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Delegations will find attached document SWD(2026) 232 final - Part 14/27.

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PART 14/27

COMMISSION STAFF WORKING DOCUMENT

Member State country fiche 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 States reports for the period 2020–2023

European Commission

Hungary

Country staff working document
on the implementation of the Nitrates Directive

Period: 2020-2023

Contents

1. KEY FINDINGS AND RECOMMENDATIONS

Hungary submitted its report under the Nitrates Directive for the period 2020-2023 in May 2024 ([1]) via electronic reporting on Reportnet 3 portal ([2]).

This country staff working document is presented in line with the reporting guidelines and it is based on the data reported by the Member State ([3]), Eurostat and other EU official data sources. The Hungarian authorities were consulted for factual correctness. There may be differences with the information presented in the Member State national report. ([4])

The numbers presented below are indicators of the situation in the Member State but need further interpretation to draw specific conclusions. In some cases, changes in the monitoring networks and in methodology for assessing trophic status may complicate comparisons between reporting periods.

1.1. Key findings

Pressures from agriculture

In Hungary, the utilised agricultural area (UAA) accounts for 56% of the country's total land area, which is higher than the EU average (38%). The livestock density is 0.4 livestock units per hectare (LSU/ha) of UAA, which is lower than the EU average of 0.7 LSU/ha. The gross nitrogen balance is 53 kg/ha UAA, and the gross phosphorus balance is below 0 kg/ha UAA. ([5])

Monitoring network

For groundwater, the density of the monitoring network is around 18 stations per 1 000 km^2, which is higher than the EU average (8 stations). Compared to the previous reporting period, the density decreased by 4%.

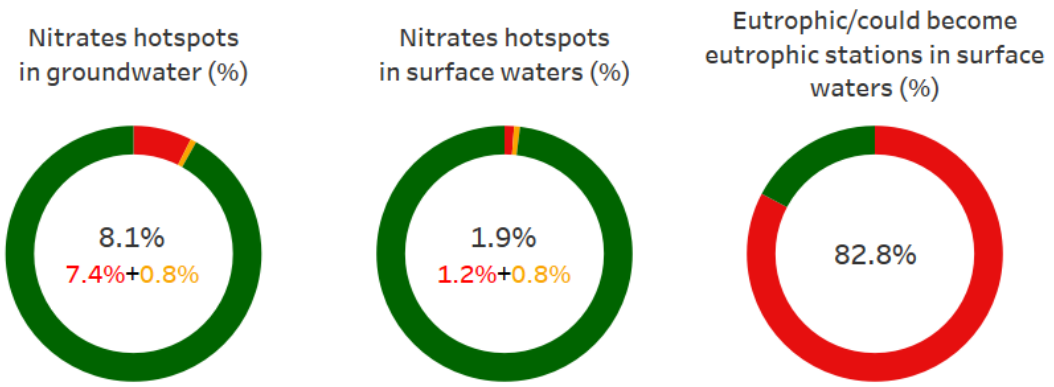
For surface freshwater, the density of the monitoring network is 10 stations per 1 000 km^2, which is higher than the EU average (7 stations). Compared to the previous reporting period, the density remained stable. The monitoring network includes river and lake/water reservoir stations.

Hungary is a landlocked country and therefore no saline surface waters are being monitored.

([1]) Final version was received in November 2025.
([2]) Reportnet 3 is an e-Reporting platform for reporting environmental and climate data to the European Environment Agency (EEA).
([3]) Only monitoring points electronically reported with nitrate concentration or trophic status, which were not removed from the monitoring network were considered for this assessment.
([4]) A uniform data-processing approach is applied to all Member States. In some instances, this may not fully correspond to the specific methodology used in the Member State.
([5]) The EU average is not available due to data gaps.

Water quality

Figure 1 – Share of monitoring points showing pollution in groundwater and surface waters



Note: The percentage share of **nitrate hotspots** refers to monitoring points with average annual nitrate concentrations ≥ 50 mg/l (red), or between 37.5 and 49.99 mg/l with an increasing trend (orange). This is calculated relative to the total number of points with measurements. The percentage share of monitoring points classified as **eutrophic or could become eutrophic** (red) is calculated relative to the total number of points with trophic status reported.

In **groundwater**, 92.6% of monitoring points show nitrate concentrations below 50 mg/l.

Overall, 8.1% of monitoring points show fall in two categories illustrated in Figure 1, i.e. they nitrate concentrations ≥ 50 mg/l (7.4%) or between 37.5 and 49.99 mg/l with an increasing trend (0.8%). Compared to the data reported in the previous reporting period, this represents a decrease of 0.5 percentage points (from 8.6% to 8.1%). The regions with the highest share are Central Transdanubia (12.8%), Southern Great Plain (10.7%), Western Transdanubia (9.7%), and Pest (9.4%).

Compared to the previous reporting period, nitrate concentrations decreased in 16.7% of groundwater monitoring points and increased in 15.5%. Among points with nitrate concentration ≥ 50 mg/l, increases (49.6%) were more frequent than decreases (44.8%).

In **surface water**, 98.8% of monitoring points show nitrate concentrations below 50 mg/l and 17.2% are classified as non-eutrophic.

Overall,1.9% of monitoring points fall in two categories illustrated in Figure 1, i.e. they show nitrate concentrations ≥ 50 mg/l (1.2%) or between 37.5 and 49.99 mg/l with an increasing trend (0.8%). Compared to the data reported in the previous reporting period, this represents an increase of 0.4 percentage points (from 1.5% to 1.9%). 30% of surface water monitoring stations show nitrate concentrations ≥ 10 mg/l, which is relevant for eutrophication.

Compared to the previous reporting period, nitrate concentrations decreased in 39.3% of surface water monitoring points and increased in 19.8%.

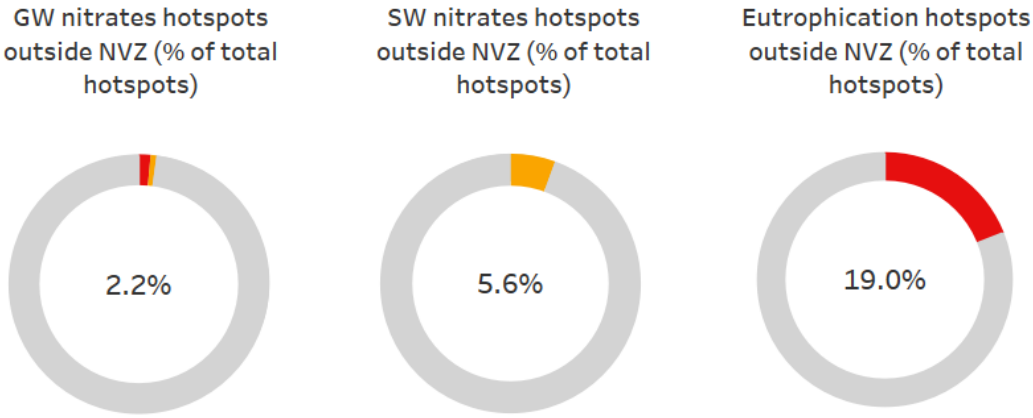
The share of monitoring points reported as eutrophic/could become eutrophic is 82.8% as illustrated in Figure 1. This represents an increase of 5.7 percentage points compared to the data reported in the previous period (from 77.1% to 82.8%). The regions with the highest share are Northern Great Plain (91.0%), Northern Hungary (88.6%) and Southern Transdanubia (85.0%).

Nitrate Vulnerable Zones

Hungary did not change the Nitrate Vulnerable Zones (NVZ) during the reporting period. The area of NVZ covers 52% of utilised agricultural area.

In Hungary, some monitoring points showing pollution are located outside NVZ. Figure 2 shows that outside NVZ, there are 2.2% of groundwater monitoring points showing nitrate pollution (3 out of 139), 5.6% of surface water monitoring points showing nitrate pollution (1 out of 18) and 19.0% of eutrophic/could become eutrophic points in surface waters (145 out of 764).

Figure 2 – Share of monitoring points showing pollution located outside Nitrate Vulnerable Zones (NVZ) relative to the total number of points showing pollution



Note: The percentage share of **nitrate hotspots outside NVZ** refers to monitoring points with average annual nitrate concentrations ≥ 50 mg/l (red), or between 37.5 and 49.99 mg/l with an increasing trend (orange), located outside NVZ. This is calculated relative to the total number of nitrate hotspots. The percentage share of **eutrophication hotspots outside NVZ** (red) is calculated as number of monitoring points classified as eutrophic/could become eutrophic, located outside NVZ, relative to the total number of points reported as eutrophic/could become eutrophic. Hotspots inside NVZ are shown in grey.

Action Programme

During the reporting period 2020-2023, Hungary modified its action programme. Amendments concerned the closed period for fertiliser application, the temporary manure storage on field and the incorporation time for organic fertiliser.

1.2. Recommendations

- Review and where necessary reinforce measures to improve water quality, notably with a view to addressing:
  - high or increasing nitrate concentrations in groundwater hotspots
  - high or increasing nitrate concentrations in surface waters
  - eutrophication of surface water bodies
- Review and where necessary update the designation of nitrate vulnerable zones to ensure that the designated zones include all areas with significant agricultural pressure that drain into:
  - waters that are eutrophic

- When preparing the Nitrates Action Programme and designating Nitrate Vulnerable Zones:
    - take into account objectives and deadlines of the Water Framework Directive, ensuring coherence with the 4th RBMP
    - consider introducing limitations on phosphorus fertilisation, if not yet implemented
    - ensure the cooperation between competent authorities in different sectors, such as agriculture and water, and with stakeholders
    - consider where measures could be simplified without compromising on results, working with the Commission and the other member States in the light of the findings of the evaluation of the Nitrates Directive
- Promote the dissemination of best practice, scientific knowledge and innovation to:
    - improve the analysis of expected future evolution in water quality and develop gap assessments for the nutrient load reductions required to reach water quality objectives
    - accelerate preparedness and resilience of action programmes and measures in the context of climate change

2. PRESSURES FROM AGRICULTURE

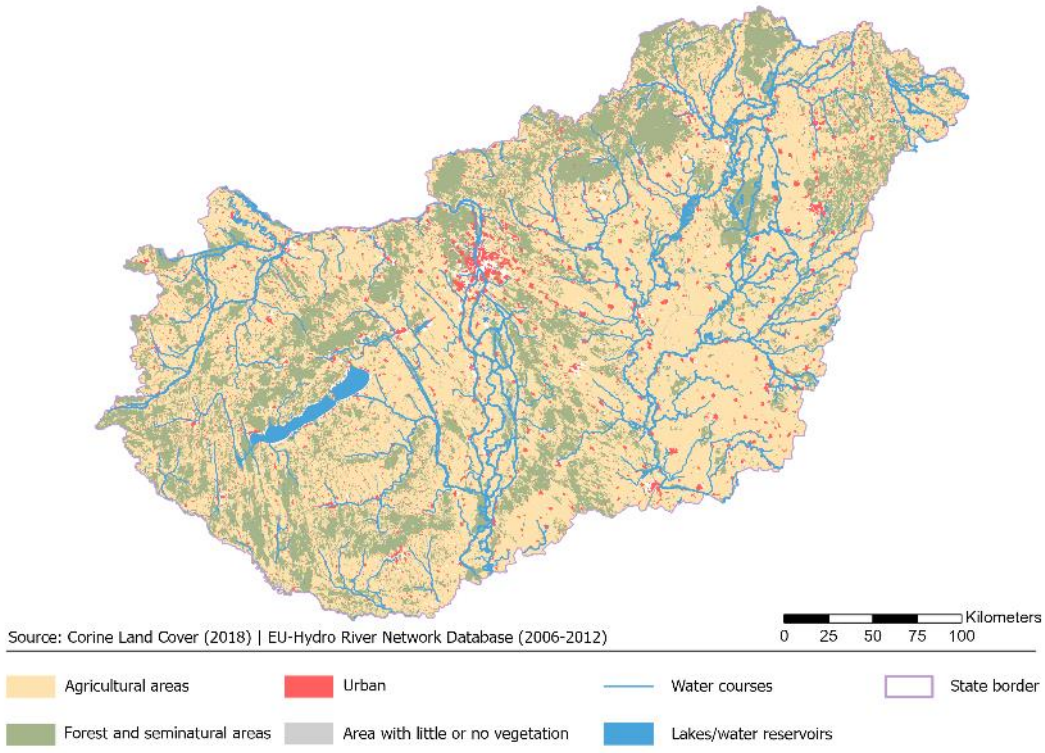
In Hungary, crop production accounted for the largest portion of the agricultural sector's total output value at 58.2% in the reporting period 2020–2023. Animal production followed with 34.8%, and other outputs made up 7.0%. ([6]) The share of agricultural land used for organic farming increased from 4.2% in the reporting period 2016-2019 to 6.1% in the reporting period 2020-2023. ([7])

The risk of diffuse pollution of waters by nutrients from agriculture is primarily dependent on the agricultural pressures in the Member State, expressed in terms of utilised agricultural area (UAA), livestock density, the use of mineral and manure fertilisers, as well as the nitrogen and phosphorus balance. This section describes the evolution of these indicators.

2.1. Land use

The map below presents the distribution of land use in Hungary along with watercourses and lakes/water reservoirs.

Figure 3 – Land use distribution in Hungary



([6]) Source: Eurostat (aact_eaa01)
([7]) Source: Eurostat (ef_m_org)

The utilised agricultural area (UAA) in Hungary covered 5.1 million hectares in 2023, making up 55.8% of the country's total land area. Arable land accounts for 81.5% of UAA, followed by permanent grassland at 15.5% and permanent crops at 2.9%.

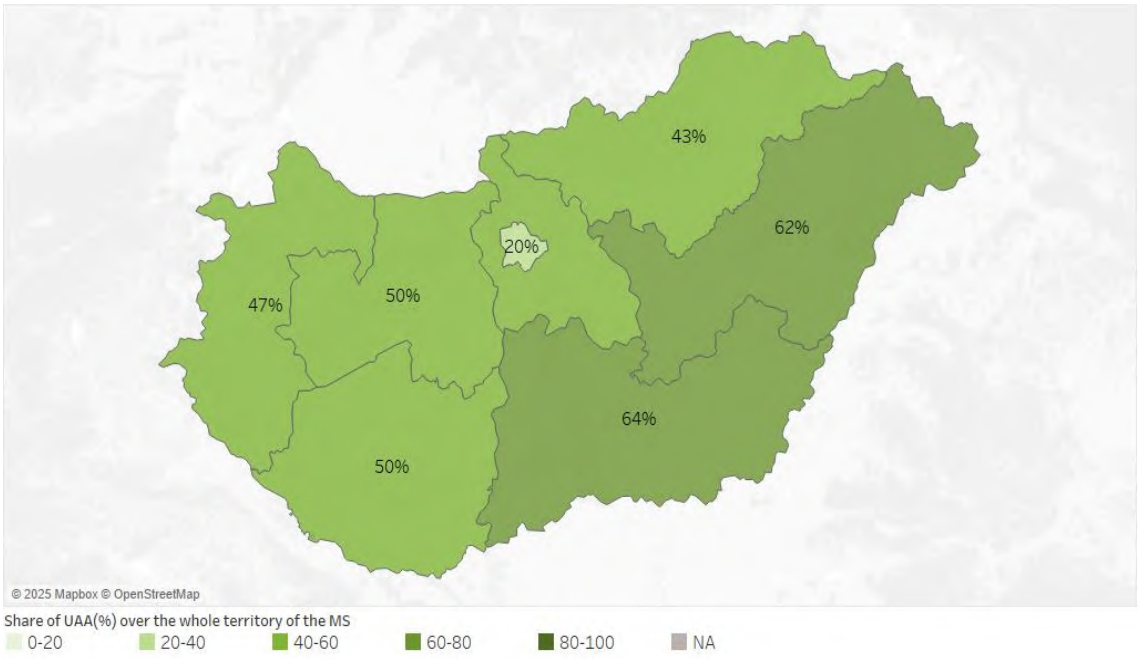
Table 1 – Evolution of the utilised agricultural area

	2010	2013	2016	2020	2023
utilised agricultural area (1000 ha)	4,686	4,657	4,671	4,922	5,087
arable land (1000 ha)	3,797	3,801	3,822	4,028	4,146
permanent grassland (1000 ha)	721	703	690	733	789
permanent crops (1000 ha)	152	139	150	158	150
kitchen gardens (1000 ha)	17	14	8	3	2

Source: Eurostat (ef_lus_main)

In 2020, the share of the UAA ranged from 64% in Southern Great Plain, to 20% in Budapest.

Figure 4 – Share of utilised agricultural area (UAA) at NUTS2 level in 2020 ([8])



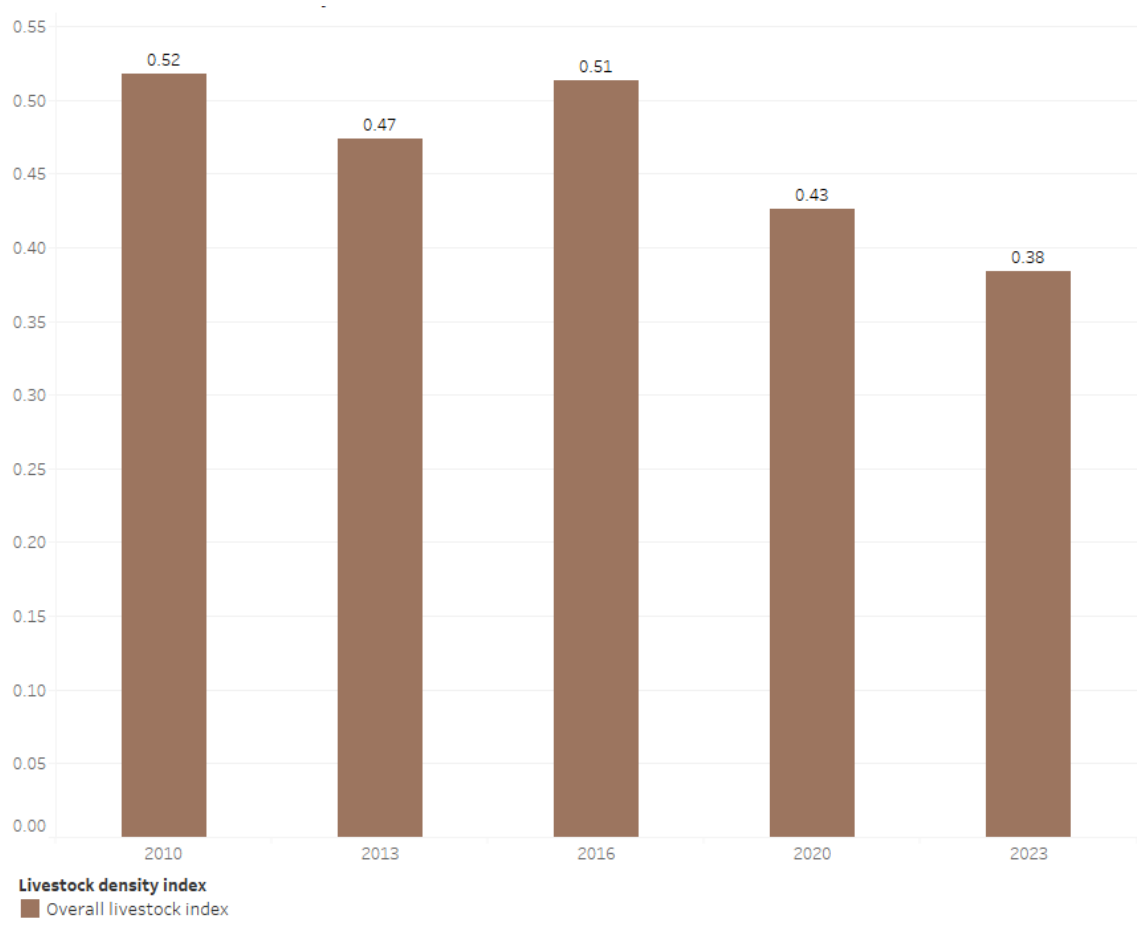
Source: Eurostat (ef_lus_main)

([8]) Latest available data.

2.2. Livestock density

In Hungary the livestock density was 0.38 livestock units per hectare (LSU/ha) of UAA in 2023. The livestock density has decreased since 2010 but with a spike in 2016.

Figure 5 – Evolution of the livestock density (LSU/ha UAA)



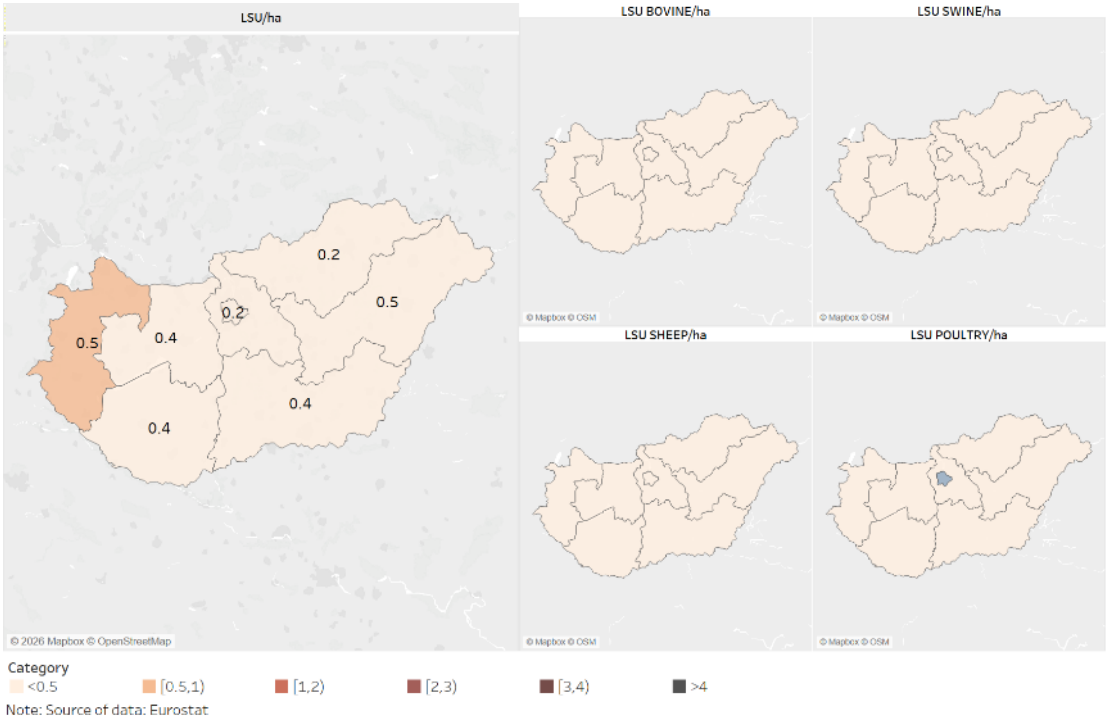
Source: Eurostat (ef_fsi_lskds)

Table 2 – Evolution of the livestock numbers by animal type

	2007	2010	2013	2016	2020	2023
live bovines (Million heads)	0.71	0.68	0.78	0.85	0.93	0.87
of which dairy cows (Million heads)	0.27	0.24	0.25	0.24	0.25	0.27
live pigs (Million heads)	3.87	3.17	3.00	2.91	2.85	2.61
live poultry (Million heads)	NA	48.70	41.10	46.69	38.24	29.12
live sheep (Million heads)	NA	1.22	1.21	1.14	0.94	0.91
live goats (Million heads)	0.07	0.08	0.07	0.08	0.05	0.03

Source: Eurostat, for live poultry and live sheep data complemented with FAOSTAT

Figure 6 – Livestock density distribution by animal type (LSU/ha UAA) at NUTS2 level in 2020 ([9])



Source: Eurostat (Livestock units: ef_lsk_main; Utilised agricultural area: ef_lus_main)

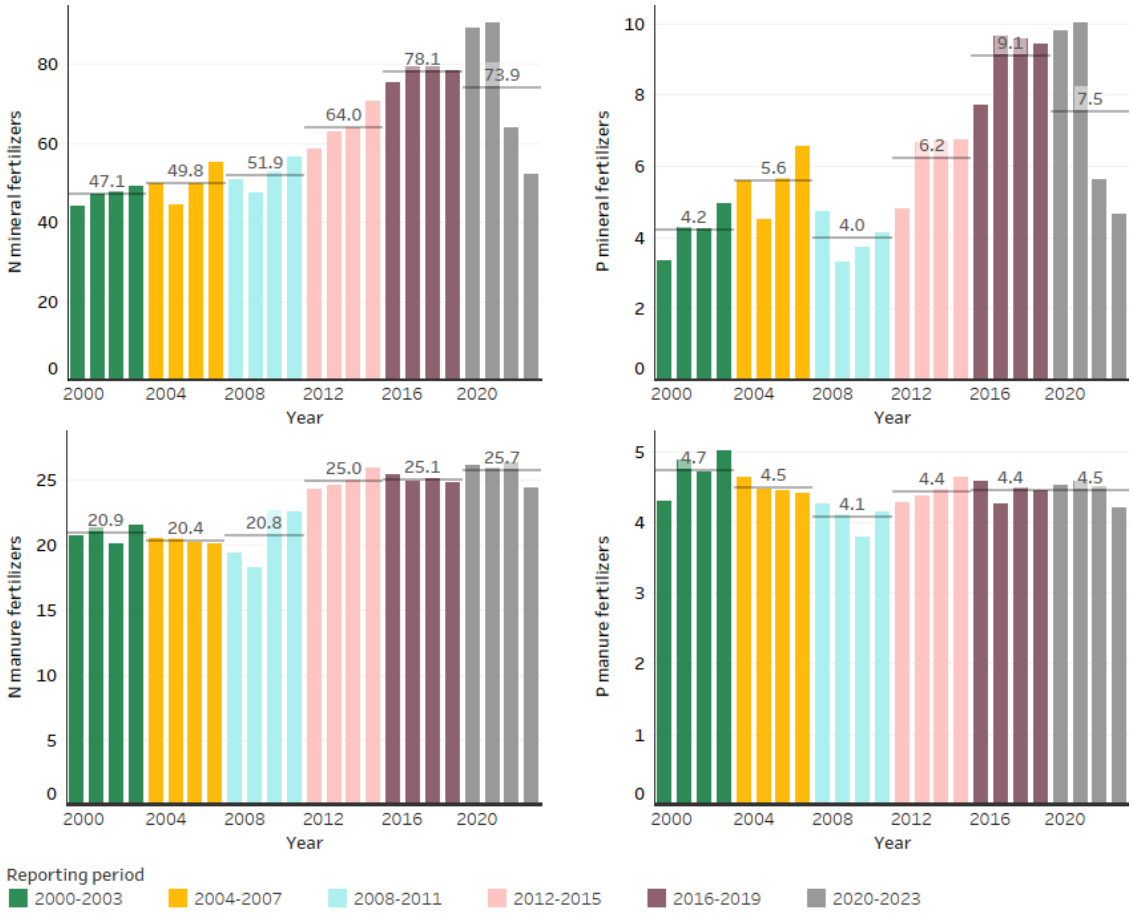
([9]) Latest available data.

2.3. Nitrogen and phosphorus fertiliser use

In Hungary, the use of **nitrogen (N) fertilisers** was 73.9 kg/ha UAA for mineral fertilisers and 25.7 kg/ha UAA for manure fertilisers in 2020-2023. The use of mineral fertilisers has decreased by 4.2 kg/ha UAA whereas the use of manure fertilisers has increased by 0.6 kg/ha UAA since the last reporting period.

The use of **phosphorus (P) fertilisers** was 7.5 kg/ha UAA for mineral fertilisers and 4.5 kg/ha UAA for manure fertilisers in 2020-2023. The use of P mineral fertilisers decreased by 1.6 kg/ha UAA since the last reporting period whereas the use of P manure fertilisers increased by 0.1 kg/ha UAA since the last reporting period.

Figure 7 – Evolution of nitrogen and phosphorus fertiliser use (kg/ha UAA)



Source: Eurostat (aei_pr_gnb)

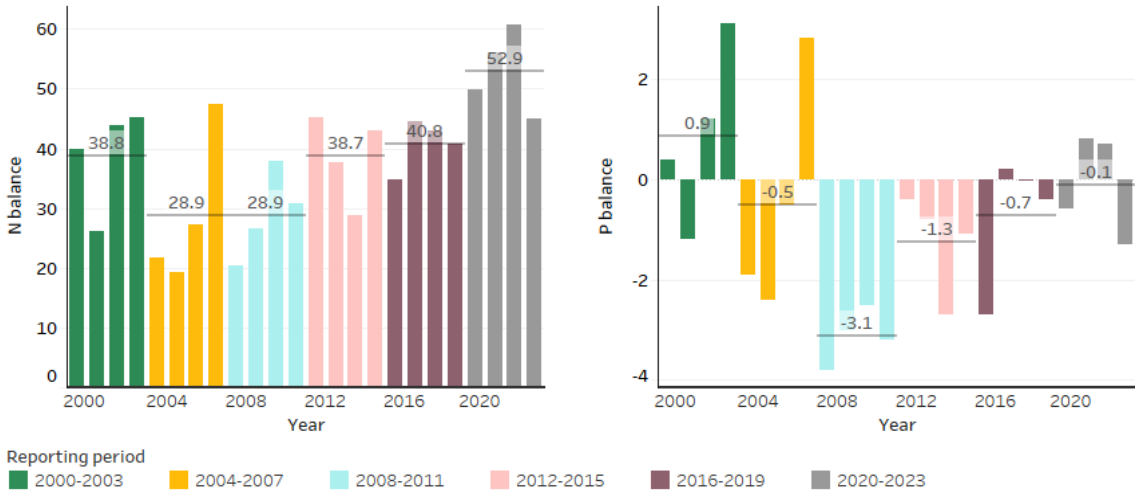
2.4. Nitrogen and phosphorus balance

The nutrient balance ([10]) per hectare of agricultural land (kg/ha UAA) is an indicator of the success that farmers have had in implementing balanced fertilisation and of the resulting nutrient pressure from agriculture. A high surplus (positive balance) indicates a risk of emissions into water and air.

In Hungary, the **gross nitrogen (N) balance** was 52.9 kg/ha UAA in 2020-2023. The nitrogen balance increased by 12.1 kg/ha UAA since previous reporting.

The gross **phosphorus (P) balance** was -0.1 kg/ha UAA in 2020-2023. The phosphorus balance increased by 0.6 kg/ha UAA since previous reporting.

Figure 8 – Evolution of gross nitrogen and phosphorus balance (kg/ha UAA)



Source: Eurostat (aei_pr_gnb)

2.5. Nitrogen discharge to the environment

Hungary provided information that the nitrogen discharge from agriculture to environment were 541 kilotonnes during the reporting period 2016-2019 and 498.5 kilotonnes during the reporting period 2020-2023. The agricultural sector's contribution to the country's total nitrogen discharge decreased from 98.4% to 98.2%.

([10]) Gross nutrient balance (aei_pr_gnb)

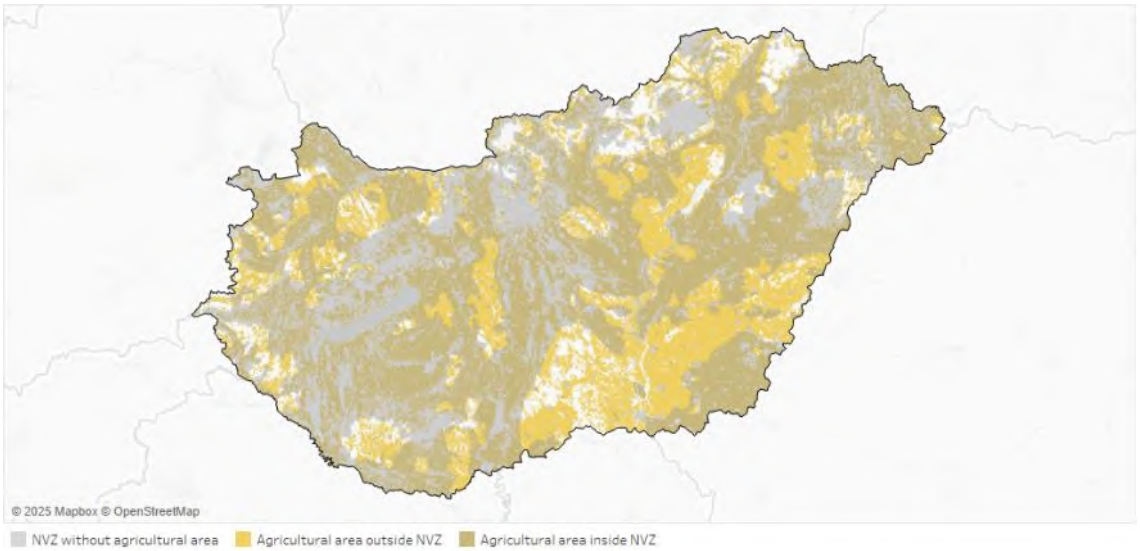
3. NITRATE VULNERABLE ZONES

In line with Article paragraph 2, Hungary designates nitrate vulnerable zones (NVZ) as all known areas of land in its territories which drain into the waters identified as polluted or at risk of being polluted and which contribute to pollution. Action programmes with mandatory measures are implemented in NVZ to reduce and prevent water pollution. The Nitrates Directive requires that the Member State reviews and if necessary, revise or add to the designation of vulnerable zones as appropriate, and at least every four years, to take into account changes and factors unforeseen at the time of the previous designation.

In Hungary, in addition to the areas designated as NVZ based on nitrate sensitivity of waters, the area of any livestock farm subject to an environmental procedure, the area of large livestock farms, manure storage areas belonging to livestock farms, or manure processing areas located anywhere in the country are considered as nitrate vulnerable zones.

During the reporting period 2020-2023 Hungary did not change the NVZ. The last change to the designation was done in 2013. The map below shows the current NVZ designation relative to the agricultural area. The designated area covers 69.9% of territory and 51.5% of UAA.

Figure 9 – Distribution of the Nitrates Vulnerable Zones (NVZ) and agricultural area



Note: Based on CORINE Land Cover data with simplified detail; some smaller agricultural areas may not appear.

4. NITRATES IN GROUNDWATER

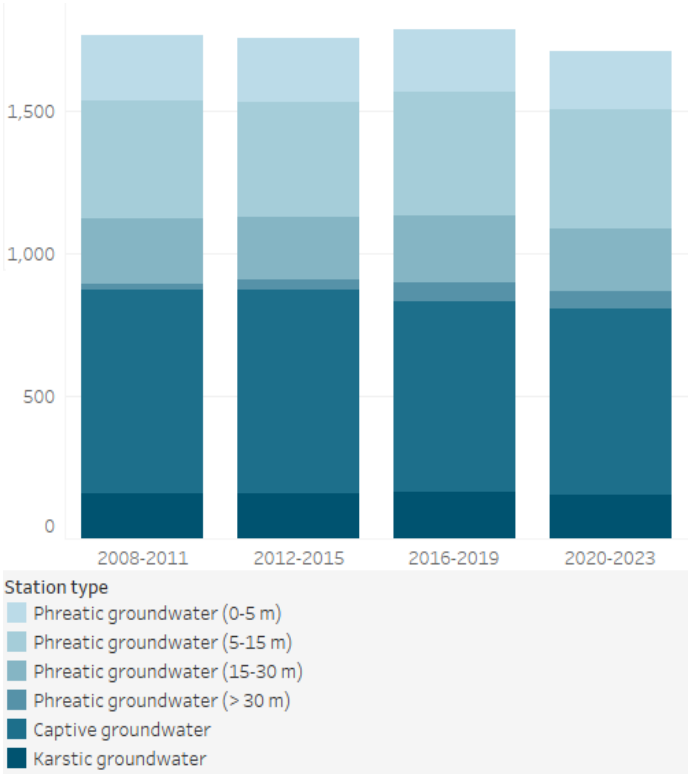
4.1. Monitoring of nitrate concentrations in groundwater

Nitrate data are generated through the groundwater chemical status monitoring programme implemented in line with the Water Framework Directive (WFD). Monitoring points designated under the Nitrates Directive are based on the groundwater monitoring network established under the WFD. Exceptions are thermal water bodies and most porous artesian wells hundreds of metres deep.

During the reporting period 2020-2023, nitrate concentrations were reported at 1 710 groundwater monitoring points. The station density was 18.4 stations per 1 000 km^2. Of these monitoring points, 95.3% of monitoring points were located within NVZ and 4.7% outside NVZ.

The overall number of monitoring points decreased by 78 (4.4%) compared to the previous reporting period. In the past three reporting periods, the number and distribution of monitoring stations remained relatively stable. The graph below presents the changes in the monitoring network over the last four reporting periods.

Figure 10 – Evolution of groundwater monitoring network (monitoring points with measurements of nitrates)



In the current reporting period, changes in nitrate concentrations compared to the previous monitoring period (trends) were assessed for 1 635 monitoring points, accounting for 95.6% of all points with measurements. The share of monitoring points with trends remained stable compared to the previous reporting period, which was 95.6% in reporting period 2016-2019. The table below presents the number of monitoring points with measurements and trends in the last four reporting periods.

Table 3 – Number of groundwater monitoring points with measurements of nitrates and trends by station type ([11])

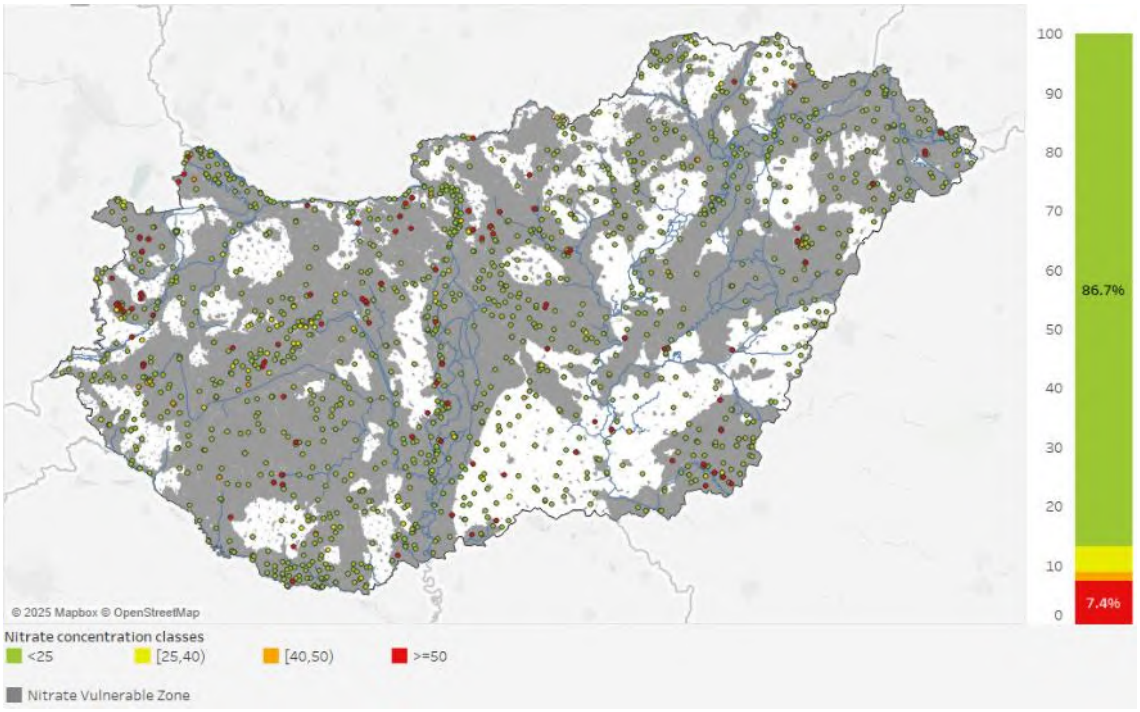
	Stations with measurements				Stations with trends			
Station type	2008-2011	2012-2015	2016-2019	2020-2023	2008-2011	2012-2015	2016-2019	2020-2023
Phreatic groundwater (0-5 m)	227	225	220	206	217	222	210	198
Phreatic groundwater (5-15 m)	416	404	434	417	405	398	401	408
Phreatic groundwater (15-30 m)	225	221	235	220	223	220	224	218
Phreatic groundwater (> 30 m)	24	32	68	60	21	31	68	60
Captive groundwater	714	718	669	652	700	709	646	600
Karstic groundwater	157	156	162	155	154	156	161	151
Not specified								
Total	1,763	1,756	1,788	1,710	1,720	1,736	1,710	1,635

[11]) Hungary reported that monitoring was discontinued in 157 monitoring points relative to the previous reporting period. Discontinuation may be due to nitrate concentrations below 25 mg/l, change in station code or type, or other specific reasons.

4.2. Nitrate concentrations in groundwater

In Hungary, 7.4% of groundwater monitoring points showed average nitrate concentrations equal to or above the drinking water threshold of 50 mg/l, whereas 1.5% had concentrations between 40-49.99 mg/l, 4.4% showed concentrations between 25-39.99 mg/ and 86.7% below 25 mg/l. The figure below shows a spatial distribution of the average nitrate concentrations and the shares in corresponding nitrate concentration classes.

Figure 11 – Map of average annual mean nitrate concentrations in groundwater and share of monitoring points by nitrate concentration class in the reporting period 2020-2023



Note: In the map, monitoring points with higher values are plotted on top. In the graph, the percentages below 5% are not labelled.

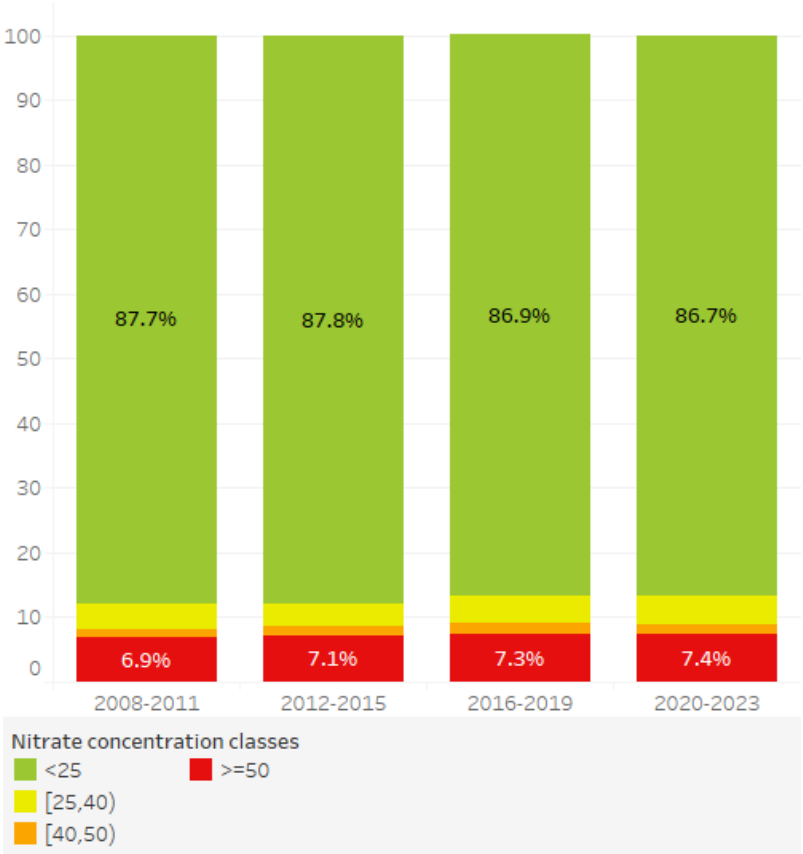
The station type category with the highest share of points with nitrate concentrations equal to or above the drinking water threshold of 50 mg/l was phreatic groundwater (5-15m) with share of 16.8%, as shown in the table below.

Table 4 – Share of groundwater monitoring points by nitrate concentration class (mg/l) in the reporting period 2020-2023, categorised by station type

	Number of stations	% of Total	<25	[25,40)	[40,50)	>=50
Phreatic groundwater (0-5 m)	206	12.0%	77.2%	8.3%	2.4%	12.1%
Phreatic groundwater (5-15 m)	417	24.4%	74.1%	5.0%	4.1%	16.8%
Phreatic groundwater (15-30 m)	220	12.9%	82.3%	5.9%	1.8%	10.0%
Phreatic groundwater (> 30 m)	60	3.5%	93.3%	5.0%		1.7%
Captive groundwater	652	38.1%	99.7%	0.3%		
Karstic groundwater	155	9.1%	82.6%	12.3%		5.2%
Total	1,710	100.0%	86.7%	4.4%	1.5%	7.4%

Compared to the previous reporting period, the share of monitoring points with concentrations ≥ 50 mg/l increased from 7.3% to 7.4%. The graph below presents the share of monitoring points per classes of nitrate concentrations in the last four reporting periods.

Figure 12 – Share of monitoring points in groundwater by class of nitrate concentration ([12]) in the current and previous reporting periods



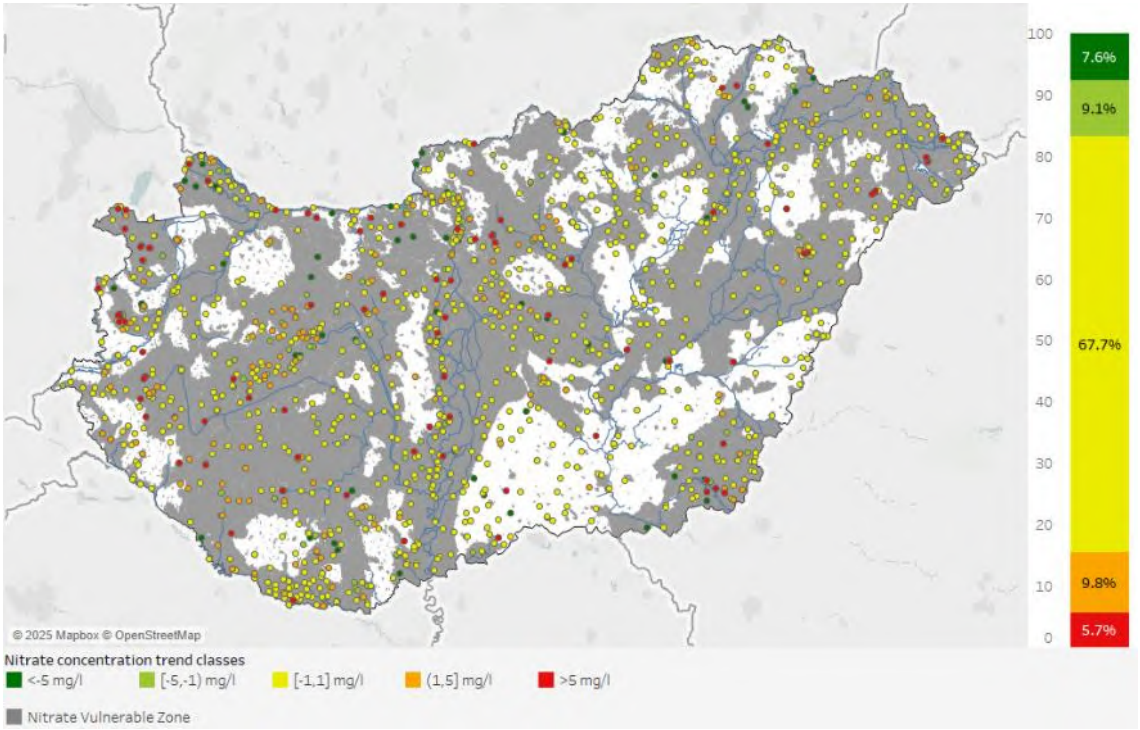
Note: The percentages below 5% are not labelled.

([12]) Average of annual mean values over the reporting period.

4.3. Trends in nitrate concentrations in groundwater

Compared to the last reporting period, there has been a decrease of nitrate concentrations in 16.7% of monitoring points and an increase in 15.5%. For the remaining 67.7% there was no significant change. The increase or decrease can be categorised as weak if it is between 1 and 5 mg/l, and as strong if it is above 5 mg/l.

Figure 13 – Map of trends in average annual mean nitrate concentrations ([13]) in groundwater between the periods 2016-2019 and 2020-2023 and share of monitoring points by trend class



Note: In the map, monitoring points with higher values are plotted on top.

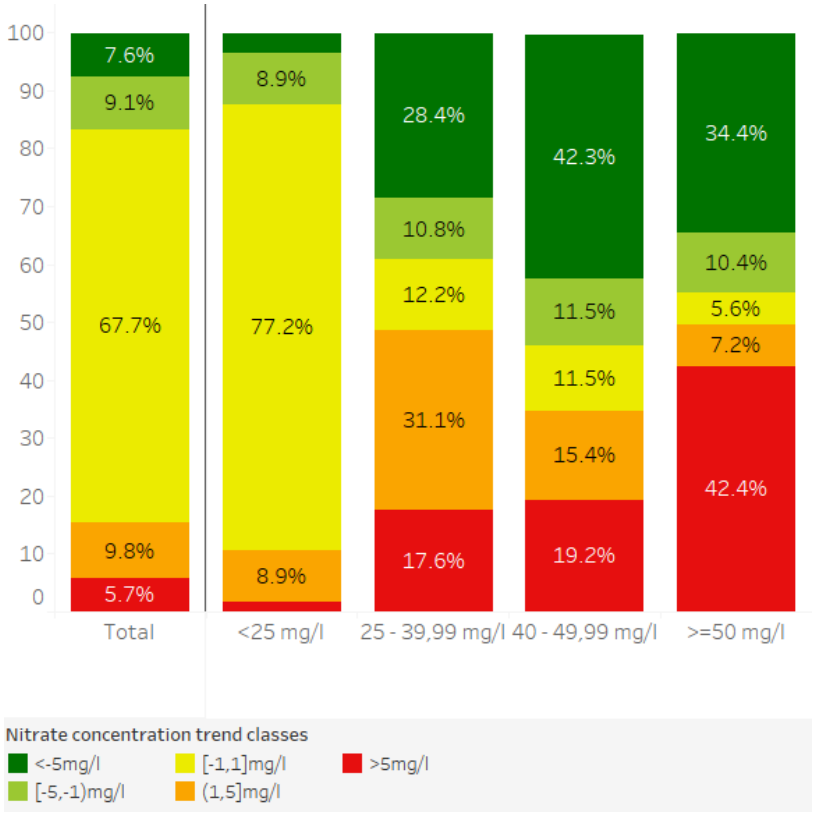
Table 5 – Share of groundwater monitoring points by trend class (mg/l) between the periods 2016-2019 and 2020-2023, categorised by station type

	Total Number of Stations	% Total Number of Stations	<-5	[-5,-1)	[-1,1]	(1,5]	>5
Phreatic groundwater (0-5 m)	198	12.1%	16.7%	18.2%	44.4%	9.6%	11.1%
Phreatic groundwater (5-15 m)	408	25.0%	14.7%	11.5%	49.8%	11%	13%
Phreatic groundwater (15-30 m)	218	13.3%	7.8%	10.1%	67.9%	9.6%	4.6%
Phreatic groundwater (>30 m)	60	3.7%	6.7%	11.7%	68.3%	10%	3.3%
Captive groundwater	600	36.7%	0.3%	2.3%	90.5%	6.3%	0.5%
Karstic groundwater	151	9.2%	6%	15.2%	55.6%	21.2%	2%
Total	1,635	100.0%	7.6%	9.1%	67.7%	9.8%	5.7%

([13]) The average of annual mean values of nitrate concentrations over the reporting period 2020-2023 compared to the average for the reporting period 2016-2019.

When looking at the trend for waters that are polluted in the current reporting period (equal to or above 50 mg/l), there has been an increase of nitrate concentration for 49.6% and a decrease for 44.8% between the previous and the current reporting periods. The graph below shows the increase (in red and orange) and decreases (in green) per nitrate concentration class.

Figure 14 – Share of groundwater monitoring points by classes of trend between the periods 2016-2019 and 2020-2023, across different nitrate concentration classes (<24.99 mg/l, 25-39.99 mg/l, 40-49.99 mg/l and ≥50mg/l) ([14])

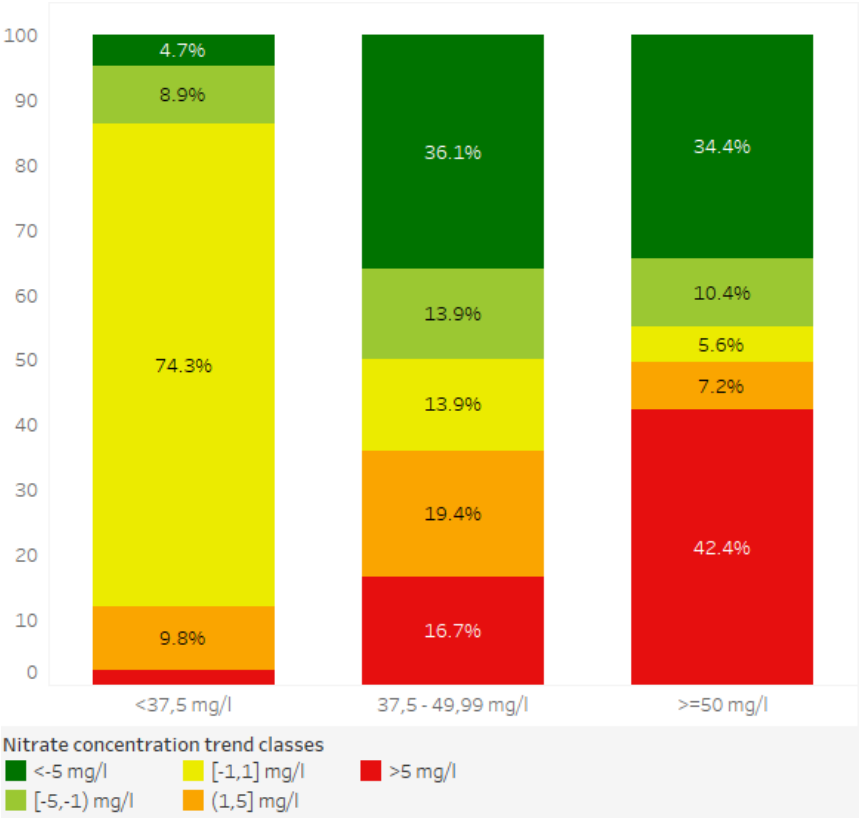


The percentages below 5% are not labelled.

([14]) Nitrate concentration classes as per the Nitrates Directive report.

To better align the water quality assessment with the thresholds defined under the Groundwater Directive, trends were also calculated for the water quality class with nitrate concentrations between 37.5-49.99 mg/l. When looking at the trend in this concentration category, there has been an increase of nitrate concentration for 36.1% and a decrease for 50.0% of monitoring points.

Figure 15 – Share of groundwater monitoring points by classes of trend between the periods 2016-2019 and 2020-2023, in different nitrate concentration classes (<37.5 mg/l, 37.5-49.99 mg/l and ≥50mg/l) ([15])

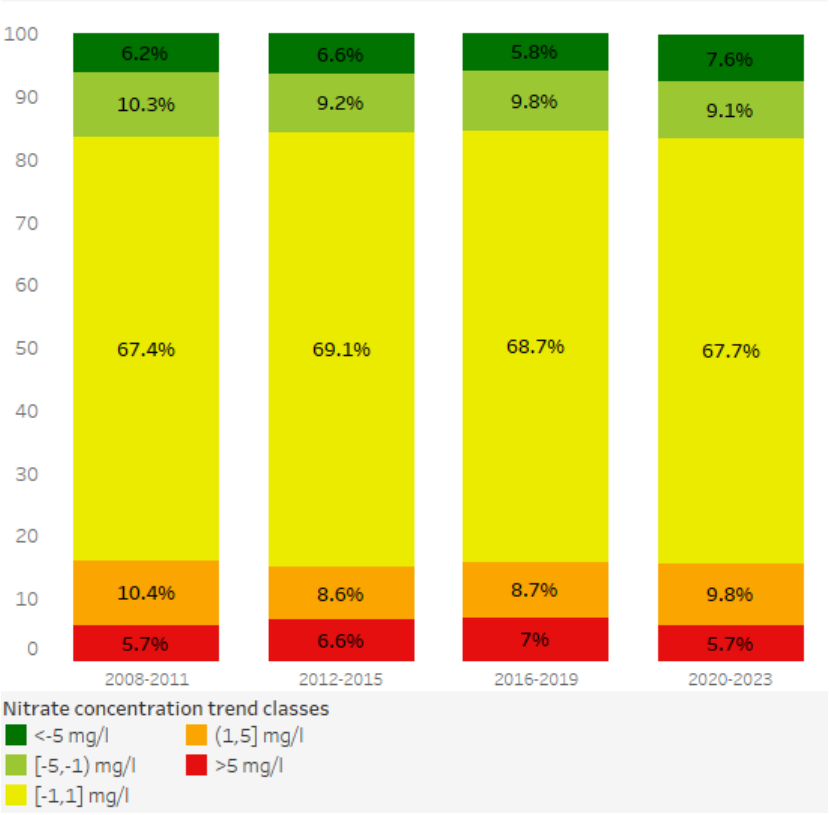


The percentages below 5% are not labelled.

([15]) Nitrate concentration classes as in the Water Framework Directive guidance on GW status and trend assessment as division of nitrates quality standard (50mg/l and 75 % of this value [37.5 mg/l]).

Compared to the previous reporting period, there was a higher share of monitoring points with decreasing nitrate concentrations (16.7% in the current reporting period compared to 15.6% in the previous reporting period) and a lower share of monitoring points with increasing nitrate concentrations (15.5% compared to 15.7%). The graph below shows the share of monitoring points with increases (in red and orange), decreases (in green) and without significant change (in yellow) in nitrate concentrations between reporting periods.

Figure 16 – Share of groundwater monitoring points by class of nitrate concentration trend ([16]) in the current and previous reporting periods

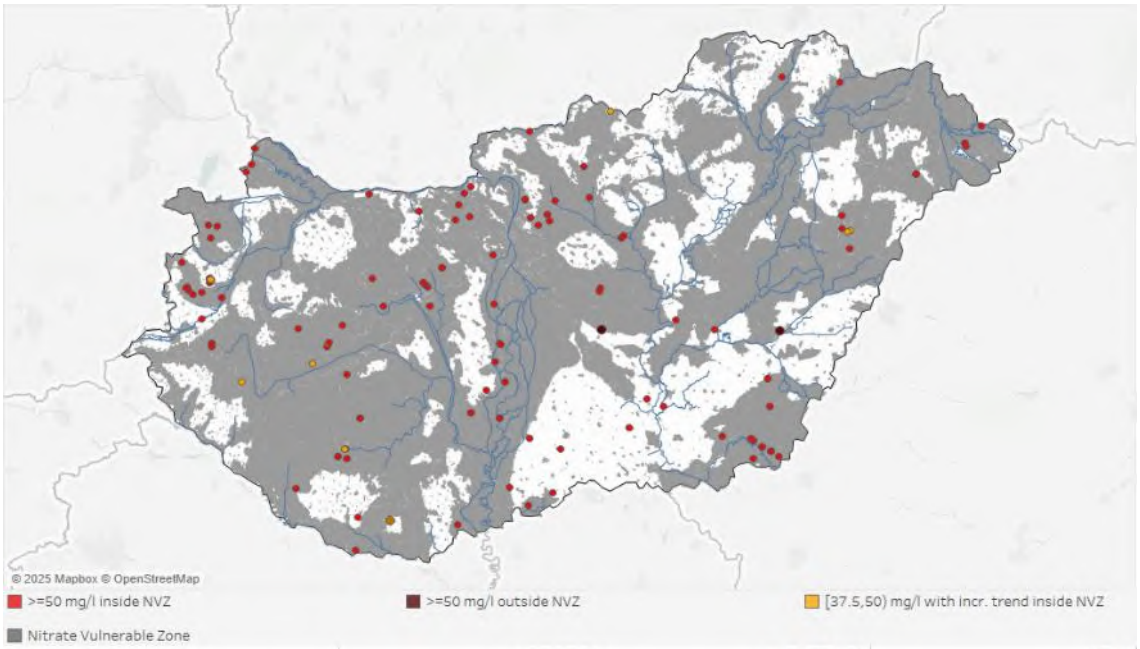


([16]) Change in average annual mean nitrate concentrations compared to the previous reporting period.

4.4. Nitrate pollution hotspots in groundwater

A nitrate pollution hotspot in groundwater is defined here as a monitoring point where the average annual nitrate concentration is either ≥ 50 mg/l or between 37.5 and 49.99 mg/l with an increasing trend. In Hungary there are 139 groundwater nitrate pollution hotspots, of which 3 are outside NVZ, accounting for 2.2% of all groundwater nitrate pollution hotspots.

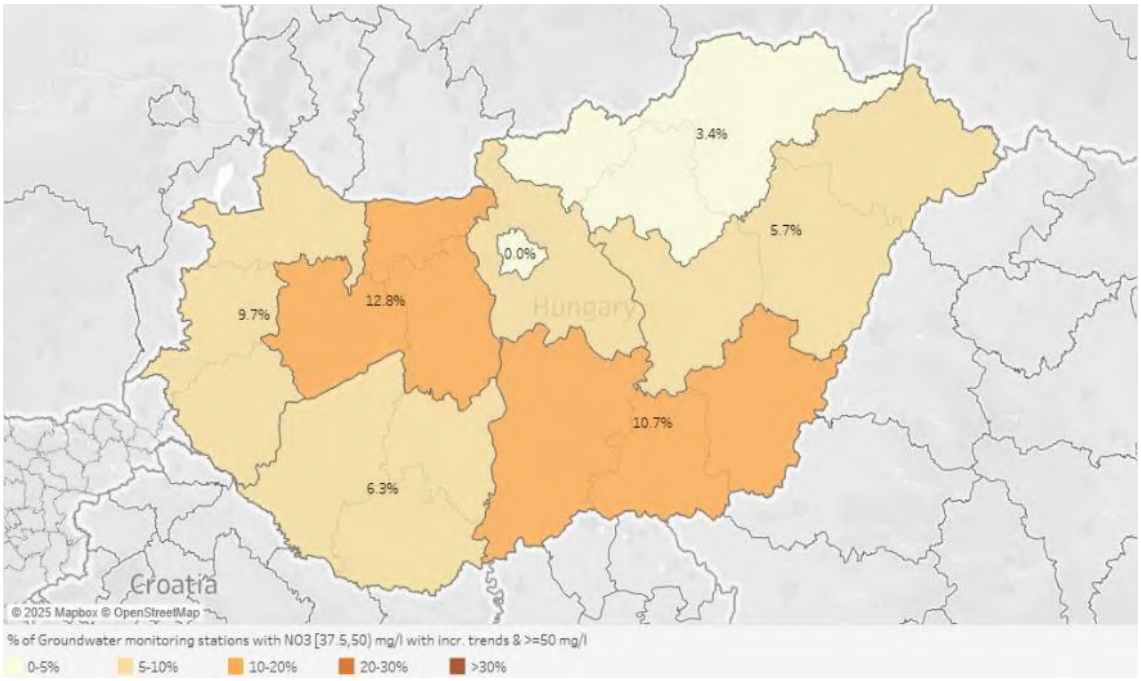
Figure 17 – Groundwater nitrate pollution hotspots (map) and their distribution inside and outside Nitrate Vulnerable Zones (table)



	inside NVZ	outside NVZ	Total
Groundwater [37.5,50) with incr. trend	12	1	13
>=50	124	2	126
Total	136	3	139

The NUTS2 regions with the highest share of hotspots are Central Transdanubia (12.8%), Southern Great Plain (10.7%), Western Transdanubia (9.7%), and Pest (9.4%).

Figure 18 – Share of groundwater nitrate pollution hotspots at NUTS2 level



5. NITRATES IN SURFACE WATERS

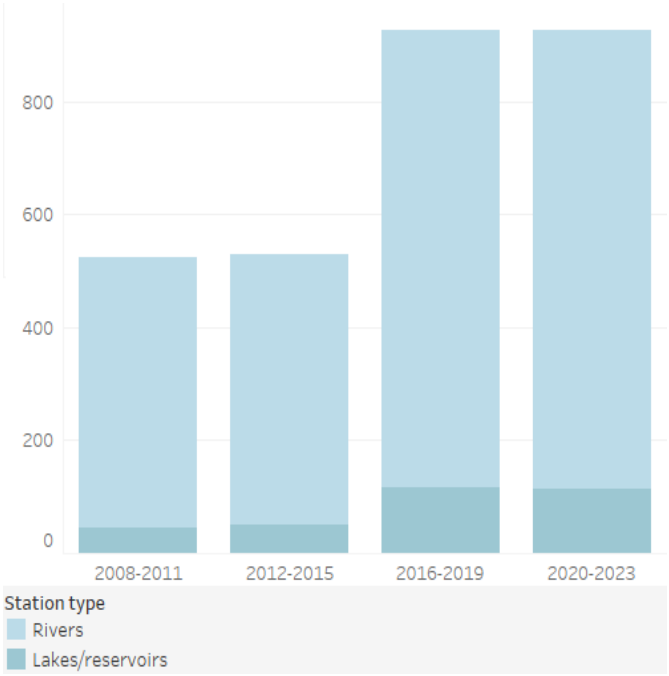
5.1. Monitoring of nitrate concentrations in surface waters

Monitoring data from the FEVISZ database of the National Environmental Information System (Országos Környezeti Információs Rendszer – OKIR) and the Water Quality Centre VMA2 database have been used for the assessment of surface water quality. The evaluation of nitrate concentrations and trophic status covered all surveillance and operational monitoring results available that were in line with the nitrate monitoring objectives of the Nitrates Directive.

During the reporting period 2020-2023, nitrate concentrations were reported at 927 surface water monitoring points. Among these, 87.7% were in rivers and 12.3% were in lakes or reservoirs. The freshwater monitoring points density was 10.0 stations per 1 000 km^2. Of these monitoring points, 82.0% monitoring points were located within NVZ and 18.0% outside NVZ. As Hungary is a landlocked country, it has no saline waters.

The overall number of monitoring points remained stable compared to the previous reporting period. The total number of stations has increased significantly from 2012-2015 to 2016-2019 and has been stable since. The graph below presents the changes in the monitoring network over the last four reporting periods.

Figure 19 – Evolution of surface water monitoring network (monitoring points with measurements of nitrates)



In this reporting period, changes in nitrate concentrations compared to the previous monitoring period (trends) were assessed for 843 monitoring points, accounting for 90.9% of all points with measurements. The share of monitoring points with trends increased compared to the previous reporting period (44.7% in reporting period 2016-2019). The table below presents the number of monitoring points and the number of monitoring points with trends in the last four reporting periods.

Table 6 – Number of surface water monitoring points with measurements of nitrates and trends per type ([17])

	Stations with measurements				Stations with trends			
Station type	2008-2011	2012-2015	2016-2019	2020-2023	2008-2011	2012-2015	2016-2019	2020-2023
Rivers	480	480	810	813	187	282	378	738
Lakes/reservoirs	45	50	117	114	25	31	36	105
Total	525	530	927	927	212	313	414	843

([17]) Hungary reported that monitoring was discontinued in 84 monitoring points relative to the previous reporting period. Discontinuation may be due to nitrate concentrations below 25 mg/l, change in station code or type, or other specific reasons.

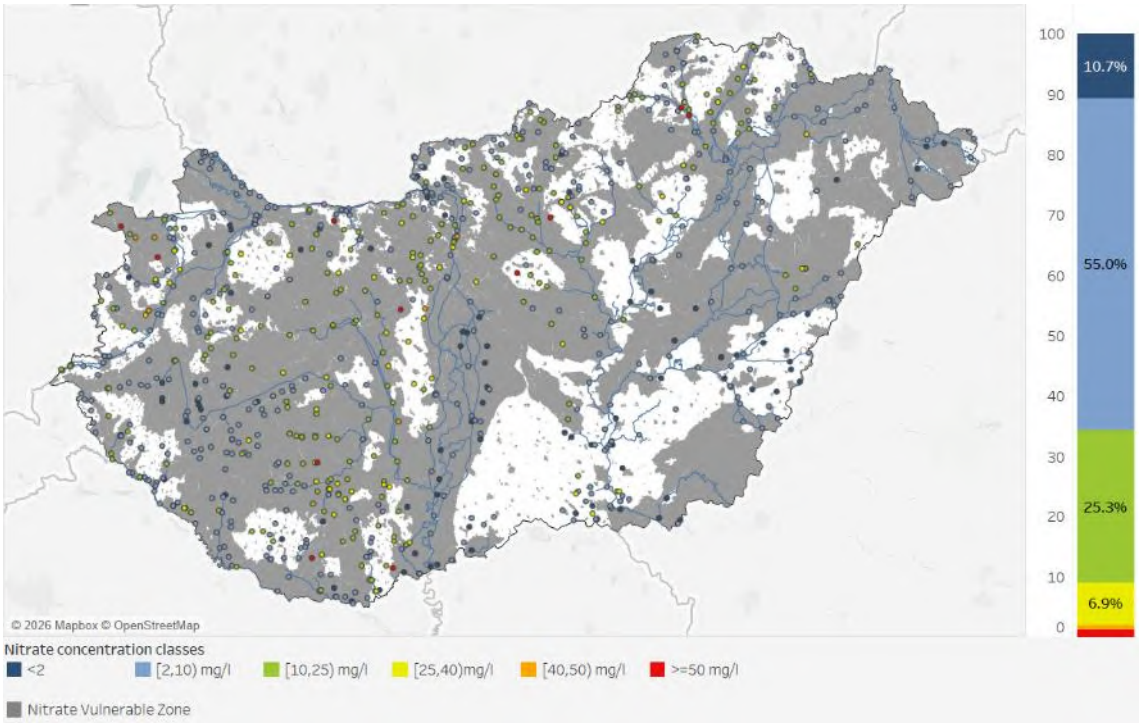
5.2. Nitrate concentrations in surface waters

Rivers

In Hungary, 1.4% of monitoring points in rivers showed average nitrate concentrations equal to or above the drinking water threshold of 50 mg/l, whereas 0.7% had concentrations between 40-49.99 mg/l, 6.9% showed concentrations between 25-39.99 mg/, 25.3% in the class 10-24.99 mg/l, 55.0% in the class 2-9.99 mg/l and 10.7% below 2 mg/l.

It is relevant to look at the distribution in nitrate concentration classes below 25 mg/l for surface water as there can be a risk of eutrophication in lower concentration classes.

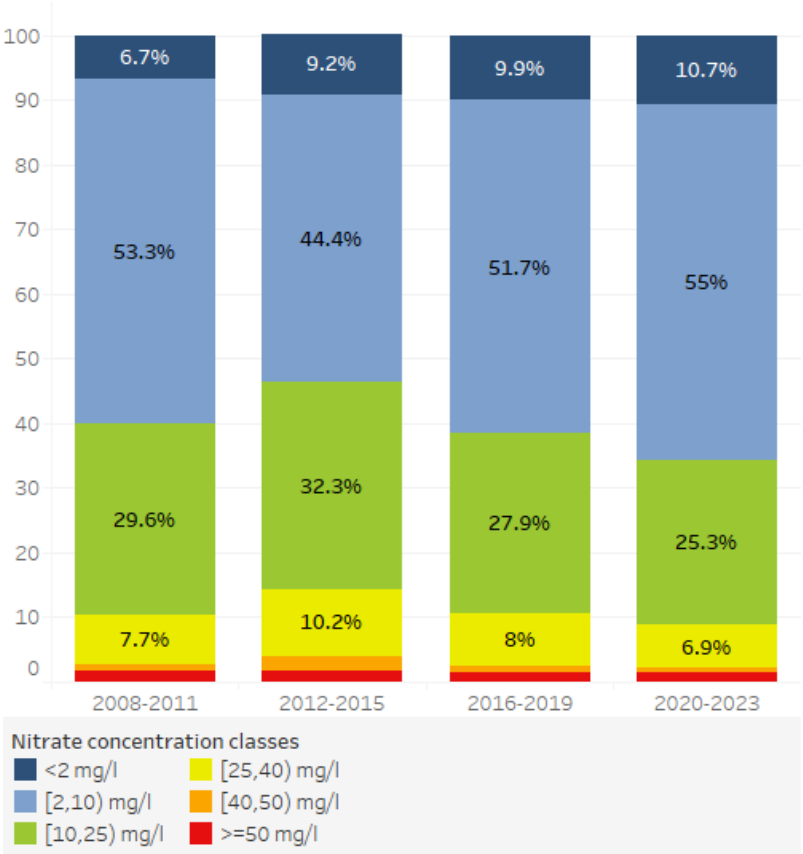
Figure 20 – Map of average annual mean nitrate concentrations in rivers and share of monitoring points by concentration class in the reporting period 2020-2023



Note: In the map, monitoring points with higher values are plotted on top. In the graph, the percentages below 5% are not labelled.

Compared to the previous reporting period, the share of monitoring points in rivers with concentrations ≥ 50 mg/l remained stable at 1.4%. The graph below presents the shares of monitoring points per classes of nitrate concentration in the last four reporting periods.

Figure 21 – Share of monitoring points in rivers by class of nitrate concentration ([18]) in the current and previous reporting periods



Note: The percentages below 5% are not labelled.

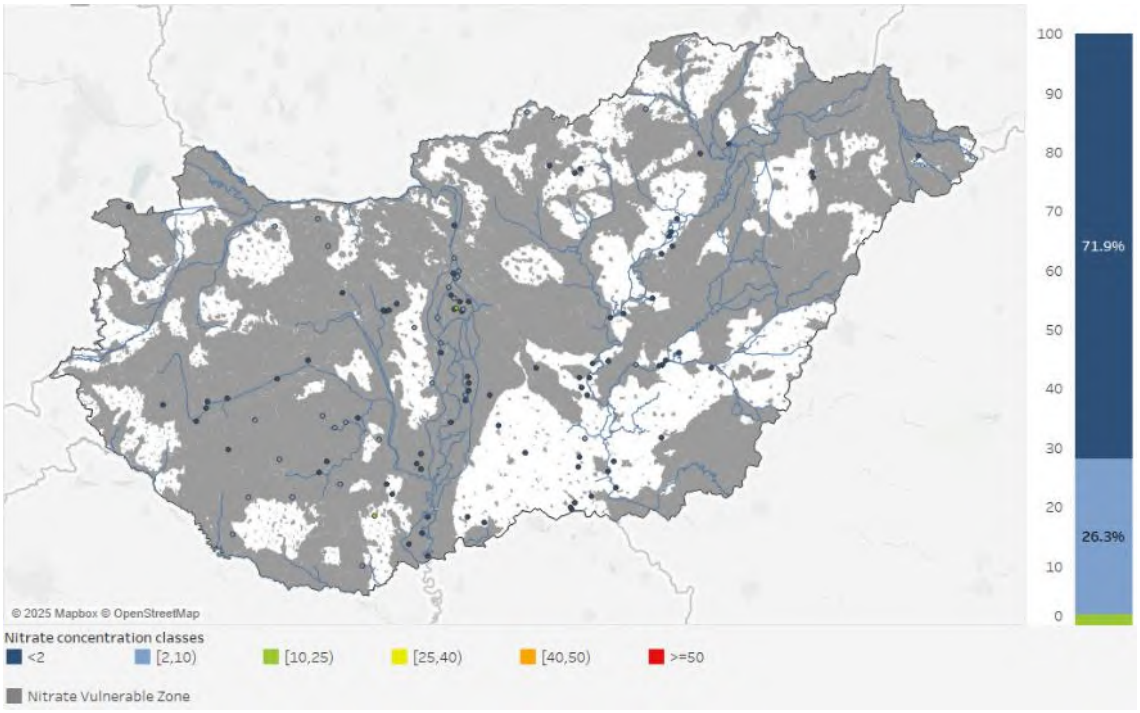
([18]) Average of annual mean values over the reporting period.

Lakes/water reservoirs

In Hungary, none of the freshwater monitoring points in lakes/water reservoirs showed average nitrate concentrations equal to or above the drinking water threshold of 50 mg/l, and equal to or above 25 mg/l, whereas 1.8% had concentrations between 10-24.99 mg/l, 26.3% in the class 2-9.99 mg/l and 71.9% below 2 mg/l.

It is relevant to look at the distribution in nitrate concentration classes below 25 mg/l for surface water as there can be a risk of eutrophication in lower concentration classes.

Figure 22 – Map of average annual mean nitrate concentrations in lakes/water reservoirs and share of monitoring points by concentration class in the reporting period 2020-2023



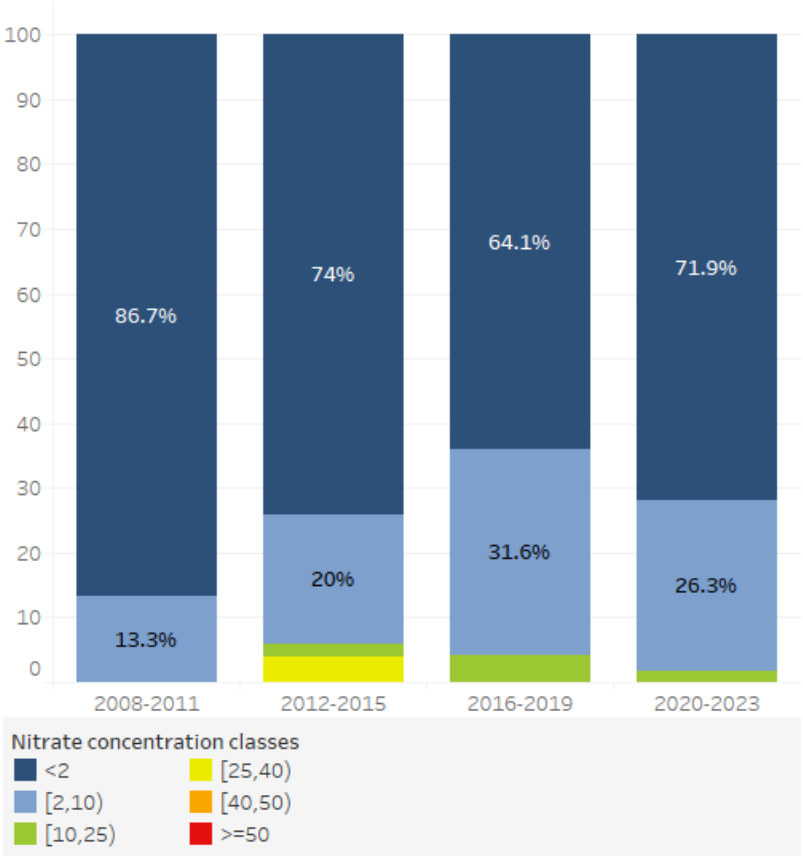
Note: In the map, monitoring points with higher values are plotted on top. In the graph, the percentages below 5% are not labelled.

Table 7 – Share of freshwater monitoring points by nitrate concentration class (mg/l) in reporting period 2020-2023, categorised by station type

	Number of stations	% of Total	<2	[2,10)	[10,25)	[25,40)	[40,50)	>=50
Rivers	813	87.7%	10.7%	55.0%	25.3%	6.9%	0.7%	1.4%
Lakes/reservoirs	114	12.3%	71.9%	26.3%	1.8%			
Total	927	100.0%	18.2%	51.5%	22.4%	6.0%	0.6%	1.2%

Compared to the previous reporting period, the share of monitoring points in lakes/water reservoirs with concentration ≥ 50 mg/l remained at 0%. The graph below presents the shares of monitoring points per classes of nitrate concentration in the last four reporting periods.

Figure 23 – Share of monitoring points in lakes/water reservoirs by class of nitrate concentration ([19]) in the current and previous reporting periods



Note: The percentages below 5% are not labelled.

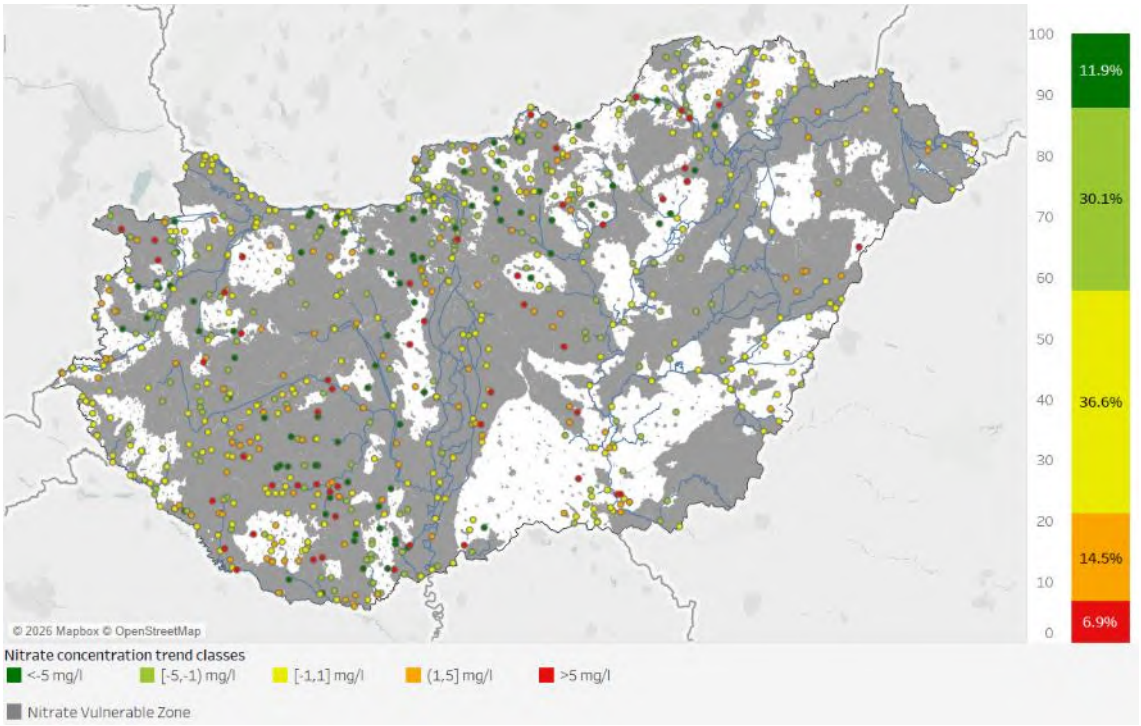
([19]) Average of annual mean values over the reporting period.

5.3. Trends in nitrate concentrations in surface waters

Rivers

Compared to the last reporting period, there has been a decrease of nitrate concentrations in 42.0% of monitoring points and an increase in 21.4%. For the remaining 36.6% there was no significant change. The increase or decrease can be categorised as weak if it is between 1 and 5 mg/l, and as strong if it is above 5 mg/l.

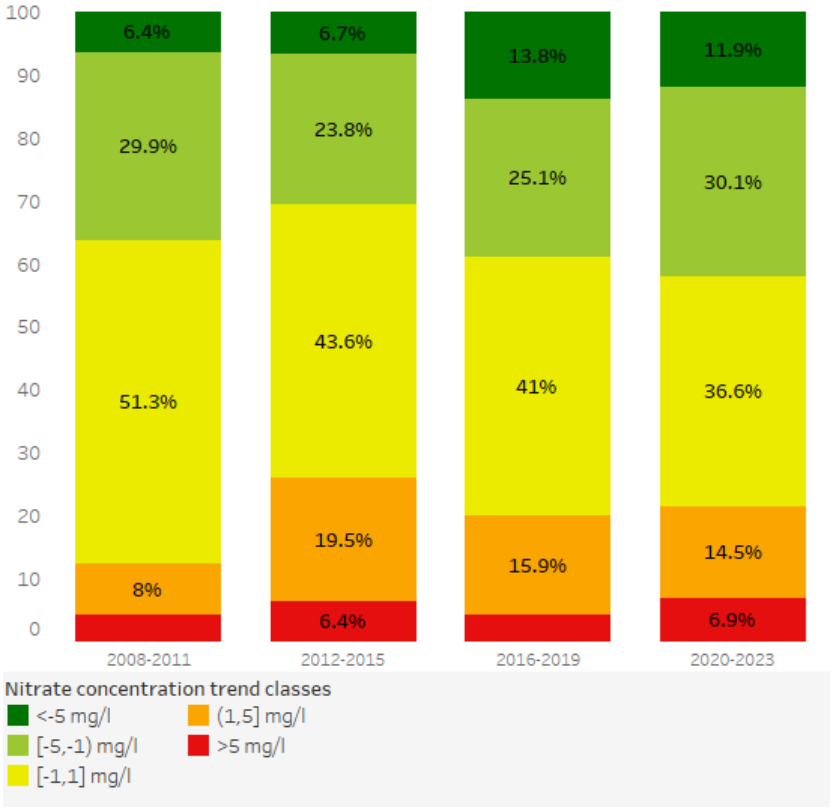
Figure 24 – Map of trends in average annual mean nitrate concentrations in rivers between the periods 2016-2019 and 2020-2023 and share of monitoring points by trend class



Note: In the map, monitoring points with higher values are plotted on top.

Compared to the previous reporting period, there was a higher share of monitoring points with decreasing nitrate concentrations (42.0% in the current reporting period compared to 38.9% in the previous reporting period) but also a higher share of monitoring points with increasing nitrate concentrations (21.4% compared to 20.1%). The graph below shows the share of monitoring points with increases (in red and orange), decreases (in green) and without significant change (in yellow) in nitrate concentrations between reporting periods.

Figure 25 – Share of monitoring points in rivers by class of nitrate concentration trend ([20]) in the current and previous reporting periods



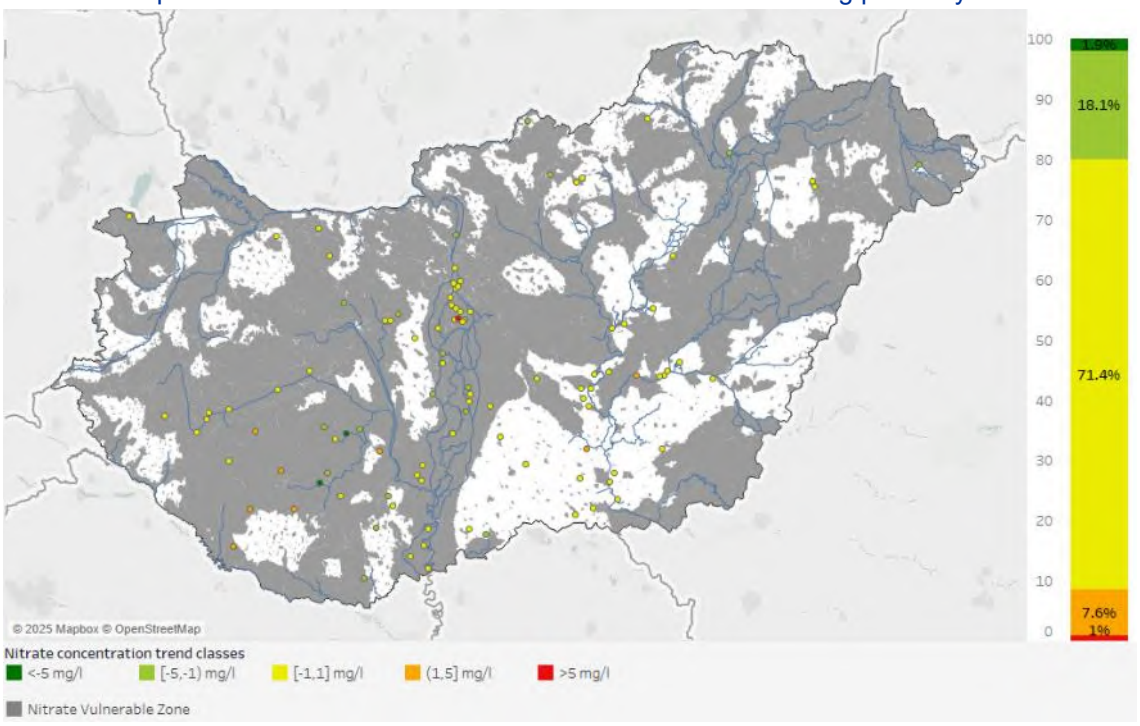
Note: The percentages below 5% are not labelled.

([20]) Change in average annual mean nitrate concentrations compared to the previous reporting period.

Lakes and water reservoirs

Compared to the last reporting period, there has been a decrease of nitrate concentrations in 20.0% of monitoring points and an increase in 8.6%. For the remaining 71.4% there was no significant change. The increase or decrease can be categorised as weak if it is between 1 and 5 mg/l, and as strong if it is above 5 mg/l.

Figure 26 – Map of trends in average annual mean nitrate concentrations in lakes/water reservoirs between the periods 2016-2019 and 2020-2023 and share of monitoring points by trend class



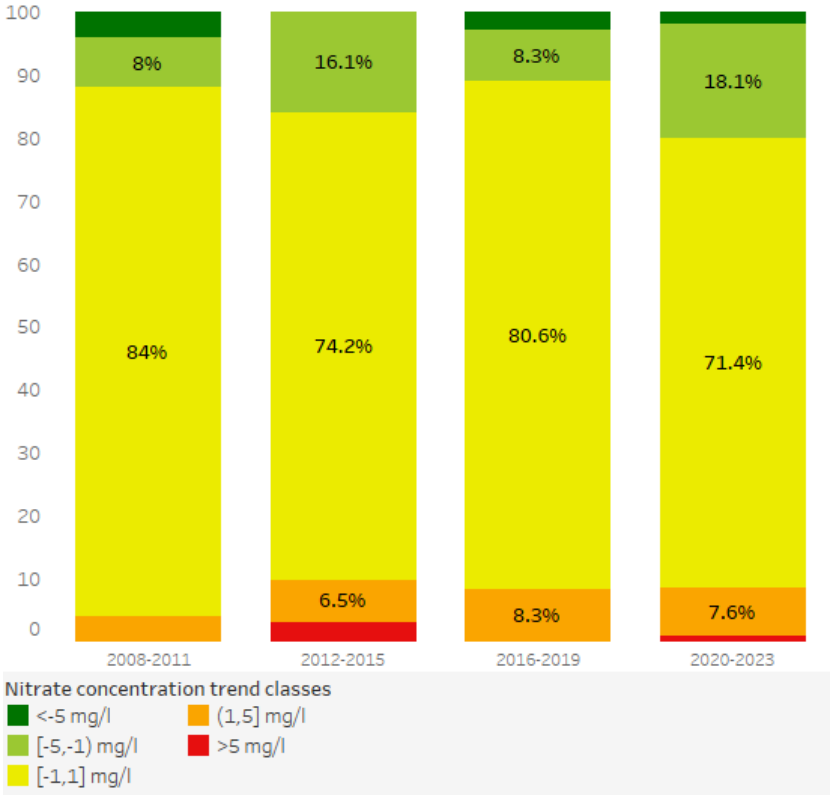
Note: In the map, monitoring points with higher values are plotted on top.

Table 8 – Share of freshwater monitoring points by trend class (mg/l), categorised by station type

	Total Number of Stations	% Total Number of Stations	<-5	[-5,-1)	[-1,1]	(1,5]	>5
River	738	87.5%	11.9%	30.1%	36.6%	14.5%	6.9%
Lake/Reservoir	105	12.5%	1.9%	18.1%	71.4%	7.6%	1%
Total	843	100.0%	10.7%	28.6%	40.9%	13.6%	6.2%

Compared to the previous reporting period, there is higher share of monitoring points with decreasing nitrate concentrations (20.0% in the current reporting period compared to 11.1% in the previous reporting period) but also a higher share of monitoring points with increasing nitrate concentrations (8.6% compared to 8.3%). The graph below shows the share of monitoring points with increases (in red and orange), decreases (in green) and without significant change (in yellow) in nitrate concentrations between reporting periods.

Figure 27 – Share of monitoring points in lakes/water reservoirs by class of nitrate concentration trend ([21]) in the current and previous reporting periods



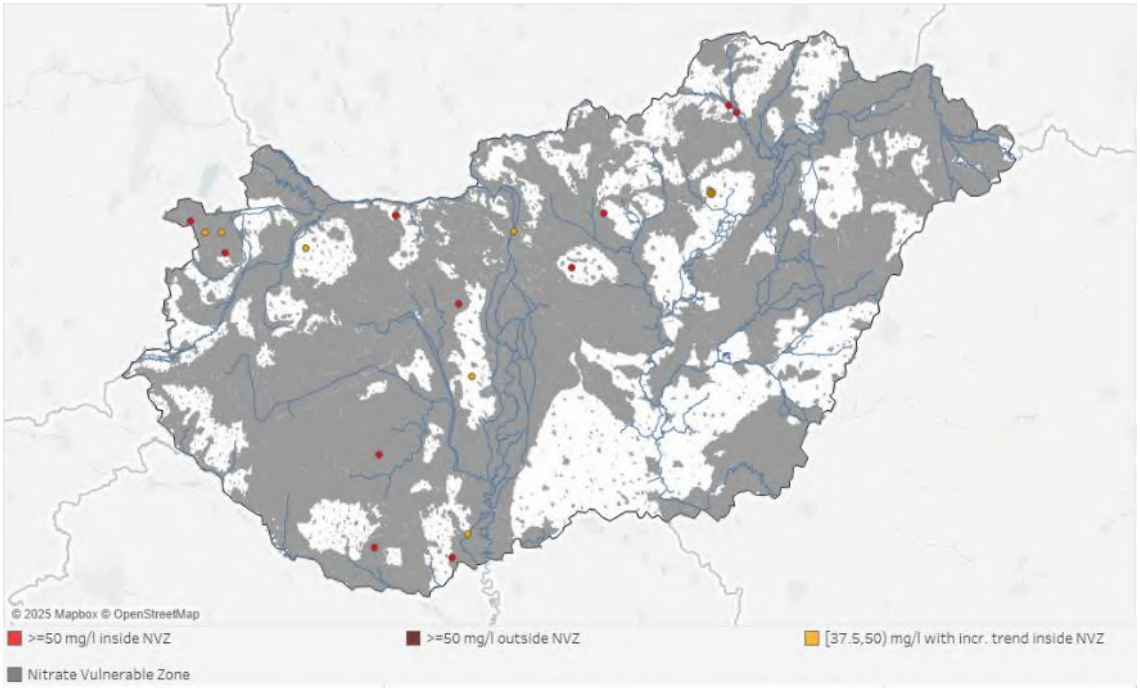
Note: The percentages below 5% are not labelled.

([21]) Change in average annual mean nitrate concentrations compared to the previous reporting period.

5.4. Nitrate pollution hotspots in surface waters

A nitrate pollution hotspot is defined here as a monitoring point where the average annual nitrate concentration is ≥ 50 mg/l or between 37.5 and 49.99 mg/l with an increasing trend. There are 18 surface water nitrate pollution hotspots, of which 1 is outside NVZ, accounting for 5.6% of all surface water nitrate pollution hotspots in the country.

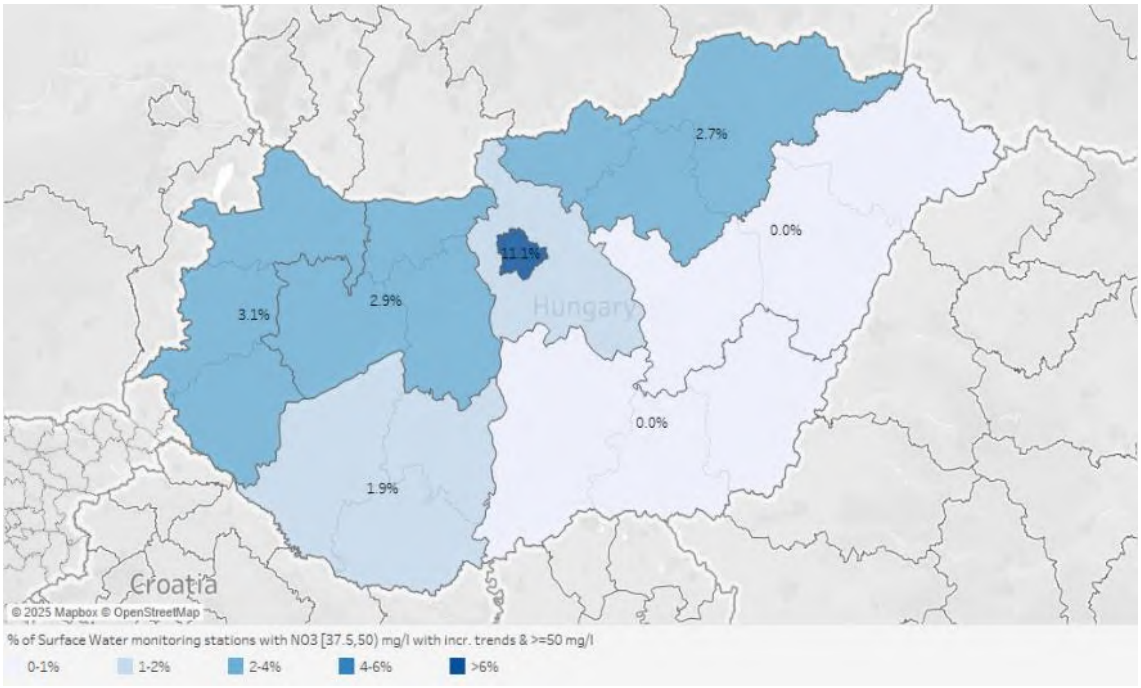
Figure 28 – Surface water nitrate pollution hotspots (map) and their distribution inside and outside Nitrates Vulnerable Zones (table)



		inside NVZ	outside NVZ	Total
Rivers	[37.5,50) with incr. trend	6	1	7
	>=50	11		11
Lakes/reservoirs	[37.5,50) with incr. trend			
	>=50			
Total		17	1	18

Those regions with the highest share of hotspots were Budapest (11.1%), Western Transdanubia (3.1%) and Central Transdanubia (2.9%).

Figure 29 – Share of surface water nitrate pollution hotspots at NUTS2 level



6. EUTROPHICATION OF SURFACE WATERS

6.1. Monitoring of trophic status in surface waters

The monitoring network is managed by the same authorities as for surface and groundwater and in line with the provisions of the Nitrates Directive and the Water Framework Directive.

During the reporting period 2020-2023, trophic status was reported at 923 monitoring points. Among these, 88.0% were in rivers, and 12.0% were in lakes or reservoirs. The station density of monitoring points where trophic status was assessed equals to 9.9 stations per 1 000 km^2. Of these monitoring points, 81.9% of freshwater monitoring points were located within NVZ and 18.1% outside NVZ.

The overall number of freshwater monitoring points reporting trophic status increased by 3 (0.3%) compared to the previous reporting period. The total number of stations has increased significantly from 2012-2015 to 2016-2019 and has been stable since.

Figure 30 – Evolution in surface water monitoring network (number of points with trophic status reported)

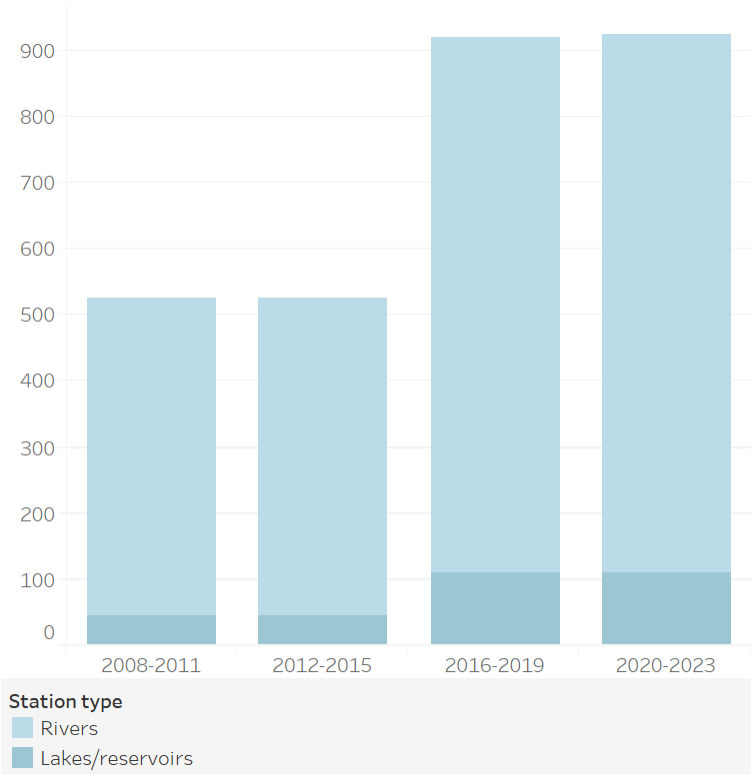


Table 9 – Number of monitoring points reporting trophic status by station type ([22])

	Stations With Trophic Status			
Station type	2008-2011	2012-2015	2016-2019	2020-2023
Rivers	480	480	808	812
Lakes/reservoirs	45	45	112	111
Total	525	525	920	923

6.2. Methodology for the assessment of trophic status

The assessment of eutrophication was carried out in accordance with the methodology of the integrated ecological status assessment under the Water Framework Directive.

For the assessment of water quality, the following parameters were measured. In watercourses, phytoplankton, phytobenthos, the average concentration of nitrate-N (mg/l), the average concentration of orthophosphate-P (mg/l), and the average concentration of total phosphorus (mg/l) were monitored. In standing waters, measurements included phytoplankton, macrophytes, the average concentration of total phosphorus (mg/l), and the summer average concentration of chlorophyll-a (µg/l).

Hungary reported that the parameters and limit values used in the eutrophication assessment for the Nitrates Directive align with those of the Water Framework Directive.

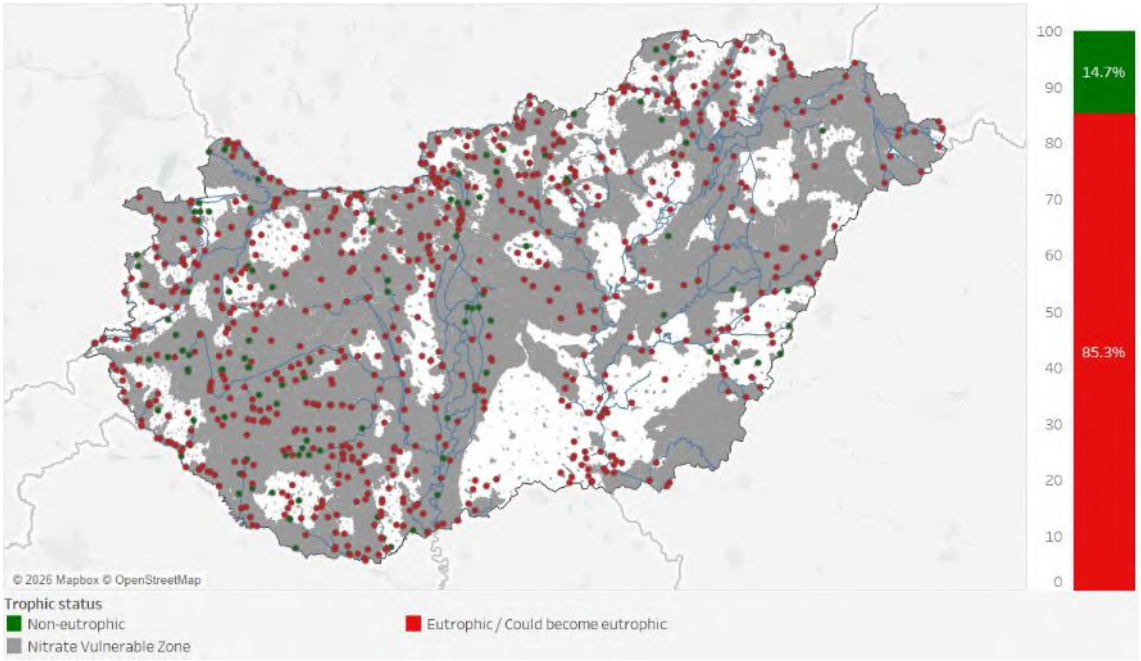
([22]) Hungary reported that monitoring was discontinued in 84 monitoring points relative to the previous reporting period. Discontinuation may be due to nitrate concentrations below 25 mg/l, change in station code or type, or other specific reasons.

6.3. Eutrophication of surface waters

Rivers

85.3% of monitoring points in rivers were eutrophic/could become eutrophic. The figure below shows the shares in respective classes in a graph and spatial distribution in the map.

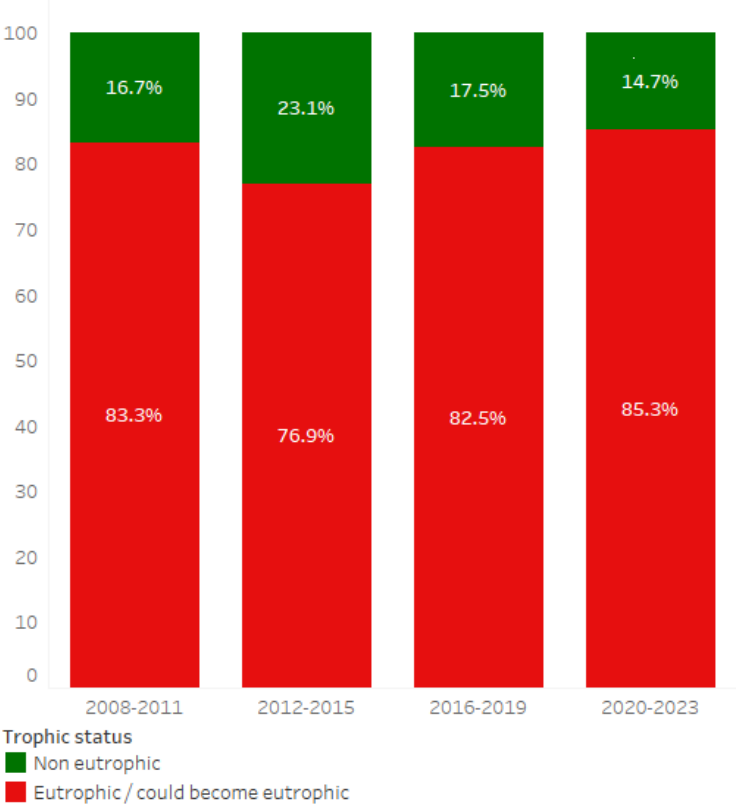
Figure 31 – Map of trophic status in rivers and share of monitoring points by trophic class in the reporting period 2020-2023



Note: In the map, eutrophic/could become eutrophic monitoring points are plotted on top.

Compared to the previous reporting period, the share of eutrophic/could become eutrophic monitoring points increased from 82.5% to 85.3%. The graph below presents the shares of monitoring points according to their trophic status in the last four reporting periods.

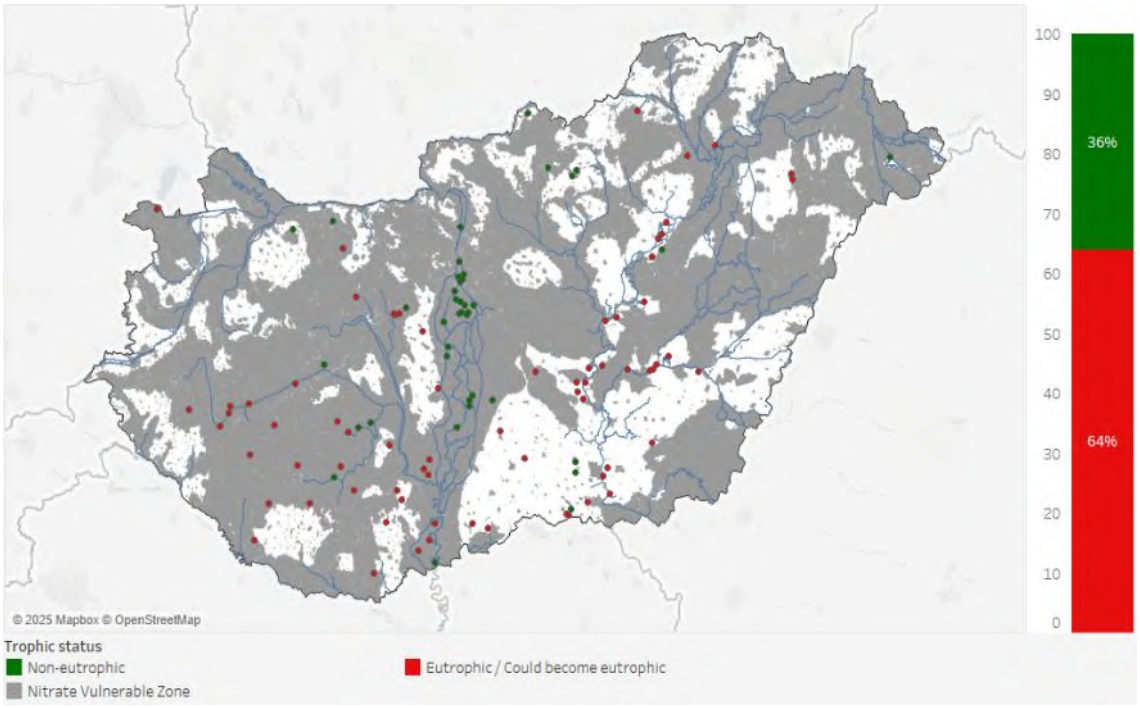
Figure 32 – Share of monitoring points in rivers by class of trophic status in the current and previous reporting periods



Lakes and water reservoirs

64.0% of monitoring points in lakes/water reservoirs were eutrophic/could become eutrophic. The figure below shows the shares in respective classes in a graph and spatial distribution in the map.

Figure 33 – Map of trophic status in lakes/water reservoirs and share of monitoring points by trophic class in the reporting period 2020-2023



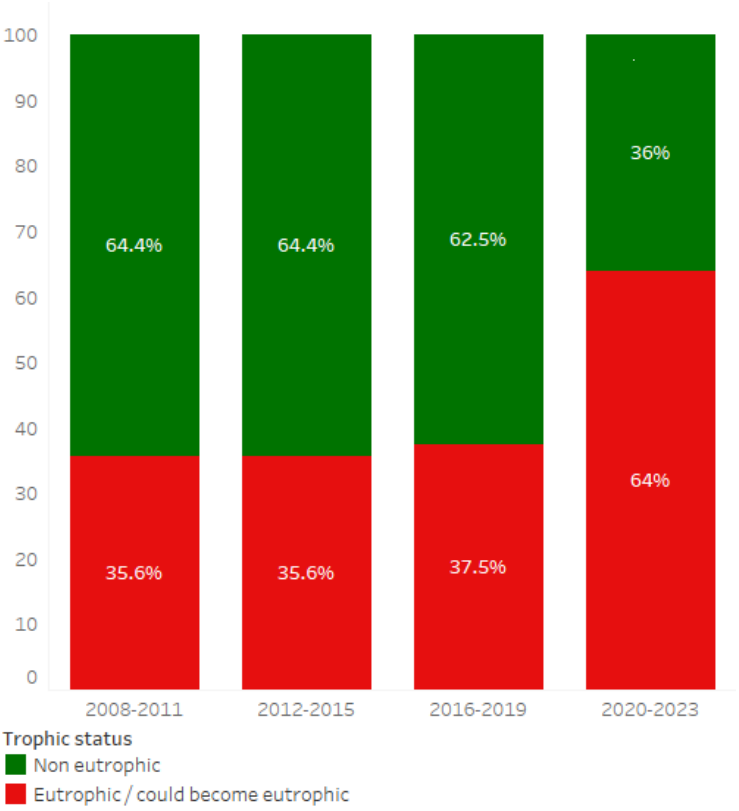
Note: In the map, eutrophic/could become eutrophic monitoring points are plotted on top.

Table 10 – Share of freshwater monitoring points by class of trophic status, categorised by station type

Station type	Number of Stations	% of Total	Non-eutrophic	Eutrophic/could become eutrophic
Rivers	812	88.0%	14.7%	85.3%
Lakes/reservoirs	111	12.0%	36.0%	64.0%
Total	923	100.0%	17.2%	82.8%

Compared to the previous reporting period, the share of eutrophic/could become eutrophic monitoring points increased from 37.5% to 64.0%. The graph below presents the shares of monitoring points according to their trophic status in the last four reporting periods.

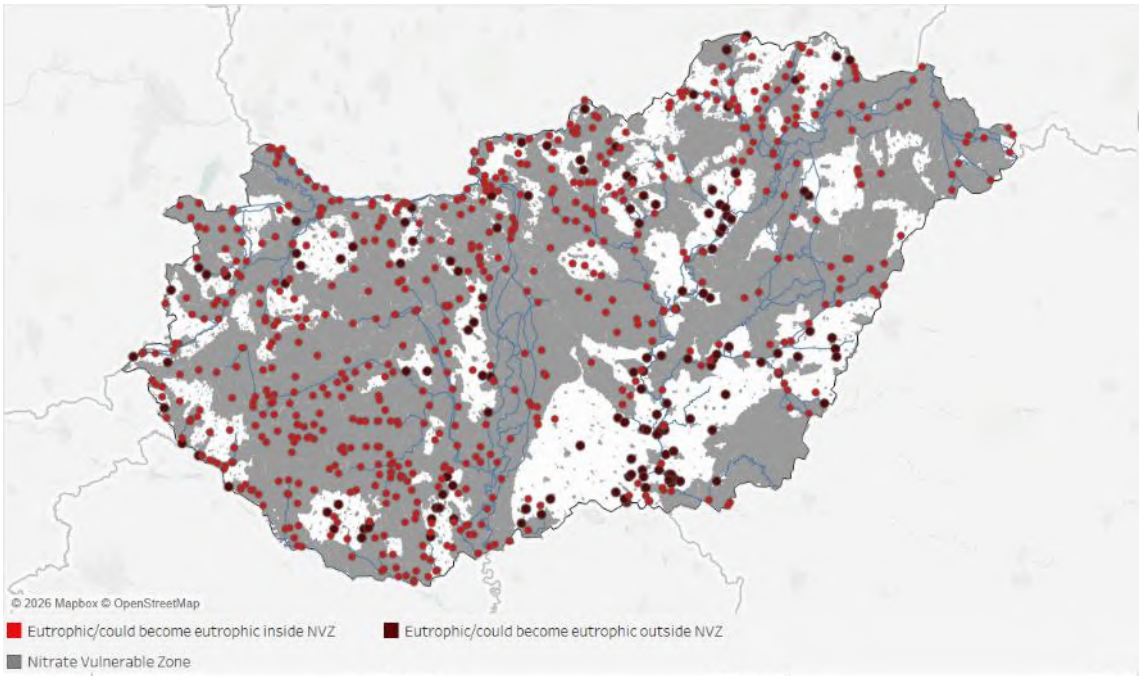
Figure 34 – Share of monitoring points in lakes/water reservoirs by class of trophic status in the current and previous reporting periods



6.4. Eutrophication hotspots in surface waters

A eutrophication hotspot in surface waters is defined here as a monitoring point with trophic status evaluated as “eutrophic” or “could become eutrophic”. Overall, there are 764 surface water monitoring points which were reported as eutrophic/could become eutrophic, of which 145 are outside NVZ, accounting for 19.0% of all eutrophication hotspots in the country.

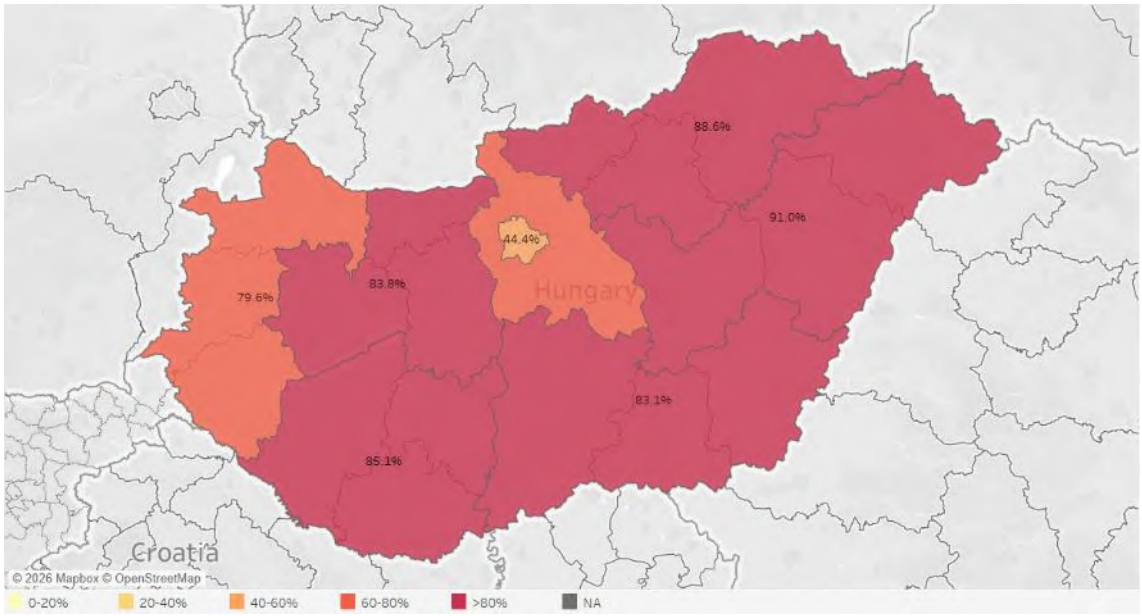
Figure 35 – Eutrophic/could become eutrophic monitoring points (map) and their distribution inside and outside Nitrate Vulnerable Zones (table)



	inside NVZ	outside NVZ	Total
Rivers	578	115	693
Lakes	41	30	71
Total	**619**	**145**	**764**

Those regions with the highest share of hotspots were Northern Great Plain (91.0%), Northern Hungary (88.6%) and Southern Transdanubia (85.1%).

Figure 36 – Share of eutrophic/could become eutrophic monitoring points at NUTS2 level



7. NITRATES ACTION PROGRAMME

The Nitrates Directive mandates the establishment of a code of good agricultural practice that shall be implemented by farmers on a voluntary basis and promoted through training and information for farmers. Action programmes with mandatory requirements for farms should be established and enforced in NVZ or across the entire territory with mandatory measures applicable to all farms in those areas. These requirements primarily focus on implementing good practices for the handling of fertilisers and manure on farms to minimise the risk of nutrient leaching and run-off from fields. Annex II and III of the Directive set the types of measures to be included. The directive leaves wide discretion to Member States to design the measures in line with local circumstances. Compliance with the action programme measures is monitored by public authorities.

The action programmes contain measures concerning fertiliser application (periods when land application of different types of fertilisers is prohibited, land application on steeply sloping ground, prohibition of land application on water-saturated, flooded, frozen or snow-covered ground, the conditions for land application of fertiliser near watercourses, balanced fertilisation and the amount of livestock manure that can be applied to the land), and the capacity of storage vessels for livestock manure. They may also include additional measures in relation to fertilizer planning and record keeping, land use management, including the use of crop rotation systems, minimum vegetation cover during sensitive periods, irrigation systems and other relevant measures complementing the nitrates action programme.

7.1. Measures in the action programme and code of good agricultural practices

The Hungarian action programme was published for the first time in 2001 before its accession in 2004. The action programme was subsequently amended in 2006 and 2008. During the period 2020-2023, the Decree 59/2008 (IV. 29.) was amended in 2020 and 2021. Thereafter it was amended in 2024 and 2025. Decree 59/2008 (IV. 29.) provides a nationally uniform action programme containing the mandatory elements of good agricultural practices in nitrate vulnerable zones. The action programme applies to all farmers in nitrate vulnerable zones, with the exception of those engaged in agricultural activities that do not exceed the household needs of private individuals. The obligation to provide data and to keep the necessary records is also mandatory for those who keep livestock in excess of the household needs of private individuals outside the nitrate vulnerable zones.

The main action programme amendments during the period 2020-2023 included the shortening of the fertiliser prohibition period by one month, a shorter prohibition period for temporary storage without leakage protection on the field, the replacement of immediate incorporation by incorporation within 4 hours after application and the clarification of continuous record keeping.

Additionally, the Nitrate Farmers' Manual, provided by the National Chamber of Agriculture, conveys the requirements of the Nitrates Directive to farmers in an accessible way, with practical examples.

A consolidated overview of the action programme currently in force is provided in a separate document ([23]).

7.2. Controls

Compliance with the action programme is inspected by the soil protection authority on agricultural land and by the water protection authority on livestock holdings.

On average, 1.3 % of the farms were checked on site in the period 2020-2023. The soil protection authority carried out an average of 1500 on-site inspections on arable land per year. The water protection authority carried out administrative or on-site inspections at an average of 1200 livestock farms per year in the NVZ's during the period 2020-2023. The inspections of both authorities included conditionality checks under the CAP. Based on the inspections, the main cases of non-compliance with the action programme concerned nitrogen supply without valid soil testing (9.0 %) and insufficient capacity of manure storage (2.2 %). In some cases, the technical design of the structures did not comply with the requirements.

The Hungarian progress report on the period 2020-2023 does not make further reference to the causes of non-compliance or difficulties in the implementation of the measures of the action programme.

([23]) https://environment.ec.europa.eu/publications/summaries-national-nitrates-action-programmes_en

8. WATER QUALITY OUTLOOK

The forecasting of changes in water quality in Hungary involved the use of the MONERIS model which has been applied already in previous reporting periods. The forecast has been made based on the calculation of trends from nitrate concentrations in the reporting period 2020-2023. For groundwaters, the trends assessment shows predominantly stagnation with slight improvements in some cases. On the other hand, on surface waters, nitrates from groundwaters account for 60% of all diffuse pressures on these waters, the model estimates that this pressure is likely to remain largely stable. An increase is projected in N loads from surface run-off in the period 2025-2027, while N loads from agricultural erosion remain stable; these pressures are the most closely associated with agricultural activities. Urban run-off is expected to decrease in that period.

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