

CONFRONTING SCARCITY:

Managing water, energy and land
for inclusive and sustainable growth

EXECUTIVE SUMMARY



MOBILISING EUROPEAN RESEARCH
FOR DEVELOPMENT POLICIES



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THE 2011/2012 EUROPEAN REPORT ON DEVELOPMENT



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Deutsches Institut für
Entwicklungspolitik



German Development
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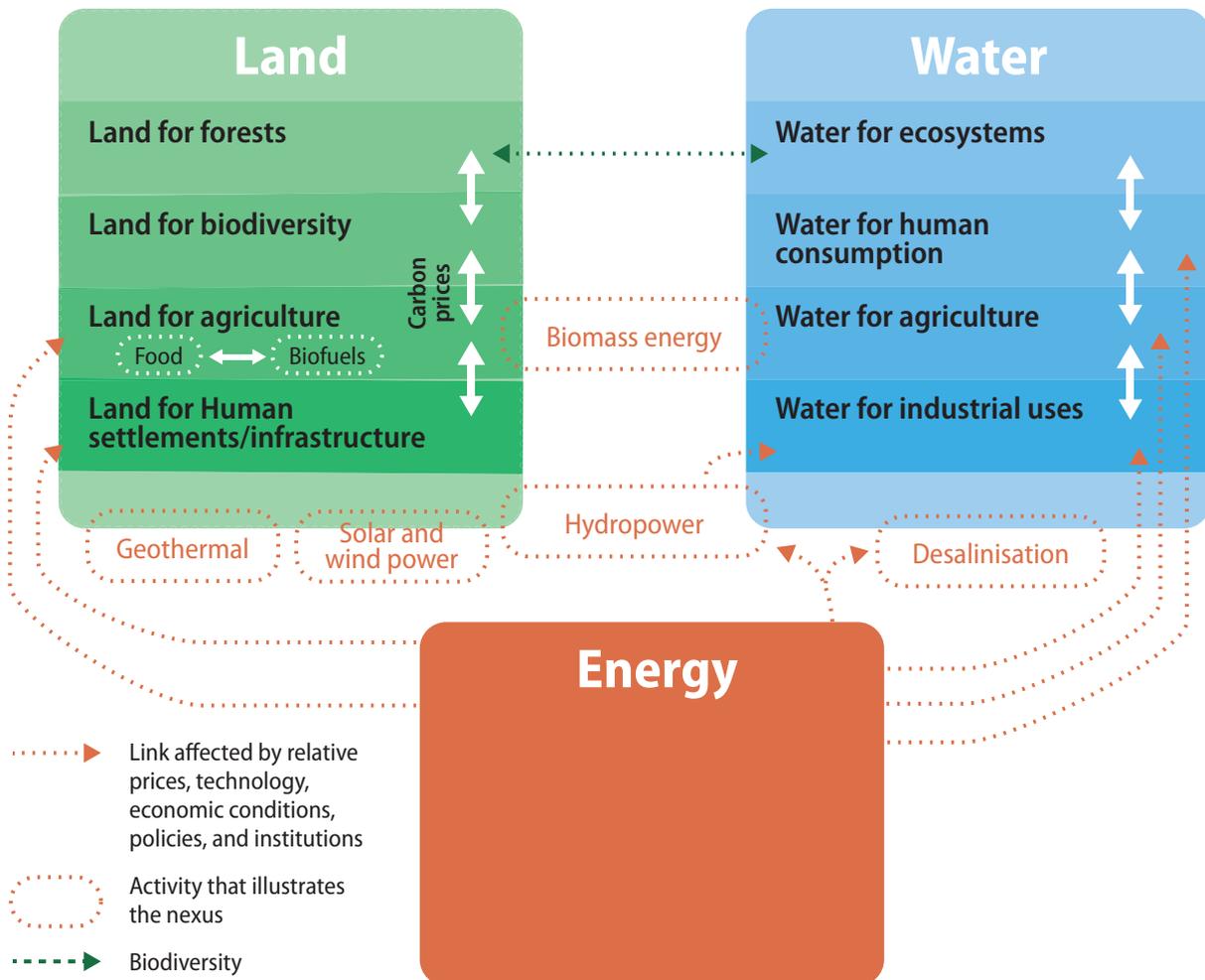


OVERVIEW AND MAIN MESSAGES

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

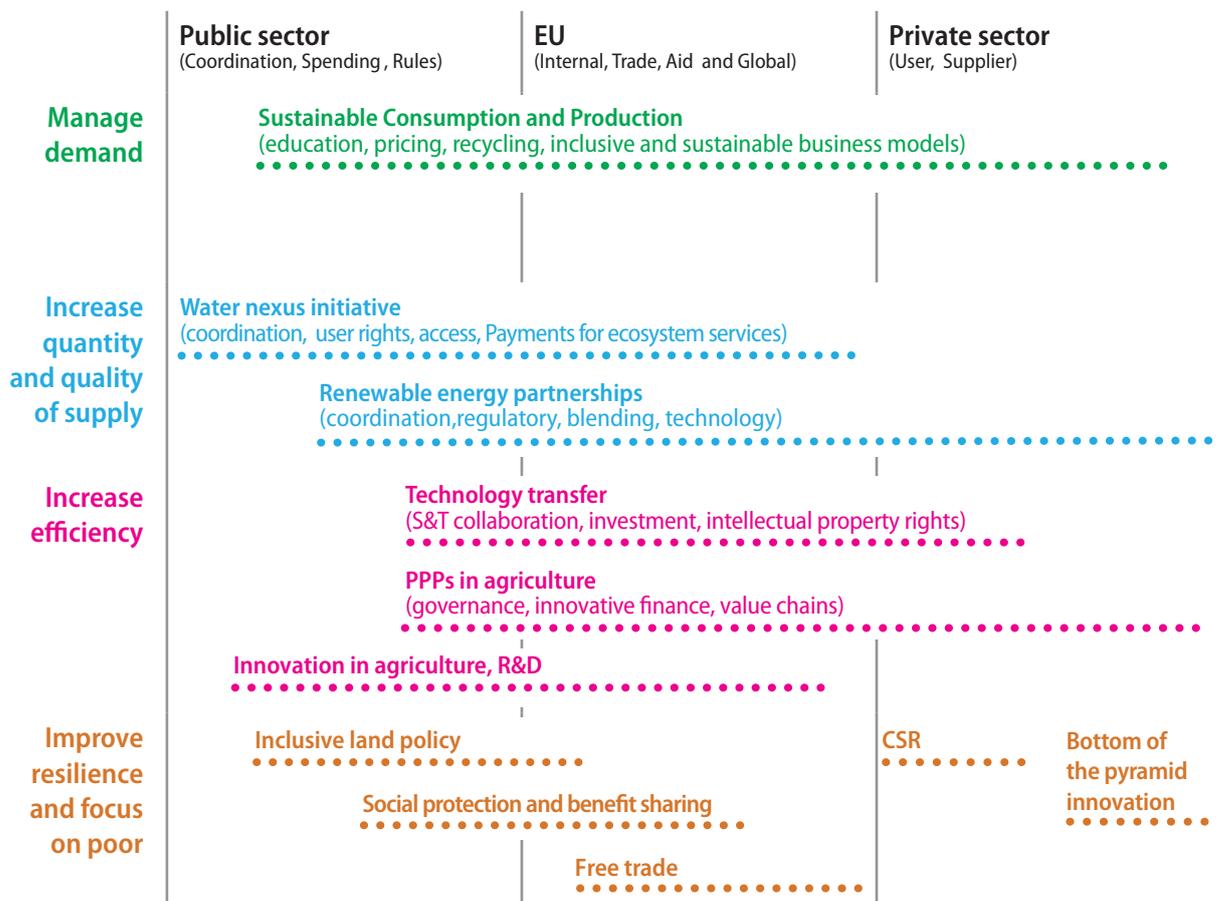
This Report urges the international community to radically transform approaches to managing water, energy and land (WEL) in order to support inclusive and sustainable growth in the poorest developing countries. This radical transformation is needed to satisfy the growing demand for water, food and energy 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.



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