



GREEN economy

A Brief For Policymakers on the Green Economy
and Millennium Development Goals



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For more information on the Green Economy Initiative www.unep.org/greeneconomy

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Foreword

Executive Summary

Defining the Challenge

Meeting the Challenge

**Key Messages
for a Green Future**



A young girl with dark hair, wearing a brown plaid shirt and a dark skirt with red and white floral patterns, is sitting on a wooden boat. She is holding a vertical wooden pole and looking towards the camera with a slight smile. The background shows a body of water and some wooden structures.

**A Brief For Policymakers on the Green Economy
and Millennium Development Goals**

Foreword



The many challenges posed by the 21st century are unparalleled in human history in terms of their scale, complexity, and interconnectedness. The solutions to these challenges - as encapsulated by the MDGs – equally have to be multi-dimensional and comprehensive.

UNEP's forthcoming "Green Economy Report" will describe how greening the world's economies lowers environmental risks and ecological scarcities, which hurt the poor and disadvantaged the most.

Indeed, one of the goals of a green economy is to help reduce poverty, while increasing resource efficiency and improving social welfare. A "green economy", both as a journey and a destination, has much to do with the Millennium Development Goals, and is inextricably intertwined with many of the drivers and factors involved in trying to achieve them.

Although "the environment" in an MDG context is often perceived as being confined to MDG7, which addresses serious issues such as freshwater scarcity, the spread of slums, greenhouse gas and ozone-depleting emissions, biodiversity loss and deforestation, the environment in reality is more complex. All the challenges addressed by

MDG7 need to be seen also in the context of their relationship to poverty, education, health, and equitable access to opportunity.

These challenges need to be targeted with international collaboration and policy solutions that reflect a multi-dimensional understanding of the biosphere and its limits, of society and its divisions, of the political economy and its drivers, and last but not least, of our changing economic compass and the evolution in thinking that is needed to actually measure our progress towards a safe economic and ecological destination.

Achim Steiner
Executive Director of UNEP



**A Brief For Policymakers on the Green Economy
and Millennium Development Goals**

Executive Summary





The underlying task of the 21st century is to provide a secure and sustainable way of life for a world population that over the next four decades will increase in size by a third. It was this challenge that in September 2000 led world leaders to adopt the eight Millennium Development Goals (MDGs), ranging from a halving of the number of people in extreme poverty to a global partnership of rich countries and poor, connected by open, non-discriminatory trading and financial systems.

On current projections the target date of 2015 for achieving all the MDGs may be missed. But that is clearly no reason for policymakers to abandon their efforts; rather, it must be a spur to further endeavour. Crucial to the attainment of the MDGs is the transition to a “green economy”, an economy that not only improves human well-being and lessens inequality but also reduces environmental risks and ecological scarcities. The Green Economy Initiative, launched by UNEP in 2008 amid the global financial crisis, aims to demonstrate how to revive economies and create lasting employment while at the same time tackling environmental challenges that, if left unaddressed, will jeopardize the ability of future generations - rich or poor - to enjoy a decent life.

The Green Economy Initiative targets policymakers, who play such a critical role in shaping the path of economic development - by setting priorities for investment, both public and private, as well as providing the necessary regulatory and financial framework for the green economy. But their role goes beyond priority-setting and regulation; they

must also lead in shaping public opinion, ensuring a readiness among UN member states to embrace needed reform.

The public at large, but governments in particular, must recognise that the solution to the challenges posed by the MDGs is a comprehensive one. For example, sustainable agriculture and fisheries, and the provision of safe water supplies, are targets of MDG7 - but meeting those targets would in the process reduce poverty and hunger (MDG1); lower infant-mortality rates (MDG4); and enhance maternal health (MDG5). That in turn would help empower women (MDG3), who would no longer be required to spend much of their time in developing countries simply fetching water, while rising living standards would enable more children to go to school (MDG2) and would help societies combat HIV/AIDS, malaria and other diseases (MDG6). It goes without saying that a fair, properly regulated global partnership of trade and finance (MDG8) between rich countries and poor would facilitate - and accelerate - the attainment of all these goals.

A Brief For Policymakers on the Green Economy and Millennium Development Goals

The first step for policymakers is to appreciate the scale of the challenge, highlighted not just by the increasing evidence of environmental pollution, the impacts of climate change but also by the loss of what could be called “natural capital”. Biodiversity and ecosystems go uncounted by conventional macro-economic accounting yet provide humanity with food, fuel, fibre and protection from floods and soil erosion among other services.

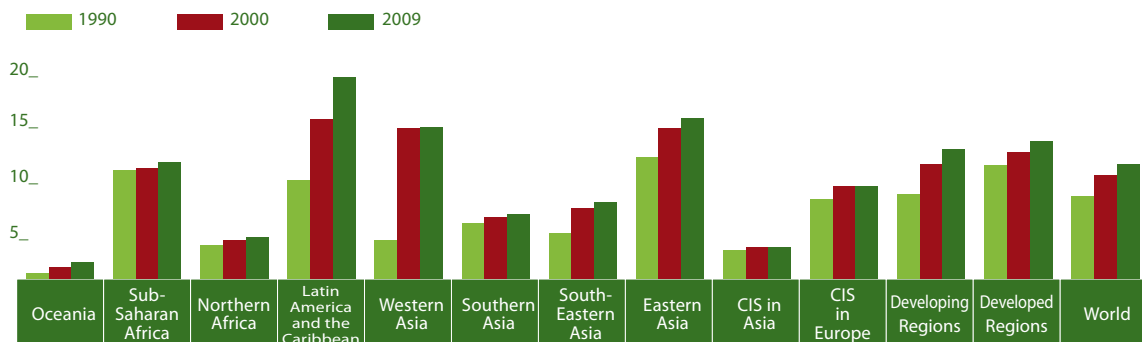
This loss of biodiversity has economic and social repercussions. The World Bank has underlined that natural capital is essential to wealth creation, accounting for a quarter of wealth creation in the poorest countries.¹

Some 60% of the world’s coral reefs, for example, could disappear over the next two decades through pollution, fishing, climate change and the introduction of alien species - yet 9-12% of

the world’s fisheries rely directly on coral reefs.² Fishing is an industry that provides protein to a fifth of mankind, particularly those populations that live along coasts and subsist on fishing.

Similarly sobering prospects could be in store for the world’s water and forests. Haiti, the poorest nation in the western hemisphere even before this year’s devastating earthquake, is an example of the umbilical connection between the environmental degradation and extreme poverty that MDGs 1 and 7 intend to combat. Once almost entirely covered by forest, the country now has less than 3% forest cover, which has meant both a huge loss of arable land through soil erosion, and a propensity to devastating floods. Because rain is no longer captured and filtered by the hillsides, ground and stream water is laden with polluted sediment - and by one estimate almost 90% of Haitian children, by drinking that water, are infected with intestinal parasites.³

Proportion of terrestrial and marine areas protected (%)



Source: UN Statistical Division



Though concern about the loss of biodiversity is sometimes seen as a rich-world preoccupation, it is, in fact, the poor who are most affected. For example, if climate change were to produce a drought in Ethiopia that halved the incomes of the poorest of the 88 million Ethiopians, the fall in global GDP would be a mere 0.003%, but the impact on this population would be devastating.

Moreover, the impact of ecosystem degradation and biodiversity loss affect sectors such as agriculture,



animal husbandry, fishing, informal forestry most, the very sectors on which many of the world's poor depend for their livelihood (the "GDP of the poor"). The Economics of Ecosystems and Biodiversity study⁴ has also stressed the fundamental link between poverty, on the one side, and the loss of biodiversity and the degradation of ecosystem services on the other. This has implications for the achievement of various MDGs - not just MDG7 - as illustrated in the table.

The Millennium Development Goals

1. Eradicate extreme poverty and hunger.

Extreme poverty is lessening; joblessness and hunger are not.

2. Achieve universal primary education. Despite encouraging progress, the goal may not be met by 2015, especially in sub-Saharan Africa and Southern Asia.

3. Promote gender equality and empower women. Poverty remains a barrier to education for girls; women remain less favoured than men in the employment market.

4. Reduce child mortality. Child deaths are falling, but not fast enough to meet the 2015 target of a two-thirds reduction, compared with 1990, in the under-five mortality rate.

5. Improve maternal health. Most maternal deaths in child-birth could be avoided with the right medical care, but giving birth remains especially risky in sub-Saharan Africa and Southern Asia

and progress has slowed in reducing the number of teenage pregnancies.

6. Combat HIV/AIDS, malaria and other diseases.

The spread of HIV has stabilised in most regions, but the rate of infection continues to surpass the expansion of treatment. Procurement of anti-malarial drugs is increasing, but poverty still limits the use of mosquito nets.

7. Ensure environmental sustainability. The rate of deforestation, though high, is slowing - but the world has missed the 2010 target for biodiversity conservation and the target of halving by 2015 the number of people without basic sanitation will be difficult to reach.

8. Develop a global partnership for development.

Aid for the least developed countries continues to rise, despite the global economic crisis, but only five donor countries have reached the UN target for official aid. Developing and least developed countries are gaining greater access to developed markets, and debt burdens have been lightened - but they remain well behind rich countries in information and communications technology.

A Brief For Policymakers on the Green Economy and Millennium Development Goals

Links between ecosystem services and the Millennium Development Goals⁴

Ecosystem services	Related MDG	Links with Targets
Provisioning and regulating services	MDG1: Eradicate extreme poverty and hunger	Steady daily supplies of water, fuelwood and food can be improved with investments to sustain and ensure natural and cultivated ecosystems.
Services from wetlands and forests	MDG3: Promote gender equality and empower women	Fuelwood and water: improved availability would help gender equality as burden of provision falls mainly on women.
Provisioning (medicinal plants) and regulating services (water)	MDG4: Reduce child mortality MDG5: Improve maternal health MDG6: Combat HIV/AIDS, malaria and other diseases	Better availability of clean water and traditional medical supplies can create improved conditions for health.

The second step must be to act in the interests of the many rather than the vested interests of the few - fossil fuel subsidies being a case in point. The exploitation of fossil fuels continues to benefit from considerable subsidies,⁵ but the cost to the environment and to society comes in pollution (of which the Deepwater Horizon disaster in mid-2010 in the Gulf of Mexico, impacting jobs as well as the environment, is just one example). It is unrealistic to totally eliminate petroleum and coal from the current energy mix, but the search for alternative sources - especially renewable ones - must be accelerated, despite resistance by some critics.

The third step is to agree on and implement effective regulation, without which business,

supplying the lion's share of investment in a green economy, will be reluctant to commit itself. According to an independent survey commissioned by the UN Framework Convention on Climate Change, investment of some US\$ 300-400 billion a year over the next two decades will be needed to deal with the impact of climate change. This actually amounts to only 1% or 2% of total global investment, and so is clearly feasible. At the same time, as the Stern Review on the Economics of Climate Change has pointed out, no new technology is required to reduce deforestation or promote better energy efficiency.⁶ Political willpower is enough to produce measurable gains in employment and a cleaner environment, and there are plenty of examples for policymakers to examine.



Costa Rica was one of the first countries in the world to recognise the economic and social benefits of environmentally sensitive forestry. Some 26% of the nation's land area consists of legally protected forests, with more than half out of bounds to human settlement. The result is a boom in "eco-tourism", creating direct employment and attracting a million visitors a year (generating over US\$ 5 million in entrance fees in 2005). Just what income and employment would have been generated if the land had stayed unprotected is a matter of conjecture, but studies have found that living in or near Costa Rica's national parks has reduced poverty and unemployment and increased wages.⁷

Curitiba, capital of Paraná state in Brazil, is an excellent example of sustainable urban planning, growing from a population of 361,000 in 1960 to over 1.8m in 2008 without the pollution and congestion typically associated with urban growth. While the population density between 1970 and 2008 tripled, average green area per person increased from 1m² to over 50m².⁸ Key to this success was the adoption of a "radial linear-branching" pattern of urban development, encouraging a diversion of traffic from the city centre and the establishment of housing and industry along the radial axes. Curitiba now has the highest usage of public transport in Brazil (45% of journeys). Excessive fuel consumption due to traffic congestion was 13 times less per capita in Curitiba in 2002 than in Sao Paolo and four times less than in Rio de Janeiro. Less pollution brings measurable health benefits (MDGs 4, 5 and 6); greater energy efficiency and improved public transport are necessary components of MDG7.

China's energy policy,⁹ outlined in the 11th Five Year Plan (2006-2010) and in large part a reaction to the severe pollution engendered by three decades of explosive economic growth fuelled mostly by coal, aims at producing 16% of primary energy from renewable sources by 2020. (The policy has been reinforced by the stimulus package announced in November 2008 to combat the economic crisis.) Some positive results are already evident: in wind power, which has been doubling each year, China is now second only to the United States in terms of installed capacity; in solar power, China is the world's biggest producer of photo-voltaic panels and 10% of Chinese households now use solar power to heat their water. In terms of employment, some 1.5 million jobs exist in the renewables sector, including 300,000 created in 2009 alone.

A Brief For Policymakers on the Green Economy and Millennium Development Goals

Opportunity from crisis

It would be wrong and unfortunate if the current situation - of rising greenhouse gas emissions, increasing soil erosion, spreading desertification, rising ocean acidity and so on - were to induce a pessimistic perspective. A responsible reaction by the world's policymakers should be to seize the opportunities that will lead to a green economy.

So-called "smart buildings", for example, already exist as energy-efficient, environmentally-friendly constructions. Intrinsic to the concept is the ability of a building, be it a shopping mall, an office block or a private house, to monitor and regulate heating, air-conditioning, lighting and other variables. The results can be financially impressive, given that maintenance - including energy provision - amounts to 80% of the cost of a building over its lifetime. Analysts have calculated that if half of new commercial buildings were constructed to use 50% less energy, the savings over the buildings' 50-100 year lifespan would amount to six million tonnes of CO₂ a year - the equivalent of removing a million cars from the roads each year.¹⁰ Clearly, therefore, introducing energy-efficiency measures into building codes could have a dramatic effect.

Similarly, "smart grids", by which two-way digital communication allows electricity generators to regulate electric appliances in consumers' homes and offices, can offer large potential savings of both money and energy. The US Department of Energy calculates that the adoption of smart grids would result in savings over 20 years of US\$ 47-117 billion by avoiding the need to build new power plants, transmission lines and substations.¹¹

A more pressing concern for the world's poor is the state of sectors such as fisheries and agriculture. Fishing, both coastal and deepwater, supports directly and indirectly some 170 million livelihoods but the industry is in a critical condition as stocks decline through over-fishing on an "industrial" scale by developed nations. Take away government subsidies and the fisheries sector is running at a constant, and ultimately unsustainable loss. Yet "greening" the sector with measures to rebuild depleted stocks and put in place effective management could produce genuine - and sustainable - profitability for the industry. Experts calculate that the benefits from "greening" the sector would be three to five times greater than the cost of this transition. The challenge for policymakers is one of political will.

Agriculture, which employs a sixth of the world's population (but accounts for only 6% of its GDP), is superficially in better shape than fisheries: production is already enough to feed the 9 billion people expected to live on the planet by 2050. But reality is too often one of localised food shortages, even famine, and persistent inequality in access to adequate nutrition. Put simply, the developed world, where agriculture is a fraction of GDP (3% in the EU), is overfed and the developing world, where agriculture is the main component of GDP (almost half in much of Africa), is undernourished. Yet neither the industrialised and chemical-dependent intensive agriculture of rich countries nor the low-productivity farming of poor countries is sustainable in the long run. To combat soil erosion, reduce farming's greenhouse gas emissions (15% of the global total) and stop the encroachment of agriculture onto forested land and water supplies, there will have to



be a “greening” of agriculture. Positive consequences of sustainable farming in developing countries will be less poverty and hunger (MDG1) and better health (MDGs 4 and 5).

Arguably the most serious challenge facing policymakers (and a key target of MDG7) is the provision of safe water to the world’s growing population. Access to clean water and adequate sanitation underpins economic growth: the less the access, the greater the levels of poverty and disease (each year some 1.4 million children under five die through inadequate access; in eastern Nigeria and northern Cameroon a 1% increase in drinking dirty water brings a 0.16% increase in child mortality). By one calculation, if the Millennium Development Goals for water and sanitation were met, an extra 322 million working days a year would be created simply by people getting less sick and spending less time physically carrying water to their homes.¹²

Fortunately, the water challenge, made worse by climate change, can still be overcome. The replacement of aging infrastructure is part of the solution. So is less wasteful use of water by farmers. But, as with energy use, the key is for policymakers to use the concept of full cost pricing for ecosystem services: when water and sanitation are delivered at full cost – including payments for ecosystem services such as watershed management – the return on investment is strong; economic progress is faster; and the private sector will finance much of the investment. This equation is however perhaps easier to promote in the rich world; in developing countries, with many people living at subsistence level, the need for water as a survival resource is an ethical



imperative, and any pricing mechanism may need to be tiered and subsidised.

Managing the waste created as the by-product of man’s economic activity is a challenge that affects rich and poor alike. Most high income countries now have legislation requiring less landfill and more recycling, often bolstered by “the polluter pays principle” to encourage more prudent use of resources. Along with reducing and recycling, the opportunity in a green economy is to utilize and profit from what typically has been simply discarded. The message for policymakers is that in a green economy, waste would refer only to those residual materials that have absolutely no potential to be reutilized and therefore have no economic value.

Seizing the moment

To paraphrase the Chinese philosopher Lao-tzu, even the longest journey must begin with a single step. In the journey towards the green economy, several steps have already been taken by far-sighted policymakers. Tougher emissions controls, either actual or potential, are spurring massive investments by American, European and Japanese carmakers in electric-powered vehicles. The European Union Emission Trading Scheme, bringing market forces to bear on carbon pollution, has now been in operation for five years (albeit with a somewhat flawed early stage); “cap-and-trade” in carbon emissions, though facing serious political opposition, has many advocates in the United States; and “acid rain”, a serious problem for forestry in North America and northern Europe in the 1970s and 1980s is now a blight that has

A Brief For Policymakers on the Green Economy and Millennium Development Goals

largely disappeared thanks to cap-and-trade and the regulation of SO₂ emissions.

Meanwhile, the microfinance credit system pioneered by Grameen Bank in Bangladesh has shown what can be achieved by empowering the poor, especially women (MDG3). Grameen Shakti (energy), a not-for-profit subsidiary of Grameen Bank, has spread solar heating systems throughout Bangladesh, creating at least 20,000 “green” jobs, such as installing photo-voltaic panels, and aiming for a target of 100,000 jobs by 2015.

How to accelerate, scale-up and embed such transitions is becoming increasingly urgent. Evidence of climate change is mounting; population growth is adding pressure to natural resources that are already under extreme stress; and governments around the world are constantly tempted to take short-term solutions to economic woes, however environmentally damaging they may be in the long term. All this is happening while the world - especially North America and Europe - has yet to recover fully from the global economic crisis of the past three years.

The Green Economy Report details how the challenges facing humanity can be met. The “green city” is not an oxymoron; water scarcity can be overcome; and environmental sensitivity is not incompatible with the economic growth and added employment that a burgeoning world population will require.

The pressing need now is for policymakers to collaborate with the financial sector: it is private-sector money, much more than government money,

that will finance the future, and it is the power of the market, helped by regulators, that will make possible the transition from today’s unsustainable economic behaviour to the sustainable future promised by the green economy. In the process, investors and policymakers need to put a price on “natural capital” and include environmental measures, notably on the impact of climate change, in their asset management; for their part, governments need to implement the environment-friendly policies that ultimately underpin economic stability.

However, corporate awareness of the challenge and of the opportunities has yet to be widespread. It tends to be confined to the largest companies, which can though instigate progress by working with both partners and competitors.

The onus, therefore, is on policymakers to take the lead. Their actions will be the necessary catalyst for the transition to a green economy that builds on the earth’s natural capital and reduces ecological scarcities and environmental risks. The reward - with renewable energy, low-carbon transport, energy-efficient buildings, clean technologies, improved waste management, enhanced freshwater provision, sustainable agriculture and forest management, and sustainable fisheries - will be real progress towards the achievement of the Millennium Development Goals.



**A Brief For Policymakers on the Green Economy
and Millennium Development Goals**

Defining the Challenge





The adaptability, inventiveness and ingenuity of humans is beyond doubt, and those qualities will be needed in confronting - and surmounting - the challenge posed by the pressures on our environment, be it population growth, increasing consumerism, the depletion of natural resources, the loss of biodiversity or climate change.

Those pressures are all related: population growth has an inevitable impact on the environment as a whole, and most scientists agree that climate change is, at least in part, the consequence of human activities. "Greening" economic activities - for example, by reducing greenhouse gas (GHG) emissions or by developing alternatives to fossil fuels - is the only answer to these pressures, both today and in the future. To continue with what could be called the "brown" economy may seem attractive in the short term, but in the long term, as it draws down our natural capital and creates destabilization risks, is not a recipe for sustainability.

One reason has been examined comprehensively by the Intergovernmental Panel on Climate Change (IPCC). It pointed out three years ago, "Warming of the climate system is unequivocal as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice and rising global sea level..."¹³ Crucially, it added that "most of the observed increase in temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic GHG concentrations."

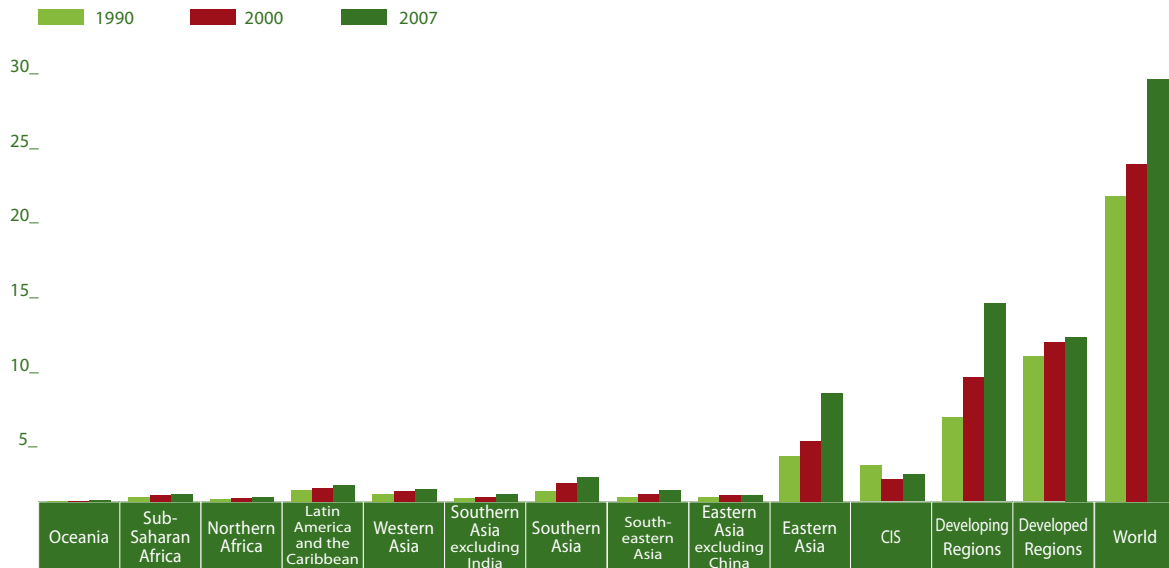
The import of the IPCC's findings, both then and subsequently, should be clear to all policymakers.

The thermal expansion of the world's oceans and the melting of polar ice already put at risk from every storm-surge low-lying coastal areas in Bangladesh or islands such as the Maldives, whose atolls are barely a metre above sea level. Indeed, President Mohamed Nasheed of the Maldives has dramatised the threat that his nation may literally disappear beneath the waves by holding a televised, under-sea cabinet meeting. The IPCC, has summarised the cost of doing nothing to limit climate change:

- The possible disappearance of sea-ice by the latter part of this century.
- An increase in climatic extremes, from heat waves to floods.
- More intense tropical cyclones.
- Less water in semi-arid areas such as the Mediterranean basin, the western United States, southern Africa and north-eastern Brazil.
- The possible elimination of the Greenland ice-sheet (which would mean a 7-metre rise in sea-levels).
- A severely increased risk of extinction for many endangered species.
- A threat of flooding in some areas, affecting perhaps 2 billion people, and increased drought in others, notably in Africa.

A Brief For Policymakers on the Green Economy and Millennium Development Goals

Emissions of carbon dioxide, 1990, 2000, 2007 - (Billions of tonnes)



Source: UN Statistical Division

The commitment by the G8 nations in 2009 to cut their GHG emissions by 20% by 2050 marks a “tipping point” in how we deal with climate change, since it must in turn involve a commitment to a green economy. After all, present statistics of the inadequacy of the “brown” economy make grim reading: for example, 1.6 billion of the world’s people lack access to electricity; a quarter of the children in the developing world are underweight; half of the population in developing countries have no access to sanitation; and current modes of transport, fuelled by petroleum products, produce unacceptable levels of air-pollution (and around 13% of anthropogenic GHG emissions).

Lost capital

In parallel with those statistics is the continuing - and increasing - pressure on the planet’s natural resources, its natural capital. Over the past 300 years, the Earth has lost some 40% of its forests; some 25 countries

now have no forests at all; another 29 have lost 90% of their forest cover.¹⁴ Forests absorb CO₂ (so combating global warming) and release oxygen; they absorb and redistribute rainwater; and they are the origin for a wide range of goods, including prescription drugs. So the consequences of deforestation, easily pursued in the search for agricultural land, tend to be dire.

Since 1990, the world has lost roughly half of its wetlands, which slow floodwaters, protect uplands from erosion and improve water quality.¹⁵ Much of this occurred in the first half of the 20th century in the northern hemisphere, but, as populations grow, there is mounting pressure for the conversion of tropical and sub-tropical wetlands to agricultural, industrial or residential use.

Over the past two decades 35% of the world’s mangroves, which protect coastal areas from flood surges and erosion, have disappeared thanks to the encroachment of aquaculture.¹⁶

Some 30% of coral reefs, essential for biodiversity, have been damaged through fishing, pollution or disease.¹⁷

The overall effect is that some 60% of the planet's ecosystem services - the benefits, such as food, freshwater, timber and pharmaceutical ingredients, that people derive from the natural environment - have been degraded over the past 50 years. Unless policymakers take the steps needed for a green economy, still more degradation is inevitable.

Environmental refugees, fleeing phenomena such as drought and desertification, already number some 25 million. Within the coming decade, the number could rise to 60 million as people in sub-Saharan Africa react to desertification and head for North Africa and Europe. At the same time, millions more will move to Africa's mega-cities, straining local resources to or beyond breaking point. The potential of such migration flows, occurring from Africa to China, to provoke political and social unrest is obvious. These forecasts do not include an additional wave which may arise due to the loss of tropical coral reefs and their fisheries due to a combination of warmer sea surface temperatures and ocean acidification, both due to GHG emissions.

Coral reefs are the world's most biodiversity-rich ecosystems, but are under constant pressure from pollution, disease, over-fishing and emissions impacts - both warming and ocean acidification. Reefs in the Caribbean area have been reduced by 80% over three decades. As a direct result, revenue from dive tourism - more important to the local economies than fishing - has slumped. The underlying explanation is that in 1983, after centuries of over-fishing on the reefs, there was an abrupt switch from coral to algal domination of reef systems. Control of the algae then depended on a single species of sea urchin - which fell prey to a species-specific pathogen. With the sea urchin population devastated, the reefs shifted to a state with little capacity to support fish. The decline of the reefs is thus a tragic example of how vulnerability increases as biodiversity decreases.

Lost opportunity

The question, given the damage, both actual and potential, to the environment and thus to overall living standards, is why the transition from a brown to a green economy has not already been made.

A fundamental reason is what could be called the power of inertia. It takes initiative, determination and foresight on the part of policymakers to direct industries and societies to change well-established habits. It also takes courage - the willingness to defy lobbying by well-funded vested interests. Policymakers need to lead and shape public opinion precisely in order to have the popular backing to counter vested interests.

This is, of course, more easily prescribed than achieved. Preserving a rainforest is undeniably sensible from an environmental standpoint - but may not seem so to small-holders seeking to gain a patch of arable land by cutting into the forest. Similarly, setting fishing quotas in order to rebuild fish stocks can be a matter of urgent necessity, but will still be resisted by fishermen concerned for their immediate livelihood. As a result of lobbying and industrial action by fishermen, for example, the EU's Common Fisheries Policy has often "softened" the quotas recommended by its experts.

A second reason, complicating international climate-change negotiations from Kyoto in 1997 to Copenhagen in 2009, is what economists would call the "free rider" problem. Put simply, why should one country make an investment to lessen emissions if another country refuses, when the benefits of the investment go to both (pollution and climate change know no boundaries) but the costs only to one? In reality, however, green investments are in and of themselves financially interesting. A new framework agreement in climate-change negotiations would therefore reward "early adopters". Policymakers need to realise that a green economy is to the advantage of all countries, rich and poor, developed and developing. They must then construct the kind of agreement that can implement a green economy.

A Brief For Policymakers on the Green Economy and Millennium Development Goals

Support from the business community would clearly help that task - but business needs to be prodded to move in that direction. For the most part it is the biggest companies that have taken real steps towards minimising their environmental impact (for example, by eliminating “excess product packaging”, helping both the environment and the corporate bottom line). The reality is that while most large companies may now recognise the need for enhanced resource efficiency or the impacts of climate change on their operations, very few have plans to reduce their GHG emissions, or enhance the life-cycle of their products. That proportion would surely rise if policymakers were to implement the appropriate regulations.

A key point of the forthcoming Green Economy Report is that the transition to a green economy makes economic and financial sense, even over the short term. It must be admitted, however, that the global financial crisis, whose effects are still being felt in many countries, has dampened the willingness of both government and business to take the necessary steps - one reason that optimists were so disappointed by the Copenhagen conference on climate change. When debt-laden governments in the developed world embark on austerity programmes, inaction - unless they see immediate gains - can become a more likely response.

All of this helps explain the shortfall in meeting the Millennium Development Goals (MDGs). In aiming for MDG1 (ending poverty and hunger), the world has achieved considerable progress in reducing the numbers of the extremely poor. But that advance has not been matched in reducing hunger and unemployment - and a significant reason for that relative failure is the

degradation of the environment: greater drought and desertification, for instance, mean worse harvests.

The effort to achieve MDG2 (universal primary education for both boys and girls) has slowed. The underlying problem is poverty, which again is often linked to environmental degradation. For reasons of cost, culture or the need to be working, girls in the poorest 20% of households, for example, are 3.5 times more likely to be out of school than girls in the richest households.

Poverty also explains the difficulty in meeting MDG3 (gender equality and the empowerment of women). Parity between boys and girls in primary education was supposed to be achieved by 2005, but remains out of reach in many developing regions. Meanwhile, women in developing regions tend to be the most vulnerable in the labour market, with the global financial crisis eroding employment, directly and indirectly, around the world.

The target of MDG4 is to reduce by two-thirds, between 1990 and 2015, the incidence of mortality for children under the age of five. Significant progress has been made, but is now slowing. Among the 67 countries with high child mortality rates (40 or more deaths for every 1,000 live births), only 10 are on course to meet the target. Some of the largest challenges are found in sub-Saharan Africa, and once again poverty - and with it the shortcomings of the brown economy - is the cause.

Improving maternal health, as envisaged by MDG5, is especially a matter of education and antenatal medical care, and considerable progress has been made, for example in narrowing the urban-rural gap in the provision of skilled care during child-birth. But the



progress has not been enough: only a third of pregnant women in rural areas in developing regions receive the right level of care. Meanwhile, the failure to provide adequate funding for contraception services hampers the improvement of women's reproductive health.

The campaign against HIV/AIDS, malaria and other diseases (MDG6) has been marked by some success. One target, for example, is to reverse the spread of HIV by 2015, and it appears that HIV infection has now stabilised in most regions and infected people are surviving longer. Even so, the rate of new infections continues to outstrip the availability of treatment (in 2008 some 5.5 million people in need of treatment could not receive the necessary medications). More positively, the fight against malaria - which puts half the world's population at risk - is progressing well: African countries with an endemic malaria problem now have half the mosquito nets they need, representing a major increase over the decade.

The sustainable environment envisaged in MDG7 is the essence of the green economy - and progress towards the goal has been mixed. The rate of deforestation, for example, is slowing: in the past decade, the annual loss of forest has averaged 13 million hectares, compared with 16 million hectares a year during the 1990s. But that is still a rate that causes lasting environmental damage. At the same time, the world has missed this year's target of reducing the rate of biodiversity loss, and a decisive response to the threat of climate-change has yet to be implemented. Meanwhile, the target date of 2015 for the halving of the proportion of the world's population without sustainable access to safe drinking water and basic sanitation (1.1 billion people lack access to basic sanitation) looks likely to be missed - and the 2020



deadline for improvement in the lives of at least 100 million slum-dwellers remains hostage to the increasing rate of urbanisation and slum formation, which makes the target appear tough to meet.

None of the MDGs can be achieved without the help of a partnership between rich and poor - the global partnership for development that is the intent of MDG8. At one level, progress towards the goal has been remarkably robust: debt-relief for developing countries is being implemented and aid from the developed world has increased despite the global financial crisis. Yet it remains true that only five nations - Denmark, Luxembourg, the Netherlands, Norway and Sweden - have met the UN aid target of 0.7% of gross national income. Fortunately, since trade is a much greater lever for development than aid, market access for exports from developing countries has increased dramatically (excluding arms and oil, the proportion of imports by developed countries from developing countries admitted free of duty reached almost 80% in 2008, up from 54% in 1998). Unfortunately, the Doha Round of world trade negotiations, which would increase market access still more, remains stalled. Meanwhile, the challenge in meeting MDG8 is to enlist the business community of the developed world, in particular to narrow the "digital divide" between rich and poor countries in information and communications. At the end of 2008 only 15% of the residents of developing regions had access to the Internet, compared with 68% in the developed world.

In short, the challenge facing humanity from its pressure on the environment is critical - but, if policymakers take the right steps towards a green economy, it is not impossible.

An aerial photograph of a lush green hillside covered in terraced rice fields. The terraces are arranged in a series of concentric, wavy patterns that follow the contours of the land. In the center of the hillside, a small village with several traditional wooden houses with dark, gabled roofs is visible. The foreground shows more terraced fields, some of which are filled with water, reflecting the sky. A few people can be seen walking on a path through the fields. The overall scene is a beautiful example of traditional agricultural terracing.

**A Brief For Policymakers on the Green Economy
and Millennium Development Goals**

Meeting the Challenge



The task for policymakers is daunting - but not impossible. One obvious problem is the difficult fiscal situation facing many governments in the wake of the global financial crisis. The contribution of private financing is also strained - including venture capital. But it would be a mistake to exaggerate these difficulties. International aid, for example, has continued to rise despite the crisis, and debt burdens for developing countries have been lightened. In short, though the Doha round of trade negotiations remains to be completed, the global partnership envisaged by MDG8 has considerable strength and promise.

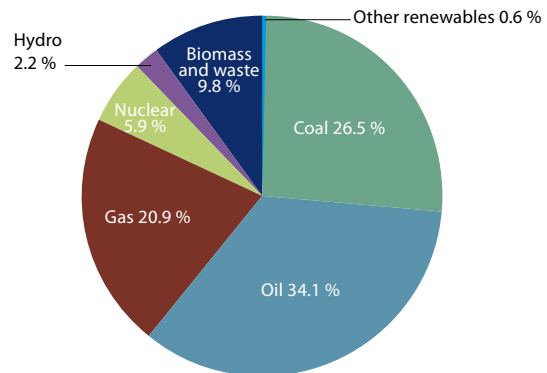
Energy is a key priority

The most important determinant in making the transition to a green economy from the wasteful, polluting and ultimately unsustainable brown economy is energy. The world, as a whole, needs to be more efficient in its use of energy - and needs to develop new, renewable sources. As the forthcoming Green Economy Report will show in detail, both requirements are entirely feasible and both are compatible with economic growth as well as targeting quicker progress on several MDGs.

The task at hand is to lessen an excessive dependence on the fossil fuels - oil, gas and coal - that have powered the rise to wealth of the developed world. In the 20th century, the consumption of fossil fuels increased twenty-fold to accommodate the spread of electricity and the exponential growth of car ownership and air travel. In 2007, oil satisfied about 34% of our energy

demand; natural gas about 21%; coal (the dirtiest fossil fuel) some 26%; nuclear power another 6%; hydropower just over 2%; biomass and waste almost 10%; and other renewables less than 1%.¹⁸

World Primary Energy Demand by Fuel (2007)¹⁸



A Brief For Policymakers on the Green Economy and Millennium Development Goals

Since the dominance of fossil fuels in the energy spectrum is unlikely to be reversed in the short term, the immediate challenge is to ensure that they are used less harmfully and more effectively.

One answer for policymakers is the price mechanism: the OPEC price increases of 1973 and 1979 spurred huge gains in conservation and energy efficiency in many developed countries, and it is clear that measures that reflect the full cost of fuel - however unpopular - can change consumer behaviour.

A second answer is technology. This can involve anything from leaner-burning motors in cars to better insulation in houses and combined heating and power (CHP) generation by electricity companies.

What is certain is that total worldwide energy consumption will rise, and indeed should rise in order to meet the MDGs. After all, 1.6 billion people lack electricity and 2.5 billion must depend on biomass (essentially wood and animal dung) for cooking. The least access to electricity is in sub-Saharan Africa, where the rate of urban electricity provision is 58% and the rural rate a mere 8%. If the MDG1 target for the reduction of extreme poverty is to be met in electricity-deprived regions, modern energy services will have to be provided for another 700 million people.

However, renewable energy technologies - solar and wind power, for example - to generate electricity can make a significant contribution to improving living standards and health. The need is pressing: in Africa, for example, the "energy poor" spend around US\$ 17 billion a year on oil-based lighting sources such as kerosene lamps - which are costly, inefficient and a fire hazard. Meanwhile, it is hard to exaggerate the harm done when households in developing regions

use coal, firewood and dung for cooking, lighting and heat: indoor air pollution kills 1.6m people a year, half of them children under the age of five and the rest women (who do most of the cooking and are therefore the most exposed).

Yet green solutions are both tested and available for developing regions. At the local level, the Grameen Shakti organisation has developed and marketed solar and biogas systems for the house that could reach 75 million rural Bangladeshis (almost half the total population) by 2015. In Mauritius some 40% of the island's electricity is already provided by bagasse (a biofuel produced by the fibre of sugarcane stalks). In Kenya geothermal energy provides 10% of the country's electricity. The simple equation for most countries is that the more they use renewable energy the less foreign exchange they will have to spend importing petroleum - and that saving can translate into more provision for education, health, mobility, communications and all other aspects that feature in the MDGs.

Kenya, in common with many developing countries, has an "energy dichotomy": the modern sector of its economy depends on expensive imported petroleum while the rural population depends on biomass for its energy needs. Petroleum is subject to the price whims of the international market and traditional biomass may ultimately become unsustainable. Hence the creative solution adopted in 2008 of "Feed-in Tariffs (FITs): the energy companies responsible for the national grid are required to buy electricity from renewable energy sources at a pre-determined price high enough to encourage new investment in the renewables sector. The result is that those who produce electricity from solar, wind and other renewable sources now have a guaranteed market and the incentive for more investment.



The role of agriculture

Agriculture is another important sector of the green economy, not because of its share of GDP (a mere 3% of the world's total output of goods and services, though sometimes up to half in the poorest countries) but because it directly provides 1.3 billion jobs – the vast majority of them in developing countries. Sustainable agricultural practices are vital in meeting the MDGs, be they reducing extreme poverty and hunger or giving households the opportunity to send their children to school. Hunger, poverty, health and the environment can all be linked to agricultural practices and output.

It makes little sense, however, for policymakers to view agriculture as a uniform part of the world economy. The reality is a sector divided into two tiers: a heavily mechanised, farming industry in developed regions such as the European Union and North America; and labour-intensive farming, often offering mere subsistence-level livelihoods, in developing regions such as sub-Saharan Africa and South Asia.

One issue that adds complexity to the picture is the persistent dependence on farm subsidies in both the European Union and the United States, leading to skewed production and allegations of “dumping” excess production onto the international market. Linked concerns are the tariff and non-tariff barriers to agricultural exports from developing countries. These still exist despite the good intentions professed in successive negotiating rounds of the World Trade

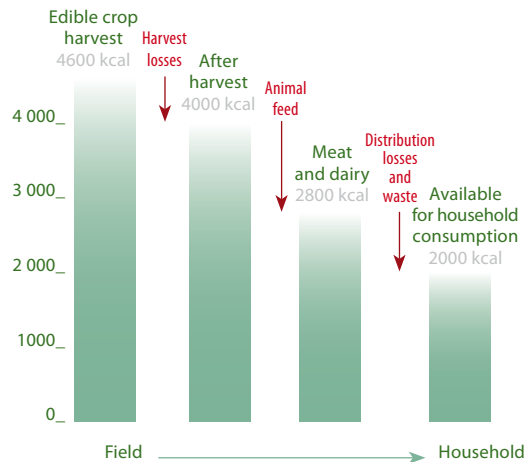
Organisation. “Food security”, an element of the European Union’s Common Agricultural Policy, is a powerful idea, but one that can be abused by vested agricultural interests.

A second complication is climate change. At the moment, agricultural operations contribute 14% of global GHGs; deforestation in order to clear more land for farming produces another 18% of GHGs. Within those figures, agriculture is responsible for about 58% of nitrous oxide emissions and 47% of methane - gases which have a far greater potential to warm the planet than CO₂.

Deforestation and farming all too often go together, with damaging results in terms of GHG emissions, soil erosion and flood control. But deforestation is not inevitable. In **Nepal** the forested area, some two-fifths of the country, was decreasing by an annual rate of 1.9% during the 1990s; this has now been reversed so that forested land increased by 1.35% a year from 2000 to 2005. The key was to hand responsibility for the forests over to Community Forest User Groups (CFUGs), of which there are now some 14,000. The CFUGs, second only to the government in the area they manage, set harvesting rules and product prices and determine how the profit is distributed. With their vested interest in the future of the forests, the result has been better conservation, enhanced soil and water management and greater local employment.¹⁹

A Brief For Policymakers on the Green Economy and Millennium Development Goals

Global losses, conversion and wastage at different stages of the food supply chain (kcal per person)²⁰



A third feature is the conventional method of sustaining or increasing crop yields, both in the developed regions and the developing ones. This involves the use of pesticides, herbicides and fertiliser - all of which in the short term can be very effective. The inevitable result, however, is to lessen the natural fertility of the soil, and so make farmers ever more dependent on expensive fertilisers (the price of phosphate rose five-fold between 2007 and 2008 after surges in demand from China and India). Meanwhile, the potential to increase arable land - at present 12% of the world's land surface - is limited by water scarcity and desertification.

The solution lies in adopting sustainable farming methods: the recycling of organic nutrients; cultivation

methods that prevent soil erosion; biological pest control; crop diversification and rotation. All these and other "green" techniques can increase both the quality and the quantity of production, and so enhance the quality of life in rural communities. One study, covering 12.6 million farms in 57 developing countries, has shown the encouraging results that can be achieved by adopting "best practices" - such as the control of erosion to reduce the loss of nutrients in the soil - in sustainable agriculture.²¹ The average yield increase was 79%, depending on crop type, and all crops showed gains in efficiency of water use.

Mechanisation is clearly a way forward: the use of tractors and other farm machines significantly boosts household incomes, as well as reducing the burden of demanding farm work. The downside, however, is that mechanisation is expensive, both in initial capital and then in operating costs. Mechanisation and organic farming are most certainly not mutually exclusive - but policymakers should note that organic farming is typically more labour intensive and can thus generate up to 30% more employment than conventional farming.²²

Uganda, a nation in which 85% of the population is involved in agriculture and which gets 80% of its export earnings from farm products, has taken an apparent liability - a dearth of expensive imported chemical inputs for its agricultural sector - and turned it into a comparative advantage by developing organic farming (the country now has one of the largest land areas in the world, and the biggest in Africa, devoted to organic agriculture). In 2004 the country had 45,000 organic-certified farmers, working on 185,000 hectares - some 2% of Uganda's agricultural land. By 2008, the number



of organic farmers had risen to almost 207,000, cultivating more than 296,000 hectares. Farm-gate prices for products such as organic pineapple, ginger and vanilla are higher than for their conventionally grown rivals, thereby boosting both incomes for organic farmers and Uganda's export earnings. A side-effect benefiting Ugandans and non-Ugandans alike is that GHG emissions from the country's organic farms are on average 64% lower than from conventional farms.²³

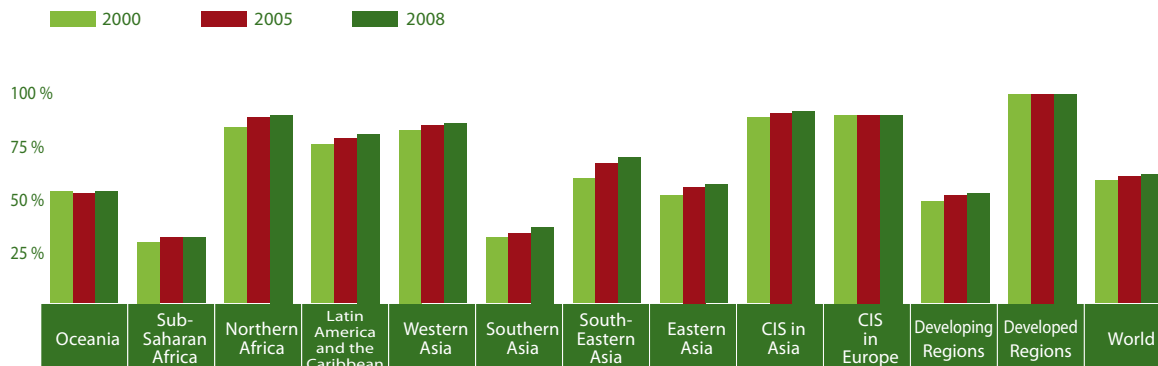
Water provision

Water is clearly an increasingly critical resource on which agriculture and the rest of the green economy (indeed, life itself) depends. But the underlying problem confronting policymakers is that demand for water will increase while its supply may well decrease. Agriculture accounts for 70% of water

consumption and a way has to be found to produce food for a world of 9 billion people by 2050 by using less water than is used today for 6 billion. At the same time, unless there is improved access to clean water and sanitation, it will be impossible to meet the MDGs for the reduction of poverty and disease, for the provision of universal primary education and for the empowerment of women.

The economic impact of **poor sanitation** on a country such as Cambodia is equal to some 7.2% of GDP (at 2005 prices).²⁴ Moreover, the poor are penalised for their lack of access: in western Jakarta water bought from a water cart costs ten times the price of mains water. Likewise the lack of easy access to water means households, especially the children and women, have to spend time fetching water rather than in pursuing other activities - such as going to school. In East Africa each trip to fetch water takes more than half an hour.²⁵

Proportion of population using an improved sanitation facility (%)



Source: UN Statistical Division

A Brief For Policymakers on the Green Economy and Millennium Development Goals

The challenge is daunting. A growing population; rising living standards; excessive exploitation of aquifers and river systems; and climate change: all will add up to a difficult social, economic and political test for governments over the coming years. Indeed, by 2030 the OECD calculates that some 3.9 billion people could be living under conditions of severe water stress.

But the challenge is not impossible. Fortunately, investing in safe water is extremely cost-effective - and the failure to do so can be disastrous. In 1991, for example, Peru had to spend US\$ 1 billion to control a cholera epidemic. If a tenth of the sum, US\$ 100 million, had been spent on sanitation, the epidemic would not have occurred.

One conventional response to water scarcity is the building of dams. But dams, involving massive capital investment and frequently the dislocation of communities and damage to the ecosystem, are not the only - or necessarily the best - remedy. Without such an option, Singapore is investing heavily in storm-water capture and sewage recycling.

An alternative is desalination - though this is an energy-intensive response. By contrast, policymakers should bear in mind that small-scale measures are often an effective alternative: in China's Gansu province a US\$ 12 per capita investment in collecting rainwater was enough to upgrade the domestic water supply and supplement irrigation (one particular project benefitted almost 200,000 households.²⁶

Jakarta, in common with many cities in developing regions, has many people living in informal settlements. The question is how to provide safe water and sanitation without at the same time legitimising the unlawful occupation of land. The imaginative answer in western Jakarta has been to give the responsibility of supplying water to a private utility company. This company in turn has established community-based organisations which are given access to a single master water meter. The community organisations are responsible for distributing the water and for developing a revenue-collection policy. The result is access to clean water at a reasonable cost in an area where the government would be reluctant to invest.

Where possible and acceptable on equity grounds, one solution is to price water and sanitation services at their full cost. The key is for policymakers to introduce pricing transparency: when water and sanitation are delivered at full cost - including payments for ecosystem services such as watershed management - the return on investment is strong; economic progress is faster; and the private sector will finance much of the investment. Argentina, where the private sector has invested in water supply, found a marked reduction in child mortality in those areas with a privatised supply, with the best results coming in the poorest neighbourhoods.

Politically and socially, however, that hypothesis can be difficult to put into practice. Subsistence farmers can hardly be expected to pay for water. Indeed, in developing countries some form of subsidy will be the norm for the supply of water to the poor. In Jakarta, for example, wealthy households with above



average water consumption are charged more than the cost of supply, with the government then using the extra revenue to facilitate supply to the poor.

Given that agriculture is by far the largest consumer of water, it makes sense to make it more “water-efficient”, especially in developed countries. A way of achieving this is for policymakers to introduce a market in water: individual irrigators can offset the cost of improving their efficiency by selling the saved water to other irrigators.

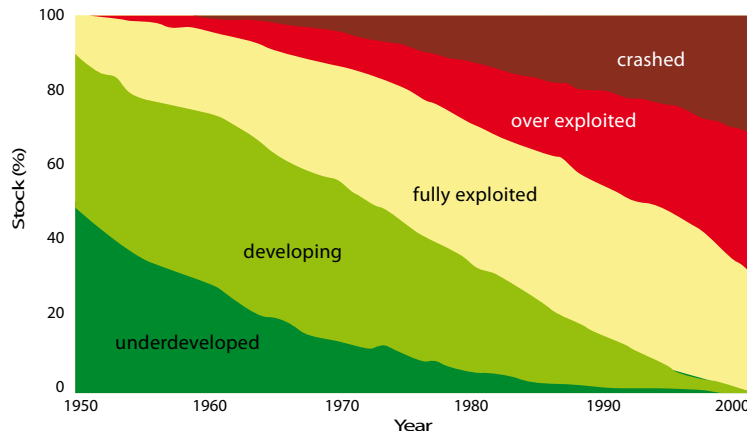
The provision of safe water and sanitation, as envisaged in MDG7, is a vital component of the green economy. There is no simple solution for delivering the benefits of water and sanitation. Part of the answer, however, lies in good governance to ensure greater economic discipline in water investment and management, and that in turn must involve a recognition that the cost of providing water can be offset by a price more often than is currently the case.

Fishing now and in the future

As with agriculture, fishing is an industry characterised by two tiers: several fishing nations in the developed world boast fleets of large vessels that “vacuum” up vast quantities of fish from the ocean, from tuna to cod; in poor countries, coastal fishing communities struggle to wrest a living with their small boats and traditional fishing methods. The fact that the sea, beyond national limits, is a “commons”, belonging to all but to no one in particular, is a constant challenge for the responsible management of fish stocks.

Again as with agriculture, the fisheries sector is of vital importance: some 20% of the world’s population rely on fish as their primary source of animal protein; around 35 million are directly employed, full-time or part-time, in fishing; and another 135 million are involved in fish-processing and related activities. Assuming three dependents for each of these, the implication is that almost 8% of the world’s population is supported by the fisheries sector.

Status of exploitation of global fish stocks²⁷



A Brief For Policymakers on the Green Economy and Millennium Development Goals

Yet the structure and practices of the sector are unsustainable. The total value added for global marine fisheries in 2005 was about US\$ 17 billion - but the industry was subsidised by about US\$ 27 billion. Overfishing, mostly by the fleets of the industrialised world, has damaged stocks to such an extent that without corrective measures, of the sort that will be outlined in the Green Economy Report, many of the world's commercial fisheries may no longer be viable in the coming decades.

Developed countries should better recognize the risk, stark evidence of which came in 1992 with the collapse of Newfoundland's cod stocks through overfishing, leading to the loss of 18,000 direct jobs, the shrinking by up to 20% of local towns and the injection of massive aid by the Government of Canada and its taxpayers. From an MDG perspective, this type of remedial action is beyond the means of most developing countries.

"Greening" the industry so that it becomes sustainable and genuinely profitable means reducing catches to a "maximum sustainable yield". Given that current fishing capacity is between 1.8 to 2.8 times greater than that which can be sustained, policymakers face a politically and socially sensitive task: they must ensure that poor and artisanal fishing communities are treated fairly in strategies to scale down capacity. That also means being intelligent in the use of subsidies, especially in the developed world where the fishing industry traditionally exercises an influence disproportionate to its weight in the labour force. In many cases, such influence leads to what amounts to a misallocation of capital - at

the expense of artisanal fishing communities in the developing world - and it opens the industry to the risk of being labelled inequitable as well as economically inefficient.

Subsidies come in various forms - both helpful and harmful, or "good, bad and ugly" in the terminology of Sumaila *et al.*²⁸ The "good" enhance the conservation of fish stocks over time, for example by funding fisheries management or by using government spending to operate marine protected areas; the "bad", such as fuel subsidies, lead to overcapacity and excessive catches; and the "ugly", such as the buyback, or decommissioning, of fishing vessels to reduce a fleet size, can either conserve a fish-stock or deplete it further. In theory, buyback schemes should be very effective.

In practice, decommissioned boats may find their way back into other fleets; or fleets may be built up in anticipation of a buyback scheme; or boats that are not part of the buyback may simply increase their catch in the absence of their previous competitors. Out of a world total of US\$ 27.1 billion in subsidies in 2003, Sumaila *et al.* classified only US\$ 7.9 billion as "good"; US\$ 16.2 billion were in the "bad" category; and US\$ 3 billion in the "ugly".

Greening the industry also means putting in place a more effective regulatory regime. A limit on an area's total catch is the most obvious instrument, but in reality is fraught with difficulty. The catch may well be limited and so help a stock to recover, but the downside can be severely shortened fishing seasons to the detriment of fishing communities.



The solution should be to allocate fish quotas and make these quotas transferable among fishing communities. To make such a system work, and to reduce illegal fishing, policymakers need to collaborate and realise that “beggar my neighbour” fishing policies are ultimately self-defeating and unsustainable.

Illegal, unreported and unregulated (IUU) fishing accounts for about a fifth of the total value of the global fishing catch, and is a prime reason for the depletion of fish stocks. The reason IUU fishing persists is that detection rates and penalties are both too low to act as disincentives. Sumaila *et al.*²⁸ recommended that penalties need to be increased at least 24 times to be effective. The European Union now has rules that only fish validated as legal by the exporting state or by the state under whose flag the fishermen are sailing can be imported into or exported from the EU.

Pathway to a green future

Transport is central to economic activity, and will remain so. But transport currently harms the environment and generates harmful economic consequences, such as productivity-lowering congestion and the burden on health systems, and so the taxpayer, of pollution-induced disease.

Complicating the challenge for policymakers, especially in their efforts to meet MDG7, is the close connection between transport and economic growth. The present global vehicle fleet of around 800 million could well rise to 3 billion by 2050, with



almost all of this increase occurring in developing countries. Meanwhile, the polluting effects of shipping and aviation will also rise as global trade increases. Yet modern transport, especially by car, is associated with personal freedom and productivity. It would clearly be unrealistic - and unfair - to deny the populations of developing regions such benefits. Nor would it be sensible to deny countries the business efficiencies that come with modern means of transportation.

What is needed is a fundamental shift in transport investment, emphasising the reduction or avoidance of trips. This would involve support for public and non-motorised transport, and a transition - helped by technological innovation - to cleaner and more efficient vehicles.

The idea, appropriate for both developed and developing regions, should be to encourage a change in behaviour by a judicious mix of taxes, charges and subsidies. In various European and North American cities “car clubs”, with subscribers paying just for the actual use of a car, are already an attractive (and much less costly) alternative to car ownership. Other measures that bear imitation are congestion charges, penalising car drivers entering city centres; subsidised subway systems; and electronic road pricing. Such policies, especially emphasising the provision of efficient public transport, work not just in developed countries but in developing ones, too - as the successful introduction of the Delhi Metro rapid transit system has demonstrated. The green reward will be a healthier, more productive workforce and a less polluted environment.