

## ASIA AND THE PACIFIC

### DRIVERS OF CHANGE

#### Socio-economic trends

The Asia and the Pacific region is comprised of 43 countries and a number of territories, and is, for the purposes of this report, divided into six sub-regions. It is endowed with a rich diversity of natural, social and economic resources. The length of its coastline is two-thirds of the global total, and it has the world's largest mountain chain. The region includes some of the poorest nations in the world, several highly advanced economies, and a number of rapidly growing ones, notably China and India. From 1987 to 2007, the population increased from almost 3 billion to almost 4 billion people, and the

region is now home of 60 per cent of the world's people (GEO Data Portal, from UNPD 2007), representing a wide range of different ethnicities, cultures and languages.

In most nations, central governments have played a key role in economic planning to achieve development goals, and have been instrumental in formulating environmental policies. For the region as a whole, GDP (purchasing power parity, in constant 2000 US dollars) increased from US\$7.5 trillion in 1987 to US\$18.8 trillion in 2004 (GEO Data Portal, from World Bank 2006).

Many countries have made considerable progress towards attaining the Millennium Development Goals (MDGs), although achievements are marked by wide disparities and stark contrasts (see Box 6.9). Since several countries have already achieved many of the MDG targets, they have raised their targets, setting new goals, called MDG Plus.

Since 2000, Asia and the Pacific's GDP growth has surpassed the 5 per cent rate suggested by the Brundtland Commission in 1987 (ADB 2005), but ecosystems and human health continue to deteriorate. Population increases and fast economic development have driven significant environmental degradation and natural capital losses during the last two decades. In turn, deteriorating environmental conditions are threatening and diminishing the quality of life for millions of people.

Rapid population growth, fast economic development and urbanization have led to increased energy needs. Between 1987 and 2004 energy use in this region increased by 88 per cent, compared to a global average rise of 36 per cent (GEO Data Portal, from IEA 2007). Presently, Asia and the Pacific is responsible for only about 34 per cent of total global energy consumption, and per capita energy consumption is much lower than the world average (see Chapter 2). There are strong signs that regional energy demands will continue to increase (IEA 2006) (see Figure 6.10). Asia and the Pacific's share of global CO<sub>2</sub> emissions increased from 31 per cent in 1990 to 36 per cent in 2003, with considerable variation within the region (see Figure 6.11). These energy and related CO<sub>2</sub> emission trends are part of a pattern of global increases that are contributing to climate change (see Chapter 2).

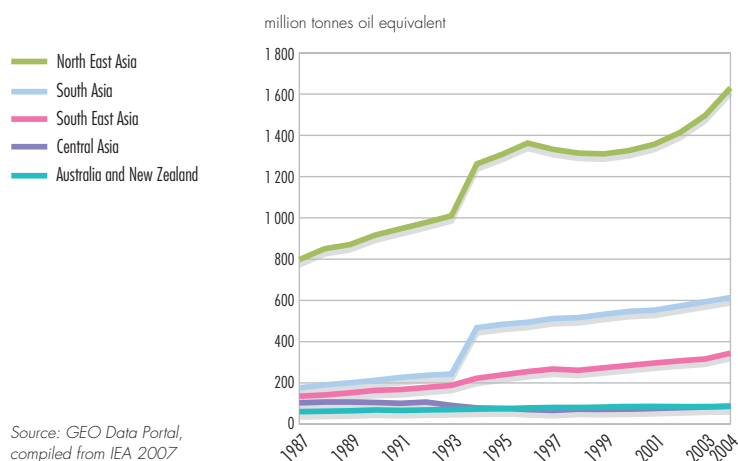
#### Box 6.9 Progress towards the Millennium Development Goals

Remarkable progress has been made in overall poverty reduction in this region. Between 1990 and 2001, the number of people living on less than US\$1/day dropped by nearly 250 million. Sustained growth in China and the acceleration of India's economy contributed to such progress. Efforts at reducing malnutrition, however, have been less successful. The most severe problems are evident in South Asia, where nearly half the children five years old and under are malnourished.

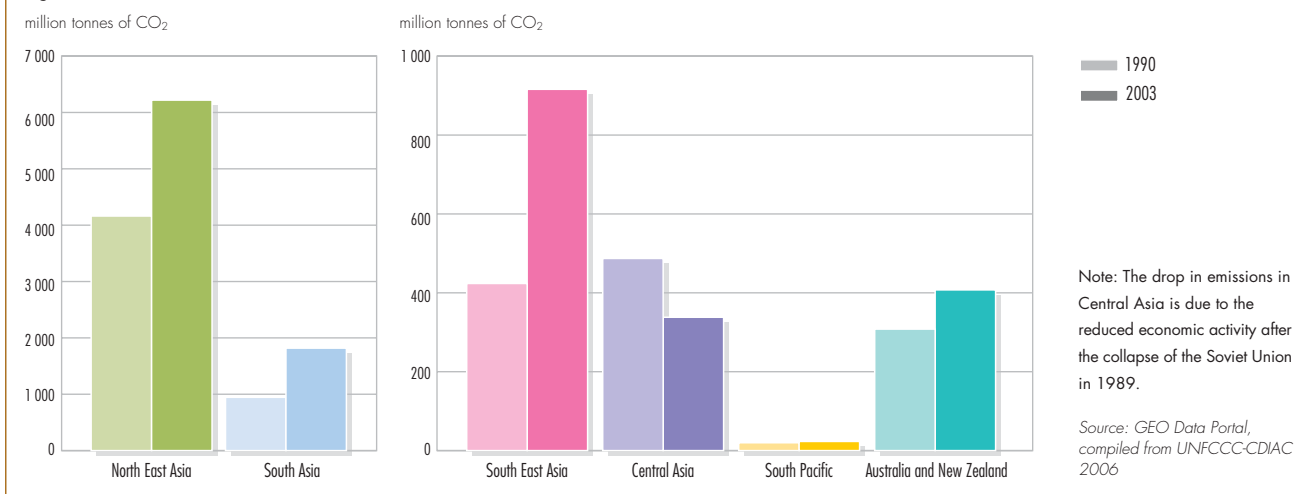
The region has also made progress towards MDG 7 on the environment. Environmental protection is considered to be a fundamental element in achieving several MDGs, and is a powerful engine for economic growth and poverty eradication. South Asia made the most impressive achievements in providing safe sources of drinking water, and India contributed substantially to the positive trend. Another encouraging sign is the significant progress in improving energy efficiency, and in providing access to clean technology and fuels in eastern and southern Asia. However, energy efficiency continues to decline in South East Asia.

Source: UN 2005a

Figure 6.10 Energy consumption by sub-region



**Figure 6.11 Total CO<sub>2</sub> emissions**



### Environmental governance

These problems are not new, although many are intractable, and some are getting worse. Most countries in Asia and the Pacific have developed extensive domestic laws, regulations and standards related to the environment, and participate in global action through multilateral and bilateral agreements. However, the implementation of laws and agreements has been hampered by a wide variety of factors. They include: inadequate implementation, enforcement and monitoring; a lack of capacity, expertise, know-how and coordination among different government agencies; and insufficient public participation, environmental awareness and education. Most importantly, the lack of integration of environmental and economic policies has been the major constraint in establishing an effective system of environmental management. All of these factors undermine efforts to alleviate pressure on environmental quality and ecosystem health.

Furthermore, the region is highly vulnerable to natural hazards. Notable examples include the 2004 Indian Ocean Tsunami and the 2005 earthquake in Pakistan. Evidence exists of significant increases in the intensity and/or frequency of extreme weather events, such as heat waves, tropical cyclones, prolonged dry spells, intense rainfall, tornadoes, snow avalanches, thunderstorms and severe dust storms since the 1990s (IPCC 2007a). Impacts of such disasters range from hunger and susceptibility to disease, to loss of income and livelihoods, affecting the survival and human well-being of both present and future generations.

Clearly, the region still faces some formidable environmental governance challenges to protect valuable natural resources and the environment while alleviating poverty and improving living standards with limited natural resources.

### SELECTED ISSUES

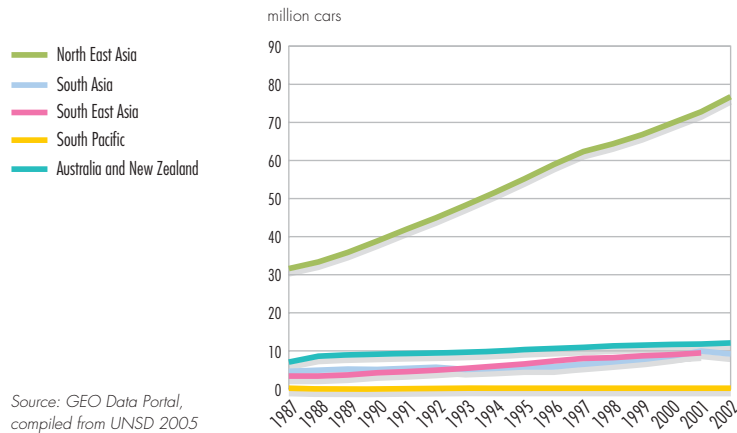
Increases in consumption and associated waste have contributed to the exponential growth in existing environmental problems, including deteriorating water and air quality. Land and ecosystems are being degraded, threatening to undermine food security. Climate change is likely to affect the region with thermal stress, and more severe droughts and floods, as well as soil degradation, coastal inundation and salt water intrusion due to sea-level rise (IPCC 2007b). Agricultural productivity is likely to decline substantially, due to projected warmer temperatures and shifts in rainfall patterns in most countries. Major trends and responses are described for five such environmental issues that are key priorities in the region: transport and urban air quality, freshwater stress, valuable ecosystems, agricultural land use and waste management.

### TRANSPORT AND URBAN AIR QUALITY

#### Air pollution

The growing energy needs and the associated increase in resource mixes and fuel types have resulted in the intensification of urban air pollution and the serious degradation of air quality in many Asian cities. This has been further complicated by the region's relatively poor energy intensity and fuel efficiency. Increased energy consumption has

**Figure 6.12 Trend in use of passenger cars**

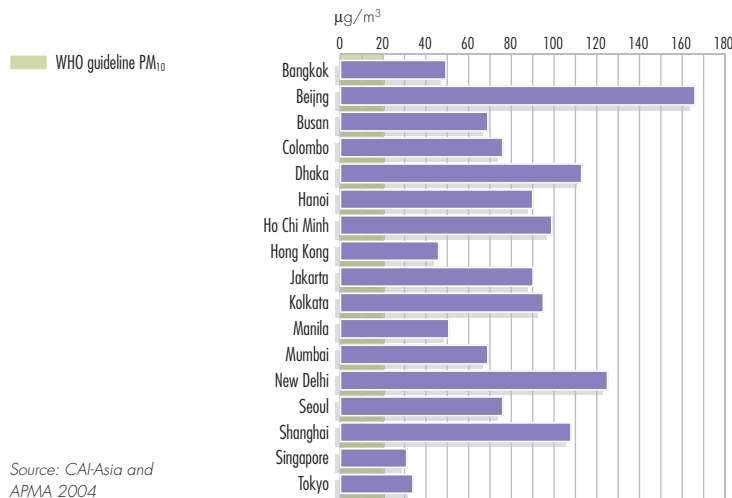


Source: GEO Data Portal, compiled from UNSD 2005

also led to a rise in greenhouse gas emissions, contributing to climate change (see Box 6.11 and Figure 6.11), which has major impacts on ecosystems and human well-being.

The exploding growth in motorized vehicles (see Figure 6.12) is the key factor in both traffic congestion and the levels of urban air pollution in many cities. Between 1987 and 2003, the use of passenger cars has increased about 2.5 times (GEO Data Portal, from UNSD 2005). During the 1990s, the number of cars and two-wheeled motorcycles in China and India rose by more than 10 per cent/year (Sperling and Kurani 2003). China had some 27.5 million passenger cars and 79 million motorcycles in use by 2004 (CSB 1987–2004). In India, passenger car ownership nearly tripled from 2.5 per 1 000 people in 1987 to 7.2 per 1 000 people in 2002 (GEO Data Portal, from UNSD 2005). Other factors contribute to a sharp deterioration in urban air quality. There is a higher concentration of people living in large cities than in other regions. With the exception of a few cities, municipal development is poorly planned. There is a lack of affordable and clean mass transit services. In addition, there is haze pollution caused by forest fires in South East Asia.

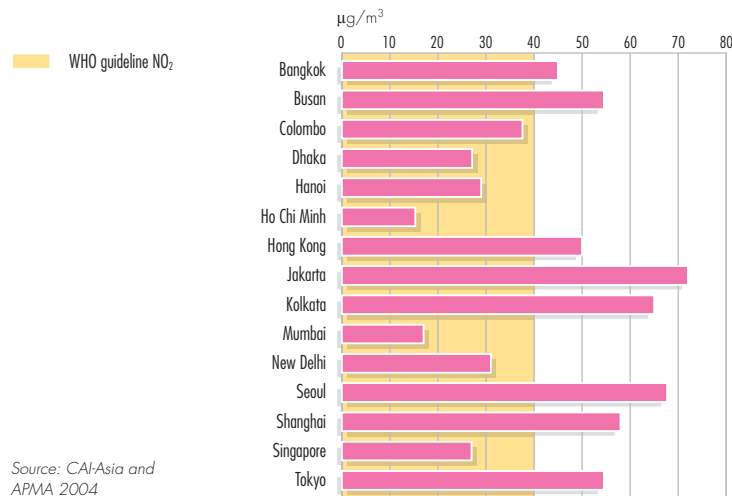
**Figure 6.13 Average annual PM<sub>10</sub> concentrations (µg/m<sup>3</sup>) in selected Asian cities, 2002**



Source: CAI-Asia and APMA 2004

The most common urban air pollutants are nitrogen oxides, sulphur dioxide, particulate matter, lead and ozone. Levels of PM<sub>10</sub> (particulate matter less than 10µ in diameter) remain high in many Asian cities, far exceeding standards prescribed by the World Health Organization (see Figure 6.13) (see Chapter 2). In particular, South Asian cities continue to record the highest levels of outdoor particulate pollution worldwide (World Bank 2003a). While there are indications that the concentrations of sulphur dioxide in selected Asian cities have declined in recent years, large and growing motor vehicle fleets in mega-cities continue to contribute to high nitrogen dioxide levels (see Figure 6.14).

**Figure 6.14 Concentrations of NO<sub>2</sub> (µg/m<sup>3</sup>) in selected Asian cities, 2002**



Source: CAI-Asia and APMA 2004

Recent assessments suggest that outdoor and indoor urban air pollution, especially from particulates, has considerable impacts on public health. A WHO study estimates that more than 1 billion people in Asian countries are exposed to outdoor air pollutant levels exceeding WHO guidelines (WHO 2000a), and this causes the premature death of about 500 000 people annually in Asia (Ezzati and others 2004a, Ezzati and others 2004b, Cohen

**Table 6.3 Health and economic costs of PM<sub>10</sub> for selected cities**

Manila	About 8 400 cases of chronic bronchitis and about 1 900 cases of excess deaths associated with PM <sub>10</sub> resulted in a cost of US\$392 million in 2001 (World Bank 2002a).
Bangkok	About 1 000 cases of chronic bronchitis and about 4 500 cases of excess deaths associated with PM <sub>10</sub> resulted in a cost of US\$424 million in 2000 (World Bank 2002b).
Shanghai	About 15 100 cases of chronic bronchitis and about 7 200 cases of premature deaths associated with PM <sub>10</sub> resulted in a cost of US\$880 million in 2000 (Chen and others 2000).
India (for 25 most polluted cities)	Estimated annual health damage of pre-Euro standards for vehicle exhaust emissions is estimated between US\$14 million and US\$191.6 million per city (GOI 2002).

and others 2005). The region has the world's highest burden of disease attributable to indoor air pollution (see Chapter 2). In addition, air pollution leads to substantial financial and economic costs to households, industry and governments in Asia. Limited studies have been done, but some show the health and economic costs of particulates (PM<sub>10</sub>) in selected cities and groups of cities in Asia (see Table 6.3).

#### Addressing urban air pollution

Most countries in Asia and the Pacific have established a legislative and policy framework to address air pollution, and there are a number of institutional arrangements at national and city levels. Most countries have phased out leaded fuels (UNEP 2006c). Many cities, including Bangkok, Beijing, Jakarta, Manila, New Delhi and Singapore, are noteworthy for their recent implementation of such actions. To address haze pollution, members of the Association of Southeast Asian Nations (ASEAN) agreed to a regional plan of action, and created a Haze Fund to implement the ASEAN Agreement on Transboundary Haze Pollution (ASEAN 2006).

Monitoring air pollutants is a key tool for informed policy making, regulation and enforcement, and for assessing impacts, but only some cities conduct regular monitoring. The region needs to accelerate the switch from fossil fuels to cleaner and renewable forms of energy. It also needs to promote a reduction in private vehicle use, as well as drastically improve the efficiency and availability of mass transit systems, with approaches such as those envisaged under the Regional Environmentally Sustainable Transport (EST) Forum, launched in 2005 in the North East and South East Asian sub-regions (Ministry of the Environment of Japan 2005). Sustainable city planning is another long-term measure that should be undertaken.

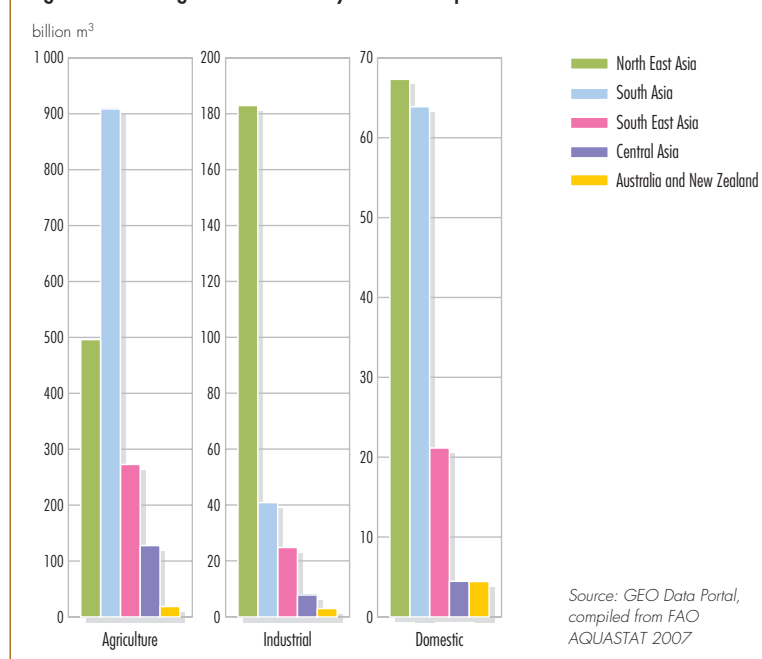
## FRESHWATER STRESS

### Water quantity and quality

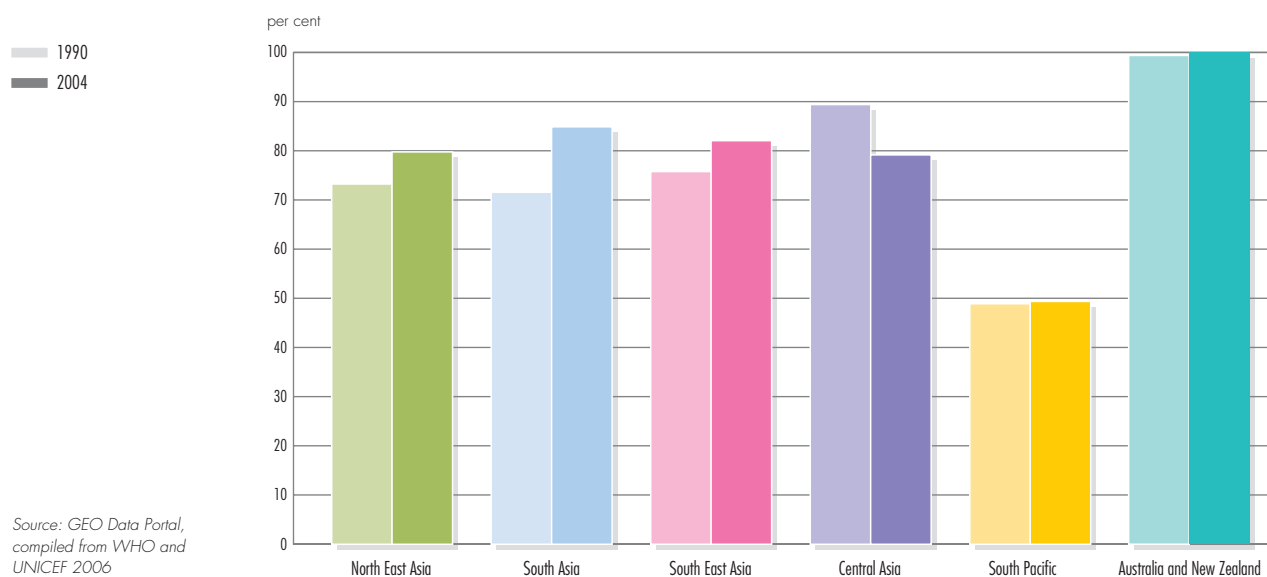
Of all freshwater-related issues, adequate water supply is the major challenge to all the Asia and the Pacific nations. The region has 32 per cent of the world's freshwater resources (Shiklomanov 2004), but is home to about 58 per cent of the world population. The South Pacific (along with many African countries) has the lowest per capita freshwater availability in the world.

Since Asian economies depend heavily on agriculture and irrigation, agriculture puts the greatest demands on water resources (see Figure 6.15). Excessive withdrawals from surface waters and underground aquifers, pollution of freshwater resources by industrial sectors, and inefficient use of freshwater are major causes of water stress (WBCSD 2005). Climate change has the potential to exacerbate

**Figure 6.15 Average freshwater use by sector in the period 1998–2002**



**Figure 6.16 Access to safe drinking water as a per cent of the total population**



water resource stress in many countries of Asia and the Pacific (IPCC 2007b). There are reports of unprecedented glacier retreats in the Himalayan Highlands over the past decade (WWF 2005). Furthermore, climatic variability and natural disasters have threatened watershed quality in recent years, causing damage to sanitation facilities and the contamination of groundwater (UNEP 2005a) (see Chapter 4).

Human activities, such as land-use change, water storage, interbasin transfers, and irrigation and drainage, influence the hydrological cycle in many

river basins (see Chapter 4) (Mirza and others 2005). Changes in recent years in continuity and withdrawal patterns in the summer monsoon have led to considerable spatial and temporal variations in rainwater availability (Lal 2005). Southwest Bangladesh suffers from extreme water shortages as well as acute moisture stress during the dry months, adversely affecting both ecological functions and agricultural production. Floods during the monsoon season inundate an average of 20.5 per cent of Bangladesh, and can flood as much as 70 per cent of the country during an extreme flood event (Mirza 2002). Furthermore, the influx of saline water is a major hazard in South Asia and South East Asia, and in the atoll islands of the Pacific.

#### Box 6.10 Water pollution and human health in South Asia and South East Asia

High natural concentrations of arsenic and fluoride in water have resulted in acute health problems in parts of India and Bangladesh. More than 7 000 wells in West Bengal have high levels of dissolved arsenic, reaching over 50 mg/litre, five times the WHO guideline. Water-borne diseases are associated with degraded water quality, and in developing countries they cause 80 per cent of all illnesses. With two-thirds of the South Asian population lacking adequate sanitation, water-borne diseases are prevalent, including diarrhoea, which kills 500 000 children each year.

There have been attempts to reform the water and sanitation sector in South Asia and South East Asia, including large-scale subsidization of water for the poor. For example, under its National Growth and Poverty Eradication Strategy (NGPES), Laos is developing the infrastructure to ensure greater access to safe water and sanitation, especially for the rural population. Singapore is recycling wastewater, bringing it up to drinking quality standards by using a new filtration technology.

Sources: CPCB 1996, OECD 2006a, OECD 2006b, Suresh 2000, WBCSD 2005, WHO and UNICEF 2006

Although remarkable progress in the provision of improved drinking water has been made over the last decade (see Figure 6.16), especially in South Asia, some 655 million people in the entire region (or 17.6 per cent) still lack access to safe water (GEO Data Portal, from WHO and UNICEF 2006). While South Pacific states have not made any progress, conditions in Central Asian countries actually deteriorated. In many mega-cities, up to 70 per cent of citizens live in slums, and generally lack access to improved water and sanitation.

Water pollution and inadequate access to improved drinking water are severe threats to human well-being and ecological health. The expansion of

agriculture, with increased use of agrochemicals, will cause more serious water pollution, as chemicals get into rivers and coastal waters. An increase in the volume of domestic wastewater is also degrading water quality in urban areas. Although discharges of organic water pollutants have declined in a number of Asian countries in recent years (Basheer and others 2003), the cumulative amount of discharges is greater than natural recovery capacity, and this continues to degrade water quality. Human health is threatened by unsafe water (see Box 6.10).

### Balancing freshwater supply and quality with increasing demand

Nations in the region are taking numerous steps to address the high demand for safe water. North East Asia relies on command-and-control policies, specifically the “polluter-pays-principle,” to target individual polluting sources. These measures have achieved significant water quality improvements. They now show diminishing returns, however, due to continued population growth and rapid urbanization. China introduced a series of policy measures promoting small-scale projects, and invested more than US\$2.5 billion between 2000 and 2004, increasing the number of people with access to

safe drinking water by 60 million (Wang Shu-cheng 2005). The Three Gorges Dam in China is expected to provide a source of water, renewable energy (annual generation of electricity up to some 85 billion kWh) and flood control (upgrading the flood control standard from 10-year floods to 100-year floods), but is also expected to have social and environmental impacts such as loss of livelihoods in areas that will be submerged and loss of some biodiversity and ecosystem functioning. The scale and magnitude of these impacts, however, will have to be further investigated (Huang and others 2006). Mongolia and China adopted demand side management and watershed management policies to complement existing supply side management. Efforts are also underway in some Central Asian countries to use water and wastewater more efficiently, especially in agriculture.

Improvements in water use efficiency, especially in the irrigation sector, will have immediate positive impacts on water availability. Cooperation among governments, industries and public utility services would lead to a better appreciation for the need to use market-based instruments (MBIs) to lower some of the implementation costs in designing and applying such changes.

The Three Gorges Dam in China: the 1987 image on the left shows the river and surrounding landscape (overview and detail) before the dam was constructed; the 2000 image (top right) shows the dam under construction and in the 2006 image (bottom right) the dam is operational.

Credit: Landsat and ASTER images from NASA/USGS compiled by UNEP/GRID-Sioux Falls



## VALUABLE ECOSYSTEMS

### Biodiversity at risk

Over the last two decades, as Asia and the Pacific has become the world's fastest developing region, enormous pressures have been put on its ecosystems to support the ever-growing demand for natural resources and energy.

Coastal ecosystems, the locus of land-ocean interaction, play an important role. The region has an extremely long coastline, and more than half of its inhabitants live on or near the sea. They depend directly on coastal resources, such as mangroves and coral reefs, for part of their livelihoods (Middleton 1999). Due to large-scale exploitation of natural resources, most of the inland ecosystems in Central Asia have been severely depleted. Factors that threaten biodiversity and ecosystem functions include rapid changes in land use, extensive but poorly

managed irrigation, more intensive use of rangelands, medicinal and food plant collection, construction of dams and fuelwood collection.

Asia and the Pacific has about 50 per cent of the world's remaining mangrove forests, although they have been extensively damaged or destroyed by industrial and infrastructure development (see Table 6.4) (FAO 2003b, UNESCAP 2005a). The most significant degradation of mangroves in South East Asia can be attributed to extensive coastal development. In addition, the mangroves are affected by sedimentation and pollutants from inland sources. Mangroves are vital to coastal ecosystems. They fulfil important functions in providing wood and non-wood forest products, coastal protection, habitat, spawning grounds and nutrients for a variety of fish and shellfish species. They are important for biodiversity conservation.

### Box 6.11 Climate change and its potential impacts

A progressive and accelerated long-term warming trend has been reported for Asia for the period 1860–2004. Australia is suffering severe drought in recent years and had its warmest year on record, as well as its hottest April, in 2005.

Both ecosystems and human well-being are very vulnerable to climate change. Coasts and rapidly growing coastal settlements and infrastructure in countries such as Bangladesh, China, India, Myanmar and Thailand are at risk from any increase in coastal flooding and erosion due to sea-level rise and meteorological changes.

South Pacific island states are extremely vulnerable to global climate change and global sea-level rise. In a number of islands, vital infrastructure and major concentrations of settlements are very likely to be at risk. In some extreme cases, migration and resettlement outside national boundaries might have to be considered. In addition, climate change is projected to exacerbate health problems, such as heat-related illness, cholera, dengue fever and biotoxin poisoning, placing additional stress on the already overextended health systems of most small island states (see Chapter 2).

Sources: Greenpeace 2007, Huang 2006, IPCC 2007a



Boy (left) runs to catch the school boat in Pramukha island of Kepulauan Seribu (thousand islands) north of Jakarta, Indonesia and children (right) play at the wooden quay of Panggang island of Kepulauan Seribu. It is believed that about 2 000 islands are threatened with coastal flooding in this archipelagic nation due to climate change-induced sea level rise.

Credit: Greenpeace/Shailendra Yashwant

Coral reefs are fragile ecosystems, sensitive to climate change, human activities, such as tourism, and natural threats and disasters. Asia and the Pacific has some 206 000 km<sup>2</sup> of coral reefs, 72.5 per cent of the world's total (Wilkinson 2000, Wilkinson 2004). Heavy reliance on marine resources across the region has resulted in the degradation of many coral reefs, particularly those near major population centres. Moreover, higher sea surface temperatures have led to severe bleaching of the corals in coastal regions. About 60 per cent of the region's coral reefs are estimated to be at risk, with mining and destructive fishing the greatest threats (see Figure 6.17) (UNESCAP 2005b). The ultimate impacts are habitat degradation and destruction, which threaten important and valuable species, and increase the loss of biodiversity (see Table 6.5).

The destruction and reduction of ecosystem services and functions in turn reduce their contribution to human well-being. Deforestation, for example, has caused the rapid reduction of timber production, especially of the valuable timber only found in natural forests, affecting the livelihoods of people who depend on those forests (SEPA 2004). However, well conserved and managed valuable ecosystems continue to support human well-being. For example, large mangrove forests in the north and south of Phang Nga, the most tsunami-affected region in Thailand, significantly mitigated the impact of the 2004 Indian Ocean Tsunami (UNEP 2005a).

#### Alleviating pressures on ecosystems

The common policy response to ecosystem destruction is the establishment of protected areas. South East Asia, where coastal ecosystems are abundant, set aside 14.8 per cent of its land for protection, a higher

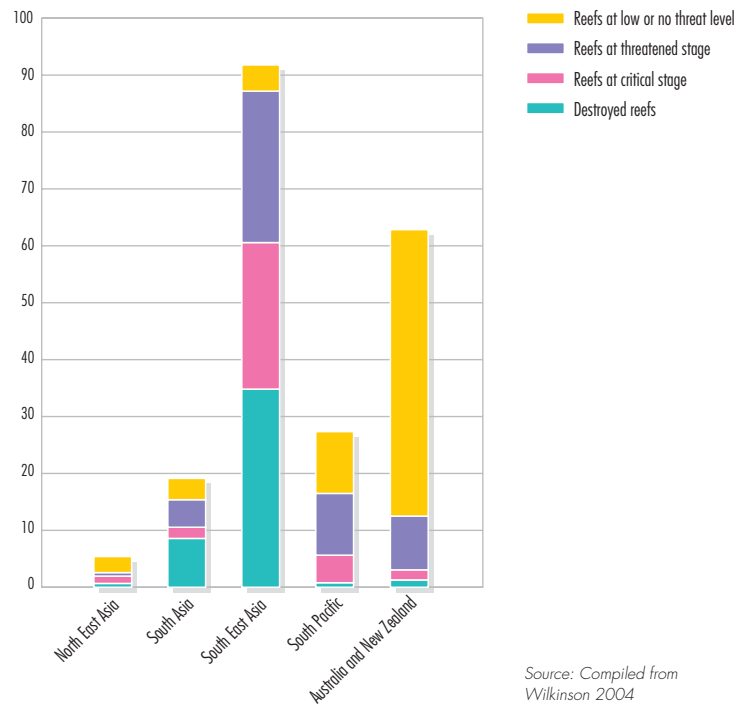
**Table 6.4 Change in mangrove area by sub-region**

Sub-region	1990 (km <sup>2</sup> )	2000 (km <sup>2</sup> )	Annual change 1990–2000 (per cent)
North East Asia	452	241	8.0
South Asia	13 389	13 052	0.2
South East Asia	52 740	44 726	1.6
South Pacific	6 320	5 520	1.3
Australia and New Zealand	10 720	9 749	0.9
Total	83 621	73 288	1.3

Source: based on FAO 2003b

**Figure 6.17 Status of coral reefs by sub-region, 2004**

Area of reefs in thousand km<sup>2</sup>



**Table 6.5 Threatened species by sub-region**

Sub-region	Mammals	Birds	Reptiles	Amphibians	Fishes	Molluscs	Other invertebrates	Plants
North East Asia	175	274	55	125	153	28	32	541
South Asia	207	204	64	128	110	2	78	538
South East Asia	455	466	171	192	350	27	49	1 772
Central Asia	45	46	6	0	19	0	11	4
South Pacific	119	270	63	13	186	99	15	534
Australia and New Zealand	72	145	51	51	101	181	116	77
Total	1 073	1 405	410	509	919	337	301	3 466

Source: IUCN 2006



proportion than the 2003 world average of 12 per cent. In the other Asia and the Pacific sub-regions, less than 10 per cent of their land is protected (UN 2005a). Countries cooperate in protecting marine and coastal ecosystems through four Regional Seas Action Plans: East Asian Seas, North-West Pacific, South Asian Seas and the Pacific Plan (UNEP 2006d). However, a recent study reveals that East Asia and South Asia discharge 89 per cent and 85 per cent respectively of their untreated wastewater directly into the sea (UNEP 2006d). This indicates that concrete measures are needed to achieve action plan goals.

In the South Pacific, as well as in Indonesia and the Philippines, local communities or land-owning groups, together with local governments and/or other partners, collaboratively manage 244 designated coastal areas, which include 276 smaller protected areas. Many are truly locally-managed marine areas (LMMA), a rapidly expanding approach, using traditional knowledge-based practices (see Chapters 1 and 7) (LMMA 2006). The LMMA strategy offers an alternative approach to more central systems managed by formal government institutions.

Along with sound policies and legislation, the nations of Asia and the Pacific need to raise public awareness of biodiversity and ecosystem service values, and to reduce human demands on ecosystems in order to alleviate pressures on them.

## AGRICULTURAL LAND USE

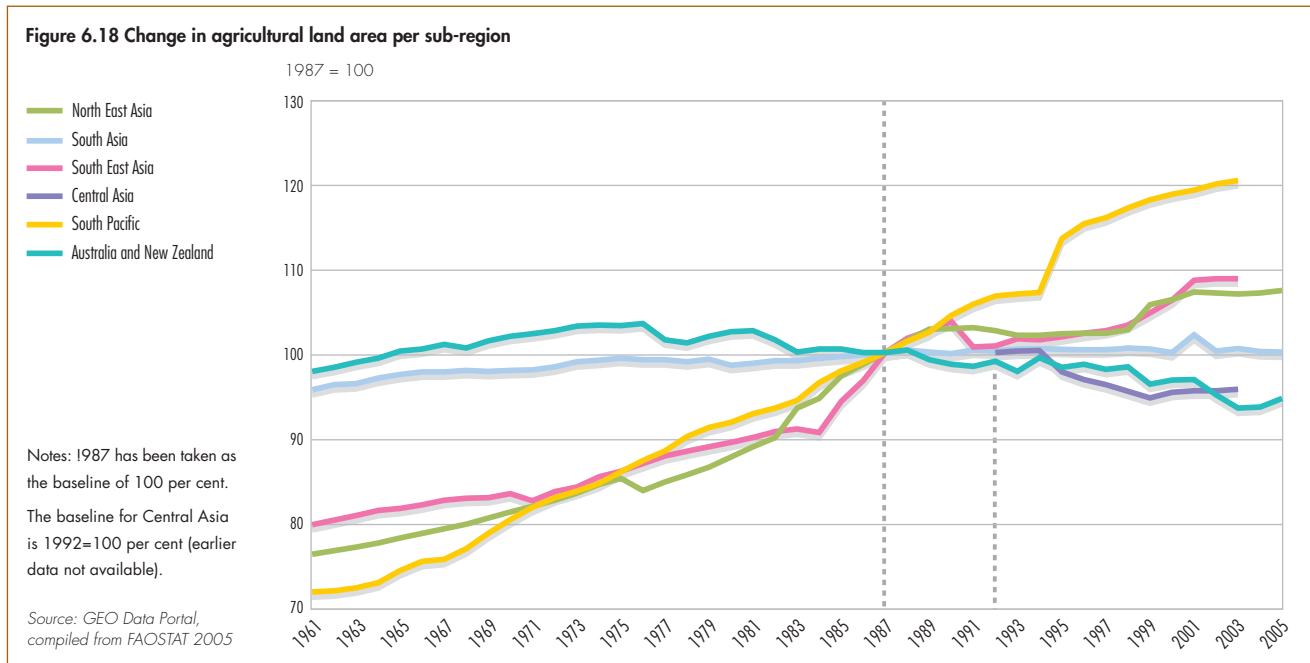
### Land quality

Human activities can have a negative impact on the quality of land. Poor land management can cause soil erosion, overgrazing can result in degradation of grasslands, overuse of fertilizers and pesticides reduces soil quality, and, in some areas, landfills, industrial activities and military activities cause contamination (see Chapter 3).

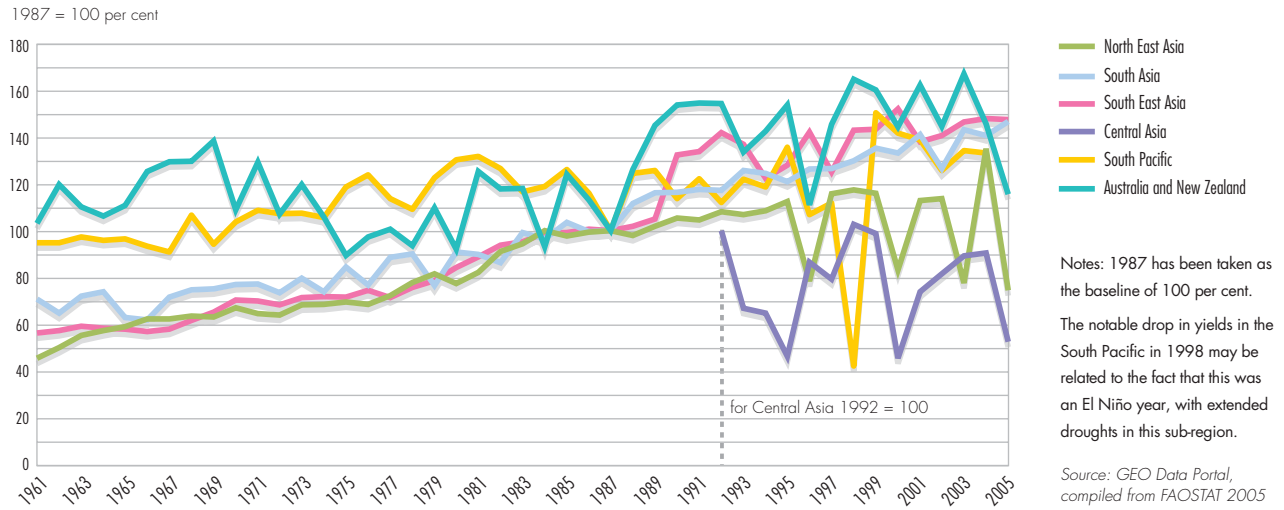
Agricultural land use is expanding in all countries and sub-regions, except for Australia and New Zealand, and Central Asia. In these sub-regions, agricultural land represents about 60 per cent of total land. The agricultural area in the six sub-regions of Asia and the Pacific, comparing changes over time, is illustrated in Figure 6.18.

Systematic data are lacking, but experts agree that land is being degraded in all sub-regions (IFAD 2000, Scherr and Yadev 2001, UNCCD 2001, ADB and GEF 2005). This degradation can have serious consequences for agriculture and ecosystem integrity, threatening food security and human well-being.

As food security has a very high priority in the region, land degradation is being tackled by countermeasures, such as substituting new arable land for degraded land. Although these shifts do not register in national figures of agricultural area, local people living in degraded areas feel the effect in terms of their well-being.



**Figure 6.19 Rice production in the Asia and the Pacific sub-regions**



From the 1960s to 1987, most parts of this region achieved remarkable increases in rice production, the dominant food crop, and most sub-regions were able to prolong this trend (see Figure 6.19). Declines in fertility were more than compensated for by such factors as the use of additional fertilizers and pesticides, increasing yields.

It appears that most countries applied sufficient countermeasures to successfully overcome the impacts of land degradation on agricultural production (Ballance and Pant 2003). The five Central Asian

countries are the exception, with deepening declines after the collapse of the Soviet Union in 1991. Land degradation in the form of salinization from poor irrigation practices continued, especially since energy supply was insufficient to allow for pumping to drain accumulated salty water. At the same time, the use of costly fertilizers and pesticides dropped sharply.

**Towards more sustainable land management**

Since agriculture is the main land use in Asia and the Pacific, land conservation as a tool of sustainable agriculture has been heavily



Poor land management can cause soil erosion. Terracing is one countermeasure that overcomes the impacts of land degradation.

*Credit: Christian Lambrechts*

emphasized. Sustainable agriculture can promote rural development, as well as increase food security and ecosystem vitality. Immediate responses include reforestation, redefining protected areas and using integrated approaches, such as integrated pest management, organic farming and integrated watershed management. Proper management of fertilizers and pesticides in agricultural activities is also crucial to protecting human health. Good governance is the basic foundation of any land conservation and management strategy. Besides providing appropriate legal and policy mechanisms for administering land ownership, it can foster the active participation of civil society in land reform efforts, and ensure the equitable distribution of agrarian development benefits.

Many farmers in South Asia and South East Asia are women, but their contribution tends to go unnoticed because they lack access to resources; men are inclined to have better access to land for farming or forestry. Land management and conservation schemes should recognize and protect the rights of female participants in agriculture, and they should share the benefits (FAO 2003c).

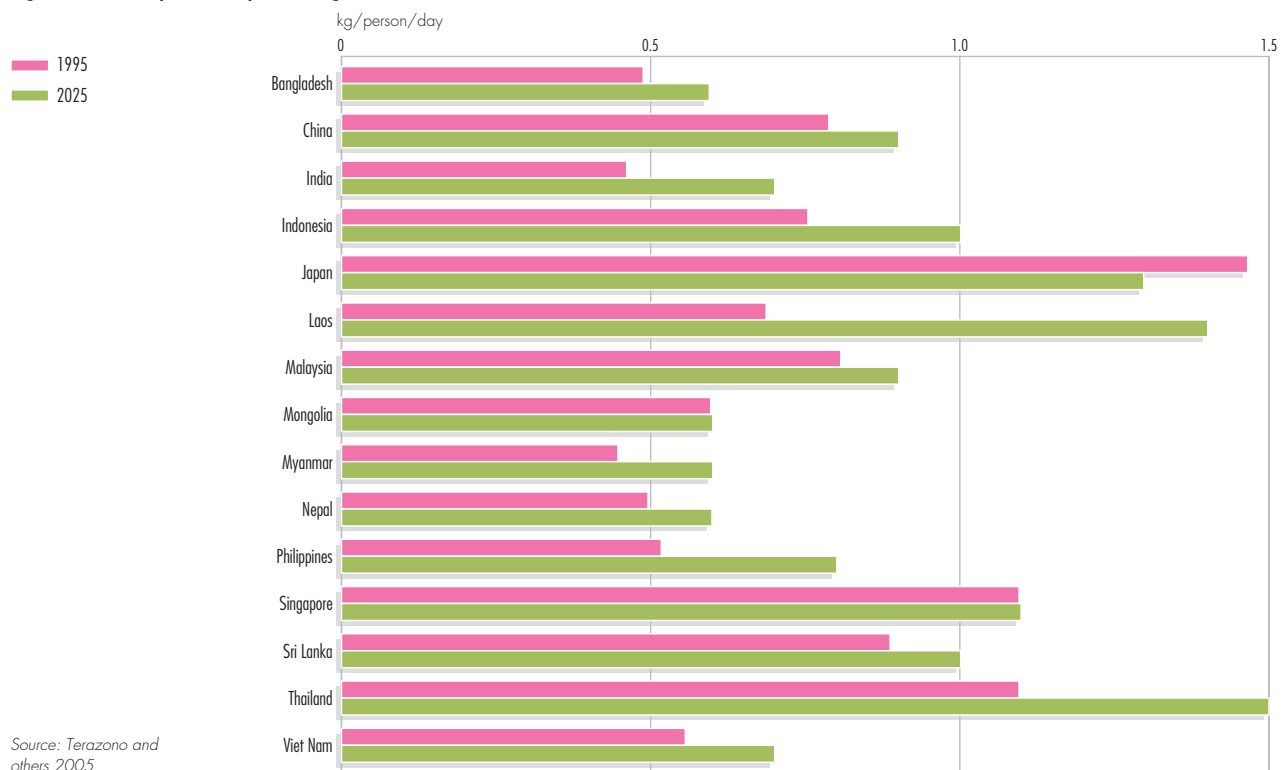
## WASTE MANAGEMENT

### Consumption and waste generation

The industrial model of development has driven the region's economy into a stage of rapid growth, accompanied by increased environmental pollution. This pattern follows the general trend in early economic growth described by the environmental Kuznets Curve (Kuznets 1995, Barbier 1997). This development model, together with new lifestyles associated with greater affluence, has led to rapid changes in consumption patterns, the generation of large quantities of waste and changes in waste composition. These are the drivers behind exponentially growing waste management problems in Asia and the Pacific.

The region currently generates 0.5–1.4 kilogrammes of municipal waste per person daily (Terazono and others 2005, UNEP 2002c). This trend shows no sign of abating, as illustrated in Figure 6.20, which extends the trend until 2025. Compostable wastes, such as vegetable and fruit peels and other leftover foodstuffs, represent 50–60 per cent of the waste stream (World Bank 1999).

**Figure 6.20 Per capita municipal waste generation in selected Asian countries**



### Box 6.12 Electronic waste – a growing human and environmental health hazard

There has been a rapid increase in the global domestic consumption of a wide range of electronic goods and advanced technologies. Often it is cheaper to buy a new product than to upgrade an old one, helping to push a 3–5 per cent annual increase in electronic waste (e-waste). More than 90 per cent of the 20–50 million tonnes of the e-waste generated every year in the world ends up in Bangladesh, China, India, Myanmar and Pakistan. Seventy per cent of e-waste collected at recycling units in New Delhi (India) was exported from or dumped by other countries.

Sources: Brigden and others 2005, Toxic Link 2004, UNEP 2005b

E-waste has become an important health and environmental issue. Recycling electronic goods involves exposure to dangerous metals, such as lead, mercury and cadmium, which can be toxic to humans and ecosystems if they are improperly handled or disposed of. A study of land and water contamination near dumps close to Guiyu Town in Guangdong province, southern China, and in the suburbs of New Delhi found toxic chemicals, including heavy metals, in the soil and local rivers around scrapyards where electronic waste is recycled. It is said that Asian workers are “using 19th century techniques to process 21st century wastes.”

The use of unsanitary landfills is becoming problematic, because they contaminate land and groundwater. Poor people, especially those who depend on local resources for their food supply, or who earn their livelihoods from recycling, are highly vulnerable to such impacts. The Japan Environmental Council (2005) found that in the Philippines, people who collect recyclable materials from landfills frequently give birth to deformed children. The illegal traffic in electronic and hazardous waste, and the effects on human health and the environment pose new and growing challenges for Asia and the Pacific (see Box 6.12).

Although most countries in Asia and the Pacific have ratified the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, the region as a whole lacks a common approach to the import of hazardous wastes.

#### Sustainable waste management

Recently, several countries have initiated a variety of policy responses to address the growing waste problem. For example, Dhaka has been implementing community-based solid waste management and composting projects. They benefit the municipality by saving transport and collection costs, and reducing the amount of land needed for landfills. They also contribute to progress in achieving some Millennium Development Goals (MDGs), including reducing poverty, as well as unemployment, pollution, soil degradation, hunger and illness (UNDP 2005b). The proper reuse and recycling of waste (its collection, sorting and processing) is labour intensive, and can provide employment for the poor and unskilled. Substantial numbers of people in developing countries

earn their living through well-organized systems of waste collection, such as rag picking and recycling. In India alone, more than 1 million people find livelihood opportunities dealing with waste (Gupta 2001). Although there are examples of policies and strategies to tackle waste problems, effective waste management strategies and systems are still lacking or inadequate in many countries, posing a serious threat to human health and the environment.

Many countries are starting to implement cleaner production policies and practices. Market-based tools, such as eco-labelling, have gained ground in the Philippines, Thailand, Singapore and Indonesia. For example, in cooperation with the government, business and other stakeholders, the Thailand Business Council for Sustainable Development launched its Green Label

Effective waste management strategies are lacking or are inadequate in many countries.

Credit: Ngoma Photos



project in 1994. By August 2006, 31 companies had submitted applications to use the label for 148 brands or models in 39 product categories (TEI 2006). The Thai Green Label, recognized by both companies and environmentally aware consumers, is gradually becoming a trademark for environmentally friendly products (Lebel and others 2006).

Several countries, such as Japan and South Korea, are adopting the “reduce, reuse and recycle” (3R) approach (see Chapter 10), and governments are integrating policies aimed at more efficient natural resource use into their agendas. The goal is to move towards a Sound Material-Cycle Society, characterized by preventing waste generation in the first place through lower input of natural resources, smarter product design, more efficient manufacturing and more sustainable consumption. It also involves reuse, recycling and proper treatment of materials that would otherwise enter the waste stream. In the Pacific, Fiji introduced in 2007 new measures to integrate air pollution, and solid and liquid waste management into a National Waste Management Strategy. Some countries lag behind. Mongolia has not developed comprehensive waste management laws, and South Asian countries have not yet instituted policy measures to promote more sustainable consumption.

## **EUROPE DRIVERS OF CHANGE**

### **Socio-economic and consumption trends**

The past two decades have seen substantial changes across the European Region. Within this broader region, the European Union (EU) has gradually expanded to include 27 countries, while 32 European countries now participate in the activities of the European Environment Agency (EEA) and its information network, Eionet (see Box 6.13).

About 830 million people (less than one-sixth of the world's population) live in the European Region, of which over half (489 million) live in the EU-27 (GEO Data Portal, from UNPD 2007). The diversity of the European Region can be seen in the various countries' socio-economic systems, environmental governance and the priority given to environmental issues on their policy agendas. The nature of environmental challenges in Europe has been changing. While industrial pollution is still a major problem in many non-EU countries, environmental

problems now also include more complex problems related to lifestyle issues.

Rising standards of wealth (leading to rising consumption of energy, transport and consumer goods) and growing numbers of households are driving greenhouse gas emissions from human activities (see Figure 6.22). A reliable and affordable energy supply and an effective transport system are preconditions for economic growth, but are also major sources of greenhouse gas emissions, and other environmental pressures.

### **Environmental governance: an evolution of ideas**

At the time of the report of the Brundtland Commission in 1987, the region was just waking up to the potential transnational consequences of its industrial activities. Today, Europe, particularly the European Union, recognizes responsibility for its contribution to global environmental problems. The European region, and the EU consumer society in particular, leave an “ecological footprint” on other parts of the world. Shrinking the footprint, and tackling environmental issues will, at least in the case of the European Union, require managing and stabilizing demand, as rising consumption may offset even the best technological and efficiency improvements.

The Brundtland Commission report, *Our Common Future*, was a milestone in integrating the objectives of sustainable and equitable environmental development into the heart of European policy. In the two decades since then, substantial progress in environmental protection has been achieved across Europe, especially in the EU member states.

The Brundtland messages resonated in a Europe scarred by two serious environmental accidents during the previous year. An incident at the Chernobyl nuclear power plant in Ukraine led to radioactive fallout in many parts of Europe, and the Sandoz chemical fire in Basel sent toxic materials into the Rhine. Both of these industrial accidents led to severe, transnational, long-term human and environmental repercussions, some of which are still felt today. The accidents perhaps helped to set the scene for the broad acceptance of the Brundtland Commission report, by focusing public attention on the need for increased international action and cooperation to protect human life, and to safeguard the environment for future generations.