

# Management of contaminated sites in Europe



# EU environmental policies: soil protection

## 60-70% of our soils are unhealthy as a direct result of current management practices

- 21% of agricultural soils with Cd > limit for drinking water; 83% of an EU-wide representative soil sample have residual pesticides
- Contaminated sites pose risk to drinking water quality, biodiversity and human health

[EU Mission Board Soil Health and Food (2020)]



# EPA's State and Outlook of the Environment Report (SOER) 2020

Air Pollution	Past trends (10-15 years)	Outlooks 2030
Emissions of air pollutants	Trends show a mixed picture	Developments show a mixed picture
Concentrations of air pollutants	Improving trends dominate	
Air pollution impacts on human health and wellbeing	Improving trends dominate	
Air pollution and impacts on ecosystems	Trends show a mixed picture	
<b>Chemical Pollution</b>		
Emissions of chemicals	Trends show a mixed picture	Deteriorating developments dominate
Impacts of chemical pollution on ecosystems		
Chemical pollution and risk to human health and well-being		
<b>Industrial Pollution</b>		
Pollutant emissions from industry	Improving trends dominate	Developments show a mixed picture
Clean industrial technologies and processes		
<b>Freshwater</b>		
Pollution pressures on water and links to human health	Developments show a mixed picture	Developments show a mixed picture
<b>Land and Soil</b>		
Soil condition	Deteriorating trends dominate	Deteriorating developments dominate

# Local Soil Pollution in the EU policy context

- **Soil Thematic Strategy (STS, 2006):** soil protection encompassing the major soil threats, including local and diffuse contamination (revision 2021)
- **Water Framework Directive (2000):** River Basin Management Plans, requiring the identification of point sources and their impacts
- **Road Map for a Resource Efficient Europe (2011):** By 2020 remedial work on contaminated sites well underway.
- **Others with regard to soil pollution:** Industrial Emissions Directive (inventory of industrial operations), Seveso Directive, Landfill Directive, Pesticides Directive, Sewage Sludge Directive, Mercury Regulation



# EU policy context: elements under the Green Deal

- **Biodiversity Strategy 2030:**
  - BDS 2020: voluntary approaches ineffective (to restore at least 15% of degraded ecosystems)
  - BDS 2030, among others: the risk and use of chemical pesticides is reduced by 50%
  - Legally binding EU nature restoration targets (2021) to restore degraded ecosystems
    - *incl. soil pollution*
- **Farm2Fork:** to reduce the overall use and risk of chemical pesticides by 50% and the use of more hazardous pesticides by 50% by 2030



# EU policy context: elements under the Green Deal

## Zero pollution ambition for a toxic-free environment: (1) Chemicals Strategy and (2) Zero Pollution Action Plan for Air Soil and Water

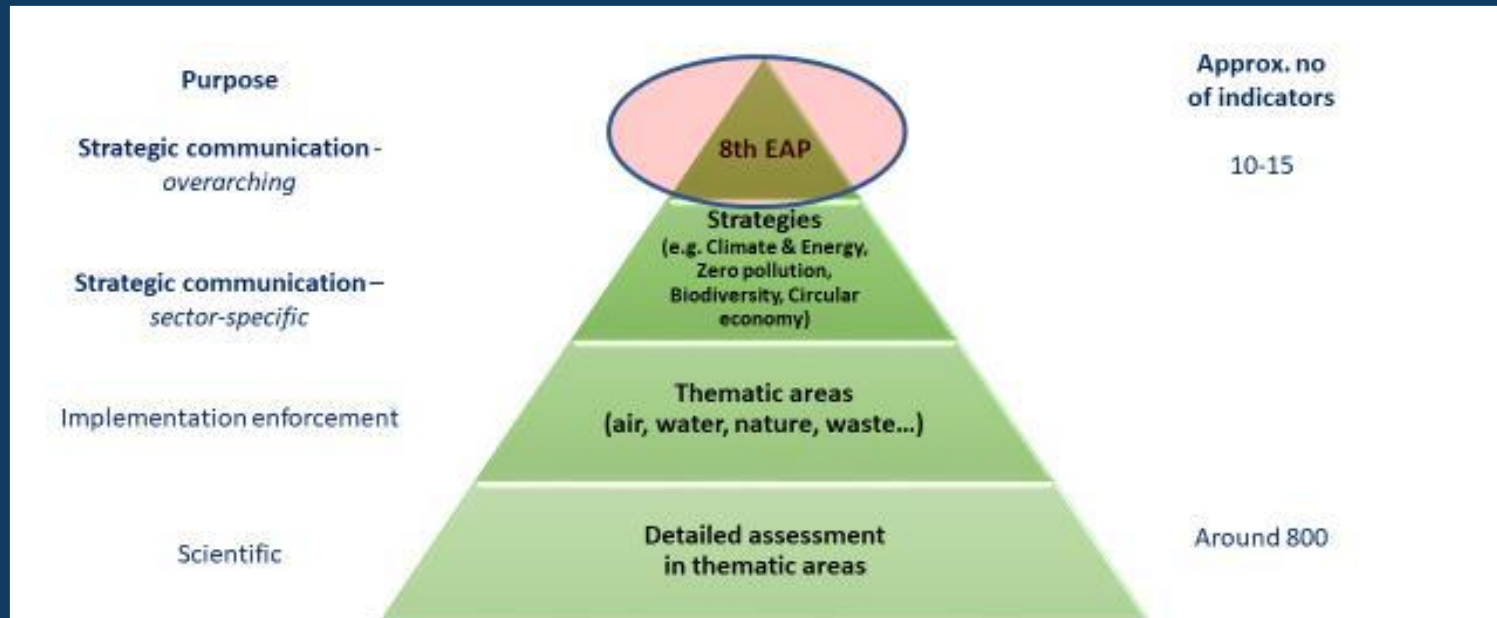
- To better monitor, report, prevent and remedy pollution from air, water, soil, and consumer products.
- To propose new legislation covering significant pollution sources, which are not yet addressed.
- To facilitate **remediation of soil pollution** via i) a monitoring framework on the state of pollution, and ii) an outlook report.



# Soil Pollution in the EU policy context

- **Soil Mission Board for Soil, Health and Food** suggests to double the rate of restoration of polluted sites
- **8<sup>th</sup> Environmental Action Programme**: accelerate the Union's transition to a climate-neutral, resource-efficient clean and circular economy ➤ 8<sup>th</sup> EAP monitoring framework

8<sup>th</sup> EAP  
headline  
indicator set



# Status of Local Soil Contamination in Europe

## EEA Indicator **LSI003** “Progress in the management of contaminated sites in Europe”

Voluntary exchange of definitions, statistics, methodical background, by country, based on questionnaires among the National Reference Centres (NRC) Soil:

- Until 2018: Ad Hoc Working Group Contaminated Sites (Lead: Ana Payá Pérez, JRC, IT)
- Since 2019: WG Soil Contamination (Lead: Frank Swartjes, RIVM, NL)

Report 2017 "European Achievements in Soil Remediation and Brownfield Redevelopment"

Report 2018 "Status of Local Soil Contamination in Europe"

Indicator: EEA 2014: Progress in management of contaminated sites





# EEA/Eionet history on soil contaminated sites

## I. 6 data-collection exercises 2001-2006

4 management steps: preliminary study/site identification, preliminary investigation, main site investigation, implementation of risk-reduction measures

## II. 2011 questionnaire , report 2014

Introduced: 'potentially contaminated sites' (PCS), 'contaminated sites' (CS) and 'sites under remediation'

### ➤ **Leading to updates of LSI 003 (2006/2014)**

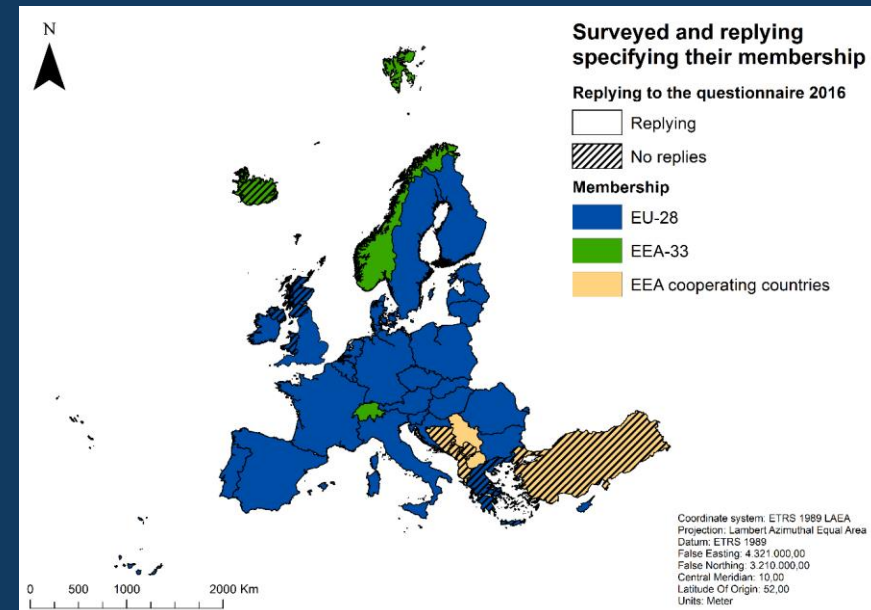
Distinguishes: polluting activities and sectors, contaminants, expenditures  
27 countries report 1.17 Mio potentially contaminated sites; 30 countries have comprehensive inventories (24 national, 6 regional)

For EEA-39: 2.5 Mio potentially contaminated sites estimated, of which about 14 % (342 000 sites) has been identified (of which 15% has been remediated)

# EEA/Eionet history on soil contaminated sites

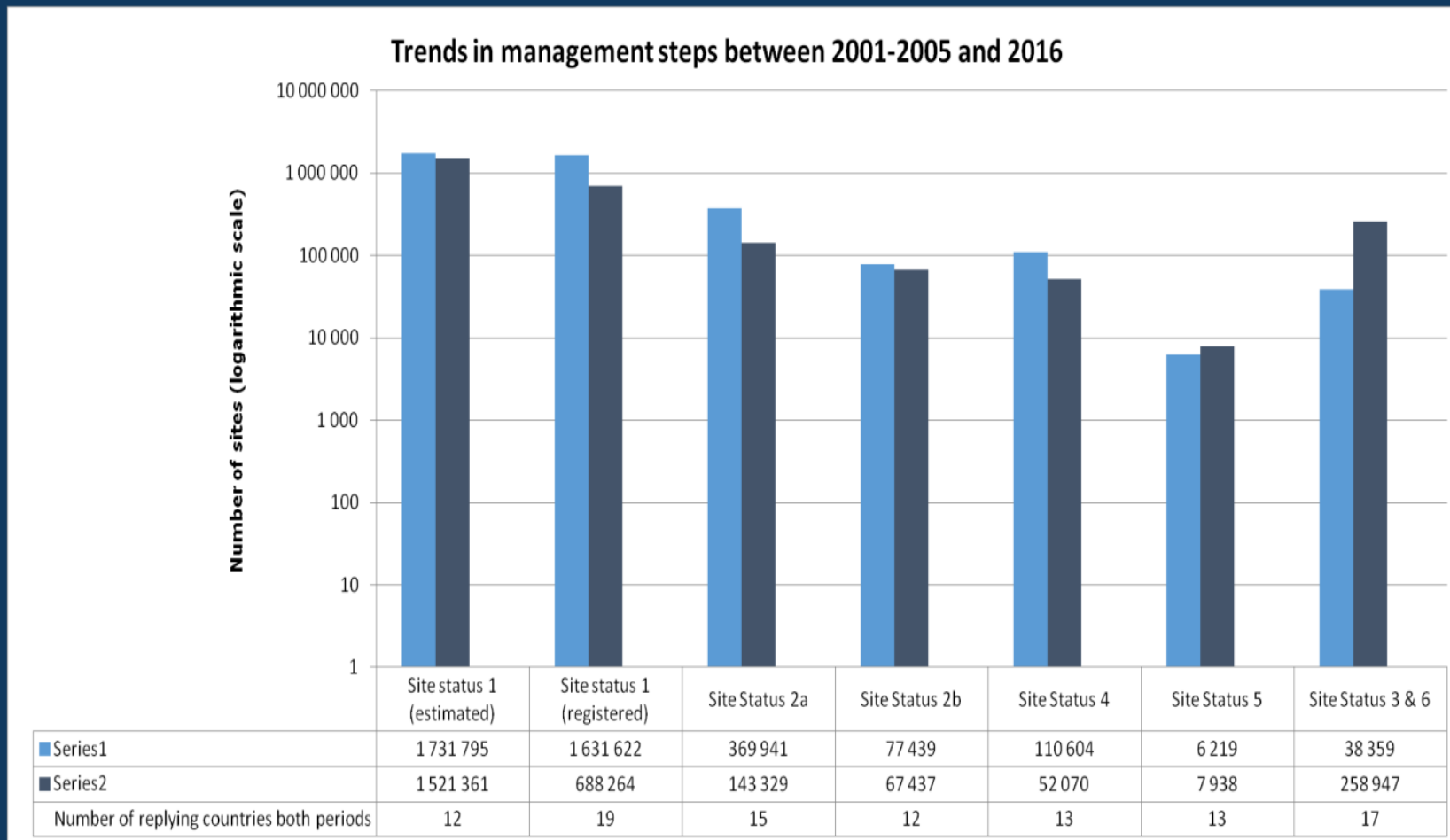
## III. 2016 questionnaire

- Status 1: sites where polluting activities took/are taking place.
  - Status 2: sites in need of investigation.
  - Status 3: sites that have been investigated but no remediation is needed.
  - Status 4: sites that need or might need remediation or risk-reduction measures
  - Status 5: sites under/with ongoing remediation or RRM.s.
  - Status 6: site remediation or RRM.s completed or sites under aftercare measures
- 6 site statuses:
- 27 countries responded to the questionnaire, partially incomplete (questions, area coverage)
  - 2.8 Mio **estimated** contaminated sites
  - > 650,000 registered sites
  - > 14,000 under remediation (235,000 already remediated)
  - Comprehensive inventories exist in 28 out of 39 countries



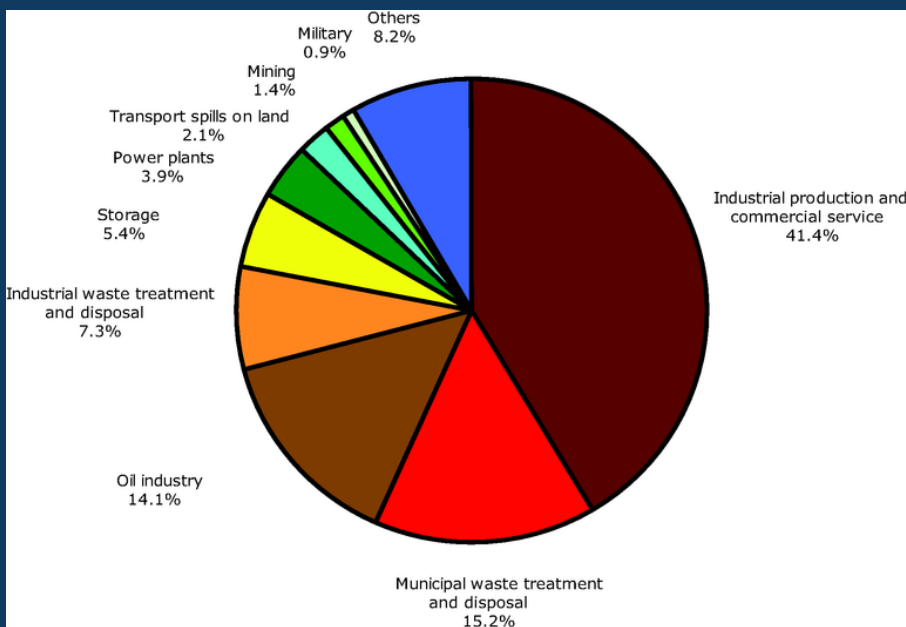
# Trend of LSI003

Site status can be mapped throughout questionnaires, however the statistics are difficult to combine (different sub classes, gaps for different countries, incomplete registers).



# Challenges and steps to improve LSI003

## Potentially soil polluting activities<sup>1)</sup>



1. Establishments, dangerous substances  $\geq$  "Seveso" (96/82/EC<sup>2)</sup>).
2. Activities listed in 96/61/EC, Annex I (IPPC)
3. Airports
4. Ports
5. Former military sites
6. Petrol and filling stations
7. Dry cleaners
8. Mining installations not covered by 96/82/EC, incl. extractive waste facilities (see 2006/21/EC<sup>3)</sup>)
9. Landfills of waste as defined in Council Directive 1999/31/EC<sup>18</sup> (on the landfill of waste)
10. Waste water treatment installations
11. Pipelines for the transport of dangerous substances

<sup>1)</sup> COM/2006/0232 final: draft directive establishing a framework for the protection of soil

<sup>2)</sup> Control of major-accident hazards involving dangerous substances, Annex I

<sup>3)</sup> 2006/21/EC management of waste from extractive industries (nuclear and fossil fuels, metals, construction materials)



# Challenges and steps to improve LSI003

Question related to these activities, and the degree to which they are covered by policies (EU and national):

Local contaminated sites	Policy	Questions
Dangerous substances	"Seveso" (96/82/EC)	any installation or activities, or chemical industry? Only emergencies (spills, leakages)
"Activities"	96/61/EC, Annex I (IPPC)	which "activities" and based on which selection criteria (emission load, ETS, see PRTR)
Airports	?	substances, policies, remediation/monitoring requirements
Ports	?	
Former military sites	?	
Petrol filling stations	?	
Dry cleaners	?	
Mining installations	not covered by 96/82/EC, incl. extractive waste facilities (see 2006/21/EC	
Landfills of waste	as defined in Council Directive 1999/31/EC18 (on the landfill of waste)	
Waste water treatment installations	?	define, which policies
Pipelines for the transport of dangerous substances	?	is that a contaminated site?



# Challenges and steps to improve LSI003

## Groups of solid and liquid pollutants

(reported by 16 countries, acc.to Panagos et al. 2013):

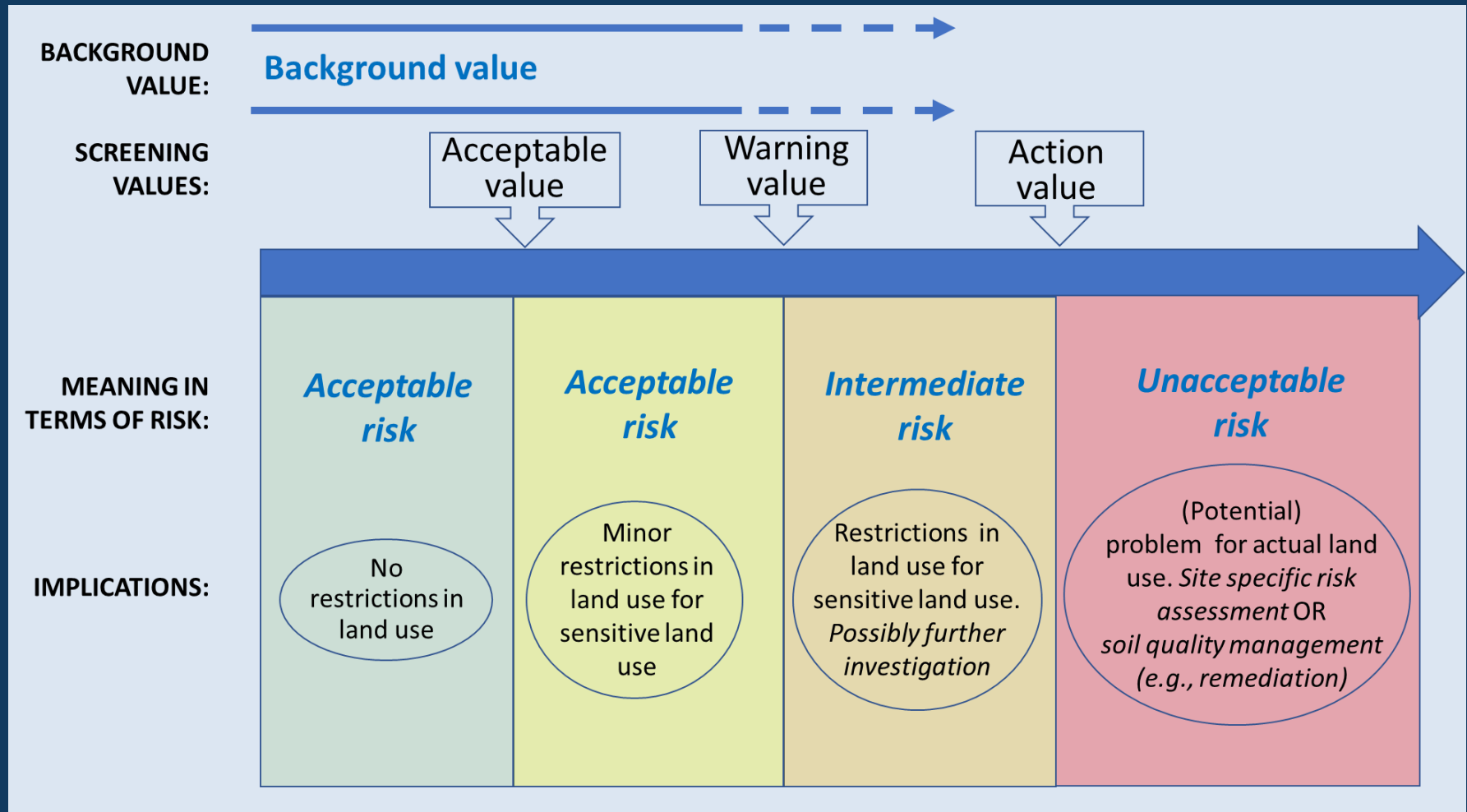
- i. chlorinated hydrocarbons (CHCs)
  - ii. mineral oil
  - iii. heavy metals
  - iv. polycyclic aromatic hydrocarbons (PAHs)
  - v. phenols
  - vi. cyanides
  - vii. aromatic hydrocarbons (BTEX: benzene, toluene, ethyl benzene, and xylene)
  - viii. others
- 60% of polluted sites

**Questions: relevance of substances in soils? Dynamics? Priority substances?**



# Challenges and steps to improve LSI003

## Harmonization: sites are identified based on different criteria



# Conclusions

- Indicator *LS1003* is the only EU-wide (+neighbors, EEA-38) repository of information about contaminated sites
- The indicator can be somewhat updated using the 2016 questionnaire, but improvement of its content is developing this indicator as a monitoring instrument under the currently evolving policy frameworks
- A policy process may then support countries in further improving their detection, monitoring, and remediation activities
- Overview of challenges
  - Data from questionnaires are static
  - Large inconsistencies and gaps (definitions, statistics)
  - Revise list of polluting activities, address brownfields
  - Develop priority list of substances
  - Discuss harmonization: risk assessment and screening values (status quo: Romkens and Swartjes 2021)

