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Towards a European chemicals information system

A survey on reported monitoring activities of chemicals in Europe

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The EEA project manager was Gabriele Schöning.

In this report an overview is given of monitoring activities in the EEA member countries. The information provided is based on an extensive survey among numerous Government Employees, National Focal Points, and Industry representatives in the various countries.

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Summary

The need for setting up a multi-purpose European chemicals information system that can be used as a tool in support of the current legislation of chemical substances within the EU has been expressed by various stakeholders within the EU. A database on monitoring activities in Europe is one of the elements of a chemicals information system. This report gives an overview of the approaches and the results of a project aimed at collecting information on monitoring activities in the 31 countries associated with the European Environment Agency, and Switzerland ([1]). The information obtained is gathered in a database that is made available for outside users. The main finding of the study is that, with the exception of the air compartment, the information obtained on monitoring in the various environmental compartments across Europe is to be classified as patchy in nature. The background to this observed lack of information is manifold. In some countries the data are simply not available, while in other countries cooperation was insufficient. Also, in some countries the information is available but a more coordinated action at the national level is needed to gather the information. Thus, further efforts will be needed to complement the information in the database. The current information in the database is recommended for use as a tool to promote further cooperation with respect to lacking data.

In addition to reporting on the contents of the information collected, an outlook is given on potential applications of the database structure and the information collected.

([1]) At the time of the study, Switzerland was not a member of the EEA. Switzerland became a member on 1 April 2006.

1 Introduction

1.1 General

There is an increasing need within the European Union and the individual countries to obtain insight into the adverse effects to humans and ecosystems associated with the release of chemicals in the environment. Assessment of the impact of chemicals in the environment requires (amongst other things) the development of an information system that supports the assessment of potentially and actually occurring adverse impacts of chemical substances. Various stakeholders within the EU have expressed the need for setting up a multi-purpose European chemicals information system that can be used as a tool in support of the current legislation of chemical substances within the EU. Such a system will serve various users:

1. scientists involved in the development of tools for the integrated assessment of the past, current and future state of the environment;
2. policy makers using these tools to developing and direct strategies for improvement of the quality of the environment;
3. the general public who need to be aware of a change of the quality of the environment at various scales.

The need for developing a European chemicals information system is recognised by the European Environment Agency (EEA) and some preliminary steps are being currently taken to mark the outlines of a future European chemicals information system. It is recognised that developing a European chemicals information system will require a lot of consensus building and effort before its implementation within the EU policy is possible. At present, the process of consensus building has to be initiated. Nevertheless, it is evident that a European chemicals information system should comprise several modules, which together make up the information content needed to fulfil the various legislative and regulatory requirements of such a system. The interconnected modules do not necessarily need to be developed and maintained at one site or at one organisation. It is the intention of EEA to streamline the process of linking the modules.

One of the modules anticipated is a database on monitoring data of chemicals in the European environment. The EEA has expressed the need for establishing an information system containing meta-information on monitoring efforts of chemical substances within the 31 EEA member countries and Switzerland ([2]). Such a database might serve a large number of purposes and various potential end-users may be identified. These range from risk assessors interested in the distribution of individual compounds to managers responsible for adhering to quality objectives, management of catchment areas, durable land use, etc. Overviews of monitoring efforts may also assist in avoiding duplication, thus allowing for the design of cost-effective sampling strategies as well as for harmonising legislation and reporting data at for instance national and EU level.

1.2 Research approaches

There is a broadly shared notion that on a European scale the different monitoring programmes show a great variation in substances considered, general methodology and the extent of the programmes. Consequently, it *a priori* is not evident that linking all current monitoring efforts will provide a thorough basis for a well-balanced chemicals information system, and large data gaps are expected. In this report the findings are described of a study in which it was attempted to collect the meta-information from the 32 countries indicated. As described in the call for proposals launched by EEA in 2003 (EEA, 2003) and the work plan prepared by RIVM (RIVM, 2004), the study is restricted to chemical substances in air, water, sediment, soil and biota. The study focused on collecting pre-defined information on monitoring networks within each of the countries. This required consultation of a large number of persons dealing with monitoring of any of the compartments indicated above. All the cooperation within the project took place on a voluntary basis and within a strict timeframe. As a more or less inevitable consequence, a full detailed analysis of all monitoring activities in a specific country was not obtained. Nevertheless, on the basis of the responses obtained and on the basis of general knowledge on monitoring requirements in Europe, the

([2]) At the time of the study, Switzerland was not a member of the EEA. Switzerland became a member on 1 April 2006.

comparability and completeness of the information are evaluated. All information collected is put in a database; the features of which are also discussed in this report. In view of a broad end-use, the information collated in the database is not restricted to data on concentrations of chemicals in each of the environmental compartments indicated. Instead, the database also contains additional information on parameters expected to be useful for interpretation of the significance of the data measured.

Chapter 2 reiterates the objectives of the study. Chapter 3 describes the methods used and the approaches taken to collect all information required. Chapter 4 provides a description of the responses obtained, both in terms of frequency and actual monitoring information. A description of the technical features of the database, including a description of the interface and the options for data retrieval, is given in Chapter 5. Finally, in Chapter 6 the main findings of the study are discussed within the context of a European chemicals information system. Some concluding remarks and recommendations for future steps towards a European chemicals information system are made in Chapters 7 and 8 respectively.

2 Objectives

2.1 General objectives

The general objective of the study is to gain information on the current state of monitoring of chemicals in air, water, sediment, soil, and biota in Europe. The result should provide a basis for an evaluation of how this data can be used for an integrated European monitoring system. The information provided should allow conclusions on representativity and comparability of data measured at different monitoring stations to be drawn.

2.2 Specific objectives

Four specific objectives were identified:

1. To provide an overview of the existing monitoring efforts within the EEA member countries and Switzerland. The overview is restricted to chemical substances in air, water, sediment, soil and biota.
2. Assess the extent to which the information collected is representative for all monitoring data within Europe; the extent to which the information collected is comparable and the level of coverage within the specific countries or regions of Europe.
3. To collate the information collected as the result of the first objective in a database that is easily accessible (user-friendly interface) and can be distributed relatively easily.
4. To provide an outlook of the possibilities of setting up a European monitoring system, possibly as part of a European chemicals information system with the objective to support risk assessment, risk management, policy decisions, compliance control, research and so on.

With regard to the fourth objective it should be noted that this outlook is not to go too far beyond the direct findings of the project.

2.3 Framework

The main task was to make an inventory on monitoring of concentrations of chemicals in the environment, and on monitoring of impacts of environmental concentrations of chemical substances in the environment. The survey is based on available information compiled in the past. This implies that the first step was to check which of these programmes are still active. On the basis of a lack of response with regard to impact assessment, it is concluded that, apart from limited epidemiological studies focussed at specific stressors on human health within well-defined areas, no systematic monitoring of impacts of chemicals in the environment is carried out in Europe. Hence, no data on systematic impact monitoring were found. The study reported here is therefore limited to the inventory of monitoring activities in the environmental compartments air, water, sediment, soil, biota and food.

3 Information search approaches

3.1 General — first phase

The project was split into two main phases: a pilot phase of relatively short duration and a final phase in which the experiences gained with the approaches indicated above were used for optimising the search for information. Additionally, in the final phase of the projects an interim report was produced, evaluated by a review panel and commented on during a workshop organised by EEA.

Three factors determine the selection of the countries for the pilot phase. The distinction in environmental policy development was one factor in selection. Other factors were geographical variety and the availability of contacts in the RIVMs network. The countries chosen were: the Netherlands, Slovenia and Portugal.

Representative for northern countries, Netherlands has a good long-term track record on the environment. Dutch environmental policy provides a framework for monitoring a wide range of substances in all compartments. In addition, environmental policy is now geared towards a further integration with EU environmental policy, in accordance with the technical and scientific implementations of new EU policy directives like the Water Framework Directive and the Air Quality Framework Directive. Furthermore, all the relevant information on Dutch monitoring programmes can be obtained relatively fast.

Southern Member States were expected to use different approaches to monitoring, and as a result alternative types of information relative to northern Member States were anticipated. As a representative indicator of this country group, existing monitoring programmes in Portugal were inventoried.

From the 'new' Member States (EU-10), Slovenia was selected. In contrast to the Netherlands and the EU-15 Member States, Slovenia had to implement EU environmental policies very rapidly. Nevertheless, considerable progress has been made over the past few years with the adoption of a National Environmental Action Programme and the foundation of a Slovenian Environment Agency. Significant progress has also been achieved in a number of sectors, such as water protection, waste management, industrial pollution control and risk management, air quality, chemicals and GMOs (genetically modified organisms). RIVM maintains close contacts with the Slovenian Ministry of Environment and Spatial Planning, the National Chemical Bureau and the institutes for public health and environmental protection. This ensures direct access to relevant monitoring databases in the Republic of Slovenia during the pilot phase.

A questionnaire was used to streamline information exchange and to provide data managers and other persons involved in monitoring activities and data mining with the essential information on the backgrounds of the project. This questionnaire is included in Appendix I.

3.2 Specific approaches — second phase

Five major routes of information mining on monitoring activities in the 31 EEA member countries and Switzerland were exploited:

1. Generally available Internet sites, (text) books, and similar sources of information were searched. A preliminary list of potential sources was provided by the contact person of the EEA at the start of the project. This list was updated and relevant monitoring activities are included in the database.
2. All national focal points (NFPs) of the EEA were consulted at the start of the project. Each NFP was requested to provide contact details of persons who can provide information on monitoring activities in the respective countries.
3. Existing national and international organisations and networks were consulted. This included industry representatives.
4. The EU topic centres on air, water, and soil were contacted.
5. Direct contacts were laid with researchers known to be directly or indirectly involved in data collection and data mining. Informal networks in which RIVM representatives participate were used as the basis for these contacts.

Ad 1. Sources of information exploited include: AirBase, WaterBase, the International Co-operative Programme (ICPs) Forest CLRTAP UNECE and EU, ICP-Waters, UNECE ICP-Integrated Monitoring of

Air Pollution Effects on Ecosystems, FIMCI (Forest Monitoring Co-ordinating Institute), the Terrestrial Ecosystem Monitoring Sites (including the FAO Forest Resources Assessment data for 1980, 1990 and 2000) available via the Global Terrestrial Observing System, the International Co-operative Programmes (ICPs) established under the Executive Body of the Convention on Long-Range Transboundary Air Pollution (LRTAP) on Assessment and Monitoring of Acidification of Rivers and Lakes (ICP-Waters), the Arctic Monitoring and Assessment Programme and the Global Ocean Observing System (GOOS) of the Intergovernmental Oceanographic Commission. In addition, the coordinators of EU-sponsored projects that are carried out within the 5th and 6th EU Research Framework (Metropolis/Rebecca) and deal with monitoring were contacted. The coordinator of the European Sediment Research Network Sednet provided cooperation on the project. Neither Metropolis, Rebecca or Sednet have the objective of collecting information on monitoring activities, nor collecting monitoring data. Cooperation from the participants in these project and network was by means of addressing individuals and organisations that potentially have access to information on monitoring activities in the countries that were part of this study.

Finally, Ecetoc has commissioned a search for aquatic monitoring data to the Dutch RIVO. The database gathered within the RIVO-project was made available for this project and is included in the database.

3.3 Coverage — third phase

An important aspect of this study is to get an impression of the extent to which the database compiled covers all relevant monitoring programmes. As an additional quality control measure on this aspect, the following leading experts in the broad area of impact assessment and monitoring of chemicals were asked to peer review both the outcome of the pilot phase and a proposal for carrying out the final phase of the project: Prof. Dr Davide Calamari (University of Insubria, Varese, Italy), Dr Steven Eisenreich (Head of Inland and Marine Water in IES — EU Joint Research Centre, Ispra, Italy), Prof. Dr Ivan Holoubek (Recetox — Masaryk University, Brno, Czech Republic), Dr Bo Jansson (Stockholm University — Institute of Applied Environmental Research, Stockholm, Sweden), Prof. Dr Wernerlein (Fraunhofer-Institut für Molekularbiologie und Angewandte Oekologie, Schmallenberg, Germany) and Dr Jozef Pacyna (Norwegian Institute for Air Research, Kjeller, Norway).

At the end of the project, the draft final report was circulated among the national representatives of the EEA, who were asked to check whether the data coverage with regard to their country was sufficiently complete. Additional information obtained at this stage is also included in the database.

Finally, following completion of the draft report, a workshop was organised by EEA for stakeholders within the EU, representatives of industry, NFPs, members of the scientific board of EEA, and the OECD to discuss the main findings and to suggest further steps to be taken towards the development of a European chemicals information system. The comments made to the draft report during this workshop are included in the final report.

4 Information obtained

4.1 General

This chapter deals with the main findings of the study as related to the first two specific objectives of the study. It aims to provide an overview of the existing monitoring efforts within the countries associated with the EEA, and to assess to which extent the information collected is representative and comparable and of use for a wide variety of potential users of the information collected. The assessment of the representativity and comparability of the information collected is carried out on the basis of a number of illustrative case-studies aimed at specific applications.

4.2 Current monitoring networks

A list of current activities was provided by the EEA at the start of the project. This list was updated during the course of the project. After processing all responses obtained within the course of this study and inclusion of all information in the database, a data search was carried out to identify whether each activity identified by the EEA was still operational. An overview of the results of this data search on the present status of the activities provided by the EEA (Counil *et al*., 2001) is given in Appendix II. All activities that are currently operational are included in the database. As can be seen from this appendix, most monitoring programmes are still operational and in these cases recent information has been included in the database. In other cases, no confirmation (i.e. neither from the information gathered in the database nor from persons assumed to be involved in the programme) was obtained to confirm that the programme was still operational. As this does not provide 100 % certainty as to whether the programme indeed is terminated, the indication 'unknown' is used.

4.3 Overview of the information obtained

With regard to meeting the second objective of this study; namely, to assess the extent to which the information collected is representative and comparable, and of use for a wide variety of potential users of the information collected, the following general observations were made:

1. The importance of setting up a European chemicals information system is broadly recognised and is the reason why a database containing information on monitoring activities is an important cornerstone. Therefore, in principle, broad agreement from representatives of various EEA member countries exists to participate in the project.
2. With the exception of 'AirBase' most of the existing databases on monitoring activities readily available for consultation were of limited use for the purposes of this project. In all cases, the required meta-data were either not present or could not be deduced indirectly. To obtain the required level of detail, a new consultation of the underlying primary sources was needed.
3. A similar observation was made for monitoring information available via the Internet by means of maps showing monitoring data for specific areas and for pre-selected compounds. In this case it was impractical to import individual data into the database.
4. From responses obtained during the pilot phase in The Netherlands (with regard to the ratio of the number of substances actually monitored in air versus the number of substances included in AirBase) and Slovenia (with regard of the number of actual sampling stations that exceeds the number of station included in AirBase) it was clear that the information contained in large databases like AirBase does not fully cover the whole monitoring data information available within each country. In AirBase this is due to the fact that the database solely contains information on substances for which EU-wide reporting obligations exist. In numerous countries, additional substances are being monitored.
5. Although the importance of the project was clear, it was found to be difficult to get complete overviews of monitoring activities carried out within individual countries. Monitoring programmes in most countries are carried out at a regional or even local level. Often, an overview at on a national scale of all monitoring programmes is lacking. In such cases a lot of effort is needed from representatives at national level in order to provide the information required within the framework of this project. It should also be noted that in most countries monitoring substances in different compartments is usually organised in a

compartment-specific manner and coordination among compartments lacks.

6. Thereupon, it was experienced that cooperation in some cases is hampered by the fact that participation in the project took place on a voluntary basis. Especially for the EU-10, all available resources in terms of manpower and funding are made available for the implementation of existing EU regulations. Although most of the contact people addressed recognised the potential importance of setting up a database on European monitoring activities, the mere fact that no funds were available to meet the costs of providing the (detailed) information asked for hampered cooperation. The overall outcome was in this respect that for some countries hardly any or even no cooperation was experienced, whereas for other countries all details could be made readily available within a relative short period of time. This required a more intense search for alternative data sources for the first category of countries or financial aid.
7. Related to the previous general remark is the observation that respondents in some cases were struck by the level of detail of the information required for monitoring in a specific country. This hampered cooperation. As a consequence the willingness of organisations and/or individuals in EEA member countries to cooperate was less than foreseen. In practice, data-owners needed to spend considerable amounts of time on activities that are not always directly of their benefit.
8. Because of the incomplete cooperation encountered it must be concluded that the overview given in this report does not fully cover all information potentially available. Further efforts are needed to get a more complete overview of **all** current monitoring activities. As such the project reported here is to be viewed as a pilot project. Nevertheless, this observation does **not** imply that the information obtained thus far is not representative of the monitoring activities across Europe. An analysis of the data representativity is given in the Paragraphs below and in Chapter 6.

The amount of information that is stored in the database is in absolute numbers as follows: total number of monitoring activities is 248 000; total number of measured substances is 630; and total number of measurement locations in the database is 16 136. An 'activity' is defined as a series of monitoring activities of a specific substance over time at a single monitoring station.

An overview of the type and the legal as well as the other frameworks under which the activities are conducted is given in Appendix III. These frameworks differ widely. Furthermore, it should be noted that this overview is not complete. In a proportion of cases no information was provided on the framework under which sampling had taken place. In Appendix IV, an overview is given of the ongoing frameworks within each of the 32 countries that were part of this study. In case no recent information was found on a specific framework, the input 'unknown' is used.

Most data on which information was received are in principle freely available. This does not by definition imply that the data are available in electronic format. As far as possible, a contact person is indicated for provision of additional information on actual data retrieval. In some cases, the underlying monitoring data are available via the Internet and are visualised by means of maps. Unless indicated otherwise, there are no restrictions in accessibility of the actual data. This is due to reasons of confidentiality. It is assumed that this is related to the observation that all contact persons who provided information on monitoring in their country restricted themselves to non-confidential monitoring programmes.

With regard to the additional features of the entries in the database, in the majority of cases no additional information on for instance QA/QC-aspects and analytical methods employed (including information on e.g. detection limit, sensitivity of the methodology used for sampling and measuring) was provided by the responders. In less than 0.1 % of all activities included in the database, information on QA/QC was made available. Further activities need to be initiated before a substantial part of the information in the database can be properly labelled in this respect. In most cases, lack of provision of this information is due to the fact that this type of information is not usually stored jointly with the other types of monitoring information reported here. The lack of sufficient information on additional aspects of monitoring campaigns precludes a detailed analysis in the course of the study.

4.4 Analysis of the information obtained

4.4.1 General

A more specific overview of the information obtained during the course of the project is given in Table 1. This table overviews the coverage/ representativity of the information on monitoring

Table 1 General overview of the coverage/representativity of the information on monitoring activities collected in 32 European countries

Countries		Surface water	Sea water	Groundwater	Sediment	Biota	Soil	Air
EU	**Data source**		**ICES**		**ICES**	**ICES**		**EMEP-AirBase**
Austria	**Data source**	EEA — UBA — data from RIVO database	Not relevant	Information obtained — UBA	Information obtained — UBA	Information obtained	Information obtained	EMEP-AirBase
Belgium	**Data source**	VMM — partial data from RIVO database	ICES — Partial data From RIVO database		ICES + VMM	ICES		EMEP-AirBase + VMM
Bulgaria	**Data source**	Information obtained					Info received	EMEP-AirBase
Cyprus	**Data source**							Monitoring data are now being collected
Czech Republic	**Data source**		Not relevant				Data provided	EMEP-AirBase
Denmark	**Data source**	National coordinator + partial data from RIVO database	ICES — Partial data from RIVO database	National coordinator	ICES	ICES		EMEP-AirBase
Estonia	**Data source**	Partial data from RIVO database	Partial data from RIVO database		Data provided	Data provided		EMEP-AirBase
Finland	**Data source**	National coordinator + Partial data from RIVO database	Partial data from RIVO database		Data provided	ICES		EMEP-AirBase
France	**Data source**	EEA	ICES — Partial data from RIVO database		ICES	EEA		EMEP-AirBase
Germany	**Data source**	Partial data from RIVO database	ICES — Partial data from RIVO database		ICES	Insufficient data on specimen databank obtained		EMEP-AirBase
Greece	**Data source**	EEA — Partial data from RIVO database	Partial data from RIVO database		Some data provided	Some data provided		EMEP-AirBase
Hungary	**Data source**	EEA	Not relevant					EMEP-AirBase
Iceland	**Data source**	Information obtained			ICES	ICES + incomplete set of information obtained		EMEP-AirBase
Ireland	**Data source**	Partial data from RIVO database	Partial data from RIVO database		ICES	ICES		EMEP-AirBase
Italy	**Data source**	Partial data from RIVO database	Partial data from RIVO database		Limited data	Limited data		EMEP-AirBase
Latvia	**Data source**					ICES		EMEP-AirBase
Lithuania	**Data source**	Information obtained				Information obtained		EMEP-AirBase
Luxembourg	**Data source**	Information obtained+ Partial data from RIVO database	Not relevant					EMEP-AirBase
Norway	**Data source**	Partial data from RIVO database	ICES — Partial data from RIVO database		ICES	ICES		EMEP-AirBase
Poland	**Data source**	Database is incomplete	Database is incomplete			ICES		EMEP-AirBase
Portugal	**Data source**	SNIRH	ICES — Partial data from RIVO database	SNIRH	ICES	ICES	ICPforest	SNIRH/EMEP-airbase
Romania	**Data source**							EMEP-AirBase
Russia	**Data source**	Partial data from RIVO database	ICES		ICES	ICES		
Slovakia	**Data source**	Incomplete data — Partial data from RIVO database	Not relevant	Incomplete data	Incomplete data	Incomplete data	Incomplete data	EMEP-AirBase

Countries		Surface water	Sea water	Groundwater	Sediment	Biota	Soil	Air
EU	**Data source**		**ICES**		**ICES**	**ICES**		**EMEP-AirBase**
Slovenia	**Data source**	NFP	NFP	NFP	NFP	NFP		EMEP-AirBase
Spain	**Data source**		ICES +Partial data from RIVO database		ICES	ICES		EMEP-AirBase
Sweden	**Data source**	S EPA + Partial data from RIVO database	S EPA + Partial data from RIVO database		ICES	ICES		EMEP-AirBase
Switzerland	**Data source**	Information received	Not relevant				General information included	EMEP-AirBase
The Netherlands	**Data source**	WaterBase (RIZA)	ICES	Monitoring network	ICES	ICES	Dutch soil monitoring network	EMEP-AirBase
Turkey	**Data source**		Information obtained			Information obtained		
United Kingdom	**Data source**	Data from RIVO database — data from DEFRA compilation — data from the Environment Agency	ICES — Partial data from RIVO database — Partial data from DEFRA compilation	Dataset is incomplete — Partial data from DEFRA compilation	ICES — Data from the Environment Agency	ICES	Partial data from DEFRA compilation	EMEP-AirBase — Partial data from DEFRA compilation

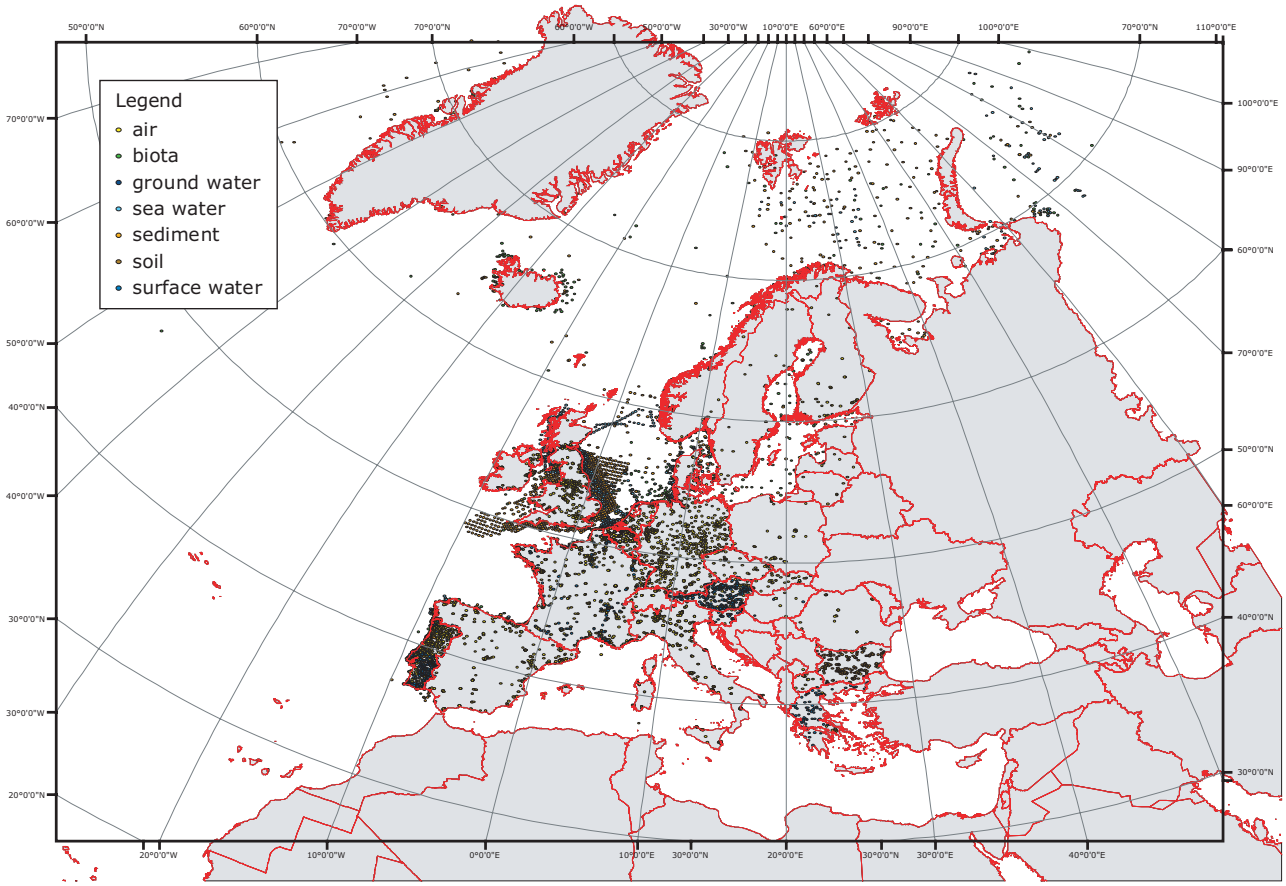
Note: Empty cells: no information available

activities that was collected in this study (specific objective two of this study). As may be concluded from Table 1, information on monitoring activities was obtained for most compartments in most countries. However, part of the coverage is only partial for a specific compartment in a specific country. Overall, information on monitoring activities was found for approximately 60 % of the compartments covered in the 32 countries. This percentage does not take into account the countries in which no systematic information on monitoring activities within the country is available, and countries in which systematic monitoring is currently not (yet) carried out. Air and water compartments are fairly well covered, whereas there is a patchier pattern for the remaining compartments. Table 1 also reflects the observation that for some countries hardly any or even no cooperation was experienced, whereas for other countries all details were made readily available within a relative short period of time. It should be noted however that Table 1 is set up in such a way that only qualitative information on data coverage is given. Underlying the entries in Table 1 is a broad range of more detailed quantitative information on monitoring activities in the various countries, requiring further analysis. This analysis is carried out in the Paragraphs that follow by means of case studies focussing on specific applications of the database.

A graphical representation of the data in the database is given in Figure 1. This figure represents all sites where monitoring activities have been recorded. Similar to Table 1, the entries in Figure 1 represent a broad range of monitoring activities for sampling frequency, time period and the number of compounds examined. A basic feature of Figure 1 is that it clearly shows the regional pattern of the information obtained. Information density is highest in Western Europe, especially Austria and Portugal. In addition, sea water in the United Kingdom and Portugal are well covered. The regional character of monitoring campaigns and the difficulties in achieving access to information on regional monitoring activities is clearly highlighted by the Portuguese distribution of information. Whereas detailed information was obtained on groundwater monitoring in the south of Portugal, only scattered data are available for the Nordic part. By contrast, air data for the southern part are lacking whereas there is an abundance of air monitoring information available for northern Portugal. It should be noted that the abundance of monitoring information collected for Portugal contrasts with one of the main considerations underlying the choice of this country as one of the countries to be investigated in the pilot phase of this project. Figure 1 also shows that in principle air monitoring is organised in a systematic matter across Europe and most regions seem well covered in this respect. Finally, the systematic design of the monitoring campaigns that are carried out in the Nordic seas is clearly visualised.

By definition, it is more or less impossible to judge whether the information received on monitoring activities in a specific country covers all the information that is potentially available without

Figure 1 Graphical representation of monitoring activities in the 31 EEA member countries and Switzerland



actually having access to the databases containing the information. The responses obtained from within the various countries always contained all known information to the person who filled in the questionnaire and provided the detailed information. This nevertheless does not warrant full coverage. However, only limited means are available to assess the completeness of the information obtained and hence the extent to which the second specific objective of this study is met. One means of quality control of the database, in terms of information coverage in the database, is to compare coverage information with the information in the existing databases. A database that is suited to this purpose is the COMMPS-database developed by the European Commission to derive a priority list of substances for the water framework directive. It covers all EU Member States and contains approximately 750 000 sample records of 293 different organic substances and 23 different metals or their compounds (Nixon *et al.*, 2001). The data were largely collected from inland waters and three quarters of all the data points came from the United Kingdom. The data may not, therefore, give a representative overview of the monitoring activities within EU Member States or of monitoring in all water types. In Table 2 a comparison is made between the number of substances monitored in water in the EEA-countries contained in the COMMPS database and the number of substances in these countries contained in the database developed within the course of the study.

Table 2 concludes that the number of substances included in the database developed within the course of this project exceeds the information contained in the COMMPS database. As such, this example indicates that increased coverage has been obtained within this study.

4.4.2 Case study 1 — legislator/risk assessor

Potentially, there is an infinite variety of users that are interested in using the information contained in the database for specific purposes. As explained in Chapter 5, the database is designed in such a manner that flexible output of all kinds of combinations of fields is possible. One of the obvious applications is the use of the information

Table 2 Comparison of the number of compounds contained in the COMMPS database and the number of substances included in this study's database

Country	This study	COMMPS
Austria	37	85
Belgium	349	95
Denmark	170	70
Finland	34	7
France	101	88
Germany	162	170
Greece	24	37
Ireland	66	4
Italy	22	18
Luxembourg	70	22
Netherlands	317	97
Portugal	108	5
Spain	59	69
Sweden	94	9
United Kingdom	164	107
Total	**1 777**	**883**

for risk assessment of specific substances. Risks are assessed by comparing information on effect levels at various degrees of integration with modelled or measured concentrations in each of the relevant environmental compartments. A risk assessor is therefore interested in (time-averaged) monitoring data at local, regional and national levels. With this objective in mind, an overview of the number of activities, the number of monitoring stations/locations and the number of substances is given in Appendix V. An 'activity' is defined as a series of monitoring activities over time at a single monitoring station of a specific substance. Appendix II displays the dissimilarity of information which was the outcome of the study. Without exception, the indicators given in Appendix V fluctuate widely between countries. This is not only a reflection of differences in cooperation obtained, but also reflects fundamental differences in past and existing monitoring campaigns.

From the numbers given in Appendix V, it may be concluded that currently there is insufficient information available for EU-wide risk assessments at various spatial scales. With regard to specific compounds sampled, it was found that a widely varying range of substances is measured and a patchy pattern of monitoring in terms of frequency, number of sites and number of compounds was encountered. This is illustrated in Table 3. In this table an example is given of information on the monitoring of chemicals in surface water, as this may be one of the specific compartments of interest from a risk assessment point of view. First of all, 13 different classes of chemicals are distinguished in this table. The definition of these classes is not according to existing classification schemes. The grouping was carried out in such a way as to maximise the use of the data present. The numbers of sampling stations at which each class of chemicals is monitored as well as the number of compounds that make up the country-specific class are given for eight countries. As may be concluded from Table 3, a fully different mixture of compounds is measured at a number of sampling stations ranging from 1–479 within the eight countries. The lower section of Table 3 provides a different way of examining the same set of information on aquatic monitoring for eight countries. In this case, the number of countries is given in which a specific class of chemicals is monitored. This comparison again indicates the patchy pattern of monitoring activities across Europe in terms of sampling of specific classes of compounds without considering other aspects, such as frequency, sites etc. From the viewpoint of risk assessors interested in monitoring data on a single compound of specific classes of compounds, this general picture might be deemed as alarming. For example, chlorobenzenes and chlorophenols (which are classes of compounds that have been of

Table 3 Overview of database information on chemical monitoring in surface water

Country	Compound class	No. of stations	No. of compounds
Austria	Herbicides, Aromatic compounds	5	11
	Metals	192	6
	Triazine derivatives	242	3
	Volatile organics	4	3
France	47 widely varying compounds	1–72	47
Greece	DDT	84	1
	Herbicides, Aromatic compounds	84	5
	Metals	84	5
Hungary	Metals	1–4	11
Luxembourg	Chlorobenzenes	1	5
	Metals	1	10
	PAHs	1	8
	PCB's	1	7
	Surface active compounds	1	2
Netherlands	Chlorophenols	27	13
	DDT-derivatives	16–23	6
	Metals	3–37	18
	PAHs	8–21	13
	Pesticides, herbicides	2–33	71
	Volatile organics	3–13	16
Portugal	DDT-derivatives	11–76	3
	Metals	19–479	22
	PAHs	45–50	6
	PCB's	5–12	8
	Pesticides, herbicides	26–76	15
Slovenia	DDT	13	1
	DDT-derivatives	13	2
	Herbicides, Aromatic compounds	13	8
	Metals	24	6
	Pesticides, herbicides	13	8

Compound class	Number of countries
Chlorobenzenes	1
Chlorophenols	1
DDT	2
DDT-derivatives	3
Herbicides, Aromatic compounds	3
Metals	7
PAHs	3
PCBs	2
Pesticides, herbicides	3
Surface active compounds	1
Triazine derivatives	1
Volatile organics	2

Note: Upper section — the number of stations at which a pre-defined (arbitrarily chosen) class of chemicals is monitored in a specific country plus the number of compounds constituting that specific com-pound class.

Lower section — the same information collated by means of the number of countries (out of the 8 given in the upper section of the table) in which a specific class of compounds is monitored

concern for a few decades) are routinely monitored in surface water of just one of the eight countries for which information on the aquatic compartment is available.

From the viewpoint of monitoring individual compounds, a patchy pattern is obtained. A limited number of compounds (such as the heavy metals Cd, Zn, Cu, Pb) are measured regularly at various stations across Europe; whereas the measuring frequency of most substances considered in this study is limited (i.e. some compounds were measured in only one single country or at a single location). An overview of the countries and the compartments in which a typical data-rich substance like zinc is monitored is given in Table 4.

It may be concluded from Table 4 that one of the pre-assumptions for the selection of countries that were to constitute the countries considered in the pilot-phase of this project (Section 3.1) is not met. The upper section of Table 4 shows that the information density for Portugal in terms of the number of monitoring stations and the number of compounds sampled is for instance similar to the information density for the Netherlands.

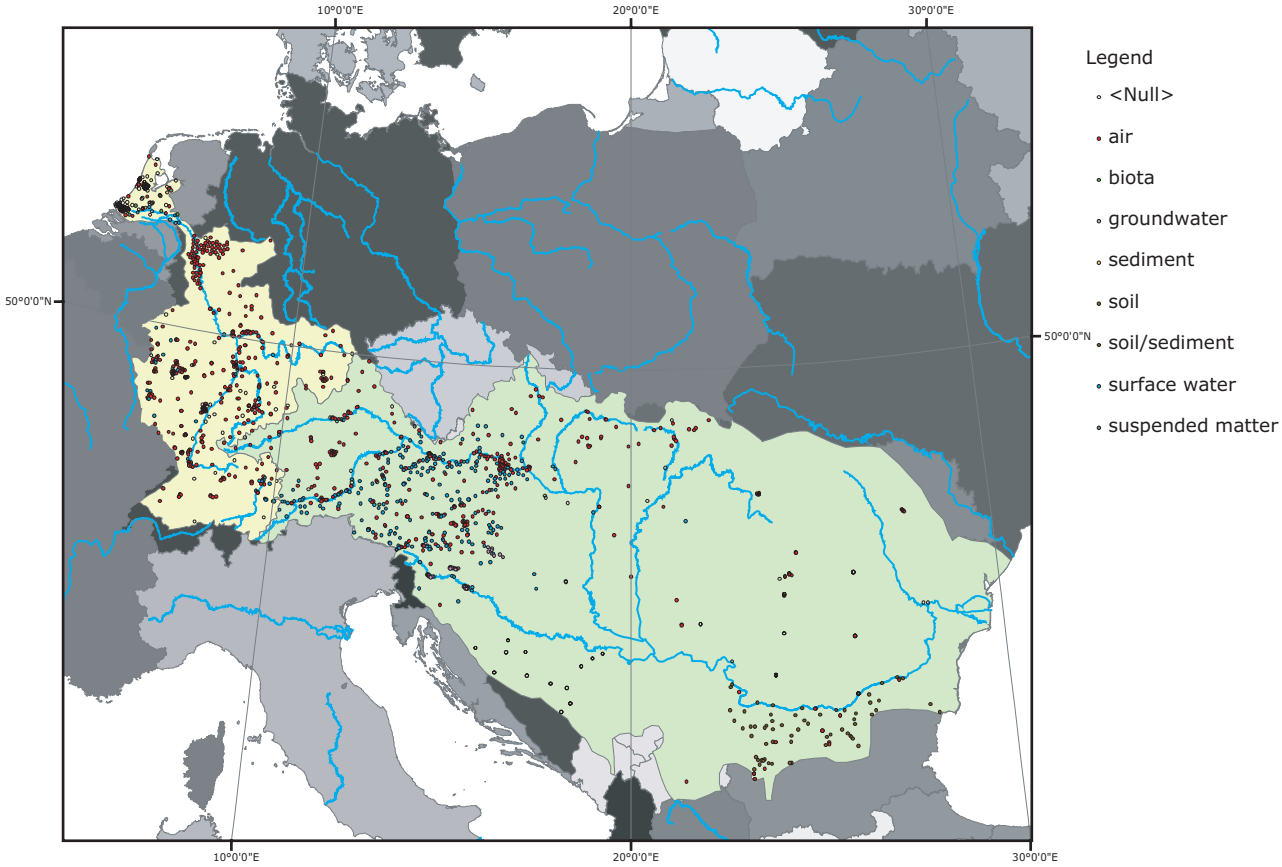
4.4.3 Case study 2 — risk manager

A specific application for risk management purposes of the information collected can be found within the implementation of the Water Framework Directive (WFD). To comply with the WFD, the chemical and ecological quality of the rivers within pre-defined catchment areas will have to be assessed in the future. In order to do this, comparable monitoring information needs to be made available across the borders that comprise a catchment area. For example, the information received for the catchment areas of the rivers Rhine and Danube is graphically

Table 4 Overview of countries and environmental compartments in which concentrations of zinc are included in the database

Compartment	Country	Compartment	Country	Compartment	Country	Compartment	Country	Compartment	Country
Air	Austria	**Biota**	Austria	**Sea water**	Belgium	**Sediment**	Austria	**Surface water**	Austria
	Belgium		Belgium		Denmark		Belgium		Belgium
	Bulgaria		Denmark		France		Bosnia-Herzegovina		Bosnia-Herzegovina
	Czech Republic		Estonia		Germany		Bulgaria		Bulgaria
	Denmark		Finland		Netherlands		Canada		Croatia
	Estonia		France		Norway		Croatia		Czech Republic
	Finland		Germany		Portugal		Czech Republic		Denmark
	France		Greece		Russia		Denmark		Estonia
	Germany		Greenland		Slovenia		Estonia		Finland
	Greece		Iceland		Sweden		Finland		France
	Hungary		Ireland		United Kingdom		France		Germany
	Iceland		Italy	**Suspended matter**	Belgium		Germany		Greece
	Ireland		Latvia		Denmark		Greece		Greenland
	Italy		Netherlands		Estonia		Greenland		Hungary
	Latvia		Norway		Germany		Hungary		Iceland
	Lithuania		Poland		Italy		Iceland		Ireland
	Luxembourg		Portugal		Netherlands		Ireland		Italy
	Macedonia		Russia		United Kingdom		Italy		Lithuania
	Netherlands		Slovenia				Lithuania		Luxembourg
	Norway		Spain				Netherlands		Netherlands
	Poland		Sweden				Norway		Norway
	Portugal		Switzerland				Portugal		Portugal
	Romania		United Kingdom				Republic of Moldova		Republic of Moldova
	Slovakia	**Groundwater**	Hungary				Romania		Romania
	Slovenia		Portugal				Russia		Russia
	Spain		Slovenia				Slovakia		Slovakia
	Sweden	**Soil**	Bulgaria				Slovenia		Slovenia
	Switzerland		Hungary				Spain		Sweden
	United Kingdom		Netherlands				Sweden		Switzerland
			Portugal				Switzerland		Ukraine
							Ukraine		United Kingdom
							United Kingdom		

Figure 2 Overview of information on monitoring obtained for the catchment areas of the river Rhine and Danube



depicted in Figure 2, whereas in Figure 3 the catchment area of the river Danube solely is shown. Figure 2 shows that the information density is not only highest for the catchment area of the river Rhine. It also becomes evident for the figure that the information is more evenly distributed across the different countries that are part of the catchment area of the Rhine. Figure 3 on the other hand shows the variance in coverage that is typical for the catchment area of the Danube, especially when taking into account that the information obtained for all environmental compartments considered in this study is included in Figure 3. In this case, the information density in Austria strongly exceeds the information obtained from the other countries within the catchment area of the Danube. This example shows that more effort is needed for a risk manager of the river Danube catchment area to obtain the additional information needed to assess the state of the environment in this catchment area than is the case for a risk manager along the river Rhine catchment area.

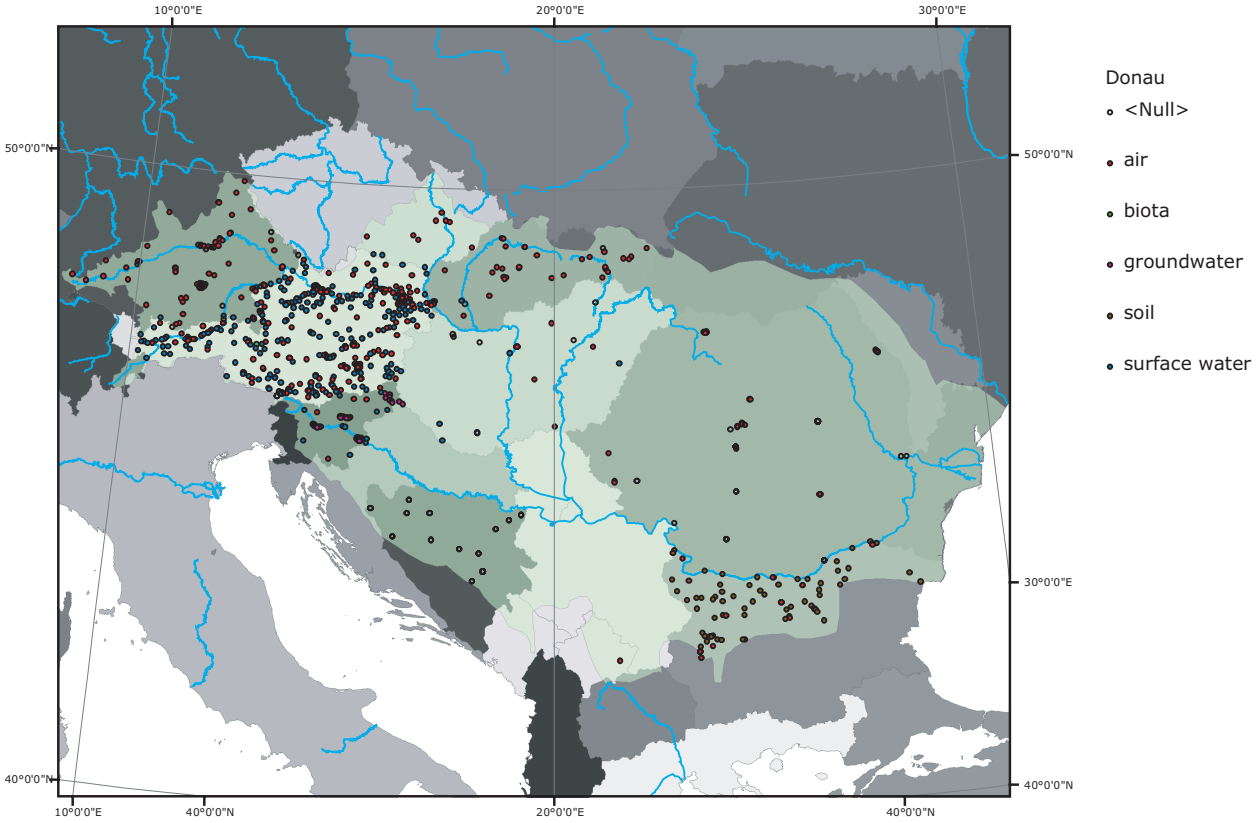
In addition to above example, it may be deduced from the overview of substances monitored in each country (Appendix V) that with a few exceptions the number of compounds for which information is available in any of the environmental compartments considered in this study is insufficient for assessing the environmental quality in the compartments considered.

4.4.4 More specific: Case study 3 — site manager

The previous sample was aimed at assessment of the environmental quality within catchment areas. This implies that information needs to be available from a regional to pan-national geographical scale. There is no need for monitoring data of specific substances at more or less the same sampling site. Instead, monitoring data of specific substances in different compartments may be compared at regional, national or even pan-national level. Also, to some extent there is usually no need for the data to be collected in a single time period. In contrast, a manager responsible for integrating monitoring information at a more local level will need data that are collected at more or less the same site and during a pre-defined time window.

In general, the contents of the database do not allow for such a detailed assessment. Firstly, this is due to

Figure 3 Overview of information on monitoring obtained for the catchment area of the river Danube



the fact that monitoring is usually carried out on a compartment-specific basis. Spatial integration of monitoring campaigns only rarely takes place at the moment. Secondly, monitoring campaigns are often restricted to sampling and measurements at regional levels and often different considerations apply when designing monitoring campaigns for the various environmental compartments within a specific region.

Consequently, at regional level there is lack of coherent information suited for assessment purposes. This is evident from the information provided in Appendix V and especially Figure 3. From the numbers given in Appendix V for each country on for instance the number of activities within each of the compartments compounds measured it may be concluded that in view of the patchy pattern of information across compartments, there currently is insufficient information available for assessing the environmental quality at the regional scale for most countries.

4.4.5 More specific: Case study 4 — tuning of reporting obligations

Appendix III provides an overview of the frameworks within which monitoring is currently carried out. As can be seen from this overview, there is a multitude of reporting obligations within a diverse set of frameworks. Although details on reporting obligations within each of the frameworks given in Appendix III were not collected, it can be envisaged that there is overlap of the reporting obligations. In Table 5 an overview is given of the frameworks within which monitoring is carried out for the countries that are part of the catchment areas of the rivers Rhine and Danube. Most noticeable of the examples given on these catchment areas is the observation that for the aquatic compartment (i.e. including sediment and sea water) there is hardly any overlap among countries within a catchment area regarding the frameworks within which specific chemicals are being monitored. Tuning of monitoring programs in this respect is to be recommended.

Table 5 Overview of the frameworks within which monitoring is carried out for the countries that are part of the catchment areas of the rivers Rhine and Danube

Watershed	Country	Matrix	Name framework	Number of activities
Danube	Austria	air	EuroAirNet (EEA ETC/ACC)	199
		biota	Persistent organic pollutants in Arctic char from a high mountain lake in the Alps	1
		surface water	Ordinance on Water Quality Monitoring	230
	Bulgaria	air	EuroAirNet (EEA ETC/ACC)	23
		soil	National Network for Environmental monitoring	66
	Czech Republic	air	EuroAirNet (EEA ETC/ACC)	8
	Germany	air	EuroAirNet (EEA ETC/ACC)	66
	Hungary	air	EuroAirNet (EEA ETC/ACC)	13
		surface water	Eurowaternet/EEA/Eionet — waterbase, based on data from the European Water Network (EWN)	4
	Macedonia	air	EuroAirNet (EEA ETC/ACC)	1
	Romania	air	EuroAirNet (EEA ETC/ACC)	24
	Slovakia	air	EuroAirNet (EEA ETC/ACC)	36
		surface water	Surface water quality monitoring	1
	Slovenia	air	EuroAirNet (EEA ETC/ACC)	5
		groundwater	Eurowaternet/EEA/Eionet — waterbase, based on data from the European Water Network (EWN)	40
		surface water	Eurowaternet/EEA/Eionet — waterbase, based on data from the European Water Network (EWN)	13
Rhine	Austria	air	EuroAirNet (EEA ETC/ACC)	7
		surface water	Ordinance on Water Quality Monitoring	12
	France	air	EuroAirNet (EEA ETC/ACC)	82
		surface water	Inventory of the Quality of Running Fresh Water	11
	Germany	air	EuroAirNet (EEA ETC/ACC)	260
		sediment	The occurrence of xenoestrogens in the Elbe river and the North Sea	1
		surface water	Deutsches Untersuchungsprogramm Rhein (DUR)	1
	Luxembourg	air	EuroAirNet (EEA ETC/ACC)	5
		surface water	Luxemburg Contaminant Monitoring Programme	2
	Netherlands	air	EuroAirNet (EEA ETC/ACC)	43
		biota	Contaminants in eel from Dutch Inland waters	1
		sea water	MWTL	1
			North Sea Task Force	1
		sediment	MWTL	1
			Survey of nine organotin compounds in the Netherlands using the zebra mussel	1
		soil	Landelijk Meetnet Bodem (LMB)	102
		soil/sediment	MWTL	3
		surface water	MWTL	4
		suspended matter	MWTL	4
	Switzerland	air	EuroAirNet (EEA ETC/ACC)	29

5 Description of the database

5.1 Database and data model

The database was constructed in MS Access. In order to use it, MS Access version 2000 or higher is needed. Appendix VI gives a graphical overview of the data model. The table definition describing all tables and fields in the database is provided in Appendix VII. The central piece of information in the monitoring database is a *monitoring activity*. A single activity is constructed of a substance reference; a reference to the measurement matrix; a monitoring location reference; and a reference to a single time frame.

Several types of meta information can be linked to a monitoring activity. In most cases, multiple instances of the same type of meta information may be linked to a single activity. The references that make up an activity and the main types of meta information are discussed in this chapter.

Substances
A single activity describes the monitoring of a single substance. The reference to the substance is made in the field *SubstanceID* of the table *tblActivities*. The table *tblSubstances* contains only one field in which the unique substance identifiers are stored. Multiple substance name synonyms may be related to each substance. The substance names are stored in the table *tblSubstanceNames*. The majority of the substances in the database are described by at least a CAS number, an EC number, a common name and a systematic name. Due to limitations in the resolution of underlying datasets, a substance identifier is in some cases used to refer to a group of substances (e.g. PAH). The number of activities in the database referring to such a substance group is estimated to be less than 1%.

Measurement matrix
Each activity in the database applies to a single measurement matrix. The matrices are defined in the table *tblMatrixLU*. The table contains the following matrices: air, biota, groundwater, sea water, sediment, soil, soil/sediment, surface water and suspended matter. Due to limitations in the resolution of an underlying dataset, the combined matrix soil/sediment was introduced. Only approximately one hundred activities refer to this combined matrix.

Monitoring locations
The field *LocationID* of the table *tblActivities* refers to a monitoring location defined in the table *tblLocations*. The fields *Latitude* and *Longitude* contain the exact geographic coordinates. A uniform geographic coordinate system is used in which the prime meridian is Greenwich and the coordinates are expressed in decimal degrees. The field *Altitude* contains the height in metres above sea level of the location, if available. The geographical information complies with the standards provided by the European Environment Information and Observation Network (Eionet).

The field *Locationtype* contains a classification of the monitoring location. Most locations refer to sampling stations (type 'sampling station'). A very limited amount of coordinates are of the type 'pseudo coordinate'. These coordinates represent a collection of monitoring locations in a certain area (e.g. a country or a district). For these coordinates, GIS locations are provided as well. In such a case, the GIS location represents the exact geographic centre of the area. When performing spatial analysis on the data in the database, these locations may be included or excluded on the basis of the classification in the field *Locationtype*. This depends upon the type of analysis being carried out.

The table *tblLocations* contains several fields supplying additional information on the monitoring locations, if available. The field *LocalCode* may contain a location code that is used to refer to the location in underlying datasets. The field *Location_Name* contains the name of the location as referred to in the original data source. The field *River_sea_name* contains names of water bodies, if applicable. The field *watershed_name* contains the name of the watershed to which the monitoring location belongs. The information on the watersheds was obtained by running a spatial analysis on the aquatic locations in the database.

Frameworks
Each activity in the database can be linked to one or more monitoring frameworks. The monitoring frameworks are defined in the table *tblFrameworks*. The table contains a unique identifier for each framework *(FramID)*; a reference to a member state; a contact reference and a description of the

framework. Frameworks are linked to activities in the table tblFramXAct. The names of the frameworks are contained in the table *tblFramNames*. By doing this, multiple synonyms referring to the same framework may be entered in the database. However, at the time of writing, no synonyms referring to the same framework were entered in the database. Therefore it might be more convenient to replace the table *tblFramNames* by a single name field in the table *tblFrameworks*.

Measurement methods
Measurement details are known for a limited number of activities in the database. These details are entered into the table *tblMethods*. The table may provide information on the sampling technique, the measurement technique, detection limits and accessibility of the data.

Reporting obligations
Information on reporting obligations is provided in the table *tblReportingobligations*. The table contains fields for the name of the reporting obligation, a link to the online EEA Reporting Obligations Database (ROD) and a description of the reporting obligation. In the table *tblReportXSubst* a link is made between the reporting obligations and the substances that they cover. The table *tblReportXAct* relates specific monitoring activities to one or more reporting obligations.

Species
Monitoring activities that are 'conducted' in the matrix biota may be linked to specific species. The table *tblSpecies* contains the unique species names. In the table *tblActXSpecies*, activities are related to the species. The table provides the field *SampleType* for details on the sample type that was used for specific activities.

Time frames
Details on the period and frequency of sampling are contained in the table *tblTimeframes*. The start and end date of the monitoring period are contained in the fields *tblStartdate* and *tblEnddate*. The frequency of sampling is stored in the fields *Frequency and Freq_unit*. For single measurements, or round of measurements the value of the field is – 1. The total number of samples taken is contained in the field *number_samples*.

5.2 User interface

The user interface (UI) was designed and programmed in MS Access VBA. In order to use the UI, MS Access version 2000 or higher is needed. The UI is contained in a separate MS Access file. Both the database file and the UI file should be placed in the same directory. After moving the files to a different directory, the links in the UI referring to the database file will be restored automatically at start-up.

The UI was designed to provide meta overviews of the data in the database and to perform queries for specific data. The results of the queries can be exported to a MS Excel spreadsheet. In order for this functionality to work, MS Excel 97 or higher should be installed on the user's computer. Additionally, the UI file contains some stored queries that can be used to produce some more complex cross-table overviews. Some basic knowledge of relational database design is required in order to run and use these queries. The main features of the UI are discussed in this section.

Providing meta-overviews

Running queries
The UI's query form is accessed from the main switchboard screen (see Figure 4).

Using this form, queries can be performed on several criteria. Criteria can be set by selecting them from the pull-down lists and pressing the 'Add' button. If no criteria are selected from a certain list, the query will not include that criterion, i.e. all available records will be returned. By pressing the 'Refresh' button at any time, the number of records that match the current criteria will be displayed in the 'Recordcount' box. This way, the user can check if there are any matching records before going to the results screen.

In order to proceed to the query results, the 'Go to results' button in the lower-right part of the screen is pressed (see Figure 5).

All matching monitoring activities are listed in this form. The activities in the list are aggregated by substance, framework, matrix and Member State. By pressing any of the four buttons at the bottom of the list, new dialogue forms will be opened displaying additional information on the selected activities. Details can be presented on time frames, reporting obligations, monitoring locations and any other available information on the selected activities.

All available information on the tests in the list can be exported to a new MS Excel workbook by pressing the button with the MS Excel logo (X) on the lower right hand side of the screen (see Figure 6).

Figure 4 Main query form

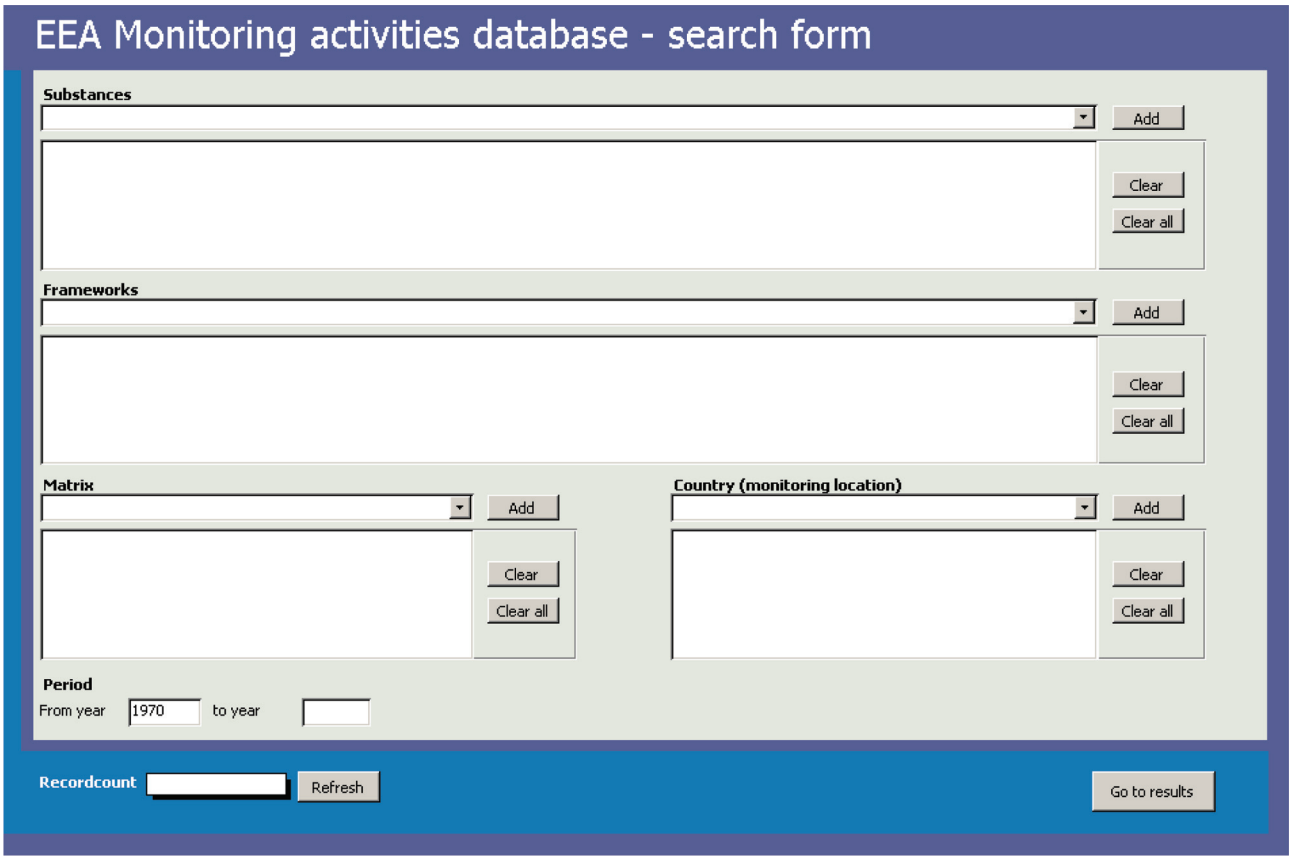


Figure 5 Search results form

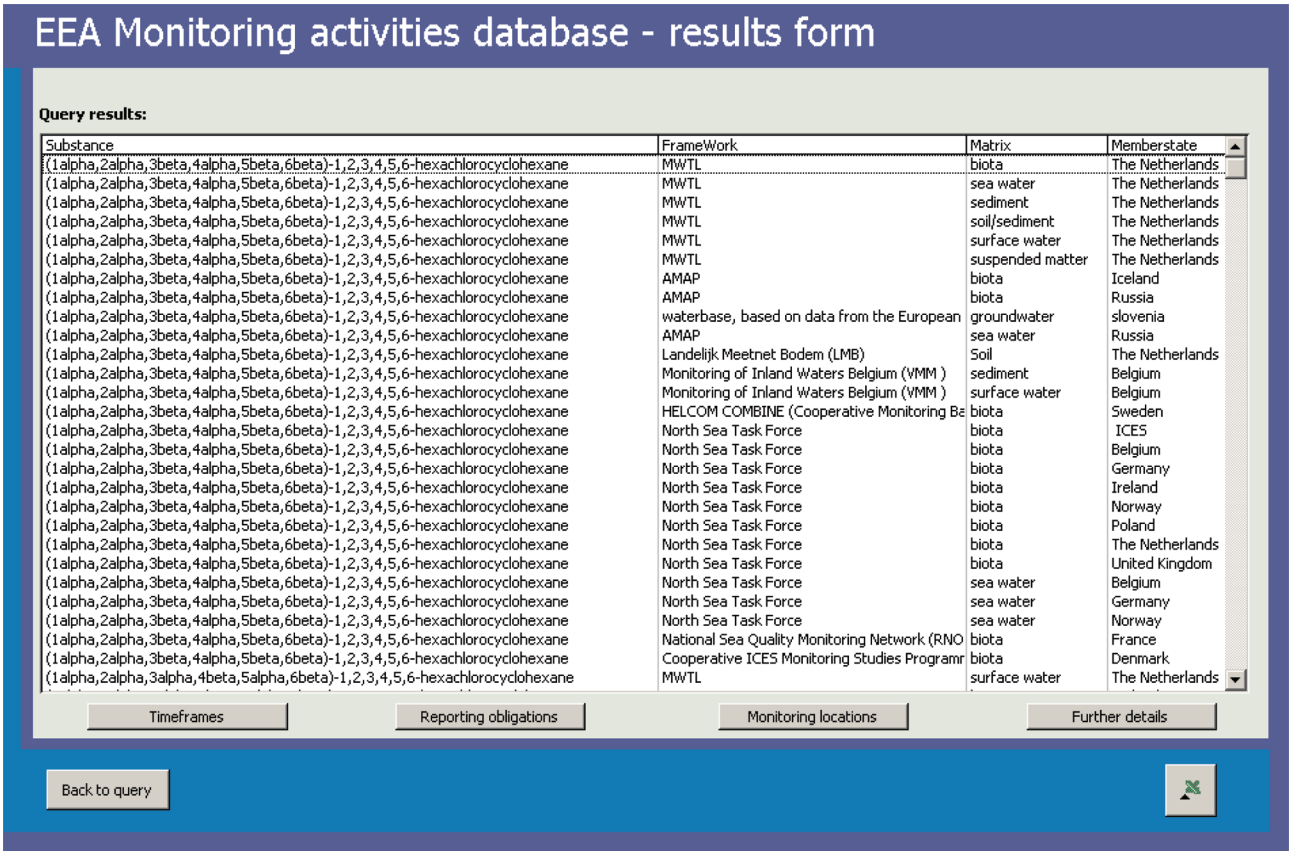
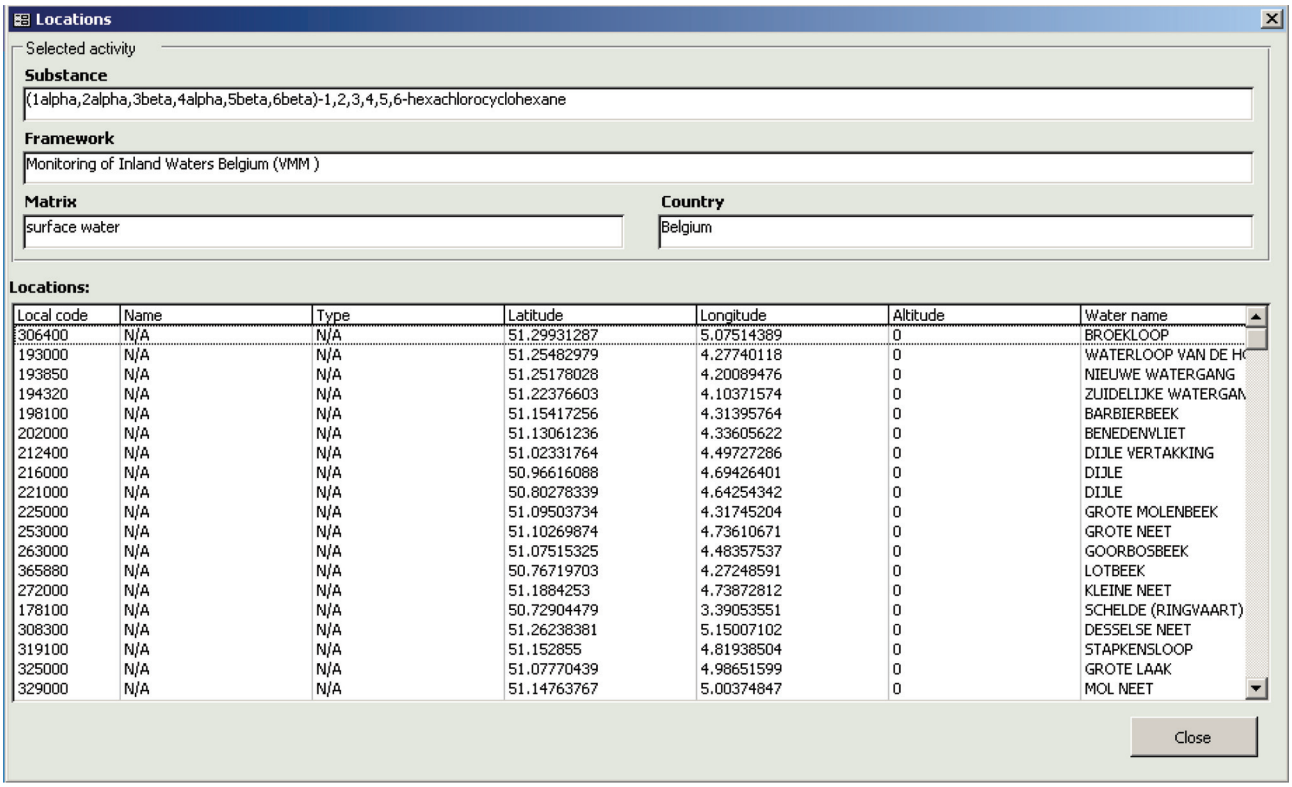


Figure 6 Details on monitoring locations



Local code	Name	Type	Latitude	Longitude	Altitude	Water name
306400	N/A	N/A	51.29931287	5.07514389	0	BROEKLOOP
193000	N/A	N/A	51.25482979	4.27740118	0	WATERLOOP VAN DE H
193850	N/A	N/A	51.25178028	4.20089476	0	NIEUWE WATERGANG
194320	N/A	N/A	51.22376603	4.10371574	0	ZUIDELIJKE WATERGAN
198100	N/A	N/A	51.15417256	4.31395764	0	BARBIERBEEK
202000	N/A	N/A	51.13061236	4.33605622	0	BENEDENVLIET
212400	N/A	N/A	51.02331764	4.49727286	0	DIJLE VERTAKKING
216000	N/A	N/A	50.96616088	4.69426401	0	DIJLE
221000	N/A	N/A	50.80278339	4.64254342	0	DIJLE
225000	N/A	N/A	51.09503734	4.31745204	0	GROTE MOLENBEEK
253000	N/A	N/A	51.10269874	4.73610671	0	GROTE NEET
263000	N/A	N/A	51.07515325	4.48357537	0	GOORBOSBEEK
365880	N/A	N/A	50.76719703	4.27248591	0	LOTBEEK
272000	N/A	N/A	51.1884253	4.73872812	0	KLEINE NEET
178100	N/A	N/A	50.72904479	3.39053551	0	SCHELDE (RINGVAART)
308300	N/A	N/A	51.26238381	5.15007102	0	DESSELSE NEET
319100	N/A	N/A	51.152855	4.81938504	0	STAPKENSLOOP
325000	N/A	N/A	51.07770439	4.98651599	0	GROTE LAAK
329000	N/A	N/A	51.14763767	5.00374847	0	MOL NEET

The database is available for download at the EEA website in the formats MS Access 2000 and MS Access XP together with a frontend viewer and a short instruction.

6 Discussion

6.1 General

When discussing the information gathered in the course of this research, there is a multitude of viewpoints for inspection of the data gathered. An important aspect is the viewpoint of potential users. Several general applications supporting risk assessment and risk management at various degrees of integration have been presented in Section 4.4. The structure of the database is designed to allow flexible searching for combinations of various parameters. In compliance with the fourth objective of this study (to provide an outlook of the possibilities of setting up a European monitoring system, possibly as part of a European chemicals information system), the use of the database within a European chemicals information system (Section 6.2) and the application of the information collected for optimising cross-boundary monitoring programmes (Section 6.3) will be discussed in more detail below. A discussion on the latter topic is included as optimised monitoring programmes are logical prerequisites for future use of the resulting monitoring data.

In general, a number of observations on the contents of the database may be made. With regard to coverage of monitoring activities currently carried out within the different countries, the information gathered in the database only partly covers the total amount of information potentially available. This is already evident from some of the responses obtained from various contact persons. In many countries there is no overview of the regular monitoring activities carried out at local and even regional level. In some cases, preparations are currently in progress for gathering the type of information requested in our study. This is especially true for countries that have recently become EU members. Most of these countries are currently gearing up to meet EU obligations, and as a consequence the required information is not yet available. This is reflected in the graphical representation given in Figure 1.

At a compartmental level, an imbalance exists between information from the various compartments. Information on substances in the air compartment is relatively well balanced across Europe. This is a consequence of existing reporting obligations. Sufficient data appear to be present for assessing regional air quality. Although some catchment areas have sufficient information to assess trends in water quality, information on monitoring in most other compartments is far patchier. Soil and sediment quality may at best be assessed at local level. In most cases comparable information across country borders is lacking, and clearly tuning of monitoring efforts among countries is currently not taking place. New EU initiatives towards a uniform soil policy as well as the EU Water Framework Directive will undoubtedly fill some of the gaps in this respect. Also, the contents of the database may serve this purpose.

With regard to types of substances monitored, a trend is visible in which monitoring in some countries is restricted to priority substances (especially 'traditional' hydrophobic POPs and metals). In other countries, attention is also being paid to emerging compounds like hydrophilic pesticides, detergents, and surface active compounds. Emerging compounds are mostly in focus in western European countries. Nevertheless, Table 3 for instance shows that when considering specific classes of compounds (with the exception of metals) there is a clear difference among countries at class level. (Note: the classes distinguished in Table 3 were relatively arbitrarily chosen, and do not include emerging substances). Moreover, the individual compounds making up the classes differ on a country basis. It is clear that this observation hinders for instance risk assessment, risk management and risk communication.

6.2 Outlook towards application within a chemicals information system

A European chemicals information system can support various legislative and regulatory processes. Although a general prototype of a European chemicals information system is still in the very early stages of development, the following types of information c.q. data sources are possibly integral parts of such a system, depending on the level of ambition:

- A database containing information on (basic) physico-chemical substance properties. This basic module should preferably include experimentally derived substance properties, but (QSAR)-derived values including estimates

of their uncertainties may for many purposes be equally suited.

- A module with Geographic Information, providing an overview of the characteristic properties of all environmental compartments within Europe at various levels of integration — from local to continental scale. (Note: strictly speaking, this module is not really necessary for a chemicals information system. However, the option to include chemicals information in spatial analysis would be a useful tool to support integrated assessments.).

- Regularly updated information on emissions (e.g. quantities and sources) at various geographical scales.

- A database containing usually laboratory generated toxicity data for biota residing in soil, water, ground water and air. Similar to the database on physico-chemical substance properties. This database may be supplemented with QSAR-generated estimates taking, amongst other factors, the toxic modes of action into account.

- A database containing data on bioassays with field samples in order to get insight in actually occurring adverse effects due to either specific chemicals or mixtures.

- A database on monitoring data of chemicals in the European Environment.

- A module relating monitoring efforts to the legislative frameworks.

- A module containing fate models in order to generate exposure levels at various scales of integration, and to supplement and verify the monitoring database.

- A risk module containing eco-toxicity models that quantitatively integrate exposure and adverse effects as expressed on the basis of the databases above. This will allow the calculation of the risks to ecosystems associated with the emission/presence of chemicals in the European environment.

- A module containing toxicity data for humans.

- A risk module containing models that quantitatively integrate exposure and adverse effects on humans as expressed on the basis of the databases above. This will allow the calculation of the risks to humans associated with the emission/presence of chemicals in the European environment.

In essence a European chemicals information system can serve many purposes, varying from overviewing compound specific properties to assessing regions adversely impacted by chemicals. Therefore, not all modules indicated here are necessarily part of a European chemicals information system. This will depend on the uses foreseen.

A database containing information on monitoring is one of the modules of a chemicals information system. The database structure and the information on monitoring activities collected within the framework of this study are the basis on which to develop a mature database which can be used as a versatile tool to address a vast array of questions. The database is flexible with regard to its input and output, can easily be accessed in a user-friendly manner. Furthermore, there are no technical restrictions on integrating or synchronising the database with other major European substance information systems, such as the databases held at the ECB.

Currently, however, there are still some drawbacks with regard to the integration of monitoring activities within the countries studied. These drawbacks hinder setting up a mature and integrated EU-wide monitoring database. The drawbacks include the following observations:

1. With the exception of the water and especially the air compartments, rather patchy data coverage of information is found. Not only is there large variations between the numbers of compounds and classes of substances sampled in specific regions, but the sampling frequency and the supporting information (e.g. soil composition, water flow, average temperature, etc.) is patchy and far from complete.
2. In many countries, local and regional soil and water management lies with regional (water) authorities. In the case of water, for instance, these bodies are responsible for flood control, water quality and treatment of urban wastewaters. Parts of the water boards operate a monitoring network. Concentrations of pollutants and classical water quality variables are only in exceptional cases measured in combination with the occurrence of aquatic species. Though very elaborately quantified, the measured concentrations of chemical substances do not reflect actual aquatic exposure to blends of chemical substances present in the

water column. As illustrated in Table 3, this is mainly due to the observation that monitoring is restricted to a limited subset of the chemical cocktail present. Hence, there is no link between chemicals included in sampling programmes and those actually having adverse ecological effects. As such, current monitoring programmes cannot yet be linked as a module within a future European chemicals information system to a database containing eco-toxicity data, or to a risk module containing eco-toxicity models that quantitatively integrate exposure and adverse effects.

3. Lack of realism in measured concentrations may in part be due to the fact that the sampling schemes are not adjusted to the emission and application regimen of specific substances. For pesticides, there may also be regional discrepancies between the types of substances measured and the types of pesticides applied. Furthermore, the lack of realism may be caused by analytical difficulties in quantifying low concentrations of substances. Hence, it would be of importance for a proper interpretation of the meaning of monitoring data that the underlying monitoring strategy is known. Often, this strategy is unknown or was even lacking in the first place. Monitoring information collected within this study shows that a large majority of even recent monitoring data relates to pesticides banned in various countries, whereas more effective and more toxic substitutes that are currently applied remain uncovered.
4. If a monitoring module is to be included in a European chemicals information system, then monitoring efforts need to be tuned at for instance the level of catchment areas or at pan-national (regional) level for air-borne chemicals, for instance. As shown in Figures 2 and 3 this is rarely the case, even for relatively small catchment areas. The database infrastructure and information gaps can be stimulants for improved monitoring and data collection.

6.3 Outlook towards optimised (cross-boundary) monitoring strategies

Being 'tailor-made', 'integrated' and 'cost-effective' may be seen as the key elements of optimised future monitoring strategies. In order to maximise the usefulness of the data gathered in terms of information content and optimal deployment of the available (financial) means, monitoring campaign must take careful consideration of a number of essential issues. The phrases 'tailor-made' 'integrated' and 'cost-effective' refer to the fact that whilst designing an optimal monitoring campaign, care should be taken that at least the following considerations are taken into account:

a) Which basic question is to be answered? Surprisingly, this straightforward consideration is often overlooked. For example, if the purpose of a monitoring campaign is to get an impression of the water quality within a specific catchment area, it is important to focus not just on the chemicals that are expected to drive water quality in terms of their occurrence and toxic potential. The issue of whether these chemicals are likely to be present at levels detectable with the current analytical methodologies should also be considered. On the other hand, if the purpose of a monitoring campaign is to show that environmental concentrations of specific chemicals have decreased (which could possibly be an objective within REACH), then a completely different approach needs be considered. For example, an approach which considers whether the toxic potential will play a limited role, if any.
b) The requirement set forward by the specific pre-set (legislative) frameworks within which the monitoring is to be carried out. These frameworks may include for instance EU directives or national legislation. Even though EU directives often prescribe a minimum set of chemicals to be monitored, the usefulness of monitoring the whole mixture of chemicals prescribed should be questioned given the likelihood of the presence of all compounds in specific environmental compart-ments. Preferably, requirements within different frameworks are combined in order to optimise the monitoring efficiency.
c) Tailor-made monitoring campaigns should be based on integrating knowledge on for instance (GIS-based) land and/or water use; specific characteristics of the environmental compartment monitored; emission characteristics; the toxic potential of chemicals; and the fate of the chemicals emitted. Fate modelling at different scales (e.g. local/regional/national/international) combined with GIS-based modelling may provide optimal tools for assessing the likelihood of detection of specific chemicals in one or more of the environmental compartments at specific sites. Supplemented with knowledge on the toxic potential of the chemicals identified, insight may be obtained into the potential adverse effects related to the mixture of chemicals present. The same insight can be used to select the substances to be monitored with highest priority; namely, those that seem to contribute most to the overall toxic

pressure. This approach also allows assessments of time trends with regard to the effectiveness of specific legislative measures in terms of both the levels of specific chemicals present and improvements in environmental quality.

d) Many pollutants are present at (extremely) low levels. Depending on their modes of action, a mixture of pollutants each presenting even low quantities (each of which in itself will not induce any significant adverse effects) may still lead to appreciable adverse effects due to the combined effect of the chemical constituting the mixture. Thereupon, the composition of the mixture of pollutants usually is time (season)-dependent. Biological monitoring aimed at assessing the potential toxicity may be a valuable tool to supplement any chemical monitoring programme.

In addition to these general considerations, specific aspects (e.g. proper statistical treatment of data to be collected, or combination of monitoring and reporting requirements set forward by different directives) apply. As especially air and water within a country are impacted by cross-boundary transport, future monitoring within the EU will encompass cross-boundary tuning. This will imply that aspects like analytical methodologies, QA/QC, selection of compounds and selection of sites require further tuning.

Knowledge on existing information on monitoring activities, as gathered in the database described here, may serve as a basis in designing tailor made, integrated and cost-effective sampling campaigns. From the examples given in Figures 2 and 3 it becomes clear that optimisation of monitoring strategies in terms of for instance compounds considered, location of sampling stations, analytical methods used, QA/QC-aspects and sampling frequency across borders requires far more attention. It is also recommended that future monitoring strategies are tuned across Europe. Again, this has the aim of improving the comparability of the data to be obtained.

7 Summarising conclusions

In line with the objectives of this study, a database on monitoring activities in the 31 EEA member countries and Switzerland is presented. As described in Chapter 5, the database contains a user-friendly interface, which allows searching for information in a flexible manner. In turn, this enables the user to approach the database from different viewpoints, ranging from risk assessors interested in monitoring data for one specific chemical to managers of catchment areas responsible for reporting on the quality of their catchment area.

As explained in Chapter 3, the contents of the database were obtained by means of a search for information on monitoring activities across the EEA member countries and Switzerland. With the exception of the air compartment, the information obtained on soil, water, sediment, biota and food is to be classified as patchy in nature (Chapter 4). It could not be verified that the collected data contained all the information available at country level. However, for some countries sufficient coverage was obtained allowing the assessment of environmental quality. For other countries, considerable amounts of information were still lacking (see Figure 1). The reasons for this lack of information are manifold. In some cases the data were simply not available, whereas in other cases insufficient cooperation was obtained. Also, in certain cases the information was available but further coordinated action at national level would be needed in order to gather the information. Thus, further efforts are required to complement the information in the database. Therefore, the current information of the database is recommended as a tool to promote further cooperation with respect to lacking data.

The database and its inherent possibilities of carrying out pre-defined searches have the potential of being a corner stone of a future multi-purpose European chemicals information system. As shown in Chapter 6, the information gathered in the database may serve many additional purposes. These range from a tool to assist in optimising existing and future monitoring strategies to identifying gaps in information on the presence of specific compounds in any of the environmental compartments included in this study. However, supporting information (e.g. methodology, QA/QC aspects and underlying legislative aspects) on the monitoring programmes is mostly lacking. Additional effort is needed to collect this supporting information. As such, the results of this report are to be considered as indicative of the potential importance of a database on environmental monitoring in light of a large number of potential applications. Further cooperation from within the EEA member countries is needed for the provision of monitoring information before a mature set of comparable information can be obtained. This mature set of comparable information would fulfil the requirements of a database on monitoring and become a cornerstone of a European information system on chemicals. The current version of the easily accessible Access database might be an important tool to promote data exchange. Moreover, it would clearly further communicate that the information exchange is needed.

8 Recommendations

Some recommendations are given for optimising the information content of the database. With regard to potential future activities, the following initiatives regarding the information needs on the occurrence, fate and effects of chemicals in the environment are prescribed:

1. Table 1 shows that full coverage of all 32 countries is not yet achieved. Therefore, further efforts are needed to collect the missing information. In general, the approaches used in this study are suited for the purpose of collecting additional information. On the other hand, it should be noted that cooperation was hampered by the large level of detail that was required from respondents. This was due in large part to the main objectives of this study and the applications of the information collected. To optimise cooperation, it is recommended that a tiered approach for further information collection is used. This would include a first step that is restricted to the core information needed for many applications of the information collected in the database. A tiered approach is also recommended because there is a need for minimum reporting and for some applications of monitoring information. Not all information given here is required. Instead, there is a need for aggregated information. This may for instance be the case for risk assessment of individual substances, as details on the exact monitoring locations, analytical methods applied and data processing are less relevant for this application. A tiered approach is recommended that is composed of two phases. The first tier should be restricted to include three essential pieces of information:
   a. general characteristics of monitoring stations;
   b. chemicals sampled in the compartments water, soil, air, sediment and biota;
   c. names and/or addresses (including information like for instance web-sites) of contact persons.
2. One of the aspects where low coverage was obtained was quality control/quality assurance. This is in part due to the observation that upon increasing levels of aggregation, the link between the QA/QC-aspects and the analytical results of the study is lost. This is especially the case for countries in which monitoring is organised in such a way that the institutes responsible for the execution of the sampling campaigns at a regional level, report their findings to government officials. In turn, these government officials could integrate the outcome of the regional monitoring networks into a national overview that is subsequently used for meeting EU-wide reporting obligations. The information stored in the database may serve as a basis for increasing awareness of the need to include information on the underlying QA/QC-aspects into the aggregated reports.
3. Another aspect of importance is the observation that QA/QC is usually restricted to the analytical part of the monitoring. Quality aspects of the sampling are often overlooked in this respect. More attention on this matter in future information collection is recommended. Again, the information in the database may serve to increase the awareness.
4. In view of the expansion of EU legislation towards areas that are not covered in this study, matching the contents of the information search and the database to future uses within EU environmental legislation and environmental management is recommended. Furthermore, information should be included on emerging monitoring issues, e.g. sampling of indoor air, dust, hazardous waste, recycling materials, as well as information on environmental epidemiology (impacts/effects) as new field in the database. Also bioassays and biological population changes and trends may be envisaged as potential fields in view of new legislation, such as the Water Framework Directive. Databases on these topics are lacking at the moment, and in some cases even regular monitoring activities are not taking place.
5. Currently, no provisions are made with regard to the continuity of the database. Monitoring is an ongoing process and new information is collected continuously. This implies that there is a continuous need to update the information contained within the database. A formal platform should be established in order to enable periodic transfer of information according to a prescribed format. Also, periodic assessments of the data to feedback this information is needed to help capacity building with respect to delivery of information. The key quality control aspect of data imported into the database in terms of comparability, presence of additional

information on the sampling campaigns should also be kept in mind. It is essential that, apart from facilitating easy transfer of information (i.e. with regard to down- and especially uploading), the information that is uploaded is actively verified.

6. With regard to establishing a platform for exchange of information, attention should be paid to new EU Member States who are starting their investigations on the quality of their environment and are looking for harmonisation of methods used in their own countries. A platform that assists in the exchange of information on chemical usage and on the optimisation of monitoring tools and strategies will help shape the monitoring programmes in the new EU Member States.

References

Counil, E., M. Herrschen, M. Klein, W. Klein, P. Lepper, J. Tarazona, Ph. Verger, A. Wenzel. *Chemicals in soil, food, and consumer products. With emphasis on human exposure assessment. Report — Part II*. Fraunhofer Institute for Environmental Chemistry and Ecotoxicology, D-57392 Schmallenberg (Germany), EEA working document, 2001.

EEA — European Environment Agency. Restricted call for tender EEA/EAS/03/005: Compilation of an inventory on monitoring activities on chemicals. Copenhagen (Denmark), 2003.

Nixon, S.C., R.E. Mitchell, I.T. Johnson, G. F. Moran, D. Forrow. *Hazardous chemicals in Europe's waters. What we do. What we know. What we need to be concerned about. What we need to do*. Water Research Centre and WRC-NSF (United Kingdom), EEA working document, 2000.

RIVM. Work plan study contract 3212/ B2003EEA51689 'Compilation of an inventory on monitoring activities on chemicals'. Bilthoven (The Netherlands), 2004.

Topic report No 2/1996. *Surface water quality monitoring*, EEA, 1996.

Topic report No 16/1996. *International Water Databases*, EEA, 1996.

Appendix I — Questionnaire

Bilthoven, 19/11/2004

Dear Sir/Madam,

Throughout the EU, various monitoring programmes are conducted in different legislative and regulatory frameworks. These programmes show a great variation in substances considered, in general methodology and in the extent of the programmes. Previous surveys regarding these monitoring programmes have usually been limited to particular media (e.g. the COMMPS database prepared for the water framework directive) or countries. In order to maximise the use of available monitoring data in Europe there is a need for a comprehensive survey to make it easier to find out what substances are being monitored and whether the results are accessible.

The commission white paper on a 'strategy for a future chemicals policy' identified the difficulty to gain access to reliable exposure data as one of the major problems in the risk assessment process. The commission therefore proposed, 'An information system should be established on environmental concentrations and releases. Monitoring data ascertained by the member States or by industry should be made available in a easily accessible form.' To support this strategy the European Environment Agency (EEA) has given a high priority to the development of a monitoring framework to provide data to build the basis for better assessments that also allow following the effectiveness of policies and measures. An overview of all relevant monitoring activities within the EU on chemicals and their effects shall serve as a first step in the identification of elements of a future integrated framework.

The final form of this overview shall be an extensive database, which will contain all useful details on the monitoring programmes in a harmonised pre-scribed format. Such a database will greatly facilitate member states awareness of sources of exposure data, monitoring methodologies, substances monitored, etc.

The EEA has asked RIVM for assistance in setting up the database on EU-monitoring activities and by means of this letter, we want to ask for your assistance in the compilation of the database on monitoring programmes in the EU. Please note that it is not the intention of the project to collect individual monitoring data. Instead, the focus is on collecting information on monitoring programmes of chemical substances in the environmental compartments air, water, sediment, soil, and biota. We are interested in obtaining overviews on past, present and planned monitoring activities at the national and regional level, and (if available) even activities at pan-national level. In case of water this might for instance include information for specific catchment areas within geographic regions. Overviews of past monitoring activities are restricted to activities that are currently still relevant for the purposes indicated above. The attached questionnaire provides the details of the relevant information.

We would be pleased if you could either provide us with this information, or if you could provide us the names and addresses of managers responsible for monitoring chemical substances in your country. A more detailed specification of the type of data that we are looking for is provided in the annex to this letter. It would be appreciated if you could return the completed Request for information, preferably accompanied with an Excel or Access file. The resulting database will be available to member states. We like to note that we are quite flexible in dealing with the formats in which the data are stored. There is also the possibility of uploading the information to the RIVM FTP server.

We look forward to your response. Please contact me in case you need any additional information on the database. For further general information on a European monitoring framework, please contact the project manager at EEA, Dr G. Schœning. The email address of Dr Schœning is: Gabi.Schoening@eea.eu.int

Yours truly,

Dr Willie Peijnenburg, Project manager. RIVM — Laboratory for Ecological Risk assessment, PO Box 1, 3720 BA Bilthoven, The Netherlands. T: +31-30-2743129, F: +31-30-2744413, E: wjgm.peijnenburg@rivm.nl

Request for information

1. Framework(s)/programme(s)
What is (are) the name(s) of the framework(s) ([3]) for the monitoring activities. Please mention practical as well as legislative and regulatory frameworks. If possible, mention the aims and objectives ([4]) of the framework(s) and include a general description of the framework(s).

2. General information
– Which compartments (e.g. water, soil, sediments, air, biota) are covered by these activities?
– Give a description of each compartment (e.g. lake, river, which catchment area)
– Which institutes are involved and what are their roles? If possible, include contact information and qualifications. Please mention at least the leading institute(s).

3. Locations
Indicate name and coordinates of the monitoring stations (preferably decimal geographic coordinates — WGS84/ETRS89).

4. Substances
Please indicate the substances that are covered by the activities for each location. Indicate behind each substance the frequency of measurements and the period during which the measurements were conducted. If measurements were conducted irregularly, or over different periods, mention this on the list.
Feel free to include any additional information.

5. Measurement
From the enclosed list of measuring methods, please indicate the measuring methods used for this framework. Indicate behind each method to which activity it applies. Include any details that are relevant to the methods. If possible, give an indication of detection limits of the methods. In case of biota mention the name of the species and the criteria for the selection of the species/organism.

6. Data processing and availability
Indicate how the data are collected (e.g. automatic sampling, manual measurements). Indicate how the result data are stored (e.g. reports or a database). Please indicate as well the possibilities of accessing the data (available via website, on request, or are the data confidential). If available, include the contact information for the data manager(s).

Is there regular reporting to national authorities, EU or other international organisations? If yes, mention the organisations and the frequency of reporting. In case of reporting obligations to EU organisations, is there any redundancy in the data that you provide?

7. Quality assurance
Which quality assurance measures apply to the above mentioned activities (e.g. GLP accreditation of the analytical laboratory).

8. Additional information
Please mention any additional information that is relevant for these monitoring activities. For instance: is it thought that the described monitoring activities are exhaustive for this purpose, or are the activities limited by the available time and/or financial resources? How flexible are the programmes to change the range of parameters, for instance to include emerging substances of concern?

([3]) A framework can be any kind of coordinating effort involving at least the collection and processing of monitoring data. In many cases a single monitoring activity is linked to multiple frameworks. Include at least the framework directly responsible for carrying out the activities. If possible mention links to other frameworks as part of a broader monitoring program.
([4]) This is especially important if the purpose of the monitoring activities is very specific. For instance the monitoring of a single substance in a polluted area.

Example of the type of information needed

Casnumber	Location_name	localcode	Latitude	Longitude	altitude	MatrixID	Country	startdate	enddate	no_ samples	frequency
14798039	A6 — VIANA DO ALENTEJO — ALVITO	488/13	38 259	– 7 995	237.63	groundwater	Portugal	01-07-2000	01-05-2003	7	2.5
14798039	A9 — GABROS DE BEJA	509/17	38 079	– 8 067	140	groundwater	Portugal	01-08-2000	01-03-2003	7	2.7
118741	M5 — QUERENÇA — SILVES	595/137	37 179	– 8 424	78.8	groundwater	Portugal	01-09-2000	01-11-2002	11	5.1
14798039	A0 — MACIÇO ANTIGO INDIFERENCIADO	314/24	39 582	– 7 644		groundwater	Portugal	01-07-2000	01-05-2003	7	2.5
14798039	A10 — MOURA — FICALHO	501/63	38 138	– 7 450	186.3	groundwater	Portugal	01-07-2000	01-05-2003	7	2.5
14798039	A11 — ELVAS — CAMPO MAIOR	400/7	38 955	– 7 069	200	groundwater	Portugal	01-10-2000	01-04-2003	6	2.4
14798039	A2 — ESCUSA	335/10	39 410	– 7 440	513.48	groundwater	Portugal	01-04-1997	01-05-2003	23	3.8
14798039	AÇ. BESÁGUEDA	13O/02	40 110	– 7 120		surface water	Portugal	01-02-2001	01-11-2003	35	12.9
14798039	AÇ. BUFO	25P/01	38 130	– 7 000	200	surface water	Portugal	01-01-1997	01-09-2003	82	12.5
14798039	AÇ. COIMBRA	12G/09	40 230	– 8 450		surface water	Portugal	01-02-2001	01-12-2002	21	11.6
14798039	AÇ. DO NEGRO	04S/01	41 660	– 6 420	700	surface water	Portugal	01-03-1996	01-10-1999	19	5.4
14798039	AÇ. MAEIRA	09K/01	40 780	– 7 810		surface water	Portugal	01-01-2001	01-12-2002	24	12.7
14798039	AÇ. PONTE DA PEDRA	17E/03	39 350	– 8 740	100	surface water	Portugal	01-01-1999	01-09-2000	21	12.8
14798039	AÇ. RAIVA	12H/05	40 308	– 8 248	100	surface water	Portugal	01-10-1994	01-12-2002	92	11.4
122349	ALB. BELICHE CAPT	30L/06	37 283	– 7 509		surface water	Portugal	01-06-1999	01-10-2001	7	3.0
118741	ALB. BELICHE CAPT	30L/06	37 283	– 7 509		surface water	Portugal	01-06-1999	01-06-2001	6	3.0
122349	ALB. BRAVURA	30E/03F	37 197	– 8 699		surface water	Portugal	01-06-1999	01-10-2001	6	2.6
122349	ALB. FUNCHO	30G/10M	37 273	– 8 373		surface water	Portugal	01-06-1999	01-10-2001	6	2.6
122349	ÓMNIAS	18E/04	39 230	– 8 680	70	surface water	Portugal	01-10-1999	01-09-2001	19	10.1
7439976	Aber Benoît	17035105	48 570	– 4 600	0	biota	France	03-03-1980	05-11-2001	86	4.0
7439976	Adour	35079101	43 520	– 1 500	0	biota	France	18-02-1980	29-11-1999	81	4.1
7440508	Veulettes	4009105	49 850	0 600	0	biota	France	07-02-1989	23-05-1994	21	4.0
7439976	Binic	13028101	48 600	– 2 810	0	biota	France	28-03-1979	24-05-1982	12	3.8
7440666	Station name: 84S, Trossavika		63 357	9 954	0	Sediment	Norway	19-10-1987	30-08-1992	7	1.4
7440508	Station name: 84S, Trossavika		63 357	9 954	0	Sediment	Norway	19-10-1987	30-08-1992	7	1.4
7439976	Station name: 30S, Steilene (Oslo city area)		59 818	10 558	0	sediment	Norway	29-10-1986	07-11-1990	7	1.7
7440473	Station name: TERHDE2		52 052	4 156	0	sea water	The Netherlands	07-02-1985	19-02-1988	23	7.6
7440473	Station name: VLISSGBISSVH		51 420	3 554	0	sea water	The Netherlands	08-01-1985	27-11-1995	65	6.0

List of methods

Number	Technique
1	Aspiration
2	atomic absorption spectrometry
3	beta-absorption
4	capillary electrophoresis
5	chemiluminescence
6	chromatography
7	colorimetric with p-rozaline
8	comptage
9	conductimetry
10	conductometry
11	continous flow analyses (CFA)
12	coulometry
13	DOAS
14	flame ionization
15	flame photometry
16	fluorescence
17	gas chromatography + flame ionisation + ECD
18	Giess-Saltzmann reaction
19	Gravimetric
20	gravimetry
21	inductive coupled plasma atomic emission spectrom. (ICP-AES)
22	inductive coupled plasma mass spectrometry (ICP-MS)
23	infrared absorption
24	ion chromatography
25	isotope dilution
26	laser scattering spectrometry
27	NEDA Griess-Ylosway
28	nephelometry
29	oscillating microbalance
30	photometry
31	potentiometry
32	reflectometry
33	spectrophotometry
34	titration
35	ultraviolet absorption
36	x-ray emission
37	x-ray fluorescence

Appendix II — Overview of the status of monitoring activities identified on behalf of EEA at the start of the project

Note: In case of the indication 'unknown', then the information obtained indicates that the programme is no longer operational.

Programme	Description	Substances under consideration	Programme still operational?	Applied in Member State(s)	Reference
International cooperative programme (ICP) — integrated monitoring	The programme is a homogeneous environmental monitoring approach consisting of several sub-parts. Typical air pollutants including heavy metals are balanced by measuring the input and output for previously defined areas (such as water catchment areas). In addition to the transport and fate in the environment, an effects assessment is performed for the chemical substances. To a high extent, the project fulfils the requirements for an ecological monitoring; however, it is limited to entry via air. Within the EU, most Member States frequently submit data. Measurements of deposition (precipitation, heavy metals in moss), soil, leachate and groundwater are frequently measured.	Cd, Cu, Pb, Zn, Ni, As, Cr, Hg, Fe	Yes	A, DK, FIN, D, I, P, E, S, NL, UK	2004 substantive report on review and assess-ment of present air pollution effects and their recorded trends. technical report prepared by the Bureau of the Working Group on Effects, in collaboration with the International Cooperative Programmes (ICPs) and the Task Force on the Health Aspects of Air Pollution and with the assistance of Mr. G. Fenech (Canada). * ICP on assessment and monitoring of air pollution effects on forests (ICP Forests) * ICP on assessment and monitoring of acidification of rivers and lakes (ICP Waters) * ICP on effects of air pollution on materials, including historic and cultural monuments (ICP Materials) * ICP on effects of air pollution on natural vegetation and crops (ICP Vegetation) * ICP on integrated monitoring of air pollution effects on ecosystems (ICP IM) * ICP on modelling and mapping of critical levels and loads and air pollution effects, risks and trends (ICP M&M), including the Coordi-nation Centre for Effects (CCE) Task Force on Health Aspects of Air Pollution (TF Health).
International Cooperative Programme (ICP) — forests	The programme has been established in the course of discussion on forest damages. It comprises long-term field observations aiming at the description of impacts by air pollution on forests. In some countries, the programme has been divided into a level I and level II programme. On a European basis, the level I programme has been established in the mid 1980s. It comprises 16 x 16 km and 4 x 4 km (for complete monitoring every three years) grid cells. Climatic parameters, the ecological structure, the crown status and regional pollutions are monitored and reported to the EU and UN/ECE.	Heavy metals, air pollutants	Yes	EU-wide monitoring programme	2004 substantive report on review and assessment of present air pollution effects and their recorded trends. technical report prepared by the Bureau of the Working Group on Effects, in collaboration with the International Cooperative Programmes (ICPs) and the Task Force on the Health Aspects of Air Pollution and with the assistance of Mr. G. Fenech (Canada). * ICP on assessment and monitoring of air pollution effects on forests (ICP Forests) * ICP on assessment and monitoring of acidification of rivers and lakes (ICP Waters) * ICP on effects of air pollution on materials, including historic and cultural monuments (ICP Materials) * ICP on effects of air pollution on natural vegetation and crops (ICP Vegetation) * ICP on integrated monitoring of air pollution effects on ecosystems (ICP IM) * ICP on modelling and mapping of critical levels and loads and air pollution effects, risks and trends (ICP M&M), including the Coordination Centre for Effects (CCE) Task Force on Health Aspects of Air Pollution (TF Health).

Programme	Description	Substances under consideration	Programme still operational?	Applied in Member State(s)	Reference
European monitoring and evaluation programme (EMEP) — monitoring of atmospheric heavy metal deposition in Europe using bryophytes and humus samples as indicators monitored by moss analyses	The moss monitoring programme aims at measuring the spatial input by the elements and reporting time trends in the pollution. In five years, intervals moss samples are analysed for the elements (25 x 25 km grid cells) and results are mapped. The European programme is under the auspices of the Nordic Council of Ministers. The long-term programme (in Scandinavia since the 1970s) enables unequivocal, area-wide and comparable results for the European Union.	Arsenic, cadmium, chromium, copper, iron, nickel, lead, titanium and zinc	Yes	Austria, Bjello Russia, Czech Republic, Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Norway, Poland, Portugal, Romania, Russia, Slovakia, Spain, Sweden, Suisse, The Netherlands, United Kingdom (1998)	* EMEP Status Report 2, 2004 — Heavy metals:transboundary pollution of the environment
Mapping critical loads: mapping of critical loads (deposition rates) and critical levels (immission con-centrations) as basis for decisions in European clean air control	The critical load/critical level concept uses scientific knowledge from the forest damage and ecosystem research in order to compare the ecosystem's resilience (given as loading capacity) and the current loading. Trigger values for the loading capacity are given for both the direct impact (concentrations, critical level) and the indirect impact (long-term deposition, critical load). The activities results are mapped and used as a basis for further decisions in the European clean air control.	Heavy metals	Yes	EU-wide	2004 substantive report on review and assessment of present air pollution effects and their recorded trends. technical report prepared by the Bureau of the Working Group on Effects, in collaboration with the International Cooperative Programmes (ICPs) and the Task Force on the Health Aspects of Air Pollution and with the assistance of Mr. G. Fenech (Canada). * ICP on assessment and monitoring of air pollution effects on forests (ICP Forests) * ICP on assessment and monitoring of acidi-fication of rivers and lakes (ICP Waters) * ICP on effects of air pollution on materials, historic and cultural monuments (ICP Materials) * ICP on effects of air pollution on natural vegetation and crops (ICP Vegetation) * ICP on integrated monitoring of air pollution effects on ecosystems (ICP IM) * ICP on modelling and mapping of critical levels and loads and air pollution effects, risks and trends (ICP M&M), including the Coordination Centre for Effects (CCE) * Task Force on Health Aspects of Air Pollution (TF Health).
European monitoring and evaluation programme (EMEP): monitoring ambient air pollution	A network has been established surveying typical air pollutants. The information exchange between the EU Member States has been established by Council Decision 97/101/EEC of 27 January 1997 establishing a reciprocal exchange of information and data from networks and individual stations measuring ambient air pollution within the Member States.	Gaseous compounds which are analysed are: CH_4, CO_2, NO_X, N_2O, O_3, SO_2, Hg, photo-oxidants as well as selected organic pollutants Particle bound compounds are: some metals, heavy metals and selected persistent organic pollutants (negotiation phase) Wet deposition: some metals, heavy metals (routinely: cadmium, copper, iron, manganese, lead and zinc; additional metals to be reported for Osparcom and Helcom are: arsenic, aluminium, nickel and mercury), persistent organic pollutants (negotiation phase)	Yes	EU-wide	* EMEP Status Report 1, 2004 — Trans-boundary Acidification, Eutrophication and Ground Level Ozone in Europe. * EMEP Status Report 3, 2004 — Persistent Organic Pollutants in the Environment * EMEP Status Report 4, 2004 — Transboundary Particulate Matter in Europe

Programme	Description	Substances under consideration	Programme still operational?	Applied in Member State(s)	Reference
Network of permanent observation plots for intensive, continuous surveillance	Relevant regulations: Council Regulation (EEC) No 3528/86 on the protection of the Community's forests against atmospheric pollution Council Regulation (EEC) No 2157/92 of 23 July 1992 amending Council Regulation (EEC) No 3528/86 on the protection of the Community's forests against atmospheric pollution Commission Regulation (EC) No 1091/94 of 29 April 1994 laying down certain detailed rules for the implementation of Council Regulation (EEC) No 3528/86 on the protection of the Community's forests against atmospheric pollution	Al, Cd, Cu, Pb, Zn, Ni, Cr, Hg, Fe, VOCs	Yes	EU-wide	EC — UN/ECE, 2000; De Vries, W. *Intensive Monitoring of Forest Ecosystems in Europe. Strategy for a scientific evaluation of the data.* EC, UN/ECE 2000, Brussels, Geneva, 45 pp.
State of the environment reporting to the EEA	Member States are obliged to report their state of the environment to the European Environment Agency. On the EEA homepage, the national information is presented under Eionet.		Yes	EU-wide	
Environmental soil survey (ESS)		Heavy metals (Pb, Cd, Hg), special programmes include organic pollutants (e.g. atrazine, lindane, DDT, DDE, HCB, PCBs and BaP)	Yes	Austria	Soil Protection in Austria. Winfried E.H. Blum, Martin H. Gerzabek1 und Sigrid Schwarz. J Soils & Sediments 3 (4) 245–246 (2003)
Soil monitoring		Basic programme: heavy metalsAdditional programme: volatile chlorinated organic compounds (upper soil layer), non-volatile chlorinated organic compounds, polycyclic aromatic compounds, dioxins/ furans (all: upper soil layer only)	Yes	Austria	Soil Protection in Austria. Winfried E.H. Blum, Martin H. Gerzabek1 und Sigrid Schwarz. J Soils & Sediments 3 (4) 245–246 (2003)
Forest soil monitoring		Pb, Cd	Yes	Austria	Soil Protection in Austria. Winfried E.H. Blum1*, Martin H. Gerzabek1 und Sigrid Schwarz2 J Soils & Sediments 3 (4) 245–246 (2003)
Initiative: persistent organic pollutants in background forest areas of Austria		Metals: lead, cadmium Organic pollutants: PCDD/F, PCB (S of PCB 28, 52, 101, 138, 153, 180), HCH (S a, b, g, d, e), lindane, HCB, PCP, DDX (DDT, DDD, DDE), PAH	Unknown	Austria	No information obtained
Initiative: environmental investigations of polluted areas		Heavy metals, polycyclic aromatic hadrocarbons, polychlorinated biphenyls, polychlorinated dibenzodioxins and furans, hexachlorocyclo-hexanes and chloro-benzenes	Unknown	Austria	No information obtained
Initiative: local soil investigations		Copper, antimony, arsenic and mercury as well as polychlorinated dibenzodioxins and furans	Unknown	Austria	No information obtained
Soil sampling and analysis of landfills, industrial sites		Metals, chlorinated aliphates, BTEX and PAH	Unknown	Denmark	No information obtained
Various surveillances of ecosystems		Cd, Cr, Co, Cu, Ni, Pb, Zn, Al, organochlorinated pesticides, trace compounds, PAHs	Unknown	France	No information obtained
Self-surveillances and official control of at risk sites under operation		Case-by-case	Unknown	France	No information obtained

Programme	Description	Substances under consideration	Programme still operational?	Applied in Member State(s)	Reference
Inventory of pollutes sites for their surveillance or remediation		Case-by-case	Yes	France	Personal communication Dr Viso
Surveillance of agricultural, forest and coastal soil quality (various initiatives)		Cd, Cr, Co, Cu, Ni, Pb, and Zn (agricultural soil and forest) Hg, Cd, Pb, Zn and Cu; PAHs, DDT, DDD, DDE, PCBs and HCHs (coastal soils)	Yes	France	Personal communication Dr Viso
Self-surveillance and official control of industrial and agricultural activities		Limit values fixed and surveyed: cd, cr, cu, hg, ni, pb and zn. Organic and inorganic substances to be controlled according to ippc directive: 1,2-dibromo-3-chloropropane, 1,2-dibromoethane (ethylene dibromide), 1,2-dichoroethane (ethylene chloride), 1,3-dichloro-2-propanol, 1-3 butadiene, 1-4 dioxane, 2-naphtylamine, 2-nitropropane, 3,3'-dichlorobenzidine, acetaldehyde, acrylonitril, aluminium oxide, ammonia, aniline, antimony and its compounds, arsenic and its compounds, benzene, benzidine, benzo(a)pyren, beryllium, bischloromethyle oxide, cadmium and its compounds, carbon sulphite, carbon tetrachloride (tetrachloreomethane), chloride, chloroform, chloromethane, chromium and its compounds, cobalt and its compounds, copper and its compounds, cresol, cyanhydric acid, dichloromethane, dimethyl sulphate, epichlorhydrine (1-chloro-2,3-epoxypropane), ethylene oxide (oxiranne), ethylenimine (aziridine), fluorhydric acid, fluorine and its compounds, formaldehyde, hexachloro-benzene, hydrazine, manganese and its compounds, mercury and its compounds, hydrogen sulphite, lead and its compounds, methanol, moca, nickel and its compounds, phenol, propylene oxide (1-2 epoxypropane), tetrachloroethylene, tin, trichloroethylene, vinyle chloride, zinc and its compounds	Yes	EU-wide, France as an example	
National inventory of polluted or at risk sites for their surveillance and/or remediation (BASOL)		Metals, halogen and non-halogen solvents, pesticides and other hazardous substances	Yes	France	http://www.environnement.gouv.fr

Programme	Description	Substances under consideration	Programme still operational?	Applied in Member State(s)	Reference
Network of permanent observation plots for intensive, continuous surveillance (specifications only; for standard surveillance see international level)		Triazines, chlorinated pesticides	Yes	Germany	EC — UN/ECE, 2000; De Vries, W. *Intensive Monitoring of Forest Ecosystems in Europe. Strategy for a scientific evaluation of the data*. EC, UN/ECE 2000, Brussels, Geneva, 45 pp.
Federal soil network		Copper, cadmium, mercury, nickel, lead, zinc, dioxins, PCB, HCB, quintocen, octachlorostyrene, heptachlor, cis-chlordane, trans-chlordane, DDT.	Yes	Germany	
Ad hoc initiative 'reference and background values for soil' (federal and state's initiative)		Cadmium, copper, lead and zinc (for all sampling sites); arsenic, chromium, mercury and nickel (for most sampling sites); cobalt, manganese and thallium (for selected sites) PAHs, PCB, HCB, PCDD/F (for most sites), DDT, aldrin/ dieldrin (selected sites), chlorophenols, N-herbicides, and VOCs (in one state only)	Yes	Germany	
Federal Specimen Bank		Arsenic, barium, cadmium, calcium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, phosphorus, potassium, selenium, sodium, sulphur, thallium, zinc, Aldrin, hexachlorocyclohexane, p,p'-DDD, dieldrin, heptachlorine, hexachlorobenzene, heptachlorepoxide, octachlorostyrene, o,p' — DDT, PCB 28, PCB 52, PCB 101, PCB 138, PCB 153, PCB 180, pentachlorophenol, p,p' — DDE, p,p' — DDT, PAHs	Yes	Germany	The german environmental specimen bank (esb) German Federal Environmental Agency, FG II 1.4 Environmental Monitoring/Environmental Specimen Bank, Bismarckplatz 1, 14193 Berlin, Germany www.umweltprobenbank.de
Surveillance of sewage sludge applied on agriculturally used soil		Cd, Cr, Cu, Pb, Hg, Ni, Zn, PCBs, dioxins	Yes	Germany	Personal communication
Surveillance of bio-wastes applied on agriculturally used soils, forests soils and gardens		Cd, Cr, Cu, Pb, Hg, Ni, Zn	Yes	Germany	Personal communication
Specific initiatives to analyse selected pollutants in sewage sludge, manure, fertilisers, and bio-waste (no frequent monitoring)		Phthalic esters, pharmaceuticals, hormones (also: bisphenol A, nonylphenol)	Yes	Germany	Personal communication
Application/ application rates of pesticides regulated under 91/414/EEC		All admitted pesticides	–	EU-wide	Not of relevance to this study

Programme	Description	Substances under consideration	Programme still operational?	Applied in Member State(s)	Reference
Application/ application rates of pesticides regulated under 91/414/EEC	Coordinated programmes of inspections in the Member States	Comprise foodstuffs, food additives, vitamins, mineral salts, trace elements and other additives	Yes	EU-wide obligatory	http://www.ipfsaph.org/id/EURLEX31989L0397
Council Directive 96/22/EC of 29 April 1996 concerning the prohibition on the use in stockfarming of certain substances having a hormonal or thyrostatic action and of ß-agonists, and repealing Directives 81/602/EEC, 88/146/EEC and 88/299/EEC			Yes	EU-wide obligatory	www.ipfsaph.org/id/EURLEX31996L0022
Council Directive 96/23/EC of 29 April 1996 on measures to monitor certain Substances and residues thereof in live animals and animal products and Decision 97/747/EC of 27 October 1997 fixing the levels and frequencies of sampling provided for by Council Directive 96/23/EC for the monitoring of certain Substances and residues thereof in certain animal products	Directive lays down measures to monitor the substances and groups of residues	Annex I: GROUP A — Substances having anabolic effect and unauthorised substances GROUP B — Veterinary drugs (1) and contaminants (1) Antibacterial substances, including sulphonomides, quinolones (2) Other veterinary drugs (a) Anthelmintics (b) Anticoccidials, including nitroimidazoles (c) Carbamates and pyrethroids (d) Sedatives (e) Non-steroidal anti-inflammatory drugs (NSAIDs) (f) Other pharmacologically active substances (3) Other substances and environmental contaminants (a) Organochlorine compounds including PCBs (b) Organophosphorus compounds (c) Chemical elements (d) Mycotoxins (e) Dyes (f) Others including unlicensed substances which could be used for veterinary purposes	Yes	EU-wide obligatory	www.ipfsaph.org/id/EURLEX31996L0023

Programme	Description	Substances under consideration	Programme still operational?	Applied in Member State(s)	Reference
Control of substances in food/imported food of animal origin (terrestrial animals and their products — animal meat, milk, eggs, honey — and fish)		Banned substances, veterinary drugs, environmental and natural substances (heavy metals, pesticides, DDT, HCHs, PAHs, PCBs)	Yes	France	
Dioxins in milk and dairy products		Dioxins	Yes	France, Belgium	commission recommendation of 11 October 2004 on the monitoring of background levels of dioxins and dioxin-like pcbs in foodstuffs *(notified under document number c (2004) 3462)* (text with EEA relevance) (2004/705/ec)
Surveillance of substances in food/ imported food of animal origin (terrestrial animals and their products — animal meat, milk, eggs, honey — and fish)		Banned substances, veterinary drugs, environmental and natural substances (heavy metals, pesticides, DDT, HCHs, PAHs, PCBs)	Yes	Belgium, France, Italy, Portugal, Sweden, Spain, United Kingdom	guidance for local authorities in Great Britain on imported food and feed controls June 2004. Food Standard Agency www.food.gov.uk/foodindustry/guidancenotes/foodguid/importedfoodfeedcontrols
Surveillance of pesticides residues vegetable food		*Pesticides*	Yes	Belgium, France, Italy, Portugal, Sweden, Spain, United Kingdom	
Food monitoring programme (control programme according to EU directives as given above and Directives 86/362/EEC, 86/363/EEC and 90/642/EEC concerning pesticide residues on food)		Compounds given in Annex I of 96/23/EEC (see above) Annually changing programmes; in at least one of the years 1995–1999: Food of animal origin: pesticides, PCBs, musc compounds, heavy metals, chlorinated hydrocarbons, bromocyclen, POPs Vegetable food: pesticides, heavy metals, mykotoxins (Also: nonylphenol, bisphenol A)	Yes	Germany	
Dioxin programme		Dioxins	Yes	Germany	
Surveillance of quality of consumer products	The exclusion of unwanted substances in consumer products is regulated by law. In order to control the compliance with the regulations, monitoring initiatives or even a continuous surveillance is possible; however, no frequent monitoring is being performed so far, but analyses 'upon event' are performed	Recent examples: analyses of phthalates in toys and of organotin compounds in clothing	Unknown	Germany	Not within the scope of this study — no information found

Programme	Description	Substances under consideration	Programme still operational?	Applied in Member State(s)	Reference
Human specimen bank	Tool for retrospective monitoring and the observation of time trends the human specimen bank functions in analogy to the environmental specimen bank	Routinely analysed: Aluminium, arsenic, barium, cadmium, calcium, copper, chromium, iron, magnesium, manganese, mercury, nickel, phosphorus, potassium, selenium, sodium, sulphur, thallium, zn, aldrin, a-HCH, b-HCH, p,p'-DDD, Dieldrin, g-HCH (Lindan), hexachlorobenzene (HCB), heptachlorepoxide, o,p' — DDT, PCB 28, PCB 52, PCB 101, PCB 138, PCB 153, PCB 180, pentachloro-phenol, p,p' — DDE, p,p' — DDT	Yes	Germany	Personal communication Dr Schröter-Kermani — UBA

Appendix III — Overview of the frameworks under which monitoring activities are currently carried out in the EEA member countries

1	A comparative study of polychlorinated alkanes as standards for the determination of C10–C13 polychlorinated paraffines in fish samples
2	A review and assessment of tributyltin contamination in the North Sea, based on surveys of butyltin tissue burdens and imposex/intersex in four species of neogastropods
3	AFEN — Atlantic Frontier Environmental Network
4	Agricultural Watershed Monitoring Programme
5	AMAP
6	Analysis of Contaminants in Marine Mammals
7	Aqualarm
8	Arge Elbe
9	Arsenic, mercury and other contaminants in fish
10	Assessment of Anti-Fouling Agents in Coastal Environments
11	Assessment of organotin pollution along the Polish coast (Baltic Sea) by using mussels and fish as sentinel organisms
12	Assessment of Physico-Chemical River Quality
13	Barents Sea and Northern Fjords (AMAP)
14	BEEP
15	Biochemical Monitoring Programme of Rivers
16	Bund/Länder-Messprogramm für die Nordsee
17	Bund/Länder-Messprogramm Ostsee
18	Coastal and Open Marine Waters Monitoring Program
19	Coastal Sea Monitoring
20	Compliance Monitoring Regulatory Review
21	Concentrations of alkylphenol polyethoxylates entering UK estuaries
22	Concentrations of alkylphenols in rivers and estuarie in England and Wales
23	Contaminant Monitoring Programme
24	Contaminants in eel from Dutch Inland waters
25	Cooperative ICES Monitoring Studies Programme
26	Dangerous Substances Directive — List I (Sediment/Biota) Inland waters
27	Dangerous Substances Directive — National Network Sites
28	Dangerous Subtances Directive — List II
29	DDT Monitoring of Lake Maggiore
30	Determination of short chain polychlorinated paraffins in fish samples by short column GC/ECNI-MS
31	Deutsches Untersuchungsprogramm Rhein (DUR)
32	ENDIS-RISK
33	Endocrine Disruptors in the Marine Environment (EDMAR)
34	Estonian State Monitoring Programme
35	Estrogenic Alkylphenols in fish tissues, sediments, and waters from the UK Tyne and Tees estuaries
36	EuroAirNet (EEA ETC/ACC)
37	Eurowaternet/EEA/Eionet — waterbase, based on data from the European Water Network (EWN)
38	Fate and Behaviour of Steroid Oestrogens in Aquatic Systems

39	FEPA Dredging Disposal Sites Monitoring
40	FIRE
41	Fisheries Research — Marine — Scotland: Environmental Monitoring of the Seas Around Scotland
42	Fisheries Research — Scotland
43	Flemisch eel monitoring network
44	Flux of PAH in baltic aquatic food chain
45	Freshwater Monitoring Programme of Italy
46	GEMS/Water
47	Halogenated organic compounds in biota
48	Harmonised Monitoring Scheme
49	Heavy Metals in Bivalve Molluscs from Designated Areas around England and Wales
50	Helcom Combine (Cooperative Monitoring Baltic Sea)
51	Helcom Monitoring Radioactive Substances in Baltic
52	Helcom Pollution Load Compilation Programme
53	Higher brominated diphenyl ethers and hexabromocyclododecane found in eggs of Peregrine falcons (Falco peregrinus) breeding in Sweden
54	Historical Record of Atmospherically Deposited Pollutants at a remote Lake site in North-West Scotland
55	ICP forest
56	Impacts of Contaminated Groundwater on Urban River Quality — Birmingham, United Kingdom
57	Imposed and Tributyltin in Nucella Lappilus (Common Dogwhelk) in UK West Coast, North Sea and Irish coastline
58	Intensive time series in reference lakes & streams
59	Inventory of the Quality of Running Fresh Water
60	Italian Marine Monitoring Programme
61	JAMP (Netherlands)
62	JAMP (Norway)
63	Lake Constance Monitoring Programme
64	Landelijk Meetnet Bodem (LMB)
65	Levels of polybrominated diphenyl ether (PBDE) flame retardants in animals representing different trophic levels of the North Sea food web
66	Levels of short and medium chain length polychlorinated n-alkanes in environmental samples from selected industrial areas in England and Wales
67	Lithuanian State environmental monitoring programme
68	LOES
69	Luxemburg Contaminant Monitoring Programme
70	Material Input to the Baltic Sea by Finnish Rivers
71	MED POL, Agean & Ionian Seas, Saronic Gulf
72	MED POL, Cretian marine waters
73	Metals in Lake Sediments and Mercury in Fish
74	MISTRA, NEWS
75	Monitoring bioaccumulating compounds in freshwater
76	Monitoring of 20 rivers in E, S and W Norway
77	Monitoring of Finnish Coastal Waters
78	Monitoring of Greenlands fjords, Telemark, Norway
79	Monitoring of harmful substances in the receiving water bodies of pulp and paper industry using incubated mussels
80	Monitoring of Hvaler-Singlefjorden, Norway
81	Monitoring of Inland Water Bodies
82	Monitoring of Inland Waters Belgium (VMM)
83	Monitoring of Open Sea Waters

84	Monitoring of Ranfjorden, Norway
85	Monitoring of riverine inputs to coastal waters
86	Monitoring of Rivers in Norway
87	Monitoring of Sørfjord & Hardangerfjord, Norway
88	Monitoring of Surface Water Quality
89	Monitoring of the quality of seawater and commercial mollusc species of the Kallomi and Moudros Bays, Prefecture of Lesvos, Greece.
90	Monitoring of Transboundary Rivers
91	Musk Rhine, ICPR
92	Mussel Watch
93	MWTL
94	National Data Topic Centre on Freshwater Data
95	National Freshwater Contaminant Monitoring
96	National Lake Water Quality Monitoring Programme
97	National Main River Outlets
98	National Marine Monitoring Programme (NMMP)
99	National Network for Environmental monitoring
100	National Rivers Monitoring Programme
101	National Rivers Monitoring Programme (Priority Substances Programmes)
102	National Sea Quality Monitoring Network (RNO)
103	National Swedish Contaminant Monitoring
104	Nation-wide Lakes Monitoring Programme
105	Nation-wide Spring Monitoring Programme
106	Nation-wide Stream Monitoring Programme
107	No link to project
108	Non-Destructive Biomarkers to Monitor Exposure to Endocrine Disrupting Chemicals and their Subsequent Effects on Reproductive Success in UK Seal and Otter Populations
109	Nonylphenols, nonylphenol-ethoxylates, linear alkylbenzenesulfonates (LAS) and bis (4-chlorophenyl)-sulfone in the German Bight of the North Sea
110	North Sea Conference
111	North Sea Task Force
112	Norwegian Fjords — Joint Monitoring Programme
113	NOVA-2003
114	Novaja Zemlya Marine Investigations (AMAP)
115	Ordinance on Water Quality Monitoring
116	Organic compounds in marine biota
117	Organochlorine and bromodiphenylethers in cod from the North Sea
118	Organochlorine food web lake Baikal
119	Organochlorine in female baltic salmon
120	Organochlorines in Greenland lake sediments and landlocked Arctic char
121	Organotin in fish and shellfish from North Sea and Dutch waters
122	Organotin pollution in deep-sea fish from the Northwestern Mediterranean
123	OSPAR
124	OSPAR Comprehensive Study on Riverine Inputs and Direct Discharges
125	Overview PBDE data in aquatic biota and sediments
126	PAH in sediment and mussel from West Mediterranean sea
127	PAH Levels in Fish and Shellfish, post Sea Empress Oil Spill
128	PAHs in Sediments from Around Scotland
129	PAHs, PCBs, PCNs, organochlorine pesticides, synthetic musks, and polychlorinated n-alkanes in UK sewage sludge: Survey results and implications

130	PARCOM and ANNEXIA of Contaminant Loads Entering the Seas Around Wales and England
131	PBDE in Swedish biological samples
132	PCB contaminants at Pladda and Garroch Head in the Firth of Clyde in relation to sewage sludge input
133	Persistent organic pollutants in Arctic char from a high mountain lake in the Alps
134	PHARE-TWINNING
135	Physico-chemical monitoring of surface waters
136	Pollutants in the Estuarine & Coastal Environment
137	Polybrominated diphenyl ethers and hexabromocyclododecane in sediment and fish from a Swedish river
138	Polycyclic Aromatic Hydrocarbon Pollution in Native and Caged Mussels from the Ligurian coast
139	Polycyclic Aromatic Hydrocarbons in mussels from the Ionian Sea
140	Quantification of organotin compounds and determination of imposex in populations of dogwhelks (Nucella lapillus) from Norway
141	Retrospective monitoring of organotin compounds in marine biota from 1985 to 1999: Results from the German environmental specimem bank
142	Sediment Analyses of POPs at Lochnagar
143	Shellfish Waters Directive
144	Short chain halogenated organic compounds in marine organisms
145	Spatial distribution of butyltin and phenyltin compounds on the Huelva coast (Southwest Spain)
146	Surface Water Abstraction Directive
147	Surface water quality monitoring
148	Survey of Alkylphenol ethoxylates (APEs) in Scotland and Northern Ireland
149	Survey of nine organotin compounds in the Netherlands using the zebra mussel
150	Survey of organotin compounds in the western mediterranean using molluscs and fish
151	TBT Concentrations in Dredged Sediments
152	Temporal trend studies on tetra and pentabrominated diphenylethers and hexabromocyclododecane in guillemot egg from the Baltic Sea
153	The occurrence of xenoestrogens in the Elbe river and the North Sea
154	Transboundary River Monitoring in Finland
155	Transport of Suspended/Soluble Material from Land
156	Tributyltin along the coasts of Corsica (Western Mediterranean): A persistent problem
157	Trophic and toxic effects in Lambro River Basin
158	Überwachungsprogramm der LAWA
159	UK National Marine Monitoring Plan (UK NMMP)
160	UK-Netherlands Collaborative Monitoring Programme
161	University of the Aegean Monitoring Programme
162	VOCs in eel from various inland waters of Belgium
163	VOCs in marine biota
164	VOCs in sediment from the Scheldt estaury and the southern North Sea
165	VOCs in various marine organisms from the Southern North Sea
166	Water Quality at River Streamflow Stations
167	Water Quality at River Streamflow Stations
168	Water Quality in Lake Deeps
169	Water Quality Network
170	Water Quality of Inland Waters
171	WRFC

Appendix IV — Overview of the ongoing frameworks within each of the 32 countries that were part of this study

Note: In case no recent information was found on a specific framework, the input 'unknown' is used in this appendix. Frameworks that have been reported in two EEA reports are also indicated.

Member State	Framework	Ongoing	EEA topic report 2, 1996	EEA topic report 16, 1996
Austria	Lake Constance Monitoring Programme	yes	x	
Austria	Lake Zeller Monitoring Programme	unknown	x	
Austria	Monitoring of Transboundary Rivers	yes	x	
Austria	Ordinance on Water Quality Monitoring	yes	x	
Belgium	Alarm network	yes	x	
Belgium	Arsenic, mercury and other contaminants in fish	yes		
Belgium	Bathing water	yes	x	
Belgium	ENDIS-RISK	unknown		
Belgium	Flemisch eel monitoring network	yes		
Belgium	Measuring network suspended solids	unknown	x	
Belgium	Measuring network water soils	unknown	x	
Belgium	Monitoring of Inland Waters Belgium (VMM)	yes	x	
Belgium	Organic compounds in marine biota	yes		
Belgium	Physico-chemical monitoring of surface waters	yes	x	
Belgium	VOCs in eel from various inland waters of Belgium	yes		
Belgium	VOCs in marine biota	yes		
Belgium	VOCs in sediment from the Scheldt estaury and the southern North Sea	yes		
Belgium	VOCs in various marine organisms from the Southern North Sea	yes		
Bulgaria	National Network for Environmental monitoring	yes		
Denmark	Organochlorines in Greenland lake sediments and landlocked Arctic char	yes		
Denmark/Greenland/ Faroe Islands	Agricultural Watershed Monitoring Programme	yes	x	
Denmark/Greenland/ Faroe Islands	Coastal and Open Marine Waters Monitoring Program	yes	x	
Denmark/Greenland/ Faroe Islands	Cooperative ICES Monitoring Studies Programme	yes		
Denmark/Greenland/ Faroe Islands	Inventory of Biological assessment of river quality	unknown	x	
Denmark/Greenland/ Faroe Islands	National Data Topic Centre on Freshwater Data	unknown		
Denmark/Greenland/ Faroe Islands	Nation-wide Lakes Monitoring Programme	yes	x	
Denmark/Greenland/ Faroe Islands	Nation-wide Spring Monitoring Programme	yes	x	
Denmark/Greenland/ Faroe Islands	Nation-wide Stream Monitoring Programme	yes	x	

Member State	Framework	Ongoing	EEA topic report 2, 1996	EEA topic report 16, 1996
Denmark/Greenland/ Faroe Islands	NOVA-2003	replaced by novana		
Denmark/Greenland/ Faroe Islands	PHARE-TWINNING	unknown		
Estonia	Coastal Sea Monitoring	yes		
Estonia	Estonian State Monitoring Programme	yes		
Estonia	Monitoring of Inland Water Bodies	yes		
EU	EuroAirNet (EEA ETC/ACC)	yes		
EU	Eurowaternet/EEA/Eionet — waterbase, based on data from the European Water Network (EWN)	yes	x	
EU	Helcom	yes	x	x
EU	ICP forest	yes		
EU	ICPE — Elbe monitoring	yes	x	x
EU	ICPGP — Lake Geneva monitoring	yes	x	
EU	ICPRP — Rhine monitoring	yes	x	x
EU	Joint Monitoring Programme — JMP	yes	x	x
EU	MEDPOL	yes	x	x
Finland	Biological monitoring of inland waters	unknown	x	
Finland	Helcom Combine (Cooperative Monitoring Baltic Sea)	yes		
Finland	Helcom Monitoring Radioactive Substances in Baltic	yes		
Finland	Helcom Pollution Load Compilation Programme	yes		
Finland	Material Input to the Baltic Sea by Finnish Rivers	yes	x	
Finland	Monitoring bioaccumulating compounds in freshwater	yes	x	
Finland	Monitoring of Finnish Coastal Waters	yes	x	
Finland	Monitoring of harmful substances in the receiving water bodies of pulp and paper industry using incubated mussels	unknown		
Finland	Monitoring of Open Sea Waters	yes	x	
Finland	Organochlorine in female baltic salmon	yes		
Finland	Transboundary River Monitoring in Finland	yes	x	
Finland	Transport of Suspended/Soluble Material from Land	yes	x	
Finland	Water Quality at River Streamflow Stations	yes	x	
Finland	Water Quality in Lake Deeps	yes	x	
France	BEEP	yes		
France	Inventory of the Quality of Running Fresh Water	yes	x	
France	Mussel Watch	yes		
France	National Sea Quality Monitoring Network (RNO)	yes	x	
France	PAH in sediment and mussel from West Mediterranean sea	yes		
France	REMI — French seashore microbiological monitoring	yes	x	
France	REPHY — French seashore phytoplankton monitoring	yes	x	
France	Tributyltin along the coasts of Corsica (Western Mediterranean): A persistent problem	unknown		
Germany	A comparative study of polychlorinated alkanes as standards for the determination of C10–C13 polychlorinated paraffines in fish samples	yes		
Germany	Arge Elbe	yes		

Member State	Framework	Ongoing	EEA topic report 2, 1996	EEA topic report 16, 1996
Germany	Bund/Länder-Messprogramm für die Nordsee	yes	x	
Germany	Bund/Länder-Messprogramm Ostsee	yes	x	
Germany	Determination of short chain polychlorinated paraffins in fish samples by short column GC/ECNI-MS	unknown		
Germany	Deutsches Untersuchungsprogramm Rhein (DUR)	yes		
Germany	Musk Rhine, ICPR	yes		
Germany	Nonylphenols, nonylphenol-ethoxylates, linear alkylbenzenesulfonates (LAS) and bis (4-chlorophenyl)-sulfone in the German Bight of the North Sea	yes		
Germany	Retrospective monitoring of organotin compounds in marine biota from 1985 to 1999: Results from the German environmental specimem bank	yes		
Germany	The occurrence of xenoestrogens in the Elbe river and the North Sea	yes		
Germany	Überwachungsprogramm der LAWA	yes	x	
Greece	MED POL, Agean & Ionian Seas, Saronic Gulf	yes	x	
Greece	MED POL, Cretian marine waters	yes	x	
Greece	Monitoring of Surface Water Quality	yes	x	
Greece	Monitoring of the quality of seawater and commercial mollusc species of the Kallomi and Moudros Bays, Prefecture of Lesvos, Greece.	yes		
Greece	University of the Aegean Monitoring Programme	yes		
Ireland	National Lake Water Quality Monitoring Programme	yes	x	
Ireland	National Rivers Monitoring Programme	yes	x	
Ireland	National Rivers Monitoring Programme (Priority Substances Programmes)	yes		
Ireland	Pollutants in the Estuarine & Coastal Environment	yes	x	
Ireland	Radioactivity monitoring of the Irish Marine Environment	unknown	x	
Italy	Freshwater Monitoring Programme of Italy	yes		
Italy	Italian Marine Monitoring Programme	yes		
Italy	Polycyclic Aromatic Hydrocarbon Pollution in Native and Caged Mussels from the Ligurian coast	yes		
Italy	Polycyclic Aromatic Hydrocarbons in mussels from the Ionian Sea	yes		
Italy	Trophic and toxic effects in Lambro River Basin	yes		
Italy/Switzerland	DDT Monitoring of Lake Maggiore	yes		
Lithuania	Lithuanian State environmental monitoring programme	yes		
Luxembourg	Biochemical Monitoring Programme of Rivers	yes	x	
Luxembourg	Luxemburg Contaminant Monitoring Programme	yes		
Luxembourg	National Lake Monitoring Programme	unknown	x	
North Sea countries	North Sea Task Force — NSTF — ICES	yes	x	x
Norway	1000-lake survey	unknown	x	
Norway	Barents Sea and Northern Fjords (AMAP)	yes	x	
Norway	JAMP (Norway)	yes	x	x
Norway	Metals in Lake Sediments and Mercury in Fish	yes		
Norway	Monitoring of 20 rivers in E, S and W Norway	yes	x	
Norway	Monitoring of Greenlands fjords, Telemark, Norway	yes	x	

Member State	Framework	Ongoing	EEA topic report 2, 1996	EEA topic report 16, 1996
Norway	Monitoring of Hvaler — Singlefjorden, Norway	yes	x	
Norway	Monitoring of Ranfjorden, Norway	yes	x	
Norway	Monitoring of river Otra, Glomma, Hedmark, Gaula, Orkla	unknown	x	
Norway	Monitoring of riverine inputs to coastal waters	yes	x	
Norway	Monitoring of Rivers in Norway	yes		
Norway	Monitoring of Sørfjord & Hardangerfjord, Norway	yes	x	
Norway	National survey on heavy metals in lake sediments and mercury in fish	unknown	x	
Norway	Norwegian Fjords — Joint Monitoring Programme	yes	x	
Norway	Novaja Zemlya Marine Investigations (AMAP)	yes	x	
Norway	Quantification of organotin compounds and determination of imposex in populations of dogwhelks (Nucella lapillus) from Norway	yes		
Polar regions	AMAP	yes		
Portugal	Water Quality Network — INAG & DRARN	yes	x	
Portugal	WRFC	yes		
Romania	Water Quality of Inland Waters	yes		
Russia	Organochlorine food web lake Baikal	yes		
Slovakia	Surface water quality monitoring	yes		
Spain	Assessment of organotin pollution along the Polish coast (Baltic Sea) by using mussels and fish as sentinel organisms	yes		
Spain	Assessment of Physico-Chemical River Quality	yes	x	
Spain	Organotin pollution in deep-sea fish from the Northwestern Mediterranean	yes		
Spain	Spatial distribution of butyltin and phenyltin compounds on the Huelva coast (Southwest Spain)	yes		
Spain	Survey of organotin compounds in the western mediterranean using molluscs and fish	yes		
Sweden	Contaminant Monitoring Programme	yes	x	
Sweden	Flux of PAH in baltic aquatic food chain	yes		
Sweden	Halogenated organic compounds in biota	yes		
Sweden	Higher brominated diphenyl ethers and hexabromocyclododecane found in eggs of Peregrine falcons (Falco peregrinus) breeding in Sweden	yes		
Sweden	Intensive time series in reference lakes & streams	yes	x	
Sweden	MISTRA, NEWS	yes		
Sweden	National Freshwater Contaminant Monitoring	yes	x	
Sweden	National Main River Outlets	yes	x	
Sweden	National Pelagic frequent monitoring	unknown	x	
Sweden	National Pelagic high frequent monitoring	unknown	x	
Sweden	National Pelagic low frequent monitoring	unknown	x	
Sweden	National Swedish Contaminant Monitoring	yes	x	
Sweden	PBDE in Swedish biological samples	yes		
Sweden	Polybrominated diphenyl ethers and hexabromocyclododecane in sediment and fish from a Swedish river	yes		

Member State	Framework	Ongoing	EEA topic report 2, 1996	EEA topic report 16, 1996
Sweden	Temporal trend studies on tetra and pentabrominated diphenylethers and hexabromocyclododecane in guillemot egg from the Baltic Sea	yes		
The Netherlands	Aqualarm	yes	x	
The Netherlands	Contaminants in eel from Dutch Inland waters	yes		
The Netherlands	FIRE	yes		
The Netherlands	JAMP (Netherlands)	yes		x
The Netherlands	Landelijk Meetnet Bodem (LMB)	yes		
The Netherlands	Levels of polybrominated diphenyl ether (PBDE) flame retardants in animals representing different trophic levels of the North Sea food web	yes		
The Netherlands	LOES	yes		
The Netherlands	Monitoring marine waters	yes	x	
The Netherlands	MWTL — National Surface Water Monitoring Programm	yes	x	
The Netherlands	Organochlorine and bromodiphenylethers in cod from the North Sea	yes		
The Netherlands	Organotin in fish and shellfish from North Sea and Dutch waters	yes		
The Netherlands	Overview PBDE data in aquatic biota and sediments	yes		
The Netherlands	Persistent organic pollutants in Arctic char from a high mountain lake in the Alps	yes		
The Netherlands	Survey of nine organotin compounds in the Netherlands using the zebra mussel	yes		
United Kingdom	A review and assessment of tributyltin contamination in the North Sea, based on surveys of butyltin tissue burdens and imposex/intersex in four species of neogastropods	yes		
United Kingdom	AFEN — Atlantic Frontier Environmental Network	yes		
United Kingdom	Analysis of Contaminants in Marine Mammals	yes		
United Kingdom	Assessment of Anti-Fouling Agents in Coastal Environments	yes		
United Kingdom	Compliance Monitoring Regulatory Review	yes		
United Kingdom	Concentrations of alkylphenol polyethoxylates entering UK estuaries	yes		
United Kingdom	Concentrations of alkylphenols in rivers and estuarie in England and Wales	yes		
United Kingdom	Dangerous Substances Directive — List I (Sediment/ Biota) Inland waters	yes		
United Kingdom	Dangerous Substances Directive — National Network Sites	yes		
United Kingdom	Dangerous Subtances Directive — List II	yes		
United Kingdom	Endocrine Disruptors in the Marine Environment (EDMAR)	yes		
United Kingdom	Estrogenic Alkylphenols in fish tissues, sediments, and waters from the UK Tyne and Tees estuaries	yes		
United Kingdom	Fate and Behaviour of Steroid Oestrogens in Aquatic Systems	yes		
United Kingdom	FEPA Dredging Disposal Sites Monitoring	yes		
United Kingdom	Fisheries Research — Marine — Scotland: Environmental Monitoring of the Seas Around Scotland	yes		

Member State	Framework	Ongoing	EEA topic report 2, 1996	EEA topic report 16, 1996
United Kingdom	Fisheries Research — Scotland	yes		
United Kingdom	Harmonised Monitoring Scheme	yes	x	
United Kingdom	Heavy Metals in Bivalve Molluscs from Designated Areas around England and Wales	yes		
United Kingdom	Historical Record of Atmospherically Deposited Pollutants at a remote Lake site in North-West Scotland	yes		
United Kingdom	Impacts of Contaminated Groundwater on Urban River Quality — Birmingham, United Kingdom	yes		
United Kingdom	Imposed and Tributyltin in Nucella Lappilus (Common Dogwhelk) in UK West Coast, North Sea and Irish coastline	yes		
United Kingdom	Levels of short and medium chain length polychlorinated n-alkanes in environmental samples from selected industrial areas in England and Wales	yes		
United Kingdom	Non-Destructive Biomarkers to Monitor Exposure to Endocrine Disrupting Chemicals and their Subsequent Effects on Reproductive Success in UK Seal and Otter Populations	yes		
United Kingdom	North Sea Conference	yes		
United Kingdom	OSPAR	yes		x
United Kingdom	OSPAR Comprehensive Study on Riverine Inputs and Direct Discharges	yes		x
United Kingdom	PAH Levels in Fish and Shellfish, post Sea Empress Oil Spill	yes		
United Kingdom	PAHs in Sediments from Around Scotland	yes		
United Kingdom	PAHs, PCBs, PCNs, organochlorine pesticides, synthetic musks, and polychlorinated n-alkanes in UK sewage sludge: Survey results and implications	yes		
United Kingdom	PARCOM and ANNEXIA of Contaminant Loads Entering the Seas Around Wales and England	yes		x
United Kingdom	PCB contaminants at Pladda and Garroch Head in the Firth of Clyde in relation to sewage sludge input	yes		
United Kingdom	Sediment Analyses of POPs at Lochnagar	yes		
United Kingdom	Shellfish Waters Directive	yes		
United Kingdom	Short chain halogenated organic compounds in marine organisms	yes		
United Kingdom	Surface Water Abstraction Directive	yes		
United Kingdom	Survey of Alkylphenol ethoxylates (APEs) in Scotland and Northern Ireland	yes		
United Kingdom	TBT Concentrations in Dredged Sediments	yes		
United Kingdom	UK National Marine Monitoring Plan (UK NMMP)	yes	x	
United Kingdom	UK-Netherlands Collaborative Monitoring Programme	yes		
WHO & UNEP	GEMS/Water	yes	x	x

Appendix V — Overview of the number of activities, the number of monitoring stations/locations and the number of substances

I Overview of the number of activities per country. An 'activity' is defined as a series of monitoring activities over time at a single monitoring station of a specific substance

Country	Surface water	Sea water	Ground water	Sediment	Suspended matter	Air	Biota	Soil
Austria	1 945					917	6	
Belgium	38 374	847		79 205	23	1 272	275	
Bulgaria						281		865
Canada				1 030				
Czech Republic						352		
Denmark		91		1 025	63	336	1 176	
Estonia	27			52	4	39	16	
Finland	1			7		139	381	
France	2 125	18		2 151		2 239	2 671	
Germany	51	393		1 248	33	4 120	1 833	
Greece	1 095			7		202	4	
Greenland							9	
Hungary	38					61		
Iceland				158		18	1 628	
Ireland	27			296		88	633	
Italy	3			3	3	2 062	1	
Latvia						49	41	
Lithuania	467			488		28		
Luxembourg	70					10		
Macedonia						53		
Netherlands	2 496	894		1 827	1 981	589	2 402	8 578
Norway		81		10 181		64	4 876	
Poland						226	122	
Portugal	9 110	115	7 858	207		228	566	44
Romania						75		
Russia	8	1 812		1 915			1 933	
Slovakia	5					164		
Slovenia	424	3 280	2 594	284		15	148	
Spain				691		2196	1 400	
Sweden	895	4		417		93	727	
Switzerland						241		
United Kingdom	111	357		4 879	13	1 460	714	

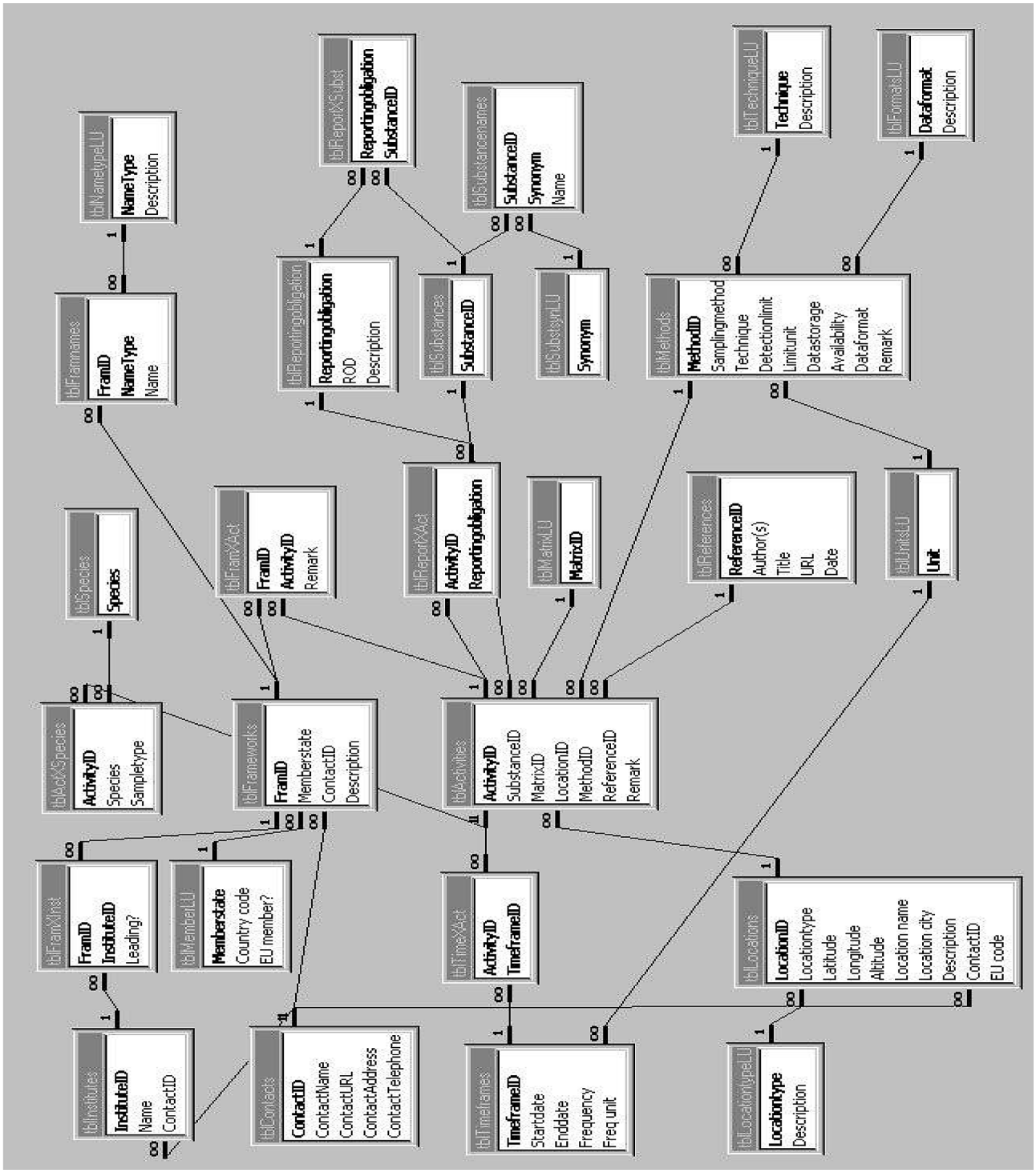
II Overview of the number of monitoring stations/locations per country

Country	Surface water	Sea water	Ground water	Sediment	Suspended matter	Air	Biota	Soil
Austria	242					207	1	
Belgium	751	90		648	1	463	18	
Bulgaria						52		173
Canada				62				
Czech Republic						58		
Denmark		33		66	2	50	113	
Estonia	2			2	1	7	2	
Finland	1			2		54	29	
France	97	3		75		865	142	
Germany	4	20		37	3	695	86	
Greece	85			2		31	2	
Greenland							1	
Hungary	4					13		
Iceland				14		6	80	
Ireland	1			33		61	33	
Italy	1			1	1	507	1	
Latvia						14	6	
Lithuania	56			61		7		
Luxembourg	2					5		
Macedonia						28		
Netherlands	33	90		57	33	89	56	318
Norway		13		288		20	186	
Poland						52	10	
Portugal	562	43	754	17		57	24	4
Romania						24		
Russia	1	93		70			52	
Slovakia	1					40		
Slovenia	24	9	41	4		5	2	
Spain				48		426	88	
Sweden	175	1		11		30	34	
Switzerland						37		
United Kingdom	13	256		605	5	459	81	

III Overview of the number of substances monitored in each country

Country	Surface water	Sea water	Ground water	Sediment	Suspended matter	Air	Biota	Soil
Austria	23					8	6	
Belgium	280	39		199	23	17	72	
Bulgaria						14		5
Canada				18				
Czech Republic						7		
Denmark		5		60	62	14	53	
Estonia	26			26	4	7	4	
Finland	7			6		11	21	
France	54	9		31		10	51	
Germany	48	27		92	20	11	69	
Greece	16			3		8	3	
Greenland							9	
Hungary	12					8		
Iceland				20		11	43	
Ireland	27			9		8	31	
Italy	3			3	3	18	1	
Latvia						8	7	
Lithuania	12			11		10		
Luxembourg	68					2		
Macedonia						2		
Netherlands	168	157		103	91	46	96	39
Norway		27		95		8	138	
Poland						8	14	
Portugal	72	11	69	18		9	32	11
Romania						8		
Russia	8	28		47			58	
Slovakia	5					8		
slovenia	28	11	70	31		5	32	
Spain				24		10	42	
Sweden	16	4		48		10	71	
Switzerland						13		
United Kingdom	66	11		94	9	8	53	

Appendix VI — Graphical overview of the data model



Appendix VII — Table definition describing all tables and fields in the database

Table	Field	Data type (*)	Description	Primary key	Example
tblActivities	ActivityID	INTEGER	Unique key	Yes	
	SubstanceID	FLOAT	Substance key		
	MatrixID	VARCHAR	Matrix name		Water, Air, Biota
	LocationID	FLOAT	Location key		
	MethodID	FLOAT	Method key		
	Remark	TEXT	Any additional remark on the activity		
tblMatrixLU	MatrixID	VARCHAR	Matrix name (unique)	Yes	Water, Air, Biota
tblLocations	LocationID	FLOAT	Unique key	Yes	
	Locationtype	VARCHAR	Type of location		Sampling station, other
	Latitude	FLOAT	Location latitude in decimal degrees		47 503
	Longitude	FLOAT	Location longitude in decimal degrees		11 700
	Altitude	FLOAT	Location altitude in metres above sea level		
	Location name	VARCHAR	Name of location (eg sampling station name)		
	Location city	VARCHAR	If applicable: name of city		Berlin, Eindhoven
	Description	TEXT	Description of the location		Sampling station in city centre
	ContactID	INTEGER	Contact for this location		
	EU code	VARCHAR	European code for station		
tblLocationtypeLU	Locationtype	VARCHAR	Type of location	Yes	Sampling station, other
	Description	TEXT	Description of location type		
tblFrameworks	FramID	INTEGER	Unique key	Yes	
	Memberstate	VARCHAR	EEA member state in which the framework is situated, in case multiple states are involved, 'multiple' is coded		Portugal, Slovenia, the Netherlands, multiple
	ContactID	INTEGER	Contact (person) for this framework		
	Description	TEXT	Description of the framework		

(*) In many cases, the FLOAT (DOUBLE) data type is used as the MS Access LONG INTEGER cannot hold large numbers

Table	Field	Data type (*)	Description	Primary key	Example
tblFramnames	FramID	INTEGER	Key for framework	Yes	
	NameType	VARCHAR	Type of name	Yes	Official, German, Acronym
	Name	TEXT	Name of framework		
tblMemberLU	Memberstate	VARCHAR	Names of EEA member states		Portugal, Slovenia, The Netherlands, multiple
	Country code	VARCHAR	Official ISO3166-1-alpha-2 code elements		
	EU?	BINARY	True if the state is an EU Member State		
tblNametypeLU	NameType	VARCHAR	Type of name	Yes	Official, German, Acronym
	Description	TEXT	Description of name type		
tblFramXAct	FramID	INTEGER	Key for framework	Yes	
	ActivityID	INTEGER	Key for activity	Yes	
	Remark	TEXT	Any remark on this particular combination of framework and activity		
tblFramXInst	FramID	INTEGER	Key for framework	Yes	
	InstituteID	INTEGER	Key for institute	Yes	
	Leading?	BINARY	True if this is the leading institute in this framework		
tblInstitutes	InstituteID	INTEGER	Unique key	Yes	
	Name	VARCHAR	Name of institute		EEA, RIVM
	ContactID	INTEGER	Contact information for this institute		
tblMethods	MethodID	FLOAT	Unique key	Yes	
	Samplingmethod	VARCHAR	Type of sampling method		
	Technique	VARCHAR	Type of measurement technique		Ultraviolet absorption, gravimetry
	Detectionlimit	FLOAT	Detection limit of method		
	Limitunit	VARCHAR	Unit for detection limit		mg/l, mg/kg dwt
	Datastorage	TEXT	Description of the method of data storage		Database at institute
	Availability	TEXT	Description of the availability of the data		Available to partner institutes
	Dataformat	VARCHAR	Format in which data are stored		Excel sheet, Comma delimitted, Oracle DBMS
	Remark	TEXT	Any additional remarks on the method		

Table	Field	Data type (*)	Description	Primary key	Example
tblUnitsLU	Unit	VARCHAR	Unit	Yes	mg/l, ppm
tblTechniqueLU	Technique	VARCHAR	Unique key	Yes	Ultraviolet absorption, gravimetry
	Description	TEXT	Description of the measurement technique		
tblFormatsLU	Dataformat	VARCHAR	Format in which data are stored	Yes	Excel sheet, Comma delimited, Oracle DBMS
	Description	TEXT	Additional information on the data format		
tblSubstances	SubstanceID	FLOAT	Unique key for each substance in the database	Yes	
tblSubstanceNames	SubstanceID	FLOAT	Unique key for substance	Yes	
	Synonym	VARCHAR	Substance name synonym type	Yes	EINECS, Common, SMILES
	Name	TEXT	Substance name		
tblSubstsynLU	Synonym	VARCHAR	Substance name synonym type	Yes	EINECS, Common, SMILES
tblReportingobligation	Reportingobligation	VARCHAR	Name of reporting obligation	Yes	EEA EuroAirNet
	ROD	TEXT	URL of EEA Reporting Obligations Database		
	Description	TEXT	Description of the obligation or commitment		
tblReportXAct	ActivityID	INTEGER	Key for activity	Yes	
	Reportingobligation	VARCHAR	Name of reporting obligation	Yes	
tblReportXSubst	Reportingobligation	VARCHAR	Name of reporting obligation	Yes	
	SubstanceID	FLOAT	Key for substance	Yes	
tblReferences	ReferenceID	INTEGER	Unique key for references	Yes	
	Author(s)	TEXT	Names of authors of publication		These fields are examples, more fields may be added
	Title	TEXT	Title of publication		
	URL	TEXT	WWW address		
	Date	DATE	Date of publication		

Table	Field	Data type (*)	Description	Primary key	Example
tblTimeframes	TimeframeID	FLOAT	Unique key for time frame	Yes	
	Startdate	DATE	Start date of time frame		
	Enddate	DATE	End date of time frame		
	Frequency	FLOAT	Average frequency of measurements. Code — 1 if continuous		
	Freq unit	VARCHAR	Unit for frequency		/day, /hour
tblNametypeLU	NameType	VARCHAR	Type of synonym	Yes	Full name, acronym
	Description	TEXT	Description of synonym type		
tblTimeXAct	ActivityID	INTEGER	Key for activity	Yes	
	TimeframeID	FLOAT	Key for timeframe	Yes	
tblSpecies	Species	VARCHAR	Species name, Latin	Yes	
tblActXSpecies	ActivityID	INTEGER	Key for activity	Yes	
	Species	VARCHAR	Species name		
	Sampletype	VARCHAR	Type of sample taken from the species		
tblContacts	ContactID	INTEGER	Unique key	Yes	
	ContactName	VARCHAR	Name of the contact		European Environment Agency
	ContactURL	VARCHAR	Web address of the contact		www.eea.europa.eu
	ContactAddress	TEXT	Address of the contact		
	ContactTelephone	VARCHAR	Telephone number of the contact		

Naming conventions

- All table names are proceded by the prefix 'tbl'.
- Small tables containing a limited number of look-up values have the suffix 'LU'.
- Tables in which cross links are made between two unique database fields are of the format 'tblField1XField2'.

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