcome these limitations, foreign direct investments can play a role in financing the production and infrastructure of second-generation biofuels (IEA 2010b).

Another trade opportunity in the renewable energy sector is the export of sustainably sourced biomass for use as a fuel. For more information on this trade opportunity, see the Forests chapter of this report.

6.4.4 Cross-border provision of renewable energy services

The development and deployment of renewable and energy efficiency technologies depend on a wide range of services, including energy and construction consultancy services. These and other services are traded internationally. In addition, significant foreign direct investment is channeled into the energy services sector (Glachant 2013). For more information on the services aspect of renewable energy, see the section on trade in environmental goods and services in the Introduction and the Manufacturing chapter.

6.4.5 Exporting carbon credits on international markets

Under certain circumstances, renewable energy projects that reduce or avoid emissions relative to a BAU baseline can have this emissions differential securitised into carbon credits. These can be sold to governments or companies in industrialised countries and consequently used by them for compliance with emissions reduction commitments under the Kyoto Protocol or under domestic emissions trading schemes such as the EU's cap and trade mechanism, the Emissions Trading System (ETS).

Under the Clean Development Mechanism (CDM) of the Kyoto Protocol, emission-reduction projects in developing countries are able to earn carbon credits, which once accepted under the UNFCCC's approval mechanisms, are termed certified emission reductions (CERs). Each CER is equivalent to one tonne of CO₂. CERs can be traded and sold, and used by industrialised countries to meet a part of their emission reduction targets under the Kyoto Protocol.

According to the World Bank, the carbon market could earn poorer nations more than US\$ 25 billion every year (Nijuru 2009). However, given the fall in prices for CERs in 2011-12, and a lack of clear future demand for such credits, the opportunity may be smaller than those earlier predictions.

Developing countries can, therefore, export GHG reductions generated in their countries to developed countries. In particular, the deployment of renewable energy technologies (or tree planting⁶) opens new export opportunities and revenue streams as developing countries become eligible for carbon crediting on international carbon markets. The Gold Standard is a key example of a standard for carbon offsets.⁷

Companies that sell clean cooking stoves, domestic biogas and green charcoal/biochar⁸ can earn credits, as can those involved with small-scale hydroelectricity, light-emitting diodes (LEDs), solar water heaters and water purification and industrial companies in the cement, biodiesel and sugar sectors. Some firms are already taking advantage of these opportunities. The Kenyan firm East African Portland Cement, for example, began a project in 2010 that would enable it to sell CERs for US\$ 1.7 million annually. Another example of a Kenyan sugar company that is making use of exporting CERs is described in Box 1.5.

6. See the Forests chapter of this report.

7. For further information, see <http://www.cdmgoldstandard.org/>.

8. For information on biochar see Carbon Gold (n.d.), The Telegraph (2013).

Box 15. Kenya – example of carbon credit trade opportunities in the renewable energy sector

To pursue a new roadmap for sustainable growth and energy production, the Kenyan government is advocating a shift from the present, carbon-intensive development model to a low-carbon pathway (UNEP 2012e). This is evident in the renewable energy sector, which is seen by the Kenyan government as a key sector for sustainable growth.

The rationale behind the national facilitation of renewable energy is manifold. Increasing economic activities and a rising national population lead to a higher domestic energy demand in Kenya, which is mostly satisfied by imports of foreign energy. The high cost of energy imports significantly slows economic growth in the country (World Bank 2012). Imported crude petroleum, for instance, accounts for about 25 per cent of the national import bill. The problem of high energy costs is supplemented by the unreliability of energy supply infrastructure. On average, Kenyan companies lose nearly 10 per cent of their production because of power outages and fluctuations (UNEP 2006). Sustainable, affordable and reliable domestic energy for all citizens is, therefore, declared a priority factor in national policy (RoK 2012).

Securing investments in new renewable energy projects, however, is often challenging. An opportune way for Kenya to attract renewable energy financing is through generating and exporting carbon credits.

Sector overview: In 2008, Kenya initiated plans to actively promote renewable energy and energy efficiency investments by implementing national feed-in tariffs (FITs) for different renewable electricity sources (UNEP 2010c). Investment guarantees under the FIT are expected to promote financing in renewable energy and carbon credit projects (UNEP 2012f). In 2012, Kenya had 32 carbon projects in the pipeline for carbon credits from the Clean Development Mechanism (CDM). On the African continent, Kenya is one of the forerunners in the attraction of CDM projects, second only to South Africa (UNEP 2012g).

Project Example – the Mumias Sugar Company project: The Mumias Sugar Company project generates renewable energy through the combustion of biogas which is available as a waste component of factory production. The project generates 35 MW of electricity of which 10 MW are consumed by the factory itself, and the balance is sold to the national electricity grid (UNFCCC 2012a).

From an emission reductions standpoint, combusting biomass for electricity generation has a dual benefit: It produces renewable energy while avoiding methane emissions, which would result from landfilling the biomass. The project is expected to save nearly 1.3 million tonnes of CO₂ emissions over a 10-year period (2008 - 2018).

Revenues from CERs are a key element of the financing strategy of the renewable energy project at Mumias Sugar Company. CER income is expected to increase the project's internal rate of return by two per cent (UNEP 2012f). Mumias Sugar has entered into a ten-year agreement (2009–2019) with the Japanese Carbon Finance Company Limited (JFC), selling its CERs on a long-term basis and thereby generating significant revenue.

Challenges: As the example of Mumias Sugar shows, CERs can be an important way to mobilise financial resources for renewable energy, energy efficiency, and other types of low-carbon projects. The CDM can open new export opportunities and revenue streams, to increase further as more countries initiate or participate in emissions trading systems.

However, while assessing manifold opportunities, the challenges and uncertainties regarding CDM projects must not be overlooked. To attract investors, a robust, bankable business plan is needed. The perceived risk of investment also depends on the overall economic environment of a country, which can be crucial for the supply of private capital.

An additional barrier concerns the complexity of CDM projects and their accreditation process. The actual registration of the project can be lengthy and transaction costs for the CDM procedures, plus the registration fee, can make the initial phase expensive.

There is also uncertainty about the development of CER prices, as the first period of emission reduction commitments of the Kyoto Protocol recently expired. This uncertainty has decreased CER prices, which lowers CDM investment incentives and threatens project owners with bankruptcy. Though future demand for international offsets may emerge from a new multilateral climate regime post-2020, prices are expected to remain low in the short and medium term (Scotney et al. 2012). However, some predict that the price for CERs will recover in the longer term and stabilise at around US\$ 10 per tonne of CO₂ (CDC 2012).

Ways forward: To increase the benefit of CDM projects, well-functioning institutional structures are imperative. In particular, clear rules regarding the granting of approvals to the projects within pre-determined timelines could help reduce the risk for private investors. For their part, investors can contribute by integrating multiple revenue streams in one project, thereby increasing the viability and resilience of the business model.

At the same time, projects must align with local development needs, as perceived by public institutions and local communities. Therefore, local communities and the public have to be integrated in CDM procedures and their political influence over CDM policy has to be strengthened to promote sustainable development (GCD 2011).

Source: Iain Henderson (UNEP FI)

According to research undertaken by the UNEP Finance Initiative (UNEP FI), there remains much untapped potential for CDM projects to promote renewable energy and other types of low-carbon technologies in developing countries.

The uptake of CDM projects, especially in Africa, has been limited (Brittlebank 2012); UNEP FI observes a general geographical disparity among the regions that are making use of the opportunity of CDM exports:

“Africa may come third in the absolute number of CDM projects in the pipeline, but considering its size, it scores worst of all regions of the world as measured by certified emission reductions (CERs) in the pipeline per capita...To date more than 4,200 CDM projects are in the global pipeline. They are expected to generate 2.9 billion CERs by 2012. However, the current distribution of projects is uneven, with 75 per cent of registered projects located in the Asia Pacific and less than 1 per cent in sub-Saharan Africa...” (UNEP 2012c).

In any case, proposals for further developing and utilising such trading schemes and project-based mechanisms need to be carefully scrutinised to ensure that they are facilitating environmental goals and meet additionality criteria. In this context, the Gold Standard is one of the mechanisms that can ensure environmental credibility.

Box 16. New CDM Loan Scheme

A new loan scheme was launched at the African Carbon Forum in April 2012 aimed at supporting CDM projects in LDCs, particularly those in Africa. The CDM Loan Scheme will provide interest-free loans for CDM projects in LDCs as well as countries that have fewer than ten registered CDM projects. The scheme is run jointly by the UNFCCC, the UNEP Risoe Centre and the United Nations Office for Project Services (UNOPS). The loan scheme will be extended to projects that meet a number of criteria including:

- A high probability of registration with the UNFCCC;
- A reasonable outlook to generate at least 7,500 CERs per year for projects in LDCs and 15,000 CERs per year for projects in other developing countries; and
- Documentation that is developed with an experienced CDM consultant.

The CDM Loan Scheme received applications from 42 projects in 23 countries in Latin America and the Caribbean, Asia and Africa. With 29 projects, Africa accounts for the bulk of applications. The types of projects submitted were equally varied. There were 22 applications for programmes of activities, covering mainly cook stove and small-scale biogas projects. Applications for 11 large-scale projects covering a wide range of technologies and sectors, including transport, methane avoidance and renewable electricity, were also received.

Source: CDM Loan Scheme, Website

6.5 Enabling conditions

The list below offers concrete suggestions for actions from governments, the private sector and other stakeholders to create enabling conditions conducive to creating and taking advantage of existing and potential trade opportunities that arise from or are associated with a transition to a greener economy. The identified policy tools are tailored to address the main challenges in renewable energy trade, as outlined in this chapter. These include the need for increased technology and infrastructure investments, energy-related tax and subsidy reform schemes, the utilisation and furtherance of international cooperation frameworks and an improved stakeholder dialogue.

6.5.1 Public investment and spending

- **Encourage innovation, research and development (R&D) and training.** Public support for R&D is essential for supporting high-risk research with a long-term outlook. In developing countries, R&D in renewables may warrant a focus on building capacity to facilitate technology transfer, including between developing countries.⁹ For example, R&D joint ventures can adapt technologies to local market conditions and support national private-sector players that install, manufacture, operate and maintain the technologies.
- **Expand grid access to facilitate export opportunities for renewable electricity.** Renewable energy supply plants should be located strategically, thus close to demand centres and conducive to integration in the national grid. By increasing renewable electricity generation and expanding electricity transmission capacities, developing countries can enhance national electrification. The extension of regional grid capacities could also facilitate trading of power among neighbouring countries, thereby supplying low-cost power while reducing carbon emissions and exposure to volatile oil prices (World Bank 2009).
- **Support nascent green sectors.** Green sector growth can be facilitated by the provision of time-bound green subsidies such as low-interest loans, feed-in tariffs, investment incentives, exemption from certain regulations, stewardship jobs, and support for green small and medium enterprises. Such support must be carefully designed to avoid dependence or otherwise ineffective and unintended outcomes and conflict with WTO rules.¹⁰

6.5.2 Market-based instruments and subsidy reform

- **Use appropriate taxes and market-based instruments to promote green investment and innovation in renewable energy supply.** Significant price distortions can discourage green investments or lead to failure of scaling up such investments. In a number of economic sectors, negative externalities, such as pollution, health impacts or loss of productivity, are typically not reflected in costs, thereby reducing the incentive to invest in more sustainable goods and services. A potential solution to this challenge is to internalise the cost of an externality via a corrective tax, charge or levy. In some cases other market-based instruments such as tradable permit schemes may be more appropriate.
- **Put in place incentive mechanisms for renewable energy technologies.** Governments can improve the risk-return profile of renewable energy by assuming some of the financial risk. A wide suite of public incentive mechanisms such as national targets and feed-in tariffs are available. Each type of incentive mechanism has advantages and disadvantages. Hence, the choice of the incentive mechanism to be used will depend on the local circumstances of the country, the energy sector concerned, and the nature and ambition of the corresponding national renewable energy targets (UNEP 2012c).
- **Phase out fossil fuel subsidies.** The considerable cost of renewable energy projects and technology incentives raises financial and political difficulties. Large sections of the population in developing countries are poor and cannot afford the additional costs of renewable energy

9. An example of public support of R&D in the renewable energy sector is the Desertec University Network, which was established by the Desertec Foundation and the Tunisian National Advisory Council for Scientific Research and Technology. The network aims at fostering renewable energy experts in MENA countries and, in the long-term, make MENA states autonomous renewable energy producers (Desertec 2012).

10. For further information, see UNEP (2008b).

deployment. However, in many developing countries this cost problem could be mitigated by tapping readily accessible sources of government funding, particularly the significant flows of public subsidies to fossil fuels. Switching the flow of subsidies from fossil fuels to renewable energies is easily justifiable because of the positive social and environmental externalities from renewable energy use. Therefore, if financial resources need to be raised nationally, this should and can be done without placing the financial burden on the poorer segments of society (UNEP 2012c).

6.5.3 National regulatory frameworks

- **Devise a renewable energy strategy to foster exports.** A review of countries' strengths and opportunities at the national level can help identify export prospects. It is important to recognise that scaling up renewable energy generation in a country has the potential to facilitate new export opportunities in those technologies, particularly where comparative cost, knowledge or technology advantages exist. In addition, investment promotion plans are needed in order to attract the necessary capital to unlock trade potential.
- **Establish and maintain an enabling policy framework for renewable energy.** The development of reliable and predictable market conditions, transparent regulatory frameworks, and clear long-term commitments is critical to the development of the sector. Such commitments could be manifested by targets for investment in additional capacity and penetration rates within the energy mix. Setting targets to achieve these goals can send a strong signal to potential investors (UNEP 2011).

6.5.4 International frameworks

- **Build on climate change negotiations.** International trade in renewable energy supply equipment and renewable energy will most likely benefit the post-2015 negotiations under the UNFCCC. In this regard, the Rio+20 Outcome Document highlights the importance of increasing the share of renewable energy for addressing climate change (UN 2012a, paragraph 128).
- **Enable green trade opportunities in energy by reaching an international agreement to liberalise trade in environmental goods and services (EGS).** Lowering tariff and non-tariff barriers from goods such as wind turbines, solar panels, hydrogen fuel cells and energy-efficient light bulbs, to services such as environmental engineering, will likely lead to new green trade opportunities and real increases in trade (ICTSD 2009). The WTO's Doha Round includes negotiations on the liberalisation of trade in EGS (WTO 2001). EGS liberalisation should be sensitive and responsive to developing country concerns and provide a certain degree of flexibility and policy space.
- **Negotiate a framework for sustainable biofuel trade.** An internationally accepted framework for determining what kinds of biofuels qualify as sustainable would enable governments and industry to implement measures to accelerate the required technology development and uptake. This could include a global road map for second-generation biofuels and international standards with respect to the sustainability of biofuels.

6.5.5 Enhancing dialogue and capacity building

- **Promote green trade financing for renewable energy.** A global programme of green trade financing for developing countries would be helpful to create synergies between international and national initiatives (UNFCCC 2012b). This would respond to the Rio+20 Outcome Document, which calls on UN agencies to assess the technology needs of developing countries, explore options to address them, and foster related capacity building (UN 2012a, paragraph 73).
- **Promote the dissemination of green technologies.** Openness to trade and investment could enable domestic actors to engage in catch-up innovation. The potential that cooperation among developing countries offers in overcoming many of the technological challenges could be further explored through dialogue between governments, intergovernmental organisations and/or regional development banks. The launch of the Green Climate Fund offers an ideal platform for cooperative engagement among stakeholders (UNFCCC 2010).

This chapter has illustrated the manifold challenges and opportunities at the intersection of trade, energy, and the transition to a green economy. As highlighted in the Rio+20 Outcome Document, the renewable energy sector has a significant role to play in encouraging a transition to a green economy and in addressing the challenge of access to sustainable modern energy services for all. International trade can play a significant role in the greening of the energy sector, in particular, by acting as a vehicle for technology transfer for renewable energy and by responding to demand for sustainably sourced energy. This demand has led to several trade opportunities, including exports of raw materials and components for renewable energy supply products and finished products, exports of energy from renewable sources, exports of renewable natural resources to produce energy and the selling of carbon credits on international markets.

However, in order for developing countries to benefit fully from these opportunities, many obstacles must be overcome. Creating suitable enabling conditions, including public and private sector investments, regulation, market-based instruments, R&D, and instalment of appropriate infrastructure, can help to address the main challenges to more sustainable trade in renewable energy. Facilitative measures should be conducive to the further development and use of renewable energy and must adhere to proper international frameworks. There is also a pressing need to phase out harmful fossil fuel subsidies and remove barriers that hamper the widespread diffusion of climate friendly technologies.

6.6 Further resources

6.6.1 Websites for additional information

Green Economy Report Renewable Energy chapter:

http://www.unep.org/greeneconomy/Portals/88/documents/ger/GER_6_RenewableEnergy.pdf

UNEP Division of Technology, Industry and Economics:

<http://www.unep.org/dtie/Branches/Energy/tabid/29686/Default.aspx>

UNEP 2012, "21 Issues for the 21st Century – Results of the UNEP Foresight Process on Emerging Environmental Issues":

http://www.unep.org/publications/ebooks/foresightreport/Portals/24175/pdfs/Foresight_Report-21_Issues_for_the_21st_Century.pdf

UNDESA Department of Economic and Social Affairs:

<http://www.un.org/en/development/desa/climate-change/renewable-energy.shtml>

UNECE Hydrogen and Fuel Cell Vehicles - Subgroup safety (HFCV-SGS):

<https://www2.unece.org/wiki/pages/viewpage.action?pageId=3178603>

UNFCCC, Second synthesis report on technology needs identified by Parties not included in Annex I to the Convention:

<http://unfccc.int/resource/docs/2009/sbsta/eng/inf01.pdf>

UNIDO 2012, Facilitation mechanisms to promote the development, transfer and dissemination of clean and environmentally sound technologies:

<http://sustainabledevelopment.un.org/content/documents/1293unido.pdf>

United Nations Commodity Trade Statistics Database:

<http://comtrade.un.org/>

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<http://www.cdmpolicydialogue.org/report/rpt110912.pdf>

WIPO Green:

https://www3.wipo.int/green/green-technology//resources/green_technology/greenSearchBL.xhtml

Transfer of Environmentally Sound Technologies, Case Studies from the GEF Climate Change Portfolio:

<http://www.thegef.org/gef/sites/thegef.org/files/publication/GEF-TechTransfer-lowres%20final.pdf>

WTO Dispute Settlement Gateway:

http://www.wto.org/english/tratop_e/dispu_e/dispu_e.htm

WTO Trade and Environment:

http://www.wto.org/english/tratop_e/envir_e/envir_e.htm

The Future of Trade: The Challenges of Convergence Report of the Panel on Defining the Future of Trade convened by WTO Director-General Pascal Lamy (24 April 2013):

http://www.wto.org/english/thewto_e/dg_e/dft_panel_e/future_of_trade_report_e.pdf

CDM Loan Scheme:

<http://cdmloanscheme.org/>

The International Renewable Energy Agency (IRENA):

www.irena.org/

Energy Charter Secretariat:

<http://www.encharter.org/>

International Sustainable Energy Organisation for Renewable Energy and Energy Efficiency (ISEO):
<http://www.uniseo.org/>

Tyndall Centre for Climate Change Research:
<http://www.tyndall.ac.uk/index.html>

International Emissions Trading Association (IETA):
<http://www.ieta.org/>

Fuel Cell & Hydrogen Energy Association:
<http://www.fchea.org/>

International Biochar Initiative:
<http://www.biochar-international.org/contact>

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Acronyms

APO	Asia Productivity Organisation
BAU	Business as Usual
CDM	Clean Development Mechanism
CMS	Convention of Migratory Species
CST	Certification for Sustainable Tourism
DFIs	Development Finance Institutions
DMO	Destination Management Organisation
DTIS	Diagnostic Trade Integration Studies
ECOWAS	Economic Community of West African States
EEZ	Exclusive Economic Zone
EIF	Enhanced Integrated Fund
ETS	Environmental Treatment Systems
FAO	Food and Agriculture Organization
FTTSA	Fair Trade in Tourism for South Africa
GATS	General Agreement on Trade in Services
GEF	Global Environmental Facility
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GSTC	Global Sustainable Tourism Council
ICAO	International Civil Aviation Organization
ICT	Costa Rica Tourist Board
ITC	International Trade Centre
ISO	International Organization for Standardization
JI	Join Implementation
LDCs	Least Developed Countries
MPA	Marine Protected Area
OECD	Organisation for Economic Co-operation and Development
PATA	Pacific Asia Travel Association
SFM	Sustainable Forest Management
SLM	Sustainable Land Management
SNV	Stichting Nederlandse Vrijwilligers (Foundation of Netherlands Volunteers)
TEEB	The Economics of Ecosystems and Biodiversity
TIES	The International Ecotourism Society
TPRG	Tourism Planning Research Group
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNWTO	United Nations World Tourism Organization
US	United States
VCS	Voluntary Carbon Standard
WEF	World Economic Forum
WTO	World Trade Organization

7 Tourism

7.1 Introduction

The Rio+20 Outcome Document “The Future We Want” (UN 2012) highlights the role of sustainable tourism in the transition to a green economy in the context of sustainable development and poverty eradication. Paragraphs 130 and 131 set out the political commitment to sustainable tourism:

130. **We emphasize that well-designed and managed tourism can make a significant contribution to the three dimensions of sustainable development, has close linkages to other sectors and can create decent jobs and generate trade opportunities.** We recognize the need to support sustainable tourism activities and relevant capacity building that promote environmental awareness, conserve and protect the environment, respect wildlife, flora, biodiversity, ecosystems and cultural diversity, and improve the welfare and livelihoods of local communities by supporting their local economies and the human and natural environment as a whole. **We call for enhanced support for sustainable tourism activities and relevant capacity-building in developing countries in order to contribute to the achievement of sustainable development.**

131. We encourage the promotion of investment in sustainable tourism, including ecotourism and cultural tourism, which may include creating small and medium-sized enterprises and facilitating access to finance, including through microcredit initiatives for the poor, indigenous peoples and local communities in areas with high ecotourism potential. In this regard, **we underline the importance of establishing, where necessary, appropriate guidelines and regulations, in accordance with national priorities and legislation, for promoting and supporting sustainable tourism.** [emphasis added]

Tourism is considered as one of the best green options for addressing poverty, employment and economic diversification initiatives in developing countries (Honeck 2012). Sustainable tourism, in particular, has the potential to create new jobs, reduce poverty and increase export revenues.

This chapter first provides a brief overview of the current state of the tourism industry. It then identifies how the transition to a green economy presents existing and potential trade opportunities for tourism and travel-related services in developing countries. The main challenges with taking advantage of the opportunities are also analysed along with suggestions on how to address them. This chapter focuses on:

- Trends and opportunities existing across the sector: environmental and economic incentives, changing tourism destinations and countries of origin, changing consumer preferences, certification, carbon offsetting, handicraft; and
- Trends and opportunities in green tourism categories: ecotourism, agro-tourism, and coastal and marine tourism.

7.2 The transition to a green economy

7.2.1 Tourism as a key export industry

Tourism is considered as an export industry since foreign tourists who travel abroad purchase goods and services with money from their home countries. Tourism markets are governed by national regulations. The liberalisation of trade in tourism and travel-related services can also take place through the General Agreement on Trade in Services (GATS) of the World Trade Organization (WTO), at the multilateral level, as well as through regional trade agreements (RTAs) covering trade in services at the regional level. Regulatory commitments under such agreements can play a significant role in promoting tourism, including intra-regional tourism among developing countries. By reducing regulatory barriers through these agreements, countries can enhance the gains from tourism trade for firms, workers and consumers (UNCTAD 2010).

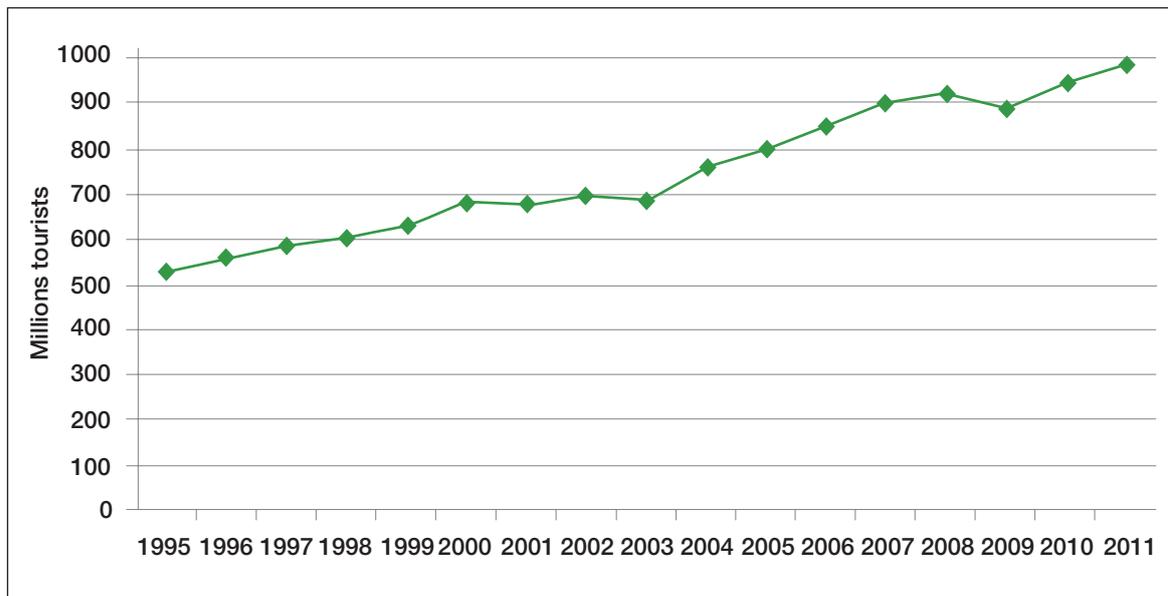
Tourism services are covered by GATS under Tourism and Travel-Related Services, which include (a) hotels and restaurants; (b) travel agencies and tour operators; (c) tour guides; and (d) other. Many services linked closely to tourism are classified under different sectors such as business, financial and recreation services. According to the WTO:

“One of the most crucial aspects of international tourism is the cross-border movement of consumers. This permits even unskilled workers in remote areas to become services exporters — for instance, by selling craft items, performing in cultural shows, or working in a tourism lodge” (WTO 2012).

International travel – whether for recreation, leisure or business – has become one of the fastest growing economic activities worldwide (see Figure 1 below). According to the World Tourism Organisation (UNWTO), in 2012, for the first time in history, the number of international tourist arrivals reached an annual figure of over one billion (UNWTO 2013a). This is a sharp rise in international tourists from 25 million in 1950, 277 million in 1980, and 528 million in 1995 (UNWTO 2012a, UNWTO 2012b). International tourists are predicted to reach 1.8 billion by 2030 (UNWTO 2011).

In terms of both direct and indirect impacts, tourism is a major contributor to the global economy. It accounts for more than nine per cent of global GDP and almost nine per cent of jobs globally (WTTC 2012). Hence, tourism is one of the largest categories of international trade in services. International tourism ranks fourth after fuels, chemicals and automotive products in global exports. The tourism industry has a value of US\$ one trillion a year and accounts for 30 per cent of the world’s exports of commercial services or six per cent of total exports (UNEP 2011a).

Figure 1. Growth in international travel



Source: UNWTO and UNEP 2012

Furthermore, tourism linkages to the other economic sectors reviewed in this report are significantly diverse and, subject to good planning, can help accomplish green trade opportunities identified in those sectors. Tourism requires support, for example, to build and operate hotels, restaurants and other tourism-related facilities through linkages with basic infrastructure services such as energy, telecommunications and environmental services, agricultural, manufacturing and construction services. Strong linkages generate broad economic benefits at the national level, including new employment opportunities and poverty reduction at the local level (UNCTAD 2010).

Tourism is a promising source of income for developing countries because it provides an effective transfer of income from developed to developing economies. According to the UNWTO, in recent years, developing country destinations have grown faster than destinations in developed countries. This trend is set to continue. Between 2010 and 2030, arrivals in countries with emerging economies are expected to increase at

double the rate (4.4 per cent annually), compared to those of developed economies (2.2 per cent annually). So far, the market share of the overall tourism industry in developing countries has increased from 30 per cent in 1980 to 47 per cent in 2011. It is expected to reach 57 per cent by 2030, equivalent to over one billion international tourist arrivals (UNWTO 2012b). Furthermore, tourism in developing countries includes intraregional South–South tourism which represents an important channel for the future growth and development of developing countries' tourism sectors (UNCTAD 2010).

In many developing countries, tourism is an important source of foreign exchange and foreign investment. Cambodia, for example, derives 18 per cent of its Gross Domestic Product (GDP) from travel and tourism, with the sector employing 14 per cent of the country's labour force (WEF 2011). In Malaysia, using a value-chain analysis, the Tourism Planning Research Group (TPRG) has found that economic benefits received by local people account, on average, for 34 per cent of total income generated by tourism. This relatively high income share, particularly in restaurants, may reflect various public and private initiatives to employ or involve locals in tourism business operations (TPRG 2009).

Tourism has been identified as a priority sector for development in 90 per cent of Least Developed Countries (LDCs) according to studies conducted by the Enhanced Integrated Framework (EIF) (EIF 2012). The studies have found that tourism is becoming a significant industry for many LDCs with a direct link to poverty eradication (Francis 2012). Notably, tourism has enabled developing countries such as Botswana, Cape Verde and Maldives to transition out of the LDC category (Orga 2010).

7.2.2 Adverse impacts of tourism

As analysed in the GER (UNEP 2011a), despite the many potential positive impacts associated with tourism, the sector is also a significant contributor to environmental pollution and degradation (UNEP 2012a).¹ Pressure on the environment stemming from tourism includes:

- **Rising greenhouse gas (GHG) emissions** – including significant emissions from transportation (e.g. aviation and road transport) and accommodation (e.g. from air-conditioning and heating systems);
- **Water consumption** – increased pressure on already diminished water resources; in some regions, tourism can compete with other sectors for water such as agriculture and the subsistence needs of local populations;
- **Waste management** – considerable impacts of waste and local wastewater; for example, it is commonplace for hotels to discharge untreated sewage directly into the sea;
- **Detrimental effects on biodiversity** – including the erosion of coral reefs, coastal wetlands, forests, arid and semi-arid ecosystems and mountainous areas (UNWTO 2010a);
- **Increased conflicts with local communities** – arising from failure to incorporate biodiversity concerns into destination planning, investment and benefit sharing; and
- **Threats to cultural integrity** – arising from unplanned (no prior consent or participation) and unmanaged tourism.

At the same time, it is important to note that the tourism sector is also a victim of environmental pollution and degradation from other industries (UNEP 2012a).

7.2.3 Sustainable tourism

Some of the negative effects described above may be reduced greatly by greening tourism (UNEP 2008). Because of the size and reach of the sector, this is a critical element of transitioning to a green economy. Even small changes towards greening, such as the more efficient use of energy and water and better waste management, can have significant positive impacts.

1. A Malaysian study, for example, estimated that tourists generate double the solid waste per capita compared with local residents (Shamshiry et al. 2011).

Box 1. UN definition of sustainable tourism

Expressed simply, sustainable tourism can be defined as:

“Tourism that takes full account of its current and future economic, social and environmental impacts, addressing the needs of visitors, the industry, the environment and host communities”.

Conceptual definition:

“Sustainable tourism should:

1. Make optimal use of environmental resources that constitute a key element in tourism development, maintaining essential ecological processes and helping to conserve natural heritage and biodiversity.
2. Respect the socio-cultural authenticity of host communities, conserve their built and living cultural heritage and traditional values, and contribute to inter-cultural understanding and tolerance.
3. Ensure viable, long-term economic operations, providing socio-economic benefits to all stakeholders that are fairly distributed, including stable employment and income-earning opportunities and social services to host communities, and contributing to poverty alleviation.

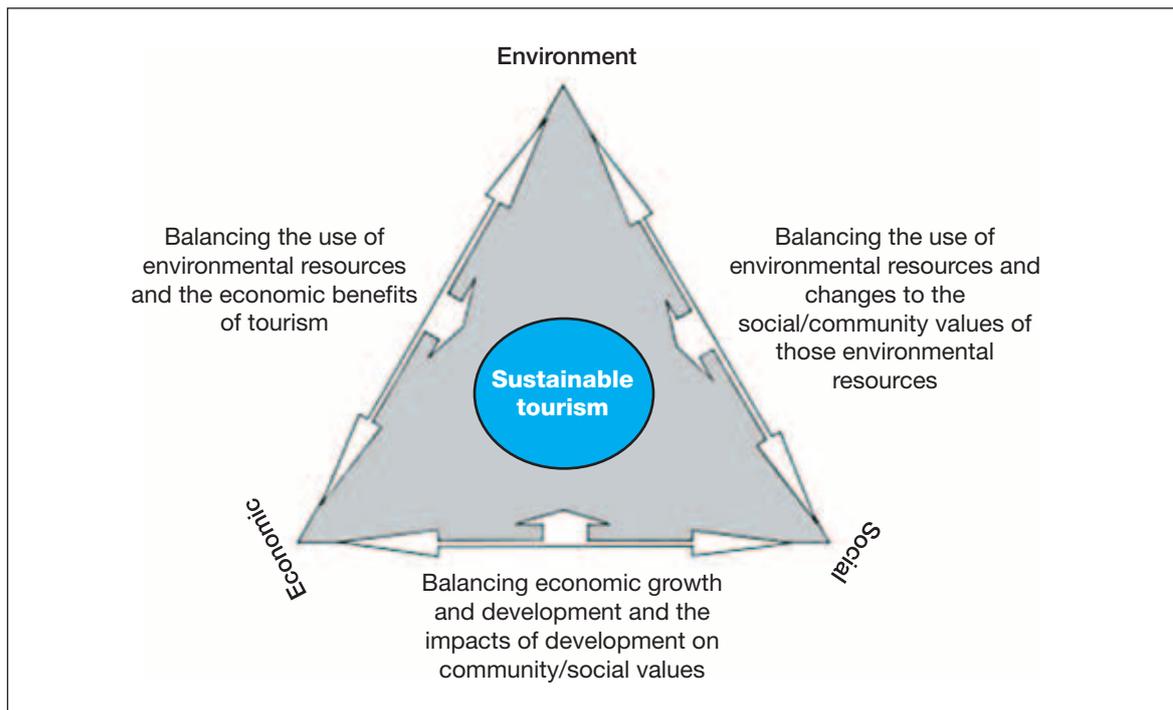
Sustainable tourism development requires the informed participation of all relevant stakeholders, as well as strong political leadership to ensure wide participation and consensus building.

Sustainable tourism should also maintain a high level of tourist satisfaction and ensure a meaningful experience to the tourists, raising their awareness about sustainability issues and promoting sustainable tourism practices amongst them”.

Source: UNEP and UNWTO 2005

Sustainable tourism comprises policies, practices and programmes that take into account both the expectations of tourists regarding responsible natural resource management and the needs of communities that support or are affected by tourism projects and environmental scarcities (ILO 2012). It addresses sustainability issues on both the demand side and the supply side of the sector, as illustrated in Figure 2.

Figure 2. Facets of sustainable tourism



Source: Sustainable Tourism 2012

Importantly, sustainable tourism is not simply one type of tourism. Rather, it represents a range of sustainability principles that can be applied across the whole tourism sector (UNEP and UNWTO 2005). These principles include:

- Increasing use of renewable energy;
- Consuming less water;
- Minimising waste;
- Using biodegradable products for guests;
- Conserving biodiversity, cultural heritage and traditional values;
- Supporting intercultural understanding and tolerance;
- Generating local income;
- Integrating local communities with a view to improving livelihoods and reducing poverty; and
- Enabling tourism businesses to make long term investments.

Sustainable tourism practices generally impose less adverse environmental impacts, when compared to traditional tourism practices. Since sustainable tourism provides for effective resource management, income can be generated while simultaneously minimising negative externalities to an area's environmental and cultural integrity. At the same time, sustainable tourism can become an important source of export growth in developing countries.

Box 2. Impact of green investment in tourism

Modelling undertaken in the GER 2011 showed the effects by 2050 of investing 0.2 per cent of total GDP in greening the tourism sector (investing in energy and water efficiency, emissions mitigation and solid waste management). Under such a green investment scenario, the sustainable tourism sector is projected to grow steadily in the coming decades. This growth could exceed projections for the Business-As-Usual (BAU) approach by seven per cent in terms of the sector GDP, while saving significant amounts of resources. The green investment scenario is projected to undercut the corresponding BAU scenario by 18 per cent for water consumption, 44 per cent for both energy supply and demand, and 52 per cent for CO₂ emissions. These projected reductions in usage would result in significant avoided costs that could be reinvested in socially and environmentally responsible local initiatives, such as improving local transportation and increasing staff training.

Source: UNEP 2011a

As highlighted in Box 2, there is a positive correlation between green investment in tourism and expenditure on local development. In particular, the move towards more sustainable tourism can enhance job creation. For example, it is estimated that sustainable tourism in Nicaragua, a country that prominently focuses on its culture and natural environment, has an employment multiplier of two. For every job in the tourism sector, additional local employment is created with higher wages than the national averages (Rainforest Alliance 2009).

Long-term prospects for sustainable growth in the tourism sector, however, depend on building adequate infrastructure and supply chains, and enhancing policies and institutions to ensure that tourism activities are carried out sustainably, and meet economic, social and environmental objectives (UNCTAD 2010). An example of a tourism destination that has taken such steps is Evason Phuket resort in Phuket, Thailand (see Box 3).

Box 3. Sustainable tourism in Phuket, Thailand

Evason Phuket resort has introduced sustainability criteria and is certified by 'Green Leaf', one of the eco-labels for green hotels and resorts. The table below demonstrates how environment friendly upgrades to older tourism infrastructure can improve energy efficiency and reduce water use, wastes and costs. The installation of resource efficient and energy saving equipment in the resort makes both economic and environmental sense. The investment has brought about significant savings, as illustrated below:

Item	Investment (US\$)	Annual savings (US\$)	Payback
Energy monitoring system	11,000	About 10%	N/A
Quantum heat recovery	9,000	7,500	1.2 years
Centralized mini chillers	130,000	44,000	1.8 years
Energy efficient light bulbs	8,500	17,000	6 months
Biomass absorption chillers	11,5000	41,000	2.8 years
LPG boilers for laundry	27,000	17,000	1.6 years
Rainwater reservoir	36,000	330,000	1 month

Source: WWF et al. 2010

Further, the tourism sector is already leading the way in some of the most innovative sustainable energy initiatives. Energy efficient upgrades to aircraft, the shift to renewable fuel for aviation and cruise liners, new energy technology solutions and energy efficiency measures in hotels are placing tourism at the forefront of such transformation (UNWTO 2012c).

Tourism can help stakeholders and beneficiaries recognise and measure the value of ecosystem services to their economic activities, removing its economic invisibility. This is analysed in detail in the report on The Economics of Ecosystems and Biodiversity (TEEB) in National and International Policy Making (TEEB 2011).

7.3 Trends and opportunities existing across the industry

7.3.1 Changing tourism destinations and countries of origin

Recent trends and forecasts point to a spreading of tourism to new destinations. These are largely in developing countries where there is potential to support development goals. There are also increasing numbers of tourists from emerging economies and larger developing countries. For example, in the first half of 2012, 38 million Chinese took international trips, 18 per cent more than in the same period the previous year. In 2011, Chinese tourists spent US\$ 73 billion while travelling abroad, third only to German and American tourists (The Economist 2012a).

Figure 3 illustrates the growth between 1990 and 2010 in international tourism receipts in developing countries ranging between 184 per cent in high-income countries and 800 per cent in LDCs.

Figure 3. International tourism receipts in developing countries (billion US\$)

	1990	2000	2010	Growth rate
World	262	475	928	254 %
High income countries	207	336	588	184 %
Developing countries	55	139	340	518 %
LDCs	1.1	2.9	9.9	800 %

Source: UNWTO 2010b

The World Economic Forum's (WEF) Travel and Tourism Competitiveness Report found that the majority of LDCs are in the top half of the WEF's ranking for natural resources, with Tanzania 2nd out of 139 economies, Zambia 15th and Uganda 29th. The report measures the factors and policies that make it attractive to develop the tourism sector in different countries. It suggests that there is a strong case for allocating resources to build competitiveness in tourism based on natural resource assets of developing countries (WEF 2011).

In this regard, ecotourism, which focuses on nature-based activities, is the fastest growing sector of tourism. It provides considerable economic benefits and is a vital source of income for many countries. Additionally, many developing countries have a competitive advantage in ecotourism over developed countries. They have unique and natural environments, cultures and opportunities for adventure holidays (see section 7.4).

7.3.2 Changing consumer patterns

Changing consumer patterns are providing promising export opportunities for sustainable tourism. As people become more environmentally and socially conscious, they are looking for a responsible alternative to traditional travel options. Thus, tourist choices have become increasingly influenced by sustainability considerations. For example, a 2010 survey undertaken by VISA and the Pacific Asia Travel Association (PATA) found that Chinese have a preference for environmentally friendly tourism and cultural immersion programs (VISA 2010). Furthermore, in a 2012 poll undertaken by Blue and Green Tomorrow, 47 per cent of respondents answered that they would consider the ethical or environmental footprint of their main holiday in 2013 (Blue and Green 2012), as set out in Figure 4.

Figure 4. Consumer demand for sustainable tourism

Source: Blue and Green 2012

Research indicates that consumers are willing to spend more on their holidays if they can be assured that workers in the sector are guaranteed ethical labour conditions (ILO 2010). Also, in a Trip Advisor survey, 34 per cent of travellers indicated that they are willing to pay more to stay in environmentally friendly hotels (Pollock 2009). According to research by the Foundation of Netherlands Volunteers in 2008, 58.5 million American travellers would pay more to use travel companies that strive to protect and preserve the environment.

There is clear and rising demand for more sustainable tourism globally. When travelling, consumers will also purchase fair and locally sourced products when the option to do so is well advertised, easy and affordable (TUI Travel 2012). At the same time, the information revolution has allowed for increased scrutiny of corporate environmental and social performance. Environmentally and socially concerned travellers are able to look for evidence of sustainable policies and practices and to use sustainability certification schemes to critically assess their choice of tourism purchases (APO 2009).

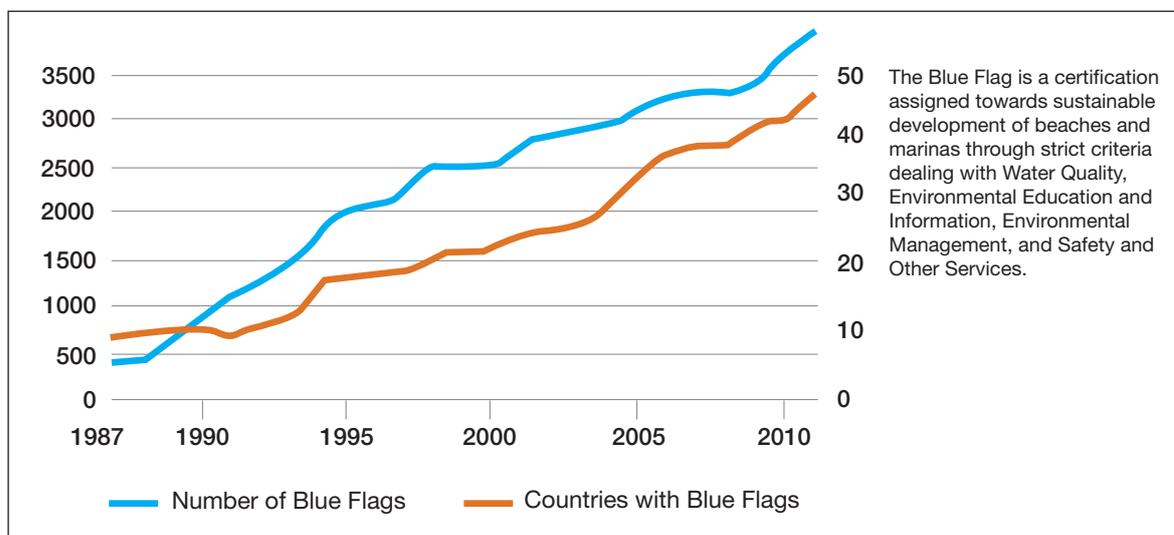
Progressive companies that seek to capitalise on the changing consumer trends towards increasing environmental and social responsibility in tourism are likely to be recognised as leaders by investors, meet growing customer demand and enjoy the related potential comparative advantages, thereby securing destinations for future exports.

7.3.3 Sustainability certification

Certification has a central role to play in promoting environmental and social performance and satisfying consumer demand for responsible travel. Certification schemes may be applied to tourism enterprises such as hotels, resorts, marinas, travel agencies, tour operators, and transportation services. They may also be used to certify the environmental soundness of tourist destinations and natural resources at these destinations (Sasidharan et al. 2002).

Various standards of the International Organization for Standardization (ISO) have been used in the tourism sector to improve the overall quality of service. These include ISO 9000 for quality management and ISO 14000 for environmental management. Other voluntary standards have also emerged. For example, Green Globe certification builds on the ISO standards and is used to verify sustainability performance of travel and tourism businesses and their supply chain partners. Another scheme is the Blue Flag label, which is awarded on the basis of the environmental performance of beaches and marinas. It has been awarded to 3,850 beaches and marinas in 46 countries across Europe, South Africa, Morocco, Tunisia, New Zealand, Brazil, Canada and the Caribbean (Blue Flag 2012). The growth of the number of blue flags between 1987 and 2010 is shown in Figure 5.

Figure 5. Blue Flag certifications



Source: UNEP 2012b

In 2012, the Global Sustainable Tourism Council published its list of recognised sustainability standards for the industry (GSTC 2012a). The list includes:

- Bundesministerium für Land und Forstwirtschaft, Umwelt und Wasserwirtschaft (BMLFUW)'s Austrian Ecolabel for Tourism (Österreichisches Umweltzeichen);
- Costa Rica Tourist Board (ICT)'s Certification for Sustainable Tourism (CST);
- EarthCheck;
- Ecotourism Australia's Advanced EcoCertification;
- Ecotourism Ireland's Ecotourism Ireland Label;
- European Ecotourism Knowledge Network's European Ecotourism Labelling Standard (EETLS);
- Fair Trade in Tourism for South Africa (FTTSA);
- Instituto de Turismo Responsable's Biosphere Hotels;
- Japan Ecolodge Association's Environmentally Sustainable Accommodations Standard;
- Rainforest Alliance's Standard for Tourism Operations; and
- Sustainable Travel International's Sustainable Tourism Eco-Certification Program (STEP).

Certification informs tourists of the environmental and social impacts of tourism-related activities. It also motivates consumers to act in favour of environmentally benign and socially positive tourism enterprises through their purchasing choices (UNEP 1998). Securing an appropriate sustainability certification can also help a tourism enterprise attract a higher number of visitors and move up-market to higher-paying customers, while protecting the natural environment that the industry depends on. Moreover, it encourages sustainable development of the industry.

Many of the opportunities and benefits applicable to sustainability certifications, also apply to ecotourism labels. The key difference is that ecotourism certification emphasises the ecological sustainability of businesses and products. Green Globe 21's ecotourism certifications, Europe's PAN Parks, Australia's Eco Certification Program, Eco-Rating in Kenya and SmartVoyager in the Galapagos are examples of ecotourism certification schemes currently in use.

In addition to environmental certification schemes, there are also fair trade certification schemes for the tourism sector. Since 2003, for example, the Fair Trade in Tourism South Africa (FTTSA) has operated a national certification programme centred on fair trade principles and methodologies. This system monitors, assesses and certifies the full tourism value chain. The FTTSA certifies holiday packages based on a standard that ensures fair pricing, pre-payment, transparency and commitment to sustainable trade (Seif 2012).

While some developing countries are becoming increasingly interested in the adoption of sustainability and fair trade certification for tourism, there is also concern about the costs of acquiring these certificates. This is particularly the case for small-scale tourism enterprises in developing countries, many of which may be ill-equipped to conform to the standards and criteria circumscribed by international certification schemes originating in developed countries (Sasidharan et al. 2002).

Box 4 below illustrates the opportunities and challenges faced by Asian initiatives for sustainability and certification.

Box 4. Asian examples of sustainable tourism initiatives

In Asia, there are several examples of hotels moving towards more sustainable tourism. Many new hotel companies are using environmentally friendly innovations, engagement and reporting initiatives to differentiate themselves from other resorts.

Various hotel companies are also committing to become carbon neutral. Nevertheless, carbon management as an approach to measuring and reporting on carbon emissions, vary widely. As a consequence, the International Tourism Partnership (ITP) and the World Travel & Tourism Council (WTTC), in collaboration with 23 global hospitality companies, launched a methodology to calculate and communicate the carbon footprint of hotel stays and meetings, in a consistent and transparent way.²

Opportunities and challenges: The opportunities for sustainability in the hospitality sector are enormous. Sustainable design can lead to product differentiation as well as creating brand loyalty. Conservation practices can reduce costs, lower risk and often secure a license to operate.

Hotels have also started to use the Leadership in Energy and Environmental Design (LEED) certification programme. The programme provides independent, third party verification that a building is designed and built using strategies aimed at “achieving high performance in key areas of human and environmental health: sustainable site development, water savings, energy efficiency, materials selection and indoor environmental quality” (USGBC 2012). The ITC Windsor’s five star hotel in Bengaluru, India was the first hotel in the country to achieve LEED Platinum ranking.³ Another ITC property, the Maurya in New Delhi, was the world’s first LEED Platinum hotel in the Existing Building category, a recognition made by the US Green Building Council. The ITC Maurya installed the world’s first on-site Paraboloid Solar Concentrator (with 320m² reflective area) in the hospitality industry. According to Scott (2011), the Maurya “uses solar power to heat its water, has a building management system to control its heating, ventilation and air conditioning systems, lighting and water management. It consumes 33 per cent less water and 23 per cent less energy than LEED benchmarks. Almost all of its solid waste is either reused, recycled or converted into manure by an organic waste converter and it recycles water to use in the gardens”.⁴

There are, however, numerous challenges for moving towards a green economy. Although many accommodations aim to conserve resources, better information and communication strategies need to be implemented. For example, signs asking guests to hang up their towels to conserve water have been found not to alter behaviour unless they are accompanied by a specific explanation of why they are doing it and what other measures the accommodation is doing to be environmentally friendly.

Another challenge is the intensity of resource use. Many conservation initiatives take place after the construction has been ultimated, therefore many brands that showcase conservation may have hotels with hundreds of rooms that are energy- and water-intensive. For example, a three star hotel uses the equivalent of approximately 350 litres per guest each night, the same amount as a rural village uses for 100 homes. A luxury five star hotel may use the equivalent of 1800 litres of water per guest per night.⁵

Education and design/building in urban areas is another key challenge. Urban resorts find more obstacles for disseminating information regarding sustainable practices to their guests and therefore tend to focus on other aspects for guests rather than their green credentials. As they are not located in natural parks or by pristine beaches, the guest is not as influenced by their natural surroundings. In addition, transparency needs to improve. Some hotels claim that they are environmentally friendly but there is limited information to illustrate what sustainable practices they have implemented or planned.

Ways forward: Governments and the private sector can promote and encourage more sustainable tourism in a number of ways. First, there is a need for universal guidelines for design and resource management. Although there are a number of sites and guidelines that outline sustainable design

2. <http://www.wttc.org/activities/environment/hotel-carbon-measurement-initiative/>

3. <http://www.greenhotelier.org/our-themes/community-communication-engagement/sustainability-in-emerging-economies/>

4. <http://www.greenhotelier.org/our-themes/retrofit-for-the-future/>

5. Information in this section is based on interviews with hotels as well as a review of major hotel chain’s CSR policies.

principles and practices,⁶ there is no universal code and often certification schemes are used as management tools to reduce costs rather than as a way for consumers to make informed green choices.

Second, there is a need for policies to incentivise hotels and other tourism businesses to become more sustainable. Comprehensive tourism development strategies need to be developed in partnership with community and industry stakeholders (including major foreign tour operators or industry associations, where appropriate). Incentives could help leverage sustainability initiatives in resorts to develop niche travel products that help local communities preserve their cultural and environmental heritage, whilst at the same time potentially increasing market share and profit margins. In this context, certification can create additional advantages.

Third, the tourism industry needs to be an active participant in the greening of their supply chain to reduce energy, water and waste and thus secure the future viability of the natural resources upon which they are based. The tourism industry should report on their initiatives to help assess overall corporate responsibility and transparency.

Finally, governments must ensure sustainable tourism measures are seen as a core value in wider development plans and policies rather than solely focusing on economic benefits.

Source: Case study prepared by Rachel Dodds, Owner/Director, Sustaining Tourism: Associate Professor, Ryerson University; UNEP 2011a.

7.3.4 Carbon offsets

The tourism sector is now actively engaged in the market for carbon offsets. Tourists who are willing to compensate their travel emissions can calculate these with the help of online calculators or through offset offerings of their travel service provider. As most offset projects are in developing countries, carbon offsetting in the tourism sector is an opportunity for developing countries to increase their revenue streams.

Evidence suggests, however, that particularly hypermobile travellers, who account for the major share of distances travelled and emissions caused, are not ready to support voluntary carbon offsets (Becken 2007; Gossling 2009). It is also often argued that carbon offsetting potentially diverts from addressing the structural and technological changes needed to achieve long-term GHG reductions (UNEP 2009).

Even though carbon offsetting is not a panacea, it is providing one element of a transition to a greener economy that is particularly attractive to the tourist sector. Further, there is now a variety of carbon standards and certification schemes to enable tourism enterprises and their customers to address carbon alongside other social and environmental issues. These include for example:

- Clean Development Mechanism (CDM);
- Climate, Community and Biodiversity Alliance (CCBA);
- Green e-Climate;
- Gold Standard;
- Social Carbon; and
- Verified Carbon Standard (VCS).

⁶ See, for example, greenhotelier.com, sustainabletourism.net, Rainforest Alliance, Coral Reef Alliance, TUI, The ITP Sustainable Hotel Siting and Design Guidelines as well as guidelines for coastal development and marine protected areas.

Box 5. The CDM applied to hotels

The ITC Sonar Hotel in Kolkata, India, is the first resort hotel in the world to be registered as a CDM project by the United Nations Framework Convention on Climate Change (UNFCCC) for its energy improvement activities.

The resort uses 15 appropriate fixtures, such as solar power for heating the spa and variable frequency drive for the main kitchen exhaust fan. The project results in energy saving of 6.32 GWh per year and an emission reduction of 1,962 tonnes CO₂. The resort has received 1,996 carbon credits per year from 2000 to 2010.

Source: UNESCAP 2010

7.3.5 Handicrafts

Handicraft production and sales to tourists, a key sub-chain in the tourism sector, account for one of the main sources of revenue for pro-poor income in developing economies (ITC 2009). Poor people in developing economies often lack resources, skills and employment, keeping them below the poverty line. This is primarily a factor of limited access to education, and a reliance on subsistence farming or poorly paid occasional jobs in urban centres. Handicraft production, however, is based on traditional skills and has low investment requirements. Thus, producing and selling handicrafts to tourists offer an opportunity for the poor to increase their income. Box 6 provides an example of the benefits of handicraft production in Ethiopia.

Box 6. Handicraft in Ethiopia

Tourism-related handicraft sales in Ethiopia are estimated to be as high as US\$ 12.7 million per year. Of these expenditures, 55 per cent or US\$ 6.9 million are considered to be pro-poor income, i.e. income that goes to poor craftsmen, traders or raw material suppliers.

In 2007, Ethiopia attracted 250,000 foreign tourists. The average tourist spent about US\$ 50 on handicrafts during a typical stay in Ethiopia, of which more than US\$ 25 was pro-poor income.

Source: ITC 2009

Handicraft production plays an important role for job creation in the informal sector. Subsistence farmers can gain additional income from handicraft production. In Vietnam, for example, craftspeople generate income that is on average 60 per cent higher than the average income for the rural population. Production of handicrafts is also often a viable alternative for the urban poor (Ngo 2005).

In countries attracting large numbers of international visitors, the tourism sector offers many opportunities for the poor to sell handicrafts, as tourists spend substantial amounts of money on such products as souvenirs. Strengthening the handicraft sector will ensure that tourists have the option to buy locally made handicrafts instead of imported or factory-made products. Handicraft production can also help diversify the tourism product of a region to include home-stays, cultural experiences and facilitate the promotion of responsible tourism principles.

Handicraft production is a labour-intensive industry and, as such, can support a number of part-time and full-time employees, both skilled and unskilled. Supporting and mediating partnerships between tourism enterprises and handicraft producers is a valuable role for development partners. Employment creation in rural areas can help to reduce migration into cities. There are, however, also challenges related to making full use of the opportunities provided by the tourism sector, as illustrated in Box 7.

Box 7. Challenges for handicraft producers

Supply-related challenges

- Limited and/or only traditional product range due to lack of innovation and new designs;
- Poor product quality due to low skills or lack of knowledge about tourist expectations;
- Difficulty in competing with imported products in terms of price;
- Lack of raw materials and other inputs when needed;
- Lack of capital to invest in machinery needed to improve product quality; and
- Dispersed and disorganised, leading to a slow, irregular and insecure supply.

Market-related challenges

- Inadequate market outlets that are attractive for tourists;
- Lack of local awareness of the supply potential in other parts of the country;
- Differential price increases by middlemen and intermediary traders;
- Mistrust between traders and craft producers preventing better cooperation;
- Poorly developed market linkages with retail shops in main tourist locations;
- Low integration into the holiday packages of tour operators and hotel resorts; and
- Customer demand for useful gift items rather than traditional souvenirs.

Source: ITC 2009

7.4 Trends and opportunities in specific sub-sectors

This section highlights some promising tourism sub-sectors for greening the economy through trade: ecotourism, marine and coastal tourism and agro-tourism.

7.4.1 Ecotourism

Ecotourism, as defined in Box 8, can be a very important source of green growth for many developing countries with significant natural endowments. It can also create many export opportunities in remote locations. Ecotourism is often built on community-led tourism activities and operations that preserve natural ecosystems, while generating employment for the unskilled workforce in rural communities. These activities do not normally require vast capital outlays and investment. Thus, ecotourism is an ideal industry for the fostering of economic growth in developing countries with natural resource abundance and capital scarcity (Viljoen 2011).

On 21 December 2012, the UN General Assembly adopted a resolution entitled "Promotion of ecotourism for poverty eradication and environment protection". This calls on UN members to adopt policies that promote ecotourism, highlighting its "positive impact on income generation, job creation and education, and thus on the fight against poverty and hunger". The resolution further recognises that "ecotourism creates significant opportunities for the conservation, protection and sustainable use of biodiversity and of natural areas by encouraging local and indigenous communities in host countries and tourists alike to preserve and respect the natural and cultural heritage" (UNWTO 2013b).

Box 8. Ecotourism as defined by the UNWTO

Ecotourism is used to define forms of tourism which have the following characteristics:

1. All nature-based forms of tourism in which the main motivation of the tourists is the observation and appreciation of nature as well as the traditional cultures prevailing in natural areas.
2. It contains educational and interpretation features.
3. It is generally, but not exclusively, organised by specialised tour operators for small groups. Service provider partners at the destinations tend to be small, locally owned businesses.
4. It minimises negative impacts upon the natural and socio-cultural environment.
5. It supports the maintenance of natural areas which are used as ecotourism attractions by:
 - Generating economic benefits for host communities, organisations and authorities managing natural areas with conservation purposes;
 - Providing alternative employment and income opportunities for local communities; and
 - Increasing awareness towards the conservation of natural and cultural assets, both among locals and tourists.

Source: UNWTO 2002

As awareness of the fragility of the world's most diverse cultures and pristine environments continues to increase, the market for ecotourism is growing. The promotion of socially and environmentally sound tourism, especially in areas of significant natural beauty, offers many opportunities to become more competitive in this fast growing global market.

In Dominica, for example, overnight tourists renting small, nature-based lodges spend 18 times more than cruise passengers visiting the island (IES 2011). In Costa Rica, it is estimated that up to 53 per cent of income from tourism may be attributable to ecotourism and related activities (ICT 2009, as cited in Bien 2010). Costa Rica is often viewed as an example of how a developing country can strategically develop its ecotourism offerings, deliver real green growth and reap the benefits of increased tourism revenues.

Maintaining protected areas that are visited by tourists may also bring long-term economic benefits to national economies. Some countries have been able to build up a lucrative nature-based ecotourism industry, generating foreign earnings and local employment. Protected areas in Costa Rica, for example, received more than one million visitors each year in the five years up to 2006, generating entrance-fee revenues of over US\$ 5 million in 2005, and directly employing approximately 500 people. Protected areas in Mexico recorded 14 million visitors per year and created 25,000 jobs (Robalino et al. 2010).

Thus, tourism is an excellent vehicle to transfer income from developed countries to developing countries. Ecotourism is especially effective in this transfer since travellers often venture into remote and economically disadvantaged regions. Since tourism is a relatively barrier-free service export, it can be a more effective means of transferring income from the developed world relative to other forms of foreign investment such as export-processing zones in which profits may be largely repatriated (Scope ACP 2011).

The benefits of ecotourism flowing to local businesses are also dramatically higher than those from mass tourism. Standard all-inclusive package tours typically deliver just 20 per cent of revenue to local companies, while airlines, hotels and large tour companies capture the rest. In contrast, ecotourism operations that are based and hire locally can return as much as 95 per cent of in-country expenses to the local economy (UNEP 2011b).

The ecotourism industry also has opportunities for the collection of conservation fees and donations for visits to protected areas. Most eco-tourists have above-average income and are willing to pay entrance fees that will enhance conservation and are shared with local communities. This revenue can be used by protected area authorities and local communities for conservation measures and sustainable practices (Scope ACP

2011). In Kenya, a new transparent ticketing and payment system has been implemented for Maasai village tours. Instead of being exploited by driver guides, a fair share of this income is now retained by the villagers. Maasai communities receive 100 per cent of fees from lodge-generated business and 75 per cent of business generated through the Kenya Association of Tour Operators (KATO). In total, revenue has increased by 800 per cent (The Travel Foundation 2007).

However, tourism revenue from protected areas does not always accrue satisfactorily to local communities, despite national legislation requiring the practice. For example, the authors Tumusiime and Vedeld (2012) of a case study on Uganda's Bwindi Impenetrable National Park, a major tourist attraction for gorilla watchers, conclude that:

"The mechanism [tourism revenue sharing] has yet to deliver adequately...In particular, it has proved challenging to ensure that the local people's share meets their expectations, and that it reaches the most deserving communities, and/or individuals within a community. It is necessary to set aside sufficient revenues for the local people, and craft legitimate and competent institutions that adequately involve local people in the decision-making process on both the structure and the process of distribution and utilisation of the tourism sharing revenues".

Specifically, in the case of Bwindi, revenue sharing is from a percentage of park entrance fees (US\$ 30 in 2010), and not from gorilla tracking permits (US\$ 500 in 2010), as originally proposed, but later changed. The real issue, according to the authors, appears to be the implementation of effective tourism revenue sharing schemes (Tumusiime and Vedeld 2012).

Thus, all aspects of ecotourism activities need to be monitored and evaluated. From an environmental point of view, tourism in certain areas may not be truly sustainable. Failure to limit tourist numbers at popular sites can damage fragile ecosystems and habitats. Experienced mountaineers have warned against overcrowding and massive amounts of garbage at base camps near Mount Everest in Nepal, where some 200 climbers attempt to reach the summit in a single weekend.⁷

In some cases, ecotourism may contribute to the displacement of communities and generate greater pollution and waste, thus undermining rights and livelihoods of the local people and environment (Gumbo 2010). Attention to the real impacts on the ground is of utmost importance.

Africa is the market leader in wildlife-based ecotourism and accounts for about half of all wildlife tourism trips worldwide with Botswana, Kenya, South Africa and Tanzania receiving the most visitors in the continent. In the African Great Lakes region, revenue from tourism based on gorilla viewing and other activities brings in about US\$ 20 million annually (Gumbo 2010). Tourism exports in Africa generate significant incentives for governments and local communities to conserve their rich environment as a basis for sustainable development in the tourism sector (UNEP 2011b).

India and Lebanon have also developed ecotourism as a key sub-sector of their tourist industries, as illustrated in Boxes 9 and 10.

7. <http://abcnews.go.com/blogs/headlines/2012/05/everest-overcrowding-could-be-fatal-this-weekend/>

Box 9. Ecotourism in India

India is known for its large ecosystems including the Himalayas and the Western Ghats. India has 661 protected areas with 100 national parks, 514 wildlife sanctuaries, 43 conservation reserves and four community reserves in different geographic zones, extending to nearly five per cent of the geographical area of the country (MoEF 2011).

Capitalising on these resources, ecotourism operations in India have substantially increased community participation, involvement of indigenous groups, forest dwelling communities and women, local level resource sharing with locally designed frameworks, and the use of indigenous technologies. The income generated is used to ensure quality tourism services as well as to improve the living standards of destination communities.

Based on Ecotourism Policy and Guidelines developed by the Indian Ministry of Tourism in 1998, the Ministry of Environment and Forest in June 2011, called on state governments to frame ecotourism policies to facilitate tourism programmes in protected areas of the country. In addition, the Indian Government's National 12th Five Year Plan (2012-17) targets to increase the net benefit of tourism activities for the poor, emphasising also that the revenue generated from tourism operations should be utilised for protected area management (India Tourism 2011).

Opportunities and challenges: Trade opportunities and relevant employment options under ecotourism are broadly classified into two categories: ecotourism services and ecotourism enterprises. Ecotourism services include guiding and interpretation, sightseeing, destination cleaning forest protection and anti-poaching services. Ecotourism enterprises include honey processing, paper bag production, bamboo handicraft production, organic farming, indigenous medicine production and sales outlets (eco-shops).

Government action at both the national and local levels has enhanced ecotourism operations to ecologically sensitive areas where attention has been given to conservation and development with the support of the local community. For instance, in 2007 at the Kumarakom bird sanctuary in Kerala, hotels established linkages to local communities for the supply of seven types of local products. By 2010, the number of items had increased to 45 including some agro-based industrial products like coconut oil, souvenirs and handicrafts. The economic linkages encouraged partnerships between the community and the industry, thereby helping the community to develop a sustainable market with fair prices for the local produce and increased production.

The Parambikulam Tiger Reserve, another example, is the second largest tiger reserve in Kerala, India. Its activities include the elephant song trail, forest tramway trekking and eco-meditation. In order to ensure participative management of ecotourism resources, ecotourism programmes are operationalised through specific economic development committees. Of the committee members, 88 per cent belong to indigenous communities. Destination sustainability is maintained through community management of resources. Emphasis is given to livelihood improvements, conservation of natural and cultural resources and reducing the dependency on forest-based, unsustainable resource consumption. These activities have helped to substantially increase the average number of visitors and revenue.

Though numerous opportunities exist, the sector is not without challenges. These include energy consumption for tourism services, usage of water, waste management issues, and loss of biodiversity as a result of outside interference and cultural erosion. Additionally, there are a number of destination specific issues that hamper the sustainable use of resources. Service quality sectors like green production, ecological benchmarking, environmental management systems and voluntary standards like Green Leaf, Blue Flag, Green Globe would, with the required investments and labour, help generate income and trade opportunities in the local communities.

Ways forward: Adherence to sustainability standards in the operations of ecotourism in India can be initiated in protected areas, rural and village settings, forest areas and conservation areas of the country. Various innovative forms of ecotourism activities like rural ecotourism, farm and wetland tourism, mangrove tourism, coastal tourism, plantation tourism, horticulture activities, minor forest produce tourism, wilderness camps, eco-parks, caves exploration, bamboo raft cruise, and water based activities like regulated angling can be promoted. In this context, the Global Environment Facility (GEF) has supported India's eco-development programme, where ecotourism has been identified as a means of livelihood for tribal and forest dwelling communities.

Source: Case study prepared by A. Vinodan, Nodal Officer, Indian Institute of Tourism and Travel Management, Andhra Pradesh, and James Manalel, Professor, School of Management Studies Cochin University of Science and Technology, Kerala, India

Box 10. Ecotourism in Lebanon

Lebanon is a small mountainous country of 10,450 km² that benefits from a moderate Mediterranean climate and high mountains with scenic views, significant snow cover in the winter, and an interior plateau with dry weather and several streams and rivers. The country further possesses a rich cultural heritage with historic cities, villages and five UNESCO World Heritage Sites.

Several projects geared towards a green economy have been established in Lebanon. These projects contribute to the improvement of well-being, reduction of social inequalities, and mitigation of environmental risks, as well as more efficient use of natural resources. Green project examples include biosphere reserves, improved waste management, bio agriculture, and ecotourism.

After the 1975-1990 civil wars, several young entrepreneurs returned to the country with creative concepts to be adopted in the Lebanese tourism industry, which would advance environmental protection, conservation, adaptation and sustainable tourism practices, restoration techniques and knowledge economy in the sector.

The first projects launched in nature conservation and ecotourism have been the *Forest of Cedars* in the Shouf region and the North-South *Lebanon Mountain Trail*. Both projects are private initiatives that have progressively received donors' contributions and now include cooperation with local communities and inhabitants, development and marketing of local products, small coaching-inns and homestays. Being in remote and sparsely populated regions, these projects are bringing back to life large parts of the country's mountainous regions. Both projects demonstrate the potential for ecotourism to preserve important environmental sites, ecosystems and local cultural traditions while also contributing to expanding the economy by creating new green quality jobs as well as direct and indirect income, especially in the remote and local communities of Lebanon.

Increasingly, more traditional housing is being used for ecotourism and new biosphere reserves created that include local development actions in their management. The Jabal Moussa Biosphere reserve and Ouadi Qadisha World Heritage site are the best examples of this new trend. These initiatives that contribute to the greening of the tourism sector are benefitting from the environmentally conscious young generation and from the continued increase of expatriate seasonal holiday tourists eager to discover Lebanon's nature.

Within the green tourism sector, the initiatives have so far often resulted from the activities of private sector entrepreneurs who invest, innovate, and are important drivers of the tourism industry in Lebanon. Today the awareness of the opportunities in Lebanon's green tourism sector is increasing. The Ministry of Environment has launched several decrees on water strategies and impact assessments, which also support the development of the eco-tourism sector (UNWTO 2011).

Further governmental support of ecotourism projects would stimulate Lebanon's tourism sector, such as protection laws for small-scale green economy projects and micro-credit facilities that are adapted to such enterprises.

Source: Dr Georges S. Zouain of GAIA-Heritage

Competition to attract customers that are increasingly interested in ecotourism destinations is encouraging neighbouring countries to create regional partnerships. These regional partnerships work together in areas such as the promotion of several economies and "coordinated marketing drives" (UNWTO 2006). Likewise, private tourist companies often market geographic regions of continents, such as ecotourism in East Africa or in Central Africa, as a way of encouraging tourists to visit ecotourism destinations in more than one country in a region.

Rising demand for wildlife-based ecotourism has also led to increased private-sector involvement in the management of protected areas in countries such as Kenya, Namibia and South Africa (FAO 2005a). In South Africa for example, the hectares of private protected areas exceed those that are publicly owned (Katila and Puustjärvi 2003). Several private reserves are now providing packages that cater to the different needs of customers, and many owners are forming partnerships to manage large conservation areas jointly (FAO 2005b). This provides further evidence of emerging opportunities for exporting ecotourism services.

The rise in wildlife photography and in bird-watching activities in Africa and elsewhere is a significant example illustrating the growing ecotourism industry. According to the Convention on the Conservation of Migratory Species of Wild Animals (CMS):

“Bird [watching] plays a significant and growing part in the tourism industry, and creates direct and indirect economic benefits for many countries and communities, also amongst developing countries. Wildlife watching appeals to a wide range of people, and opportunities to participate in wildlife watching are and should increasingly be a factor in tourists’ holiday choices today” (UNEP 2012c).

Box 11. Technical support to ecotourism development in forests

In recent years, the FAO has provided technical assistance to a number of countries, including Egypt, Hungary, Laos, the Philippines and Tunisia, to develop ecotourism as a sustainable forest use. With support from the Global Environment Facility (GEF), FAO recently began implementing an US\$ 18 million programme in collaboration with Pacific islands (Fiji, Niue, Samoa and Vanuatu) aimed at developing ecotourism as a major component of sustainable forest management.

Source: UNEP 2011b

7.4.2 Marine and coastal tourism

Coastal and maritime tourism can also provide a trade opportunity for developing countries to conserve and protect ecosystems and species. Instead of overexploiting marine resources, marine and coastal areas can be used for sustainable tourism and recreation. If carefully designed, activities such as surfing, wind surfing and sea kayaking can be developed into sustainable tourist attractions (Ghosh 2011).

Marine Protected Areas (MPAs) are another way that marine regions can develop a sustainable tourism industry by catering for activities such as recreational fishing, whale watching and scuba diving. MPAs serve to conserve resources and consequently benefit surrounding areas through protecting species migration and enhanced recruitment. MPAs have grown in popularity amongst tourists in recent years (Aas et al. 2008; Hoyt 2001; Hollingworth and Pitcher 2002).

Recreational fishing, in particular, is a popular tourist activity. It includes angling, gathering, trapping, spearing, bow fishing and netting aquatic organisms (FAO 2008). Tourist recreational fishing occurs in approximately 118 maritime countries. In 2003, nearly 60 million recreational anglers around the world generated a total of about US\$ 40 billion in expenditure, supporting over 950,000 jobs (Cisneros-Montemayor and Sumaila 2010).

Despite the attractiveness of recreational fishing as a vehicle for sustainable economic development, in vulnerable ecosystems it can pose ecological risks. Unless recreational fishing is practiced responsibly, it can lead to a decline in fish stocks and habitat degradation. Promoting a sustainable model for recreational fishing is in the interests of natural resource managers, environmentalists, tourism promotion agencies, and local communities who depend on the fish stock for their livelihood (Pinsky et al. 2005).

Snorkelling and scuba diving provides additional export opportunities for many developing countries. Scuba diving as a leisure activity has increased significantly over the last 30 years, as evidenced by the rapid increase in the number of certified divers (PADI 2012). However, concerns have been raised over the impact of dive tourism on marine biodiversity (Hasler and Ott 2008; Uyarra et al. 2009). For example, large-scale diving activity in the Red Sea has had a direct negative impact on corals including increased sedimentation and broken and damaged corals (Hampton and Haddock-Fraser 2010). For the diving industry to be sustainable, there is a need for diving restrictions, sustainable dive plans at the site level, and increased education for both diving guides and recreational divers.

Whale watching is also developing into a significant industry in many countries. It is estimated that 13 million people went whale watching globally in 2008. Whale watching generated US\$ 2.1 billion per

annum in tourism revenue worldwide and employed around 13,000 workers (Cisneros-Montemayor and Sumaila 2010). Other estimates have put this as high as 18,000 (Pew 2010). Significant further economic benefits can be expected from an expansion of the whale watching industry (Kaschner et al. 2006). The economic benefits of, as yet, unexploited whale watching opportunities “could bring the value of whale watching to US\$ 2.5 billion globally, with 19,000 jobs employed by the global industry”. In particular, Asia could potentially gain an extra US\$ 46.7 million and Africa US\$ 15.6 million through direct (i.e. ticket sales) and indirect (i.e. accommodation, additional food and lodging) economic benefits (Scarpaci and Parsons 2011).

Several recent studies, however, have shown that whale watching activities can impact cetaceans, in particular causing a reduction in biologically important activities such as feeding (Scarpaci and Parsons 2011). Thus, it should be ensured that whale watching is sustainable by, in particular, avoiding too much interference with the whales. For example, this could include having time breaks between visits and keeping a safe distance, in order to avoid stressing the cetaceans.

Further, Box 12 sets out the tourism opportunities provided by shark-related activities.

Box 12. Shark tourism and shark sanctuaries growth

Revenue from tourism opportunities generated by the presence of shark species is rising in a number of countries. For example, in 2010 in the Pacific Island state of Fiji alone, shark-related diving contributed US\$ 42.2 million to the country’s economy, while shark-diving operations produced US\$ 4 million for Fijians through salaries and local levies. Similarly, in Palau, 8 per cent of the country’s GDP, approximately US\$ 18 million annually, is derived from shark tourism. According to the Pew Environment Group, “Studies conducted on the economic value of sharks in Palau’s waters indicate that a single reef shark contributes approximately US\$ 179,000 to the country’s economy every year, compared to a one-time value of US\$ 108 if caught and sold on the market”.

In addition to Palau, the Bahamas, the Cook Islands, French Polynesia, Honduras, the Maldives and the Marshall Islands have also declared their entire Exclusive Economic Zones as shark sanctuaries. No commercial shark fishing is permitted, providing vital protection for the vulnerable species, some of which are endangered with extinction. In December 2012, the Cook Islands declared a 1.9 millions km² sanctuary, contiguous with neighbouring French Polynesia, creating an area of 6.7 millions km².

Source: Pew Environment Group (2012) and www.pewenvironment.org

A particularly promising market for marine and coastal tourism is in Small Island Developing States (UNWTO 2012d). Apart from marine and coastal tourism, there are tourism opportunities for other ecosystems and locations, including mountain tourism (UNEP 2007) and wetlands tourism (UNWTO and Ramsar 2012). Thus, if designed properly, sustainable activities for tourists to benefit from marine resources instead of treating them solely as a food source can create significant economic and development gains.

7.4.3 Agro-tourism

Agro-tourism shares similarities to ecotourism but with a primary appeal towards cultural and traditionally managed landscapes (Kasperek n.d.; Maruti 2009). Agro-tourism may include taking part in growing, harvesting and processing locally grown food crops on farms. In many cases, farmers provide a home-stay opportunity and education on farm life. This contributes to farm income, increases the awareness and understanding of farming methods, and provides farmers with a way to market their farm products (Scope ACP 2011).

An example of agro-tourism is in the Chang Klang district in southern Thailand. In this district, farmlands are promoted as agro-tourism destinations and operate a wide range of tourism activities such as farm visiting and the demonstration of product processing (Na Songkhla and Somboonsuke 2012).

One niche agro-tourism market is enotourism or wine tourism. This experience is based upon the tasting, consumption or purchase of wine, often at or near the source of production. For example, in Chile, there is a growing market for enotourism. Hotels and restaurants are now common sites in vineyards (MercoPress 2007). It is also well established in the Western Cape of South Africa and attracts many international tourists.

7.5 Enabling conditions

This section outlines policy options that governments may use to harness the trade opportunities discussed in this chapter. In line with the voluntary nature of green economy policies, and the recognition that national circumstances are to be assessed on a case-by-case basis, the mix of policy tools for harnessing sustainable trade opportunities in the tourism sector, and the timeframes for their implementation, vary from one country to another. Moreover, a country's transition strategy may be defined in relation to government decisions at the most senior level, or gradually, from initiatives at lower levels by ministries and local government authorities, as well as in response to initiatives by the private sector.⁸

7.5.1 Public investment and spending

- **Create fiscal incentives for making the transport sector more sustainable.** Such incentives could, for example include reforming fuel prices and taxes across transport sectors, clearly incorporating the environmental and social external costs (e.g. potential for global human health problems caused by pollution). Such fiscal incentives should also support new and more fuel-efficient transport equipment.
- **Make air transport to tourist destinations more sustainable.** Improving sustainability of air transport includes, for example, accelerated development and deployment of low carbon emitting fuels in the aviation sector. However, the use of sustainable fuels must not impact global agriculture or lead to rain forest depletion, and should be evaluated on a life-cycle emissions impact basis.⁹ Investments in vehicles to tow aircraft will reduce the use of an aircraft's main engines when they are on the ground (The Economist 2012b). In addition, investing in improving air travel infrastructure efficiencies, including airspace and air-traffic management could yield significant benefits (WEF 2009).
- **Invest in sustainable small and medium size tourism companies.** One example is microcredit financing for local communities in areas with high ecotourism potential. In this respect, it is important to establish, where necessary, appropriate guidelines and regulations in accordance with national priorities and legislation for promoting and supporting sustainable tourism.
- **Invest in accelerating green hotel refurbishment and green construction.** Supporting energy efficient heating, cooling, lighting and building systems can make a substantial impact in the tourism operations. Water-saving equipment and techniques should be introduced, such as low-flow showerheads, and low-flow toilets. Where irrigation is a major factor for water use in tropical resort hotels, design of gardens should be re-considered, turning to less extensive areas in need of irrigation and to more drought-resistant plants. In addition, hotels should ensure waste is treated. Guests should be encouraged to re-use towels and informed that linen will not be changed daily. Educational programmes for staff and information for tourists can also contribute to reduced energy and water use (UNWTO and UNEP 2012).

7.5.2 Identification of market-based instruments

- **Identify and evaluate opportunities for sustainable tourism development.** The success of tourism destinations is best evaluated not only in terms of arrivals or international tourism receipts, but also in terms of broader economic, social and environmental impacts. Valuation exercises can

8. Further insight into possible national policies is available in the UNEP publication Making Tourism More Sustainable, a guide for policymakers, UNEP and WTO (2005). See also Draft Ecotourism Planning and Policy Development: Theme A UNEP/WTO Summary of Regional Preparatory Conferences and Discussion Paper for the World Ecotourism Summit, Wight (n.d.).

9. The use of biofuels is discussed in the Renewable Energy chapter of this report.

help identify opportunities for sustainable tourism development in areas where demand readily exists. Tools such as business surveys and the Tourism Satellite Accounts can support policy design and business strategy. Particular attention should also be paid to the Global Sustainable Tourism Criteria for Hotels and Tour Operators that was released in March 2012 (GSTC 2012b).

- **Emphasise sustainability in tourism promotion and marketing initiatives.** Marketing campaigns that motivate companies and operators to advertise their sustainability credentials through the Internet and foreign tourism offices can build a competitive edge over less sustainable tourism options. For example, linking sustainability practices or protected areas and cultural sites more closely to tourism marketing campaigns will help position sustainable or nature-based ecotourism favourably (UNEP 2005).

7.5.3 International frameworks

- **Support the harmonisation of national standards.** Promoting harmonisation and adopting internationally recognised standards and criteria for the tourism sector at a global level would provide for a better understanding of the practical aspects of sustainable tourism. It would also enable the monitoring of sustainability aspects of tourism operations and management. Generating consensus on global and regional sustainability standards and metrics for measuring and reporting for example carbon emissions in the tourism sector, and establishing green benchmarks for tourism destinations and travel products, would also enable travellers to make carbon-conscious choices.
- **Strengthen networks and share lessons learned on sustainable tourism.** Fostering a stronger network in the global ecotourism community could allow developing countries to share success stories and best practices, thus triggering future cooperation between developing countries. Examples are the International Ecotourism Society and the UNWTO's Global Observatory.
- **Establish guidelines on carbon offsetting options for tourists.** There is a need for clear criteria and guidelines that will allow the comparison and evaluation of the effectiveness of various carbon offsetting services. These guidelines could be further linked to a set of global principles for sustainable tourism (UNWTO et al. 2008).
- **Improve trade policy for sustainable tourism.** Developing countries may be able to attract further investment in the sustainable tourism sector through multilateral and regional trade agreements. The Economic Community of West African States (ECOWAS), for instance, includes a provision requiring members to coordinate the "marketing of quality tourism into and within the community joint promotion of products portraying natural and socio-cultural values of the region" (Saner et al. 2011).

7.5.4 Enhancing dialogue and capacity building

- **Foster partnerships between tourism enterprises and local artisans selling handicrafts.** Synergies can be developed with opening up market access for local artisans and handicraft suppliers in locations where tourists will visit, including among others, at local markets, commercial centres in local villages, speciality shops in towns and cities, as well as shops in hotels, museums and airports (ITC 2009).
- **Promote the Global Sustainable Tourism Criteria.** These are consensus-based international minimum criteria that a tourism business and destination, respectively, should adhere to in order to approach sustainability. The criteria were developed as part of a broad initiative managed by The Partnership for Global Sustainable Tourism Criteria, a coalition of over 40 organisations, working together to foster increased understanding of sustainable tourism practices and the adoption of universal sustainable tourism principles.
- **Enhance cooperation between international development institutions and the tourism industry.** Ensuring that international development institutions, such as multilateral and bilateral cooperation agencies and development finance institutions can engage, educate and work with the tourism industry, is an essential step to integrate sustainability into policies and management practices.

This chapter has illustrated the trends, challenges and opportunities at the intersection of increased numbers of tourists, both from developed and developing countries, the consequent environmental challenges and

the transition to a green economy. As highlighted in the Rio+20 Outcome Document, well-designed and managed tourism can make a significant contribution to sustainable development. This chapter has illustrated several opportunities for sustainability, such as increased demand for tourists to stay in certified resorts. This chapter also highlights how the non-consumptive usage of forests, coastal and marine environments and farms for recreational and tourism services provides opportunities for sustainable development.

However, in order for developing countries to be able to fully participate in these opportunities, many challenges need to be overcome. Meeting standards in export markets remains problematic for producers and economic operators in developing countries. The cost and know-how needed for achieving compliance with certification requirements can act as a barrier for greener trade. In addition, sustainable tourism depends heavily upon capital investments and R&D (particularly for green hotel refurbishment and sustainable transport options for tourists), which in turn depend on the availability of human and financial resources. It is important to foster partnerships at all levels of the tourism chain and focus and establish clear priorities at the national, regional and international levels.

7.6 Further resources

7.6.1 Websites for additional information

Green Economy Report's chapter on Tourism:

http://www.unep.org/greeneconomy/Portals/88/documents/ger/11.0_Tourism.pdf

UNEP and tourism:

<http://www.unep.fr/scp/tourism/>

UN World Tourism Organisation:

<http://www2.unwto.org/>

UNWTO Sustainable Tourism Indicators:

<http://sdt.unwto.org/en/content/indicators-sustainability-tourism-destinations>

UNWTO Global Tourism Observatories:

<http://sdt.unwto.org/en/content/global-observatory-sustainable-tourism-gost>

ITC and Tourism:

www.intracen.org/tourism

AITO and Sustainable Tourism:

http://www.aito.co.uk/corporate_Responsible-Tourism.asp

The Global Environmental Facility:

<http://www.thegef.org/gef/home>

European Network for Sustainable Tourism Development:

<http://www.ecotrans.org/>

Private voluntary standards:

www.standardsmap.org

Tourism Concern — action for ethical tourism:

<http://www.tourismconcern.org.uk/why-fair-trade.html>

Fair Trade in Tourism South Africa NPC (FTTSA):

<http://www.fairtourismsa.org.za/>

7.6.2 References

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Conclusion

8. Conclusion

Before Rio+20, the focus of the debate on trade and the transition to a green economy was largely on the risks related to the creation of new barriers for exports of goods and services from developing countries. In that connection, Rio+20 has been able to initiate a shift of focus towards improving the trade performance of developing countries as an additional effect of, and motivation for, the implementation of green economy policies.

If accompanied by appropriate regulation, sustainable international trade – a recognised catalyst of growth and economic development – can facilitate the transition to a green economy. Given the significant surge in international trade during the last two decades, sustainable trade should lead to a relative increase in production and trade of environmentally friendly goods and services.

Sustainable and responsible trade in the six sectors covered in this report, though still limited when compared with conventional trade, has become much more prominent in recent years. Trade in environmentally friendly goods and services, the implementation of sustainability standards, and the greening of global supply chains play a major role in this process. Indeed, there is a strong economic case for improving social and environmental sustainability of trade, and there are clear instances where the opportunities to increase revenues through trade fully coincide with the objectives of a green economy.

Developing countries, and particularly the least developed ones, are faced with an urgent need to diversify their economies. In the past ten years, trade-driven pressure on natural resources has escalated and resulted, with few exceptions, in detrimental environmental and social impacts, such as biodiversity loss, environmental degradation and inequitable income distribution.

Opportunities to reverse these trends can be found in the growth of existing sustainable trade markets, relative to conventional markets, and in the opening of new markets for green goods and services. Pioneering producers, service providers and exporters are already taking advantage of new trade opportunities driven by more sustainable consumption and production patterns. Developing countries with abundant natural capital, as well as competitive production costs and valuable human capital, may have an absolute advantage for capturing these opportunities.

In addition, there are several instances where the transfer of environmentally sound technologies, through trade- and investment-related channels, is also promoting economic and social development in developing countries. These channels allow the results of investments in R&D to benefit a larger number of producers and consumers while facilitating natural resource protection and climate change mitigation and adaptation efforts. At the same time, it remains crucial for developing countries to build or reinforce R&D capacity, particularly related to environmentally sound technologies. In addition, technological advancements and spillovers favoured by international trade can lead to a further specialisation in the production of more energy- and resource-efficient goods and services.

Overall, this report finds that sustainable trade exists, and that it can help reduce pressure on natural resources, improve social conditions, help secure market shares and respond to new market trends across the six sectors. The report also acknowledges the challenges related to sustainable trade opportunities, which in many instances are the same as those existing in conventional trade. In many cases, substantial policy and business constraints need to be overcome as countries embark on a transition to a greener economy. In the light of these constraints, sector-specific flanking policies and trade integration strategies are needed to assist in creating an enabling environment for capturing sustainable trade opportunities.

Opportunities and challenges

The incorporation of sustainable practices in production and trade can positively impact different elements of the supply chain and consequently make exports more competitive in international markets. In the agricultural sector, for example, sustainable farming methods can increase productivity, notably in developing countries where there exists a large potential for increasing yields and strengthening export markets.

In the manufacturing sector, products that present an environmentally friendly design appear to have an advantage in terms of market access across several jurisdictions. In addition, manufacturers that are able to implement more resource-efficient production methods and lifecycle management processes are more likely to have a competitive advantage in global markets.

Even though greening products, processes and production methods can be costly as well as demanding in terms of know-how, investing in them will eventually yield environmental and economic benefits. In the medium to long term, implementing green practices is likely to enhance the attractiveness of a product and supplier and thus secure international market shares and longer-term profitability.

Reducing trade-related emissions is also a key challenge for achieving more sustainable trade and mitigating climate change. Hence, the transition to a greener economy will necessitate greater fuel efficiency and the use of alternative energy sources across all sectors as part of wider domestic, regional and global measures. The development of new markets in carbon credits and carbon offsets may also offer additional opportunities to reduce emissions and increase revenues.

Mainstreaming sustainability in production can also provide opportunities to **access global supply chains**, particularly through business-to-business certification of sustainable practices and sustainability reporting initiatives.

In the renewable energy sector there are opportunities for building capabilities in manufacturing energy system parts and components, and in service provision along the value chain for solar, wind and energy-efficient technologies. Compliance with quality, safety and sustainability standards is a key enabler for participation in these transactions.

For farmers, too, access to agricultural supply chains has been supported by an increased use of sustainability standards and certification schemes, called for by buyers, traders, retailers and consumers to verify sustainable farming practices.

In the manufacturing sector, many multinational companies have also adopted sustainability standards and certification schemes. They may, for example, require suppliers to implement a certified environmental management system or more sustainable production methods. In response, many suppliers, including from developing countries, are adapting their practices in order to secure their positions within the supply chains.

Yet, there are risks of marginalisation, particularly for small producers, and there are challenges related to the start-up costs and know-how needed for upgrading production methods to meet sustainability standards. Small and medium-sized enterprises, in particular, may need external support and capacity building to enable them to participate in sustainable suppliers' networks.

Besides facilitating access to global supply chains, compliance with sustainability standards can lead to achieving certification. According to the report, **trade in certified products** presents advantages in terms of market access, and despite the current worldwide economic slowdown, trade in certified products, e.g. in the fisheries and forestry sectors, has been on the rise. Middle income consumers in particular, in both developed and developing countries, are increasingly demanding sustainably produced and certified products.

In the agriculture, aquaculture, fisheries and forests sectors, key export opportunities include certified produce and trade in products resulting from the adoption of green economy policies, such as sustainable fisheries, forests, and land management systems. Sales of certified products are also on the rise in the manufacturing sector, while in the tourism sector evidence shows that certification has a central role to play in promoting socially and environmentally responsible travel.

However, certification can entail costs that put a higher burden on small producers and necessitate know-how and education that are not yet available. Without targeted technical assistance, there is a real risk that only small portions of local producers reap the benefits of sustainable trade in, for instance, certified agricultural products. An additional challenge is related to the increasing proliferation of labels. Further harmonisation, equivalence and mutual recognition between different standards and labels will be important for facilitating trade in certified products.

Trade in environmental goods is a field where developing countries are building a competitive advantage. This includes for example renewable energy supply equipment or inputs or components of such equipment. As national priorities shift towards mitigating environmental damage including anthropogenic climate change, emerging economies have become significant players in the production and trade of various clean technologies. These trends – combined with increasing environmental awareness internationally and investments in R&D – are creating dynamic opportunities for trade in environmental goods.

However, even if dynamic and growing, trade in environmental goods, when compared for example with the value of global trade in materials and resources, remains a small fraction of total merchandise trade. An important margin to liberalise, and thus encourage, trade in environmental goods exists in South-South trade, where environmental goods face higher bound and applied tariffs. While tariff revenue represents an important source of income for many developing countries, lowering tariffs on environmental goods may significantly increase consumers' welfare while contributing to sustainable development.

Trade in environmental services, as identified across the six sectors in this report, includes trade opportunities concerning environment-related business, construction and engineering, education and training, sustainability certification and tourism services. In the tourism sector, for example, there are vast opportunities for incorporating sustainability policies, as well as for capturing promising markets such as ecotourism, agrotourism, and coastal and marine recreation tourism. In addition, environmental services, such as waste and water management, and those related to the reduction of air pollution and green house gas emissions, are becoming a major source of technology transfer. Infrastructural and non-infrastructural environmental services, however, present their own challenges. Where the former generally necessitate capital investments, in fact, the latter may require education and training programmes that are not yet in place in many developing and least developed countries.

Ways forward

Even when there is a convincing economic case for investing in greening trade, a number of important obstacles remain. These relate mostly to limitations in financial and human resources, weak regulatory frameworks, lack of implementation and enforcement mechanisms and poor economic infrastructure. Illiteracy and limited access to energy are barriers to the further development of sustainable and certified trade. These issues need to be addressed through concerted efforts at the international, regional, national and local levels.

Against this background, the report has identified a number of **enabling conditions** that can facilitate the creation and realisation of sustainable trade opportunities arising from a transition to a green economy. These can be divided into the following categories:

- Investment and spending;
- Market-based instruments;
- National regulatory frameworks;
- International frameworks; and
- Dialogue and capacity building.

In accordance with national sustainable development priorities, **strategic investment and spending** is an important means for promoting the development of green markets. In order to increase the success rate of developing country suppliers in accessing greener international markets, public investments in key economic infrastructure, technical assistance, targeted education programmes and access to sustainable resources, such as electricity from renewable energy, are crucial.

Public investments can also leverage private sector funds which are essential for example for R&D into sustainable products, services and technologies, sustainable processing, marketing and warehousing, in order to create or enhance developing countries' comparative advantages in sustainable trade. Public-private partnerships are also important in this process.

Market-based instruments, such as taxes and subsidies, are used to correct negative environmental externalities and market failures in general. An essential condition for enabling sustainable trade is the reform of subsidies that encourage the production and trade of unsustainable products – in particular fossil fuel, agricultural and fisheries subsidies – and the implementation of pricing policies that take fully into account environmental and social costs of production and consumption.

Creating economic incentives to implement sustainability standards and traceability methods that allow tracking products from the source to the shop also enables sustainable trade. In addition, as is the case in the renewable energy sector, the risk-return profile of renewable energy projects can be improved by governments assuming some of the risks. A wide range of public incentive mechanisms, such as national renewable energy targets and feed-in tariffs, are available.

Further, creating incentives for effective supply chain partnerships with international exporters promoting sustainability, would particularly benefit small producers. In the same vein, incentivising the formation of associations of producers and service providers, developing new models of partnership between producers and market operators, and building and developing sustainable supply chain infrastructure including warehousing, packaging, and transport are all examples of means for promoting supply chain partnerships.

Strengthening domestic institutions and improving **national regulatory frameworks, transparency and accountability** can also stimulate green trade activities. National strategies, programmes and frameworks are a primary means through which efforts to green new and existing industries can be integrated, resourced, coordinated and implemented. Policies and actions to support the greening of industries can be incorporated into national sustainable development strategies and overarching legal frameworks. Strategies that more specifically address the greening of industries, such as national sustainable consumption and production plans, and sector- and issue-based strategies, such as resource use, safe waste disposal, energy, education, and health and safety are also important policy tools.

International frameworks are key for the transfer and dissemination of technologies, skills and resources needed to ensure that countries can create and equally benefit from new trade opportunities arising from a transition to a green economy.

Strengthened international trade governance, for example, can assist governments to promote the trade aspects of a green economy. In particular, the conclusion of the World Trade Organization (WTO) Doha Round could potentially lead to improved synchronisation of environmental and trade objectives through:

- Reduction or elimination of tariffs and non-tariff barriers to trade in environmental goods and services, facilitating access to green goods and services;
- Enhanced dissemination and deployment of environmentally sound technologies critical to green economy development; and
- Substantial cuts in environmentally harmful agricultural and fisheries subsidies.

Outside the WTO framework, progress can be achieved in other arenas such as regional trade agreements (RTAs) and multilateral environmental agreements (MEAs). If properly designed, RTAs can offer important opportunities to promote sustainable practices and be a driver of policy reforms, increased capacity development, strengthened environmental regulation and better cooperation among relevant ministries. For example, lowering tariffs and removing unnecessary non-tariff barriers can facilitate inter-regional trade in goods such as wind turbines, solar panels and energy-efficient light bulbs, and in services like environmental engineering.

Similarly, further developing and implementing existing MEAs that include trade-related measures, such as the Convention on Biological Diversity, the Convention on International Trade in Endangered Species of Wild Fauna and Flora, and the United Nations Framework Convention on Climate Change, could also contribute to sustainable trade. MEAs have a critical role to play in ensuring the advancement of environmental laws and the mutual supportiveness of green economy and trade. MEAs also have an important role to play in ensuring that trade is legal, sustainable and traceable, and in promoting the transfer of environmentally sound technologies as well as capacity building in furtherance of their objectives.

Finally, enhancing **dialogue and capacity building** on trade opportunities arising from a green economy is essential. Such efforts need to be targeted at facilitating trade in environmental goods and services, accessing new markets, supporting standard setting, accessing certification schemes, promoting and leveraging public and private investments in green sectors, and sharing experiences and promoting best practices around the world.

One of the key challenges faced by producers and traders is access to export markets which have a complex regulatory regime. These can include sanitary and phytosanitary or technical requirements, and specific requirements applying to niche markets such as organic or fair trade goods. Regulatory cooperation and capacity building are means to overcome these challenges in a proactive manner. Scaling up support for developing countries to harness green export opportunities requires coherent support from international institutions and agreements including UN agencies, MEAs and RTAs, development banks, the WTO as well as the private sector and non-governmental organisations.

South-South cooperation will also be essential to support developing countries seeking to sustain and deepen their participation in international trade for sustainable goods and services. In this context, a key challenge is to inter-connect producers in developing countries and to link them to regional and global markets. Suppliers also require improved access to quantitative and qualitative information and analyses of global markets, as well as information on marketing, product promotion, tariffs, non-tariff measures, transport and insurance costs, and other trade-related issues pertaining to the export of sustainable products.

Next steps on trade and the green economy

As shown in this report, there are positive signs that trade-related practices are moving towards more environmental, social and economic sustainability. These trends have to be encouraged as well as fully informed by the Rio+20 mandate to advance the green economy in the context of sustainable development and poverty eradication. Further research, particularly focused on sustainable trade opportunities at the country level, is highly desirable and should be promoted by governments as well as the private sector.

The nexus between international trade and the transition to a greener economy, as discussed in the report, should provide governments with additional incentives to implement green economy policies. In this context UNEP, along with other organisations, is committed to supporting governments at the international, regional and national level in the design and implementation of green economy policies and in the assessment and realisation of relevant sustainable trade opportunities.



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By addressing the critical nexus between a green economy and international trade, this report responds to the calls made by world leaders at Rio+20 for supporting the transition to a green economy that contributes to poverty eradication and sustainable development. Acknowledging international trade as an engine for development and sustained economic growth, this report provides an overview and examples on how the transition to a greener economy can create sustainable trade opportunities for developing countries. It also points to the main challenges related to the realisation of these opportunities and sets out enabling conditions for trade to contribute to environmental objectives while advancing economic and social development.

