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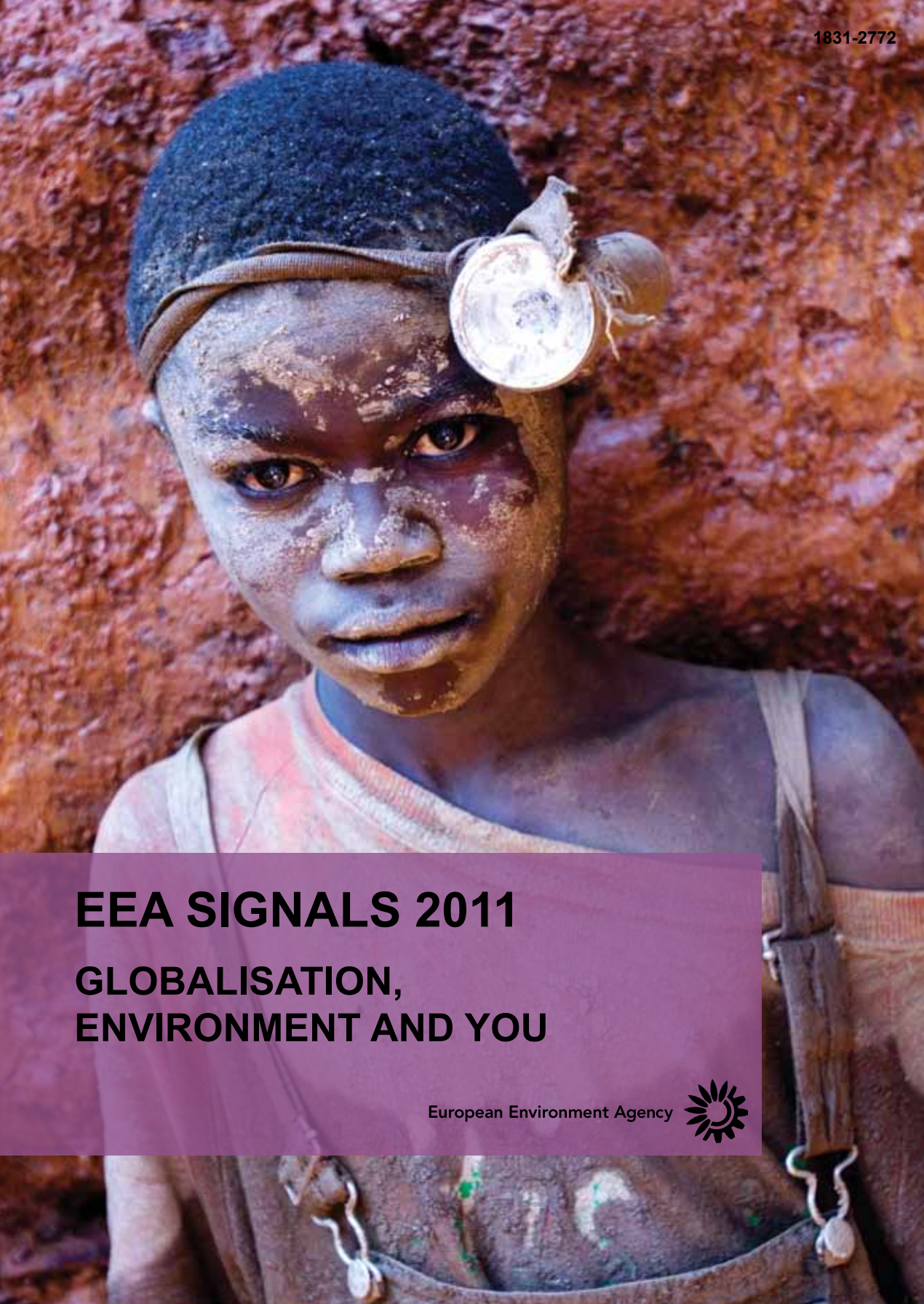

EEA SIGNALS 2011

GLOBALISATION, ENVIRONMENT AND YOU

European Environment Agency

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European Environment Agency
Kongens Nytorv 6
1050 Copenhagen K
Denmark
Tel.: +45 33 36 71 00
Fax: +45 33 36 71 99
Web: eea.europa.eu
Enquiries: eea.europa.eu/enquiries

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WHAT IS SIGNALS?

The European Environment Agency (EEA) publishes Signals each year, providing snapshot stories on issues of interest to the environmental policy debate and the wider public in the coming year.

At EEA, we monitor the environment across our 32 member countries in partnership with our network. From researchers up to their knees in water to satellite imaging from space, we work with a huge amount of environmental data. Finding, reading and understanding the range of 'signals' regarding the health and diversity of our environment is at the heart of what we do. Signals respects the complexity of the underlying science and shows awareness of the uncertainties inherent in all of the issues we address.

Our target audience is broad, ranging from students to scientists, policymakers to farmers and small business people. Signals is published in all 26 EEA languages, using a story-based approach to help us communicate better with a diverse readership. Signals employs several approaches to tell its stories. While each story has specific points to make, as a collection they also illustrate the many interrelations between seemingly unconnected issues.

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How Signals 2011 is organised

At the EEA we recently completed a major analysis, *The European environment — state and outlook 2010* (SOER 2010) — our flagship report. In SOER 2010 we highlight the challenges facing us globally.

Signals 2011 is largely based on SOER 2010 and is organised around the following key messages:

- the complex interconnections in the global economy, environment and society create many challenges;
- nature delivers hugely valuable services to humankind, determining our wellbeing and prosperity;
- when resource extraction destroys ecosystems, poor people bear many of the costs but receive few of the benefits;
- global consumption patterns are a key driver of humanity's environmental impacts;
- how and where we live affects our consumption and therefore our environment;
- in addition to demanding resource inputs, our economies threaten our ecosystems and the services they provide by generating pollution and waste;
- globalisation creates new challenges but it also offers solutions including sharing of innovations and knowledge and new mechanisms of governance.

Throughout Signals 2011, we highlight examples of innovation to challenge the perception that we are passive onlookers. Indeed, a key message of Signals 2011 is the role we all play in shaping the world today and the role we can play in shaping the future. With the right governance, economic incentives and attitudes, we can design a fairer, better future.

EDITORIAL

Gangi Bhuyan, her husband Sukru and their young family know the forest intimately. They must — without it they would starve.

For five months each year Gangi and Sukru feed their family from a tiny plot of land. They supplement this with food from the forest. For another four months they depend entirely on the forest — harvesting vegetables, seeds, fruit and medicines. The rest of the year they are forced to migrate to cities such as Bangalore or Mumbai where they work as labourers. They dread this time as they are often separated from each other and the city slums can be unwelcoming and dangerous.

The Bhuyan family are Soura — an indigenous forest-dwelling tribe of the Gajapati region of Orissa, east India. Such is the wealth below the ground, Orissa is now key to global mineral supply. As a result, mining companies are queuing up to secure access to the region's forests. The stakes are high and the rewards can be great.

However, the tribal people are often on the losing side. As their land rights have never been properly recognised or documented their voice is not strong.

For these people the natural environment is their lifeline. Their situation is not unique. Across the world, the poorest of the poor are being affected by environmental degradation. Often, as you will read, this damage is driven by global demand for raw materials, which in turn is driven by human consumption. And that consumption is itself linked to demographics: the size and make-up of human populations.

By 2050 our population could be as much as 9 billion. ‘Could be’ because the truth is we simply don’t know exactly how our population will develop. This uncertainty is everywhere around us when we speak of the future. But it must not paralyse us into inaction. Rather, we must get better at taking the long view. In day-to-day life we are continuously confronted with long-term issues and plan accordingly. We must broaden this approach to include some of the major issues facing us as societies.

In this regard, 2011 and 2012 are critical years. 2012 represents the 20th anniversary of the United Nations ‘Earth Summit’ in Rio de Janeiro. Then, people from all walks of life agreed to rethink economic development and find ways to halt the destruction of irreplaceable natural resources and pollution of the planet — to shift to a path of ‘sustainable development’. These aspirations were later summed up in eight ‘Millennium Development Goals’ aimed at making sure that human development reaches everyone, everywhere, without sacrificing the environment.

In this context Signals 2011 can be seen as a reflection on the aspirations of twenty years ago — many of which are unrealised. Signals also sets out the challenge: the time is ripe to shift decisively to a sustainable, green, global economy.

The urgent need for this shift is becoming ever more apparent. Across the world, systemic crises threaten in areas such as finance, climate change, energy, biodiversity, ecosystems and demography. And the scale, speed and interconnectedness of global economic, social and environmental changes are creating unprecedented challenges.

However, opportunities abound. The shift to a sustainable, global green economy is possible and timely.

Since the ‘Earth Summit’ in Rio in 1992, many things have changed (although many more have stayed the same). Only now are we realising the environment’s full significance in determining humanity’s wellbeing. We cannot even begin to deal with poverty without also maintaining the natural systems that sustain our societies and economies. The poorest of the poor depend for their lives on nature and what it provides. Development in this context means securing their local environment first and foremost and then moving forward in other ways.

There is hope. Everywhere we go people are asking questions, finding out, innovating, demanding change. The Forest Rights Act in India is now facilitating the transfer of land rights to tribal communities. Gangi and Sukru Bhuyan have not received a title to the plot of land but some of their neighbours have. These one-sided, carefully laminated pieces of paper are displayed by their owners with a mixture of pride and surprise. The success of their neighbours means that the Bhuyan family has hope.

By the time the delegates congregate for the ‘Rio+20’ conference, the Bhuyans may have a piece of paper of their own. That would represent a tiny step in the context of global poverty, human development and our shared sustainable future. But empowering one more family symbolises the opportunities that exist for millions of others. In a globalised world in which we are all connected it also represents a more secure future for us all.

Professor Jacqueline McGlade,
Executive Director

Complex challenges in an interconnected world

One of the main conclusions in EEA's flagship report, SOER 2010, appears obvious: 'environmental challenges are complex and can't be understood in isolation'.

Simply put, this means that environmental issues are joined together and are often only one part of the larger jigsaw puzzle of challenges facing us and our planet. The truth is, we live in and depend on a highly interconnected world made up of many distinct but related systems — environmental, social, economic, technical, political, cultural and so on.

This global interconnectivity means that damaging one element may cause unexpected impacts elsewhere. The recent global financial crash and the aviation chaos caused by an Icelandic volcano demonstrate how sudden breakdowns in one area can affect whole systems.

This interconnectivity is often referred to as 'globalisation' and it's not a new phenomenon. In Europe, globalisation has allowed us to prosper as a continent and take a leading economic role for a long time. Along the way we have used a great deal of our own natural resources as well as those of other nations. Our 'footprint' or impact is broad and goes well beyond our borders.

Indeed, driving forces at the heart of globalisation are expected to be a major influence on Europe and our environment in the future. Many of them are beyond our control. For example, the world population could exceed nine billion by 2050, with major environmental consequences. Asia and Africa will most likely account for most of the population growth, while only around 3 % of the growth will occur in the most developed countries (Europe, Japan, USA, Canada, Australia and New Zealand).

Environmental challenges connected with global drivers of change

A range of unfolding trends are shaping the world. We call some of these trends 'global megatrends' as they cut across social, technological, economic, political and even environmental dimensions. Key developments include changing demographic patterns or accelerating rates of urbanisation, ever faster technological changes, deepening market integration, evolving economic power shifts or the changing climate.

Such trends have huge implications for global demand for resources. Cities are spreading. Consumption is increasing. The world expects continued economic growth. Production is shifting towards newly emerging economies, which will grow in economic significance. Non-state actors could become more relevant in global political processes. And accelerating technological change is anticipated. This 'race into the unknown' brings new risks – but also offers great opportunities.

The future impacts on Europe's environment of these 'global megatrends' is the subject of one section of SOER and underpins Signals 2011. These key trends have huge implications for our global environment and our stewardship of the resources contained therein. Throughout Signals 2011 there are sections entitled 'Earth 2050 global megatrend' where we look forward at a key trend and assess its impact on Europe's environment in the future.

We can't say exactly what the earth will look or feel like in 2050. However, many trends are already well established. How they continue comes down to the choices we make now. In that sense, the future is in our hands. Let's choose wisely. Our grandchildren and everybody else in the family portrait 2050 will thank us for it.

Web link: SOER 2010:
www.eea.europa.eu/soer

Global megatrends:
www.eea.europa.eu/soer/europe-and-the-world/megatrends

THE YEAR OF THE FOREST: CELEBRATING FORESTS FOR PEOPLE

- 1.6 billion people depend on forests for their livelihoods
- Forests are home to 300 million people worldwide

UN Forum on Forests

'In the city, we are split up from one another and it is dangerous. The forest is our birthplace and our home. We can't leave this place. The forest gives us security which disappears in the city,' a member of the Soura tribe, Orissa, East India, says.

Forests are not just trees: they are communities

2011 is the United Nations Year of the Forest, focusing on the people who live in and depend on forests around the globe. Throughout the year we will reflect on the role forests play in our lives. Forests are communities made up of plants, animals, microorganisms, soil, climate and water. Forests are also the complex interrelationships among organisms (including us) and the environment they live on.

Forests cover over 30 % of the earth's surface. They are one of the most important 'storehouses' of biological diversity on land: home to more than two-thirds of known terrestrial species and the largest share of threatened species on earth.

Forests help keep us alive: they clean our air and our water. They nurture our soil and provide many of us with food, shelter and medicine. Forests regulate the local, regional and global climate and store carbon that could otherwise accumulate in the atmosphere, contributing to global warming.

On the other hand, forests are also full of valuable resources that we can use. Today forests represent some of the key choices we face as a species. Can we balance the desire to exploit forest resources and land with the other crucial roles they play in our planet's life-support system?

Over the coming pages you will meet interesting people who have strong connections with forests around the globe. From the Congo to India and back to Europe we will hear stories about forests and the people living there. Celebrate 2011 by thinking about your local forest and what it means for you and future generations.

1. LIVING IN AN INTERCONNECTED WORLD

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'…the sheer weight of the combined aspirations and lifestyles of 500 million Europeans is just too great. Never mind the legitimate desires of many other billions on our planet to share those lifestyles.... We will need to change the behaviour of European consumers. To work on people's awareness and to influence their habits.' Janez Potočnik, European Union Commissioner for Environment (March 2010).

Five years ago Bisie was jungle. Located in the Wailikale territory, east Congo, it is now a cramped township as a result of the discovery of cassiterite, a derivative of tin that is a crucial component in the circuitry of many modern gadgets. It's in your mobile phone, laptop, digital cameras and gaming devices.

Cassiterite is widely sought after and very valuable. Indeed our demand for consumer electronics has resulted in a price surge for tin ore. Prices on the London Metal Exchange have increased from around USD 5 000 per tonne in 2003 to more than USD 26 000 per tonne in late 2010, according to the Financial Times.

Today a range of natural resources in the forests and jungles of the Congo are in great demand. Nevertheless, the Congo remains extremely poor. During the past 15 years more than 5 million have died in eastern Congo in a war between several armed groups. And it is estimated that no less than 300 000 women have been raped.

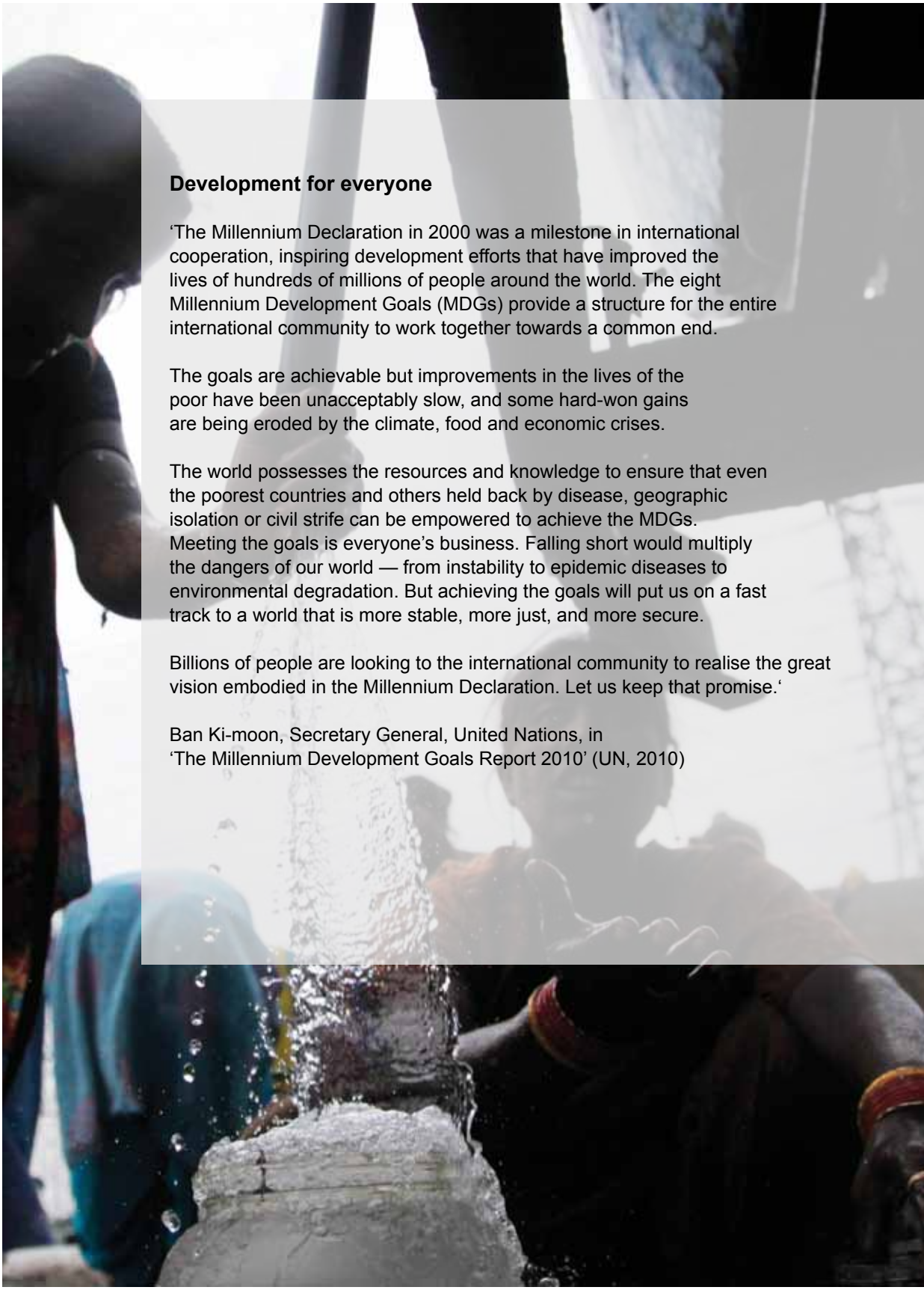
'As global citizens we are all tied to the violence taking place in the Congo. The extraction of conflict minerals that sustains this conflict connects us all.'

Margot Wallström, UN Secretary-General's Special Representative on Sexual Violence in Conflict. You can read more on sexual violence, war and minerals here: **www.eea.europa.eu/signals**

This has happened before in the Congo, which was colonised just over 100 years ago by King Leopold II of Belgium. He became one of the richest men in the world by selling rubber from the Congo. This was the time of industrialisation and the booming car industry depended on rubber.

Our longstanding demand for natural resources to feed, clothe, house, transport and entertain ourselves is accelerating just as stocks of certain resources are reaching critically low levels.

Natural systems are also subject to new demands, such as for plant-based chemicals or for biomass to replace fossil fuels. Taken together, these mounting demands on a shrinking resource base point to serious risks to Europe's development.



Development for everyone

‘The Millennium Declaration in 2000 was a milestone in international cooperation, inspiring development efforts that have improved the lives of hundreds of millions of people around the world. The eight Millennium Development Goals (MDGs) provide a structure for the entire international community to work together towards a common end.

The goals are achievable but improvements in the lives of the poor have been unacceptably slow, and some hard-won gains are being eroded by the climate, food and economic crises.

The world possesses the resources and knowledge to ensure that even the poorest countries and others held back by disease, geographic isolation or civil strife can be empowered to achieve the MDGs. Meeting the goals is everyone’s business. Falling short would multiply the dangers of our world — from instability to epidemic diseases to environmental degradation. But achieving the goals will put us on a fast track to a world that is more stable, more just, and more secure.

Billions of people are looking to the international community to realise the great vision embodied in the Millennium Declaration. Let us keep that promise.‘

Ban Ki-moon, Secretary General, United Nations, in
‘The Millennium Development Goals Report 2010’ (UN, 2010)

Europe and the new balance of power

As the 21st century progresses we see that more and more key global dynamics are outside Europe's influence and control. This has implications in terms of access to resources.

Globally, we see marked uncertainty regarding supply and access to a range of crucial natural resources: food, water and fuels. Europe's need for resources could in coming decades be matched by those of China, India, Brazil and others, putting even greater pressure on the environment.

Indeed, some developing nations are racing towards levels of economic activity equal to Europe's: their populations, consumption levels and production capacity have the potential to dwarf ours. Their legitimate quest to develop economically and socially will lead to greater use of global stocks of raw materials. China in particular is proving adept at securing access to raw materials from a range of countries and regions.

The human population is growing, technologies are advancing and the power of non-governmental private actors such as multinationals is expanding. In the context of weak international governance mechanisms, these forces threaten a global 'free for all' in securing and accessing natural resources.

Globalisation: a framework for human development

The very nature of globalisation also provides opportunities and structures for a different outcome. The seeds exist for effective, fair global governance of matters critical to us all.

The United Nations 'Millennium Development Goals' are just one example of a global policy process devoted to equitable and sustainable human development.

International climate talks have made progress over the past year. The Cancún Agreement, signed in December 2010 acknowledges for the first time in a United Nations document that global warming must be kept below 2 °C compared to the pre-industrial temperature.

The agreement confirms that developed countries — whose industrial activities and footprint initiated manmade climate change — will mobilise USD 100 billion in climate funding for developing countries annually by 2020. It also establishes a Green Climate Fund through which much of the funding will be channelled.

Innovations such as the so-called 'REDD+' (Reducing Emissions from Deforestation and Forest Degradation) mechanism enable action to reduce emissions from deforestation and forest degradation in developing countries. None of these activities would be possible without global governance structures and a spirit of cooperation.

The European Union is seeking to promote collaborative responses to common challenges and goals. The EU's 2020 Vision sets out a strategy for growth designed around a smart, sustainable and inclusive economy.

A growing role for non-state actors

Global political processes clearly have an important role to play in ensuring that economic growth doesn't destroy the underlying natural systems. But another defining characteristic of globalisation is the growing importance of non-government actors.

Multinational businesses, such as mobile phone and IT companies, can also play a key role in delivering sustainable development. The first company to certify their products as free of 'conflict' minerals will have a positive impact on many lives and massive marketing potential.

We must take the innovative research and development examples of leading companies and apply them to the challenges facing us. We must mobilise the full range of problem-solving capacity available to us towards continued, sustainable development.

As citizens — individually and through non-governmental organisations — we are also mobilising. Some of us take to the streets to protest. Some are investing their time and energy in rediscovering food or community activism. Many are adjusting their consumption choices to minimise environmental impacts and ensure a fair return for producers in developing countries. The point is: globalisation is affecting all of us and we're beginning to wake up to the fact that we are not powerless: we can shape things.

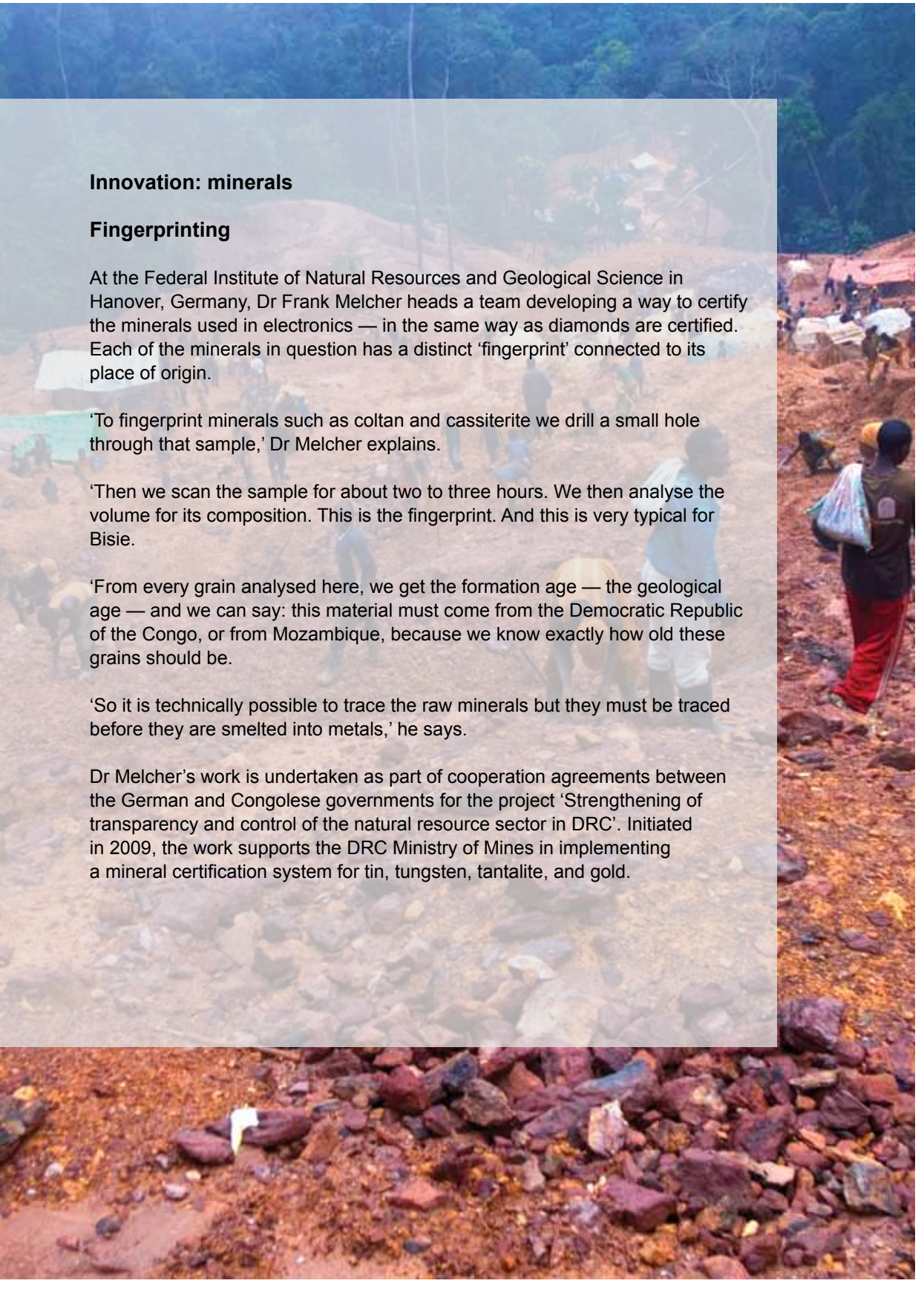
Develop, create, work and educate

We must continue to develop, to create, to work and educate ourselves, and become smarter about our use of natural resources. For example, the first, critical aim of the Millennium Development Goals is to secure the natural environment on which the poorest of the poor depend for their daily survival.

This means managing natural resources in a way that that allows local communities to survive, then benefit and then advance. This is one of the major challenges facing us globally as we shall read in the next chapter on resources and forest-dwelling people in India.

It's a challenge in which Europeans have a large part to play. Managing global resources sustainably will be key to equitable economic prosperity, greater social cohesion and a healthier environment.

Read 'Pathways to a Green Economy', a recent UN report, here: **www.unep.org/greeneconomy**



Innovation: minerals

Fingerprinting

At the Federal Institute of Natural Resources and Geological Science in Hanover, Germany, Dr Frank Melcher heads a team developing a way to certify the minerals used in electronics — in the same way as diamonds are certified. Each of the minerals in question has a distinct 'fingerprint' connected to its place of origin.

'To fingerprint minerals such as coltan and cassiterite we drill a small hole through that sample,' Dr Melcher explains.

'Then we scan the sample for about two to three hours. We then analyse the volume for its composition. This is the fingerprint. And this is very typical for Bisie.

'From every grain analysed here, we get the formation age — the geological age — and we can say: this material must come from the Democratic Republic of the Congo, or from Mozambique, because we know exactly how old these grains should be.

'So it is technically possible to trace the raw minerals but they must be traced before they are smelted into metals,' he says.

Dr Melcher's work is undertaken as part of cooperation agreements between the German and Congolese governments for the project 'Strengthening of transparency and control of the natural resource sector in DRC'. Initiated in 2009, the work supports the DRC Ministry of Mines in implementing a mineral certification system for tin, tungsten, tantalite, and gold.

Eyewitness: the boy Chance

‘My name is Chance, I’m 16. I worked at the Bisie mine for three years. I heard that a mine had been discovered — close to where I live. I wanted to work and earn enough to build my own house.

It takes so long to crawl down and up again that I sometimes stayed down there for a week before coming up. Every month people die here, when one of these holes collapses,’ Chance says.

Bisie is the biggest mine in the area. It is located approximately 90 kilometres inside dense forest and reaches 100 metres underground. The mines are often little more than a hole in the ground. Dozens of men and boys crowd each mine and conditions are atrocious.

Five years ago this place was jungle. Today as many as 20 000 people are employed carrying and mining the minerals here. They come from far away with a dream of making money. But living expenses are so high due to the informal taxes demanded by armed groups that most people can’t afford to get out again. There are hundreds of such mines all over east Congo. Bisie alone is estimated to produce minerals worth USD 70 million a year.

Once above ground, the minerals are brought to towns such as Ndjingala, Osakari and Mubi. The carriers walk the 90 kilometres in two days, bearing as much as 50 kilos each. Every day 600 carriers come out of the woods with a total of 30 tonnes of minerals.

Cassiterite from Bisie is bought by middlemen linked to exporters and international traders who sell the ore on to smelters on the open market. At the smelters, the tin is refined and sold either directly to solder manufacturers, or through international metal exchanges. Finally, tin solder is sold to manufacturers for use in the production of electronic gadgets.

‘The first time I crawled down the hole — I could not stay for very long. I wasn’t used to the heat, so I could only stay for two hours down there. Again and again I had to go down, work a lot and then come up again.’

‘It was very hot, and I couldn’t handle it. I ran away from Bisie mine during a massacre. But I didn’t achieve my dream — so now I came back home to finish school.’

The World Wide Fund For Nature (WWF) calls the Democratic Republic of the Congo (DRC) one of the most important centres for biodiversity in the world. WWF says the challenge is to preserve the forests of the Congo, their species and the carbon sequestrated in the swamp forests while improving the livelihoods of the Congolese people.

This is a global challenge. In its Millennium Development Goals Report 2005, the United Nations states that ‘despite the many benefits of globalisation, nearly half the world’s 2.8 billion workers still live on less than USD 2 a day. More than 500 million of these workers subsist on half that much.’ It goes on to say that ‘reducing poverty will require more jobs and more productive employment.’

The text in this section of Signals is partly based on the documentary film ‘Blood in the Mobile’, directed by Frank Piasecki Poulsen. Congo photography copyright Mark Craemer.

Read an interview with photographer Mark Craemer:
www.eea.europa.eu/signals

Earth 2050 global megatrend: a new global order

Why is this global power shift important for you?

When countries grow relatively fast they often gain in economic power because of their enlarging production and consumption markets. They may exercise that power at international negotiations on economic matters (such as trade barriers and product standards). But they can also use that influence in other areas, including in the context of environmental negotiations.

The resources that fuel national economies also influence the international balance of power. Owning essential resources may further improve emerging economies' competitiveness and influence, particularly given the uneven distribution of resources globally. For example, more than half of the world's stock of lithium, a metal at present essential for hybrid and full-electrical cars, is believed to be located in Bolivia.

The global use of Neodymium, which is an essential material for many high tech laser technologies, is expected to quadruple over the next 30 years. The element is only available in quantity in China. Growth in related industries will be almost totally dependent on China and its production capacity. The consequences for both the states that possess such resources and the economies reliant on imports will be considerable.

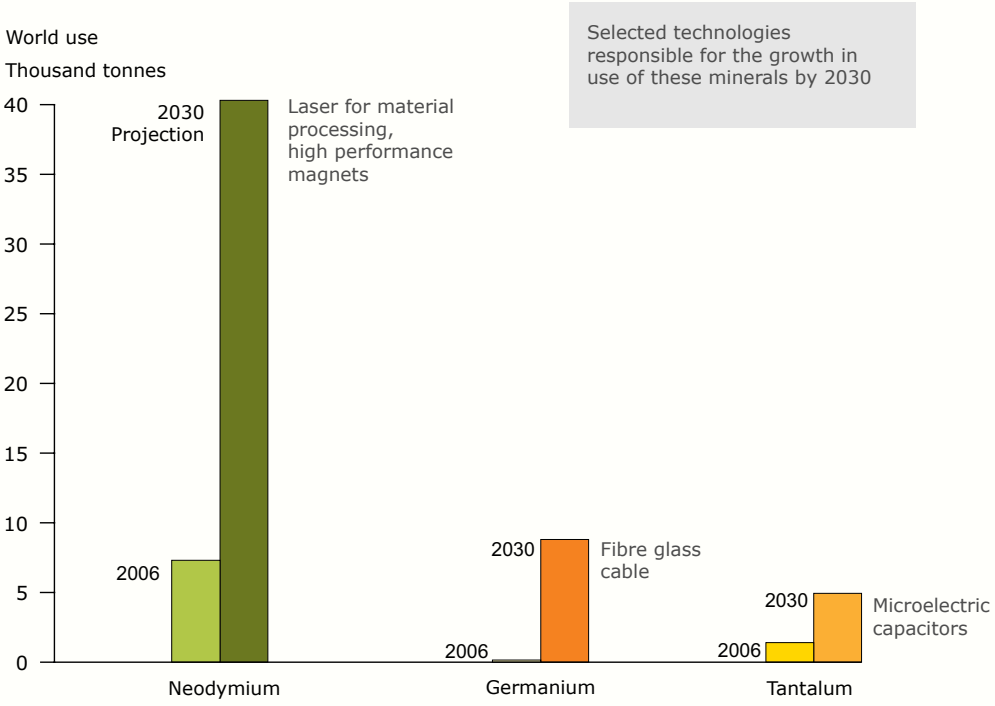
Global power is shifting. One superpower no longer holds sway and regional power blocs are increasingly important, economically and diplomatically. As global interdependence and trade expands, Europe will benefit if it can expand its resource efficiency and knowledge-based economy.

Future economic power shifts may mean that the EU wields less global influence in the future. In view of current changes in global governance mechanisms, designing policies to represent European interests effectively on the international stage will be a growing challenge.

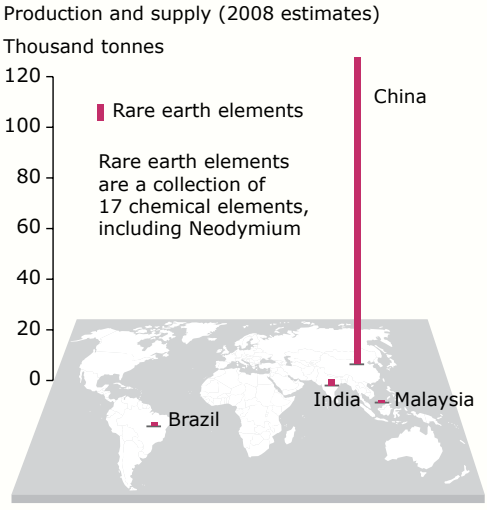
Graph 1: Selected raw materials

Why is intensified global resource competition important for Europe? Access to natural resources is a crucial factor for Europe's production base. Europe is relatively resource-poor and needs to import much of the resources it requires.

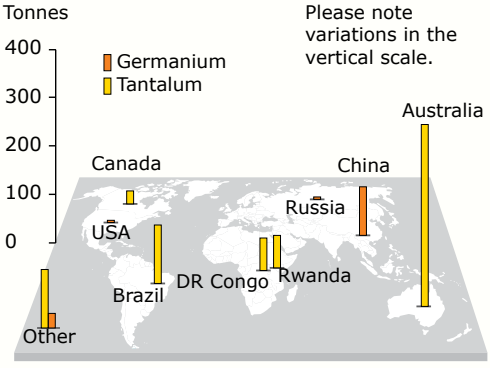
For more information see: Global megatrends: intensified global competition for resources: **www.eea.europa.eu/soer/europe-and-the-world/megatrends**



Sources: Fraunhofer, 2009; USGS, 2004.



Source: USGS, 2010, Mineral Commodity Summaries.



Source: USGS, 2010, Mineral Commodity Summaries.

2. HEALTH IN A CHANGING CLIMATE

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In August 2007, local health authorities in Italy detected a high number of cases of an unusual illness in Castiglione di Cervia and Castiglione di Ravenna, two small villages divided by a river. Almost 200 people were affected and one elderly man died (Angelini et al., 2007).

After detailed investigation, the illness was found to be Chikungunya, an insect-born virus transmitted to humans by the *Aedes* or 'tiger' mosquito more common in Africa and Asia. The source of the infection was traced to a man holidaying in the region.

It is believed that the sick man was infected before travelling to Europe but was bitten by a tiger mosquito in Italy. The tiger mosquito is a vector or carrier of the virus and the insect in question is believed to have spread the virus to another person in the village. This set off a chain reaction, with tiger mosquitoes biting infected people and spreading the virus until a mini-epidemic developed.

A web of interactions

The outbreak of Chikungunya depended on an intricate web of interactions and conditions that reveal some of the health risks and challenges we face in a globalised world. Tourism, climate change, trade, movement of species and public health all played a part in the situation.

The tiger mosquito is believed to have been introduced to Europe via a range of imported goods — from ornamental plants such as 'lucky bamboo' to used tyres. The mosquito larva has been found in many parts of Europe but only survives outdoors in warmer, southern countries or in greenhouses further north — in the Netherlands, for example.

Dengue and West Nile Fever are also now found in Europe and are also transmitted by mosquito bites. According to the European Centre for Disease Prevention and Control (ECDC) in Stockholm, Sweden, since the first large outbreak in Romania in 1996, West Nile Fever infection has become recognised as a major cause of public health concern in Europe. No vaccine is currently available and the main preventive measures are aimed at reducing exposure to mosquito bites.

Intensive food production

We may be creating the conditions necessary for the spread of infectious disease — conditions that didn't exist before. The industrialisation of food production, for example, is a cause for major concern.

By intensively breeding one type of animal, we risk producing 'monocultures' with little genetic variability. These animals are very susceptible to diseases created by poor hygiene or infection from wild animals, such as birds. Once inside the monoculture, the diseases can easily mutate and spread even to the people working with the animals in question. Overuse of antibiotics has become an accepted method of compensating for the lack of natural resistance — a practice that could cause its own problems.

'Modern efficient agriculture, just like public health, looks to science and medicine to meet some of the demands of a globalised world. Although modern agriculture has benefited many of us with cheaper and plentiful food supplies it can also lead to unforeseen pressures and problems,' says Dr Marc Sprenger, Director of the ECDC.

‘For example, as a result of the extensive use of antibiotics in agriculture, their effectiveness may decrease as bacteria become more resistant, which can potentially have an impact on humans too,’ Dr Sprenger says.

Joining up the dots in Europe

New species and new diseases arriving in Europe are just some of the health impacts of climate change. Many more environmental and social impacts may ultimately affect human health through changes in the quality and quantity of water, air and food, and altered weather patterns, ecosystems, agriculture and livelihoods.

Climate change may also exacerbate existing environmental problems, such as air pollution, and disrupt sustainable water supplies and sanitation services.

The heat wave in Europe in summer 2003, with a death toll exceeding 70 000, highlighted the need for adaptation to a changing climate. The elderly and people with particular diseases are at higher risk, and deprived population groups are more vulnerable. In congested urban areas with high soil sealing and heat absorbing surfaces, the effects of heat waves can be exacerbated due to insufficient cooling at night and poor air flows.

For populations in the EU, mortality has been estimated to increase by 1–4 % for each degree increase of temperature above a (locally specific) cut-off point. In the 2020s, the estimated increase in heat-related mortality resulting from projected climate change could exceed 25 000 per year, mainly in central and southern European regions.

Innovation: environment and health

Efforts to fight climate change will improve air quality

The European Union’s Climate and Renewable Energy (CARE) package aims to:

- reduce greenhouse gas emissions by 20 % by 2020;
- increase the share of renewable energy by 20 % by 2020;
- improve energy efficiency by 20 % by 2020.

The efforts required to meet these targets will also cut air pollution in Europe. For example, improvements in energy efficiency and increased use of renewable energy will both lead to reduced fossil fuel combustion — a key source of air pollution. These positive side effects are referred to as the ‘co-benefits’ of climate change policy.

It has been estimated that the above package will cut the annual cost of meeting EU air pollution targets by billions of euros. And the savings to the European health services could be as much as six times greater.

‘The discussion connecting health, land use, agriculture, tourism, trade and climate change needs to develop in an imaginative way. We may not be connecting public health and environment or climate change appropriately right now,’ Dr Sprenger says.

‘For example, I recently visited a department of health and asked who was in charge of climate-change-related issues and was told no one was. This is not passing judgement on any particular department or authority but it does illustrate that we need to change the way we think about these problems as they are all connected,’ Dr Sprenger says.

‘Public health systems must begin to adapt and open up to the possibility of new disease and new climate conditions. People may be misdiagnosed at the moment because their doctor is not familiar with a new virus. Many look and feel like flu. We need new tools to deal with the new challenges such as training, and facilities such as laboratories have to be flexible and adaptable,’ he says.

Visit the website of the ECDC:
www.ecdc.europa.eu

For more information and a full list of references, refer to the SOER 2010 Synthesis.

For a full interview with Dr Sprenger, visit the Signals website:
www.eea.europa.eu/signals

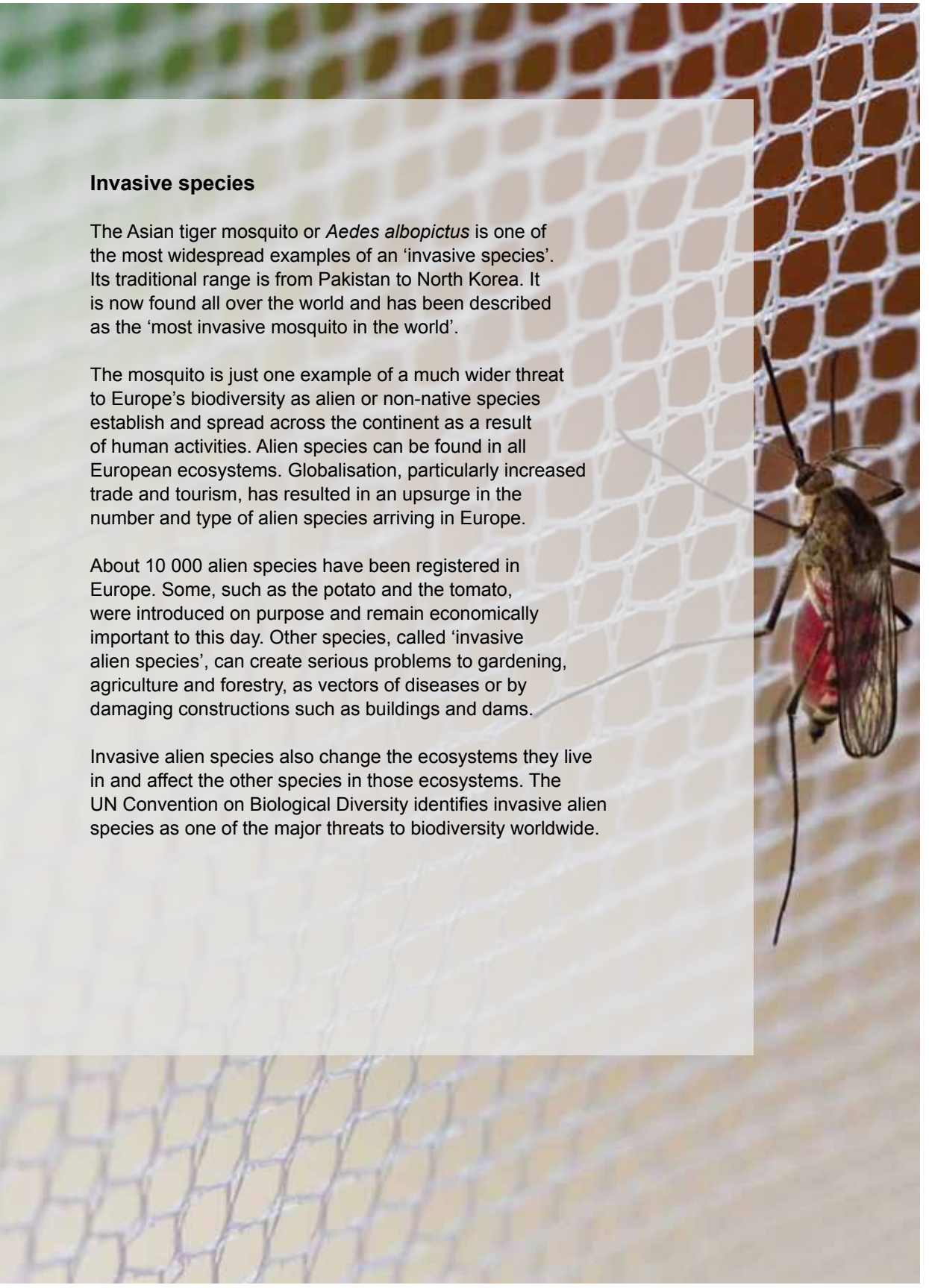
Invasive species

The Asian tiger mosquito or *Aedes albopictus* is one of the most widespread examples of an ‘invasive species’. Its traditional range is from Pakistan to North Korea. It is now found all over the world and has been described as the ‘most invasive mosquito in the world’.

The mosquito is just one example of a much wider threat to Europe’s biodiversity as alien or non-native species establish and spread across the continent as a result of human activities. Alien species can be found in all European ecosystems. Globalisation, particularly increased trade and tourism, has resulted in an upsurge in the number and type of alien species arriving in Europe.

About 10 000 alien species have been registered in Europe. Some, such as the potato and the tomato, were introduced on purpose and remain economically important to this day. Other species, called ‘invasive alien species’, can create serious problems to gardening, agriculture and forestry, as vectors of diseases or by damaging constructions such as buildings and dams.

Invasive alien species also change the ecosystems they live in and affect the other species in those ecosystems. The UN Convention on Biological Diversity identifies invasive alien species as one of the major threats to biodiversity worldwide.



Earth 2050 global megatrend: changing patterns of disease

Health is key to human development and we increasingly consider the environment as a key factor determining human health. Globally, health has improved in recent decades, largely in step with improved life expectancy. However, the disease burden is unevenly distributed across the population, varying with, for example, gender and social and economic status.

Over the next 50 years, global health megatrends will continue to have direct and indirect relevance for policymakers, particularly by prompting investment in preparing for emerging diseases and pandemics.

Why are global health patterns important for you?

Health impacts can be direct. The risks of exposure to new, emerging and re-emerging diseases, to accidents and new pandemics increase with globalisation (through, for example, travel and trade), population dynamics (such as migration and ageing), and poverty.

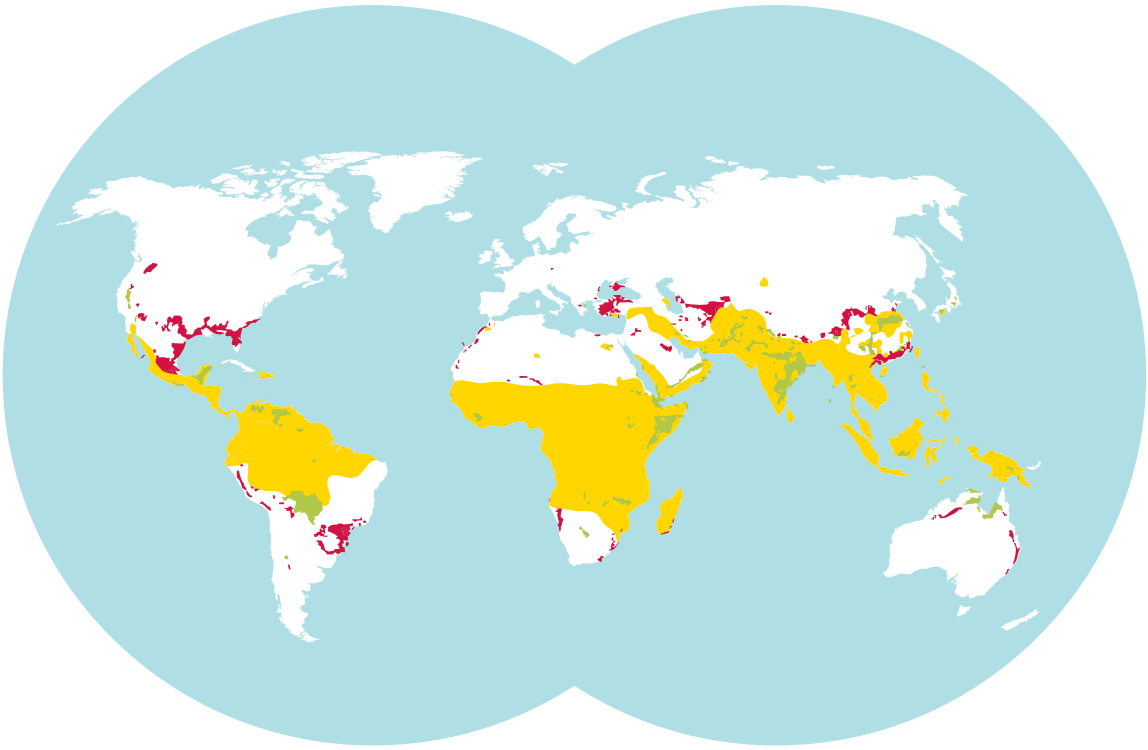
Growing resistance to antibiotics and other drugs, and neglect in dealing with many tropical diseases also give rise to concern in both developed and developing countries.

Technology can play an important role in supporting improvements in health. It may also facilitate spatial monitoring of health patterns, allowing mapping and analysis of geographic patterns of disease that were previously overlooked.

The possibility of exposure to new, emerging and re-emerging diseases, to accidents and new pandemics grows with increased mobility of people and goods, climate change and poverty.

Graph 2: Health, malaria by 2050

Plasmodium falciparum is a parasite that causes malaria in humans. It is transmitted by mosquito. Changing climate and land use conditions mean that the mosquito could spread to new areas bringing malaria with it. However, it could also die out in existing areas. The areas of appearance and disappearance are about equal and have about the same number of inhabitants (about 400 million in each).



Current distribution of *falciparum* malaria [1]

Unsuitable climate for vector and parasite by 2050 (where malaria could disappear)

Suitable climate for vector and parasite by 2050 (where malaria could appear) [2]

[1] *Plasmodium falciparum* is a parasite that causes malaria in humans. It is transmitted by the *Anopheles* mosquito. The current distribution represents the maximum extent of the distribution and its vector.

[2] The areas of appearance and disappearance are about equal in extent and have about the same number of inhabitants (about 400 million each). These assumptions are based on the HadCM2 high climare scenario.

Sources: Rogers, D. and Randolph, S., 2000, *The Global Spread of Malaria in a Future, Warmer World*; Ahlenius, H., 2005, UNEP/GRID-Arendal Maps and Graphics Library.

3. SHARING NATURE'S RICHES


NATION
WEST BENGAL

3. SHARING NATURE'S RICHES

Of the 8.2 billion tonnes of materials consumed in EU-27 Member States in 2007, minerals accounted for 52 %, fossil fuels for 23 %, biomass for 21 % and metals for 4 %.

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Thousands of kilometres from Europe in the state of Orissa nestled up against the Bay of Bengal, trucks trundle past in their thousands. This is east India, the legendary spring of India's mineral wealth and a major source of materials for global industrial growth in the past. The mineral wealth in this part of India is still among the most valuable in the world and its industrial revolution may only be starting.

The tribal people living in the forest here have a lot to lose and little to gain. The forest tribes are not well protected — their rights have never been set down or properly recognised. In a small tribal village deep in the forests covering the district of Gajapati, married couple Gangi Bhuyan and her husband Sukru Bhuyan live with their young family in and around the forest.

For about five months of the year they feed their family from the less than half acre plot of land they cultivate on the verge of the forest that surrounds Raibada, their village. During this time they also harvest vegetables, seeds, fruit, medicine and building materials (such as grass) from the forest. For a further four months, this is their main supply of food. Without the forest they would starve. For the remaining three months they are forced to migrate to large urban areas such as Bangalore or Mumbai where they work as labourers.

Wealth below the ground — poverty above it

Orissa, located in peninsular east India on the Bay of Bengal, is richly endowed with a variety of minerals. Indeed the state is regarded as one of the most resource-rich states in the country. In terms of quality, the minerals found in Orissa are considered among the best in the world.

With its abundance of largely unexplored reserves of coal, iron ore, bauxite, chromite, limestone, dolomite, manganese, granite, tin, nickel, vanadium and gemstones, the state is experiencing a huge leap in industrialisation. For a few minerals Orissa also constitutes a significant share of world reserves, not just in terms of quantity but also quality. That is why international companies are queuing up to gain access.

Some of the minerals are used in India but a sizeable amount go elsewhere: China, Japan, South Africa, Russia, Korea, Korea, Thailand, Malaysia, Indonesia, Ukraine, Nepal, USA and of course, the European Union (Ota, A.B., 2006).

Fault lines of our global world

Orissa, with its combination of wealth in the ground and poverty above it, illustrates several fault lines of our global world. Here inequality, the relentless drive for natural resources and forced migrations come together. While mining in Orissa does bring economic benefits to the area, these returns are not shared equally. For the forest tribes the cost is high because their homes are in jeopardy as mining companies increasingly seek to gain access to their land.

Sixty per cent of Orissa's tribal populations live on land below which mineral wealth is buried. Traditionally, however, they have no record of rights over this land. Displacement of tribal people to enable economic development projects, including mining activities, has happened for some time. But the scale of the displacement has changed in recent decades, with economic developments since 1991 increasing the number and spread of displacements (Ota, A.B., 2006).

Growing impacts of Europe's resource use

In Europe, we rely heavily on natural resources to fuel our economic development and wealth. Our use of resources now exceeds local availability and we increasingly depend on resources from elsewhere in the world.

In fact more than 20 % of the raw materials we use in Europe are imported. And we use significantly more raw materials indirectly as we also import finished goods made elsewhere.

Our reliance on imports is particularly serious with regard to fuels and mining products. But Europe is also a net importer of fodder and cereals for European meat and dairy production. And more than half of EU fish supplies are imported; having depleted our own fish stocks, we are now doing the same elsewhere.

The environmental pressures related to extracting resources and producing traded goods — such as the waste generated, or water and energy used — affect the countries of origin. The resource impacts can be significant — in the case of computers or mobile phones they may be on a scale several orders of magnitude greater than the product itself. Yet, despite their importance, such pressures are seldom reflected in prices or other signals that guide consumer decision-making.

Another example of the natural resources embedded in traded products is the water required in growing regions for many exported food and fibre products. Such production results in an indirect and often implicit export of water resources. For example, 84 % of the EU's cotton-related water use lies outside the EU, mostly in water-scarce regions with intensive irrigation.

Read more and find a full list of references in the SOER 2010:
www.eea.europa.eu/soer/synthesis

Where nature's benefits flow

Natural resource use links to a range of environmental and socio-economic issues.

The Economics of Ecosystems and Biodiversity (TEEB process) — a major analysis of the global economic significance of biodiversity — sheds light on the links between biodiversity loss and poverty.

TEEB researchers sought to identify the immediate beneficiaries of many of the services of ecosystems and biodiversity. 'The answer', writes Pavan Sukhdev, Head of the UNEP Green Economy Initiative, 'is that it is mostly the poor. The livelihoods most affected are subsistence farming, animal husbandry, fishing and informal forestry — most of the world's poor are dependent on them (EC, 2008).

The impact of the loss of biodiversity in India also has serious implications for women as it severely affects their role as forest gatherers. Studies in the tribal regions of Orissa and Chattisgarh, have recorded how deforestation has resulted in loss of livelihoods, in women having to walk four times the distance to collect forest produce and in their inability to access medicinal herbs which have been depleted. This loss reduces income, increases drudgery and affects physical health. There is also evidence to show that the relative status of women within the family is higher in well-forested villages, where their contribution to the household income is greater than in villages that lack natural resources (Sarojini Thakur, 2008).

In Europe, we are often insulated from the direct impacts of environmental degradation — at least in the short term. But for poor people directly reliant on the environment for food and shelter, the effects can be severe. The weakest in society are often bear the greatest burden from the destruction of natural systems, while deriving few, if any, of the benefits.

Annual natural capital losses are typically estimated at an unimpressive few percentage points of GDP. If, however, we re-express these in human terms, based on the principle of equity and our knowledge of where nature's benefits flow — i.e. to the poor — then the argument for reducing such losses gains considerable strength.

This point applies around the globe. It is about the right of the world's poor to livelihood flows from nature which comprise half of their welfare or more, and which they would find it impossible to replace (EC, 2008).

Natural capital and ecosystem services

The concepts of ‘natural capital’ and ‘ecosystem services’ are at the heart of discussions about humankind’s relationship with the environment. To understand them, it’s useful to consider what natural systems actually do for us.

Take forests, for example. Forests can provide all sorts of food: fruit, honey, mushrooms, meat and so on. If properly managed, they can also deliver a sustainable flow of resources such as wood to the economy. But forests do a lot more too. For example, trees and vegetation help ensure a healthy climate locally and globally by absorbing pollutants and greenhouse gases. Forest soils decompose wastes and purify water. And people often travel far to enjoy the beauty and tranquillity of forests, or to engage in pastimes such as hunting.

All of these services — providing food and fibre, regulating the climate and so on — are valuable. We would pay a lot for machines that could do the same thing. For that reason, we should think of ecosystems as a form of capital, which provides services to the owner but often also to other people nearby and far off (as in the case of climate regulation). Crucially, we need to maintain our natural capital — not overexploiting the ecosystem and not over-polluting — if it is to continue providing these hugely valuable services.

The value of biodiversity in our forests

The primary reason for losing forest biodiversity is that its value is not well understood. For example the decision to convert one hectare of forest rich in biodiversity for agriculture or construction is usually based on the immediate benefits. Little attention is paid to the many non-measurable ecological services provided by these ecosystems.

Medicine in India's forests

In addition to rich flora and fauna, India also has one of the world's richest medicinal plant heritages. As many as 8 000 species of plants are regularly used as medicine by the people of India with 90–95 % coming from forests. Less than 2 000 of these plants are officially documented in the Indian system of medicine. Information on the rest is undocumented and transmitted by word of mouth and as traditional knowledge. Only 49 species are used in modern medicine.

Biodiversity is a form of insurance against human disease — a bank of knowledge holding potential cures for diseases such as cancer or AIDS. For example, the bark of the cinchona tree contains a drug used to fight malaria. Critically, we are often ignorant of society's loss when a species becomes extinct.

This section is based on the report *Green accounting for Indian states project: the value of biodiversity in India's forests* (Gundimeda et al., 2006)

The power to stay still

Globalisation is often characterised by movement — of people, goods, wealth and knowledge, for example. Standing still or staying put is not generally counted among the human rights we prioritise. But the forest people of Orissa and many others often crave just that: to be able to stay where they are, where they have food and shelter and contacts with their family and tribal relations. Where generations have felt safe and secure.

Indeed, as a tide of peoples moves towards cities and urban areas we should be thinking about empowering people to stay where they are.

Eyewitness: the Forest Rights Act — empowering the powerless

In the face of rapid industrialisation there is hope for the forest tribes of Orissa. On 1 January 2009, the Indian Parliament brought the Forest Rights Act into force, a year after it was originally passed. The Act gives forest dwellers the right to claim legal possession of the land they have lived on and cultivated for generations.

‘Keeping the people on the land in the areas they have been for generations is very important. When they leave, they lose the integrity of the village. The forest also suffers as it loses its guardians and is open to development and destruction. Social bonds also break down,’ says Dipankar Datta, Country Director Manager for Concern Worldwide — an international aid agency working in the area.

With the help of several non-governmental agencies, Gangi and Sukru Bhuyan (who were mentioned above) have made a claim under the Forest Rights Act to have their small plot recognised. They have not yet received an answer. Their neighbour Mohan Mandol has. As a result he has a carefully laminated title to his plot. ‘It gives me security. Nobody can ask me for bribes or threaten to evict me,’ he says.

The village has also made a collective application for rights to the section of the forest where they gather food, building materials and medical supplies. They have not yet received a collective right and so are still open to harassment from forestry officials, local government and mining companies.

Land is granted under the Forest Rights Act on the condition that the individual or village cares for the land. The title can be passed on to family members but cannot be sold.

‘The forests are actually better off when the tribal groups remain there. They generally cultivate a small piece of land on the lower grounds on the edge of the forest and simply harvest what is available in the forest without planting or damaging existing plants,’ says Sisir Pradhan, who also works for Concern Worldwide in Orissa.

Earth 2050 global megatrend: intensified global competition for decreasing stocks of resources

How will we survive in the intensifying scramble for scarce resources? The answer may well lie in more efficient production and resource use, new technologies and innovation, and increasing cooperation with foreign partners.

Key message: The world's stocks of natural resources are already decreasing. A larger and richer global population with increasing consumption needs will make bigger demands for many things including food, water and energy.

In the future, rising demand and falling supply could intensify global competition for resources.

SOER 2010: thematic assessment — consumption and the environment

Why are resources important for you?

Access to resources is crucial for any economy. As Europe is relatively resource-poor it needs to import many resources. This is especially true assuming continuing growth in demand for the resources needed to produce advanced technologies.

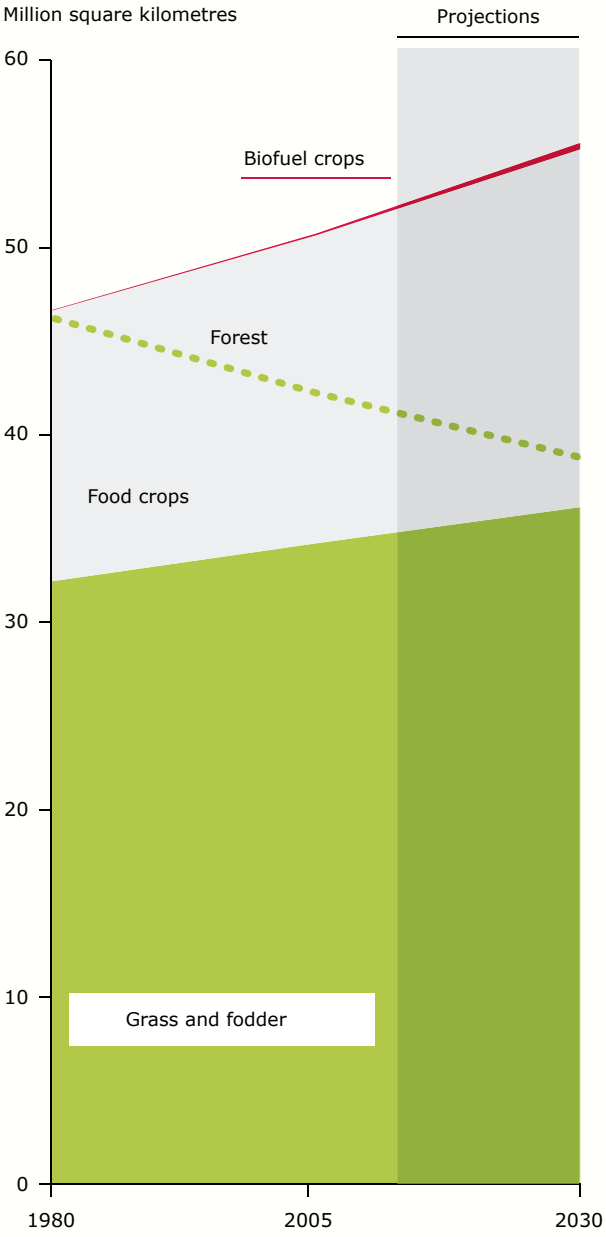
Raw materials (minerals, for example): Growing long-term scarcity of minerals and metals may induce us to turn to sources hitherto deemed uneconomic. Expanding mining has several environmental effects, including changing landscapes, polluting water and generating waste. Poorer quality mineral reserves may mean that exploiting such sources is less energy efficient.

Natural resources (food crops, for example): A larger, wealthier population by 2050 implies a demand for agricultural production that is much higher than today. This could have impacts in terms of: loss of natural ecosystems, damage to ecosystem services including carbon and water cycling, and impacts on provisioning of food and fibre.

Graph 3: Changing area of farmland

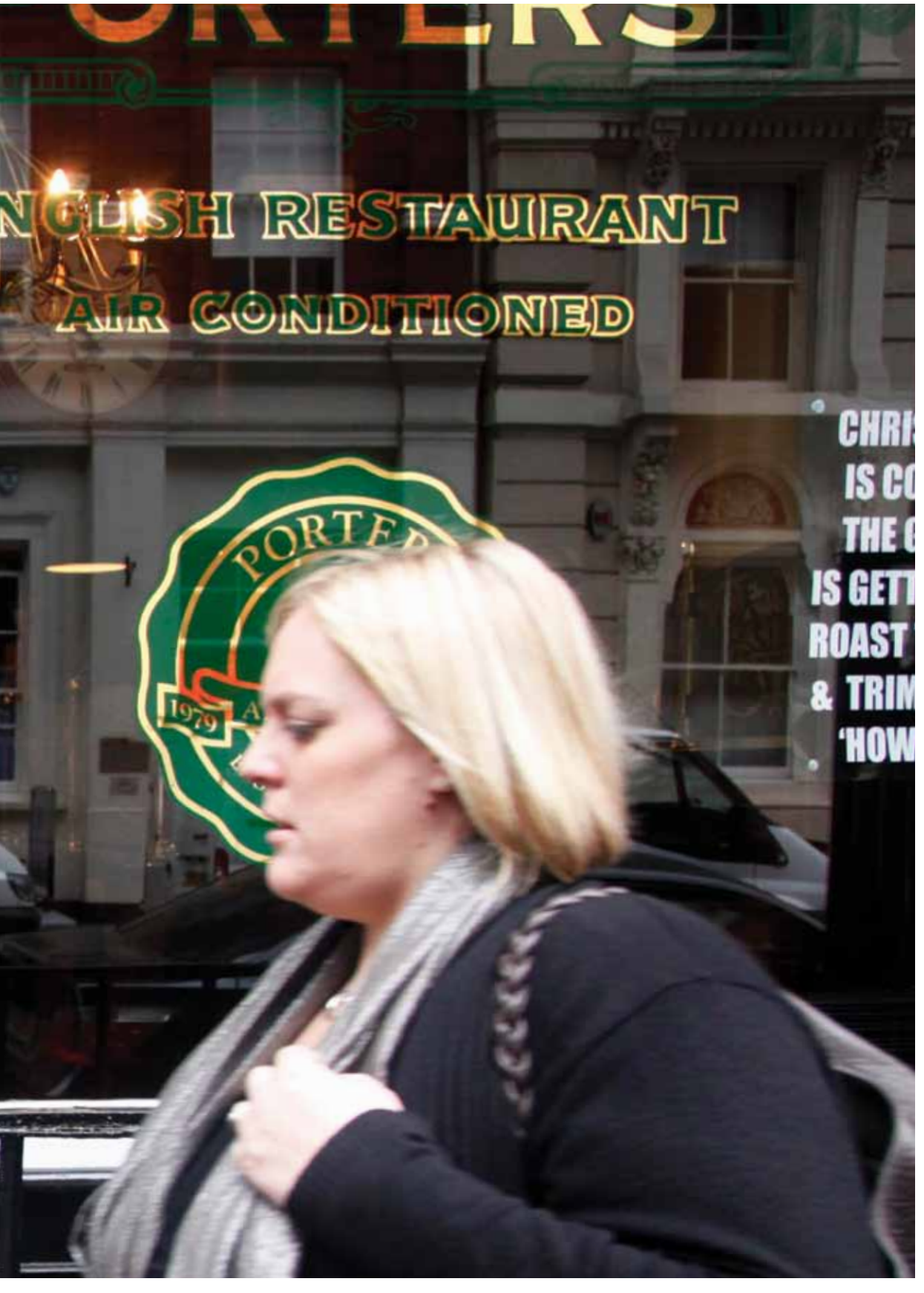
The world's population may grow significantly over coming decades and diets are shifting from cereals to meat as wealth increases. This has considerable implications for land use and natural ecosystems.

For more information see: Global megatrends: decreasing stocks of natural resources: **www.eea.europa.eu/soer/europe-and-the-world/megatrends**



Source: OECD, 2008, *OECD Environmental Outlook to 2030*.

4. CONSUMING UNSUSTAINABLY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4. CONSUMING UNSUSTAINABLY

Key message: A major reason why consumption negatively affects the environment and causes over-use of resources is because the costs to society of environmental and resource degradation are not fully reflected in the prices of goods and services. Many goods are cheap even though they harm the environment, ecosystems or human health.

SOER 2010

‘The smoke started to blow over the farm late one evening. It wasn’t nice. The ash was falling like snow,’ says Guðni Þorvaldsson, who runs the family farm in southern Iceland, just 8 km from the Eyjafjallajökull volcano.

‘We had to move the sheep, lambs and some of the horses indoors. The sheep had to be checked every three hours because it was the lambing season. Everything was grey. The largest bits of ash were 3 cm. I left footprints in it like snow.’

Guðni Þorvaldsson and the rest of the Icelandic population were remarkably well prepared for the massive eruption of the Eyjafjallajökull volcano in March 2010. A sophisticated monitoring system using global satellite positioning technology continually measures active volcanoes on Iceland. The readings suggested that the volcano was increasing in height — a sure sign of volcanic activity inside the mountain. Other monitoring activities confirmed this. Combined with an effective public information system, it shows just how valuable environmental information can be.

The rest of the world was perhaps not as well prepared. The impacts became global within days, mostly as a result of the massive ash cloud that formed and its impacts on air traffic. The ash moved at between 20 000 and 36 000 feet — the same altitude range that airliners use. Air space was shut over Europe, which in turn grounded Europe-bound flights from as far away as Sydney. The International Air Transport Association estimated that airlines were losing USD 200 million a day in revenues.

Almost any industry relying on air transport was affected. In Kenya, plants, flowers and vegetables grown for the European market rotted in the baking sun with losses in the millions of Euros. It is estimated that during the first few days after the eruption, ten million flowers — mostly roses — were thrown away. Vegetables, such as asparagus, broccoli and green beans were fed to cattle instead of ending up on European dinner tables. Supplies of fresh tuna from Vietnam and the Philippines began to run out in Europe.

The eerily quiet skies over Europe in April 2010 served as a reminder of just how much air traffic there normally is. Stories about rotting flowers and vegetables in Kenya remind us where our some of our flowers and vegetables come from. Indeed, the eruption illustrated clearly the connectivity between some of the key systems — manmade and natural — underpinning our globalised society.

Our big foot

The Ecological Footprint is one of a number of measures used to illustrate the demands humanity places on the planet. The footprint has limitations but it is also a relatively easy concept to understand: it estimates the area of land and sea required to provide the resources we use and to absorb our waste.

In 2003 the European Union's Ecological Footprint was 2.26 billion global hectares or 4.7 global hectares per person. In contrast, Europe's total productive area was 1.06 billion global hectares or 2.2 global hectares per person (WWF, 2007).

If all the world's citizens were to live as Europeans do, humanity would need more than two and a half planets to provide the resources we consume, absorb our wastes and leave some capacity for wild species (WWF, 2007).

Earth Overshoot Day

Earth Overshoot Day marks the day in the calendar when humanity's consumption of ecological resources that year is equal to what nature can produce in 12 months. It's the day our collective pay packet runs out and we start borrowing from the planet.

In 2010, the Global Footprint Network estimated that by August 21 humanity had used up all the ecological services — from filtering CO_2 to producing the raw materials for food — that nature could safely provide for all of that year. From August 21 until the end of the year, our ecological demands were met by depleting resource stocks and accumulating greenhouse gases in the atmosphere.

Did you know? An average European citizen uses about four times more resources than one in Africa and three times more than one in Asia, but half of one in USA, Canada or Australia.

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Feeding our habit

Both the 'Global Footprint' and 'Earth Overshoot Day' are rough estimates. But we know for certain that our demand for natural resources worldwide has increased tremendously over recent decades.
The main drivers have been growth in population, wealth and consumption. Most of the population growth has taken place in developing countries while the highest levels of wealth and consumption are in developed countries.

In Europe we maintain our ecological deficit — the difference between our footprint and our biocapacity — by importing goods and services from beyond our borders. We also export some of our waste. Essentially, we are becoming increasingly less self-sufficient.

As a result of growing global trade, an increasing share of the environmental pressures and impacts caused by consumption in EU Member States are felt elsewhere. While some of this shift is between EU Member States, a large part is outside the EU and beyond the reach of current EU production-related policies. This means we are exporting the impacts of our consumption to countries where environmental policy is often underdeveloped — effectively putting the local populations and environment under extreme pressure.

Global consumption is causing major, irreversible impacts on global ecosystems: 130 000 km^2 of tropical rainforest are being cleared each year. In addition, since 1960 a third of the world's farmland has been abandoned or exhausted as a result of overexploitation and soil degradation.*

Breaking the cycle

We need to become better at balancing the need to preserve natural capital and using it to fuel the economy. Increasing the efficiency of resource use is a key response. Recognising that our demands on natural systems are currently unsustainable, we basically need to do more with less.

Encouragingly, this is an area where the interests of the environmental and commercial sectors can be aligned: businesses prosper or falter based on their ability to extract maximum value from inputs, just as preserving the natural world and human wellbeing depends on us doing more with a limited flow of resources.

Resource efficiency is now a flagship initiative in the EU — a crucial element of the strategy for smart, sustainable and inclusive growth by 2020. Resource efficiency combines the principles of good business with good environmental practice by making more while reducing waste. It's like combining a healthier diet with an exercise regime — after a while you learn that you can do more with less.

* For more information see SOER thematic assessments: consumption and the environment: **www.eea.europa.eu/soer/europe/consumption-and-environment**

Purchasing power

Our consumption patterns of eating, driving or heating our homes, leads directly to environmental pressures. Of greater magnitude, however, are the indirect pressures that are created along the production chains of the goods and services consumed. This could be the impacts from mining or harvesting, the use of water to grow crops, or damage to local biodiversity from intensive farming or pollution.

As consumers, however, we can influence our environmental impacts, for example by purchasing sustainably produced food and fibres.

Globally, organic production and 'conservation farming' are gaining in popularity and success. The Conservation Cotton Initiative is just one example of sustainable approaches to production that lessen impacts on local environments.

Innovation: clothing

The Conservation Cotton Initiative

The Conservation Cotton Initiative Uganda (CCIU) was created by ethical clothing company EDUN, the Wildlife Conservation Society and Invisible Children to build sustainable farming communities in Uganda.

'CCIU is based in one of the poorest area of Uganda, Gulu District, an area recovering from a civil war, which displaced millions. The CCIU Programme assists farmers who are returning to their land by providing funding, tools, and training to grow a sustainable cotton business,' says Bridget Russo, Global Marketing Director, EDUN.

Farmers are trained to extend their fields by growing a combination of rotational food crops to meet their families' basic needs, and cotton, a cash crop for which there is international demand. Currently there are 3 500 farmers benefitting from the CCIU Programme and there are plans to increase this to 8 000 over the next three years.

This collaboration aims to improve the livelihoods of communities in Africa by supporting farmers to sustainably harvest conservation cotton.

Earth 2050 global megatrend: economic growth, rather than population growth, will be the core driver of consumption

The global population will still be growing in 2050 but more slowly than in the past. People will live longer, be better educated and migrate more. Some populations will increase as others shrink. Migration is only one of the unpredictable prospects for Europe and the world.

Why is global demography important for you?

Population growth influences most global megatrends. The stabilisation of the human population — projected to occur in the second half of the current century — will not solve the world's problems but can help efforts towards sustainable development.

A growing population will increase the use of natural resources, environmental pollution and land use changes like urbanisation. The shifts in global demographic trends will have direct impacts on local environments through climate change and resource consumption.

In Europe, migration from outside Europe may compensate to some extent for the natural decline of Europe's population and workforce but will require substantial policy interventions at the regional and national levels.

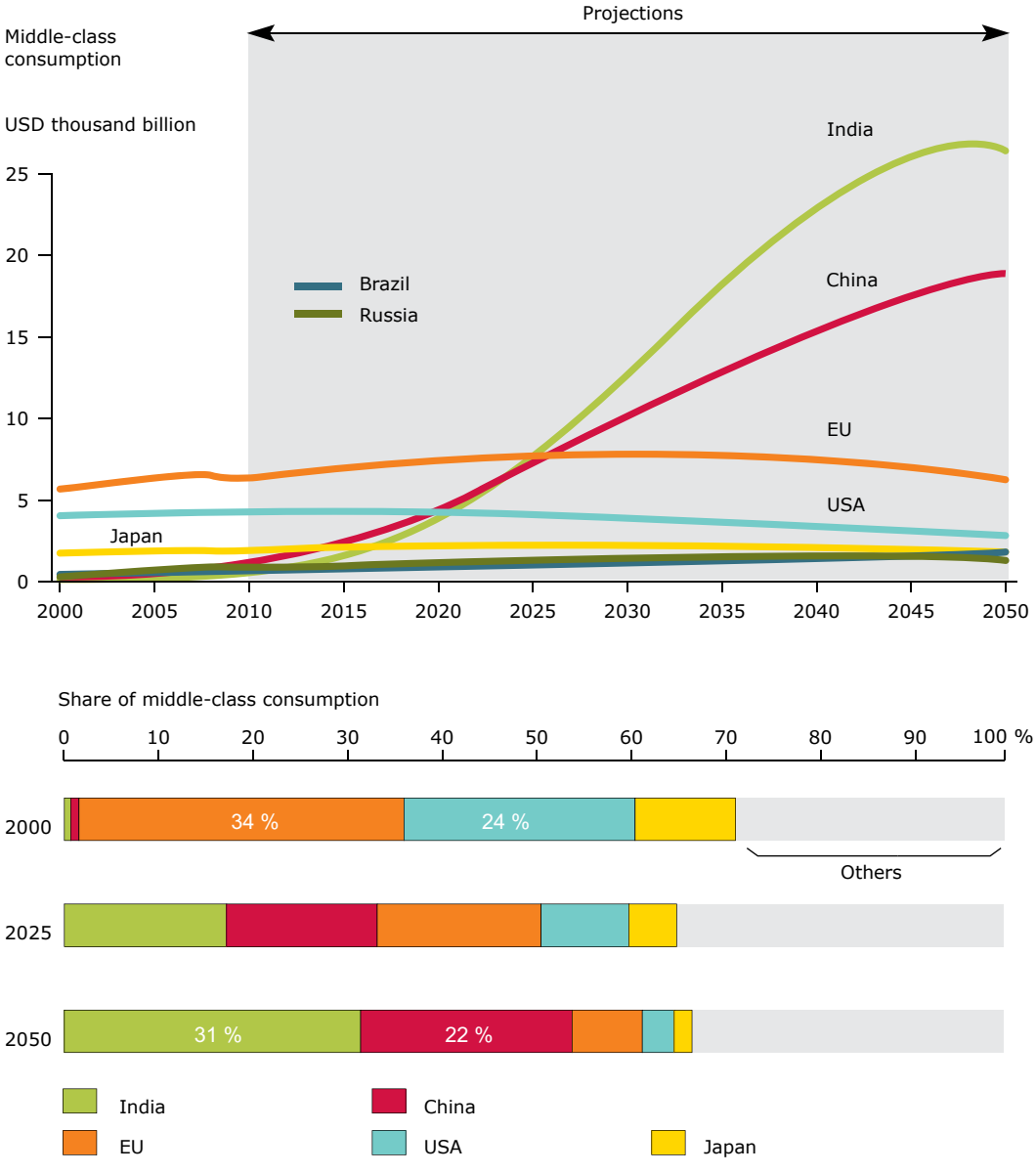
The idea that overpopulation will be a primary cause of planetary crisis is being discussed. It is not that there are too many of us for the planet to sustain but rather that lifestyles in the rising number of industrialised economies demand more resources than the planet can produce. The use of natural resources is driven more by economic growth than population growth in an increasing number of regions.

Graph 4: Change in middle class consumption

A bigger global middle class in 2050 will mean greater spending power

In this study, the middle class is defined in terms of consumption levels: It is the group of households spending between USD 10 and 100 per day (in purchasing power parity).

For a full list of references see: *Global megatrends: living in an urban world*, **www.eea.europa.eu/soer/europe-and-the-world/megatrends**



In this study, the middle class is defined in terms of consumption levels:
it is the group of households spending between USD 10 and 100 per person per day
(in purchasing power parity).

Source: Kharas, H., 2010, *The emerging middle class in developing countries*.

5. THE POLLUTION CHALLENGE

5. THE POLLUTION CHALLENGE

‘The gardens and streets were covered in about 15 cm of red sludge. People were trying to wash it off their homes and their belongings with soap and water. Others were simply packing up. I tried to wash the sludge off my rubber boots that night but couldn’t. The red just wouldn’t come off,’ says Gábor Figeczky, acting head of the Worldwide Fund for Nature in Hungary.

On 4 October 2010 one of the worst toxic spill accidents in Europe of recent years occurred near the city of Ajka in Veszprem County, Hungary, approximately 160 km south-west of Budapest. As a consequence of a failure of the tailing dam of a reservoir for an aluminium production plant alkaline sludge flooded a wide area including three villages. Long-term consequences of the event are not yet known (EEA, 2010).

This is just one example of the challenges facing us in terms of pollution from industrial activity. The oil spill in the Gulf of Mexico, which began in April 2010, is another well documented pollution episode in the same year. These are dramatic examples, however, most of us come in contact with some form of pollution in our daily lives.

Shaping the earth and its mechanisms

Human impacts on the environment have risen steadily. Previously our impacts were primarily felt locally. However, in the last few decades we have seen impacts spread across regions — think of acid rain. And now, climate change, for example, has global impacts.

The term ‘anthropocene’, based on the Greek word ‘anthropos’ meaning ‘human being’, has been used to describe our era. This is because human resource use and the resulting complex mix of pollutants has become a dominant driving force, shaping the Earth and its regulating mechanisms.

Like us, our environment is vulnerable to pollution. A lot of the time it can absorb the unwanted outputs of our activities — pollution and waste — rendering them harmless over time. Indeed, this ability to absorb and transform pollutants is one of the essential services that healthy ecosystems perform for us. But ecosystems have a limited capacity in this regard. If we overburden them then we risk damaging them and the species living there — ourselves included.

A closer look at three pollutants

If we concentrate on just three pollutant types it will give us some idea of the serious impacts we are having on our planet: particulates, nitrogen and ground-level ozone. They merit particular attention because of their complex and potentially far-reaching effects on ecosystem functioning, climate regulation and human health. And they share most of the same drivers, for instance industrialisation, globalisation and rising consumption.

Emissions of many air pollutants have fallen substantially over recent decades in Europe and air policy is one of the great success stories of the EU’s environmental efforts. In particular, policy has dramatically cut emissions of sulphur, the main component of ‘acid rain’.

However, we continue to burden the environment with an increasingly complex pollutant load, the potential effects of which on public health and the environment are poorly understood. An estimated 70 000 to 100 000 chemical substances are already in commerce and this number is rapidly expanding. Almost 5 000 of these substances are produced in high volumes, over one million tonnes a year.

- Particulate matter is a term used to describe a variety of tiny particles from sources such as vehicle exhausts and domestic stoves, affects the lungs. Long-term and peak exposure can lead to a variety of health effects, ranging from minor irritation of respiratory system to premature death.

- Nitrogen pollution affects groundwater quality and leads to eutrophication of freshwater and marine ecosystems. After application of manure and fertilisers to agricultural land, excess nutrients may be emitted to the air or leak as nitrate into ground water or run off to surface water. This freshwater pollution load is ultimately discharged to coastal waters, where it can have serious consequences.

- Though it acts as a protective layer high above the earth, ozone (O_3) can be harmful. 'Ground level ozone' refers to the ozone in the air near the earth's surface. It is not emitted directly into the air but forms when other substances mix. Ground level ozone exposure can have severe health implications for people and can reduce crop yields. Productivity and species composition of natural habitats may change, putting biodiversity at risk.

Keeping an Eye on Earth

In the context of this increasingly complex pollution challenge information is critical for scientific and policy design purposes. However, the EEA is also committed to providing access to relevant, timely and understandable environmental information to the general public. Simply put, we want to engage people in dialogue and empower them.

For most users, of course, raw data may be more or less meaningless. The key is to make it accessible in formats that are accessible and relevant. Working together with Microsoft, EEA is putting these ideas into effect. New information and communication technologies mean that — in a single location — we can now gather, organise and access data of different types from potentially huge numbers of sources.

The new Eye on Earth platform provides information on local bathing water and air quality, based on near real-time data from monitoring stations and computer modelling. It translates rather 'dry', complex scientific data into a format that is relevant and understandable for more than 500 million EU citizens, in 25 languages.

Innovation: the energy example

'Like finding a needle in a haystack' is how Ocean Nutrition Canada describes the company's discovery of a microorganism hidden in algae that is capable of producing triacylglycerol oil — a base for generating biofuel — at a rate 60 times greater than other types of algae previously being used.

By converting carbon dioxide and sunlight into lipids (fatty acids) and oils, certain types of algae can generate up to 20 times more fuel per acre than traditional crops.

This project is just one example of the research being undertaken into new fuel options around the world. Single-celled microalgae contain oils similar to the vegetable oils that have already been successfully used as biofuels. And this algal oil may well be the greenest solution available to reduce the carbon footprint we leave every time we drive a car, buy fruit trucked in from far away, or travel by air.

Unlike fossil fuels, which release carbon, microalgae consume carbon dioxide (CO_2) in the atmosphere as they grow. As a result, algal fuel would not add to net carbon emissions.

And unlike other biofuel sources such as corn, microalgae do not require the diversion of farmland from food production. In fact, according to the National Research Council of Canada — a leader in this area of research, an ideal scenario would be to cultivate microalgae in municipal wastewater, which is rich in fertilisers like ammonia and phosphates. Carbon dioxide could be diverted from industrial flue stacks to provide the carbon source. No other source of biofuel could be grown in this way.

Ocean Nutrition Canada is in fact a food supplement company and was looking for ingredients when it made its discovery. This reality illustrates perfectly both the potential and the conflicts that we face in the future. Should we use crops/resources to feed ourselves or to create fuel? Can we innovate our way forward?

Water Watch, for example, gives users easy access to information on water quality ratings drawn from 21 000 monitoring points at bathing sites in 27 European countries. Using Cloud computing technology, visitors to the site can zoom into a selected area of the online map of Europe or, alternatively, type a beach name into the search bar.

Eye on Earth also gives the public the chance to give their opinion on beach, water and air quality, supplementing and validating (or perhaps refuting) official information. This two way communication is a key step towards engaging with each other and empowering different communities.

Over coming years, we hope to enrich the service, with new types of information, derived both from scientific monitoring and other sources, including local or indigenous perspectives.

Visit Eye on Earth:
www.eyeonearth.eu

Europe is innovating

Access to natural resources is crucial for all parts of the world. This is especially true in the context of global energy demand, where increased scarcity of fossil fuels may stimulate a shift to energy sources available domestically.

A shift to new energy sources could affect Europe's environment. Potential impacts include increased land take for biofuels, disruption of ecosystems through new hydropower capacity, noise and visual pollution from wind turbines, and pollution and greenhouse gas emissions from oil shale exploitation. Expanding nuclear energy capacity will trigger public debate about waste storage and safety risks.

Europe must continue to innovate and find market niches that reduce the overall need for minerals, metals and energy, while developing new technologies and solutions.

Earth 2050 global megatrend: pollution — increasing use of chemicals

Presently, most chemicals are produced by so called 'developed countries' but production is increasing more than twice as fast in India, China, Brazil, South Africa and Indonesia. Their economic share of total world chemical production is projected to rise to around 30 % by 2020 and almost 40 % by 2030.

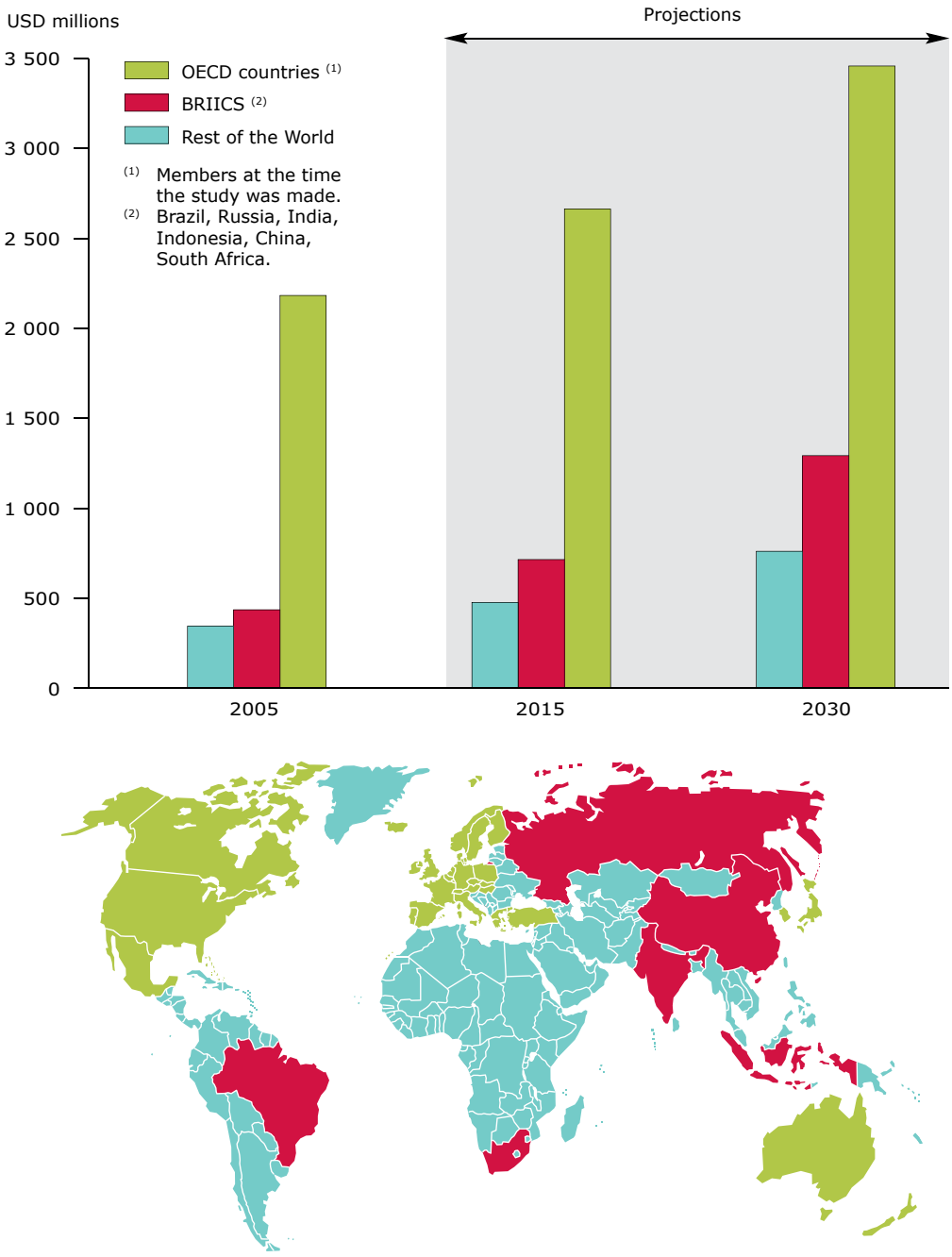
Why is this increasing use of chemicals important for you?

The potential consequences of global pollution trends include further impacts on human health and ecosystems. For Europe, unsafe drinking and bathing water and contaminated food, from both European products and imports, pose immediate risks. Risks may also be connected to the increasing import of intermediate and final industrial chemical products. In Europe, the problem of reactive nitrogen is particularly evident in the Baltic Sea, where the current ecological status is already poor.

Graph 5: Production of chemicals

An estimated 70 000 to 100 000 chemical substances are produced in high volumes, over one million tonnes a year. OECD countries are the biggest producers of chemicals but production is increasing more than twice as fast in India, China, Brazil, South Africa and Indonesia.

For more information see: *Global megatrends: increasing environmental pollution load*, **www.eea.europa.eu/soer/europe-and-the-world/megatrends**



Source: OECD, 2008, *OECD Environmental Outlook to 2030*.

6. URBAN WORLD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6. URBAN WORLD

Did you know?

A city affects a large area outside its own boundaries. For example, London alone is thought to need an area of almost 300 times its geographical size to satisfy its demands and to dispose of its waste and emissions.

SOER 2010

It's late September and the last monsoon rains have hit New Delhi hard. It's hot in the Indian capital city — in the 30s, and humid. The rain has stopped but water is everywhere. An outbreak of the mosquito-borne dengue fever has just been confirmed in the city.

Known as the Yamuna Pushta or 'Yamuna embankment', the illegal settlement in the north-east of the city normally runs for miles on the flood plains on either side of the great river. Now, the plains themselves are completely flooded. A tide of humanity has already engulfed the highway as tens of thousands of slum dwellers abandon their shanty towns along the river and seek shelter.

The communities make camp on the highway with whatever belongings remain, only feet from Delhi's other raging torrent: the traffic. A tiny infant sleeps on hard concrete, a yard or two from the road, wrapped in a blanket. A teenage girl meticulously combs her long, dark hair under the plastic sheeting of her home. Another texts on her mobile phone while filling a canister with drinking water from a water truck.

Global megatrends at the side of the road

When we think of globalisation we rarely think of slums but the people of Yamuna Pushta are part of a global phenomenon. Billions of people are congregating in our cities and urban areas, leaving the land and rural settings behind. For the first time in history more than 50 % of the world's population lives in urban areas. By 2050, about 70 % of us are likely to be urban dwellers, compared with less than 30 % in 1950 (UNDESA, 2010).

Cities are also reaching historically unprecedented sizes. The rising number of megacities across the globe puts enormous strains on their natural resource support systems. The even faster growth in small and medium-sized cities could eventually be even more important from an environmental perspective.

Cities concentrate investment and employment opportunities, promoting economic growth and increased productivity. They provide higher-income jobs, as well as greater access to goods, services and facilities, and improved health, literacy and quality of life. These opportunities tempt rural residents to search for a better life and higher income in urban areas.

However, in the absence of strong governance, rapid urban growth can cause major environmental challenges by increasing both consumption and urban poverty.

UN-Habitat statistics suggest that there are 1.1 billion people living in urban slums around the world. With population continuing to rise, more and more people are moving to urban areas around the world and the trend is set to continue.

While the majority of the population suffering severe deprivation still lives in rural areas, there is a large and growing proportion in urban areas too, though just how many is believed to be greatly underestimated in official statistics. Importantly, the proportion of the urban poor is rising faster in many developing countries than the overall rate of urban population growth.

Designing the future

Cities are ecosystems: they are open and dynamic systems that consume, transform and release materials and energy; they develop and adapt; they are shaped by humans and interact with other ecosystems. They must therefore be managed like any other type of ecosystem.

Through rethinking urban design, architecture, transport and planning, we can put our cities and urban landscapes at the forefront of climate change mitigation (e.g. sustainable transport, clean energy and low consumption) and adaptation (e.g. floating houses, vertical gardens). Furthermore, better urban planning will improve quality of life across the board by designing quiet, safe, clean and green urban space. It also creates new employment opportunities by stimulating the market for new technologies and green architecture.

Due to their concentration of people and activities, cities matter. Their problems cannot be solved at the local level alone. Better policy integration and new governance are needed, involving closer partnership and coordination at the local, national and regional levels. Indeed, effective, joined-up policy is crucial in the interconnected world we live in.

Earth 2050 global megatrend: living in an urban world

An increasingly urban world will probably mean increasing consumption and greater affluence for many. But it also means greater poverty for the urban underprivileged. Poor urban living conditions and associated environmental and heath risks could impact all areas of the world.

Why is urbanisation important for you?

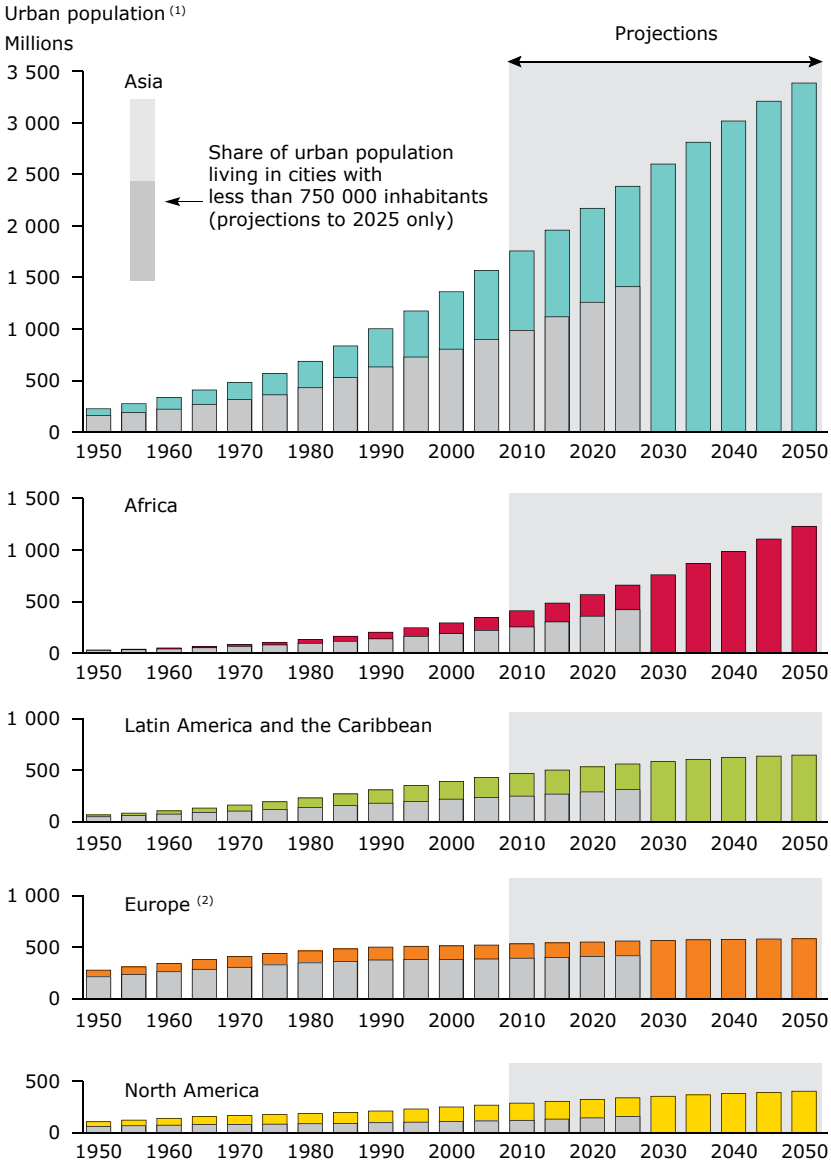
The design and governance of urban areas, particularly in south-east Asia, will have strong impacts on global greenhouse gas emissions and resource demand. Once built, a city can be difficult to fundamentally alter. Inhabitants adapt to these conditions and their behaviour can also be difficult to change. In many places in the developing world, cities currently risk locking in energy- and resource-intensive models of urban development for decades ahead.

In a highly interconnected world, with changes in urbanisation and related consumption patterns, Europe will mostly be affected indirectly. Impacts may include changing European land-use patterns induced by tougher competition for resources and the threat of diseases developing and spreading globally.

Graph 6: Urban trends

For the first time in history, more than 50 % of the world's population live in urban areas. By 2050, about 70 % of people are likely to be urban (UNDESA, 2010). Demographers estimate that Asia will be home to more than 50 % of the global urban population by 2050.

For more information see: Global megatrends: living in an urban world: **www.eea.europa.eu/soer/europe-and-the-world/megatrends**



(1) The definition of 'urban area' varies from one country to the next.

(2) Albania, Andorra, Austria, Belarus, Belgium, Bosnia and Herzegovina, Bulgaria, Channel Islands, Croatia, Czech Republic, Denmark, Estonia, Faroe Islands, Finland, France, Germany, Gibraltar, Greece, Holy See, Hungary, Iceland, Ireland, Isle of Man, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Monaco, Montenegro, the Netherlands, Norway, Poland, Portugal, the former Yugoslav Republic of Macedonia, Moldova, Romania, Russia, San Marino, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Ukraine, the United Kingdom.

Urban areas of Oceania — not included here for legibility reasons — are projected to reach 38 million people by 2050 (currently 25 million).

Source: UN Population Division, *World Urbanization prospects: The 2009 Revision*.

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European Environment Agency
Kongens Nytorv 6
1050 Copenhagen K
Denmark

Tel: +45 33 36 71 00
Fax: +45 33 36 71 99

Web: eea.europa.eu
Enquiries: eea.europa.eu/enquiries

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