

Europe's environment: the third assessment

Summary



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Introduction

This report has been prepared by the European Environment Agency for the Kiev Ministerial Conference in May 2003 as part of the 'Environment for Europe' process under the auspices of the United Nations Economic Commission for Europe (UNECE), with the support of the working group on environmental monitoring (WGEM). It is the third in a series, the first two of which were published in 1995 and 1998 for the conferences in Sofia and Aarhus respectively.

This third assessment differs in scope from previous reports by taking a more integrated approach both on environmental issues (e.g. combining inland and marine waters; assessing health and environment issues) and on the integration of environmental concerns into sectoral policies, reflecting policy developments in these areas. It also differs in geographical coverage addressing central Asia and the whole of the Russian Federation for the first time since the assessment series began (see box on main country groupings).

The second assessment concluded that the policy measures that had been taken up to the mid-1990s had not by then produced substantial improvement in the state of the

Box: Main country groupings used in this summary

Western Europe (WE)	Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden, United Kingdom (EU), Iceland, Liechtenstein, Norway, Switzerland (EFTA), including the small states Andorra, Monaco, San Marino.
Central and eastern Europe (CEE)	Bulgaria, Czech Republic, Estonia, , Hungary, Latvia, Lithuania, Poland, Romania, , Slovak Republic, Slovenia, Cyprus, Malta and Turkey (EU accession countries), Albania, Bosnia-Herzegovina, Croatia, FYR of Macedonia, Serbia and Montenegro.
Twelve countries of eastern Europe, Caucasus and central Asia (EECCA)	Armenia, Azerbaijan, Belarus, Georgia, Republic of Moldova, Russian Federation, Ukraine, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan.

In any report of this type with such a huge geographical scope it is necessary to group countries together and draw generalised conclusions. For practical reasons the groups used are based on established political groupings rather than environmental considerations and it must be underlined that there can be considerable variations in environmental performance within the groups and substantial overlaps between the groups. Where possible these variations and overlaps have been highlighted in the report proper.

environment overall. Progress was evident in some areas, notably reductions in air emissions and improvements in air quality, and reductions in point source emissions to water. The environmental situation was especially poor, however, in areas such as waste management, fishing and soil degradation. The process of integrating environmental concerns in the transport and agriculture sectors policies was seen at a very early stage of development. It warned against solely focusing on end-of-pipe measures that were inappropriate to deal with the environmental impacts of infrastructure development and rapidly changing and increasing production and consumption patterns.

Developments since the mid-1990s have essentially confirmed the conclusions of the second assessment and show that the overall picture of Europe's environment remains complex.

Environmental policies, when properly developed and implemented, have in several fields led to significant improvements in and reduced pressures on Europe's environment.

There have been substantial reductions in emissions of substances that deplete the ozone layer, reductions in air emissions and improvements in air quality, and reductions in point source emissions to water leading to improved water quality. Protection of biodiversity through the designation and protection of habitats has provided some improvements.

Such progress has mainly been brought about through 'traditional' measures regulating products (such as lead in petrol, sulphur in liquid fuels or catalytic converters on cars) and production processes (such as emissions from power plants, industry and waste incinerators), and protecting important nature sites. These areas are covered by well-established EU legislation and in many cases are also directly or indirectly framed by international conventions.

Implementation and enforcement of environmental policies — together with adaptation to technical progress and new

insights — remains a core task throughout the region. There is also a need to widen the coverage of such policies to all countries in Europe.

Contrary to the abovementioned progress, environmental policies in other fields such as waste management have not led to significant overall achievements in terms of reduced use of natural resources, reflecting the fact that progress here is more intimately related to general economic and social development.

Marked economic and social transition since the pan-European process began has resulted in environmental improvements in some areas — and degradation in others.

The last decade of the 20th century saw substantial changes in economic terms in Europe. Under conditions of steady economic growth throughout most of the period, western Europe continued to move from an agricultural and manufacturing economic base towards a more service-oriented society. Central and eastern Europe saw transition to a market economy coupled with the political process of accession to the European Union. In the twelve countries of eastern Europe, Caucasus and central Asia (EECCA), there was a slower transition to market economy, but nonetheless radical departures from the previously centrally planned economies.

These developments have resulted in overall reductions in emissions of greenhouse gases, and in central and eastern Europe and EECCA reduced pressure on water resources from agriculture and industry and lower diffuse emissions from agriculture to the ground and air. In central and eastern Europe and EECCA, economic restructuring was also the major driving force behind the observed reductions in emissions of air pollutants.

On the negative side, land abandonment due to economic restructuring in central and eastern Europe and EECCA is threatening biodiversity. Furthermore, economic growth is making the achievement of individual burden-sharing

targets for greenhouse gas emissions challenging for many western Europe countries. Urban development and transport infrastructure is sealing soil and fragmenting habitats in many places across the region. Overfishing is threatening marine natural resources.

As developments in these areas are mainly determined by the general economic situation and related developments in economic sectors such as transport, energy and agriculture, much of the progress seen is unlikely to be sustained in the face of continuing or renewed economic growth, while many of the negative impacts are likely to be exacerbated. This trend is already apparent in the transport field.

The implementation of more integrated approaches to policy making needs to be accelerated if Europe is to ensure proper protection of the environment and meet its aspirations on sectoral integration and sustainable development.

The overall picture in terms of sectoral integration is one of increased activity in the development of the necessary policy frameworks, particularly in most of the EU but increasingly also in many of the EU accession countries and EECCA. However there has been only limited progress with developing and implementing concrete initiatives to date and only in a few cases has there been significant decoupling of economic growth from the associated environmental pressures.

There is still a heavy emphasis on the use of traditional regulatory instruments in specific areas to deal with environmental issues. Environmental impacts caused by economic developments and general patterns of production and consumption are typically not taken into account. Other instruments, such as economic instruments and voluntary agreements, which are more appropriate tools to deal with such impacts, are being developed in the EU, but have as yet not been used to any large degree across the European region.

As was already stated at the pan-European Ministerial Conference in Sofia in 1995, the whole of the European

region is committed to fostering a transition towards sustainable development. The Johannesburg World Summit on Sustainable Development amplified this challenge. The role of Europe as the originator of several of the world's environmental problems was highlighted. European cooperation can therefore, if there is the political will, play a major role in attaining global progress towards sustainability. A better balance of policy action — between regulatory measures to deal with specific environmental problems and the use of economic and other instruments to deal with the environmental impacts of sectoral activities — will be indispensable for the transition towards sustainable development.

Finally, it is important to bear in mind that transition towards sustainable development requires action at all levels, local, regional, national and international. This report mainly addresses issues at the national and international levels. However, these levels can often only create the necessary boundary conditions for progress — the real solutions have to be found locally, where the problems and conflicts are often also most apparent. Strong local and regional understanding, support and involvement, in government, business, civil society and individual action, are therefore of fundamental importance for achieving sustainable development.

Economic development and related pressures on the environment

Economic growth in western Europe has been steady in the latter part of the 1990s following the recession early on in the decade. It has a significantly higher gross domestic product (GDP) per capita than the other European regions. The former centrally-planned economies in central and eastern Europe and EECCA are still in a phase of gradual but uneven transition. These countries experienced economic decline at the beginning of the 1990s, but most picked up growth at the end of the decade, some with even higher growth rates than are found in western Europe. They may have in some cases shown decreasing environmental pressures as the consequence of their economic downturn, but they also have relatively limited possibilities for private or public financing of environmental measures. As a result there are wide variations between the regions and countries in the scale and range of environmental pressures and in the balance between positive and negative impacts.

Sustainable use of natural resources

High levels of material use have broadly stabilised in EU and CEE countries. They are placing an increasing environmental burden associated with extraction on other countries, including EECCA, through increased imports of raw materials.

The sustainable management of natural resources has been a priority issue since Rio de Janeiro, and was recently re-emphasised in Johannesburg. So far, the issue has not been addressed in a coherent and comprehensive way. However, the European Union has announced recently that it will develop a thematic strategy to tackle this issue.

In relative terms, the use of resources over the last two decades has been decoupled from economic growth in EU and accession countries. However, in absolute terms, material use is still high, remaining at levels that were recognised as unsustainable in Rio. In EU accession countries, material use per capita is 70 % of the EU, but as resource productivity is much lower, at about 20 % of the EU, productivity will have to be improved if their efforts to reach standards of living comparable with the west are to be successful.

Western European and central and eastern Europe economies have, over the past 20 years, increasingly imported their raw materials, which means that the environmental burden associated with extraction is moved to other parts of the world. The EECCA countries are some of the main exporters of raw materials to the European Union. Global responsibility requires that countries should each be aware of the impact they are having on the rest of the world. It also underlines the fact that sustainability assessments are most meaningful when carried out in a global, rather than a regional or national, context. However it was not possible to take such a global perspective in this report as much of the required data is currently lacking.

Facts and figures:

- Fossil fuels are a major component of direct material input in both EU and accession countries, respectively accounting for 24 % and 31 % of the total.
- Total material requirement is around 50 tonnes per capita in the EU, of which imports grew particularly fast during the nineties and currently constitute almost 40 %. Imports of goods in accession countries increased by almost 30 % in this period.
- The EU is increasingly importing from EECCA countries. Currently, about 12 % of EU's 'physical' imports originate from the EECCA countries, particularly as regards fossil fuels and metals.

Energy

Total energy consumption and related pressures on the environment fell in Europe in the 1990s but the impact of energy use on climate change appears destined to increase unless fossil fuels become less dominant and large improvements in energy efficiency are made. The sector remains the dominant contributor to climate change. Efficiency measures and increased use of renewables continue to help reduce environmental impacts, but more needs to be done if, among other things, the projected rundown of nuclear power takes place.

Energy use is the major source of greenhouse gas emissions and emissions of acidifying substances in Europe.

Total energy-related greenhouse gas emissions fell substantially in Europe between 1990 and 1999, due mainly to economic difficulties and restructuring in central and eastern Europe and EECCA. However, total energy consumption is expected to rise again as economies recover. The rise in energy consumption observed in the Russian Federation in 1999 might be a first sign of this recovery.

Emissions of acidifying air pollutants from the energy sector decreased substantially as a result of switching to cleaner fuels, flue-gas clean-up and economic restructuring, and all three regions of Europe are on track to achieve their 2010 emission targets for these pollutants.

Energy intensities (total consumption/GDP) of individual economic sectors

(toe/ USD million)	Industry		Transport		Households and services	
	1992	1999	1992	1999	1992	1999
Western Europe	126	124	33	33	43	40
Central and eastern Europe	622	418	73	73	202	164
12 countries of eastern Europe, Caucasus and central Asia	924	1 281	242	223	751	615

Note: energy intensity data for regional comparison within a sector only

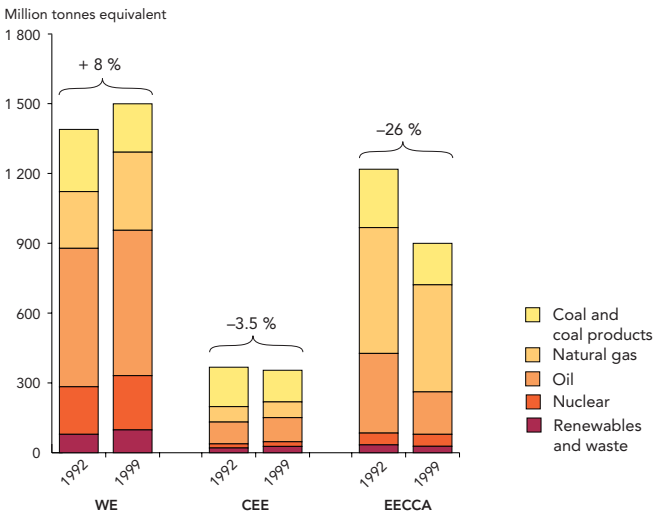
Energy efficiency has improved in all regions, but especially in central and eastern Europe, as a result of a combination of positive measures and economic restructuring.

The proportion of renewable sources, both in total energy and in electricity production, has increased, but remains small and continues to be dominated by hydropower and biomass. Much faster growth in 'new renewables', such as wind and solar power, is needed as, among other things, the projected run-down of nuclear power production would otherwise lead to increasing fossil fuel consumption and carbon dioxide emissions.

Facts and figures:

- Total energy use in western Europe increased by 8 % between 1992 and 1999 and fell in the EECCA by 26 %. This brought consumption in western Europe to an average of 3.9 toe/capita, compared with 3.2 toe/capita in EECCA, dominated by industrial use in the Russian Federation and the Ukraine.
- The share of renewables in total energy consumption in Europe increased from 4.5 % in 1992 to 5.6 % in 1999.

Total energy consumption



Transport

Transport volume grew at a fast rate in western Europe in the 1990s. It fell in central and eastern Europe and EECCA in the first part of the decade but is again beginning to rise. The sector's contribution to air pollution was reduced substantially across Europe due to a mixture of policy-driven technological improvements, fleet renewal and reduced transport volumes. Developments on other issues such as climate change, land and habitat fragmentation, noise and waste were less positive. More than 100 000 people died on European roads in 2000. Transport patterns in central and eastern Europe and EECCA are currently more sustainable than in western Europe but are moving in the wrong direction. An overall assessment of the environmental and other impacts of transport is needed as the basis for developing an integrated suite of policy measures covering regulation, investment, taxes and other instruments.

In western Europe the transport sector has become the second largest consumer of energy (30 % of total energy use) and is therefore an important source of greenhouse gas emissions. In central and eastern Europe and EECCA the transport sector is a relatively less important energy consumer (22 % and 17 %, respectively). The increase in demand for road and air transport in western Europe has resulted in transport issues rising to the top of the environmental/sustainability agenda. Central and eastern Europe and EECCA have experienced a sharp decline in transport volume during the last decade but volumes in the central and eastern Europe are now increasing again. Central and eastern Europe passenger transport volumes are back at 1990 levels and rising rapidly.

As well as transport volumes, shares of road, rail, waterways, and air transport differ markedly across the regions. Road has been increasingly dominant in western Europe for many decades. While rail and public transport dominated the transport system in the central and eastern Europe countries in the early 1990s, road is gaining rapidly at the expense of rail. The market share of rail in central and eastern Europe is however still much higher than in western Europe. In EECCA, the position of rail remains strong, with no signs of decline. Aviation is the fastest growing mode and in EU its

passenger market share (5 %) is about to overtake that of rail. The aviation share in other regions is still much smaller.

EU experience shows that environmental regulation on vehicles and fuels has helped to reduce certain impacts per unit of transport significantly, particularly air pollution. But such gains in eco-efficiency have not been sufficient to mitigate the impacts of the rapid growth of transport and infrastructure volumes on greenhouse gas emissions, noise and habitat fragmentation. In addition to technological solutions, better-integrated transport and environmental strategies are needed to restrain traffic growth and promote the use of more environmentally friendly modes — two of the key objectives of the EU sustainable development strategy.

The voluntary agreement between car manufacturers and the European Commission, which aims to reduce average CO₂ emissions from new vehicles sold on the EU market, has contributed to a 2 % improvement in energy efficiency of the entire EU car fleet. The EU also advocates the need to internalise the external costs of transport on society. One instrument to help achieve this is fuel taxes; however, despite regular increases in tax, fuel for road transport remains cheaper in real terms than it was twenty to thirty years ago. Some Member States have begun to introduce other charges and taxes to achieve internalisation of external costs, but a number of barriers to implementation remain.

So far, environmental pressures from transport in the accession countries are generally lower per capita than in the EU, due to less transport demand. Rapid growth in road transport, however, indicates that these countries risk ending up with the unsustainable transport patterns similar to EU. While the main short-term challenge in these countries is to comply with the complex and extensive EU environment and transport legislation, which already contributes to lower emissions of lead and other air pollutants, they should not lose sight of the longer-term issue of decoupling transport demand from economic growth. The most important short-term challenges for EECCA countries are to phase out leaded petrol, abolish fuel subsidies where they are still used, introduce self-

financing of the transport system via fuel taxes, and move towards cleaner fuels and vehicles and better inspection and maintenance regimes. Again, in the longer term decoupling is the challenge.

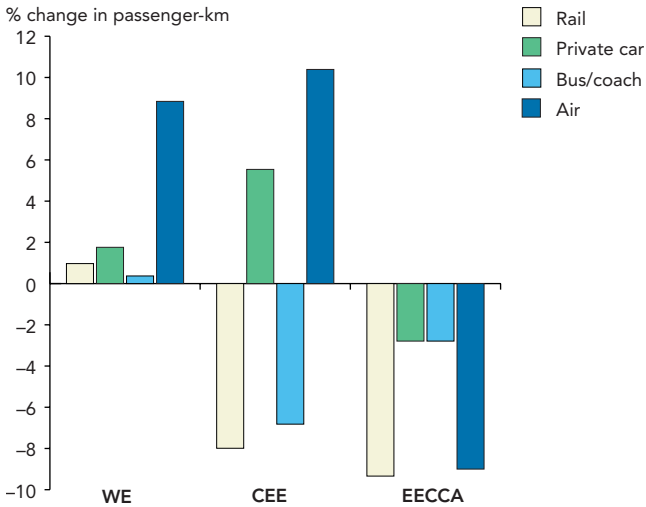
Investment in infrastructure remains a priority of transport policy throughout Europe. Investment in western Europe has focused on extending the infrastructure, particularly roads, and investment in the accession countries is moving in the same direction. The multi-modal trans-European transport network and its extension to the east constitutes a major pillar of the common transport policy. Although investments were originally targeted to have a dominant rail share, road network development is currently ahead of that for the railway network. An overall assessment of the transport, economic, social, environmental impacts and benefits of the trans-European transport network and its eastern extension has not yet been made.

Reflecting the importance of transport, the Transport, Health and Environment Pan-European Programme was launched three years ago to streamline existing activities and make progress towards transport patterns that are sustainable for both health and the environment.

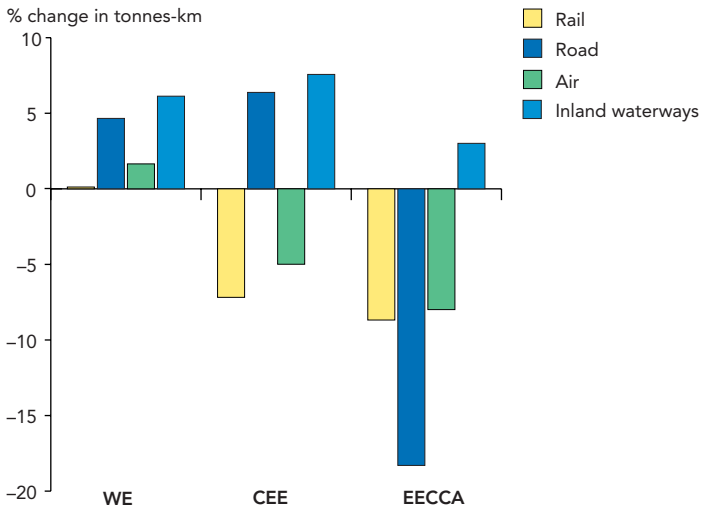
Facts and figures:

- Freight volumes in CEE have been increasing again since the mid 1990s; passenger transport is back at the 1990 level and rising rapidly.
- Car ownership increased by 61 % in CEE and 20 % in EECCA between 1990 and 1999; but the number of cars per 1 000 inhabitants in CEE is half of that in western Europe and in EECCA less than one-sixth of that.
- The plans of the extension to the east of the trans-European transport network include a 21 000 km rail network and a 19 000 km motorway network. The network's costs are estimated at EUR 91.5 billion, with 48 % for the motorway network and 40.5 % for the rail network.

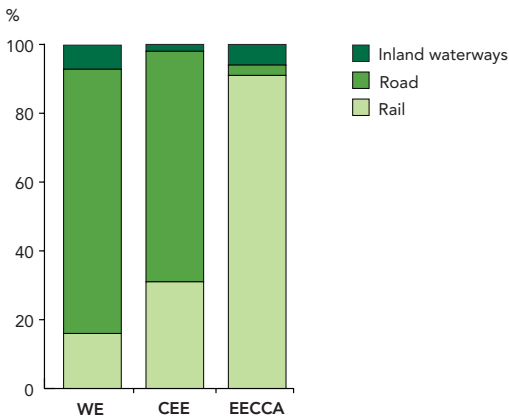
Annual changes in demand for passenger transport over the last decade



Annual changes in demand for freight transport over the last decade



Modal shares freight transport



Tourism

Tourism is one of Europe's fastest growing sectors and a strong contributor to transport growth. In addition tourism brings further pressures at destination areas through water stress, waste generation and land fragmentation. Economic, political and demographic changes mean the share of household expenditure on tourism is increasing rapidly, but policy measures to promote more sustainable tourism are progressing only slowly.

Tourism is a main driver of the increase in demand for passenger transport with its associated environmental impacts, and this demand is expected to continue to grow. Cars and planes, which are the most environmentally damaging transport modes, are the most-used forms of tourism transportation. Air traffic, for example, is forecast to double by 2020 mainly due to growth in the tourism sector.

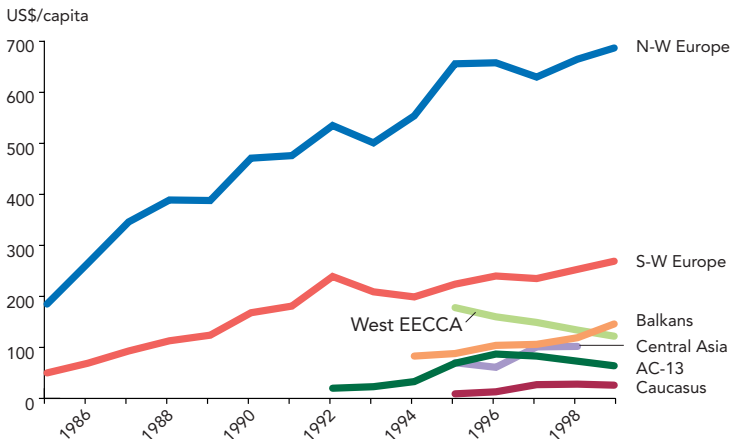
Apart from its influence via transport, tourism increasingly burdens the environment through the use of water, land and energy, the development of infrastructure, buildings and facilities, pollution and wastes, land fragmentation and the increasing number of second homes. In some popular destinations, these pressures have resulted in serious degradation of the local environment, which affects their attraction for tourism.

Prices of holiday trips continue to fall and at the same time the share of tourism in household expenditure is rising. Vacation patterns are changing, with more short breaks; and people are travelling more often, for shorter stays and visiting further from home. The seaside remains by far the favourite destination while mountains, cities and the countryside are about equal in popularity at a much lower level. Some previously little-visited countries, mainly in central and eastern Europe, are becoming more attractive as a result of economic transition and the opening of borders, with a huge potential for tourism development. However, implementation of policies for more sustainable tourism is only progressing slowly, for example there has been only minimal penetration of eco-labelling schemes in the sector.

Facts and figures:

- The World Tourism Organisation forecasts an increase of international tourism in Europe of 3.1 % per year over the period up to 2020.
- Tourism expenditure for travelling abroad increased by 7 % between 1995 and 1999 in Europe.
- In France, the world's top tourist destination, the number of second homes increased by 10 % between 1990 and 1999, mainly in coastal zones and mountains.

**Annual tourism expenditure on travel abroad
(excluding international transport)**



Industry

The industry sector in central and eastern Europe and EECCA countries is much more energy intensive than in western Europe and hence has much greater environmental impacts. However, western Europe relies on manufactured products from CEE and EECCA and so has to assume a degree of responsibility for the environmental burden associated with industrial pollution in these countries. Sharing of best practice on regulations, technical standards and other measures would help raise environmental performance across Europe.

Industrial output is growing throughout Europe, and industry remains an important sector of the economy in all regions. However, its share of the economy is smaller, and falling, in western Europe than in central and eastern Europe and EECCA. Eco-efficiency and energy efficiency are generally improving, partly through direct improvements, and partly through a relative move from manufacturing to services, which is inherently less energy-intensive. In central and eastern Europe, energy efficiency is improving at a faster rate, but remains well below that in western Europe, while industry in the EECCA is still seven times more energy-intensive than that in western Europe. This again partly reflects the greater emphasis on manufacturing in central and eastern Europe and EECCA.

The main challenge in western Europe is to ensure better protection of the environment while maintaining a competitive industrial base, especially as the more polluting sectors of manufacturing industry (mining, chemicals) tend to show a stronger growth than the average industrial growth and as the technical improvement measures with lowest costs have already been taken. In the light of the growth in freight transport, there is a particular need to address industry-driven transport demand.

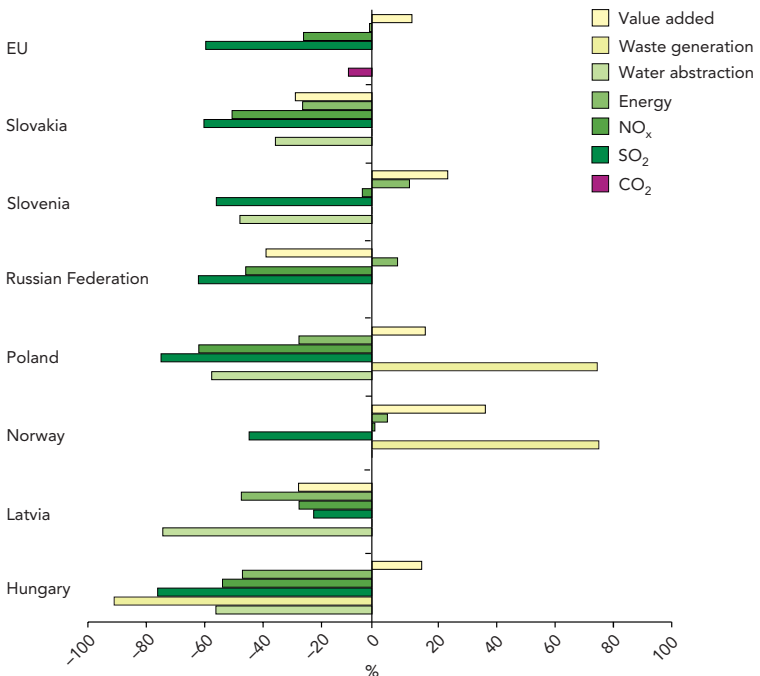
Soil contamination from localised sources is often related to industrial plants no longer in operation, past industrial accidents and improper industrial waste disposals.

In central and eastern Europe, major investment is needed to raise the environmental performance of industry to the standards required by the accession process. In the EECCA, the main challenge is to build an appropriate institutional and regulatory framework and improve enforcement of environmental standards.

Facts and figures:

- Industry in CEE and EECCA generates 35 to 40 % of GDP. In the more advanced transition countries manufacturing industry has recovered from the downturn in early 1990s. In contrast, total manufacturing in the Russian Federation fell by 70 % between 1990 and 1999, with some signs of recovery only recently appearing mainly in food and metal industries
- In the 1990s industrial energy use declined by 35 % in the EECCA, mainly because of the fall in industrial output. In western Europe, industrial energy use increased by more than 1 % per year.

Industrial pollution and the input of resources in relation to production growth, 1990–1999



Agriculture

Agriculture intensification and specialisation have led to soil erosion, water stress and severe declines in biodiversity, across Europe. Biodiversity remains much healthier in CEE and EECCA countries but new threats are emerging from undergrazing and land abandonment. The redesign of the EU Common Agriculture Policy within an agri-environment framework and its implementation in accession countries remain major challenges for the enlarged EU; little or no agri-environment framework exists in EECCA countries.

Despite different conditions specialisation and intensification of farming are common trends across the region, associated with significant environmental pressures in practically all countries. Many government programmes supporting drainage, irrigation and land consolidation had a significant influence on the development of agricultural production capacity and intensity. All these factors led to over-exploitation of resources, such as freshwater for irrigation. This trend was exacerbated by large-scale collectivisation in central and eastern Europe and EECCA. However, in these countries the dramatic decline in resource use in agriculture, due mainly to economic restructuring during the 1990s, has reduced several environmental pressures.

The common agricultural policy (CAP) has been one of the important drivers of farm intensification and specialisation in the EU. Conversion of grassland into arable land, loss of field boundaries, and high fertiliser and chemical use has led to a severe decline in biodiversity and to increases in water and air pollution. However, the reorientation of the CAP has started to create new opportunities, via agri-environment schemes for example, for farmers to reduce pressures on the environment.

Soil erosion and water pollution are still major agri-environmental issues in many European countries. Point source pollution from large livestock facilities and stockpiles of obsolete pesticides remain a problem although at a more limited scale than previously. In central and eastern Europe, irrigation and the environmental problems associated with it have decreased markedly since the 1990s, although facilities

are currently being restored in some areas. The challenge now is to include appropriate environmental management systems into the restoration of these irrigation infrastructures.

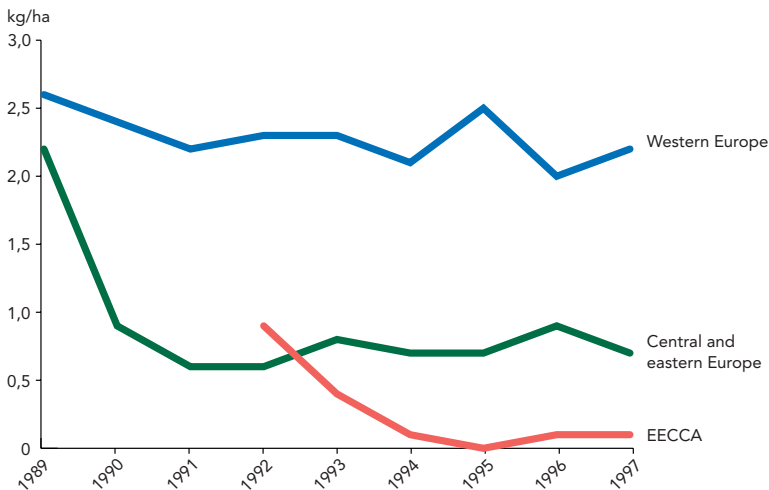
The quality and density of farmland biodiversity and semi-natural habitats remains far higher in central and eastern Europe and the EECCA than in western Europe. The large fall in livestock production in central and eastern Europe has led to new environmental problems in the form of under-grazing and land abandonment that threaten semi-natural grasslands. The lack of capital to maintain or improve farm infrastructure, such as manure pits, also leads to renewed environmental pressures. To maintain farmland biodiversity and improve the environmental management of farms will be a challenge during the coming years.

Accession to the EU means new challenges for the design of the CAP to provide equal opportunities for farmers in East and West and maintain the environmental quality of farmland in the new Member States. Enlargement of the CAP could bring some intensification on arable land, but improved management of fertilisers and pesticides can prevent negative consequences for soil and water resources. However, conversion of (semi-natural) grassland to arable land would be a detrimental trend. A particular effort is required to promote the implementation of environmental measures in the CAP, such as agri-environment schemes, cross-compliance or support for environmental investment.

Facts and figures:

- After a reduction at the start of the transition process, consumption of fertilisers has stabilised at around 50 kg per ha of agricultural land in CEE and 7 kg per ha in EECCA. Average consumption in western Europe is 120 kg per ha.
- Livestock numbers fell markedly between 1989 and 2001 in EECCA and EU accession countries. However, high pressure on the environment persists from intensification and concentration of livestock production in large units and poor animal waste management, especially in EECCA and accession countries.

Total pesticide consumption per hectare of agricultural land



Forestry

Total forest area of Europe is increasing but the condition of forests continues to worsen owing to acidification and loss of soil quality. Forests remain an important economic resource in EECCA countries and elsewhere as timber demand continues to grow. Fragmented ownership may be a barrier to proper management practices.

The economic scale of forestry in Europe is generally small, but significant in most countries bordering the Baltic Sea. Forests constitute an important natural resource, which covers about 38 % of Europe's total land area. Approximately 80 % of European forest resources lie in Russia.

Europe's total forest resources are increasing, as the total area of forests is growing in size by approximately 0.5 % per year (the Russian Federation excluded) and annual fellings are much lower than growth in nearly all countries. The countries reporting the largest increase are some EECCA (in particular Belarus and Kazakhstan) and those in the Mediterranean region (Spain, France, Portugal, Greece and Italy).

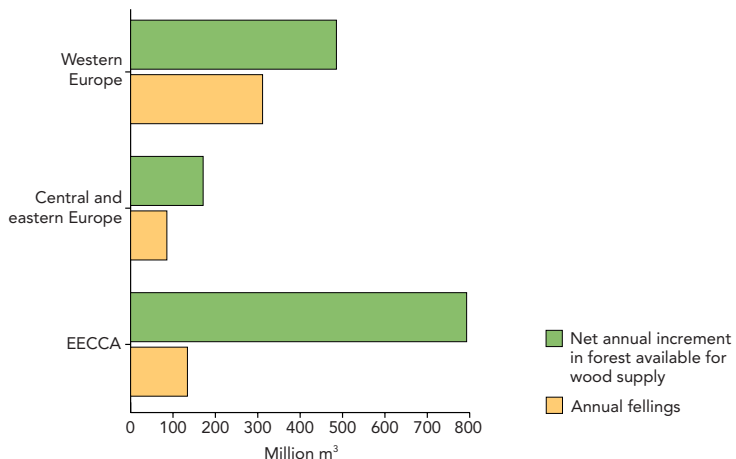
The picture as regards forest condition is more worrying. Since monitoring commenced in the mid-eighties, forest condition has generally declined and more than 20 % of trees are now classified as damaged.

The relatively low level of exploitation of Europe's timber resources provides opportunities for policy makers and forest managers to diversify the functions of forests and move to a better balance of environmental, social and economic interests in forest areas. However, fragmented ownership following privatisation and restitution in countries with economies in transition may be a barrier to proper management practices and hence environmental protection.

Facts and figures:

- The proportion of forest undisturbed by man in most European countries is less than 1 %, with the exception of the Russian Federation and the Nordic countries (northern Sweden, Finland and Norway).
- About 7 % of forest area in Europe is under some form of protection and about 3 % under strict protection.
- In all parts of Europe the annual fellings are far lower than the growth of wood. In the Russian Federation only 16 % of the annual increment is used, while in western Europe this proportion is 65 % and in CEE 50 %.

Annual fellings and the net annual increment of forest growing stock of forest available for wood supply



Fisheries

Many marine fish stocks are below levels that can sustain their populations due to over-fishing by efficient, modernised fleets. Inland fish stocks are under more threat from environmental degradation than overexploitation. The environmental impacts of aquaculture, which has grown dramatically in production, need more attention.

Government subsidies designed to reduce and modernise fishing fleets may have exacerbated the problem of over-exploitation of marine fish stocks, as increased efficiency due to modernisation have outweighed reductions in capacity. A further reduction of the capacity of many fishing fleets is being considered, which would ideally be accompanied by the use of economic instruments that would remove the incentive to fish more intensively with a smaller (but more modern) fleet. Support schemes for people leaving the fishing industry could reduce the severity of the socio-economic impacts.

Commercial inland fisheries outside aquaculture have fallen by 32 % since 1990. The UN Food and Agriculture Organization considers in general that environmental degradation, rather than overexploitation, is the biggest threat to inland fish stocks. However often illegal landings, for example of sturgeon from the Caspian Sea, are many times greater than legal landings and constitute a major pressure on the resource.

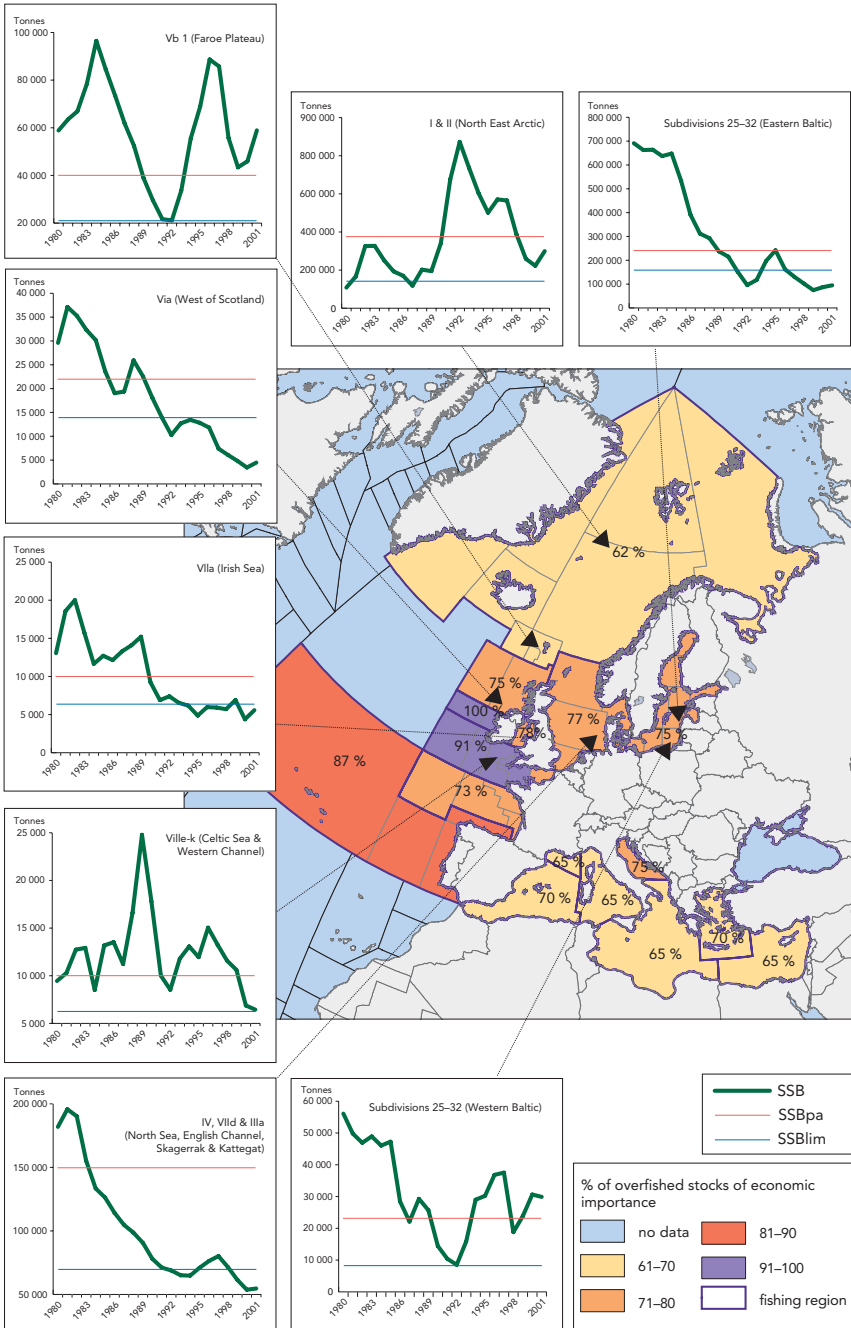
Aquaculture has grown dramatically, especially marine aquaculture in western Europe and reached a total production just over 2 million tonnes in 2000. The main environmental concerns relate to the intensive cultivation of salmon, sea bass and sea bream in marine waters and trout in freshwater. Effects in the immediate vicinity of farms are generally well understood and managed. However, wider impacts on the nutrient status of waters and on wild populations have not yet been given enough attention. In some areas fish farms provide a significant source of nutrients, and populations of escapees from farms can be of the same order of magnitude as wild populations.

These concerns call for a better management of the whole aquaculture sector.

Facts and figures:

- Since 1990, total European landings of marine catch have increased by 25 % despite a reduction in the fleet capacity.
- Most European cod stocks have declined significantly since 1980 and most are considered to be at risk of stock collapse.
- Only modest reductions in the capacity of the European fleet as a whole have been achieved over the last decade. The largest reductions have been in the EU fleet.

Spawning stock biomass (SSB) of European Atlantic cod stocks



Environmental developments

In the current evolving socio-economic context, the overall picture of Europe's environment is complex. Notable progress has been made for example in the reductions in air pollution, and there has been significant progress in the management of water resources and quality across Europe. However there remain several problem issues, such as hazardous waste, chemicals, soil erosion and decline of species related to disappearing or degrading habitats, where more efforts are needed.

Many of the favourable environmental trends that are observed have resulted from relatively straightforward technical developments (safer alternatives to ozone-depleting substances, lead-free petrol), one-off measures (switching from coal and oil to natural gas) or economic recession following the restructuring in EECCA (reduction in energy consumption and hence greenhouse gas emissions). In some of these cases, e.g. in the fall in energy consumption in central and eastern Europe and EECCA, this trend is likely to reverse as economies recover.

Climate change

In summer 2002, heavy rainfall caused floods in central Europe. These cannot be attributed to climatic change alone, but can be considered an example of what may happen if climate change continues. The risk of floods is projected to increase in central Europe and droughts are likely to become more frequent in other areas of Europe. The costs of climate mitigation in western Europe can be reduced significantly through the use of the Kyoto mechanisms. In eastern Europe, investments in the energy sector are needed and greenhouse gas mitigation costs are expected to be lower than in western Europe. The Russian Federation, which is likely to have a significant surplus of emission allowances by 2010, could have a central role in the future market for greenhouse gas allowances.

Mean temperature in Europe has increased by 1.2 °C (compared to 0.6 °C at global level) over the past 100 years. The 1990s was the warmest decade for 150 years. The average temperature is further projected to increase between 1.4 to 5.8 °C between 1990 and 2100, with large increases in eastern and southern Europe. The range in projections is due to differences in assumptions on global population growth, socio-economic and technological developments and uncertainties in the understanding of the climate system. It is therefore useful to present a range of projected changes by 2100, where possible.

Global precipitation increased by about 2 % during the last century, with northern Europe and western Russia getting 10 to 40 % wetter. Projections show an increase of precipitation of 1 to 2 % per decade for the coming century. Also the risk of floods in some areas and droughts in others is projected to increase. In summer 2002, heavy rainfall caused floods in central Europe, which cannot be attributed to climatic change alone, but which can be considered an example of what may happen if climate change continues.

The European Community, its 15 Member States and central and eastern Europe countries ratified the Kyoto protocol in 2002. If the Russian Federation ratifies as expected in 2003, the Kyoto Protocol will enter into force, since a sufficient number of countries accounting for a sufficient proportion of emissions will then have ratified the protocol.

Significant reductions in greenhouse gas emissions occurred during the 1990s, ranging from 3.5 % in the EU, to 34 % in CEE and 38 % in EECCA. However, projections based on existing domestic and EU policies and measures indicate that emissions in the EU will have fallen by only 4.7 % in 2010, 3.3 percentage points short of the Kyoto target of 8 %. Implementing all proposed but not yet adopted additional policies and measures should result in a reduction of 12.4 %, well in line with the target. These figures assume though that some Member States over-achieve on their individual national targets under the EU burden-sharing agreement, something that cannot be taken for granted. Emission trading and other

flexible Kyoto mechanisms can therefore play a role in reaching targets for some Member States and for the EU as a whole, in addition to a range of policies and measures already implemented in various sectors (energy, transport, industry, waste management).

In central and eastern Europe and EECCA, where decreases in emissions were mainly the result of fuel switching and economic restructuring, Kyoto mechanisms provide an opportunity to put new measures into place. These measures can be designed to limit emissions that would result from rapid re-growth of production and consumption. It can be expected that western Europe countries as part of their efforts to meet their own commitments would largely finance these measures.

The Kyoto Protocol is only the first step towards the global emission reductions of 60 to 70 % in industrialised countries needed to attain 'sustainable' greenhouse gas concentrations and climate conditions, in line with the proposed EU target to limit temperature increase to a maximum of 2 °C above pre-industrial levels. Such reductions will require a much more substantial shift to low and zero-carbon energy sources than is likely to occur under current projections to meet the Kyoto targets. In western Europe countries, as overall electricity consumption is still growing, the speed of uptake of renewable sources of electricity; as well as the future for nuclear energy are both very relevant to the possibility of attaining future greenhouse gas targets.

However, even immediate large reductions in emissions will not prevent some climate change and environmental and economic impacts. Measures are therefore also necessary to adapt to the consequences of climate change, especially in regions vulnerable to flooding or droughts.

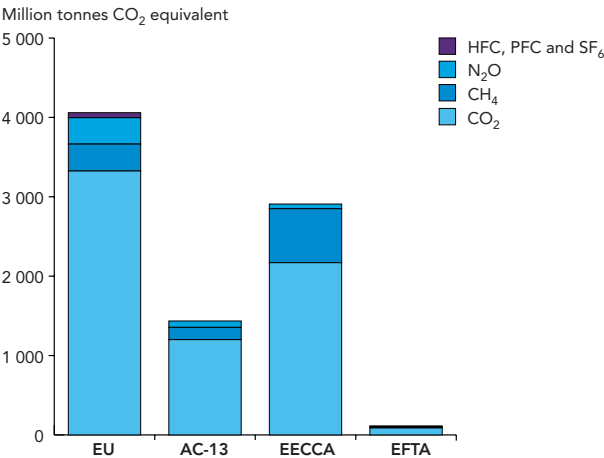
Climate change policies can have significant positive effects ('co-benefits') by also reducing emissions of air pollutants.

Facts and figures:

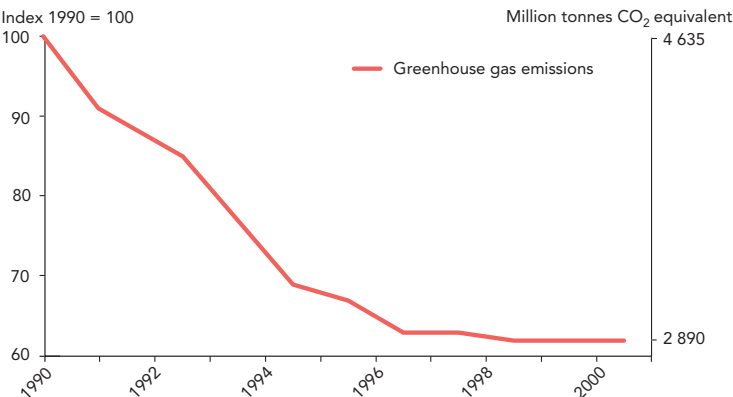
- Combustion in the energy industries, industry, transport and other sectors (mainly heating in commercial and residential areas) — is the dominant source of greenhouse gas emissions in all of Europe.

- Emissions from energy industries (electricity and heat production) are larger in accession countries and in EECCA than in western Europe, partly because of the lower share of other sources such as road transport.
- In the EU, transport contributes about 20 % of total greenhouse gas emissions, whereas in accession countries the contribution is considerably less, since there is less road transport.
- Emissions from industry contribute about 20 % of total greenhouse gas emissions in most of Europe. Fuel combustion for power and heat generation is the main source.

Greenhouse gas emissions by gas and region in 2000

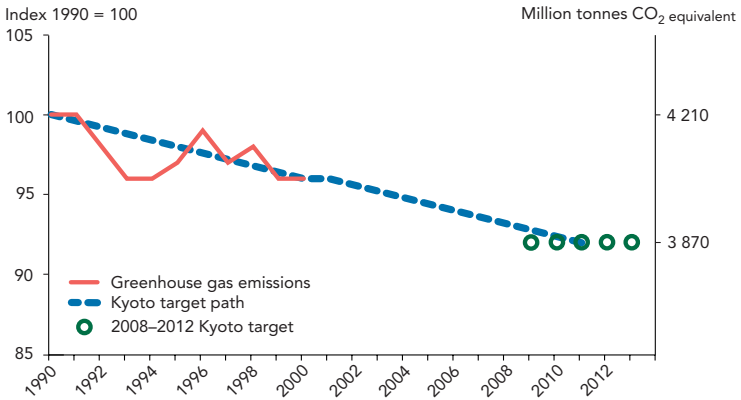


Greenhouse gas emissions in EECCA (excl. fluorinated gases, land use change and forestry)



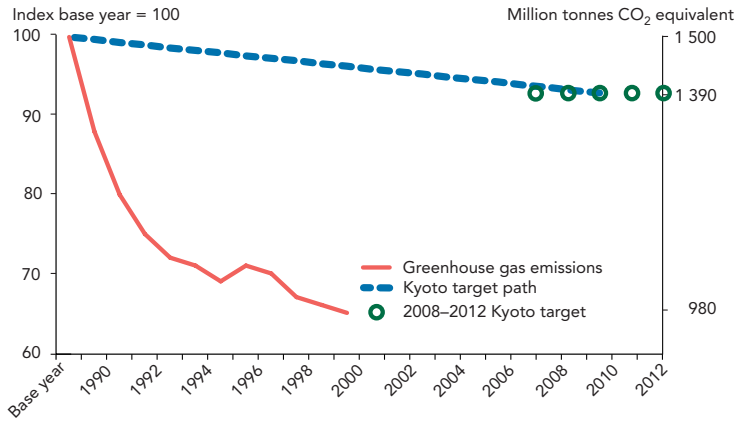
Greenhouse gas emissions compared with target for 2008–2012

EU (excluding land-use change and forestry)



Accession countries

(excl. fluorinated gases, land use change and forestry)



Stratospheric ozone depletion

The gradual fall in the concentration of chlorine-containing ozone-depleting substances in the troposphere shows that international policies to control emissions of ozone-depleting substances are succeeding. However, increased ultraviolet radiation will continue until ozone recovery is complete and the damaging effects of UV on human health and ecosystems are likely to persist even longer. If the current control measures are implemented, the increase in future skin cancer incidence caused by ozone depletion will be very limited, with the maximum impact expected around 2050.

The average ozone column over Europe in March for the period 1997–2001 is about 7 % lower than the average column for the period 1979–1981. This decrease is larger than the global average decrease at northern mid-latitudes for winter-spring of about 4 %.

Implementation of the Vienna Convention and its Montreal Protocol has clearly been a success story in western Europe, where the use of ozone-depleting substances has fallen faster than required under the Protocol. However, the long life of these substances in the atmosphere means that the ozone layer may not recover fully until after 2050, even with this faster phase-out.

In central and eastern Europe and EECCA countries the past five years have also seen a reduction in both the production and consumption of ozone-depleting substances.

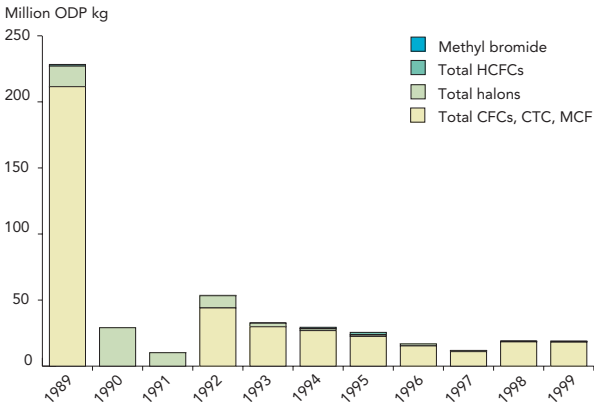
In addition to managing remaining stocks of ozone-depleting substances, preventing smuggling and dumping, and encouraging development of replacements with fewer environmental impacts the main action in western Europe will be helping developing countries to reduce their production and consumption of ozone-depleting substances.

Facts and figures:

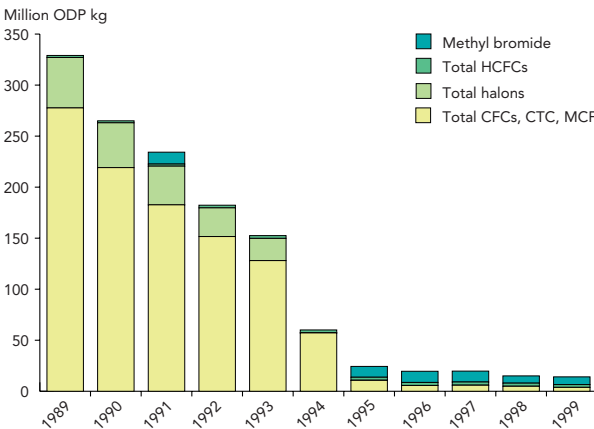
- Production of ozone-depleting substances in western Europe has decreased by almost 90 %. However, production of HCFCs — with low ozone-depleting potential but high global warming potential — is increasing.

- The radiative forcing of ozone-depleting substances is still increasing. This is because the radiative forcing of HCFCs is increasing, while that of CFCs is levelling off.
- Smuggling and illegal production of ozone depleting substances is estimated at 10 % of 1995 global production. These illegal activities will delay the recovery of the ozone layer by several years.
- Western European countries contributed 48 % of total global payments to multilateral fund between 1991 and 2000. The total amount spent so far by the fund is expected to result in the phasing-out of the use of 122 million ODP kg (more than twice the 1997 production in western Europe — ODP: ozone depleting potential).

Consumption of ozone depleting substances in EECCA



Sales of ozone depleting substances in western Europe



Air pollution

Air pollution remains a problem in most cities. Average ground-level ozone concentrations continue to increase although peak concentration values are falling. Exposure to particulate matter may be the largest potential health problem from air pollution in most cities. Although concentrations have been falling since monitoring began, a significant proportion of the urban population experiences concentrations above future EU limit values.

Pollution by sulphur dioxide (SO₂) and to a lesser extent nitrogen oxides (NO_x) has been reduced significantly in western Europe. Ground-level ozone and particulate matter (PM) are, however, still issues for concern for human health and effects on ecosystems. While air quality is also improving in central and eastern Europe and EECCA, especially the latter still have problems with sulphur dioxide and nitrogen oxides. A use of different monitoring methods, however, precludes in-depth assessments in EECCA countries.

Exposure to particulate matter is now the largest threat to human health from air pollution in western European cities, and many EU Member States are likely to have major difficulties in meeting future standards. The situation in central Asia and Russia is likewise of concern: in contrast to sub-regional situations, in 1998, 30 % of Russian cities exceeded the World Health Organization limits for particulate matter and exceedences in central Asian cities were also widespread. It is anticipated that emissions of particulate matter may increase in central Asia in conjunction with increases in energy use in the near future. Existing policies tackling transport and poor quality coal are not expected to reduce emissions sufficiently to cancel out increased energy use.

In 1999, air concentrations of ground level ozone exceeded the future target in about 30 % of cities in EU. Most exceedences are in central and southern European countries. Projections for 2010 show substantial decreases, leading to a significant improvement in health protection, but not enough to allow target values to be met everywhere in Europe.

In general there has been good progress in reducing air pollutant emissions and meeting the targets set in the Gothenburg Protocol of the Convention on Long-range Transboundary Air Pollution. However, in southern European countries, further reductions in emissions of acidifying substances and ozone precursors will be needed to reach the targets.

Eutrophication remains a substantial problem with large ecosystem areas unprotected throughout Europe, especially in western and central Europe. Pollution loads on most of Europe's ecosystems are now below levels that are likely to cause damage from acidification, but many localised areas still remain at risk, especially in central Europe. The large overall reductions in emissions of acidifying and eutrophying substances and ground-level ozone precursors that occurred during the past decade resulted more from economic restructuring in central and eastern Europe and EECCA than from targeted emission-reduction measures.

Baseline projections for 2010 suggest that economic restructuring and switching to cleaner fuels should enable the Russian Federation and the western EECCA to reach the CLRTAP Gothenburg Protocol emission ceilings targets. Implementation of EU legislation in central and eastern Europe should result in countries attaining their national emission ceilings for all air pollutants except ammonia. In western Europe, additional measures beyond current legislation will be needed to reach the national emission ceilings of nitrogen oxides, volatile organic compounds and ammonia.

The reduction of carbon dioxide emissions to comply with the Kyoto protocol will have significant co-benefits in terms of additional reduced emissions of air pollutants, reduced costs of air pollution abatement and reduced risk of human health impacts and ecosystem damage.

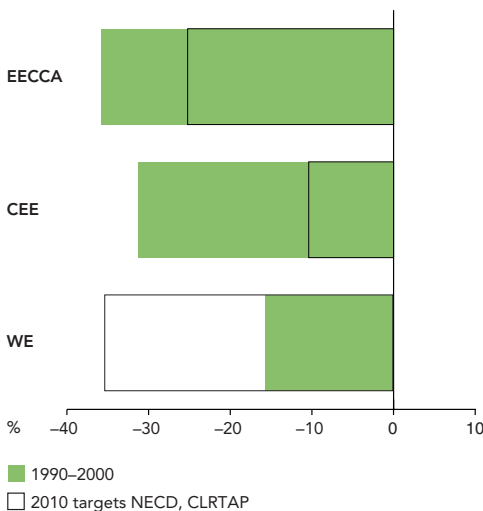
The use of flexible mechanisms to implement the Kyoto Protocol in western Europe could shift the additional reductions of air pollutant emissions to central and eastern

Europe, the Russian Federation and the western EECCA, and result in higher ecosystem protection for the whole of Europe.

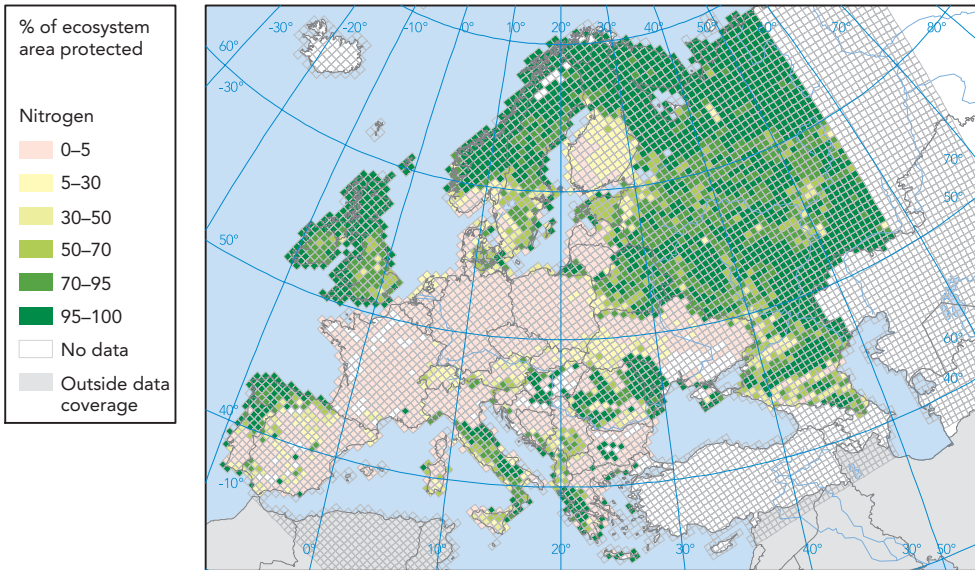
Facts and figures:

- In 2000, more than 90 % of the ecosystems in CEE and EECCA were estimated to be protected against further acidification. In western Europe more than 10 % of the ecosystem area remains unprotected — i.e. acidifying deposition exceeds the thresholds for these ecosystems.
- For ground-level ozone the EU target value is exceeded in many European cities. Average ozone concentrations have continued to increase since 1995, but peak concentrations have fallen. Almost 90 % of agricultural crops in western and central Europe are exposed to ozone concentrations above the long-term EU target.
- A significant proportion of Europe’s urban population is exposed to fine particulates concentrations above limit values. However, concentrations have fallen since monitoring began in the early 1990s.

Change in emission of eutrophying substances 1990–2000 compared to EU and UNECE targets for 2010



Calculated estimate of the distribution of ecosystem protection against eutrophication in 2002



Chemicals

Although there is much 'good news' about the effectiveness of policies leading to decreasing concentrations of hazardous chemicals in the environment, there remain a number of instances where target levels are exceeded, and which, for example, necessitate food recommendations for pregnant women. Dioxins and mercury in fish are two examples. Monitoring and reporting of chemicals in Europe is uncoordinated, with an imbalance between different substances. A relatively few selected heavy metals, persistent organic pollutants and pesticides appear to be the only groups of substances that are frequently monitored in most environmental compartments, food, consumer products and human tissues. Pharmaceuticals and their metabolites are monitored occasionally.

The chemical industry has grown faster than other sectors in manufacturing industry; and faster than gross domestic product in the EU. Production volumes of chemicals, including selected toxic chemicals, is increasing in the EU,

but there remains a general lack of knowledge and key data for vast numbers of chemicals that are on the market in Europe. This leads to difficult risk management decisions based on inadequate data; notably the absence of evidence of ill effects is not the same as evidence for the absence of such effects. Proposed new measures to enforce regulation in cases of 'reasonable doubt' would help to bridge the information gap. Such a precautionary approach has been advocated in the Stockholm Convention on persistent organic pollutants and the recent EU Chemicals Policy White Paper.

There have been successes, however, in reducing for instance emissions to air of cadmium, lead and mercury in Europe. Contamination by chemicals in human milk has significantly decreased since the 1970s, at least in some parts of Europe.

There are some chemical problems specific to the central and eastern Europe countries and EECCA. These include the large quantities of old and out-dated pesticides (some of which are persistent organic pollutants) that are known to be stockpiled. Storage facilities for these chemicals are frequently inadequate, ranging from simple holes in the ground and open sheds in fields to decomposing concrete bunkers.

Reductions of emissions of many heavy metals and persistent organic pollutants within western Europe during the past decade are mainly due to the introduction of stricter national and regional regulatory frameworks, the use of improved pollution-abatement systems by industry and the development of cleaner technologies. For example the Stockholm Convention has resulted in the phase-out of production in Europe of many persistent organic pollutants that threaten the environment and human health. Nevertheless, there remain several concerns where target levels are exceeded, for example for dioxins and for mercury in fish.

The policies that have reduced exposures to these well-known chemicals do not appear to provide adequate protection for a number of effects that are of increasing public concern, for example combined exposures to multiple pollutants and

European emissions (tonnes/GDP) of cadmium, lead and mercury in 1990 and 1999

Country grouping	Cadmium		Lead		Mercury	
	1990	1999	1990	1999	1990	1999
Western Europe	21	9	2 477	632	32	12
Central and eastern Europe	376	208	12 696	5 167	175	88
EECCA	211	222	12 257	11 377	79	91

the impacts of carcinogens and endocrine disruptors at low concentrations.

Facts and figures:

- Emissions of the toxic metals cadmium, lead and mercury decreased in Europe during the 1990s, with emissions in 1999 being 40 % of those in 1990.
- Although hexachlorobenzene (HCB) emissions have decreased throughout Europe, the rate of decrease has slowed markedly since 1990. HCB remains widely dispersed throughout the region due to long-range atmospheric transport processes and local 'hot spots' that reflect high levels of local use or contamination.
- There is concern over the dispersion of polybrominated flame retardants in the environment. Concentrations have risen steeply in Swedish human milk since the 1970s, despite these substances never having been manufactured in that country. Although concentrations are now declining, they remain many times higher than those in the 1970s.

Waste

Waste is a major issue in every European country and waste quantities are generally growing. The generation of waste reflects a loss of materials and energy and imposes economic and increasing environmental costs on society for its collection, treatment and disposal. Most of the waste in Europe is landfilled, while incineration is on the increase. The impacts of landfill and incineration are significant because of their potential for greenhouse gas emissions (methane) and transboundary migration of organic micro-pollutants (dioxins and furans) and volatile heavy metals.

Total waste quantities remain on the increase in most European countries. Municipal waste arisings are large, and continue to grow. The quantities of hazardous waste generated have decreased in many countries but increased in others, in some cases due to changes in definitions. In western Europe and EECCA, manufacturing waste arisings have increased since the mid 1990s, while in central Europe the picture is less clear. Mining and quarrying waste is the largest single category of waste in Europe, and data indicate a general decrease, which is in line with a reduction in mining and quarrying activity.

Total waste generation has only been de-coupled from economic growth in a limited number of countries. Moreover, agreed objectives to stabilise the generation of municipal waste in the European Union have not been met. Quantities are increasing in most western Europe countries and to a lesser extent in most countries in central and eastern Europe and EECCA.

Landfilling remains the dominant waste disposal method in Europe. Recycling is increasing in western Europe, while central and eastern Europe and EECCA countries still have relatively low recycling rates. Initiatives to promote waste prevention and recycling and raise the safety standards for final disposal are considered to be the most effective options for minimising the environmental risks and costs associated with waste generation, treatment and disposal.

The Basel Convention aims not only to reduce transboundary movements of hazardous waste but also to minimise the creation of such waste. Data are scarce, but hazardous waste generation appears to have increased in several countries, and now constitutes 1 % of all European waste generation.

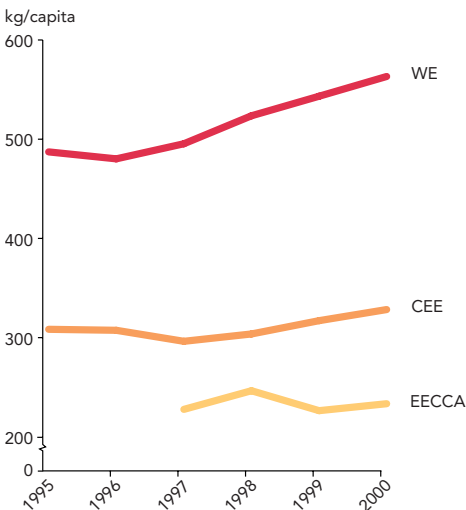
Large quantities of hazardous waste are being disposed of in ways that can threaten the environment and human health. Nuclear power is responsible for a steady accumulation of highly radioactive waste of which part will remain radioactive for hundreds of thousands of years and, as yet, no generally acceptable disposal route has been found. In EECCA countries in particular, many known hazardous waste disposal sites are overloaded and not adequately isolated

from the environment. A lack of national capacities and adequate funds limit the abilities of countries to fulfil their commitments under the Basel Convention, and open the possibility of these countries becoming major recipients for international trade in hazardous waste.

Facts and figures:

- More than 3 000 million tonnes of waste are generated in Europe every year. This equals 3.8 tonnes per capita in western Europe, 4.4 tonnes per capita in CEE and 6.3 tonnes per capita in EECCA.
- The collection of municipal waste varies considerably among countries, from 685 kg/capita (Iceland) to 105 kg/capita (Uzbekistan). It accounts for approximately 14 % of total waste arisings in Europe and landfilling still is the predominant treatment option in most countries.
- Several EU countries report hazardous waste recovery rates in excess of 40 %. In other regions, the situation is less clear but several countries report unsatisfactory disposal of hazardous waste.

Municipal waste collected in selected countries in WE, CEE and EECCA



Water

Only few European citizens suffer from the devastating shortages of water and poor water quality experienced by people in many other parts of the world. However, water resources in many areas of Europe are under threat from a range of human activities. About 31 % of Europe's population lives in countries that use more than 20 % of their annual water resource, this being indicative of a high water stress. Drinking water quality is still of concern throughout Europe, with significant microbiological contamination of drinking water supplies in EECCA, contamination by salts in central Europe and more than 10 % of EU citizens potentially exposed to microbiological and other contaminants that exceeded the maximum allowable concentrations.

Problems are generally highest near pollution hot-spots resulting from a range of industrial and other activities. The situation is generally of greatest concern in some EECCA countries, especially as regards the quality of drinking water in terms of microbiology and toxic substances. This reflects the relatively poor economic conditions in this region and in several countries the deterioration or lack of infrastructure for providing clean drinking water.

The health of humans and ecosystems is also threatened in other parts of Europe, for example by water contaminated by organic and inorganic pollutants such as pesticides and heavy metals at concentrations greater than those laid down in standards by the EU and other international organisations.

Total fresh water abstractions fell during the last decade in most regions. However, 31 % of Europe's population lives in countries that experience high water stress, particularly during droughts or periods of low river flow. Water shortages also continue to occur in parts of southern Europe where there is a combination of low water availability and high demand, particularly from agriculture.

Although there has been significant progress in the management of water resources and quality across Europe, problems still persist, especially where there is a

lack of capacity and financial resources for monitoring and for implementing essential measures and technical improvements.

In western Europe and the accession countries, river, lake and coastal water quality, in terms of phosphorus and organic matter, is generally improving reflecting decreases in discharges, resulting mainly from improved wastewater treatment. Nitrate levels have remained relatively constant — but significantly lower in accession countries reflecting less intensive agriculture production than in the EU. Concentrations of nutrients are much higher than natural or background levels. Eutrophication, as indicated by high phytoplankton levels in coastal areas, is highest near river mouths or big cities.

Heavy metal concentrations in western European rivers, and their direct discharges and atmospheric deposition into the North-East Atlantic Ocean and the Baltic Sea, have all fallen as a result of emission reduction policies. Existing information on the state of waters in EECCA shows that many rivers, lakes, groundwater and coastal waters are polluted, often with hazardous substances including heavy metals and oil. The pollution tends to be concentrated in localised hot-spots downstream of cities, industrialised and agricultural areas and mining regions. Away from these hot-spots, river and lake water quality appears to be relatively good.

Oil pollution caused by discharges from coastal refineries and offshore installations is decreasing in western Europe. However, illegal discharges, mainly from ships, are still a problem, especially in the North Sea and Baltic Sea. Oil pollution in general, from several sources, is of major concern in the Black Sea, the Caspian Sea, and the Mediterranean. The recent disaster involving the oil-tanker *Prestige*, off the coast of Northern Spain, highlighted the need to reduce risks from similar accidents in the future.

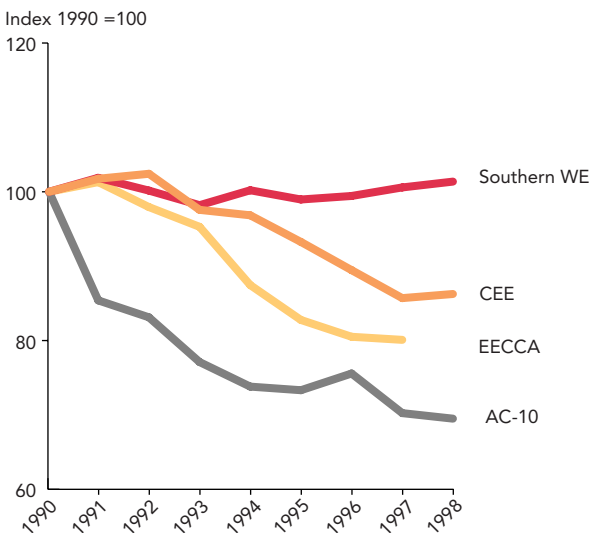
Facts and figures:

- The average water exploitation index in Europe is 7 %. A total of 33 countries can be considered as non-stressed of which 20 countries

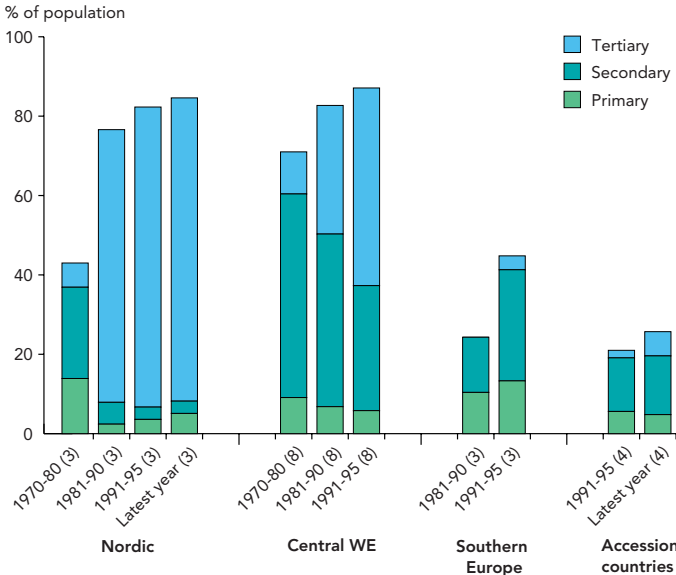
have a water exploitation index of less than 10 %. However there are 14 countries that use more than 20 % of their freshwater resources and hence face a high level of water stress.

- Overall total freshwater abstractions fell during the last decade in most regions. In the EECCA and central EU accession countries the decrease was due to a marked reduction in abstractions for industrial and agricultural purposes.
- There is a danger of pesticide pollution in many countries.
- There has been marked improvement in the level of treatment and the proportion of the population connected to treatment plants in western countries since the 1970s. In central and eastern countries on average 25 % of the population is connected to wastewater treatment plants, with most of it receiving secondary treatment. In the EECCA there is very low level of treatment of wastewater in terms of population connected to treatment works, treatment levels applied and the operational efficiency of those treatment plants that do exist.
- 10 % of EU coastal bathing waters and 28 % of EU inland bathing beaches still do not meet (non-mandatory) guide values even though the EU Bathing Water Directive was adopted almost 25 years ago.

Trend in water abstractions



Changes in wastewater treatment in regions of Europe between 1980 and late 1990s



Notes: Only countries with data from all periods included, the number of countries in parentheses.

Nordic: Norway, Sweden, Finland.

Western Central: Austria, Denmark, Germany, Ireland, the Netherlands, Luxembourg, Switzerland, United Kingdom

Southern: Greece, Spain and Portugal

Accession: Estonia, Hungary, Poland and Turkey

Soil

Major soil issues in Europe are irreversible losses due to soil sealing and erosion, continuing contamination from local and diffuse sources (including acidification), salinisation and compaction. Pressures result from high concentrations of population and activities in localised areas, economic activities and changes in climate and land use. Consumer behaviour and the industrial sector are contributing to the increase of potential sources of contamination such as municipal waste disposal, energy production and transport, mainly in urban areas. Tourism is a further cause of soil degradation, especially along the coasts of the Mediterranean.

Soil is a limited and non-renewable resource on a 50–100 year timescale. The capacity of soil to remove contaminants

from the environment by filtration and adsorption and its resilience mean that damage is not usually perceived until it is far advanced. This partly explains the low priority given to soil protection in Europe until recently.

Soil erosion affects large areas of Europe — about 17 % of the total land area in Europe is affected to some degree. Climatic conditions make the Mediterranean region one of the areas most severely affected. Changes in land use, such as abandonment of marginal land with very low vegetation cover and increases in the frequency and extent of forest fires, have had a strong impact on soil resources since historical times. In the most extreme cases, soil erosion, coupled with other forms of land degradation, has led to desertification in some areas of the Mediterranean region and eastern Europe. Soil erosion is an increasing concern in northern Europe, although to a lesser degree.

One of the most significant influences on the quality of soil is the cultivation systems used in agriculture. Loss of organic matter/soil biodiversity and consequently soil fertility is often driven by unsustainable practices such as deep ploughing on fragile soils and cultivation of erosion-facilitating crops such as maize. In addition, overgrazing and the intensification of agriculture, some of which is linked in the EU to the implementation of the common agricultural policy, may accelerate the loss of soil through erosion.

Many soil problems stem from past activities and poor management practices in EECCA. In central Asia there are acute problems of desertification that goes beyond the sole issue of soil erosion. Similar problems occur in southern areas of the Russian Federation and in the Mediterranean region.

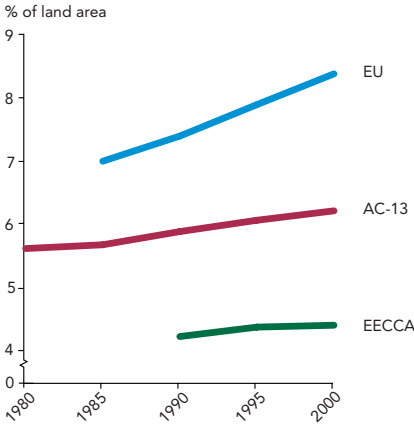
Acidification is the most widespread type of soil contamination in western Europe and central and eastern Europe, where vast areas have been affected. Contamination by pesticides is a major issue in EECCA countries such as Ukraine. Contamination by radio-nuclides from nuclear tests performed in the past, uranium mining and processing, and

the manufacture of nuclear fuel affected surrounding areas in these countries, in addition to the effects of the Chernobyl accident. Soil contamination from localised sources, which is often related to industrial plants no longer in operation, past industrial accidents and improper municipal and industrial waste, is widespread in western Europe as well as in central and eastern Europe and EECCA. In general, all countries apply the 'polluter-pays' principle to a varying extent. However, a considerable share of total remediation costs has been provided from public money and many countries have developed special funding tools for the clean-up of contaminated sites.

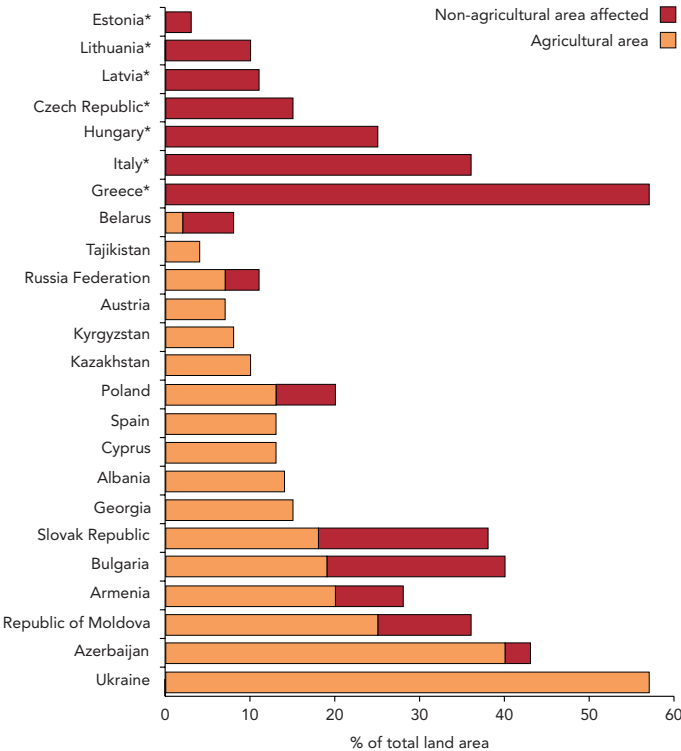
Facts and figures:

- Soil sealing continues to increase, especially in western Europe, where the area of built-up land is increasing more rapidly than the population. This is the result of the steady increase in the number of households and average residential space per capita since 1980.
- Unsustainable agricultural practices, coupled with adverse natural and other factors, are increasing the loss of soil through erosion, some of which may be irreversible. About 17 % of the total land area in Europe is affected to some degree.
- Soil erosion has a major economic impact. Yearly economic losses in affected agricultural areas in Europe are estimated at around 53 EUR per ha, while the costs of off-site effects on the surrounding civil public infrastructures, such as destruction of roads and siltation of dams, are estimated to cost 32 EUR.
- Even though a considerable amount of money has already been spent on contamination remediation activities, the share compared to the total estimated remediation costs is relatively low (up to 8 %).
- Moderate to high salinisation is affecting agricultural soils in the Mediterranean region and EECCA, mainly as a result of inappropriate irrigation systems. For example, salinisation affects 16 million hectares or 25 % of irrigated cropland in the Mediterranean.

Built-up areas in Europe as percent of total land



Area affected by erosion



Notes: Asterisks indicate that data for agricultural area are not available. Ukraine: data includes area at risk of erosion. Data refer to 1990–99, except for Austria, Greece, Hungary, Italy, Poland, Slovak Republic and Spain where the data cover 1990–95.

Technological and natural hazards

The catastrophic earthquake in Turkey in 1999, the mining disasters in Ukraine in 2002, the recent Prestige disaster off the west coast of Spain and the 'flooding of the century' in central Europe and Black Sea region in summer 2002: disasters like these will continue to occur throughout Europe — some due to technology, some to the forces of nature, some to the combined effects of the two. A holistic approach to hazard management, based on lessons learned from past accidents and natural disasters and recognition of the need for better emergency planning, should help to reduce the numbers and consequences of technological accidents and reduce the impacts of some natural disasters.

Technological accidents continue to occur in Europe — even with advances in the safety management of hazards. Occurrences that involve large numbers of fatalities have however fallen during the past decade, with the exception of mining disasters in Ukraine. Although technological accidents claim only a fraction of the lives lost as a result of natural hazards (approximately 5 % of the total between 1985 and 1996 in Europe), the risks of the two are often perceived as being similar because of a lack of knowledge of the overall situation, and dread but also acceptability of the technological hazards. The unpredictable and uncontrollable nature and potentially large-scale environmental impacts of warfare and terrorist activities also display similarities to technological and natural hazards in terms of damages and loss of life.

By far the biggest immediate cause of major technological accidents is mechanical failure. Operator error is also a significant contributor. Both these are likely to be due to some kind of management failure.

The number of nuclear installations in Europe has increased since 1970, and many European countries now have nuclear reactors that are approaching the end of their working lives. Another complicating factor is the increasing physical deterioration of the older plants in eastern Europe. In recent years, however, the safety of Soviet-designed reactors has

been improved. This is due mainly to the development of a culture of safety encouraged by increased collaboration between East and West, and substantial investment in improving these reactors.

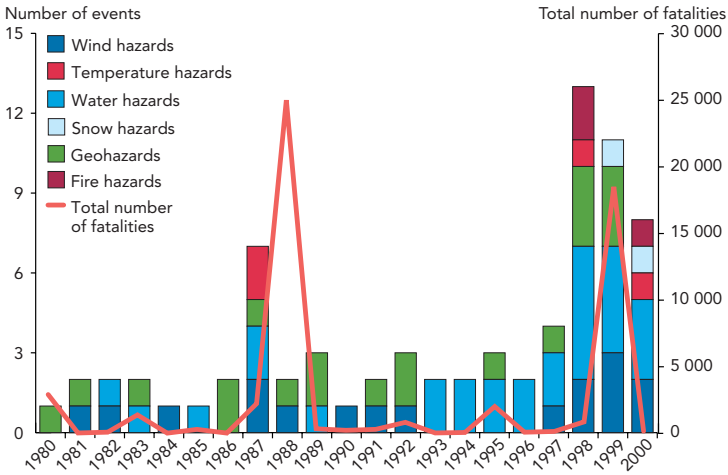
Natural disasters continue to have a far greater impact than technological accidents. The cost of natural disasters may run into billions of Euros rather than the millions associated with the more serious technological accidents. Both the probability of occurrence and the consequences of natural disasters may be increased as a result of technological advances and human activities such as agriculture and forestry, as well as climate change.

For technological hazards and those activities that may exacerbate the effects of natural hazards, design evolution and operational experience have reduced the risk levels over the years. Holistic approaches are becoming more prevalent, with increasing attention to the reduction of risk of long-term environmental impact as well as acute health and property damage from accidents. However, there remains a residual risk that must be well managed at all times.

Facts and figures:

- By 2010, all tankers and supertankers carrying crude oil in EU waters must have double hulls. For spills greater than 700 tonnes, about 77 % are due to hull failures, collisions and groundings.
- Studies in the Ukraine, Russia and Belarus, based on national registers, show that over 1 million people were possibly affected by radiation following the Chernobyl accident. The studies confirmed a rising incidence of thyroid cancer among exposed children — nearly 700 cases of thyroid cancer have been attributed to radiation among children and adolescents.

Events involving natural hazards and the associated number of fatalities in Europe 1980–2000



Biodiversity

In addition to a responsibility to reduce its ecological footprint on the rest of the world, Europe has a global responsibility to preserve the character of its varied ecosystems and landscapes, and to conserve the migratory species that cross the continent and the threatened species that it hosts. This includes responsibility for controlling the collection and trade in wildlife specimens that is occurring on a global scale.

Europe has a significant responsibility for the conservation of globally threatened mammals, birds and plant species under the UN Convention on Biodiversity, the Bern and Ramsar Conventions, and a number of marine Conventions. Two recognized global biodiversity prime regions are partly located in Europe, in the Caucasus and the Mediterranean basin. Other major areas such as the Arctic are also partly situated within the European region. Across Europe species population trends are mixed. Some previously highly threatened species are starting to recover, while others continue to decline at alarming rates, generally as a result of the disappearance or degradation of their habitats.

Europe is home to a large range of domestic animal breeds, which account for almost half of the global breed diversity. However, almost half of these European breeds are at risk of extinction. Europe is also the region where the highest proportions of breeds (26 % of the mammalian and 24 % of the bird breeds) are under active conservation.

As required by the Ramsar Convention, many countries have successfully implemented policies or national action plans to halt the decline of wetlands. However, rates of wetland loss due to the changing economic conditions in eastern Europe are likely to be higher now than in the mid-1980s.

European trends in farm structure, farm management and farmland species have resulted in species-rich agricultural habitats declining considerably during recent decades.

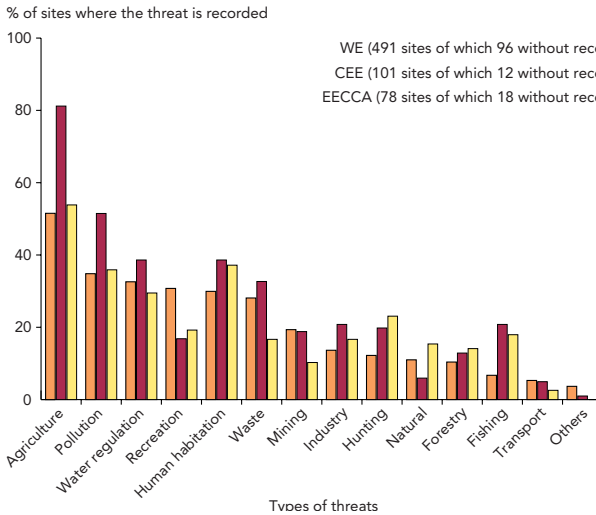
There are nearly 600 different types of designation of protected areas, and more than 65 000 designated sites throughout Europe. There has been an increase in national designations since the 1970s when most countries started to implement national laws on nature protection and when the Bern Convention came into force (1979). The designation of new sites is likely to tail off for a number of reasons, at least in western Europe, where increasing land-use pressures from transport, urbanisation and intensive agriculture are diminishing the remaining semi-natural remote areas. In central and eastern Europe and EECCA land privatisation and restitution (returning nationalised land to previous owners) are issues of concern. On the other hand, concern for biodiversity is becoming more integrated into sectoral policies, for example with agri-environmental measures or sustainable forestry policies. A major concern for the long-term relates to the effects of climate change on the distribution of major European ecosystems and their management within protected areas (for example Natura 2000 sites).

Facts and figures:

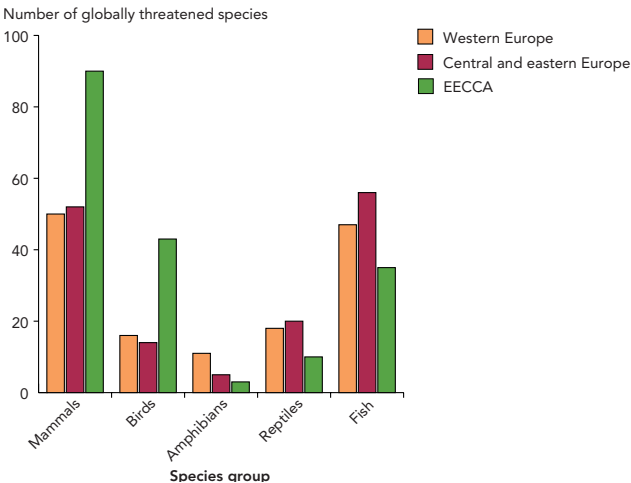
- Among the 3 948 globally-threatened vertebrate species 335 occur in Europe and central Asian countries. Of these 37 % are mammals, 15 % birds, 4 % amphibians, 10 % reptiles and 34 % freshwater fish.

- Though progress is noticeable, exploitation of wildlife for trade endangers native species, particularly in the Russian Federation and Central Asian countries. This is partly due to demand by western European citizens.
- As a whole sites designated under national designations in central and eastern European countries represents 9 % of the total region area; in western countries this is 15 %.

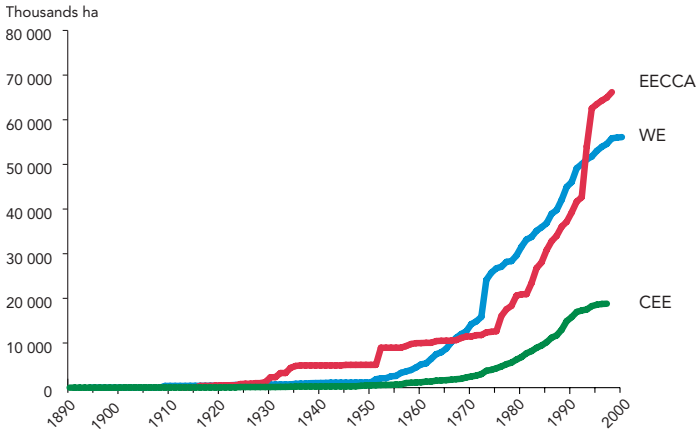
Threats inside Ramsar sites as reported by countries



Europe's responsibility for conservation of globally-threatened vertebrates within regions



Total surface area designated under national designations in pan-Europe over time



Human health

The life expectancy of people in some EECCA countries has fallen dramatically within the last decade to an average of less than 50 years in several of the more polluted and impoverished zones. In Europe, there has been evidence of dioxins and PCBs in food and livestock feedstuffs (in Belgium 1999, 2000), phthalates exceeding permitted concentrations in children's toys (in Denmark 2001, 2002), and flame-retardants in human milk (in Sweden 2000). These cases illustrate the potential for low exposures and possible risks. The causes of diseases are not as obvious as the causes of infections, but as they have grown to prominence fairly recently, changes in the environment and other factors of modern life are likely to be playing a significant role in the risk to human health.

There is growing concern about the links between the environment and human health. Worldwide, and probably also in Europe, one quarter to one third of the burden of disease is attributable to environmental factors. Vulnerability, however, varies markedly between different groups and areas.

There is reasonable understanding of cause-and-effect relationships between water and most air pollutants and human health, but little or often none about the health consequences of climate change and hazardous chemicals in the environment. Causal relations for the largest air pollution threat to health, particulate matter, are not available. Few relevant indicators are available, but work has started to develop and test a pan-European system of indicators covering the main environmental health issues.

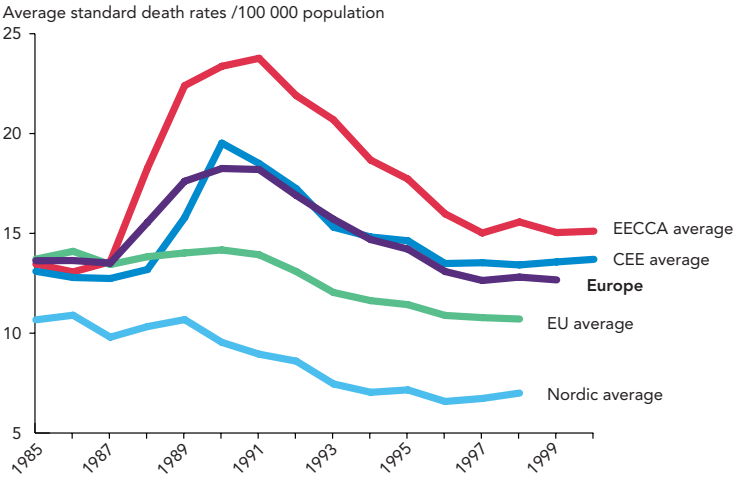
While European levels of water and air pollution are generally low compared with some regions of the world and there have been significant improvements during recent decades, a number of health-related problems persist, particularly in some eastern European countries and EECCA. Transport continues to be a significant contributor to health effects through pollution and noise, and to mortality and morbidity through accidents.

Although there is limited evidence of health effects, hazardous chemicals in the environment and the disposal of wastes continue to be of concern.

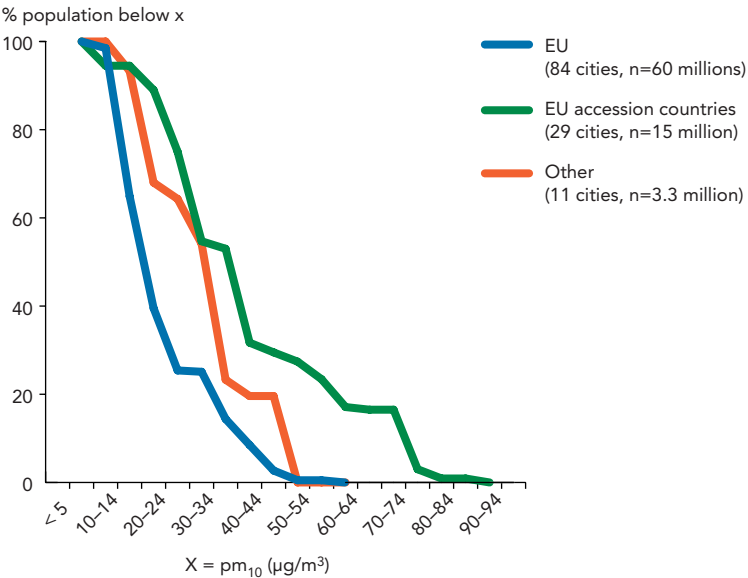
Facts and figures:

- An estimate of mortality due to long-term exposure in 124 European cities (for a total of 80 million inhabitants), showed that around 60 000 deaths per year may be associated with the long-term exposure to particulate air pollution exceeding the level equivalent to $PM_{10} = 5 \mu\text{g}/\text{m}^3$ in the 124 cities with PM data
- For each 1 % decrease in stratospheric ozone, average annual percentage increase in the incidence of nonmelanoma skin cancer ranges from 1 % to 6 %, and for squamous cell carcinoma and basal cell carcinoma ranges from 1.5–2.5 %.

Deaths caused by road traffic accidents



Population exposure to estimated PM₁₀ levels in 124 European cities



Progress in managing the environment — improving integration

The Environmental Programme for Europe recommends that participant states ensure that environmental considerations are integrated into all decision-making processes. This requires action across sectors and different levels of government and society, including:

- strategies and policy plans at the (sub)-regional and national level and above;
- appropriate plans and actions at sectoral level;
- specific approaches to integration in the management of certain sectors;
- flexible use of a wide range of integrative policy instruments; and
- initiatives and partnerships involving stakeholders in both public and private sectors.

Enlargement of the EU and the World Summit on Sustainable Development commitments provide an opportunity to develop more effective sectoral/environment integration and to build the principles of sustainable development into the design of environmental policies. For example, to ensure that pollutant concentrations do not exceed sustainable reference threshold levels for human health and to maintain the integrity of ecosystems, priorities should be based on the needs of current and future generations, and preventive approaches should be used in preference to end-of-pipe abatement measures.

Integration initiatives at the EU level have so far had only a minor impact on the more fundamental problems to be addressed. The EU integration process has lacked urgency and has yet to have a significant impact on sectoral policy-making. At the Member State level, few strategies are yet beyond the stage of formulation, and few have yet clearly demonstrated positive outcomes. Integration in central and

eastern Europe is at an even earlier stage, although there are some positive examples emerging. EECCA countries are aware of the requirements of integration but do not generally have the administrative capacity or other resources to carry forward initiatives for drafting strategies and plans, far less for their implementation. There is however no uniformity within the blocks as to progress in formulating and implementing integration strategies.

Economic instruments such as taxes (in the framework of a wide ecological tax reform) charges and emissions trading systems are important elements in the integration policy 'toolbox', and can be more flexible than traditional regulatory approaches. Reducing environmentally-harmful subsidies is now generally accepted as necessary, but in practice they remain widespread, particularly in agriculture, the energy sector, and transport. There has been little progress in internalising external costs and ecological tax reform — i.e. switching the tax burden from 'goods' (e.g. employment) to 'bads' (e.g. environmental damage). In countries in transition, some of which have a history of using market mechanisms, progress has been made in some cases.

Governments and other public sector bodies on their own cannot achieve integration — a commitment from industrial and commercial sectors is also needed. 'Green' business initiatives such as negotiated agreements between governments and industry, and industry self-commitments, are growing in number. Use of eco-labels is also on the increase. Private initiatives by businesses such as certified environmental management schemes, environmental reporting and participation in international organisations aimed at sustainable development are spreading, but do not necessarily improve environmental performance. EU companies are the frontrunners in business environmental initiatives, in particular in north-western Europe. Companies in accession countries are catching up, but those in other central and eastern Europe countries and the EECCA are almost entirely absent. Multinational corporations are heavily represented in 'green' initiatives and are well organised through trade groups, but small and medium sized enterprises are hardly engaged at all.

Environmental taxes and charges in Europe

Country	Natural resources				Waste			Emissions		Selected products				Other		
	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p
Albania	✓															
Armenia	✓	✓		✓	✓			✓	✓			✓				
Austria				✓	✓				✓		✓	✓				
Belarus								✓								
Belgium	○	○							○		✓	✓	✓			
Bosnia & Herzegovina	✓															
Bulgaria	✓		✓	✓				+	+							
Croatia	✓	✓		✓				+	+							✓
Czech Republic	✓	✓					✓	✓	✓	✓					→	✓
Denmark	✓		✓		✓	✓		✓	✓	✓	✓	✓	✓	✓		
Estonia	✓	✓	✓		✓			✓	✓		✓					
Finland	✓		✓		✓			✓	✓		✓		✓			
France		✓						✓	✓							
Germany		○					✓	✓	✓							
Greece			✓					✓	✓							
Hungary	✓	✓	✓	✓			✓	+	✓		✓	✓			→	
Iceland			✓				✓	✓	✓	✓						
Ireland								✓	✓					✓		
Italy					✓			✓	✓					✓	→	
Kazakhstan	✓	✓	✓	✓	✓			✓	✓							
Kyrgyzstan	✓	✓	✓					✓	✓							
Latvia	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓				
Lithuania	✓	✓	✓	✓				✓	✓							
Moldova, Rep. of	✓	✓	✓					✓	✓							
Netherlands		✓	✓		✓			✓	✓	✓	✓				→	
Norway					✓	✓		✓	✓	✓	✓				→	
Poland	✓	✓	✓	✓			✓	✓	✓	✓	✓					✓
Portugal			✓						✓							
Romania		✓						+	✓							
Russian Fed.	✓	✓		✓				✓	✓							
Slovak Rep.	✓	✓			✓			✓	✓	✓	✓	✓		✓		✓
Slovenia			✓						✓							
Spain								○	✓	✓	✓					
Sweden	✓		✓		✓			✓	○			✓	✓			
Switzerland								✓	✓						→	
Turkey								→	○						→	
United Kingdom	✓				✓				✓							
Ukraine	✓		✓		✓			✓	✓							
Uzbekistan	✓	✓	✓	✓	✓			✓	✓							

Note: Charges which only cover the costs of production or public services (e.g. waste collection fees, waste water treatment) are not included.

Key: + Non compliance fees (fees/penalties which only apply to emissions above limits)
○ At the regional (sub-national) level
→ Aircraft only

a	Mining, minerals, gravel, sand, etc	i	To water
b	Groundwater, surface water	j	Chemical substances
c	Hunting, fishing	k	Packaging
d	Forest use, tree cutting	l	Batteries
e	Landfilling	m	Pesticides
f	Incineration	n	Plastic bags
g	Hazardous waste	o	Noise
h	To air	p	Land use change

Bridging the gap — Towards an integrated monitoring system to support pan-European environment assessments

Future reports to inform the pan-European process would benefit from a greater availability of relevant data and indicators across the whole geographical area as analyses in the present report were hindered by the (continuing) lack of comparable data. This applies for both environmental and socio-economic data. Further investment is needed to streamline reporting of environmental data and information across all of Europe through the development and adoption of common frameworks of information needs, the implementation of operational assessment methods and more efficient institutional co-operation. In this context, building on the upcoming proposal for a EU Framework Directive on Reporting to take account of European needs could be considered appropriate. In addition, investment support in basic environmental monitoring and data management infrastructure, particularly in the EECCA countries, is needed to deliver the required data. On the international level, frameworks for cooperation between countries and international organisations play important roles. For the present report, for example, the UNECE Ad Hoc Working Group on Environmental Monitoring has provided this support. For the future, it may be appropriate to formalise the role of this group and to extend its remit and coverage to take account of broader information needs and wider participation by international organisations other than the European Environment Agency.

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