European Environment Agency

Indicator Fact Sheet

(WEU10) Drinking Water Quality

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Key messages

★ Nitrate in drinking water is a common problem across Europe particularly from small supplies/wells in contaminated shallow groundwater.

★ Pesticide and metal contamination of drinking water supplies has been identified as a problem in many European countries

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Figure 1: Main drinking water problems identified by national reports

Main drinking water problems identified by national reports

- a) Microbiology
- b) Nitrates
- c) Toxics
- d) Metals
- No data
- Outside data coverage
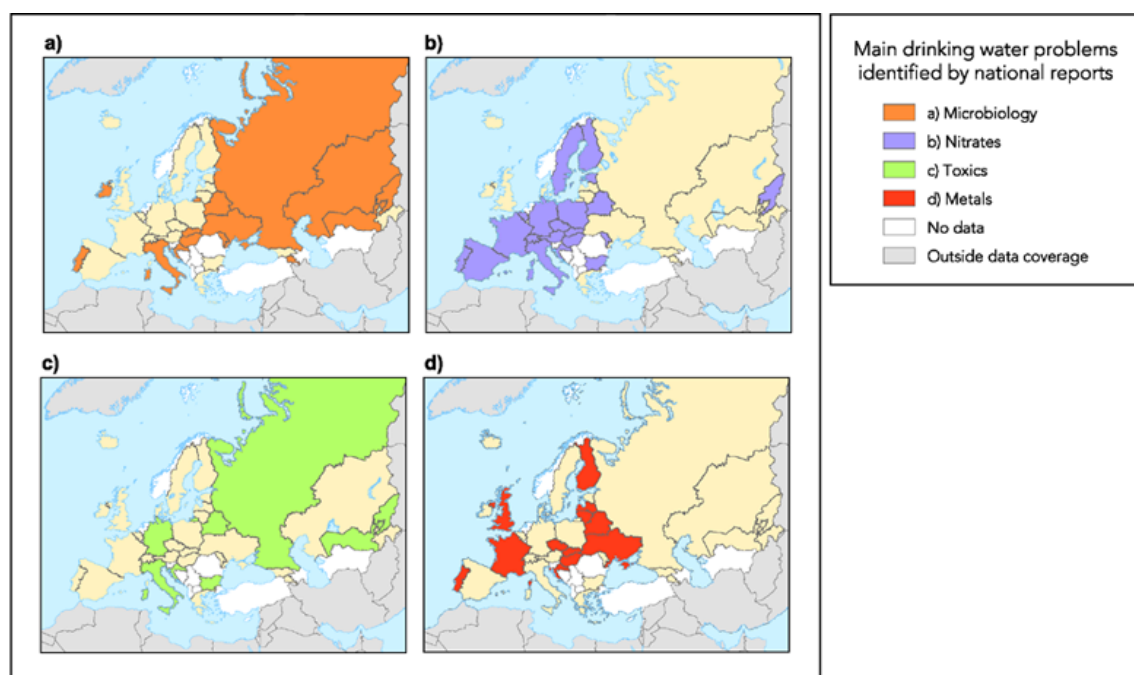
Results and assessment

Policy relevance and context:

The Drinking Water Directive (80/778/EEC) and its revision (98/83/EC which comes in force in 2003) aims to ensure that water intended for human consumption is safe. It must be free of any microorganism, parasite or substance that could potentially endanger human health. The directive sets minimum requirements for certain parameters. Member states must set standards for these parameters that are no less stringent than in the directive and then monitor the quality of drinking water against those standards.

For countries outside the EU the World Health Organization has as one its priorities that "all people, whatever their stage of development and their social and economic conditions, have the right to have access to an adequate supply of safe drinking water". To help achieve this they publish 'Guidelines on Drinking Water Quality' (now it its 3rd edition) which countries should meet to ensure the health of their population.

Monitoring of drinking water quality varies across the EU, candidate countries and NIS with some countries monitoring the water at the point of consumption i.e. at tap and others monitoring at source or as the water leaves the distribution works. There is also a lot of variation in the parameters monitored, the techniques used and the number of samples taken across different countries. This makes comparisons of data difficult. This indicator therefore gives a general overview of the main problems in each country by categories of parameters.

Environmental context:

Drinking water quality is of direct relevance to human health and also reflects the levels of contaminants in the raw water (surface water and groundwater), and the efficiency of water treatment and water distribution systems.

Assessment:

In the EU15 countries nitrate contamination is a problem commonly identified in many national reports. This is likely to be due to intensive agriculture and the use of artificial fertilisers which contaminate raw water sources. Nitrate contamination is often a particular problem in small wells e.g. in Belgium 29 % of 5 000 wells examined had nitrate levels in excess of 50 mg/l nitrate (OECD EPR Belgium, 1997). Excess nitrogen in drinking water is of particular concern for babies where it is known to cause methemoglobinemia, or "blue baby" syndrome. It is also often a particular problem in rural water supplies, which are not necessarily reported or well monitored since they often only serve small populations and are not covered by the drinking water directive. However, nitrate contamination should be reduced with the implementation of the Nitrates Directive ((91/676/EEC *Nitrates from agricultural sources*).

In the Central and Eastern European countries problems with microbiology (e.g. in Slovakia and Hungary) and nitrates (e.g. in Estonia) were also reported. However, the most common problem across the CEE countries was metal contamination. For example, the Czech Republic has problems with barium, nickel and selenium (OECD EPR Czech Republic, 1999) and in Lithuania 55% of samples from centralised sources have excess iron (CEETAC, 2000). Problems with iron and manganese are common in Central and Eastern European countries due to lack of efficient technologies installed for removal of these contaminants which often occur naturally in groundwater. In addition, Slovakia and Hungary had high exceedances for the toxic parameter arsenic. The sources of arsenic in drinking water are from the water flowing through arsenic rich rocks and also from industrial contamination. Long-term exposure to arsenic contamination causes various skin diseases and also cancer of the skin, lungs, urinary bladder and kidneys (WHO, 2001).

The main problem in the Newly Independent States is microbiological contamination of drinking water due to decaying infrastructure e.g. water treatment works that are no longer functioning properly and the prohibitive cost of chlorine or other disinfectants needed to treat the water. For example in Armenia, 90% of pipes are more than 10 years old and 60% are more than 20 years old (SoE, Armenia, 1998). Contamination from toxics and nitrates was also evident from national reports.

Sub-indicators

Key messages

✸ EU15: The most common problem with drinking water in the EU15 countries identified from national reports is nitrate contamination. In addition at least 12% of citizens in EU15 countries[1] were potentially exposed to microbiological and some other undesirable contaminants that exceeded Maximum Allowable Concentrations as laid down in the EC Drinking Water Directive, in the years reported.

✸ Candidate Countries and South East European countries: Physico-chemical parameters are most commonly failed in these countries and this is often due to contamination from metal salts. The percentage of samples failed in other categories also implies significant exposure of populations to contaminants but the data is not available to calculate the proportion of the population effected.

✸ Newly Independent States: Drinking water quality in the NIS is of major concern. All of the NIS for which information was available (8 of 12) have major problems with microbiological contamination of their drinking water supplies. They suffer from aging infrastructure and from the prohibitive cost of chlorine and other disinfectants. These countries also have problems with contamination from toxics and metals and there were also some reports of nitrate pollution.

✸ In many of the Newly Independent States a significant percentage of the population do not have access to improved drinking water sources and so are likely to be exposed to contaminants. This is also the case for some of the Central and South eastern European countries.

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[1] Data from 9 countries: Belgium, Germany, Greece, Spain, France, Ireland, Italy, the Netherlands and the UK

Figure 2: Population with access to improved sources of drinking water
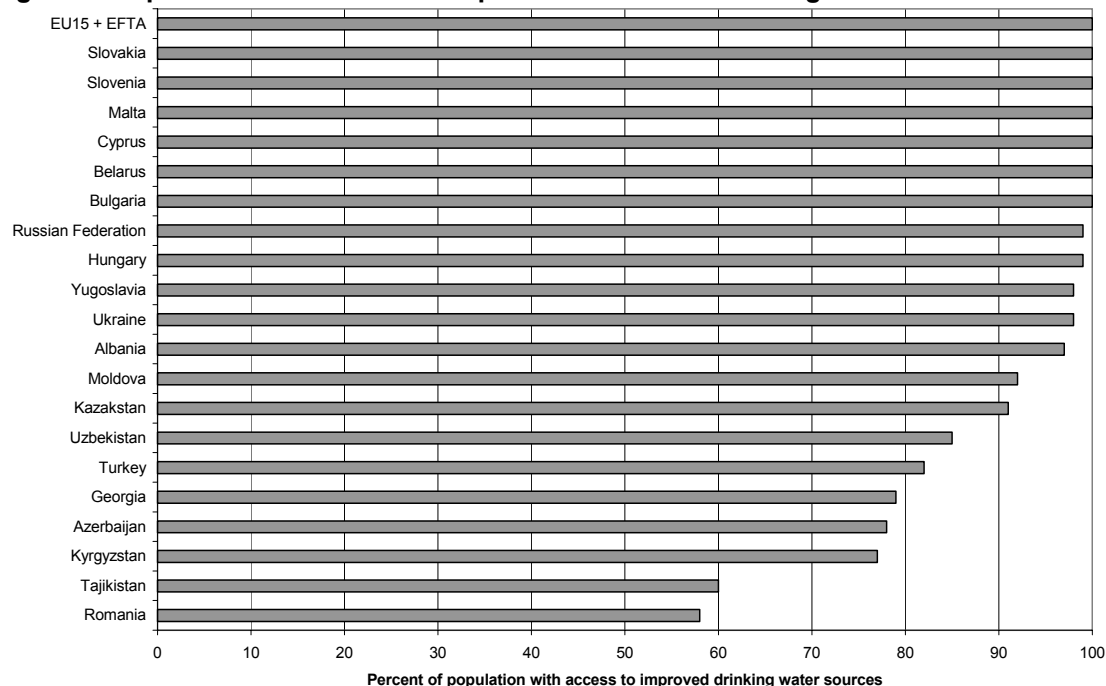
Note:
- IMPROVED: Household connection, public standpipe, borehole, protected dug well, protected spring, rainfall connection.
- NOT IMPROVED: Unprotected well, unprotected spring, river, pond, vendor-provided water, tanker truck

Source: WHO/UNICEF Joint Monitoring Programme, 2001

Figure 3: Minimum percentage EU15's population exposed to exceedances of Maximum Allowable Concentrations in their drinking water (for the EU15 countries that reported: Belgium, Germany, Greece, Spain, France, Ireland, Italy, the Netherlands and the UK).
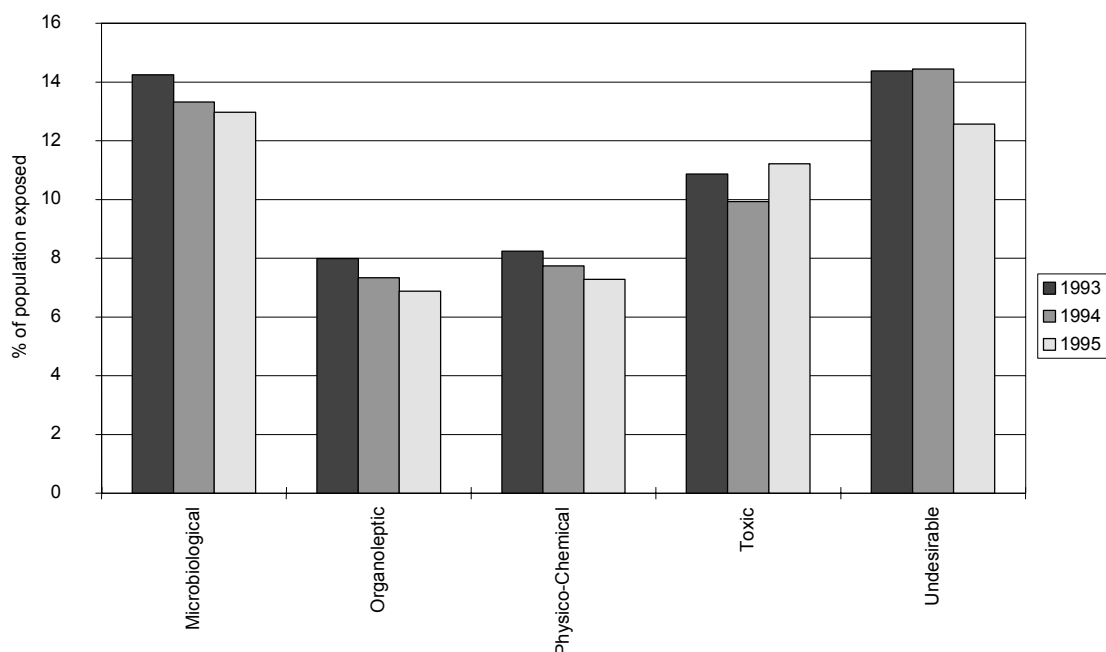
Note: Parameters are in 5 categories: microbiological (e.g. faecal coliform, faecal streptococci), organoleptic (e.g. colour, and taste), physicochemical (e.g. temperature and chlorides), toxics (e.g. pesticides and mercury), and undesirable (e.g. nitrate and surfactants). Results are based on returns from 9 EU countries expressed as percentage of total population in those 9 countries (334.2 million people in 1995).
Source: DGEnv. Member States returns under the Reporting Directive for the period 1993 to 1995.

Figure 4: Percentage of samples exceeding standards in the Candidate countries and South Eastern European countries (Hungary, Latvia, Slovak Republic, Czech Republic and Croatia)
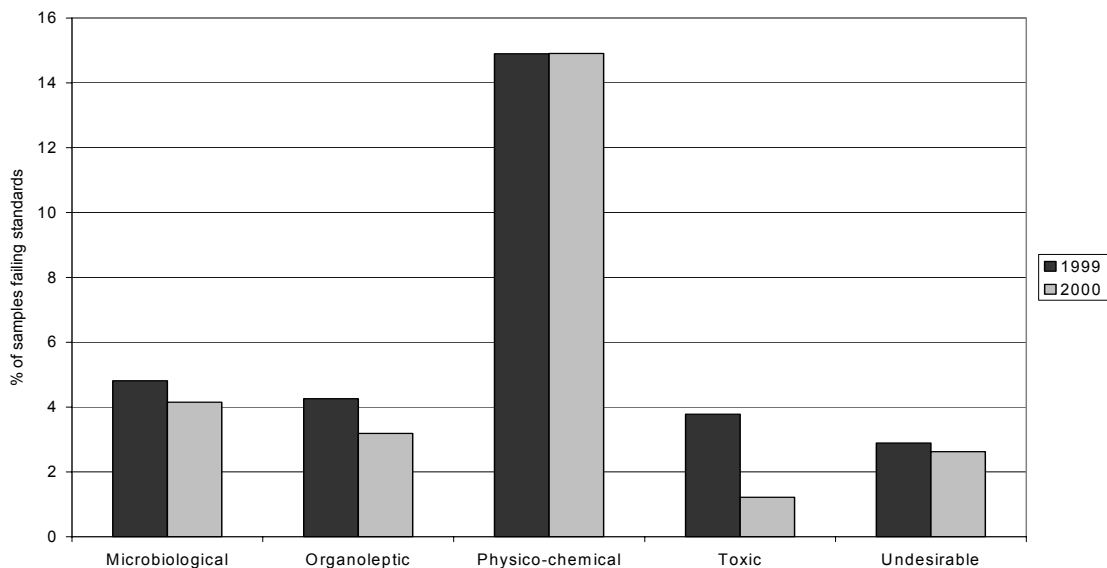
Note: Parameters are in 5 categories: microbiological (e.g. faecal coliform, faecal streptococci), organoleptic (e.g. colour, and taste), physicochemical (e.g. temperature and chlorides), toxics (e.g. pesticides and mercury), and undesirable (e.g. nitrate and surfactants).
Source: Collected by ETC Water

Figure 5: Samples exceeding microbiological parameters in the Newly Independent
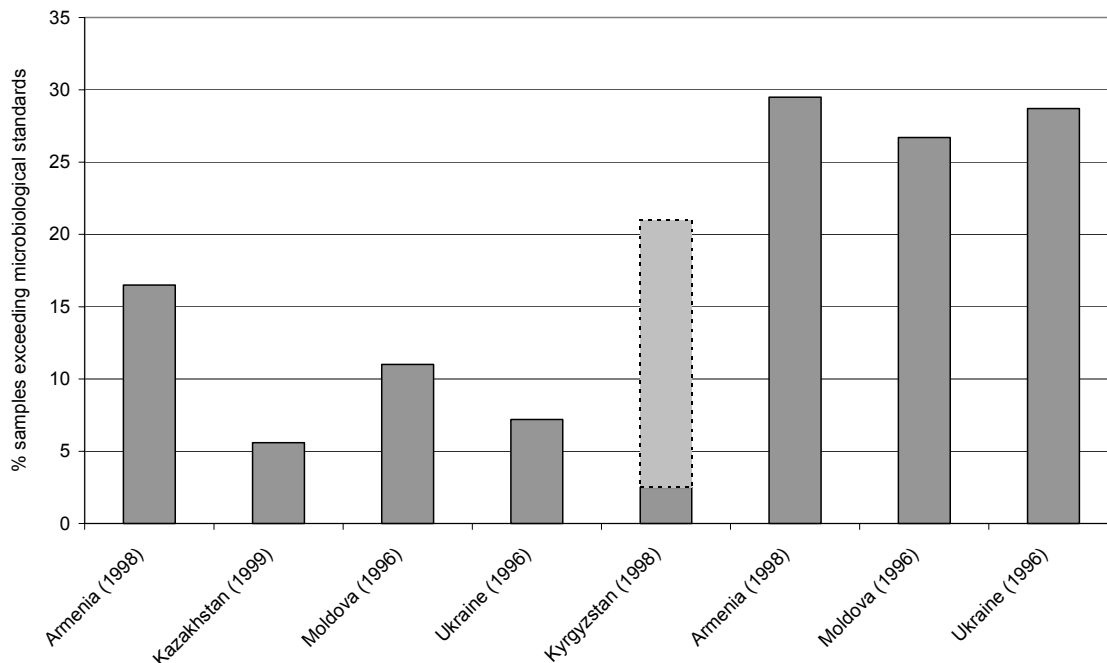
States

Note: Data for Kyrgyzs CENTRALISED SOURCES ences as on⅓ NON-CENTRALISED SOURCES
aggregated was availa

Source: UNECEPR's

Assessment for the sub-indicators

When a supply is found to exceed the standards, the population served by that supply is considered to have been exposed to water inadequate for human consumption. This sub-indicator examines the proportion of the EU population that is potentially affected by these exceedances. The significance of any exposure to water quality failing standards is a function of various factors such as the duration of exceedances of standards and the level of exceedance. Data was not available to calculate exposure for the Central and Eastern European countries or the Newly Independent States and so percentage sample exceedance has been examined.

EU15: The original Drinking Water Directive (80/778/EEC) had 66 parameters. In the new directive this has been reduced to 48 parameters but includes 15 new ones. These are listed on Annex 1 of the directive but Member States may also set values for additional parameters. For some parameters, the Maximum Allowable Concentrations MACs have been reduced based on the most recent technical and scientific information. For example, the standard for lead has been reduced from 50 µg/l to 10 µg/l. The standards against which the data for EU15 countries has been examined are those from the original directive (80/778/EEC) since Member States do not have to comply with the new directive until 2003.

The sub-indicator shows that there are still problems with the quality of drinking water in terms of the proportion of the population exposed to microbiological and other contaminants. In the 9 EU15 countries for which data were available, at least 12% of citizens were potentially exposed to microbiological and some other undesirable contaminants exceeding the MACs (figure 3). In addition to this Belgium, France and the UK all had high exceedances of total pesticides. The new drinking water directive has more stringent requirements for certain pesticides.

Central and Eastern Europe: About 4% of samples failed microbiological standards in 2000 (figure 3) with Slovakia having the highest exceedances of total coliforms and faecal coliforms. These parameters are considered to be indicative of faecal contamination, which can lead to the spread of waterborne disease. Also about 15% of samples did not meet physico-chemical parameters (figure 3) mainly due to conductivity failures and contamination from magnesium, aluminium, chlorides and sulphates.

Newly Independent States: The percentage of samples exceeding microbiological standards in the NIS is between about 5 and 30% (figure 4). Exceedances are higher in non-centralised sources. At least 50% of the population of the Russian federation is thought to be at risk from unclean water (OECD EPR Russia, 2000).

Data

Table 1: Population exposed to contaminants by category of contaminant in each country that supplied data. Percentages are averages of all the years that the country supplied data for as shown in brackets.

Country	Microbiological	Organoleptic	Physico-Chemical	Toxic	Undesirable
BE (1993-1994)	38.4	8.2	18.9	0.0	18.7
DE (1993-1995)	1.6	0.4	2.6	0.0	4.6
EL (1993-1995)	63.1	55.2	54.2	0.0	37.6
ES (1993-1995)	27.3	17.1	31.1	0.1	23.1
EST (1997-2001)			6.8		7.9
FR (1993-1995)	43.8	22.4	10.8	15.9	17.6
HU (1997-2001)	33.0		50.3	0.3	29.4
IE (1993-1995)	34.7	32.5	19.6	1.2	35.8
IT (1993-1995)	7.5	3.8	3.3	0.0	5.8
LAT (1999-2001)	35.1	50.8	2.3		53.9
NL (1993-1995)	25.6	6.8	0.5	17.3	14.5
UK (1993-1995)	12.1	6.2	10.4	45.0	40.1

Spreadsheet files:

Population exposed table.xls
Percentage population exposed EU15.xls
CCE countries.xls
NIS countries.xls
Population exposed table.xls

References

CEETAC (2000) Water for the 21st Century.
OECD (1999) Environmental Performance for Belgium, Organisation for Economic Co-operation and Development, Paris
OECD (1999) Environmental Performance for Czech Republic, Organisation for Economic Co-operation and Development, Paris.
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United Nations Economic Commission for Europe (1999) Environmental Performance Reviews: Ukraine. Economic Commission for Europe, Committee on Environmental Policy. United Nations, New York and Geneva.
WHO (2001) Fact Sheet No 210, Arsenic in Drinking Water. WHO web page, URL:
http://www.who.int/inf-fs/en/fact210.html

Meta data

Technical information

1. Data source: National Reports (SoE, OECD and UN EPRs). European Commission DGEnv. Member States returns required under the Reporting Directive. Data collected through questionnaire by ETC-Water

2. Description of data: Textural descriptions from National Reports. Responses to standardised questionnaires from DGEnv and data collected by ETC-Water. The information is available at a more dis-aggregated level. For example the returns can be broken down by Country, by parameter and by the number of samples exceeding their MACs.

3. Geographical coverage: There are national reports for most EEA countries and NIS. Data from DGEnv is only for 9 EU15 countries (12 were supposed to report the information in 1993 to 1995). Data collected by ETC-Water is for 5 Central and Eastern European countries but some information is missing.

4. Temporal coverage: National Reports often for 1 year only. From 1993 to 1995 for EU15, 1997 to 2001 for CEE countries.

5. Methodology and frequency of data collection. DGEnv collects information from Member States every 3 years. New data from EU15 has not been made available.

6. Methodology of data manipulation. Main drinking water problems were from textural descriptions in National Reports. Also some data e.g. % microbiological exceedances for the NIS are from the UNECEPRs. DGEnv returns for 1993-95 were aggregated from paper

(sometimes hand-written) returns. Future data manipulation should be possible electronically (database). CEE countries supplied data electronically.

Qualitative information

7. Strength and weakness (at data level). Lack of actual data and so main indicator was based on textural descriptions from National Reports and so is only general. For the DGEnv data, only 9 of the EU15 countries responded for the first reporting period and only 5 CEE countries to the recent request. All of a country's population is not necessarily covered by the returns (e.g. small rural supplies). Also exceedence of MACs is only a crude indication of exposure. For the EU15 1993 to 1995 returns there was no information on the **level** or **duration** of exceedences and this was also mainly the case for the CEE country returns. Hence an assessment of the **significance** of the exposure could not be made. However the indicator gives a good general impression of the problems in drinking water supplies.

8. Reliability, accuracy, robustness, uncertainty (at data level). As stated above the data were limited because of inability to assess significance of exposure to populations. However this should improve during subsequent reporting periods. There is also often ambiguity in the returns, which can lead to uncertainty.

9. Overall scoring (give 1 to 3 points: 1=no major problems, 3=major reservations):
Relevancy: 1
Accuracy: 2
Comparability over time: 2
Comparability over space: 2

Further work required

Electronic templates developed for DGEnv should ensure speedy analysis of information, and also a more complete response from all EU15 countries. The other EEA countries should also supply the same information through the same templates and then this can be put into a database and the analysis of the information will be relatively straightforward.