

CONFRONTING SCARCITY:

Managing water, energy and land
for inclusive and sustainable growth



MOBILISING EUROPEAN RESEARCH
FOR DEVELOPMENT POLICIES



EUROPEAN REPORT
ON **DEVELOPMENT**



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for inclusive and sustainable growth



d·i·e

Deutsches Institut für
Entwicklungspolitik



German Development
Institute

European Centre for Development
Policy Management

ecdpm

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FOREWORD

Water, energy and land, three crucial resources for development and human well-being, are under increasing strain due to rising food prices, climate change, global population growth and economic growth. Today almost a billion people are undernourished, 0.9 billion have no safe water and 1.5 billion no source of electricity. Worse still, at current rates, by 2030 demand for energy and water will have grown by 40% – and by 50% for food.

As the threat of absolute resource scarcity looms closer, poor people are the most vulnerable and least equipped to cope. Inclusive and sustainable resource management is thus a developmental and environmental necessity – and a moral imperative, too.

This is why this third European Report on Development, focusing on managing water, energy and land for inclusive and sustainable growth, is so welcome. As the international community prepares for the UN Conference on Sustainable Development in Rio, it is also most timely. And as a proud Member of the Secretary General's High Level Group on Sustainable Energy for All, whose work will feed into the discussions on Sustainable Development Goals, I believe it is most relevant.

The report strongly discounts "business as usual" as an option. Inaction would be catastrophic. But there is hope: a path towards growth which is both inclusive and sustainable can be mapped out.

The report analyses the interconnections among water, energy and land and stresses the benefits of shifting towards an integrated nexus approach. Such an approach would be key to addressing interdependencies, increasing coherence and creating synergies across sectors and resources.

This independent research by three leading EU development institutes calls on us to manage water, energy and land better. It encourages us to think and act more strategically, working in cooperation with partner countries and the private sector to increase the impact of our policies and foster inclusive and sustainable growth.

This is very much in line with our "Agenda for Change," which aims to boost the impact and effectiveness of EU development policy. We plan to focus our future support on achieving good governance and inclusive and sustainable growth for human development. Our support in agriculture and energy will help insulate developing countries from shocks and help them tackle inequalities in areas like access to natural resources. We will strive to improve coherence, build synergies and work together with our Member States, partner countries and the private sector to deliver change for the better.

This report will help us rise to the challenges ahead by improving our understanding of trade-offs and potential responses. The main message to take away is that the nexus approach presents opportunities we cannot afford to miss. Opportunities that we will harness as we pursue our Agenda for Change.

Andris Piebalgs



European Commissioner for Development

THE DIRECTORS' FOREWORD

The Overseas Development Institute (ODI), the Deutsches Institut fuer Entwicklungspolitik (DIE) and the European Centre for Development Policy Management (ECDPM) have welcomed the opportunity to produce this year's European Report on Development, **Confronting scarcity: Managing water, energy and land for inclusive and sustainable growth**. As founder members of the European Think Tanks Group, we are committed to bridging the gap between research and policy and this report has given us a unique opportunity to do this on a set of issues at the forefront of European and global development policy.

In his foreword, Commissioner Piebalgs has underlined the importance of an integrated approach to natural resource management and the nexus of water, land and energy – three crucial resources for development and human well-being, now and in the future for inclusive and sustainable growth. We would also like to reinforce the Commissioner's point on the critical importance of managing the nexus to achieve inclusive and sustainable growth.

The report recognises that it is the poor that are often the first to suffer the consequences of badly managed or scarce resources. It analyses in detail five areas where co-ordinated action is required by the international community, both public and private sector, to aid the transition to sustainable economic development while addressing the fundamental challenges of poverty and vulnerability.

These areas include a concerted effort to reduce the environmental footprint of consumption across the globe, especially but not only in developed countries such as the EU; the promotion of innovation in agriculture and renewable energy to meet the world's needs in food and sustainable energy; establishing or reforming national and global institutions and instruments of governance in order to equip them to manage resources in an integrated manner; the promotion of inclusive land policies globally that protect the rights of the poor and most vulnerable and, pricing natural resources and services appropriately, safeguarding the welfare of the poorest.

Natural resources and services are often overexploited because they are perceived as free or cost very little to use. A major policy shift is required to properly account for the value of natural capital and for the costs of its depletion.

With the Rio Conference on Sustainable Development around the corner in June 2012, we trust the European Report on Development 2011-2012 will help both national governments and international institutions consider a radical and comprehensive agenda for confronting the multiple challenges of natural resource management in a rapidly changing world.

Dr. Alison Evans

Director of ODI

Prof. Dr. Dirk Messner

Director of DIE

Dr. Paul Engel

Director of ECDPM

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As part of the writing process, the Core Team organised a series of consultative events in Bonn, Brussels, Maastricht, Nairobi and York, workshops in Bolivia and Brazil, and a consultation at the Bonn Nexus Conference. We are immensely grateful for the support and contributions made by the participants at the consultations and workshops. The ERD team also commissioned 20 background papers (list of papers) from 30 researchers worldwide.

The Report was drafted by a team of researchers from the three participating institutions, including Michael Brüntrup, Roger Calow, Nicola Cantore, Chris Coles, Ines Dombrowsky, Karen Ellis, Alejandro Guarín, Elke Herrfahrdt-Pähle, Jan van Heukelom, Niels Keijzer, Alberto Lemma, James Mackie (Core Team Member), Nathaniel Mason, Imme Scholz (Core Team Member), Dirk Willem te Velde (Team Leader) and Frauke de Weijer. We thank Tilman Altenburg, Kristy Graham and Waltina Scheumann for their comments and inputs. We thank Raphaëlle Faure and others for research assistance.

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LIST OF ACRONYMS

ACP	African, Caribbean and Pacific
ADB	Asian Development Bank
AEA	Atomic Energy Authority
AfDB	African Development Bank
AIDS	Acquired Immune Deficiency Syndrome
AU	African Union
BAU	Business as Usual
BICEP	Business for Innovative Climate & Energy Policy
CAADP	Comprehensive Africa Agriculture Development Programme
CAP	Common Agricultural Policy
CDF	Community Development Fund
CDM	Clean Development Mechanism
CEPS	Centre for European Policy Studies
CFP	Common Fisheries Policy
CHP	Combined Heat and Power
CILSS	Comité Inter-Etat pour la Lutte contre la Sécheresse au Sahel (Permanent Inter-state Committee for Drought Control in the Sahel)
CMA	Catchment Management Agency
CO2	Carbon Dioxide
COM	European Commission
CPR	Common Pool Resources
CSD	Commission on Sustainable Development
CSIR	Council for Scientific and Industrial Research
CSO	Civil Society Organisation
CSR	Corporate Social Responsibility
CTF	Clean Technology Fund
DAC	Development Assistance Committee (OECD)
DCI	Development Cooperation Instrument
DECC	Department of Energy and Climate Change
DFI	Development Finance Institution
DFID	UK Department for International Development
DG	Directorate-General
DIE	Deutsches Institut für Entwicklungspolitik (German Development Institute)
DRA	Demand-responsive Approach
DRC	Democratic Republic of the Congo
DSER	Demand, supply, efficiency and resilience
DWAF	Department of Water Affairs and Forestry (South Africa)
ECDPM	European Centre for Development Policy Management
ECOWAS	Economic Community of West African States
EDF	European Development Fund
EEA	European Environment Agency
EIB	European Investment Bank
EITI	Extractive Industries Transparency Initiative
ERD	European Report on Development

ESIA	Environmental and Social Impact Assessment
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FDI	Foreign Direct Investment
FFD	Financing for Development
FIAN	Food First Information and Action Network
FLEGT	Forest Law Enforcement, Governance and Trade
GDP	Gross Domestic Product
GhG	Greenhouse Gas
GLAAS	Global Annual Assessment of Sanitation and Drinking Water
GMO	Genetically Modified Organism
GoE	Government of Ethiopia
GTP	Growth and Transformation Plan (Ethiopia)
GWP	Global Water Partnership
ha	hectare
HANPP	Human Appropriation of Net Primary Productivity
HDI	Human Development Index
HIC	High-income Country
HIV	Human Immunodeficiency Virus
HLPE	High-level Panel of Experts
IA	Impact Assessment
IAASTD	International Assessment of Agricultural Knowledge, Science and Technology for Development
IAEA	International Atomic Energy Agency
IEA	International Energy Agency
IFAD	International Fund for Agricultural Development
IFC	International Finance Corporation
IFPRI	International Food Policy Research Institute
IIASA	International Institute for Applied Systems Analysis
ILC	International Land Coalition
ILO	International Labour Organization
IMF	International Monetary Fund
IPCC	Intergovernmental Panel on Climate Change
IRENA	International Renewable Energy Agency
ISG	Inclusive and Sustainable Growth
ISRIC	International Soil Reference and Information Centre
IUCN	International Union for the Conservation of Nature
IWMI	International Water Management Institute
IWRM	Integrated Water Resource Management
KACST	King Abdulaziz City for Science and Technology
kWh	kilowatts per hour
LDC	Least-developed Country
LIC	Low-income country
mb/d	million barrels produced per day
MDG	Millennium Development Goal
MENA	Middle East and North Africa

MEP	Member of the European Parliament
MIC	Middle-income Country
MNC	Multinational Corporation
MoWE	Ministry of Water and Energy (Ethiopia)
Mtoe	megatons equivalents
NGO	Non-governmental Organisation
NPA	Norwegian People's Aid
O&M	Operations and Maintenance
ODA	Official Development Assistance
ODI	Overseas Development Institute
OECD	Organisation for Economic Co-operation and Development
OMVS	Organisation pour la Mise en Valeur du Fleuve Sénégal (Senegal River Basin Development Authority)
PCD	Policy Coherence for Development
PE	Political Economy
PES	Payment for Ecosystem Services
ppm	parts per million
PPP	Purchasing Power Parity
PPPs	Public-Private Partnerships
PRI	Principles for Responsible Investment
PuP	Public-public Partnership
PV	Photovoltaic
R&D	Research and Development
RAI	Responsible Agricultural Investment
RBM	River Basin Management
RDB	Regional Development Bank
REC	Regional Economic Community
RECIPES	Renewable Energy in Developing Countries: Current Situation, Market Potential and Recommendations for a Win-Win-Win for EU Industry, the Environment and Local Socio-economic Development
REDD	Reducing Emissions from Deforestation and Forest Degradation in Developing Countries
REPN	Renewable Energy Policy Network
REPTS	Renewable Energy Premium Tariff System
RWSN	Rural Water Supply Network
SAI	Sustainable Agriculture Initiative
SBR	State-Business Relations
SDG	Sustainable Development Goal
Sida	Swedish Agency for International Development Cooperation
SME	Small and Medium-sized Enterprises
SRI	Socially Responsible Investor
TW	terawatt
UAP	Universal Access Programme (Ethiopia)
UHCPV	Ultra-high Concentrator Photovoltaic
UK	United Kingdom
UN	United Nations
UNCDD	United Nations Convention to Combat Desertification
UNCED	United Nations Conference on Environment and Development
UNCSD	United Nations Conference on Sustainable Development

UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
UNECA	United Nations Economic Commission for Africa
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
UNGC	United Nations Global Compact
UN-HABITAT	United Nations Settlements Programme
UNICEF	United Nations Children's Fund
UNIDO	United Nations Industrial Development Organization
UNPD	United Nations Population Division
USA	United States of America
USAID	US Agency for International Development
WASHCO	Water and Sanitation Committee
WBCSD	World Business Council for Sustainable Development
WBGU	Wissenschaftliche Beirat der Bundesregierung Globale Umweltveränderungen (German Advisory Council on Global Change)
WCED	World Commission for Economic Development
WEF	World Economic Forum
WEL	Water, Energy and Land
WET	Water Entitlements and Trading
WHO	World Health Organization
WMO	World Meteorological Organization
WRD	Water Resources Department (China)
WSP	Water and Sanitation Programme
WSS	Water Supply and Sanitation
WSSD	World Summit for Sustainable Development
WTO	World Trade Organization
WUA	Water User Association
WWF	Worldwide Fund for Nature
Yr	year

EXECUTIVE SUMMARY

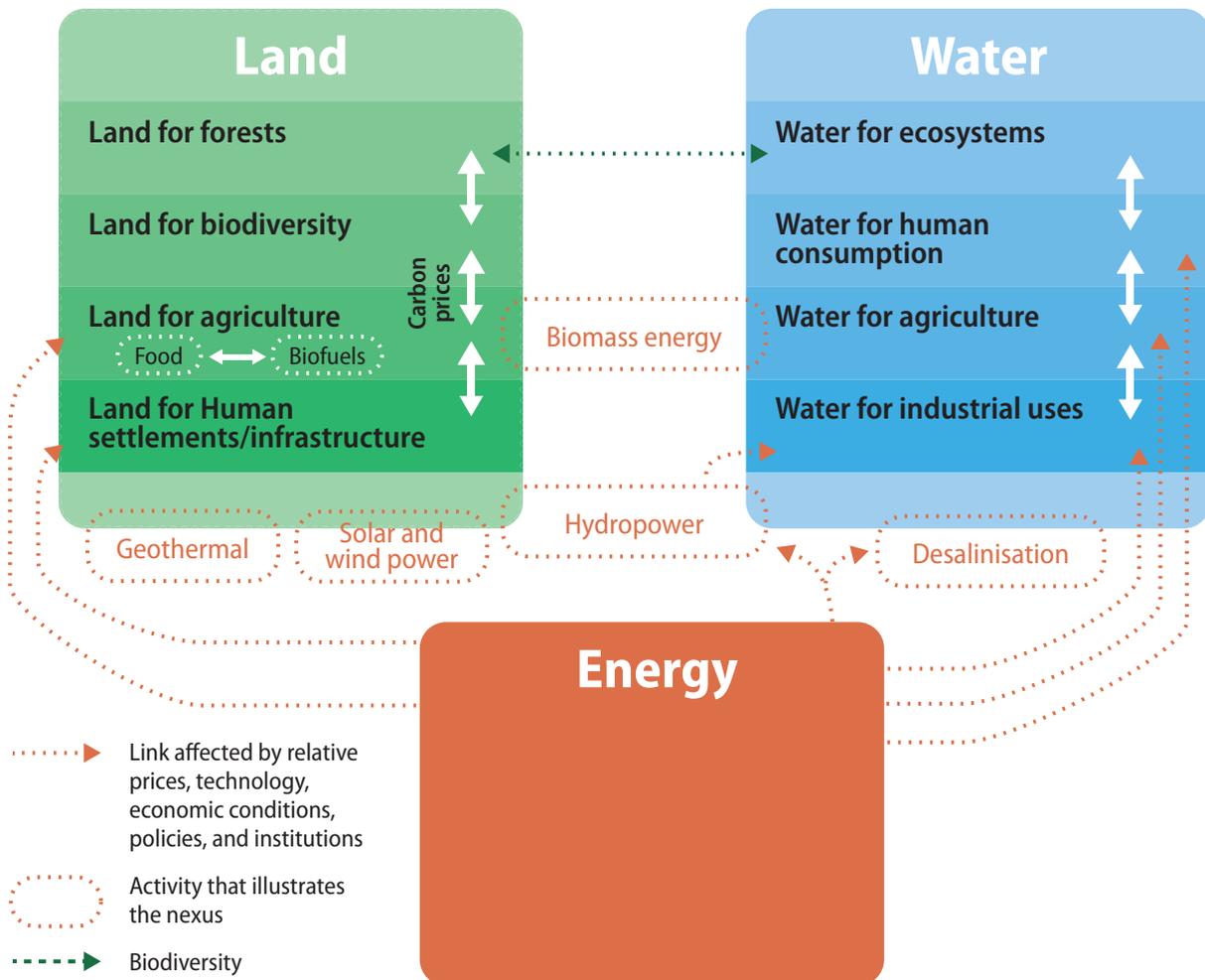


OVERVIEW AND MAIN MESSAGES

It is becoming ever more difficult to provide universal access to water and energy and achieve food security in a sustainable way. Close to 1 billion people are undernourished, 0.9 billion lack access to safe water and 1.5 billion have no source of electricity. Improved governance of water, energy and land will play a vital role in achieving the Millennium Development Goals (MDGs). At the same time the context in which resources need to be managed is changing rapidly. Many life-supporting natural resources are increasing in scarcity. There is now incontrovertible evidence that some planetary boundaries are being reached or transgressed. Problems include greenhouse gas (GhG) concentrations in the atmosphere, freshwater availability, land-use change and biodiversity losses.

This Report focuses on water, energy and land. It examines the constraints on each, the interrelationships between them and then considers how they can be managed together to promote growth in developing countries that is both socially inclusive and environmentally sustainable. A rising world population and global economic growth place new pressures on natural resources. The demand for energy and water is expected to grow by 40% and for food by 50% by 2030 compared to present levels. In an interconnected world, these pressures are exacerbated when solutions to resource constraints in one area place additional strains on another. Expanding the provision of biofuels, for example, can contribute to pressures on both land and water (Figure 1). Countries pursuing food security at home have acquired land overseas, sometimes at the expense of access to land and water by existing communities.

Figure 1: The Water-Energy-Land (WEL) nexus



MANAGING THE WEL NEXUS

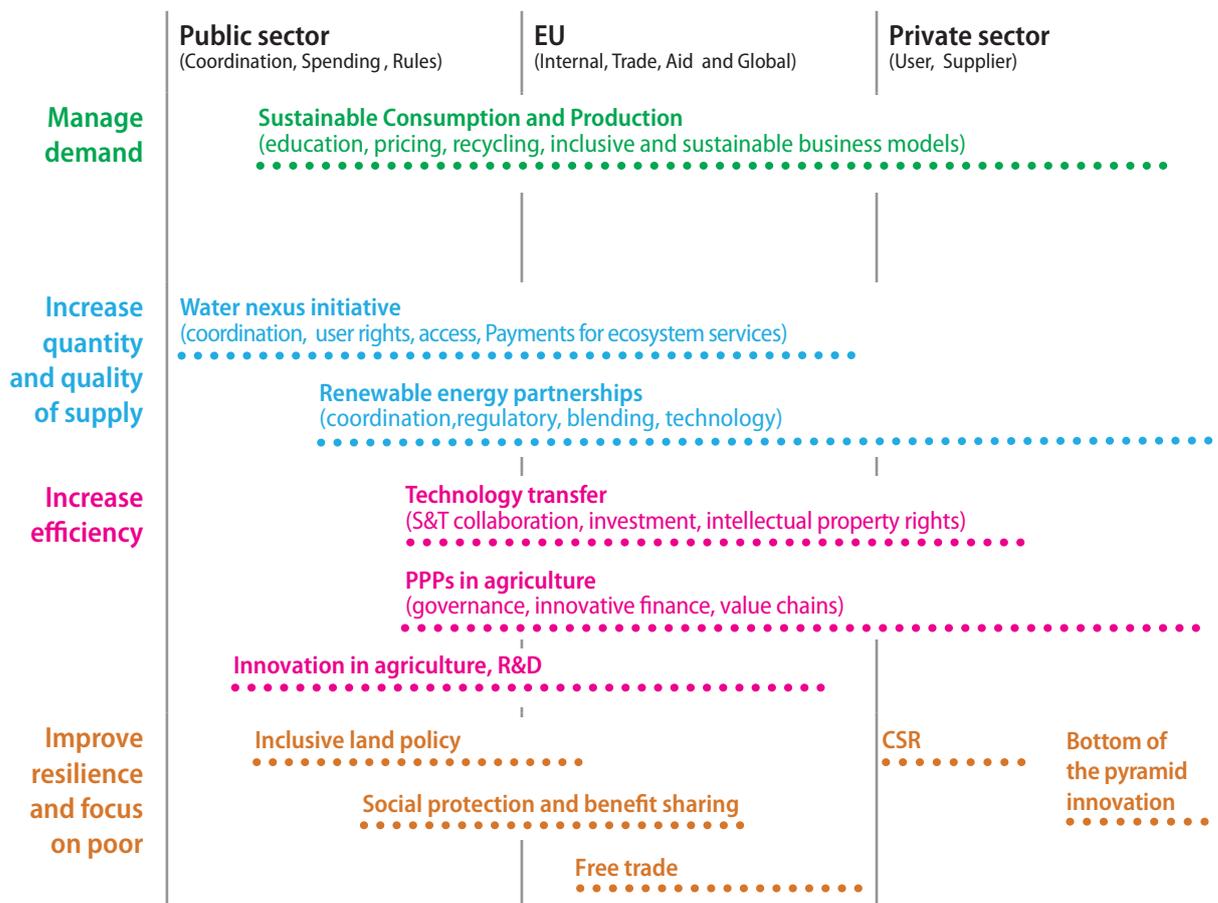
This Report urges the international community to radically transform approaches to managing water, energy and land (WEL) in order to support inclusive and sustainable growth in the poorest developing countries. This radical transformation is needed to satisfy the growing demand for water, food and energy without transgressing environmental limits or tipping points. It involves institutional change and joint implementation by the public and private sectors. An integrated approach managing the WEL nexus accentuates the importance of certain solutions (e.g. payments for ecosystem services) and downplays the appropriateness of others (e.g. mandates on biofuel production).

The poor are occasional winners but frequent losers in a resource-constrained world. They may find that prices rise for essential but resource-intensive goods and services such as food and energy. And their employment opportunities may decline if growth is constrained by physical or economic shortages. These are not inevitable outcomes, however. An alternative vision is possible, of inclusive and sustainable growth that provides livelihoods for all, preserves the environment and is sustainable over time. In 2012, the year of the Summit on Sustainable Development and of Sustainable Energy Access for All, this new vision will shape global action.

How can a new vision be realised? Not by leaving it to the market alone to adjudicate between competing uses of resources and to allocate resources between rich and poor. There are too many market failures embedded in the current economic system to achieve benign outcomes across the board. Growing problems with climate change illustrate the challenge only too clearly. Instead, a combination of public and private action is required to respond to the challenges and seize the opportunities.

Three types of actors must address transformation challenges towards inclusive and sustainable growth. The national *public sector* sets the regulatory and legal framework, uses public expenditure and coordinates and facilitates. The *private sector* can respond by making its business models more inclusive and sustainable and by investing in sustainable outcomes. The *European Union (EU)* can support poorer countries through internal policies on production and consumption, as a major trade and investment partner, as a major donor, and through contributions to global governance, as well as by promoting better policy coherence for development.

Figure 2: Confronting scarcity: Options for managing the WEL nexus



All actors must consider the full range of options in managing pressures on water, energy and land. So far the focus has been on partial solutions: Businesses emphasise the opportunities in increasing supply and raising resource efficiency; the green economy concept at Rio+20 highlights enhancing the resource base, resource efficiency, and sustainable consumption and production; NGOs highlight fair resource shares for the poor; others emphasise resilience against climate shocks. **This ERD argues that the scale and urgency of the problems require transformative action in a combination of four pillars (DSER):**

- influencing **Demand** patterns to reflect scarcity values (e.g. sustainable consumption and production by cutting waste and changing lifestyles)
- improving the quantity and quality of **Supply** (e.g. partnerships on renewable energy, soils, water storage through appropriate finance, regulation and knowledge sharing)
- increasing **Efficiency** (e.g. technology transfer, national innovation systems)
- increasing **Resilience** against shocks and benefits for the poorest (e.g. benefit-sharing, social protection, Corporate Social Responsibility, inclusive land policy)

Figure 2 shows the Report's major policy suggestions and opportunities for action around the WEL nexus, many of which require coordination across actors and sectors.

The report analyses in more detail how action is particularly required in five areas:

1. Radically reduce the environmental footprint of consumption (especially, but not only, in developed countries such as the EU) to promote inclusive growth without increasing resource use.
2. Promote innovation to increase agricultural productivity to feed more than 9bn people sustainably by 2050 and scale up renewable energy technologies that help to deliver sustainable energy for all by 2030.
3. Establish or reform institutions for an integrated approach towards managing resources.
4. Push for inclusive land policy to ensure access to land and water for the poorest and most vulnerable.
5. Price natural resources and services comprehensively and appropriately (e.g. using instruments such as payments for ecosystem services, PES), whilst safeguarding the welfare of the poorest.

This radical long-term agenda should be reflected in the values and institutions of public and private sectors. It will also challenge public, private and global governance. It sets the scene for the upcoming Rio+20 Conference and should inform the design and implementation of EU development policy. The international community needs to establish the right governance structures and make available sufficient finance (using aid, innovative development financing and responsible foreign direct investment) to support the transformation towards inclusive and sustainable growth and human security, particularly in poor countries.

THE CHANGING CONTEXT OF NATURAL RESOURCE MANAGEMENT

Human wellbeing depends on the availability and management of water, energy and land. These are basic production factors within the economic system and form part of the ecosystems that regulate and maintain the conditions for life. Natural capital represents a quarter of total wealth in sub-Saharan Africa and natural resources are often the principal source of income of the world's poorest people. However, a lack of investment in infrastructure, skills and an enabling framework constrain access both to water and sanitation as well as to energy, and limit the productivity of land.

A growing population, rising income levels and global environmental change create a new context for managing natural resources. This context creates opportunities for growth, but also presents major challenges. Rising incomes are likely to increase demand for a wide range of goods and services, offering countries valuable opportunities to realise the wealth-creating potential of water, energy and land. At the same time, increased demand will place new pressures on the regeneration capacity of renewable resources and on the absorptive capacity of the Earth's physical systems. People who are poor and vulnerable are most exposed and least equipped to cope with the likely impacts.

The interconnectedness of different natural resources, and between local and global processes of resource use, highlights the complex issues involved in addressing these challenges in ways that also make effective use of the opportunities. The tight interconnections between water, energy and land – what we call the WEL nexus (Figure 1) – make clear that the management of each of them cannot be considered in isolation, but must be seen as part of an integrated system. The use of a WEL-nexus perspective for managing water, energy and land refers both to managing the linkages between the resources and doing so in a way that takes into account the cross-sectoral effects of sectoral policies. Focusing on the WEL nexus is thus an analytical approach to facilitate the elaboration of solutions that are based on an integrated assessment of the challenges and opportunities in managing water, energy and land.

A number of characteristics underline the importance of the WEL nexus. First, the world is moving towards a situation of absolute scarcity of certain resources and sink capacities, and the scarce resource can become an indirect constraint, which presents both challenges and opportunities to identify integrated solutions. Second, resources are increasingly interrelated. Coordination failures between policies on water, energy and land need to be addressed in order to avoid the negative impacts of these interlinkages. Third, although there are markets for pricing traditional inputs (e.g. labour, capital), markets for pricing land and water – and the pre-requisites of clear property rights and data on resource conditions – are often inadequate, particularly in developing countries; or, in the case of the carbon sink capacity of the atmosphere, are simply non-existent. Finally, the nexus affects the poorest population groups disproportionately. All three elements in the nexus are basic to their livelihoods and have often been to some extent free of charge. As the world moves towards absolute scarcities in some of these resources, the poor are the first to experience the pressure on their livelihoods.

RISKS AND OPPORTUNITIES IN THE PURSUIT OF INCLUSIVE AND SUSTAINABLE GROWTH

The changing context requires a transformation to a new pattern of growth that is both inclusive and sustainable. The three essential principles embodied in the concept of *inclusive and sustainable growth* (ISG) can be broadly defined as sustained growth that is consistent with the natural cycles that allow ecosystems to replenish resources, absorb waste, and maintain adequate conditions for life, while at the same time providing everybody the opportunity to participate in and enjoy the benefits of increased wealth for this and future generations. There will inevitably be trade-offs, but there are also potential 'triple wins'.

The new context for the management of natural resources poses severe risks for both inclusiveness and sustainability. The world has already trespassed three of the nine planetary boundaries within which it can operate safely: biodiversity loss, nitrogen and phosphorus loading and climate change. Ocean acidification and freshwater boundaries are expected to be next in the coming 50 years (Rockström et al. 2009). The risk that tipping points are being reached, or will soon be reached, will jeopardise the future wellbeing of the poorest, who will be the hardest hit by environmental degradation. Applying the technology that lay behind the Green Revolution of the 1960s will not sustainably produce food for 9.3 billion people by 2050 (Noone, 2011). The Earth's natural resource base does not allow developing and emerging economies to reach consumption patterns that developed countries have followed and continue to follow (e.g. a reliance on meat consumption) (Allan, 2011), hence distributional issues will have to be addressed, especially since technological progress has not been sufficient to decouple consumption of natural resources from economic growth.

Action is needed now to avert substantial economic and social costs – the failure to act on climate change could reduce global GDP by 20% by 2050 (Stern, 2006). The poorest countries will see the greatest effects of climate change although they have contributed least to the problem. Increased water scarcity could lead to annual grain losses of 30% of current consumption (WEF, 2011a). Localised physical water scarcity is occurring in parts of China, India, the Middle East and sub-Saharan Africa. In China, water scarcity costs around 2.3% of GDP (World Bank, 2007). Not investing in water resources development could involve major future costs: some 2% of Africa's GDP is lost to power cuts, and up to 25% to droughts and floods in affected countries (AfDB, 2009). Environmental degradation and inappropriate public-sector responses affect the poorest most: between 30% and 60% of existing rural water supply schemes are not working at any given time (Brikké and Bredero, 2003), with the result that the very poorest people, and especially women and girls, end up paying the most for lower quality, less reliable water services.

While staying within environmentally and socially acceptable boundaries imposes limits on the economic use of natural resources, it also provides opportunities for innovation and economic gains. The greening of the economy will require a great deal of innovation, which could open up huge opportunities. The World Business Council for Sustainable Development (WBCSD) offers a vision in which leading firms argue that putting sustainability at the core of their mission makes good business sense. Many companies are investing in green energy (e.g. biofuels, solar power provisions, micro-hydropower, geothermal) in countries ranging from China and India to Kenya. Larger companies are starting to put sustainability at the forefront of their planning and turn it into their advantage.

The risks and opportunities for countries, regions and different social sectors depend on governance systems, income levels and resource endowments. Increased pressures on water and land and the importance of renewable energy will lead to an increased benefit attached to land, water and renewable energy. This will affect trade, investment and production patterns. Countries and groups that possess relevant assets will have new opportunities, but these come with social and environmental risks. Less well-endowed countries, regions and groups face different types of risks and opportunities (e.g. parts of northern China, India, Middle East and Southern Africa have little water, while countries such as Ethiopia, Ghana, Madagascar and Sudan have large tracts of land). Increased pressures also increase the need for good governance generally. Governments and business that meet this challenge are also better placed to seize the opportunities. Finally, increased income and investment levels help to provide complementary activities (infrastructure, skills, etc.) for using land, water and energy for ISG.

FRAMING RESPONSES TO THE NEW CHALLENGES

To transform the economy towards inclusive and sustainable growth requires a wide-ranging change in institutions, policies and values and the participation of all stakeholders. A successful transformation will depend upon appropriate incentives such as efficient regulation, secure and transparent property rights, resource pricing and coordinating activities that steer the market in the desired direction. There is a need for a strong private sector, governed by a regulatory framework, to respond to incentives, identify and seize new opportunities, and innovate in ways designed to realise the growth potential of natural resources within the natural physical boundaries. The setting of new frameworks, which will also mean replacing old incentives, is a deeply political process. Achieving this will require a strong and vigilant civil society, public leadership and decisive state intervention. There will be a need to mobilise significant political will and unprecedented levels of international coordination.

A 'four pillar' or DSER framework to assess the roles of the public and private sectors, and the relationship between them, addresses the new challenges of managing natural resources, and helps to move towards inclusive and sustainable growth. First, *demand* must be managed to reflect scarcity values, both for the individual resource and for the cluster of resources. Second, resource *supply* must be managed to improve quantity and quality. Third, the *efficiency* of resource use must be improved. Fourth, development strategies need to focus on *resilience* and the welfare of the poorest in the face of economic and resource-based shocks.

MANAGING THE WEL NEXUS

Managing the elements in the WEL nexus depends on an integrated approach. A drop of water, a piece of land, or a kilojoule of renewable energy cannot be seen through the single lens of one sectoral policy or management system. What might appear to be an efficient policy in one dimension can be harmful for the others, and different ways of exploiting water and land or producing renewable energy place different stresses on the other resources. An adequate response to emerging challenges, and specifically the linkages between water, energy and land, make it imperative to examine and manage the trade-offs not only among users and uses of the same resource, but also of other related resources.

The management challenges at the interface between WEL policies are influenced by factors such as (1) resource endowments of land and water; (2) resource-intensive consumption and production patterns; (3) access to water, energy and land for the poorest; and above all (4) good appropriate governance and monitoring systems.

The sections below discuss the management of the three elements of the WEL nexus. They focus on how global challenges manifest themselves in the sector, what the public and private sector have done about some of the issues, and how management of one affects management of the others.

MANAGING WATER

Water stresses play out very differently across the globe, depending on factors such as resource endowments, income levels and governance. Water is already intensely developed and physically scarce in a number of emerging economies, and also in parts of Eastern and Southern Africa. Many low-income countries have enough water to meet their needs, but it is economically scarce because there is insufficient financial, human and technical capacity to provide and sustain the infrastructure to enable access. Other countries suffer from too much water in the form of floods. Climate variability and extreme events such as droughts and floods will increase the difficulties of management and supply.

From a development perspective, the primary challenge is to strengthen water security for vulnerable populations. We define water security as the availability of, and access to, water sufficient in quantity and quality to meet the health, livelihoods, ecosystem and production needs of populations, coupled with an acceptable level of water-related risk. Achieving water security requires investments in both the hydraulic and the institutional infrastructure needed to store, convey and manage water effectively. Many countries lack adequate storage capacity with which to buffer rainfall variability, and this will require significant investment in physical infrastructure.

Where water resources are more intensively used, investment in management and institutions for resolving allocation tensions and trade-offs is a priority, particularly at the agriculture-urban-environment interface. In this context there is a fundamental need for investment in allocation planning, the development of modern systems of water rights that define shares of available resources for different users and uses, and judicious use of regulatory and market instruments to allocate water in a transparent, equitable and efficient manner.

Reforms in the water sector have been influenced by the concept of Integrated Water Resources Management (IWRM), which calls for 'co-ordinated development and management of water, land and related resources, in order to maximize welfare in an equitable manner without compromising the sustainability of vital ecosystems' (GWP, 2000: 22), and is thus broadly in line with a WEL perspective. IWRM is usually associated with the idea that water resources should be managed at the level of river basins,

which requires better coordination and decision-making among different water-using sectors, while seeing water services as both a social and economic good. However, few national governments have prepared such policies, and real 'integration' has remained elusive. Lack of significant and *sustained* investment on the part of government and donors is one problem, especially since such investment does not generate 'quick wins' and easily measurable results. Another is the political reality that decisions regarding water, energy and land are frequently made outside such integrating bodies, reflecting wider economic objectives and signals that remain stubbornly uncoordinated.

There have been significant shifts in responsibilities for water management among different administrative levels, across spatial scales and between the public sector, the private sector and civil society. From emerging 'coalitions of interest' for rural water services in Ethiopia, comprising government, the private sector, NGOs and, at centre stage, local communities, to multinational corporations (MNCs) engaging in initiatives such as the UN CEO Water Mandate and Water Resources Group Phase 2, the landscape of water management is changing. Overall, however, the public sector retains the reach and, in principle the mandate, to clarify rights, set prices, resolve trade-offs, and ensure access for the poor and excluded, whether as a service provider or supporter, or through contracts with private firms.

The use and management of water requires an integrated perspective that takes into account land and energy issues. First, water is an important input factor for agriculture and energy, and land use and energy have direct implications for water quantity and quality. While all agricultural production requires water, it makes a difference whether the agriculture is rain-fed or irrigated, and the way fertilisers and pesticides are used influence water quality. Virtual water trade can play an important role for water-scarce areas by enabling them to import water in the form of food grown in areas with sufficient available water. Furthermore different ways of producing renewable energy vary in their impact on water-resource systems. Production of feedstock for biofuels, for example, competes with food production on significant tracts of prime cultivated land, and the water 'footprint' of biofuels is large compared to other forms of energy (see Box 1). Second, particularly in many water-scarce areas, energy is an important input factor for water supply, e.g. for pumping or seawater desalination, and the potential to use renewable energy should be explored.

MANAGING RENEWABLE ENERGY

The provision of renewable energy can provide energy to the poorest while reducing CO₂ emissions. Given that energy-related GhG emissions are rising while the atmosphere's sink capacity is finite, the world needs to move from a high-carbon to a low-carbon path while still providing the required energy services for inclusive and sustainable growth. A key element of this transition is to increase the supply of renewable energy services and reduce the dependence on fossil fuels, first in the industrialised world, but also in developing countries. The large emerging powers also have the scope to make major reductions in their GhG emissions. There may also be unexploited opportunities for investment in renewable energy in those low-income countries with a large potential for renewable supply and they could be helped to adopt a 'green growth path', e.g. using climate finance when renewable energy is not yet economically viable, or to supply green energy for high-income countries.

The provision of renewable energy can be a 'triple win' in terms of economic, social and environmental outcomes. The adoption of effective policy packages (such as the removal of market failures on capital markets, start-up incentives to reduce high initial capital costs related to the production of alternative energy, interventions to reduce negative externalities from the introduction of renewable energy plants, an efficient administrative regulatory framework and complementary skills) can help to make renewable energy economically, environmentally and socially sustainable. Kenya produces a large proportion of its electricity from green sources (hydropower, geothermal), including energy provided by the private sector enabled by an appropriate regulatory framework. Appropriate electricity grids can also help to provide the poorest with access to energy.

In practice, these apparently attractive options for promoting renewable energy may not be feasible because of conflicting interests across groups (e.g. the lobbying power of fossil-fuel producers may pose an obstacle to boosting the production of renewable energy), short-term economic considerations (e.g. a rise in the price of fossil fuels sways public opinion against the removal of subsidies) or the lack of the right processes (e.g. the lack of participation impedes finding the right compromises between 'winners' and 'losers').

Box 1: A WEL-nexus perspective on biofuel production

The use of biofuels has the potential to reduce the pressures on carbon space by reducing GhG emissions, but producing them affects food and water security. Biofuel feedstocks occupy some 2-3% of arable land worldwide. Since production is mostly in highly commercial agricultural areas, the impact on prices may be higher than the share in total area or production implies. Many factors such as oil prices, speculation and government interventions contributed to the 2008-09 spike in the price of food and the increases in biofuels may have raised food prices from between 5% and 20% in recent years. Projections of future biofuel and food production indicate growing competition for land if all biofuel policies are fulfilled or if biofuels became economically viable without government support. Some suggest that biofuels could be responsible for 27% of world transport energy by 2050, and using 6% of the world's arable land.

Global biofuel feedstock production affects land-use change, land pressure and food prices, particularly if its production depends on large amounts of external inputs. The effects on poor people in developing countries and to ISG are mainly via food prices, which create positive incentives for net-producers and negative impacts for net-consumers. The impact of biofuels on food production depends on context-specific factors such as the land, technology and farming model used, and whether there is a spillover to other crop production. Some biofuels are also very water-intensive, and the average water footprint of biomass is 70 times bigger than that of oil. However, the water footprint of biofuels (e.g. from ethanol) also varies widely across countries and contexts, which underlines the need to monitor the effects of biofuel production on water and land use.

Source: See Chapters 6 and 7 of ERD 2011/2012

Renewable energy sources such as biofuels, biomass and hydropower depend on land and/or water, and therefore a large increase in the supply of renewable energy could place considerable pressures on the other resources in the WEL nexus. This underscores the need to manage efficiency across the WEL resources, since an increased supply of renewable energy may create stresses on water and the environment – an important example of the WEL nexus. This is especially true of biofuels (see Box 1). In countries such as China and India, which have large populations and high economic growth, the stress on water and land from the production of hydropower and biofuels may be particularly severe, although in the case of water this relates more to changes in basin flow regimes (including trans-boundary) rather than consumptive use. Concrete actions that policy-makers could take to preserve water and land include creating incentives for rainwater harvesting, the use of marginal land for production or the adoption of agricultural practices such as intercropping as well as smaller, decentralised dams and mini-hydropower.

The much-needed investment in renewable energy must also bring with it a commitment to deal with distortionary energy subsidies that contribute to the over-exploitation of water. In some countries, the intensive use of groundwater is fuelled by energy subsidies, bleeding the energy economy dry and contributing to the overuse of resources. Investing in energy supply (albeit renewable) without addressing the politically difficult question of demand management – with energy and water locked together – is unsustainable.

MANAGING LAND

The increased global demand for land is creating increased tension among competing needs at the global, national and local level. The rising demand for food and energy competes for productive land. At the national level, the availability of land raises prospects for investment, productivity change and wealth creation. At the local level, land represents spiritual and cultural values as well as the economic basis for people's livelihoods, which may fall victim to these new forces. Greater competing needs and uses come up against environmental constraints and will call for difficult trade-offs.

The amount of land under production is rising. It is estimated that to meet global demand, compared to present levels, by 2030 an additional 47 million ha will be needed for food and animal feed production, 42-48 million ha for large-scale afforestation, and 18-44 million ha for producing biofuel feedstock. This will weaken ecosystems, such as forests, wetlands and protected areas, which perform vital functions that risk being forfeited. Unless these ecosystems are properly valued and included in decisions about land use, this trend is likely to continue and is usually irreversible.

Increased land scarcity also provides opportunities for economic growth and development, and also incentives to increase agricultural productivity. Between 1967 and 2007 global yields grew by 115%, yet the cultivated area increased by only 8%. The case of Brazil shows that increased productivity can boost the national economy, but at a social and environmental cost (Box 2). This underlines the importance of increasing land productivity in ways that encourage growth that is also sustainable and inclusive. There are two broad schools of thought on this. One advocates large-scale capital-intensive methods using technological innovations. The other

stresses that small family-run farms can also achieve high increases in yields and work in a more ecologically friendly manner that also reduces poverty levels (IAASTD, 2008).

The perception of increased scarcity has led to an increase in large-scale land deals by both international and domestic investors. It is estimated that between 2008 and 2009 investors expressed interest in some 56 million ha worldwide, of which over half was in sub-Saharan Africa. Although up to 80% of intended projects have yet to become operational, research to date reveals high social and environmental risks while the promised benefits often fail to materialise. A further concern is that (foreign) investors seem particularly attracted to countries with weak governance and insecure property rights.

Of special concern are the rights of the customary users of land. It is estimated that 69% of land in sub-Saharan Africa is customary common property (1.6 billion ha), of which less than 10% is formally titled. Indigenous peoples, secondary users and women hold the weakest rights. This has both social and environmental implications because such people are often moved onto more marginal land, where livelihoods are more vulnerable. There is a need to strengthen land-tenure systems by developing innovative and cost-effective systems and procedures that help to protect customary and collective rights. The international community can provide significant financial and technical support to such efforts.

While land deals give rise to concerns they also provide opportunities. Investors may introduce new technologies and skills, expedite the development of contextualised production systems with higher productivity, and spark innovation. Innovative business models can offer different approaches to raising agricultural production. Industry codes for responsible investment are welcome, but they are not sufficient to ensure compliance. Transparency and appropriate governance remain key.

The state needs to formulate a clear vision for economic development and ensure that investments in land contribute to this. This will require research and the capacity to analyse the economic, social and environmental impacts of various land uses, as well as inclusive and well-informed land-use planning. To ensure compliance and to optimise the developmental benefits, it is crucial to have clear and transparent investment frameworks, contracts and negotiation procedures. Technical and financial support is required to build up this capacity. Sierra Leone has developed the technical capacity to negotiate contracts that have ensured better land deals.

Land use is closely related to water, which is central to land productivity. For example, more efficient use of water helped Egypt to raise its wheat yields by 300% between 1960 and 2010. Since the end of the war in 1975, Vietnamese farmers have achieved a 400% increase in rice production. Access to water also underpins many land acquisitions, as investors aim to guarantee future access to water. This is why the failure to factor water into land deals has become such a major concern. At the international level this requires attention to trade in virtual water. At the national level it means that water and land use need to be managed jointly and that more resource-efficient production systems need to be explored. It also highlights the need to decouple, strengthen and increase the transparency of land and water rights.

Energy production is another driver of the demand for land (e.g. biofuel feedstocks, lands flooded for hydropower). Biofuel policies in the EU and the USA, and increasingly in developing countries, contribute to the demand for land. These interrelations point again to the importance of more policy coherence for development. At the EU level this means reviewing food and energy policies for their effects on land and water use. It also underlines the need for joint management of these resources at the global, regional and national level, which will require significant investment in the institutional capacity for WEL planning.

Box 2 Brazil: The environmental and social consequences of increasing land productivity

Brazil is the world's largest producer of commodities such as beef, sugarcane, coffee, and orange-juice concentrate, and is a major producer of maize, soybeans, cotton, cocoa, tobacco and timber. It also has more head of cattle than any other country. In 2007, agribusiness contributed 25% of Brazil's GDP and more than 30% of its exports. Agricultural production has increased considerably since the 1970s. The agricultural area grew by 32% between 1976-77 and 2010-11, expanding mainly into the cerrado and the Amazon basin. Overall yields per hectare increased by 157% over this same period, supported by Embrapa, the public agricultural research agency. Embrapa concentrated on crops that were adapted to the climate and the soils of the cerrado, and to large tracts of unused land that suited mechanised agriculture. No such attempts were made for the Amazon. The cerrado produces 40% of Brazilian soybeans and maize, while agricultural productivity in the Amazon remains low: smallholders produce for subsistence and local markets while many large cattle ranches lie idle.

Although agricultural expansion and productivity increases have enabled Brazil to become a major exporter of agricultural commodities, there have been social and environmental costs. Agribusiness has contributed to modernising Brazil's economy, but smallholders and indigenous peoples have been forced to retreat to more uncertain livelihoods. The state of Mato Grosso is now the centre of modern agriculture in the cerrado. Due to economies of scale, cheap land, and mechanisation,



soybean farming is profitable and has generated a thriving economy around the associated inputs and services. But only 2% of the total agricultural labour force is employed in soybean production (in the south and southeast it is between 12% and 20%): and in the 1980s and 1990s, most smallholders sold their land either voluntarily or under pressure.

In environmental terms, the balance is mixed. Existing laws protecting forests, biodiversity and watersheds were not enforced, and environmental benefits were the by-products of production methods aimed at increasing productivity. The state of Mato Grosso had one of the country's highest rates of deforestation in the 1980s and 1990s, owing to large-scale mono-crop farming. The intensive use of fertilisers has polluted the groundwater. Deforestation in the cerrado led to high carbon emissions and biodiversity losses; modern agriculture reduced soil organic content and thus increased emissions. No-tillage planting is slowly gaining ground, helping to reduce carbon emissions and control soil erosion, but large parts of the 54 million ha of pastureland are degraded.

Source: See Chapter 7 of ERD

WHAT CAN THE PUBLIC SECTOR DO?

The main responsibility for leading the response to the new environmental challenges lies with the public sector. The public sector needs to set targets for improved resource use efficiency and develop policy to manage scarcities in water, energy and land while also protecting the poorest. The development of appropriate and integrated policies and the setting of ambitious targets are often essential in formulating new strategies and transforming governance systems for WEL-nexus management. There is a need for joint institutions for joint analysis and management of water, energy and land at the global, regional, national and local level. Appropriate governance is crucial. Decisive action needs to be taken to address the demand side, securing resource supply, improving efficiency and increasing the resilience to shocks while protecting the poorest. The public sector has three main functions here: (a) coordination and facilitation; (b) regulation and incentive framework; and (c) public expenditure.

a) Coordination and facilitation

Strengthening public-sector coordination and facilitation to ensure more inclusive and responsive forms of engagement with the private sector, civil society, local authorities, and regional and global actors is an essential part of integrated WEL-nexus thinking. Inter-ministerial coordination remains a key challenge in terms of cross-sector management of the nexus of WEL resources. Access to public authorities on the part of smallholders, marginalised groups, and the poor can harness their development potential and ensure timely compensatory or redistributive measures. The public sector also has a role in improving transparency in resource use, given that land deals often take place in weakly governed countries.

b) Regulation and incentive framework

The public sector should develop legal and regulatory frameworks that are conducive for private-sector development and responsive to concerns of less powerful and more fragmented actors (smallholders, consumers, civil society actors, etc.). This will help to stimulate private investment e.g. in renewable energy or water. It could also strengthen the host-country's capacity to establish the regulatory, legal and implementation capacity to manage investor interest and bring it into line with the overall development vision (e.g. through a strengthening of land-tenure systems that are both cost-effective and protective of customary and collective rights). Renewable energy policies should include policies that are private sector-friendly, e.g. to encourage small-scale hydropower or solar services companies. Clear water rights are also needed, based on assigning the rights of total available resources among different groups. The process of determining annual water shares is critical to providing certainty to water users. Formula-based approaches can increase consistency and transparency.

Appropriate pricing of natural resources can ensure that the environmental externalities of using natural resources and services are clearly signalled. There are market failures associated, for example, with the use of fossil fuels (costs of CO₂ emissions to the environment) or the withdrawal of 'free' water in water-scarce areas. Appropriate pricing can address these market failures, internalise externalities and encourage development. Activities that harm the environment (e.g. carbon emissions) can be fully priced (e.g. through establishing carbon prices), while activities that help the environment (e.g. agreement to invest sustainably or not to deforest) can be rewarded by payments for ecosystem services (PES). The public sector needs to encourage the proper valuation of ecosystem services in policy and planning processes. This will affect consumer patterns, steer private investment, foster supply and incentivise innovation. For example, land is often given away to investors or leased at low prices below the option value (although land prices are currently rising) and this can lock a country into undesirable contracts with investors (Collier and Venables, 2011). Fuel subsidies reduce the competitiveness and investment in renewable energy.

Appropriate pricing is a radical proposal that depends upon considerable information, innovative approaches, good communication skills, coordination, coalition-building and leadership. Higher resource prices disadvantage the poor, who already lack access to water, energy and land, while efficient pricing can have strong distributional consequences, which have hampered reform in the past (e.g. in India or Nigeria). Thus subsidy reform needs to occur within a careful process that is appropriately communicated, and be accompanied by measures to protect the poorest and address affordability issues. The practicalities of pricing differ by resource and socioeconomic context: volumetric water pricing, for example, is rare in many countries because delivery systems were not designed with this in mind, and cost-recovery through zero marginal cost pricing remains the only realistic alternative. An allocation-licensing system, however, can be used to manage demand effectively and is the principal approach used in those water-scarce countries that have managed to balance demand and supply. Although there are some carbon-pricing schemes (to internalise the environmental costs of fossil fuels), carbon prices are too variable and often set too low (e.g. the EU could set a minimum carbon price). The option value of land depends on the existence of (unknown) complementary factors.

Significant coordination is required for appropriate pricing. In the Lake Naivasha basin in Kenya, flower production, upstream agricultural land users, energy providers, fishing and tourism all compete for the same resource. The traditional response to freshwater scarcity in the flower-production industry is to raise water efficiency through drip irrigation. Yet, upstream farmers have a greater effect on water withdrawals through their land-use practices. After coordinating their activities, flower farmers decided to pay upstream farmers for PES – an example of a WEL-nexus-wide solution (see Box 3).

Box 3: Managing the WEL nexus and payments for ecosystem services (PES) in the Lake Naivasha Basin

Lake Naivasha is the largest freshwater lake in Kenya and its basin supports a variety of sectors such as tourism (attracted by its biodiversity), agricultural smallholders in the upper catchment, commercial flower and vegetable farmers (responsible for some 10% of Kenyan foreign exchange and around 2 million jobs) around the lake, and renewable energy provision (both hydropower and geothermal energy). But these multiple demands strain the sustainability of this ecosystem.

The basin is characterised by a complex set of actors, with different short- and long-term interests and different stakes in their respective value chain: large-scale foreign investors, a very small proportion of local horticulturalists, Maasai pastoralists, smallholders, fishing communities and hotel owners. Some of these groups are well organised (e.g. trade unions, business associations such as the Kenya Flower Council, or interest groups such as the Lake Naivasha Riparian Association). Other actors include local authorities and international agencies such as UNDP and WWF. But private companies also play important roles as innovators and funders.

Numerous innovations have already been introduced through the varied interrelationships and the trade-offs they foster. Although the public sector did not take the lead in coordinating all these actors, coalitions between state and private actors emerged and continue to do so. Such coalitions help to resolve some of the collective-action problems and to tackle concrete problem areas related to competing uses in the management of the WEL nexus around Lake Naivasha. One example includes payments for ecosystem services (PES) by downstream companies to upstream smallholders, to ensure that their land-use practices are more sustainable, including for water quality and quantity. Other actors contribute their expertise, facilitation skills, transparency and sensitisation, investments, linked value chains and capacity development.

Source: ERD 2011/2012 Chapters 8 and 9

c) Public expenditure

The provision of public goods can also correct market failures and improve the quantity and quality of supply and promote efficiency. For example, the development of ISG-compatible agricultural production systems requires a combination of public and private-sector inputs (e.g. technology policy such as R&D and national innovation systems). Infrastructure provision (e.g. storage or new irrigation systems) can secure water supply, improve supply-side management and water efficiency and resilience. It is difficult to weigh competing demands and interests because the provision of public goods (ranging from large to small-scale investments in infrastructure, R&D, experimentation, etc.) – or indeed its absence – can have considerable trade-offs, social costs or missed opportunities for natural resource management and development. In addition, the presence of WEL linkages means that increasing supply and productivity of one resource affects the use of other resources (see Box 1).

Empowering the poor to cope with and respond to shocks. Global environmental change, but also responses to it such as fuel or land pricing, can have major effects on the poorest. Enhancing responsiveness to affected groups through redistribution, social protection and strengthening resilience could be achieved by providing space for citizens' demands for reforms and for mobilisation, contestation and bargaining. Governance structures need to ensure that the poor are adequately represented in decisions and

design benefit-sharing agreements (as happens in some hydropower projects). It can build capacity to create a more enabling environment for them to engage with decisions. For example, a strengthening of land-tenure and water-rights systems can be cost-effective, offer security to rights holders, provide an incentive to invest in land and water conservation and help identify and protect customary and collective rights. Finally, trade barriers need to be lifted especially on agricultural commodities because this can encourage virtual water trade that is helpful for people living in water-scarce countries.

Institutional innovation is needed for integrated policy-making. Policies that are informed by a nexus view can be quite different to those that are based on isolated sectoral approaches. Institutional changes can be quite minor: for example, it might simply be required that certain provisions be included in a land contract. Other, more complex arrangements such as ceasing an activity (e.g. biofuel subsidies), or starting an activity (e.g. payments for ecosystem services), might call for new institutions or even organisational structures to be established. Integrated management represents a challenge for the public sector because it requires an improved coordinating function and institutional capacity and hence an emphasis on governance.

We should be under no illusion that the options above are cheap or will involve no major changes in the way people live. A long-term perspective is required in order to understand the real impacts of 'business as usual' scenarios for economic development in order to make clear the extent of change required (see Table 2.2).

All countries can and must contribute to the necessary solutions at the pace of which they are capable (common but differentiated responsibilities), and richer countries are expected to help finance the attainment of long-term goals in poorer countries. Policy priorities are context-specific (with progress constrained by political economy considerations) and depend on a range of factors such as income levels, resource endowments, quality of the governance systems, and existing distortions or market and coordination failures.

Richer countries should act first to manage demand and reduce the environmental footprint of consumption and production of resource-intensive goods and services. They should take the lead on cutting waste, educating their citizens and paying the full prices for resources. On the other hand, LICs should be entitled to obtain finance for renewable energy, because it contributes to a global public good and improves access to energy. Large MICs should gradually set binding targets on the use and efficiency of land, water and energy. The poorest and most vulnerable countries require assistance to improve access to resources when they lack them. The poorest countries with large endowments of land and water need to put in place inclusive land and water management policies. Since many land and water deals take place in countries characterised by weak governance, there is no guarantee that gains accrue either to the country or to the poorest. The most pressing priority for such countries is to improve governance. Even poor countries (e.g. Sierra Leone) have succeeded in obtaining good land deals because they had the capacity to manage contracts. Policy priorities will also depend on the extent to which past development is based on distortionary incentives (e.g. subsidies on fossil fuels). Developing countries that incorporate the effects of increasing scarcity of natural resources and associated environmental costs in resource pricing will eventually reap the economic and environmental gains, but will often need significant development support in the transition.

WHAT CAN THE PRIVATE SECTOR DO?

The incentives for the public and private sectors to make more sustainable and inclusive use of natural resources as yet are not sufficiently aligned. Only a few companies currently place sustainability objectives at the core of their business. This raises the question of what can be done to strengthen the incentives for and capabilities of companies to use natural resources in a more sustainable and inclusive way. The private sector plays two broad roles in relation to the management and use of natural resources: it generates or provides access to natural resources (e.g. generating energy, or supplying water) and it uses and consumes natural resources in order to produce goods and services.

The emergence of new public policies addressing resource stresses will alter relative prices, and this will affect international trade, investment and production patterns. It has already become clear that the new pressures on water, energy and land offer opportunities for the private sector. There are a number of examples of the growing interest of the private sector in investing in water, energy and land in poor countries. For example, local companies provide solar power services to the poor (e.g. India) or invest in water boreholes (e.g. Bangladesh).

The private sector, both small and large firms, plays a crucial role in seeking a new type of growth: finding efficient and innovative ways to supply natural resources; managing the demand for natural resources as inputs to production, and influencing and informing consumer decisions in a way that promotes sustainable consumption; using resources efficiently through innovation in products and processes; understanding the WEL nexus and adjusting production patterns accordingly; and taking appropriate steps to manage risks and shocks in order to protect the business and the livelihoods which depend on it. Large businesses use a number of demand-side management measures: water footprinting, carbon labelling and initiatives such as the Roundtable on Sustainable Palm oil. On the supply side, small and large companies are already important in water distribution, provisions of solar, hydro and geothermal energy, and development of land in some land deals. Several companies promote their own efficiency and

that of their suppliers, in some cases in the form of partnerships with donor agencies. Companies are also increasingly taking an ecosystems approach, improving efficiency within the WEL nexus.

There is a range of incentives for the private sector to move towards a more sustainable and inclusive business model and to address the corporate governance gap. Among the larger companies, these incentives include cost-efficiency, securing access to and supply of inputs, license to operate, reputation and public image and market access. Several large companies have already adopted initiatives to use natural resources more efficiently. Some business initiatives appear to be effective, although mechanisms to assess their impact remain in their infancy. For example, the mechanisms to verify the effectiveness of the Johannesburg 2002 type II business-led partnerships are still poorly developed. But this Report recognises that there are limitations to what business initiatives can achieve, and that it is only through collective behaviour that the complexity of the WEL-nexus challenges can be addressed effectively.

WHAT CAN THE EUROPEAN UNION DO?

The EU and its Member States can help poor countries by using the full range of European policies. The EU is legally committed to promoting Policy Coherence for Development (PCD), which seeks to take into account the interests of the low-income countries within national and European policy processes (Art 208 of the Lisbon Treaty). The European Commission, Council and Parliament recognise the need for joint problem-solving and the needs of low-income countries. PCD should inform the Multi-Annual Financial Framework for 2014-2020, and give shape to key policy initiatives such as the Roadmap and the reform of the Common Agricultural Policy (CAP). We thus consider four important roles through which the EU can help developing countries confront scarcities in water, energy and land: (a) EU internal policies affecting sustainable consumption and production patterns in the EU; (b) EU external policies including trade and investment policies; (c) EU development cooperation; and (d) EU role in shaping global governance.

a) Internal policies affecting sustainable consumption and production patterns in the EU

The EU has a major impact on the global management of natural resources and is responsible for one-sixth of the global environmental footprint. The EU should push for major changes in consumption and production patterns in Europe towards sustainability and inclusiveness (many of which are already in EU policy documents), and in particular the switch to renewable energies, and changes in food consumption and production patterns in order to radically reduce the environmental footprint of European agriculture, food wastage and protein (meat, fish) consumption. It can also adopt an integrated nexus-wide approach to policy and programmes dealing with water, energy and land both internally in Europe and in its development cooperation programmes. This will require increased investments in adaptive processes, policy learning and data collection to inform decision-making. Implementing the Roadmap to a Resource Efficient Europe, reforming the CAP – which currently subsidises resource-intensive farmers – and reassessing its biofuel policies need attention. Making its internal policies and institutions more coherent with development will enhance the credibility of EU actions elsewhere.

b) EU external policies including trade and investment policies

The EU is a major trade and investment partner of poor countries. The EU should work closely with the *private sector and particularly European companies and investors* that operate in developing countries to promote investment, innovative approaches and high standards of corporate practice in the inclusive and sustainable use of water, energy and land. In doing this the EU can forge a new partnership with the private sector (Box 4) which could be championed at Rio+20 or at the G20 development working group, e.g. as sustainable, climate-smart and high-productivity agriculture through PPPs.

There are different forms of European finance, some of which are more suited than others to financing access to water, renewable energy and land. Mechanisms to increase the supply of finance include: green and other type of bonds, concessional finance, and challenge funds (Griffith-Jones et al., 2011). Some of these mechanisms are particularly suited to leveraging European pension funds and sovereign wealth funds and can provide 'patient capital', which is beyond the typical short-term horizons of private capital markets.

The EU should not put up new trade barriers in its bilateral trade agreements as part of a transition to a green economy. It could, however, promote mechanisms that reward sustainability throughout the value chain.

Box 4: Forging a new relationship between the EU and the private sector

EU development cooperation programmes have not to date involved much direct engagement with European companies on development issues. Beyond direct regulation, the EU could demonstrate leadership in its relations with the private sector by actions that may include:

- Overcoming coordination problems by facilitating multi-stakeholder processes in the EU and with participation of developing countries to implement sustainability and inclusiveness initiatives in relation to the WEL nexus.
- Supporting the development of improved assessment methodologies and mechanisms, in order to build the evidence base on the impact of business activity and corporate sustainability initiatives.
- Providing direct support to enable the private sector to build sustainability in suppliers.
- Using codes of conduct and/or performance targets and associated monitoring to strengthen inclusive and sustainable behaviour (e.g. the EU could extend the EITI to land).
- Rewarding responsible business behaviour through procurement policies, or funding decisions (e.g. through development financing institutions), or as a condition of other kinds of partnership.
- Enhancing the negotiating capacity of governments in developing countries to demand responsible behaviour from companies, and assisting them in developing monitoring mechanisms.

c) EU development cooperation

The October 2011 EU communication on development policy 'An Agenda for Change' argues that in agriculture 'the EU should support sustainable practices, including the safeguarding of ecosystem services', and in energy, 'the EU should offer technology and expertise as well as development funding'; the EU notes that it is 'looking for long-term partnerships with developing countries'. A WEL-nexus view suggests that the emphasis on sustainable agriculture and energy in this policy will also need interventions in the area of water.

The EU has significant development programmes dealing with natural resource challenges in poor countries (e.g. a €500mn EU Water Facility, a €200mn Energy Facility, and a €1 billion Food Facility). There are several examples of EU projects that illustrate the Report's findings: a conservation agriculture project for small-scale farmers in Zambia leading to greater yields and more sustainable use of resources; better integrated water management around the Pangani river basin in Tanzania; or blended finance for a hydropower project in West Africa, where a grant from the EU-Africa Infrastructure Trust Fund combined with an EIB loan helped finance sustainable and clean power in Mali, Mauritania and Senegal.

The effectiveness of EU aid could be further improved or scaled up by (a) accounting better for the resource nexus (Box 5); (b) better bundling of aid and non-aid activities (e.g. bundling funding, technical assistance and technology transfer in renewable energy partnerships); and (c) though a better link with the private sector by starting a challenge fund for business to take an ecosystems approach to planning (Box 4). These issues could be promoted at Rio+20 and through the implementation of the EU 'Agenda for Change'.

The EU could also expand its support to increase transparency and good governance in relation to large-scale land deals that are directly linked to water, and work with the private sector to increase sustainability. When implementing the Agenda for Change, the EU should consider water, energy and land from an integrated, ecosystems perspective. An EU WEL-nexus initiative could build up knowledge on the linkages and consider the increasing pressures on water resources. It could involve identifying integrated (WEL) solutions including benefit-sharing, PES, adequate assignments of water- and land-user rights, and inclusive land policies. The EU could provide technical assistance (reducing transaction costs), technology transfer (e.g. on institutional innovation) and political incentives for the various stakeholders to engage with the process (e.g. by stimulating alignment between river-basin institutions and existing political groupings, possibly at a regional level). The EU's involvement in the Nile River negotiations suggests that a long-term perspective is needed for such WEL-nexus management.

Box 5: Re-assessing EU development cooperation

International cooperation can support developing countries or regions to take a range of actions. EU development cooperation programmes should aim to:

- Support governance and the adoption of a political economy analysis in designing interventions, to identify winners and losers of reform, the blockages to reform and to ensure the most relevant and appropriate focus and methods of cooperation.
- Support institutional development in relation to WEL-nexus pressures (e.g. the initiative on Forest Law Enforcement Governance and Trade, the Reducing Emissions from Deforestation and Forest Degradation scheme and support for Integrated Water Resource Management including a new water-nexus initiative).
- Improve EU-wide harmonisation and coordination.
- Support government capacity to coordinate stakeholders in the WEL nexus.
- Provide data and other support to enhance transparency concerning WEL linkages, e.g. links between land deals and water.
- Improve state-business relations with respect to the WEL nexus and ensure that land, water and energy policies do not unduly constrain responsible private investment in these areas.
- Promote renewable energy partnerships which bundle development finance, technical assistance and technology transfer.
- Contribute to social protection systems aiming to deal with resource shocks to support those who are most vulnerable to any changes.
- Support regional integration to deal with water stresses and energy shortages.
- Give priority to infrastructure projects that support poverty reduction through improved WEL-nexus management.

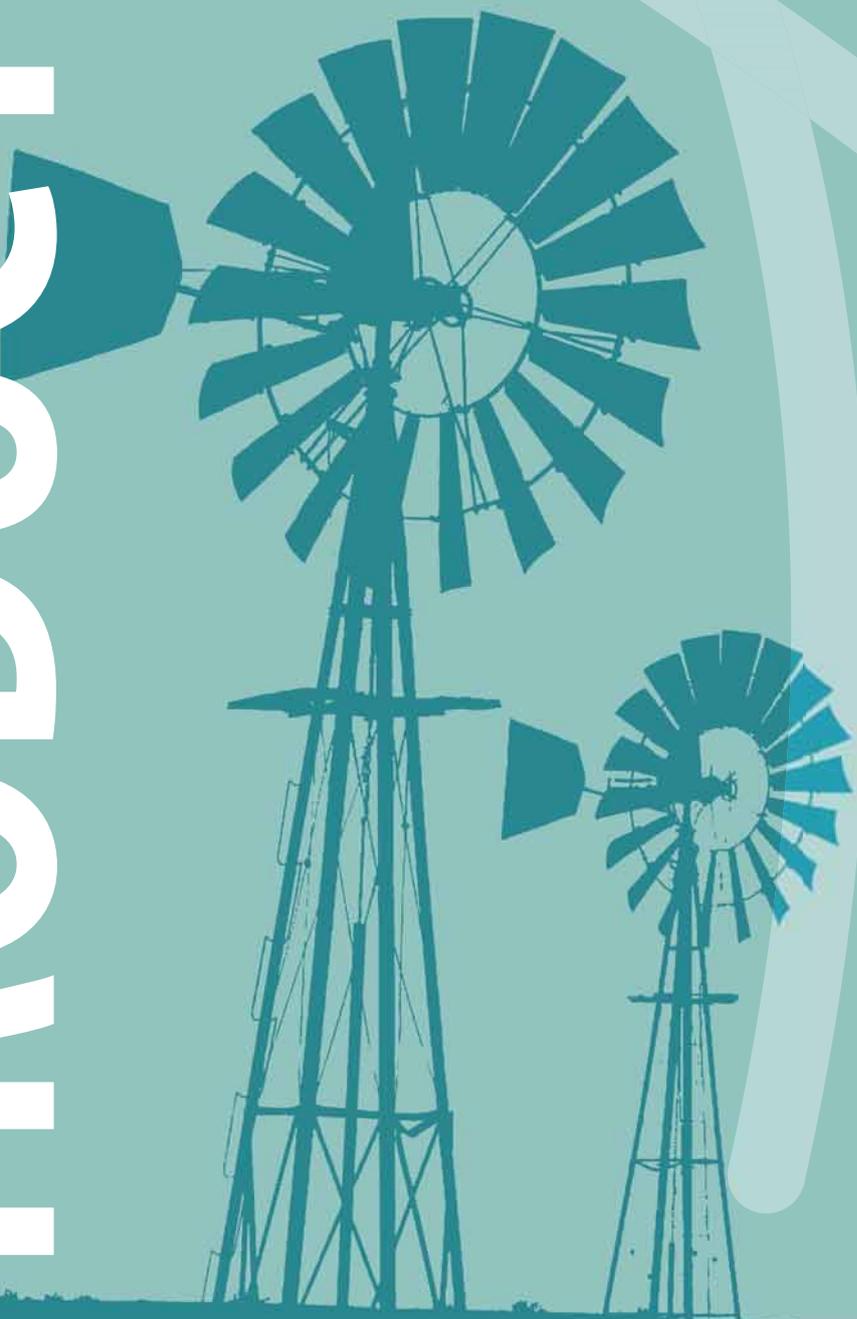
Finally, while EU development cooperation is often provided in the form of grants, loans (including through the European Investment Bank) can also be blended with grants to finance large projects such as water infrastructure and renewable energy supply.

d) EU role in shaping global governance

The Rio+20 discussions on the Institutional Framework for Sustainable Development aim to improve global governance. The EU should ensure that environmental, social and economic objectives are pushed on an equal footing in global governance systems, and that economic, environmental and social governance are mutually reinforcing. Reinforcing the role of UNEP, FAO and ensuring a more coordinated and centralised UN response to land, water and energy policy-making is also important. For example a Sustainable Development Council could monitor and evaluate progress on a set of sustainable development goals (SDGs) as well as the action plans that follow Rio+20.

The EU should speak with one voice in the UN High Level Panels on Sustainable Energy for All and Global Sustainability, and in organisations and networks such as the IFIs, WTO and G20, to promote the integrated management of water, energy and land. Global action on emission-reduction policies plays a strong role in driving technological innovation on climate change, in which agreements can be made on fostering innovation that will be beneficial to developing countries. An ambitious EU position using alliances with the poorest and most vulnerable countries helped the move towards a global agreement at COP 17 in December 2011. Similarly, the EU should be ambitious in supporting *open, transparent and stable trade, investment and migration rules* that allow developing countries to respond effectively and efficiently to global scarcity pressures, including through trade in virtual resources.

INTRODUCTION



CHAPTER 1 INTRODUCTION

1.1 INTRODUCTION

Providing universal access to water and energy and ensuring food security remain fundamental development challenges. Some 0.9 billion people lack access to safe water, close to 1 billion are undernourished and 1.5 billion have no source of electricity. At the same time the context in which resources need to be managed is changing rapidly. The scarcity of natural resources on which the world depends has been a matter of heated debate since the Club of Rome published its first report, *The Limits to Growth*, in 1972. Now, 40 years later, there is incontrovertible evidence that some planetary boundaries are being reached or transgressed. Carbon in the atmosphere is the most evident, but there are also emerging problems with regard to fossil-based energy, water, the oceans and land. This sets a new context for the attainment of the Millennium Development Goals (MDGs), specifically to halve hunger (MDG 1) and ensure environmental sustainability (MDG 7).

This European Report on Development (ERD) focuses on water, energy and land (WEL), three crucial resources for development. It examines the constraints on each, the interrelationships between them and then considers how they can be managed together to promote growth in developing countries that is both socially inclusive and environmentally sustainable. The Report urges institutional change and a more integrated approach to tackling the world's challenges.

A rising world population and global economic growth place new pressures on natural resources. Rising global incomes can support the development of the institutional capacities and infrastructure needed to provide access, but they are also expected to increase the demand for energy and water by 40% and for food by 50% by 2030. These pressures are exacerbated when solutions to resource constraints in one area pose additional strains on another. Biofuels, for example, can contribute to pressures on both land and water. Steps taken to address shortages in one region may export problems to other regions: for instance, governments that are concerned about domestic food security have sometimes acquired land overseas at the expense of the access to land and livelihoods of existing communities.

The poor are occasionally winners but far more often losers in a resource-constrained world. They may lose long-standing access to resources, or that they are forced to pay for resources that have traditionally been free. They may face price increases in resources traded on markets. And they may have fewer employment opportunities if growth is constrained by physical or economic shortages. These outcomes are not inevitable. It is possible to imagine an alternative of inclusive and sustainable growth (ISG), locally, nationally and globally. This is an economic model that provides livelihoods for all, in a manner that is friendly to the environment and sustainable over time.

How could such a vision be realised? Not by leaving it to the market alone to adjudicate between competing uses of resources, and to allocate resources between rich and poor. There are too many market failures embedded in the current economic system to achieve benign outcomes across the board. Growing climate problems illustrate this only too clearly. Rather, it calls for a combination of public and private action.

Governments, business, international organisations and civil society will all need to work together to manage the new pressures on land and water use and on energy supply. All actors must seek to support natural resource management around four pillars: influencing demand patterns, securing sustainable supply, increasing efficiency (productive and allocative) and increasing resilience and benefits for the poorest. The *public sector* develops policies, sets targets and can use its role in coordination, encouraging appropriate price setting, providing public goods, setting regulatory and legal frameworks and empowering the poor to cope with shocks and also to reap benefits. The *private sector* can respond by making its business models more inclusive and sustainable and by investing in sustainable outcomes. At the global level *international actors* can support poorer countries in various ways – the European Union (EU comprising the European Commission and Member States), for instance, through its status as a major consumer, trader and investor, and as the world's largest aid donor.

The core proposition of this Report is that all countries, individually and jointly, must urgently recognise and address in an integrated manner the rapidly growing scarcity of and increased pressures on three crucial resources: water, energy and land. Taking an integrated approach is key to optimising the contribution these resources can make to inclusive and sustainable growth. The three resources are already subject to economic, and in some cases, physical, scarcity. These scarcities have different dimensions: there is a distinction, for instance, between limited physical availability and economic scarcity, which occurs when the right to access is constrained financially. How each of these resources is used and choices about its allocation increasingly affect the other two. This Report refers to the growing interconnection among the three resources as the *WEL Nexus*, and argues for an integrated nexus approach to policy-making and management. A growing number of studies confirm the need for an integrated 'nexus'-based approach.

1.2 THE RESOURCE NEXUS IN RELATED INITIATIVES AND GLOBAL POLICY

Much has been written about managing water, energy and land (see Box 1.1), but few initiatives focus directly on the resource nexus. The November 2011 Bonn conference and associated background papers are the main exception, although business is also becoming interested in the resource nexus (e.g. WEF, 2011; Shell, 2011).

Box 1.1: Examples of relevant initiatives and events

Growing awareness of the impacts of climate change, water scarcity and food insecurity has spawned a series of international activities, although only a few focus on the nexus among them. The 'Rio+20' United Nations Conference on Sustainable Development (UNCSD), a follow-up to the 1992 United Nations Conference on Environment and Development (UNCED), will address issues related to the management of water, energy and land.

At the UN level, other important conceptual initiatives include the 2011 Human Development Report on equality and sustainability (UNDP, 2011) and the UN Global Sustainability Panel, which was established by the UN Secretary-General in 2010, to work on building a low-carbon, green and resilient economy that can eradicate poverty and ensure a dignified life for all. The Report by the Sustainability Panel was published in January 2012, and the paragraph 17a of the executive summary highlights the importance of the food, water and energy nexus (United Nations Secretary-General's High-Level Panel on Global Sustainability, 2012). The FAO has published a report on the state of land and water, and the High Level Panel of Experts on Food Security and Nutrition (HLPE) on food security. Last but not least, 2012 is also the International Year of Sustainable Energy for All.

The German government organised the 2011 Bonn Nexus Conference on the linkages between water, energy and food security, which took water management as its central analytical perspective and aims to influence the Rio+20 process.

Within the private sector, the World Business Council for Sustainable Development (e.g. 'Vision 2050' (2010)) and the World Economic Forum have examined the nexus among water, energy and food-related issues.

This Report builds on these initiatives but also takes a unique approach that combines (1) a perspective on the new context for natural resource management with a particular focus on the WEL nexus; (2) an analytical focus on the roles of and interactions between the public and private sectors; (3) a focus on the effects on inclusive and sustainable growth; and (4) an analysis of the policy implications, in particular for the EU.

The nexus approach proposed in this Report has direct links to the analysis and policy principles of Agenda 21, which was adopted in 1992 at the United Nations Conference on Environment and Development (UNCED), the so-called Earth Summit. Central elements to a new understanding of development were proposals for an integrated management of water and land and, consequently, of agriculture and rural development. Chapter 10 of Agenda 21 recognises the need to plan and manage all uses of land in an integrated manner. Chapter 18 refers to integrated water resources management and suggests that in developing and using water resources, priority should be given to the satisfaction of basic needs, safeguarding of ecosystems and appropriate pricing of water uses. Chapter 14 suggests that the capacity of available resources and technologies to meet the demands of a growing population for food and other agricultural commodities remains uncertain. It calls for major changes to increase food production in a sustainable way and to enhance food security.

The question of energy is, however, missing from Agenda 21. Here, the assessment reports of the International Panel on Climate Change (IPCC) and the deliberations of the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol reveal the challenge ahead in transforming energy systems towards inclusiveness and sustainability. In development terms, the link between access to energy and the achievement of the MDGs is well documented (World Bank and UNDP, 2005). The United Nations Secretary-General declared 2012 the International Year of Sustainable Energy for All and launched the 'Sustainable Energy for All 2030' initiative, which aims to extend 'energy's reach in order to combat endemic poverty'. Development Commissioner Piebalgs has an active involvement in this initiative. Further, the EU Agenda for Change makes a series of recommendations to improve the impact of EU development policies and calls on the EU to invest more in sustainable agriculture and systems and efficient renewable energy.

As the analysis of this Report shows, there has been little progress overall in implementing the Agenda 21 proposals and recommendations. This Report argues that to continue along the 'business as usual' path will further compromise the attainment of development goals. The strong statements made at UNCED in 1992 were only partially taken up in subsequent international commitments. The MDGs, for example, emphasise food security and access to water, but Goal 7 does not set out clear quantitative

targets to ensure environmental sustainability in relation to biodiversity protection and the management of natural resources. Progress in implementing the three Rio Conventions – the United Nations Framework Convention on Climate Change, the Convention on Biological Diversity and the United Nations Convention to Combat Desertification – has generally been slow, although the sense of urgency was reflected to some extent in the alliance that emerged at the 2011 Conference of the Parties (COP17) in Durban between the most vulnerable and Least Developed Countries (LDCs) and the EU. But there is no room for complacency.

This Report links directly with the 2012 United Nations Conference on Sustainable Development (Rio+20), which will focus on two areas: green economy and an institutional framework for sustainable development. The green economy is a controversial concept. The EU has proposed a roadmap for achieving the green transformation, which would include actions at both global and national level. The adoption of global sustainable development goals (SDGs) in eight thematic areas is favoured by many developed and developing countries (e.g. Norway, Switzerland, the African consensus statement, the Arab region, Brazil, Colombia, Kenya, Mexico, and Thailand). The two approaches are not mutually exclusive. Better management of water, energy, and land for sustainable and inclusive growth, the subject of this Report, encourages the development of strategies and programmes to achieve concrete change. The proposals for a new institutional framework for sustainable development seem to converge around a Sustainable Development Council (SDC) under the auspices United Nations, in a structure similar to the Human Rights Council. Such a proposal is in line with this Report's recommendations on the need for institutional change to address issues at the nexus between different resources. There is, however, significant opposition to the proposed SDC.

The G77/China and EU inputs for Rio+20 (UNCSD, 2011a and 2011c) coincide in arguing that a change in consumption and production patterns is fundamental for reducing poverty and increasing wellbeing within the limits set by ecosystems and critical life-supporting systems, for both present and future generations. The G77/China emphasises that much could be achieved by implementing what has been agreed over the last 20 years. They underline the importance of burden-sharing, referring to the principle of common but differentiated responsibilities set out in Agenda 21 and the Rio Conventions. Financial transfers from rich countries (ODA and additional finance) and access to technologies are cited as essential to this process of change. The EU argues that a 'just transition' to a green economy is necessary in order to eradicate poverty by placing consumption and production patterns on a sustainable path. It emphasises the need for institutional and policy change at national and sub-national levels to overcome the current 'silo' approach to global problems.

Africa's input to Rio+20 (UNCSD, 2011b) underlines that it contributes least to the global environmental problems and yet is affected most by them. It calls on the international community to support the transition of African countries to a green economy, to refrain from imposing new trade barriers and to commit to SDGs on land use. It also mentions the diversification of trade in order to become more resilient to shock and includes proposals for its own action in all these areas. Some developing countries express concerns that the 'green economy' concept might be used as a pretext for the richer nations to introduce trade protectionism and impose new aid conditionalities.

In January 2012, the co-chairs of the Rio+20 Preparatory Committee released the zero draft outcome document, 'The Future We Want' (FWW). This opens with the vision and renewal of political commitments on sustainable development, discusses the two main themes, and presents a framework for action. This Report is relevant to each of the FWW sections.

1.3 REPORT STRUCTURE AND OVERVIEW

The key research question guiding this Report is: *what does the evidence tell us about the appropriate roles of the public and private sector, and their interactions, in managing water, energy and land for inclusive and sustainable growth in the context of increased scarcity and climate change?*

To answer this question, the Report is divided into three main parts: (1) context, concepts and frameworks; (2) case studies; and (3) policy implications.

Part I comprises three chapters. Following this introductory chapter, Chapter 2 discusses how a growing population, higher income levels (with an emerging middle class at the global level) and global environmental change (particularly climate change) are combining to create a new context for natural resource management.

Chapter 3 clarifies the key terms used in the Report and situates these in the context of inclusive and sustainable growth in relation to several aspects: whether incomes are growing, whether growth is inclusive or benefits only a few social groups, whether growth is environmentally sustainable, and finally whether the growth process has a long-term basis in effective institutions and in life-supporting natural systems.

Chapters 2 and 3 further highlight the severe consequences for inclusive and sustainable growth posed by the new challenges of natural resource management, and the need to abandon 'business as usual' (BAU) growth patterns and to engage in transforming the governance setting towards one that promotes a new pattern of inclusive and sustainable growth.

Chapter 4 provides a framework for assessing the roles of the public and private sectors, and the relationship between them, in tackling the challenges of natural resource management. It defines the responses to the new challenges in order to promote ISG around four pillars: (1) demand-side management; (2) increasing the sustainable supply of the resource; (3) increasing resource efficiency (productive, allocative and nexus-wide); and (4) increasing resilience. Each of the chapters on specific resources (Chapters 5-7 on water, energy and land) focuses on the new context, identifies issues that need to be addressed in the use and management of the resource, and discusses the roles of the public and private sectors in tackling them.

Part II comprises Chapters 5-8. Chapters 5-7 apply the broad framework to water, energy and land respectively and use case studies to illustrate how the interconnections among increasingly scarce resources and degraded ecosystem services play out at the country level. These case studies exemplify the importance of placing the WEL nexus within the debate on resource scarcity and climate change, and illustrate the roles of the public and private sectors in responding to the new challenges.

In Chapter 8, we consolidate the evidence on the linkages among the resources and synthesise the key features of examples that show how an integrated approach to managing natural resources can lead to better policies and solutions.

Part III comprises Chapters 9-11, which consolidate the policy implications emerging from our analysis of the specific problems in resource use and management. The chapters centre on three governance gaps in responding to the new challenges.

The main responsibility for managing natural resources remains with the public sector. Chapter 9 presents how the public sector should respond. Without decisive action, the new pressures on resource use are likely to threaten ISG. The public sector can use its coordinating, redistributive and regulatory role, and also provide public goods, while the private sector can respond by making its business models more inclusive.

Chapter 10 discusses the role of business as both using and providing natural resources. It examines a number of incentives for the private sector to move towards a more sustainable and inclusive business model and to close the *corporate governance gap*.

Finally, Chapter 11 examines the role of the EU in helping developing countries to manage the new challenges. This includes taking action within the EU, acting in global fora, and focusing its development programmes on enabling developing countries to address their resource challenges. The global community could help to set the right framework to tackle the challenges, but has to date failed to do so. The EU can help to address this *global governance gap*.

1.4 MAIN IMPLICATIONS OF THE REPORT

The international community urgently needs to recognise and address in an integrated manner the rapidly growing scarcity and increased pressures in three crucial areas: water, energy and land, so that sufficient quantities and quality continue to be or become available in the right places to support inclusive and sustainable growth in developing countries, especially the low-income countries. This radical transformation involves joint implementation by the public and private sectors, supported by the EU, around a four-pillar approach (and summarised in Figure 2 in the executive summary):

- *Manage demand to reflect scarcity values.* Joint action should aim to **reduce the environmental footprint of consumption**, and without decoupling consumption and resource use, a reduction of consumption itself. Without such action, development will become harder to achieve for many, and impossible for some. The public sector should lead this endeavour, especially in the more developed countries, by (1) introducing **appropriate resource pricing** to reflect the full services provided by ecosystems through mechanisms such as payments for ecosystem services (PES); (2) educating citizens and business about the challenges and the need to **reduce food wastage**; (3) introducing measures to encourage **recycling**; and (4) coordinating with other actors, including the private sector. The private sector needs to establish environmental footprinting techniques and adopt an ecosystems approach along its value chain. The EU could manage demand by reducing its internal and global environmental footprint.
- *Improve the quantity and quality of resource supply.* The public sector needs to invest in infrastructure, decentralised energy production and/or grids and storage facilities to **increase access to water and energy for the poorest**. It must also set **transparent incentive and regulatory frameworks** to encourage responsible, long-term investment in land, renewable energy and water. This involves **removing subsidies** that distort sustainable investment, such as fuel subsidies, but also building capacity for regulatory reform and establishing the right conditions for development finance. The EU can use development cooperation (e.g. a blend of grants and loans) to promote investment in infrastructure, implement **renewable energy partnerships** and build the resilience of the poorest to the effects of price shocks.
- *Improve the efficiency of resource use.* Research and Development (R&D) is a public good and the public sector needs to step up investment in **R&D relating to agriculture and renewable energy**. The **promotion of agricultural innovation** is needed to feed a rising population in a sustainable and inclusive way. The public sector and donors need to establish incentives to maximise the contribution of innovation in business and suppliers. The private sector needs to recognise that without innovation in natural

resource use and governance, **traditional business models could become obsolete** while ecosystems on which it depends may even disappear. The EU needs to encourage technology transfer and improved natural resource governance.

- *Improve the resilience and ensure the poorest benefit.* The public sector needs to **protect the interest of the poorest**. It should pursue **inclusive land policies**, promote **virtual trade** in resources, implement **benefit-sharing** from large projects, and step up **social protection** (ERD, 2010) as resources increasingly reflect scarcity values. The EU's aid programme can support the poorest communities' ability to cope with changes.

This four-pillar approach cannot be achieved without institutional and coordinating structures that recognise the complexity of the linkages (including through the WEL nexus) and the severity of the challenges. Thus, above all, there is a need for **radical changes in institutions**, values and governance arrangements and practices that underpin the approach. An integrated approach towards natural resource management can significantly increase the importance of certain solutions (e.g. payments for ecosystems services) while questioning the appropriateness of others (e.g. mandates on biofuel production).

This Report proposes that joint action (by governments, business, donors, civil society) is particularly required in five main areas:

Radically reduce the environmental footprint of consumption (especially, but not only, in Europe)

Consumption is a basic driver of resource use. Current resource-intensive consumption patterns often undermine rather than promote long-term efforts to promote development, reduce poverty and address the associated impacts of climate change. Policy measures need to promote a radical change in consumption patterns in richer countries in order to decouple economic growth from absolute resource use. Past trends have only seen relative decoupling at the global level; failing a technological breakthrough equivalent to the ICT revolution, there is a clear need to reduce consumption and change our lifestyles drastically.

Promote innovation to increase agricultural productivity to feed 9.3bn people sustainably in 2050 and spread renewable energy technologies that help to deliver sustainable energy for all by 2030

Innovation is crucial for dealing with the challenges of water, energy and land, but the innovation challenges differ across sectors. In the area of renewable energy, many technologies exist, but there are many barriers to their adoption. For water, there is especially a need for institutional innovation (see next point). For land, there is a pressing need to promote agricultural methods that can feed a growing population in a sustainable way, especially in relation to climate adaptation and mitigation measures. Given the right conditions, both capital- and input-intensive large farms and low-capital smallholders can contribute to achieving higher productivity in a manner that is inclusive and sustainable. The right balance between these different contributions will vary from one situation to another. We need to improve our understanding of this balance and of how these different contributions work best, and to promote the use of innovations in a manner that is accessible to all agricultural producers. The public sector urgently needs to promote and encourage research on innovative technological solutions that (1) incentivise low-carbon, biodiverse agriculture that is environment-friendly and (2) support sustainable productivity increases particularly in smallholder agriculture.

Establish institutions for an integrated approach towards managing resources

Managing the increased linkages between water, energy and land requires a new mindset. Research conducted for this Report shows that current institutions seldom adopt the integrated thinking required to confront the new challenges and manage water, energy and land effectively for inclusive and sustainable growth. Rectifying this requires major efforts to promote changes in context-specific institutions and broader governance arrangements, including coordinating activities, that build on integrated 'nexus' thinking at both the technical/managerial and the political level. Major investments in institutional development for WEL-nexus management will be required in most circumstances.

Push for inclusive land policy to ensure access to land and water

Low income countries are often unable to convert the current interest and pressures on land and water (e.g. through large land deals) into development opportunities. There is thus an urgent need to design and implement inclusive land policies in many countries, that manage the increased demand for agricultural land in a way that can still benefit the poor and does not undermine their livelihoods, whilst reducing deforestation and degradation of ecosystems important for biodiversity. Ensuring access to land must go hand in hand with improving access to water in poor countries. Such an approach would entail strengthening institutions and legal frameworks, and working to clearly define and enforce both customary and modern, as well as collective and private property and users' rights.

Price natural resources and services comprehensively and adequately

Natural resources and services are overexploited because they are free or cost very little to use. A major policy shift is required to properly account for the value of natural capital, and for the costs of its depletion. Yet it is also clear that although appropriate valuation of ecosystems is a 'must', the practicalities of full pricing are challenging and involve winners and losers. It is not always possible to establish pricing mechanisms. Some critical ecosystem services are extremely difficult to price due to their complexity, and even if they could be priced, they could not be traded in the market. In addition, any pricing scheme (particularly for water or land use) must ensure that the poor do not lose out, hence the need for social protection. Further research and debate are vital to move this crucial question forward.

In conclusion, it is hoped that the European Report on Development 2011/2012 will stimulate awareness of the urgent need for a new approach to managing the three natural resources of water, energy and land in an integrated manner whereby both the public and the private sectors have their roles to play. This approach also needs to be adopted at a global level because many of the current and future problems and scarcities, particularly those related to climate change, where the EU is taking the lead, cannot be resolved solely at the national or regional level. The EU, that is both its Member States and its institutions such as the European Commission, but also European private sector and civil society actors, can make an important contribution to this global effort, providing all are willing to take up the challenge and so create the political momentum to address the corporate, public and global governance gaps so that inclusive and sustainable growth can be achieved.

PART ONE

CONTEXT, CONCEPTS AND FRAMEWORK

In the chapters forming Part I, we sketch out the context of scarcity in which the WEL nexus is to be considered and then present the concepts and analytical framework that shape the substance of the Report.



CHAPTER 2

MANAGING WATER, ENERGY AND LAND IN A CHANGING WORLD

2.1 INTRODUCTION

This Report is about the challenge of managing water, energy and land for inclusive and sustainable growth in the 21st century. The ability to capitalise on and improve access to the wealth contained in their natural resources offers developing countries significant opportunities to overcome poverty and deprivation. At the global level, a growing number of wealthy consumers have increased the demand for a range of natural resources. Countries that can meet these demands stand much to gain. At the same time, there is a growing recognition that the current approach to exploiting natural resources is pushing the limits of the planet's natural systems to cope with disturbances – and that this might lead to dangerous and irreversible environmental changes (Rockström et al. 2009). Moreover, economic growth, while impressive, is far from ending global poverty.

The resolution of these challenges requires a coordinated set of actions that move away from environmentally and socially unsustainable of growth – ‘business as usual’ – in favour of a broad institutional transformation towards inclusive and sustainable patterns of growth. This involves respecting the physical boundaries of the world's ecological system, while at the same time guaranteeing equality of opportunity for present and future generations to share in the creation and enjoyment of prosperity.

The main purpose of this chapter is to explain why BAU growth is a problem, and why current trends in natural resource use are so worrying. We see that many of the countries with the highest standard of living (e.g. measured by the composite Human Development Index (HDI) established in the Human Development Report) also have a greater environmental impact. Thus although economic growth has improved people's standard of living, despite technological advances, this has been at the expense of the global environment. Section 2.1 introduces the Report's focus on land, water and renewable energy, and examines the link between these and development. In Section 2.2 we give an overview of the current and future drivers of water, energy and land use, which create a new context for natural resource management. In Section 2.3, we consider in detail the development implications of the BAU approach to growth, and show why change is needed.

2.1.1 MANAGING WATER, ENERGY AND LAND FOR DEVELOPMENT

This Report focuses on water, energy and land, all three essential for growth and development. In a broad sense, access to these resources is necessary in order to improve people's lives and expand human capabilities (Sen, 1985). The management of water, energy and land for development has two related, but distinct dimensions.

First and foremost is *access*. All people, but particularly poor people, must be guaranteed adequate access to food, safe water and a clean, reliable source of energy. The Millennium Development Declaration reiterates these objectives. We all need food, so we are all inextricably dependent on land for our survival.

Second, the effective management of water, energy and land can and should contribute to economic *growth*. We draw on water, energy and land for a broad range of productive activities, from the production of food and fibre to the generation of power that moves our society. Water, energy and land are key inputs to the economic system, and thus play a crucial role in creating wealth. Inclusive and sustainable growth means that the gains and the achievement of wealth should be enjoyed throughout society, and that it should remain within the boundaries of the natural system.

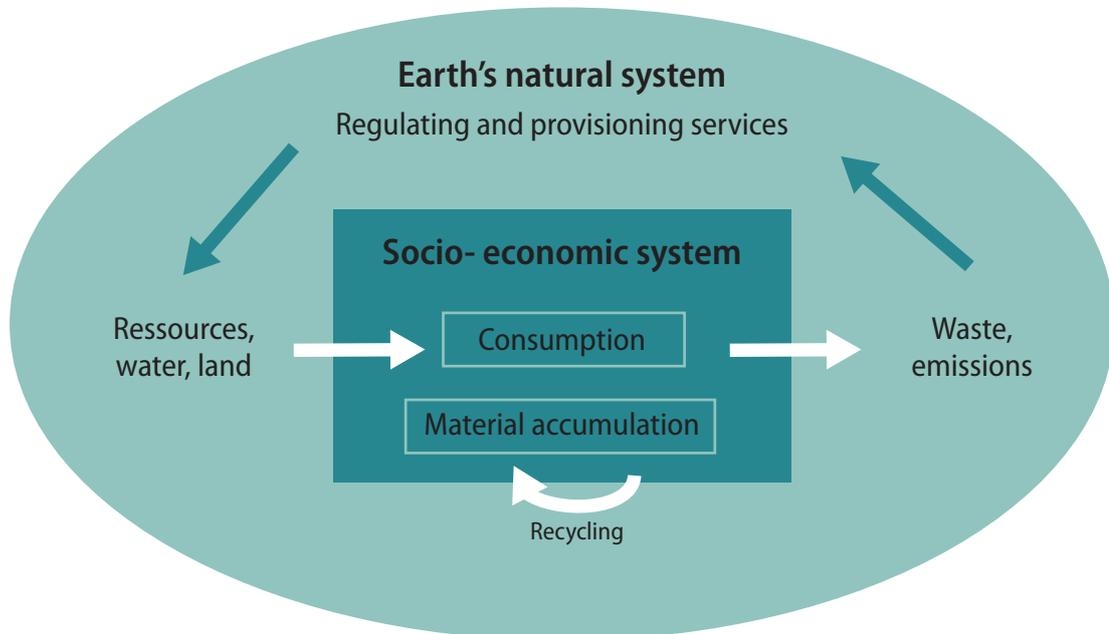
Although water, energy and land are closely related, they differ in important respects. Land and water are renewable resources that exist in finite physical quantities; their regeneration – and hence their usefulness to us – depends on natural replenishment cycles of different lengths. Energy is not a natural resource as such, but we draw on a multitude of renewable and non-renewable natural resources such as fossil fuels, timber, wind or solar light in order to generate energy. In this sense, the availability of energy is in practice tied to the stocks and flows of specific resources.

2.1.2 NATURAL AND SOCIAL SYSTEMS

Water, energy and land are key inputs for our socioeconomic system, and crucial to satisfying many basic human needs. But the full importance of water, land, and the resources that we use to generate energy, can only be appreciated if we view them as parts of the natural system on whose functioning life depends. We consider the human socioeconomic system as being a part of – and indeed dependent on – the natural physical system. Water, energy and land form a part of the critical sink and life-supporting functions provided by natural systems. These include the ability of ecosystems to regulate the hydrological cycle, absorb and recycle waste, purify the air and maintain a relatively stable climate. Human life depends on these systems.

To understand the challenge of managing water, energy and land – and natural resources more broadly – it is helpful to see the economy as a closed system in which society exchanges energy and materials with the environment (Ayres, 2008; Muradian et al., 2010). In this view (Figure 2.1), resources are drawn from the environment, are processed and used to satisfy human needs, and the waste is discarded back into the environment. In addition, human existence depends on the ability of the environment to sustain the right conditions for life, to replenish (at least some) raw materials, and to recycle waste so that it is not harmful to human beings (Martínez-Alier et al., 2010).

Figure 2.1: Socioeconomic and natural systems



Sources: based on Hertwich et al. (2010) and Martínez-Alier (2010)

The impressive improvement of human living conditions over the last century coincided with increased use of natural resources. The history of this relationship reveals two trends: first, economic growth has been coupled with an *absolute increase in the consumption of natural resources and energy* (Krausmann et al., 2009). Second, as societies become richer, technological improvements allow them to use resources and energy more efficiently, which leads to a *relative decoupling of growth and resources and energy use* (UNEP, 2011b).

The attainment of higher living standards has been based on using more materials and having a greater impact on the sink and regulatory functions of natural ecosystems. Economic growth has been linked to the increased consumption of a wide range of materials, including those derived from biomass and from minerals, such as metals, fossil fuels and construction materials (UNEP, 2011b). Human appropriation of net primary productivity (HANPP), a measure of how much of the Earth's biomass is consumed by human activity, has also increased steadily as a result of economic growth (Erb et al., 2009).

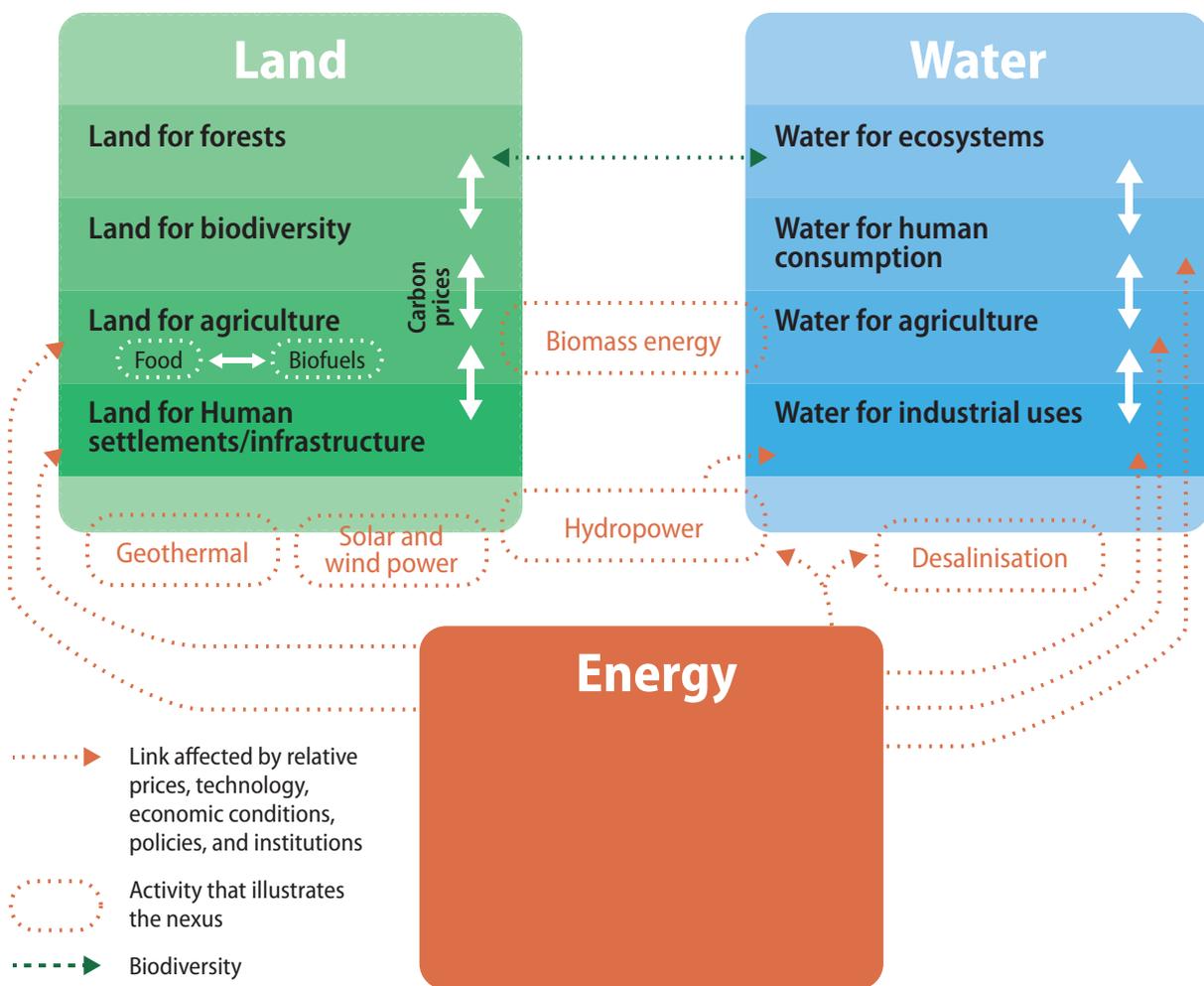
With wealth comes technology; and with it, a more efficient use of natural resources, energy and human labour. This leads to the decoupling of economic growth and the use of natural resources, i.e. the economy increases faster than its use of natural resources. The rate of per capita consumption of physical resources has risen far more slowly than that of per capita income. In other words, as societies get richer, they also get better at producing more with less. This decoupling is not absolute, however. The gains in efficiency do not necessarily translate into less use of resources. On the contrary, efficiency may lower prices and drive people to consume more, not less, of a given resource. This phenomenon, which was observed in the 19th century by the British historian W.S. Jevons, is also known as the 'rebound effect' (UNEP, 2011b). This has crucial implications for natural resource management, because technological developments have not been sufficient to decrease the global demand for resources.

2.1.3 THE WEL NEXUS

An integrated view of natural and economic systems allows us to see water, energy and land not as independent inputs, but rather as a *nexus* – a group in which the behaviour of the individual components is tightly interconnected. Water, energy and land perform a crucial role as building blocks of the economic system, as well as parts of the natural cycles and regulating functions of ecosystems. Yet these three components are also related in complex feedbacks; the management of land and water resources has become increasingly intertwined with the provision of energy. Concerns about global warming are prompting a radical shift in the market for energy sources away from fossil fuels. In this context, interest in renewable energy is growing steadily, and land and water play a major role in the provisioning of key forms of renewable energy such as biofuels and hydroelectric power.

The increasingly close connection between water, energy and land – the *WEL nexus* – is a central focus of this Report (Figure 2.2). The global demand for more and very diverse goods and services is shifting the pressure on natural resources to unprecedented levels. This new context of natural resource use is characterised by three key features: (1) greater competition among users and among uses for a limited pool of resources; (2) greater interconnections between the drivers of production and consumption worldwide; and (3) the possibilities of absolute scarcity, or irrevocable deterioration, of ecosystem functions. The WEL nexus aims to put some of this complexity into focus. As we discuss in subsequent chapters, natural resource management for inclusive and sustainable growth requires an integrated approach that makes explicit the connections between different resources, different uses and different users.

Figure 2.2: The Water-Energy-Land (WEL) nexus



2.2 DEMAND FOR WATER, ENERGY AND LAND IN A CHANGING WORLD

2.2.1 CURRENT AND FUTURE DRIVERS OF CONSUMPTION

Human consumption is the basic driver of natural resource use. In the framework outlined above, natural resources of all types are either inputs to, or enablers of, society's metabolism. Although the drivers of natural resource use are multiple and interrelated, for analytical purposes they may be divided into demographic, economic and environmental.

Population growth is one of the most important drivers of natural resources use, although its effect is always mediated by other social and economic factors: it is not just about the size of population but also about the way in which people behave. The same number of human beings may consume a lot or very little, depending on their income, access to technology, political system, degree of urbanisation and cultural norms (Millennium Ecosystem Assessment, 2005a). World population has tripled since the beginning of the 20th century (UNEP, 2007), driven primarily by growth in the developing world, mainly in Asia, sub-Saharan Africa, South Asia and the Middle East; but the vast majority of births in the last 25 years have been in Asia. This growth will continue, albeit at a slower pace, and it is expected that world population will peak at about 10 billion by the middle or end of the 21st century. In many European and other wealthy countries, low fertility and higher life expectancy are likely to result in a declining and increasingly ageing population (Millennium Ecosystem Assessment, 2005a).

Alongside population growth, rising wealth is a major driver of natural resource use. About 0.5 billion people have moved out of poverty in the last two decades, a process that reduced the overall incidence of poverty worldwide and rearranged the global distribution of wealth (OECD, 2010b). In 2000, members of the Organization for Economic Cooperation and Development (OECD) accounted for 60% of global Gross Domestic Product (GDP) (in purchasing power parity (PPP)); by 2010 this figure had been reduced to 51%, and it is estimated that, at current growth rates, it will shrink to about 43% in 2030 (OECD, 2010b).

These shifting patterns of wealth have created new patterns of global consumption. As incomes rise and living conditions improve, the satisfaction of basic food needs has given way to the consumption of non-agricultural products, including consumer goods and an array of services (Millennium Ecosystem Assessment, 2005a). Diets have shifted from cereals and starchy tubers towards meat, animal fats, and fruit and vegetables (Foresight, 2011), and the demand for raw materials of all kinds has increased. There has also been a surge in the demand for energy, especially coal, to generate electricity, and liquid fuels for cars and aeroplanes.

The shift of wealth towards low-income (LIC) and middle-income countries (MIC) is projected to intensify and expand geographically in the coming decades. Although incomes will probably rise at different rates in different regions – more rapidly in China, East Asia and Latin America – it is expected that they will continue to increase around the world, including sub-Saharan Africa. This changing landscape of wealth will produce a major shift in the world's economic and political balance of power. In 2050, probably only the USA and the EU will have an economy to rival the size of China's or India's. Most significant, however, is the emergence of a large middle class in Brazil, China and India and elsewhere, which will shift the centre of gravity of wealth and consumption to countries that are currently classified as LICs or MICs (Wilson and Dragusanu, 2008).

Environmental problems are often seen to be exclusively a result of human action, but, – through feedback mechanisms – they can become its causes. The scale of human activity has altered the natural flows of matter and energy: the production of waste, the depletion of stratospheric ozone, the artificial disruption of the nitrogen cycle and the emission of greenhouse gases (GhG) illustrate the unintended consequences of human actions that are now beginning to condition society's behaviour.

Environmental change can result in reactive behaviour, whereby a noticeable disruption triggers a societal response. For example, farmers are already adapting to actual or foreseeable changes in precipitation caused by global warming by changing the timing and location of crops (UNEP, 2007). Other types of adaptation are being pursued to cope with the likely increase in the frequency and intensity of severe weather patterns across the planet (IPCC, 2007b).

Environmental change can also stimulate proactive social responses: awareness of environmental change has triggered new political, economic and technological behaviours aimed at averting foreseeable damage. The market is picking up signals of change; for example, trade and investment patterns are beginning to shift to reflect growing expectations that emitting fossil fuels, as well as other forms of environmental degradation, will become more costly in the future. Resource efficiency and renewable sources of energy will be critical for long-term business viability.

2.2.2 WHAT ARE THE LIKELY TRENDS IN THE USE OF NATURAL RESOURCES?

If past trends are typical, the use of natural resources and the demands for ecosystem services will continue to increase as population grows and incomes rise (Krausmann et al., 2009). Existing projections (e.g. Prins and Kok, 2011), already suggest that the demand for water, energy, land and their linkages will result in unprecedented pressure on resources and pose considerable governance challenges (see Table 2.1).

The demand for food exemplifies the complex interactions between demographic, socioeconomic and environmental drivers, as well as the linkages between different resources and their uses – underscoring the importance of the WEL nexus. Changing diets – in particular, greater meat consumption – are expected to have some of the most far-reaching implications on water, energy and land use worldwide. Meat consumption per capita is expected to almost double – or even triple in Asia – by 2050. Even more cautious assessments still project significant increases (Millennium Ecosystem Assessment, 2005b). This increased demand for meat will trigger the production of grain to feed livestock (Dickson-Hoyle and Reenberg, 2009), and this is expected to account for the largest share of cereal production worldwide (de Fraiture et al., 2007). The long chain of interconnected processes will also result in greater demands for land, energy, fertilisers and water.

To achieve the type and amount of food production required to meet future demand, there will be an increase both in water withdrawals for irrigation and rainwater use. In the light of current patterns of use and projections of world GDP, the demand for water is expected to increase by around 50% by 2050, from 7000 to about 10,600 km³ of water per year (Lundqvist et al., 2007). Even if water use becomes more efficient through improvements in irrigation systems and other types of technology, it is still very likely that some areas of the world will not have enough water to produce crops (de Fraiture et al., 2007). Climate change will complicate this picture. While the impacts on water availability due to rising global temperatures will probably vary widely across regions, water withdrawals for irrigation are expected to increase substantially (IPCC, 2007b).

A greater demand for water will lead inevitably to a greater demand for land. Higher agricultural productivity, particularly in sub-Saharan Africa, will account for most of the production increases needed to sustain the future world population, but the expansion of agricultural land is likely to happen in poorer regions (Hertel, 2010). Land requirements are expected to increase under all modelling scenarios, even taking into account improved irrigation technologies. Land conversion due to agricultural demands will be exacerbated by climate change, causing further deforestation and all of its concomitant effects (Millennium Ecosystem Assessment, 2005b). The challenges facing the future use of land will be complicated by serious socio-political dynamics. Land conflicts are increasingly driven by the expansion of large-scale commercial agriculture (often monocultures for production of timber, livestock feed or energy crops) at the expense of smallholder farms, a trend that is particularly relevant in countries with poorly defined property rights and unequal land distribution (Gerber, 2011).

Table 2.1: Current and expected trends in the use of water, energy, land and their linkages

Resources and linkages	Key facts and trends
Land and food	<ul style="list-style-type: none"> • To meet projected demand, cereal production will have to increase by nearly 50% and meat production by 85% between 2000 and 2030 (Rosegrant et al., 2007). • Meat constitutes only 15% of the total global human diet, but approximately 80% of agricultural land is used to produce animal feed and fodder (FAO, 2006). • Since 1960, agricultural area has increased from just below 4.5 billion hectares (ha) to just over 4.9 billion ha in 2007 (http://faostat.fao.org/site/339/default.aspx). Over the same period, the amount of land per capita halved (from 0.39 to 0.21 hectares), but demand for it is increasing rapidly (Evans, 2011). • Since 1960, 30% of the world's farmland has been abandoned because it has been degraded beyond use, and it is estimated that about 10 million ha are destroyed every year (Schade and Pimentel, 2010). • Nearly a quarter of the Earth's land is degrading, particularly in southern Africa, South East Asia and southern China (ISRIC, 2008).
Water	<ul style="list-style-type: none"> • Total global water demand could rise by between 35% and 60% between 2000 and 2025, and could double by 2050 (Foresight, 2011). • A 40% global gap for accessible and reliable water supply for economic development is expected by 2030 (Granit, 2010).
Energy	<ul style="list-style-type: none"> • The world economy is forecast to demand 40% more energy in 2030 compared to 2007 (IEA, 2008). • Demand for electricity is expected to grow by over 70% between 2010 and 2030 (Granit, 2010). • 75% of the increase in energy use from 2007 to 2030 is expected to be met through fossil fuels, especially coal (IEA, 2009). • The IEA estimates ultimately recoverable oil resources at just below 3.6 trillion barrels, of which 1.1 trillion has already been produced. The US Geological Survey 2000 states 3.0 trillion barrels (DECC, 2009). • Between 2005 and 2010 the IEA adopted more cautious projections of oil supply: from an estimate of 120 million barrels produced a day (mb/d) by 2030 in 2005 it declined to an estimate of 96 mb/d by 2035 (IEA, 2010). • Geothermal energy could account for around 3.5% of annual global electricity production and 3.9% of energy for heat by 2050 – a substantial increase from current levels of 0.3% and 0.2%, respectively (IEA, 2011). • Studies have consistently found that total global technical potential for renewable energy is substantially higher than global energy demand (IPCC, 2011). • Hydropower contributes about 20% of the world's electricity-generating capacity.
WEL linkages	<ul style="list-style-type: none"> • In 2030 biofuels are expected to consume between 20% and 100% of global agricultural water use (WEF, 2011e). • About 14 million ha of land were used for the production of biofuels and by-products in 2006, equal to about 1% of the world's available arable land (IEA, 2006). • The biofuel industry uses almost 40% of US maize production and 66% of EU production of vegetable oils (HLPE, 2011b). • An increase in energy demand by 40% using current energy systems could translate into an increase of 165% in freshwater access needs according to some estimates (WEF, 2011a). • It takes one litre of water to grow one calorie. This means that the near doubling in food production projected will not be sustainable without radical changes in agricultural water use (WEF, 2011a). • In 2009, about 3% of the arable land surface was dedicated to crops for biofuels, compared to 1% in 2006 (IEA, 2006), a percentage that could climb to 36% by 2050 (Bringezu et al., 2009). • Agriculture accounts for 70% of water use (and up to 30% of GhG emissions) (WEF, 2010). • The future of irrigated agriculture is threatened by salinisation, although estimates of the area likely to be affected vary from 10% to 50% of irrigated land (HLPE, 2011b).

2.2.3 WHAT IS THE NEW CONTEXT FOR NATURAL RESOURCE MANAGEMENT?

The management of natural resources in the 21st century is likely to be shaped by two key elements:

1. Heightened pressure on natural resources and regulating systems, resulting from unprecedented demand; and
2. An emerging consensus on the need to prevent dangerous and irreversible damage to natural life-support systems – particularly to mitigate climate change – and to eradicate poverty.

The unique challenge arises from the fact that these two features are in tension. Economic market signals are pulling in the direction of greater and more complex consumption of a wide range of natural resources (because prices do not reflect the environmental costs) while the scientific and political acknowledgement of unsustainable social and environmental conditions is pulling in a different direction.

2.2.3.1 UNPRECEDENTED CONSUMPTION AND PRESSURE ON THE WEL NEXUS

The picture of drivers and consumption trends presented in the previous section suggests that there is a qualitative shift in the pressure on natural resources. This pressure is applied not only to physical inputs such as fossil fuels, water or food, but also to a range of natural sinks and large-scale regulating functions. What is new about these challenges?

First, the increasing demand for limited resources exacerbates competition for them. The case of land is particularly illustrative, because it will be needed to produce food, fibre and fuels, as well as to sequester carbon (Hertel, 2010). Water, which is needed for uses ranging from human consumption to the generation of energy, faces similar pressures (Glassman et al., 2011). One use often precludes another, which means having to make tough choices about the allocation of these scarce resources. This is also vividly illustrated in the case of competing land uses in the case of Bangladesh (Rahman, 2011a).

Pressure on resources is further exacerbated by the fact that demands are interlinked. Indeed, demand is for bundles of resources (with relative amounts depending on technological options) rather than for individual resources. For example, the demand for food increases the demand for both land and water, and the use of these resources to produce food also requires energy (for transport, irrigation systems, fertilisers etc.). The increased demand for renewable energy also puts pressure on land and water resources, for example to produce biofuels or to generate hydropower.

The second important aspect of the demand for natural resources is that there are both local and global transmission mechanisms, which means that pressure on a country's natural resources does not come only from within its own boundaries. In a highly interconnected global economy, there can be pressures on a country's resource even if there is very little domestic demand. The demand for beef, for example, is growing rapidly in countries like China, and in many cases the domestic supply is insufficient to meet this demand. This has created a great need for land, not only to raise the livestock, but also to produce the feed to sustain the livestock. Through these global trade forces, greater demand for meat in one part of the world translates into pressure for land and water in another (Dickson-Hoyle and Reenberg, 2009). As will be discussed in Chapter 7, the global pressure for food and energy security is leading to the international demand for land in order to grow food or biofuels. This raises the question of how national governments can use this option value of land (Collier and Venables, 2011).

The third feature of the natural resource management challenge is the increased likelihood of absolute scarcity of both natural goods and services (see Box 2.1). The interconnections among resources, as well as global linkages in their production and consumption that create unprecedented pressures on land and water, have brought the question of scarcity to the fore (Evans, 2011).

2.2.3.2 THE NEED TO AVERT IRREVERSIBLE CLIMATE AND ENVIRONMENTAL CHANGE

There is now growing recognition that the heightened and complex pressures on natural resources and life-supporting systems mean that the preservation of human civilisation as we know it depends on averting potentially dangerous and irreversible environmental change. This consensus has emerged primarily, although not exclusively, in relation to the problem of global warming and climate change (WBGU, 2011).

Such a consensus is remarkable in both a scientific and political sense. The IPCC is an unprecedented international effort to establish the current scientific understanding – and it is clear that both the diagnosis of the problem, as well as its possible solutions, have come into sharper focus as uncertainties decrease. Politically, the question is much more difficult. Despite this, markets are already anticipating new regulations on carbon emissions. Such expectations, rather than existing legislation, are now a defining feature of natural resource management.

Box 2.1: Looming scarcity?

The importance of scarcity in the context of natural resources management is somewhat controversial. The lack of access to natural resources (including food and water) is often because of lack of economic means rather than physical unavailability. There is a difference between physical and economic scarcity, and the latter appears to be more important in many poor countries.

Despite this, ever since Malthus's 1798 *Essay on the Principle of Population*, there has been a concern that consumption will outstrip supply of food and other natural resources. To date, such concerns have proved wrong. Technological advances have been able to cope with increased demand either by substituting some resources for others, or by making their use more efficient (Krautkraemer, 2005). Given that land and water are finite resources, however, there are questions about the limits of technology to overcome supply restrictions.

It is also important to differentiate between relative and absolute scarcity. The idea of relative scarcity is at the foundation of modern economics: in order to have one thing we must forgo something else (Baumgärtner et al., 2006), on the assumption that things are substitutable. Absolute scarcity refers to goods that cannot be substituted: there is no choice because there are no alternatives (Baumgärtner et al., 2006).

This distinction is important because natural resources do not have the same degrees of substitutability (Krautkraemer, 2005). The depletion of natural physical stock – say, of iron ore, coal or timber – represents a problem of relative scarcity because technological change probably can and will offer alternative substitutes. But other resources, particularly those involved in sink and life-supporting functions, cannot be substituted. As we will see in Chapter 3, the absolute scarcity of these critical natural functions compels us to establish physical boundaries for the safe operating space for human society, and this will also affect how to optimise the use of natural resources (the WEL nexus) for inclusive and sustainable growth.

2.3 THE NEED TO ABANDON 'BUSINESS AS USUAL'

The challenge of how to manage natural resources in a way that promotes development is hugely complex, but it can be stated rather simply. The increased demand and higher prices for a wide range of goods, services and energy, make natural resources a potentially vast source of wealth, including for those poorest countries that have valuable natural resources. At the same time, global demand strains global natural and social coping mechanisms, which means that realising the growth potential of these natural resources requires a fundamental reorientation of the approach to growth.

2.3.1 NATURAL RESOURCES AS A KEY SOURCE OF GROWTH

Economic growth is a critical part of development, and natural resources are likely to be a key source of such growth. Many of the world's poorer countries are endowed with significant natural resources, giving them the potential to generate considerable wealth. An important aim of this Report is to suggest how to unlock this growth potential in the context of new challenges in a way that is both environmentally sustainable and socially inclusive.

The potential to achieve growth derived from increasingly scarce natural resources is enhanced by the likelihood that their prices will rise accordingly: this should be the outcome of a combination of high demand and, in some cases, shrinking physical availability. There is growing demand for a range of renewable and non-renewable resources, as well as for food and energy. Minerals and oil have seen dramatic price swings over the years, and even agricultural commodity prices have risen, reversing a decades-old trend. These changing conditions of supply and demand will open significant opportunities for resource-rich countries. Global trade and investment flows are already reflecting a renewed interest in natural assets, and this may generate significant revenue to such countries (Bowie and Mehrotra, 2011; Giovannetti and Ticci, 2011). There are, however, both advantages and disadvantages to these higher prices depending on whether a country sells or purchases resources or goods and services that embody them.

Given our focus on the WEL nexus, we need to examine the potential of linkages between these three resources as a potential source of economic growth. Growth can derive directly from land and water in the form of rents, from putting them to productive use or by drawing on their ecological functions. Land and water are essential for agricultural production whether of traditional crops such as food and fibre, or of crops for biofuels. Natural and cultivated forests and pasturelands are also important sources of raw materials. Rivers, lakes and artificial water bodies can be used for wild or farmed fish, and running water can be harnessed to produce electricity. In addition, land and water also facilitate critical ecosystem functions such as carbon sequestration by biomass and soil, and the provision of habitat for biodiversity. Although the valuation of these services is still in its infancy, we anticipate that markets for them will provide important sources of revenue in the future.

There is no standard relationship between these activities and growth, or indeed inclusiveness and sustainability. The potential needs to be harnessed by appropriate policies and institutions, which are mostly country-specific. For example, the increased interest in land should enhance the development prospects of poor countries, but this has not been the case so far. Chapter 7 will tackle this paradox and examine what policies and institutions can help to translate pressures on land into inclusive and sustainable growth. Chapter 6 examines how unexploited opportunities in renewable energy options can be realised and contribute to inclusive and sustainable growth in developing countries. Very often, increased pressures on and demand for natural resources have led to conflict or to the over-reliance on mineral resources rather than developing other sectors of the economy; this hampers the growth potential of developing countries, let alone its inclusiveness and sustainability.

The significance of the WEL nexus is evident in the complementary uses of land and water, as well as in the effect of the increasing demand for renewable energy. Realising the growth potential of land and water resources thus gives rise to complicated trade-offs. For example, using land to produce food forecloses on land and water for biofuel crops, and the behaviour of energy markets is likely to play a decisive role in determining the relative importance of such uses. Avoiding deforestation has already become a significant source of income given the likely emphasis on carbon sequestration and the transition from fossil fuels (e.g. the UN Reducing Emissions from Deforestation and Forest Degradation in Developing Countries (REDD) project in Indonesia), but maintaining forest cover means that land for agriculture becomes scarcer and more expensive. The following chapters elaborate on the problems in deciding between competing uses, and resolving conflicts among competing users within the WEL nexus.

2.3.2 THE COSTS OF 'BUSINESS AS USUAL'

While natural resources are an important source of growth, the prevailing ways of realising their productive potential are unsustainable from an environmental and a social perspective for two main reasons:

1. Socioeconomic systems (capitalist and otherwise) have been based on a short-term perspective of the Earth's resources. Each generation has been concerned to satisfy its current needs and wants. Because prices do not reflect long-term costs, this has led to an exploitation of natural resources that privileges short-term returns at the cost of long-term development.
2. Apart from their extraction cost, many natural resources are essentially free. Societies have profited from 'cross-scale subsidies' (Carpenter et al., 2001), i.e. wealth that was created over millennia, such as that contained in oil or in precious metals, that is available for use. Economists have long recognised that in relying on these 'free' resources, little attention is paid to the actual costs involved in their consumption and disposal, which are therefore not reflected in the price – the problem of 'externalities'. However, like any other subsidies, these cross-scale subsidies are very hard to remove.

What we call 'business as usual' refers to set of institutions, policies and values that are based on this short-term, 'nature is free' worldview. These are not simply abstract concepts, but have concrete implications for how our socioeconomic system interacts with the Earth's natural system. There is no single BAU, but rather a range of approaches to natural resource management with varying degrees of environmental and social sustainability. We therefore identify here the three aspects of the prevailing socioeconomic system that place fundamental obstacles to achieving inclusiveness and sustainability. The current pattern of growth will continue along its BAU path if:

1. Natural resource stocks are depleted faster than they can be regenerated or substituted.
2. The regulating function of ecosystems is increasingly pushed towards a critical limit.
3. The benefits and opportunities of growth fail to benefit large parts of the world's population.

The first two refer to environmental sustainability and the third to social inclusiveness.

First, BAU patterns of growth involve using stocks of natural resources at a rate that far exceeds the rate of natural (biological or geological) replenishment, or the technological ability to replace them. The exploitation of renewable resources beyond their natural replacement rates has led to land degradation, desertification, soil erosion, depletion of groundwater and the reduction of fish stocks worldwide. The exploitation of non-renewable resources such as minerals inevitably leads to their depletion, but they are being used much faster than the technological capacity to replace or recycle them.

The second feature of natural resource management in BAU growth involves reliance on sinks and other complex regulating functions performed by ecosystems. Although our understanding of these systems is far from complete, it is clear that we are demanding too much from several life-supporting systems – perhaps more than they can support without collapsing. Climate change related to global warming is one of the most serious and potentially destructive consequences of the disruption of natural life-supporting systems. Fundamentally, global warming occurs because human activity has overwhelmed the ability of the atmosphere, oceans, soil and forests – the major natural sinks – to absorb carbon dioxide and other GhGs. The reliance on coal and petroleum underscores the key problems of BAU growth: while fossil fuels have undoubtedly contributed to unprecedented levels of economic growth and human wellbeing, the short-term and quick-gain thinking induced by incorrect pricing has set humanity on a truly dangerous path.

A third characteristic of BAU patterns of growth is that, despite immense improvements in the standards of living across the world, a vast number of people live in conditions that are an affront to human dignity. That growth is important for development is undeniable: since the 1990s, almost a billion people, most of them in Asia, have moved out of deep poverty. But the situation remains dire for more than a billion more (ADB, 2007). In many parts of sub-Saharan Africa the main challenge is simply to sustain economic growth.

In sum, BAU patterns of growth bring us close to transgressing dangerous tipping points. If we continue to realise the potential of land, water and energy for growth on a BAU basis, human society will have less of what Rockström et al. (2009) call a 'safe operating space'. At the outset of this chapter we argued that natural resources should be seen in two complementary but different senses. On the one hand, resources are materials, literally the building blocks of our economy and society. On the other hand, resources are also parts of complex systems upon whose regulating functions life depends. Our way of life is depleting natural resources in both senses. The increased scarcity of material resources driven by unprecedented levels of consumption is likely to push up prices and exacerbate the deprivation of those who already lack access to natural resources. Technological advances in the form of greater efficiency and productivity may offer possibilities for substitution, but there is no guarantee this will be sufficient. And there is no way to substitute the natural systems of absorption, recycling and regulation. We are only beginning to understand how these systems work but, as we will see in the following chapter, our knowledge suggests that decisive and timely action is necessary to avoid irreversible and potentially catastrophic shifts in their structure and function.

Table 2.2 summarises the costs of BAU for inclusive and sustainable growth in the poorest economies, since the cost of failing to act on climate change will be borne disproportionately by the poorest. Physical water scarcity is expected to constrain economic activity in a range of locations; and large-scale land acquisitions to help satisfy future food needs elsewhere in the world fail to recognise the livelihoods of poor people.

Table 2.2: The costs of business as usual for the future: some illustrative examples

Resources and linkages	Key facts and trends
Environmental costs	<ul style="list-style-type: none"> • We live in the anthropocene epoch, an environment of which there is no historical experience (Noone, 2011) • We have already trespassed three of the nine planetary boundaries within which we can operate safely: biodiversity loss (10E/MSY); nitrogen and phosphorus loading (35MT N/yr) and climate change (350ppm CO₂). Ocean acidification and freshwater boundaries are expected to be trespassed in the coming 50 years. • Possible tipping points include the Greenland ice sheet, collapse of Amazonian forest, Antarctic ozone hole, Indian monsoon transformation and salinity valves. • Solutions to solving one need, e.g. satisfying energy demands, will put considerable pressure on other resources such as land and water, potentially creating a crisis in the other resources (stresses in the WEL nexus).
Economic costs	<ul style="list-style-type: none"> • Failure to act on climate change will reduce world GDP by 20% (Stern, 2006). • Increased water scarcity could lead to annual grain losses of 30% of current consumption (WEF, 2011a). • Localised physical water scarcity is occurring in parts of India, China and sub-Saharan Africa. In China, water scarcity costs around 2.3% of GDP (World Bank, 2007). • Global fish catches have already declined due to overexploitation.
Social costs	<ul style="list-style-type: none"> • Poorest countries will see the greatest effects of climate change, but have contributed least to the problem (Stern, 2006). • Agriculture is currently not intensified in Africa, but applying the technology behind the Green Revolution will not sustainably produce food for 9 billion people (Noone, 2011). • The natural resource base does not allow developing and emerging economies to aim for the consumption patterns of the developed countries (e.g. meat consumption) (Allan, 2011), hence distributional issues are important in the absence of technological developments. • Roughly 1.6 billion people worldwide live without electricity, e.g. India is already the fifth largest emitter of CO₂, yet about 45% of its population lacks electricity and roughly 85% lives on less than US\$2 per day (WB/CSD, 2007). • Environmental degradation and high levels of water-related risk affect social inclusiveness in LICs as it is generally the poor who settle in fragile environments and who are most vulnerable to water-related risks. • The poor are often excluded from large-scale land deals.

CHAPTER 3

A TRANSFORMATION TOWARDS INCLUSIVE AND SUSTAINABLE GROWTH

3.1 WHAT DOES INCLUSIVE AND SUSTAINABLE GROWTH LOOK LIKE?

Water, energy and land can potentially be vast sources of wealth. However, the realisation of this potential within what we have called the ‘business as usual’ path is likely to compromise the wellbeing of present and future generations.

In this chapter we argue for the need to follow a different growth path, one that will lead to a transformation towards inclusive and sustainable growth. What does this mean? We have described BAU as a set of institutions, policies and values that shape our social and economic system. *The transformation towards inclusive and sustainable growth implies a broad change in those institutions, policies and values, rather than a set of pre-determined targets or outcomes.*

This chapter defines inclusive and sustainable growth. We propose a transformation towards a new set of policies, institutions and behaviour that can achieve this. The precise pattern of growth and appropriate set of policies and institutions will vary by country and period. There is no ‘ideal’ level of social equality, just as there is no objectively preferred number of species. But a change in institutions, policies and values should enable better-informed decisions about the levels of income distribution and biodiversity that are consistent with inclusive and sustainable growth.

In this Report, we define inclusive and sustainable growth broadly as a type of growth that is consistent with the natural cycles that allow ecosystems to replenish resources, absorb waste, and maintain adequate conditions for life; and that at the same time offers all people an equal opportunity to participate in and enjoy the benefits of increased wealth. The Appendix discusses in detail the three dimensions of inclusive and sustainable growth.

Box 3.1: ‘Inclusive and sustainable growth’ or ‘sustainable development’?

The idea of inclusive and sustainable growth builds on several related concepts, chief among which is sustainable development. What are the similarities and differences between these two concepts?

The concept of ‘sustainable development’ was popularised by the 1987 World Commission on Environment and Development Report, commonly known as the Brundtland Report. Its definition of sustainable development as the ability to satisfy present needs without curtailing the ability of future generations to satisfy theirs (WCED, 1987: 43) is still widely used. From the outset, the idea of sustainable development encompassed environmental, economic and social dimensions.

In the years following the 1992 Earth Summit, however, ‘sustainability’ was increasingly used in the more narrow environmental sense. The sustainability agenda was largely appropriated by government departments and NGOs focused on the environment, while the other dimensions of sustainable development – including the social dimension – were seen to belong to a different realm. This had more to do with the way in which it was implemented than with the idea of sustainable development as such.

The notion of inclusive and sustainable growth makes explicit *both* the environmental *and* the social dimensions of development. Growth is crucial for development, but when it addresses social and environmental concerns it is more likely to achieve human wellbeing.

In this Report, the term ‘sustainability’ refers mostly to environmental sustainability and ‘inclusiveness’ refers to social inclusion. Taken together, these elements refer to a different type of growth.

Inclusive and sustainable growth is an integrated objective and achieving it will require actions along each of its three dimensions as well as difficult compromises between them, and between objectives at the global, national and local level.

For example, LICs need to realise the potential value of their natural resources, and might reasonably question any limits on their right to do so if the ISG principles are strictly applied at country level. Certainly there is, and should be, more ecological space for low-income than for richer countries. A major challenge for poorer countries is to promote growth and use skills and infrastructure to exploit natural resources, while at the same time reinvesting these rents in order to build a more sustainable future. But no country, rich or poor, exists in isolation: inclusive and sustainable growth makes most sense as a *global* objective. Wealthy nations, including the EU, have a responsibility to reduce their own environmental impact to allow for a period of less sustainable growth

in poorer countries. Moreover, the richer nations must help finance the transformation towards inclusive and sustainable growth in developing countries.

Inclusive and sustainable growth is about opportunities, and not just about limits. A shift towards a more sustainable and inclusive model depends crucially on innovation and investment in sustainable options. The transformation towards a green economy also means exploiting previously overlooked possibilities. Renewable energy and avoided deforestation schemes are good examples of opportunities opened by the concept of inclusive and sustainable growth in a global context. The fact that important markets already exist for these two initiatives indicates that the new context is already offering such opportunities.

The emerging context for natural resource management is characterised by increased pressure for natural resources, new and complex interconnections among resources and their uses, and much less room for manoeuvre due to the need to avoid reaching or transgressing critical thresholds. The need to understand and make the trade-offs between the objectives of growth, inclusiveness and sustainability become crucial. This Report does not prescribe an ideal resolution of these trade-offs, but rather aims to contribute to the debate by making the choices and their consequences visible for decision-makers and the general public.

3.2 ECONOMIC GROWTH

Long-term economic growth underpinned by productivity changes is a necessary, if not sufficient, condition for development. Growth creates the resources necessary to meet the basic preconditions of human wellbeing such as adequate food, water, health, energy, education, housing and infrastructure. No country has succeeded in reducing poverty without economic growth, but growth is a means rather than an end in itself (Commission on Growth and Development, 2008). Development is about increasing the possibility of realising the full range of human capabilities (Sen, 1985), so the non-income dimensions of development such as education, health, gender equality and freedom of expression are essential for human wellbeing. Growth enables the income and non-income dimensions.

There is considerable debate about how much growth is actually needed. Although low-income countries need (more) growth to reach an acceptable standard of living conditions, there is increasing support for the view that rich countries may not *need* more growth (Victor, 2010). Proposals for a so-called 'steady state' economy are based not only on sustainability grounds, but also on the fact that the pursuit of economic growth alone may not necessarily lead to increased wellbeing.

This Report is largely about growth in low- and middle-income countries, which is different from the balanced or sustained growth used in modern economics to refer to industrialised economies. In developing countries, growth is mainly about the structural transformations in institutions, infrastructure, and the productive apparatus that make sustained growth possible (Acemoglu, 2009). Lin et al. (2011) and UNECA (2011) argue that high and sustained economic growth rates in LICs, combined with high levels of social development, are unlikely to be achieved without productivity changes based on widespread economic diversification, structural transformation and technological change.

Finally, the question of economic growth is intricately related to the problem of how to measure it, because in practice growth *is* defined by the measures we use. The most common measure of a country's growth is the rate of change in its GDP, the sum total of its economic output. While this is a convenient and simple measurement, GDP alone does not give the full picture of a country's economy. Measurements of growth that encompass aspects of sustainability and inclusiveness, such as 'green' accounting methods (see section 3.3.), can make explicit the under-appreciated or hidden social and environmental costs and benefits of economic growth.

3.3 ENVIRONMENTAL SUSTAINABILITY

Environmental sustainability is what allows economic growth to stay within the physical boundaries that make human life possible. There are different conceptual and practical approaches to achieving this objective, but there is a growing consensus in the scientific community, international organisations, governments and business leaders on the imperative to stay within the limits of the Earth's natural system. What those limits are, and how to avoid transgressing them is, however, a hugely complicated methodological and political question.

One widely used approach to the issue of sustainability is based on the idea of natural capital. This view assumes that greater attention will be paid to the environment if its value to human beings is made explicit. Earlier we identified two key features of BAU growth: the pursuit of short-term returns, and the notion that natural resources come for free. Since these are entrenched in the BAU market mentality, the solution is to make the costs and benefits of using natural resources visible because prices and costs are the real market incentives. Identifying and valuing natural capital is one way to do this.

Natural capital is the value of all the world's assets that have not been created or transformed by human beings. Like the other forms of capital – manufactured (or produced), human and social – natural capital can create financial wealth. The conventional expression of economic wealth, GDP, is based on the monetary value of produced goods and services and does not explicitly consider other forms of value (i.e. qualitative changes in goods, non-market goods and services, non-material dimensions of prosperity and activities which reduce prosperity). So, for example, if a country depletes vast quantities of forest and sells the trees as timber, its GDP rises because the loss of value of the forest is not included (World Bank, 2011b). This is why new forms of accounting, such as the one discussed by Jemio (2011), are an essential part of measuring the sustainability of economic growth.

Not all natural capital is of equal value. Societies rely on a wide range of natural resources and functions. These include physical material inputs such as minerals and timber, complex natural systems that recycle our waste and create the right conditions for life on Earth (e.g. a relatively stable climate, oxygen to breathe and water to drink), as well as aesthetic, cultural or recreational dimensions (Ekins, 2003).

Assessing the value of these natural functions is not straightforward because it involves trying to predict the future rents that might be derived from current assets (World Bank, 2011b), and because of our limited knowledge of the hugely complex natural systems that perform sink and life-supporting functions. However, a systematic attempt to calculate the wealth embodied in different dimensions of natural capital indicates that this is considerable, up to a third of total wealth in some parts of the world (World Bank, 2011b). Moreover, natural resources that are not used as direct material inputs to the economy, including non-timber forest resources (e.g. hunting, recreation and watershed protection) and protected areas (such as life-supporting systems and tourism) account for a significant part of the value of natural capital.

The concept of natural capital can be used to assess whether natural resources are being used sustainably. To be sustainable, the current use of natural resources and services should not deplete the stock of capital that is endowed to future generations. 'Green accounting' methods (e.g. Jemio, 2011) permit these types of quantification. This intergenerational fairness can be approached in two different ways. The first is referred to as 'weak sustainability', which means that the legacy for future generations must be at least an equal amount of total existing capital, regardless of the type, assuming that the different types of capital are mutually substitutable. The depletion of natural capital is sustainable only if the rents from exploiting natural resources are reinvested in other types of capital, for example in education or built infrastructure (Hartwick, 1977).

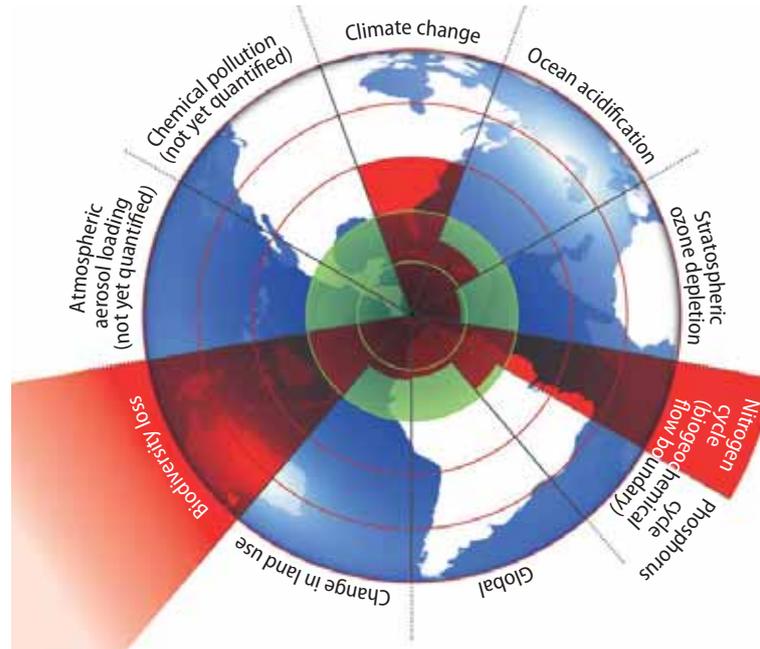
Weak sustainability makes a rather optimistic assumption about the power of technology and produced capital to substitute for natural processes (Dietz and Neumayer, 2007). The technological possibilities, however, confront three main obstacles: (1) it is very unlikely that technology can ever replace the complex, large-scale regulating functions of natural systems such as climate; (2) the gains from increased efficiency are often offset by the 'rebound effects' described in Chapter 2; and (3) some solutions are limited by WEL-nexus linkages, e.g. the production of renewable energy is often constrained by availability of water and land.

The limited possibility of substitution across the different types of capital underscores the concept of 'strong' sustainability. In this view, it is not enough to maintain the *total* stock of capital for future generations because some forms of natural capital are irreplaceable. This *critical* natural capital cannot be substituted by any other form of natural or manufactured capital, and its loss would be either irreversible or entail unimaginably large costs (Ekins, 2003). Ecosystem functions such as waste absorption and recycling, climate and temperature control, water purification and soil fertility, are critical forms of natural capital.

These critical and irreplaceable functions of natural capital have important implications for how we think about sustainability. Natural ecosystems are resilient, i.e. they can respond and adjust to disturbances without fundamentally changing – but if we push them beyond a tipping point, their ability to perform critical life-supporting functions might be irrevocably disrupted. Complex systems (such as ecosystems) often change abruptly rather than gradually once a critical threshold is crossed, and this non-linear change can be irreversible (Scheffer and Carpenter, 2003). For example, the geological evidence shows that the Earth's climate is prone to such abrupt, rapid change, which is why the gradual accumulation of Greenhouse Gas (GhG) in the atmosphere could lead to catastrophic climate change (Rockström et al., 2009). Similar tipping points might exist in relation to the Greenland ice sheet, the collapse of the Amazonian rainforest, the Antarctic ozone hole, changes in the Indian monsoon and deep ocean currents.

The possibility of sudden and irrevocable changes to the natural systems upon which human life depends makes it essential to refrain from crossing these critical thresholds or tipping points. Society needs to define the boundaries of a safe 'room for manoeuvre' within which human activity is environmentally sustainable. Some of these boundaries have probably already been crossed (Figure 3.1): the loss of biodiversity and the disruption of the natural nitrogen cycle may already have irreversible consequences (Rockström et al., 2009). Other boundaries, such as climate change, ocean acidification or the phosphorus cycle may not yet have been crossed, but it is vital to act quickly to stop this happening (WBGU, 2011).

Figure 3.1: Schematic representation of the nine planetary boundaries



Source: Rockström et al. (2009)

Climate change as a result of global warming is by far the most extensively studied of these planetary boundaries, and the assessment of likely tipping points and safeguards is particularly well developed (IPCC, 2007b). Computer modelling can predict the consequences of different degrees of warming, as well as the volume of CO₂ emissions that would cause such a change. In Copenhagen in 2009, there was international agreement that a 2°C increase would probably maintain the Earth's system within relatively normal conditions, but that anything beyond that target could potentially result in catastrophic change. Such a concrete boundary establishes a fixed amount of CO₂ that may be emitted within a certain period of time – a 'carbon space' within which we should move in order to avoid transgressing the agreed targets.

The process of selecting and defining targets of this kind, although informed by science, is ultimately subjective (Rockström and Karlberg, 2010). What are 'acceptable' conditions for human life? The human species has flourished during the period of relatively stable and mild climate since the end of the last ice age some 15,000 years ago, and recent natural disasters such as floods, droughts and hurricanes have shown how ill-prepared we are to cope with climate change. Furthermore, determining a 'safe operating space' involves political decisions about how much risk is socially acceptable (Rockström et al., 2009). This is also a question of inclusiveness, because the effects of transgressing these boundaries are likely to be borne by the poor and the disadvantaged.

The notion that sustainable growth is about keeping within a set of physical boundaries, which is central to this Report, is broadly acknowledged by all major development organisations. The COM has placed an emphasis on sustainable growth in its recent green paper (COM, 2010), while the World Bank (2011c) is preparing a report on 'green growth', a theme also developed by the OECD (2011). These various approaches recognise that managing natural resources for growth must avoid the disruption of key life-supporting systems, which explains their focus on avoiding climate change.

So far the discussion has been on sustainability at the global scale, but sustainable growth is largely a national and sub-national problem. What is the relationship between these global challenges and development at smaller scales? Sustainability issues are neither wholly local nor wholly global. What may appear to be local sustainability issues – such as groundwater depletion – are to some extent driven by international economic processes such as global land, food and energy markets. In addition, the aggregate effect of environmental problems such as local deforestation can have global consequences.

Setting sustainability targets entails complex layers of governance problems involving different actors and operating at multiple scales. Global thresholds will always have a local component; local sustainability targets will vary depending on a country's resource endowment, economic outlook, socio-political situation, and international relationships. For example, nutrient loading (i.e. fertiliser use) can be regarded as a relatively local environmental target. Individual farmers may have incentives to use fertiliser to boost their production, but the resulting water eutrophication can have immediate adverse consequences for the entire community. Imposing limits on fertiliser use will require balancing farmers' needs to increase production against the negative environmental

consequences of nutrient loading, and this process is likely to focus on relatively small regions. The setting of carbon-emissions targets arising from deforestation, however, is likely to involve national and international governance institutions. Although the emissions happen at the specific location where the trees are felled or decomposed, the cumulative effect of these emissions affects the global population, so a target must be set and enforced by an intergovernmental authority. Chapter 4 will provide a framework for addressing the regulations, market incentives and political processes that respond the global challenges and which may lead to more sustainable growth.

3.4 INCLUSIVENESS

If sustainability is about the wellbeing of future generations, inclusiveness is about the participation of current generations in sharing the world's wealth. Inclusiveness is important in itself because all human beings should have the same rights and opportunities to develop their full range of capabilities. In addition, more equitable or inclusive societies tend to perform better economically and politically than unequal ones (Wilkinson and Pickett, 2009). Inequality hampers growth because it represents wasted human potential (UNDP, 2011), and extreme forms of inequality of access to resources and opportunities can give rise to conflict and violence (World Bank 2006a).

Inclusiveness is based upon, but is distinct from, the idea of inequality. Conventional measurements of inequality, such as the Gini coefficient, measure the relative allocation of a particular attribute such as income across the different population percentiles, but they say nothing about how much wealth there is to allocate; a society can be very equal but also very poor (World Bank, 2006a). The concept of inclusiveness is more absolute because it is concerned with the amount of wealth held by different people or sectors. Inclusiveness is not limited to income inequalities but can include non-income aspects of wellbeing, such as access to education, health or – of particular relevance to this Report – access to land and water.

The importance of inclusiveness as necessary component of economic growth has been highlighted by the recognition that the impressive economic growth in Asia (and particularly China) over the last two decades has deepened inequality in the region (ADB, 2007). Although 'first grow, then distribute' has been influential in economics (Kandur, 2005), the simultaneous increase of wealth and inequality in Asia and elsewhere underscores the need for specific policies that deliberately aim to ensure wide participation in the benefits of economic growth. Moreover, since a highly skewed distribution of assets and opportunities constrains the creation of additional wealth, inclusiveness may function as a catalyst that promotes positive feedbacks and spurs greater growth (Ali, 2007).

The concept of inclusive and sustainable growth in this Report includes two different dimensions: process and outcomes. As a process, inclusive growth should allow for the participation of all members of society – particularly disadvantaged people – in economic opportunities (World Bank, 2006a). Ethnicity, gender or income group should not be obstacles for participating in the creation of wealth. When such obstacles arise, adequate social-protection mechanisms are needed to assist those who are excluded (Ali, 2007). Growth is inclusive if it reduces the inequality of education, health, and other non-income dimensions of wellbeing (Klasen, 2010).

The measurement of inclusive growth needs to encompass both the process and the outcome dimensions of inclusiveness. An indicator of inclusive growth would examine traditional distribution measures such as income per capita, but would also compare whether the incomes are rising at similar rates among disadvantaged and non-disadvantaged groups. In addition, such a measure would examine the status of non-income attributes such as health and education across social sectors (Klasen, 2010).

Realising the productive potential of water, energy and land in an inclusive way presents a complex governance challenge. In many countries, this will involve reversing the highly unequal access to these productive resources. In most cases, the promotion of inclusive growth will involve trade-offs between growth and equality concerns. For example, large-scale export-oriented commercial agriculture can maximise the productive potential of land and generate significant sources of revenue which the state can invest in health and education; but this agro-industrial development expands at the expense of small-scale agriculture, then many farmers would lose their livelihoods and be unable to participate in the creation of wealth. In other cases, the need to generate foreign exchange through exports will have to be balanced with the demands for domestic food security.

In the previous section we considered the need to identify physical critical thresholds that should not be crossed in order to preserve the integrity of natural ecosystems. Can we envisage comparable social boundaries? Extreme forms of inequality can create social tensions that result in conflict and the breakdown of political institutions (Ali, 2007). Using the indicators described above it may be possible to suggest 'inclusiveness boundaries', i.e. minimal economic and social conditions to ensure political legitimacy and stability. Such boundaries would also have an ethical basis. Changing moral conventions turned slavery from a common social practice into an unacceptable crime within the course of a few generations (Appiah, 2010). Extreme forms of inequality may come to seem just as unacceptable. Like natural systems, social norms and institutions are prone to rapid and unexpected change (Gladwell, 2008; Scheffer et al., 2009). What these changes might be if inequality increases beyond a particular tipping point merits further research.

3.5 THE RELATIONSHIP BETWEEN INCLUSIVENESS, SUSTAINABILITY AND GROWTH

Ideally, inclusive and sustainable growth should lead to ‘triple-win’ solutions – but in practice, balancing the three dimensions is likely to involve difficult trade-offs. We have seen that defining these three concepts separately poses considerable conceptual and practical challenges. Bringing them together is as much a question of physical as of political possibilities.

The first question is whether growth *can* be simultaneously inclusive and sustainable. There are bound to be trade-offs between the three components. These trade-offs can be informed by scientific knowledge, but they will not be resolved by examining relative merits in isolation. Such decisions are always embedded in socio-political contexts, and they reflect relationships of power. Like other political questions, the choices between trade-offs tend to be motivated by shorter-term goals (e.g. electoral cycles), whereas attention to inclusiveness and sustainability requires a longer-term perspective. Subsequent chapters of this Report will make the trade-offs explicit, e.g. who stands to gain or to lose what from land deals, water allocation or renewable energy options.

The second question has to do with the relationship between inclusiveness and sustainability. Inequality and lack of environmental sustainability often occur at the same time and in a mutually reinforcing vicious cycle (Neumayer, 2011). In a highly unequal society, the elite have a much firmer grip on the political process, thus benefiting from the profits of unsustainable growth, while the rest of the population suffers most of the negative effects (Boyce, 2007). In addition, the lower average educational levels that characterise highly unequal societies will prevent the emergence of social movements to push for greater environmental sustainability. Inequality also affects the position of poor people (or nations) in negotiating with more powerful counterparts on trade-offs between sustainability and economic objectives – unequal negotiations in which the poor seldom prevail (Muradian et al., 2010).

The negative effects of environmental problems tend to fall disproportionately on poor people because the rich have ways to mitigate these effects. This is also the case between countries: although rich countries pollute more, they have the means to offset the potential damage, but poorer countries are left to suffer the consequences (Neumayer, 2011). Unfortunately, the policies aimed at improving environmental sustainability can also be disproportionately tough on the poor, and may even increase inequality. For instance, sustainability boundaries tend to take the form of increased costs, which are often shouldered by the poor (Fullerton, 2011).

3.6 INCLUSIVE AND SUSTAINABLE GROWTH IS ABOUT LIMITS AND OPPORTUNITIES

We have so far focused on sustainability and inclusiveness mainly as an issue of limits and boundaries. But this is too negative a perspective. Staying with environmentally and socially acceptable boundaries obviously imposes limits on what can be done, but it can also open many possibilities for innovation and economic gains. The notion of ‘greening’ the economy must mean a comprehensive transformation of all of its aspects, not merely the mitigation of its negative impacts. This will translate into new jobs to design and build more technologically sound and energy-efficient transport and infrastructure and more sustainable cities.

The demand for renewable energy is increasing rapidly, making it a very dynamic sector. The ‘de-carbonisation’ of the economy will require a great deal of innovation, and will thus open up new spaces. Similar opportunities exist for investment in more efficient and sustainable use of land and water. Companies are already investing profitably in water efficiency, in new techniques for biofuel production that require less land and water, and in renewable energy supply. Sustainability is no longer a cosmetic issue to comply with demands for social responsibility. For some of the world’s largest corporations, sustainability is part of the core business model; this is not out of altruism, but because it guarantees their long-term viability (WBCSD, 2009). Chapter 10 summarises the evidence from Chapters 5-7 showing to what extent sustainability and issues of natural resource scarcity are becoming mainstream and part of the core of business model in some companies.

A transformation towards inclusive and sustainable growth will entail a broad change in institutions, policies and values. Achieving this transformation requires the participation of all stakeholders. A strong private sector is needed to respond to new market incentives, as well as to identify new growth opportunities, and innovate to realise the growth potential of natural resources within the natural physical boundaries. However, the setting of boundaries, as well as the removal of old incentives and the establishment of new ones, is a deeply political process. This will require the participation of a strong and vigilant civil society and, above all, decisive public intervention. A transformation towards inclusive and sustainable growth will require both the mobilisation of significant political will, and unprecedented levels of international coordination.

CHAPTER 4

FRAMEWORK FOR UNDERSTANDING THE ROLES OF THE PUBLIC AND PRIVATE SECTORS IN MANAGING NATURAL RESOURCES

4.1 INTRODUCTION

This chapter sets out a broad analytical framework for understanding the roles of the public and private sectors in contributing to the transformation towards inclusive and sustainable growth.

We use this framework in Chapters 5-7 to examine public and private responses to the new challenges with regard to water, energy and land respectively, and especially those challenges identified in Chapters 2 and 3. Each of these three chapters is divided into four broad sections:

1. Context
2. Issues to be addressed in the demand, supply and management of water, energy and land
3. Roles of public and private sectors, and their interactions, in tackling the issues
4. Lessons learned

Section 4.2 discusses these four sections in turn, setting out the broad questions that will be examined in relation to water, energy and land in Chapters 5-7. Section 4.3 concludes.

4.2 THE FRAMEWORK FOR THE WATER, ENERGY AND LAND CHAPTERS

4.2.1 CONTEXT

The context is examined in relation to the current trends and challenges in the use and management of water and land and in the supply of energy with respect to scarcities and competing uses or conflicts over use (as discussed in Chapter 2). How do these challenges manifest themselves in the use and management of the resource at the country level? In which regions, countries and localities do we find physical, economic and social scarcities? How do different countries experience global scarcities? Which threats and opportunities arise in the pursuit of more inclusive and more sustainable growth?

4.2.2 ISSUES TO BE ADDRESSED IN THE DEMAND, SUPPLY AND MANAGEMENT OF WATER, ENERGY AND LAND

The new trends pose different threats and opportunities for water, energy and land depending on the context. How do global drivers and the new trends manifest themselves? Where and how scarcities are growing or remaining stable, and how they affect the transition towards inclusive and sustainable growth? We group the options for managing natural resources broadly around four pillars – demand, supply, efficiencies and resilience (DSER):

- Managing the **demand** for water, energy and land (i.e. mitigating degradation and preserving the environment). This refers broadly to production and consumption patterns that place unsustainable pressures on the resources, thus jeopardising the attainment of ISG in the future.
- Expanding the **supply** of water, energy and land. While this seems an obvious response to scarcity, current levels of overuse (e.g. of local groundwater or global carbon space) and the systemic, interlinked nature of resource use and management, reduce the scope of this option.
- Improving **use efficiencies**, including
 - *productive efficiency*
 - *allocative efficiency*
 - *nexus-wide or WEL efficiency*
- System-wide efficiency depends on taking into account trade-offs and externalities among water, energy and land and optimising across a range of uses, i.e. not simply examining different users of each resource in a compartmentalised fashion.

- Strengthening **resilience** to cope with gradual change and rapid-onset shocks, especially among the **poorest and most vulnerable** sectors of society. Resilience refers to the ability of different entities (e.g. countries, households, or businesses) to respond to shocks, and includes economic, social, cultural, political governance and environmental components. Inclusiveness translates into a particular interest in whether the poor are resilient to changes.

These issues affect ISG differently in different contexts. In some cases, the best or only option to safeguard ISG is to manage demand. In others there is scope to work on the supply side or on productive or allocative efficiency, along with measures to build resilience for the poorest, as the most appropriate way to promote ISG.

It is crucial to consider the *institutional* context in which these issues are addressed. The complexities of the problems and their growing interconnectedness create a pressing need for institutional change. Existing power relations will be affected by efforts to promote ISG, and any resistance to such efforts can represent a potential obstacle to change.

There is a strong parallel with the Rio+20 discussions on the green economy. The concept of the green economy concretises the debate on sustainable development. According to the draft outcome document (January 2012), a green economy 'should protect and enhance the natural resource base, increase resource efficiency, promote sustainable consumption and production patterns, and move the world toward low-carbon development'. This relates closely to demand, supply, efficiency and demand. So our DSER framework encompasses the green economy but crucially also includes a focus on the resilience of the poor, therefore enhancing the development perspective.

The DSER framework further encompasses approaches such as by McKinsey (2011) arguing that a complete rethink of resource management will be needed to keep pace with demand, as up to three billion new consumers join the world's middle classes over the next 20 years. However, they suggest that the challenge can be met through a combination of expanding the supply of resources and a step change in productivity improvements, whilst paying no or less attention to managing the demand side or the poverty and resilience angle.

Further the DSER framework also encompasses approaches to resource scarcity that emphasise the allocation, equity and poverty angles, or "fair shares for the poor" as discussed in Evans (2011).

4.2.3 ROLES OF THE PUBLIC AND PRIVATE SECTORS, AND THEIR INTERACTIONS, IN TACKLING THE ISSUES

Each of the three chapters discusses the roles of the public and private sectors and other actors in addressing the issues identified, differentiating among different types of actor in the private sector (e.g. large companies, smallholders) and separating 'good-practice' public policy from issues of political economy, institutions and stakeholder capacity. Where appropriate, they also consider the role of other actors such as civil society organisations (CSOs). The main question these chapters address is:

What does the evidence show about the appropriate roles of the public and private sectors, and their interactions, in managing natural resources for ISG?

Our broad hypothesis is that joint public and private action, supported by the international community, can help to address the development challenges posed by the new challenges in managing natural resources, and that it is also the only way to deal with the gaps in corporate, public and global governance that will, if not addressed, seriously jeopardise inclusive and sustainable growth in the future.

The capacity to design and implement such policies is marked by inequalities both between private and public actors, and among and within countries. The authorities in charge of water and land management often lack staff and resources; and technological path-dependency is a problem in all sectors. This situation leads to governance gaps that both exacerbate current mismanagement and also allow other actors to step in. Increased business interest in resource use and management may suggest that the boundaries of responsibility between the private and the public sectors are shifting: if so, what are the potential effects of such a shift on inclusive and sustainable growth?

There are also questions about the urgency and degree of innovation and changes needed. Can international cooperation help to address insufficient capacities so that opportunities for change are seized in time to avoid irreversible change? What are the best ways to manage private-public cooperation, and what contribution might development cooperation make?

Box 4.1: Working definitions of public, private and other actors

- The public sector comprises all levels and branches of government and government-owned institutions such as parastatals.
- The private sector includes large and small domestic and foreign businesses (including the informal economy) in the agricultural, manufacturing, extractive and service sectors. It also includes business associations.
- Other actors include organisations of civil society, such as academic institutions, think tanks, trade unions, consumer bodies, non-governmental organisations (NGOs) and social movements.

ROLES OF THE PUBLIC SECTOR

The main focus of this report is on the role of the public sector in developing countries in managing water, energy and land. The public sector plays several roles. For example, the public sector often owns resources (e.g. land), and governments provide resources (e.g. energy or water services), and design public policies and institutions that define, monitor and control the rights to use resources, and reconcile or mediate competing uses. The public sector also controls public expenditure, and implements a regulatory and incentive framework.

Chapter 9 will gather evidence on the roles of the public sector in three areas:

1. Coordination and facilitation
2. Regulation and incentive framework
3. Public expenditure

Generally, the public sector uses these roles to support and strengthen mechanisms to overcome market and coordination failures and to protect the poorest social sectors. Markets are driven by price signals, so a core concern is to describe the circumstances and processes – including incentives, disincentives, taxes, cost structures, institutions – which governments have or could put in place to get prices right as a means to promote ISG.

If the market is working well, the private sector can also foster change in the right direction. But without the institutional, regulatory and incentive framework for markets to operate efficiently there is no guarantee that businesses will want or be able to allocate resources in ways that are socially and environmentally optimal. For example, markets cannot provide answers to future challenges if prices do not signal future scarcities or environmental damage that will oblige companies to adopt new business models. Public policies can help to ensure that the concerns highlighted in this Report are adequately mirrored in business practices and in research and innovation agendas.

The range of issues and challenges identified in the Report requires a wide variety of policy responses. Many studies examine issues in responding to shocks and stresses, reducing their incidence and finding ways to cope with them (e.g. IMF, 2009; te Velde et al., 2010; Briguglio et al., 2008). These studies highlight macroeconomic resilience, economic diversification, institutional development and other factors in mitigating or responding to economic shocks. Studies examining new pressures on natural resources (e.g. Evans, 2011) describe how policy-makers respond to resource scarcity by increasing supply and managing shocks. Other research focuses on specific resources such as water (Allan, 2011), emphasising demand-side management (influencing consumption patterns), infrastructural investment, sustainable intensification and virtual water trade. A range of research examines responses to increased foreign pressures on land (Cotula, 2011), while there is an emerging literature (e.g. UNEP, 2011 a and b) on the promotion of renewable energies to tackle carbon-space scarcities. Dercon (2011) assesses whether different types of green growth policies have different effects on the poor, e.g. arguing that compensatory social protection must be part of strategies to adequately price natural capital.

More generally, the public sector could tackle the new challenges and stresses by addressing the four 'DSER' pillars by:

- **Managing demand** for water, energy and land by influencing consumption and use, e.g. by getting global and national prices right, enacting emission-reduction policies or reducing wastage.
- **Increasing the quantity and quality of supply** of water, energy and land – if doing so is sustainable – by investing in expanding access to resources (e.g. through infrastructure) and by promoting an enabling environment for investment on the supply side (e.g. improving national and international conditions for finance).
- **Promoting (resource) use efficiencies**
 - *Providing an enabling environment for technological change (national innovation systems, tax and/or subsidy system, support organisations)*
 - *Promoting a flexible and adaptive economy through institutional development in order to allocate natural resource use appropriately (institutional development)*
 - *Ensuring that trade-offs and externalities among resources are considered through coordinating activities (WEL efficiency)*
- **Improving resilience** so that the **poorest** benefit from and cope with changes (e.g. through social protection, virtual resource trade) and putting in place complementary policies to exploit the opportunities (e.g. linking local farmers and foreign firms in large land deals).

ROLES OF THE PRIVATE SECTOR

The private sector affects the management of water, energy and land both as a user and as a provider. It must therefore respond to the new resource challenges, as some businesses are beginning to do. Private-sector decisions about resource use affect ISG. This section in each chapter deals with a number of questions. How is the private sector reacting to perceived or actual resource scarcities? Which factors (e.g. public policies, corporate governance models, regulation, incentives) influence how the private sector reacts and what strategies it adopts? Are private companies operating at the frontier of the technological possibilities in using water, energy and land (e.g. introducing the most energy-efficient, renewable technologies, or the best land-use techniques)? If not, is this because of specific barriers to the adoption of new technologies? If the reason is that externalities are not taken into account when making investment decisions this is essentially a form of market failure.

Finally, we ask whether the private sector is taking initiatives to improve management of water, energy and land. If so, why? And what has been the impact of doing so on ISG? Most researchers now agree that it is the core business activities that have the greatest impact on development. It is in both the business and the social interest to use resources efficiently and sustainably (WBCSD, 2009), although in practice there is a wide range of behaviour at the interface between narrow, short-term business interests and broader, longer-term public benefits (Newborne, 2011, commissioned background paper).

Chapter 10 builds on the evidence from Chapters 5-7 to analyse how the private-sector roles as user and provider can be used to manage the demand for resources, increase the supply of resources, increase the efficiency of resource use, and meet the needs of the poorest.

INTERACTIONS BETWEEN THE PUBLIC AND PRIVATE SECTORS: POLITICAL ECONOMY ANALYSIS

Political economy analysis tends to be critical of reports that present only ideal or 'best practice' suggestions for improving development outcomes. Instead, it recognises the need to explore the underlying causes of poor development outcomes and weak governance, the local political context, the incentives and interests that drive political and economic actors, the types of power they hold and coalitions they build, the issues around (and ways in) which business and citizens organise and interact with the state.

Four strands of research on these issues are discussed in the Appendix: (1) State-Business Relations (SBR); (2) leadership, coalition-building and agency; (3) local governance, public goods and common pool resources (CPR); and (4) regional and international drivers affecting domestic political processes and governance. In effect, these examine three interacting dimensions that shape national policy processes: (i) structural or foundational factors; (ii) rules of the game or formal and informal institutions; and (iii) political processes or the here and now and its actors¹. Table 4.1 lists these key considerations (see also Box A4.2 in the Appendix for key terms in political economy analysis).

¹ The World Bank, the European Commission, the UK Department for International Development (DFID), the Swedish Agency for International Development Cooperation (Sida), the Dutch Ministry of Foreign Affairs, the Danish International Development Agency (Danida) and others have developed political economy analytical frameworks. Terminology and the level at which such analysis is undertaken (global/regional/national level, or sector level and problem-driven) but the key characteristics (a combination of structure, institutions and agency/actors) are the same.

1. **Structural or foundational factors:** These are deeply embedded factors that have shaped – and still shape – the nature of the state and political system, such as geography, history, socioeconomic structures, and sources of revenue². The sources of revenue, for instance, may have a profound impact on whether power holders engage in bargaining over the type and level of taxation and the state's reciprocal obligations. Colonisation deeply affected the nature of the relationship between state and traditional authorities and of state relations vis-à-vis land, etc. Another example of fundamental factors is the 1973 oil crisis and drive towards energy security, which facilitated the development of renewable energy in Brazil.
2. **Institutions and informal 'rules of the game':** In political economy, 'institutions' are the formal and informal 'rules of the game' (North, 1990) or established patterns of behaviour. Institutions shape social, economic, political and cultural relations. Formal political, legal, and market institutions shape political competition, laws protecting property rights and the enforcement of contracts. But only in combination with informal norms and practices is it possible to understand the nature of political settlements. Three questions lie at the core of this dimension of the analysis. How is power distributed? Do rules of the game depend on personalities and personal networks, or are they more impersonal and predictable? Which interest groups have (formal and informal) power and influence over the political executive?
3. **Political processes – 'here and now':** This dimension is about day-to-day politics and how these are shaped by both the formal and informal rules of the game, as well as by events. It is also influenced by the quality of leadership, the capacity of relevant actors, and the type of coalitions that develop and evolve over time. Such factors help shape policy priorities, affect how credible such commitments are, and their likely rates of success.

Political economy analyses that focus on these dimensions can be undertaken at the national, sector or sub-sector level, e.g. using a sector-specific, problem-focused approach (World Bank, 2009a). Because of the complex, varied and changing settings of managing natural resources and specifically the WEL nexus, this Report includes some sector-specific analyses in order to capture the room for manoeuvre for reforms and the likely trade-offs in managing natural resources in ways that foster ISG (Leftwich and Wheeler, 2011).

Table 4.1: Studying the nature of the interactions between public and private sectors

Political economy dimension	Illustrative issues
Structural issues	Path dependency; resource endowments, geography
Formal and informal institutions	Property rights, trust, networks and interest groups
Current political processes	Leadership, personalities, recent political agenda

4.2.4 LESSONS LEARNED

This section in each of the three chapters concludes and provides a number of lessons for how water, energy and land can best be managed to promote ISG.

4.3 CONCLUDING REMARKS

This chapter has outlined a research framework in which to analyse how new challenges (e.g. scarcities) affect a country's ability to manage natural resources for the benefit of ISG. It has identified three roles for public policy and two for the private sector and discussed the importance of the institutional context within which they interact and play their respective roles in relation to the four pillars of DSER.

In Part II, we apply this framework to water, energy and land (Chapters 5-7) and discuss the interrelations within the WEL nexus as set out in Chapter 2. This sets the context for Part III, in which we turn to the three governance gaps – public, corporate and global – that must be addressed in order to achieve the transition to inclusive and sustainable growth.

² An important issue is how to manage the rents arising from the exploitation of natural resources, and also to avoid conflict (Corden and Neary, 1982; Gelb, 1998; Collier, 2007). If resources are poorly invested, increased rents will lead to a real appreciation of the currency and challenge competitiveness (the 'Dutch disease'). The presence of natural resources can lead to conflict over their exploitation and hence lower growth and development.

PART TWO

CASE STUDIES: WATER, ENERGY AND LAND

This second part of the Report focuses on the three elements of the WEL-nexus: water, energy and land. It analyses each of the three in turn, the trends affecting them, the issues that need to be addressed, the roles of the public and private sectors in tackling each of these issues and the policy implications that emerge from this analysis. In each of the chapters, we also illustrate linkages among water, energy and land.

A final chapter in this part will discuss the challenges and opportunities in managing the WEL-nexus

CHAPTER 5 MANAGING WATER STRESS

The availability of water resources and the management of water for inclusive and sustainable growth are attracting attention not least in the context of climate change. This chapter addresses these issues within the context of the WEL nexus.

5.1 CONTEXT

5.1.1 WATER SCARCITY AND INSECURITY

Global and national political and business circles have developed a strong interest in freshwater scarcity (Committee on Foreign Relations, U.S. Senate, 2011; WEF, 2011a). The potential impacts of too much or too little water, and the need for institutions and infrastructure to manage water effectively for growth and poverty reduction, have given rise to the concept of water *security* (Calow et al., 2002, 2011b; Grey and Sadoff, 2007). Climate change is one factor in this renewed focus on water, given the 'abundant evidence that freshwater resources are vulnerable and have the potential to be strongly impacted' (Bates et al., 2008). Another is increasing demand associated with population growth and changing patterns of consumption, especially food. In many regions, from the Middle East to northern China and India, water resources are *already* being overexploited and/or polluted. Concerns are now being raised by the private sector, as well as by public bodies and international institutions. Some major companies believe that demand could outstrip accessible, reliable supply by 40% within two decades (Addams et al., 2009).

While the scarcity debate is dominated by the 'gloomy arithmetic' of physical availability, this chapter starts from the premise that scarcity can also arise in situations where water is apparently abundant. This is because, apart from availability, access is the principal determinant of water scarcity. Since access to water is mediated through institutions and infrastructure, 'poverty, inequality and unequal power relationships' can mean that people (and ecosystems) face water scarcity even where there is no physical shortage. This distinction corresponds to the difference between physical scarcity (where availability is the key determinant) and economic scarcity (where access is the key challenge) (Cosgrove and Rijsberman, 2000; Molden, 2007). The continuing debate about how to measure water scarcity is presented in Box 5.1.

Having too much rather than too little water, especially in the context of climate change and the increased likelihood of extreme events – floods and tropical storms as well as droughts (Kundzewicz et al., 2007) – also poses a threat. Hence some definitions of water security cover both 'acceptable quantity and quality of water' and an 'acceptable level of water-related risks' (Grey and Sadoff, 2007). Here, we combine the definitions offered by Calow et al. (2002, 2011b) and Grey and Sadoff (2007): Water security is the availability of an acceptable quantity and quality of water for health, livelihoods, ecosystems and production and the capacity to access it; coupled with an acceptable level of water-related risks to people and environments, and the capacity to manage those risks.

Box 5.1: Water scarcity: key concepts

A simple proxy for physical water availability is renewable water resources per capita per year divided by the population. From this relatively straightforward measurement, Falkenmark et al. (1989) developed a Water Stress Index based on estimates of water requirements for household, industrial and agricultural uses, and the needs of the environment. This defines water stress as occurring below 1700 m³/person/year, while countries are classified as water-scarce if they have less than 1000m³/person/year, and face absolute water scarcity below 500m³/person/year. The measure incorporates human and environmental needs. It does not, however, address the 'economic' dimension of water scarcity because it does not consider how infrastructure and institutions mediate access. Furthermore, it is usually calculated at the national level, overlooking sub-national differences in availability as opposed to need, and water needs, which vary according to climate and socioeconomic factors (Rijsberman, 2006). It is also difficult to make estimates of renewable water resources in trans-boundary contexts.

The *Water Resources Vulnerability Index* determines that countries are water-scarce when they withdraw 20% – 40% of annual available resources, and severely water-scarce if withdrawals exceed 40% (Raskin et al., 1997). By this definition 36% of the global population – about 2.4 billion people – already live in physically water-scarce areas (Veolia and IFPRI, 2011). This measurement has the advantage that it accounts for differing levels of water use in each country or basin. However, the Vulnerability Index again masks key issues: the question of access, given that withdrawals require infrastructure to make

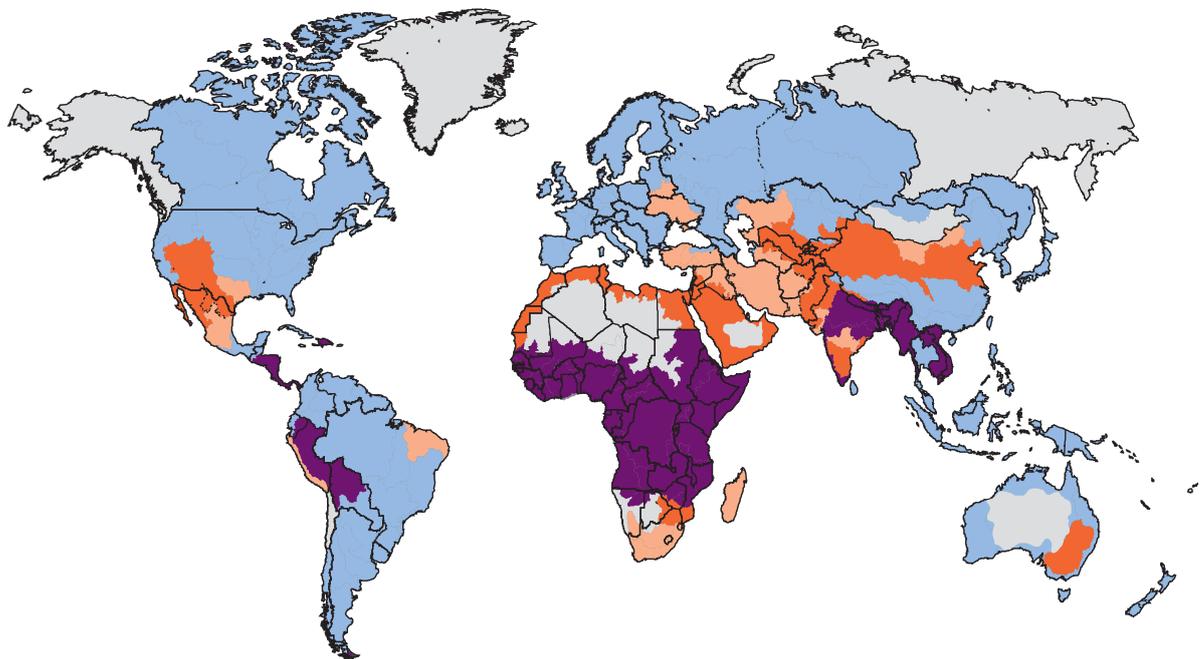
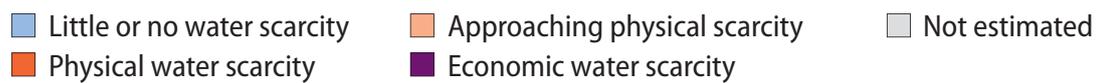


the water available to meet human needs; that water withdrawn may be used consumptively (i.e. lost to the atmosphere through evapo-transpiration) or non-consumptively (i.e. returned to the liquid water cycle for other users); and that different countries will be more or less able to adapt to water stress (Rijsberman, 2006).

There have been various alternatives proposed in response to these challenges, particularly the problem of accounting for differences in the institutions and infrastructure that mediate access. Access to drinking water, covers only one use of water, and omits the issue of access for other purposes such as sanitation, hygiene, and 'productive use' such as irrigation. The difficulties in capturing all aspects in a single metric are immense. Nonetheless, the following definitions of economic and physical water scarcity developed by the International Water Management Institute for the 2007 Comprehensive Assessment of Water Management in Agriculture are relatively intuitive and will serve as a useful reference point (IWMI, 2007).

1. **Little or no water scarcity:** Abundant water resources relative to use, with less than 25% of water from rivers withdrawn for human requirements.
2. **Physical water scarcity:** Water resources development is approaching or has exceeded sustainable limits. More than 75% of river flows are withdrawn for agriculture, industry, and domestic purposes (accounting for recycling of return flows)
3. **Economic water scarcity:** Human, institutional, and financial capital limit access to water even though enough water is available locally to meet human demands. Less than 25% of water from rivers is withdrawn for human purposes, but malnutrition exists.

Figure 5.1: Areas of physical and economic water scarcity



Source: Molden (2007)

5.1.2 DRIVERS EXACERBATING THE PROBLEM

5.1.2.1 DEMOGRAPHIC CHANGE

Although water is renewed through the hydrological cycle, it remains a finite resource: freshwater accounts for only 2.5% of the planet's total water, 99% of which is groundwater or held in glaciers (World Bank, 2010). Given projected population growth from around 7 billion now to over 9 billion by 2050 (UNFPA, 2009) the rising demand for water will push some areas towards physical scarcity. Much will depend on the location of population growth: the fastest growth is projected in sub-Saharan Africa and the Middle East, and the greatest overall gains in Asia (Carpenter, 2005), areas already facing severe physical and economic water scarcity (de Fraiture et al., 2007). Increased urbanisation in low- and middle-income countries, is likely to place additional strain on ageing infrastructure and could increase political pressure to reallocate water from other sectors, particularly agriculture (Molle and Berkoff, 2006).

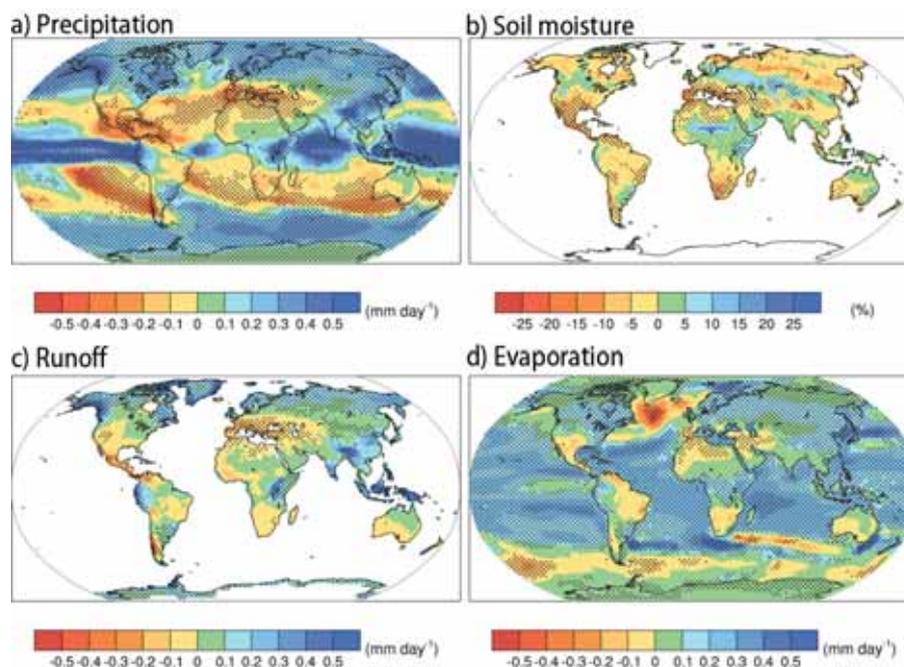
5.1.2.2 GLOBALISATION AND SHIFTING PATTERNS OF WEALTH

The demand for food and feed crops is projected to more than double over the next 50 years, a function both of population growth and dietary changes. Meat consumption is expected to lead to a 25% increase in demand for grain for animal feed, which will in turn increase agricultural water needs. Without improvements in water productivity or production patterns, water 'consumed' (i.e. lost to the atmosphere) in agriculture will increase by between 70% and 90% in the same period (de Fraiture et al., 2007). A 36% surge in the global demand for primary energy by 2050 (IEA, 2010b), largely in non-OECD countries, will have implications for water. While withdrawals for cooling power plants are largely non-consumptive, losses through evaporation will be more substantial from biofuels and hydropower. As with population growth, much depends on the location of the changing demand for water. Broader economic changes will also affect levels and patterns of demand, and the 'water footprint' of countries and regions. As industrialising economies move away from a dependence on agriculture, consumption of their own internal water resources may stabilise, but this will increase demand for agricultural water in those countries on which they depend for food imports through transfers of 'virtual water' – water embedded in food and other commodities (Allan, 2003). In contrast to water for food, water to meet domestic needs has to be found locally.

5.1.2.3 GLOBAL ENVIRONMENTAL CHANGE

Several projections for the water-related impacts of climate change have been established with reasonable certainty, namely those associated with increases in temperature, precipitation variability and sea-level rise. The IPCC confidently projects decreased low-season flows from water stored in glaciers and snow, sea-level rise causing salinisation of groundwater and estuaries, and increased likelihood of drought and flooding in many areas. This will have serious ramifications for water management in the affected areas. Although there is greater uncertainty with respect to precipitation change and other variables (see Figure 5.2), the IPCC considers it 'very likely' that hydrological characteristics will change sufficiently to make it difficult to predict future conditions on the basis of past experience (Kundzewicz et al., 2007).

Figure 5.2: Fifteen-model mean changes in percentage (a) precipitation, (b) soil moisture content, (c) runoff, and (d) evaporation for the last two decades of the 21st century compared to the last two decades of the 20th century.



Source: Meehi et al. (2007)

Note: Regions are stippled where at least 80% of models agree on whether mean change is positive or negative. Changes are annual means for 2090-2099 relative to 1990-1999 for the Special Report on Emissions Scenario A1B (rapid economic growth, low population growth, rapid introduction of new and more efficient technology).

Efforts to mitigate climate change are likely to accelerate the demand for water-intensive modes of energy production. The World Bank (2010) estimates that 3%-4% of total abstraction is currently in the form of evaporative losses from reservoirs, a proportion which may increase if developing countries tap their substantial hydropower potential.

5.1.2.4 EFFECTS OF DRIVERS ON DIFFERENT SECTORS

The impacts of these drivers will be differentiated across the main water-using sectors. Agriculture, which accounts for around 70% of global extractions (over 90% in some cases), is at the heart of the challenge. Reallocation could provide the water needed for high-value uses – drinking water and sanitation, industry – as well as for the environment. As competition for water intensifies, municipal and industrial demands can be expected to make agriculture a residual user (Turrall et al., 2011).

The energy sector represents 10% of global abstractions of water, though much of this is returned for other uses, but the demand for new energy sources could have major implications for water, food production, food prices and virtual water flows. For example, the production of feedstock for biofuels competes with food production for prime cultivated land, and the biofuel water ‘footprint’ (i.e. the volume of freshwater used to produce goods and services for consumption) is large compared to other forms of energy. In countries such as Brazil and the USA, the choice of crops will be influenced by local and international subsidies, and by oil prices (Allan, 2011).

Domestic and other industrial uses account for 20% of current abstractions. Such uses are likely to carry significant weight in deciding how water should be allocated because of their importance for inclusive growth, continuing urbanisation (by 2030, over 60% of the world’s population will live in urban areas) and the persistent lack of access to safe drinking water in some regions. Although the volumes of water involved are relatively small, the quality and reliability demands are much higher.

Figure A5.1 shows the projected distribution of extraction and consumption by sector up to 2025, although other estimates project significantly higher water withdrawals by 2030 – 4500km³/year for agriculture, 1500km³/year for industry, and 900km³/year for domestic uses (Addams et al., 2009).

5.2 ISSUES IN MANAGING WATER FOR INCLUSIVE AND SUSTAINABLE GROWTH

In this section we look at managing water resources for inclusive and sustainable growth across three dimensions: (1) ensuring the provision of water for social inclusiveness (5.2.1); (2) ecological sustainability (5.2.2); and (3) economic growth (5.2.3). Section 5.2.4 discusses the implications including for the WEL nexus.

5.2.1 WATER AND SOCIAL INCLUSIVENESS

Ensuring the provision of water for social inclusiveness implies that all human beings should (1) have access to a minimum quantity of water of sufficient quality for their survival and (2) be exposed to an acceptable level of water-related risks (i.e. enjoy water *security*). The access dimension includes access to safe drinking water and sanitation (as underlined in the MDGs) and to the water that rural smallholders need for agricultural production (including livestock) and other productive uses to secure their livelihoods. Access to water therefore has rights, infrastructural and financial dimensions.

Regions with *economic water scarcity* usually have sufficient water resources, but lack the means to access, convey and store the water to meet their needs and to protect people against extreme events. Access to safe water supply and sanitation is a prerequisite for a decent, dignified, secure and healthy life and the avoidance of water-related illnesses (WHO, 2003). It also has important gender implications since it is women and girls who fetch and carry water – a chore that is time-consuming, hazardous and can have high opportunity costs in terms of girls' education and the economic opportunities available to women and girls (WSP, 2010). For countries facing both economic and physical water scarcity (e.g. Burkina Faso, Kenya, Rwanda and Yemen), ensuring that poor people have access to water and for irrigation and other productive uses is important for inclusive growth (OECD, 2008).

It is primarily the responsibility of the public sector to provide access to water for domestic and agricultural purposes. Even if the private sector or local communities provide the services, the public sector usually needs to ensure that the poorest receive them. Where the private sector is a dedicated provider of water services (rather than providing water as an ancillary activity), it has found it harder to serve poor rural communities and populations in informal urban settlements. At the same time, the private sector appears to be increasingly involved in large irrigation schemes, including those financed by foreign direct investment in land. While the private sector may provide infrastructure and employment opportunities (see Chapter 7), however, such initiatives can have negative impacts on the established water rights of existing smallholders (Bues, 2011; Woodhouse and Ganho, 2011).

In countries with limited *water resource endowments*, access for human domestic consumption is often not the primary issue. Of 23 water-scarce countries with a total renewable water availability of less than 1005 m³/c/yr approximately 60% have an improved water-supply coverage of over 90%. The data confirm that coverage is much more a function of economic development than of water availability. In water-scarce countries, however, access to irrigation water may be an issue for poorer rural populations (see the following section).

Protection against an unacceptable level of water-related risk is also highly relevant for social inclusiveness in LICs since it is generally the poor who settle in fragile environments (such as flood plains and deforested watersheds that are subject to landslides), and who are most vulnerable to water-related risks. Providing such protection falls mainly to the public sector and includes hydrological monitoring and establishing early-warning systems. It also requires infrastructure to protect against floods and to reduce low flows, and spatial planning and the regulation of land use (e.g. of agriculture in flood plains). The development of water infrastructure – particularly large dams – can, however, have significant social and environmental impacts. In this sense, poorly planned responses to the issues of water scarcity and security may both jeopardise inclusiveness (by failing to provide universal access), and also impose direct costs in the form of the dispossession and forced displacement of vulnerable populations, or through the loss of unrecognised ecosystem services on which poorer people depend.

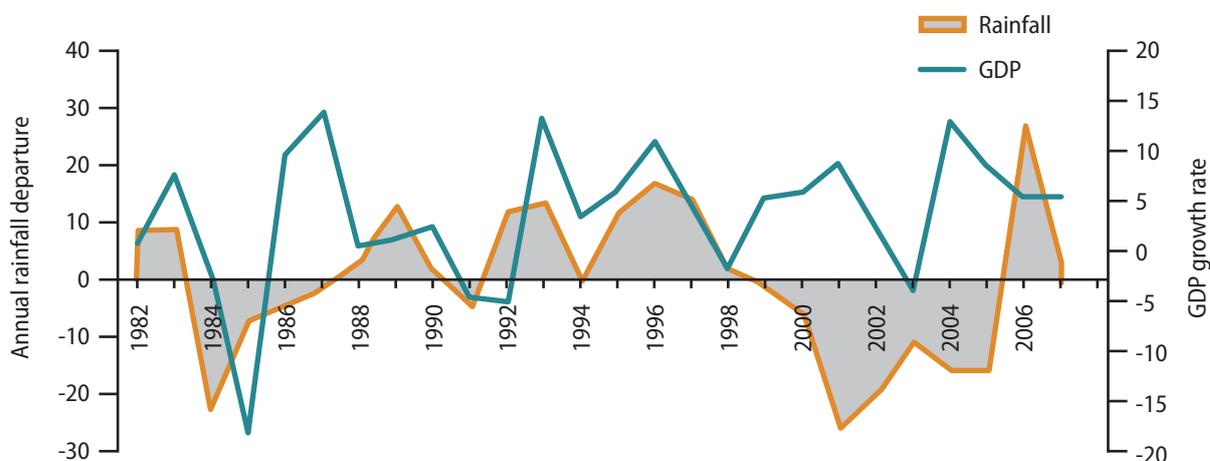
5.2.2 WATER AND ECONOMIC GROWTH

Water is critical for food production (irrigation), energy generation (hydroelectricity, cooling, biofuels) and most industrial processes. Hence the provision of sufficient water of the requisite quality for such uses is important for economic development and growth.

In regions experiencing *economic water scarcity* infrastructure is often a key prerequisite for growth. A detailed analysis of factors favouring economic development reveals the critical importance of the spatial and temporal distribution of water availability – i.e. *variability*. The most important factor appears to be rainfall variation between months because of the challenge this poses for agriculture in predominantly rural economies (Brown and Lall, 2006). Countries without adequate storage, conveyance and regulation infrastructure are particularly vulnerable to rainfall variability, and become 'hostage to hydrology' (Grey and Sadoff, 2007). In other words, it is not total availability but variability, and the capacity to manage it, that show the strongest link to poverty and/or growth in predominantly rural economies. For instance, building on World Bank analysis (World Bank, 2006b), Conway and

Schipper (2011) confirm Ethiopia's sensitivity to rainfall variability, but also show that the diversification of the country's economy and reduced reliance on rain-fed production as a contributor to GDP have weakened this link (Figure 5.4).

Figure 5.3: Annual rainfall and GDP growth for Ethiopia 1982-2007



Source: Conway and Schipper (2011)

Storage capacity can be enhanced by protecting natural storage and buffering processes (e.g. forests in watersheds, wetlands, floodplains) – which contribute both to ecological sustainability and indirectly to growth – and by developing infrastructure such as reservoirs and dams. Currently sub-Saharan Africa uses only 7% of its hydropower potential (AfDB, 2009), which suggests low water-storage capacity. It has been argued, however, that investments in water storage and conveyance may need to reach a 'tipping point' before they contribute to growth (Grey and Sadoff, 2007). Obviously, it falls to the public sector to finance basic water infrastructure and related institutions as their provision goes beyond narrow corporate interests.

Once a certain level of development has been achieved, the private sector (e.g. irrigation companies, mining companies, industrial firms, hydropower firms) as well as irrigation smallholders (e.g. in northern China or India) may develop water resources for their own purposes. An important function of the public sector is therefore to regulate access and rights and protect the environment. In particular, in the planning and implementation of hydropower projects, the public sector plays a crucial role in ensuring adherence to environmental and social safeguards (Hensengerth, 2011).

In regions of *physical water scarcity*, total water availability is limited and some river basins may be closed (i.e. no water reaches the ocean or inland outlet). As mentioned above, water scarcity and economic development are not directly related. The data show that of 23 water-scarce countries 12 are MICs and only three are LICs. Managing water for inclusive and sustainable growth in countries where water is scarce may require difficult trade-offs among different uses. Although it is often suggested that social and environmental needs must take priority over economic uses (Le Quesne et al., 2007), economists tend to argue that water should be allocated to those uses that produce the highest returns. In many water-scarce regions, agriculture uses the most water but the economic return is often limited. In economic terms it might make sense to reallocate water to industrial uses, while for social and food-security reasons it may be rational to support the agricultural sector. In many regions with physical water scarcity, such as northern China (see Box 5.7), governments are exploring how to use both regulatory and market mechanisms to reallocate water from agriculture to municipal and industrial uses, although Molle and Berkoff (2006) question whether this is always for economic reasons.

Some high-income water-scarce countries are oil producers, which means they have access to cheap oil with which to pay for the desalination of seawater. But non-oil-producing countries such as Singapore demonstrate that applying strict measures on water conservation and the import of food (and therefore virtual water) can permit growth even where water resources are severely constrained (Muller et al., 2009). Israel is an example of a water-scarce non-oil-producing nation that has become a high-income country (HIC) in the space of 60 years and is now reallocating agricultural water to high-value industrial uses. However, Israel's heavy dependence on external sources of water arguably limits water use in co-riparian countries, particularly Palestine (Dombrowsky, 2003). In addition, the use of the River Jordan by both Israel and Jordan is leading to the Dead Sea shrinking at the rate of one metre a year. This is one of many cases where water resources have been intensively developed through policies of 'capture and control', so that growth is to some extent being achieved at the expense of the environment.

5.2.3 WATER AND ECOLOGICAL SUSTAINABILITY

Water plays a fundamental role in sustaining land and water-related ecosystems, and forests, wetlands and floodplains are crucial in storing and regulating water. Hence, the protection of ecosystems is vital in order to enhance water security, and the provision of sufficient water is essential to sustain water-related ecosystems. Links include those between (1) flow regimes and fish migration; (2) minimum and pulse flows and the flushing of sediments or contaminants; (3) ecosystem services and products and the livelihoods of poor people (UNEP/IWMI, 2011); and (4) wetlands, water storage and flood control. The Millennium Ecosystem Assessment (2005) concluded that attempts to develop water resources to encourage growth have not sufficiently recognised the needs of wetland ecosystems, and that there is evidence of increased risk of abrupt, non-linear change both in systems and in the services they provide (Finlayson et al., 2005).

Water resources are also being degraded by over-abstraction in water-scarce areas (e.g. Aral Sea, Dead Sea, North China Plain), as well as pollution – which is a problem in a growing number of developing countries. Uncontrolled pollution, in particular by enterprises such as mining companies, but also from fast-growing urban settlements and agriculture, can severely affect both the environment and health. In the Middle East and North Africa (MENA) region, for example, the annual cost of water-related environmental degradation is an estimated US\$ 9 billion, or between 2.1% and 7.4% of the GDP of MENA countries. Hence, an important role of government is to set and enforce standards for abstraction, factoring in environmental costs, and to control, diffuse and point-source pollution. These pose massive challenges in those countries (the majority) whose regulatory authorities lack the monitoring information, enforcement capacity or political authority to intervene effectively.

5.2.4 IMPLICATIONS FOR MANAGING WATER FOR INCLUSIVE AND SUSTAINABLE GROWTH AND FOR THE WEL NEXUS

The above discussion shows that there may be synergies and trade-offs in using and managing water to achieve the triple objectives of inclusive and sustainable growth. While some uses and measures contribute to more than one objective (e.g. watershed protection may contribute to social inclusiveness, ecological sustainability and possibly to economic growth), the use of water to achieve economic growth can sometimes undermine social and environmental objectives. Hence the challenge is to take the three ISG objectives into account in allocating water or access to water.

The previous section also shows that the use and management of water is closely related to land and energy issues, which illustrates the WEL nexus. Water is an important input for both food production and energy generation, and in that sense the security of water, food and energy are closely related (WEF, 2011a). While all agricultural production requires water, whether it is rain-fed or irrigated makes a huge difference to the water budget. In rain-fed agriculture, plants grow on the basis of soil moisture (or 'green water'), whereas irrigation requires liquid (or 'blue') water to be withdrawn from the system. In water-scarce or drought-prone areas, irrigation greatly boosts agricultural productivity. Similarly, different types of energy production also vary in their water demand and impact on water-resource systems. Biofuel production may be at the expense of food security and also increase pressures on the quantity and quality of water resources. While the use of fertilisers and pesticides may affect the quality of water regardless of its availability, the issue of quantity poses a real challenge in water-scarce regions. Hydropower is an important source of renewable energy, and reservoirs (often multi-purpose) may serve to buffer hydrological extremes. This has led to a new debate on the role of dams in mitigating and adapting to climate change. Since very little hydropower potential has been developed in LICs, in particular the least-developed countries, several donors are now re-engaging in hydropower, although it is important that they do so in ways that avert or mitigate any negative social and ecological effects. This underlines the fact that decisions about land use and energy generation have direct implications for the quantity and quality of water.

Energy is an important input factor for water supply, especially in water-scarce areas where water is pumped over high altitudes or long distances or to desalinate seawater. At the same time, because many water-scarce areas are rich in solar radiation (and some in fossil fuels), it may become possible to use renewable energy to develop water-conveyance and desalination schemes.

The complexities involved in managing water resources have given rise to the concept of Integrated Water Resources Management (World Bank, 2004). The Global Water Partnership (GWP) defines IWRM as 'a process which promotes the co-ordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems' (GWP, 2000: 22). In stressing the need for coordinated management of water resources without compromising ecological sustainability, this definition encompasses the concept of ISG and explicitly takes the water-land nexus into account. Arguably it therefore permits the consideration of other interdependencies such as the water-energy nexus.

There are many other interpretations beyond the very broad GWP definition. IWRM is usually associated with the concept of River Basin Management (RBM): the idea that water resources should be managed at the level of river basins rather than according to political or administrative boundaries. Another interpretation of IWRM emphasises the integration of different water-using

sectors, such as water supply and sanitation, industry, agriculture, energy, and nature protection (GWP, 2000; World Bank, 2004). The 1992 Dublin Principles stress the need to treat water as an economic good and the importance of managing water at the lowest appropriate level (World Meteorological Organization, 1992), fostering bottom-up decision-making (Rogers and Hall, 2003; Butterworth and Warner, 2010). So there are at least three coordination challenges regarding (1) different jurisdictions at the river-basin level; (2) different water-using sectors; and (3) water management across different levels of administration, which may reach from the local to trans-boundary and global levels. Finally, and in the context of climate change, some authors stress the need for *adaptive* management of water resources that is 'robust to uncertainty', and thus for adaptive and integrated approaches (Huitema and Mostert, 2009; Pahl-Wostl, 2009).

Unsurprisingly, given the complexities involved in IWRM, the vast majority of developing countries have yet to implement such plans (Biswas, 2004; van der Zaag, 2005; Butterworth and Warner, 2010; Horlemann and Dombrowsky, 2011).

5.3 THE ROLE OF THE PUBLIC AND PRIVATE SECTORS IN MANAGING WATER FOR INCLUSIVE AND SUSTAINABLE GROWTH

5.3.1 INTRODUCTION: ACCESS, ALLOCATION AND ACTORS

Sections 5.1 and 5.2 highlighted two major tasks implicit in managing water for inclusive and sustainable growth: allocating between different uses, and increasing access, especially for those who lack water in sufficient quantity or quality to sustain their health and livelihoods. In each case we use the different allocation and access challenges and the potentially divergent roles of the public and private sector to frame the analysis, although the distinction can become somewhat blurred in practice because water management is characterised by overlaps and interactions.

With these broad distinctions and caveats in mind, Section 5.3 explores public and private roles and interactions in managing water for inclusive and sustainable growth. We present examples of innovative developments to address access and allocation problems at different spatial scales. Innovations respond to changing incentives and pressures, including perceived and actual water scarcity. Although roles vary between the access and allocation tasks, the broad groups of actors are similar.

Within the public sector, *national agencies* such as government ministries are typically responsible for developing broad policy and planning frameworks, and obtaining much of the necessary finance. In the case of allocation, inter-agency task forces are sometimes convened for specific functions such as hydropower assessment and planning, bringing together ministries responsible for agriculture, water, energy and transport. Such bodies are likely to grow in importance in areas where intersectoral competition and climate variability are increasing – in China, India and South Africa, for example – as will their international equivalents involved in trans-boundary water management issues.

Regional public-sector agencies that are critical to water management include structures established according to administrative boundaries, such as local authorities and municipalities, and hydrological boundaries, such as river-basin organisations (RBOs). Both play a role in ensuring that water resources are protected and equitably and sustainably used, particularly where they are empowered to take on some local management functions (e.g. through byelaws). The devolution of responsibility, however, is often not matched by funds, which leaves sub-national entities with low capacity. This is often the case for RBOs, which are newer and may have a somewhat ambiguous status both as platforms for multi-stakeholder dialogue and as entities for planning and implementation.

At the *local level*, *communities and households*, with support from *local government* and *civil society institutions*, are increasingly being given ownership of, and responsibility for, water-supply infrastructure, especially in rural areas – a shift intended to increase the limited lifetime of many interventions to increase access.

Within the *private sector*, *MNCs* are increasingly interested in understanding water risk, extending to the 'virtual water' embedded through their supply chains (SAB Miller et al., 2010). Their ambitions may also extend to collaborating with stakeholders in the water basins where their operations are based, to resolve specific water-management issues, e.g. Coca-Cola's Water Resource Sustainability Requirement (The Coca-Cola Company, 2011). Such activities at company level, at the 'fringes' of the allocation task, are accompanied by signs of increased cross-company engagement in initiatives such as the Water Resources Group Phase 2 (whose partners include the International Finance Corporation (IFC), the World Economic Forum (WEF) and a large number of MNCs), which claims to have the potential to 'support governments... to undertake public-private transformations in the water space' (WEF, 2011d: 2). Whether such initiatives presage 'new normative approaches to water management' (ibid.) or simply provide a more structured route for the private sector to influence decisions regarding water allocation will need to be evaluated carefully. In terms of access, international corporations have only limited engagement as water-service providers, perhaps because of past difficulties arising from unrealistic assumptions about their ability to bring private finance to inadequately funded public infrastructure (Marin, 2009).

At the intermediate or national level, *private firms* constitute significant water users – for example, large-scale flower farms in Kenya’s Naivasha region – that may be involved in allocation debates. The domestic, medium-to-large private sector may also provide urban services and be responsible for increasing access.

At the local level, *small private actors* can play a critical role in shaping and helping to resolve water-management challenges, especially when their collective impact is considered. This role extends both to allocation, for example where small-scale farmers are exploiting or (occasionally) collaborating to manage a CPR, and to access, such as the desire to use the small-scale private sector to provide technical support and spare parts to community-owned rural water supplies.

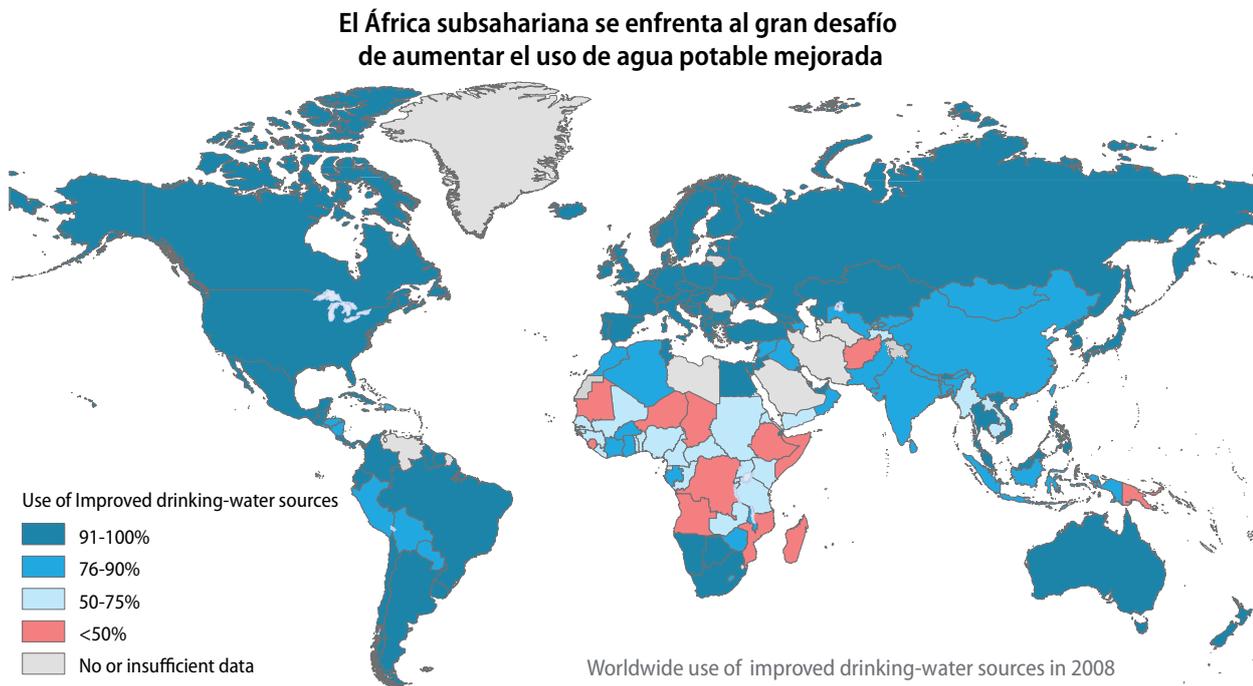
5.3.2 EXTENDING ACCESS FOR THE LONG TERM: RE-THINKING PUBLIC AND PRIVATE ROLES IN PROVISION

5.3.2.1 THE GLOBAL CONTEXT

At the global level, there has been good progress in providing access to improved water sources. But global figures, skewed by rapid progress in China and India, hide major regional differences. By 2008, 18 of the 21 developing countries where access remained at 60% or below were in sub-Saharan Africa (ODI, 2010). The aggregate figures also conceal major national and local disparities, in particular the urban-rural divide and differences between socioeconomic strata. Of the one billion people without access to safe, reliable water, 90% live in rural areas. Furthermore, many who are classified as ‘served’ receive poor or non-existent water services because systems are not working properly.

In part, this picture reflects levels of external assistance. According to OECD data, support for all aspects of water fell from 8% to 5% of official development assistance (ODA) between 1997 and 2008; and *less than half* of the external funding for water and sanitation goes to LICs, only a small proportion of which is allocated to the provision of basic services (WHO, 2010).

Figure 5.4: Worldwide access to safe drinking water



Source: WHO/UNICEF (2010)

Obviously, progress is not measured by ODA levels. As the Global Annual Assessment of Sanitation and Drinking Water (GLAAS) report (WHO, 2010) makes clear, sanitation and drinking water remain relatively low priorities in domestic public spending, and many governments have failed to develop or apply criteria for the *distribution* of funds to the poorest (unserved) populations. Some of the poorest countries are unable to absorb budgets earmarked for sanitation and drinking water because they lack the institutional and human capacity to spend them effectively. Finally, the capacity to deliver and sustain progress at the national level often remains relatively weak, particularly in rural areas. Indeed, achieving *long-term, enduring* increases in coverage that reach the poorest people represents a huge challenge for governments and other stakeholders, not least because of the ‘hidden’ crisis

of functionality: many systems fail to provide a secure supply of water because they break down. Recent figures for 21 countries in sub-Saharan Africa suggest that roughly 40% of hand pumps are 'non-functional', representing a total investment of some US\$1.2- US\$1.5 billion over 20 years (RWSN, 2010). Indeed, Brikké and Bredero (2003) report that in most developing countries, between 30% and 60% of rural water schemes are not working at any given time. One result is that the very poorest people, particularly women and girls, end up paying the most for lower quality, less reliable water services (UNDP, 2006; Sadoff et al., 2006).

Against this background, the key conclusion of the *Human Development Report 2006*, 'Beyond scarcity: Power, poverty and the global water crisis', remains valid, i.e. that the crisis in drinking water is a crisis for the poor, with its roots in politics and institutions rather than water availability (UNDP, 2006; Batchelor et al., 2010; Calow et al., 2011a). But if the crisis has been 'manufactured through political processes and institutions' (UNDP, 2006), what is being done to address the problem? In particular, *what lessons have been learned about the roles and responsibilities of the state, community and private sector in delivering and sustaining progress?*

Historically, governments have been responsible for ensuring the fulfilment of basic water needs. Now, while governments continue to take the lead in setting targets, developing strategies, defining roles and financing services, service *delivery* is increasingly viewed as a joint endeavour involving the private sector, community-based organisations (CBOs) and Non-governmental Organisations (NGOs) (MacDonald et al., 2005). In part, this reflects the poor performance of government-run programmes that treated communities as passive recipients. By the mid-1980s, it was widely agreed that such programmes had established inappropriate systems that local people either did not want or could not afford, leaving governments to pay for costly, open-ended maintenance. One outcome was the recognition that, particularly in rural schemes, 'end users' needed to be involved in planning and implementation, and to take responsibility for ongoing maintenance. This heralded a new era of community participation in decision-making and management of infrastructure. In urban areas, it was hoped that the private sector would help to improve water supply and sanitation.

5.3.2.2 ACCESS IN RURAL AREAS: FROM STATE PROVISION TO COMMUNITY CONTRACTING

In rural areas, this change also reflects shifts in prevailing ideology. First, widespread *decentralisation* reflects a fundamental shift in beliefs about the role of the state. In most countries the state now facilitates a far more heterogeneous process involving a coalition of different actors and institutions, with communities at centre stage. Second, a global consensus emerged in the 1990s around water as both a social *and* an economic good, leading to the adoption of demand-responsive approaches (DRA) that give priority to communities that articulate demand as an expression of value. Allowing communities to self-select for projects on the basis of widely understood rules is one of key tenets of DRA.

Today, variations on DRA dominate service provision across sub-Saharan Africa, especially in rural areas. These approaches use consumer demand to guide key decisions on investment and procurement. In some cases, the private sector is also viewed as community partner. While the precise roles and responsibilities of the stakeholders differ from one country to another, a pattern is emerging (MacDonald et al., 2005) whereby national agencies provide broad leadership (training, facilitating, developing policies and targets) but devolve implementation to lower levels. After implementation, communities become the owners of the schemes, responsible for setting and collecting user fees, with the aim of at least covering operations and maintenance (O&M). The private sector is also increasingly contracted to provide support services, including the supply of equipment and spare parts, well or borehole siting, drilling, O&M, and organisational support and training. In many countries, however, the capacity of the private sector to 'fill the gap' is weak, in part because public subsidies for hardware stifle its development (Box A5.1 in the Appendix).

Ethiopia: from state provision to community contracting: The situation of water resources and water access in Ethiopia highlights a conundrum faced across sub-Saharan Africa: the country has a relatively generous endowment of water resources, yet at least 35% of rural Ethiopians lack access to safe water. The World Bank (2006) estimates that, of the country's total renewable resources of 1900 m³/capita (according to FAO 1512 m³/capita in 2008), less than 2% is diverted to use. Water for human and livestock consumption – the highest priority use defined by the government – accounts for less than 1% of withdrawals.

Facing a legacy of entrenched poverty, extreme climate variability and a history of drought-related disasters, the Government of Ethiopia (GoE) is seeking to extend safe, reliable water services to a rapidly growing population. Over the last five years, the Ministry of Water Resources, now the Ministry of Water and Energy (MoWE), has led a process of policy reform and the development of the Universal Access Programme (UAP), which aims to achieve universal access to water and sanitation by 2015. Current levels of funding for rural water supply are, in theory, enough to meet the target. At the same time, there are new demands on communities and households to plan, finance and implement water-supply schemes, and on private artisans and traders to fill the contracting gap left by government.

The impact of UAP investment has been dramatic. In 1990 coverage was estimated at roughly 11% of the rural population, whereas government figures now put it at over 65% (WSP, 2011). Progress has not simply mirrored investment, however. Over the last 15 years, the GoE has followed a policy of administrative decentralisation, with responsibility for delivering services and meeting (national) targets progressively devolved to regional, zonal and local water offices. Since the inception of the UAP, the GoE has also recognised the need for community participation in decision-making and community management and ownership of water systems, and hence the need to reduce the state's role in service delivery (WSP, 2011; Calow et al., 2011a). Although progress achieved under the UAP is widely acknowledged, major challenges remain in meeting targets for areas and groups that are hard to reach – inclusiveness – and in sustaining services over time. Ensuring that increased coverage is sustained in the long term is perhaps the most significant challenge (WSP, 2011), since data have historically been based on inventories of built infrastructure and therefore assumed levels of service, rather than on post-construction outcomes. The difference is important: field surveys, albeit limited in scale, suggest that in practice access is far lower than the coverage data suggest, because so many water points fail either permanently or periodically.

The GoE has responded to the sustainability problem, and the difficulty of being able to use funds at lower levels, by mainstreaming the Community Development Fund (CDF), an approach that transfers funds and all planning, financial management, implementation and maintenance responsibilities to communities, including responsibility for procuring goods and services (Ministry of Water and Energy, 2011). Funds for the development of water-supply infrastructure are transferred via a Regional Credit and Savings Institution, a financial intermediary, to train Water and Sanitation Committees (WASHCOs). The WASHCO leads the process of planning and developing a new water point, with significant in-kind community contributions and the contracting of local artisans and suppliers. A 2010 evaluation concluded that, compared to other methods, the CDF offered an efficient, cost-effective and sustainable approach to extending services.

5.3.2.3 TESTING PRIVATE INVOLVEMENT IN ADDRESSING THE URBAN ACCESS CHALLENGE

In South Africa, some 20 years' experience of private-sector participation in urban water supply has left a mixed picture. Since the adoption of the Water Services Act (Republic of South Africa, 1997) state-owned water boards and municipalities are charged with addressing the backlog in access to water and sanitation, a legacy of apartheid times. Since 1994 access to basic water services has risen from 23 million (59%) to 46.3 million (93%) and access to sanitation went from 18.5 million (48%) to 39.4 million (79%) (DWA, 2010). Where unmet social needs persist, mainly in rural areas but also in poor urban townships, they reflect poverty and the problem of organising services for areas and groups that remain hard to reach, rather than a shortage of water (Muller et al., 2009). A growing population, inefficient management, a lack of qualified managerial and technical staff (resulting in budgets not being spent) as well as inadequate institutional arrangements and vandalism, have hindered municipalities from delivering adequate water services (CSIR, 2010; Bhagwan et al., 2006; Mukheibir, 2007).

While it is difficult to attract private investment to rural areas and illegal to sell water infrastructure to the private sector (CSIR, 2010), the government acknowledges the key role of the private sector in assisting municipalities to provide water services (ibid.). Private companies may take on the obligations of the municipalities in a situation of reduced financial and human resources in various ways: (1) constructing and maintaining water infrastructure; (2) providing water services via contracts; (3) investing in public water utilities; and (4) supporting water-service providers (Municipal Demarcation Board, 2010). Franchising is another option (Bhagwan et al., 2006).

In practice, the involvement of private companies in providing water services has been limited, e.g. concessions to private utilities in Dolphin Coast and Nelspruit (USAID, 2005; DWAF, 2003; WSP, 2009), and results have been mixed. The positive effects include the provision of technical skills and knowledge (USAID, 2005). However, (international) private water utilities faced problems such as incorrect demand estimates and outdated infrastructure. Poor implementation of the requirement to provide free basic water led to community discontent, and concessions had to be renegotiated. Furthermore, the involvement of large international companies rather than small-scale local entrepreneurs does little to support inclusive growth (Pybus and Schoeman, 2006).

An international review of the comparative advantages of public-private partnerships (PPPs) and public-public partnerships (PuPs) in providing urban services concluded that the main determinant of performance (assessed against criteria including efficiency and equity) was not whether it was under public or private management, but the political, institutional, financial and regulatory context of reform (Tucker et al., 2010). In the right circumstances, the private sector can improve efficiency and management, but at a relatively high cost. PuPs generally have lower costs and a greater focus on capacity-building and equity. Partnerships with local actors can also improve services by allowing more flexible approaches to meet the needs of different households. In particular, the involvement of civil society and community groups helps to improve services for poor households. A key conclusion is that governments should have a choice of partnership options and be able to end any that are not working.

5.3.3 DEVELOPING, MANAGING AND ALLOCATING WATER RESOURCES FOR INCLUSIVE AND SUSTAINABLE GROWTH

5.3.3.1 INTRODUCTION

Although access to water to meet basic human needs is of fundamental importance, the primary uses of abstracted water remain agriculture (roughly 70%) and domestic and industrial uses (roughly 20%) (World Bank 2010; see Figure A5.1). Hence any discussion of water scarcity and water management at a national, trans-boundary or global, level has to focus on issues of sectoral or 'bulk' water development and allocation, and on the roles of public and private actors in shaping patterns and levels of water use, and in resource management. Agriculture lies at the heart of this discussion, as the allocation tensions arising – or set to arise – in rapidly growing economies are essentially about conflicts between irrigation and other uses, including the environment (Turrall et al., 2011). Where runoff is predicted to decline because of climate change, allocation decisions and trade-offs between agriculture, ecosystems and urban users will become much more challenging (UN-Water, 2007). In addition, when river basins cross international borders, these allocations may be contested by co-riparian countries.

5.3.3.2 DEVELOPING, MANAGING AND ALLOCATING WATER AT THE NATIONAL LEVEL

At the national level, the task of developing, managing and allocating water has historically been addressed as a sectoral issue through the establishment of public water agencies and utilities. At the same time, the main drivers of water demand and investment – for energy, food or industry – have originated outside the water sector (see Box A5.2 in the Appendix).

One consequence of this is the uncoordinated development and management of resources, which encourages different sectors to compete for larger shares of water to boost economic development and satisfy national production needs (World Water Assessment Programme, 2009). Another is the loss of ecological services and the degradation of water resources through over-exploitation and pollution. Hence in China (see below), while public investment in flood control and irrigation has reduced vulnerability, increased food production and raised incomes, it has also incurred massive environmental costs, prompting a major review of the water (and wider economic) model.

Within the *public sector*, these new configurations range from national bodies including national ministries and regulatory institutions, to more localised bodies arranged along hydrological boundaries. For such RBOs a key role, sometimes shared with regulatory bodies, is to define available water resources, allocate variable shares (between uses and users in different parts of the basin), develop river-basin management plans and monitor and enforce compliance. This can be a daunting task: resource conditions are often poorly understood, and administering a system of water rights is logistically and politically complex, particularly where large numbers of private groundwater users collectively withdraw large volumes of water – as in Bangladesh, northern China, India and Pakistan, for example (see Box A5.2 in the Appendix). In most developing countries, allocation procedures are non-existent, ad hoc or poorly developed (Turrall et al., 2011). Nonetheless, investment in basin-level allocation planning and establishing clear, volumetrically defined water rights – where feasible – is a key priority, as this rather than water pricing or trading (Box 5.2) offers the greatest potential for balancing demand and supply in stressed basins.

Within the framework above, *service providers* (public, private or civil society, operating singly or in partnership) and *private-sector users* may be required to play a role in resource management by maintaining hydrological balances and helping to ensure resource sustainability. However, the extent to which private users and corporations can play a neutral role in the management of water resources, particularly allocation, may be limited (see Box 5.7). It is essential to have a publicly established, long-term development and legal and regulatory framework to guide, monitor and enforce standards (World Bank, 2004) and to set appropriate prices.

Box 5.2: What role for market instruments in managing water?

Since the Dublin Conference proclamation that water should be treated as an economic good, there has been growing interest in the role prices and markets can play in addressing problems of inefficient use and physical scarcity. However, the role of water as a basic need, and as a social, economic and environmental resource, makes the design of an appropriate set of prices, or market principles, challenging. Moreover, applying market instruments can be extraordinarily difficult, partly because the flow of water through a basin provides scope for externalities and market failure, and partly because of basic administrative, logistical and political hurdles.

Take utility water pricing in urban areas. Urban water supply is a low volume, high value use. Supply costs associated with abstraction, treatment and distribution are high, while opportunity costs are generally low. The pricing challenge, then,



relates mainly to the supply cost axis, yet very few utilities in developed countries manage to recoup long term marginal costs. In developing countries, aiming for economic perfection is neither practical nor helpful. Instead, the challenge is simply to set, monitor and collect tariffs in a way that is reasonably transparent, legitimate and forces suppliers to be accountable. This alone presents problems for over-stretched utilities lacking human and technical capacity, even when the politics of pricing are favourable. Hence very few are able to recover the costs of operation and maintenance – the lowest rung on the supply cost ladder.

Irrigation, in contrast, is a high volume and often low value user of water. Supply costs are generally modest, but opportunity costs can be high. Why then do we not see more use of prices to reduce inefficiencies (more crop per drop), and markets to encourage reallocation? First, most formal irrigation schemes have not been designed and built to deliver volumetrically monitored and controllable flows to farmers: the main challenge remains one of covering costs through non-volumetric charging systems, itself difficult with large numbers of users and political arguments around affordability. Groundwater users who have self-financed their boreholes do have to pay volumetrically-linked costs, but energy subsidies may encourage pumping and externalities associated with 'chasing the water table' are not included. Imposing 'better' prices is logistically impossible in most places given the numbers of people involved (see Box A5.3). Second, while informal water trading is common place within small areas (e.g. between farmers along a canal), formal trading between major users, or sectors, is rare. This is because establishing clear, enforceable rights according to available (and variable) supply is difficult. Moreover, where water trading has worked beyond the purely local level, there are in place: laws assigning rights; laws describing how rights may be traded; legal systems that enforce such rights and punish infringements; and (in most cases) systems in place for protecting the interests of third parties. These are stiff pre-conditions.

Box A5.3 in Annex provides more information on water pricing.

Box 5.3: Taming anarchy: groundwater irrigation in Asia and the challenge of controlling water and energy use

In Asia, groundwater irrigation is a US\$ 25 billion business, although not one with large, readily identified firms operating within rules set by public authorities. Rather, it exists entirely within the private and informal sectors, is largely self-financed by millions of small farmers, and has emerged over the last 50 years or so as a spontaneous and opportunistic response to the need to grow food and make money. Over this period, private investments in groundwater by Indian farmers are estimated to have reached US\$ 12 billion, and the number of mechanised wells and boreholes has increased from a few hundred thousand in 1960 to around 19 million in 2000 (Shah et al., 2003).

Meanwhile, the groundwater economy is bleeding the energy economy dry. India's farmers use subsidised energy worth some US\$ 4.5-US\$ 5 billion a year, bringing state electricity boards close to bankruptcy (ibid). This issue lies at the heart of the WEL nexus, but it is politically difficult to remove subsidies. A study of the political economy of the removal of energy subsidies in India shows that reforms are hindered by powerful interest groups and by opposing views on essential facts, causal mechanisms and appropriate policy solutions among diverse stakeholders and researchers (Birner et al. 2007). As the demand for energy grows, India is applying for concessional finance from the Clean Technology Fund (CTF) to invest in energy expansion through hydropower, rather than dealing with the thorny issue of demand management.

The explosion in groundwater-based irrigation in Asia has fuelled an agrarian boom and benefited millions of small farmers. But in some areas the costs of unrestricted groundwater development are all too apparent as water levels drop, pumping costs increase and wells run dry. So why not regulate? Recommendations have focused on the assignment and monitoring of clear water rights through well licensing. But a major problem in transferring such approaches to the Indian context is the number of people involved, and the fact that when individuals self-supply groundwater, they are disconnected from the official water bureaucracy and its standard regulatory and policy mechanisms (Giordano, 2009).

Although the IWRM principles have been incorporated into many new water laws (e.g. Chile, China, Ghana, Jordan, Kenya, Mexico, Mongolia, South Africa and Tanzania), progress towards more integrated, decentralised and multi-actor approaches has been mixed. Indeed, even in industrialised and emerging economies where key institutional and legal preliminaries have been in place for decades, it remains a challenge to implement IWRM approaches (World Bank, 2004), and achieving broad stakeholder engagement

in planning has proved difficult and costly, as South Africa's experience (below) illustrates. This is one reason why more recent thinking has focused more on the political economy of reform and what can actually be achieved: 'good enough' governance that recognises contextual diversity, including the need for public investment in growth-inducing infrastructure – particularly storage and conveyance – in parallel with management reforms (World Bank, 2004; Grey and Sadoff, 2006).

We now look at how these debates are playing out in Ethiopia, South Africa and China – three very different water economies and political environments – and at some of the lessons on the management roles and capacities of different actors.

Ethiopia: addressing hydrological variability through a new wave of public investment. Although Ethiopia has a relatively generous endowment, unmitigated hydrological variability is estimated to cost the economy a third of its growth potential (World Bank, 2006a). Yet Ethiopia's investments to mitigate these impacts, and to use its considerable water assets for power, food production, livestock, manufacturing and improvements in health and livelihoods, have been very limited.

The government, recognising the scale and importance of the challenge, has embarked on a wide range of state-led water-investment programmes, most recently under the policy priorities laid out in its poverty-reduction programme – the Growth and Transformation Plan (GTP) (GoE, 2011). This aims to create a platform of hydraulic infrastructure to help buffer rainfall variability and provide the reliable flows needed to expand hydropower capacity and the irrigated area. To increase food production, increase the resilience of rural livelihoods and induce wider economic growth, the GoE plans to increase the irrigated area from current levels of under 3% of potential, which is common to many countries in sub-Saharan Africa (Box 5.4), to 18% by 2015 (GoE, 2011). Many of these projects are multi-purpose: water diverted from storage will be used for irrigation, hydropower and a range of other uses.

The growth of the Ethiopian economy, and the need to extend electricity coverage and arrest environmental degradation caused by tree felling, is also driving massive investment in hydropower. The country's economically feasible hydroelectric potential is estimated to be 100 times more than current production. With the growing demand for energy, MoWE aims to quadruple capacity by 2015. Around 60 new hydropower schemes are planned or in the feasibility/design stage, involving investment channelled via state agencies, including soft loans from China.

While investment in artificial storage and conveyance is clearly justified, returns will be limited without investment by the state and donor agencies in an array of other public goods, particularly roads (World Bank, 2006a). Moreover, there will be a need for parallel investment to support institutions and management policies that can further leverage returns on infrastructure, e.g. embryonic RBOs, monitoring capacity, the legal framework, rights administration and the development of robust and flexible allocation mechanisms. The latter is paramount: while physical investments can reduce the variability of supply, achieving a balance between demand and supply, and mediating between the claims of competing sectors, are *institutional* issues.

Box 5.4: Challenges in developing irrigated agriculture in sub-Saharan Africa

In Africa's sub-humid and semi-arid savannah, agriculture depends on sound water management. While there are many indigenous farming systems using water conservation and harvesting systems (e.g. flood recession agriculture), only 5% of African's agricultural land uses modern irrigation techniques, compared with almost 40% in South Asian countries. Efforts to modernise African agriculture started during colonial times with large-scale irrigation schemes on the Nile in Sudan and the Niger in Mali, but productivity remained below expectations. A second wave of irrigation investments started after the severe drought in the Sahel in 1972-73, but state-managed irrigation schemes have suffered from design failures, inappropriate pumping schemes and low levels of cost-recovery and maintenance, as well as from inadequate access to roads and markets. Loans for irrigation in Africa reached a low from the mid-1990s to mid-2000s.

In the second half of the 2000s, soaring food prices and biofuel policies led to renewed interest and investment in agriculture in sub-Saharan Africa, including FDI in land (see Chapter 7). Investors include countries that face water constraints in expanding irrigated agriculture, such as the Gulf States, India and China, and countries or regional blocs seeking to expand biofuel production, including the EU. In many cases, agricultural products are re-imported to the investing countries. The effect is a 'virtual water' transfer from Africa to Europe, the Middle East and Asia, and it is likely that many investments use 'blue' as well as 'green' water. This raises questions about the impact of such schemes on existing water users such as smallholder farmers, whose informal rights may be ignored during times of peak demand and limited supply. Bues (2011), for example, reports a case of FDI in land in Ethiopia that has had severe negative impacts on water availability for smallholder farmers, and made an effective change in the water-rights regime. The new wave of investment also raises the question of whether irrigation systems can be designed and managed in ways that avoid the failures of the past.

Source: Woodhouse and Ghano (2011)

Investments in water to support local livelihoods and reduce poverty will probably be needed at various scales (not just 'big infrastructure'), including smaller, distributed networks of storage, conveyance and governance. A larger number of smaller physical infrastructure elements can help to deliver better and more flexible risk management as part of a multi-pronged approach to climate-change adaptation, and can also be part-financed and managed by local user groups (IWMI, 2009).

South Africa: from private water rights to the state as the custodian of all water resources: In contrast to Ethiopia, South Africa's water resources are more limited, with only 1000 m³/c/yr in 2008, including 10% sourced from beyond the country's borders. In addition, rainfall is strongly seasonal, water is distributed unevenly across the country, and the main centres of inland demand are located away from the major rivers. Consequently, the government has established a highly complex system of water transfers between river basins inside and outside the country. In addition to these 'real' water imports, South Africa is among the top net importers of 'virtual water', importing 21.8 km³ each year (Hoekstra and Hung, 2003).

Under apartheid, water was tied to land titles and thus privately owned. The responsibility for water allocation and water services resided at the local level (Muller, 2008). The townships were largely excluded from access to safe water and water for productive uses. South Africa is now one of the few countries enshrining a right to water in its constitution (Republic of South Africa, 1996) and the new legislation (Republic of South Africa, 1998) prioritises the allocation of water for human needs (equitable access) and the environment (environmental flows), and separates rights to use water from land ownership. These legal provisions are underpinned by the policy to provide free basic water, granting every citizen 25 l per day free of charge. The measure is cross-subsidised through an increasing block tariff.

Today the Minister of Water Affairs is the custodian of all water resources, which authorises the state to determine use rights and allocation mechanisms. This shift from individual (riparian rights) to state authority (Movik, 2009) has strengthened the role of the state over private actors. However, the reform faces several problems, e.g. regarding the implementation of environmental 'rights' (see Box 5.5).

South Africa's limited endowment of water has not prevented the country from harnessing the available supply to support a dynamic, growing economy (Muller et al., 2009). This includes extensive commercial agriculture (the main user), water-dependent mining operations and rapidly expanding urban areas. The reallocation of water from agriculture to more productive uses, such as industry, is being discussed despite the potential social implications of reducing water allocations to the main employers in rural areas (Movik, 2009; Otieno and Ochieng, 2004). Legislation allows trading of water licenses and foresees the (forced) reallocation of water licenses in stressed catchments (Republic of South Africa, 1998). There is to date only limited experience of these measures. Water trading often needs substantial support from the Department for Water Affairs and occurs mainly within the agricultural sector (not across sectors) and only in areas with marked differences between users in returns per unit of water (Perret, 2002; Nieuwoudt and Armitage, 2004).

Box 5.5: The difficulty of implementing the Reserve

A major instrument of the South African water legislation to achieve equitable and sustainable water use and allocation is the Reserve, comprising a basic human needs reserve and an ecological reserve. The former prioritises domestic use over other uses, e.g. agricultural and industrial, and, together with the policy on free basic water is a means to achieve inclusiveness. The ecological reserve ensures sustainable water use by preserving the environmental integrity of aquatic ecosystems such as rivers (Republic of South Africa, 1998; Wyk et al., 2006). There have been obstacles to implementation, however, since it proved technically difficult to determine the environmental reserve, which involves the definition of a desired state of the respective ecosystem and minimum water quality, quantity and flows needed to sustain it. Once determined, the ecological reserve has priority over other uses – a problem in those basins where water allocation exceeds this limit, and a potential threat to successful enforcement (Muller, 2011). Since the ecological reserve has not yet been determined in most catchments, provisional reserves have been established. The priority for the ecological reserve in some places has put (even small) water allocations on hold, potentially serving as a bottleneck for agrarian reform (van Koppen et al. 2009). As a result, the political will to proceed in this direction (which would also imply cuts for economic uses) is low and trade-offs between inclusive growth and environmental sustainability become apparent.

³ www.fao.org/nr/water/aquastat/dbase/index.stm (FAO, 2011a)

Despite the reforms, South Africa faces significant challenges in achieving a water-secure future and addressing a range of 'here and now' problems. These include environmental degradation and pollution, and difficulties in safeguarding environmental flows (the 'ecological reserve'); conflicts in some basins over limited water supplies; and difficulties in reallocating water to promote more equitable distribution (even if this might imply less productive use (Muller, 2011)). Moreover, South Africa's ambitious attempt to move from a top-down and technocratic style of management to a much more democratic and participatory one that involves broad stakeholder representation, has proved challenging. In particular, catchment management agencies (CMAs), conceived as fora for balancing the interests of all stakeholders, have proved difficult and costly to manage, with a tendency for more organised and powerful private interests to dominate (Box 5.6).

Box 5.6: The role of the private sector in catchment management

The aim of CMAs to enable deliberations for fair distribution and management of water resources depends on the equitable representation of all stakeholders. The National Water Act demands that members of the CMA governing board be appointed 'with the objective of achieving a balance among the interests of water users, potential water users, local and provincial government and environmental interest groups' (Republic of South Africa, 1998, section 8.1).

Experience to date is limited since only two CMAs are functioning (Muller 2011), but suggests that the private sector succeeds in actively shaping or even dominating the CMAs and their establishment, while smallholders and formerly disadvantaged groups lose out (van Koppen, 2003; Brown and Woodhouse, 2004; Herrfahrdt-Pähle, 2010; Muller, 2011). At the local level, irrigation boards or Water User Associations (WUA), which are traditionally dominated by white commercial farmers, have the greatest expertise in water management, sometimes even outperforming the government's competence (van Koppen et al., 2002). Meanwhile, emerging farmers are often either not involved or are poorly prepared to engage in consultation processes. This suggests that the Department of Water Affairs is not always able to regulate the interests of powerful stakeholders – which implies a de facto bias towards large-scale industries (Brown and Woodhouse, 2004).

China: experimentation with state oversight and private-sector involvement in water allocation. Since the reforms of the late 1970s, China's economy has grown rapidly and average household incomes have risen substantially. This growth has come at a high price to China's natural resource base, however, with growing water scarcity – exacerbated by pollution – estimated to cost around 2.3% of its GDP (World Bank, 2007). Water scarcity is especially acute in the drier northern region, where the success of state-funded irrigation development has contributed to today's problems. In particular, spiralling industrial and urban demands pose difficult political questions about how to protect water-dependent rural livelihoods and meet grain targets, while releasing water to higher-value municipal users (Calow et al., 2009).

Against this background, the 2002 revisions to the 1988 Water Law broke new ground. While the revised law is virtually silent on stakeholder participation, it heralded a major shift in emphasis from supply-side solutions to water conservation and demand management, underpinned by a modern system of water rights. An effective system of publicly defined water rights provides the basis for a number of different strategies for managing demand, including water pricing, permitting and trading. Perhaps more importantly, it provides a transparent, rules-based system for allocating water within and between uses (Box 5.7).

Box 5.7: Water saving and transfer: state oversight and market allocation on the Yellow River, China

To address water shortages experienced by downstream industrial users on the Yellow River in northern China, the Office for Water Transfer Affairs under the Water Resources Department (WRD) of Erdos City in Inner Mongolia, has overseen a programme in which irrigation returns saved through channel lining in Hangjin Irrigation District are transferred to downstream industries, with the costs of lining met directly by industrial beneficiaries through competitive tender for transferred water. The outcome to date is a transfer of 78 million m³ of water to downstream users. Although the transfer programme is new, its effects on different stakeholders are already becoming apparent.

The willingness of industrial enterprises to invest in channel lining indicates that this is a cheaper supply option for them, at least in the short to medium term. Farmers have benefited from reduced irrigation fees as they no longer pay for unlined delivery (and therefore leakage) at WUA purchase points. Farmers are also likely to benefit from reduced soil salinity as water-logging in some areas is a serious problem. However, the Hangjin Irrigation Management Bureau has seen its financial position undermined by the channel-lining programme, with annual losses of around one million CNY anticipated by project



completion. This is because farmers are no longer paying for leakage. Also, wetlands towards the tail of the irrigation district have dried up, and impacts on groundwater levels within and outside the district are uncertain. Questions remain over whether leakage-reduction programmes in water-stressed basins generate 'real' savings.

These effects highlight positive as well as some potentially negative impacts, particularly in terms of agency financing and third-party effects. Moreover, rights to the traded water remain ambiguous, and it is unclear whether the permits assigned to irrigation districts are owned by the irrigation agency, or simply held by such organisations on behalf of farmers in a form of 'trusteeship'.

Source: Water Entitlements and Trading (WET) Project (2007); Calow et al., 2009

5.3.3.3 DEVELOPING AND MANAGING WATER AT INTERNATIONAL LEVEL

The challenge of water development, management and allocation is even more complex for trans-boundary river basins. More than 260 of the world's river basins are internationally shared (Wolf et al., 1999: 389; UNEP, 2002). These international river basins cover about 45% of the Earth's total land area, and about 60% of the global population live in shared river basins. For instance, in Africa there are 59 shared river basins (UNEP, 2002 – see Figure 5.8) and the vast majority of the continent's water resources are concentrated within 14 major river basins shared by a majority of its 54 countries (Nicol, 2011), meaning that most large river development in Africa has implications beyond national boundaries. In view of the need to deal with high and potentially increasing climate variability (in terms of storage in the basin), and in order to develop low-carbon energy sources, it is expected that more dams will be built on Africa's shared rivers and on other major trans-boundary rivers, such as the Mekong (World Bank, 2009).

In internationally shared river or groundwater basins, uses by one riparian generally affect others. These external effects may give rise to tensions or conflicts among co-riparian states. Typically, such conflicts are about water quantity, water-flow regimes (minimising droughts and floods) or water quality and the ecological status of river basins. For basins with physical water scarcity, such as the Jordan, the Euphrates or the Nile, some have predicted that in the 21st century there could be 'water wars' (Starr, 1991; Gleick, 1993; Klare, 2001). To date, however, while water is contested in many water-scarce basins (Zeitoun and Warner, 2006; Dombrowsky, 2003), water scarcity has not been an explicit cause of war (Wolf, 1998). This notwithstanding, disputes may arise in basins with economic water scarcity, e.g. if one riparian country pursues the development of a major multi-purpose dam that decreases overall water flows downstream or increases peak flows. Dams on upstream locations can create positive externalities such improved flood control and regulated river flows, and whether it presents opportunities for cooperation very much depends on how the dam is operated. Wolf et al. (2003) found that, overall, there are more cases of cooperation than of conflict on international rivers.

Since any proactive management of internationally shared water bodies depends on some form of collaboration among the affected sovereign states, the public sector is bound to be a key actor in trans-boundary water management. Almost half of all international river basins are governed by some form of international agreement and about one in four has an international organisation in place (Dombrowsky, 2007). In addition to the public sector, in particular in industrialised countries, non-governmental and private actors also tend to become engaged in international water management, either lobbying for certain interests, such as the Dutch port of Rotterdam or Dutch farmers' organisations on the Rhine (Durth, 1996), or as observers of international river commissions, such as the International Commission on the Protection of the Rhine (Holtrup, 1999).

The incentives for cooperation on shared rivers largely depend on the specific situation, e.g. on the alignment of hydrological and political borders and on the direction of external effects (unidirectional versus reciprocal) as well as on whether the overall external effects are negative or positive (Dombrowsky, 2007).

Some authors suggest that trans-boundary water conflicts may be resolved through benefit-sharing schemes (Biswas, 1999; Sadoff and Grey, 2002; Klaphake, 2005), arguing that riparian states should not seek to share the water itself, but rather share various derived benefits. Proponents claim that this moves the focus from the zero-sum game of sharing water (quantities) to the win-win game of sharing derived benefits. Dombrowsky (2009) argues, however, that the incentives for cooperation may differ for negative and positive externality problems. Benefit-sharing is certainly easiest where infrastructure measures create additional net benefits on shared rivers (see the case of Senegal in Box 5.8), but it may be difficult to agree on such measures if existing allocations are highly disputed – as is arguably the case in the Jordan and to some extent the Nile basins (e.g. Allan 2011 and Box 5.8).

Ultimately, it depends on the specific circumstances whether it is in the interest of riparian states to cooperate. In general, there are more opportunities when hydrological variability plays a significant role – and so in regions with economic water scarcity – than in settings in which water is physically scarce. Going beyond physical water, there may also be opportunities for international transfers in the form of 'virtual water' (Allan 2003).

Box 5.8: Benefit-sharing through joint dams on trans-boundary rivers: the Senegal and Eastern Nile

The development of the Senegal River built on French colonial efforts to maximise benefits from the river. Following independence, in 1963, all basin states declared the Senegal to be an international river, thus departing from a territorial perspective. Mali, Mauritania and Senegal all lacked a supply of energy. In addition, Mauritania and Senegal sought to expand irrigated agriculture in order to increase food security, and Mali had an interest in increasing the navigability of the river and access to the Atlantic. The riparian countries therefore agreed to build an upstream dam in Mali, the Manantali, in combination with a downstream dam in Mauritania, the Diama. The Manantali Dam was to generate hydropower and store water for irrigation purposes while the Diama dam was to enable additional irrigation and to prevent saltwater intrusion up the Senegal. As none of the states could finance the dams alone, they decided to co-own the assets and to share the cost based on the projected distribution of benefits. This was the Clé de Repartition, adopted in 1985 by the Senegal River Basin Development Authority (OMVS) Council of Ministers. When it became clear that the projects also entailed negative environmental effects, the OMVS embarked on developing an environmental management plan. International donors funded the projects because of the financial constraints among the co-riparians (Hensengerth et al., 2011).

The Eastern Nile, shared by Ethiopia, Sudan and Egypt, is another example of a basin in which trans-boundary development could potentially yield benefits of cooperation in the form of increased hydropower generation, better protection against floods and droughts and reduced evaporation losses from reservoirs (Whittington et al. 2007). Multi-purpose dams upstream in Ethiopia could contribute towards the generation of up to 30,000 MW of hydropower and a more regulated river flow in Sudan, as well as protecting against floods and droughts and potentially contributing additional irrigation water. Furthermore, increased upstream storage could potentially allow for decreased storage at the Aswan High Dam, and as such save up to 4 billion m³ of evaporative losses (Whittington and McClelland, 1992). Since 1999, the three countries have been exploring opportunities for cooperation in the context of the Nile Basin Initiative, but they also continued pursuing unilateral infrastructure projects, including the Toshka project in Egypt, diverting excess flows from Lake Nasser/Nubia to reclaimed land in the southwestern valley, Ethiopia's Tekeze dam on the Tekeze River and Sudan's Merowe dam. More recently Ethiopia has begun development (and domestic financing) of the Millennium (or Renaissance) Dam on the border with Sudan, which was originally mooted under the Nile Basin Initiative. In parallel, nine of the ten (now 11 with the creation of South Sudan) Nile countries have been negotiating a legal treaty, the Cooperative Framework Agreement (CFA). In 2007, agreement was reached on the text of the CFA except for paragraph 14(b), which seeks to reconcile the term 'water security' with existing treaties (in particular Egypt's and Sudan's 1929 and 1959 Nile agreements) and upstream demands for greater equity. In 2009 the upstream countries decided not to forgo the opportunity to create a Nile Basin commission and associated donor funding, and started signing their preferred version of the CFA. By the end of 2011, six countries had signed. This example shows how hard it is for a regional 'logic' to break through national concerns, particularly of domestic constituencies. At the same time, political upheavals have also challenged Egypt's position, with suggestions of a new opening-up towards southern African neighbours and a less hegemonic position on Nile issues (Alan 2011).

5.4 LESSONS LEARNED: CONCLUSIONS AND KEY POLICY FINDINGS ON MANAGING WATER FOR INCLUSIVE AND SUSTAINABLE GROWTH

This chapter has underlined the importance of water resources for inclusive and sustainable economic growth, using the term *water security* to emphasise that resource access and entitlements matter, as well as availability and variability. The following conclusions can be drawn:

1. The management of water plays an important role for social inclusiveness, economic growth and ecological sustainability. There are potential synergies and trade-offs in managing water for the triple objectives of inclusive and sustainable growth and the challenge is to explore measures that create such synergies (e.g. watershed protection) and to deal proactively with any trade-offs.
2. Within the IWRM paradigm, the last 20 years have seen significant shifts in the allocation of responsibilities for water management and development across administrative levels and scales and among the public and private sectors and civil society. However, the public sector remains responsible for clarifying rights, setting prices, resolving trade-offs, and representing the needs of poorer groups and of the environment.

3. Regimes of water management are context-specific. Many LICs suffer economic water scarcity and water insecurity despite sufficient availability, largely due to a lack of human, institutional and financial capital and infrastructure. This also increases their vulnerability to hydrological variability. In such cases the primary challenge is to invest in physical infrastructure and institutions to improve access in rural areas, increase storage capacity in river basins and provide the basis for economic development through access to electricity and adequate irrigation infrastructure.
4. Access to safe water in rural areas can be assured via partnerships whereby national authorities provide broad leadership but devolve management responsibilities and funds to local communities, while the local private sector provides support services. For such partnerships to work, subsidies for hardware that stifle the private sector need to be removed and fair arrangements created for supplying spares.
5. Sub-Saharan Africa is particularly lacking in modern irrigation infrastructure following the failures of state-led irrigation development. There is a need to learn more about which irrigation approaches work in African savannah conditions.
6. Many 'emerging economies' face physical water scarcity following decades of investing in the 'supply-side' development of water resources. Water pollution exacerbates scarcity and affects quality. It is a priority to invest in management and institutions for resolving allocation tensions and trade-offs, particularly at the interface between agriculture, urban demands and the environment.
7. Most developing countries lack adequate allocation procedures, partly because of the political and logistical complexity of administering a system of water rights, and partly because resource conditions and patterns of use remain poorly understood. Investment in establishing and administering water-rights systems and overcoming these hurdles is essential, as water rights underpin basin allocation planning, offer security to users and provide a means of prioritising use within defined supply limits. However, indirect means of managing abstraction may need to be sought where large numbers of private groundwater users collectively withdraw large volumes of water, such as in the Indo-Gangetic basin. Establishing tradable water rights depends on robust knowledge and monitoring of the hydrological conditions, a comprehensive hydraulic infrastructure, well-defined water rights, and a mechanism to ensure minimum environmental flows are assured and other third-party interests protected. In most countries these conditions cannot be met. In the case of surface water irrigation, where appropriate, Water User Associations (WUAs) may receive a fixed volume to organise allocation and monitor and enforce compliance.
8. To stimulate the efficient use and allocation of water governments can apply volumetric water charges that reflect marginal cost of supply. In reality, however, systems, prices and politics work to recover costs and ensure social affordability, not demand management. Logistically, volumetric water charges require centralised supply systems and water meters (or surrogates) and so are difficult to implement and enforce. In the agricultural sector such an approach is largely impractical, which means that government-set prices rarely contribute towards demand management and allocative efficiency. In most developed countries, the main instrument used to balance demand with supply is not pricing but allocation licensing based on volumetrically defined water rights. A water-rights system involves identifying the total available resource and then assigning the rights to that resource among different users.
9. There has been some progress in increasing cost recovery and thus the financial sustainability of utilities. Mechanisms include fixed and flexible charges to recovering O&M and capital costs, addressing social affordability concerns through cross-subsidies. Maintaining service levels over time depends on securing financial sustainability.
10. Several examples discussed in this chapter demonstrate how water, energy and land issues are closely interrelated and may lead to synergies and trade-offs in achieving sustainable and inclusive growth.
 - South Africa shows that progressive water legislation may be thwarted by information and political economy concerns. South Africa prioritises water allocation for human needs and the environment (the 'Reserve'), separates water rights from land ownership, allows trading of water licenses and foresees the establishment of Catchment Management Agencies. Establishing the environmental reserve has proved technically difficult, however, so some water allocations are on hold, threatening agrarian reform. This has eroded the political will to proceed and trade-offs between inclusive growth and environmental sustainability become apparent. Furthermore, the private sector has succeeded in actively shaping or dominating the existing CMAs to the detriment of smallholders and disadvantaged groups.
 - In India, energy subsidies to smallholder farmers have promoted inclusive growth but often lead to declining water tables.
 - In Ethiopia, multi-purpose dams are supposed to promote sustainable inclusive growth through hydropower and irrigation development and averting tree felling, but may raise environmental and social concerns.

- Water scarcity and pollution is estimated to cost China around 2.3% of GDP. Spiralling industrial and urban demands pose difficult political questions about how to protect water-dependent rural livelihoods and meet grain targets, while releasing water to higher-value municipal users. A programme in northern China in which industrial beneficiaries pay for the costs of lining irrigation channels has led to significant water savings, benefiting farmers and industries, but reducing income for the irrigation administration due to less leakage and leading to the drying up of some wetlands at the tail of irrigation systems.
- In the Eastern Nile Basin, benefits of cooperation are envisaged through integrated development of water storage, hydropower and irrigation in the basin. Trans-boundary consultation has significantly increased since the late 1990s, but so far unilateral approaches towards infrastructure development prevail.

11. The WEL nexus is particularly pronounced in water-scarce countries, including countries like China and India, where wider economic objectives and external signals place demands on the resource. Many LICs have sufficient water resources and hence the WEL nexus may be less pertinent in addressing the challenge of providing access to domestic water in the rural areas.

12. Aquatic ecosystems such as wetlands are vital both for supplying food and other resources to poor people, and also for providing storage and buffer capacity and thus security during extreme events such as droughts and floods, which is relevant not only to local users but to the economy as a whole. These services are often unseen and undervalued.

13. The IWRM paradigm takes account of the interrelation of water, land and other resources and could therefore contribute to better management of the WEL nexus. Many countries have in principle mainstreamed IWRM, but integrated, multi-sector approaches entail significant transaction costs and complex incentive structures among all water-using sectors. This calls for pragmatic context-specific approaches to bring the relevant stakeholders together (idealistic pragmatism). The focus should be on the political economy of reform and what can actually be achieved: 'good enough' governance that recognises diversity across country contexts. There is increasing recognition that LICs and LDCs require infrastructure development over and above water-sector reforms.

Finally, there is considerable uncertainty about the impacts of climate change on future water availability and quality. Global warming is likely to intensify existing climatic and hydrological variability and may cause an increase in the frequency and magnitude of extreme events such as tropical storms, floods and droughts. Thus, climate change adaptation requires a paradigm shift in the planning, development and management of water resources in order to allow for flexible responses in the face of uncertainty.

CHAPTER 6

RENEWABLE ENERGY: PROMOTING A TRIPLE WIN

This chapter examines how renewable energy can meet the needs of the poorest while reducing CO₂ emissions. Given that energy-related emissions of greenhouse gases (GhG) are rising while the atmosphere's sink capacity is finite, the world needs to move from a high-carbon to a low-carbon path while still providing the required energy services for inclusive and sustainable growth. A key element of this transition is to increase the supply of renewable energy and reduce the dependence on fossil fuels, first in the industrialised world, but also in developing countries. The large emerging economies also have the scope to reduce their GhG emissions. There may also be unexploited opportunities for investment in renewable energy in those low-income countries that have large potential for renewable supply, which could be helped to adopt 'green growth', e.g. using climate finance when renewable energy is not yet economically viable, or to supply green energy for high-income countries.

This chapter discusses whether LICs can promote renewable energy for inclusive and sustainable growth within the context of the WEL nexus. It makes three main arguments:

1. The public sector in LICs could promote renewable energy by removing barriers to the adoption of new technologies (e.g. to reduce the high initial capital costs) and by eliminating negative side-effects from the production of renewable energy, such as the overuse of land and water (e.g. providing incentives for floating solar panels on canals and reservoirs, or intercropping for biofuels).
2. The private sector can play a crucial role in promoting renewable energy and achieving a 'triple win', provided there is a favourable business environment in terms of human skills, financing, and a stable institutional context.
3. A political economy perspective suggests that good policies are not always implemented especially when particular interests can trump wider public interests, such as in the case of the removal of subsidies for fossil fuels.

6.1 CONTEXT

Energy-related GhG emissions are increasing more rapidly than the atmosphere's capacity to absorb them. The resulting rise in global temperatures will have dangerous consequences for human wellbeing. The world needs to move from a high-carbon to a low-carbon path while still providing the required energy services for inclusive and sustainable growth. A key element in this transition is to increase the supply of renewable energy services. The opportunities to invest in renewable energy in LICs, where most of the potential supply is to be found, remain largely underexploited. This chapter examines how these opportunities can be realised in a way that promotes inclusive and sustainable growth.

The debate on climate change confirms the need for a greater reliance on renewable energy. There is a scientific consensus on the following trends:

1. All IPCC scenarios show that CO₂ concentrations in the atmosphere will increase throughout the 21st century (IPCC, 2007a).^{4,5}
2. Atmospheric carbon concentrations related to climate change are expected to rise unless appropriate policies are put in place.^{6,7}
3. To reach ambitious targets, rich and developing countries need to contribute (Stern, 2006).

⁴ The scenarios project CO₂ concentrations ranging from 535 to 983 parts per million (ppm) by 2100, which is 41% to 158% higher than current levels.

⁵ Without climate policy, the overall concentration of the six Kyoto gases is projected to increase up to 638-1360 ppm CO₂-equivalent by 2100, whereas the concentration of all GhGs may increase up to 608-1535 ppm CO₂-equivalent. The global atmospheric GhG concentration of 450 ppm CO₂-equivalent could be exceeded by 2015 (depending on climate policy and definitions) (EEA, November 2010).

⁶ The causal relationships driving global warming can be described as follows: anthropogenic emissions (generally expressed as GtC) caused by certain human economic activities affecting the atmospheric concentration of carbon (expressed as parts per million). An increase in carbon concentration determines the balance between absorbed and radiated energy (radiative balance is expressed as Watts per m²). A positive forcing (more incoming than outgoing energy) tends to warm the system and to increase the Earth's temperature (expressed in degrees Celsius or Fahrenheit).

⁷ Based on current understanding of the climate-carbon cycle feedback, stabilisation at 450 ppm CO₂ is needed. To achieve this requires a reduction in emissions over the 21st century, from an average of approximately 670 GtC to approximately 490 GtCO₂. 450 ppm CO₂-eq corresponds to the best estimate of 2.1°C temperature rise above the pre-industrial global average. The 2009 Copenhagen Accord 'recognizes the scientific view that the increase in global temperature should be below 2 degrees Celsius'.

4. It is essential to reduce global emissions because the impact of climate change will be especially severe for poor and developing countries (World Bank, 2010).
5. Renewable energy represents an important option for reducing global emissions and many LICs have huge untapped renewable energy potential (World Bank, 2010).

According to the IPCC (2007a), since 1750 human activities have caused a marked increase in the global atmospheric concentrations of CO₂, methane and nitrous oxide. The global increase in CO₂ concentration⁸ is due primarily to the reliance on fossil fuel and land-use changes.

Although the atmosphere and the oceans absorb GhG,⁹ the growth of emissions due to climate change is saturating the Earth's sink capacity to reduce carbon concentration through natural cycles (Manne et al., 1995; Nordhaus and Boyer, 1999). This process is in marked contrast to the definition of sustainable development as 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs' (WCED, 1987).

There are several ways to decarbonise economies. These can be broadly categorised as options (1) to address the demand and supply of energy and the efficiency of its use (energy efficiency); (2) to increase of the use of renewable energy in the energy and fuel mix, and to switch from coal to gas;¹⁰ and (3) to address the absorption of emissions (i.e. carbon capture and storage, forest sinks, reduction of other GhG such as methane and nitrous oxide from agriculture).

This Report focuses on the relationship between water, energy and land – the WEL nexus – within which context this chapter addresses the issue of renewable energy supply. We do not address options for reducing emissions in agriculture and forestry.

Over time, a greater supply of renewable energy, if compared to a 'business as usual' scenario, may reduce pressures on carbon space – but at the same time potentially lead to higher demand for water and land to produce energy at a time when these resources will become scarcer. Compared to fossil fuels, renewable energy creates fewer GhG emissions. The major challenge is whether low-carbon energy sources can contribute to enhancing economic development (economic sustainability), preserving environmental services (environmental sustainability) and promoting inclusive growth (social sustainability). An increase in the supply of renewable energy requires several changes in the institutional and policy framework as well as appropriate incentives to avoid or minimise trade-offs in the short term, in order to realise the 'triple win' referred to in our opening paragraph.

6.2 THE ISSUES: THE ROLE OF RENEWABLE ENERGY IN DECARBONISING ECONOMIES – CAN IT ALSO PROMOTE INCLUSIVE AND SUSTAINABLE GROWTH?

A stronger reliance on renewable energy offers major opportunities to reduce pressures on the sink capacity of the atmosphere. The carbon impact of renewable energy is lower than that of fossil sources. Technological advances mean that all energy sources have reduced their emissions intensity over time, but renewable energy shows the lowest carbon impact.¹¹ This chapter pays particular attention to the following sources of energy:¹² solar, wind, geothermal, biomass (in particular biofuels) and hydropower.

We do not discuss traditional biomass in detail: although it is one of the main causes of energy poverty and of deaths from air pollution, this Report focuses on 'triple win' improvements from the use of energy in terms of economic, environmental and social sustainability. As shown in Table 6.1, over 2.6 million people rely on traditional biomass as a fuel for cooking, and OECD/IEA (2010) estimates that by 2030 over 1.5 million people will die every year due to the effects of breathing smoke from poorly combusted biomass fuels – greater than estimates for premature deaths from malaria, tuberculosis or Human Immunodeficiency Virus (HIV) and Acquired Immune Deficiency Syndrome (AIDS).

⁸ CO₂ emissions represent the highest share of GhG emissions (56.6% in 2004 (IPCC, 2007).

⁹ Greenhouse gases are carbon dioxide, methane, nitrous oxide, dichlorodifluoromethane, chlorodifluoromethane, tetrafluoromethane, hexafluoroethane, sulphur hexafluoride, nitrogen trifluoride.

¹⁰ Natural gas is the least emission-intensive of fossil fuels (compared to oil and coal), it allows for a very flexible energy supply and is thus compatible with the changing energy volumes supplied by wind and solar.

¹¹ 1 kw/h electricity production from coal produces 966 g CO₂, wind equivalent is 9 g/Kw/h.

¹² For reasons of brevity we do not discuss other sources of energy such as wave and other biomass sources such as biogas or solid biomass (e.g. trees, crop residues, animal and human waste).

Table 6.1: Number of people relying on traditional biomass cooking fuel (millions)

Region	Number of people relying on traditional biomass for cooking fuel
Africa	657
<i>Sub-Saharan Africa</i>	653
Asia	1,937
<i>China</i>	423
<i>India</i>	855
<i>Other Asia</i>	659
Latin America	85
Total for all developing countries	2,679

Source: OECD/IEA (2010)

Drawing on data based on 164 scenarios,¹³ the Special IPCC Report on Renewable Energy (2011) points out that in most of these scenarios, by 2050, compared to fossil fuels (1) renewable energy could become the dominant low-carbon energy supply option and (2) that total renewable energy deployment is higher over the long term among non-Annex I than Annex I countries.

Recent data on investment in renewable energy corroborate these forecasts. The Bloomberg Report (UNEP and Bloomberg, 2011) shows that in 2010 new financial investment – defined as total investment excluding small-scale projects and government and corporate R&D – was for the first time higher in developing countries than in developed countries. In 2010 it increased by US\$17 billion to more than US\$72 billion, while in developed economies it increased by US\$4 billion to US\$70.5 billion. China attracted the most investment in renewable energy, with new investments up 28% to almost US\$49 billion, representing more than a third of the global figure. Investments are quite heterogeneous in terms of energy sources. The Bloomberg Report emphasises that wind and solar energy represent more than 90% of total investments (see Figure A6.1).

Installed capacity of renewable energy differs across countries and regions. Brazil and the USA are world leaders in biofuels (Figure A6.2), the EU in solar power (Figure A6.3) and China in wind and hydropower (Figures A6.4 and A6.5), as a result of an appropriate and well-managed set of environmental policies aimed at stimulating clean energy and energy efficiency. Recent evidence suggests that in China wind power alone could accommodate the entire energy demand projected for 2030, about twice the current consumption (McElroy et al., 2009). The role of developing countries is particularly relevant for geothermal energy (Figure A6.6) where Philippines, Mexico, Indonesia, El Salvador and Kenya are among the top 10 countries in terms of installed capacity.

These findings suggest that China, Brazil and India now have a leading role in promoting investments in renewable energy, but that Africa in particular and LICs as a whole still lag behind. United Nations Industrial Development Organization (UNIDO) (2009) argues that renewable energy technologies – such as solar, wind, micro-hydro and geothermal resources – remain largely untapped in developing countries, despite the relative abundance of sunshine, wind, water and geothermal heat. For example, only 5% of the hydropower and 0.6% of the geothermal energy in the African continent has been exploited. The Middle East and North African (MENA) region has a solar energy potential that is larger by several orders of magnitude than the total world electricity demand (Trieb, 2005).

Ummel and Wheeler (2008) suggest that by 2020 solar thermal power production in the MENA region could provide enough power for Europe to meet the needs of 35 million people. They also estimate that implementation will require international clean technology subsidies of about US\$20 billion over 10 years, which range from US\$12 billion to \$28 billion depending on various scenarios. By the end of the subsidy period, the profitability of solar power is expected to rival that of coal and gas-power generation in Europe.

Our main interest here is whether the promotion of renewable energy can lead to ‘triple win’ improvements in economic, environmental and social sustainability for an inclusive and sustainable growth path in LICs and emerging economies. The WCED (1987) definition of sustainable development also helps to clarify what we mean by economic, environmental and social sustainability. Economic sustainability can be defined as the ability of an economy to support a specified level of economic production indefinitely. Environmental sustainability is the capability to boost growth by incorporating environmental costs (Bolt et al., 2002) and the necessary expenditures for environmental protection. Social sustainability is essentially an anthropocentric concept of justice between and within generations whereby all human beings are entitled to a dignified life. Central to these definitions is the commitment to social cohesion, the aversion to social exclusion and discrimination and the need to foster citizens’ participation in public affairs (Omann and Spangenberg, 2002).

¹³ They are 164 recent medium- to long-term scenarios from 16 global energy-economic and integrated assessment models. The scenarios cover a large range of CO₂ concentrations (350 to 1050 ppm atmospheric CO₂ concentration by 2100), representing both mitigation and baseline scenarios.

6.2.1 ECONOMIC SUSTAINABILITY OF RENEWABLE ENERGY

A major concern about the role of renewable energy in achieving inclusive and sustainable growth is that it is not always cost-competitive. An International Energy Agency (IEA) report (2010e) suggests that the cost of renewable energy is higher than energy from fossil fuels (Table 6.2).

Table 6.2: Comparative projections for energy production costs by 2015

IEA projected cost of generating electricity in OECD countries in 2015. All figures in US\$ cent per kwh	Median cost at 5% interest rate	Median costs at 10% interest rate
Nuclear electricity	5.9	9.9
Coal electricity	4.4	5.8
Natural gas electricity	7.6	8.1
On-shore wind electricity	9.7	13.7
Off-shore wind electricity	14.5	19.0
Photovoltaic solar electricity	21.5	33.3
Thermal solar electricity	13.6	24.3

Source: IEA 2010e

The estimates presented in Table 6.2 are based on median values. The IPCC Report on renewable energy (IPCC, 2011) clarifies that costs vary widely, depending on parameters such as the discount rate, the technology or the installation capacity (Table 6.3). The IPCC Report (2011) highlights that in many cases the cost of renewable sources of energy is already competitive compared to fossil-fuel sources, especially in remote rural areas.

Table 6.3: Costs ranges for different renewable energy

US\$/GJ	Cost (US\$ 2005/kwh)
Biofuels for electricity	0.035 – 0.25
Concentrating solar power electricity	0.1 – 0.3
Photovoltaic	0.074 – 0.92
Hydroelectric	0.01 – 0.15
Ocean	0.12 – 0.32
On-shore wind	0.035 – 0.17
Off-shore wind	0.075 – 0.23
Geothermal condensing flash plants	0.045 – 0.066
Geothermal binary cycle	0.049 – 0.086

Source: IPCC, 2011

Higher costs of fossil fuels and lower operating costs of renewable energy will make renewable energy more cost-competitive and help to create the conditions for businesses to invest in producing and purchasing renewable energy. Evidence from Zimbabwe shows that farmers benefited from a solar photovoltaic project, and that their payment of maintenance fees was linked to whether they could harvest and sell their produce, which is susceptible to weather conditions and erratic income patterns (Mabuza et al. 2006). Renewable energy can be more economically sustainable in contexts in which it is easy to promote business initiatives around the energy infrastructure in terms of appropriate human skills, financing mechanisms, investment risk management and the institutional framework.

6.2.2 ENVIRONMENTAL SUSTAINABILITY OF RENEWABLE ENERGY

While the literature shows unambiguously that the greater production and use of renewable energy reduces emissions, this does not in itself guarantee full environmental sustainability. First, it is important to adopt a sufficiently broad definition of sustainability to incorporate a wide range of environmental impacts (Box 6.1) beyond GhG emissions. This means applying a life-cycle analysis to the production of renewable energy. Large-scale hydropower plants provide a good illustration. The carbon emissions intensity of hydropower electricity generation is far lower than that of fossil-fuel sources, but these environmental benefits need to be set against the environmental impacts of building large dams (see Box 6.1).

Box 6.1: The environmental impact of Brazil's Tucuruí Dam in Amazonia

The Tucuruí Dam was the first hydroelectric project in the Brazilian Amazon. Phase I began in 1975 and ended in 1984. Phase II began in 1998 and is ongoing. Fearnside (2001) points out the project's 'substantial' environmental costs. Beyond monetary costs (construction and maintenance), opportunity costs of natural resources (timber) and the money invested by the Brazilian government, environmental costs have involved forest loss leading to the loss of natural ecosystems, GhG emissions, the blockage of fish migration affecting aquatic ecosystems, sedimentation phenomena and the decay of vegetables left in the reservoir, which has corroded turbines and produced methane through the creation of anoxic water. Fearnside concludes that the social and environmental costs were virtually ignored in the decision-making process, an outcome facilitated by the secrecy surrounding it.

Source: Fearnside (2001)

Another example of unanticipated environmental impacts occurs when solar panels leach out. In response, manufacturers have begun planning and forming coalitions (e.g. PV Cycle Association) to recycle used panels. The manufacturing process can also be dangerous. A small village in the province of Henan in central China (Nath, 2010) was overcome by a steady flow of silicon tetrachloride, a by-product of polysilicon. Silicon tetrachloride is an extremely toxic substance that renders crops infertile, causes skin burns, increases the likelihood of lung disease, and transforms into acids and poisonous hydrogen chloride gas when it is exposed to air.

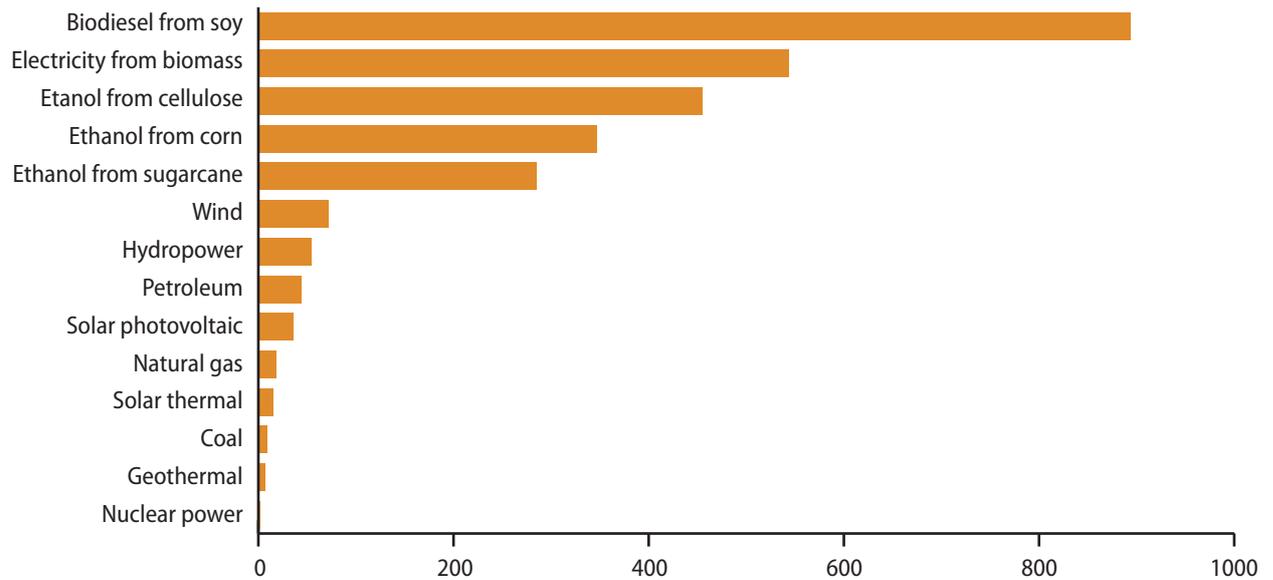
Table 6.4: Environmental impact of renewable energies

Energy source	Impacts
Solar	Solar cells manufacture waste, end of cycle waste
Wind	Landscape, land-use footprint
Geothermal	Sulphur dioxide and carbon dioxide emissions, land subsidence, 'micro-earthquakes', noise
Hydropower	Water consumption, emissions from deforestation, ecosystems
Biofuels	Land-use change, GhG from downstream processing, soil degradation, water use and water contamination

Sources: Nath (2010); www.ucsusa.org/clean_energy/technology_and_impacts/impacts/environmental-impacts-of.html; Kagel et al. (2007); Fearnside (2001)

Second, the production of renewable energy may require the use of additional land and water, which can affect the availability of these resources for future generations when combined with the pressures of climate change, population growth and food security.

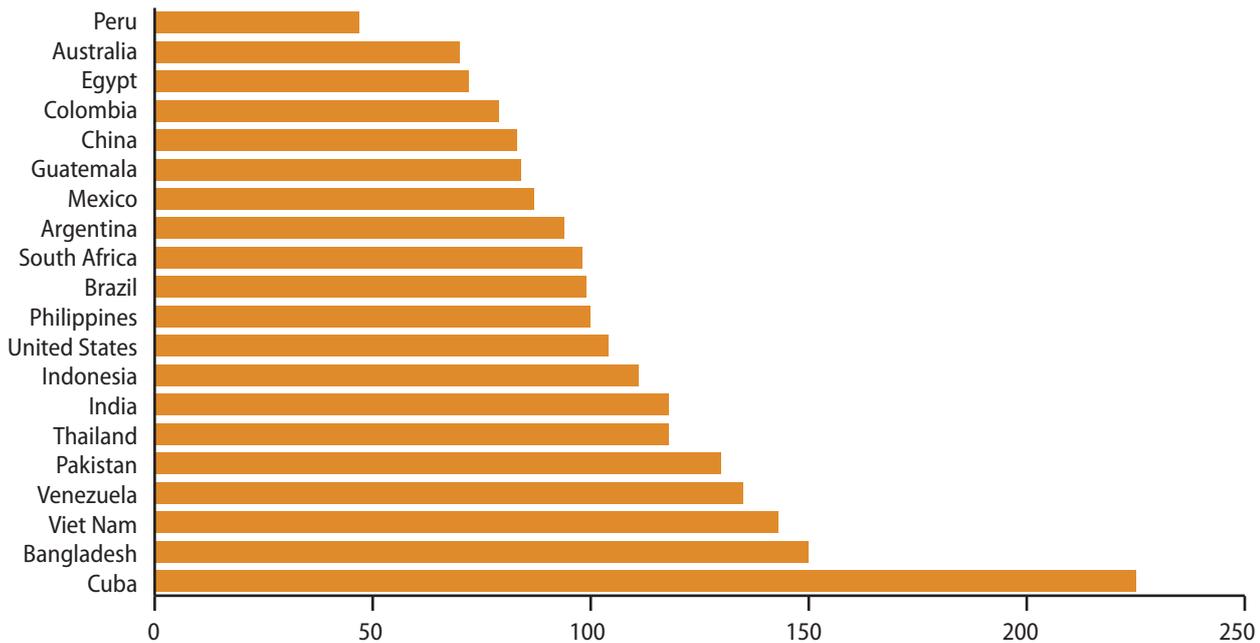
Jacobson and Delucchi (2010) argue that energy infrastructure that is based only on water, solar and wind power could produce all new energy by 2030, and pre-existing energy by 2050, by reducing the global demand for power by 30%. The necessary infrastructure may require only between 0.41% and 0.59% more of the world's land. But evidence suggests that renewable energy may not be less land-intensive than fossil-fuel sources, especially if first-generation biofuels that rely on ethanol and biodiesel are taken fully into account (Figure 6.1). Second-generation biofuels based primarily upon lignocellulosic feedstocks, which are less water- and land-intensive, are not expected to become competitive for about 40 years (Murphy et al.).

Figure 6.1: Land-use intensity in 2030 (km²/TWh/yr) in the USA

Source: McDonald et al. (2009)

The International Institute for Applied Systems Analysis (IIASA, 2009) estimates for a set of simulated scenarios for 2020 and 2030 are based on different projections of global biofuel production. These show a variation in the use of cultivated land in 2020 of between 1649 million ha and 1694 million ha, while in 2030 this variation runs from 1700 million ha to 1755 million ha. While global arable land use increases by between only 1% and 3% in different biofuel scenarios compared to a situation without biofuels, the impact becomes substantial when expressed in terms of land-use expansion between 2000 and 2020. From this perspective, the impact of biofuels shows a net 20% to 40% expansion in cultivated land over this period, and a further 15% to 30% between 2000 and 2030. This increase is expected to be substantial in developing countries (over 60%) compared to developed countries, and the changes will be concentrated mainly in Africa and Latin America (around 80%). The IIASA (2009) report concludes that the development of first-generation biofuels, in accordance with national policies, is (1) conflicting with goals of achieving food security, (2) results in only modest increases of agricultural value-added in developing countries, (3) achieves net GhG savings only after 2030, (4) creates additional risks of deforestation and (5) jeopardises biodiversity. For this reason the Global Bioenergy Partnership (GBEP, 2011) recently pushed forward a set of 24 indicators to monitor and support policy-making for biofuels.

Biofuels are also extremely water-intensive. Current production of biomass for food and fibre accounts for about 86% of global freshwater use (Gerbens-Leenes et al., 2008), and Allan (2011) states that the average water footprint of biomass is 70 times greater than that of oil. It is possible to make a comprehensive sustainability analysis of renewable energy sources only on the basis of regional studies to investigate specific local conditions. For example, the water footprint of ethanol production varies widely across countries (Figure 6.2).

Figure 6.2: Water footprint of sugar cane bio-ethanol (m³/GJ)

Source: Gerbens-Leenes et al. (2008)

De Fraiture et al. (2007) estimate the additional water requirements in the event that governments forced a 5% annual growth in the production of biofuels until 2030. They calculate the need for a further 180 km³ of irrigation water (compared to 2980 km³ for food). Since this represents only a small increase in the total irrigation demand, it should not dramatically affect agricultural systems overall, but countries such as China and India, which already face water shortages, would need an additional 35.1 km³ and 29.7 km³ of irrigation water respectively.

6.2.3 SOCIAL SUSTAINABILITY OF RENEWABLE ENERGY

Energy poverty has become a priority for many developing countries. Although energy is not included in the MDGs, the lack of energy infrastructure seriously affects the daily life of millions of people as well as national economic growth. Current IEA data (Table 6.5) suggest that sub-Saharan Africa in particular lacks adequate access to energy and that there is a major deficit in rural areas.

Table 6.5: Electricity access in 2009 – regional aggregates

	Population without electricity (millions)	Electrification rate (%)	Urban electrification rate (%)	Rural electrification rate (%)
North Africa	2	99.0	99.6	98.4
Sub-Saharan Africa	585	30.5	59.9	14.3
China & East Asia	186	90.8	96.4	84.5
South Asia	612	62.2	89.1	51.2
Latin America	31	93.4	98.8	74.0
Middle East	22	89.5	98.6	72.2

Source: <http://www.iea.org/weo/electricity.asp>

Access to electricity improves the quality of life by providing, e.g. light and appliances, entertainment, and convenience. The productive use of electricity increases incomes and brings major developmental benefits, particularly to rural areas.

Projected investments of US\$630 billion in the renewable energy sector by 2030 could generate at least 20 million jobs – 2.1 million in wind energy, 6.3 million in solar photovoltaic (PV), and 12 million in biofuels-related agriculture and industry (AEA-DFID, 2011). Recent data (REN21, 2011) show that renewable energy currently creates about 3.5 million jobs worldwide (about 30% of which are in Brazil and China). About half of these jobs are concentrated in the biomass sector,¹⁴ with the greatest multiplier per produced GWh in the solar and geothermal sectors (MacQueen and Korhaliller, 2011).

There are many case studies of renewable energy projects that have promoted inclusive development. In India, efforts to promote the adoption of renewable energy have changed the lives of many people who are living in poverty. Programmes have largely been commercially sustainable but with the additional goal of improving the users' livelihoods and living conditions. They have offered employment opportunities, better medical and educational facilities and an opportunity for villagers to broaden their horizons.¹⁵ Several empirical studies confirm the positive contribution of renewable energy production on the GDP of developing countries through capital formation, innovation and jobs creation and creating import-substitution mechanisms (Chien and Hu, 2008; Apergis and Payne, 2011).

The evidence that investments in renewable energy help to reach all of the objectives embedded in ISG is, however, mixed. There are several reasons for this. First is the current lack of cost competitiveness of many types of renewable energy, which may be reflected in higher costs for users, especially in developing countries. Second, the production of renewable energy may have negative effects on other markets, or have negative social consequences. This seems to have been the case of biofuels, which may affect price volatility and endanger food security in LICs (FAO et al. 2011).

Third, programmes to eradicate energy poverty may fail because funds are not spent on self-sustaining projects or are invested in projects that fail for various reasons – for instance, poor technical performance, services inappropriate to users' needs and local conditions (stemming from the lack of stakeholder involvement), or because of the lack of institutional and commercial viability, of maintenance mechanisms, of reliable sources of credit and expertise, or of incentive structures for sustained operating performance (Martinot et al., 2002). In some cases funds were not used specifically for development purposes. Michaelowa and Michaelowa (2005) found that Danish development cooperation for Clean Development Mechanism (CDM) energy programmes in Malaysia and Thailand placed more emphasis on the opportunities to reduce the costs of emissions for Denmark than on poverty reduction, and appeared to be more suited to cutting mitigation costs rather than promoting development.

Fourth, the increased supply of renewable energy may have negative social effects. A typical example is that of forced relocation when dams are being built – so-called development-induced displacement. Between 1949 and 1999, the development of some 85,000 reservoirs in China displaced 12 million people. Despite the importance of the overall economic effects of dams (and hence, indirectly, their contribution to poverty reduction), there can be highly visible social and economic effects at the local level, including landlessness, joblessness, homelessness, food insecurity, community disarticulation, increased morbidity, loss of community resources, and depression among the displaced population (Brown et al., 2008).

The social costs of the Tucuruí dam construction in Brazil were also considerable (Brown et al., 2008). These included displacement of the population in the submergence area and subsequent relocation due to a plague of *Mansonia* mosquitos, collapse of the fishery that had traditionally supported the downstream population, health effects including malaria and mercury contamination, and displacement and disruption of indigenous peoples.

Box 6.2: The social impact of the Nu River Dam in China

In 2006 a group of journalists from the Beijing-based NGO Green Home conducted a number of interviews with people around the Nu River in order to gain a better understanding of local concerns regarding the Nu River cascade. In a sample of 94 interviews, 78% of people claimed that compensation for losing their property because of the dam construction had not been discussed with them. Moreover, 77% were worried about their life if they were relocated and only 33% thought that the dams might be economically beneficial for their village.

Source: Brown et al. (2008)

¹⁴ For this study the estimation of jobs in the green sector is lower (2.3 millions), but the authors specify this is a conservative measure.

¹⁵ More information is available at: <http://www.winrockindia.org/HomePage.htm>.

Micro hydropower tends to be less problematic from a social and environmental perspective. An emblematic example is represented by the Nyamarimbira integrated water project in Zimbabwe. At the beginning of 1990s feasibility studies indicated that the river flow was enough to install two micro hydropower schemes along the water line (Barton, 2003). Local communities approached Zimbabwe's Lands and Agriculture Ministry and Agritex, a government body providing extension services to farmers and other organisations for technical assistance. The plants serve hundreds of families who now have better access to drinking water and irrigation and to education, and have become less energy-poor.

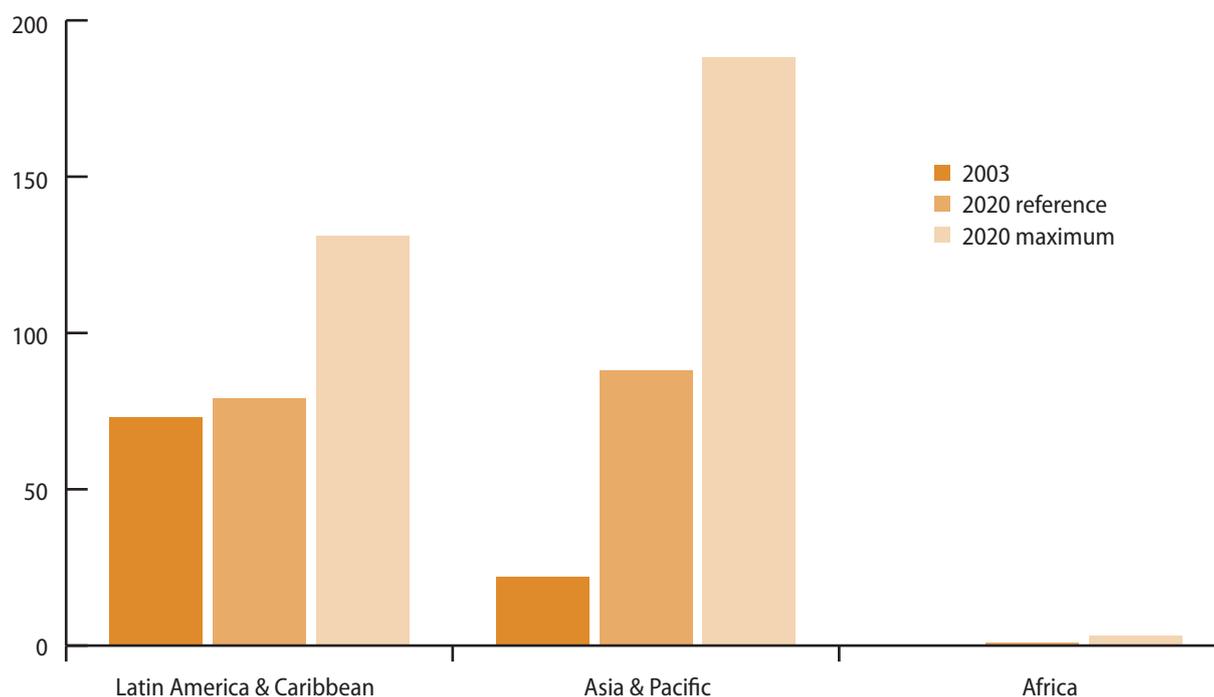
6.2.4 BARRIERS TO THE ADOPTION OF RENEWABLE ENERGY

The barriers to introducing and developing renewable energy pose an even greater challenge than simply examining its effects.¹⁶ Beck and Martinot (2004) summarise these factors in terms of:

1. Economic barriers (high initial capital costs, subsidies for competing fuels, uncertainty of fossil-fuel prices).
2. Regulatory barriers (lack of legal framework, transmission access, technical or pricing obstacles, utility interconnection requirements).
3. Market performance barriers (lack of access to credit, lack of skills, asymmetric information).

Despite the huge market potential for renewable energy, such barriers to its adoption can be difficult to overcome in low-income countries. A recent project¹⁷ surveys the market potential of renewable energy in developing countries. Whereas Latin America had the highest level of renewable energy production in 2003, by 2020 Asia is projected to become the major player in both the reference and maximum scenario. According to the findings of the RECIPES project, even in an optimistic scenario, Africa will continue to play a minor role by 2020 (Figure 6.3).

Figure 6.3: Renewable energy volume in different world regions (excluding large hydropower). Megatons equivalents (Mtoe)



Source: RECIPES project

¹⁶ The distinction between barriers to the adoption of renewable energy and factors affecting social, economic and environmental sustainability should not be interpreted strictly. For example, if the price of renewable energy is not competitive, this represents a barrier to its adoption and affects the economic sustainability of renewable energy projects. In the third section we do not maintain this distinction, but it is useful to stress the importance of analysing renewable energy within both a short-term (technology adoption) and a long-term (sustainability) perspective.

¹⁷ Information on the RECIPES project is available at: <http://www.developingrenewables.org/energyrecipes/reports/genericData/RECIPES%20D4.1%20RE%20market%20potential%20for%2011%20countries.pdf>.

But the RECIPES forecast underestimates the role of sub-Saharan Africa in the light of evidence of some successes. For example, Kenya is now one of the world's top 10 producers of geothermal energy in terms of installed capacity. Box 6.3 discusses how geothermal development in sub-Saharan Africa has been hampered by country-specific factors such as lack of skills, lack of funding for exploration or technical feasibility problems. If these barriers are overcome, there could be many more Kenya-type stories.

Box 6.3: Barriers to full exploitation of geothermal energy in African countries

Ethiopia started a long-term geothermal exploration in 1969. This work peaked during the early to mid-1980s when exploration drilling was carried out at Langanu (Lakes District). The 7.2 MW net capacity pilot plant installed at Langanu has faced operational difficulties due to the lack of management skills.

Djibouti drilled about six exploratory wells in the Assal geothermal fields. While a very high temperature system was located, problems related to the high salinity of the fluid discovered, because of its close proximity to the Gulf of Aden, has delayed resource development and exploitation

In Zambia a mini-geothermal pilot power plant (200 KW) was installed on the basis of limited exploration work, and the plant never became operational.

Countries such as the Malagasy Republic, Malawi, Rwanda and Tanzania have to date not gone beyond inventorising the resource potential, which is the starting point for geothermal work.

The major exceptions are Ethiopia and Kenya with regard to the exploration phase, but further exploration and development are constrained mainly by very limited know-how.

Source: Teklemariam (2008)

To summarise the two main issues:

1. How can governments and other national actors in developing countries, and LICs in particular, remove barriers to the introduction of renewable energy?
2. How can countries create conditions in which renewable energy promotes inclusive and sustainable growth, and realise a 'triple win' in economic, environmental and social improvements?

6.3 THE ROLE OF THE PUBLIC AND PRIVATE SECTORS IN PROMOTING RENEWABLE ENERGY FOR INCLUSIVE AND SUSTAINABLE GROWTH

This section examines the roles of the public and the private sectors, and their interactions, in answering the main issues identified in section 6.2.

6.3.1 PUBLIC SECTOR

Policy-makers face two major problems: (1) barriers to increasing the supply of renewable energy and (2) even when renewable energy is introduced or promoted, there may be environmental externalities associated with its production and use, or it may not guarantee economic and social sustainability.

There is ample support in the literature to justify the intervention of the public sector in promoting renewable energy, particularly in relation to the theory of market failures and externalities. Externalities refer to situations in which the effect of production or consumption of goods and services imposes costs upon or benefits others that are not reflected in the market price.¹⁸ A typical example is that of industrial pollution. When such negative externalities arise, governments are justified in tackling these via taxation and subsidies to force industries to pay the full environmental costs.

In the light of this, there is no economic (or environmental) justification for fossil-fuel subsidies. Such subsidies provide active incentives to generate pollution and to increase social costs for both the environment and for health. Government intervention should subsidise renewable energy in order to incentivise its positive externality in terms of preserving the carbon stock.

¹⁸ Definition based on the OECD glossary, available at: <http://stats.oecd.org/glossary/detail.asp?ID=3215>.

The public sector may address such issues at international, national or local level. The international level is important, because global action on emission-reduction policies helps to 'induce' technological change and a shift towards clean energy (Grubb and Koehler, 2000). As global negotiations are still in progress, further actions agreed at the international level may be crucial in boosting technological change towards clean energy.

Further, this Report emphasises the link between energy and the management of land and water, which means that the country and local levels are particularly important. Box 6.3 suggests that the barriers to the adoption of renewable energy, and the conditions for economic, environmental and social improvements, need to be addressed through a range of policies. It also suggests the need for strong cooperation between national and local levels of governance to implement a wide series of complementary and synergy-creating interventions. An example is that feed-in tariffs boost the economic sustainability of renewable energy, but may represent an obstacle to social sustainability if the burden of the guaranteed price is passed on to consumers. A Renewable Energy Premium Tariff System (REPTS) could be used to encourage decentralised production in remote rural areas (Moner Girona, 2009) and could be made possible through effective interaction among the Rural Electrification Agency, the Local Energy Utility, independent producers (or cooperatives) and local rural institutions. In this scenario, through the local energy utility, the rural electrification agency provides the RPT premium tariff to the IPP per kilowatts per hour (kWh) produced by renewable energies, whereas consumers are charged below production costs to guarantee affordability. Such a scheme aims both to provide affordable electricity to users in isolated areas, and at the same time to make renewable energy projects attractive in order to attract private-sector investment by decreasing the financial risk and guaranteeing the recovery of invested capital. Simulations suggest that this system could be financially viable in Ecuador, Gambia and Mauritania, although Deichmann et al. (2010) warn that while decentralised renewable energy is often competitive in remote and rural areas, grid-connected supply dominates denser areas where most people live. In other words, they claim that decentralised energy remains an important option to provide energy in rural areas, but that centralised grids may still remain cost-effective in populated regions.

Table 6.6: Examples of policies to overcome barriers to the adoption of renewable energy and to guarantee economic, environmental and social sustainability

Category	Policies
Economic (OECD, 2010)	<ol style="list-style-type: none"> 1. Feed-in tariffs offer either a minimum guaranteed price or a premium on the market price for output. They help to overcome market price uncertainties. 2. Subsidies, grants and loans play a role in overcoming high costs of renewable and the lack of capital. Carbon pricing on fossil-fuel energy or carbon emissions makes renewable energy relatively cheap and convenient. 3. Development Financial Institutions finance large infrastructure investments in countries needing access to capital.
Regulatory (UNIDO, 2008)	<ol style="list-style-type: none"> 1. In most sub-Saharan African countries, electricity-generation licences are issued for periods varying between seven and 15 years. Issuing longer-term licences allows producers to gain more time to recover high initial capital costs. 2. Targets may stimulate the private sector to invest in renewable energy. Kenya has set a 25% target for geothermal energy by 2020. 3. Quota mechanisms oblige electricity suppliers to take a certain amount of sustainable power, or for customers to source a proportion of their power from renewable energy sources.
Environmental (McCartney, 2009)	<ol style="list-style-type: none"> 1. Avoidance measures can protect existing environmental functioning by avoiding anticipated adverse effects. Mitigation measures reduce the undesirable effects of renewable energy projects. Compensation measures compensate for effects that can neither be avoided nor sufficiently mitigated. They are particularly important for large hydropower plants. 2. Incentives and support to minimising the use of land such as the floating of solar panels on mining ponds, hydroelectric reservoirs and canals and use of marginal land or intercropping for biofuels. 3. Incentives and support to minimise water use such as harvesting rainwater, using evapotranspiration for estimating the need for irrigation, estimating amount and availability of groundwater for biofuels production.

Category	Policies
Social (IPPC, 2011)	<ol style="list-style-type: none"> 1. Training, education, skills enhancement and technological development policies (R&D) (capacity-building). 2. A favourable or enabling environment for renewable energy can be created by addressing the possible interactions of a given policy with other renewable energy policies as well as with energy and non-energy policies (e.g. regarding agriculture, transport, water management and urban planning). 3. Energy poverty and access policies.
Local (REPN, 2009)	<ol style="list-style-type: none"> 1. Urban planning may call for green buildings and renewable energy technologies. 2. Support for private and community initiatives for small-scale renewable energy. 3. Promotion and market facilitation agencies and departments.

Of course, the same policy may have very different outcomes in different contexts. For instance, in Brazil, subsidies have stimulated a large industry that provides a 'triple win' from an economic, environmental and social perspective,¹⁹ evidence is weak for South East Asia (Goh and Lee, 2010). To support the biodiesel industry, in 2004 the Malaysian government allocated US\$16 million in low-interest loans, US\$3.3 million in federal grants and US\$3.8 million from Petronas (the state-owned oil and gas company) for demonstration projects, and in 2006 a further US\$3.7 million for R&D. The Indonesian government provided US\$1.6 billion for biofuels between 2006 and 2008, but results have been disappointing. While 92 biodiesel projects were approved between 2006 and 2007, by 2008 only 14 functional plants had been built, of which eight were operational. By contrast, in 2009 Indonesia was exploiting 10% of its capacity. The three main reasons were:

1. A lack of foresight, follow-up and strict policy monitoring.
2. The companies' capacity to carry out biofuel projects was not clearly investigated and evaluated before licenses and incentives were awarded.
3. The legal framework for biofuel policies was unclear.

Policy-makers face a crucial role in managing land and water. Evidence (Che Ani et al., 2009) shows that a rainwater-harvesting system improved the quality of life of Sandakan people in Malaysia, a country where increasing water consumption by industry, agricultural and household users had strained existing infrastructure. The Malaysian government introduced appropriate laws, but only few municipalities, such as that of Sandakan, responded quickly by introducing new rainwater-harvesting systems. Governments, especially in developing countries, will be challenged by the threats posed by biofuels and hydropower in terms of land and water consumption. Second-generation biofuels based on crop residues or cultivation of miscanthus and switchgrass will address the problem of competing uses of land, but time is needed to establish the financial viability of this technology. As outlined in an IEA report (2010d), R&D for second-generation biofuels is currently concentrated in OECD countries. Developing countries will need to promote appropriate policies for technology transfers and foreign direct investment to acquire technologies. Third-generation technologies (from algae) are still in an experimental phase, so the immediate challenge for developing countries is to manage the first-generation biofuels. The promotion of marginal land could be a remedy. Cai et al. (2011) estimate that 320-702 million ha could be made available even if only abandoned and degraded cropland and mixed-crop and vegetation land, which are usually of low quality, are included. If grassland, savannah, and shrub-land with marginal productivity are considered for planting low-input high-diversity mixtures of native perennials as energy crops, the total land availability could increase by between 1107 and 1411 million ha. Brittain and Litaladio (2010) claim that the production of jatropha in semi-arid regions could benefit poor producers, particularly in remote areas far from consumption centres, where inputs are more expensive and prices lower, thus rendering food production largely uncompetitive. Moreover jatropha should be less water-intensive than other crops (Kheira and Atta, 2009), though the evidence for this claim has yet to be scientifically validated.

For managing competing uses of water, approaches aimed at regulating consumption have proved successful. Zhao et al. (2009) show that a unified water-flow regulation in the Yellow River Basin through a water-allocation agreement across nine provinces increased GDP by 2.5% every year, maintaining the hydrologic equilibrium. From a policy perspective, coordination is the key to water and land management. Integrated water resource management as a 'process, which promotes the co-ordinated development and management of water, land and related resources in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystem' (GWP, 2003) lies at the heart of current policy discussion.

¹⁹ See Box 6.4 for further information on the Brazilian case.

It is also very likely that traditional biomass will continue to represent the main source of energy for many poor countries before modern biofuels make real inroads. Public policies are also needed to reduce deforestation and to improve the safety and efficiency of cooking stoves. Although Arnold et al. (2006) claim that there does not appear to be a fuelwood crisis, they suggest the elimination of fuelwood subsidies, the creation of appropriate institutional bodies and the removal of unnecessary and counterproductive licensing as concrete measures to ensure appropriate forest management. More energy-efficient cooking stoves could also help to cut the health risks and fuel costs for users and reduce deforestation.

To summarise, the main points for the role of the public sector in pushing forward renewable energy are:

1. The pursuit of different sustainability dimensions depends on complex, multi-actor policy packages. The feed-in tariff scheme may fail to satisfy the social sustainability dimension and for this reason the new Renewable Energy Premium Tariffs schemes may reconcile the need to reduce producers' operational costs with making the production process more competitive over time (economic sustainability), expanding energy access for poor people (social sustainability) and widening the renewable energy penetration (environmental sustainability).
2. When land and water are public goods, the public sector has wide margins to intervene in order to regulate provision and promote inclusive and sustainable growth. China obtained a 2.5% growth rate increase through a unified policy of water provision, whereas policies on marginal land could facilitate good business opportunities for biofuels production in dry and remote areas, such as *jatropha caucas*.
3. There are concrete examples where the public policies have been decisive in boosting inclusive and sustainable growth through renewable energy, but these cannot simply be replicated in other contexts, where the institutional, enforcement and private-sector capacities may be quite different.

6.3.2 PRIVATE SECTOR

The private sector faces many challenges in the production of renewable energy, especially in rural and remote areas, due to the lack of infrastructure and skills and an unfavourable business environment. How can the private sector help to promote renewable energy and 'triple win' improvements in developing countries? Here we discuss a number of specific examples of successful private-sector involvement in the promotion of renewable energy and the challenges to be addressed.

In 1996, Dipal Barua founded Grameen Shakti, a non-profit organisation set up to promote, develop, and supply renewable energy in Bangladesh. Grameen Shakti received a huge boost in 2002 when low-interest loans from the World Bank and the Global Environment Fund enabled it to make micro-finance agreements. The most popular among a number of preferential options to purchase a domestic solar system was a 15% down payment and monthly repayments of the remainder over three years. By the end of 2009, over 300,000 domestic solar systems had been installed, bringing electricity to over 2 million people in Bangladesh (*Making It*, 2010).

The most interesting idea was to train over 1000 women technicians who became instrumental in the rapid take-up of the solar-power systems. The plan now is to build on Grameen Shakti's success to train 100,000 women, so that they can establish their own renewable energy businesses.

The lesson to be drawn from this example is that policies to overcome economic barriers to the adoption of renewable energy must be accompanied by training and skills development to enable the creation of small-scale energy production, and maintenance or assistance services to guarantee the sustainable impact of the adoption of renewable energy.

Human capacity was also a key ingredient for the Chinese manufacturer Suntech Power, which is the world leader in the solar-power industry. Suntech Power enjoys the collaboration of 350 R&D professionals based in Australia, China, Germany and Japan and also partners with research institutions. Finance played an important role. The Government of Wuxi in Jiangsu province provided US\$ 6 million as business start-up support, at a time when the international movement to find alternative energy sources gained momentum as governments recognised the need to diversify energy sources, to tackle the rising extraction costs, to combat global warming and to ensure long-term energy supply (*Making It*, 2009).

From this perspective, the EU 20-20-20 package represents an important opportunity for developing countries to create jobs by boosting the production of renewable energy through ensuring increased European demand.²⁰ Article 9 of Directive 2009/28/EC on the promotion of the use of energy from renewable sources makes it possible to import 'green' electricity to reach the desired 20% renewable share. Of course, these opportunities should also take into account the negative effects that solar-power industries may have on health and the environment. In February 2011, following consultations over a period of two and a half years, the

²⁰ 20-20-20 targets are a 20% cut in GhG emissions by 2020, compared to 1990 levels; a 20% increase in the share of renewables in the energy mix; and a 20% cut in energy consumption.

European Commission formalised the first ban on chemicals under the Regulation on the Registration, Evaluation and Authorization of Chemicals (REACH) directive 1907/2006. In May 2011 EU ministers voted to exempt solar panels from a ban on toxic substances.

It is estimated that Chinese companies have been producing polysilicon at between US\$21,000 and US\$56,000 per ton, far below the US\$84,500 necessary to ensure proper environmental protection (Nath, 2010).

There are, however, many examples in developing countries where the private sector is acting to preserve land and water scarcity. For example the Australian firm SunEnergy recently signed a deal with India's biggest utility company, Tata Power, for a trial solar-panel project on a hydroelectric reservoir near Mumbai. This initiative will produce renewable energy-based electricity without increasing the land footprint.

In 2010 Saudi Arabia announced a partnership with IBM to build a water-desalination plant. King Abdulaziz City for Science and Technology (KACST), Saudi Arabia's leading R&D institute, will collaborate with IBM to study the feasibility of building a solar-powered desalination plant in the city of Al Khafji. The facility would feature ultra-high concentrator photovoltaic (UHCPV) technology, and could provide 30,000 m³ of water per day for over 100,000 people. Today, the most common desalination methods are thermal technology and reverse osmosis. Studies suggest that market prospects for investment in water desalination would be very good in the MENA region (German Aerospace Center, 2007). This example shows the role of MNCs in the transfer and diffusion of environment-friendly technologies in developing countries, but that coordinated small-scale initiatives are important to stimulate knowledge diffusion. Mabuza et al. (2006) stress that apart from the social, economic, financial, institutional and environmental challenges, technology transfer has generally been misunderstood, and is largely seen as mere delivery of high-tech equipment. In Kenya, the Ceramic Jiko charcoal stove, which saves 50% of fuels and is now used by 80% of the urban population and 10% of the rural population, represents a success story.²¹ There are now over 200 businesses connected to the Jiko's manufacture. Training for manufacturers and users and product quality were the key to success, and results include cutting health risks and fuel costs for users and reducing deforestation.

Box 6.4: The success of policies on biofuel subsidies in Brazil

Brazil started its Pro-Alcool programme in the wake of the 1973 oil crisis. It satisfied both the need to reduce dependence on oil imports and to create a new market for the country's sugar crop. The government stimulated the development of the industry through measures including low-interest loans and enlisted a state-owned enterprise, Petrobras, to incorporate the product into gasoline. Through beneficial tax treatment, ethanol was available at a price that made it competitive with gasoline, and manufacturers were persuaded to produce cars that could use the fuel at levels above traditional gasoline-powered vehicles. The current policy operates largely through mandatory ethanol-blending shares. These are adjusted occasionally, but have remained within the 20%-25% range of anhydrous ethanol in gasoline. All gas stations are required to sell both gasohol (E25) and pure ethanol (E100). The blending mandate has also been accompanied by a host of supporting policies, including retail distribution requirements, subsidised credit for ethanol storage and tax preferences for vehicles. The Pro-Alcool Programme has now been phased out, but the literature shows that Brazilian-produced ethanol employed economies of scale through 'learning by doing' effects, technical progress and productivity gains induced by initial subsidies. Evidence shows that in many regions the production of biofuels from sugarcane generated a 'triple win' improvement in terms of:

1. Sustained increase of sugarcane production
2. Generation of local employment
3. Reduced urban air pollution and averted CO₂ emissions
4. No direct connection between deforestation/land-use change and sugarcane production, but there could be indirect effects on which we cannot be conclusive at this stage
5. Low water consumption because Brazilian sugarcane is largely grown without irrigation.

Only 47% of Brazil's sugarcane area is used for ethanol purposes. It is easy to convert sugar plants into ethanol distilleries, and for this reason the production of ethanol could also expand significantly in other sugarcane-producing countries.



²¹ More information is available at: <http://ces.iisc.ernet.in/energy/paper/tech101/jikostove.html>.

Country	Harvested area (thousands km ²)
Brazil	61,529
India	42,000
China	12,200
Thailand	9,362
Pakistan	9,073
Mexico	6,682
Colombia	4,257
South Africa	4,200
Australia	4,150
Cuba	3,971
Philippines	3,922
Indonesia	3,700
USA	3,634
Viet Nam	2,851
Argentina	2,846

Sources: Goldemberg and Guardabassi (2009); La Rovere et al. (2011); Josling et al. (2010); Kostka et al. (2009); Walter et al. (2008); de Fraiture et al. (2007)

Box 6.5: Brazilian biofuels and the WEL nexus

Schaeffer et al. (2011) analyse the impact of Brazil's 2010-2019 biofuel expansion programme on land and water, which shows the development of biofuels in the context of linkages with water and land use.

Brazil has an arable land area of approximately 340 million ha, currently distributed as follows: 200 million ha for pasture; 55 million ha for cultivation; 7 million ha occupied by planted forests; and 5 million ha in reforestation areas. It was therefore possible to incorporate 73 million ha into agricultural production, of which 31.8 million would be suitable, in terms of climate and soil conditions, for sugarcane production and 44.9 for soy production. Of these, 11.9 million and 3.4 million ha were allocated to sugarcane and soy production, respectively, in order to meet the 2010-2019 biofuel production goals. Thus there is sufficient land to meet the need of the biofuel plan. The authors estimate production and water demand of sugarcane and soybean in the coming decade.

Crop/State	Production (thousand tons)		Crop Yield (tons/ha)		Specific Water Demand (m ³ /ton)		Total Water Demand (millions of m ³)	
	2010	2019	2010	2019	2010	2019	2010	2019
Sugarcane (São Paulo)	356,360	581,150	86.4	98.8	197	187	69,687	108,638
Soybeans (Mato Grosso)	18,766	32,841	3.1	3.4	2,140	2,056	40,151	67,509

They compare these figures with water availability in the Amazon and the Paraná basins and estimate that in 2019 97% and 65% of the water would be left in the two basins respectively, suggesting that there is enough water to meet the needs of the biofuel plans and for many other competing uses. This is for the aggregate region, but there may be local pressures.



		Amazon Basin	Paraná Basin
% Water Available	2010	N.A.	76%
	2019	N.A.	65%
% Water Available	2010	98%	N.A.
	2019	97%	N.A.

A sustainability analysis of Brazilian biofuels production suggests that the sugarcane-based ethanol is sustainable in terms of its use of land, water, energy and the environment, as well as being socially sustainable, because: there is enough land and water to expand sugarcane cultivation; it improves income and rural development; its energy profit ratio is positive; and the potential of emissions mitigation relative to gasoline is positive. In terms of economic sustainability, although the cost of ethanol is competitive with that of gasoline, its profitability has declined due to the pressure on land prices, which jeopardises its long-term economic sustainability. Moreover, Box 2 in the executive summary expresses questions about the sustainability of land use in Mata Grosso, suggesting that further research needs to continue to monitor and analyse impacts in order to come to definite conclusions.

For the same reasons, the soy-based biodiesel is also sustainable in terms of its use of land, water, energy and the environment, but is as yet not socioeconomically sustainable. While it is profitable, biodiesel is not competitive with diesel because of the rise in the price of soybeans in the international market. Also, although the income of the rural workforce rises, there is little employment generated for family farming systems, leading to a negative impact on rural development.

	Ethanol	Biodiesel
Land occupation vs fossil fuels	▲	▲
Price of land vs fossil fuels	▲	▲
Rural worker income vs fossil fuels	▲	▲
Rural development vs fossil fuels	▲	▲
Cost vs fossil fuel	+	-
Water availability	+	+
Energy Balance	+	+
GhG emissions reduction vs fossil fuels	+	+

Key: (▲) increases; (▼) decreases; (+) positive; (-) negative

* taking into account the items analysed

Source: Schaeffer et al. (2011)

A recent United Nations Framework Convention on Climate Change (UNFCCC) report (2009) summarises the findings of Technology Needs Assessment submitted by 59 developing countries and outlines the most important barriers to technology transfers. Economic and market barriers (in particular high costs, lack of investors and local affordability) are mentioned by 82% of these countries whereas 66% cite the lack of human capacity. Interestingly 75% cited the lack of water-management technologies (water recycling and water conservation) and land-management practices as major technology gaps. The private sector, and in particular large companies, may take the lead in the process of technology transfer to preserve land and water (if they are facilitated by appropriate regulations encouraging investments, information exchange and capacity-building), but the private sector can also improve its own management practices and footprint performance.

Keam and McCormick (2008) suggest that greater efficiency in the private sector could make significant savings in the use of water and land. One McKinsey report stresses that productivity is the single most important means to achieve water savings in India, with 80% of the cheapest solutions focused on increasing 'crop per drop', and in some industries the more efficient use of water could bring huge returns. But it is also important that the private sector needs to be willing to engage in participatory processes in order to guarantee that all the interested parties have access to water. Bhatia et al. (2007) show the construction of dams may

generate many direct effects such as agricultural irrigation, hydropower generation, water supply and flood control, but also huge indirect effects on the economy through higher household income and expenditure. The provision of water to support multiple economic and non-economic purposes needs multi-actor agreements.

Recent evidence (FAO, 2010) also stresses the potential to overcome competition for land and water deriving from integrated food and energy systems (IFES), or agricultural systems that produce both food and energy. They vary widely in shape, size and composition but can be broadly categorised into two types. In the first type, food and biomass for energy are produced on the same land. The second type maximises the synergies between renewable energy production processes and the processes involved in crop, livestock and fisheries production (e.g. gasification or anaerobic digestion, recycling or re-using by-products and other residues created in the production processes). There are examples in Africa and Latin America showing that biomass can be produced sustainably in ways that do not compete with food for land or water (FAO, 2011b).

In many developing countries, funding poses one of the greatest constraints to guaranteeing access and business development. An opportunity to fund renewable energy projects came from the Kyoto Protocol flexible mechanisms and in particular the Clean Development Mechanism (CDM). Evidence shows that over the period 1999-2009 almost 50% of CDM were mobilised through private finance (Nylander et al., 2010), but that it has proved problematic in Africa, which accounts for only 2% of the 3220-plus registered CDM projects in 71 countries worldwide. Research suggests that there is a great deal of untapped CDM potential in Africa, which has seen strong recent growth as well as increasing private-sector interest. According to the United Nations Environment Programme (UNEP) Riso data-set there are now 190 CDM projects at different stages in the pipeline in Africa. This is up from 170 projects at the end of 2010, 130 in 2009, 90 in 2008 and just 53 in 2007.

The fundamental challenge for low-carbon finance is the need for capital reallocation from highly carbon-intensive assets to low/no carbon-intensive assets at scale and speed. Most of the necessary finance will come from the private sector. With carbon pricing absent in many parts of the world it is difficult to see how this can occur at the necessary scale and speed. There is an urgent need for policy-makers to focus on establishing a range of measures to lower the risks associated with low-carbon investments and/or reduce the cost of capital finance both for debt and equity providers (WEF, 2011c). The Olkaria III Project of geothermal power in Kenya is an interesting example of the attractiveness of renewable energy in LICs to private capital. The first privately owned geothermal plant in Africa, the Olkaria III Project attracted financing of US\$15 million.

The right actors and instruments are necessary to overcome the barriers to financing in developing countries. Even when the basic economics and returns are attractive, the most important characteristic is that the finance be long term. Investment in renewable energy can take years, even decades, to yield good returns. What is needed, therefore, is 'patient capital', which is relatively hard to obtain, given the typical short-term horizons of private capital markets (Griffith-Jones et al., 2011), see Box 6.6. One example of 'patient funding' is the European Investment Bank (EIB), which represents one of the most solid financing sources in Mediterranean countries. The EIB has massive operations in North Africa, including long-term loans, equity and technical assistance grants, in an area where there are many barriers to the promotion of renewable energy. A recent EIB report (2010) points out that solar power is still non-competitive in Mediterranean countries and some countries need subsidies because carbon credits cover only about 20%-30% of the funding gap.

This discussion on the role of the private sector in boosting renewable energy through inclusive and sustainable growth can be summarised as follows:

1. In the renewable energy market, where initial investment and operations costs are particularly relevant, the private sector often needs public start-up support. The leading solar-power company in China began with initial investment from the public sector.
2. Even when a form of renewable energy is globally competitive, there is still a need for policies to ensure that such companies can internalise their negative externalities (e.g. through pricing mechanisms, compensation) and to guarantee an appropriate business environment: access to capital, a transparent and effective credit market, laws to encourage technology transfers and education are all necessary in order to promote inclusive and sustainable growth via private-sector intervention in renewable energy.
3. In terms of water and land conservation, corporate profit-seeking behaviour is often compatible with economic, environmental and social sustainability. Productivity can be increased by using water more efficiently, biodiesel business activities in marginal lands may reduce poverty in rural areas and integrated food-energy systems already provide examples in Africa and Latin America where biomass can be produced sustainably in ways that do not compete with food for land or water. Public policies may strengthen these virtuous processes through policies on integrated approaches to water management and land access.

The enabling conditions to promote renewable energy require a mix of good public policies and the proactive entrepreneurial role of the private sector. In practice, however, the public-private partnership is problematic as many diverse stakeholders interact – hence the need for a political economy analysis.

Box 6.6: Tools to raise finance for renewable energy and to reduce the uncertainty of investments

There are many different forms of finance, some more suited than others to financing renewable energy. Even when the basic economics and returns are attractive, the most important requirement is that the finance be long term. Investment in renewable energy can take years, even decades, to yield good returns. Financing options include:

Green bonds: Green bonds are particularly appealing to Socially Responsible Investors (SRI) that give priority to mitigating climate change. Provided that the instrument can deliver a market-level return, mainstream institutional investors and sovereign wealth funds are also considering similar types of investment. The scale of potentially long-term financing from these institutional investors and sovereign wealth funds is very large.

Other types of bond: The most straightforward – and possibly cheapest – option is to raise finance using government (or institutional) bonds, and earmark the revenues for renewable energy projects in developing countries as bilateral or multilateral concessional or non-concessional lending. An intermediate option would be an indexed bond whereby the coupon is linked to an indicator such as the price of carbon or levels of emissions. The crucial point is that yields are inversely linked to progress on mitigating climate change, which offers investors a hedge against inaction.

Concessional finance: Investment in renewable energy in a developing country requires long-term, patient capital, which is unfortunately precisely the type of investment that is most difficult for developing countries to attract. Part of the solution to energy infrastructure is the involvement of Development Finance Institutions (DFI) and Regional Development Banks (RDB). Largely because of their backing by sovereign states, DFIs can provide finance at maturities that the private sector cannot.

Cornerstone and challenge funds: A number of innovative partnership models with DFIs and investors have been proposed. As with Green Bonds, the aim is to attract institutional investors into the renewable energy sector. Recognising that institutional investors operate at a scale far above that of individual projects, and require a minimum level of liquidity to invest, fund-of-fund structures may be appropriate. Two options are Cornerstone funds and Challenge funds. In both cases the fund-of-funds would have access to Public Financing mechanisms. In the case of Cornerstone funds, these would be negotiated between the DFI and investors, while for Challenge funds, institutional investors would compete for access to the Public Finance Mechanisms.

Three mechanisms are used to reduce uncertainty of renewable energy investments. First, institutions can be employed to absorb early-stage project risk, taking projects to the point where they are attractive to investors. Second, guarantees may be offered. Prices, for example, may be fixed within a necessary band to guarantee profitability, or loans may be guaranteed by a public body. Given uncertainties around the level and volatility of the price of oil and gas, one policy tool might be to introduce a variable tax on the price of oil, that would increase as the price fell below a given level, and decrease as the price of oil increased beyond this level. As a result, the market price of oil would be maintained at a certain level, and the profitability of investment in renewable energy made less uncertain. Third, insurance may be provided to protect investors from a range of potential events that could derail a project. This could be used to offset uncertainty over the maintenance of particular policies, or it could be related to price.

Responsibility for funding the various financing mechanisms – all of which involve a cost to make the instruments commercial attractive to the private sector – should lie with developed countries, both because they are richer and because they have accumulated carbon emissions in the past.

Source: Griffith-Jones et al. (2011)

6.3.3 PUBLIC-PRIVATE INTERACTION

Political economy analysis is concerned with the interaction of political and economic processes in a society: the distribution of power and wealth between different groups and individuals, and the processes that create, sustain and transform these relationships over time. This Report does not aim to analyse all the mechanisms by which the policy decision-making process and the interests of the private sector may interact to design a good renewable energy policy. Here, we limit the discussion to some illustrative cases where the decision-making process led to successful or unsuccessful outcomes.

As already shown, the removal of fossil-fuel subsidies is the right policy option and is based on sound economic grounds, but these subsidies still exist in many developed and developing countries (Figure A6.7), apparently for social reasons. According to the IEA (2010a) the world spends US\$557 billion a year on subsidies for fossil fuel compared to US\$33 billion for low-carbon sources of energy according to the Stern Review (Stern, 2006), including biofuels and nuclear power.

The discrepancy between 'ideal' policies and the reality can be explained by political economy factors.

For example, until 2004 Ghana spent roughly 2.2% of its GDP subsidising fossil fuel (Laan et al., 2010), more than the Ministry of Health budget. Moreover, Ghana continued to support its national refinery, the Tema Oil Refinery. The government commissioned an independent poverty and social impact assessment to assess which sectors would gain or lose out if the subsidy was removed. This assessment found that it was Ghana's rich who most benefited from the subsidies. The finding was used to justify the need for reform and for policies to reduce the impacts of higher fuel prices on the poor. The coalition between the government and the poorest population sector was crucial for the removal of subsidies on fossil fuel. The coalition was strengthened through: preliminary research, a communication campaign, mechanisms to reduce political interference in fuel prices and pro-poor policies.

The Government of Ghana decided that fuel prices should be set by the National Petroleum Authority, in order not to be directly involved in pricing-setting mechanisms. Funds generated from the removal of the subsidies were used to support pro-poor social policies. The intention was to enlist popular support for the removal of fuel subsidies, and to create a credible system that would not fall prey to partisan propaganda.

The policy to remove fuel subsidies was only temporarily successful for two main reasons. First, the government taxed gasoline for vehicles at a higher rate in order to use the profits to reduce the prices of other fuels (cross-subsidising policy) and continued to subsidise fuel. Second, when oil prices soared in 2007 and 2008, energy prices became an election campaign issue, affecting the policy to separate the government from price-setting mechanisms. By March 2009 fuel prices in Ghana were more than 45% below the corresponding fuel prices in neighbouring countries.

When specific policies are introduced, a political economy analysis can show how winners and losers interact and identify the best means of encouraging their implementation. An example of the successful implementation of energy infrastructure is Brazil's benefit-sharing mechanism: Brazilian law stipulates that affected states and municipalities receive a percentage of royalties from Itaipu Binacional, the owner and operator of the Itaipu Dam on the River Paraná.²²

Benefit-sharing mechanisms go beyond resettlement and rehabilitation programmes, and beyond practices for compensating socioeconomic losses. Benefit-sharing mechanisms are a means 'to share part of the benefits from dam operations' with all those affected by the project, addressing a wide range of people. They may be applied even if nobody has to be resettled and can serve as a catalyst for local and regional development, although they do not (but could) compensate for land and property losses. Most important, funds are derived from the revenue stream and are not part of a project's investment budget (Égré et al., 2002).

Égré (2007) makes clear that a good benefit-sharing mechanism can be implemented under the following conditions:

1. Existence of an economic rent that can be shared with project-affected populations.
2. Stakeholders' goals are reconciled.
3. Benefits are efficiently distributed. In the case of legislation establishing revenue-sharing mechanisms through taxes or royalties, the process used to transfer revenues to project-affected populations should contain steps, provisions and safeguards to ensure that the declared goals are met.
4. Ensuring the involvement of local communities.
5. Ensuring the accountability of agencies entrusted with benefits redistribution.

This example shows how a political economy analysis can complement traditional theoretical, empirical and economics studies in examining policy design and implementation and identify important factors for decision-makers:

1. Good policies such as the removal of fossil-fuel subsidies which promote the deployment of polluting industries may create negative effects such as increasing fuel prices, which will affect social outcomes and 'triple win' improvements.
2. Even when policies overall ensure a 'triple win', it is critical to identify and analyse which individuals and sectors stand to lose.
3. When policies do not provide 'triple win' solutions, or if they damage some social sectors, it is crucial to establish compensation measures (a top-down approach) such as policies to reduce the cost of energy for rural consumers (REPTS) discussed earlier, or participatory process (bottom-up approach) such as in the case of the Itaipu dam in Brazil, to facilitate compromises among the various interested parties.

It is challenging to try to eliminate externalities by subsidising green energy rather than fossil fuels if this is not done in a way that takes into account how the different parties will be affected.

²² Égré (2007) points out that no information could be found on the municipalities' use of the royalty revenues, but Itaipu Binacional has developed its own large-scale environmental and social development programmes, focusing on activities such as reforestation, public health, reservoir fisheries, biodiversity conservation and environmental monitoring.

6.4 LESSONS LEARNED

Energy-related GhG emissions are increasing faster than the absorptive capacity of the atmosphere can sustain (IPCC, 2007a). A key solution lies in increasing the supply of renewable energy. There are unexploited opportunities for investment in renewable energy in LICs, where most of the potential renewable supply potentials are to be found. The question is how to realise these opportunities in a way that promotes inclusive and sustainable growth. The discussion on renewable energy has identified a number of insights and suggestions that policy-makers should consider in order to promote economic, environmental and social sustainability:

1. The introduction of renewable energy faces a number of constraints. These need to be removed to encourage the diffusion of renewable energy production and uptake through appropriate interventions in terms of economic conditions (e.g. carbon market mechanisms, including subsidies, incentives), market (to eliminate market failures) and regulation (e.g. laws and institutions such as regulatory agencies).
2. The removal of barriers to investment in renewable energy may not be sufficient to guarantee economic, social and environmental sustainability. A wide set of policies (e.g. promoting human skills, the right business environment) are needed to provide the conditions for long-lasting social improvement and to mitigate negative pressures on the availability of land, water and biodiversity (e.g. integrated water resource management for the construction of dams).
3. The increased supply of renewable energy is likely to create stress on water and the environment – an important example of the WEL nexus – especially for biofuels. In countries such as China and India, with strong population and economic growth, this stress may be particularly severe. Concrete measures such as incentives for rainwater harvesting, the use of marginal land for production or the adoption of management practices such as intercropping, are policy instruments to reduce the pressure on resources. For new environment-friendly technologies (e.g. second- and third-generation biofuels), R&D expenditures can reduce the time when they will be financially viable.
4. The public sector plays a crucial role in the development of renewable energy. Successful cases at the country or company level are driven by specific incentives and policies, such as in the case of subsidies for biofuels in Brazil. Such policies may have different outcomes according to the capacity of the state and the private sector to implement, enforce, monitor and design the interventions.
5. Private companies have often led the promotion of inclusive and sustainable growth and there are many examples where they have preserved the water and land or promoted corporate social responsibility (CSR). Even so, the public sector still needs to stimulate the internalisation of negative externalities, e.g. through pricing, targets, and legislation or to regulate the WEL nexus. There is evidence to suggest that measures to manage the WEL nexus boost growth by preserving environment (e.g. unified water regulation in China produced 2.5% growth rates).
6. Rich countries and in particular the EU may play a crucial role in boosting renewable energy and development in developing countries. The demand for renewable energy in OECD countries could help to create markets and jobs in LICs. The EU 20-20-20 policy presents a great opportunity to do this. Article 9 of Directive 2009/28/EC on the promotion of the use of energy from renewable sources makes it possible to import 'green' electricity from outside the EU to reach the desired 20% renewable share, which means that improvements in the infrastructure for an integrated Euro-Africa energy grid could enable African countries to sell green energy.
7. There is a set of 'theoretical' options to enhance the production of renewable energy for sustainable development, but in practice many of these options may be unrealistic. Reasons for this may include conflicting interests across groups (e.g. the lobby power of fossil-fuel producers may be an obstacle to boosting the production of renewable energy), economic circumstances (e.g. in Ghana the rise in the price of fossil fuel was important in turning public opinion against the removal of subsidies) or the lack of the right processes (the lack of participatory approach may make it difficult to find the right compromises across winners and losers). Political economy analysis helps us to understand these factors and the interaction between winners and losers from specific policies, and to set feasible solutions in order to shape policies that are socially acceptable.

There is a great potential for the renewable energy production in developing countries to bring important economic, environmental and social benefits. Achieving this depends on sound policy packages (such as the removal of market failures for capital access, incentives for project start-up to reduce high initial capital costs related to the production of alternative energy, interventions to reduce negative externalities from the introduction of renewable energy plants and a set of measures such as developing the education and skills to increase the indirect effects of the renewable energy business) which can reconcile short-run needs to push for the adoption of renewable energy and long-term needs to make renewable energy work for economic, environmental and social sustainability.

CHAPTER 7

MANAGING SCARCITY: INVESTMENT IN LAND

7.1 CONTEXT

Projected scarcities of food, water, and energy, and the search for investment opportunities to satisfy food security in an increasingly global market, have led to growing pressure on land worldwide. It is estimated that agricultural production must double by 2050 compared to current levels, simply to meet the needs of a growing population. Changes in diet, with greater demand for meat and other animal products, will intensify these needs (Bruinsma, 2009). Although in global terms, meat constitutes only 15% of the human diet, around 80% of agricultural land is used for feeding livestock (FAO, 2006). High levels of wastage and spillage in production, retail and consumption compound the problem. The demand for biofuels is also expected to rise, driven by concerns about rising oil prices and by the finite availability and detrimental environmental effects of fossil fuels, and this will affect land use (see Box A7.3 in the Appendix). Other international efforts to mitigate climate change, such as REDD, and concerns about delicate ecosystems, also make competing demands on land (e.g. forests, wetlands, nature reserves). In addition, land is needed for other purposes such as residential use, tourism, conservation, towns and cities and industrialisation, which are also on the rise (Hilhorst and Zoomers, 2011). Finally, land is increasingly seen as an investment.

These combined factors place significant pressure on the world's ability to produce enough food and energy to meet current and projected needs. The crisis in food prices in 2007 and 2008 was a clear indicator of the changed context and of the need for careful management of this situation.

Major technological advances have contributed to increased global yields, accounting for 70% of the increase in crop production between 1961 and 2005 (Bruinsma, 2009). In theory, the rise in global demand could be met by increasing productivity on land that could sustain rain-fed agriculture, thereby eliminating the need to expand into forests (Deininger and Byerlee, 2011: 76). Some regions, however, still exhibit major gaps between current and potential levels of productivity, which need to be exploited. Yield gaps are particularly high in sub-Saharan Africa, and farming practices worldwide achieve less than 30% of potential yields (ibid). With the current rate of productivity increases, notably in sub-Saharan Africa, demand is not likely to be met, which means that expansion of agricultural frontiers and conversion of land will continue. This will lead to increasing incursion into fragile ecosystems and may have serious global environmental consequences. The situation is further complicated by the prediction that climate change will reduce the potential of some regions (e.g. in India and across Southern Africa) to increase production.

On the bright side, large potential yield gains also create major opportunities for economic growth in some of the poorest countries, provided this takes place within limits set by inclusiveness and sustainability. Achieving this will require careful consideration of trade-offs between different land uses and production systems. Land performs a number of non-economic services that serve deep cultural values, provide livelihoods, and are critical for the survival of the system as a whole. As human civilisation moves rapidly towards planetary limits, it is important to protect these global public goods. With the exception of REDD, ecosystem resources such as for the medicinal potential of biodiversity or carbon-capture capacity do not yet have a monetary value. Similarly, the livelihoods of rural dwellers are seldom fully incorporated into cost-benefit analyses or market mechanisms. Agriculture must become more sustainable, more productive and more efficient in its use of resources, along with the focus on providing livelihood opportunities for the rural poor. At present, however, it is rare for the right incentives to be in place to strengthen sustainable agricultural practices.

A second clear manifestation of increasing scarcity is the phenomenon of large-scale land acquisitions (LSLA). The media focus has been on the sheer size of some of the proposed deals, rising social tensions in some cases and vivid accounts of negative social impacts. Large-scale land acquisitions are just one manifestation of the increased pressure on land, and not necessarily the most important one. Nonetheless they clearly indicate the rapid pace of change and the negative impact this can have on rural populations and the environment.

There are no precise data on the real dimensions of LSLAs but it is clear that trend has accelerated since about 2007 and that it is continuing to do so (Hilhorst and Zoomers, 2011; Deininger and Byerlee, 2011; HLPE, 2011a). (More information on the extent of land acquisition and the main actors involved is presented in the Appendix.) It is now evident, though not easily proven, that many land deals are as much about water as about land. Early movers seek to control or 'lock in' access to water for agriculture in anticipation of future shortage (WEF, 2011a; Smaller and Mann, 2009). Sub-Saharan Africa and Latin America in particular have large untapped water resources and are therefore of interest to water-scarce countries or to investors foreseeing future scarcity (Deininger and Byerlee, 2011; Muller, 2011). The right of investors to use the water required to cultivate the land is implicit in land deals, but is seldom paid for (Hall and Paradza, 2011).

Of course, such pressures on land and the associated changes in land use and ownership are far from new. Colonialism and large-scale migration had massive effects on land use and ownership patterns. What has changed is our understanding of the planetary

limits and of the environmental value of land and ecosystems, as well as the widespread adoption of the concepts of human rights and social inclusion. We now need to consider land management in a context of relative scarcity and rising global demand in order to optimise its contribution to inclusive and sustainable growth. The Appendix to Chapter 7 further discusses a number of concepts on land in relation to ISG, as well as a discussion on the meaning of 'scarcity' in relation to land.

All of these issues are typically cross-sectoral and relate to various global concerns, such as biodiversity and climate change, and to energy, food and water scarcities. To achieve land-use planning for ISG in the WEL nexus requires the careful analysis of the benefits and opportunity costs of competing options. This is no simple task as the functions involved in the various options are usually valued differently – some are private goods while others are local or global public goods. Some have market values, some could be priced through national or international schemes, some will remain underpriced, and others cannot even be expressed in monetary terms (e.g. the ancestral or sacred value of land).

Complex issues of subsidiarity also arise as national sovereignty needs to be balanced against the global responsibility to protect the planet. There are relatively few global policy levers, e.g. reducing demand or changing overall incentive structures. At the national level there will be trade-offs between various competing land uses, as the three objectives of economic growth, inclusiveness and sustainability tend, as earlier chapters have shown, to be in tension or competition with each other and 'triple-win' solutions are unusual. Benefits and losses are often distributed in complex ways, and mitigated through various channels. The debate on biofuels gives some insight into the complexity and interconnectedness of the issues.

This chapter examines ways to promote mechanisms for land-use planning and investment in land that will encourage the necessary transition to ISG, focusing on what role the public and private sectors can play at the local, national and trans-boundary level.

7.2 ISSUES IN MANAGING LAND FOR INCLUSIVE AND SUSTAINABLE GROWTH

This chapter examines two main issues related to the increased pressure on land. The first is the land-use changes that occur as a consequence of the rising and competing claims for land. Promoting ISG implies making trade-offs between agricultural production and other uses, and between pre-existing rights and new opportunities. Decision-making needs to involve local participation, but at the same time national-level decisions have global implications, and decisions taken at the international level play out at the country level. This raises complex questions about how to manage the global resources effectively.

The second topic is the rapid rise in large-scale land acquisitions (LSLAs). Although there is as yet no evidence of a positive impact on development, it is clear that the phenomenon is likely to intensify. A proper management of increasing investment interest requires robust and competent institutions, and these take time to build. Yet, investment also raises tremendous prospects for economic growth, which can be harnessed through good policies and management of the natural resources.

7.2.1 INCREASED DEMAND FOR LAND

7.2.1.1 OPPORTUNITIES FOR ECONOMIC GROWTH

Demand for land is high and growing. It has been estimated that to meet projected global demand by 2030 some 47 million ha of additional land must be brought into production for food and feed alone (a decrease of 27 million ha in industrialised and transition economies and an increase of 74 million ha in developing countries) (Deininger and Byerlee, 2011). Demand for forest is estimated at between 42 million ha and 84 million ha, and for biofuel at between 18 million ha and 44 million ha by 2030 (ibid), although the IEA (2010c: 26 and Figure 11) estimates 100 million ha by 2050. Although these issues fall largely outside the scope of this Report there is also a need for land for the growing urban population (estimated at about 16 million ha per year), often the most fertile lands (Foresight, 2011: 57), large infrastructure (e.g. dams) and tourism.

Overall, these competing claims place a high value on natural resources. This presents real opportunities for economic growth in countries endowed with vast natural resources, and in particular those with a large productivity gap – which is the case of many of the poorer countries, particularly in sub-Saharan Africa. Agricultural growth could therefore provide a good basis for economic growth in such countries.

First, the opportunities created by greater commercial interest have led (or will do in sub-Saharan Africa) to increasing the value of land. Second, the higher prices for agricultural commodities heighten the potential for new employment as well for higher returns on public goods (such as infrastructure, services, extension). Third, the desire by some MNCs to forge stronger ties with local producers for input tracking, quality control, and reputational issues associated with environmental norms and labour standards, create opportunities for the deeper integration of local producers into global value chains and raise prospects for more FDI. This could create scope for increased market access, and for technology transfer and capacity-building.

Brazil is the best-known example of increased productivity, which has contributed significantly to its growth trajectory – although it also came with environmental and social costs (see Box 1 in the executive summary which is based on Coy and Neuburger (2009); Coy (1991); Deconto (2009); Fearnside (2007); Margulis (2003); Martha (2011)).

This potential for economic growth needs to be harnessed since low-income countries need to develop economically and reduce poverty. It has now become a global responsibility to enable LICs with natural resource endowments to do this, while also respecting sustainability and inclusiveness concerns, and against the backdrop of the global transition from BAU growth. We can learn from the mistakes that were made in countries like Brazil.

In addition to the economic benefits that can be gained from higher productivity and from leveraging the increased demand for agricultural products, it may be possible to benefit from the increased global and local interest in ecosystem services, as will be discussed below.

7.2.1.2 CONSIDERATIONS OF ENVIRONMENTAL SUSTAINABILITY

The increased demand for land is likely to lead to more conversion of fragile ecosystems such as forests, wetlands and protected areas to other uses. These vital ecosystems risk being forfeited. There are concerns about the loss of the global functions played by these ecosystems, such as providing hydrological services, landscape beauty, carbon sequestration and biodiversity (Ravnborg et al., 2007).

The severe loss of biodiversity is already on the global agenda, as, for instance, in the 1993 Convention on Biological Diversity. Biodiversity is eroded when forests are converted into agricultural land and the shift from mixed to mono-crops reduces agricultural biodiversity. It is sometimes possible to bring degraded lands into production, which could have a positive effect on biodiversity (Pehnel and Vietze, 2010). Soil is another finite resource, and significant negative impacts have been observed since the 1950s.

There is still debate about what agricultural practices should be promoted, but they tend to include the increased use of naturally and sustainably produced nutrient inputs, diversified crop rotation, livestock and crop integration, minimum tillage and cover-crop cultivation techniques; integrated biological pest and weed management practices; and improved post-harvest storage and processing facilities. Other issues of contention include high-tech versus low-tech solutions, such as genetically modified organisms (GMOs), and the role and degree of external inputs. In all cases, however, the solutions are context-specific.

7.2.1.3 CONSIDERATIONS OF INCLUSIVENESS

In addition to the environmental effects there are the issues of inclusiveness and pro-poor development aspects to choices about how land is used. Most agricultural production takes place on family-owned farms, and there are some 450 million small-scale farmers worldwide (ETC Group, 2009; IFAD, 2008). Some 80 million smallholder farms contribute 30% to Africa's GDP and 40% of its exports (Hall, 2011). These farmers also constitute a large proportion of the global poor, and there is great variation in the degree to which they are subsistence- or market-oriented (World Bank, 2007).

As agriculture tends to be far better at creating incomes and food security than does growth in any other sector (World Bank, 2007), efficient agricultural development could in principle offer the real potential to reduce poverty. But have higher agricultural commodity prices, the increased value of land, the increased integration into supply chains, and payment for ecosystem services actually created pro-poor opportunities?

Increased value of land

First, the increased value of land can only be appropriated if there is a market, and if the owner or user has unequivocal land rights, which is often not the case, as discussed in Section 7.2.2.2. And even if this condition is met, the increased value of land can be a double-edged sword for the rural poor. Landowners may opt to sell their land and benefit from the higher value, but this is a one-off gain and, depending on the alternative off-farm employment opportunities, may not enable such farmers to improve their economic status. Distress sales are common (European Parliament, DG External Policies, 2011), and for these farmers as well as the long-term landless it becomes increasingly difficult to (re)gain access to land, which may therefore deepen land inequality. On the other hand, it could help to consolidate small and fragmented land parcels and lead to greater productivity (Alemu, 2011). Whether this has positive developmental outcomes will depend on the specific context and in particular on the available off-farm employment opportunities.

The increased value of land also attracts local power brokers. The relatively weak tenure security of local land users makes them vulnerable to expropriation by the state, local elites, or even traditional authorities (Alden Wily, 2011a: 737). There are many cases where local people have been coerced or pushed off their lands (Hall and Paradza, 2011), sometimes violently.

Increased integration into global value chains

There are real opportunities in a shift towards market-oriented production and greater integration of smallholders into global value chains. In practice, however, the larger-scale actors tend to be at a competitive advantage because they are better able to overcome market failures and the lack of infrastructure that often characterise the host countries. They have access to global financial markets and so can deal with gaps in credit provision and high interest rates. They can self-insure by spreading their risk over a wider geographical area or over multiple sectors. Some large companies also invest in 'public goods', such as R&D, infrastructure and social services for their agricultural workers.

A key question is how these forces will affect the future livelihoods of today's small-scale farmers, and the kind of policy environment that will enable these farmers to become integrated into global value chains in a way that promotes ISG.

Public spending in agricultural development has been neglected in the past, especially in sub-Saharan Africa (World Bank 2007; Oxfam International, 2011a). There is a need to renew the focus on agriculture, to level the playing field between smallholders and large-scale agriculture, and to manage a transition to more ISG-friendly agriculture.

There may be a risk attached to the co-existence of large-scale agriculture and smallholder farms. The UN Special Rapporteur on the Right to Food (de Schutter, 2011) warns that increased domestic competition may drive out small and local food producers because they will be unable to compete with large-scale agro-industrial production of large quantities at low cost.²³

He argues that co-existence will be sustainable only if it is coupled with a deliberate strategy to invest in supporting small-scale farming, including measures to protect these farmers from the negative impact on their competitiveness. It is therefore important to assess whether business models will increase the productivity of local farmers and not undermine their competitiveness and resilience in the long run.

The potential for integrating smallholders into production systems depends on how these are organised. For instance, current methods of ethanol production require fairly large economies of scale and vertical integration and are therefore unlikely to help small-scale farmers in developing countries. Second-generation biofuels may require even larger economies of scale (World Bank, 2007). Certain crops are more conducive to out-grower systems or other inclusive business models (e.g. oil seed and sugarcane) and other less so (e.g. oil palm, perennials, horticulture) (Deininger and Byerlee, 2011: 34). Again, this depends on the policies in place and on the presence of local markets in services (marketing, distribution, inputs, finance) and public goods (extension services, infrastructure, agronomic knowledge, etc). And it depends on the business model, as shown in the Appendix, Box A7.5 on Sarawak.

Payment for ecosystem services

The global systems for carbon sequestration, such as REDD and the CDM, are potentially interesting for countries with large natural endowments and for benefit-sharing under the Biodiversity Convention. However, they require a strong management capacity both at the government and the local level. The demands of monitoring, verification and certification are therefore very sensitive to economies of scale, which may reduce opportunities for small producers. In addition, REDD is labour-intensive because it is a pure transfer for letting trees stand. For these reasons, social movements representing smallholders and landless farmers, forest-dwellers and indigenous peoples (such as La Via Campesina) often oppose REDD.

At the national and local level there are also opportunities for payment for ecosystem services, for instance for water quality and quantity, erosion and land-slide prevention, micro-climate regulation, eco-tourism, habitat protection and gene-pool conservation (Ravnborg et al., 2007). An interesting example of PES is Lake Naivasha in Kenya, where downstream producers pay a fee to the upstream farmers for maintaining water quality and quantity (see Nyangena and te Velde, 2011). Such cases could provide pro-poor benefits and could be promoted.

7.2.1.4 RESILIENCE

Whilst openness increases the options to become food secure (e.g. by importing in times of local drought) and hence increases resilience, there are also risks associated with an increased exposure to global commodity chains, in terms both of resilience of the overall production system and of domestic food security. Increased dependency on global commodity markets, especially in relation to production systems based on mono-cropping, increases the risks of sudden shocks. Fluctuations in commodity prices and vulnerability to pests pose real risks to farmers, so it is important to consider how far they can spread such risks. An increasingly unpredictable climate exacerbates these vulnerabilities. Improved risk-management strategies, such as micro-insurance systems (Churchill, 2007) may mitigate this to some extent, but not entirely. A further risk is that of monopsony, whereby smallholders depend mainly on one buyer (Collier and Venables, 2011).

²³ The risk of 'internal dumping' does not occur in perfectly segmented markets, where large estates produce solely for export, although this has implications regarding food security, as discussed above.

The second key risk relates to domestic food security. Higher food prices may benefit producers, but not consumers (and most poor people are both). Furthermore, a shift from self-sufficiency or self-reliance in food to greater dependence on cash crops may make both household and national economies more dependent on purchasing food on global markets, which have been extremely volatile in recent years.

In sum, increased integration into market systems and dependence on local markets may increase the options to become food secure it may also make incomes more volatile, which will particularly affect poorer households. This heightens the importance of social-protection systems and safety nets. This leads to the following urgent issues:

- *Ecosystem services need to be valued* more appropriately in order to change the global incentive structures. Current patterns of consumption and wastage are unsustainable.
- The transition to more sustainable agricultural practices requires *serious investment in agricultural development*. Agronomic knowledge and farming practices must be appropriate to the local context, and there is a need for mechanisms to ensure that local farmers can benefit from opportunities created through the promotion of improved production systems and business models. *Agricultural policy must aim at levelling the playing field* for smallholders, in particular through risk mitigation.
- *Productivity will need to rise* within the limits placed by considerations of sustainability and inclusiveness. Trade-offs between economic growth, sustainability and inclusiveness have to be taken at the national (or sub-national) level. This requires *solid land-use planning systems* that can identify the best opportunities to realise potential growth, taking into account competing uses that are non-agricultural in nature but may provide direct and indirect economic benefits, such as afforestation under REDD and examining *various production systems and business models* and their likely impact on ISG.

7.2.2 LARGE-SCALE LAND ACQUISITIONS

If they are well managed, LSLAs have the potential to generate economic growth, but the capacity to leverage these opportunities leaves much to be desired.

7.2.2.1 POTENTIAL FOR ECONOMIC GROWTH

Governments and investors are aware that LSLAs could have real benefits for development. Host governments are attracted by the prospect of capital, jobs, infrastructure, technology transfer and skills training, revenues, access to markets, and demand for local supply/services. Additional positive effects may also be the introduction of new management practices and institutional norms.

Recent analysis shows, however, that these opportunities have generally not been realised because investors fail to provide the promised benefits (Deininger and Byerlee, 2011).

- Host-country governments receive little revenue from land leases (Cotula et al., 2009). Land is often leased for free or for very low rents because governments prioritise FDI as a way to generate economic growth (Cotula et al., 2009).
- Tax revenues are reduced by exemptions and benefits to attract FDI, and because tax revenues only materialise once the projects become profitable and proper audits are conducted (Cotula, 2011).
- Depending on the land and how it is intended to use it, a business model that invests in capital-intensive technology may be the easiest and most commercially viable option, but generates little or no local employment.
- The potential of increasing productivity to generate growth is eroded by the fact that investors often focus on the most productive land rather than on marginal land where it would be possible to achieve the most immediate productivity gain (Cotula, 2011; de Schutter, 2011).
- Unlike agricultural entrepreneurs, financial speculators have no interest in developing the land or in ensuring tangible benefits for the local population.
- The degree of technology transfer determines how far this will benefit the host country. Investor islands that function in isolation from either government or smallholders are less likely to provide long-term benefits.
- The potential of LSLAs to contribute to economic growth depends on how far the investment makes a strategic contribution to economic development. Currently such land deals are often ad hoc and based on the investors' preferences. Host-country governments seldom have the necessary information to inform decisions on their potential to contribute to ISG.

There are cases where LSLAs have generated employment and improved access to markets and technology (Brüntrup, 2011). The distributional and environmental effects of LSLAs largely depend on the crops planted, the production mode and the business model. It appears that the most positive examples occur in situations where there is a degree of collaboration and synergy between local producers and the large-scale investors. There is scope for more inclusive business models, as described in Section 7.2.1.3, and research is being conducted on the impact of various business models on local populations (Vermeulen and Cotula, 2010).

Weak regulatory environment, systems and implementation

There is little evidence overall of processes and systems to ensure that LSLAs fulfil their promises. Either there are no targets regarding investment, employment generation and tax payments in the agreements, or any that do exist are vague and unverifiable (Deininger and Byerlee, 2011; Cotula et al., 2009). Furthermore, both investors and host governments often lack proper, independent information about the project's technical and economic viability, and host governments are seldom in a position to assess whether promised benefits are realistic (Cotula et al., 2009; Cotula 2011; Deininger and Byerlee, 2011).

Most contracts do include some provision to allow the host government to terminate it in the case of non-compliance with the investment plan, but vague wording makes it difficult to invoke any such provisions – and in any case governments often lack the capacity to monitor and enforce them. The generally secretive negotiation processes and outcomes provide few opportunities for public scrutiny, which potentially allows for collusion between individual government officials and investors (Cotula et al., 2009: 83). The international legal dimension is further discussed in Box A7.6 in the Appendix.

Some countries – Liberia, for instance – have made considerable progress in developing better contracts, such as including specific, quantifiable and verifiable investment commitments regarding jobs and training, stipulations on local content and local processing, as well as provisions for the involvement of small-scale producers. Such contracts are commended for their flexible duration, greater attention to local food security and tight social and environmental safeguards. The contracts have to be ratified by parliament and are available online (Cotula, 2011).

7.2.2.2 CONSIDERATIONS OF INCLUSIVENESS

Access to land

Many case studies show that people have been evicted from forests, wetlands, and agricultural fields to make way for LSLAs (Hilhorst and Zoomers, 2011). Resource users with weak or informal rights are often evicted or pushed into the more marginal zones. Women's livelihoods are often heavily dependent on the land, so the impact on women can be particularly severe. Women are also more likely to lose customary or derived rights, as registration tends to focus on the (male) household head. Users with secondary rights (e.g. seasonal users such as pastoralists) also tend to lose out (Deininger and Byerlee, 2011; Zoomers, 2010; Hall and Paradza, 2011). More vulnerable users may be pushed into fragile ecological zones, where they may both contribute to environmental degradation and be more exposed to climate-related risks. Given that land leases can be for up to 99 years, livelihood strategies and agricultural knowledge may be lost forever (Cotula, 2011).

To understand such impacts we need to look at the current formal and informal mechanisms affecting ownership of, access to and control over land, which are often heavily influenced by history.

Throughout most of Africa, as well as parts of Asia and Latin America, most land is owned by the state and held under customary tenure by local users. Here, we will focus predominantly on sub-Saharan Africa, where there are strong new commercial interests and large gaps between formal and informal land ownership.

In sub-Saharan Africa, customary rights are legally recognised in a number of countries, including Ghana, Mali, Mozambique and Tanzania (Cotula and Polack, 2011), but in practice these rights are poorly protected. In fact, most of the land that is being leased is not from the titled land sector, but from these customarily held lands (Alden Wily, 2011b). These lands are considered 'unowned', 'idle' and 'available', but this ignores their users, who do have de facto rights and tend to include the poorest whose survival depends on their access to land (Alden Wily, 2011a; Cotula et al., 2009; Cotula, 2011; Oxfam, 2011b).

Tenure security

This means that security of tenure is an essential ingredient in policies to achieve better pro-poor outcomes of land leases, and it also influences people's ability to participate in decision-making processes.

Box 7.1: Tenure security

The concept of tenure security used to be equated with property rights, to which the main policy response was individual titling and registration. This tended to increase the willingness and ability of landowners to invest by ensuring that any profits would accrue to them and enabling them to obtain credit by using the land as collateral. In sub-Saharan Africa, however, titling did not always lead to greater agricultural investment, but tended to exacerbate disputes and was often manipulated by local elites, as those with more power, contacts and resources could register land in their names, while smallholders, women and herders would lose out.

The current concept of tenure places a stronger focus on security of use rather than outright ownership. Customary and collective tenure systems can provide sufficient security, provided these rights are clearly recognised. Indeed, some countries have taken steps to strengthen the protection of customary rights, e.g. Mali, Mozambique, Namibia, Tanzania and Uganda. The challenge now is to create systems to record and register such rights when these overlap, based on local realities.

Just as some convergence on the importance of customary tenure systems has been reached, these systems have come under growing pressure in the context of profound and rapid change. Customary rules are increasingly contested, with different social groups making competing claims and more powerful actors shaping the interpretation of these rules. Women's access to land remains precarious, and is at times intensified as men aim to take control over the land prior to registration.

Source: Hall and Paradza (2011)

Most host countries lack at least one of the essential ingredients for effective land-tenure security (Alden Wily, 2011a), either because they do not have the necessary institutions, systems and capacities to implement the land policy, or their provisions are not effective. Ghana, Mali, Mozambique and Tanzania, for example, have relatively strong policies and institutions in place, but implementation lags behind (Alden Wily, 2011a; Cotula et al., 2009; Cotula and Polack, 2011). Many of the countries that are heralded as 'best practice' examples of land-rights administration are at the centre of major LSLAs that appear to exclude local smallholders (Hall and Paradza, 2011).

Inclusion in decision-making processes

Local populations are seldom included in consultations on land allocations, as deals tend to be struck between the government and the investor behind closed doors. Local communities may be informed only after the event (Hall and Paradza, 2011).

Few governments in sub-Saharan Africa establish a legal requirement for consultations with local users of land before making a land deal. Sometimes such consultations come under the aegis of Environmental and Social Impact Assessments (ESIAs) that form part of investment appraisal procedures. But these do not necessarily take place, and are rarely open to public scrutiny (Cotula and Polack, 2011; Deininger and Byerlee, 2011). Sierra Leone is a laudable exception.

A few countries, such as Mozambique, have incorporated the requirement for local consultations into their land policies. Early experiences show that such consultations are often rushed and raise issues concerning the legitimacy of community representation, which tends to be one-off and exclude marginal groups. Women and seasonal users (pastoralists, hunter-gatherers, charcoal burners), whose livelihoods often depend most on common resources, are among the least involved in decisions on land use (Hall, 2011; Cotula and Polack, 2011; Deininger and Byerlee, 2011).

Local land users thus have a very weak legal status and bargaining position from which to negotiate, due to lack of information about the viability of potential businesses, weak capacity to analyse and interpret the data and little access to support services. These asymmetries also affect their capacity to engage with legal systems and seek redress when their rights are infringed. Costs are high and the legal environment is biased towards formal rather than customary tenure (Cotula and Polack, 2011). One recent survey showed that formal justice systems tend not to be used to mediate land-use conflicts because of the high barriers to formal judicial institutions and complaint systems (van Westen et al., 2011).

Box 7.2: Inclusive decision-making in Sierra Leone

Addax bioenergy intended to lease about 10,000 ha of land in Sierra Leone. An ESIA was a legal requirement, along with compensation for affected communities. The result of the ESIA was that there would be significant compensation costs because of the large number of people who would be displaced. The lease was therefore revised to reduce the negative social and environmental impact. The new design avoided wetlands upon which residents relied for crop production, as well as forest resources, and thereby reduced the number of livestock farmers who required compensation. Local residents can continue to harvest natural resources from the land until biofuel cultivation begins. Furthermore, committees were set up to resolve particular issues, as well as a company-community relations office and grievance mechanisms (Hall and Paradza 2011, citing Andrew and Vermeulen, 2011).

This is an interesting example of the positive impact made by an inclusive decision-making process and the legal requirement for an ESIA. Yet an independent evaluation still expressed concern about the openness, transparency and inclusiveness of the process, and raised doubts about whether the principle of free informed prior consent (FIPC) was genuinely respected. It also expressed a particular concern about whether Addax has the right to stop or alter the course of any water source (Anane and Abwu, 2011).

Distribution of benefits

It is unusual for any job opportunities that do exist to be equitably shared. Many production systems require skilled labour and management staff, which tends to rule out local farmers, so the companies either bring in labourers or hire migrant workers (Zoomers, 2011; Burgers and Susanti, 2011). Women are less likely than men to benefit from work opportunities, and may also be clustered in less secure and lower-paid jobs. They are also disadvantaged by the lack of childcare facilities (Hall and Paradza, 2011).

Benefits may be distributed through compensation payments, for instance when people are displaced. National legislation tends to permit the state to appropriate land for the public good, and may regard private investment as a justifiable reason (Alden Wily, 2011a). Compensation is usually a legal obligation, but is not always met and the basis of calculation is often vague and open to multiple interpretations. Compensation may be paid only for the loss of visible improvements rather than for the land itself, and it is very rare for the value of water and forest resources to be included (Cotula, 2011). Of course compensation will only be paid to those with legally recognised rights. Customary rights holders, and in particular those with derived and secondary rights, such as women and pastoralists, are most likely to lose out (Cotula et al. 2009; Cotula and Polack, 2011; Hall and Paradza, 2011).

There are some examples of investors paying higher compensation benefits than those stipulated in the law, generally involving large international lenders adhering to the Equator Principles²⁴, although in some cases the motivation seems to be one of governments and investors wishing to be seen to do the right thing (Cotula, 2011: 34-35).

7.2.2.3 CONSIDERATIONS OF ENVIRONMENTAL SUSTAINABILITY

Large-scale land acquisitions pose major concerns about environmental sustainability. Many of the issues described above apply to issues of sustainability and also inclusiveness, especially regarding the absence of legal requirements to conduct EIAs and the weak legal backing for performance requirements. In the absence of such controls and a strong regulatory environment, LSLAs can have substantive negative impacts (see Box A7.6 in the Appendix).

Owing to the advantages of scale in mechanised production and harvesting, 'modern' agriculture prefers larger plots and mono-crop systems. Such systems often have negative effects on the local environment, such as soil erosion, sedimentation and excess nutrient (nitrogen and phosphorous) runoff into surface waters, and the infiltration of fertilisers into groundwater. In addition, they tend to use improved hybrid varieties, which reduce biodiversity.

Negative environmental effects are not necessarily linked to scale but rather to overall changes in land use and to production systems. All agriculture can have detrimental effects. These are not necessarily related to scale or ownership, but to farming practices and technologies. While harmful practices should not continue indefinitely, the course of transformation to more sustainable farming will not be the same for smallholders and large-scale agriculture. Smallholders may better placed to embark on a more organic trajectory, whereas large-scale farms may opt for 'smart' technologies to achieve greater efficiency and recycling of waste products.

²⁴ The Equator Principles are voluntary guidelines for financial institutions, which are intended to serve as a common baseline and framework for the implementation by each adopting institution of its internal social and environmental policies, procedures and standards related to project financing (www.equator-principles.com).

7.2.2.4 RESILIENCE

Competing interests in the control over irrigable land and water has trans-boundary implications, and the shifting of geopolitical alliances is becoming visible in regions such as the Nile area and South Sudan (Hall and Paradza, 2011). This may generate international instability in the future.

Furthermore, outsourcing food production via LSLAs means that food is produced for export, and indeed many contracts contain export-only provisions. Yet, a number of countries in which LSLAs are occurring are food importers and some also receive food aid, such as Sudan. The ability of these countries to feed their populations will be reduced unless they can translate cash income into food imports. When domestic food production declines, access to food depends largely on purchasing power. Investors tend to focus on countries with weaker governance, which are unlikely to have strong social-protection measures to ensure that the poorer sectors can obtain food, which leaves them even more vulnerable. The rising stakes increase the potential for conflict, as described in Box 7.3

Box 7.3: Risk of increased conflict?

The new pressures on land change existing power relations and create new forms of social differentiation. Will this increase the risk of conflict? If so, what forms may this take? To date, very little comprehensive research has been done on this topic and evidence is anecdotal (Hall and Paradza, 2011).

The most visible type of conflict is popular protests against investors, which can play out in the political arena or closer to the ground. One famous example is in Madagascar, where strong public resentment over two deals of 1.3 million ha and 200,000 ha helped to bring down the government (ILC, 2011a). In the Philippines, organised protest used the legal route to block a US\$3.84 billion investment in 1 million ha, which the Supreme Court ruled unconstitutional (ILC, 2011b).

In Asia and in Latin America social movements have emerged in response, and there are squatter movements in a number of countries, notably Brazil. Sub-Saharan Africa has not yet seen such massive social opposition movements (with the exception of South Africa and Zimbabwe, owing to their specific historical legacies and land-reform policies) (Hall and Paradza, 2011). Indeed, few of the intended land acquisitions in sub-Saharan Africa have yet become operational, and it is therefore perhaps too soon for communities or civil society to respond. Communities may be positive about the potentially positive impact of investments because they have not yet witnessed any negative effects (Kadiri and Oyalowo, 2011). Where operations have begun, or the land has become enclosed, communities do react, however. Protests are not limited to the issue of dispossession but also include complaints about unfulfilled promises of social benefits, environmental effects, greater distance to travel to schools, health clinics etc. because of land enclosures, restrictions on access to water, grazing and crop residues (ILC, 2011b). While it is not yet clear whether such protests will turn violent, many community leaders have threatened 'war on the investor' (Hall and Paradza, 2011).

Since the benefits and losses are unequally distributed, changes have different effects across the population. Groups may be pitted against each other, which may create new social problems and exacerbate existing tensions. For instance, the declining level of water in Lake Chad has intensified disputes about access to and use of land, water and grazing between agriculturalists, pastoralists and fishing communities. The fact that the river basin is shared among nations, along with upstream large-scale commercial operations, could give the conflict a trans-national dimension (Hall and Paradza, 2011).

Large-scale land acquisitions take place in a historical context. Land dispossession has often led to rural resistance and insurrection, while control over land has also been used by the state or powerful elites as a means to co-opt communities. Land disputes have been an explicit or underlying cause of many civil conflicts. Simmering resentments related to such historical events can be re-ignited by land acquisitions. In Kampala, for instance, demonstrations in 2007 against the conversion of thousands of hectares of rainforest into an oil-palm plantation developed into an ugly riot (Graham et al., 2011).

Food exports are also accompanied by the export of 'virtual water', often to more water-scarce countries, thus potentially contributing to future scarcities (Allan, 2011). Most contracts give the investor the right to use the water attached to the land but do not include mechanisms to adjust this entitlement in the face of future water scarcity (Hall and Paradza, 2011), and fail to address issues of access by rural inhabitants to the water sources (see Box 7.2 on Sierra Leone).

7.2.2.5 CALL FOR ACTION

Investments in land need to be more strategically embedded into national or sub-national visions for rural, agricultural and economic development. This will allow for a more targeted provision of public goods and increase the chances that investments can contribute to the larger public good.

An important policy instrument to improve the impact of land acquisitions on ISG is a clear and transparent legal and regulatory framework. This should include a broad-based and genuine consultation with local rights holders over the relevant resources, and improved procedures for land-allocation and farming contracts.

Consultations on land-allocation and production systems need to be taken in a more inclusive manner, with special emphasis on weak rights holders, such as those with customary rights, particularly women and secondary users. This will require a significant strengthening of customary tenure systems to allow for the registration and recognition of often complex and layered users' rights. This will take time to achieve in view of the huge challenges posed by adjusting the legal and regulatory frameworks, putting in place implementation mechanisms and processes, and overcoming inherent power struggles. And all this has to happen at a time of rapid change and increasing pressure.

Finally, there need to be strong systems for monitoring and enforcement of investors' performance. Land-use planning processes should include agreements on the type of business model employed.

7.3 THE ROLES OF THE PUBLIC AND PRIVATE SECTORS IN MANAGING LAND FOR INCLUSIVE AND SUSTAINABLE GROWTH

7.3.1 PRIVATE SECTOR

Many agricultural or agro-processing operators or traders aim to expand operations, or integrate their operations backwards or forwards, in order to overcome supply constraints and secure a degree of market control. Profits are potentially high, but there are also considerable risks involved because the return on substantial investments may take a long time to realise.

The investor's greatest fear is that of compulsory expropriation. Ambiguities in many of the legal frameworks in sub-Saharan Africa, vague definitions of what constitute reasons for expropriation and the degree of compensation, mean that neither investors nor the host-country government can guarantee the outcome (Alden Wily, 2011a; Mosquera, 2011). New investment laws provide some protection, and there is growing convergence in such protection measures and institutional bodies (Mosquera, 2011; Alden Wily, 2011a; Cotula and Polack, 2011).

Further protection is provided through international investment treaties. These generally include safeguards against discrimination, expropriation and arbitrary treatment, provisions on profit repatriation and currency convertibility, and access to international arbitration for the settling of disputes (Smaller and Mann, 2009; Cotula and Polack, 2011). Ambiguities and differing perspectives still leave a degree of uncertainty, however, and any dispute-settlement process consumes valuable time and resources. Greater clarity and transparency would benefit the investors as well as the host-country governments and local people.

The risk of civil unrest caused by a large-scale land acquisition is a real concern for investors, especially where national or local governments have leased tracts of land that local communities regard as their 'property', or to which they had usufruct rights. Long-term socioeconomic sustainability is also of benefit to them. Media attention and the subsequent collapse of planned investments have heightened this risk, because it no longer affects the investment itself but also involves reputational risk.

Private-sector initiatives to mitigate these risks through collective action include the Roundtable on Sustainable Palm Oil,²⁵ the Roundtable on Sustainable Biofuels, the Forest Stewardship Council and the Roundtable on Responsible Soy. These tend to incorporate measures to address environmental and social concerns, and use certification methods. Such initiatives remain to have had only a limited impact in the area of crops that significantly affect land use. For instance, it is estimated that only 4% of palm oil comes from such certified sources, demand for which has been slow to develop (Deininger and Byerlee, 2011: 22). Several international lenders have adopted the Equator Principles, a code of conduct for the banking sector.

²⁵ <http://rsb.epfl.ch/>.

All of these principles, initiatives, commitments are voluntary rather than binding, and the secrecy shrouding deals between investors and host governments suggests that such voluntary guidelines may not be sufficient. There are also questions about the types of company that sign up to such commitments and whether these are the most relevant in terms of land acquisitions. Companies based in 'emerging economies' may be less susceptible to reputational risk than are large 'brand-name' MNCs. Another critique is that these guidelines neither refer to nor meet obligations regarding human rights, and neglect accountability, and may thus create an excuse for national governments to abdicate their responsibilities (de Schutter, 2011).

Even voluntary guidelines can, however, provide a degree of protection for the poor in situations of weak governance, and so may be a step into the right direction. There is some evidence, for example, that the Equator Principles have had a positive impact on land investments (Cotula, 2011: 31). Voluntary guidelines may also provide a tool for watchdog organisations to campaign, identify minimum and best practices, and if necessary target reputations and use 'naming and shaming' tactics against companies that have not signed up to the relevant guidelines. As such they can play an important role in setting norms and so should be promoted.

7.3.2 PUBLIC SECTOR

7.3.2.1 CURRENT MULTILATERAL EFFORTS TO DEAL WITH PRESSURE ON LAND

Global initiatives

The Convention to Combat Desertification, ratified by 119 countries, shows the international commitment to tackle land degradation. More specifically, the Food and Agriculture Organization of the United Nations (FAO) is preparing 'Voluntary Guidelines on Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security' to enhance governance in relation to the tenure of land and other natural resources. These guidelines will provide practical guidance on responsible governance of tenure as a means to alleviate hunger and poverty, enhance the environment, support national and local economic development, and reform public administration. The guidelines adopt a rights-based approach, and there has been extensive consultation with representatives from the private and public sectors and civil society, and negotiations for its formal adoption are in progress.

The World Bank, the International Fund for Agricultural Development (IFAD), the UN Conference on Trade and Development (UNCTAD) and FAO are also developing a set of voluntary guidelines for responsible investment. These Principles for Responsible Agricultural Investment that Respect Rights, Livelihoods and Resources (RAI) comprise seven principles that investors can choose to adopt when making large-scale land acquisitions. As yet, these principles are not operational.

Olivier de Schutter (2009), the UN Special Rapporteur on the Right to Food, has also formulated 11 core principles for investment in land. These emphasise the human rights implications of the rush for land and the state's obligation to ensure access to minimum essential food.²⁶ These principles help to put food security and human rights onto the national and international agenda.

By definition, voluntary guidelines do not establish legally binding obligations or enforcement mechanisms, but given their potentially positive effects in providing a basis for public scrutiny they should continue to be promoted.

EU initiatives

The EU issued its land policy guidelines in 2004 as a guide to best practice and to promote coordination among bilateral donors supporting land reform. This comprehensive and strongly rights-based document provides guidance for bilateral technical support programmes between EU Member States and host countries,²⁷ and thus contributes to policy coherence and convergence.

The European Commission has also stressed its resolve to accelerate the implementation of the African Union's (AU) Framework and Guidelines on Land Policy in Africa and support the process of establishing international guidelines on access to land and other natural resources (EU Press Service, 2011).

Pan-African initiatives

In 2009, Heads of State and the Government of the African Union endorsed a Declaration on Land Issues and Challenges in Africa (AU, 2009). They committed themselves to ensuring that land laws provide for equitable access to land – especially the landless, women, youth, displaced persons and other vulnerable groups – by adopting the Framework and Guidelines on Land Policy in Africa. Since their adoption, however, little progress appears to have been made on implementing them (Hall and Paradza, 2011).

²⁶ Specifically, de Schutter stresses the importance of measures and legislation to protect domestic food security, the promotion of labour-intensive farming systems, full transparency and participation of communities in land use decision-making processes based on the principle of Free Informed Prior Consent (FIPC), a fair sharing of benefits, and a concern for the environment.

²⁷ Other relevant EU and global policies in relation to sustainable land management and food security are the Earth Charter of the World Forum on Sustainable Development, the Common Agricultural Policy (CAP), the EU policy framework to assist developing countries in addressing food security and the FAO Voluntary Guidelines on the Progressive Realization of the Right to Food in the context of national food security. These policies will be discussed in Chapter 11.

The Declaration envisages an important role for the Regional Economic Communities (RECs) for the convergence of land policies and to address issues of land policy within their respective agricultural policy frameworks.

Progress on these issues in the RECs remains slow.²⁸ Such regional collaboration needs to be strongly promoted because it creates more local ownership, policy convergence and provides an opportunity for information exchange. There are concerns that land initiatives are still fragmented and uncoordinated, and further multilateral assistance to such regional or continental efforts should therefore seek to increase coherence (Potsdam Spring Dialogues, 2011; ECOWAS, 2010).

7.3.2.2 HOST-COUNTRY GOVERNMENTS

Host-country governments play the most important role in managing natural resources and (should) perform the following functions:

7.3.2.2.1 Development vision – structural transformation of the economy

One of the most vital responsibilities of government is to determine its development trajectory and vision for the future against which to align its policies. The vision will depend on the mix of natural, physical, social and human capital at its disposal, and likely productivity trends. It also needs to encompass the interlinked areas of water, energy and food security. The ability to provide off-farm labour opportunities is another crucial factor in the prospects and strategies for rural economic development.

Governments also need to evaluate current patterns of land distribution and how they measure up in terms of inclusive and sustainable growth. Any land reform undertaken to achieve ISG needs to incorporate measures to support the transition to sustainable agriculture.

A strong and coherent development vision gives the basis upon which to target the provision of public goods such as infrastructure and R&D, address market inefficiencies, and define incentives and taxation regimes. Investments in LSLAs should be in line with this vision and not be based on ad hoc decisions by investors and bureaucrats. Clear strategies also add to transparency and accountability, which contribute to the sustainability of the investment.

Box 7.4: Strategic use of pioneer investors

Pioneer investors who negotiate a beneficial deal, can research and experiment with different practices and both discover potential land productivity and show the feasibility of profitable investments. This will 'crowd in' other investors and create a more competitive environment that will push up land prices. Leased areas need to be sufficiently large to provide a strong incentive for a pioneer firm to be interested, but small enough to allow for other investors to be crowded in for substantially higher rents. In order to create the incentives for these investors, the host government needs to target its public goods, such as R&D, infrastructure and access to credit and business support to input suppliers or other service providers and effectively create an economic cluster. This is better done at sub-national level than at national level, as agro-ecological zones are localised and resources are limited. Agricultural zoning measures could also be used (Collier and Venables, 2011).

Host-country governments need to be strategic about exploiting the increased value of land. Different methods can be used to ensure it is realistically valued and not ceded too cheaply. Auction, as conducted for instance in Peru, can work well in an environment where there is sufficient competition and relatively strong systems and procedures (Deininger and Byerlee, 2011). In other circumstances this may lead to collusion, so a more objective valuation of land may be appropriate, although this also requires the capacity to project future value – knowledge that may not yet exist. A third method might be to use 'pioneer firms' to assess the price and productivity.

²⁸ For instance, the West African Heads of State adopted the Bamako Declaration on land issues in 2003, and the region has since launched an initiative to create a Regional Land Observatory; and the Economic Community of West African States (ECOWAS) initiative to establish a regional framework on land policies as part of its agricultural policy under the Comprehensive Africa Agriculture Development Programme (CAADP) (CILSS, 2011).

7.3.2.2 Broad-based, inclusive systems for land-use planning

Land-use planning is an essential tool to operationalise the national development vision, in particular the sectoral strategy for agriculture and rural development. Trade-offs will need to be resolved between economic growth, equity and biodiversity in the context of the broader strategic vision on food, energy and water security, and the acceptable degree of dependence on volatile international markets. These trade-offs cannot be made by government alone, but require a broad and inclusive process.

Host governments need to establish or strengthen the capacity for evidence-based land-use planning. Some components of this capacity might also be established at a regional or continental level to provide a service to governments in assessing LSLAs. In Africa, the RECs or the AU could possibly take on this role since they have already established several initiatives that are worth strengthening. Such regional institutions are also well placed to provide a platform for South-South exchange and to address problems associated with competition for foreign investment in a collective fashion.

Furthermore, although cost-benefit analyses provide essential input, land-use planning is primarily about distributive allocation. The distribution of potential revenues and of gains and losses need to be part of the planning process from an early stage. Participatory processes are essential. At the local level, it is important to make sure that rural communities, and especially women and secondary users, are included in these processes. This will require cost-effective and accessible planning and redress mechanisms, which need to be embedded in strengthened tenure and participatory land-administration systems, as discussed below.

7.3.2.3 Inclusive land policies

The most essential ingredient of a sustainable land policy is substantive tenure security, which must include measures to ensure customary land rights as well as other resource rights. Both individual and collective rights must be legally recognised.

Achieving a positive impact on the ground depends upon effective support systems, such as affordable, relatively simple and manageable mechanisms for land administration and participatory land-use planning.²⁹ A collective approach to determining resource rights has time and cost advantages, but the allocation and recognition of rights must closely follow existing informal arrangements. To avoid the risk of exacerbating latent conflict, local conditions should determine the strategies and pace of implementation. It is essential to address asymmetries in knowledge, capacity and access to resources in order that local land users benefit from administration mechanisms, and from complaints and dispute-settlement systems.³⁰

Implementation calls for significant levels of capacity, and institutions and systems take time to become established and accepted. There is a need both for strong regulatory frameworks and for substantive investment to close the gap between the law and the reality.

Box 7.5: Sustainable intensification of agricultural production

All agricultural solutions are site-specific because they depend on local soil, water, climate, biological stresses and topography as well as the availability of infrastructure and external services. Existing modern and traditional institutions, the policy environment and political economy must also be taken into account. Most approaches have strengths and limitations and involve some trade-offs. For instance, sophisticated irrigation is too expensive for smallholders; integrating crops and livestock often require major social changes; agro-forestry systems often compete with annual crops for nutrients, water and sun and may hamper mechanisation. Organic farming increases yields compared to many traditional systems, but requires higher prices in order to compete with conventional modern farming techniques. There is still widespread concern about the risks of GMOs, one of the world's most contested technologies.

With these caveats in mind, some approaches or technologies for intensifying agricultural production include:

- Increase and improve soil organic matter to improve nutrient absorption capacity, increase carbon absorption, increase water storage and reduce runoff, soil erosion and water contamination. This can be achieved through improved crop-residue management, manure application, intercropping, reduced or zero-tillage, crop rotation, organic matter increasing crops and grasses, care for soil organisms, contour-ridging and terracing.
- Integrate crop and animal production to improve nutrient cycles, increase the number of useful crops for improved and more diversified crop rotation, particularly leguminous plants. Integrated aquaculture systems and vegetarian fish feed can improve the environmental balance.



²⁹ The report 'Innovations in land rights' presents some innovative examples (Deininger et al., 2010).

³⁰ For instance the Community Land Fund in Mozambique provides legal empowerment and capacity-building to enable local communities to benefit from existing consultation mechanisms.

- Agro-forestry systems can increase and improve nutrient cycles, improve water balance, cycles and runoff, create better micro-climates and produce high-value forest products such as nuts and fruits. Trees and timber store carbon, mitigating GhG emissions.
- Mixed cropping or gardening agriculture combines the strengths and sensitivities of various crops and creates synergies, e.g. repelling and reducing insects and pests, and increases resilience.
- Precision farming combines detailed information for each plot such as water saturation or nutrient conditions from sample analysis or satellite images in order to target mineral fertilisation.
- Improved irrigation techniques such as drip or underground irrigation increase production through higher yields and multiple crops, reduce variability and improve resilience to climate change. Targeted fertilisation can be achieved by adding nutrients to drip irrigation water, thus reducing nutrient losses and potential contamination.
- Other production technologies in the R&D phase include second and third-generation biofuels based on cellulose, lignin, mixed or algae biomass; algae drop in fuels; brackish water aquaculture, hydroponics and aquaponic systems; GMOs to deal with heat, drought, and nutrient stress; urban and vertical agriculture using artificial light; artificial meat.

Sources: IAASTD (2009); Pretty et al. (2006); UNEP (2011b); Pond et al, (2009); Niggli (2009); Foresight (2011)

7.3.2.2.4 Support for the transition to sustainable and productive agriculture

One of the biggest challenges for host-country governments is to increase agricultural productivity and expand the technological frontier. It is crucial to strengthen existing agrarian systems in order to increase producers' capacity to use new opportunities and so become more competitive with commercial agriculture. The domestic or private sector can contribute to processes of discovery, technology transfer and embedded services, but this may depend on the government providing an appropriate incentive structure or regulatory framework. In sub-Saharan Africa in particular, there is a need for additional public investment to make up for past negligence.

Important policy instruments include investments in R&D and extension services for small-scale farmers; investment in relevant public goods (infrastructure, coordination of capabilities); the organisation of farmers into cooperatives or other forms that facilitate collective action; appropriate technology development, innovative arrangements to facilitate access to capital, machinery and technologies; processing facilities, marketing support, the development of a land rental market to increase access and flexibility of land use; risk-management strategies such as micro-insurance schemes; and the protection of insecure tenure rights (IFAD, 2011).

Considerable investment will be required in research and extension, with a strong concerted effort by the public and private sectors and research institutes. National innovation systems need to be geared to adjusting technologies to local needs. (See Box 7.5)

7.3.2.2.5 Clear and transparent legal and regulatory framework for investment

A strong legal and regulatory framework is the main mechanism for governing investments in agricultural land and ensuring its social, economic and ecological sustainability. This includes laws relating to the admission of foreign investors, the strategic use of incentives and taxation regimes, property laws and tenure regimes, water rights and rates, and legislation relating to the potential impact of investments on the public good, including environmental standards, health and safety standards, and labour rights. Issues concerning land-related allocation and equity of water rights also need to be incorporated into legal and regulatory frameworks, adopting a WEL perspective on land and water policy.

Systems and procedures for socioeconomic and environmental assessments are often not in place, and even when they do exist the eagerness to attract investors may lead to their neglect (Deininger and Byerlee, 2011). A strong regulatory framework should be unambiguously enshrined in law. The government must establish effective systems and procedures to ensure environmental and socioeconomic sustainability, including a strong monitoring and enforcement capacity.

The procedures for awarding contracts should seek to optimise the potential of land deals to contribute to inclusiveness, sustainability and growth. There needs to be a clear description of the land under consideration, including other resources that are being allocated (such as water); a lease duration that optimises current and future land rents; clearly formulated socioeconomic and environmental standards; an inclusive stakeholder consultation process; and explicit performance criteria. The latter may include local content provisions and the involvement of local producers, processors or other service providers. Governments must maintain the right to withdraw the lease if performance milestones are not met, and there should be provision for the government to restrict use of water and the export of food under certain agreed conditions of shortage. The government must ensure that such provisions are legally binding. Such requirements should not lead to fewer investors if there is a high option value on the land.

Contracts need to be complemented by appropriate mechanisms to distribute gains and losses. These can take a number of forms, including the provision of equivalent land, monetary transfers, setting up a community fund, or giving the communities an equity stake in the investment.

The government must also ensure that the contracting procedures and outcomes are transparent. This is essential to enable appropriate democratic control over the process and to protect the concerns of the less powerful, which may make it difficult to achieve. Greater transparency would allow CSOs to ensure monitoring and accountability along the lines of the Extractive Industries Initiative (EII) or the Publish What You Pay initiative (Hilhorst and Zoomers, 2011).

Such institutional reform and capacity-building take time, so governments may want to place a moratorium on land acquisitions above a certain size in order to allow for the appropriate procedures to be put in place and fully functioning, as Mozambique and Tanzania have done (Hilhorst and Zoomers, 2011). They may also consider establishing a graduated land ceiling that requires the authorisation of successively higher levels of government (NPA, 2011).

7.3.3 ROLES OF CIVIL SOCIETY

Many CSOs, along with the media, have brought the issue of LSLAs into the public eye, referring to them as 'global land grabs'. These CSOs are motivated by the perceived failure of the state to protect the public interest and the rights of poor people. Such CSOs are working individually, at the regional level or within global coalitions (Hall and Paradza, 2011).

Their activities include research, the sharing of information,³¹ 'whistle-blowing' and policy analysis. They use their legitimacy and knowledge to lobby national governments for improved resource-governance regimes and also provide capacity-building support and legal services to communities facing strong asymmetries in knowledge and access to resources.³² Many NGOs that work with small-scale farmers are attempting to address information and technology gaps, and helping smallholders to be more competitive.

Some organisations challenge the premise that the answer to LSLAs lies in stronger regulation. A range of social movements and CSOs (e.g. Food First Information and Action Network (FIAN), GRAIN, the Global Campaign on Agrarian Reform and the Land Research Action Network) denounce the RAI principles, contesting the possibility of win-win outcomes.³³ An alternative vision was developed in 1996 by the global coalition, La Via Campesina, whose concept of 'food sovereignty' is defined as the right of people and states to define their agricultural and food policy, which entails that rural people should have access to land-productive resources, have priority access to the local markets, and have the right to protect themselves against excessively cheap imports. These movements have played an important agenda-setting role on this issue, framing the questions in a way that challenges the logic of the market. This position sets them on a rather confrontational path with investors and government actors (Hall and Paradza, 2011; Hilhorst and Zoomers, 2011) and other organisations focus on ways to make land deals more socially just.

Voluntary guidelines such as the FAO guidelines on responsible governance, de Schutter's minimum principles and the RAI principles remain important as they provide CSOs and social movements with a reference point to use as a basis for public scrutiny and increased transparency.

7.3.4 A TOUCH OF REALITY

Historical factors, institutional inertia, structural power inequalities and cultural patterns determine the context in which the issues of land scarcity and increased commercial interests need to be managed.

7.3.4.1 POWER RELATIONS

This chapter has frequently referred to the asymmetries in capacity and power between the various parties, such as between the international investors and national governments, the state and the rural poor, primary users and secondary users, men and women, indigenous peoples and national development plans. Such issues of power are important, and can hamper progress on making land use more sustainable and inclusive.

Scarcity and the rising demand for land raise the stakes for all the interested parties and have an immediate effect on power relations between the state, elites and citizens. Alden Wily (2011a) suggests that the state has increasingly appropriated its ownership of land, in part in order to capture rents. Rumoured or actual expressions of interest affect access to resources and shift the local balance of power. This may encourage speculative 'land grabs' by local investors (Deininger and Byerlee, 2011; Cotula, 2009). Strong linkages between national elites and global capitalism further consolidate the position of local investors, particularly in neo-patrimonial

³¹ The most up-to-date databases are maintained by CSOs such as GRAIN, the International Land Coalition (ILC) and the Land Matrix Partnership.

³² Such as the work done by the International Development Law Organization in Liberia, Mozambique and Uganda (www.idlo.int).

³³ Civil society response of 17 April 2011, available at: <http://www.grain.org/article/entries/4227-it-s-time-to-outlaw-land-grabbing-not-to-make-it-responsible>.

states, where local elites often constitute a class of citizens who combine traditional, political, economic and even legal and military power (Alden Wily, 2011a: 738).

The increased interest in land changes local power relations as elites and other traditional power brokers concentrate their control over the land, leaving smallholders increasingly disempowered. Where traditional authorities have a degree of formal power, they can serve as an interface between communities and the government, although they too may abuse their power (Alden Wily, 2011a).

The provision of secure tenure to the rural poor and to their inclusion in participatory processes is no simple matter. There are major interests at play and it can be hard to strike the balance between stimulating economic growth through private investment and protecting citizens' rights. It may be time to revisit the role of governments in land deals so that rather than leasing customary lands it serves as a mediator and ensures that transactions serve the public good (Hall and Paradza, 2011). But since host governments are often signatories to land deals and have so much to gain from them, it is difficult to imagine how this could be achieved in practice.

7.3.4.2 INSTITUTIONAL IMBALANCES AND POLICY FRAGMENTATION

Weak government capacity and compartmentalised policy-making processes can lead to incoherent policy outcomes and asymmetries in institutional strength. For instance, the emphasis on attracting FDI has led to a mushrooming of 'one-stop-shops' for investors, which are often also charged with leasing land. Land commissions and decision-making systems concerning land use have not always been strengthened in tandem, leading to a mismatch in capacity. A likely result is that leasing of land for investment purposes trumps other considerations of sustainability and inclusiveness (Cotula et al. 2009; Cotula, 2011).

Motivations, incentives and accountability demands vary at different levels of government. Current land users and investors may obtain a right at one level of government only to find it subsequently rejected by another (Cotula et al., 2009; van Westen et al., 2011). Similar situations occur between investors and traditional authorities that have some formal role in land-use planning.

7.3.4.3 GOVERNMENT CAPACITY AND SEQUENCING OF REFORMS

The degree to which host-country governments can and will perform the roles expected of them needs to be under constant scrutiny because it cannot be assumed that more support for capacity-building and institution-strengthening will resolve the issues described above. Supply-side public policies to strengthening state capacity may work well in situations where governments have a high level of competence and concern for the public good, but less so in more neo-patrimonial states. In the case of the latter, there is a need to find an appropriate balance between supporting public-sector reform and supporting initiatives to increase accountability and community empowerment and voice. These are, of course, politically sensitive issues in which external donors and other actors need to tread carefully.

Where government capacity is limited and stretched across a number of priorities for reform, external support may be biased towards one type of institution (e.g. investor protection) versus another (e.g. security of land tenure). In addition, more neo-patrimonial systems struggle with the unclear separation of power and institutional inertia that impede rapid upgrading of regulatory capacity.

Donors and other external actors need to understand these obstacles and adjust their support policies accordingly, adhering to the principle of 'first, do no harm'. It is essential to sequence reforms appropriately and this means making efforts to find best-fit solutions for each context.

7.4 LESSONS LEARNED: CONCLUSIONS AND POLICY IMPLICATIONS ON MANAGING LAND FOR INCLUSIVE AND SUSTAINABLE GROWTH

This chapter has reviewed the pressures on land in developing countries resulting from the current global environment. There has been considerable media attention on the growing phenomenon of large-scale land acquisitions, often referred to as 'global land grabs', with investors from land-shortage countries seeking to lease or purchase large tracts of land at low prices in more land-abundant parts of the globe. Despite poor data on many of these deals it is clear that the motivations range from speculation to the establishment of large-scale projects to produce food or biofuel feedstock. It appears that often it is not simply the land but also the water available on the land that attracts buyers. Local reactions are often mixed due to the lack of transparency in how the deals are conducted, which can lead to tensions. Although promises of inward investment, jobs and benefits can be attractive, in many cases such promises fail to materialise. In addition, many projects have yet to come to fruition. These intensified pressures are increasing global land scarcity, which in turn, has serious implications for accelerating land conversion into agriculture and away from forestry or other biodiversity and carbon sink uses.

These investments can provide real opportunities for countries keen to attract FDI to encourage growth and to potential increases in agricultural productivity, though such positive outcomes are by no means assured. It is essential to manage these pressures in a way that will secure sustainable outcomes and real increases in productivity and efficiency. At the same time it is vital to protect the rights and livelihoods of the poor who are often casual users of land or only hold it under customary rights systems that can be arbitrarily set aside or overridden by investors or by governments keen to attract investment.

There is an urgent need to develop strong, inclusive land policies and institutions that secure rights and are accessible to the poor. Governments play a key role in this but the private sector can also do much by observing existing codes of conduct for responsible investment, ensuring that land deals are transparent and adhering to the terms of the contract. Governments should pay close attention to land valuation to prevent foreign investors from benefiting unduly from low prices unrelated to the global market.

While steps can be taken to reduce pressures on land and to establish transparent regulatory institutions that protect the rights of the poor and other existing users, agricultural productivity must rise in order to cater for a growing global population. There is no single best solution or blueprint for this, and both large-scale commercial farms and smallholders have their place, taking into account both the inclusive and sustainability goals of the necessary growth. Innovation, R&D and agricultural extension work are vital for this growth to occur, along with a trading and market environment that is conducive to correct pricing and avoids distortions.

The trends in land use described in this chapter are not a source of concern only at the national or local level but their cumulative effect also raises global issues. In addition, the linkages between water, energy and land underline the need to approach these resources from a WEL-nexus perspective. Given the weakness of the data, and the fact that analysis is still fragmented, effective policy responses will depend on developing a better understanding of how these processes work at global, national and local levels. This would also enable public and private actors to have a better understanding of the implications of their decisions.

It is clear that in many cases that national governance and land-use planning systems and structures are not sufficiently strong to withstand external pressures and cope with them in an open, transparent and equitable manner that promotes ISG. Support is required to strengthen these institutions so that they can better manage natural resources in their own country and also contribute to addressing these challenges at a global level. The roles that the public and private sectors and civil society can play have been discussed in Section 7.3. External support is also important. The EU Land Policy Guidelines provide a useful framework for providing such support, and the EU should continue to seek ways to strengthen the capability of the actors involved to perform their roles more effectively.

There are various other measures the EU can take. These fall under the following headings (more details are provided in the Appendix):

- Strive to **reduce the pressures** that lead to increased demand, particularly in addressing consumption patterns and reviewing its biofuels policy.
- Contribute to **getting the prices right** and reducing distortions that have a negative impact on ISG.
- Contribute to **increasing the productivity** of agriculture in general and food production in particular through investment in R&D and capacity support.
- **Strengthen its own legal, regulatory and policy frameworks**, particularly through the pursuit of Policy Coherence for Development (PCD) and in encouraging CSR, in line with its own objectives for inclusive and sustainable growth.
- Help to **strengthen the legal, regulatory and policy frameworks** and support the establishment of effective institutions in host countries.
- Support partner countries in addressing the strong **asymmetries between investors, state and citizens** to enable a well-functioning legal and regulatory system to develop.

CHAPTER 8

MANAGING THE WEL NEXUS: OPPORTUNITIES AND CHALLENGES

8.1 INTRODUCTION

Using a WEL.nexus perspective for managing water, energy and land refers both to managing the linkages between the resources and doing so in such a way that takes into account the cross-sectoral effects of sectoral policies. Focusing on the WEL nexus is thus an analytical approach to facilitate solutions based on an integrated assessment of the challenges and opportunities in managing water, energy and land. Adopting a WEL-nexus perspective allows us to understand how policies regarding one resource may affect the others, and to take appropriate action to mitigate problems. The outcome of employing this analytical approach ranges within two possible extremes:

- that certain policies and actions that seem appropriate in one area are detrimental when viewed from an integrated perspective
- that certain policies that appear to be inefficient in one sector are efficient when viewed from an integrated perspective.

In practice, a WEL-nexus approach may alter the costs and benefits of different types of policies and actions and hence the relative emphasis placed on them. This means that an integrated approach leads to better solutions.

Despite the complexity and challenge of managing resources in an integrated fashion, several public and private actors have already underscored the need for a nexus perspective. For example, Allan (2011) examines the water-food nexus, and Shell (Bentham, 2011) examines food, water and energy security and uses a network analysis to identify the 10 most important factors to be taken into account in managing these issues. Addressing a crucial issue may well solve not just one but several problems. For instance, WEF (2011a) discusses the food-water-energy nexus, as did a series of papers prepared for the Bonn Nexus Conference³⁴ add link in footnote. Business-led initiatives such as the Cambridge Natural Capital Project are urging the private sector to take an integrated ecosystems approach. There are also examples of individual companies recognising that the major challenges to their existence lie in the linkages among resources. Integrated management of natural resources should be an important issue at the 2012 United Nations Conference on Sustainable Development (UNCSD), or Rio+20, as a crucial element of the green-economy approach and institutional reform. These and other examples show that a nexus approach to natural-resource governance is complex, but that it can no longer be avoided. A nexus approach requires considerable information and may involve transaction costs, but it leads to more effective solutions, and ultimately benefits development.

8.2 A NEXUS APPROACH: OPTIMISATION RATHER THAN MAXIMISATION

The recognition that the production and consumption of water, energy and land are interrelated is not in itself a new finding; the use of input-output models in economic planning was introduced many years ago. But the environmental dimension is seldom included in input-output tables, which means that the environmental impacts and external costs of different economic activities are not factored into the equation. In an effort to address this gap, the European Commission has since 2007 supported a project to develop environmentally extended input-output tables for the EU (see <http://www.feem-project.net/exiopol/index.php>).

Four issues place the WEL nexus in a new light:

- *The world is moving towards a situation of absolute scarcity of certain resources and sink capacities.* Globally, human beings are already using nearly 25% of all biomass produced by the Earth's land (IPCC, 2007a) and more than 40% of all renewable and accessible freshwater resources (Millennium Ecosystem Assessment, 2005b). If all coal reserves were burned for electricity generation this would exceed the atmosphere's sink capacity for CO₂ and push global warming beyond the 2°C target by a factor of 58 (WBGU, 2011: 122). This means that any activity that depends on a relationship between water, energy and land can be compromised by the weakest link. In other words, the scarce resource can become a hidden binding constraint, which increases the benefits, or shadow price, of alleviating that constraint. Integrated thinking provides opportunities to avoid coordination failures that are generated when these effects are ignored.
- *Resources are increasingly interrelated* (i.e. the input-output coefficients are increasing). For example, energy is increasingly required to produce clean water and irrigation, and water is needed to grow food – a key reason for land deals or for producing energy. Large-scale, high-productivity agriculture requires considerable amounts of water and energy. This increases the importance of externalities and also heightens the need to address coordination failures since efficiency in providing one resource increasingly affects efficiency in providing another.

³⁴ <http://www.water-energy-food.org/en/home.html>

- *Although there are markets for pricing traditional inputs (e.g. labour, capital), markets for pricing land and water are often inadequate, particularly in developing countries; or, in the case of the carbon sink capacity of the atmosphere, are non-existent.*
- *The nexus often affects the poorest population groups disproportionately.* All three elements in the nexus are basic to the livelihoods of people living in poverty and have tended to be free of charge. As the world moves towards absolute scarcities in each of these resources, the poor are the first to experience pressure on their livelihoods. The rural and urban poor are pushed onto increasingly marginal land and there is less open land for grazing or forests for collecting raw materials. 'Free' energy from firewood and 'free' water from open-access, unpolluted sources are increasingly inaccessible. The poorest are affected first and have the least capacity to respond.

Maximising the effectiveness and efficiency of use of one resource (e.g. the provision of renewable energy) regardless of how this affects resource use in other sectors informs much public and private policy-making. But when resources are scarce, a compartmentalised approach may create a crisis in another resource. A national government can promote biofuel production, for instance, but if this results in land or water being unavailable for other uses such a policy is likely to impose unacceptable costs on other uses and users. It is therefore imperative to move towards an approach that identifies solutions that accommodate several constraints in the combined uses of water, energy and land. At the same time it is vital to monitor how these solutions affect different groups of users, especially those whose livelihoods are most at risk from changes. This is not simple since there may be constraints in the use of each separate resource, as well as in their combination, with regard to economic costs, distributive effects and the regenerative capacity of water, soils, biodiversity and the sink capacity of the atmosphere. This calls for a clear analysis in order to discern when a WEL-nexus approach is necessary and when it is not.

The shadow price (or benefits) of alleviating a binding constraint will depend on the scarcity of the resource, the activity to which it contributes and the complementary factors (e.g. skills, infrastructure) that are in place. For example, there will be fewer water constraints on biofuel production in humid regions of Brazil than in northern Kenya. In addition, it may be possible to use a large quantity of a resource for certain activities and if these yield high returns, the shadow price of increased efficiency in that resource will also be high. In South Africa, for example, it is perhaps better to use water for high-value activities (e.g. services, manufacturing) than for low-value activities such as agriculture. This idea has been widely discussed in the context of trade in 'virtual water'. It would, however, involve broadening the concept of food security to include imports and the need to address losses for activities that were dependent on water. Both arguments would induce investment in more water-efficient agriculture. The shadow price will also depend on complementary policies, e.g. in trade. With the application of free-trade policies, virtual resources become more available, and water and food security also rise.

8.3 LINKAGES BETWEEN WATER, ENERGY AND LAND: A BRIEF REVIEW

The evidence presented in this Report and in several recent studies point towards a growing relationship among the effects of water, energy and land use, and hence a nexus approach could potentially yield more benefits than the sum of sectoral approaches.

Water-Energy

Water is often used for the production of energy, and energy is crucial for the provision and treatment of water. Hydropower accounts for 3.4% of global energy production (REN21, 2011). In addition, water withdrawals for other forms of energy production and power generation are estimated to account for 8% of the world's total, and up to 45% of withdrawals in industrialised countries (SOER, 2010). Water is used, for instance, in the production of biofuel crops, for cooling energy plants and for extracting fossil fuels. A move towards less carbon-intensive sources of energy, such as renewable energies, does not necessarily lead to reduced water use. For example, coal production consumes far less water (2-12 m³/TJ) than does the production of biofuels derived from maize (9000-100,000 m³/TJ) (Granit and Lindström, 2011), although energy production using other renewable sources, such as photovoltaic solar energy and wind power, consumes less water.

Energy is also a prerequisite to meeting water demands because it is used for pumping, transporting, distributing and cleaning water. Clearly, ensuring access to water in water-scarce regions increases the consumption of energy, particularly in the case of the re-use of waste water, desalination of seawater or pumping from great depth or over high altitudes (the difference in energy consumption for pumping water from a depth of 35 metres and 120 metres varies from 540 KWh to 2000 KWh/million gallons) (WBCSD, 2009).

Water-Land

The interdependence between land and water is indisputable and manifests itself in areas such as food production, conservation of ecosystems, urbanisation, ecosystem services and forestry. About 30% of the planet's land surface is used for agriculture, 30% is under forest cover, 20% is savannah and grasslands, and the rest is barren or unproductive. Cities occupy only around 1% of the land surface (Hertel, 2010).

Agricultural production makes the greatest demands on water, accounting for 70% of global use (WEF, 2011a). In Africa and Asia more than 80% of water is used for agriculture while in Europe and North America it is less than 40% (FAO, 2009a). Urban areas also represent a water-intensive use of land: at present half of the world's population lives in towns and cities, and this is expected to reach 75% by 2050 (Bentham, 2011). Land use can also lead to water pollution (e.g. from chemical fertilisers), and can have an impact on the self-purification and buffer capacity of water resources systems.

Recent years have seen a rise in the scale, frequency and intensity of extreme natural events such as floods and droughts. This can in part be attributed to global warming, but changes in land use (e.g. deforestation) also contribute to the scale of damage (e.g. loss of crops, soil erosion, landslides). Too much or too little water can have devastating effects on the land's productivity.

Energy-Land

This third pair of resources within the WEL nexus is also characterised by close interrelatedness. Energy production requires land and therefore competes with other uses, and certain types of land use are energy-intensive.

Energy is exploited principally in the areas of food production and urbanisation. The energy consumption of the entire food production and supply chain represents 30% of the total global energy demand (Hoff, 2011). But most land comprises forests, savannahs, grasslands and barren land that consume no energy.

Sources of energy require land (e.g. for mines, biofuel crops, wind turbines), thereby potentially reducing the use of fertile soils to produce food crops. Consequently, energy production contributes both to intensifying the competition between different uses of land (e.g. food vs. biofuels) and in some cases jeopardise its quality.

8.4 WEL LINKAGES: OPPORTUNITIES AND RISKS AT THE COUNTRY LEVEL

Water, energy and land, together with complementary factors (e.g. skills, technologies, infrastructure, and a supportive regulatory framework), are required in differing degrees for the production of various goods and services. Long-term drivers can change the relative scarcity and also affect the prices of water, energy and land. The trend towards scarcity creates risks and opportunities at the national level. The risks of increasing scarcity are that countries may experience constraints on the production of goods and services that make intensive use of water, energy and land, and that poorer population groups will be denied current levels of access. Governments that are aware of these risks may make explicit choices to reduce them (e.g. by diversifying agrarian economies, as Israel has done). There are also opportunities for countries with relatively high endowments of scarce resources to exploit their position to raise living standards.

More generally, the management challenges at the interface between water, energy and land policies are influenced by a number of key factors:

Resource endowments of land and water: Countries that have little fertile land or water will face challenges, but those well endowed with these resources will have a comparative advantage in products and services that are water- and land-intensive. The price of land is already rising in many areas. Managing these opportunities in order to ensure that they promote inclusive and sustainable growth is, of course, a challenge in itself.

Resource-intensive consumption and production patterns: Countries with resource-intensive consumption and production patterns will face greater pressures on water, energy and land. For example, middle- and high-income countries (MICs and HICs) tend to demand more water and energy and also food, particularly meat, than do low-income countries. High aggregate demand for resource-intensive products and services may also increase imports, leading to growth opportunities for the exporting countries and increasing the environmental footprints of dynamic MICs.

Access: Countries with poor access to water, energy and land (and hence greater poverty) face correspondingly greater management challenges. Low-income countries, and persistently poor regions of MICs, tend to be characterised by poor access to resources owing to a myriad factors. Lack of investment in infrastructure often causes lack of access to water. Lack of access to energy also causes problems, but the solutions to these situations are different. For example, if the 2°C target is accepted, all countries must take action. There is little room even for poor countries to expand their GhG emissions, and they should therefore adopt renewable energies early on and avoid getting locked into obsolete technologies. This will remain difficult without guaranteed international support to cover the incremental costs of such a switch, and to overcome the information and knowledge barriers still associated with newer energy technologies. Exploiting the untapped potential for hydro-energy will require the thorough consideration of possible social and environmental effects from a nexus perspective (e.g. on downstream users, on biodiversity, and with regard to forced displacement and relocation). Access to land is basic for food security in most poor countries, and access to water and energy are required in order to secure or improve land productivity. User rights, whether formal or customary, need to be respected.

Governance: The pressures on water, energy and land are complex and interrelated. The challenges will be greater for countries with weak governance institutions, where resource pressures could lead to conflict. Other countries may also need to build up appropriate governance institutions that can effectively implement a WEL-nexus approach.

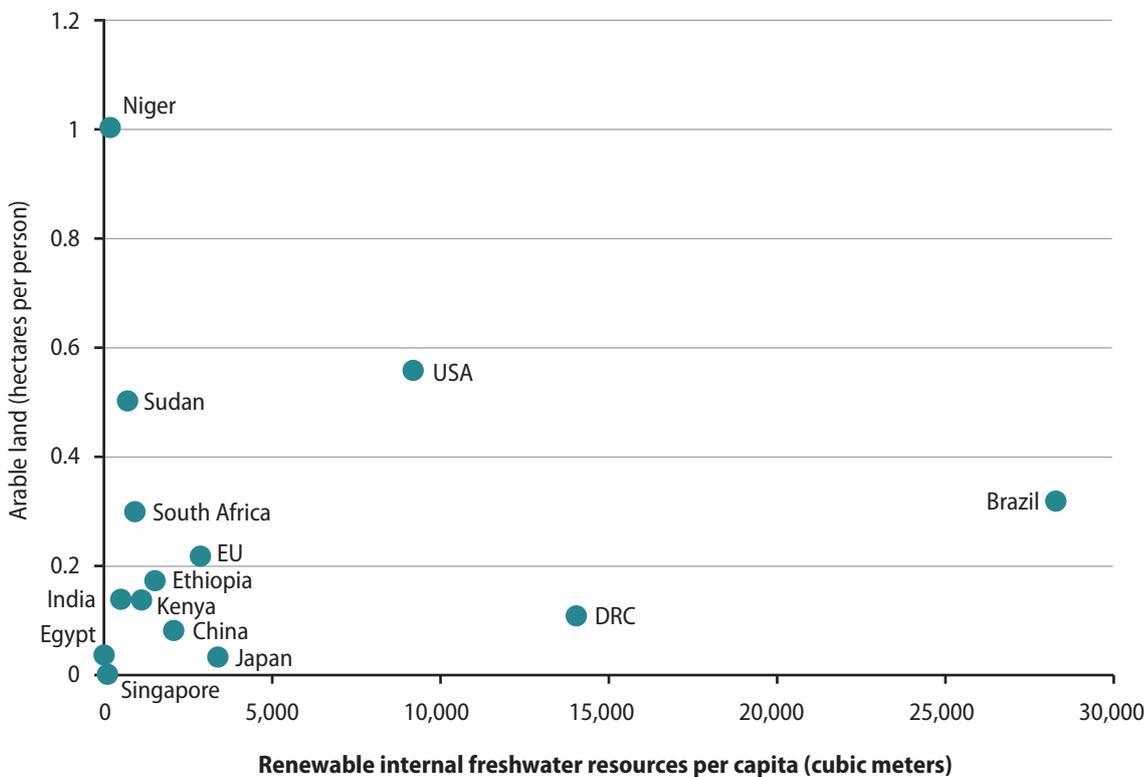
Various other factors affect how well a country is able to overcome challenges relating to water, energy and land. For example, as incomes increase the demand for resources also rises. While this might pose immediate problems, it can also help to resolve issues of access and introduce better pricing policies.

To illustrate the importance of these factors, Figure 8.1 shows data on resource endowments including freshwater resources (per capita) and arable land (per capita) for countries discussed in earlier chapters. It shows the wide variation in resource endowments. Brazil and Democratic Republic of the Congo (DRC) possess ample freshwater per person, while countries such as Egypt, India, Kenya, Niger and South Africa have very little freshwater. Niger, Sudan (North and South combined) and South Africa have a lot of arable land per person, but China, Egypt and Singapore do not.

Considering the availability of WEL resources and their linkages, countries with abundant water and land can engage in activities that make intensive use of these resources, such as agriculture for food and biofuels. Brazil enjoys such conditions and is indeed a major world exporter of these two products. Countries such as Egypt, India, Niger and South Sudan, and regions like North China, are likely to experience water scarcity as a binding constraint on agricultural production. Egypt used to be the ‘bread basket’ of the world when its population was smaller, but the country now imports wheat and other commodities that depend on water- and land-intensive production. Allan (2003, 2011) calls this virtual water trade. In a similar pattern, China has begun to import soy beans from Brazil.

Natural resource endowments, and linkages among them, reveal potential opportunities and problems. For example, a significant increase in water-intensive economic activities will inevitably lead to problems in India, Niger and Sudan because of their relative lack of water. Natural resource endowments alone do not, however, determine whether a country is a successful producer and trader in resource-intensive production. For instance, the DRC has many opportunities for water-dependent activities but lacks the complementary elements needed to exploit them. As global scarcity becomes a more important consideration, resource endowments are increasingly likely to affect trade and investment patterns and hence the potential for economic growth for those countries that have abundant natural resources.

Figure 8.1: Availability of arable land and freshwater for selected countries



Source: World Bank (2011d)

Figure 8.1 also illustrates the potential of regional approaches. Resource endowments vary within regions, which could create new opportunities. For example, South Africa is beginning to meet its water limits in certain areas (Muller, 2011) while DRC has abundant water. Tension in water-scarce areas could be resolved through regional trade in virtual water.

The physical availability of water and land is not the main constraint for water and food security. Opportunities for inclusive and sustainable growth that an abundance of water and land provides can be realised only if a set of institutional and knowledge requirements are met. These include secure land tenure and water rights, policies to mediate between competing uses, financial capital for exploration, knowledge of sustainable and productive technologies, extension services for diffusing knowledge and practical experience of implementation.

Abundance can also be an incentive for inefficient use and thus requires explicit (pricing and other) policies to change development pathways – for instance, from extensive land use to more labour-intensive production in order to reduce deforestation, or improving irrigation in order to reduce soil waterlogging and salinisation. Maintaining the abundance of water and fertile land may also require policies to protect specific features of original ecosystems (e.g. biodiversity of agricultural landscapes for soil fertility, or forest cover for hydrological cycles).

Country examples

Having outlined the general factors influencing the WEL nexus, we will now sketch out six country examples which illustrate different configurations of these factors and therefore present different opportunities and needs for national development policies. We do not consider the EU here, as Chapter 11 analyses how the EU should deal with its own demand patterns, the impacts these have on the inclusive and sustainable use of water, energy and land resources elsewhere, and how it could support transformative change.

Brazil: Brazil is an upper MIC and one of the world's largest exporters of agricultural commodities. Highly productive large landholdings exploit the country's rich land and water endowments and climatic advantages, supported by the knowledge services of EMBRAPA, a world-renowned public agricultural research institution. Brazil has the world's highest head of cattle; is the second largest soybean producer after the USA; and the largest producer of ethanol, which is used as vehicle fuel. Increasing external demand (from the EU, China, and other developing countries) for agricultural commodities has been pushing the agrarian frontier into the cerrado (savannah) and the Amazon forest, since clearing these lands is cheaper than investing in the rehabilitation of degraded land. This runs counter to other policy objectives, namely forest and biodiversity conservation, reducing emissions from deforestation, and securing the land rights of smallholders and indigenous peoples. The Brazilian government has reacted by demarcating large conservation areas (with different use intensities), issuing a land-use plan to restrict sugarcane growing to areas outside the Amazon region, and investing in control measures.

Electricity supply is largely based on hydropower, and the energy strategy until 2030 includes building new large dams on the River Amazon. Infrastructure plans in the region also include increasing access for urban populations to energy, water and sanitation, as well as highways and ports to facilitate agricultural exports. While improving access promotes inclusiveness, new energy and transport infrastructure runs into conflict with the protection of indigenous areas and biodiversity.

China: China's dramatic economic growth over the last three decades coincided with industrialisation and urbanisation. China, an upper MIC, is now the world's largest energy consumer, relying mainly on CO₂-intensive coal power plants. Economic growth has reduced poverty but also increased pressures on water and land resources, and on the atmosphere's sink capacity. In China, the WEL-nexus perspective is clearly needed for managing water, energy and land towards sustainable and inclusive growth. Water resources are distributed very unevenly: 'Northern China is home to approximately 40 percent of the country's total population and almost half its agricultural land, and produces more than 50 percent of GDP. But it receives only 12 percent of total precipitation. Southern China, in contrast, receives 80 percent of China's total precipitation, yet skyrocketing levels of water pollution dramatically reduce the south's natural advantage' (Economy, 2011). While agriculture consumes most water in China, water consumption by industry and the energy sector (particularly coal mining, processing and consuming) is highly inefficient. China plans to triple its hydropower capacity by 2020, which means that several river basins will run dry before reaching the coast. At the same time, infrastructure is being built to transfer water from south to north. In 2008, a comprehensive soil-fertility survey showed that erosion affects 40% of the Chinese territory, and could reduce grain production in its most fertile areas by up to 40% in the latter 21st century (Xinhua News Agency, 2008).

China's ambitious policies for promoting renewable energy technologies include a feed-in tariff, targets to increase the share of renewable energies in its energy mix, and R&D programmes. Policies also extend to improving energy efficiency in industry and in buildings. These measures do not, however, replace policies and incentives geared towards fossil fuels. Rather, they represent parallel approaches, as they do in the EU and other OECD countries.

China (and India) are large, population-rich economies whose share in global middle-class consumption could grow considerably if macroeconomic policies increase household consumption (Kharas and Gertz, 2010). China is already a major importer of food and meat, and it is assumed that its investments in agriculture in Africa relate to securing future food supplies.

Ethiopia: The OECD classifies Ethiopia as an LDC. It has little fertile land and is a typical case of economic water scarcity (or lack of access): it is the lack of infrastructure for water storage, conveyance and regulation that make Ethiopians vulnerable to the impacts of recurrent droughts and highly variable rainfall. There are large gaps in access to drinking water and sanitation, and to energy. Access to land is largely based on customary rights. Many rural areas that experience recurrent drought, degradation of natural resources and rapid population growth now also face food insecurity. The Ethiopian government has formulated an ambitious programme to provide universal access to safe water and sanitation, and coverage officially increased from 11% in 1990 to over 65% in 2010. Ethiopia also plans to establish a hydraulic platform for hydropower and irrigation in order to improve energy and food security. The government has accepted large foreign investment in land as a means to increase productive use and export earnings, but this has also displaced previous land users. The ability to balance trade-offs and resolve tensions in a transparent way remains an importance governance challenge.

Kenya: According to the OECD, Kenya is a LIC and also lacks water resources. In Kenya, water, energy and land policies need to take into account the nexus perspective. Irrigation illustrates this point: since the early 2000s, the government has invested in restoring irrigation schemes in the main agricultural areas, which has led to a decisive increase in food security and in rural income. At the same time, irrigation is ever more threatened by environmental challenges. Some of these problems are caused by irrigation itself, e.g. high water extractions and unsustainable agricultural practices. Other problems such as deforestation and the overexploitation of land outside the irrigation schemes are caused by general mismanagement and also by external factors such as higher rainfall variability. These factors together contribute to the increasingly uneven water supply and the dramatic increase of silting of rivers, reservoirs and scheme canals (Neubert et al., 2007). On the other hand, Kenya also exploits its land and water resources to generate hydropower and geothermal energy and a relatively large share of its electricity provision comes from renewable energy sources.

South Africa: The OECD classifies South Africa as an upper MIC. Historically, its resource endowments have served white-owned commercial agriculture and industrial use. With the end of apartheid – and the repeal of the land laws that set aside 87% of the land for the white minority – there was a strong political drive to achieve redistribution, broad-based service delivery and inclusive growth. With 10 years, an extra 14 million people gained access to water and sanitation, and important legislative reforms were made in the areas of land and tenure. Despite the infrastructural investments and the improved regulatory environment, the lack of institutional arrangements and capacity constraints still need to be overcome to provide inclusive and secure access to water and land, and in ways that promote more productive uses of land and water.

This is important at a time of rising expectations (due to participatory and competitive politics) and increased pressures on the South African economy (due to climate change, resource scarcity, and rising unemployment). The South African economy has a strong industrial base and is very diversified, with a legacy of skewed infrastructural and institutional arrangements from the apartheid era. Commercial agriculture, for example, still consumes 60% of water resources, but only contributes 3% to GDP. This puts further pressure on two other big water consumers, i.e. mines and urban areas. Energy production currently accounts for half of GhG emissions, and cannot feed the demands from consumers and industry. The regional trade in virtual water could allocate water to more productive uses while relocating low value-added but water-intensive activities to those countries in the region that have comparatively abundant water resources. It will not, however, be easy to realise this opportunity.

Since 2010, the *National Planning Commission* is responsible for strategic planning and longer-term development. It brokers dialogue among multiple stakeholders and actors in the public and private sectors and in civil society, collects evidence, and initiates research. Headed by the charismatic former Minister of Finance, Trevor Manuel, this apex body has finalised and presented its first *National Development Plan* in November 2011. The plan deals among other things with key strategic choices. It presents trade-offs when balancing interests, demands and policies in the separate fields of energy, land and water management, as well as the WEL nexus. It also presents these trade-offs within the broader context of regional trade and integration, which affect policy choices in water management and land use for commercial agriculture.

These cases show that the pressures on these resources and the challenges of the WEL nexus have immediate and far-reaching implications in each of these countries. The problems are complex and generally require major public-sector involvement in resolving them. While there is some evidence of integrated thinking it is also apparent that in many cases the approach is continued along traditional sectoral lines. Mismanagement is a major issue that can quickly intensify the problems and exacerbate scarcities. Some of these problems may be down to weak institutions, but it is also likely that the complexity and the scale of the issues is such that even well-functioning institutions may be increasingly stretched as the problems intensify. Improving governance and institutional development in different ways is thus a key issue for an effective WEL-nexus approach.

8.5 HOW CAN A WEL-NEXUS APPROACH LEAD TO A RE-ASSESSMENT OF EXISTING POLICIES?

We argue that a WEL-nexus perspective is appropriate – and indeed necessary – to effectively deal with the management of water, energy and land in an ever more interconnected way. But how do we know that management based on the nexus view is better than traditional sectoral management? We draw from examples discussed in other chapters to examine in what sense a nexus view is different, and what sorts of management implications are derived from it and draw a number of lessons.

Policies based on a WEL-nexus approach would take into account how the linkages between water, energy and land, and complementary factors, affect inclusive and sustainable growth. The ability to make such a diagnosis depends on ensuring that relevant voices and interests are heard. This relies on strong coordinating institutions and capacities, and is further complicated by the fact that, increasingly, many actors are international and many policies have international spillover effects.

A number of illustrative examples in this Report and in the background papers show the importance of such a WEL-nexus approach. It is not straightforward to distil general messages about such complex and context-specific issues, so we summarise a number of key issues on the basis of illustrative examples in Table 8.1 (see appendix for further examples):

Table 8.1: Implications of managing with a WEL nexus perspective: illustrative examples

Issue	Limitations of traditional sectoral approach	Opportunities for integrated perspective and management	Nexus-informed policies and measures	Roles of public and private sectors
<p>Expansion of land area for agriculture through large-scale land deals that have effects on water withdrawals (e.g. Woodhouse, 2011, and Chapter 7)</p>	<p>BAU will lead to steady expansion of land for agriculture and water use locked in to land deals. This will increase loss of land for other key uses (biodiversity etc) and reduce water availability for other users.</p>	<p>Integrated management can take into account not only the range of desirable land uses to promote increased food production and ISG, but also other needs in terms of water management and energy production and distribution in a context of growing scarcities.</p>	<p>An inclusive land policy will identify suitable land for different types of use, encourage land conservation and rehabilitation and promote land deals that respect defined uses.</p>	<p>Public sector to set framework with an inclusive land policy and institutional framework that takes account of need to balance use of land for production with other uses.</p> <p>Public sector needs to assess water requirements of land deals with a view to varying water availability and their effects on use rights of third parties.</p>
<p>Large vs. small-scale agricultural systems (Chapter 7)</p>	<p>Emphasis on commercial agriculture for agro-export generates profit, but may affect local water availability, cause land degradation and lead to deforestation.</p> <p>Smallholder farming is not necessarily less productive, but spread of new technologies can be slower. It also supports rural livelihoods and is more sensitive to biodiversity and good ecosystem management.</p>	<p>Water management of small- and large-scale farming can be complementary, but conflicts between uses and users need to be explicit and differences resolved; potential pressures on deforestation can be identified and averted; soil conservation is a key consideration; implications of agro-exports (e.g. biofuels) for food security are made visible.</p>	<p>Land productivity should be increased in both types of farming, within limits posed by integrated water resource management, biodiversity protection and the need to improve energy efficiency and reduce GhG emissions.</p>	<p>Public sector to promote research on trade-offs and innovative technological solutions, to incentivise low-carbon, biodiverse agriculture with low impact on the environment, to support sustainable productivity increases in smallholder agriculture; private sector to follow public policies.</p>

Issue	Limitations of traditional sectoral approach	Opportunities for integrated perspective and management	Nexus-informed policies and measures	Roles of public and private sectors
Biofuels for reducing emissions generated in the transport sector; as income-generating measure, export crop and to substitute petrol imports	As part of energy policy, priority concerns are about emissions and fossil fuel prices volatility; this drives demand for alternative sources of liquid fuels; conventional agriculture policy promoting biofuels ignores impacts on biodiversity and on food security.	Nexus perspective shows a more complex picture: potential land-use conflicts between crops for biofuels and for food; energy needed to synthesise fertilisers and run machinery may offset emission reductions from using biofuel; water use for production of biofuels might affect access for other uses and users; pressures on land might lead to deforestation and biodiversity loss and increase land concentration.	Land-use planning should balance food/biofuels/biodiversity objectives; innovative transport policy could make energy use more efficient (including collective urban transport, railways, e-mobility); avoid oligopolistic structures of biofuel markets that create new dependencies for smallholders.	Renewable energy policy needs to respect other objectives such as food security, and biodiversity protection; low-carbon transport policy strategy including mix of collective and individual mobility infrastructure; invest in rural infrastructure and in smallholder agriculture.
Dams for hydropower and irrigation	Current policies driven by the need to expand irrigation infrastructure and demand for renewable sources of energy, but often sideline negative impacts.	Productive uses of water are seen in a larger context that includes the role of water in ecosystem functions; the effect of the disruption of natural waterways for biodiversity and smallholder livelihoods is made explicit.	Large dams intervene in river basins and ecosystems; need to relocate sizable parts of local population makes livelihoods insecure; large lakes may sediment; flooded vegetation may lead to considerable methane emissions when rotting.	Careful evaluation of pros and cons of large dams (i.e. based on the principles of the World Commission on Dams); favour smaller dams with less heavy impacts.

Table 8.1 shows that policies developed on the basis of an integrated assessment differ substantially from those that have been derived in a sectoral vacuum. Appropriate solutions may help to avert a negative externality (e.g. accounting water withdrawals in land deals, or effects on livelihoods of people living in poverty), and, in the best case, also open up new opportunities (as PES do in Lake Naivasha, see Box 9.2). It is also clear that setting the framework for these types of integrated solutions requires an effective public sector that can solve coordination failures, and enabling the private sector to be part of the solution.

Table 8.2 takes a more general view and identifies threats and opportunities of policies and activities through the lens of the WEL nexus. While applying the WEL nexus can make demands on information and coordination, small changes could solve multiple problems. So the potential for a WEL perspective is huge, but will require adequate investment.

Table 8.2: Examining the appropriateness of policies in a WEL-nexus context: illustrative examples

Activity or policy	Immediate effects	Unintended co-benefits or negative effects on other elements of WEL nexus
Pricing		
Payments for environmental services	Rewards and encourages environmentally sustainable productive uses.	Improved environmental services have positive effects on other economic activities.
Tax on (red) meat	Reduces consumption of (red) meat.	Reduces pressures on land and water for protein-intensive feedstock; has positive health effects; may induce higher consumption of other goods and services
Reducing fossil fuel subsidies	Promotes renewable energy, reduces emissions from fossil fuels, improves efficiency in fossil-fuel use.	Promotes low-input agriculture and promotes use of labour, although high energy prices affect oil users. May reduce excessive pumping of groundwater (e.g. in India).
Subsidising biofuels (Chapters 6 and 7)	Cost competitiveness with fossil fuels, reduced carbon emissions depending on technology.	Increases pressures on land and water, depending on technology.
Pricing for water services to reflect scarcity values	Internalises environmental costs and promotes efficiency and sustainability in water use.	Reduces energy intensity of water supply; reduces pressures on land deals; high water prices affect water users and may not be affordable for some, hence tariffs should consider cross-subsidies.
Providing public goods (technology, infrastructure) and use expenditure		
Planning sustainable cities	Reduces electricity and fuel consumption in cities, improves efficiency in the use of energy and water, avoids the use of fertile land for urban development.	Better management of interfaces with other policy areas (agriculture, water, land-use planning, transport).
Improved water efficiency in irrigation	Increases water efficiency, reduces salinisation, reduces costs of irrigation water and energy and increase access to water.	Reduces competition among different users (large farmers vs. smallholders, productive vs. environmental use). May have rebound effect if not controlled for allocation (more irrigation, more water use).
Promoting technological change: from first to second and third-generation biofuels	Promotes 'clean' energy.	Leads to fewer pressures on water and land, opening up other opportunities.
Improved land productivity for smallholders and large farms	Increases agricultural output.	Reduces pressure on land. Methods for improving land productivity need to respect environmental sustainability requirements.
Incorporate benefit sharing in hydropower projects	Promotes 'clean' energy and pays compensation for displaced households.	Displaces land users, increases pressures on river basins and their biodiversity.

From the various examples reviewed in Tables 8.1 and 8.2 it is evident that a WEL-nexus approach can lead to significant benefits. However, there are two key impediments to moving in this direction.

First, such a change requires a major shift in mindsets and ways of thinking, which cannot be expected in the short term. While thinking in an increasing number of quarters is moving in this direction, as we indicated at the start of this chapter, there will also be considerable resistance to overcome. A political economy analysis of each situation where a nexus approach could be introduced may therefore help to identify and understand these obstacles and ideally find the ways around them.

Second, it is recognised that this approach requires significant investment particularly in institutional development in order to provide the structures and capacities required to formulate and implement these policies. We turn to this institutional aspect in the next section.

8.6 THE INSTITUTIONAL SETTING FOR MANAGING THE WEL NEXUS

Policies that are informed by a nexus view can be quite different to those that are based on isolated sectoral approaches. Hence we need to understand the institutional setting that will be conducive to implementing and applying a WEL-nexus perspective in policy and decision-making. Institutional changes can be minimal; for example, it might simply be required that certain provisions be included in a land deal contract. Other, more complex arrangements such as ceasing an activity (e.g. biofuel subsidies), or starting an activity (e.g. payments for ecosystem services, or PES), might call for new organisational structures to be established. In certain cases it may be that to apply a nexus perspective in decision-making would only add administrative burdens and the returns might not be sufficiently significant to warrant making a change, but such assessments can only be made on a case-by-case basis.

Integrated management represents a challenge for the public sector because it calls for an improved coordinating function and institutional capacity. Pricing, for example, requires secure and transparent property rights, and water and land rights need to be decoupled. Only secure rights will provide an incentive to invest in soil and water conservation. Property rights also need to reflect and protect customary and collective rights.

Integrated approaches to land-use and energy planning are common at the local level, but it is in the water sector that such approaches have been pushed up to the national and the cross-border or regional management of river basins and have acquired the strongest reputation in the process. Thus one of the best-known examples of an integrated approach is that of Integrated Water Resources Management, introduced in Chapter 5, which aims for 'co-ordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems'. It has become clear over 20 years' experience of implementing IWRM approaches in many countries that integrated, multi-sector approaches involve significant transaction costs. This suggests the need for pragmatism concerning what reforms can actually be achieved, along with a willingness to accept 'good enough governance' adapted to specific challenges, but also that leadership and a thorough political economy-based analysis are key to ensuring that integrated approaches are really taken.

Beyond pragmatism, it also suggests the need for more detailed analysis of the specific hurdles to IWRM implementation. From the perspective of integrated management, it might also be necessary for other sectoral policies to adopt integrated goals and approaches. Cross-sectoral policy coordination might be easier if IWRM is matched by agricultural policies that combine productive, environmental and social objectives, and by well-informed energy policies.

Appropriate institutional contexts will be context-specific. There is no blueprint. As we saw in the example of China, water allocation was done by the public sector. Under the guidance of the Yellow River Conservancy Commission and the Ministry of Water Resources (MWR), Inner Mongolia has assigned water-withdrawal quotas among six riverside cities, drafted a plan for water transfers, and established an Office for Water Transfer Affairs to manage transfer funds and oversee implementation.

In other cases the private sector takes the lead in managing or dominates the management of the WEL nexus. The aim of catchment management agencies in South Africa is to ensure the fair distribution of water resources to relevant stakeholders. The National Water Act demands that the members of the CMA governing board be appointed 'with the objective of achieving a balance among the interests of water users, potential water users, local and provincial government and environmental interest groups' (Republic of South Africa, 1998, section 8.1). To date only two CMAs are functioning (Muller, 2011). The private sector has succeeded in actively shaping or even dominating the CMAs and their establishment, while smallholders and formerly disadvantaged groups lose out.

But the private sector can contribute in a positive way, as it has in the case of Kenya's Lake Naivasha, where there is a complex set of actors, with diverging short- and long-term interests and different stakes in the value chain of the multiple economic activities: large foreign investors (most of them familiar household names), a very small proportion of local horticulturalists, Maasai pastoralists, smallholders, fisherfolk and hotel owners. Some of these groups are well organised (e.g. trade unions, private-sector associations, interest groups such as the Lake Naivasha Riparian Association). Other actors include the local authorities, international donors,

UN agencies such as the United Nations Development Programme (UNDP) and NGOs such as the Worldwide Fund for Nature (WWF). Private companies play important roles, either as direct innovators, but also with financing.

Numerous innovations have already been introduced through the varied interrelationships and the trade-offs they foster. A number of coalitions between state and private actors emerged and continue to do so. Such coalitions help resolve some of the collective-action problems) and help tackle concrete problem areas related to competing uses in the nexus of water-energy-land management around Lake Naivasha, although challenges still remain. One example of such a temporary, domestically crafted solution includes a new payment for ecosystem services by downstream companies to upstream smallholders, in order to behave in ways that respect sustainability concerns. Other actors contribute their expertise, facilitation skills, transparency and sensitisation, investments, linked value chains and capacity development.

8.7 CONCLUSIONS: THE WEL-NEXUS APPROACH

Managing natural resources in the context of growing pressures such as increasing scarcity and existing interconnections among water, energy and land, requires a radically different approach towards solving the problems.

The analysis and examples provided in this chapter clearly show that a drop of water, a piece of land, or a kilojoule of renewable energy cannot be seen through the single lens of water management, land management or energy policy respectively. What might appear to be an efficient policy in one dimension can be harmful for the others, and different ways of exploiting water and land place different stresses on the other resources.

An adequate response to the new challenges, and specifically the WEL linkages, requires the examination and management of the trade-offs not only among users of the same resource, but also across users of other related resources. In certain sectors such as water management (sometimes in association with land management) there is already a considerable body of experience in using integrated approaches that could be extended to other sectors and from which lessons can be drawn. Transaction costs are high, however, so it is vital to have institutions that are up to the task. Leadership is key. A good political economy-based analysis of each specific context is equally important because there is no blueprint that fits all situations. It will also be advisable to be pragmatic in adopting 'good enough' solutions.

Governments need to radically re-think their management of natural resources and to ensure that their institutions are ready for an integrated approach. This will entail costs and changes in behaviour, but these will be justified in terms of better policies, and greater development impacts.

PART THREE

POLICY IMPLICATIONS

The third part of this Report considers the policy implications of its core proposition: the urgent need to recognise the increasing scarcity of water, energy and land, and to address what we have termed the WEL nexus in an integrated manner. Each of these resources requires major shifts in the way they are used. A central contention of the Report is that while the role of the public sector at different levels – international, national and sub-national – is vital, the roles of the private sector and other non-state actors are also critical.

This part of the Report therefore considers in turn the roles of the public sector at the national and sub-national levels (Chapter 9), of the private sector (Chapter 10) and finally of the EU and other international actors (Chapter 11). These chapters correspond to the three governance gaps between current behaviour and what the Report has argued is necessary to address tackle the new challenges posed by natural resource trends in the long term: a public governance gap (Chapter 9), a corporate governance gap (Chapter 10), and a global governance gap (Chapter 11).

CHAPTER 9

PUBLIC POLICY AND GOVERNANCE IMPLICATIONS

This chapter draws together the policy ideas and lessons that have emerged throughout the Report into a set of messages for formulating public policy on natural resource management. The responsibility for managing natural resources is borne largely by national governments: they must mediate both between present and future generations for securing sustainable natural resources use as well as between current users and uses. Time is an issue in changing the balance from short-term to long-term interests, and also in terms of urgency: rapid changes are needed in order to avoid reaching irreversible tipping points for the global climate and for many local ecosystems that will reduce the wellbeing of future generations.

The evidence presented in this Report points to the need for urgent action. The failure to tackle the accumulation of pressures on global resources will be felt most acutely by the poor. It is now clear that environmental degradation or insufficient attention to resource scarcity affects the poor and their livelihoods disproportionately (see Box 9.1).

Box 9.1: The disproportionate impact of resource pressures on the poor

Sustainable use of and access to water (Chapter 5):

- Between 30% and 60% of existing rural water-supply schemes are dysfunctional. The poorest people, particularly women and girls, end up paying the most for lower quality, less reliable water services.
- Access to safe water supply and sanitation is a prerequisite for a decent, dignified, secure and healthy life and the avoidance of water-related illnesses. It often falls to women and girls to fetch and carry water, a chore that is time-consuming, hazardous and can have high opportunity costs in terms of girls' education and the economic opportunities available to women and girls.
- Protection against an unacceptable level of water-related risk is critical to social inclusiveness because it is generally the poor who settle in fragile environments (such as flood plains and deforested watersheds that are subject to landslides), and who are most vulnerable to water-related risks.

Climate change and energy poverty affect the poorest countries most as they can least afford the adaptation measures (Chapter 6):

- Sub-Saharan African countries generally have poor access to energy and there is a major deficit in rural areas.
- Electricity can provide a healthier source of fuel for cooking and heating than other methods. Lighting enables children to study at home.
- Access to affordable electricity facilitates many productive and agro-processing industries, which can increase incomes and provide major developmental benefits to rural areas. Energy is needed for agricultural water pumping, which is used for irrigation, livestock and drinking water.

The new pressures on land tend to disadvantage the poor, increase insecurity and combined with poorly functioning land-tenure systems are a source of tension and conflict (Chapter 7):

- The poor have little or no voice in large land deals. Such land is often considered 'unowned', 'idle' and 'available', but this ignores the users of these lands, who have de facto rights, among whom are the poorest whose survival depends on them.
- Poorly regulated, high-cost land-tenure systems that lack transparency and have little or no redress systems tend to disadvantage the poor, increase their insecurity and reduce their ability to use their land as collateral for credit.
- Rapid expansion of palm-oil farming can create economic opportunities for smallholders, for instance in Indonesia, but the benefits are skewed in such a way that the local rural poor are being pushed onto more marginal land.

The new environmental pressures are already setting a new context for development, especially for the poorest people. In the context of growing pressures on water, energy and land and the complex interrelationships among them, this chapter discusses what types of public policy can best address the challenges this presents. It takes into account the considerable political economy constraints in formulating and implementing public policy.

The chapter covers the roles that public policy can play in addressing the issues of coordination and facilitation, regulation and incentive framework and public expenditure (Section 9.1). In Section 9.2, it discusses how these public-sector roles can best be used in each of the central pillars introduced in Chapter 4 in order to achieve four objectives: (1) manage *demand to reflect scarcity*; (2) *improve quantity and quality of resource supply in a sustainable way*; (3) *improve efficiency* (productive, allocative and WEL nexus-wide) of resource use; and (4) increase *resilience* and ensure the poorest benefit. Finally, the chapter reviews the next steps towards promoting inclusive and sustainable growth, presents a set of key conclusions, and considers policy differentiation and political economy constraints.

9.1 GOVERNANCE, POLITICAL ECONOMY AND PUBLIC-SECTOR ACTION

9.1.1 PUBLIC-SECTOR COORDINATION AND FACILITATION

The formulation and implementation of a coherent vision and policies in response to the challenges posed by resource scarcity make demands in terms of coordination and facilitation at the inter-departmental level, but also between the central and sub-national levels of government. The public sector also has to deal with an expanding number and range of stakeholders. This is partly due to democratisation processes, but also to stronger regional and global integration. The public sector faces coordination challenges at four intersecting levels: (1) private sector and civil-society stakeholders; (2) inter-ministerial; (3) sub-national authorities; and (4) regional and international bodies.

(I) COORDINATION BETWEEN PUBLIC SECTOR, PRIVATE SECTOR AND CIVIL SOCIETY

The increasing number of private-sector actors in natural resource management (producers, processors, service providers, investors, etc.) creates new pressures and demands on the public sector to properly facilitate multi-stakeholder cooperation and dialogue and resolve coordination failures, with a view to achieving the sustainability and inclusiveness of natural resource use. This is especially true in developing a coherent vision for managing natural resources that seeks to balance trade-offs among multiple stakeholders, including civil-society or community-based actors, smallholders and individual water consumers, many of whom have little or no access to policy-makers. The public sector can facilitate, coordinate and broaden such participation in order to help in designing, implementing and monitoring policies and instruments that match ambitions for inclusive and sustainable growth. In practice, there are numerous institutional and political constraints, and increasingly also internal and external factors that influence these internal coordination dynamics and may provide incentives for both the public and private sectors to address concerns of inclusiveness and sustainability in managing natural resources.

As analysed in Chapter 7 the increasing commercialisation of land uses and land leases to investors have intensified competition over land rights. Whatever the sources of the increased pressure – speculation, food production, fuel conversion, ‘water grabs’ or population growth – they have among other things prompted large-scale and long-term land leases of farmland to investors, predominantly in sub-Saharan Africa. Anecdotal evidence on such deals points to the lack of transparency in how well organised private-sector actors with an interest in securing access to land also tend to have better access to key government officials (Cotula and Polack, 2011; van Westen, 2011). For historical reasons, the government in much of Africa is the *de facto* owner of most of the land. In countries where relationships between the state and citizens are characterised by strong patron-client dynamics, access to public services and policy-makers is largely restricted to those interest groups that fit within a neo-patrimonial pattern. This lack of inclusive mechanisms hampers the ability of less organised groups (e.g. smallholders, tenant farmers) to engage in policy processes, have their voices heard and their views represented. This tends to result in one-sided policies and poor regulations on access to and availability of land, ineffective use and few or no compensatory measures or development opportunities to absorb the negative impacts on weaker land users. There are some examples of inclusive and localised negotiations. The case of a biofuel venture in Sierra Leone (Hall and Paradza, 2011) illustrates that an enabling legislative environment, in combination with inclusive coordination, transparency and an effective impact assessment can contribute to promoting lease agreements and compensatory annual rent payments as mechanisms for providing sustainable compensation for those holding a legal or *de facto* right to the land.

The roles of the public sector have shifted considerably over the last 20 years and will continue to do so. In the water sector (Chapter 5), a wide range of private-sector actors and a host of regulatory bodies, enforcement agencies and increasingly also CSOs – all with different degrees of weight and access to power holders – seek to influence public policies. While it is a top priority, water for domestic use accounts only for small volumes. Agriculture is the major user, with manufacturing and power generation rising in importance as economies grow and diversify. Uncoordinated or one-sided public responses may result in persistent difficulties in providing universal access to safe water and sanitation, the loss of ecological services, degradation of water resources, and new or increased vulnerabilities. Integrated Water Resource Management is a widely accepted policy approach, yet in practice its adoption is not always straightforward.

The case of Lake Naivasha in Kenya underscores the complex web of domestic and external interest groups and multi-level governance involved in finding environmentally sustainable and inclusive solutions to the multiple pressures on this ecosystem (see Box 9.2 below). Ensuring access to basic water needs – setting coverage targets, developing strategies, defining roles, and responsibilities, resolving trade-offs, prioritising and ensuring budgetary resources – remains the responsibility of public authorities, but implementation is increasingly a mixed endeavour involving a variety of different actors from the public and private sectors and civil society. Depending on the nature and scales of the water-management regimes (local, national and trans-boundary) different coordination mechanisms and roles of the public sector come into play.

Since the adoption of the Cancún Action Framework in 2010, many governments increasingly coordinate with multiple stakeholders in setting targets for renewable energy or even emissions reduction. But this is a difficult task. The critical domains for government interventions include countering market failures and externalities, coordinating with and mediating among different stakeholders and interest groups in formulating policies, as well as making choices and trade-offs within the WEL nexus (especially choices between the use of land for food crops versus biofuel production). Fossil-fuel subsidies create incentives to generate pollution and to drive up social costs and pose an obstacle to the introduction and uptake of renewable energy. Coordination efforts in support of ‘right pricing’ of fossil fuels may still be thwarted by ‘here and now’ politics as the example of Ghana in Chapter 6 and recent experience in Nigeria have shown.

Box 9.2: Lake Naivasha – multi-level governance challenges in managing the WEL nexus

Lake Naivasha is the largest freshwater lake in Kenya and its basin supports a variety of sectors such as tourism (attracted by its biodiversity), agricultural smallholders in the upper catchment, commercial flower and vegetable farmers (responsible for some 10% of Kenyan foreign exchange and 2 million jobs directly and indirectly) around the lake, and renewable energy provision (both hydropower and geothermal energy). But this multitude of demands strains the environmental sustainability of its ecosystem.

A complex set of actors, with diverging short- and long-term interests and different stakes in the various value chains characterises this biotope: large-scale foreign investors (most of them familiar household names), a small number of local horticulturalists, Maasai pastoralists, smallholders, fisherfolk, hotel owners. Some of these groups are well organised (e.g. trade unions, business associations, the Lake Naivasha Riparian Association). Other actors include the local authorities, who are often bypassed by the central state; international donors, UN agencies such as UNDP, and international NGOs such as WWF. Private companies also contribute as direct innovators and/or as funders.

Numerous interrelated problems have arisen around the lake:

- Water quantity and quality influence the viability of certain species, fish productivity and flower farms
- Water extraction by flower farms affects biodiversity
- Loss of biodiversity affects tourism
- Tourism and population growth affect the quality of water
- Availability of water affects location decisions by flower farms
- Flower farms face reputational risk because of environmental consequences and hence face risks in export markets, issuing of licenses and access to finance
- Upstream land use affects water quality and quantity downstream
- Water-payment systems affect activity upstream
- Flower farms rely on access to energy, which is supplied by geothermal and hydropower plants around the lake
- Renewable energy generation (hydropower, geothermal plants) requires water

Although the public sector did not take the coordinating lead, coalitions between state and private actors emerged and continue to do so. Such coalitions help to resolve some of the collective-action problems (see also Chapter 8) and to tackle specific issues related to competing uses in managing the WEL nexus. An example of such a temporary, locally crafted solution includes payment for ecosystem services (PES) by downstream companies to upstream smallholders, in order to avoid land-use practices leading to soil erosion and sedimentation. The initial results regarding land management, water quality, soil erosion look promising. Others contribute expertise, facilitation skills, transparency and sensitisation, investments, linked value chains (e.g. Marks & Spencer) and capacity development.

Source: Nyangena and te Velde (2011)

(2) INTER-MINISTERIAL COORDINATION

Different ministries and public agents are involved in developing and implementing policies designed to achieve sustainable and inclusive natural resource use. Setting and implementing a coherent agenda for the management of natural resources requires effective coordination and dialogue between different sectoral government ministries and departments. Typically, ministries and public agencies dealing with trade and commerce, agricultural development, environment, public works, energy, water and sanitation all need to be involved. Cross-sector or horizontal ministries, such as those dealing with reforms and broader public finance policies and management can also have considerable influence on the outcomes of policies relating to natural resources.

There are examples of functioning mechanisms of high-level inter-ministerial coordination, sometimes directly under the country's president. Yet the real test is whether sufficient political will is mobilised and backed by effective institutional arrangements and incentives, along with the necessary organisational capacity to coordinate relevant ministries in a systematic, deliberate and ongoing way. This will determine, ultimately, whether budgets reflect policy priorities both in terms of mobilising domestic resources and in spending. Policies on infrastructure, services (judiciary, security, etc.) and social protection relating to the management of natural resources, for example, will need cooperation and coordination. Such coordination also implies administrative and regulatory capacity as well as resources. This implies the need to coordinate with core horizontal departments, including those dealing with finance (contributing to responsible fiscal policies and alignment of budgets with policies) and public-sector reform.

Managing the WEL nexus thus requires coherent and systematic cross-departmental coordination. This has proved hard to organise. Water, for example, is a central, but often ignored component of land deals. The right of investors to access water in order to cultivate the land they have acquired is usually tacitly included in land leases or deals. Given the lack of institutional arrangements to ensure policy coherence, this aspect of the WEL nexus is seldom taken into account in terms of ensuring the broad public benefits of land deals. Large infrastructure projects such as dams, or major investment projects involving large-scale land acquisition (e.g. converting land from food to biofuel production), pose particular coordination problems for governments.

Powerful actors often use their privileged access to key ministries to influence or capture policy agendas for narrow interests and rent seeking, hence thwarting coordination efforts in support of integrated, inclusive and sustainable strategies or policies. In the case of allocating water resources, agendas may be (and often are) dominated by other sectoral priorities and ministries. This is because the main drivers of the demand for water and investment originate outside the sector: in energy, food and industry. Despite commitments acknowledging the importance of the concept of integrated water management, in practice there is rarely a strong internal coalition to champion integration and coordination across departments and sectors. More generally, decision-making processes tend to be dominated by 'here and now' politics (often in response to ecological or political crises) and to the dominance of vested interests within certain policy domains. These can relate to large-scale public or private investors, or to historically embedded policy priorities such as national security, which affect, for example, decisions on food production, energy supply and water management.

Box A9.1 in the Appendix presents clear illustrations of inter-ministerial coordination challenges. In the case of pressures on land in sub-Saharan Africa (Hall and Paradza, 2011), even countries that do have sound land policies such as Ethiopia, Madagascar, Mozambique and Zambia, face the lack of public administrative capacities to coordinate and manage the complexities and multiple pressures arising from investor and state interests. The National Planning Committee in South Africa is an example of a dramatic shift in the political priority given to water services and access to water involving inter-ministerial discussions culminating in the National Development Plan. In the case of China, the policy steer on energy-related matters seemed sufficiently convincing for the public sector to be proactive in seeking alliances, building coalitions and aligning interest through so-called 'interest-bundling' (convening parties with distinct interests, but which may still be prepared to work together around a particular policy) and 'policy-bundling' (where one initiative is used to pursue multiple policy priorities) (Kostka and Harrison, 2011).

(3) COORDINATION BETWEEN CENTRAL AND SUB-NATIONAL GOVERNMENTS: DECENTRALISATION

Many countries have experimented with some form of decentralisation, usually combining degrees of delegated political, administrative and fiscal authority to lower levels of government. It is argued this can enable citizens to engage more directly with public authorities at the local level. This proximity may make it possible to adjust policies or procedures to meet diverse local conditions, and also facilitate accountability mechanisms to ensure quality and well-tuned public services related to natural resource management. The strong donor push for decentralisation in developing countries places additional requirements on national and sub-national authorities to assume ownership and facilitate coordination.

In reality, however, the provision of public goods at sub-national levels remains sub-optimal, which undermines the potential to solve problems at the local level and facilitate collective action. Insights into such dynamics (Booth, 2010) are essential to understanding the context-specific roles, their potential and the various constraints on the public sector. Different levels of governance rarely create the necessary levels of cooperation and synergies in support of removing barriers to the adoption of renewable energy, let alone doing so in sound economic, environmental and social ways. The case of South Sudan illustrates that even when formal

arrangements such as legislation, rules and regulations are in place, there is a lack of supportive community and national institutions (NPA, 2011). There is often insufficient national political support behind institutional arrangements for effective decentralisation.

An additional complexity, especially in sub-Saharan Africa, relates to the roles of customary authorities. These roles are deeply embedded in tradition. The pressures of large-scale investors may cut across the downward accountability of customary chiefs, although Cotula and Polack (2011) suggest that chiefs are increasingly reinterpreting custom in order to claim 'ownership' over common resources. Traditionally, they managed the land on behalf of the community.

There is an increased interest in decentralisation and in the need for users to participate in planning and implementing water-management schemes. Demand-Responsive Approaches to service provision require a shift in roles from the public sector, ranging from the national ministries (with a stronger emphasis on facilitation, developing policy frameworks for rural water supplies, setting targets etc.) and local authorities (more direct support to local communities in planning, procurement and training) to all sorts of regulatory and enforcement agencies (monitoring and enforcing water rights, environmental management, land use planning etc.). Equally it requires solid coordination and cooperation mechanisms. Nevertheless, the sub-Saharan African experience of subsidies for hardware in programmes to supply water in rural areas underlines that such coordination and facilitation schemes are hard to implement. Most of the investment costs remain externally financed, which raises serious questions about sustainability, the potential for private-sector engagement and growth, and ultimately about inclusiveness and outreach functions (RWSN, 2010). River-basin management poses other multi-level, multi-stakeholder challenges often involving local and customary authorities that are seldom organised to address these complexities.

In the water sector, the case of Ethiopia provides a good counter-example of where the central government pushed for both decentralisation and more effective forms of service delivery, including water services. This has resulted in mixed approaches to service provision, within a context of administrative decentralisation that gradually encourages and empowers local water offices and seeks to facilitate community participation. Moreover, certain donors have aligned behind this agenda.

(4) PUBLIC-SECTOR COORDINATION FOR GOVERNANCE AT THE REGIONAL AND INTERNATIONAL LEVEL

Four other dimensions place considerable new demands on national public authorities. First, regional integration dynamics place multiple pressures on partner governments to contribute or respond to regional norm and policy-setting initiatives. They are called upon to participate in developing multi-country collaborative arrangements at supra-national levels that may directly affect stakeholder behaviour or sector-specific issues through voluntary guidelines, responsible investment principles, sensitisation, etc.

In terms of large-scale land acquisitions (LSLAs), for example, Africa has been most exposed to multiple regional and global initiatives. The UN Special Rapporteur on the Right to Food has published Ten Minimum Principles for Land-based Investments (see Chapter 7). The African Union adopted the AU Land Policy Guidelines in 2009, and is now working with the African Development Bank and the UN Economic Commission for Africa (ECA) to ensure the adoption of these guidelines at regional levels and in Member States. Further sensitisation or pressure flows from the work of CSOs, and also from the Pan-African Parliament initiatives at the level of the Regional Economic Commissions to promote legislative and policy responses to land acquisitions.

A second set of regional and global initiatives that require attention from the public sector relates to efforts to reduce the scope for corruption. A number of global and regional initiatives have been designed to strengthen global financial governance and to improve transparency. These may tackle the drivers of corruption and reduce the incentives and scope for domestic elites to capture rents (e.g. through tax havens). Reputational pressures generated by regional and international actors are also on the rise as actual or potential corruption affects different stakeholders, depending on their degree of exposure to clients, citizens or peers. This is also related to national, regional, global and EU initiatives to enhance transparency in the extractive industry, and in natural resource management.

Box 9.3: Coordination challenges and external drivers

The complexities of coordination can be illustrated by experiences of illegal logging and the external factors that affect the behaviour of multiple stakeholders. European and US markets – driven by consumer reaction against illegally exploited resources – have created incentives for policy changes in some developing countries. In some cases, donors such as the EU have facilitated government responses to these market incentives and their impact on different domestic and other constituencies. These include various private actors in the value chain, CSOs and public authorities.

The EU Forest Law Enforcement, Governance and Trade (FLEGT) initiative builds on reputational pressures and the fear of losing market access. Through well-targeted support packages the EU has helped to resolve information asymmetries, provide dialogue platforms, and support capacity development. Support can be designed in such a way that it enhances country ownership, enforces collective action and can contribute to stronger coalitions for sustainable forest governance. These efforts have resulted in Voluntary Partnership Agreements (with government, civil society and businesses as equal partners) in countries such as Ghana and Liberia, with ongoing negotiations in Central African Republic, Indonesia and Malaysia.

Global and regional pressures for transparency – for example, concerning large-scale land acquisitions – may also create some form of reputational pressure, though this may not provide enough incentive unless it creates sufficient pressures in the value chain.

Source: Unsworth and Williams (2011)

Third, national governments also face new opportunities and challenges through international efforts to make aid more effective. Through the so-called ‘new aid modalities’ such as budget support and *sector-wide approaches* donors commit to harmonise and pool their resources behind country-owned sector policies, provide technical support for institution and capacity strengthening, and align as much as possible behind government systems. Through such arrangements the governments of partner countries commit to pursuing citizen participation in the design, implementation and monitoring of poverty-reduction policies and sector strategies (see also COM, 2011e).

Sector ministries with responsibilities for natural resource management are called upon to assume leadership and take ownership of coordinating development and external support efforts. Government ownership of coordination efforts with multiple stakeholders (including weaker and affected groups in society) should in principle contribute to developing policies that are inclusive, sustainable and also improve resilience, or that are responsive to key concerns about resource efficiency. When the public sector does take ownership of coordinating external assistance, such new aid modalities can offer entry points for more inclusive and coherent policy development, accountability and improved state-society relations in the management of natural resources.

A fourth trans-boundary dimension of public policy that merits particular attention relates to the requirements and obligations that flow from competing claims and uses of natural resources, primarily water (also for energy production). Shared groundwater and river basins, and large infrastructure projects such as dams on international rivers, raise particular issues of inter-state cooperation and dialogue. In some cases, increased pressures on scarce resources have resulted in innovative trans-boundary public initiatives. In Southern Africa, for example, one policy scenario relates to virtual water trade, reducing South Africa’s reliance on water-intensive domestic agriculture by importing agricultural products.

9.1.2 REGULATION AND INCENTIVE FRAMEWORK

In order to manage natural resources effectively, the public sector has to overcome numerous market failures and externalities by investing in public goods (see Section 9.1.3) and creating regulatory frameworks and appropriate incentives. It is up to the public sector to assure property and user rights, the design and implementation of regulatory frameworks, and the enforcement of rules and contracts. Recent research suggests that good state-business relations are conducive to economic growth (te Velde and Leftwich, 2010).

Such enabling relations are characterised by various positive mechanisms that jointly contribute to relations of trust: (1) transparency and flow of accurate and reliable information; (2) the likelihood of reciprocity between government and business; and (3) a relationship characterised by a fair degree of credibility. But relations between the private and public sectors can also be characterised by collusion and by harmful rent seeking and favouritism. In such cases, less powerful and fragmented private actors, such as smallholders, consumers or CSOs are unable to find or create access to public authorities, overcome information asymmetries and have their voices heard.

The regulatory challenges in the area of managing natural resources for inclusive and sustainable growth have vastly increased, including for security, environmental safety standards, health standards (for consumers and workers), price setting (to internalise external costs in order to reflect scarcity of land, water and carbon space), creating incentives for R&D (for assessing impact, or improving the quantity and quality of resource supply and use), or for productive efficiency and an adaptive economy, for conflict resolution and for compensatory measures, etc.

These are all areas in which the public sector fulfils unique roles in developing rules, regulations and incentives. These need to induce behavioural change that favours long-term over short-term benefits, and addresses existing inequalities in access. But for the state to develop, enforce and assess appropriate rules and regulations, including taxation and subsidies, the harder question remains of what is the appropriate mix between public and private roles, and the scope, depth and nature of these frameworks. In creating this balance, public authorities have to avoid allowing powerful interest groups to dominate the policy agenda and hijack regulatory regimes or regulatory agencies. For this process of change to succeed, trust is an essential requirement.

This constitutes both a technocratic as well as a highly political agenda. It demands both expertise and political commitment to create the institutional incentives to motivate independence, inclusiveness, capacity to enforce and adapt. Given the often conflicting interests in the use of natural resources – occasionally leading to violent conflicts – it is not enough to set up regulatory regimes and agencies. Sufficient capacity and means need to be assigned to conflict-monitoring and conflict-resolution mechanisms in order to avoid situations in which, under mounting pressures and scarcities, existing market failures are compounded by numerous government failures. Conflicts can be the conduits make the public and private sectors more responsive.

Regulatory bodies and enforcement agencies have a complex set of responsibilities ranging from monitoring and enforcement of user and other rights, access to resources, environmental management and protection, land-use planning, setting of performance targets, and the setting of prices and fees. Pricing mechanisms and regulatory frameworks can steer the allocation of natural resources to different user groups, incentivise investments and innovations (for more cost-efficient use), and encourage lower (and not only more efficient) use. At the same time subsidies from outside the sector, for example for electricity, can encourage the over-exploitation of water because users are unaware of the full financial and environmental cost of pumping it. This is well illustrated by the fragmented private investments in groundwater irrigation in parts of Asia and in the subsidies for fuel or electricity. Millions of small farmers benefit from subsidised energy to pump groundwater, but this practice is not sustainable because it rapidly depletes groundwater aquifers and is also bankrupting the state electricity boards.

How the state engages with the private sector can create incentives for private investments that contribute to the sustainability and inclusiveness of natural resource management. The regulations affecting domestic users may create a demand for better services, as well as providing incentives for proper monitoring and behavioural change. Research in household investments in domestic water supply in Bangladesh, Ethiopia, Niger, Nigeria and Pakistan (RWSN, 2010) confirms that these are already significant. Such investments could be further stimulated, and could involve the private sector more effectively provided that public policies on investment and maintenance are non-distortionary.

For the private sector to see an interest in investing in renewable energy, for example, there needs to be enabling regulation in several areas. Such regulation can include removing obstacles for smaller energy producers to supply to the grid, removing administrative obstacles, facilitating the private sector to overcome the high initial capital costs for renewable energy, and doing away with the distortionary market or incentive effects of subsidies for competing fuels. In Kenya, investors in renewable energy have developed geothermal energy projects to the point that the country is now one of the world's top 10 producers. Investments in geothermal exploration in Djibouti, Madagascar, Malawi, Rwanda and Zambia have not, however, moved beyond the inventory or exploration phase.

Initiating and negotiating such changes in the law or in regulatory frameworks is not straightforward and requires decisions on the speed of change in the energy mix (from fossil fuels to renewable technologies). It also implies weighing up which environmental costs are acceptable and deciding on how economic costs will be distributed among the public sector, different productive users and private households that have different levels of purchasing power. In the land sector, the coalitions behind responsible contract allocations and inclusive and forward-looking negotiation processes are often not sufficiently influential. Lack of strategic and inclusive decision-making results in missed opportunities to turn incoming agricultural investments into components of long-term rural development. Hence, the challenge of balancing productivity gains with benefit-sharing remains unresolved.

In an environment of increasing pressures on the use of natural resources, the public sector's engagement is vital to ensuring redistribution of potential benefits among affected communities and building resilience to likely fallouts. Smallholders, farm labourers, forest dwellers, people with unreliable access to water and energy sources, or citizens affected by large-scale public investments such as dams, constitute a fragmented constituency. They seldom enjoy access to decision-makers despite the upsurge in formal democratic institutions. Civil society may seek to engage with state bodies or the body politic to claim rights and improve public-sector performance through mobilisation, contestation and bargaining. Such processes constitute the *demand side* for reforms and for responsive governing authorities. The potential of the poor to overcome constraints to collective action, to

aggregate their interests, form coalitions, voice demands, exercise their rights and hold policy-makers and public administration accountable is also affected by public policies and regulations, for example, freedom of association and organisational space, the right to information, freedom of the press, the way in which political competition is organised, and the degree of openness and transparency on the part of public authorities.

The lack of transparency and state-of-the-art impact assessments, and the secrecy that often shrouds large-scale land deals, reduce the scope for informed public dialogue. When tensions and conflict rise, there may be a need for regulation and conflict-resolution mechanisms. There are examples of public authorities facilitating or creating sufficient enabling conditions for weaker stakeholders to overcome certain obstacles to collective action, as happened, for instance, in post-war Liberia, where the government was keen to gain broad public legitimacy and enjoyed coherent donor support.

In most cases, smallholders are insufficiently embedded in the value chain and lack the resources to gain access to the public bodies that determine policies affecting land deals and redistributive mechanisms. This is compounded by the lack of services for de facto tenure holders whose access to and use of land are affected. In addition to an enabling environment for citizens to engage with the state, it is important for the public sector to ensure social protection to reduce vulnerability from pressures on resources, such as large-scale land investments and infrastructure works that affect livelihoods. The case of the Itaipu Dam in Brazil demonstrates that a government can use its regulatory role to ensure that utility companies provide compensation or benefit-sharing for affected states and municipalities, and can also insist on royalties, which can be used for local and regional development.

9.1.3 PUBLIC EXPENDITURE

The provision of public goods and investments is an essential public function in natural resource management. Depending on the sector or sub-sector, public investments may include large-scale infrastructure projects (irrigation, dams), rural and other roads that facilitate access to markets, and R&D and innovation (to increase resource efficiency). Improving the management of natural resources may also require smaller investments, which places the onus is on the public sector to create an enabling environment for the involvement of and partnerships with other actors (e.g. private sector).

Competing demands and interests in the use of and access to natural resources impose difficult choices on policy-makers. In terms of investments, the broader political reality often reflects objectives that run counter to an ISG-agenda, which aims to secure natural resources for the sustainable and inclusive use of both present and future generations. National debates and priority-setting on food production, energy supply, national security, import protection taxes and subsidies may compete with each other, and not contribute to managing the WEL nexus in sustainable ways.

Large-scale investments in water management for energy production provide a compelling illustration of some of the challenges facing the public sector. Usually, this involves substantial relocation programmes. In China, the high social costs and trade-offs in public investments in flood control and irrigation policies are increasingly compounded by environmental costs. This is prompting a major re-evaluation by Chinese policy-makers as higher-end objectives of security and productivity come under threat. Post-apartheid South Africa illustrates other challenges in public choices in managing the WEL nexus in a water-scarce environment. The country faces pressures from high expectations for improved public services, from climate change and strong demands from the main users, i.e. commercial agriculture and industry. Within government there are debates about shifting priorities from agriculture to the mining and industrial sectors, and the subsequent shift to virtual water imports through stimulating agricultural production in neighbouring countries. In all likelihood, this will require infrastructural investments and trade facilitation.

Finding the right balance between public and private investments as well as obtaining the appropriate quality of public investment poses key challenges. In this respect, the public sector is often seen as an enabler, with important roles in creating incentives for R&D to encourage the uptake of innovations and for the private sector to invest in renewable energy or in energy savings. This often calls for a clever mix of carbon taxes (to discourage pollution) and subsidies or other incentives to encourage innovation on cleaner inputs. But there are also warnings against rent-seeking practices, lobbying and cosy deals between private firms and bureaucrats, which may stifle rather than stimulate innovation.

The role of the public sector is gradually shifting. In delivering rural services, for example, changes of emphasis are reflected in a variable mix of contributions from the public sector, the private sector and civil society. Hardware subsidies have dominated rural water-supply programmes in sub-Saharan Africa. This approach, according to the Rural Water Supply Network, acts as a disincentive to private-sector development, outreach to unserved communities and other sources of funding.

Public investment in sustainable and inclusive growth of renewable energy varies substantially. Chapter 6 exemplified the importance of combined policies and strong cooperation between different government levels by juxtaposing the cases of Brazil and Malaysia. In Brazil, initial subsidies 30 years ago (stimulating economies of scale through 'learning by doing' effects, technological progress and productivity gains) combined with other economic, social and industrial policies and investment, generated 'triple win' improvements in its Pro-Alcool programme. In many parts of Brazil the production of biofuels has resulted in sustained increase

of sugarcane production, local employment, reduced urban air pollution, and avoided CO₂ emissions, while maintaining low water consumption. Whether this success has indirectly led to deforestation and land-use change requires further research, as sugarcane may replace pasture and other crops in some regions of the country. The biodiesel industry in Malaysia, on the other hand, never kicked off and the public inputs suffered from lack of foresight, preparation, legal framework, and prioritisation.

Despite the multiple promises of redistribution, compensation or productive opportunities for smallholders, large-scale land acquisitions (LSLAs) have rarely fulfilled them (Hilhorst and Zoomers, 2011). Land deals made for speculative purposes often result in negative trade-offs for the poor. So social protection that is flexible, quick and efficiently applied has to ensure some form of mitigation of such negative effects, at least in the short term. There is a danger that ill-conceived, and short-term compensation mechanisms may catch the rural poor in ‘subsidy traps’ that can be hard to overcome. So public authorities should prioritise inclusive strategies that envisage growth and sustainability by engaging with smallholders on productive strategies that also strengthen their longer-term resilience. Effective checks and balances are often lacking, with insufficient transparency over trade-offs between different land-related policy options, and a lack of institutions that facilitate the access of smallholders and CSOs to public goods. This situation may result in continued lack of policy focus on the interests, livelihoods or future productive capacities of the poor.

Even when agriculture develops and diversifies with investments obtained through large land acquisitions, there may be insufficient political support behind reforms of rural labour markets and migration. The World Development Report on Agriculture for Development (2008) strikes a sobering note with the comment that ‘stunningly little policy attention has been given to the structure, conduct and performance of rural labour markets and how they ease successful transitions out of agriculture’. This lack of commitment relating to the broader labour market and investment climate will also affect the chances of achieving inclusive and sustainable growth.

Drawing on examples from the previous chapters Table 9.1 illustrates various political economy (PE) factors (outlined in Chapter 4) to be considered. It becomes clear that these permeate right through the management of natural resources.

Table 9.1: Political economy and the management of water, energy and land

Political Economy dimension	Illustrative issues	Examples of PE issues that affect tackling increased resource scarcities in the pursuit of ISG
Structural issues	Path dependency; resource endowments, geography	<ul style="list-style-type: none"> • Trans-boundary river basins lead to tensions and require coordination: Ethiopia versus Sudan and Kenya along the Nile • Energy security (and lobbying by sugar industry) in Brazil led to introduction of biofuel subsidies after the 1973 oil crisis • Fuel subsidies helped catalyse ‘Green Revolution’ in India based on intensive use of water and chemical fertiliser – but cannot be removed easily • As economies diversify and importance of agriculture declines, it remains difficult to move water from agriculture to faster-growing sectors – lack of institutional and infrastructural capacity, political clout of farming lobby (China, Middle East, South Africa and exemplified by the EU and the USA)
Formal and informal institutions	Property rights, trust, network and interest-group analysis	<ul style="list-style-type: none"> • Traditionally WEL not managed as a nexus • Land deals between investors and elites often exclude the poor and based on little trust and transparency • IWRM does not preclude domination by private sector • Hydropower investments, relocation and compensation for the poor require effective benefit-sharing arrangements • Irrespective of state view on water ownership, de facto private rights often strongly entrenched, particularly for groundwater (northern China, India, Middle East)
Current political processes	Leadership, personalities, recent political agenda	<ul style="list-style-type: none"> • Elections drive subsidies for food and fuel • Leadership of central vs local decision-making in the low-carbon transition in India versus China • Tensions between ‘GDP-ism’ (local) and environmentally sustainable development (national) in China – development vs protection of water-related environmental services • Centralised push for water provision in Ethiopia • Centralised targets helped Brazil to introduce biofuels

Table 9.1 demonstrates the range of political economy factors that enter into play in terms of structural issues, formal and informal institutions and current leadership processes. The presence of these factors suggests that there are many constraints on the way towards optimal natural resource management, but also provide information and insights into the reasons.

9.2 HARNESSING THE PUBLIC SECTOR AROUND THE FOUR-PILLAR APPROACH

The new context in which to manage natural resources calls for an ambitious and coordinated response from the public sector in order to promote inclusive and sustainable growth. As argued in Chapter 2 'business as usual' is expected to lead to stresses which will undermine the ability to pursue ISG into the future. Chapter 4 presented a framework for understanding what policies can help to promote ISG, based around a four-pillar response. Section 9.1 discussed the roles of the public sector. Here we gather the evidence and discuss how the public sector could tackle the new natural resource challenges around the four pillars.

9.2.1 MANAGE DEMAND TO REFLECT SCARCITY VALUES

In managing natural resources, demand management refers to policies to control consumer demand for sensitive or scarce goods such as water or harmful goods such as energy based on fossil fuels. Consumer demand encompasses households as well as firms. In several instances, current consumption patterns will create irreversible changes to the planet's ecosystems (see the discussion of tipping points in Chapter 2). It is possible to mitigate some of these pressures on water, land and carbon space by reducing demand for them, and for the products that require these resources. We will also return to such policy responses in the Chapter 11 on global and EU policies.

The public sector can establish sectoral public policies and institutions that define, monitor and control rights to resource use and reconcile or mediate competing uses. Pricing policies operating within a clearly defined regulatory framework, for example, can contribute to managing demand by setting incentives for more efficient resource use within absolute caps set by government (as in land-use planning, or when setting limits for GhG emissions or water withdrawals). In absolute terms, the promotion of such policies in developed and emerging economies is generally more important for reducing global pressures from production and consumption patterns, but poorer countries should ideally avoid establishing unsustainable local consumption patterns, which would set them on a path that they will eventually have to abandon.

Box 9.4: Better pricing and valuation to reduce the environmental footprint of consumption

Natural resources are overexploited either because there are no (apparent) costs in doing so, or because these costs are very low. Because of missing markets and other market failures, resource prices do not reflect scarcity values. A major policy shift is required to account properly for the value of natural capital, and for the costs of its depletion. This is difficult, and it requires a push for research that might help to value natural capital adequately, as well as improving governance to incorporate it into national accounting systems and implement it in practice. Developing pricing mechanisms is one way to account for the 'externalities' of resource use, i.e. ensuring that the prices reflect the cost of resource use to the environment.

Pricing water for agriculture presents social and infrastructural challenges, but it is essential to rationalise water withdrawals in water-scarce regions. Similar pricing systems could be developed for changes in soil or land use. Land is sometimes given away or leased out for free, while the global interest in land is increasing. This suggests that the option value of land is not being exercised – which means that land-abundant countries are forgoing the benefits. Carbon prices should reflect the pressure on carbon space, but there has been little progress on this in the absence of a global emissions-reduction deal. On the contrary, fuel subsidies are widespread, e.g. in India.

It is not always politically, socially or technically feasible to introduce pricing mechanisms. Some critical ecosystem services are extremely difficult to price due to their complexity, and even if it were possible to do so they could not be traded in the market. In addition, pricing schemes (particularly for water or land use) must ensure that these do not reduce access by the poor. Pricing reforms are often blocked by other priorities and unacceptable side effects (e.g. because fossil-fuel subsidies are so important for the agricultural poor in India).

An interesting way to manage pricing is by introducing PES. This approach provides opportunities to link those 'supplying' ecosystem services more closely to those benefiting from the same services and in doing so, potentially provide cost-effective ways to develop new streams of financing. The example of PES in Lake Naivasha underlines the point. Governments should consider the feasibility of PES more generally.

Source: ERD chapters 5-9

Demand-side measures can be vital in reducing global pressures on water, energy and land by cutting the consumption of products and services with a large environmental footprint. Some of these measures could immediately address several of the challenges presented in Chapter 2. These include:

- Use consumer-awareness campaigns and recycling measures to reduce waste in consumption, e.g. up to 30% of food is thrown away in rich countries (Allan, 2011).
- Reduce waste through better storage facilities. The Future of Food and Farming Report (Foresight, 2011) suggests that 'as much as 30% of all food grown worldwide may be lost or wasted before and after it reaches the consumer. Some estimates have placed it as high as 50%.' Addressing waste across the food chain will be critical in any strategy to feed 9 billion people sustainably and equitably by 2050.
- Share information on how consumption affects the sustainability of ecosystems.
- Ensure that product prices reflect the scarcity of natural resources, by internalising costs in relation to the scarcity of land, water and carbon space. The costs of water use to the environment (e.g. with intensive groundwater use in northern China and parts of India) are rarely taken into account. Nor is the effect of fossil-fuel use on climate change.

These measures could reduce the pressures on resource use, but there may be differences between global and local effects in the short to medium term. For example, reducing waste can reduce costs and negative pressures on the natural resources used by the poor. But reduced consumption of these products could also harm poor people and this needs to be monitored. Any price change will create benefits and disadvantages: higher product prices will benefit those who have access to the factors of production, but may harm others, for instance in the case of higher food and energy prices (Wiggins et al., 2008; te Velde, 2007). So while reducing demand is an efficient response to new resource scarcities, the measures designed to achieve this must consider the needs of the poorest countries because policies designed to address environmental issues more efficiently could create social challenges. We discuss protecting the poorest groups from shocks in Section 9.2.4.

9.2.2 IMPROVE QUANTITY AND QUALITY OF RESOURCE SUPPLY IN A SUSTAINABLE WAY

The second pillar in the approach to seek an optimal approach towards resource scarcity is to enhance supply. From the perspective of inclusiveness this approach looks desirable but it is less straightforward than it seems. There are planetary limits to increasing supply given that the amount of land is fixed (except where it is reclaimed from or lost to the sea) as is the amount of available water, and in the short run the main constraints to supply are technology and finance. There are further constraints that are less often considered. For example, as Chapter 6 clearly shows, while economic barriers are the main constraints, the potential of renewable energy (biofuels in particular) is limited through its links with other resources such as land, water (illustrating the importance of the WEL-nexus, see Chapter 8) and biodiversity, and some options are more poverty-oriented or socially constrained than others.

Only a third of the world's land is currently used for agriculture, and because of conflict with environmental uses there is little remaining scope to increase the amount of arable land. Putting degraded land back into use (currently between 5 million and 10 million ha are lost each year, see Chapter 7) seems an obvious measure, but there are considerable costs associated with preparing such land for agricultural use. A first step might be to reduce the amount of land lost to degradation through sustainable land-management practices. The public sector needs to invest in research and extension services in order to preserve soils and to put previously degraded land back into use.

Box 9.5: Regulation and investment in renewable energy

A simple change in the rules governing the private sector can spur private investment in renewable energy. The evidence gathered in Chapter 6 and its background paper (Kimuyu, 2011) suggests that:

- A change in Kenya's energy law enabled the private sector to invest in small-scale hydropower, before which it was not possible to sell generated hydropower electricity to the grid.
- Centralised regulatory measures, such as establishing rules on emissions by large energy users, can provide the necessary incentives for investment in renewable energy (see Chapter 6, specifically the section on Brazil).
- More 'patient capital' is needed to address the long-term finance needs and this depends on the regulatory framework and incentive structure in development finance institutions such as the EIB.

Water-rich and water-scarce countries often co-exist in the same region (e.g. East Africa and South Africa). Muller (2001) discusses how regional integration might help to expand water supply through inter-basin transfer from water-rich to water-scarce areas. Chapter 5 makes the point that even countries with a generous endowment of water can still face 'economic' scarcity if the infrastructure is not in place to store and deliver it. In these circumstances, the primary challenge remains one of extending reliable and affordable access for basic needs. There are different ways to do this. The Ethiopia case shows that centralising delivery has improved coverage from 11% to 65% of the rural population, with major benefits for the rural poor. In South Africa, the allocation process has become more inclusive, with a move away from private rights towards the state as custodian of water resources. However, this change was made without due consideration of the consequences for growth. The public sector built the infrastructure but was hampered by lack of maintenance capacity and institutional arrangements, while the private companies were not enabled to fill the gaps. Options to increase the supply of water, such as desalination, can be impeded by the availability of energy (in some Gulf States, desalination uses 60% of the available energy), further illustrating that single-sector solutions may not be efficient when seen from a WEL-nexus perspective (Chapter 8). Chapter 6 suggests that technology transfer can help to address some of the desalination options.

We have also seen that there will be a large energy deficit in the future. Given the scarcity of carbon space, promoting the supply of renewable energy is the best way to fill this gap. Chapter 6 identified a number of promising ways in which different renewable energy sources could be promoted, for instance by supporting geothermal exploration, 'learning by doing' through R&D subsidies, or removing subsidies for fossil fuels and introducing subsidies for renewable energy (e.g. subsidising the preparation of hydropower projects) to get prices right, or improving the financial and legal environments (e.g. a change in the energy law in Kenya enabled the private sector to invest in small-scale hydropower). However, the links with water and land use need to be actively considered (see section on WEL-nexus efficiency).

In summary, the public sector needs to design an appropriate framework including rule-setting and financing measures to encourage a supply response where feasible from the perspective of inclusiveness and sustainability. When both the framework and the prices are right, this will provide inclusive access to natural resources and new business opportunities for investment in water, energy or land. Some of these opportunities relate to providing resources to the poorest (e.g. the case of solar panels for the poor in India, see Chapter 6 on energy), but in other cases this needs public support in collaboration with the private sector to ensure that increased supplies are indeed developed to serve the poorest (e.g. support to the private sector could be linked to certain output measures).

9.2.3 IMPROVE THE EFFICIENCY OF RESOURCE USE

Public-sector engagement is vital for promoting more efficient resource use as one response to scarcities. Here it can use its three roles, i.e. stimulating technological development and improving coordination and allocation institutions. As Chapter 2 discussed, natural resource use is becoming more efficient but not enough to offset the increased need for these resources: to date, rich economies have succeeded in relative but not in absolute decoupling of economic growth from natural resource consumption.

PRODUCTIVE EFFICIENCY

Governments can set targets for resource efficiency and provide an enabling environment for technological change (e.g. support national innovation systems, use the tax/subsidy system, and put in place support organisations), including for smallholders (Chapter 7), renewable energy options (Chapter 6) for the poor, or water efficiency in farming and industry.

Box 9.6: Public-sector R&D and land productivity

Managing water, energy and land for inclusive and sustainable growth is a central challenge for agriculture. Technology and innovation are essential to ensuring that future global demands can be met, and that expanding access to productive resources and food does not put further pressure on natural resources and rural livelihoods. This implies improving agricultural technologies (including irrigation, seeds and fertilisation) so that yields increase in a resource-efficient way. Research, innovation and extension are also needed to create new and cost-effective infrastructure for storing and improving access to water in poor countries.

Embrapa (the research arm of the Brazilian Ministry of Agriculture) has achieved remarkable productivity in the cerrado (savannah); some 525 million ha were saved by improving land productivity by 224% between 1970 and 2006, although the expansion of intensive agriculture has not been without considerable environmental costs and has favoured large-scale farms over smallholders (see Box 1). There are efforts to introduce these techniques to sub-Saharan Africa, but many of the complementary factors needed such as agricultural support systems, extension services and infrastructure are as yet not in place.

A major role for public policy in enhancing the efficient use of resources is through supporting R&D to improve productivity (e.g. renewable energy technology, new land-use technology, drip irrigation). This support also needs to include measures for the diffusion and adoption of new technological solutions to information and other barriers created by path dependencies. The Montreal Protocol, designed to protect the ozone layer by phasing out the production of substances responsible for ozone depletion, illustrates this: in rich countries, new technologies diffused rapidly as regulations required the replacement of ozone-depleting substances, and because these new technologies were often cheaper than conventional ones. In poor countries, adoption and diffusion were facilitated by an international fund established for this purpose.

ALLOCATIVE EFFICIENCY FOR A FLEXIBLE AND ADAPTIVE ECONOMY

With a fixed supply of resources (in the short run due to supply constraints and in the long run due to planetary boundaries), the allocation of resources, whether through market-based or non-market-based measures, to the best possible use is key to optimising a given supply. Different allocation mechanisms have different effects on ISG, which will be conditioned further by local contexts.

In those countries or areas where water is intensively used, cross-sectoral allocation becomes a major issue. Agriculture, as the major withdrawer and consumer of water, will need to release water to other high-value urban and industrial uses and, increasingly, the environment. This can be difficult to achieve because agriculture's claim to water is based on social and poverty grounds, as well as strategic concerns about food production and food security. Chinese policy-makers are grappling with this problem by trying to raise productive efficiencies (more crop per drop), and by reallocating savings to thirsty urban and industrial users (more cash per drop).

Allocation plays a role not only at the local or national level, but also at the regional and global level. For example, regional institutions are needed to allocate water among co-riparians in shared rivers or river basins. In Africa, such institutions exist but they need support for overcoming their shortcomings (Scheumann and Neubert, 2006).

Thus, the ability to examine the trade-offs between various users and uses and to determine the broad effects on ISG is critical. This needs good governance, capacity and information (as discussed in Chapter 7). Graham et al. (2011) show the possible linkages between different land uses on ISG and the complex information that is required, as for example in the case of Indonesia.

PROMOTE WEL-NEXUS-WIDE EFFICIENCY

Managing the increased linkages between water, energy and land requires a new mindset. As Chapter 8 highlights, institutions must adapt or be created to enable an integrated governance, planning and management of land, water and energy resources. It is clear, however, that major investments in institution development for WEL-nexus management will be necessary in most circumstances.

9.2.4 INCREASING RESILIENCE AND ENSURING THAT THE POOREST BENEFIT

Chapters 5-7 argue that the solutions to the global resource stresses can be inclusive, but that they depend on decisive action:

- Increased energy prices often hit the poorest hardest as the poorest sectors of the population in a given country, and the poorest countries overall, are relatively energy-intensive. Energy subsidies helped the Green Revolution in India. Hence a removal of energy subsidies needs to go hand in hand with stronger social protection.
- Increased pressures on land will increase land prices, which will affect the rural poor depending on their status, e.g. as landowners with adequate title or as secondary users.
- Different renewable energy options to reduce pressures on the planet's carbon space have different social implications. Large-scale electricity-generating options could replace biomass and fuel lighting and cooking, but will benefit the poor only if they have access to electricity grids.
- Large-scale hydropower projects will need to include the benefit-sharing principle of in order to compensate the poor for their possible displacement.
- Some biofuels have the potential to hit the poor by displacing agricultural production, although this is by no means the case for all types of biofuel.
- The provision of energy services in developing countries could be based on renewable energy technologies, both for environmental and inclusiveness reasons. Several renewable energy services employ labour-intensive technologies and allow for decentralised grids, which are likely to foster local development. This path into economic modernisation requires coordinated investment in education, research, and institutional change. Technologies range from simple solar modules accessible to the rural population to more sophisticated equipment requiring skilled labour.

- Large-scale payment schemes such as REDD will have a poverty-reducing effect especially when smallholders have a chance to participate in them, when they are not displaced without compensation and when the poor are also compensated for their loss of energy services when they are prevented from collecting fuelwood.
- Small-scale systems for the payment of ecosystem services can be focused on the poorest segments of the rural population (e.g. smallholders at rivers flowing into Lake Naivasha, for protecting watersheds and reducing sedimentation).
- IWRM is key for solving water stresses arising from competing uses, but the voices of the poor needs to be strengthened in this.
- Improving water access is a major challenge. A centralised system in Ethiopia helped to increase access for the rural poor significantly. Where the private sector is engaged as a dedicated water-service provider, it has found it hard to provide access for the poor in rural areas where cost recovery is difficult and populations dispersed, and even in urban areas where poor people are perceived as non-paying or are hard to reach because they live in informal settlements.
- Better land-tenure protection and transparency concerning land deals can amplify the voices of the poor when dealing with increased pressures on land.
- Large-scale agriculture helps to increase efficiency, but without complementary actions may have negative effects on smallholders (see Box 2 on Brazil in the executive summary).

As mentioned in Chapter 4, resilience refers to the ability of countries, firms and households to deal with shocks. Here we are primarily concerned with the measures and resources that can help prepare people, especially poor people, to cope with any changes in the new context of resource scarcity. For example, if higher prices lead to a more efficient use of a particular resource, it is important that there are effective mechanisms to protect the interests of the poor; this could be directly through allocation and management of existing land and water resources or indirectly by other means. For example, there may be structures to resolve or avoid trade-offs between smallholders and new investors in large land deals, or ways to compensate smallholders adequately if land is allocated to investors. Similar structures might apply in the case of water allocations. The chapters on energy and water suggest that benefit-sharing is an important way in which the poor can reap the benefits from the resource itself, or from hydropower projects. In some cases this works, but in others it may not.

The Report has further examined a number of complementary economic, social and governance policies that can build up resilience and protect the poorest. On economic policies, Chapter 6 and Kimuyu (2011) discuss how the lack of skills is affecting the implementation of geothermal energy. Chapter 7 discusses how smallholder productivity can be enhanced by complementary investment in infrastructure and skills and industrial policies to promote local smallholders to produce food and link up with larger firms. Chapters 5 and 8 argue that policies that enable trade in virtual resources (e.g. virtual water embodied in food production), including regional integration (Chapter 5) can help countries and poor people deal with shocks. Chapter 6 argues that migration and mobility can help countries to deal with shocks, including negotiated relocation in the case of hydropower projects.

Complementary social policies such as social protection are needed for the poor to be compensated in land or energy deals. Chapter 7 argues that increased integration into market systems and dependency on local markets may increase the volatility of income, and this will affect in particular the poorer households; hence systems to provide social protection and safety nets are important.

Complementary governance policies should ensure that the poor are included in transparent decision-making processes and have recourse to dispute-resolution mechanisms when they need them (Chapters 5 and 7). For example, currently land is often allocated (leased) without adequate processes to take into account the concerns of current users or checks on the effects on ISG. More open and transparent institutions for land allocation are better for ISG, as the case of Sierra Leone illustrates. Chapter 7 suggests that secure land-tenure rights, transparent institutions, capacity-building and the inclusion of the poor in discussions concerning land use, and hence inclusive land policies, may improve land deals.

Box 9.7: The need for an inclusive land policy

International demand for land pushes up land prices, intensifies land concentration, and endangers the livelihoods of millions of farmers in poor countries. This may be good for landowners. However, inclusive land policies are required to help prevent two things: first, homogenisation of agricultural systems towards monoculture and ecologically unsustainable commercial agriculture, which can lead to severe degradation of land and soil quality, and is often intensive in water and agricultural inputs – but does not generate employment. Moreover, when coupled with a focus on export markets, it can lead to major exports of underpriced virtual water and possibly pose a threat to food security if cheap imports are not reliably available.

Second, unless there is compensation, pushing small-scale farmers off good land will undermine livelihoods, tend to increase food insecurity, and reduce ecological husbandry. Inclusive land policy is also required to manage the increased demand for agricultural land, which is otherwise likely to expand the agricultural frontier through deforestation and the degradation of ecosystems important for biodiversity. Ensuring access to land must be accompanied by improved access to water in poor countries. Achieving this would entail strengthening existing institutions and legal frameworks, and working to define and enforce customary and modern, as well as collective and private, property rights.

This Report uses the example of governance of land deals in Sierra Leone to suggest that effective land policies are possible if the host government has the necessary capacity.

9.2.5 SUMMARY

Table 9.2 summarises the range of policies and institutions required for the management of natural resources in the new context. They are centred around four pillars and cross-referenced with the three public policy roles. In later chapters, we will consider the role of other actors (i.e. the private sector and the EU) with respect to the same pillars.

Table 9.2: Options for public-sector action

	Incentive and regulatory framework	Public expenditure (public goods, social protection)	Coordination/facilitation
Manage demand to reflect scarcity values	<ul style="list-style-type: none"> • Pricing and labelling of ecosystem services (value natural capital) • Incentives to recycling waste • Tax on meat • Volumetric licensing of water withdrawals • Reduce speculative investment in land by insisting on land use • Implement RAI guidelines 	<ul style="list-style-type: none"> • Education on wastage and consumption patterns • Better storage facilities 	Coordinate users (e.g. biofuel and food producers) with ecosystem planners
Improve quantity and quality of resource supply	<ul style="list-style-type: none"> • Remove fuel subsidies to improve competitiveness of renewable energy • Regulatory reform for an enabling investment climate for private investors • Put previously degraded land back in use • Feed-in tariffs for renewable energy technology or for land productivity 	<ul style="list-style-type: none"> • Infrastructure for water access • Improve financing conditions 	Bring actors together for planning supply of renewable energy policies

	Incentive and regulatory framework	Public expenditure (public goods, social protection)	Coordination/facilitation
Improve the efficiency of resource use	Adequate pricing	<ul style="list-style-type: none"> • R&D for improved land productivity and less resource-intensive renewable energy technology • Efficient irrigation 	<ul style="list-style-type: none"> • National innovation systems (interactions among stakeholders) • IWRM to improve allocative efficiency • Coordination of resource users to improve nexus-wide efficiency
Increasing resilience and ensure poorest benefit	<ul style="list-style-type: none"> • Land-tenure systems • Improve transparency of land deals • Encourage virtual trade • Enable benefit sharing • REPTS – premium paid to rural renewable energy providers without charging local consumers 	<ul style="list-style-type: none"> • Social protection for smallholders in new context of large-scale commercialisation • Investment in water storage to buffer rainfall variability 	Ensure poorest are included in decision making on natural resources (water, energy and land), e.g. inclusive land policy

9.3 ROADMAP TO A NEW APPROACH

Sections 9.1 and 9.2 above, as well as Chapter 8, suggest a range of policies and institutions that governments can introduce or strengthen to address challenges in a way that moves towards ISG. In terms of public policy, the main messages are that the public sector needs to:

- Manage demand to reflect scarcity values by reducing the environmental footprint, through appropriate pricing, education, and measures to encourage recycling.
- Improve resource supply by removing fuel and other distortionary subsidies, setting a private sector-friendly and transparent investment climate for long-term investment in the sustainable use of water and land, and the supply of renewable energy, and investing in infrastructure and storage facilities.
- Improve the efficiency of resource use by investing heavily in R&D for renewable energy and agricultural land use.
- Improve the resilience of the poorest and ensure that they benefit by pursuing inclusive land policies, promoting virtual trade in resources, implementing benefit-sharing initiatives, and supporting social protection.
- Pursue these policies within fresh institutional structures that recognise the complexity of the WEL-nexus and the severity of the challenges.

All countries can and must contribute to the necessary solutions at the pace of which they are capable (see discussion in Chapter 8), and richer countries are expected to help finance the attainment of long-term goals in poorer countries. Policy priorities are context-specific (with progress constrained by political economy considerations, as discussed above) and depend on a range of factors such as income levels, resource endowments, quality of the governance systems, and existing distortions or market and coordination failures. We explore each of these below.

Income levels. Richer countries should act first to manage demand and reduce consumption of resource-intensive goods and services. They should take the lead on cutting waste, educating their citizens and paying the full prices. On the other hand, LICs should be able to obtain finance for renewable energy, for instance, because it contributes to a global public good. Large MICs should gradually set binding targets on the use and efficiency of land, water and energy.

Resource endowments. Countries, and social sectors or population groups within them that lack sufficient access to resources, must address the supply side as a matter of urgency. The poorest countries require assistance. Countries that have resources should harness these, and the poorest countries with large endowments of land and water need to put in place inclusive policies for land and water management. They need support in order to price for increasing scarcity of natural resources so that they draw the benefits.

Quality of governance. The management of natural resources is about governance. Countries need effective leadership, adequate public capacity, and a range of formal and informal institutions. Since many land and water deals to take place in countries characterised by weak governance, there is no guarantee that gains accrue either to the country or to the poorest. The most pressing priority for such countries is to improve governance around such deals. Even poor countries have obtained good land deals and introduced pricing mechanisms because they had the capacity to manage contracts.

Existing policy distortions. Policy priorities will depend on the extent to which past development is based on distortionary incentives. Countries relying on fossil-fuel or agricultural subsidies for individual farmers should correct this immediately. Countries that have not yet invested in R&D need to do so because a major challenge is to innovate and develop sustainable and productive models for agriculture (public goods that have been in undersupply). Chapter 8 discussed the urgent need for institutional change to foster integrated thinking given the formidable coordination failures regarding the WEL nexus.

Despite the importance of policy differentiation, action is required in all countries because 'business as usual' trends have significant economic, social and environmental threats for the poor. These policies and institutions will help to shift from BAU towards new arrangements that safeguard ISG. Unfortunately, the policies and institutional changes that seem feasible are very different from what is required to tackle the challenges that the new context of managing scarce natural resources brings for ISG. This represents a considerable public governance gap.

Box 9.8: A new social contract for sustainability

The German Advisory Council on Global Change (WBGU, 2011) refers to the necessary change as a 'great transformation', and compares it with the Neolithic Revolution that ushered in agriculture 10,000 years ago, and with the Industrial Revolution of the 18th and 19th centuries, which unleashed unprecedented technological change, productivity and human population growth. But the 'great transformation' envisaged by the WBGU differs from these predecessors in two fundamental ways:

- It needs to be a **deliberate process of change**, based on scientific knowledge, with public policies based on long-term global cooperation. By contrast, the earlier great transformations took place in a slow, evolutionary manner and were driven by multiple actors and processes without any plan, targets or timetables.
- This **change must happen in a very short timeframe**, within the next 20 to 30 years, in order to avoid dangerous and irreversible environmental change, especially global warming and its negative effects on water availability, biodiversity, food security, weather extremes and sea levels. Such irreversible change would seriously reduce the wellbeing of future generations.

The WBGU believes a social contract for sustainability is needed to ensure that prosperity, democracy and security considering the natural boundaries of the Earth's system.

Few of these options are cheap and all of them involve major changes in the way people live. A long-term perspective is required in order to understand the real impacts of BAU for economic development and to extrapolate from these the extent of change required today. Time is critical. Chapter 2 suggests that postponing changes in production and consumption patterns may make them costlier to achieve. Investing today in solutions that will have undesirable environmental and/or developmental impacts in the future leads to costly structures and path dependencies that are hard to abolish.

CHAPTER 10

THE ROLE OF THE PRIVATE SECTOR IN SUSTAINABLE AND INCLUSIVE NATURAL RESOURCE MANAGEMENT

10.1 INTRODUCTION

This chapter deals with the role of the private sector in tackling natural resource scarcity and shows that the incentives for the public and private sectors to achieve more sustainable and inclusive use of natural resources are becoming increasingly aligned. It examines the evolving engagement of the private sector with this agenda and analyses the business incentives to improve sustainability and inclusiveness in natural resource use. The chapter discusses some of the ways in which the private sector is currently responding to scarcity concerns in relation to water, energy and land. It highlights inadequacies in the evidence base on the impact of private-sector approaches to improving natural resource use and suggests ways to ameliorate it. Finally, it analyses the constraints to private sector-led solutions, and discusses the role of the public sector in encouraging and facilitating such solutions, including through partnerships. The chapter concludes with a section setting out the suggested implications for business and for the public sector.

The private sector plays two broad roles in relation to the management and use of natural resources: (a) it generates or provides access to natural resources (e.g. generating energy, or supplying water); and (b) it uses and consumes natural resources in order to produce goods and services. The private sector can use these roles to address many of the issues set out in Chapters 4 and 9: finding efficient and innovative ways to supply natural resources; managing their own demand for natural resources as inputs to production; influencing and informing consumer decisions in a way that promotes sustainable consumption; using resources efficiently through innovation in products and processes; understanding the WEL nexus and adjusting production patterns accordingly; and taking appropriate steps to manage risks and shocks in order to protect the business and the livelihoods which depend on it.

Issues concerning the provision of access to water, energy and land – in which the private sector usually plays an important role, albeit one defined largely by the policy and regulatory framework within which it operates – have been discussed in Chapters 5-7. This chapter focuses on issues relating to how the private sector uses, consumes, or manages natural resources as production inputs. A summary of some of the actions that the private sector can take, both as providers (drawing on Chapters 5-7) and as users (drawing on the analysis in this chapter), of natural resources is provided in Table 10.2.

The emergence of new scarcities and stresses will drive up prices, which creates both significant risks for businesses, as well as a set of new opportunities. Leading businesses are beginning to respond to these opportunities and threats, even where public policy is failing to address the governance gap. Responses to the risks are discussed further below. It is already clear that the new pressures on water, energy and land offer opportunities for the private sector. Table 10.1 provides a number of illustrative examples of the growing interest of the private sector in making investments in water, energy and land in poor countries, as set out in Chapters 5-7, on the basis of the evidence to date and on background papers produced for this Report, such as Giovannetti and Ticci (2011) and Massa (2011).

Table 10.1: Private investment in water, energy and land

Area	Illustrative Examples
Investment in water	Investment in water supply and sewerage in developing countries is around US\$2-3 billion annually. The number of private-sector projects in sub-Saharan Africa tripled between 2000-2005 and 2005-2010 (Giovannetti and Ticci, 2011). Chapter 7 suggests an increase in land investments motivated in part by access to water.
Investment in renewable energy	Developing countries attract the largest share of renewable energy. Africa and Middle East have respectively about 57% and 8% of the world's potential solar and wind electric power. Africa has also a large underexploited hydropower capability: the continent accounts for 11% of technically exploitable capability but has only 3% of current installed capacity. Chapter 6 shows growing private-sector investment in renewable energy, e.g. Olkaria geothermal plant, small-scale solar energy and biofuel companies. Kimuyu et al. (2011) document increase in small-scale hydropower in Kenya.
Investment in land	Chapter 7 suggests an increase in private investment in land. Private agribusiness deals, many by Western companies, account for about 90% of the aggregate land areas in Ethiopia, Ghana, Madagascar and Mali (Deininger and Byerlee, 2011; Cotula et al., 2009). Land deals have risen in recent years, particularly since 2007.

10.2 THE EVOLVING ROLE OF THE PRIVATE SECTOR IN NATURAL RESOURCE MANAGEMENT

Companies do not share the same goals as the public sector. Their overall aim is to make a profit. As Adam Smith explained many years ago, it is through the pursuit of self-interest, or profit, that business can generate social welfare. According to most models of corporate governance, companies act in their own self-interest, which is to promote their continuing success.³⁵ Most companies are strongly incentivised by their owners (often shareholders) to seek (or indeed maximise) profit. Social enterprises, or 'triple bottom line' enterprises, which may have goals other than profit, are a growing but still small minority.

Few would consider companies to be responsible for the achievement of wider social goals, such as globally sustainable natural resource management. Companies are in competition with each other and are in any case poorly placed to meet such goals. This is why appropriate public regulation is crucial for sustainable natural resource management – as discussed in detail elsewhere in this Report. But as natural resource scarcities increase, the private sector will have correspondingly greater incentives to use natural resources in a more sustainable and inclusive way, for its own commercial (profit-related) reasons. Indeed, some companies are beginning to respond to increasing natural resource scarcity via innovation, e.g. to develop renewable energy technologies, or products and processes that make more efficient use of water and energy, for which there will clearly be a growing demand and thus potentially lucrative markets.

Many companies produce regular 'Sustainability Reports'. Corporate sustainability initiatives and associated reporting are now widespread, at least among MNCs. This has been a fast-growing part of the corporate social responsibility agenda, responding in part to increased public scrutiny of these issues, driven by the media and civil society, and resulting in considerable growth of ethical consumption and investment schemes. But there are also clear commercial reasons why the private sector should want to ensure that natural resources are used in a sustainable way – not least because a sustainable business model is based on continued access to the necessary inputs for production. So sustainability reporting is beginning to move beyond CSR towards operational necessity.

We are also seeing an evolution in the way the private sector engages. A small but growing number of initiatives are bringing together private players from a range of sectors to address the problems related to managing natural resources in a more systemic way. At the international level this might involve new international governance mechanisms being discussed or developed in collaboration with state or other actors. At the local level an overview of the availability of natural resources is developed and private players are involved, alongside others, in negotiating and agreeing the distribution of those resources.

While examples of the latter are rare (though the Lake Naivasha case study discussed in Box 9.2 provides one such example) some (e.g. University of Cambridge, 2011) suggest that in order to improve the sustainability of their supply chains, businesses should collaborate around the ecosystem (the ecosystems approach), rather than within the sector. In other words, that competing users of natural resources within a particular ecosystem should collaborate to solve scarcity problems and allocate access. If the private sector does increasingly move in this direction as natural resource scarcities bite, it would represent a significant shift in the responsibility that companies are willing to shoulder, to proactively manage natural resources in a way that takes into account the needs of competing users. This is potentially a positive step. Leading such processes is clearly a not a traditional business role, however, which could raise concerns about the balance of power between competing users – thus checks and balances and public-sector involvement is likely to be needed to ensure that such processes generate an inclusive or socially optimal outcome. Examples of the different types of private-sector engagement are provided in section 10.7.

Under the auspices of the World Business Council for Sustainable Development, 29 major companies came together to rethink the roles that business must play over the coming decades in order to move towards being sustainable. This resulted in 'Vision 2050', a call to action that encourages companies to transform themselves, their products and services in order to move towards a more sustainable future. Vision 2050 makes it very clear that leading companies anticipate the need for major, systemic change in natural resource management: public policies will have to be more ambitious in securing ecosystem services in the long term, and companies will have to be more proactive in redefining their core business and investing in sustainable innovations. It argues that engaging with this agenda, and innovating around it, is in the business interest, both to capitalise on new market opportunities and to secure their own commercial competitiveness. 'Vision 2050' sets out a challenging agenda for business – one full of opportunity as well as risks – but it is far from current reality. This 'aspirational' business agenda is discussed further in section 10.4.5 below.

Elkington and Zanganehpour (2011: 10) argue that '...the mainstream business framing of sustainability issues is in the process of shifting from an early focus on compliance (involving a largely defensive position for business), through a period of corporate citizenship (with a growing degree of engagement and voluntary efforts), to a now emerging phase, involving a fundamental shift to competitive strategies built around innovative technologies, entrepreneurial solutions and potentially disruptive business models'.

³⁵ In some corporate governance legislation e.g. in Germany, there is a requirement for companies to serve the public good, although it is unclear whether and how this works in practice (Newborne, 2011), how trade-offs between different parts of the public (e.g. consumers versus producers) are assessed, or whether there is any observable difference in the behaviour of companies operating under different corporate governance laws. In any case, in a world of increasingly international corporate ownership, the more profit-focused model appears to be extending its influence.

Some companies are beginning to set very ambitious targets for their use of natural resources, and there is a move away from sustainability reporting – where communications are focused on an external audience – towards integrated approaches to accounting and reporting that place the emphasis on relevance to their core operations, as well as for external monitoring purposes. Integrated Reporting – although still a new and evolving concept – can in principle help to demonstrate the linkages between a company's strategy, governance and financial performance, and the social, environmental and economic context within which it operates. There is considerable evidence showing that firms' financial performance can be significantly improved through competent environmental management of their operations, by ensuring smooth processes, avoiding accidents, saving energy, and conserving the use of raw materials (e.g. World Bank and IFC, 2002). The top environmental performers in Innovest Strategic Value Advisors' annual survey of the global metals and mining industry posted accumulated returns that were over 60% higher than those of environmental laggards over a three-year period, and 10% higher over one year. Total per-share returns on equity and earnings growth were also found to correlate positively with environmental leadership.

Improving sustainability can be costly initially, so there is also potentially a trade-off between short-term costs and long-term profit. Many argue that shareholders and markets are too short-termist, which could undermine incentives for sustainability. However, some companies are clearly starting to take a longer view, contributing to sustainability goals because it is in their own longer-term interest to do so. We might then ask why certain companies do take a longer view that is inclusive and sustainable and why others do not. One important set of explanations concerns business-specific incentives, which vary by industry, location of operations, competitive strategy, market positioning, business model, operational risks, and public profile etc.

But even where there are strong incentives for more sustainable business activity the blockages may include lack of awareness of the problem or appropriate solutions, short-term financial or capacity constraints, or because the coordination problems and high transaction costs (e.g. building the necessary collaboration among companies) associated with achieving the necessary solutions.

In addition to regulation, there is a clear role for the public sector to assist in supporting private-sector solutions, by raising awareness, providing clear, strong and stable signals on the direction into which natural resource use and energy policy will move so that the private sector understands and responds to these challenges, and by helping to build the response capacity within the private sector. This is an area where the EU could demonstrate global leadership. Section 10.7 discusses some options for achieving these outcomes.

10.3 A FOCUS ON MULTINATIONALS

The private sector ranges from large multinationals to small and medium-sized enterprises (SMEs), self-employed entrepreneurs in the formal or informal economy, and small farmers. Although in most countries SMEs constitute the bulk of private-sector activity, their *individual impact* is by definition relatively small, and their scope to implement schemes collectively in order to manage natural resources more sustainably at scale has been fairly limited. (There is a large literature, e.g. Ostrom, 1990, exploring the institutions necessary to facilitate such collective action.) Collectively, the environmental impact of SMEs may be larger than that of MNCs. Changing this in practice is largely a matter of public policy and public support (Chapter 9). This chapter thus focuses mainly on MNCs because – individually – they have the necessary scale, capacity, resources and arguably stronger incentives to make a bigger impact (positive or negative) on natural resource management than do individual small businesses. The EU may also engage more effectively with MNCs to effect change than it can with the vast number of SMEs around the world. There is also a clearer evidence base on MNC initiatives. This is not to say that SMEs and local business should not also be engaging with this agenda – indeed, they should be doing many of the same things – but there is less evidence of this happening to date.

Large companies also have significant impacts down the supply chain, so their initiatives regarding natural resource management can directly affect the sustainability and inclusivity of the many small farmers and entrepreneurs who provide inputs to them. Evidence shows that in developing countries, MNCs often have higher environmental (and labour) standards than national regulations demand, and that their implementation, through demonstration and training etc., serve to improve standards not only in their own supply chain, but can also have spillover effects and raise standards more generally.

For example, Visser (2008) categorises internal and external drivers for CSR, including environmental sustainability standards, among firms based in developing countries. Two of the external drivers, i.e. international standardisation and supply-chain requirements, are created through links to international corporations. Multinationals often aim to achieve global consistency among subsidiaries and operations in developing countries. Chapple and Moon (2005: 415), for example, observed that MNCs in Asia were more likely to adopt CSR than those operating solely in their home country.

When SMEs are linked to MNCs through supply chains, the latter often impose their standards upon the former. Ethical trading initiatives (e.g. Blowfield, 2003, 2004) were the beginning of a process that gave rise to auditing and labelling schemes for agricultural products (Dolan and Opondo, 2005; Schrage and Ewing, 2005). Box A10.2 in the Appendix gives an example of how one MNC has assisted its suppliers to improve their environmental performance.

10.4 INCENTIVES FOR IMPROVING SUSTAINABILITY AND INCLUSIVENESS OF NATURAL RESOURCE USE

Companies have a range of commercial incentives to examine and improve the sustainability and inclusiveness of their operations, and these are likely to grow as natural resource scarcities increase and prices rise:

1. COST EFFICIENCY

Cost efficiency is a potentially strong incentive for making operations more sustainable. Competitive markets already provide incentives to keep costs down. However, externalities mean that the private costs associated with the depletion of natural resources or environmental degradation are lower than the social costs. Consequently, the private sector will not make enough effort (in terms of a socially optimal level) to use natural resources efficiently. But increased scarcity of natural resources, or more regulation (e.g. of carbon emissions) would make these inputs more costly. The likelihood of increased costs generate incentives for companies to invest now in developing new technologies and business models that will allow them to use natural resources more efficiently – and thus more competitively – in the future. The strength of the incentive depends on how far costs are expected to rise, or the policy framework to change, as a proportion of the overall cost that the natural resources in question represent in a company's balance sheet, the ability to substitute or relocate in order to obtain these resources more cheaply elsewhere, and the degree of competition in the market. This emphasises the importance of establishing a clear policy framework.

The Economist reports that many companies have increased their emissions-reduction targets in recognition of the savings this represents. 'They include Walmart, which adopted energy-efficiency targets in 2005 and claims to be saving over \$200m a year on transport fuel alone. Tesco aims to be carbon-neutral by 2050 and claims to be saving £150m (\$239m) a year. According to the Carbon Disclosure Project (CDP), a watchdog that collects information on the emissions of over 500 large companies, 59% of emissions-reducing investments made so far – mostly in energy efficiency or renewable energy – will pay for themselves within three years.'³⁶

2. SECURING ACCESS TO SUSTAINABLE AND RELIABLE ONGOING SOURCES OF INPUTS

This is becoming increasingly important in a world of growing scarcity. Many companies are investing in both environmental improvements and in building long-term relationships with local communities (which can contribute to increasing inclusiveness) in areas where they operate, in order to ensure a reliable source of future supply. For example, both Nestlé's Creating Shared Value programme and the Kenya Flower Council's efforts to promote more responsible use of water are motivated in part by this incentive.

In economic terms, this kind of consideration may go some way towards internalising the externalities associated with the depletion of natural resources and environmental pollution, because companies may themselves incur costs if they do not do so. Market competition, however, means that companies are less concerned than a welfare-maximising policy-maker would be about overall stocks of natural resources in a given location, and are rather more concerned to secure their own access to stocks of natural resources, possibly at the expense of other actual or potential users.

In addition, a large company may well relocate production if and when resources in a particular location become too scarce, and so again is less likely to value avoiding depletion than a welfare-maximising policy-maker would be.

The strength of this incentive will depend on how far the availability of natural resources is genuinely essential to the ongoing success of the business; whether a business can relocate and bear the associated costs; the extent to which an individual company jeopardises the availability of resources in a particular location; and how far it can coordinate with other users of natural resources to improve sustainability. Companies may also explore new business models to avoid the problem of sourcing supplies of raw materials, e.g. leasing models which encourage firms to design products for long-term sustainability rather than short-term obsolescence; or designing products for recovery – which enables the original manufacturer to re-use components when designing improved versions of the product rather than purchasing and processing new raw materials, thus increasing efficiency.

3. LICENSE TO OPERATE / RISK MANAGEMENT / REPUTATION MANAGEMENT (BRANDING)

Companies need the support or acquiescence of the government, civil society and local population in the country of operation. One way to achieve this is to demonstrate their efforts to operate in a sustainable and inclusive manner. This appears to matter more in some industries than others, perhaps because of the nature of their relationship with government (e.g. mining companies or construction companies which have to negotiate and/or contract directly with government when establishing operations), the visibility of their activities, or because of their public and media profile. Household-name firms appear to be under greater media

³⁶ <http://www.economist.com/node/21538083>

scrutiny in terms of their environmental impacts than are companies in tourism or heavy industry – so risk and reputation may be a weaker incentive for low-profile, non-branded companies.

The civil disturbance and/or related political opposition that occurs where a license to operate does not exist represents a serious risk, potentially resulting in shutdown and exit from the market and the associated losses. Thus many companies work hard to prevent such problems, and to build the 'social license to operate', often through a wide range of CSR and community-investment projects, including sustainability initiatives. This is particularly likely where risks relate to the environmental impacts of their operations, or to competing demands for resources. For example, Coca-Cola was widely criticised when local people accused a bottling plant in the Indian state of Kerala of extracting so much groundwater that local farming activities had to be abandoned. The company disputed this, but the authorities and the NGO ActionAid took up the grievances. This contributed in part to the establishment of the Water Stewardship Scheme discussed below (Newborne, 2011). Companies may invest in providing services to local communities in order to make the economic benefits associated with the company's activities more inclusive, thus building public support for their continued operation.

4. MARKET ACCESS / MARKET PREMIUM

For some products, standards, labels and certification schemes have become a de facto requirement for access to certain markets. For example, GlobalGap is in principle a voluntary certification scheme – relating to production processes of agricultural products, including their environmental impacts – but so many European retailers now make evidence of GlobalGap certification a prerequisite for doing business that it is effectively essential for access to the European market.

Other schemes, such as the Rainforest Alliance certification and labelling scheme, which incorporates environmental standards in relation to sustainability, effectively allow labelled products to charge more for consumers who are willing to pay a premium for 'ethical' products. These represent direct, commercial incentives for companies to participate in sustainability-related standards and labelling schemes, at least in relation to fair trade and 'green' consumer markets. These have been niche markets to date, but as their uptake grows, and as the number of schemes and standards proliferates, the market premium is likely to be eroded.

The strength of this incentive will depend largely on the extent to which there are product standards and/or labels in product and export markets, and on their impact on market demand and pricing. Such schemes are likely to be established where public scrutiny is greatest, resulting in increased consumer and/or investor interest.

5. NEW MARKET OPPORTUNITIES AND COMPETITIVE DIFFERENTIATION

As natural resource scarcity increases, prices will rise. Consumers will then look for products that are cheaper to buy and also to use, e.g. electrical appliances which use less energy and water, vehicles which use less fuel, buildings which require less heating. This will generate demand for more efficient and cleaner technologies and products, and should create strong incentives for innovation to gain 'first mover' advantage. Companies may also want to position themselves to take advantage of new market opportunities, such as payments for environmental services arising from government policy, or market-based environmental offsets or eco-credits.

For companies that have to compete for contracts (e.g. construction companies), there may be a more direct commercial benefit associated with a commitment to sustainability and social inclusion if this helps them to win bids. Governments could strengthen this incentive by making such commitments a key criterion in their procurement policies, and when assessing competing bids and negotiating contracts.

The strength of this incentive will therefore depend on how far a company is or seeks to be a market leader or household name. Competitive differentiation will depend on whether the extent to which the company competes directly with others to secure large, public contracts, or whether it negotiates directly with governments regarding large-scale investments.

6. TO BE PART OF A LEARNING NETWORK

Companies may be keen to work with others to share experience in order to tackle problems related to natural resources as effectively as possible. For example, this is a key objective of the UN Global Compact (UNGC), which aims to identify, disseminate, and promote good corporate practices based on principles taken from the Universal Declaration of Human Rights, the International Labour Organization's (ILO) Fundamental Principles and Rights at Work, and the Rio Declaration on Environment and Development. The UNGC has created a learning network as it engages the private sector with the UN, other international organisations and NGOs.

This type of network helps companies to learn about good practice and to reach a consensus on how to define it. The learning network also leads to the accumulation of experience, which is 'likely to lead gradually to a desire for greater codification, benchmarking,

and moving towards “good” to “best” practices – including by industry leaders wanting to protect themselves against competitive disadvantage’ (Ruggie, 2001).

The strength of this incentive depends on the reasons for wanting to engage, the costs associated with doing so, and the extent to which cooperation helps companies to achieve commercial or reputational goals.

To conclude, a range of factors and incentives appear to underpin private-sector incentives to improve the sustainability and inclusiveness of their operations.

10.5 EXAMPLES OF PRIVATE-SECTOR INITIATIVES ON WATER, ENERGY AND LAND

This section provides some examples of private-sector sustainability initiatives relating to the use of water, energy and land. We can distinguish between three different broad types of engagement: (a) single company sustainability initiatives and innovations; (b) guidance frameworks to help companies make sustainability improvements; and (c) collaborative initiatives to improve the overall governance of natural resources.

10.5.1 WATER

Many companies have introduced their own schemes to use water more efficiently. A well-known example is Coca-Cola’s Global Water Stewardship Program, which aims to achieve water ‘neutrality’ – although it is unclear what exactly ‘neutrality’ means (Newborne 2011) – in three key areas: more efficient use of water, the recycling of water used, and replenishment of water supplies by providing improved access for some local communities and watershed restoration and protection.

In addition to improving efficiency, companies are innovating in order to reduce how much water they use. For example, at one of its Georgia plants, PepsiCo uses purified air rather than water to sterilise plastic bottles. For its Frito-Lay brands, it has identified drought-resistant potato strains that it provides to farmers along with a soil-monitoring method so that crops are watered only when necessary.

Companies are also trying to turn such innovation to competitive advantage and brand positioning. In Asia, Unilever is selling products designed to cope with future resource constraints, such as detergents that clean well at low temperatures and can be rinsed using relatively little water. Levi Strauss & Company has introduced a brand of jeans made of stonewashed denim smoothed with rocks but no water. Its jeans also include tags urging wearers to wash them less frequently and in cold water. It also supported a programme to teach cotton farmers in Brazil, India, Pakistan and West Africa the latest irrigation and rainwater-capture techniques. The company says it must radically change how it does business, engaging more directly with contractors as well as farmers to ensure efficient water use.³⁷

Frameworks designed to guide improved sustainability include the UNGC CEO Water Mandate, which is designed to assist companies in the development, implementation and disclosure of their policies and practices in relation to water sustainability. Companies that endorse the Mandate commit themselves to its objectives and align their company policies to its framework.

Another example comes from the tourism industry. ABTA-The Travel Association has established the ‘Travelife System’ to monitor and manage social and environmental impacts including water management, and a certification and awards scheme. Hotels are awarded bronze, silver or gold awards depending on the measures they have taken to reduce their environmental impact and provide extra benefit for local communities. The travel company Kuoni has identified its top 300 suppliers in 15 destinations for audit.

The cotton industry and associated retailers, including Ikea, Gap and Adidas, founded the Better Cotton Initiative in 2005 to promote water conservation and reduce pesticide use in the industry. They report that a three-year independent study of Indian farms found those adopting the new techniques reduced water and pesticide use by an average of 32%.

Straddling the second and third categories, the Alliance for Water Stewardship aims to bring business, public sector, NGOs and other stakeholders to establish a programme to create social and environmental benefits and serve the economic interests of water users. An international standard is being developed, and the initiative seeks to ‘recognise and reward responsible water managers and users’, including businesses, ‘by creating opportunities for enhanced community standing and competitive advantage’ (Newborne, 2011; Alliance website³⁸).

Chapter 5 argues that, at the systemic level, private companies have only limited capacity to play a neutral role in water resources management, particularly the task of allocation. The equity concerns inherent in allocation decisions mean that it is only natural that there will be some wariness of private interests. However, it was also noted that some MNCs are taking initiatives to intervene collectively in what has previously been the public domain of water resources management at the national level. Of particular

³⁷ http://www.nytimes.com/2011/11/02/science/earth/levi-strauss-tries-to-minimize-water-use.html?_r=1&src=me&ref=general

³⁸ <http://www.allianceforwaterstewardship.org/>

note is the Water Resources Group (WRG) Phase 2, which is engaging in Mexico, India (Karnataka State) and Jordan. The support offered by the WRG Phase 2 to these countries reportedly includes a diagnostic step, to create 'a comprehensive fact base on the water supply-demand balance the country faces to 2030 and the economics of options available to address any gaps', followed by '[m]ultidisciplinary assistance ... through a public-private advisory platform that helps the government shape and test concepts and governance processes, which seek to close the identified future water volume gaps' (WEF, 2011d: 2).

The initiative appears to represent a significant intervention by a group of companies collaborating to offer specific technical assistance and advice 'to improve water resource management in a river basin, country or region and to inform national or regional water adaptation planning' (WEF, 2011d: 2). Evidence-based technical advice could be of great use to the countries concerned, given the rigorous economic analysis of the costs and benefits of water resource development and management options, including supply-side development, increasing water productivity, and economic diversification to change water usage patterns (Addams et al., 2009), as well as independent efforts by the companies involved, such as Coca-Cola (The Coca-Cola Company, 2011) and SAB Miller (SAB Miller et al., 2010), to develop data and understanding on water-related risks. It is as yet not possible to make an objective evaluation of the potential of such consortia to positively, or at least impartially, influence water resource management and planning. Public information on the type of advice offered or conclusions reached in the three countries is not readily available. The companies and governments concerned may wish to make transparency a priority, in order to help establish whether these potentially significant interventions are in the special interest of the firms concerned, or serve the broader public interest of sustainably managed, equitably distributed water resources.

10.5.2 ENERGY

Many companies have developed their own energy efficiency initiatives. For example, many firms in the retail sector have adopted initiatives to promote the development of 'green buildings', seeking to optimise environmental and total cost considerations through better use of natural lighting, improved energy systems, more efficient refrigeration and natural landscaping. As part of its 'Going Green Programme', Tesco has introduced 'Greener Stores', designed to incorporate more energy-efficient heating and air-conditioning units, meters to track energy and water use, and combined heat and power (CHP) plants to generate their own energy. The buildings also make better use of natural light to reduce electricity use and rainwater is collected for use in the toilets and carwashes.

Shell is one of few companies that has spoken explicitly about the nexus between energy and water, and is examining water use associated with different energy types, i.e. comparing the water used for electricity, transport and heating. Shell recognises that the use of water is currently using energy and increasing carbon emissions, and talks about the need to develop technologies that can reduce both.

Some companies are also introducing carbon labelling to indicate the level of carbon emissions associated with a particular product – or to proxy for efforts to reduce carbon emissions – so that consumers can make informed choices.

One of the frameworks designed to guide company action is the Carbon Reduction Label introduced by the Carbon Trust, which applies to a range of retail products and shows that the producer is working to reduce its carbon footprint. Such labels are often voluntary, although some are now being used as part of mandatory regulation. The Carbon Disclosure Project – an independent non-profit organisation – provides another framework that enables businesses to measure and report on their carbon emissions so that they can set their own reduction targets and monitor improvements in their performance. It does not itself propose specific targets, however. Over 3000 companies across 60 countries now participate. In 2008, emissions data were published for 1550 of the world's largest corporations, accounting for 26% of global anthropogenic emissions. An example of an initiative with more systemic solutions in mind is CERES, a national network of investors, environmental organisations and other public-interest groups working with companies to address sustainability challenges such as climate change. CERES coordinates the Business for Innovative Climate & Energy Policy (BICEP), which lobbies government to pass legislation that will support innovative solutions to energy use and climate change.

10.5.3 LAND

Unilever established a Sustainable Agriculture Programme in 1998. It has developed a best-practice Code to help the company and its suppliers achieve 100% sustainable sourcing of agricultural raw materials by 2020. The Code is based on indicators addressing key areas including land use, along with biodiversity, water use and energy consumption. The Sustainable Agriculture Initiative (SAI) is a guidance framework which aims to bring together companies in the food and beverage industry to support sustainable agriculture. The initiative provides support for all stakeholders in the supply chain to develop and adopt sustainable agricultural practices including land use and waste management. This support includes development tools and knowledge exchange among members. The SAI currently has over 30 industry members including Unilever, Nestlé, Kellogg's and Heineken.

Conservation/biodiversity credits represent a growing market. Businesses can purchase them to spend on projects that contribute to conservation and biodiversity. These credits are used to offset their own impact on biodiversity, for instance by companies building infrastructure projects like roads and bridges, and residential and commercial developers. In some countries, for instance the USA, these are a legal requirement (usually defined by an Environmental Impact Assessment). There are, however, many voluntary conservation credits (e.g. conservation certificates issued by the Malua BioBank in Malaysia) and some that are developed by industry (e.g. Wal-Mart's 'Acres for America' Program). The global annual market is estimated to be worth between US\$ 1.8 billion and US\$ 2.9 billion, and as a result at least 86,000 ha a year are covered by some sort of conservation management or permanent legal protection (Madsen et al., 2010).

There are several voluntary sustainable forestry certification schemes in which companies can participate, to indicate that the timber has been produced according to sustainable forestry practices. The Forestry Stewardship Council provides one such scheme. The Rainforest Alliance is another labelling scheme designed to promote sustainable practices including land use and biodiversity conservation. The objective is to make sustainable practices profitable for participating farmers and firms through product differentiation. Businesses that meet certain environmental and social standards gain access to the Rainforest Alliance Verified mark, which distinguishes them in the marketplace, and may allow them to obtain a price premium.

Several other sectoral initiatives promote the sustainability of particular types of land use, e.g. the Roundtable On Sustainable Palm Oil, the Roundtable on Sustainable Biofuels, the Forestry Stewardship Council, and the Roundtable on Responsible Soy. Some may also incorporate components designed to protect the needs of, or provide benefits for, local communities.

The Sustainability Consortium (see Box A10.3 in the Appendix) is an example of an effort to improve sustainability – including land use – at a systemic level, by developing methodologies for life-cycle analysis that will facilitate analysis, monitoring and regulation of private-sector activity, as well as tools to assist companies to adopt sustainability initiatives.

10.5.4 IMPACT

The impact of these private-sector schemes is difficult to assess, and there is very little robust evidence of impact. The Appendix discusses a number of methodologies for assessing impact of business initiatives. The findings suggest that there is a need for public support for the development of improved assessment methodologies and mechanisms, along with innovative methods to encourage corporate reporting. Given the public-good nature of this evidence base, and the importance of independent verification (i.e. not necessarily financed by the participating businesses), there appears to be a strong justification for public (or donor) subsidisation of this kind of research.

10.6 CHALLENGES FOR PRIVATE-SECTOR SOLUTIONS

As discussed above, companies have a range of incentives to manage natural resources efficiently and responsibly, for a mixture of direct commercial and reputational motives. However, these incentives will not be enough in and of themselves, for a number of reasons.

1. COORDINATION PROBLEMS

An individual company may have little incentive to address the problem through regulating its own use of natural resources, because this may increase short-term costs and thus undermine its competitive advantage. Coordination among firms – so that they all bear some costs – can help to address this, which is one reason why businesses often like to collaborate to address sustainability issues. Achieving such coordination will depend on factors such as the degree of organisation in the industry, the extent to which performance against commitments can be monitored in practice, and the size and capacity of the market players. Coordination is likely to be more difficult where there are many small companies.

The costs of achieving such collaboration may also depend on the institutional and cultural environment in a company's home country. For example, Hall and Soskice (2001) discuss the differences between liberal and coordinated market economies, and argue that the latter facilitate more collaborative approaches in business behaviour, whereas liberal economies are built around competitive relationships. This may affect the ability of and incentives for companies to collectively tackle problems related to natural resources.

Close collaboration among businesses operating in the same market might also create problems with competition authorities, so there may be a role for the public sector to remove the opportunity for (or perception of) collusion.

2. FREE-RIDER PROBLEMS

Another problem is that other companies, not necessarily operating in the same market but competing for the same resources, can free-ride on efforts by one company or industry to improve its natural resource management. This suggests that sustainability improvements should be coordinated across companies operating in different sectors in a region. It is unlikely that the private sector has the capacity to engineer such coordination in most cases. Thus there may be a role for the state or CSOs such as NGOs to facilitate coordination and dialogue, as a way to support private-sector solutions to sustainability problems by reducing the costs borne by the companies. Partnerships with donors or NGOs may also facilitate solutions and promote coordination, as discussed further in section 10.7 below.

3. SHORT-TERMISM

Many firms are focused on delivering returns for investors in the short term – or indeed just surviving – and so may not prioritise investment in actions that will reduce costs or increase viability in the long term. This will again depend on the industry and the period over which returns are generally realised. For market-leading MNCs, demonstrating commitment to long-term profitability is likely to be more important, which may also explain why they are more likely to use some of their resources to invest in sustainability initiatives. In times of economic difficulty, CSR projects are often dropped unless they are important to a company's commercial objectives, and thus embedded in operational departments, in which case they are more likely to be maintained.

Some companies may actually position themselves as *not* engaging with the sustainability agenda, seeing that as a source of competitive advantage in some markets. For example, in Indonesia, one leading producer of palm oil has said that it does not sell to the West in order to avoid the burdensome environmental and social requirements (Elkington and Zanganehpour, 2011). Similarly, not all oil companies demonstrate the same commitment to improving their impact, and where some are reluctant to tread, others may be willing to go – perhaps with support from governments that are keen to reap the economic benefits.

4. LACK OF AWARENESS AND CAPACITY

Finally, companies may not be aware of the problem, or lack the financial or human capital to address it, particularly in difficult economic times where immediate survival is the main focus. Knowledge and capacity constraints may be particularly severe for SMEs and companies based in developing countries. This suggests a role for donors to support awareness-raising initiatives and capacity-building.

As has been observed in relation to climate change, when there is a clear policy direction, business responds, even in the absence of regulation. Companies start to make the innovation and investment that will help them to capitalise on the future direction (e.g. in generating renewable energy, or in energy-efficient technologies). Businesses need clarity so that they know that at some point in the future there will be an adequate return on their investments. Collaborative private-sector mechanisms may then emerge.

This has been more clearly visible in relation to climate change than natural resource management, reflecting the greater international attention it has received. The private sector as a whole is making enormous investments, and numerous collaborative mechanisms and partnerships are also being developed between the public and private sectors to tackle climate change-related problems. A similar drive is needed on the issue of natural resource management, to raise awareness within the private sector of the implications of this growing problem, to increase the pressure to act, to highlight the benefits and reduce the costs associated with private-sector solutions, and to provide supportive mechanisms for collaborative action.

Much of the private sector in developing countries – and particularly SMEs – may lack both awareness about natural resource-related issues and capacity to respond appropriately, even when it is in their interests to do so. Public policy to strengthen incentives, awareness-raising programmes, and the development of appropriate market institutions (e.g. standards and certification schemes, training courses, fora for consultation and dialogue) will be even more necessary in developing countries to help business to respond. MNCs that are already tackling these issues may help by engaging with their suppliers and business partners to improve practices down the supply chain.

The corporate sustainability agenda is largely a Western business phenomenon – it is less evident in other parts of the world, such as Asia. However, other business models may also offer innovative approaches and solutions. Given the growing and potentially enormous impact of businesses from countries such as Brazil, China and India on global natural resource use, increased engagement with Southern business and political leaders on this issue is crucial to finding collaborative solutions.

Companies from emerging markets have been slower to adopt environmental and social standards. Elkington and Zanganehpour (2011) notes that Chinese businesses derive their main competitive advantage from the low cost base, employees' willingness and ability to work in difficult situations, cross-industry sector collaboration, and long investment timelines. He cites evidence that Chinese FDI depends mainly on market size, and access to natural resources coupled with poor institutions – suggesting a conflict with wider sustainability objectives. Many of these companies are state owned, and thus investment decisions may reflect political objectives as much as commercial ones. There is a growing understanding of the sustainability agenda within the business communities in India and Brazil, but Russia seems to be lagging behind on this agenda.

Governments of developing countries and CSOs often lack the capacity to negotiate effectively with the private sector, or scrutinise and publicise the impact of business activity. This tends to weaken some of the incentives identified above, such as the need to obtain a social license to operate, or the value of competitive differentiation. Efforts to build the capacity of government and civil society can help to strengthen these incentives. In addition or alternatively, home-country governments can apply the pressure that is lacking in host countries in order to achieve the same effect.

10.7 THE ROLE OF PARTNERSHIPS

Partnerships between the private and public sectors and civil-society actors can help to facilitate more effective solutions to global problems, including natural resource management. Policy-makers and donors increasingly recognise the importance of working with other partners, including the private sector, in order to achieve policy goals. At the same time, companies frequently seek to implement sustainability initiatives through partnerships with others. These partnerships may be with governments, donors, or NGOs, and can involve financial or in-kind contributions from both parties.

Such partnerships among various stakeholders can better address the complex and interdependent issues of sustainable and inclusive development than is possible if they act independently of each other. They can overcome shortcomings in traditional state-centred approaches and intergovernmental cooperation (e.g. power-based state policies, corrupt elites, bureaucracies, ineffective treaties, insufficient information, lack of flexibility) and better allow for the use of different competencies, for information diffusion and social learning, and for involving directly affected actors in resolving the problem. These types of partnership may enjoy stronger legitimacy than governments. There are various operational challenges, however, concerning lack of accountability and transparency, imbalances of power between Northern and Southern actors and weaker versus more powerful groups, and the risk that they provide an excuse for government inaction (i.e. if voluntary mechanisms substitute for potentially more effective mandatory regulation) (Andonova and Levy, 2003).

Partnerships with governments can take the form of public-private partnerships, whereby the government funds or subsidises private service providers. Partnerships with governments also arise when issues can be tackled only through collaboration. Risk-sharing partnerships can be developed where government or donors subsidise private-sector innovation. Partnerships with NGOs can evolve in cases when the latter have a better understanding of realities on the ground or because they can act as watchdogs and provide greater legitimacy to companies' own efforts.

For companies, such partnerships can provide public credibility, a risk-sharing or risk-management mechanism, and the necessary expertise in order to develop and/or implement a sustainability initiative. Since corporate managers are usually under very tight time constraints, however, they will be reluctant to participate in 'partnerships' that do not swiftly demonstrate their practical value. The same is true of the resource aspects: corporate budgets are highly scrutinised, and activities that do not contribute to commercial goals will generally be avoided. Partnerships will work only when partner organisations recognise the constraints under which corporate managers operate – and, of course, vice versa; engage in ways that demonstrate this understanding; and develop approaches which provide the requisite corporate benefits.

Partnerships such as the Extractive Industries Transparency Initiative (EITI) have maintained considerable corporate support, because in this case it provides a vehicle to address a difficult issue that is central to companies' concerns about operating in countries where corruption is a problem. Similarly, the Voluntary Principles on Business and Human Rights have provided a mechanism for identifying acceptable ways to manage physical security in dangerous environments. But the Voluntary Principles also illustrate a potential problem with free-riders, i.e. companies wanting to take credit for participating in the process, but which are unwilling to make the necessary changes in their operations.

WSSD Type II Partnerships

The need for partnership with other stakeholders, including the private sector, is increasingly reflected in policy processes such as the 2002 World Summit for Sustainable Development (WSSD), which launched the concept of Type II partnerships whereby multi-level stakeholders form partnerships to meet sustainability goals.

The impact and success of the partnership-building process launched at WSSD is likely to be discussed at the 'Rio+20' conference in June 2012. Over 300 Type II partnerships have been launched since WSSD, though relatively few involve business in a leading or major role³⁹. (Box A10.1 in the Appendix discusses the Type II partnerships involving the private sector.)

In the projects where business does play a major role, some relate to the provision of natural resources (e.g. Alliance for Rural Energy in Africa), some to providing pro bono goods or services, and some are philanthropic initiatives unrelated to the core business (e.g. NetMark Plus: A Public-Private Partnership for Sustainable Malaria Prevention). Only a small minority of partnerships relate to the management of natural resources within the core business function. The five partnership projects that fit clearly into this category are summarised in the Appendix, Box A10.1.

The extent to which the Type II partnership process is encouraging new partnerships or initiatives is not clear. Most of the existing partnerships seem to have been initiated separately and only subsequently linked to the process. There appear to be no strict criteria or requirements for the kinds of partnership that can be included in the process, nor any process for independent monitoring of their implementation or impact, or for setting targets associated with the partnerships. This hampers efforts to assess their impact. The involvement of developing countries is also fairly limited.

In conclusion, partnerships can play an important role in facilitating private-sector solutions to natural resource problems. When designing them, there is a need for a clear assessment of the problem to be solved, aims and objectives and means to assess the impact and value of the partnership. Sound monitoring mechanisms are also needed, as is a means to assess the 'added value' of the partnerships – beyond what the individual partners would do anyway. The WSSD Type II partnership framework provides a potentially important foundation for engaging more constructively with business to improve natural resource management, but is not yet fulfilling its potential. While it could be expanded, the governing framework should also be developed further to facilitate more robust selection, design, assessment and evaluation.

10.8 IMPLICATIONS FOR BUSINESS

As we have seen in this and previous chapters, there is much that businesses can do to improve natural resource sustainability. Using the four-pillar framework discussed earlier in the Report, we can see that business can help to manage demand for natural resources, improve supply, improve efficiency in resource use, and increase resilience and inclusivity. Table 10.2 summarises some of the things that businesses can do – and indeed are doing – under each of these headings, both as providers of natural resources (summarising some of the examples given in Chapters 5-7) and as users of natural resources (based on the examples discussed in this chapter).

³⁹ According to Biermann et al. (2007), businesses led only 3% of all partnerships, and only 11% of all partners came from business and industry at that time.

Table 10.2: Private-sector roles in tackling the new resource challenges

	Provider of resources	User of resources
Manage demand to reflect scarcity values	<ul style="list-style-type: none"> • Measure and report on resource use, e.g. water footprinting, carbon labelling • Consumer education and awareness raising • Electricity and water metering 	<ul style="list-style-type: none"> • Measure and report on resource use and environmental impacts, e.g. water footprinting, carbon labelling • Consumer education and awareness raising • Sustainability Reporting • Collaborate with other users to find solutions to scarcity in particular areas, e.g. the 'Ecosystems approach'
Improve quantity and quality of resource supply	<ul style="list-style-type: none"> • Invest in renewable energy, e.g. hydropower, wind, solar • Invest in land development • PPPs in water infrastructure and desalination • Small-scale supply of boreholes • Innovate sustainable business opportunities • Eco-credits 	<ul style="list-style-type: none"> • Use procurement systems to incentivise sustainable supply, e.g. sustainable agricultural inputs • Lobby government to solve natural resource problems • Eco-credits
Improve the efficiency (productive, allocative and WEL-wide) of resource use	<ul style="list-style-type: none"> • R&D and innovation in efficient water and energy supply, e.g. drip irrigation, and land productivity • New business models, e.g. water replenishment • Carbon capture and storage • Reduce waste 	<ul style="list-style-type: none"> • Improve energy and water efficiency of production, adaptation of business models as necessary • Introduce sustainable agricultural practices down the supply chain • Explore leasing as a business model • Design products that permit resource recovery and re-use • Effective waste-management systems • Forecast scarcity impacts and adapt business models • Develop more efficient consumer • Promote stakeholder collaboration on scarcity issues
Increasing resilience and ensure poorest benefit	<ul style="list-style-type: none"> • Increase provision to low-income population groups • Invest in renewable energies that are more economically feasible in off-grid areas • Publish What You Pay / EITI 	<ul style="list-style-type: none"> • Responsible approach to land purchase and use to benefit local communities. • Align with UNGC and ILO principles on human rights and labour standards • Develop sourcing infrastructure, e.g. irrigation systems and business models that improve local access to natural resources • Employ labour-intensive production that improves resource efficiency • Explore 'Green Growth' industries that create job opportunities, e.g. waste management

Some of these will depend on public policy or rising prices for natural resources to provide the necessary incentives. Others are starting to happen, as the private sector begins to understand and respond to the opportunities and threats their current business models will face as a result of increasing natural resource scarcity.

The 'Vision 2050' (WBCSD, 2009) report argues that the next 40 years will see a transformation in the way societies develop and do business. It envisages that this will result in huge shifts in regulation, markets, consumer preferences, input prices and measures of profitability. The adjustments required will radically transform both internal corporate values and external market structures. In the process, many firms will fail and many others will start up. This readjustment process may result in job losses and economic insecurity.

In order to survive such tumult, 'Vision 2050' argues that today's business leaders must understand the nature of this anticipated transformation, and adapt their business models appropriately. They should also be assessing the new opportunities that will be created and positioning themselves to take advantage of them. This will call for flexibility and creativeness, but will be essential for survival in the long run. The respective roles for achieving this and the areas that need tackling are outlined in Table 10.2. The private and public sectors can complement each other in finding solutions to major challenges that neither sector could achieve alone.

It further argues that business must stay ahead of the curve, leading the transformation by creating cost-effective solutions and developing more sustainable products. Creativity, experimentation and innovation will be key, which depend on a culture of openness to new ideas. Business should also play a central role in informing the development of appropriate policy frameworks.

'Vision 2050' also discusses the new opportunities that will be generated in this transformation process. It estimates that sustainability-related global business opportunities in natural resources, health and education could build up to around US\$3-10 trillion annually by 2050. It identifies opportunities in three broad categories:

1. Building and transforming where and how we live, e.g. offering opportunities in energy-efficiency technologies, and more efficient water-management systems.
2. Improving bio-capacity and managing ecosystems – offering opportunities in seed development to improve agricultural productivity, and ecosystem markets etc.
3. Developing new financial and collaboration structures – generating opportunities for innovative financing and risk-management instruments, and for more sophisticated early-warning systems.

To date, however, only a few companies seem to be engaging fully with this agenda. While it is clear that the public sector can do much to incentivise this transformation, the private sector could and indeed will have to do a lot more in future to ensure its own commercial survival.

Companies that want to show leadership on this agenda (which is likely to give them a first-mover advantage as scarcity increases), will need to consider the following kinds of action:

1. Learn about the expected changes and increasing natural resource scarcities, as a first step to understanding the risks to their current business model.
2. Develop models and tools (such as a WEL diagnostic) for analysing the impact of the WEL nexus and future changes in prices and scarcity, and identifying in more detail the risks and opportunities faced.
3. Develop approaches to understanding the practical and political economy risks and costs associated with insufficiently inclusive approaches to natural resource use.
4. Work to address these risks internally and make the necessary investment to exploit these opportunities.
5. Invest in R&D and encourage innovation and 'blue sky thinking' in order to benefit from first-mover advantage.
6. Examine corporate values and structures to ensure these can adapt to future transformation, i.e. are sufficiently long-term in approach and open to new ideas and 'blue sky thinking'.
7. Work with the public sector to improve public governance and design market-friendly regulation.
8. Work with other stakeholders to identify natural resource constraints, and develop solutions, partnership models, fora for cooperation and dialogue, and more robust monitoring mechanisms, and gather and share relevant data.
9. Establish or engage in participatory platforms and other democratic processes for decision-making or oversight of natural resource governance.
10. Engage and work with local communities to improve understanding and promote inclusiveness.
11. Work with, support and provide the necessary finance to suppliers to help them reform their business models and improve standards down the supply chain.
12. Learn from best practice elsewhere.
13. Develop new financial instruments for the (often longer-term) investment required, i.e. investors need to take a longer-term approach.
14. Incorporate natural assets into balance sheets and corporate accounts to ensure they are valued and managed appropriately.
15. Explore new business models, e.g. leasing models or designing products for recovery of raw materials.

Understanding and managing the WEL nexus may be particularly challenging for business. Elkington and Zanganehpour (2011) note that problems tend to be identified – and solutions developed – on an issue-by-issue basis, but that business will need to develop a lens that analyses and addresses all these issues holistically.

While policy can help speed up these incentives, as natural resource scarcities bite and prices start to rise, companies should increasingly see the commercial incentives to engage anyway. The earlier they do so, the more likely they are to gain a first-mover advantage by developing more competitive products.

10.9 IMPLICATIONS FOR PUBLIC-PRIVATE ENGAGEMENT

Stronger public governance of natural resource management at the national and international policy level remains crucial, but as this chapter has shown, there is also a crucial role for the private sector in moving towards a more sustainable future. Policy-makers, donors and civil society can contribute to the achievement of business-led solutions in a number of ways. This is an area where the E U can demonstrate leadership. The growing level of engagement and interest within the private sector suggests that there is considerable scope for fruitful and effective collaboration between the private and public sectors on issues of resource scarcity.

Broadly, these can be divided into policies to increase incentives for private-sector engagement, and policies that reduce the costs of that engagement.

Options for strengthening incentives for engagement:

1. Build awareness of the problem of growing natural resource scarcity and its likely impact on business in the future, and set out a clear policy direction in order to encourage stronger private-sector engagement. Engage in a major strategic international forecast of natural resource scarcity and its influence on prices and future economic wealth and political security, in order to spur business action and planning.
2. Support the development of improved assessment methodologies and mechanisms, in order to build the evidence base on the impact of business activity on natural resources and the effectiveness of corporate sustainability initiatives. There is a need to encourage new ways of corporate reporting, including help to develop and establish appropriate reporting requirements, and to fund bodies to monitor compliance with private-sector initiatives in order to assess and strengthen their impact and to draw lessons. Given the ‘public good’ nature of this evidence base, and the importance of independent verification (i.e. not necessarily or solely financed by the participating businesses), there appears to be a strong justification for public (donor) funding for such research.
3. Develop systems for aggregating company reporting to facilitate more coherent sector or economy-level reporting, in order to provide overall assessments of environmental impacts to set against measures of the economic and social value created.
4. Promote policy-makers’ use of impact-assessment tools that allow them to weigh up the socioeconomic and environmental costs and benefits of different private investments. This will enable them to take better-informed and more appropriate decisions, and improve their understanding of how to negotiate with the private sector in order to maximise its contribution to sustainable and inclusive growth.
5. Build the negotiating capacity of governments in developing countries so they can more effectively demand responsible corporate behaviour, and assist them in establishing monitoring mechanisms.
6. Tighten up rules and transparency on business lobbying of government, in order to weaken vested interests that are opposed to pro-sustainability reforms.
7. Ensure that trade and investment treaties are compatible with the promotion of policy and regulation to promote sustainable business practice.
8. Examine the potential for reforms to corporate governance laws and rules governing investment markets in order to tackle short-termism.
9. Encourage MNCs to adopt sustainable practices, e.g. establishing codes of conduct and/or performance targets and associated monitoring, and encouraging new private-sector initiatives to achieve those targets. This will increase private-sector incentives to self-regulate and to find effective solutions, particularly where such pressure from host governments and civil society remains weak.
10. The EU policy on CSR encourages engagement with existing CSR initiatives, but these are not well developed in relation either to natural resource management or sustainable and inclusive growth and development outside the EU. Thus there is scope to promote the development of stronger frameworks for CSR on natural resource management for inclusive and sustainable

growth, e.g. incorporating Ruggie's human rights framework and other voluntary provisions on environmental duties directly into the relevant agreements, institutional frameworks and processes.

11. Encourage responsible business practice in foreign countries by rewarding responsible business behaviour through procurement policies, or funding decisions (e.g. through development financing institutions), or as a condition of other kinds of partnership.
12. Raise awareness and build the capacity of civil society to scrutinise company behaviour, and to promote informed discussion and assessment of the benefits as well as the costs.

Options for reducing the costs of private-sector engagement include:

1. Overcoming coordination problems by facilitating multi-stakeholder processes to design and adopt sustainability initiatives and work to improve inclusivity, or by playing an active role in industry-wide initiatives in order to prevent opportunities for, or perceptions of, collusion.
2. Direct support for and risk-sharing by donors and/or NGOs for private-sector solutions. Donor or NGO assistance in brokering partnerships and facilitating engagement in developing countries can also be valuable. Donors need to find better ways to measure the impact and value-added of these partnerships in order to be accountable to their domestic constituency.
3. Establish new partnerships with business to tackle natural resource problems – including through the WSSD Type II partnership framework. More robust criteria and methods for selection, design, assessment of additionality and evaluation of impact should also be developed.
4. Assistance to producers in developing countries to meet standards and certification requirements of sustainability initiatives, to ensure that the financial burden of compliance is not passed down to the poorest in the value chain, thus excluding them from accessing markets.
5. Engage with the financial sector to find ways to incentivise, share risks or otherwise encourage longer-term investment in innovation to facilitate the transformation to more sustainable business models – especially for SMEs.
6. Provide information to support sound business decision-making. Build capacity and market institutions to support SMEs and local businesses in developing countries to engage with this agenda.

CHAPTER 11

THE ROLE OF THE EUROPEAN UNION

This concluding chapter discusses the role of the EU and its Member States in supporting developing countries to manage the new pressures on water, energy and land for inclusive and sustainable growth. The EU can do this by helping to close the three gaps that this Report regards as major barriers to moving away from prevailing unsustainable and exclusionary practices. The EU can support developing countries in addressing the *public governance gap*, including through its development cooperation programmes. The EU can seek to close the *corporate governance gap* by promoting CSR and inclusive and sustainable business models, which would mean working differently with the private sector (Box 11.3). Finally, the EU can address the *global governance gap* by promoting appropriate global governance.

Policy changes in these three directions are likely to trigger larger processes of change since the EU already influences the management of water, energy and land in developing countries through different policy 'fields'. The EU is the world's largest ODA provider and it is legally committed to promoting Policy Coherence for Development.

In this chapter, we therefore look at the roles of the EU as:

- A significant consumer and producer
- A worldwide trade and investment partner
- A major provider of development cooperation
- A global player affecting global processes

This chapter first discusses the current impact of the EU on water, energy and land (Section 11.1) in these four areas. It then discusses current reform processes in these four areas (Section 11.2). Clearly, proactive EU engagement in closing the governance gaps as a means to promote global inclusive and sustainable growth is also based on self-interest. In terms of its global vision, the EU has embarked on a path towards fundamental reform of its own economy towards inclusive and sustainable growth in its adoption in 2010 of the Europe 2020 Strategy.⁴⁰ Yet the EU also faces various core challenges preventing it from marshalling its entire range of sectoral policies behind the overall goals set out in Europe 2020. Finally, Section 11.3 presents the main policy conclusions for the EU in four areas: recommendations for the EU itself and its internal policy processes; for its external trade and investment policies; for its development cooperation; and for its position in global fora.

11.1 EUROPE'S CURRENT IMPACT ON MANAGING WATER, ENERGY AND LAND FOR INCLUSIVE AND SUSTAINABLE GROWTH

11.1.1 EU CONSUMPTION, TRADE AND GLOBAL ENGAGEMENT

The EU exerts major influence in the global arena:

- The EU has the world's largest economy, with a GDP of over €11 trillion in 2009, is both the largest provider and recipient of foreign direct investment (Eurostat, 2011) and provided 58% of the OECD's development cooperation in 2010.
- The EU is responsible for about 16% of the global environmental footprint (van Schaik et al., 2010b).
- Despite plans to reduce consumption considerably in the coming years, the EU will continue to be a major global consumer (Eurostat, 2011).
- In 2009 the EU had a negative trade balance in the areas of food, drinks and tobacco, raw materials, mineral fuels and lubricants (Eurostat, 2011) and its consumption of extractive resources is particularly dependent on imports: 83% of oil, 47% of natural gas, 59% of coal, 85% of iron ore and bauxite, 100% of certain rare metals (Vopel, 2011).
- While the EU is relatively self-sufficient in livestock products, about 75% of protein-rich feed, mainly soy-based products, is imported. Around 12 million ha outside Europe may be attributed to European livestock production (Westhoek et al., 2011).

⁴⁰ Available at: http://ec.europa.eu/europe2020/index_en.htm

- Two thirds of the fish consumed in Europe is imported.⁴¹
- The average per-capita consumption of animal proteins in the EU in the form of meat, fish and dairy produce is about twice the global average, and it increased by some 50% between 1961 and 2007, mainly due to improved welfare and relatively low prices (Westhoek et al., 2011).

The EU therefore already has a major influence – positive and negative – on the global management of natural resources, including water, energy and land.

11.1.2 CURRENT ROLE OF EU DEVELOPMENT COOPERATION IN HELPING DEVELOPING COUNTRIES TO TACKLE NATURAL RESOURCE STRESSES

Europe is the world's largest ODA donor and a major provider of other official flows through the EIB and EDFs. The European Consensus on Development, which was jointly adopted in 2005 by the EU Member States, the Parliament and the Commission, remains the highest-level political statement on EU development cooperation, and defines its poverty-reduction ambition. The European Consensus underlines Europe's commitment to contribute to achieving the Millennium Development Goals, emphasising that poverty is multidimensional, and that its reduction therefore depends on giving equal attention to investing in people, the protection of natural resources to secure rural livelihoods, and wealth creation.

Over the period 2004-2010, the EU and its Member States together accounted for 57% of net ODA to developing countries from all OECD DAC (Development Assistance Committee), and for 65% of the global €25.7 billion increase in ODA. In 2010, ODA provided by the OECD DAC and EU donors reached €97.2 billion in nominal terms, of which the EU as a whole provided 58% (COM, 2011c). The EU recognises that Financing for Development (FFD) is far broader than ODA commitments alone and includes actions such as mobilising domestic and international resources for development, innovative financing and climate finance. All these actions can support developing countries in promoting inclusive and sustainable development.

Current OECD statistics do not provide a reliable overview of the total EU contribution to inclusive and sustainable growth or to specific investments in water, energy and land. This is because relevant interventions can be reported under different sector codes, and there are no disaggregated ODA figures for the management of these resources.⁴² Within the broader category of ODA support to the environment in developing countries, however, the European Commission alone spent more than €0.5 billion in 2009 on environment-related actions.⁴³ An overview by the OECD DAC of support to the environment shows that EU Member States provided roughly US\$2.4 billion in the period 2008-2009 (OECD/DAC 2011).⁴⁴

The European Commission and EU Member States do have programmes in water, energy and land (see the Appendix for details on the European Commission). The European Commission makes a major contribution to water and sanitation programmes in developing countries and promotes an integrated framework for water resources management with three priorities: (i) universal access to safe drinking water and adequate sanitation; (ii) establishing and strengthening organisations and infrastructure for the sustainable and equitable management of trans-boundary rivers, lakes and groundwater; and (iii) coordinating fair, sustainable and appropriate distribution of water between different users. Examples of EU endeavours in the field of water, energy and land include, for instance, the EU-Africa energy partnership, which is a framework for structured dialogue and cooperation on energy issues. It builds on initiatives and instruments such as EU-Africa partnership on infrastructure, the ACP-EU Energy Facility and the EU environment programme. The EU is also a major funder of agricultural R&D, which can provide some responses to the growing challenges of food security and sustainable development associated with water shortage, climate change, land degradation and resistant diseases/pests. The €1 billion EU food facility enables the EU to respond rapidly to problems caused by soaring food prices in developing countries. The EU also supports transparency and information-gathering in relation to land management.

⁴¹ Source: EU Fisheries Commissioner's speech. The full text is available at: http://ec.europa.eu/commission_2010-2014/damanaki/headlines/speeches/2011/07/20110713-speech-cfpreform_en.pdf.

⁴² For example, support to energy can be reported in statistical codes both under the production sectors grouping and under the multi-sector/cross-cutting grouping.

⁴³ Source: http://ec.europa.eu/europeaid/what/environment/documents/press_pack_-_eu_actions_on_environment_in_external_cooperation_-_december_2010.pdf. For the period 2007-2013, the European Commission's activities in these areas are financed through two types of instrument: (1) The implementation of the policy at national and regional level is supported by geographical mechanisms, such as the European Development Fund (in the ACP countries), the Development Co-operation Instrument (in Latin America, Asia, Central Asia, Middle East and South Africa), and the European Neighbourhood & Partnership Instrument (in the EU's neighbouring regions). (2) A specific thematic programme under the Development Cooperation Instrument, addressing issues that are not priorities in the geographical instruments as well as issues common to groups of countries not belonging to a single region.

⁴⁴ Note that the EU12 are not systematically covered by OECD/DAC aid statistics.

Some of these programmes are already supporting the public sector in developing countries to manage resource stresses in the way we suggest in Chapter 9. For example, some interventions use a nexus-perspective, investing in political economy and governance analysis and support, cooperate with the private sector, and adopt innovative approaches to funding (e.g. blending of loans and grants, equity). Box 11.1 discusses some of the characteristics and outcomes of projects (co-)financed through EU development cooperation and the Appendix provides further details. These projects show innovative approaches to investments in water, energy and land from a nexus-wide perspective, as opposed to dealing with one of the three resources in relative isolation. This can assist the transition away from a 'business as usual' path, especially when a country or region is committed to making such changes. Section 11.2.4 will further analyse the potential role of EU development cooperation, with particular attention to the EU Agenda for Change proposed in October 2011.

Box 11.1: EU development assistance for managing the stresses on water-energy-land; illustrative projects

The EU supports conservation agriculture in Zambia. The EU contributed €16.9 million to food production by small farmers in Zambia through improved access to agricultural inputs and the promotion of conservation agriculture (CA) principles. More than 19,500 farmers and an estimated 500 extension officers have been trained in conservation agriculture. Productivity in the CA project areas has increased by 44% and conservation agriculture was one of the major factors contributing to the 2009/10 bumper maize harvest. Integrated conservation agriculture has been streamlined with the country's Sixth National Development Plan.

SWITCH-Asia is a regional EU-funded environment programme (with a budget of €152 million for the period 2007-2013) that seeks to promote the adoption of Sustainable Consumption and Production (SCP) among Small and Medium sized Enterprises (SMEs) and consumer groups in Asia. Sustainable Consumption and Production (SCP) is an attempt to reconcile the increased demand for goods and services to meet basic needs and bring a better quality of life, while minimising the use of natural resources, toxic materials and emissions of waste and pollutants over the life-cycle.

The Pangani River Basin Management Project aims to generate technical information and develop participatory fora to strengthen Integrated Water Resources Management (IWRM) in the Pangani River Basin, including mainstreaming climate change, to support the equitable provision and governance of freshwater for livelihoods and environment. Supported by a range of donors including the EU-ACP Water Facility, the project has established four Water User Associations (WUA), and these have both helped to inform local government and encouraged action in cases of water encroachment upstream in the basin and cases of water pollution.

The **EU-Africa Infrastructure Trust Fund** supports infrastructure projects with a regional impact including large hydropower projects, where joint water management is essential. The Trust Fund mixes non-refundable grants (here €9.3 million) from donors (e.g. the EU) with long-term investment finance from financiers (e.g. EIB). This 'blending' acts as a catalyst for investment (ETT, 2011). Blended finance for a hydropower project in West Africa helps to finance the provision of sustainable and clean power in Mali, Mauritania, and Senegal. The project shows that it is important to co-ordinate innovative finance such as blending with support for adequate governance arrangements (across sectors and countries) that need to be in place before financing can take place.

The **Global Energy Efficiency and Renewable Energy Fund (GEEREF)** is a fund-of-funds of more than €100 million, supported by the EU and others, providing global risk capital through private investment for energy efficiency and renewable energy projects in developing countries and economies in transition. It aims to accelerate the transfer, development, use and enforcement of environmentally sound technologies for the world's poorer regions, helping to bring secure, clean and affordable energy to local people.

11.2 EXPLORING THE EU POTENTIAL ROLE THROUGH INTERNAL POLICIES, EXTERNAL POLICIES, DEVELOPMENT COOPERATION AND GLOBAL GOVERNANCE

11.2.1 INTRODUCTION: EU POLICY PROCESSES AND COMMITMENT TO POLICY COHERENCE FOR DEVELOPMENT

Sectoral policies, when implemented in isolation, fall short of reaching their full potential to promote ISG. Therefore one key means toward moving away from 'business as usual' is to promote horizontal or 'cross-cutting' policy objectives. Increasing complexities in European policy-making have contributed to the compartmentalisation of policy processes, which risks undermining policy coherence as well as the achievement of objectives that go beyond specific sector domains (Pollack and Hafner-Burton, 2011; Peterson, 2001, cited in CEPS, 2006). Policy proposals from the Commission are adopted by the College of Commissioners, thereby allowing interests to be discussed and authorised by all. In contrast, EU decision-making processes in the Council tend to be more mono-sectoral and segregated compared to national policy processes, because decisions are typically prepared in compartmentalised meeting structures and then adopted by portfolio ministers or Heads of State (CEPS, 2006). Members of the European Parliament (MEPs) often rely on information and other knowledge services provided by the most effective lobbies, which tend to push particular sectoral interests (Rasmussen, 2011).

Parallel to this gradual increase in EU 'policy sectors', there has been a rise in cross-cutting policy objectives that should guide the direction, aims and gradual integration of sectoral policies. Such horizontal policy objectives are reflected in the European Consensus and the Lisbon Treaty. Similar objectives are also reflected in the UN Charter (e.g. environmental protection, gender equality).⁴⁵

Clearly, horizontal policy objectives do not co-exist harmoniously but have to be weighed against each other in each policy process. This process is referred to as strengthening the coherence of sectoral policies towards these horizontal objectives. Policy Coherence for Development is one specific objective that appears in EU treaties and international declarations. The Lisbon Treaty, which entered into force in December 2009, states that the Union '(...) shall take account of the objectives of development cooperation in the policies that it implements which are likely to affect developing countries (Art. 208).' Of these development objectives, the primary objective is defined by the same article as 'the reduction and, in the long term, the eradication of poverty'.⁴⁶ Most recently, the Outcome Document of the 2011 Fourth High Level Forum on Aid Effectiveness in Busan was endorsed by key actors for North-South and South-South cooperation and states that '(...) it is essential to examine the interdependence and coherence of all public policies – not just development policies – to enable countries to make full use of the opportunities presented by international investment and trade, and to expand their domestic capital markets.'⁴⁷

In 2009, the EU agreed to focus their efforts to promote PCD in particular on five key policy areas, these being (1) trade and finance, (2) food security, (3) climate change, (4) migration and (5) security. In December 2011, the European Commission published the third report on EU performance on promoting PCD.⁴⁸ Besides presenting a detailed overview of what had been achieved by the EU and its Member States in relation to these and other areas, the document also identifies several concrete challenges and outstanding issues for the next period (COM, 2011e). Various studies have emphasised the need to establish institutional 'mechanisms': formal and systematic efforts that can drive progress in promoting PCD at these different levels. There is an extensive body of literature on the performance of past efforts at mainstreaming policy objectives such as gender equality and environmental protection, from which lessons can be drawn that are also of relevance to PCD.

Mechanisms can be placed on a continuum from soft incentives (e.g. investments in training, coordination groups to allow for intersectoral exchange) to hard incentives (binding or otherwise enforced measures). While Pollack and Hafner-Burton (2010) note that most EU measures are found at the 'soft' end of the spectrum, they point to the European Commission's Impact Assessment (IA) system as having much potential to drive the successful realisation of horizontal policy objectives. This system looks into the expected economic, social and environmental consequences of policy proposals prepared by the Commission. Following its introduction in 2003, the COM Guidelines on IAs were revised in 2005 and 2009. The most recent guidelines pay more attention to

⁴⁵ More information on the specificities of European policy-making in relation to the subject matter of this Report can be found in the Appendix.

⁴⁶ In Global Policy statements, similar commitments are increasingly found, most notably in relation to Millennium Development Goal (MDG) 8 that concerns giving shape to a global partnership for development. The most recent high-level review of the MDGs included the following specific paragraph on PCD, as well as the additional references to particular policy areas that should be made more coherent: 'We call for increased efforts at all levels to enhance policy coherence for development. We affirm that achievement of the Millennium Development Goals requires mutually supportive and integrated policies across a wide range of economic, social and environmental issues for sustainable development. We call on all countries to formulate and implement policies consistent with the objectives of sustained, inclusive and equitable economic growth, poverty eradication and sustainable development'(UN, 2010: 41).

⁴⁷ See: http://www.aideffectiveness.org/busanhlf4/images/stories/hlf4/OUTCOME_DOCUMENT_-_FINAL_EN.pdf

⁴⁸ See: http://ec.europa.eu/europeaid/what/development-policies/documents/eu_2011_report_on_pcd_en.doc.pdf

assessing the impacts on developing countries.⁴⁹ An independent Impact Assessment Board examines and issues opinions on the quality of individual draft IAs prepared by the Commission directorates general.

Beyond mechanisms to strengthen information exchange and ensure attention to PCD in policy-drafting processes, the promotion of PCD implies an important change to current policy-formulation processes and requires greater efforts to close information and knowledge gaps. Better management of the policy cycles that link to the WEL nexus require additional investments into research-based evaluations that can feed into policy-learning processes within the legislative system in the EU, Member States and aid-recipient countries. Linked to this is the need to adapt the current policy-learning process so that they benefit from the newly generated information and analysis.

Against the backdrop of EU commitment to PCD, this section will present analysis of potential EU roles and specific ongoing engagements in four areas: (1) internal policies; (2) external policies on trade and investment; (3) development cooperation; and (4) global governance.

11.2.2 THE POTENTIAL OF EU INTERNAL POLICIES

Recent policy initiatives aiming to make Europe's economy more inclusive and sustainable

As discussed in the first chapter of this Report, the United Nations Conference on Sustainable Development – commonly referred to as 'Rio+20' – takes place in June 2012. Following a public consultation to gather views, ideas and research evidence, on 20 June 2011 the European Commission published a proposed EU position for Rio+20,⁵⁰ expressing the ambition that this would contribute to a consistent EU position that could '*... contribute to an ambitious Rio+20 outcome with concrete policies and actions for greening the economy*'.

The Communication emphasises that the EU can best contribute to promoting global inclusive and sustainable growth by starting at home, citing the Europe 2020 Strategy, which aims to transform the EU into a knowledge-based, resource-efficient and low-carbon economy and provide a sustainable response to the challenges facing the EU up to 2050. Europe 2020 seeks to mainstream and reinforce the role of sustainability in policy development by establishing the mutually reinforcing priorities of sustainable and inclusive growth, which are driven by five headline targets and seven flagship initiatives. Many of these flagship initiatives are directly relevant to global inclusive and sustainable growth and to EU engagement in Rio+20. The Communication highlights the flagship initiative on resource efficiency, which includes the development of a proposal for a Roadmap for a Resource Efficient Europe. This flagship initiative includes:

1. Decoupling the use of natural resources from economic growth.
2. A range of new policy measures including action on raw materials, energy efficiency, biodiversity, as well as roadmaps to decarbonise the economy, energy and transport.
3. Stepping up of the use of market-based instruments, phasing out environmentally harmful subsidies and introducing the 'greening' of tax systems.

The core of the COM's proposal for Rio+20 is the fundamental need to 'green' the global economy, which the Communication describes as follows: '*What is needed is an economy that can secure growth and development, while at the same time improving human well-being, providing decent jobs, reducing inequalities, tackling poverty and preserving the natural capital upon which we all depend. Such an economy – a green economy – offers an effective way of promoting sustainable development, eradicating poverty and addressing emerging challenges and outstanding implementation gaps.*'

This greening of the economy should not be seen as a project mainly propelled by people working outside the productive sector but also involves business (see A11.1 in the Appendix).

⁴⁹ In addition to some other parts of the guidelines, pages 40 and 41 state that every impact assessment should establish whether the policy options affect relations with non-EU countries. Among the aspects examined should be: 'impacts on developing countries – initiatives that may affect developing countries should be analysed for their coherence with the objectives of the EU development policy. This includes an analysis of consequences (or spill-overs) in the longer run in areas such as economic, environmental, social or security policy.' The guidelines are available at: http://ec.europa.eu/governance/impact/commission_guidelines.

⁵⁰ http://ec.europa.eu/environment/international_issues/rio20_en.htm

In the Communication, the Commission further proposes that the transition to a 'green economy' can be furthered by taking action in three policy dimensions:⁵¹

1. **'Investing in key resources and natural capital'** (*'the what'*): water, renewable energy, marine resources, biodiversity and ecosystem services, sustainable agriculture, forests, waste and recycling. These areas underpin millions of livelihoods and can help alleviate poverty. They could become areas for future economic growth and global markets.
2. **Combining market and regulatory instruments** (*'the how'*): eco-taxes, removing environmentally harmful subsidies, mobilising public and private financial resources, investing in skills and green jobs. Indicators that reflect a wider sense of progress (both environmental and social), and that can work alongside GDP, need to be developed.
3. **Improving governance and encouraging private sector involvement** (*'who'*): reinforcing and streamlining the existing international governance structures (for example by upgrading the United Nations Environment Programme (UNEP)). The much greater involvement and engagement of businesses and civil society is also essential.⁵²

Although it has been commended for putting forward these proposed actions, the Communication on Rio+20 has also been criticised by NGOs (e.g. Eurostep) for focusing mostly on sustainable development, and much less on the social inclusiveness and equity aspects (the terms 'inclusiveness' and 'equity' are each mentioned only once).⁵²

Having considered the Commission's proposal, the EU and Member States decided to give more attention to social and equity dimensions in the EU submission to the Rio process in November 2011.⁵³ The submission particularly refers to the need to reconcile social and economic policies, and notes that '... Ratification of the relevant ILO conventions is of utmost importance to ensure that growth is not only economically and ecologically sustainable, but also fair, just and equitable, taking into account social issues and contributing to poverty eradication.'

The Appendix discusses in detail two initiatives from the perspective of the integrated management of water, energy and land towards inclusiveness and sustainability: (1) the Roadmap to a Resource Efficient Europe and (2) the reform of the Common Agricultural Policy (CAP).

11.2.3 THE POTENTIAL OF EU EXTERNAL POLICIES ON TRADE AND INVESTMENT

The introduction of this chapter pointed to the important influence of the EU as a global trade and export-oriented region and also a major consumer. Chapter 10 took a more detailed look at the potential role of the private sector and pointed to EU policy initiatives that seek to make its engagement more transparent and conducive to inclusive and sustainable growth.

In 2012 the EU will publish a new policy proposal on trade, growth and development⁵⁴, for which it organised a stakeholder consultation in 2011.⁵⁵ This policy proposal defines the key objectives of EU trade policies with regard to developing countries in line with Europe 2020 Strategy. Among other key EU and global changes that this proposal aims to address, the report on the public consultation points to the need to respond to the increased pressure to enforce environmental and social standards globally. This should however not be seen as a reason to implement protectionist policies. As an interesting case study for EU trade and investment policies, the Appendix analyses the extent to which virtual water trade is taken into account in its current policies.

11.2.4 THE POTENTIAL OF EU DEVELOPMENT COOPERATION

In October 2011, the European Commission published a policy proposal aimed at increasing the overall impact of European development cooperation, and is likely to lead to agreements among EU ministers responsible for development cooperation in the first half of 2012.

⁵¹ <http://tinyurl.com/4ycryxm>

⁵² It is also related to the EU having its 'own initiative' in making policy proposals in the areas of environment and development cooperation, while in the area of social policy the Commission's role is limited to one of taking action to promote policies in Member States.

⁵³ The EU's joint position can be found here: <http://www.uncsd2012.org/rio20/index.php?page=view&type=510&nr=240&menu=20>

⁵⁴ See: http://trade.ec.europa.eu/doclib/docs/2012/january/tradoc_148992.pdf

⁵⁵ See http://trade.ec.europa.eu/consultations/?consul_id=156

Box 11.2: 'Agenda for Change' – increasing the impact of EU development policy⁵⁶

On 13 October 2011 the Commission published a policy proposal entitled 'Increasing the impact of EU Development Policy: an Agenda for Change'. The press release summarises some of the fundamental changes that it proposes for EU development cooperation: 'Future EU spending should concentrate on sectors which are key for long-term and inclusive growth, target countries that are in the greatest need of external support and where aid can make a difference.'

The Agenda for Change seeks to make fundamental changes to EU development cooperation:

1. It proposes to be more strategic and to develop a more focused portfolio of country and regional cooperation programmes in support of **good governance** and **inclusive and sustainable growth**. These two priority areas are presented as essential for long-term poverty reduction, and therefore the Commission intends to spend an increasing share of EU aid on these areas.
2. The Communication emphasises the need to **reduce the exposure of developing countries to climate change and volatile food and energy prices**, and calls on the EU to invest more in sustainable agricultural systems and increased access to sustainable energy services. The proposal further unequivocally states that 'development is not sustainable if it damages the environment, biodiversity and natural resources and increases the exposure/vulnerability to natural disasters.' This points to the potential of working in a WEL-nexus integrated manner, as this Report recommends.
3. In terms of the delivery of its development cooperation, a specific Communication presents ideas for improving budget support while the Agenda for Change pays specific attention to new financial instruments, such as **blending grants and loans and other risk-sharing mechanisms**.

The policy proposal further includes ambitious proposals that seek to increase the effectiveness of the collective European contribution (Commission and Member States) to development. For this it seeks to limit its own focus to three focal sectors – depending on developing country interest – per country or region, in line with the 2007 EU Code of Conduct on Complementarity and Division of Labour. Second, it seeks gradually to move away from its former approach of formulating Country Strategy Papers and instead take the national development strategy formulated by developing countries as a basis for compiling a more concise Joint Framework Document.⁵⁷ In this way, it aims to increase cooperation among EU donors, specifically in the area of reporting on results and budget support.

In its ambition to reform EU development cooperation, the Agenda for Change has influenced EU proposals for the key financial instruments for financing external actions under the next EU budget (€972.2 billion is proposed for EU external action the period 2014-2020). The Development Cooperation Instrument of €23 billion particularly reflects many of the proposals put forward in the Agenda for Change and a need to focus on good governance and inclusive and sustainable growth. Under the Development Cooperation Instrument (DCI) it is planned that at least 50% of the programme for Global Public Goods and Challenges will be spent on climate change and environmental objectives, with a major focus on sustainable energy and food security.⁵⁸

There are also specific policy processes and opportunities in relation to water and energy. For example, on water, the paper of the Hungarian EU presidency (in 2011) on 'The role of Water in EU development policy': argues that water is key for economic development and contributes to human development, but that the importance of aquatic ecosystems for sustainable development needs stronger recognition. The Environment Council requested an update framework for management of water that recognised the interrelationships between water and other development areas and to review and update the EU Water Initiative. A new EU comprehensive policy and implementation framework for water in developing countries is being prepared for 2012. This aims to put water as a horizontal issue in development policy, especially with respect to growth and the productive sectors. New instruments under discussion include the use of partnerships, technology transfer, enhanced coordination, supporting regions in their river-

⁵⁶ The Communication is available at: http://ec.europa.eu/europeaid/what/development-policies/documents/agenda_for_change_en.pdf

⁵⁷ As is described in a recent policy proposal by the Commission and the European External Action Service published alongside the legislative proposals for the new financial instruments for 2014-2020, a Joint Framework Document would '... integrate all aspects of EU external action and all EU tools/instruments to achieve an adequate balance between flexibility and predictability as well as between short-, medium- and long-term objectives. The JFD would define strategic lines of action, and a broad policy mix referring to the EU and Member States instruments and policies to be used in a country or region taking into account diplomatic and political aspects (Common Foreign and Security Policy, political dialogue, democracy and human rights, etc.), development cooperation, humanitarian aid, security, and the external projection of internal policies. As reflected in the proposed new instruments, where a JFD is prepared for a partner country or region, it would be used for the programming process and therefore no country paper for such country or region shall be required.' Full text is available at: http://ec.europa.eu/europeaid/how/finance/documents/joint_communication_global_europe_en.pdf.

⁵⁸ http://ec.europa.eu/europeaid/how/finance/documents/prop_reg_instrument_dev_coop_en.pdf

basin management plans, addressing the infrastructure financing gap, scaling up support for productive sectors (food and energy), and integration with the peace and security agenda.

On energy, the UN Secretary-General has launched the 'Sustainable Energy for All in 2030' initiative and this will be followed by an Action Agenda for Sustainable Energy focusing on (a) universal access to energy; (b) clean energy; (c) business action; and (d) communication. The EU energy initiative launched at the WSSD in 2002 could become a key vehicle for EU contributions, including the following: provision of data on energy and development; policy assistance; mobilisation of financial resources and innovative financing approaches; and implementation of EU energy partnerships with developing countries. The Africa-EU energy partnership is one such example.

In general, development cooperation can help to accelerate the processes of social and economic transformation in developing countries towards governance arrangements that are more conducive to inclusive and sustainable growth. For this it is important that the governments of partner countries formulate overarching policy strategies with the capacity and political will to ensure that foreign development cooperation is able to have a catalytic effect on such reforms. Development financing can also be used to support non-state actors, such as CSOs and trade unions, that can inform debates and mobilise their constituencies to demand such reforms (e.g. the EU SWITCH programme has promoted sustainable consumption and production practices in Asia). Finally, development finance can be used to stimulate technological innovations that are particularly or exclusively beneficial to developing countries, based on an evidence-based assessment of the advantages and disadvantages of intellectual property rights (IPR). This is also linked to any agreements reached in future negotiations on climate change.⁵⁹

In addition to the potential contribution of EU development cooperation, the impact of FDI, trade and EU domestic consumption on natural resource use is likely to be even greater. Development cooperation alone is not sufficient to address the challenges and promote global inclusive and sustainable growth. Given that development cooperation can be – and indeed has been – used to support public-sector actions that undermine the aim to increase inclusiveness and sustainability, there is clearly a need for close scrutiny for any such perverse effects, even when these actions are 'owned' by the government of a partner country. As recognised in the European Consensus on Development, one means to do this is to support efforts made by developing countries to incorporate environmental considerations into national development strategies, and to increase the capacity of developing countries to implement multilateral environmental agreements.

In conclusion, EU development cooperation can be catalytic in helping developing countries to manage water, energy and land for inclusive and sustainable growth, but the EU needs to review its programmes and use existing mechanisms more effectively. There is also a need for stronger investments in environmental and social impact assessments of overall development strategies and interventions, which not all EU donors (including the Commission) currently undertake with the same intensity.

11.2.5 THE EU ROLE AND INFLUENCE IN GLOBAL GOVERNANCE

This section contains a number of tables on basic features of global policy processes relevant to water, energy and land, with further attention to the preparation of EU internal and external processes relevant to these (see also Sections 11.2.2 and 11.2.3 on this and the literature survey by Keijzer and Koeb, 2011). We do not aim to give a comprehensive overview, but rather to present examples of key policy initiatives that affect the promotion of global inclusive and sustainable growth. In relation to how decisions can be made in these policy areas to promote inclusive and sustainable growth, we would make four general observations:

- While *inclusiveness* and *sustainability* are recognised as horizontal concerns, promoting economic *growth* was a key underpinning of the creation of the EU and trade has its own internationally binding legislation guarded by the World Trade Organization (WTO).⁶⁰
- Promoting poverty reduction as a means to achieve some level of *inclusiveness* at an international level is a relatively long-standing EU objective (Maastricht Treaty 1992).
- *Sustainability* concerns such as climate change and biodiversity are gaining a higher policy profile (e.g. the creation of a European Directorate-General (DG) for Climate Action in 2010).

⁵⁹ Different studies on this topic reach contrasting conclusions. One study that was commissioned by DG Trade concluded that 'intellectual property rights [IPRs] do not in themselves constitute a barrier to the transfer of carbon abatement technology from developed countries, neither to low-income developing countries nor to emerging market economies', available at: http://trade.ec.europa.eu/doclib/docs/2009/february/tradoc_142371.pdf. A more recent study on the role of IPRs in the context of facilitating MDGs 1 and 6 concluded that they were not designed to promote development, and that there is a general lack of coherence between IPRs and development (Genukten and Meijknecht, 2011).

⁶⁰ It should also be noted that the WTO only allows for environmental standards when environmental damage is internationally recognised. http://www.wto.org/english/thewto_e/whatis_e/tif_e/bey2_e.htm

- Policies to promote *inclusiveness* are only gradually being accepted because social policy is regarded as a matter for national policy (as shown, for instance, by very slow ratification or non-ratification of ILO conventions).

This short overview indicates that the functions of the state in providing public goods do not have an international-level equivalent. At this level only the WTO and United Nations Security Council have limited enforcement powers, while most international decisions are essentially non-binding (Kaul, 2011).

A more detailed look at global governance processes and EU policy-making in relation to water, energy and land is summarised in the following overview tables.

Table 11.1: European and global policy-making in water⁶¹

European policy-making ⁶²	Global policy-making
<p>No Council body or EP Committee 'owns' policy-making in this area, and there is no 'EU water policy'.</p> <p>Unlike energy policy, different Council configurations can make decisions that significantly influence water use within EU Member States: the environment Council (e.g. Natura 2000), the agriculture and fisheries Council (e.g. CAP and CFP), among others.</p> <p>This is mirrored in the EP, where Committees such as Agriculture and Rural Development, and Environment, Public Health and Food Safety, among others, have a role to play.</p>	<p>The international basis of existing policies on water management lies in Agenda 21. The Global Strategy introduced by the GWP in 1996, and the MDG7 (target 7c) form the most important supporting initiatives.</p> <p>The World Water Forum meets every three years, and its 2012 meeting is in Marseille.</p> <p>In addition to UNCSD, which is concerned with water issues mainly from an environmental perspective, several UN agencies are working on water-related fields, some with a broad mandate and others with a more specialised focus. These include: FAO, UNDP, UNEP, UNESCO, UNICEF, UN-HABITAT, WHO and WMO.</p>
Selected key EU policies influencing global inclusive and sustainable growth	Selected key global policies influencing global inclusive and sustainable growth
<ol style="list-style-type: none"> 1. The existing EU policy on water and development cooperation is captured in a Communication, a Council Resolution, and the EU Water Initiative (dating from 2002), and in a 2004 Communication establishing the ACP Water Facility.⁶³ 2. Recent EU Council Conclusions adopted on 21 June 2011 recommended a further integration of water management issues into other EU policies, particularly into the Cohesion, Transport, Energy, Climate, Maritime and Common Agricultural and Fisheries Policy.⁶⁴ 	<ol style="list-style-type: none"> 3. Agenda 21, Chapter 18 – 'Protection of the Quality & Supply of Freshwater Resources' (1992)⁶⁵ 4. The Global Water Partnership (GWP) and Strategy (1996)⁶⁶

Table 11.1 indicates that in the area of water the situation is quite different from a sectoral policy area such as trade, where policy formulation is led by a trio of a designated DGs who prepare policy proposals that are then 'co-decided' by a designated Council formation and committee in the European Parliament. There is no policy vacuum here, as many EU policy decisions influence the use, access to and quality of water both within and outside the EU. At the global level, the number of multilateral agencies that are involved with water issues attests to the perceived importance and visibility of the topic.⁶⁷

⁶¹ This analysis focuses on fresh water, and hence excludes water legislation such as the UN Convention on the Law of the Seas.

⁶² See for Council formations <http://www.consilium.europa.eu/showPage.aspx?id=427&lang=en> and for Working Parties: <http://register.consilium.europa.eu/pdf/en/11/st05/st05688-re01.en11.pdf>

⁶³ Resp.: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2002:0132:FIN:EN:PDF> <http://www.euwi.net/about-euwi> http://europa.eu/legislation_summaries/development/sectoral_development_policies/r12531_en.htm

⁶⁴ http://consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/envir/122943.pdf

⁶⁵ Agenda 21, Chapter 18 – 'Protection of the Quality & Supply of Freshwater Resources: Application of Integrated Approaches to the Development, Management & Use of Water Resources', available at: http://www.un.org/esa/dsd/agenda21/res_agenda21_18.shtml.

⁶⁶ Global Water Partnership, 1996, available at: www.gwp.org/; The Global Strategy, www.gwp.org/en/Our-approach/Strategic-goals

⁶⁷ The 2002 EC COM on water included a useful overview of the workings of multilateral agencies in this area: '... several UN agencies are working on water-related fields (UNDP, UNICEF and WHO, FAO, UNCHS, WMO, UNESCO and UNEP); some have a broad mandate, many have a more specialised focus. The UN Commission on Sustainable Development, the follow-up body for the Agenda 21 process, is also concerned with water issues, mainly from an environmental perspective.'

Table 11.2: European and global policy-making in energy

European policy-making	Global policy-making
<p>Energy policy is a shared competence between the EU and the Member States (TFEU Art. 4).</p> <p>Most EU energy-related decisions are taken by the Council for Transport, Tele-communications and Energy (prepared by Council Working Group on Energy).</p> <p>Key committee in the EP is that on Industry, Research and Energy, while the Committee on Environment plays an important role in Climate Change policy affecting energy.</p> <p>Various other Council configurations and EP Committees also discuss energy issues (e.g. biofuel policy). The Commission created a separate DG for Climate Action in 2010.</p> <p>In 2009, Denmark, Germany, Latvia and Spain created the International Renewable Energy Agency (IRENA), an intergovernmental body currently comprising 149 signatories.</p>	<p>Agenda 21 does not contain a specific chapter on energy, but aspects of energy in relation to environment and development are been addressed in Chapter 9, under 'Protection of the Atmosphere'.</p> <p>During the 2002 World Summit on Sustainable Development (WSSD) in Johannesburg, energy and access to energy services took centre stage. The Declaration and Plan of Implementation (JPOI), which highlighted the issues of poverty reduction and environmental protection, with energy as one of the ten key commitments.</p> <p>Nuclear energy is covered by the International Atomic Energy Agency (IAEA) but there is no UN body to discuss other sources of energy (with exception of UNFCCC in relation to renewables).</p> <p>Climate policy also includes many explicit links to energy policy, which played a key role in the 2011 COP17 meeting in South Africa at which a non-binding decision was reached on aiming to bring all countries under the same legal regime by 2020.</p>
Selected key EU policies influencing global inclusive and sustainable growth	Selected key global policies influencing global inclusive and sustainable growth
<ol style="list-style-type: none"> 1. The EU has promoted renewable energy since 1997 when the COM White Paper on a Community Strategy on Renewable Energy was adopted with a 12% overall target for renewable energy share in final consumption in 2010.⁶⁸ 2. On 21 June 2011, no agreement could be reached in the EU Council on the adoption of a 'Roadmap for moving to a competitive low-carbon economy in 2050'. Key principles and necessary actions were, however, adopted.⁶⁹ 3. The 2009 EU Renewable Energy Directive⁷⁰, a new law focusing on achieving a 20% share of renewable energy in the EU overall energy mix by 2020, with specific targets for Member States and one shared target of 10% renewable energy in the transport sector. 4. Key EU climate policies affecting energy include the climate and energy package that was endorsed in 2007 as well as the Emission Trading Scheme.⁷¹ 5. The 2007 EU Strategic Energy Technology (Set) Plan – Towards a low carbon future.⁷² 6. In 2010, the EU joined the Global Bioenergy Partnership, a Commission on Sustainable Development (CSD) Partnership which brings together public, private and civil society stakeholders in a joint commitment to promote bioenergy for sustainable development 7. The Commission is currently finalising an impact assessment on indirect land use change, and ways of how to minimise such effects. It will be released on the adoption, if appropriate, of a legislative proposal for amending the Renewable Energy Directive and the Fuel Quality Directive 	<ol style="list-style-type: none"> 1. The Renewable Energy & Energy Efficiency Partnership was established alongside the 2002 WSSD in Johannesburg.⁷³ It aims to catalyse the market for renewable energy and energy efficiency, with a primary focus on emerging markets and developing countries. 2. The Copenhagen Accord noted at COP15 in Denmark does not include binding targets or agreements in relation to renewable energy. 3. Neither at the EU nor at the international levels have there been specific policies in relation to intellectual property policies on sustainable energy. 4. Despite the critique of non-EU countries at the 2011 COP17, the Kyoto Protocol remains a major international policy affecting the use of energy.

⁶⁸ COM(97)599 final of 26.11.1997

⁶⁹ http://consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/envir/122956.pdf

⁷⁰ <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:140:0016:0062:en:PDF>

⁷¹ http://ec.europa.eu/clima/policies/package/index_en.htm

⁷² <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2007:0723:FIN:EN:PDF>

⁷³ <http://www.reeep.org>

EU policy discussions on energy have intensified in recent years, in part because the EU economy is vulnerable to increases in the price of fossil fuels, and relies on particular producers for supplies. Although the EU has made important policy decisions in recent years on the production and use of renewable energy, reaching a consensus on limiting the use of fossil energy has proved harder despite the prominence given to the 'resource-efficient Europe' flagship in Europe 2020.

Table 11.3: European and global policy-making in land

European policy-making	Global policy-making
<p>There is a lack of active EU policy making in the area of land, with policy issues limited to the 2004 EU land policy guidelines (see below) and an inactive EU working group on land issues.</p> <p>There are no binding decisions on land. In the area of forestry Voluntary Partnership Agreements are legal agreements between the EU and developing countries.</p> <p>Different Council configurations can make decisions that significantly influence the land use of EU Member States: the environment Council (e.g. Natura 2000), and the agriculture and fisheries Council (e.g. CAP), among others.</p> <p>In the EP, Committees such as Agriculture and Rural Development, and Environment, Public Health and Food Safety and increasingly for development play a role in relation to land policy.</p>	<p>In addition to various international initiatives, the most important on the specific issue of land are UNCED (1992), and the WSSD (2002), specifically the Agenda 21 comprehensive plan of action endorsed by both (although its recommendations are not legally binding).</p> <p>The FAO is the task manager for Chapter 10 of Agenda 21.</p>
Selected key EU policies influencing global inclusive and sustainable growth	Selected key global policies influencing global inclusive and sustainable growth
<ol style="list-style-type: none"> 1. At the EU level, there is a set of Guidelines (SEC (2004) 686) that deals specifically with how the EU can support land-policy design and land-policy reform in developing countries. 2. The legislative proposals for the reform of the CAP were published in November 2011. 3. Investment transparency policies for which proposals are of being developed⁷⁴. 4. The Voluntary Partnership Agreements in the EU Forest Law Enforcement, Governance and Trade (FLEGT) Action Plan.⁷⁵ 5. The EU support to REDD aimed at the sustainable management of forestry resources in developing countries to maintain the carbon sink. 6. The EU Land Policy Guidelines (2004) for support to land policy design and reform in developing countries formulated by an EU Task Force of the COM and EU Member States. 	<ol style="list-style-type: none"> 1. Since 1992, various non-legally binding documents adopted in relation to Forest Management and FAO Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests (in progress). 2. Convention on Biological Diversity (meeting in Nagoya 2010). 3. United Nations Convention to Combat Desertification (UNCCD) 10-year strategy 4. United Nations Framework Convention on Climate Change (UNFCCC) implementation of Cancún Agreements

⁷⁴ The following statement was made by Barroso and van Rompuy after the May G8 Summit: 'To help Africa increase their fiscal resources, the European Commission will table in October legislative proposals that include the obligation for companies to publish information about their activities, in support of the Extractive Industries' Transparency Initiative', available at: http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/ec/122263.pdf.

⁷⁵ http://ec.europa.eu/development/icenter/repository/com2003_0251en01_en.pdf

The above overview highlights the current absence of binding international legislation on investments in and use of land, or of EU legislation concerning investment in land outside Europe. It thus underlines the need to address the global governance gap as a key requirement for effective promotion of global inclusive and sustainable growth.

The EU can play a crucial role in this process at the Rio+20 conference in June 2012. Here it has the chance to highlight its own initiatives in the EU (see Section 11.2.2) and to improve global governance. A further initiative with the potential to strengthen international engagement in inclusive and sustainable growth, which the EU can support, concerns the Colombian government's proposal to establish a set of Sustainable Development Goals to be adopted at Rio+20. The proposal invites different stakeholders to exchange ideas about how to formulate these SDGs. In 2011 and 2012, the proposal will be discussed in several settings, with the most recent note presenting a strategy to adopt not more than 10 headline SDGs at Rio+20 as the basis for further discussions after the summit.⁷⁶

All three tables confirm and illustrate the conclusions of Section 11.2.1, namely that EU and international policy making is still organised largely in silos, and that the majority of decisions taken to promote inclusive and sustainable growth take the form of soft, non-binding policy statements. Particularly at the international level, the relative lack of hard incentives to translate the policies into effective action, and the absence in many policies of a nexus-wide approach, illustrate the shortcomings of current institutional approaches to policy change. Building on the analysis of the potential roles of the EU and the findings of this Report, the following section presents four key policy recommendations for the EU.

11.3 POLICY IMPLICATIONS FOR THE EU

This Report's analysis of the functioning of the EU policy processes in relation to water, energy and land, and of the preparation for specific policy decisions, indicate the need for the EU to move away from its 'business as usual' system of policy-making and make more fundamental changes in the way it prepares its policies. In terms of what the German Scientific Advisory Council on Global Change calls 'a new social contract for sustainability', the EU would need to convince its constituencies that global cooperation is paramount in order to reverse the current trend and move towards a sustainable and inclusive economy for all (WBGU, 2011).

Policy coherence for development is about acknowledging the needs and interests of developing countries as well as about joint efforts to secure inclusive and sustainable growth for all in the future. The European Commission, Council and Parliament acknowledge the need to do so, within the limits posed by the Lisbon Treaty, as is reflected in Europe 2020. This strategy will inform the Multi-Annual Financial Framework for 2014-2020, and should help to shape key policy initiatives such as the Roadmap and the reform of the CAP. Yet the strategy also indicates that there is significant unfinished business, and the analysis in this chapter has illustrated some facets of the political economy of EU policy-making where there are strong vested interests in continuing to conduct 'business as usual'.

The main findings of this Report thus confirm the existence of *significant EU and global governance gaps*, and confirm that *today's institutions are inadequate* to deal with water, energy and land (the WEL nexus) in an integrated and sophisticated manner. Moving away from 'business as usual' evidently requires *moving away from 'business as usual' policy-making*.

We put forward the policy implications of this report for the EU as well as more operational and specific suggestions in the four categories in which the EU affects management of water, energy and land in developing countries. They build on research and policy suggestions presented in the body of the Report and explicitly reflect those where the EU can act. They are not meant to be exhaustive but rather to suggest ways that the EU can act on the policy implications. They should not be seen as a technical shopping-list but rather as a means to inform the political leadership Europe needs in order to realise the institutional, economical, ecological and social transformations that this Report confirms are both needed and long overdue.

11.3.1 REFORM INTERNAL POLICIES AFFECTING SUSTAINABLE CONSUMPTION AND PRODUCTION PATTERNS IN THE EU

The first set of policy suggestions relates to what the EU can do as a consumer and producer. The EU should push for *major changes in consumption and production patterns in Europe* towards sustainability and inclusiveness (commitments to which are already in EU policy documents), and in particular the switch to renewable energies, and changes in food consumption and production patterns in order to radically reduce the environmental footprint of European agriculture, food wastage and protein (meat, fish) consumption. As a key element of this reshaping of policies, the EU should support the establishment of *mechanisms to reflect the true value of natural resources in their pricing* and abolish subsidy schemes and policies that distort this pricing.

⁷⁶ The proposal is available at: http://www.eclac.org/rio20/noticias/paginas/6/43906/2011-613-Rio+20-Note_by_the_secretariat_Colombia_note.pdf.

The EU should adopt an *integrated nexus-wide approach* to policy and programmes dealing with water, energy and land both internally in Europe and in its support for programmes and projects in developing countries. Such a shift will require *increased investments in adaptive processes, policy learning and data collection* to inform decision-making.

The following specific suggestions can help to realise these policy implications:

1. The EU Council and Parliament need to invest seriously in discussing, finalising and critically monitoring the implementation of key horizontal policies such as the Europe 2020 Strategy and the proposed Roadmap to a Resource Efficient Europe. Specific attention should be paid to ensuring that new sectoral policies, or reforms of existing ones such as the CAP, are coherent with these horizontal strategies.
2. For example, the EU could reconsider support for the CAP in the light of new developments (food prices, environmental challenges, PCD etc), remove the most distorting subsidies (in relation to trade or the environment) and use the freed up resources to promote global food security in a sustainable way.
3. The EU should be aware of the impact of its biofuel-use targets for the EU energy mix by 2020 on international trends in direct and indirect land-use change and closely monitor the impact of the use of biofuels on inclusive and sustainable growth in developing countries. Furthermore it should avoid EU farm subsidies to promote the production of biomass for biofuels and should prepare now for the time when second- and third-generation biofuels and biomass will be economically viable without public policy support.
4. A different vision for decision-making in Europe will require different data to support it. There are important data gaps in relation to the EU's impact on water, energy and land and other key resources in developing countries that need to be monitored as a basis for formulating policies that could promote inclusive and sustainable growth (see also Evans, 2011). In this context the COM should explore making further improvements to the IA system as a means to gain new insights into trade-offs within the WEL nexus in relation to new policies.
5. Efforts should be made to ensure that progress on the Europe 2020 Strategy is carefully monitored during meetings of EU Heads of State, for which the EU Council President sets the agenda. Political and economic crises can interfere with this agenda-setting process, yet continuing to let the agenda to be driven by short-term concerns will disadvantage the EU in the long run.
6. Given the need to promote more integrated policy-making, the Council should evaluate the implementation of the Council Conclusions adopted on 17 October 2006 that aim to better integrate development concerns in Council decision-making. Lessons learned from this and from other attempts to ensure coordinated Council decision-making could be used to adopt specific measures such as joint meetings of Council bodies.
7. The European Parliament should consider reconvening the Special Committee on Policy Challenges (known as SURE) in order to monitor the implementation of Europe 2020, and promote cross-committee debate in relation to promoting inclusive and sustainable growth within and outside Europe.

11.3.2 ENSURE EU EXTERNAL POLICIES INCLUDING TRADE AND INVESTMENT POLICIES ARE COHERENT WITH DEVELOPMENT OBJECTIVES

The second set of policy implications relates to EU external policies on trade and investment. The Union's values and interests are defined by the Treaty and include the sustainable development of the Earth, the promotion of free trade as well as the reduction of poverty. The EU external policies need to be reshaped and guided by Europe 2020 and made consistent with inclusive and sustainable management of natural resources.

Chapter 10 suggests that the EU should work closely with the *private sector and particularly European companies* working in developing countries to promote investment, innovative approaches and high standards of corporate practice. In doing this the EU can forge a new strategic partnership with the private sector (Box 11.3) which could be championed at Rio+20 or in the G20 development working group.

Box 11.3: Forging a new relationship between the EU and the private sector for managing natural resources

EU development cooperation programmes have not to date involved much direct engagement with European companies on development issues. Beyond direct regulation, the EU could demonstrate leadership in its relations with the private sector by actions that could include:

- Overcoming coordination problems by facilitating multi-stakeholder processes to design and implement sustainability initiatives and work to improve inclusiveness in relation to the WEL nexus.
- Supporting the development of improved assessment methodologies and mechanisms, in order to build the evidence base on the impact on natural resources of business activity and the efficacy of corporate sustainability initiatives, e.g. there is as yet no account of the effectiveness of the business-led Type II partnerships agreed at Johannesburg in 2002.
- Providing direct support to private sector solutions to build sustainability in suppliers.
- Using codes of conduct and/or performance targets and associated monitoring to strengthen inclusive and sustainable business behaviour (e.g. the EU could push for agreement to extend the EITI to land).
- Rewarding responsible business practice in foreign countries through procurement policies or funding decisions (e.g. through development financing institutions), or as a condition of other kinds of partnership.
- Enhancing the negotiating capacity of governments in developing countries to enable them to demand responsible behaviour by companies, and assisting them in developing monitoring mechanisms.

The EU should work closely with the *private sector and particularly European companies* working in resource-scarce developing countries to promote innovative approaches and high standards of corporate practice in the inclusive and sustainable use of water, energy and land.

The EU should work closely with governments in its own partner countries and the private sector to *promote and support transparency* initiatives among European investors and their partners in developing countries on projects related to water, energy and land.

Different forms of European finance can be used to increase the availability of much-needed capital in developing countries, some more appropriate than others for financing access to water, renewable energy and land. Mechanisms to increase the supply of finance include green and other type of bonds, concessional finance, and challenge funds (Griffith-Jones et al., 2011). Some of these mechanisms are particularly suited to leverage European pension funds and sovereign wealth funds and can provide 'patient capital' to developing countries, which is beyond the typical short-term horizons of private capital markets.

In relation to trade, the EU should not put up new barriers in its bilateral trade agreements as part of a transition to a green economy. It could, however, promote mechanisms that reward sustainability throughout the value chain.

The following specific suggestions help realise these policy implications:

1. The EU should seek to remove economic, regulatory, informational barriers that constrain responsible investment in water, renewable energy and land. It could bundle its own internal expertise with other measures of support and regulation, by supporting renewable energy partnerships between the EU and developing countries.
2. The EU should redefine its relationship with the private sector in seeking sustainable solutions to the challenges faced by developing countries in managing natural resources.
3. EU Member States should adopt legislation requiring all EU companies to report large-scale land acquisitions outside Europe to the COM, in order to maintain an online record of these deals to serve as a basis for establishing an equivalent system to the EITI for international investments in land.

Box 11.4: EU support for renewable energy partnerships

The EU is well placed to help low-income countries realise the underexploited potential of renewable energy and create a 'triple win' for profit, planet and people.

The EU can initiate renewable energy partnerships involving:

- Improved blended finance for hydropower and geothermal investment, combining loans from the EIB and other development finance institutions with Commission grants for project preparation such as feasibility studies, development of business cases, support for enabling environment and impact assessments.
- Increased knowledge-sharing on technology and know-how for renewable energy investment including through exchanges of scientific staff.
- Updated guidelines for EU investors to behave responsibly when investing in energy services in developing countries;
- Enhanced development support for WEL-nexus governance and in particular to support energy policies that are conducive to private-sector provision of renewable energy and that can provide energy services to the poor.
- Tailored support for flanking measures to support the poorest following IAs of investments in renewable energy.
- More support for modernising electricity grids, including through deep regional integration.

These elements together can help partner countries to realise underexploited potentials of renewable energy towards inclusive and sustainable growth. In some cases the EU is already doing this (e.g. its support for regional integration), in other areas it has just started (e.g. blending mechanisms), and other measures still need to be brought into this package of support.

11.3.3 IMPROVE THE IMPACT OF EU DEVELOPMENT COOPERATION

The third set of policy implications relate to EU development cooperation. The EU should *review its development cooperation policies and programmes in the light of a WEL-nexus approach* and make adjustments to ensure such a nexus-wide approach is consistently followed in order to avoid perverse outcomes and maximise the opportunities.

EU development cooperation policies and programmes should particularly address the need to *work closely with the poorest communities* in developing countries. This should help them adapt to and strengthen their resilience to the negative effects of increasing scarcity of water, energy and land on their livelihoods as well as to the global economic changes that resource scarcity will prompt (ERD, 2010). The EU could put in place complementary measures to ensure the poorest do not lose out when developing countries introduce new regulation and pricing schemes for managing water, energy and land. This will need to be done in partnership with other donors and of course developing countries themselves.

The effectiveness of EU development cooperation could be further improved by (1) accounting better for the *WEL nexus* (Box 11.5); (2) seeking a better *bundling of aid and non-aid activities* (Box 11.4 gives an example for renewable energy); and (3) through a *better link with the private sector* and starting a challenge fund for businesses to take an ecosystems approach to their planning.

Box 11.5: Re-assessing EU development cooperation

International cooperation can support developing countries or regions to take a range of actions.

EU development cooperation programmes should aim to:

- Support governance and the adoption of a political economy analysis in designing interventions, to identify winners and losers of reform, the blockages to reform and to ensure the most relevant and appropriate focus and methods of cooperation.
- Support institutional development in relation to WEL-nexus pressures (e.g. the initiative on Forest Law Enforcement Governance and Trade, the Reducing Emissions from Deforestation and Forest Degradation scheme and support for Integrated Water Resource Management including a new water-nexus initiative).
- Improve EU-wide harmonisation and coordination.
- Support government capacity to coordinate WEL-nexus stakeholders.
- Provide data and other support to enhance transparency concerning WEL linkages, e.g. links between land deals and water.
- Improve state-business relations with respect to the WEL nexus and ensure that land, water and energy policies do not unduly constrain responsible private investment in these areas.
- Promote renewable energy partnerships which bundle development finance, technical assistance and technology transfer.
- Contribute to systems of social protection aiming to deal with resource shocks to support those who are most vulnerable to any changes.
- Support regional integration to deal with water stresses and energy shortages.
- Give priority to infrastructure projects that support poverty reduction through improved WEL-nexus management.

Finally, while EU development cooperation is often provided in the form of grants, loans (including through the EIB) can also be blended with grants to finance large projects such as water infrastructure and renewable energy supply.

EU development cooperation should *consider water from an integrated, ecosystems perspective*, in line with its Agenda for Change. Assistance to sectors such as agriculture and energy should pay more consideration to the increasing pressure on water and *identify integrated (WEL) solutions* including benefit-sharing and pricing of ecosystem services.

The following specific suggestions could help to realise these policy implications:

1. Through development cooperation, the EU can support ongoing transitions towards inclusive and sustainable growth in developing countries, as well as raise awareness and inform policy processes through targeted support of non-state actors. In particular, the EU needs to reassess its development cooperation programme, gearing it to helping developing countries deal with the challenges.
2. In coordination with partner countries, each country strategy could have a section on the WEL nexus detailing how it relates to inclusive and sustainable growth, as a means to illustrate the importance of considering sectoral policies in relation to other policies.
3. The EU can use various means to promote integrated (WEL-nexus) solutions, such as technical assistance (to reduce transaction costs), technology transfer (including institutional innovation) and political incentives for key stakeholders (e.g. stimulating alignment between river-basin institutions and existing political groupings, including at the regional level).
4. Specifically in relation to land, the EU can also draw on its budgets for development cooperation and R&D to stimulate productivity gains for smallholders in countries with large yield gaps, as well as related investments in hardware and governance reform. The EU can do so effectively only if the government in the partner country is committed to promoting such transformations.
5. The EU can use development cooperation to support investment both in legal frameworks for transparent and accessible land registration that protects local rights and in integrated systems for formulating land policy. This can be expected to involve strengthening the institutions and capacity of the state at both central and local levels.
6. Specific suggestions for how EU development cooperation could assist in improving the management of water and land are set out in the Appendix Box A11.2 and Box A11.3 respectively.

11.3.4 STRENGTHEN EU ROLE IN RESHAPING GLOBAL GOVERNANCE

Last, but not least, the EU needs to use its influence to reshape global governance. Both in the United Nations and in all relevant multilateral or intra-governmental institutions (including IFIs, WTO and the G20), the EU should advocate for and support the international community in setting up *binding agreements and regulatory frameworks to reduce emissions and promote the management of water, energy and land* in a manner that is consistent with the goals of inclusive and sustainable growth.

Given the importance of progress for Europe's own development and that of its development partners, the *EU should speak with one voice* in international negotiations, including Rio+20. In addition to making strategic use of its participation in the United Nations High Level Panels on Sustainable Energy for All and on Global Sustainability, the EU should seek to back proposals to strengthen the institutions of the United Nations at Rio+20, as a contribution to *closing the global governance gap*.

The EU should also support *open, transparent and stable trade, investment and migration rules* that allow developing countries to respond effectively and efficiently to global scarcity pressures, including through virtual resource trade.

The following specific suggestions help realise these policy implications:

1. The EU should strongly push for ensuring that environmental, social and economic objectives are pursued on an equal footing in global governance systems, and move away from the current situation whereby economic governance overrides environmental and social governance. Reinforcing the role of UNEP and the FAO, and ensuring a more coordinated and centralised UN response to water policy-making, are key to such an endeavour.
2. The EU should seek to back ambitious proposals to be adopted in Rio+20, in particular for a strong role for UNEP and for the replacement of the Commission on Sustainable Development with a Sustainable Development Council. This new body should gradually create strong incentives for reform, including the possibility of having the power to apply sanctions, similar to the powers of the UN Security Council and the WTO.

Global action on emission-reduction policies plays a strong role in driving technological innovation. The EU should continue to take an active stance in negotiations on climate change, consolidating its recent engagement in COP17 in December 2011. In this context, following an evidence-based assessment of the advantages and disadvantages of intellectual property rights (IPR), the EU could push for agreements on fostering innovations that are particularly or exclusively beneficial to developing countries.

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ANNEX

1. APPENDIX

Additional information, graphs and boxes can be found at: http://www.erd-report.eu/erd/report_2011/index.html

2. COMMISSIONED PAPERS

Alemu, G. (Addis Ababa University): *Rural Land Policy, Rural Transformation and Recent Trends in Large-scale Rural Land Acquisitions in Ethiopia.*

Ayres, R. (INSEAD): *Growth in a Bind – Limits and Options for Europe.*

Bowie, B. (Independent consultant on climate change and resource management) and Mehrotra, S. (Independent adviser on climate change, resource scarcity and governance): *The Resource Nexus: Dynamics, Impacts and Practical Steps Forward for the Private Sector and Enabling Public Policy.*

Burgers, P. (University of Utrecht) and Susanti, A. (Gadjah Mada University, Yogyakarta): *Questioning the sustainability of oil palm development: seeing the complexity of its implications at Riau Province – Indonesia.*

Collier, P. (Centre for the Study of African Economies, University of Oxford) and Venables, A. (Oxford Centre for the Analysis of Resource Rich Economies, University of Oxford): *Land Deals in Africa: Pioneers and Speculators.*

Cotula, L. and Polack, E. (International Institute for Environment and Development): *Land tenure and agricultural investment: Investing in local tenure security for inclusive and sustainable development.*

Elkington, J. and Zanganehpour, S. (Volans Ventures Ltd): *Private sector led natural resource management.*

Giovannetti, G. (University of Florence and European University Institute) and Ticci, E. (University of Siena): *Sub-Saharan Africa in global trends of investment in renewable energy. Drivers and the challenge of the water-energy-land Nexus.*

Griffith-Jones, Stephany (Initiative for Policy Dialogue, Columbia University), Ocampo, J. A. (Initiative for Policy Dialogue, Columbia University) and Spratt S. (Institute of Development Studies): *Financing renewable energy in developing countries: mechanisms and responsibilities.*

Hall, R. and Paradza, G. (Institute for Poverty, Land and Agrarian Studies): *Pressures on land in sub-Saharan Africa: Social differentiation and societal responses.*

Hilhorst, T. (Royal Tropical Institute – KIT) and Zoomers, A. (University of Utrecht): *How can large-scale transnational land acquisitions contribute to inclusive and sustainable growth?*

Jemio, L.C. (Independent, former Finance Minister of Bolivia): *Alternative Measurements for Inclusive and Sustainable Growth: The case of Bolivia.*

Kimuyu, P. with Mutua, J. and Wainaina, J. (School of Economics, University of Nairobi): *Role of renewable energy in promoting inclusive and sustainable development in Kenya.*

Kok, M. and Prins, A.G. (PBL Netherlands Environmental Assessment Agency): *Global environmental perspectives on scarcity on the Water-Energy-Land Nexus.*

Maroun, C., Rathmann, R. and Schaeffer, R. (Federal University of Rio de Janeiro): *Brazilian Biofuels Programmes from the WEL Nexus Perspective.*

Massa, I. (Overseas Development Institute): *Sub-Saharan Africa in global trends of water investment. Drivers and the challenge of the private sector.*

Mosquera Valderrama, I. (University of Utrecht): *Regulatory framework for land acquisition in sub-Saharan Africa. A comparative study.*

Muller, M. (University of the Witwatersrand): *Lessons from South Africa on the management and development of water resources for inclusive and sustainable growth.*

Negash, F. (Basin Administration Directorate, Ethiopian Ministry of Water and Energy): *Managing water for inclusive and sustainable growth in Ethiopia: key challenges and priorities.*

Newborne, P. (Independent consultant on water and environment policy and programmes): *Roles of companies in water management – extending the boundaries of private sector responsibility?*

Nicol, A. (Research Fellow, Institute of Development Studies): *Transboundary River Basins in Africa: Opportunities and Obstacles for Inclusive and Sustainable Growth.*

Nyangena, W. (University of Nairobi) and te Velde, D.W. (Overseas Development Institute): *Managing the Water-Energy-Land (WEL) nexus for inclusive and sustainable growth. A case study of flower production around Lake Naivasha.*

Rahman, M. (Centre for Policy Dialogue, Bangladesh): *Sustainable Exploitation of Bangladesh's Coal Resources: An Intractable (?) Policy Dilemma.*

van Vlerken, T. (University of Utrecht), van der Wal, F. (Ministry of Foreign Affairs, Netherlands) and van Westen, G. (LANDac, University of Utrecht): *Investors in Land: Perspectives on Investors engaged in Transnational Land Acquisitions in Developing Countries.*

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