



LEARNING TOXICOLOGY
THROUGH OPEN EDUCATIONAL
RESOURCES

ENVIRONMENTAL QUALITY EUROPEAN ENVIRONMENT AGENCY

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1. INTRODUCTION

The presentation below is part of the Module 6, Topic 4, as additional information related to Unit 4.

This unit / course will present several European institutions involved in the environmental monitoring, with their main tasks and activities:

1. European Environment Agency (EEA);
2. Environmental Protection Agencies Network;
3. Joint Research Centre (JRC).

At the end of the course, students will be able to

- present the European institutions /organisations involved in the environmental monitoring;
- navigate on these institutions websites;
- select adequate information on the environmental quality and comment relevant monitoring results.

2. EUROPEAN ENVIRONMENT AGENCY

The European Environment Agency (EEA) is one of the European agencies that provides independent information on the environment thereby helping those involved in developing, adopting, implementing and evaluating environmental policies, as well as informing the general public.

The European Environment Agency has 39 member countries, not only the 28 countries of the European Union, but also 5 non-EU countries and 6 more cooperating countries.

In Table 1. are presented the 28 member countries of the European Union, where in “italics” are marked the partner countries involved in the TOX-OER project. More information are available on the European Environment Agency website <https://www.eea.europa.eu/countries-and-regions>.

Table 1. EU member states, also member of the European Environment Agency.

1. Austria	11 Germany	20. Netherlands
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2. Belgium	12. Greece	21. Poland
3. <i>Bulgaria</i>	13. Hungary	22. <i>Portugal</i>
4. Croatia	14. Ireland	23. <i>Romania</i>
5. <i>Czech Republic</i>	15. <i>Italy</i>	24. Slovakia
6. Cyprus	16. Latvia	25. Slovenia
7. Denmark	17. Lithuania	26. <i>Spain</i>
8. Estonia	18. Luxembourg	27. Sweden
9. <i>Finland</i>	19. Malta	28. United Kingdom ⁽¹⁾
10. France		

⁽¹⁾ United Kingdom is scheduled to leave EU on 30 March 2019

Apart of the 28 EU member countries, presented in green on the map (Figure 1.) the non-EU member countries are marked with blue arrows, while the black arrow is for the cooperating countries, from Eastern Balkan Peninsula.

Considering the date on which the European Environment Agency was established and the geographical extension of the member countries, it is obvious that EEA is not an agency of interests only for the European Union member countries.

EEA also cooperates with more countries and regions, in the context of the European Neighbourhood Policy:

- Eastern Partnership (EaP) states: Armenia, Azerbaijan, Belarus, Moldova, Georgia and Ukraine;
- Union for the Mediterranean (UfM) states: Algeria, Egypt, Israel, Jordan, Lebanon, Libya, Morocco, Palestinian Authority, Syria and Tunisia;
- European Neighbourhood and Partnership Instrument (ENPI) states: Russia;
- Central Asia states: Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan.

Moreover, EEA cooperates with multiple international organizations and the corresponding agencies of the following countries:

- United States of America, with the Environmental Protection Agency;
- Canada, with the Environment Canada;
- PR China, with the State Environmental Protection Administration.

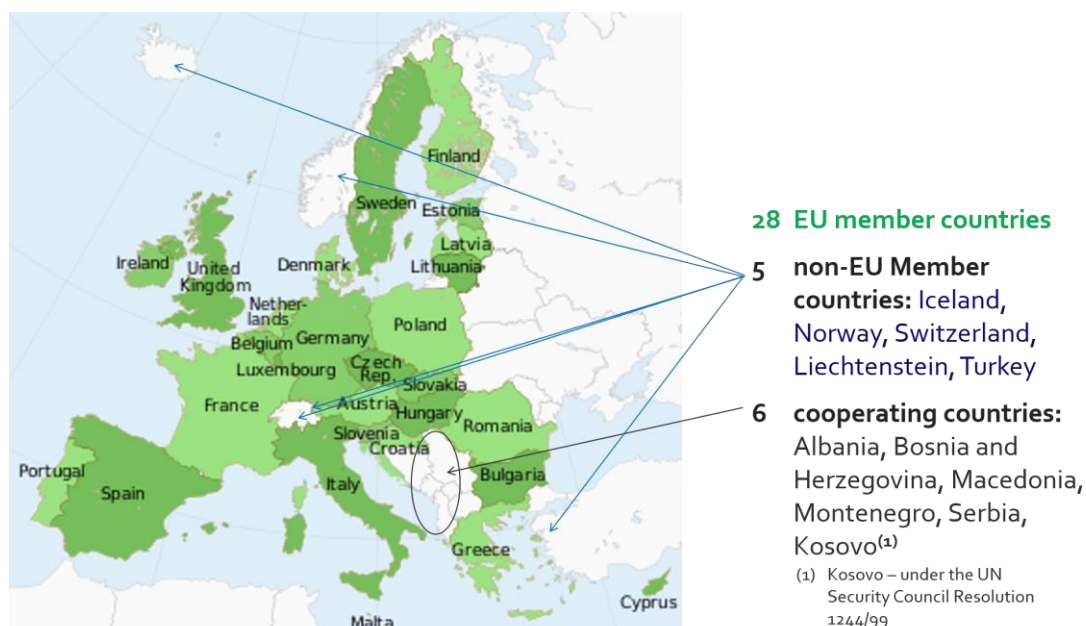


Figure 1. Map of the EEA member countries

The four themes and sub-themes of interest for the European Environment Agency are presented in Table 2.:

- *air and climate*, including sub-themes air pollution, climate change adaptation and climate change mitigation;
- *nature*, with biodiversity - ecosystems, land use, soil, and water and marine environment as sub-themes;
- *sustainability and well-being*, with environment and health, policy instruments, resources efficiency and waste, sustainability transitions as sub-themes;
- *economic sectors*, with the agriculture, energy, industry and transport as sub-themes, activities influence the quality of the environment.

From all these themes and sub-domains of the European Environment Agency, we have selected for further presentation, those sub-themes that are of interest for the monitoring of the environment quality: *air pollution, soil, water and marine environment*.

Table 2. EU member states, also member of the European Environment Agency.

Air and climate	Nature	Sustainability and well-being	Economic sectors
<i>Air pollution</i>	Biodiversity — Ecosystems	Environment and health	Agriculture

Climate change adaptation	Land use	Policy instruments	Energy
Climate change mitigation	<i>Soil</i>	Resource efficiency and waste	Industry
	<i>Water and marine environment</i>	Sustainability transitions	Transport

More information are available on the European Environment Agency site <https://www.eea.europa.eu/themes>.

2.1. EUROPEAN ENVIRONMENT AGENCY. AIR POLLUTION

From the EEA website, air pollution section, a map showing the positions of the air monitoring stations was selected (<http://www.eea.europa.eu/themes/air/air-quality-index>). The map also gives information on the European air quality index, presented in five quality classes, from good to very poor (Figure 2.), informing people in real time about the air quality, how clean is the air where they live, at the time of map visualising.

To be noticed that at the time of downloading this map there were air quality monitoring stations that did not provide data to EEA, either the stations were not working any longer, or data transmission was deficient, such as in Iceland, Italy, Romania, Turkey and a part from the cooperating countries. On the other hand, one can be noticed that regions highly industrialized are those with poor air quality.

The EU air quality regulations Directive 2008/50/EC on Ambient Air Quality and Cleaner Air for Europe and Directive 2004/107/EC on heavy metals and polycyclic aromatic hydrocarbons in ambient air set pollutant concentrations thresholds that shall not be exceeded in a given period of time.

Such air quality standards are presented in Table 3., comparing the pollutants concentrations thresholds set by the European Directives, with those accepted by the World Health Organization (<https://www.eea.europa.eu/themes/air/air-quality-standards>).

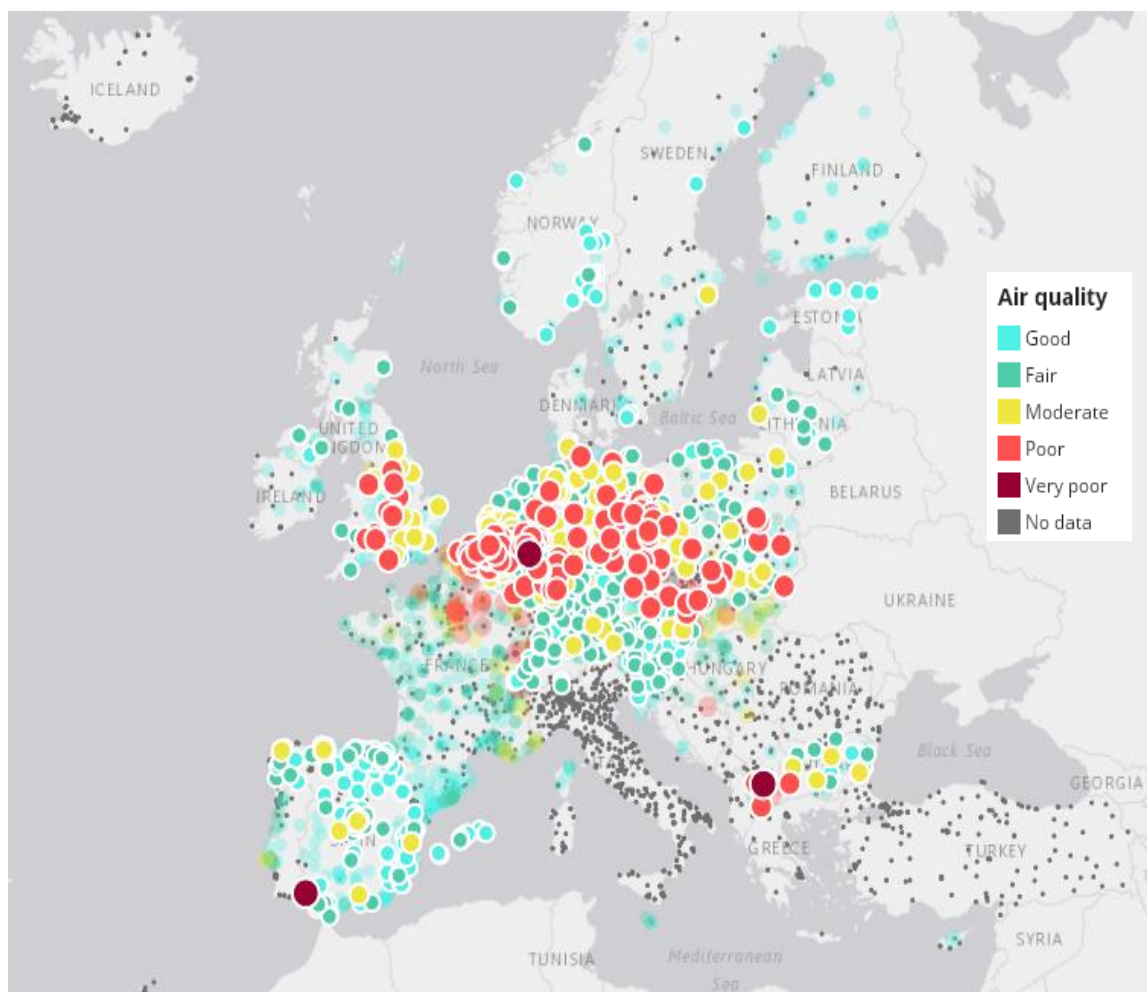


Figure 2. Map of the European Air Quality Index

Table 2. Air quality standards.

EU Air Quality Directive				WHO Guidelines
Pollutant	Averaging period	Objective	Concentration ($\mu\text{g}/\text{m}^3$)	Concentration ($\mu\text{g}/\text{m}^3$)
PM _{2.5}	daily			25
	annual	limit value	25	10
PM ₁₀	daily	limit value	50	50
	annual	limit value	40	20
O ₃	maximum daily 8-hours mean	target value	120	100
NO ₂	daily	limit value	200	200
	annual	limit value	40	40



The European Directive indicates the concentration, either as a limit values or as a target values, and for different averaging periods: daily, annually or maximum daily 8-hours mean. Only the PM₁₀ and NO₂ daily average accepted by the two regulations are similar, 50 µg/m³ and 200 µg/m³, respectively, the others being different.

A comment on the European Environment Agency website has caught our attention: **“Air pollution is the single largest environmental health risk in Europe”**.

More information, as graphs and interactive maps, can be obtained from the European Environment Agency website.

2.2. EUROPEAN ENVIRONMENT AGENCY. WATER AND MARINE ENVIRONMENT

Another theme of interest for our course is the quality of water and the marine environment. The EEA website mentions that the European continental waters encounter several millions km of flowing water, more than a million lakes and the member countries have open to nine seas and the Atlantic Ocean:

- Baltic Sea – of interest for TOX-OER Finland partner;
- Black Sea – of interest for TOX-OER partners Romania and Bulgaria;
- Mediterranean Sea – of interest for TOX-OER partners Spain and Italy;
- North Atlantic Ocean – of interest for TOX-OER partners Spain and Portugal;
- Barents Sea;
- Caspian Sea;
- North Sea;
- Norwegian Sea;
- Sea of Azov;
- White Sea.

On the map presented in Figure 3., the position of the water monitoring stations all over EEA countries are indicated (<http://www.eea.europa.eu/data-and-maps/explore-interactive-maps/overview-of-soe-monitoring-stations>):

- with the green dots are the river stations;
- with the blue dots are the lakes stations;
- with the red-brown dots are the groundwater stations.

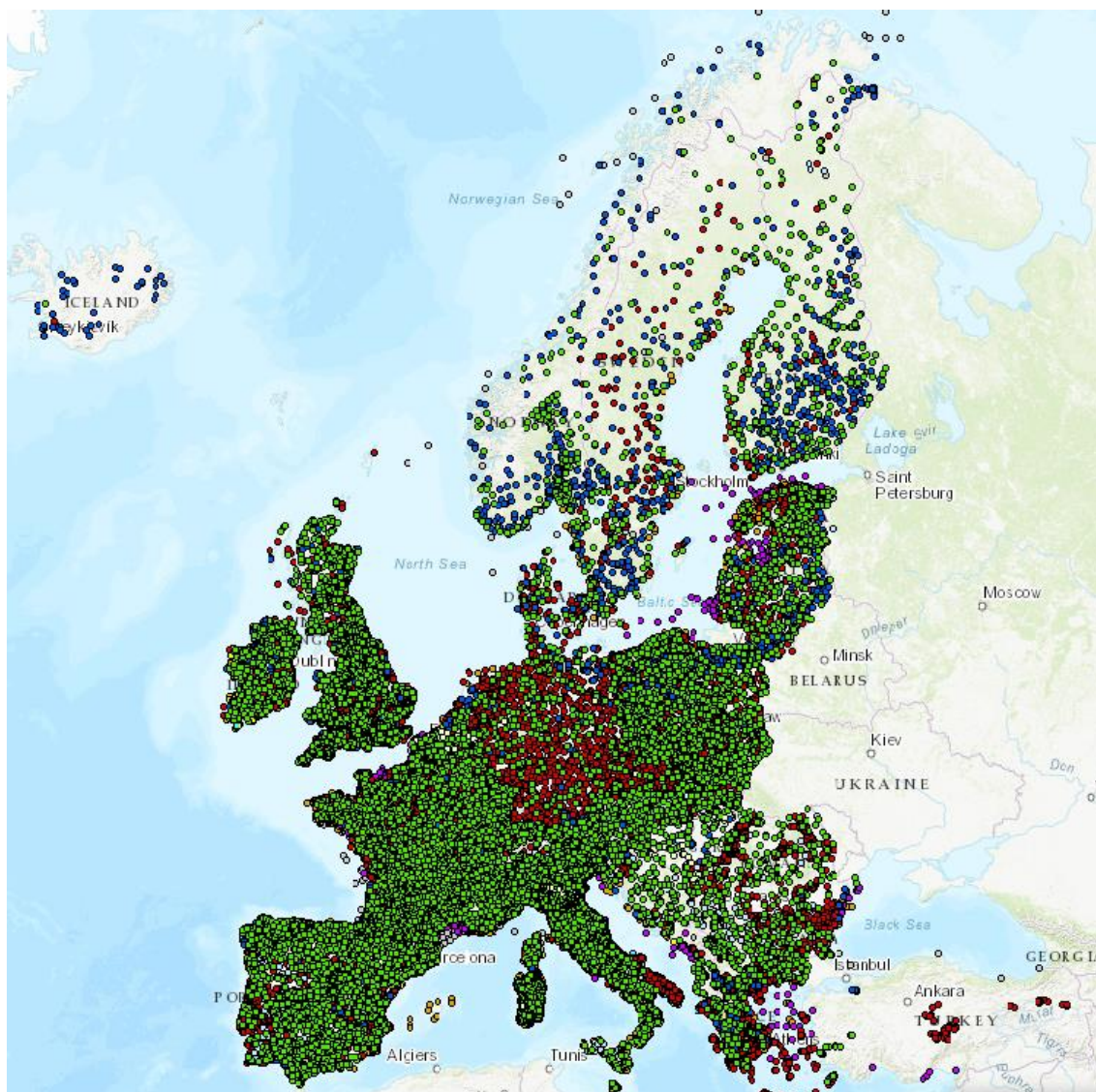


Figure 3. Water quality monitoring stations: green dots – river stations; blue dots – lakes stations; red-brown dots groundwater stations.

One can observe the density of the monitoring station network, rivers stations being predominant. Similar with air quality monitoring stations map, the situation in different countries and regions can be zoomed.

Another selection of maps to indicate a classification of water bodies in different river basins is given in Figure 4. The upper map, shows the waters quality for the continental hydrographic basins (streams, lakes), while the lower map gives the waters quality for coastal and transnational areas.

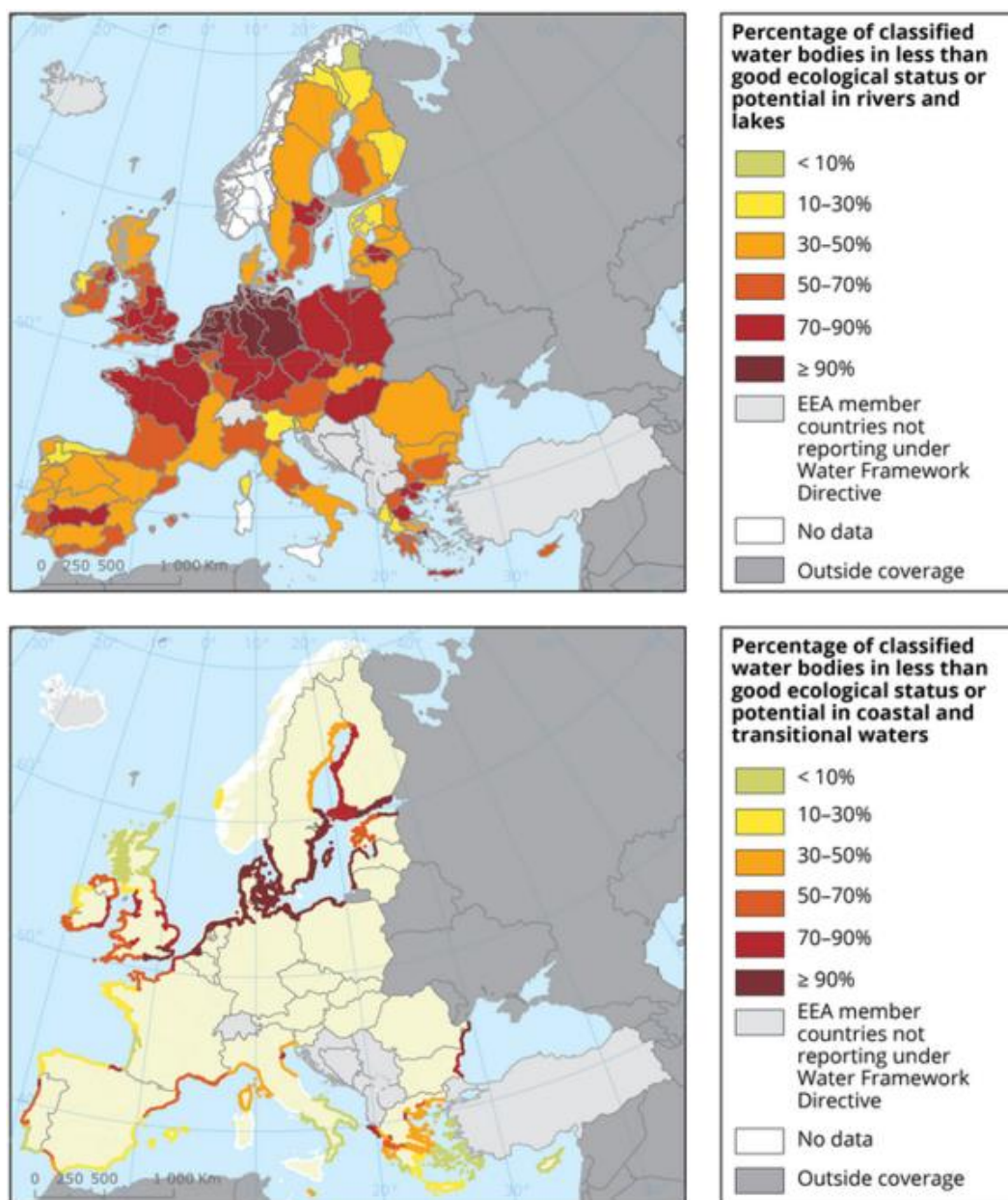


Figure 4. Classified surface water bodies in different basin districts: rivers and lakes (up); coastal and transnational waters (down).

There is a symmetry between the lower quality of the continental waters adjacent to marine areas and the lower quality of related coastal waters, for example the waters of the rivers the waters quality North Europe and of the coastal areas from the Baltic Sea and the North Sea. Similar with the air quality, water quality in North Europe is influenced by industrial, energy production and transport activity, more developed than elsewhere in Europe (<https://www.eea.europa.eu/data-and-maps/figures/proportion-of-classified-surface-water-3>).

Another selected map shows the mercury emissions in European waters, recorded in 2007 (Figure 5.), different coloured dots corresponding to emissaries (expressed in kg/year) and coloured regions corresponding to the emissions in hydrographic basins (expressed in g/km²/year) <https://www.eea.europa.eu/data-and-maps/figures/soer2010-thematic-assessment-freshwater-quality>.

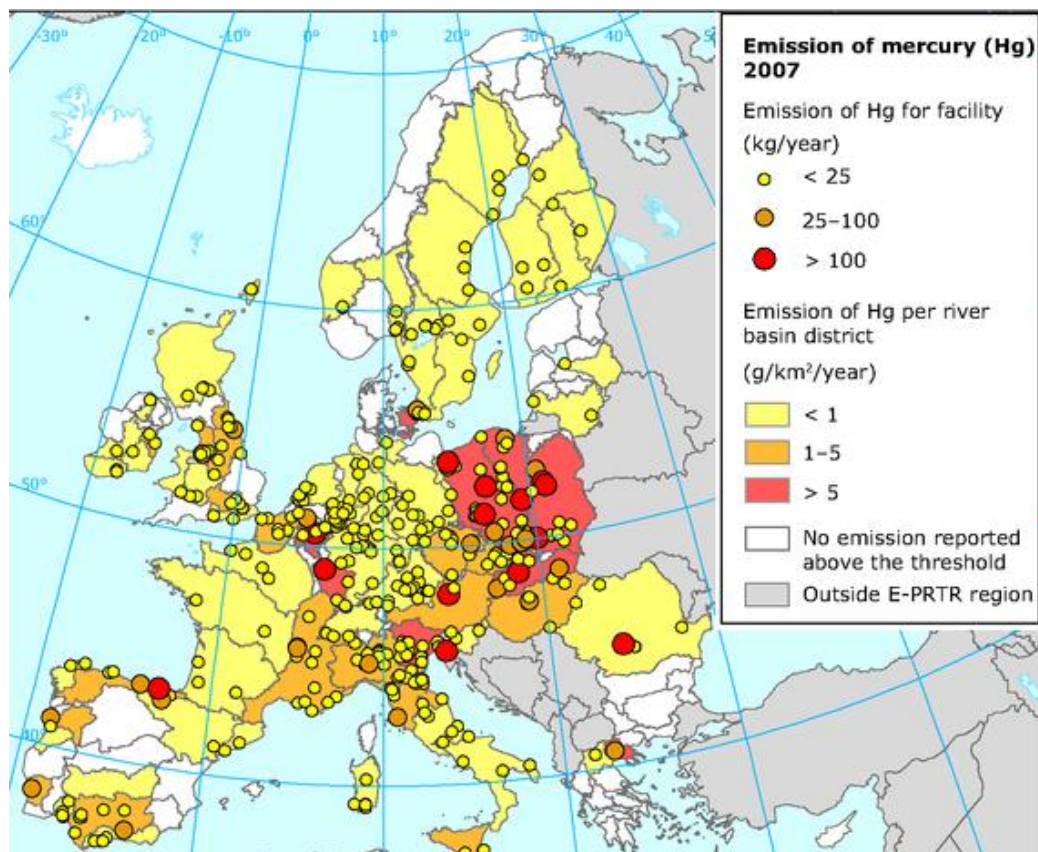


Figure 5. Emissions of mercury to European waters.

Other maps or graphs related to water quality and coastal areas are also available on the EEA website.

2.3. EUROPEAN ENVIRONMENT AGENCY. SOIL

The third sub-theme of interest for our course, also presented on EEA website is the "soil" one. For this, two graphs were selected (Figure 6.), showing the following (<https://www.eea.europa.eu/themes/soil/soil-threats>):

- the activities contributing to soil contamination, of which industrial activity and commercial services have the highest contribution (41.4%), followed by

- municipal waste treatment and disposal (15.2%) and those of oil industry (14.1%).
- contaminants affecting soil and groundwater quality in Europe; heavy metals contribution is of 37.3%, followed by mineral oils with 33.7% and polycyclic aromatic hydrocarbons with 13.3%.

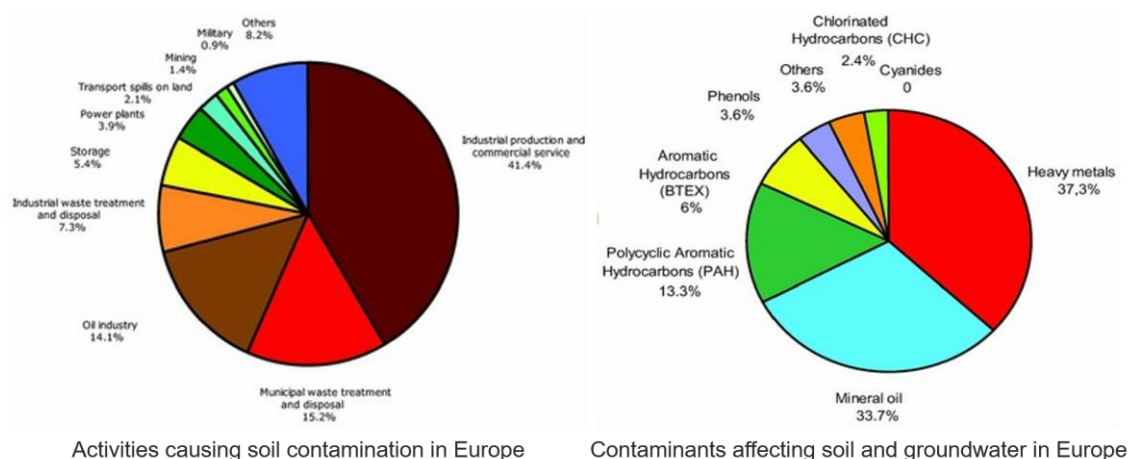


Figure 6. Soil quality in Europe – sources of contamination and contaminants.

The site of the European Environment Agency presents in this sub-theme domain other graphs and maps on the status of the identification and management of the contaminated sites, in different European regions monitored by EEA.

2.4. STATE OF THE ENVIRONMENT REPORT

The European Environment Agency annually publishes a State of the Environment Report with the acronym SOER. The latest available report is the 2015 one, downloadable from the EEA website, <https://www.eea.europa.eu/soer>.

SOER 2015 provides a comprehensive assessment of the European environment's state, trends and prospects, informs about the European environmental policy implementation between 2015 and 2020 and analyses the opportunities to modify existing policies in order to achieve the European Union's 2050 vision of living well within the limits of the planet

The report on the state of the environment in Europe contains five chapters:

1. **Synthesis report** chapter informs future European environmental policy in general, and its implementation between 2015 and 2020 in particular.

2. **Global megatrends** chapter assesses 11 global megatrends (GMT) of importance for Europe's environment in the long term.
3. **European briefings** chapter present the state, recent trends and prospects in 25 key environmental themes, grouped in three clusters: environment, socio-economic, and systemic perspectives.
4. **Cross-country comparisons** chapter provide an analysis of progress across European countries for 9 different selected topics: agriculture, air pollution, biodiversity, energy freshwater quality, climate change, resource efficiency, transport and waste.
5. **Country briefings** chapter provide an overview of state of the environment across the 39 European countries, based on national reports emitted by the Environmental Protection Agencies or similar institutions from each EEA member country.

Of all the chapters of the SOER 2015, we selected a series of documents downloaded from the SOER 2015 site, considered to be of interest to this course and included in the supporting text documents.

3. ENVIRONMENTAL PROTECTION AGENCIES NETWORK

As already mentioned in the presentation of SOER 2015, this report is also based on data provided by the national agencies from each of the 39 member countries. In this respect, a network of the Environmental Protection Agencies (EPA) and of similar bodies across Europe, called EPA Network, has been established.

It is an informal grouping of the heads and directors of national European Environmental Protection Agencies and similar bodies across Europe, that was established in 2003 and has 39 member organizations, corresponding to the 39 EEA member states (<http://epanet.pbe.eea.europa.eu/>).

Tasks of EPAs within individual countries are related to:

- oversee and implement the environmental related obligations;
- enforce national laws.

The main tasks of EPAs:

- informational and data handling tasks, like research, monitoring and information systems and assessment;

- operational tasks, like advice to ministries and citizens and enforcement of regulations and licensing.

4. JOINT RESEARCH CENTER

The third European organization that will be presented, involved in environment monitoring in Europe, is the Joint Research Centre (JRC), which is a European Commission's science and knowledge service. JRC supports European Union policies with independent scientific evidence throughout the whole policy cycle.

JRC contributes to a healthy and safe environment, secure energy supplies, sustainable mobility and consumer health and safety and has specialized laboratories and unique research facilities that contribute to the above-mentioned studies (<https://ec.europa.eu/jrc/en/research-topic/environmental-monitoring>).

Of the 45 research fields of JRC we will mention a of list 7, selected as being of interest for our course.

1. Air quality and greenhouse gases;
2. Coastal and marine environment;
3. Radioactive environmental monitoring;
4. Reference materials for environmental analysis;
5. Soil;
6. Soil protection;
7. Water.

The Joint Research Centre website presents all these domains of interest, specific research programs and projects, as well as research results, reports and articles. Some of these are indicated as an additional source to be consulted for this course.

REFERENCES

1. Directive 2008/50/EC on Ambient Air Quality and Cleaner Air for Europe.
2. Directive 2004/107/EC on heavy metals and polycyclic aromatic hydrocarbons in ambient air.
3. <https://www.eea.europa.eu/countries-and-regions>
4. <https://www.eea.europa.eu/themes>
5. <http://www.eea.europa.eu/themes/air/air-quality-index>
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7. <http://www.eea.europa.eu/data-and-maps/explore-interactive-maps/overview-of-soe-monitoring-stations>
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11. <https://www.eea.europa.eu/soer>
12. <http://epanet.pbe.eea.europa.eu/>
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