

# 14. Information gaps and needs

## 14.1. Introduction

The preceding chapters of this report describe the past and current state of the pan-European environment, as required of the European Environment Agency (EEA) by the European ministers for the environment. Although the information on trends shows clearly the areas which still face environmental problems, limitations of data availability and comparability continue to pose difficulties in the development and systematic use of indicators (see Chapter 1). This chapter reviews these limitations and gives examples of some of the most important needs and gaps in the provision of information for reporting and policy-making, and of current and proposed initiatives to improve information systems.

In this context, the report helps to show that:

- much more data and additional information are available in most countries than generally perceived, but a lack of structuring and accessibility hinders their use;
- awareness of the 'Environment for Europe' process and the preparation of indicator-based reports can help to harmonise monitoring and reporting activities in the long term;
- the more structured and systematic involvement of public authorities and public participation in countries that are not members of the EEA would allow a longer-term vision of improved and relevant data flows;
- the framework for cooperation between countries provided by the United Nations Economic Commission for Europe (UNECE) working group on environmental monitoring (WGEM) was very appropriate for experience-sharing and common implementation of monitoring methods and reporting techniques;
- the progress and steps taken over the past few years to streamline data flows in Europe, for example on greenhouse gas emissions and water quantity and use, are examples to be analysed for application to less-developed areas.

### 14.1.1. Main gaps in information and the role of monitoring

Information on the interlinkages within the environmental causality chain is indispensable (see Chapter 1, Figure 1.1 on the DPSIR assessment framework). It is no coincidence that it is in this area that the report most lacks complete and consistent information on trends, since many of the needs have only been identified relatively recently and the related data collection processes are either not in place or have yet to be identified and implemented. Even in areas where monitoring activities have been in place for the past 25 years or so, such as for aspects of air quality and water quality, the required information on past trends, for example on the effects of urban air pollution on the population, is not always available.

This potential for inefficiencies in monitoring, together with the need for new information to address new environmental paradigms, was recognised at the 'Bridging the gap' conference (UK EA, 1998), which concluded that:

*'At present some of the systems for monitoring and gathering information about the environment in European countries are inefficient and wasteful. They generate excessive amounts of data on subjects which do not need it; and they fail to provide timely and relevant information on other subjects where there is an urgent policy need for better focused information, and for consistent environmental assessment and reporting.'*

The conference has since generated many discussions which all recognised the need for a concerted European movement involving the EEA, the European Commission, countries and international organisations with the view to:

- streamlining environmental monitoring and practices;
- focusing new information gathering on key issues and perspectives;
- developing indicators, which would need to be widely agreed, that illuminate the significance of environmental change and measure progress towards sustainability.

In tackling this issue, the EEA Management Board later concluded, at the 'Streamlining

### Box 14.1. Towards a shared European environment information system

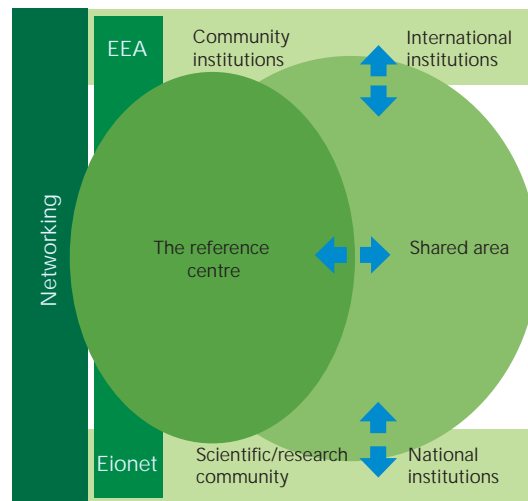
Countries in Europe report a huge amount of environmental data and information to the international organisations every year. It is now widely accepted that a revision is necessary in order to increase efficiency (EEA, 2002). For a concerted European movement involving 'the environmental reporting community' (EEA, European Commission, countries and international organisations), products and services need to be developed with an integrated, comprehensive and systematic approach within an information system, such as the European environment information system (EEIS) illustrated in Figure 14.1. This system comprises the people and organisations in the network, their networking activities within the reporting system, and the supporting infrastructure and electronic tools referred to as ReportNET. The collective pool of validated and quality-assured data, information, assessments, reports and expertise made available within the system is referred to as the reference centre. The EEA is supporting and working towards such a shared information system expanding on the systematic approach of EEA and EEA's European environment information and observation network (EIONET).

Under the umbrella of the EEIS, the development of a shared environmental information structure should allow better use and reuse of the reported information, leading to a reduction in the reporting burden at the national level, while providing the international reporting community with better, faster and more policy-relevant information. The international environmental reporting networks that are currently operating, such as the EEA EIONET, and those of the European Commission, the countries and the various international conventions, should define and share a common understanding and goals. These should be largely in the form of an information structure, which each organisation can use for its own purposes as well as to support the overall goals. A wider use of the ReportNET tools will help to achieve this objective.

ReportNET is built on the basis of the key principles of a shared European environment information system: harmonised collection, providing the data once and using it for many purposes, proceeding with a common validation and aggregation, and delivering policy-relevant assessments. To satisfy these principles, ReportNET includes components for reporting obligations, metadata, directory services, data repositories, indicator management and process monitoring and is built using and contributing to IDA (the European Commission initiative on interchange of data between administrators) common tools and techniques. ReportNET covers the functions that are needed by the input part of the EEIS. The components described in Figure 14.2 do not include databases and other systems at the national level, because these are different for each country. The country links are through harmonised collection of data and based on data exchange modules.

The European environment information system

Figure 14.1.



Components of ReportNET

Figure 14.2.



reporting' seminar (EEA, 2001a) that 'the current situation in environmental monitoring is chaotic'. A vision of a shared environmental reporting system in Europe was set out. It was based on the conclusion that the need to improve the quality and timeliness of information and prevent double, overlapping and confusing requests

for information from international organisations remained, despite progress being made in national attitudes to the development of information systems (see Box 14.1).

In addition, seen in the context of *Europe's environment: The third assessment*, even where

there is collection of data, complete data appear not to be available. For example, significant gaps in country coverage are revealed by the submission of data from international databases, as stated in a report (ECE/EEA, 2003) prepared by the EEA in consultation with the UNECE secretariat for the Kiev ministerial conference. A number of UNECE countries, although members of relevant international organisations and conventions, do not submit data, or their submissions are either incomplete or do not cover the agreed time intervals. The biggest gaps in data availability throughout the region are related to urban air pollution, soil contamination, soil remediation, waste management systems including hazardous waste, water quality, wastewater treatment, discharges to water, hazardous substances and long-term series on biodiversity (see Section 14.2 for further details).

#### 14.1.2. The data collection process for Europe's environment: the third assessment

The most important principle for the collection of data for this report has been to avoid any unnecessary burden on the countries. The EEA has therefore used data from international databases as much as possible and *Guidelines for the data collection of the Kiev report* (EEA, 2001b) were produced to make the data collection as transparent and coherent as possible.

Where data were not available from international databases, as was the case for a number of environmental variables, they were collected by the EEA European topic centres (EEA/ETCs). Three questionnaires were developed, on soil, waste and water topics, to extend the data from international organisations and EEA/ETCs. These covered key topics such as soil sealing, degradation and contamination, waste generation and treatment, waste treatment facilities, water resources and water quality including marine waters. Twenty-two countries that are not

members of EEA completed the questionnaires: the non-EEA western European (WE) countries, the new Mediterranean EEA countries, the western Balkan countries and the 12 countries of eastern Europe, the Caucasus and central Asia (EECCA).

All the data collected were stored in the EEA data warehouse (see Figure 14.3).

Support for data collection to the non-EEA member countries was part of European Union (EU) CARDS (regional environment reconstruction programme for Balkans) funding for the western Balkan countries (Albania; Serbia and Montenegro not included at that time). It was part of EU Tacis (technical assistance programme for countries in transition) funding for the 12 countries of EECCA. Support was provided for activities such as:

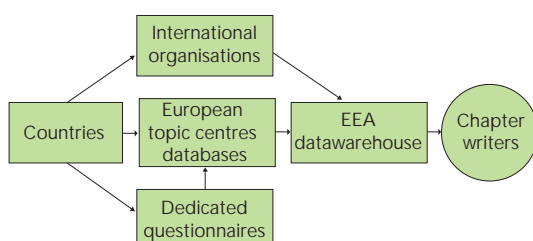
- collecting data and assisting in the completion of the questionnaires;
- providing helpdesk support, progress control and follow-up;
- building and strengthening networks, and promoting coordination and links between institutions by organising meetings on specific topics;
- processing data (validation, quality control) and making these available by translating and summarising them;
- making collected data available to the relevant EEA/ETCs.

The UNECE ad hoc WGEM was established in order to operationalise national contributions to information gathering at the UNECE level (see Chapter 1 for more details). WGEM was, with the UNECE working group of senior officials preparing the Kiev conference, the main group involved in the preparation of the Kiev report.

## 14.2. Existing information and new needs

The EEA reports *Europe's environment: The Dobris assessment* (EEA, 1995) and *Europe's environment: The second assessment* (EEA, 1998) included overviews of the strengths and weaknesses of environmental and related information. There has been some progress since these reviews but much remains to be done to allow comprehensive and relevant indicator-based reporting for Europe. Nevertheless, the present report, the Organisation for Economic Co-operation and Development (OECD) and UNECE

Figure 14.3. Data flows for the Kiev report



country environmental performance reviews, and the report *Environment in the European Union at the turn of the century* (EEA, 1999), show that more use is being made of the information currently available to highlight the state of knowledge and the remaining gaps and inconsistencies.

The following sections review, for each economic sector and environmental issue covered in this report, the main information strengths, weaknesses and gaps and what is being done to address some of the major deficiencies. They are not intended to be exhaustive, but highlight the main areas where action is either under way or needed.

#### **14.2.1. Developments in economic sectors**

The following subsections present the information situation for each sector regarding environmental assessment, eco-efficiency, market integration and management integration. All the main economic sectors are addressed except the household sector, which is not analysed per se in the report because of too large gaps in information. However, households are an important part of the economy and as a source of environmental pressure and resource use. Households, as a target group, are still often overlooked in integration policies, compared with other groups such as producers. The importance of the sector lies in its demand for resources, the waste generated through the consumption of those resources and its capacity to influence industrial and commercial activities through its spending power. Several factors determine the overall impact of the sector on the environment, including population growth, the ageing population, the number of households and household size, the growth in disposable income and consumer spending, and the greater availability, affordability and sophistication of items available for purchase. A corresponding information provision process is necessary to improve assessment of these pressures on the environment and of the related policies.

#### *Material flows*

The flows of materials are systematically described and monitored through material flow accounting, which includes the production of indicators on the 'metabolic performance' of national economies. For the analysis of material flows, there are substantial data gaps that prevent the presentation of a comprehensive cycle of 'industrial metabolism' (changes in the natural environment brought about by

human activities and the corresponding flows of materials) in all the countries covered by this report. The situation is best in the EU, for which full, comprehensive, reliable and long time-series datasets are available. This also includes comprehensive data on foreign trade, which allow calculation of domestic material input (DMI) and domestic material consumption with a high degree of accuracy. For the accession countries, the statistics on foreign trade and imports of commodities are incomplete, so DMI is the only indicator that can readily be derived. Using DMI, indicators of the efficiency of resource use (see Chapter 2.0., Box 2.0.1) have been developed for the countries of the EU and the accession countries. For the EECCA countries, data were not available to derive a reliable set of material flow indicators.

Moreover, it has not been possible to measure the global consequences of a country's materials flows. Total material requirement, which accounts not only for domestic environmental burdens but also for the environmental pressures exerted during the production of imported goods, is still only available for a limited number of countries. Despite the lack of robust indicators for all the countries covered, all countries should be aware of the impact that they are having on the rest of the world by using — and especially importing — raw materials. This underlines that sustainability assessments are most meaningful when carried out in a global, rather than a regional or national, context. However, such a global perspective has not been possible in this report as many of the required data are lacking.

#### *Energy*

Relatively good information is available in most areas to support a comprehensive *environmental assessment* of the sector; the main area of weakness is waste generation. *Eco-efficiency* indicators have been developed for many years by the OECD International Energy Agency and in various countries. A selection is to be included in the EU project on indicators for the integration of the environment in energy policies, and data availability is generally good. To improve the use of market-based instruments, studies have been done on the external costs of the energy sector, but no country comparisons are readily available. For energy use by the transport sector, information will also be needed on the contributions to overall external costs of the different types of externality — climate change, air pollution,

waste. Some information is available on the use of taxes, subsidies and voluntary agreements, but little is known about the effectiveness of such instruments for alleviating the environmental impacts of energy use for transport. For *management integration*, little is known about the extent and effectiveness of environmental impact assessments of energy projects.

#### *Industry*

Data for air, waste and water pollution are available only for some countries. The main areas of weakness are waste generation and soil contamination. Data on industrial pollution, water and energy use are limited to some countries. For these few countries, *eco-efficiency* indicators are well developed, in particular for comparing output with air emissions and also with contaminant discharges to freshwater bodies and the sea. Some data on recycling rates by key industries are also available. For *market integration*, there are no data available on external costs. As for other sectors, data will be needed on the contributions made to overall external costs of the different types of externality — air pollution, water pollution, waste generation, soil contamination. There is some information available on expenditure by industry on environmental compliance. Current deficiencies include incomplete coverage of countries and expenditure categories, and lack of time series. The European Commission has a work programme in place to develop this important area further. Some information is available on the extent of use of instruments such as taxes, subsidies and voluntary agreements, but little is known about the effectiveness of such instruments for alleviating the environmental impacts of the sector. An exception is water discharges where there are assessments available showing the impact of charging on minimising effluent discharges. For *management integration*, relatively good information is available on the extent of use of tools such as environmental impact assessments, environmental management systems and green procurement policies. However, little is known about their effectiveness in minimising environmental impacts. Corporate environmental reporting becomes increasingly available but so far uniform reporting parameters and formats are missing.

#### *Agriculture*

The available data on impacts (positive or negative) are gradually being extended. It is

often difficult to distinguish the specific contributions of agriculture to changes in the environment, such as water stress or changes in breeding birds. The OECD has been working on a set of agri-environmental indicators since the mid-1990s. At the EU level, corresponding indicators on agri-environmental policy integration (IRENA operation) are being developed within the framework of the Cardiff process. In the meantime, *eco-efficiency* indicators that compare agricultural outputs with inputs such as fertilisers and pesticides are available at the European level. But time series for important inputs to the sector (e.g. pesticide and fertilisers) are incomplete. Data on agricultural land use are often too limited to enable inferences on the distribution of semi-natural habitats, a key issue for biodiversity on farmland. Similarly, data on actual *management* practices on farms are nearly completely lacking. In terms of policy response, information is available on the implementation of agricultural policy instruments, such as agri-environment schemes, but little is known about the effectiveness of these instruments. These information gaps can only be filled through targeted surveys that collect key data for a representative sample of farms.

#### *Forestry*

There is a relatively large amount of information available in most areas to support a comprehensive environmental assessment of the sector. *Eco-efficiency* indicators have been developed in various countries. As a result of the decline in natural forests during the 1980s, monitoring programmes have been established on forest resources, ownership and the management status of forest and other wooded land, biological biodiversity and environmental protection (e.g. UNECE/FAO (Food and Agriculture Organization of the United Nations), IUCN-The World Conservation Union). Good country coverage in international databases should be maintained, in particular data submission of UNECE regions to the UNECE/FAO database on forests. The European project 'Forest reserves research (COST E4)' aims at harmonising definitions and data collection on protected areas at the EU and the pan-European level.

#### *Fisheries and aquaculture*

Data are available for environmental assessment of the sector. *Eco-efficiency* indicators have been developed, but the data availability is very poor, even in western Europe, and needs urgent improvement.

Progress in taking measures as well as in the current situation is now reported with regard to overfishing of several species in several seas. But only a limited number of fish stocks are being addressed. Better assessment is needed for the Mediterranean, Black Sea and Caspian Sea and deep-sea fish stocks. Other environmental problems that may affect the sector, such as the effects of climate change, pollution and habitat destruction on fish stocks, are poorly understood. Countries should continue to submit data to the international organisations (FAO, International Council for the exploration of the Sea (ICES), Eurostat, OECD) and to the international fisheries organisations (IFOs). There are gaps in datasets on fleet capacity, especially for CEE and EECCA. Data on the sale of fishing vessels or through fishing agreements with third-party countries is lacking, to address the export of overcapacity of the fishing fleet.

Marine aquaculture has grown dramatically in WE. The local effects of aquaculture practices on the aquatic environment are well understood, and highly regulated and monitored in the main producing countries but data are seldom available at the European level. The wider impacts on the nutrient status of receiving waters, and effects on wild populations via escapees and parasites are, however, less well understood and more difficult to monitor and manage. Further research is needed. In the EU, these concerns should be more effectively addressed under the water framework directive, the EU recommendations on integrated coastal zone management and strategic environmental assessment.

#### *Transport*

There is relatively good information available on transport supply in terms of vehicle fleet size or length of infrastructure, and fuel prices. Data on demand (passenger- and tonne-km) is of lesser quality, particularly for private transport. The main information weaknesses that hamper a comprehensive *environmental assessment* of the sector are in the areas of transport noise, land use for infrastructure, habitat fragmentation and access to basic services. *Eco-efficiency* indicators have been identified under the EU transport environment reporting mechanism (TERM). Data are available, for example for fuel efficiency and the proportion of the vehicle fleet that meets air emissions standards, but not always for all countries or on a comparable basis. Indicators of the eco-efficiency of transport

by mode with respect to air emissions are being developed by Eurostat and the EEA. For *market integration*, data on the external costs to the environment are available for most countries, but more information is needed on the contributions to overall costs of the different types of externalities — noise, air pollution, congestion, etc. More consistency is needed on the definitions and methodologies used by countries to compile estimates of external costs; also trend data are not yet available. Some information is available on instruments such as taxes, subsidies and voluntary agreements, but little is known about their effectiveness for alleviating environmental impacts; trend data are also needed. For *management integration*, little is known about the extent and effectiveness of environmental impact assessments for transport projects.

#### *Tourism*

Apart for the measurement of the economic performance of the sector, there has been no agreed framework either globally or in Europe to develop indicators across the DPSIR framework. There are no data which measure the positive and negative impacts of tourism on the environment and how these are being dealt with through policy responses, including the use of economic instruments. The main problem is measurement of tourism activity at the local level, where the bulk of tourism impacts occur. There are no agreed *eco-efficiency indicators* for tourism and data availability is likely to be a problem once such indicators have been defined. For *market integration*, there is no information available at the European level on the costs of the various externalities: water pollution, land and soil degradation, soil erosion, heritage loss, landscape loss. For *management integration*, there are no data available on environmental impact assessments for tourism projects or non-green procurement strategies. Policy awareness on the cross-cutting dimension of the tourism sector increased in 2002, both at the international and the European level, especially the need for a more integrated approach to developing tourism markets and activities, particularly when seeking to preserve a high-quality environment. The EEA is now developing a set of environmental indicators for tourism.

#### **14.2.2. Prominent environmental problems**

##### *Climate change*

There have been improvements in the completeness, consistency and comparability

of greenhouse gas inventories through improved reporting by many countries to the UN Framework Convention on Climate Change (UNFCCC) including the EECCA countries. Many countries now use the Intergovernmental Panel on Climate Change (IPCC) *Guidelines* and also increasingly the IPCC *Good practice guidance* for estimating greenhouse gas emissions. In the EU the continuing cooperation between the EEA and the European Commission (under the EU monitoring mechanism for greenhouse gases) has also helped to improve the quality of EU Member States' greenhouse gas inventories. However, the Kyoto protocol increases the demand for further improvement of quality, for reducing and managing the uncertainties of inventories and for improving estimates of removals through land-use change and forestry ('carbon sinks'), for which IPCC guidance is expected to be available in 2003. In addition, the increasing demand for high quality sectoral greenhouse gas emission indicators, showing eco-efficiency (e.g. emissions per vehicle-km/energy consumption) also provides a stimulus, in particular for data gathering of the required underlying statistics.

#### *Stratospheric ozone depletion*

Reporting emissions of ozone-depleting substances to the Ozone secretariat is well established under the terms of the Montreal protocol. Data on trading and smuggling of ozone-depleting substances are lacking.

#### *Air pollution*

There have been improvements in the consistency and comparability of air pollutant emission inventories through improved reporting by many countries to the UNECE Convention on Long Range Transboundary Air Pollution (CLRTAP). Countries increasingly use the new reporting format that is more consistent with the format used for reporting of greenhouse gas inventories. For the EU recent (2002) reporting under the national emission ceiling directive is also helping to improve emission data quality. However there still remains substantial scope for countries to report their emissions data in a more complete way in particular by including better sectoral emission data. Although all European countries have signed protocols under CLRTAP, air emissions are not properly inventoried in many countries in EECCA. This constrains the possibility of producing complete assessments in support of policy

developments. Emission data are best for acidifying pollutants and ozone precursors, but less well developed for the 'newer' pollutants: fine particulates, heavy metals and persistent organic pollutants. The increasing demand for high quality sectoral greenhouse gas emission indicators, showing eco-efficiency (e.g. emissions per vehicle-km/energy consumption) also provides a stimulus, in particular for data gathering of the required underlying statistics.

Coverage and data availability for urban air quality monitoring are still poor in some countries due to lack of data. The effect of air pollution on human health is among the most serious environmental problems faced by the cities of the 12 countries of EECCA and urban monitoring is not covered by EMEP (the CLRTAP programme). Therefore efforts should be made to improve urban air quality monitoring in the framework of the Environment for Europe process in general.

#### *Chemicals*

Much of the monitoring effort and work on risk assessment has been focused on the *toxicity* of chemicals in the environment. Overall, there are still inadequate toxicity data for about 75 % of the chemical substances in use in western Europe, and inadequate eco-toxicity data for 50-75 % of the 2 500 priority high production volume chemicals (HPVCs) — chemicals whose production exceeds 1 000 tonnes/year. In recent years, there has been increasing recognition of the need to shift towards monitoring and assessment of the risk of exposure of people and nature to chemicals. However, there is also a major lack of human health and exposure data for these HPVCs. Downstream users (e.g. industrial users, formulators and product manufacturers) do not have to provide any data. Information on the uses of specific substances is therefore difficult to obtain, and knowledge about subsequent environmental and human exposures from use of downstream products is scarce. Other information deficiencies for chemicals include: the pathways, fate and concentrations of many chemicals in the environment; the use of chemical substances and their presence in consumer products; and the costs of the impacts on people and nature of exposure to chemicals, including mixtures of chemicals (EEA/UNEP, 1999). Monitoring and reporting of chemicals in Europe is uncoordinated, with an imbalance between different substances.

Pharmaceuticals and their metabolites are monitored occasionally. A relatively few selected heavy metals, persistent organic pollutants and pesticides seem to be the only groups of substances that are frequently monitored in most environmental areas, food, consumer products and human tissues. An integrated monitoring and exposure assessment should ideally consider all relevant sources during the life cycle of a product, emphasise the complete sequence of direct and indirect routes of exposure, and especially consider the exposure of sensitive groups. Most of these data are currently lacking. Long-term and systematic monitoring of concentrations of hazardous substances in ecosystems, food and human tissues is scarce in all European countries.

#### *Waste*

There has been little progress in the quality of information. Detailed analysis is hampered by the lack of comparable statistical information across Europe. Even for municipal and household wastes, which are normally thought of as areas with good statistics, confusion prevails. Reliable time series of data can only be obtained with a great effort to collect supplementary information and interpret the definitions used in different countries. These problems can only be overcome by harmonising definitions and collection of data on a common platform. For life-cycle analysis of products, there is a lack of systematic knowledge of the connection between the composition of individual products and resulting emissions from different treatment types when they end up in the waste stream. There is also a need for better transfers of information between product developers and producers and the waste management sector in order to develop a system whereby products and waste management fit better together. Although data on the generation and management of different waste categories and total waste generated are generally accessible, data quality is not good enough for analysis in all countries. In several countries, hazardous waste data are unreliable because of inaccurate inventories and different classification systems. Waste classifications need to be harmonised to improve the situation.

#### *Water*

Information on regional freshwater resources and water abstraction has improved. Methodological differences make it difficult to produce comparable data at the European level on the uses of freshwater.

Relatively little is known about the diffuse discharges to freshwater bodies from agricultural activities and their impacts on the state and quality of European freshwater bodies. More data are available on the quality of European rivers than for lakes and groundwaters. In collaboration with member countries and western Balkan countries, EEA is also developing Eurowaternet/Waterbase to help improve data comparability and provide the information relevant to the proposed EU water framework directive. However, there are still few data on small rivers and lakes, organic micro-pollutants and metals. Water-quantity and water-use data were mostly available. There is a general lack of environmental monitoring and comparable data and information on the state of waters in EECCA (rivers, lakes, groundwater and coastal waters). National surface-water monitoring systems are not coherent, as neither the data reporting systems nor the methodologies are harmonised.

Information on riverine inputs and direct discharges from point sources to the marine environment remains limited especially for the Mediterranean Sea, Black Sea and Caspian Sea, as well as for atmospheric deposition of hazardous substances, oil and nutrients. Monitoring of illegal oil discharges is carried out only in the North Sea and Baltic Sea and should be extended into the Mediterranean and Black Sea. Data on water quality are only available for a few substances. The EEA has brought together the various marine conventions and programmes in an interregional marine forum to help improve the comparability and timeliness of information for future assessment and reporting.

#### *Soil*

Despite the efforts that have been made in recent years in implementing a monitoring and assessment framework for soil, important data gaps still remain. These gaps are a consequence of the lack of soil protection legislation at the EU level and the consequent absence of legal requirements for reporting. Moreover, little funding is available for monitoring. This situation is expected to improve in the future, as a thematic strategy on soil protection is being developed and a proposal for a soil monitoring directive is expected for mid-2004.

More data on some aspects of soil contamination have gradually become



available through the establishment of European data flows, but analysis is hampered by lack of comparability. Aggregated information on driving forces and responses is available on contamination from localised sources, partly based on expert estimations, while little information is available on pressures and impacts (e.g. amount of hazardous substances released to soil or impacts of soil contamination on drinking-water supplies).

Monitoring of historic contamination is provided through national surveys, which have been established to serve management needs and therefore are not directly focused on environmental protection objectives. An adequate assessment of the current state of soil erosion in Europe is still missing. Information on the extent of area affected by soil erosion is available for most countries, but measurement approaches and reporting units used are not homogeneous, making comparisons across Europe difficult. The situation should improve in the future, as model-based regional assessments of soil erosion risk will become available, as a result of EU research efforts.

Information on the loss of soil resources through sealing is still patchy. Due to the lack of monitoring on the amount of soil actually sealed, a proxy indicator on built-up areas is used. Major sources of information are national land-use statistics. While time series on land-use changes exist in all countries, detailed surveys on built-up areas are only carried out in a few of them. Basic data, such as detailed European soil maps, are still unavailable for assessment, and problems with data access and data ownership remain.

#### *Technological and natural hazards*

There is an improved culture with regard to industrial accident reporting and sharing the lessons learnt. The European Commission's industrial accident database MARS (major accident reporting system), only for EU countries, is now complemented by SPIRS (Seveso plants information retrieval systems) which will cover information related to location and amount of substances handled in each 'Seveso plant' in the EU. For the non-EU states, the use of the Seveso II directive (and other relevant directives) appears appropriate and some are already using these, including some non-accession countries. The comprehensive nature of such directives provides a valuable model for more effective monitoring of risk

management measures and accidents. An enormous amount of accident monitoring and environmental radioactivity data are now being collected across Europe that now need to be better linked and used. Major transportation accidents are subject to improved reporting. Information about the risks and environmental impacts of natural hazards and interactions with human activities is not widely available. A holistic approach should ensure that all hazards are identified and that the risks from these are balanced against each other. Cooperation with insurance companies on accident-reporting data is to be developed.

#### *14.2.3. Cross-cutting impacts*

##### *Biological diversity*

In general, the natural biodiversity is better known and understood in Europe than in many other parts of the world. However, our knowledge is far from covering all the many elements of biodiversity (species, habitats, genetic resources). By 2000 most countries had or were planning a basic national nature or biodiversity monitoring programme with a data flow for the first very limited set of biodiversity indicators to suit national environmental reports as well as international reporting to conventions and directives. The best data exist for vertebrates and vascular plants; data for some invertebrate groups (butterflies) and lower plants are improving. Red Lists for the same species groups now exist in most countries.

In Europe the EU LIFE and Corine biotopes programmes, but also large-scale non-governmental organisation (NGO) programmes have enhanced inventories. The most comprehensive datasets are being collected on species, habitats and sites for Natura 2000 (the birds and habitats directives) for the EU countries and for non-EU European countries in the related Emerald network of the Bern convention. Many of the datasets are being used by the EEA through the European nature information system (EUNIS) in cooperation with the European Commission, the Council of Europe and international nature conservation organisations. However, the many activities in monitoring, indicator developments and assessments create problems of overlaps and unclear data flows and still need much effort in coordination and harmonisation, nationally, in Europe and globally.

The main challenges for the future therefore concern:

- Coordination across Europe on indicators and monitoring, relating this to European and global efforts. Ongoing, global: Convention on Biological Diversity indicators (gaining impetus), forest indicators (the Ministerial Conference on the Protection of Forests in Europe (MCPFE), finalised 2003), OECD and Eurostat indicators (ongoing since 1990s). Ongoing, pan-European: biodiversity monitoring and indicator framework (EBMI-F, agreed 2002) forum under the pan-European biological and landscape diversity strategy (PEBLDS), international working group on biodiversity monitoring and indicators (IWG Bio-MIN technical group, led by EEA, started 2002), EEA biodiversity indicators (started 2002), including biodiversity implementation indicators (Bio-IMPs, started 2003). Several NGO indicator initiatives are based on long-term monitoring such as on birds or wetlands.
- Using harmonised reference tools: geo-references such as biogeographical regions and regional seas, assessment criteria such as harmonised by IUCN (threats, management categories), species names, habitat classifications (such as the EUNIS habitat classification).
- Broadening the scope of biodiversity to include other important species groups and habitat types (the common ones) as well as genetic aspects.
- Developing more widely usable sets of general bio-indicators or biomarkers for environmental change (hormones in species, biomass, CO<sub>2</sub> functions etc.).
- Ensuring set-up and maintenance of a selection of long-term harmonised monitoring programmes to catch the generic trends of biodiversity conditions.
- Enhancing and maintaining open access to datasets and information held by countries and organisations, such as by using the national and EU internet-based clearing house mechanisms, related to the Convention on Biological Diversity.

#### *Human health*

For human health issues, there are long-established monitoring systems, for example for quality of urban air and drinking water. Little progress has been made in relating these monitoring data to the consequences for human health. A study to relate water

quality to human health has been jointly published by the EEA and WHO (WHO/EEA, 2002). Some progress has been seen for exposure assessment, in particular population exposure to air pollution (both indoor and outdoor). However, little is known about dose/response relationships and about the impacts on human health of exposure to mixtures of pollutants from multiple exposure routes. Some research and modelling has been undertaken in limited communities to understand better the relationships between human health and the low levels of chemicals and pollution that many people are exposed to on a daily basis. These studies have shown some indication of impacts on human health and behaviour e.g. lower sperm counts and neurotoxic effects, but the links between multiple, low-level exposures to chemicals (including pharmaceuticals) in food, water, air and consumer products and impacts on people remain largely unexplored. Data and information are particularly needed on cumulative chemical exposures, and related biologically effective doses, to sensitive subgroups, such as the foetus, children, the elderly, pregnant women, and those with depressed immune systems; on the antagonistic and synergistic interactions between these exposures; and on biomarkers of exposure, early effects and susceptibilities, which together can help identify potential threats to sensitive communities so that adverse impacts can be avoided or minimised.

Pharmaceuticals and consumer care products are emerging issues. Many types of chemical classes, ranging from endocrine disruptors, anti-microbials and antidepressants to lipid regulators and synthetic musk fragrances have been identified in sewage and domestic wastes. Food-borne diseases caused by microbial hazards are a growing public health problem. The WHO Programme for Surveillance of Food-borne Diseases in Europe has been collecting official information from the Member States of the WHO European Region for the past 20 years. Scientific knowledge about the health effects of electromagnetic fields is substantial, and is based on a large number of epidemiological, animal and in-vitro studies. Many health outcomes ranging from reproductive defects to cardiovascular and neuro-degenerative diseases have been examined, but the most consistent evidence to further monitor concerns childhood leukaemia.

### 14.3. Some ways forward: a better integration of environmental monitoring and reporting systems

Although the information on trends is incomplete, this report clearly shows the areas where achievement of environmental objectives is likely to present the greatest future challenge. The development of appropriate data flows in these areas is required so as to allow relevant and regular indicator-based reporting that enables progress to be assessed. An important part of such work still concerns harmonisation of definitions (e.g. air quality measuring methods), data collection methods and agreement on terminology for reporting (e.g. waste classifications). Having the right information, moreover, is important not only for helping to frame and monitor the policies required for improving the state of the environment, but also for changing societal behaviour and influencing in a positive way the impact that society as a whole has on the environment.

International legal instruments can play an important role in the implementation of environmental monitoring regimes. In this respect, the UNECE Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (the Aarhus convention) has made significant progress. It requires governments to provide the public with access to environmental data, thus enabling the public to hold data up to scrutiny and, in some cases, apply pressure on the governments to fill in gaps in information (see Box 14.2). Furthermore, Article 5, Paragraph 4 of the convention clearly conveys the legal obligation to 'publish and disseminate a national report on the state of the environment, including information on the quality of the environment and information on pressures on the environment'. The most significant development under the convention with respect to the generating and collecting of data has come in the form of the new protocol on pollutant release and transfer registers (PRTRs). Under this new instrument, negotiated under the auspices of the Aarhus convention, companies will be required to report annually on their releases and transfers of certain pollutants. The information will then be placed on a public register, known as a pollutant release and transfer register or PRTR. Each Party to the protocol will be required to establish a publicly accessible and user-friendly PRTR,

based on a mandatory scheme of annual reporting. The data generated will contribute to building up a picture on the movement of pollutants and how they enter the environment.

By providing the basis for a phase of 'learning from lessons', this report marks the start of a new phase of cooperation in environmental monitoring and reporting in Europe. This new phase is characterised by more systematic approaches, a policy focus and a clearer organisational structure for supporting long-term partnerships between countries and funding by international donors. From the start of its activities, the WGEM has been involved in articulating the contents of the report to make it relevant to policies and include proper analyses, and has remained involved in the necessary data flows and information processing. Such an activity has been important in establishing an effective bridge between a responsive monitoring system and a relevant reporting process in support of policy-making. 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 EEA.

At the international level, further development of an analogous framework for cooperation between countries, as provided by UNECE in past years and as demonstrated by the preparation process of this report, is required. The importance of this work should be adequately backed at the political level. A higher level of national investment, in particular in the 12 countries of EECCA, is required. Environmental monitoring investments are needed especially for raw data collection (networks), processing capacities (human resources) and equipment (computer hardware and software).

In the UNECE region, priority areas for improving environmental monitoring capacities are: air quality, water quality, waste management, biodiversity, and chemicals in ecosystems and foodstuffs. Substantial efforts are still needed to develop proper networks for providing environmental data and information. The experience of the EIONET network developed by the EEA should be taken fully into account for improving the capacity of the various national institutes in their task of providing environmental information.

The experience gained from the data collection for this report has proved that only some of the requested data were in fact publicly available (e.g. in state of the environment reports or from state statistical sources). To remedy to this situation, national implementation of the Aarhus convention on access to information and justice in environmental matters should be supported. Specific efforts are required under relevant international organisations and conventions to cover existing gaps. This would improve compliance and reporting systems and facilitate data collection for future pan-European environmental assessments. In this context, building on the upcoming proposal for an EU framework directive on reporting to take account of European needs could be considered appropriate.

Recommendations for future developments in order to improve the environmental monitoring capacities in Europe and allow for a real pan-European monitoring and reporting process are thus (ECE/EEA, 2003) to:

- develop indicators, which would need to be widely agreed, that illuminate the significance of environmental change and progress towards sustainability;
- focus on new information gathering on key issues and perspectives;
- maintain the framework for cooperation on environmental reporting and information management between countries at the pan-European level;
- ensure an appropriate level of investment in basic environmental monitoring infrastructure;
- establish mechanisms for the provision of environmental information by countries, in particular EECCA countries;
- encourage international collaboration to enhance cross-border and international comparability of information, in the priority areas of air emissions, urban air quality, transboundary inland water pollution, marine pollution, hazardous waste, waste management and biodiversity;
- encourage UNECE countries to submit data to international organisations and conventions according to their international commitments;
- strive towards the effective implementation of relevant legal instruments such as the Aarhus convention and its new protocol on PRTRs.

#### Box 14.2. Implementing the Aarhus convention

The United Nations Economic Commission for Europe (UNECE) Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (the Aarhus convention) was adopted in Aarhus (Denmark) on 25 June 1998 and entered into force on 30 October 2001. As of 1 February 2003 23 countries had ratified, approved, accepted or acceded to the convention. By recognising citizens' environmental rights to information, participation and justice, the Aarhus convention aims to promote greater transparency and accountability in environmental governance. While the convention is an instrument of international environmental law, by emphasising the responsibilities that governments have towards the citizens, it also promotes democracy and good governance. More specifically, the convention aims to:

- allow members of the public adequate access to environmental information held by public authorities, thereby increasing the transparency and accountability of government;
- provide an opportunity for people to actively participate in the decision-making process on environmental matters;
- provide the public with access to review procedures when their rights to information and participation have been breached and with respect to general violations of environmental law.

The first meeting of the Parties to the convention took place in Lucca, Italy on 21–23 October 2002. A number of significant results were achieved at the meeting, including the establishment of several new subsidiary bodies. The participants present at the meeting adopted the Lucca Declaration, which emphasised the importance of the convention and set out the direction of work for the nearer future. Furthermore, the meeting adopted 14 decisions on specific substantive issues (genetically modified organisms - GMOs, PRTRs, access to justice and electronic information tools), review of compliance, capacity-building, and other elements concerning the procedural and institutional architecture that will support the implementation and future development of the convention. Environmental NGOs played an active role during the negotiation of the convention to an extent unprecedented in the development of an international legal instrument. Their active involvement continues to be an important feature of the implementation processes.

Knowledge of developments that support policy processes with environmental information is needed for improving the state of the environment in Europe. This report and eventual follow-up studies may become a catalyst for improved information and data flows at the national and the pan-European level. These would form the legal background for improving and strengthening capacities in national environmental monitoring and reporting, and allow comprehensive and relevant indicator-based reporting for Europe.

#### 14.4. References

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