Council of the European Union

Brussels, 23 July 2026
(OR. en)

12018/26
ADD 12

ENV 963
CLIMA 403
AGRI 601

COVER NOTE

From:	Secretary-General of the European Commission, signed by Ms Martine DEPREZ, Director
date of receipt:	15 July 2026
To:	Ms Thérèse BLANCHET, Secretary-General of the Council of the European Union
No. Cion doc.:	SWD(2026) 232 final - Part 13/27
Subject:	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

Delegations will find attached document SWD(2026) 232 final - Part 13/27.

Encl.: SWD(2026) 232 final - Part 13/27

EUROPEAN
COMMISSION

Brussels, 15.7.2026
SWD(2026) 232 final

PART 13/27

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

Croatia

Country staff working document
on the implementation of the Nitrates Directive

Period: 2020-2023

Contents

1. Key findings and recommendations 1
1.1. Key findings 1
1.2. Recommendations 3

2. Pressures from agriculture 5
2.1. Land use 5
2.2. Livestock density 7
2.3. Nitrogen and phosphorus fertiliser use 9
2.4. Nitrogen and phosphorus balance 10
2.5. Nitrogen discharge to the environment 10

3. Nitrate vulnerable zones 11

4. Nitrates in groundwater 12
4.1. Monitoring of nitrate concentrations in groundwater 12
4.2. Nitrate concentrations in groundwater 14
4.3. Trends in nitrate concentrations in groundwater 16
4.4. Nitrate pollution hotspots in groundwater 20

5. Nitrates in surface waters 22
5.1. Monitoring of nitrate concentrations in surface waters 22
5.2. Nitrate concentrations in surface waters 24
5.3. Trends in nitrate concentrations in surface waters 30
5.4. Nitrate pollution hotspots in surface waters 36

6. Eutrophication of surface waters 38
6.1. Monitoring of trophic status in surface waters 38
6.2. Methodology for the assessment of trophic status 39
6.3. Eutrophication of surface waters 40
6.4. Eutrophication hotspots in surface waters 45

7. Nitrates action programme 47
7.1. Measures in the action programme and code of good agricultural practice 47
7.2. Controls 48

8. Water quality outlook 49

1. KEY FINDINGS AND RECOMMENDATIONS

Croatia submitted its report under the Nitrates Directive for the period 2020-2023 in July 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 Croatian authorities were consulted for factual correctness. There may be differences with the information presented in their 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 Croatia, the utilised agricultural area (UAA) accounts for 27% of the country's total land area, which is lower than the EU average (38%). The livestock density is 0.5 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 56 kg/ha UAA and the gross phosphorus balance is 2 kg/ha UAA ([5]).

Monitoring network

For groundwater, the density of the monitoring network is around 2 stations per 1 000 km^2, which is lower than the EU average (8 stations). Compared to the previous reporting period, the density increased by 5%. The monitoring network is mostly located in nitrate vulnerable zones (NVZ).

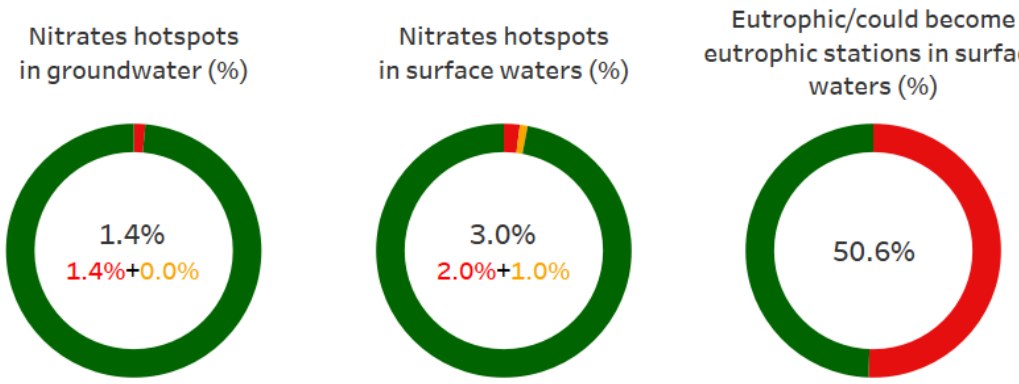
For surface freshwater, the density of the monitoring network is around 2 stations per 1 000 km^2, which is lower than the EU average (7 stations). Compared to the previous reporting period, the density increased by 11%. The monitoring network includes river stations and lakes/water reservoirs.

For surface saline waters, the monitoring network includes transitional and coastal waters. Monitoring for transitional and coastal waters has only been presented if they were located in NVZ catchment areas.

([1]) Final version was received in November 2024.
([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**, 98.6% of monitoring points show nitrate concentrations below 50 mg/l.

Overall, 1.4% of monitoring points fall in two categories illustrated in Figure 1, i.e. they show nitrate concentrations ≥ 50 mg/l (1.4%) or between 37.5 and 49.99 mg/l with an increasing trend (0%). Compared to the data reported in the previous reporting period, the share remained stable at 1.4%. The region with the highest share of monitoring points showing pollution was Sjeverna Hrvatska (5.4%)

Compared to the previous reporting period, nitrate concentrations decreased in 31.3% of groundwater monitoring points and increased in 18.4%. Among points with nitrate concentration ≥ 50 mg/l, in all monitoring points nitrate concentration decreased.

In **surface water**, 98.0% of monitoring points show nitrate concentrations below 50 mg/l and 49.4% are classified as non-eutrophic.

Overall, 3.0% of monitoring points fall in two categories illustrated in Figure 1, i.e. they show nitrate concentrations either ≥ 50 mg/l (2.0%), or between 37.5 and 49.99 mg/l with an increasing trend (1.0%). Compared to the data reported in the previous reporting period, this represents a decrease of 0.5 percentage points (from 3.5% to 3.0%). 18% 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 19.8% of surface water monitoring points and increased in 18.6%.

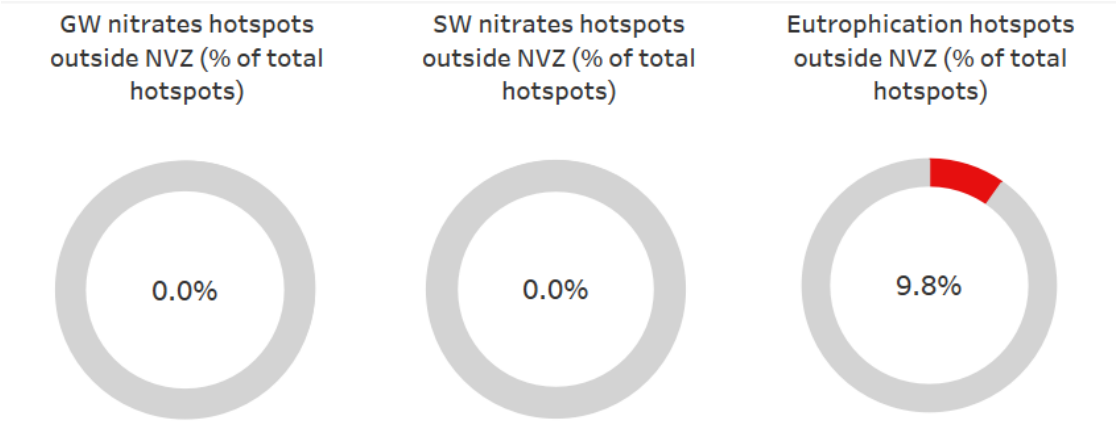
The share of monitoring points reported as eutrophic/could become eutrophic is 50.6% as illustrated in Figure 1. This represents an increase of 11.1 percentage points compared to the data reported in the previous period (from 39.5% to 50.6%). The regions with the highest share are Sjeverna Hrvatska (69.8%), Panonska Hrvatska (66.7%) and Grad Zagreb (44.4%).

Nitrate Vulnerable Zones

Croatia did not change the Nitrate Vulnerable Zones (NVZ) during the reporting period. The area of NVZ covers 8% of UAA.

In Croatia, some monitoring points showing pollution are located outside NVZ. Figure 2 shows that 9.8% of eutrophic/could become eutrophic points in surface waters were situated outside NVZ (4 out of 41).

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

Croatia modified its action programme during the reporting period. Amendments mainly affected the closed period for fertiliser application.

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 surface waters
  - eutrophication in surface water bodies
- Improve representativeness and coverage of monitoring networks and reported data by extending the monitoring network outside nitrate vulnerable zones
- 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

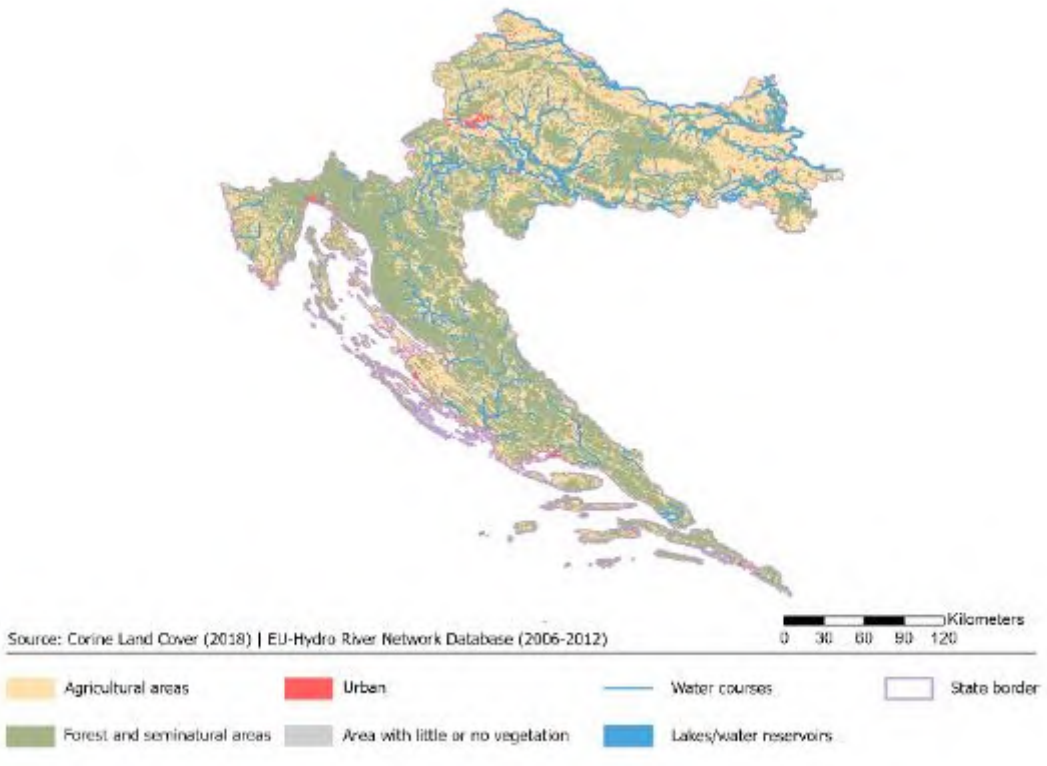
In Croatia, crop production accounted for the largest portion of the agricultural sector's total output value at 58.5% in the reporting period 2020–2023. Animal production followed with 35.9%, and other outputs made up 5.6% ([6]). The share of agricultural land used for organic farming increased from 6.7% in the reporting period 2016-2019 to 8.1% 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 Croatia along with watercourses and lakes/water reservoirs.

Figure 3 – Land use distribution in Croatia



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

The utilised agricultural area (UAA) in Croatia covered 1.5 million hectares in 2023, making up 26.9% of the country's total land area. Arable land accounts for 59.0% of UAA, followed by permanent grassland at 35.8% and permanent crops at 5.2%.

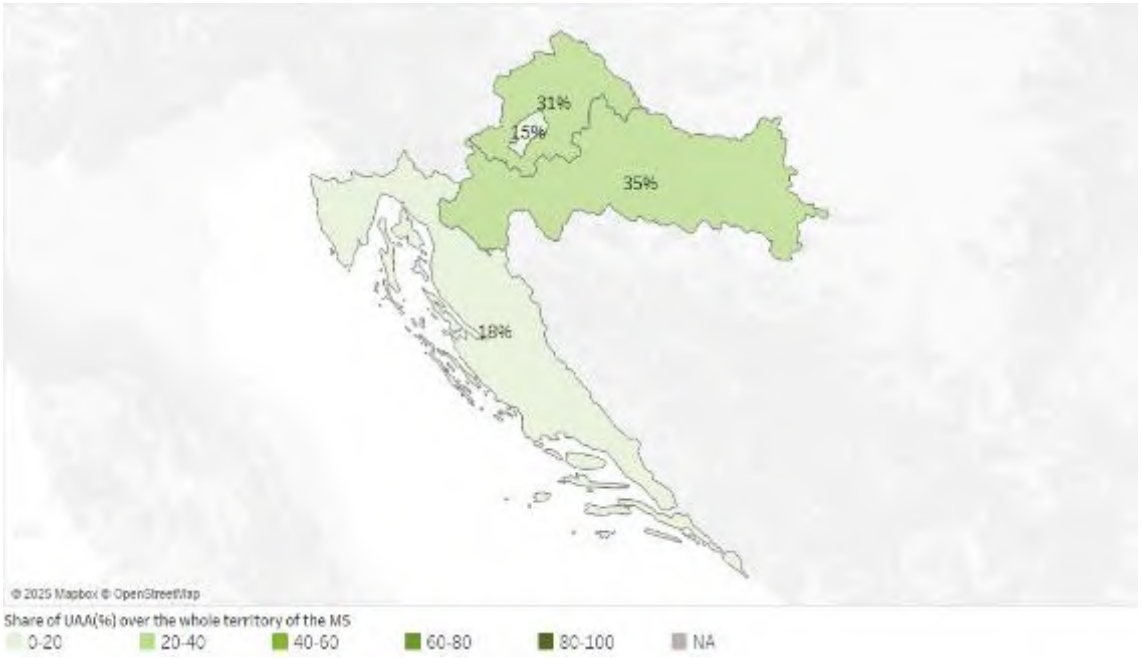
Table 1 – Evolution of the utilised agricultural area

	2010	2013	2016	2020	2023
utilised agricultural area (1000 ha)	1,346	1,571	1,563	1,505	1,506
arable land (1000 ha)	895	878	882	888	888
permanent grassland (1000 ha)	339	618	608	540	539
permanent crops (1000 ha)	78	73	72	76	78
kitchen gardens (1000 ha)	3	2	2	2	2

Source: Eurostat (ef_lus_main)

In 2020, the share of the UAA ranged from 35% in Panonska Hrvatska, to 15% in Grad Zagreb in 2020.

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

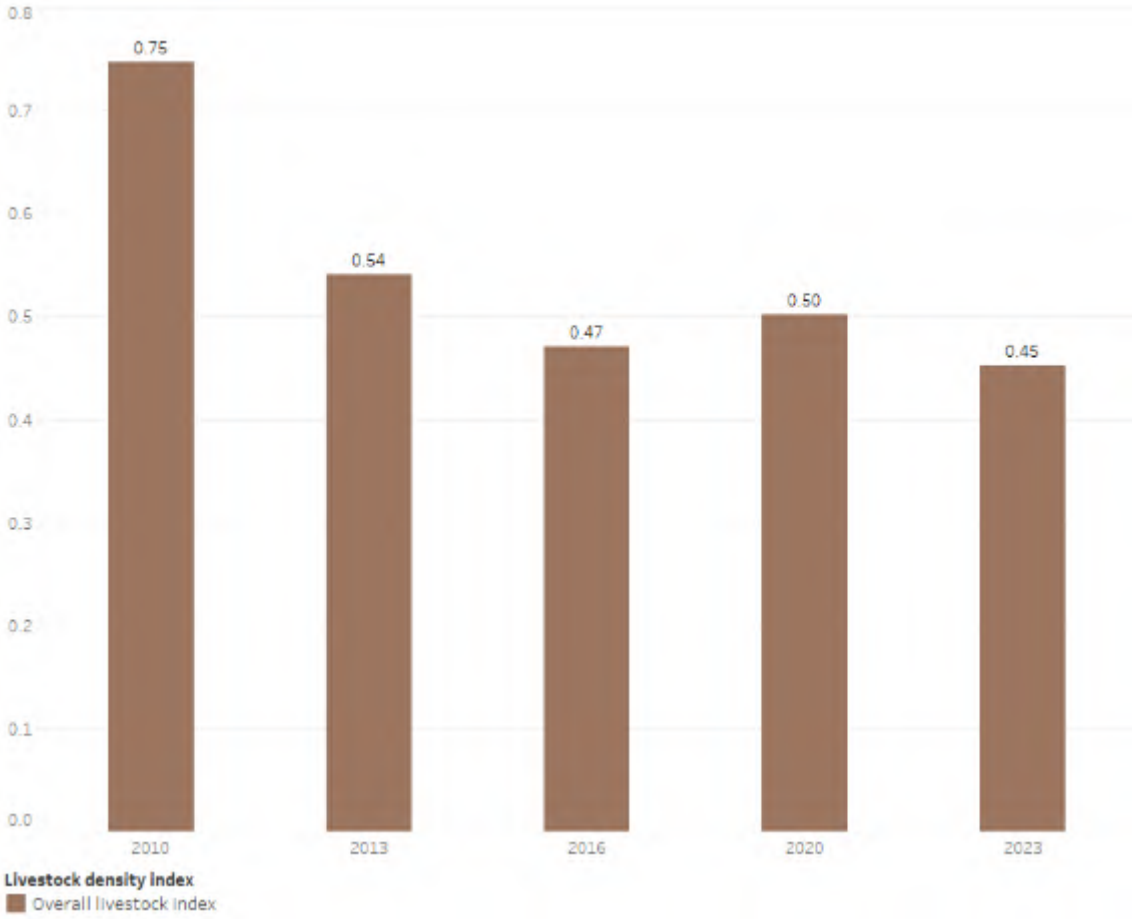


Source: Eurostat (ef_lus_main)

2.2. Livestock density

In Croatia the livestock density was 0.45 livestock units per hectare (LSU/ha) of UAA in 2023. It was decreased since 2010 but with a spike in 2020.

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



Source: Eurostat (ef_fsi_lskds)

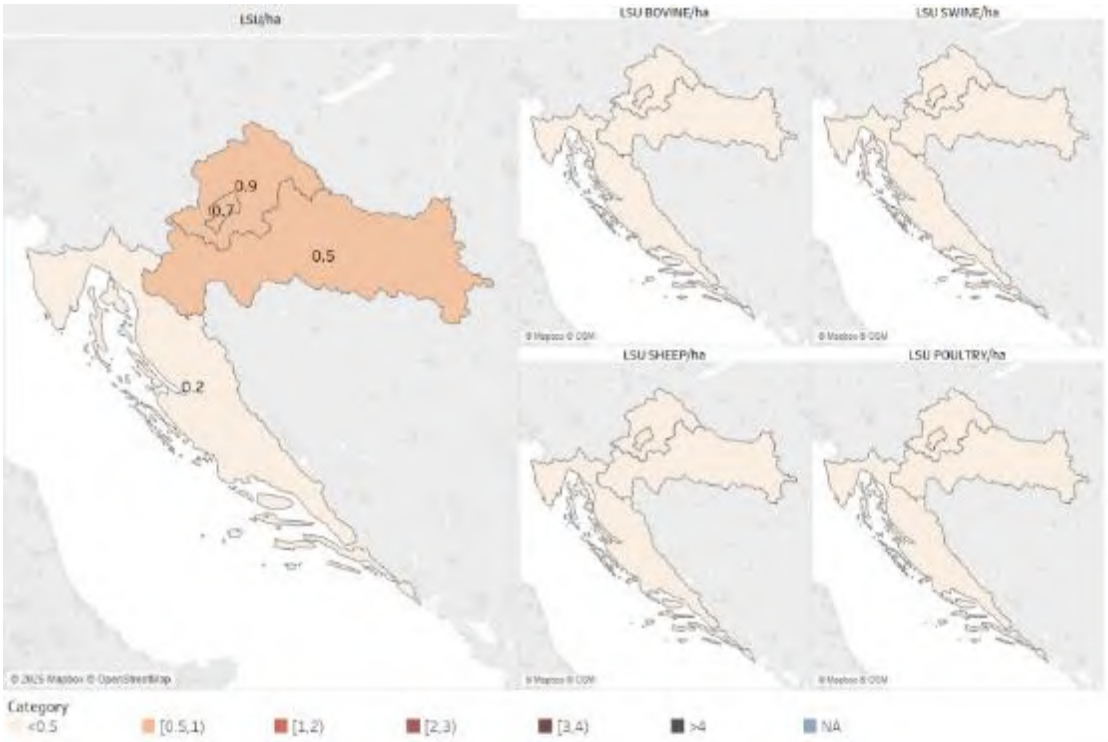
Table 2 – Evolution of the livestock numbers by animal type

	2007	2010	2013	2016	2020	2023
live bovines (Million heads)	0.47	0.44	0.44	0.44	0.42	0.42
of which dairy cows (Million heads)	0.23	0.21	0.17	0.15	0.11	0.07
live pigs (Million heads)	1.35	1.23	1.11	1.16	1.03	0.85
live poultry (Million heads)	NA	13.47	13.63	10.39	12.05	10.34
live sheep (Million heads)	NA	0.63	0.62	0.62	0.66	0.55
live goats (Million heads)	NA	0.08	0.07	0.08	0.09	0.07

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

There are regional variations, with livestock density of 0.9 LSU/ha UAA in Sjeverna Hrvatska.

Figure 6 – Livestock density distribution by animal type (LSU/ha UAA) at NUTS2 level in 2020 ([8])



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

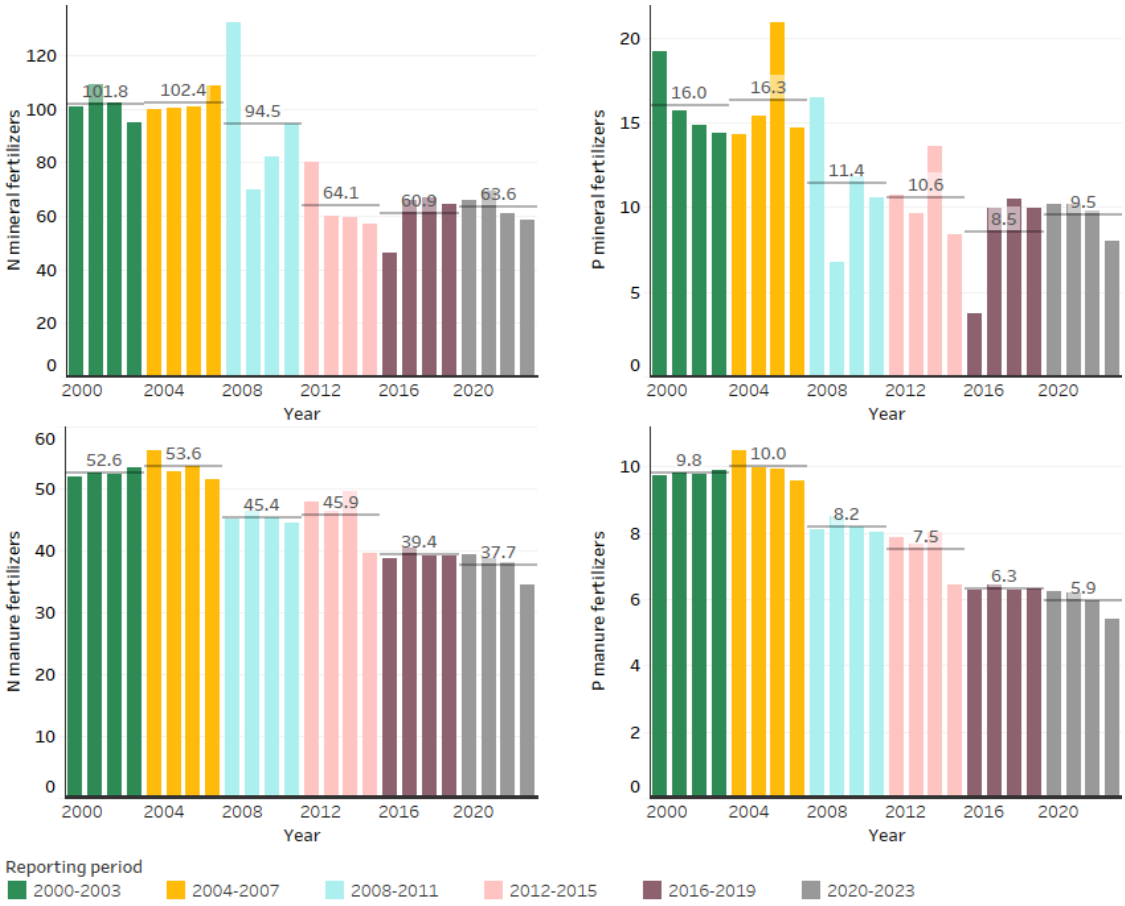
([8]) Latest available data.

2.3. Nitrogen and phosphorus fertiliser use

In Croatia, the use of **nitrogen (N) fertilisers** was 63.6 kg/ha UAA for mineral fertilisers and 37.7 kg/ha UAA for manure fertilisers in 2020-2023. The use of mineral fertilisers has increased by 2.7 kg/ha UAA whereas the use of manure fertilisers has decreased by 1.7 kg/ha UAA since the last reporting period.

The use of **phosphorus (P) fertilisers** was 9.5 kg/ha UAA for mineral fertilisers and 5.9 kg/ha UAA for manure fertilisers in 2020-2023. The use of mineral fertilisers increased by 1.0 kg/ha UAA since the last reporting period whereas the use of manure fertilisers decreased by 0.4 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)

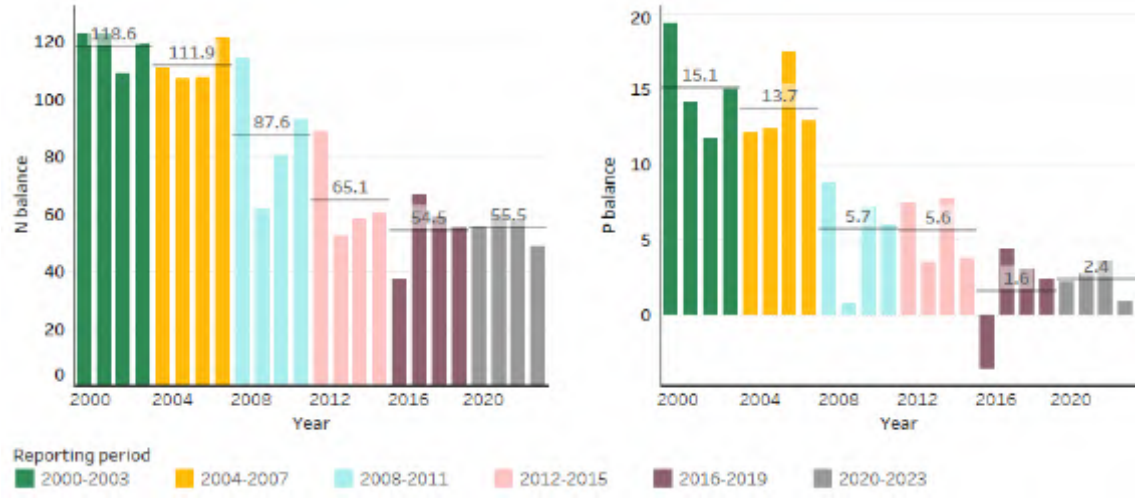
2.4. Nitrogen and phosphorus balance

The nutrient balance ([9]) 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 Croatia, the **gross nitrogen (N) balance** was 55.5 kg/ha UAA in 2020-2023. The nitrogen balance increased by 1.0 kg/ha UAA since previous reporting.

The **gross phosphorus (P) balance** was 2.4 kg/ha UAA in 2020-2023. The phosphorus balance increased by 0.8 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

Croatia provided information that the nitrogen load from agriculture to environment during the reporting period 2016-2019 and 2020-2023 remained the same at 177.3 kilotonnes. The agricultural sector's contribution to the country's total nitrogen loss increased from 96.9% to 97.3% between the reporting periods.

([9]) Gross nutrient balance (aei_pr_gnb)

3. NITRATE VULNERABLE ZONES

In line with Article 3 paragraph 2, Croatia 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.

During the reporting period 2020-2023 Croatia did not change the NVZ. The last designation was done in 2012. The map below shows the current NVZ designation relative to the agricultural area. The designated areas cover 9.0% of territory and 8% 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.

In the report Croatia states that the results of monitoring groundwater and surface waters at stations outside vulnerable zones indicate that the vulnerable zones should be expanded.

4. NITRATES IN GROUNDWATER

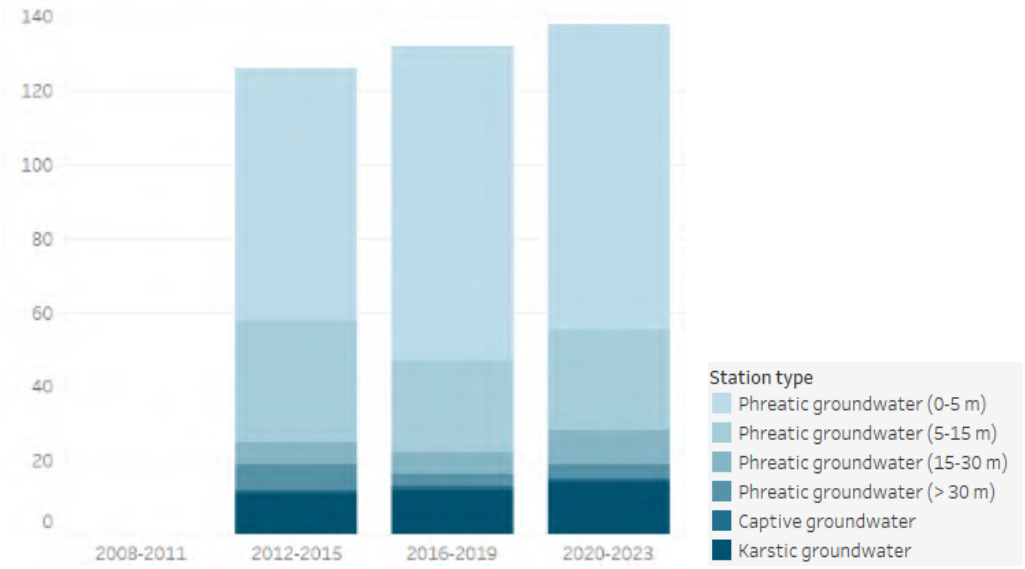
4.1. Monitoring of nitrate concentrations in groundwater

Monitoring of groundwater quality in Croatia is the responsibility of Croatian Waters, which operates in accordance with an agency-approved monitoring plan. To date, groundwater monitoring has been exclusively conducted in Nitrate Vulnerable Zones (NVZ). Following the European Commission's recommendation ([10]), six groundwater monitoring stations were established outside NVZ. All monitoring activities are conducted in compliance with the Nitrates Directive. For groundwater monitoring, the aquifer type has been changed for three monitoring stations, while the rest of the monitoring network remained the same.

During the reporting period 2020-2023 nitrate concentrations were reported at 138 groundwater monitoring points. The station density was 2.4 stations per 1 000 km^2. Of these monitoring points, 94.2% of monitoring points were located within NVZ and 5.8% outside NVZ.

The overall number of monitoring points increased by 6 (4.5%) compared to the previous reporting period. Since 2012-2015 the number of monitoring points has increased steadily. 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)



([10]) Staff Working Document to Commission's Nitrates Directive Implementation Report for the period 2016-2019, Croatia Fiche, 2021

In this reporting period, changes in nitrate concentrations compared to the previous monitoring period (trends) were assessed for 131 monitoring points, accounting for 94.9% of all points with measurements. The share of monitoring points with trends decreased compared to the previous reporting period, which was 93.2% 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])

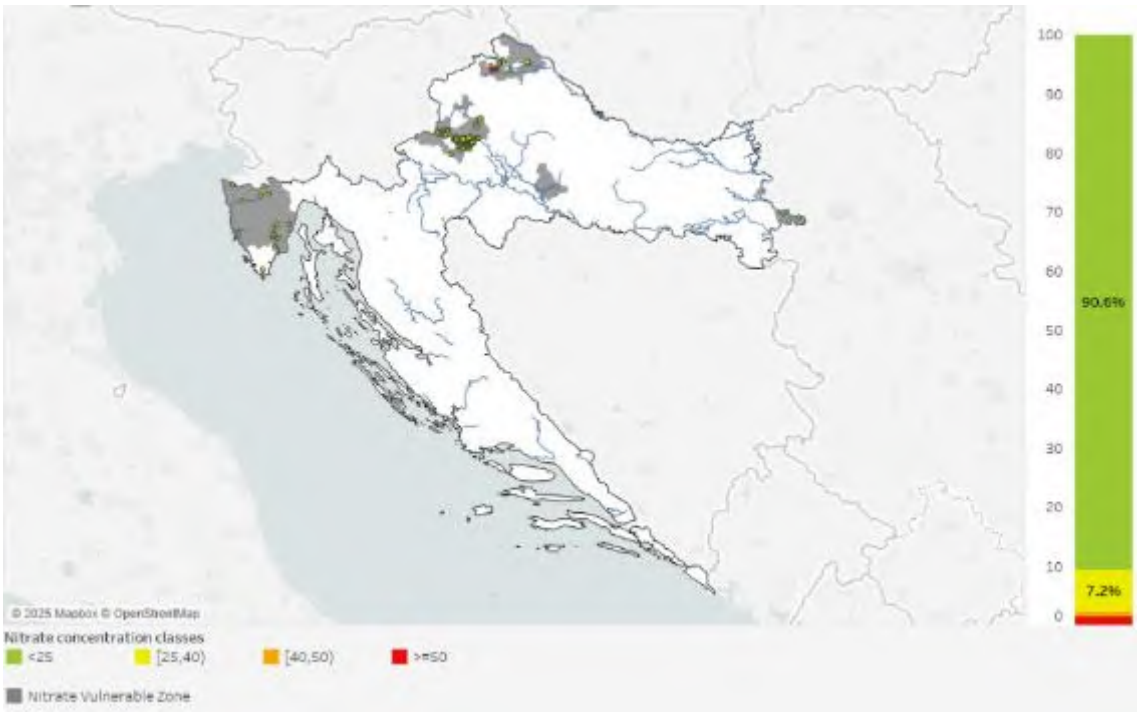
	Stations with measurements				Stations with trends			
Station type	2008-2011	2012-2015	2016-2019	2020-2023	2008-2011	2012-2015	2016-2019	2020-2023
Phreatic groundwater (0-5 m)		68	85	83			79	82
Phreatic groundwater (5-15 m)		33	25	27			25	25
Phreatic groundwater (15-30 m)		6	5	9			6	7
Phreatic groundwater (> 30 m)		7	3	4			3	4
Captive groundwater		1	1	1				1
Karstic groundwater		11	12	14			10	12
Not specified								
Total		126	132	138			123	131

([11]) Croatia reported that monitoring was discontinued in 5 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 Croatia, 1.4% of groundwater monitoring points 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, 7.2% showed concentrations between 25-39.99 mg/ and 90.6% below 25 mg/l. The figure 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.

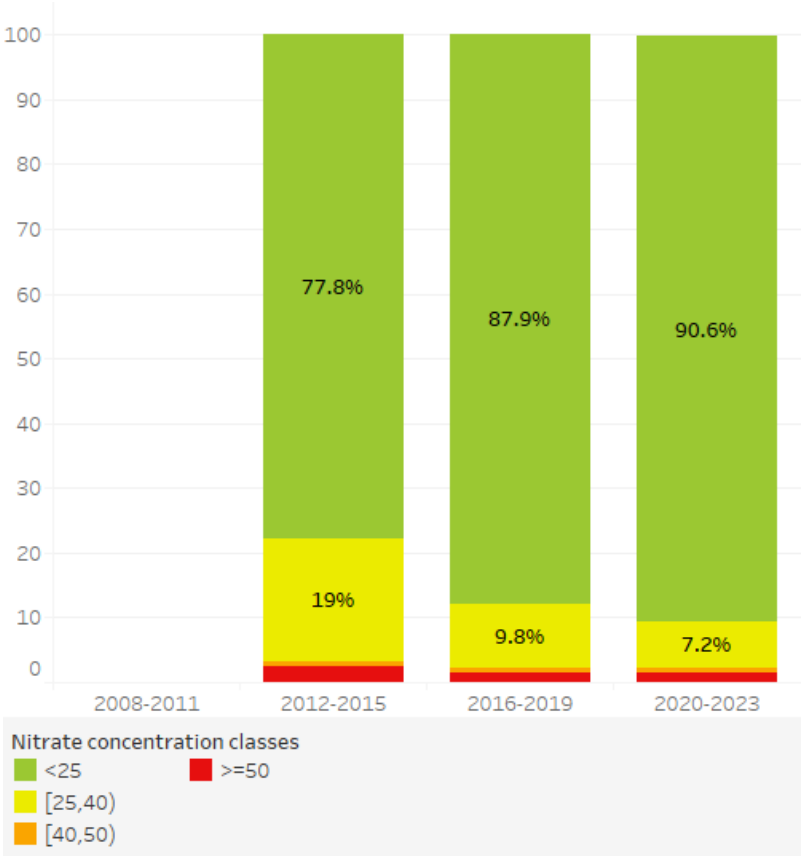
The station type category with the highest share of points with nitrate concentrations equal to or above the threshold of 50 mg/l was phreatic groundwaters at depth 15-30m with share of 11.1%, as shown in the table below.

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)	83	60.1%	90.4%	9.6%		
Phreatic groundwater (5-15 m)	27	19.6%	92.6%		3.7%	3.7%
Phreatic groundwater (15-30 m)	9	6.5%	88.9%			11.1%
Phreatic groundwater (> 30 m)	4	2.9%	75.0%	25.0%		
Captive groundwater	1	0.7%	100.0%			
Karstic groundwater	14	10.1%	92.9%	7.1%		
Total	138	100.0%	90.6%	7.2%	0.7%	1.4%

Compared to the previous reporting period, the share of monitoring points with concentration ≥ 50 mg/l decreased from 1.5% to 1.4%. The graph below presents the share of monitoring points per classes of nitrate concentrations in the last three reporting periods. Since 2012-2015 the share in classes ≥25 mg/l has steadily decreased.

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



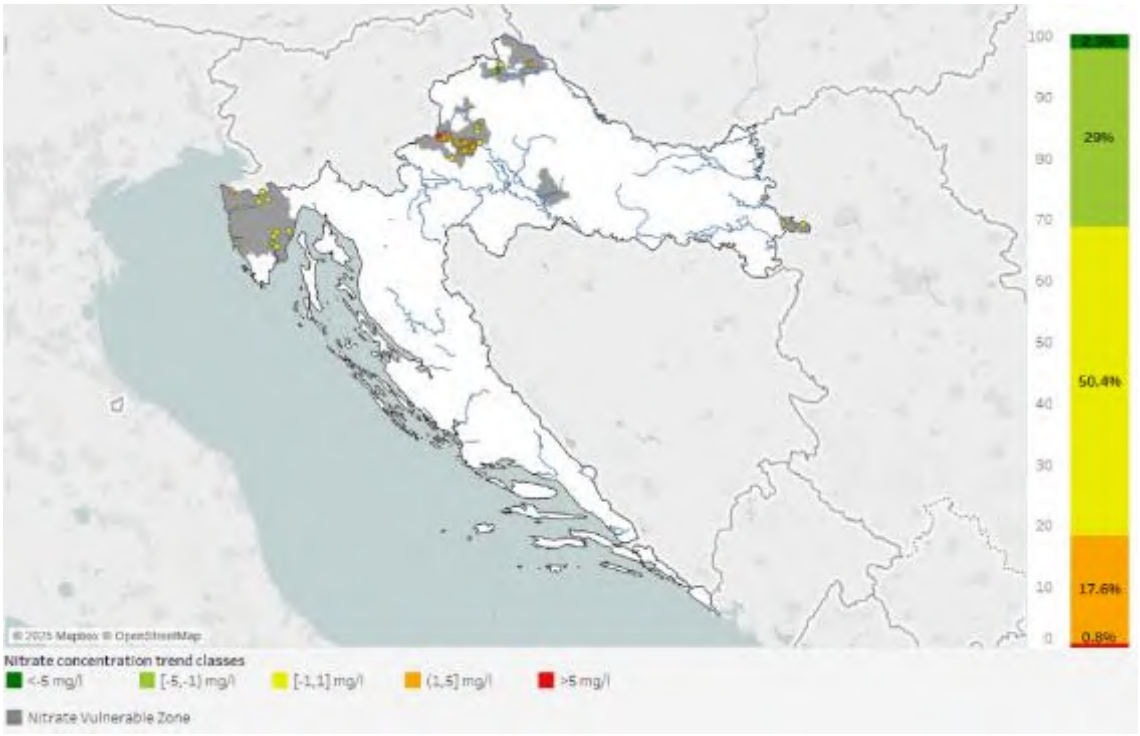
Note: The percentages below 5% are not labelled.

([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 31.3% of monitoring points and an increase in 18.4%. For the remaining 50.4% 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 5mg/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.

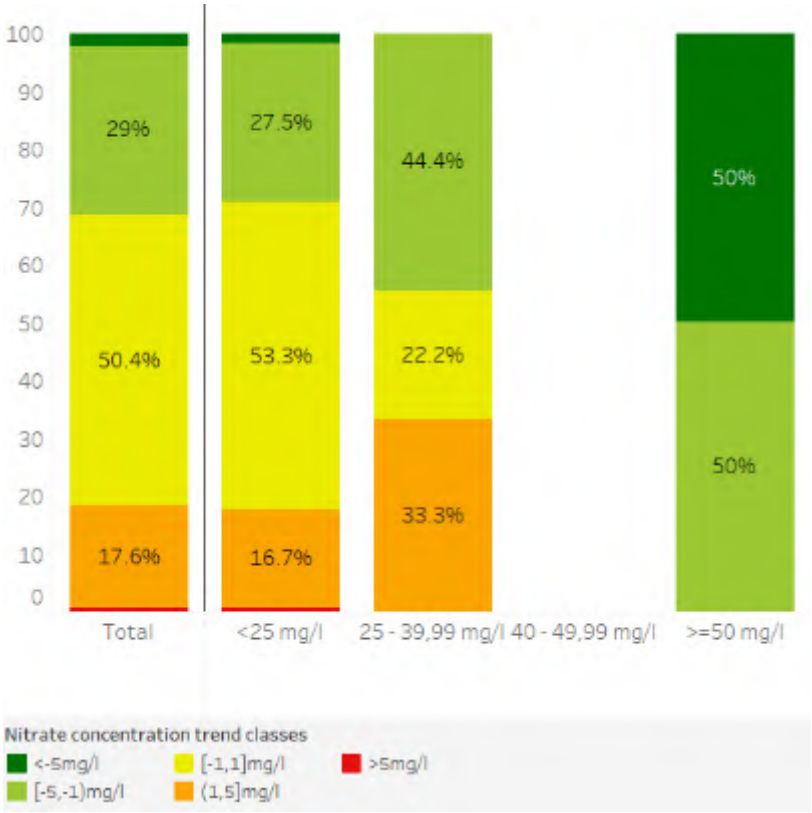
Table 5 – Share of groundwater monitoring points by trend class (mg/l) between the periods 2016-2019 and 2020-2023, categorised by station type

	Total Number of Stations	% Total Number of Stations	<-5	[-5,-1)	[-1,1]	(1,5]	>5
Phreatic groundwater (0-5 m)	82	62.6%	2.4%	31.7%	42.7%	22%	1.2%
Phreatic groundwater (5-15 m)	25	19.1%		24%	72%	4%	
Phreatic groundwater (15-30 m)	7	5.3%	14.3%	28.6%	42.9%	14.3%	
Phreatic groundwater (>30 m)	4	3.1%			75%	25%	
Captive groundwater	1	0.8%				100%	
Karstic groundwater	12	9.2%		33.3%	58.3%	8.3%	
Total	131	100.0%	2.3%	29%	50.4%	17.6%	0.8%

([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 during the current reporting period (equal to or above 50 mg/l), there has been an increase of nitrate concentration for 0% and a decrease for 100% 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])

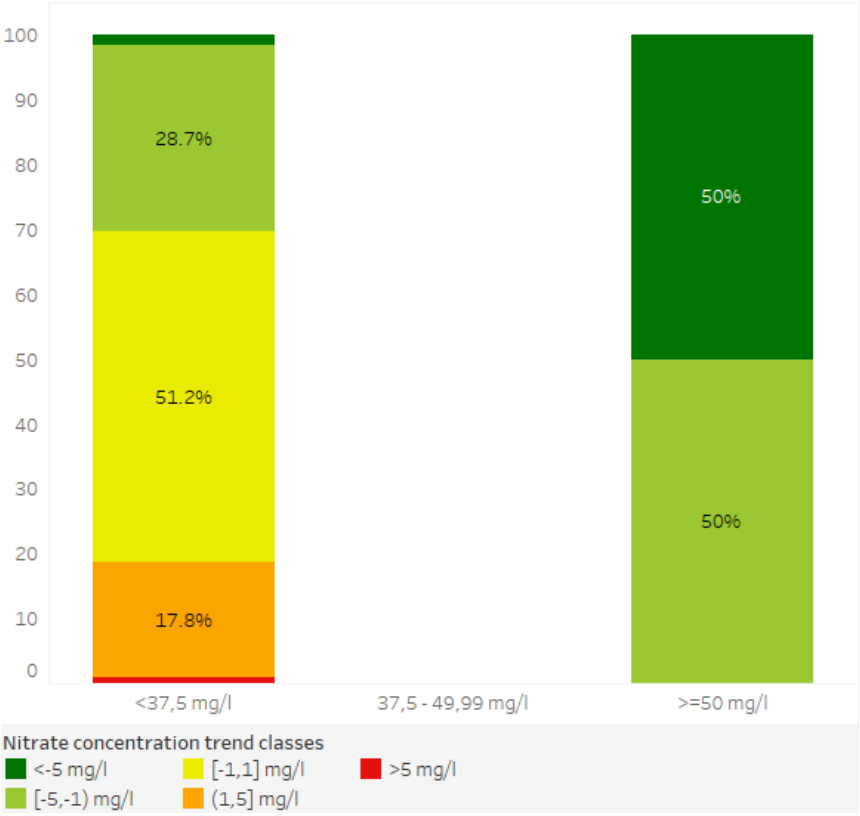


Note: The percentages below 5% are not labelled.

([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. There are no trends in this concentration category.

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])

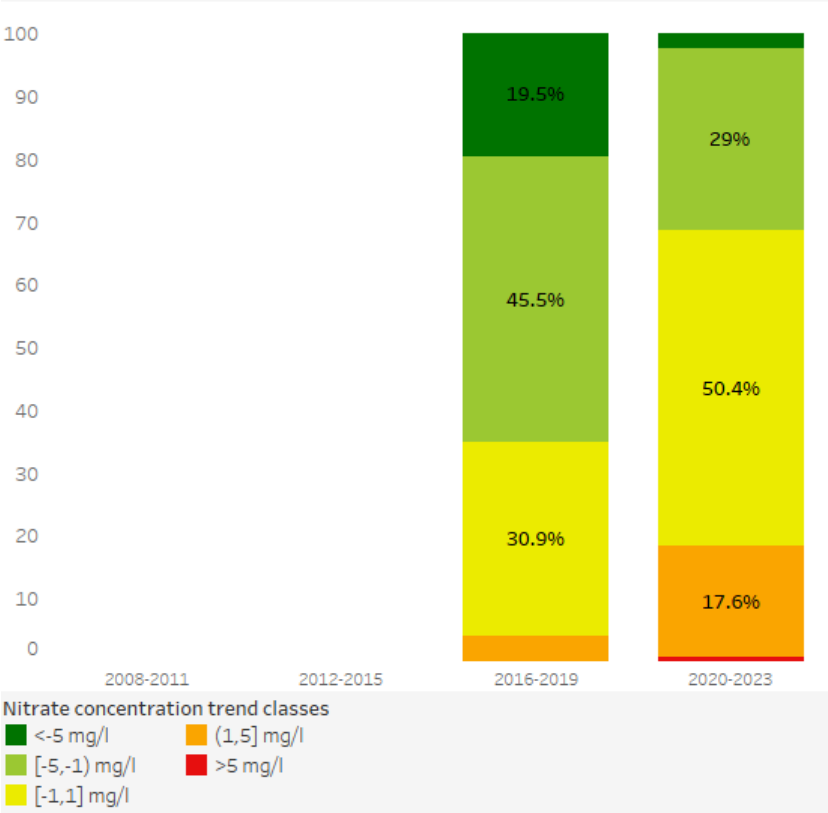


Note: The percentages below 5% are not labelled.

([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 is a lower share of monitoring points with decreasing nitrate concentrations (31.3% in the current reporting period compared to 65.0% in the previous reporting period) and a higher share of monitoring points with increasing nitrate concentrations (18.4% compared to 4.1%). 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 16 – Share of groundwater monitoring points by class of nitrate concentration trend ([16]) in the current and previous reporting periods



Note: The percentages below 5% are not labelled.

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

4.4. Nitrate pollution hotspots in groundwater

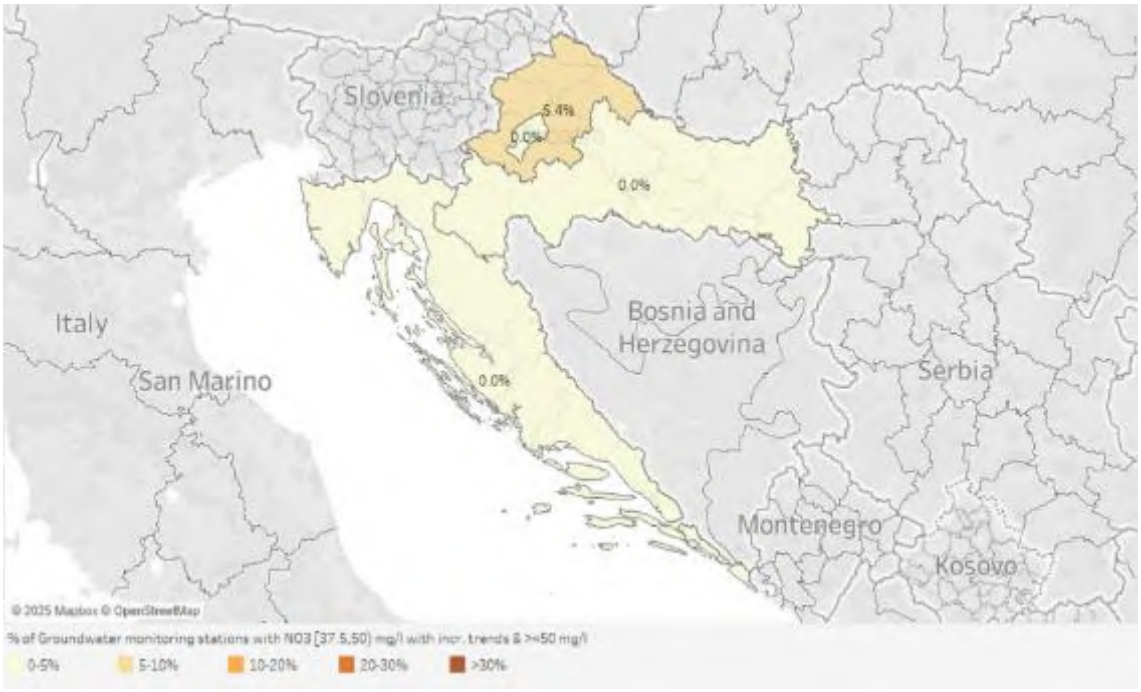
A nitrate pollution hotspot in groundwater is defined here as a monitoring point where the average annual nitrate concentration is either ≥ 50 mg/l or between 37.5 and 49.99 mg/l with an increasing trend. In Croatia there are 2 groundwater nitrate pollution hotspots.

Figure 17 – Groundwater nitrate pollution hotspots

	inside NVZ	outside NVZ	Total
Groundwater [37.5,50) with incr. trend			
>=50	2		2
Total	2		2

The NUTS2 region with the highest share of hotspots is Sjeverna Hrvatska (5.4%)

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



5. NITRATES IN SURFACE WATERS

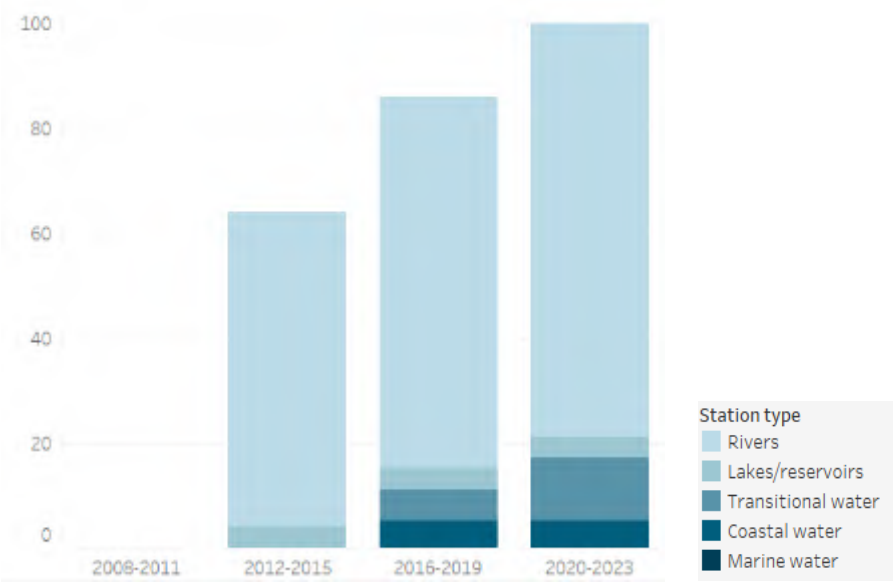
5.1. Monitoring of nitrate concentrations in surface waters

Monitoring of surface water quality in Croatia is the responsibility of Croatian Waters, which operates in accordance with an agency-approved monitoring plan. To date, surface water monitoring has been reported in Nitrate Vulnerable Zones (NVZ). Transitional and coastal waters have been reported if they fell within an NVZ catchment area. Following the European Commission's recommendation ([17]), nine surface water monitoring stations were established outside NVZ. For these monitoring stations, nitrate concentrations have been reported, while trends could not yet be calculated for the reporting period 2020-2023.

During the reporting period 2020-2023 nitrate concentrations were reported at 100 surface water monitoring points. Among these, 79.0% were in rivers, 4.0% were in lakes or reservoirs, and 17.0% were in saline waters. The freshwater monitoring points density was 1.5 stations per 1 000 km^2. Of these monitoring points, 89.2% freshwater monitoring points were located within NVZ and 10.8% outside NVZ.

The overall number of monitoring points increased by 14 (16.3%) compared to the previous reporting period. The number of monitoring points has steadily increased since 2012-2015 with transitional and coastal water stations being added in 2016-2019. 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)



([17]) Staff Working Document to Commission's Nitrates Directive Implementation Report for the period 2016-2019, Croatia Fiche, 2021

In this reporting period, changes in nitrate concentrations compared to the previous monitoring period (trends) were assessed for 86 monitoring points, accounting for 86.0% of all points with measurements. The share of monitoring points with trends increased compared to the previous reporting period (74.4% 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 ([18])

	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		60	71	79			60	70
Lakes/reservoirs		4	4	4			4	4
Transitional water			6	12				7
Coastal water			5	5				5
Marine water								
Total		64	86	100			64	86

([18]) Croatia reported that monitoring was discontinued in 1 monitoring point 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.

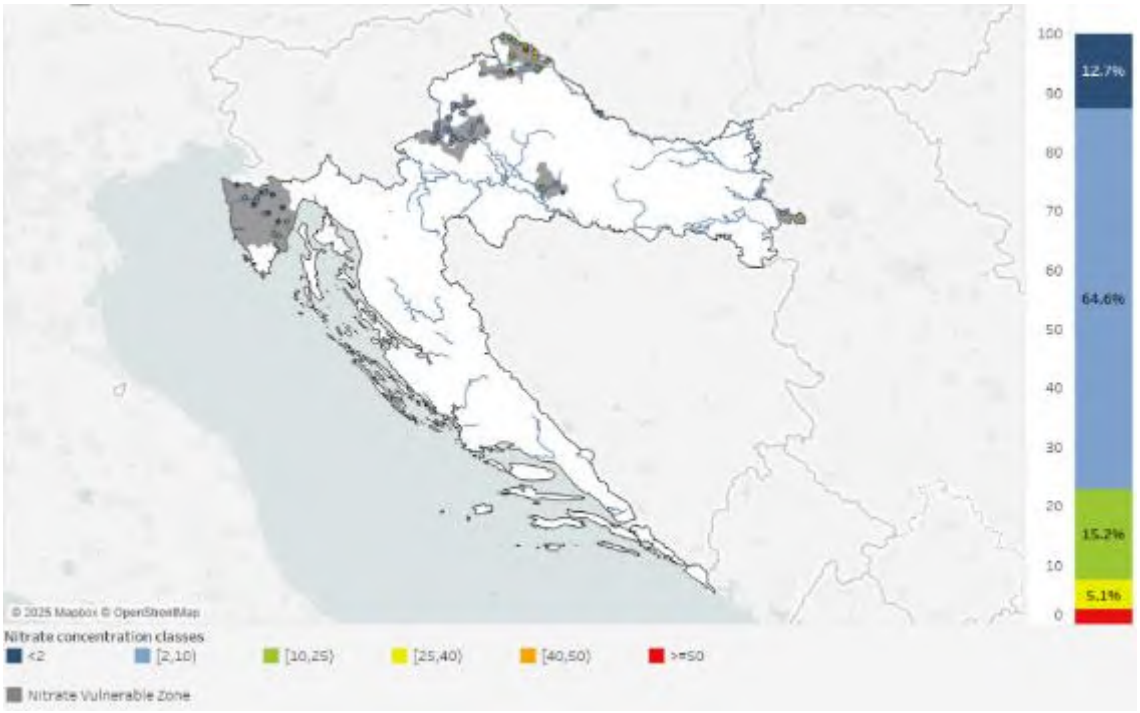
5.2. Nitrate concentrations in surface waters

Rivers

In Croatia, 2.5% of monitoring points in rivers showed average nitrate concentrations equal to or above the drinking water threshold of 50 mg/l, whereas 0% had concentrations between 40-49.99 mg/l, 5.1% showed concentrations between 25-39.99 mg/, 15.2% in the class 10-24.99 mg/l, 64.6% in the class 2-9.99 mg/l and 12.7% 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.

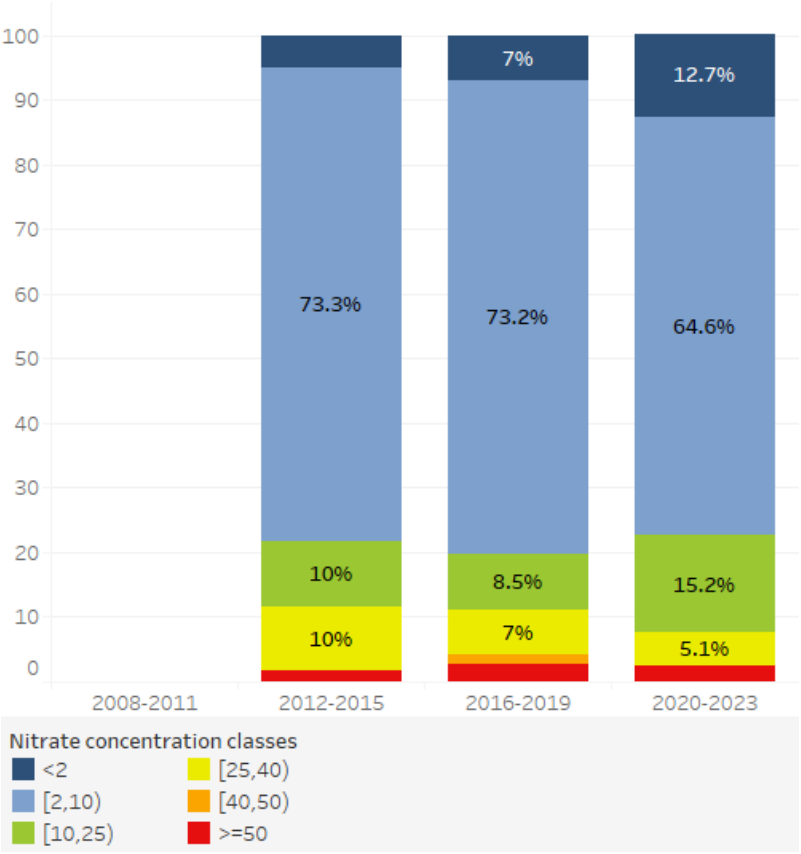
Figure 20 – Map of average annual mean nitrate concentrations in rivers and share of monitoring points by concentration class in the reporting period 2020-2023



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 decreased from 2.8% to 2.5%. The graph below presents the shares of monitoring points per classes of nitrate concentration in the last three reporting periods.

Figure 21 – Share of monitoring points in rivers by class of nitrate concentration ([19]) in the current and previous reporting periods



Note: The percentages below 5% are not labelled.

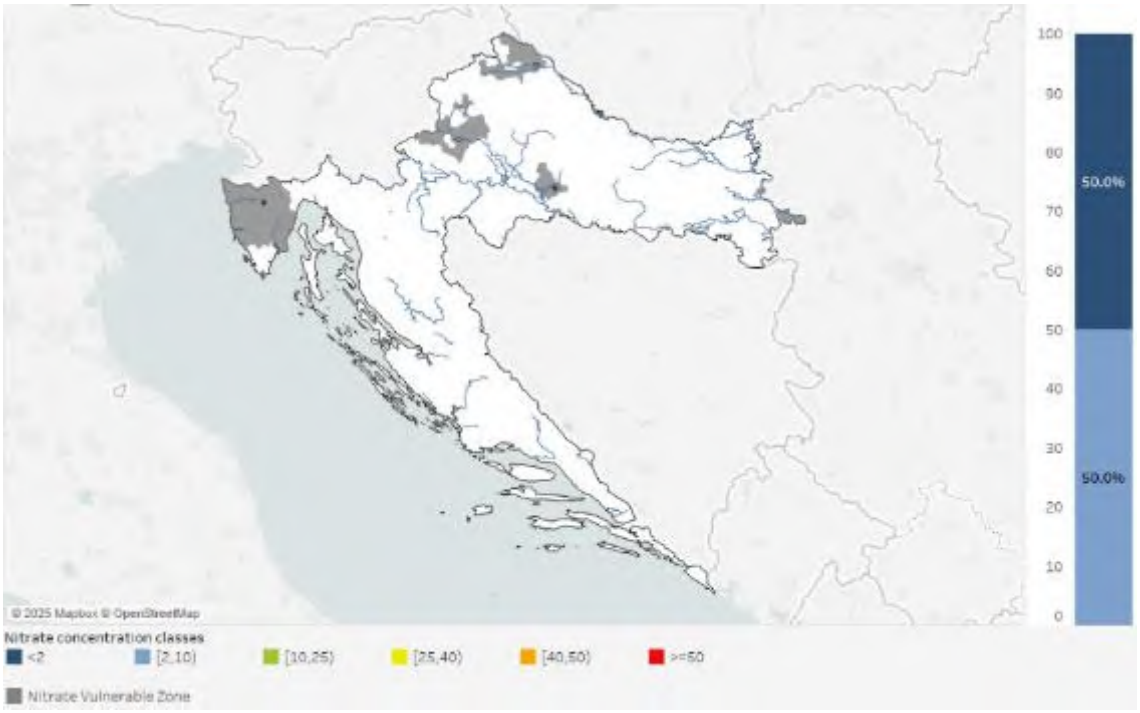
([19]) Average of annual mean values over the reporting period.

Lakes/water reservoirs

None of four monitoring points in lakes/water reservoirs showed average nitrate concentrations equal to or above the drinking water threshold of 50 mg/l and at or above 10 mg/l, whereas 50.0% had concentrations between 2-9.99 mg/l and 50.0% 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



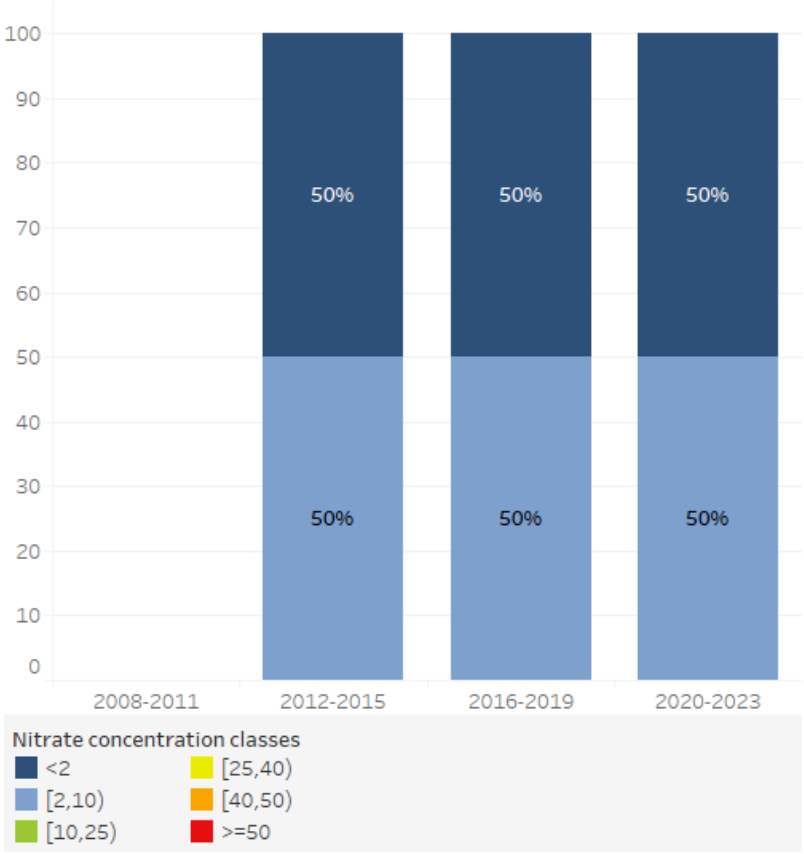
Note: In the map, monitoring points with higher values are plotted on top.

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	79	95.2%	12.7%	64.6%	15.2%	5.1%		2.5%
Lakes/reservoirs	4	4.8%	50.0%	50.0%				
Total	83	100.0%	14.5%	63.9%	14.5%	4.8%		2.4%

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 three reporting periods. Since 2015-2015 the shares in classes 2-9.99 mg/l and <2 mg/l have been equally distributed with 50% in each category.

Figure 23 – Share of monitoring points in lakes/water reservoirs by class of nitrate concentration ([20]) in the current and previous reporting periods



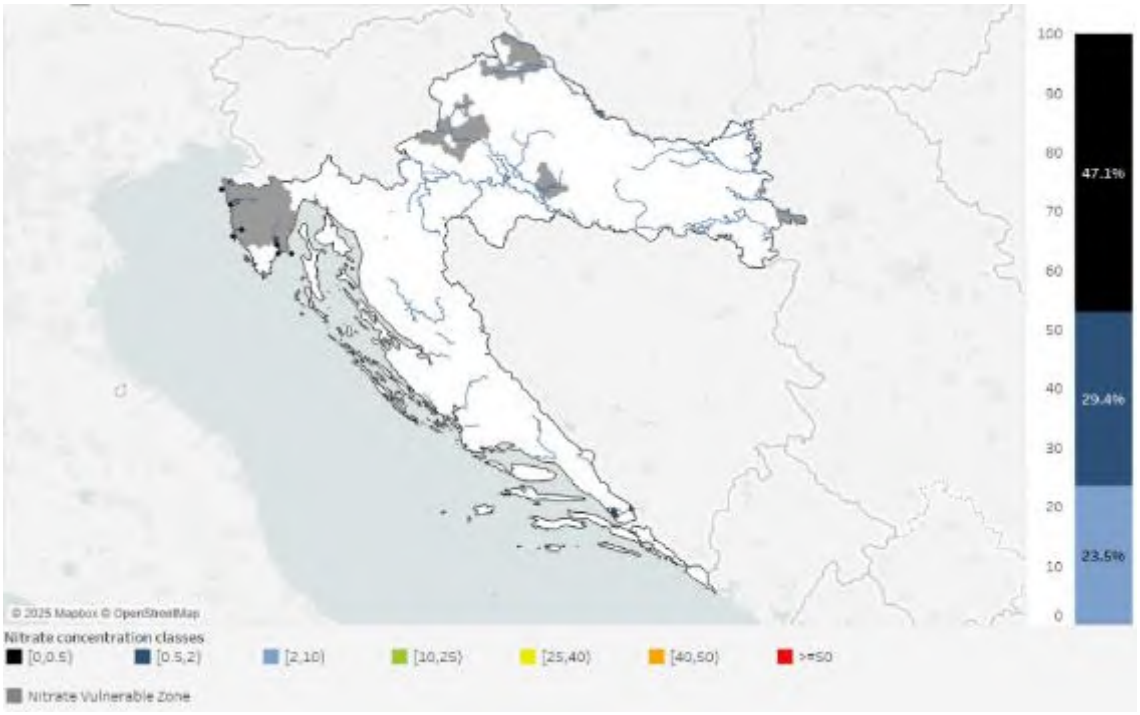
([20]) Average of annual mean values over the reporting period.

Saline waters ([21])

No points in saline waters monitoring points showed average nitrate concentrations ≥ 10 mg/l, 23.5% showed concentrations between 2-9.99 mg/l and 29.4% between 0.5-2 mg/l and 47.1% below 0.5 mg/l.

It is relevant to look in detail at very low nitrate concentrations, also below 0.5 mg/l and between 0.5 mg/l and 2 mg/l, because saline waters tend to have very low concentrations and some saline waters can become eutrophic even at concentrations below 2 mg/l.

Figure 24 – Map of average annual mean nitrate concentrations in saline waters and share of monitoring points by concentration class in reporting period 2020-2023



Note: Higher values are plotted at the top.

It is also relevant to look separately at transitional waters as they typically show higher nitrate concentrations. In Croatia, 33.3% of monitoring points showed average annual mean nitrate concentrations at or above 2 mg/l, 41.7% between 0.5-2 mg/l and 25.0% below 0.5 mg/l, as shown in the table below.

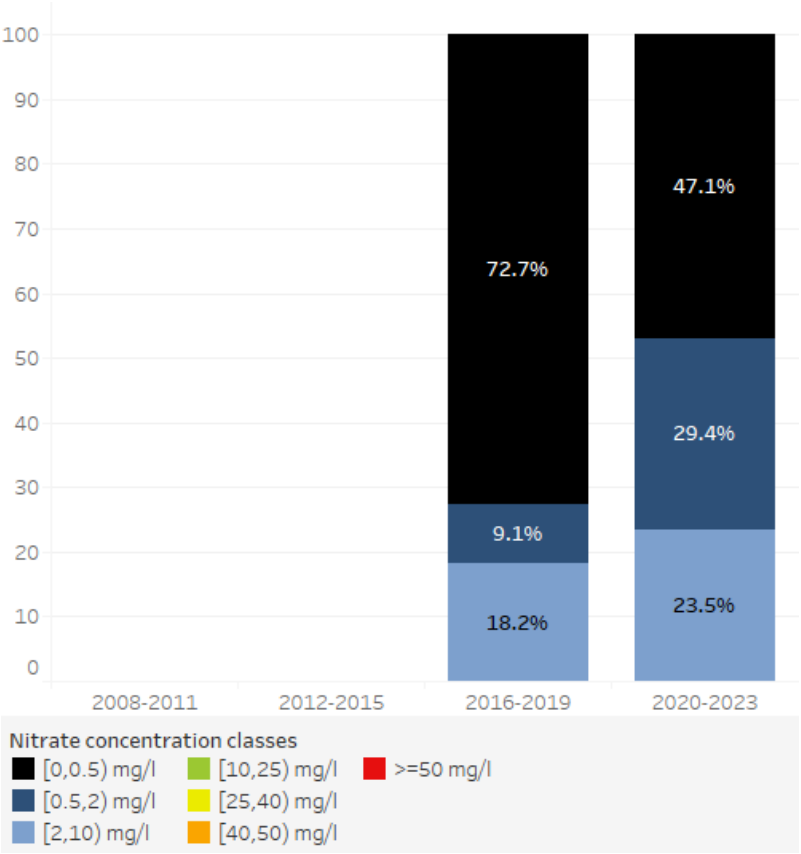
Table 8 – Share of saline water monitoring points by nitrate concentration class (mg/l) in the reporting period 2020-2023, categorised by station type

	Number of stations	% of Total	<0.5	[0.5,2)	[2,10)	[10,25)	[25,40)	[40,50)	>=50
Transitional water	12	70.6%	25.0%	41.7%	33.3%				
Coastal water	5	29.4%	100.0%						
Marine water									
Total	17	100.0%	47.1%	29.4%	23.5%				

([21]) This includes coastal, marine and transitional waters.

The graph below presents the shares of monitoring points per classes of nitrate concentration in the last two reporting periods.

Figure 25 – Share of monitoring points in saline waters by class of nitrate concentration ([22]) in the current and previous reporting periods



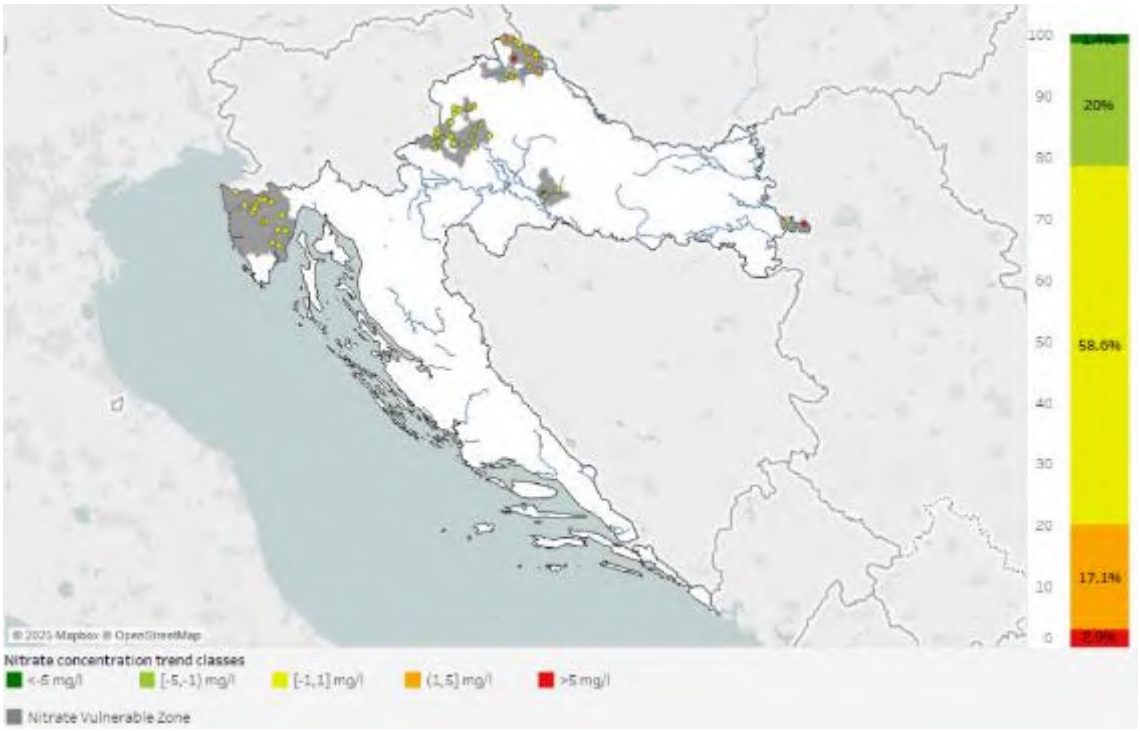
([22]) Average of annual mean values over the reporting period.

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 21.4% of monitoring points and an increase in 20.0%. For the remaining 58.6% 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.

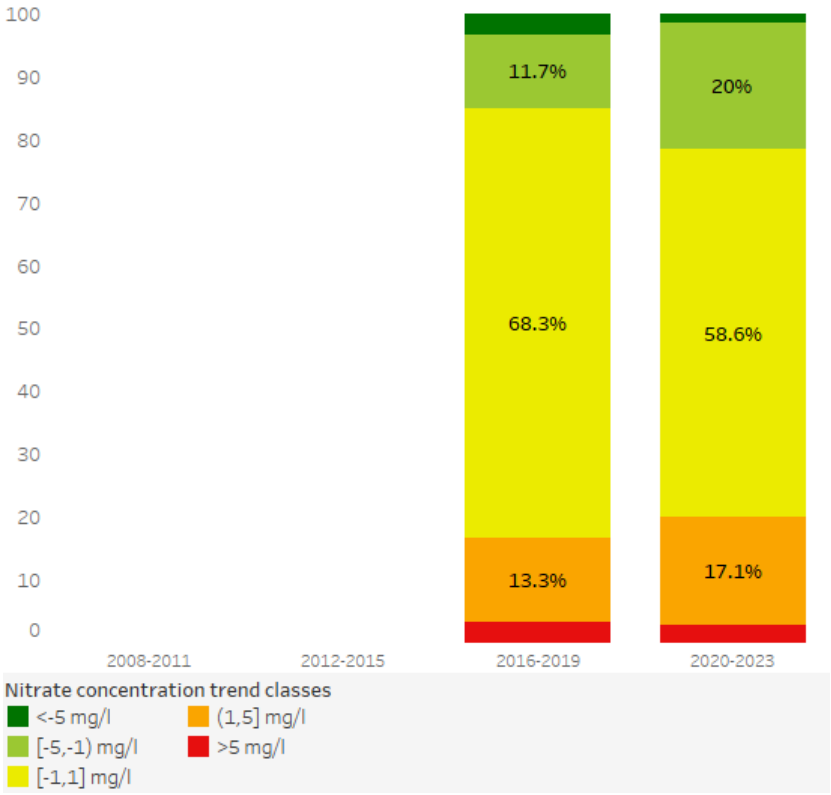
Figure 26 – Map of trends in average annual mean nitrate concentrations in rivers between the periods 2016-2019 and 2020-2023 and share of monitoring points by trend class



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

Compared to the previous reporting period, there is a higher share of monitoring points with decreasing nitrate concentrations (21.4% in the current reporting period compared to 15.0% in the previous reporting period compared) but also a higher share of monitoring points with increasing nitrate concentrations (20.0% compared to 16.6%). 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 rivers by class of nitrate concentration trend ([23]) in the current and previous reporting periods



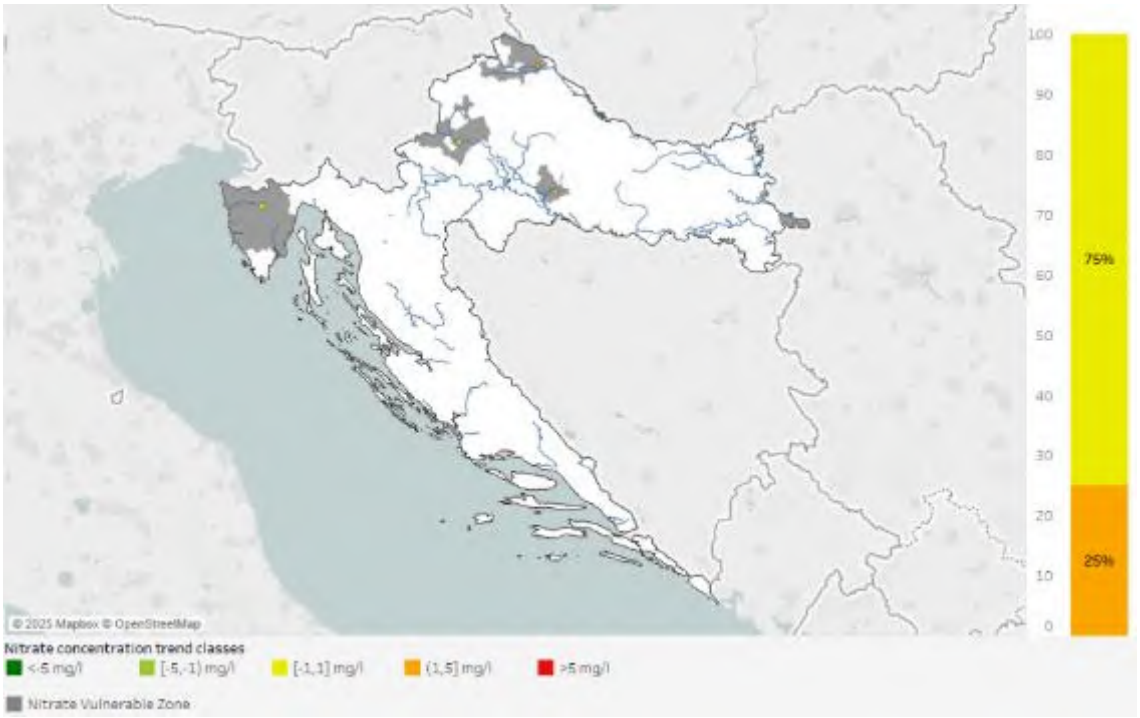
Note: The percentages below 5% are not labelled.

([23]) 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 none of the monitoring points and an increase in 25.0%. For the remaining 75.0% 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 28 – 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



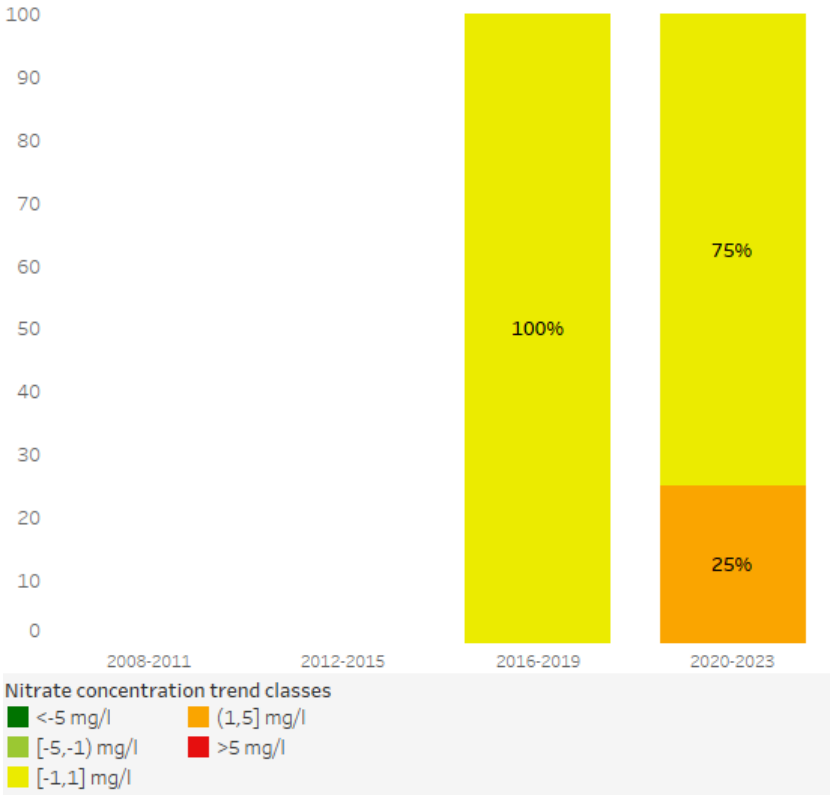
Note: In the map, monitoring points with higher values are plotted on top.

Table 9 – 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	70	94.6%	1.4%	20%	58.6%	17.1%	2.9%
Lake/Reservoir	4	5.4%			75%	25%	
Total	74	100.0%	1.4%	18.9%	59.5%	17.6%	2.7%

Compared to the previous reporting period, the share of monitoring points with decreasing nitrate concentrations remained stable (0% in the current reporting period compared to 0% in the previous reporting period) and there was a higher share of monitoring points with increasing nitrate concentrations (25.0% compared to 0%). 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 29 – Share of monitoring points in lakes/water reservoirs by class of nitrate concentration trend ([24]) in the current and previous reporting periods

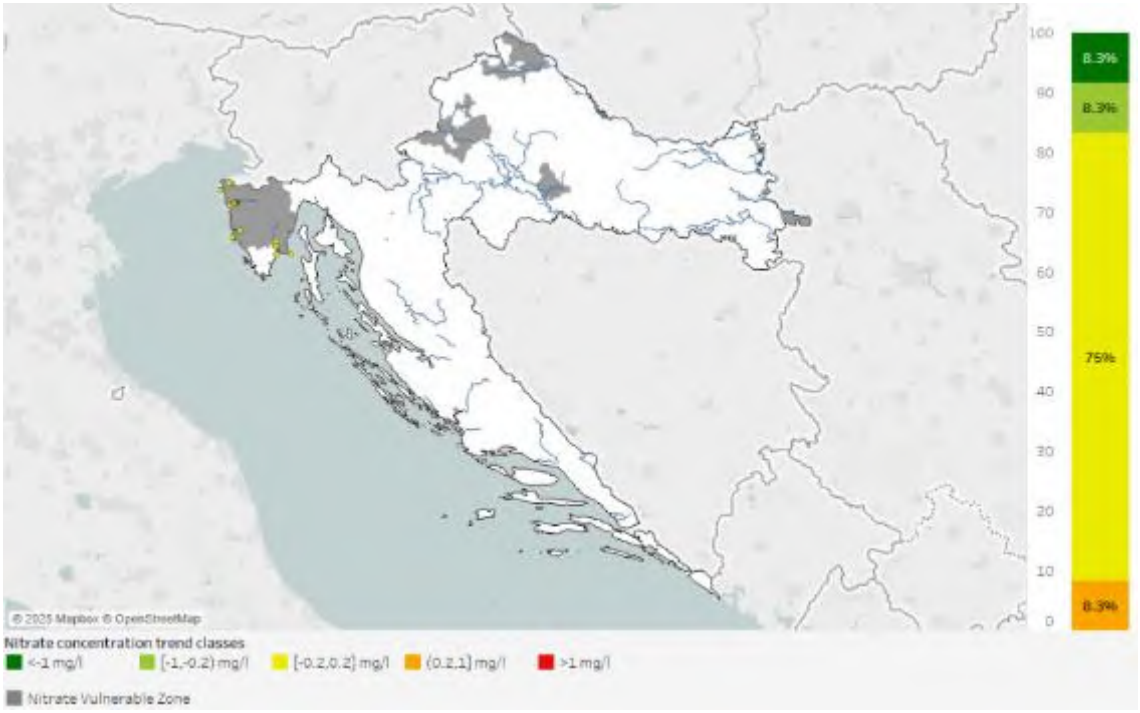


([24]) Change in average annual mean nitrate concentrations compared to the previous reporting period.

Saline waters

Compared to the last reporting period, there has been a decrease of nitrate concentrations in 16.6% of monitoring points and an increase in 8.3%. For the remaining 75.0% there was no significant change. The increase or decrease can be categorised as weak if it is between 0.2 and 1 mg/l, and as strong if it is above 1 mg/l.

Figure 30 – Map of trends in average annual mean nitrate concentrations in saline waters between periods 2016-2019 and 2020-2023 and share of monitoring points by trend class



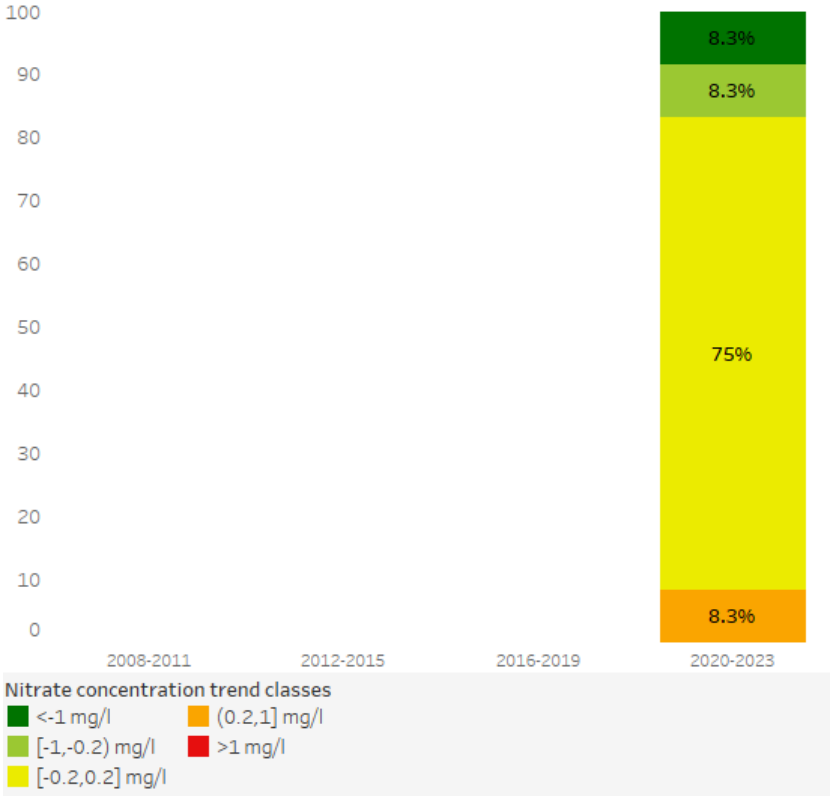
Note: In the map, monitoring points with higher values are plotted on top.

Table 10 – Share of saline water monitoring points by trend class (mg/l), categorised by station type

	Total Number of Stations	% Total Number of Stations	<-1	[-1,-0.2)	[-0.2,0.2]	(0.2,1]	>1
Transitional water	7	58.3%	14.3%	14.3%	57.1%	14.3%	
Coastal water	5	41.7%			100%		
Marine water							
Total	12	100.0%	8.3%	8.3%	75%	8.3%	

No comparison can be made with the previous reporting period because there are no trends available in 2016-2019. 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 31 – Share of monitoring points in saline waters by classes of nitrate concentrations ([25]) in the current and previous reporting periods



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

5.4. Nitrate pollution hotspots in surface waters

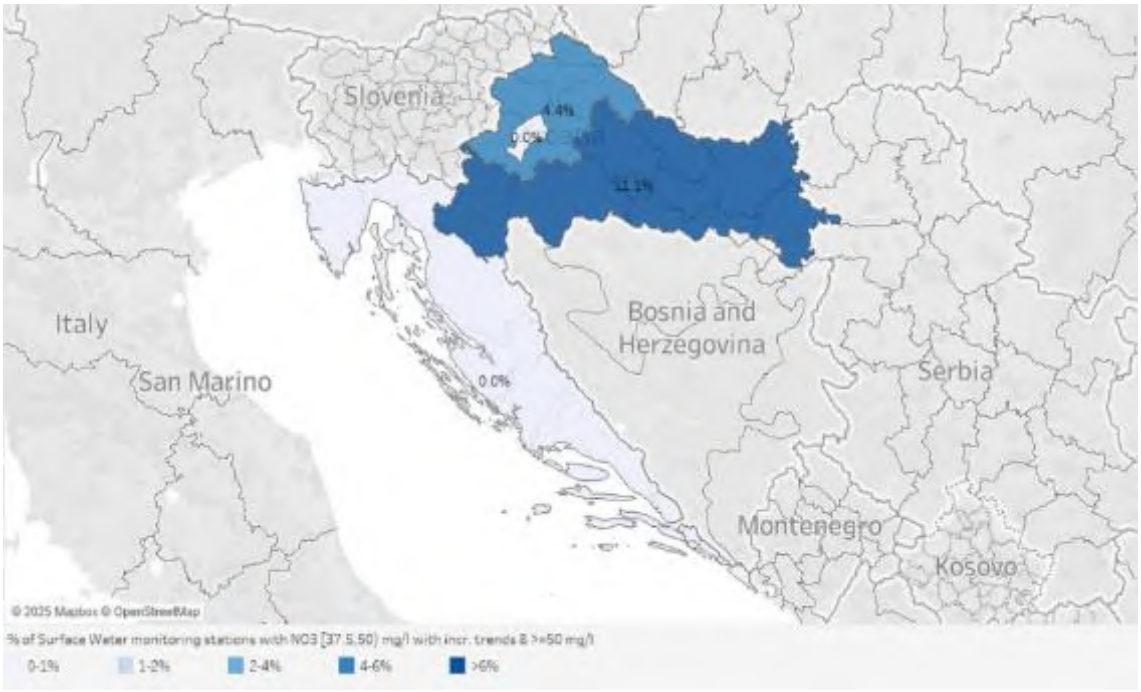
A nitrate pollution hotspot is defined here as a monitoring point where the average annual nitrate concentration is ≥ 50 mg/l or between 37.5 and 49.99 mg/l with an increasing trend. There are 3 surface water nitrate pollution hotspots, all of which are inside NVZ.

Figure 32 – Surface water nitrate pollution hotspots

		inside NVZ	outside NVZ	Total
Rivers	[37.5,50) with incr. trend	1		1
	>=50	2		2
Lakes/reservoirs	[37.5,50) with incr. trend			
	>=50			
Total		3		3

The highest shares of hotspots were in the regions Panonska Hrvatska (11.1%) and Sjeverna Hrvatska (4.4%).

Figure 33 – 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 trophic status was determined for rivers and coastal waters in the reporting period 2020-2023. During the reporting period 2020-2023 trophic status was reported at 81 monitoring points. Among these, 93.8% were in rivers, none were in lakes or reservoirs, and 6.2% were in saline waters. The station density of monitoring points, where trophic status was assessed equals to 1.3 stations per 1 000 km^2. Of these monitoring points, 92.1% of freshwater monitoring points were located within NVZ and 7.9% outside NVZ.

The overall number of freshwater monitoring points increased by 1 (1.3%), and number of saline water monitoring points decreased by 6 (54.5%) compared to the previous reporting period. While five river monitoring stations were added, four stations lakes/reservoirs were removed in the current reporting period. At the same time all 6 transitional water stations were removed.

Figure 34 – Evolution in surface water monitoring network (number of points with trophic status reported)

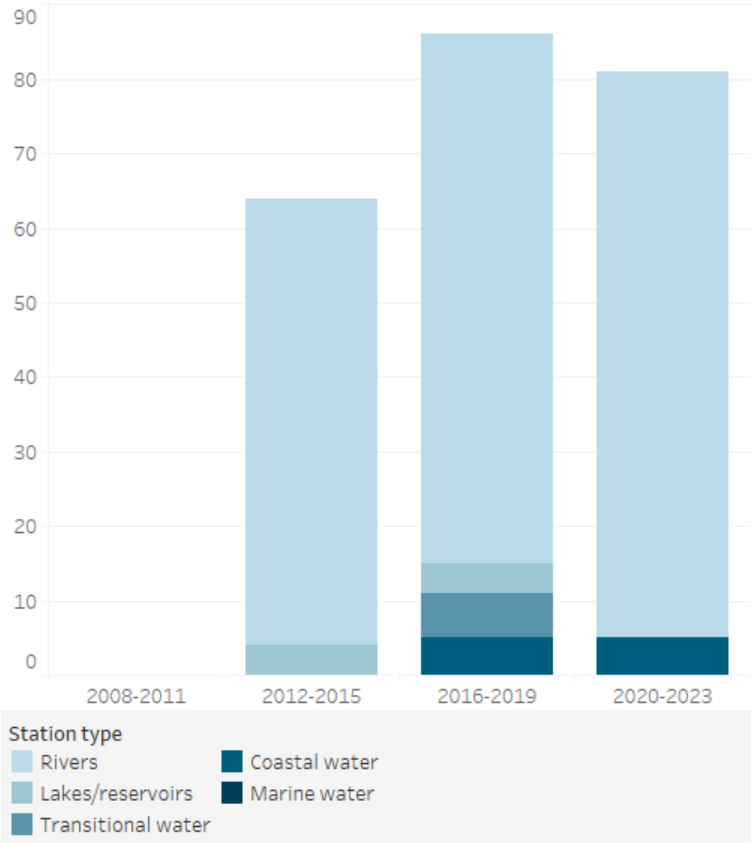


Table 11 – Number of monitoring points reporting trophic status by station type ([26])

	Stations With Trophic Status			
Station type	2008-2011	2012-2015	2016-2019	2020-2023
Rivers		60	71	76
Lakes/reservoirs		4	4	
Transitional water			6	
Coastal water			5	5
Marine water				
Total		64	86	81

6.2. Methodology for the assessment of trophic status

The trophic status for rivers was assessed based on the concentrations of total nitrogen and total phosphorus. For natural lakes chlorophyll-a, transparency (in m) and total biomass of phytoplankton and for coastal waters dissolved oxygen and trophic index (TRIX) have been assessed additionally. The trophic status classification system for transitional waters is not yet developed.

Croatia initiated a project for developing a classification system for the eutrophication of transitional waters to include it in the 2024 Water management plan. The research was expected to start at the end of 2024.

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

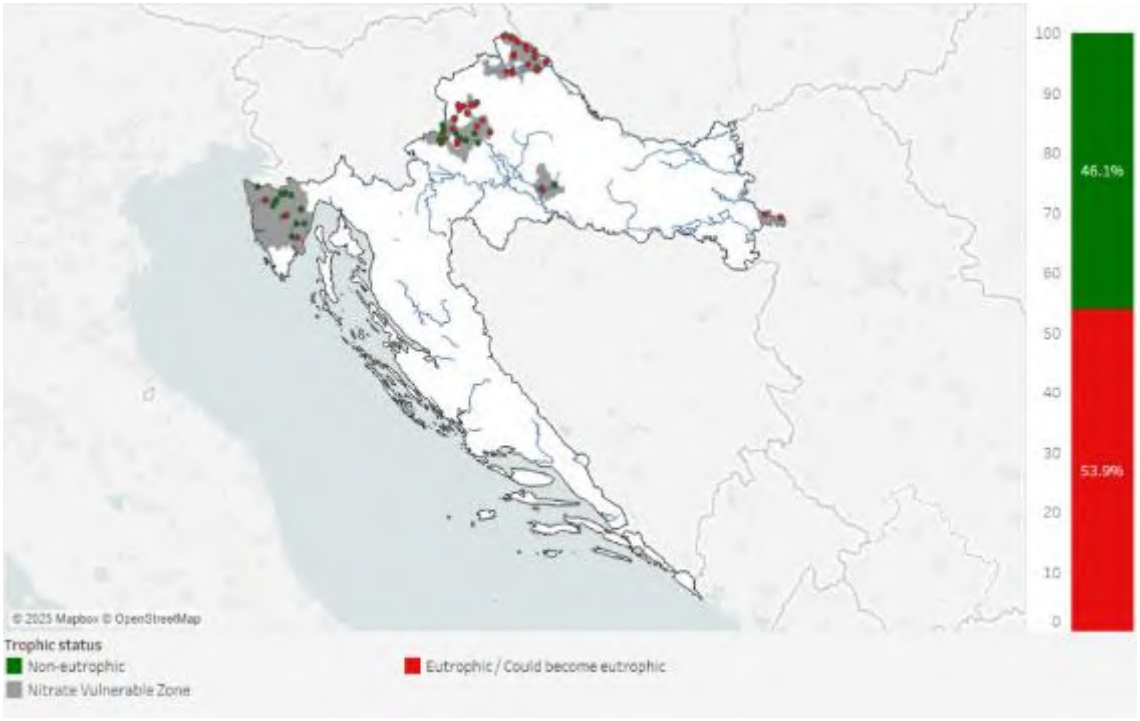
([26]) The Member State reported that monitoring was discontinued in 1 monitoring point.

6.3. Eutrophication of surface waters

Rivers

53.9% 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.

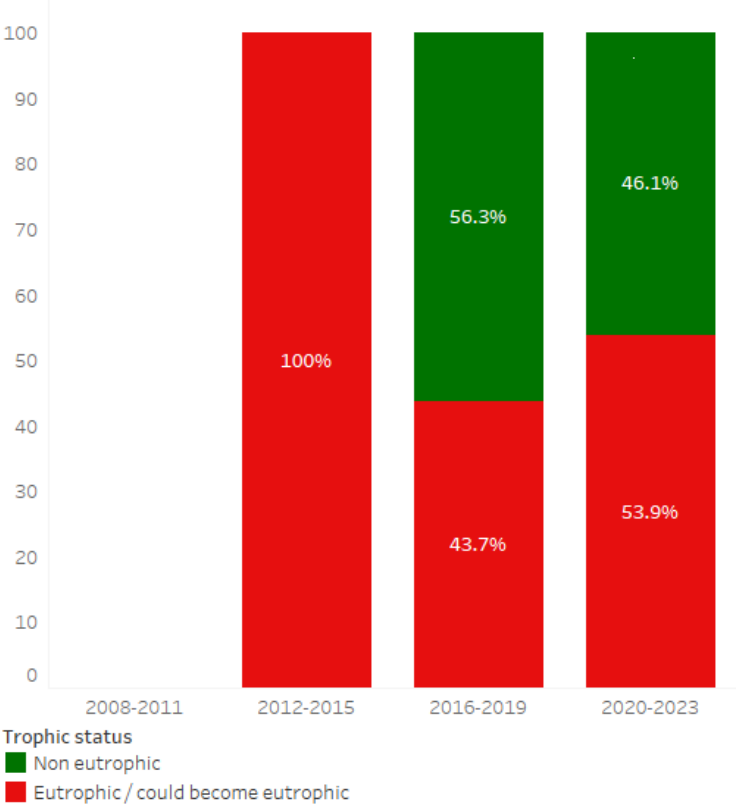
Figure 35 – Map of trophic status in rivers and share of monitoring points by trophic class in the reporting period 2020-2023



Note: Eutrophic/could become eutrophic points are plotted at the top.

Compared to the previous reporting period, the share of eutrophic/could become eutrophic monitoring points increased from 43.7% to 53.9%. The graph below presents the shares of monitoring points according to their trophic status in the last three reporting periods.

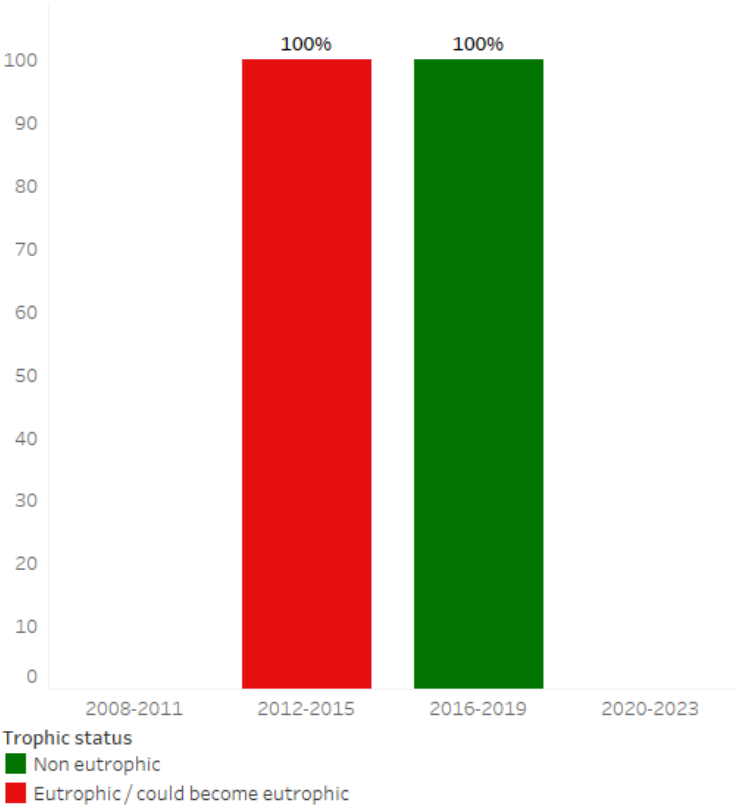
Figure 36 – Share of monitoring points in rivers by class of trophic status in the current and previous reporting periods



Lakes/water reservoirs

None of the monitoring points were reported in lakes/water reservoirs. The graph below presents the shares of monitoring points according to their trophic status in the previous two reporting periods.

Figure 37 – Share of monitoring points in lakes/water reservoirs by class of trophic status in the current and previous reporting periods



Saline waters

No saline water monitoring points were eutrophic/could become eutrophic. The figure below shows the shares in respective classes in a graph and spatial distribution in the map.

Figure 38 – Map of trophic status in saline waters 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.

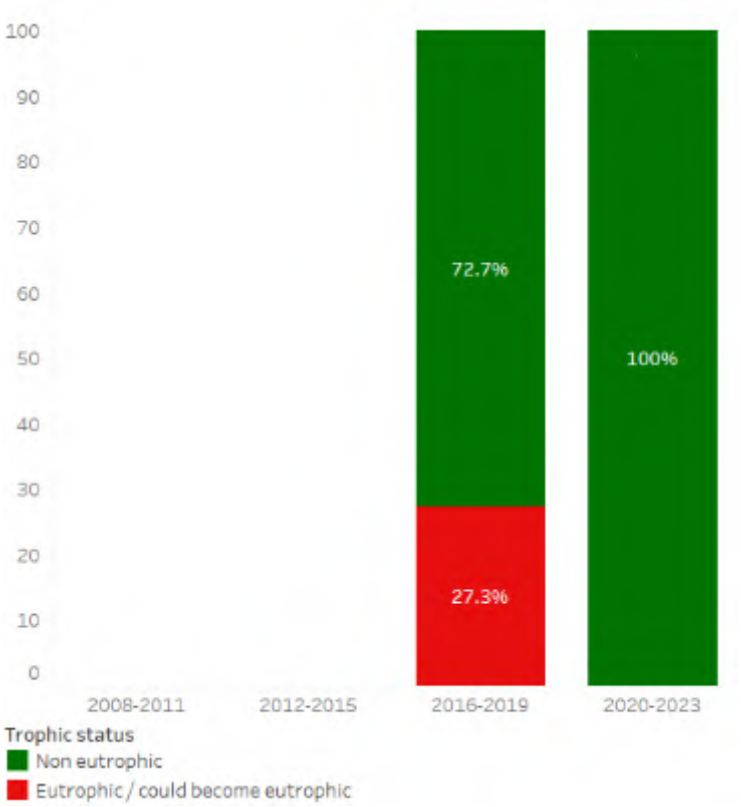
It is relevant to look separately at different types of saline waters (transitional, coastal and marine). However, in Croatia, only coastal water was assessed.

Table 12 – Share of saline water monitoring points by class of trophic status, categorised by station type

Station type	Number of Stations	% of Total	Non-eutrophic	Eutrophic/could become eutrophic
Transitional water				
Coastal water	5	100.0%	100.0%	
Marine water				
Total	5	100.0%	100.0%	

Compared to the previous reporting period, the share of eutrophic/could become eutrophic monitoring points in saline waters decreased from 27.3% to 0%. The graph below presents the shares of monitoring points according to their trophic status in the last two reporting periods.

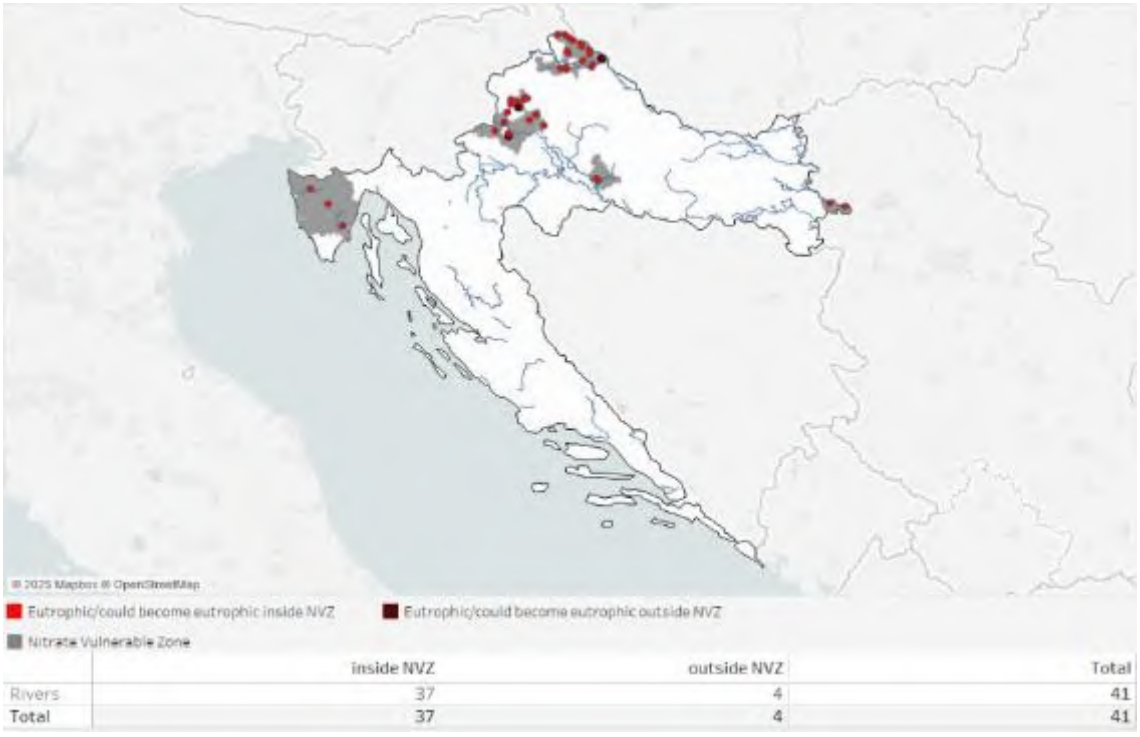
Figure 39 – Share of monitoring points in saline waters by class of trophic status in the current and previous reporting periods



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 41 surface water monitoring points which were reported eutrophic/could become eutrophic, of which 4 are outside NVZ, accounting for 9.8% of all eutrophication hotspots in the country.

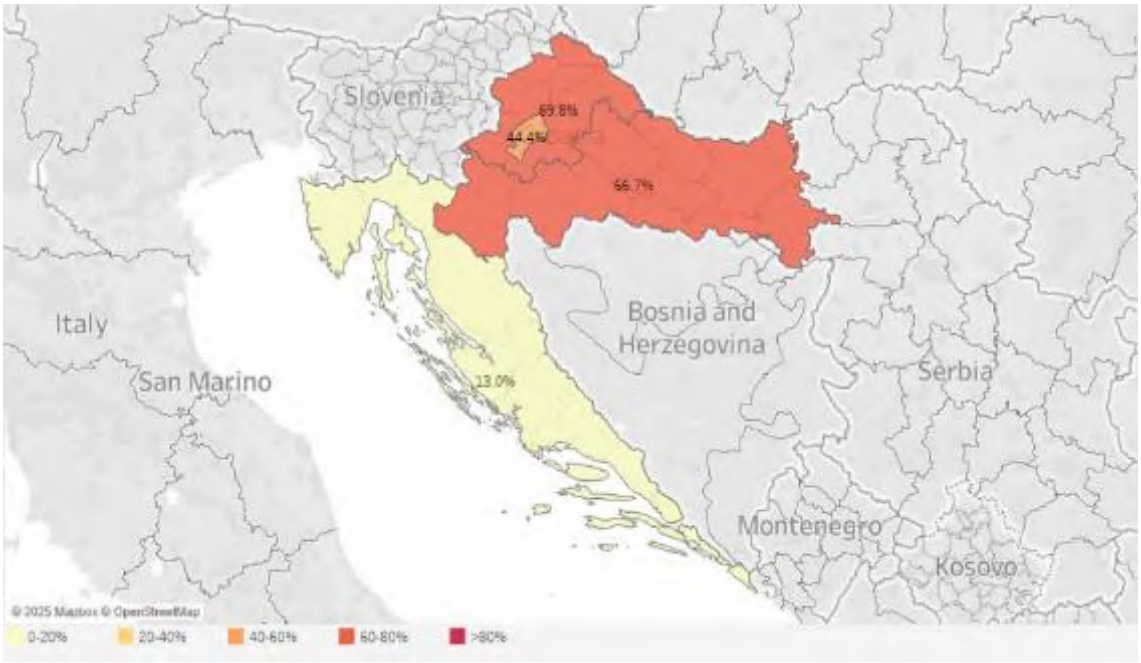
Figure 40 – Eutrophic/could become eutrophic monitoring points



	inside NVZ	outside NVZ	Total
Rivers	37	4	41
Total	37	4	41

The highest shares of hotspots were in the regions Sjeverna Hrvatska (69.8%), Panonska Hrvatska (66.7%) and Grad Zagreb (44.4%).

Figure 41 – 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 practice

The 'Principles of good agricultural practice' were drawn up in 2009. The thematic section on the 'Principles of good agricultural practice in water protection' makes reference to the 'rules on good agricultural practice in fertiliser use' (NN No 56/08). Since these rules ceased to apply, all parts of the brochure cross-referencing the provisions relating to the good agricultural practice in fertiliser use are to be interpreted in accordance with the provisions of the action programme for the protection of water against pollution caused by nitrates from agricultural sources.
The first action programme for Croatia entered into force on 01.07.2013. For the period 2020-2023, the third action programme (NN No 73/21) came into force, in 2021. The main change in the third action programme, covering the period 2020-2023, was the shift of the fertiliser prohibition period. The prohibition period for slurry and liquid manure shifted by one month, from 15.11-15.02 to the period 15.12-15.03. The length of the closed period continues to cover a period of 3 months.

The latest (the fourth) action programme for the period 2025-2028 (NN No 95/25) was published on 16.06.2025 and entered into force on 01.07.2025. It sets out measures that are mandatory in the nitrate vulnerable zones and voluntary outside the nitrate vulnerable zones.

A consolidated overview of the action programme currently in force is provided in a separate document ([27]).

7.2. Controls

The agricultural inspection of the Ministry of Agriculture, Forestry and Fisheries carries out controls in nitrate vulnerable zones. The Payment Agency in Agriculture, Fisheries and Rural Development controls those measures of the action programme ~~w~~which are part of the conditionality requirements under the CAP.
According to the Croatian progress report, 82602 inspections were carried out during the period 2020-2023 within the scope of the Water Act and the CAP conditionality. These inspections included 10670 (12.9 %) inspections in nitrate vulnerable zones. The specific control on the measures of the action programme in nitrate vulnerable areas was carried out by 216 on-site inspections in the period 2020-2023.
The Croatian progress report makes no reference to the incidence of non-compliance.
According to the progress report for the period 2020-2023, no specific difficulties were identified when controls were carried out on the measures of the action programme in nitrate vulnerable zones.

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

8. WATER QUALITY OUTLOOK

No statistical model or methodology has been applied to forecast water quality in Croatia. However, evaluations of the impact of climate change on Croatian water bodies suggest a greater vulnerability of water resources to pollution from agricultural sources in the future. The report states that a review of vulnerable zones will be carried out accordingly for the next reporting period.

Publications Office
of the European Union