

WAT009

Pesticides in water indicator

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Pesticides indicator – data used

- Pesticides indicator since 2021 available
- Waterbase – Water Quality (ICM); Includes monitoring data officially reported by EU member and cooperating countries to voluntary dataflow Water Information System for Europe (WISE); Data are public.
- High data variability between countries (use of a country weighting factor in the assessment)
- Available pesticides data between 2013 – 2021 (status July 2023)

Variable	Category	Total	Total
Number of countries	SW	29	30
	GW	22	
Number of monitoring sites	SW	10 562	24 914
	GW	14 352	
Number of records	SW	1 937 076	4 860 574
	GW	2 923 498	
Number of pesticides	SW	236	
	GW	243	



Results – Figure 1 (status July 2023)



Figure 1: Percentage of reported monitoring sites with pesticides exceeding thresholds per year in surface waters and groundwater in Europe weighted by country area.

Surface waters

- Exceedance rates at 10 % to 25 % of all monitoring sites.
- Exceedances mainly due to insecticides (imidacloprid) and herbicides (metolachlor, metazachlor).
- Proportion of exceedance decreased by more than half from 2020 to 2021 (potentially partly due to changes in reporting).

Groundwater

- Exceedance rates at 4 % to 11 % of all monitoring sites.
- Exceedances mainly due to atrazine and its metabolites

➤ **No trends can be derived**



Results – Figure 2 (status July 2023)

Figure 2: Percentage of reported monitoring sites with pesticides exceeding thresholds in surface waters, different sized rivers, lakes and groundwater in European countries in time period 2013 – 2021

- > 30% were reported in 10 out of 29 countries (sw) and in one out of 22 countries (gw).
- High exceedance rates were mainly reported at monitoring sites in small and medium-sized rivers

Country	Surface waters	Rivers, large	Rivers, medium	Rivers, small	Lakes	Groundwater
AT	38% (32)	0% (2)	38% (16)	55% (11)	n.d.	6% (2070)
BE	52% (103)	50% (2)	47% (71)	64% (22)	n.d.	11% (396)
BG	1% (94)	n.d.	0% (64)	6% (17)	0% (2)	2% (133)
CH	0% (1)	n.d.	0% (1)	n.d.	n.d.	8% (51)
CY	2% (54)	n.d.	2% (50)	n.d.	0% (4)	0% (83)
CZ	53% (757)	n.d.	54% (646)	44% (103)	88% (8)	10% (667)
DE	35% (275)	51% (43)	35% (185)	44% (18)	9% (23)	4% (1150)
DK	5% (22)	n.d.	0% (5)	25% (4)	n.d.	5% (1115)
EE	17% (97)	0% (3)	21% (47)	30% (10)	8% (37)	0% (173)
EL	15% (296)	36% (11)	12% (207)	14% (28)	12% (33)	n.d.
ES	22% (2907)	n.d.	24% (1369)	19% (939)	22% (143)	12% (1505)
FI	18% (22)	0% (5)	25% (12)	50% (2)	0% (2)	n.d.
FR	29% (1774)	37% (109)	28% (1070)	31% (314)	12% (150)	24% (1795)
HR	55% (49)	86% (14)	48% (23)	43% (7)	0% (4)	19% (59)
HU	60% (5)	0% (1)	75% (4)	n.d.	n.d.	n.d.
IE	10% (287)	n.d.	8% (100)	24% (38)	5% (118)	0% (222)
IS	0% (2)	n.d.	n.d.	n.d.	0% (1)	n.d.
IT	40% (2180)	n.d.	44% (828)	37% (811)	14% (178)	16% (3714)
LT	17% (52)	n.d.	25% (32)	0% (19)	100% (1)	4% (54)
LU	50% (2)	n.d.	50% (2)	n.d.	n.d.	n.d.
LV	44% (34)	n.d.	47% (15)	33% (6)	33% (9)	9% (173)
NL	57% (322)	36% (11)	44% (16)	56% (54)	60% (208)	n.d.
NO	5% (21)	0% (4)	0% (11)	20% (5)	0% (1)	n.d.
PL	1% (905)	7% (42)	2% (271)	0% (632)	0% (376)	1% (323)
PT	14% (106)	33% (6)	18% (67)	0% (15)	n.d.	6% (204)
RO	n.d.	n.d.	n.d.	n.d.	n.d.	1% (139)
RS	18% (79)	0% (1)	23% (13)	30% (10)	7% (41)	2% (53)
SE	22% (23)	n.d.	25% (16)	14% (7)	n.d.	n.d.
SI	12% (25)	0% (1)	14% (22)	0% (2)	n.d.	7% (54)
SK	14% (36)	50% (4)	9% (32)	n.d.	n.d.	45% (219)
Total	26% (10562)	43% (261)	30% (5195)	34% (3074)	31% (1339)	10% (14352)

0% 0-10% 10-20% 20-30% > 30%

n.d. No data

() total number of reported monitoring sites in time period 2013 to 2020

Outlook

- Updating with comments from consultation process and publish in autumn 2023
- **Comments consultation – THANK YOU, always appreciated!**
- Next year:
 - Update Figure 2: Use a more recent period (i.e., 2016-2021) to better reflect recent monitoring data
 - Consider amending the methodology, e.g. using exceedances in water bodies rather than at monitoring sites



Development of the indicator – handling of below LOQ data

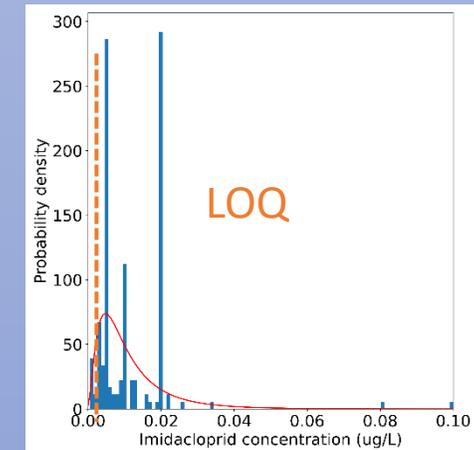
- **Limit of quantification (LOQ)** = smallest concentration of a substance that can be reliably measured by an analytical procedure
- More than 90 percent: **concentration measurements < LOQ** in WISE 6
- **WAT009**: ten different cases for the use of LOQ for disaggregated data were defined and considered in the assessment → **substitution method**
 - Disadvantage: underestimates or overestimates real concentration
- **More sophisticated methods** exist to estimate average concentration e.g., Maximum likelihood estimation (MLE), Kaplan-Meier (KM), Robust regression on order statistics (ROS)



WAT009 is calculated at the monitoring site level: → too low data availability (substance/monitoring site/year)

Short excursus on the method:

- Estimating (more accurate and precise) summary descriptive statistics e.g. of concentration data, hypothesis testing, regression analysis



*Adopted from
Jeanne V. et al.*

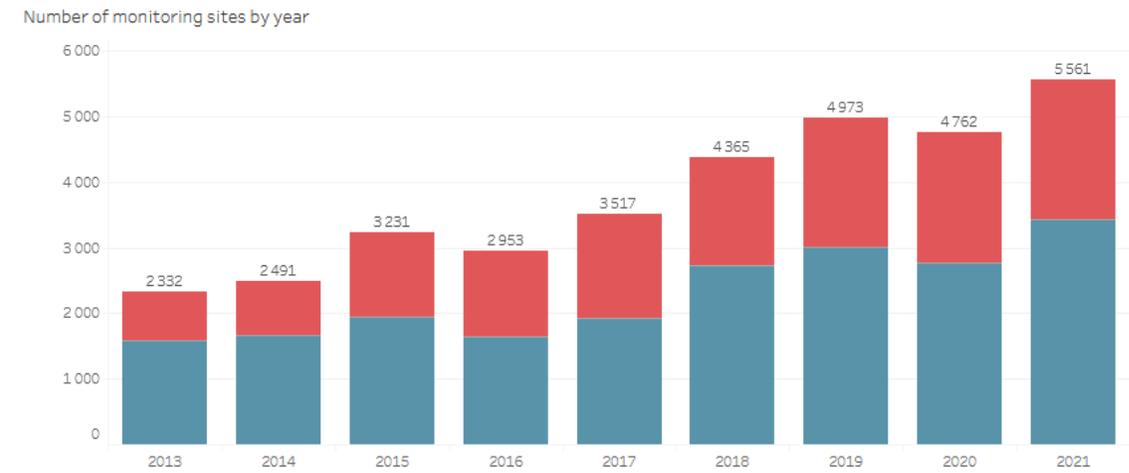
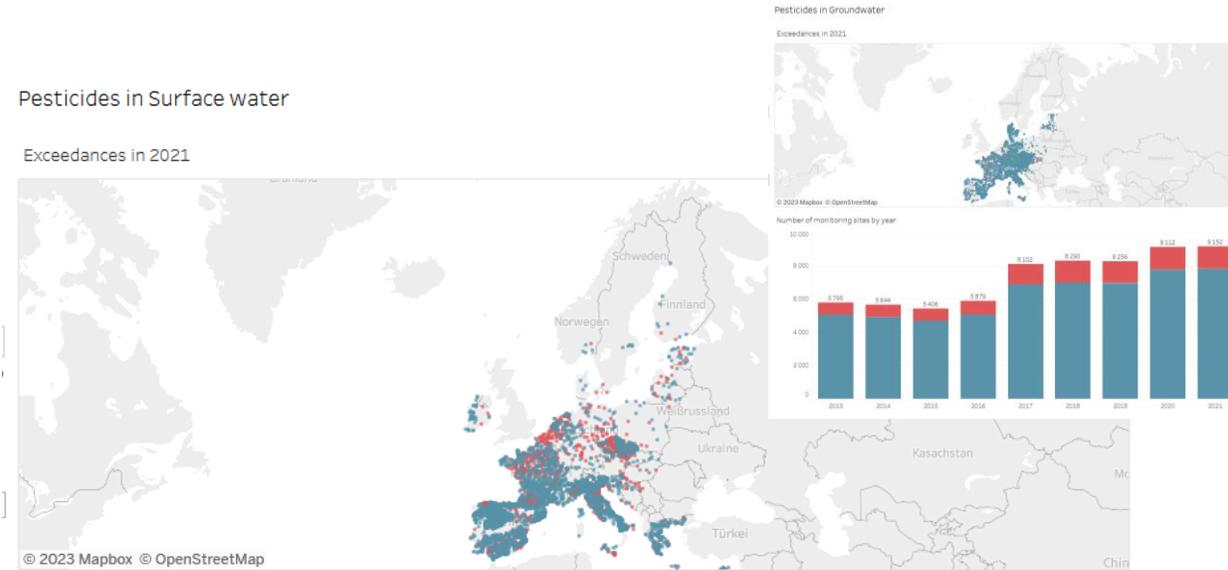
MLE: log-normal distribution fitted on both detects and non-detects
Based on the fitted distribution (mean, std), other statistics are calculated



How to get a more representative dataset at the EU level?

Improve reporting:

- Increased spatial coverage (more monitoring sites)
- Increased number of pesticides
- Limit of quantification (LOQ) data for more reliability
- Increased representativeness of the indicator
- Usability of the indicator



Links

- Consultation: <https://forum.eionet.europa.eu/nrc-eionet-freshwater/library/pesticides-water/eionet-consultations-pesticides-rivers-lakes-and-groundwater/2023/consultation-on-the-indicator-on-pesticides-in-rivers-lakes-and-groundwater/introduction>
- Dashboards for data review:
- [Exceedances by Year - Map and Bar Chart](#)
- [Exceedances by Pesticide by Year - Map and Bar Chart](#)
- [Exceedances by Pesticide by Year - Overview Table](#)
- [Exceedances by Country by Year - Overview Table](#)
- [Exceedances by Country by Category - Overview Table](#)
- [Exceedances by Pesticide by Category - Map](#)
- [Exceedances by Pesticide - Line Chart](#)



Thank you

Comments consultation – THANK YOU, always appreciated!

- **Other pesticide residues can contribute to exceedances. For example, non-relevant metabolites widely distributed in groundwater.**
 - Yes, not taken into account in the assessment as there is no environmental quality standard at EU level. As soon as there is one, non-relevant metabolites will be included.
- **Data heterogeneity between Member States**
 - Yes, to be interpreted with caution, no country-to-country and no year-to-year comparison possible
- **Data for pesticides in Groundwater for Bulgaria missing**
 - Technical issue, will be included in the next update
- **Comments on dashboards**
 - Will be checked and dashboards will be updated
- **Comment on the consideration of Limit of Quantification (LoQ)**
 - The comment was for groundwater: $0.5 * \text{LOQ} > 0.1 \mu\text{g/L}$ (quality standard)
 - However, if $\text{LoQ} > \text{EQS}$ → values are removed from the indicator calculations
- **Figure 2: Numbers in brackets...**
 - ... indicate the total number of reported monitoring sites in the period 2013 to 2021. The number for "surface waters" is not necessarily equal to the sum of "large, medium, and small rivers and lakes" because the information on which of these groups a monitoring site belongs to is not available for every monitoring site. An explanation can be found on page 11 of the methodology paper.
- **Figure 2: suggestion from EEA to use a more recent period (i.e., 2016-2021) to better reflect recent monitoring data; Comment: not to be used instead, but useful additionally**
 - only one figure can be shown

