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COMMISSION STAFF WORKING DOCUMENT

Accompanying the document

REPORT FROM THE COMMISSION TO THE COUNCIL AND THE EUROPEAN PARLIAMENT

on the implementation of Council Directive 91/676/EEC concerning the protection of waters against pollution caused by nitrates from agricultural sources based on Member State reports for the period 2016–2019

{COM(2021) 1000 final}

Pressure from Agriculture

Poland's utilised agricultural area is around 14 Mha, representing 47% of the total land area and has remained stable since 2010. The major outputs of the agricultural industry excluding services and secondary activities include in a decreasing order milk (16.3%), poultry (12.4%) and pigs (11.4%).

Eurostat

Major land use statistics for Poland

Table 1.Utilized agricultural area (abbreviated as UAA)

Poland	2005	2007	2010	2013	2016
Utilised agricultural area UAA (1000 ha)	NA	15477	14603	14410	14406
arable land (1000 ha)	NA	11748	10878	10760	10806
permanent grass (1000 ha)	NA	3271	3284	3206	3176
permanent crops (1000 ha)	NA	375	398	412	394
kitchen gardens (1000 ha)	NA	75	63	NA	31

Note:

Eurostat (FSS)

Poland's arable land has remained stable since 2010, while permanent grassland and crops decreased since 2013.

Animal distribution in Poland

Poland's live bovine and poultry have increased since 2013. The livestock density index decreased from 2010 and it is slightly lower than the EU average of 0.8.

Table 2. Livestock statistics

Poland	2005	2007	2010	2013	2016
Livestock index	0.72	0.72	0.72	0.64	0.66
dairy cows (10^6 heads)	2.75	2.68	2.53	2.30	2.13
live bovines (10^6 heads)	5.38	5.41	5.56	5.59	5.97
live pigs (10^6 heads)	18.71	17.62	14.78	10.99	11.11
live poultry (10^6 heads)	NA	NA	174.30	149.19	198.36

Note:

Eurostat (FSS)

Nitrogen and phosphorus fertilizers and surplus (kg/ha UAA)

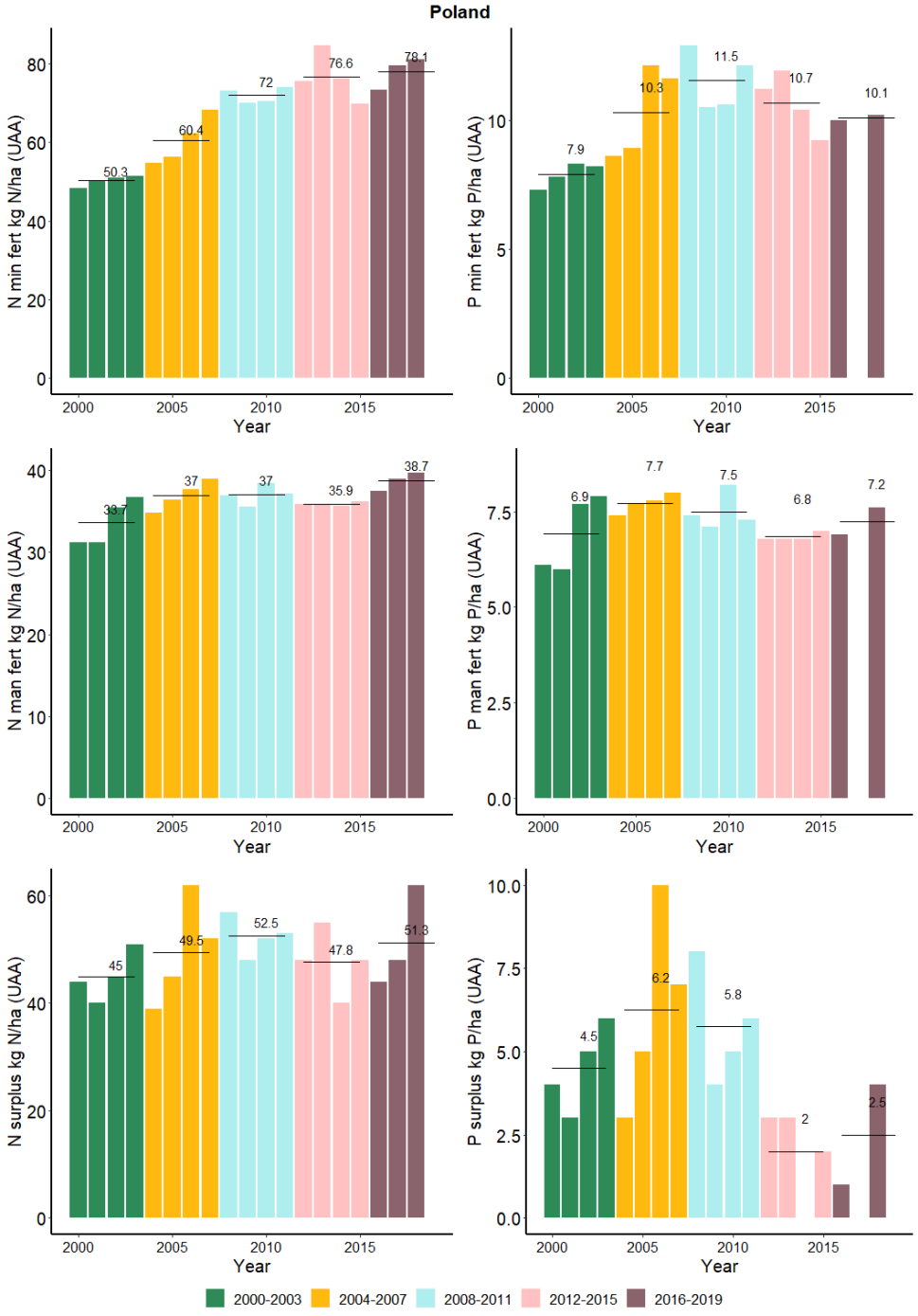


Figure 1. N and P fertilizers and gross surplus (kg/ha)

The gross nitrogen and phosphorus surpluses originate form EUROSTAT data for the years 2000-2018. The use of inorganic nitrogen fertilizer has increased since the reporting period 2000-2003, while the use of inorganic phosphorus fertilizer has decreased since the last reporting period. The usage of manure has increased since the last reporting period. The nitrogen and phosphorus surpluses slightly increased. In the plots: N/P min and N/P man are respectively the N/P mineral fertilizers and N/P manure.

Livestock unit - LSU /ha

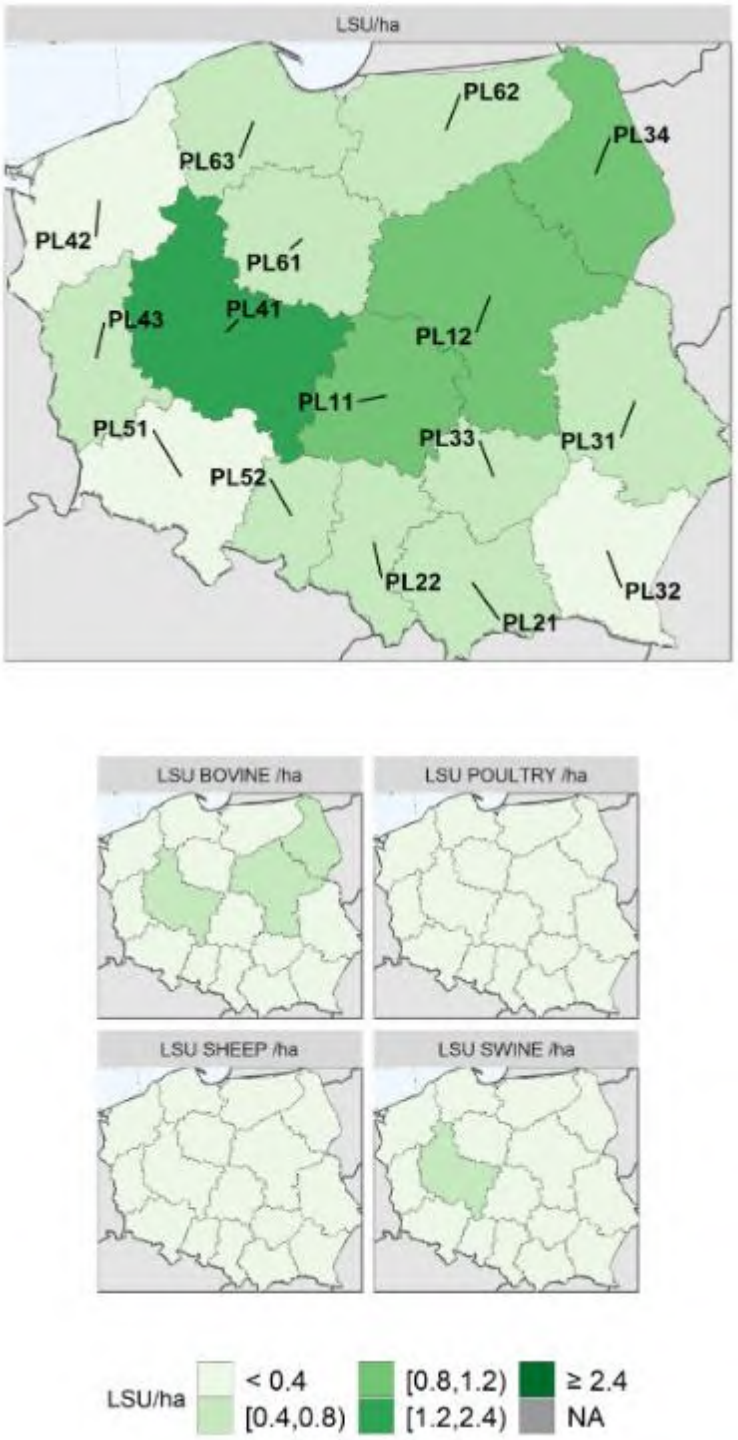


Figure 2. Map of livestock unit distribution, year 2016 (Source: Eurostat, February 2021)

Animal production is concentrated in the central part of the Poland mainly due to bovine and swine. PL41 is the nuts with the highest LSU/ha (total LSU and LSU by animal type were retrieved individually from EUROSTAT).

In this document, the NUTS-2013 version is used. (https://ec.europa.eu/eurostat/web/gisco/geodata/reference-data/administrative-units-statistical-units/nuts)

Water Quality Monitoring

Poland has a State Environmental Monitoring system from which data is used for reporting on the implementation of the Directive. Concerning groundwater, the large majority of the stations have reported data for 2 and 4 years. For surface waters, concentrations are mostly available for one or two years. The frequency of sampling is determined in the Regulation of the Minister of Maritime Economy and Inland Navigation on the forms and methods of monitoring surface water bodies and groundwater bodies.

For groundwater and surface water measurements, some stations have same coordinates due to different depths. In this case, the average values cover different measurements in time, but also location. In maps providing the spatial distribution of monitoring points, it is not possible to distinguish stations with the same coordinates: for NO3 concentration, the average value is shown; for trends and trophic status the worst case was considered.

It is noteworthy that in some cases in the bar charts the total value can differ from 100% due to rounding errors.

Groundwater quality monitoring network

Table 3. Number of GW stations with measurements and trends per type

		Number of stations with measurements			Number of stations with Trends		
Station Type	Description	2008-2011	2012-2015	2016-2019	2008-2011	2012-2015	2016-2019
0	Phreatic groundwater (shallow): 0-5 m	307	351	311	274	225	282
1a	Phreatic groundwater (deep) 5-15 m	158	161	147	142	104	130
1b	Phreatic groundwater (deep) 15-30 m	50	36	35	49	26	28
1c	Phreatic groundwater (deep) >30 m	34	15	21	32	11	12
2	Captive groundwater	709	889	802	628	620	755
3	Karstic groundwater	0	111	105	0	77	97
9	Not specified	0	0	0	0	0	0
	Total	**1258**	**1563**	**1421**	**1125**	**1063**	**1304**

Surface water quality monitoring network

Table 4. Number of SW stations with measurements, trends and trophic status per type

		Number of stations with measurements			Number of stations with Trends			Number of stations with Trophic status		
Station Type	Description	2008-2011	2012-2015	2016-2019	2008-2011	2012-2015	2016-2019	2008-2011	2012-2015	2016-2019
4	River water	2211	2053	3384	1571	1628	1892	1475	2053	3063
5	Lake/reservoir water	591	473	551	14	28	289	551	473	533
6	Transitional water	31	9	9	17	4	9	31	9	9
7	Coastal water	15	10	10	5	3	9	15	10	10
8	Marine water	0	0	0	0	0	0	0	0	0
9	Not specified	0	0	0	0	0	0	0	0	0
	Total	**2848**	**2545**	**3954**	**1607**	**1663**	**2199**	**2072**	**2545**	**3615**

Note: Monitoring network for eutrophication also include 23 marine stations, not analysed in the current reporting period.

Groundwater Quality

Groundwater average annual nitrate concentration

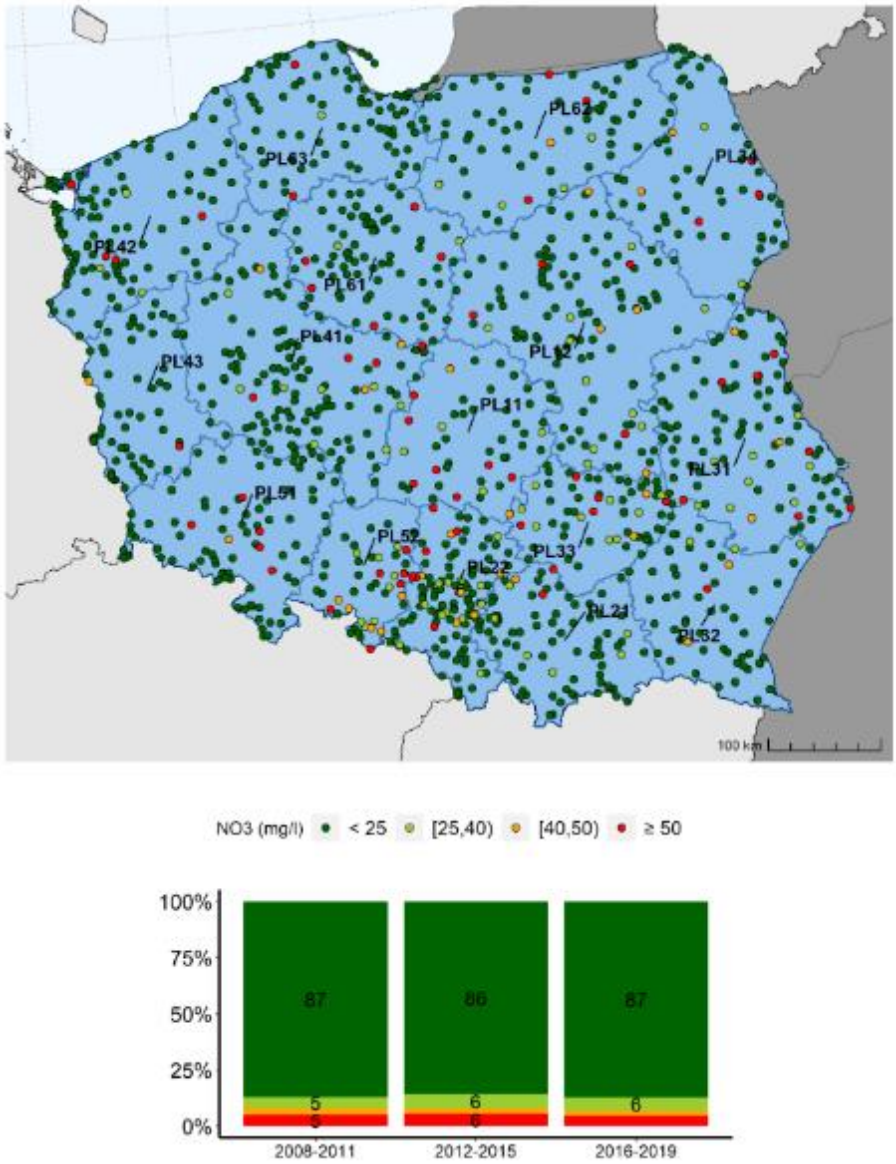


Figure 3. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information.

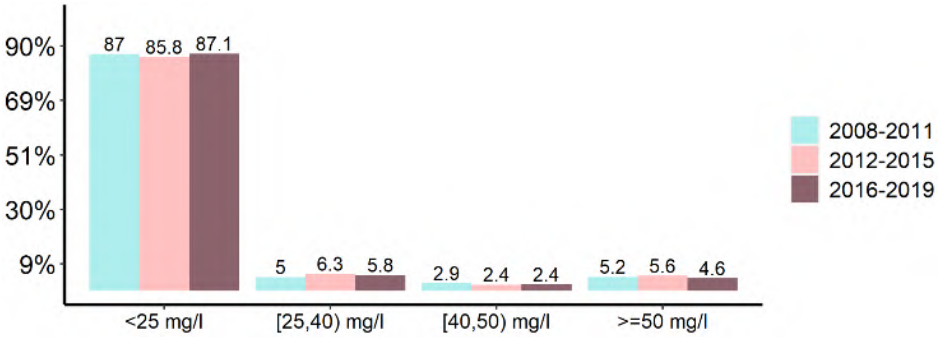


Figure 4. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis)

Groundwater average annual nitrate concentration trend

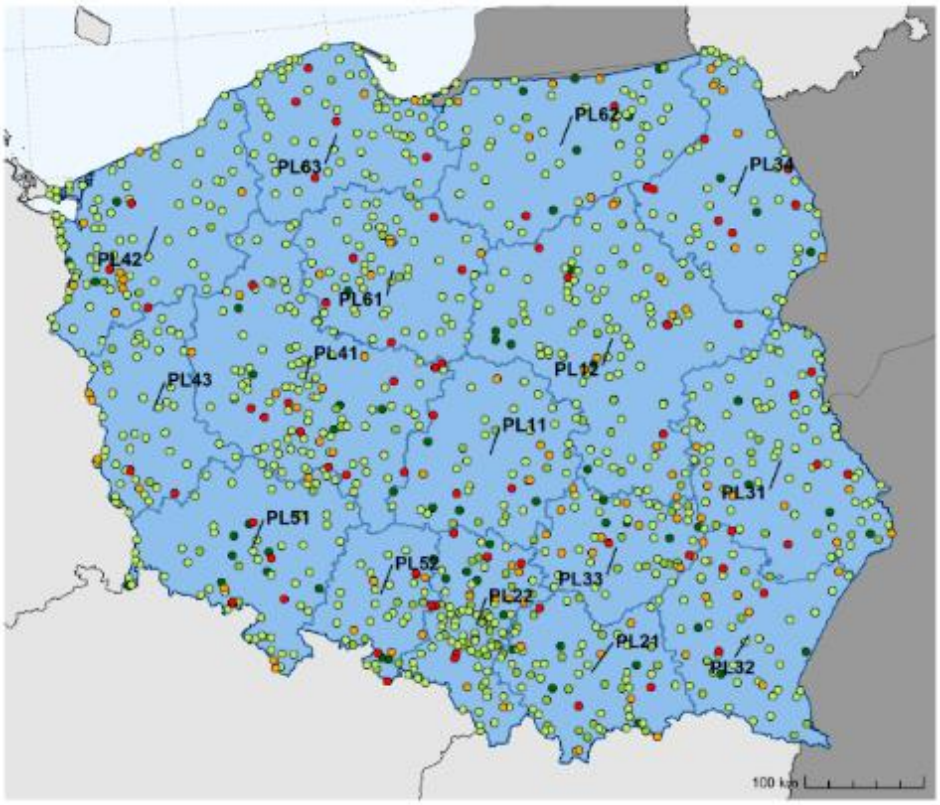


Figure 5. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information.

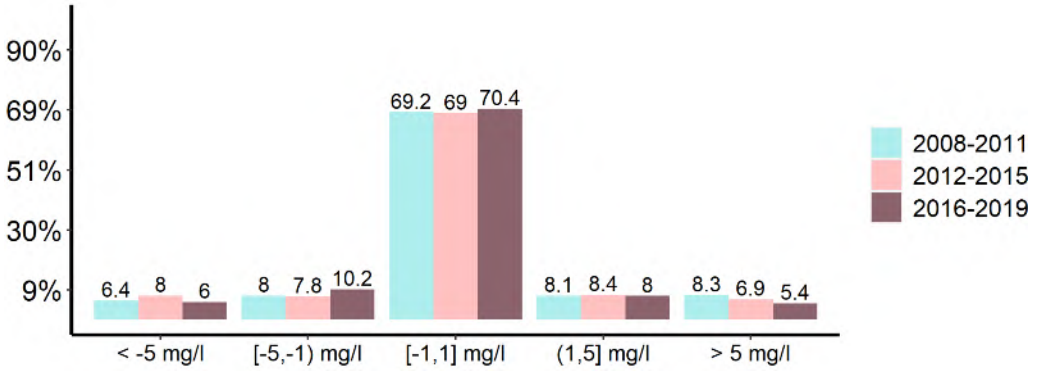
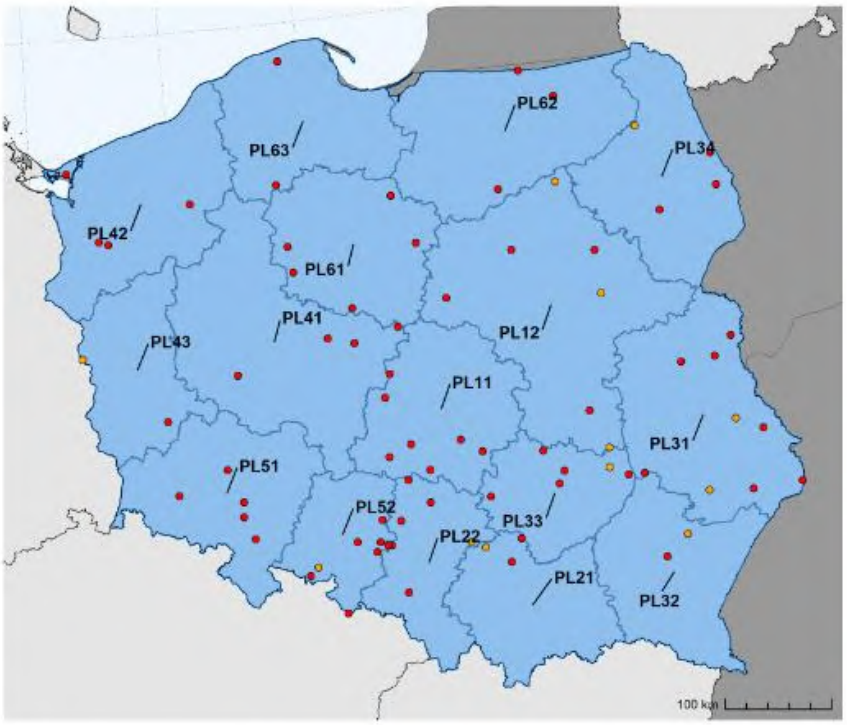


Figure 6. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis)

Groundwater hotspot



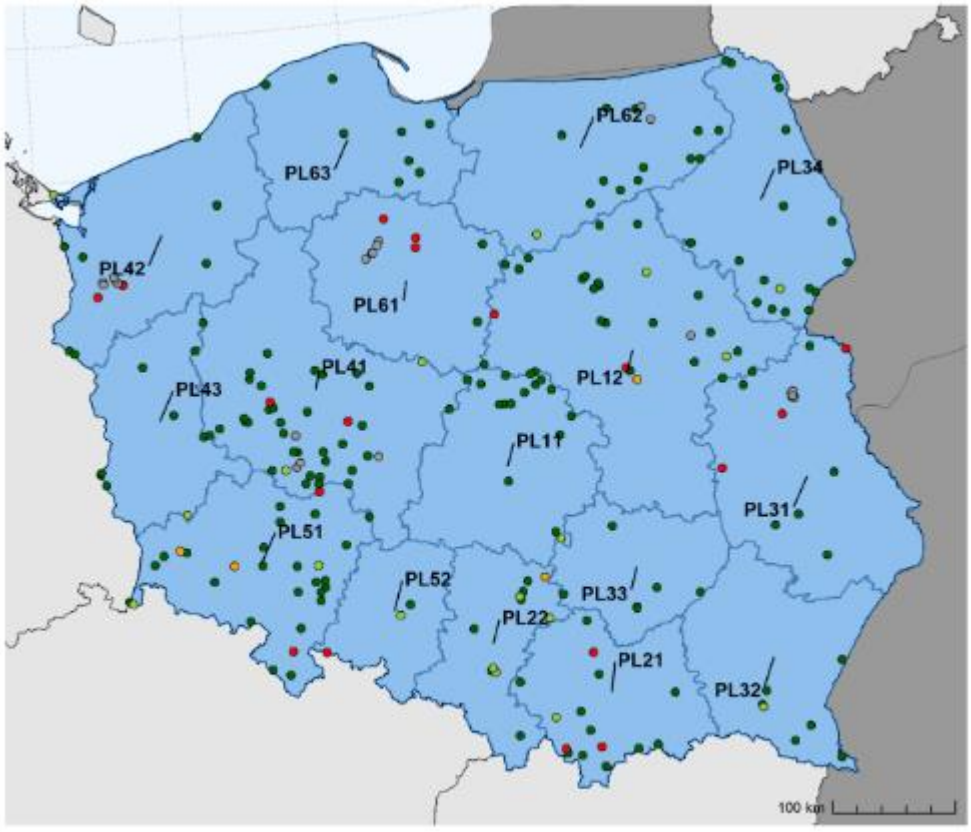
NO3 (mg/l) [40,50) incr. trend ≥ 50

NUTS ID	NUTS NAME	>=40 and < 50 mg/l incr.trend	>=50 mg/l
PL11	Lódzkie	0	7
PL12	Mazowieckie	3	4
PL21	Malopolskie	1	2
PL22	Slaskie	1	6
PL31	Lubelskie	2	7
PL32	Podkarpackie	1	1
PL33	Swietokrzyskie	1	5
PL34	Podlaskie	1	3
PL41	Wielkopolskie	0	5
PL42	Zachodniopomorskie	0	4
PL43	Lubuskie	1	1
PL51	Dolnoslaskie	0	5
PL52	Opolskie	1	7
PL61	Kujawsko-Pomorskie	0	4
PL62	Warminsko-Mazurskie	0	3
PL63	Pomorskie	0	2
	Total	**12**	**66**

Figure 7. GW hotspot analysis map (top graph) and distribution by NUTS2 (lower graph) of average NO3 annual concentration greater than 40 mg/l.

The hotspot analysis identifies all the GW monitoring stations that have NO3 concentration in the range of 40-50 mg/l with increasing trends or are above 50 mg/l. The map shows the spatial distribution of these points, and the table reports the number of stations by NUTS inside and outside NVZ.
Only the NUTS of interest are reported.

Groundwater stations removed



Station Type	Description	Number of removed stations		
		total removed	with measurements	with trends
0	Phreatic groundwater (shallow): 0-5 m	69	56	26
1a	Phreatic groundwater (deep) 5-15 m	31	27	13
1b	Phreatic groundwater (deep) 15-30 m	8	8	6
1c	Phreatic groundwater (deep) >30 m	3	3	0
2	Captive groundwater	136	131	69
3	Karstic groundwater	10	10	3
9	Not specified	0	0	0
	Total	**257**	**235**	**117**

Figure 8. GW removed stations map (top graph) and distribution by groundwater type (lower graph).

The removed stations analysis identifies all the GW monitoring stations that were removed in the current reporting period. The map shows the spatial distribution of these points with the concentrations of the previous reporting period, and the table reports the number of stations with measurements and trends per type.

These changes in the groundwater monitoring network reflected the changes occurred in the number, delineation and risk assessment of the groundwater bodies for the 2016-2021 Water Framework Directive planning cycle and changes in the approach to the implementation of Nitrates Directive that took place in 2017.

Surface Water Quality

Surface water average annual nitrate concentration

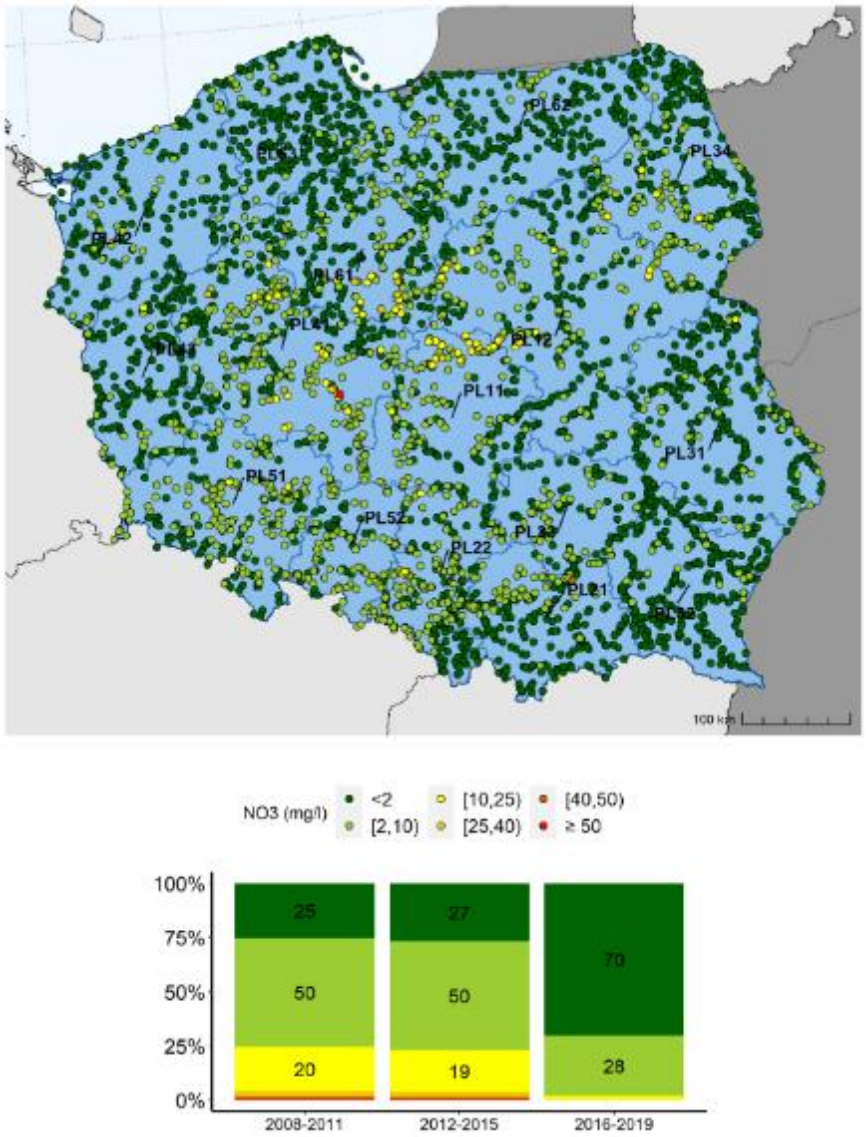


Figure 9. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information.

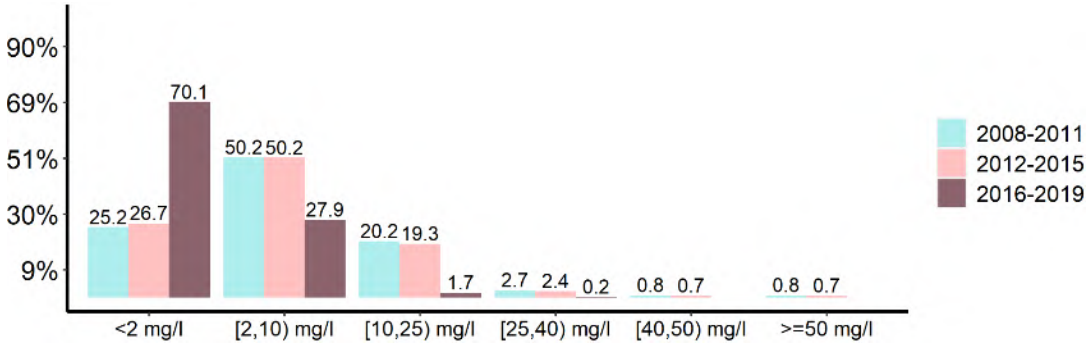


Figure 10. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis)

Surface water average annual nitrate concentration trend

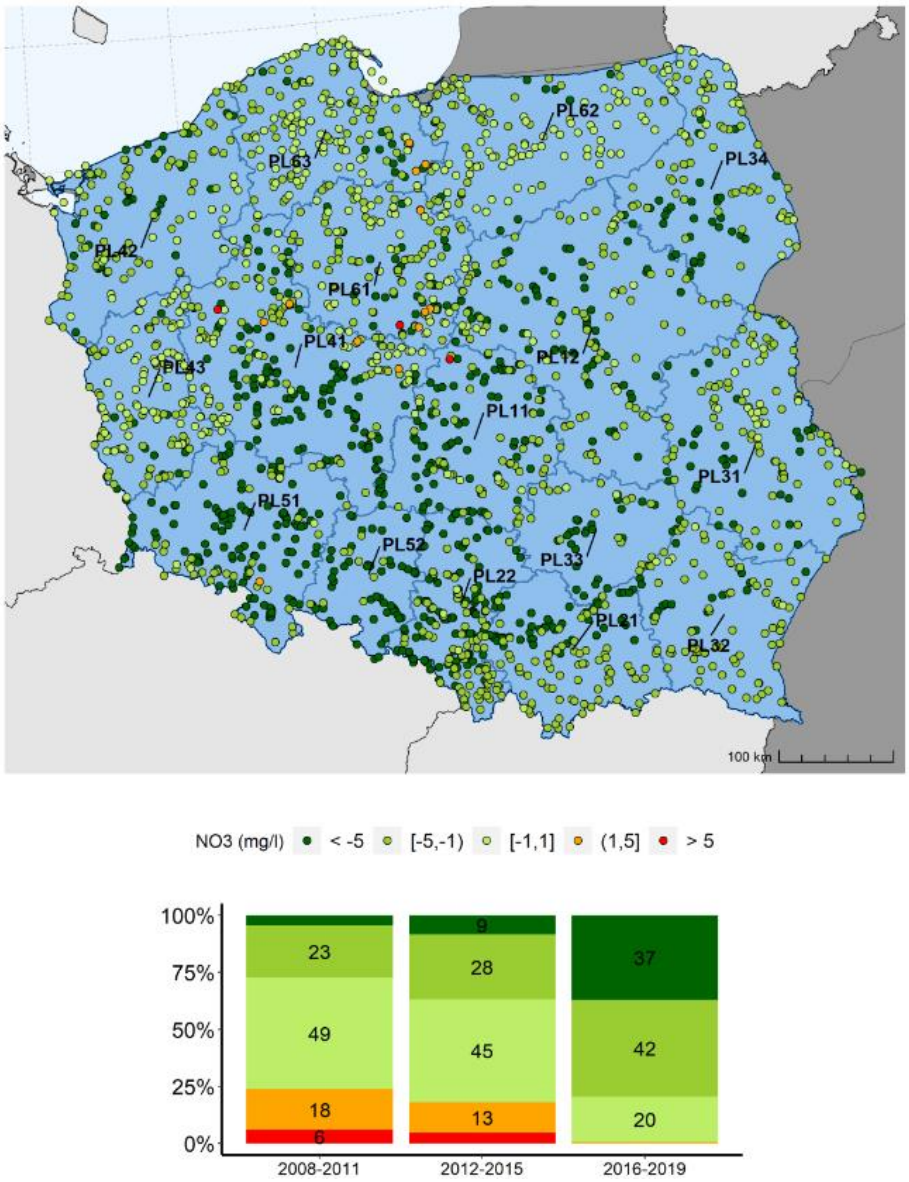


Figure 11. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information.

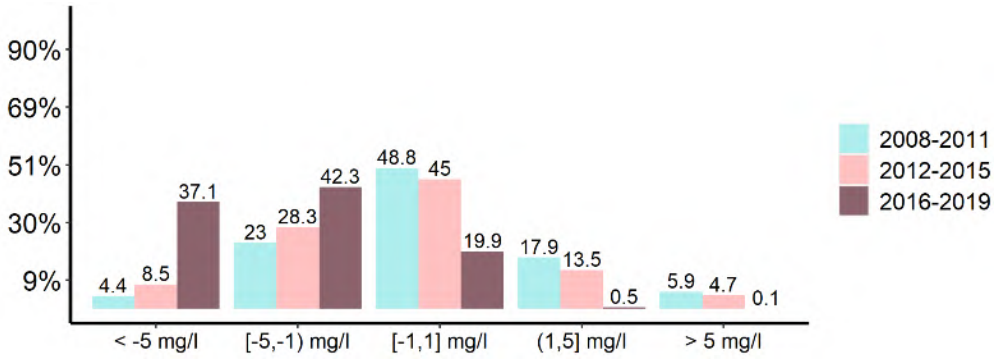


Figure 12. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis)

Surface Water Eutrophication

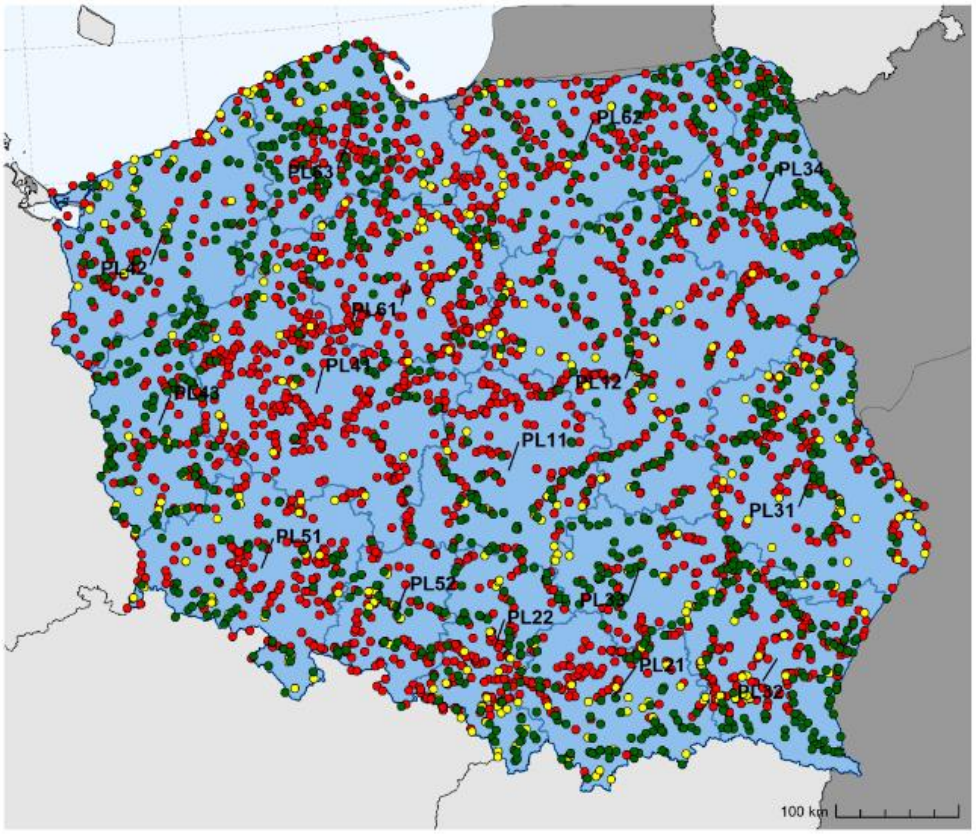


Figure 13. Spatial distribution of eutrophic status (map) and corresponding percentage of monitoring points per classes of status by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information.

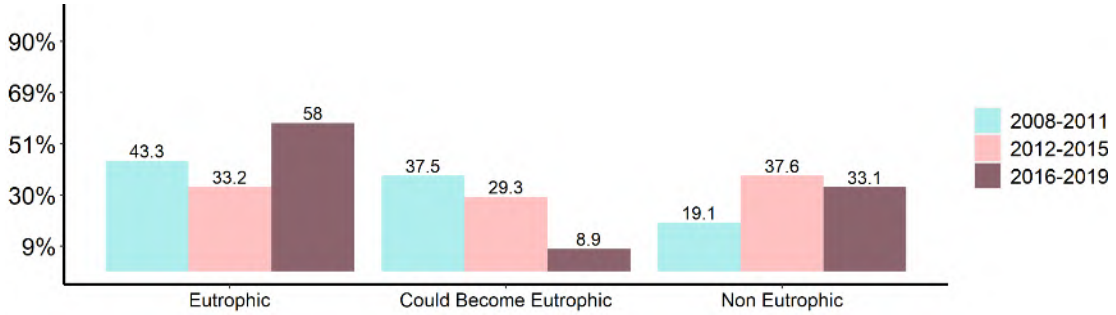
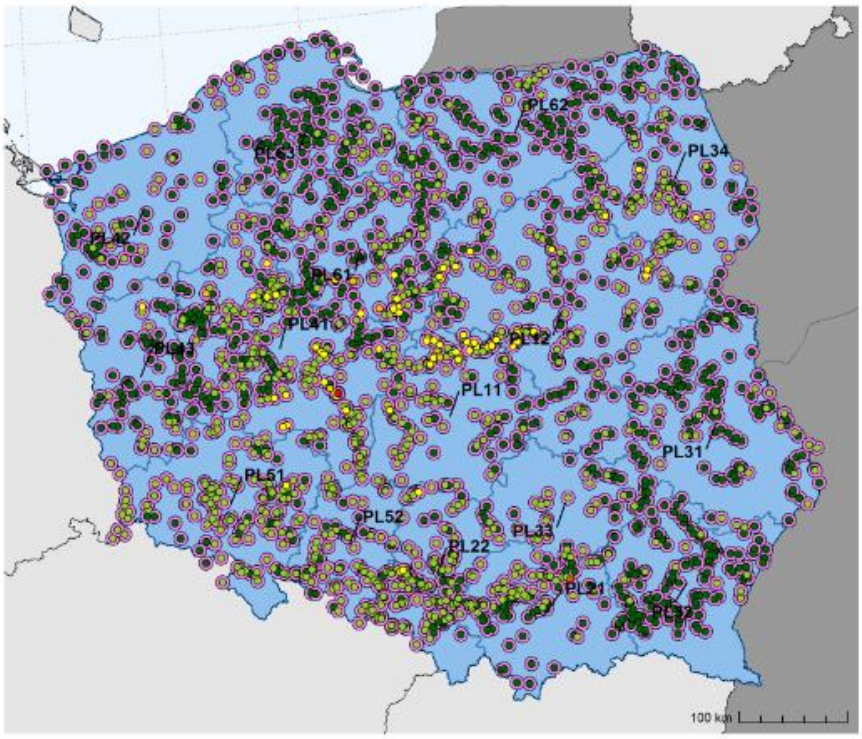


Figure 14. Comparison of percentage of monitoring points in the three reporting periods by classes of status (x axis)

The Eutrophic status vs average NO3 annual concentration



NUTS ID	NUTS NAME	High trophic status	Number of stations by classes of concentration						
			<2 mg/l	[2,10) mg/l	[10,25) mg/l	[25,40) mg/l	[40,50) mg/l	>=50 mg/l	Unclassified
NO_NUTS	SALINE	19	19	0	0	0	0	0	0
PL11	Lódzkie	121	31	71	18	1	0	0	0
PL12	Mazowieckie	182	94	74	14	0	0	0	0
PL21	Malopolskie	100	49	50	0	0	1	0	0
PL22	Slaskie	125	34	88	3	0	0	0	0
PL31	Lubelskie	145	117	28	0	0	0	0	0
PL32	Podkarpackie	138	125	13	0	0	0	0	0
PL33	Swietokrzyskie	50	26	24	0	0	0	0	0
PL34	Podlaskie	125	69	56	2	0	0	0	0
PL41	Wielkopolskie	274	114	141	16	2	0	1	0
PL42	Zachodniopomorskie	81	58	23	0	0	0	0	0
PL43	Lubuskie	83	64	18	1	0	0	0	0
PL51	Dolnoslaskie	138	33	104	1	0	0	0	0
PL52	Opolskie	82	20	62	0	0	0	0	0
PL61	Kujawsko-Pomorskie	163	106	48	7	2	0	0	0
PL62	Warminsko-Mazurskie	155	122	33	0	0	0	0	0
PL63	Pomorskie	117	94	23	0	0	0	0	0
	Total	**2098**	**1175**	**856**	**62**	**5**	**1**	**1**	**0**

Figure 15. The SW monitoring stations with eutrophic status versus the average NO3 annual concentration.

The analysis shows all the SW monitoring stations with the higher trophic status and the corresponding value of NO3 concentration. The map shows the spatial distribution of these points, and the table reports the number of stations with measurements with highest trophic status and the corresponding stations by classes of NO3 concentration. Only the NUTS of interest are reported.

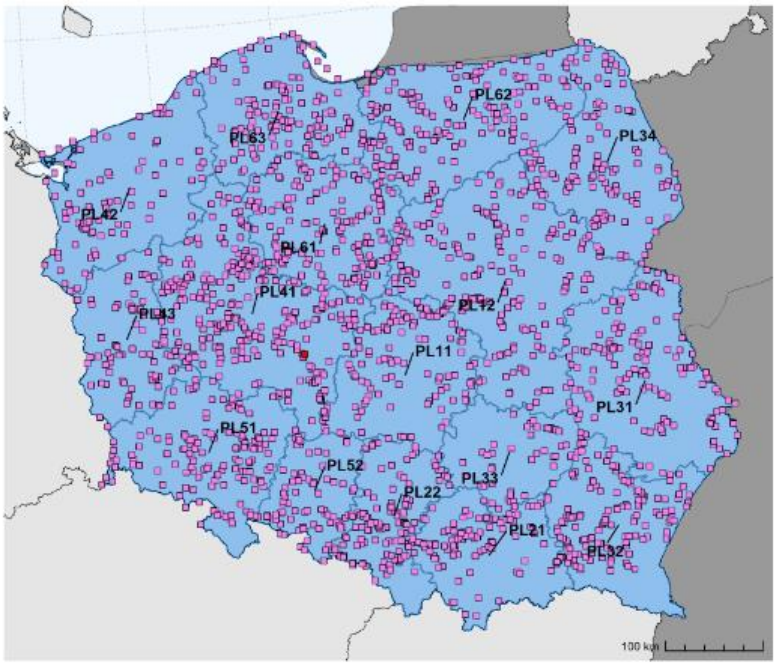
Eutrophication in surface waters is determined based on the results of the assessment carried out by GIOŚ (Chief Inspectorate of Environmental Protection). The assessment is based on a classification of selected ecological status/potential indicators on a scale of 1-5. The bioindicators analyses include phytoplankton, phytobentos while the physico-chemical indicators used include water transparency, dissolved oxygen, BOD5, nitrite, nitrate, total nitrogen, phosphate and total phosphorus. The threshold values for quality classes of the above indicators in surface waters are specified in the Regulation of the Minister of Maritime Economy and Inland Navigation on the classification of ecological status, ecological potential and chemical status and the method of classification of the state of surface water bodies, as well as environmental quality standards for priority substances. The final eutrophication class, also on a scale of 1-5, is determined on the basis of the indicator classified as worst. About 24% of rivers and 32% of the monitored lakes were classified as eutrophic. About 95% of transitional and coastal waters were classified as eutrophic. Due to a change in the methodology to assess the eutrophication status during the current reporting period, there is no possibility to compare the results with the assessment of the previous reporting period.

Table 5. Summary of SW stations by classes of trophic status and type.

		Number of stations with Trophic status		
Station Type	Description	Eutrophic	Could become eutrophic	Non Eutrophic
4	River water	1685	322	1056
5	Lake/reservoir water	394	0	139
6	Transitional water	9	0	0
7	Coastal water	10	0	0
8	Marine water	0	0	0
9	Not specified	0	0	0
	Total	**2098**	**322**	**1195**

Note: Monitoring network for eutrophication also include 23 marine stations, not analysed in the current reporting period

Surface Water quality hotspot

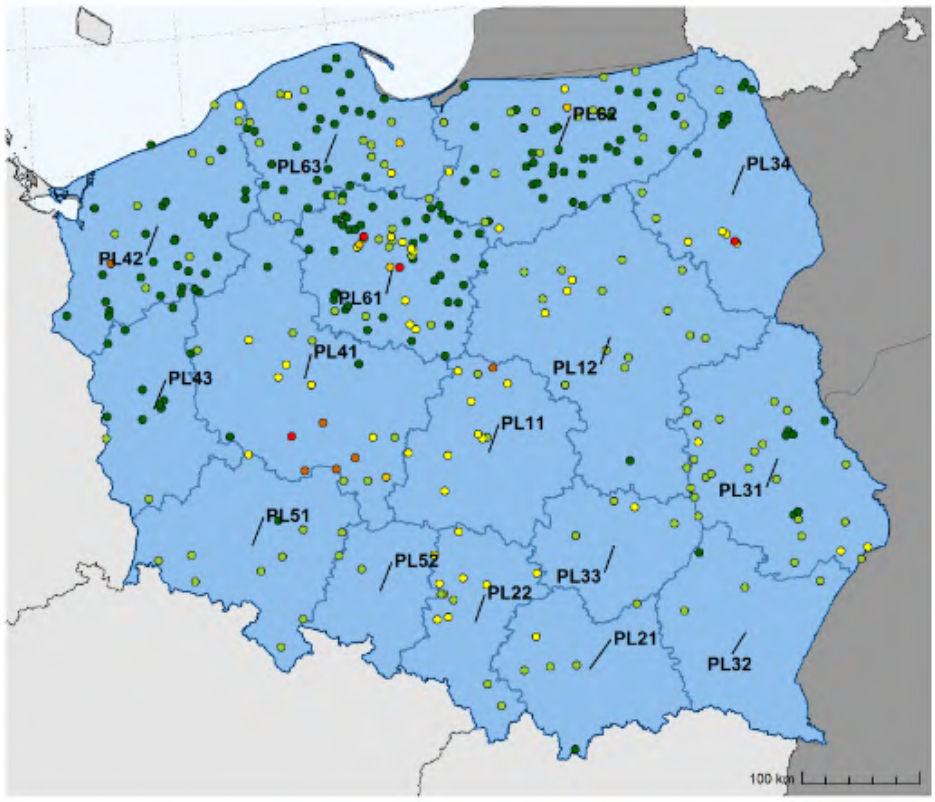


NUTS ID	NUTS NAME	High trophic status	>=40 and < 50 mg/l incr.trend	>=50 mg/l
NO_NUTS	SALINE	19	0	0
PL11	Lódzkie	121	0	0
PL12	Mazowieckie	182	0	0
PL21	Malopolskie	100	0	0
PL22	Slaskie	125	0	0
PL31	Lubelskie	145	0	0
PL32	Podkarpackie	138	0	0
PL33	Swietokrzyskie	50	0	0
PL34	Podlaskie	125	0	0
PL41	Wielkopolskie	274	0	1
PL42	Zachodniopomorskie	81	0	0
PL43	Lubuskie	83	0	0
PL51	Dolnoslaskie	138	0	0
PL52	Opolskie	82	0	0
PL61	Kujawsko-Pomorskie	163	0	0
PL62	Warminsko-Mazurskie	155	0	0
PL63	Pomorskie	117	0	0
	Total	**2098**	**0**	**1**

Figure 16. SW hotspot analysis map (top graph) and distribution by NUTS2 (lower graph) of average NO3 annual concentration greater than 40 mg/l and trophic status.

The hotspot analysis identifies all the SW monitoring stations that have high trophic status (eutrophic), NO3 concentration in the range of 40-50 mg/l with increasing trends or are above 50 mg/l. The map shows the spatial distribution of these points, and the table reports the number of stations by NUTS inside and outside NVZ.
Only the NUTS of interest are reported.

Surface Water Stations Removed



Station Type	Description	Number of removed stations			
		total removed	with measurements	with trends	with trophic status
4	River water	212	212	125	212
5	Lake/reservoir water	133	133	2	133
6	Transitional water	0	0	0	0
7	Coastal water	1	1	1	1
8	Marine water	0	0	0	0
9	Not specified	0	0	0	0
	Total	**346**	**346**	**128**	**346**

Figure 17. SW removed stations map (top graph) and distribution by surface water type (lower graph).

The removed stations analysis identifies all the SW monitoring stations that were removed in the current reporting period. The map shows the spatial distribution of these points with the concentrations of the previous reporting period, and the table reports the number of stations with measurements and trends per type.

Measures in the Action Programme

The current Code of Good Agricultural Practice (CGAP) was developed in 2019 pursuant to the requirements of Article 103 of the Act of 20 July 2017 – the Water Law (J.L. of 2020, item 310, as amended). The Code also replaces Part H (Concise code of good agricultural practice for the purposes of implementation of the Nitrates Directive) of the 2004 Code of Good Agricultural Practice. The CGAP was developed for voluntary application and as such is not subject to control.

The Action Programme (AP) was published for the first time on 12/07/2018 and was recently revised on 12/02/2020. In July 2017, a country-wide approach was adopted in Poland, and the Action Programme became applicable in the entire country in July 2018.

Due to changes in the Polish law from the year 2016, affecting the implementation of the Nitrates Directive and referred to in Subchapter 2.5. Review of NVZs, a number of consecutive Action Programmes were applied in the reporting period 2016-2019. In particular, in the reporting period 2016-2019, there are new legal provisions in force to implement the Action Programme. List of Regulations introducing Action Programmes for NVZs applicable until July 2017 are listed in table 4.3 of the MS report and the list of national laws directly or indirectly implementing the requirement of Nitrates Directive are reported in table 4.6.

The changes implemented in the new AP are broken down into relevant actions: technical concerning a change in requirements, substantial concerning an extension of the obligated entities, and spatial concerning a change in the areas of application of the Action Programme. The details of AP are reported in the following table.

The cost effectiveness of the implementation of AP activities was based on shared ARiMR (Agency for Restructuring and Modernisation of Agriculture) data on the value of co-financing programs for activities aiding the implementation of the Nitrates Directive, and a cost estimate of advisory and training activities based on information from provincial Agricultural Advisory Centres (ODR), the Agricultural Advisory Centre (CDR) and data from specific literature. The cost effectiveness, shows that the average cost of reduction of total N from agricultural sources reaching the Baltic Sea from Poland in the years 2016-2019 was EUR 6.23/kg N, i.e. PLN 26.53 at the exchange rate of EUR 1 = PLN 4.2585.

Table 6. Details of the Action Programme

Measure	General details in Action Programme
Period of prohibition of fertiliser application	• Allowing period 1 March and 31 October solid organic fertilizers on arable land
	• Allowing period 1 March and 30 November solid organic fertilizers on permanent crops and grassland
	• Allowing period 1 March and 20 October mineral nitrogen fertilisers and liquid organic fertilisers on arable land
	• Allowing period 1 March and 31 October mineral nitrogen fertilisers and liquid organic fertilisers on permanent crops and grassland
	• Period limiting nitrogen application do not apply to crops under covering and container crops.
Restrictions for application on sloped soils	• prohibiting land application of wastewater on sloping grounds at an inclination greater than 10% for arable land and 20% for meadows, pastures and forest tree plantations;
	• prohibiting the application of liquid organic fertiliser and nitrogen fertiliser on soils without vegetation cover on slopes at an inclination greater than 10%;
	• 10 m distance from the shoreline of lakes and reservoirs of up to 50 ha, natural water courses, ditches over 5 m in width, and canals – for fertilisers other than slurry
	• 15 m distance from the shoreline of lakes and reservoirs of up to 50 ha, natural water courses, ditches over 5 m in width, and canals – for fertilisation with slurry
	• 25 m distance from the shoreline of lakes and reservoirs of over 50 ha, water intakes, and marine coastal belt areas – for all fertilisers
Restrictions for application on soaked, frozen, or snow-covered soils	• Application of fertilizers on soaked, frozen or snow-covered soils is prohibited. No change respect to the previous AP.
Restrictions for application near watercourses (buffer strips)	• 5 m distance from the shoreline of lakes and reservoirs of up to 50 ha, natural water courses, ditches over 5 m in width, and canals – for fertilisers other than slurry
	• 10 m distance from the shoreline of lakes and reservoirs of up to 50 ha, natural water courses, ditches over 5 m in width, and canals – for fertilisation with slurry
	• 20 m distance from the shoreline of lakes and reservoirs of over 50 ha, water intakes, and marine coastal belt areas – for all fertilisers
Effluent storage works	• Fertilizers containing nitrogen should be kept in an environmentally safe way to prevent the leaching of effluent to waters and ground
Capacity of manure storage	• An impermeable surface for storage of solid organic fertiliser for a period of 5 months
	• Covered tanks of adequate capacity for liquid organic fertiliser, with leak-proof bottom and walls, for a period of 6 months
	• If livestock is kept on deep litter, manure may be stored in a livestock building with impermeable flooring
	• The AP permits temporary storage of manure directly on arable land under certain conditions providing it is safe for waters
	• Storage of chicken manure directly on arable land is prohibited
	• Set deadlines for adapting the area or capacity of manure storage based on LU
	• Liquid organic fertilisers should be stored in leak-proof tanks of a capacity sufficient to hold at least 4 months' production of these fertilisers prior to the adaptation deadlines
Rational fertilisation (e.g., splitting fertilisation, limitations)	• The current AP specifies the annual land application of organic fertiliser which cannot exceed 170 kg N/ha
	• The current AP requires a nitrogen fertilisation plan from agricultural holdings
Crop rotation, permanent crop enhancement	• Not specified
Vegetation cover in rainy periods, winter	• Not specified
Fertilisation plans, spreading records	• The new AP requires a nitrogen fertilisation plan from agricultural holdings (including special branches of agricultural production and other activities where fertilisers are used)
Other measures	• Not specified
Date for application limit of 170 kg N/ha/year:	• 2001

Controls

The evaluation of implementation of practices in the field was conducted with respect to key measures used in the Action Programme for the entire territory of the country. The inspections were carried out by Agency for Restructuring and Modernisation of Agriculture (ARiMR) and Voivodship inspectorates for environmental protection (WIOŚ) for each year in the period 2016-2019. It should be noted that during the reported period 2016-2019 there was a change of the scope of inspections. It was a result of introducing the whole territory approach and a new Action Programme in 2018 which established new measures for majority of the farmers. The ARiMR inspections are carried out for the purpose of cross-compliance in the context of the Common Agricultural Policy. The infringements found during inspections mainly related to fertiliser storage, where fertilisers were not stored correctly or the capacity and design of storage facilities was incorrect, as well as the specified application periods and fertiliser dosage. In addition, the lack of a nitrogen fertilisation plan or failure to apply it was a common problem among farms where infringements were found.

Designation of NVZ

Poland has adopted the action program throughout whole its territory and is exempted from designating Nitrate Vulnerable Zones.

Forecast of Water Quality

The forecast of future water quality was made by extrapolation of the evolution of water quality derived from current monitoring. The analysis shows that in 96% monitoring points for river and 98% monitoring points for lake for which a trend could be determined, annual nitrate averages in 2024 will not exceed 2 mg NO3/l. For rivers, forecast values for 2024 do not exceed 25 mg NO3/l. For groundwater the analysis shows that in 87% of the monitoring points for which a trend could be determined, annual nitrate averages in 2024 will not exceed 25 mg NO3/l. It is estimated that about 5% of groundwater monitoring points will exceed 50 mg/l in 2024.

Summary

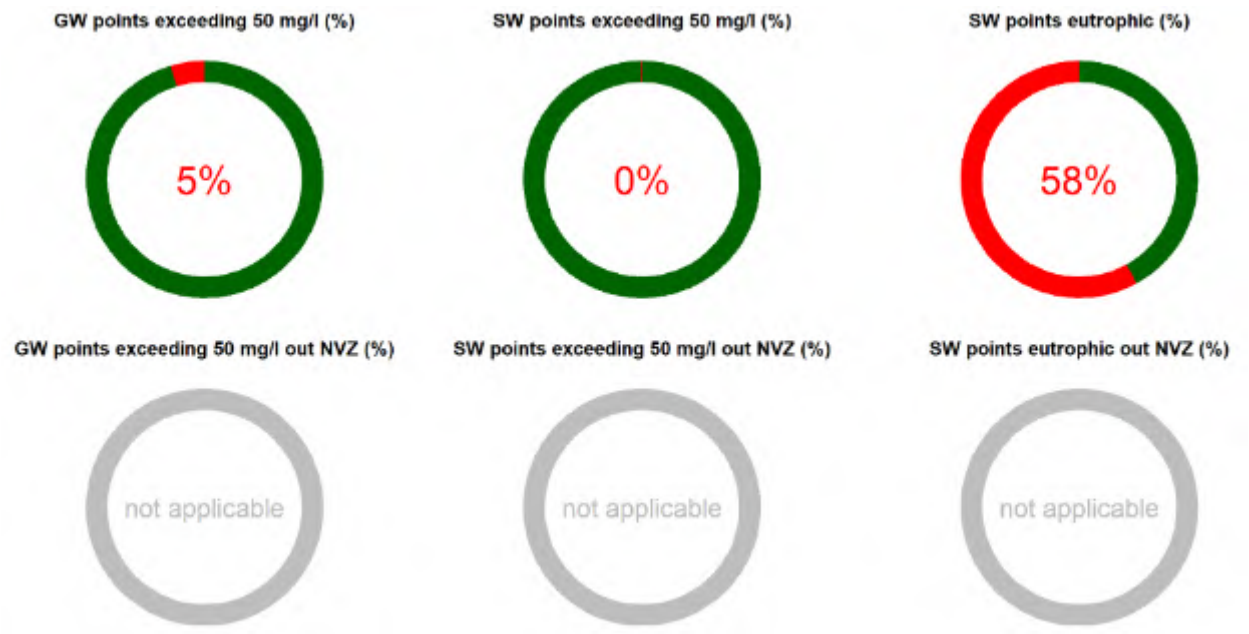


Figure 18. The summary plot for the period 2016-2019

This plot provides in the first row the percentage of stations exceeding 50 mg/l with respect to the total stations with measures and the percentage of eutrophic SW stations with respect to the total for which the trophic status is reported. In the second row, the percentage of stations exceeding 50 mg/l that are outside NVZ with respect to the total of stations exceeding 50 mg/, and the percentage of SW eutrophic stations that are outside NVZ with respect to the total that are eutrophic.

Long term analysis

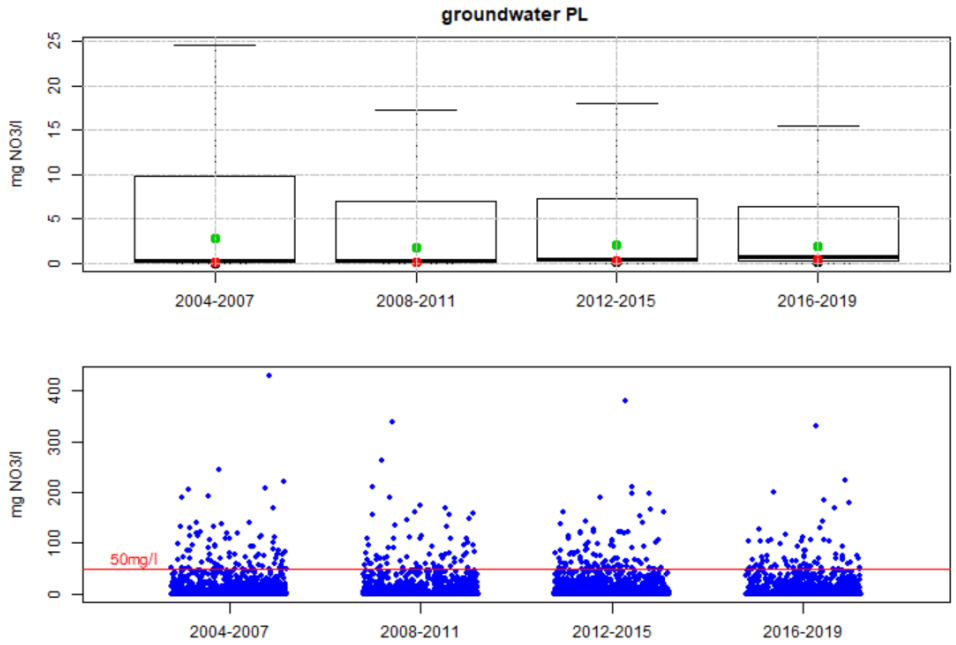


Figure 19. Time series of box whisker plots along with the distribution of the average NO3 annual concentrations for each reporting period, for groundwater stations. RPs represent the reporting periods, RP7 being the last period (2016-2019). The blue, red, green and black dots represent the mean of the fourth third, second and first quartiles, respectively.

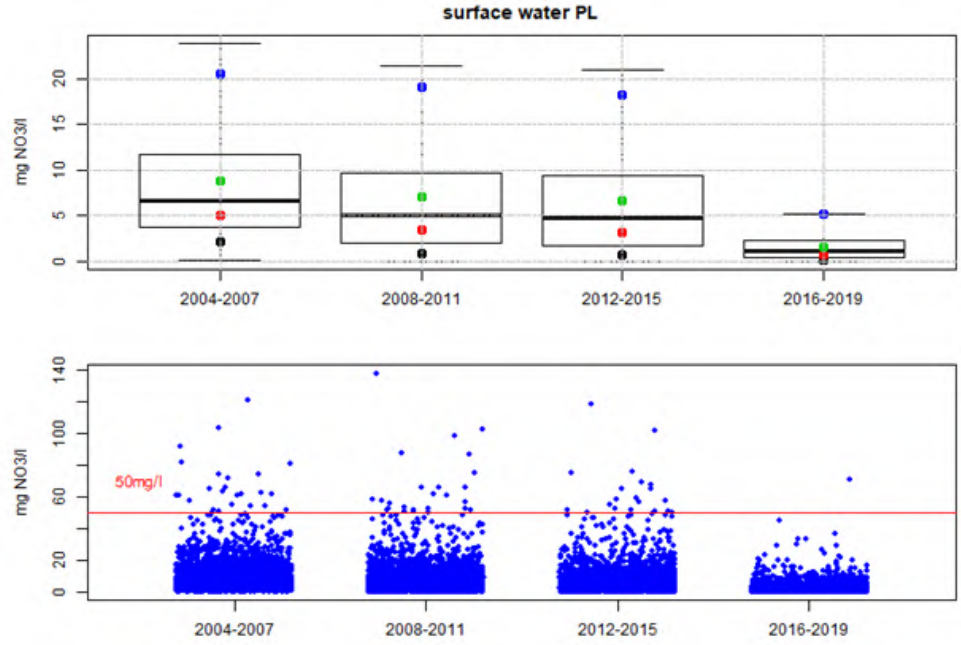


Figure 20. Time series of box whisker plots along with the distribution of the average NO3 annual concentrations for each reporting period, for surface water stations. RPs represent the reporting periods, RP7 being the last period (2016-2019). The blue, red, green and black dots represent the mean of the fourth third, second and first quartiles, respectively.

Conclusions and recommendations

The livestock density is close to the EU average and the net nitrogen and phosphorus surplus slightly above the EU average.

There is a well elaborated network of monitoring stations. The groundwater quality is generally good, with some hotspots having a nitrate concentration > 50 mg/l. A very high number of surface waters are found to be eutrophic. Eutrophication is affecting both inland and marine waters.

The action programme was revised in 2018.

The Commission recommends that Poland reinforces its action programme to tackle the eutrophication issues for both inland and marine waters for which the agriculture pressure is significant.