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COMMISSION STAFF WORKING DOCUMENT

Accompanying the document

REPORT FROM THE COMMISSION TO THE COUNCIL AND THE EUROPEAN PARLIAMENT

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

{COM(2021) 1000 final}

Pressure from Agriculture

Italy's utilized agricultural area amounts 12.8 Mha, representing 43.7% of the total land area and has remained stable since 2010. The major outputs of the agricultural industry include in a decreasing order cereals (17.1%), industrial crops (10.3%) and forage plants (9.4%).

Eurostat

Major land use statistics for Italy

Table 1.Utilized agricultural area (abbreviated as UAA)

Italy	2005	2007	2010	2013	2016
Utilised agricultural area UAA (1000 ha)	NA	14490	12885	12426	12843
arable land (1000 ha)	NA	7381	7015	6827	6697
permanent grass (1000 ha)	NA	4473	3470	3011	3663
permanent crops (1000 ha)	NA	2570	2371	2389	2452
kitchen gardens (1000 ha)	NA	33	30	NA	32

Note:
Eurostat (FSS)

Italy's arable land has remained stable since 2013. The permanent grassland has increased by 21.7% since 2013, while permanent crops have remained stable

Animal distribution in Italy

Italy's live bovine and poultry have remained stable since 2013, while live poultry has increased by 4%. The livestock density index has remained stable and is closed to the EU average of 0.8.

Table 2. Livestock statistics

Italy	2005	2007	2010	2013	2016
Livestock index	0.75	0.78	0.77	0.77	0.75
dairy cows (10^6 heads)	1.84	1.84	1.75	2.08	2.06
live bovines (10^6 heads)	6.46	6.58	5.83	6.25	6.32
live pigs (10^6 heads)	9.20	9.27	0.74	8.56	8.48
live poultry (10^6 heads)	NA	NA	167.52	164.90	158.03

Note:
Eurostat (FSS)

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

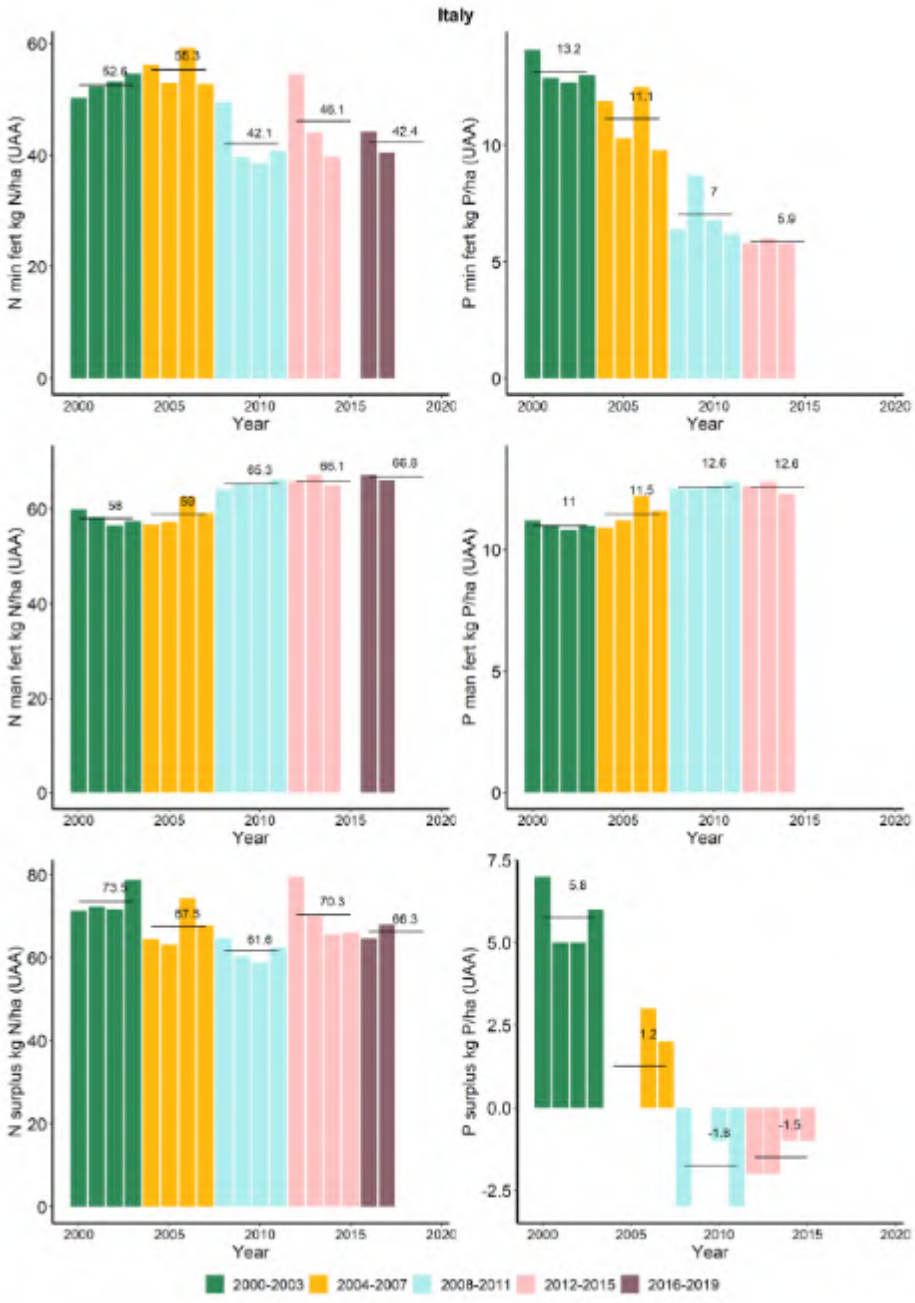


Figure 1. N and P fertilizers and gross surplus (kg/ha)

The gross nitrogen and phosphorus surpluses originate from EUROSTAT data for the years 2000-2015. N mineral fertilizer decreased by 9.5 %from the last reporting period, while P mineral fertiliser decreased by 15.7%. Both N and P manure remained stable with respect to the previous reporting period. The P surplus increased from the 2012-2015 period, while N slightly decreased. The nitrogen surplus originates form EUROSTAT data for the years 2000-2015. In the plots: N/P min and N/P man are respectively the N/P mineral fertilizers and N/P manure.

Livestock unit - LSU /ha

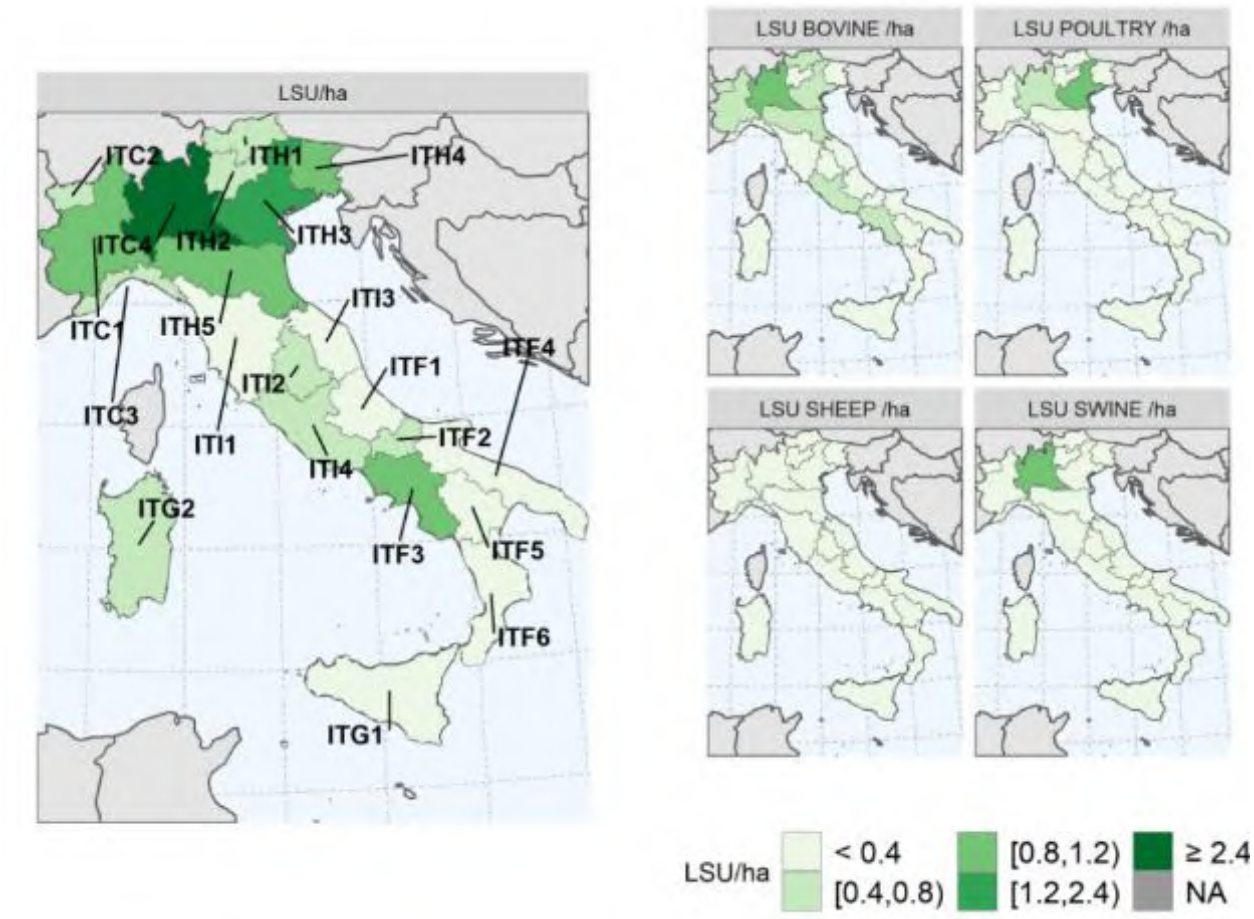


Figure 2. Map of livestock unit distribution, year 2016 (Source: Eurostat, February 2021)

Animal production is concentrated in the northern part of Italy, in particular in Lombardia for bovine and swine, and Veneto for poultry (total LSU and LSU by animal type where retrieved individually from EUROSTAT).

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

Water Quality Monitoring

The monitoring network of the Nitrates Directive, compared to the previous reporting period 2012-2015, has been subjected to changes concerning the number of stations and their location. These changes have been implemented especially due to the impossibility of sampling, absence of agricultural pressure or monitoring stations located in areas where the agricultural pressure was not considered significant.

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

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

Groundwater quality monitoring network

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

		Number of stations with measurements			Number of stations with Trends		
Station Type	Description	2008-2011	2012-2015	2016-2019	2008-2011	2012-2015	2016-2019
0	Phreatic groundwater (shallow): 0-5 m	1229	1338	905	927	1005	766
1a	Phreatic groundwater (deep) 5-15 m	818	823	694	549	707	527
1b	Phreatic groundwater (deep) 15-30 m	292	475	665	293	423	432
1c	Phreatic groundwater (deep) >30 m	493	647	682	510	598	530
2	Captive groundwater	1036	1310	773	969	1080	654
3	Karstic groundwater	708	442	428	347	321	284
9	Not specified	494	0	465	598	0	238
	Total	**5070**	**5035**	**4612**	**4193**	**4134**	**3431**

Surface water quality monitoring network

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

		Number of stations with measurements			Number of stations with Trends			Number of stations with Trophic status		
Station Type	Description	2008-2011	2012-2015	2016-2019	2008-2011	2012-2015	2016-2019	2008-2011	2012-2015	2016-2019
4	River water	2220	2906	2112	1554	1984	1787	2238	2753	2099
5	Lake/reservoir water	243	248	176	243	199	144	123	157	155
6	Transitional water	216	223	240	142	86	223	163	183	240
7	Coastal water	174	294	255	53	138	229	212	281	255
8	Marine water	194	60	8	224	43	8	259	49	8
9	Not specified	0	0	0	0	0	0	0	0	0
	Total	**3047**	**3731**	**2791**	**2216**	**2450**	**2391**	**2995**	**3423**	**2757**

Groundwater Quality

Groundwater average annual nitrate concentration

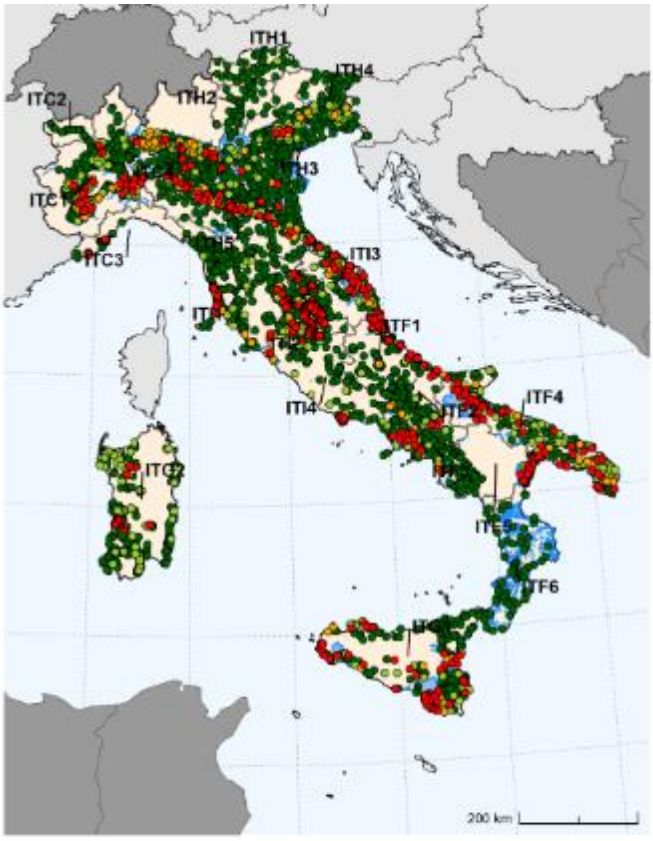


Figure 3. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information. In the map in blue the NVZ

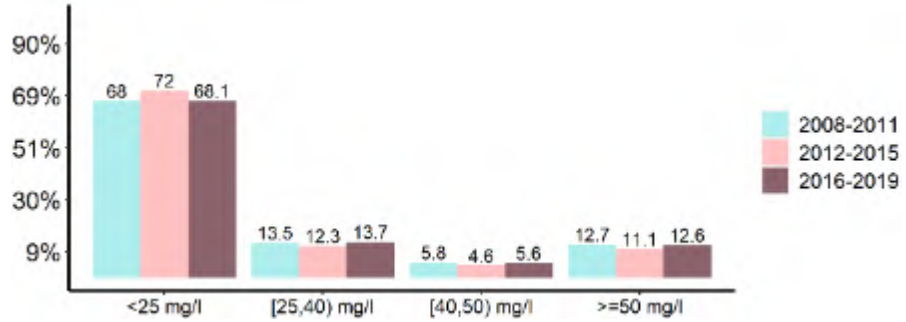


Figure 4. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis)

Groundwater average annual nitrate concentration trend

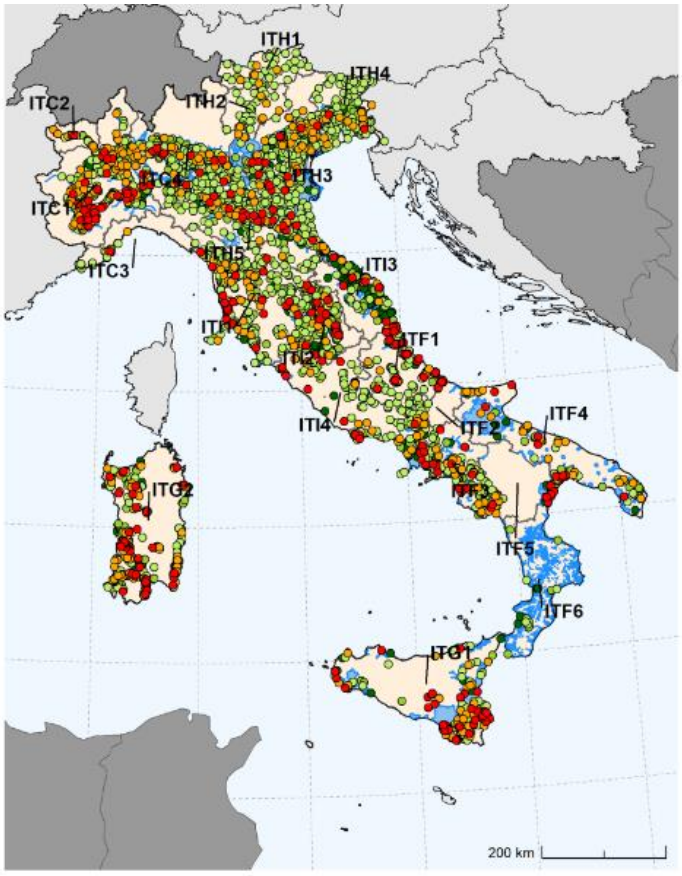


Figure 5. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis). In the map in blue the NVZ.

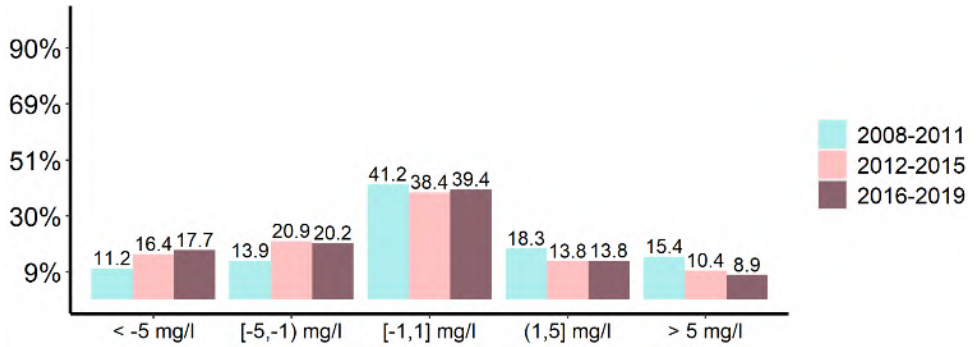
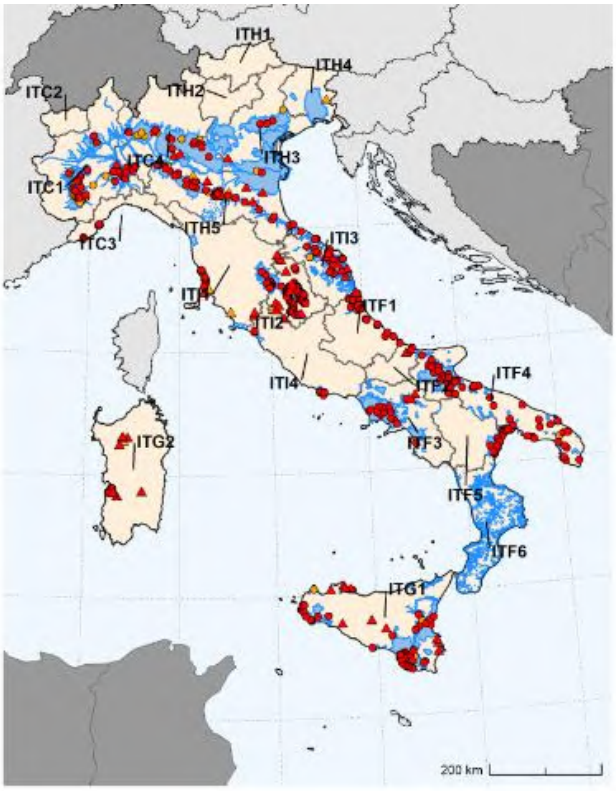


Figure 6. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis).

Groundwater hotspot



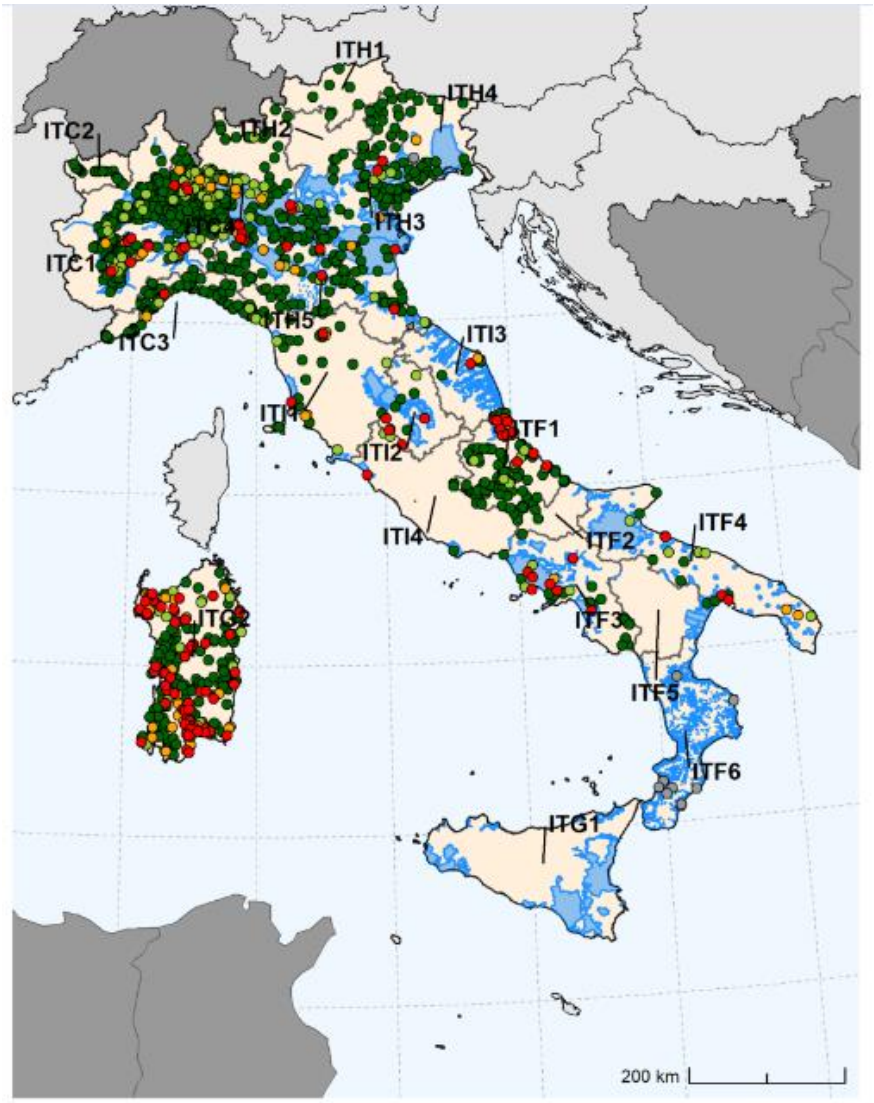
NO3 (mg/l) [40,50) incr. trend InNVZ [40,50) incr. trend OutNVZ ≥ 50 InNVZ ≥ 50 OutNVZ

		>=40 and < 50 mg/l incr.trend		>=50 mg/l	
NUTS ID	NUTS NAME	InNVZ	OutNVZ	InNVZ	OutNVZ
ITC1	Piemonte	10	2	27	1
ITC3	Liguria	0	0	10	0
ITC4	Lombardia	7	0	14	2
ITF1	Abruzzo	3	0	37	0
ITF2	Molise	0	0	2	2
ITF3	Campania	1	0	14	3
ITF4	Puglia	1	0	65	0
ITF5	Basilicata	0	0	21	0
ITG1	Sicilia	6	1	57	14
ITG2	Sardegna	3	1	25	9
ITH3	Veneto	1	0	5	1
ITH4	Friuli-Venezia Giulia	0	1	0	0
ITH5	Emilia-Romagna	6	3	35	4
ITI1	Toscana	2	2	14	4
ITI2	Umbria	2	2	159	11
ITI3	Marche	2	0	20	10
ITI4	Lazio	0	0	13	0
	Total	**44**	**12**	**518**	**61**

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

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

Groundwater stations removed



NO3 (mg/l) < 25 [25,40) [40,50) ≥ 50 NA

Station Type	Description	Number of removed stations		
		total removed	with measurements	with trends
0	Phreatic groundwater (shallow): 0-5 m	352	343	297
1a	Phreatic groundwater (deep) 5-15 m	214	214	179
1b	Phreatic groundwater (deep) 15-30 m	84	84	66
1c	Phreatic groundwater (deep) >30 m	148	148	142
2	Captive groundwater	559	558	441
3	Karstic groundwater	109	109	56
9	Not specified	0	0	0
	Total	**1466**	**1456**	**1181**

Figure 8. GW removed stations map (top graph) and distribution by groundwater type (lower graph). In the map in blue the NVZ

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

Surface Water Quality

Surface water average annual nitrate concentration

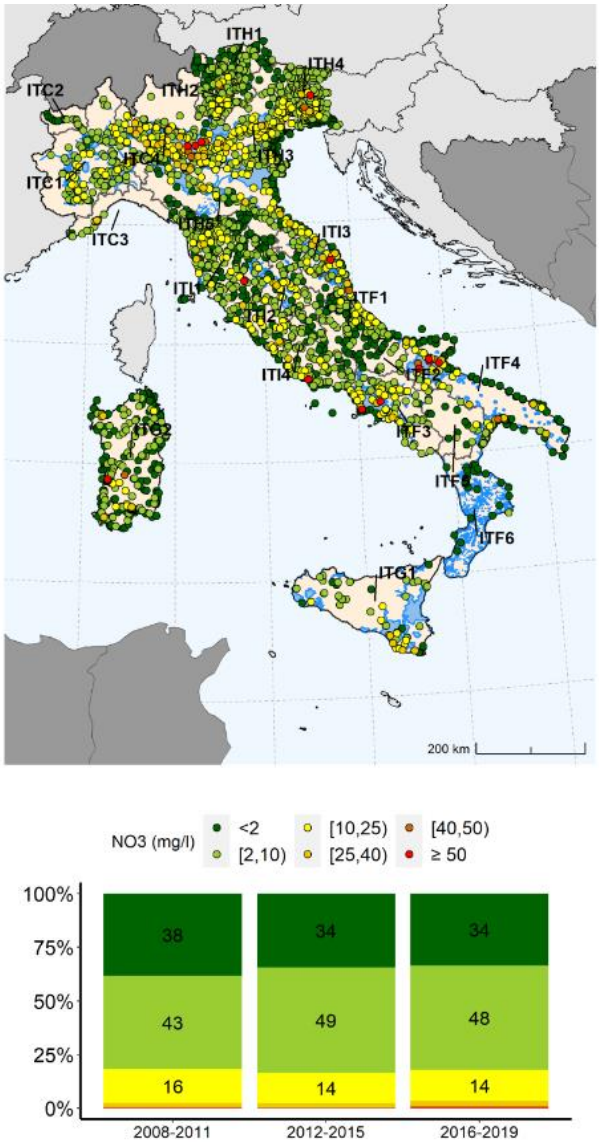


Figure 9. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information. In the map in blue the NVZ

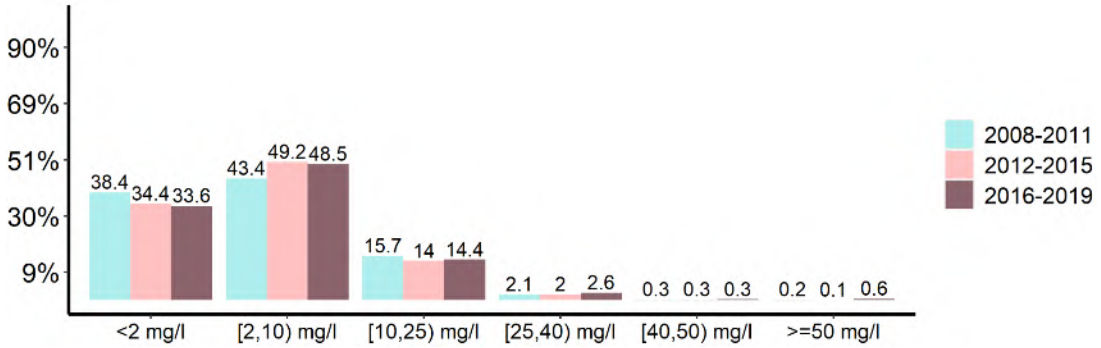
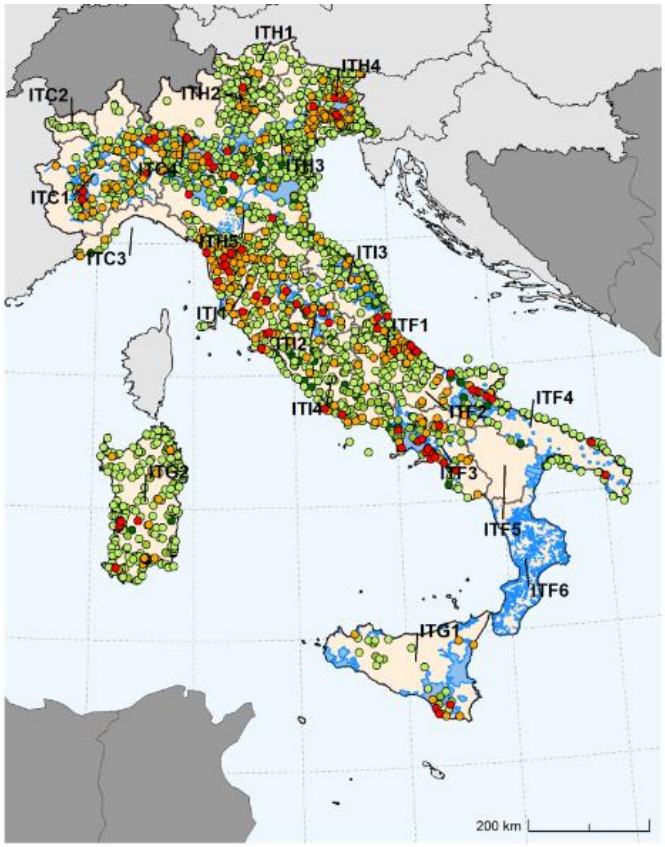


Figure 10. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis)

Surface water average annual nitrate concentration trend



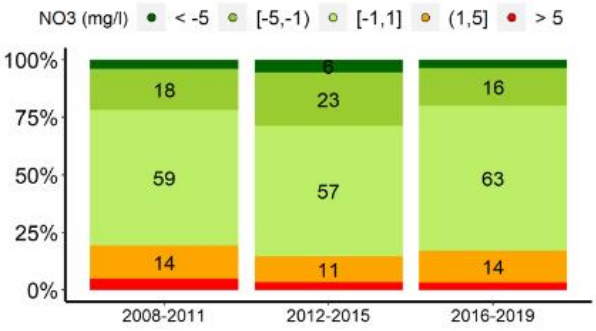


Figure 11. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information. In the map in blue the NVZ

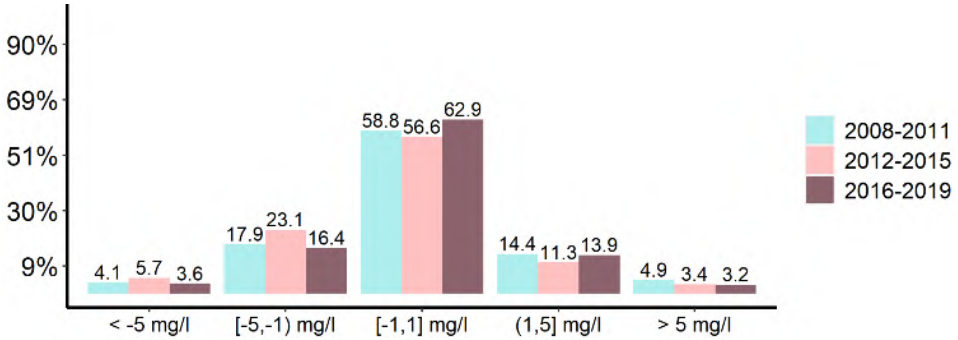
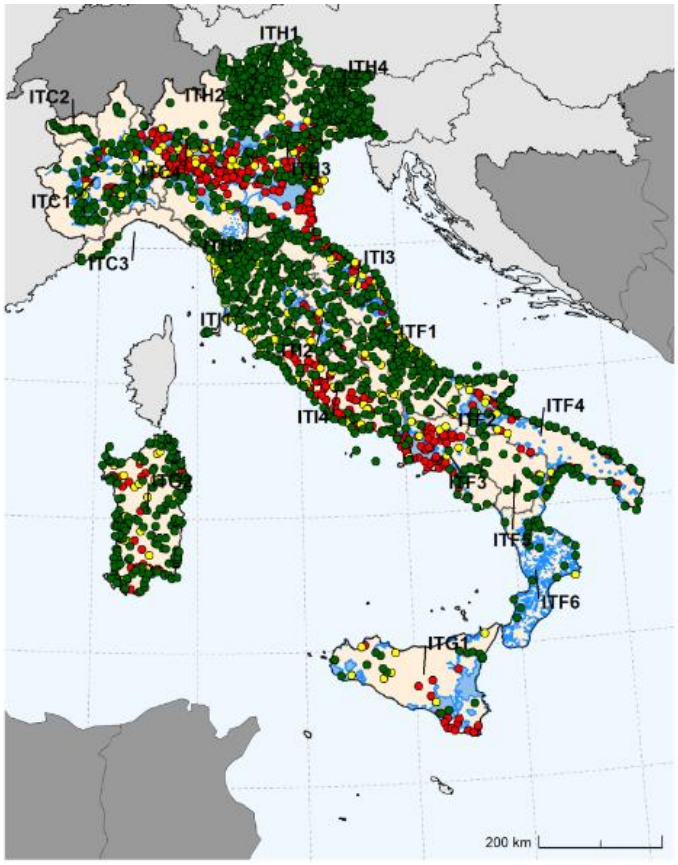


Figure 12. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis)

Surface Water Eutrophication



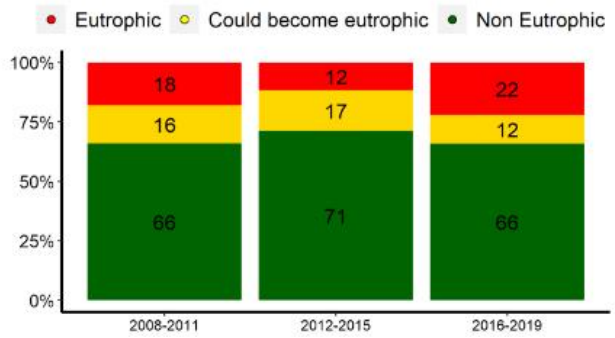


Figure 13. Spatial distribution of eutrophic status (map) and corresponding percentage of monitoring points per classes of status by reporting period (x axis). In the map in blue the NVZ

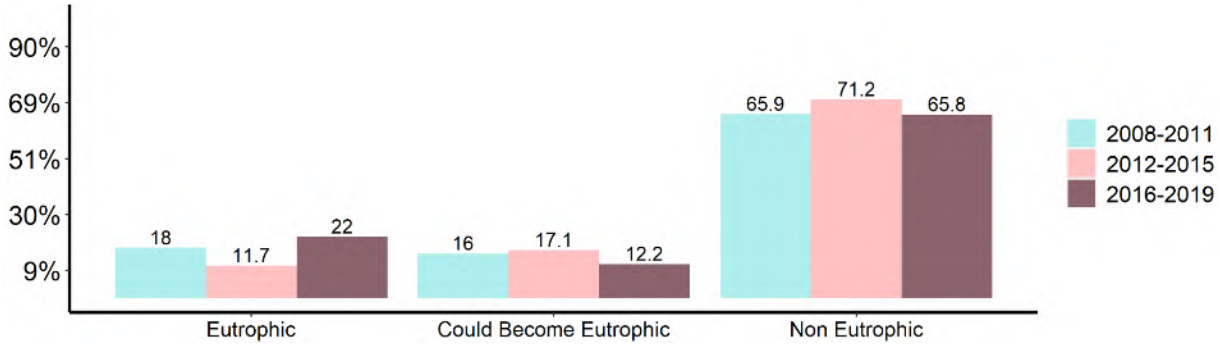
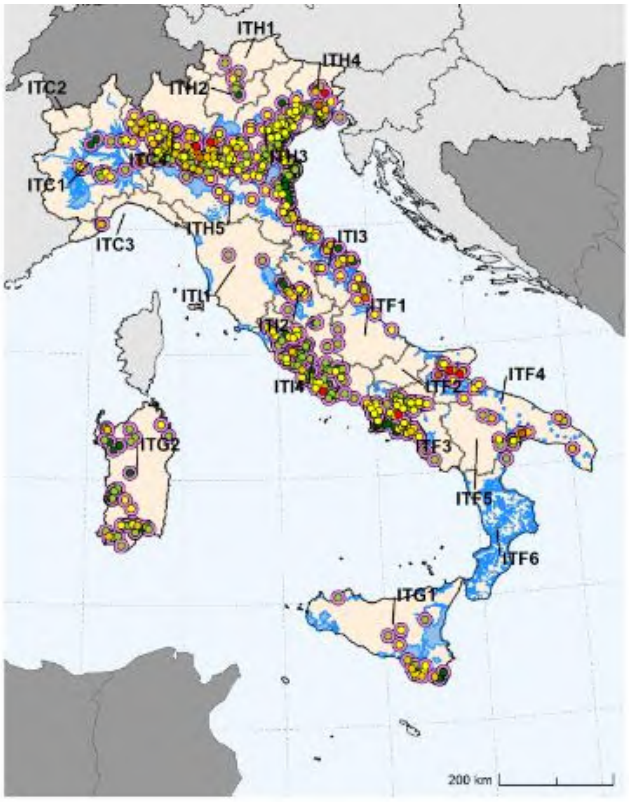


Figure 14. Comparison of percentage of monitoring points in the three reporting periods by classes of status (x axis)

The Eutrophic status vs average NO3 annual concentration



High trophic status | [2,10) | [25,40) | ≥ 50 mg/l
<2 | [10,25) | [40,50) | Unclassified

NUTS ID	NUTS NAME	High trophic status	Number of stations by classes of concentration						
			<2 mg/l	[2,10) mg/l	[10,25) mg/l	[25,40) mg/l	[40,50) mg/l	>=50 mg/l	Unclassified
ITC1	Piemonte	24	12	6	6	0	0	0	0
ITC3	Liguria	2	0	0	1	1	0	0	0
ITC4	Lombardia	111	1	32	54	18	4	2	0
ITF1	Abruzzo	7	0	3	3	0	1	0	0
ITF3	Campania	55	0	17	35	2	0	1	0
ITF4	Puglia	22	0	2	8	8	2	2	0
ITF5	Basilicata	7	0	4	3	0	0	0	0
ITG1	Sicilia	14	0	4	6	4	0	0	0
ITG2	Sardegna	29	5	15	6	3	0	0	0
ITH1	Provincia Autonoma di Bolzano/Bozen	4	0	4	0	0	0	0	0
ITH2	Provincia Autonoma di Trento	2	1	0	1	0	0	0	0
ITH3	Veneto	85	1	49	34	1	0	0	0
ITH4	Friuli-Venezia Giulia	23	0	10	8	3	1	1	0
ITH5	Emilia-Romagna	33	0	6	22	5	0	0	0
ITI1	Toscana	2	0	2	0	0	0	0	0
ITI2	Umbria	11	2	2	6	1	0	0	0
ITI3	Marche	21	0	5	10	6	0	0	0
ITI4	Lazio	63	5	38	18	2	0	0	0
NO_NUTS	SALINE	92	57	34	0	0	0	1	0
	Total	**607**	**84**	**233**	**221**	**54**	**8**	**7**	**0**

Figure 15. The SW monitoring stations with eutrophic status versus the average NO3 annual concentration. In the map in blue the NVZ.

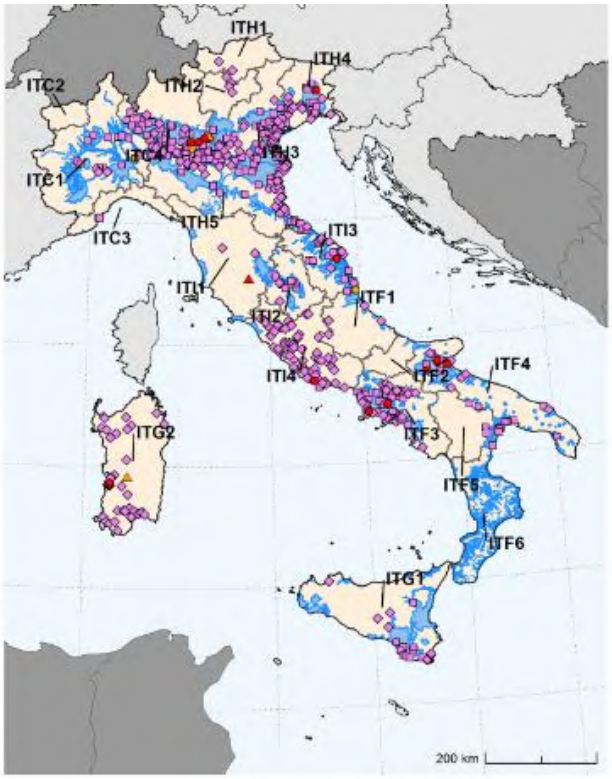
The analysis shows all the SW monitoring stations with high trophic status and the corresponding value of NO3 concentration. The map shows the spatial distribution of these points, and the table reports the number of stations with measurements with highest trophic status and the corresponding stations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

The classification and assessment system for the trophic status of water bodies has been developed in line with the “Guideline document on eutrophication assessment in the context of European water policies” (Guideline CIS document no. 23).
In this context, the Ministry of Ecological Transition (MiTE) has published the document “Criteri per la valutazione dell’Eutrofizzazione nei corpi idrici superficiali", available on the SINTAI network (System National Fact Sheet for the Italian Water Market)
The methodology shall be carried out for the evaluation of the trophic State using the aquatic flora and physical-chemical quality elements to support biological elements.
In some regional contexts, not all biological elements required for the method application were available for the current reporting period. In such cases, transitional methodology has been used. This method is mainly based on the use of chemical-physical elements and implement the TRIX index for the definition of the trophic state of the water.

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

		Number of stations with Trophic status		
Station Type	Description	Eutrophic	Could become eutrophic	Non Eutrophic
4	River water	482	224	1393
5	Lake/reservoir water	33	57	65
6	Transitional water	68	43	129
7	Coastal water	19	13	223
8	Marine water	5	0	3
9	Not specified	0	0	0
	Total	**607**	**337**	**1813**

Surface Water quality hotspot



High Trophic Status InNVZ | [40,50) mg/l incr. trend InNVZ | ≥ 50 InNVZ
High Trophic Status OutNVZ | [40,50) mg/l incr. trend OutNVZ | ≥ 50 OutNVZ

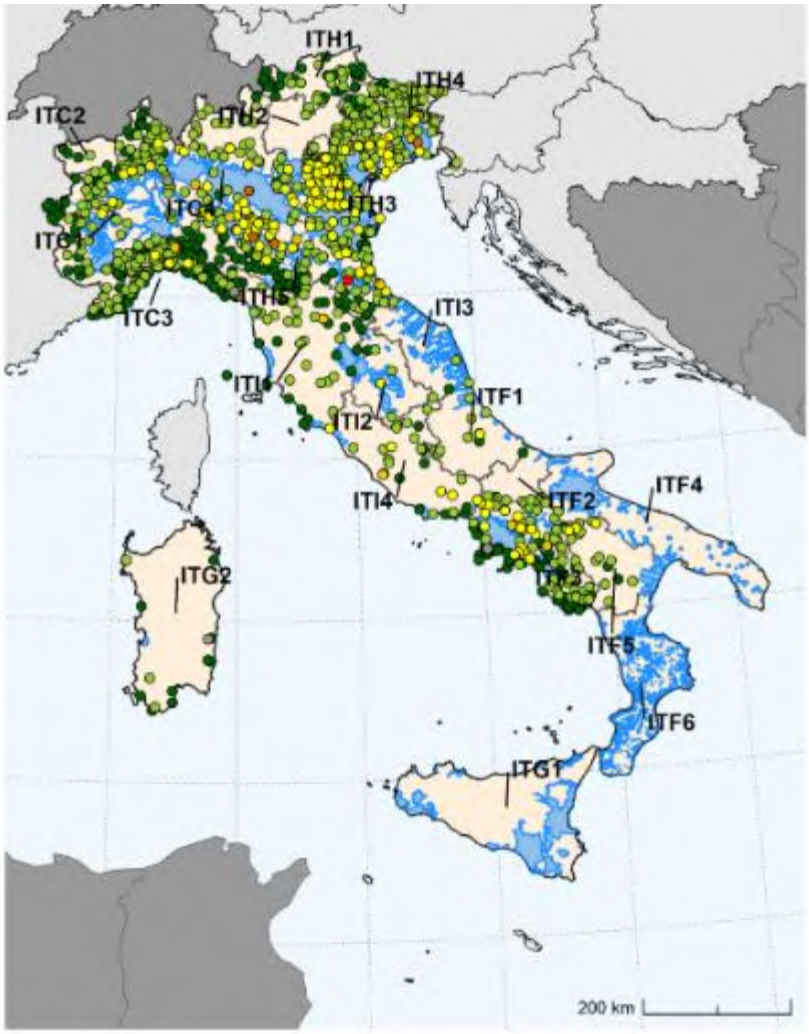
		High trophic status		>=40 and < 50 mg/l incr.trend		>=50 mg/l	
NUTS ID	NUTS NAME	InNVZ	OutNVZ	InNVZ	OutNVZ	InNVZ	OutNVZ
ITC1	Piemonte	21	3	0	0	0	0
ITC3	Liguria	2	0	0	0	0	0
ITC4	Lombardia	98	13	2	1	2	1
ITF1	Abruzzo	2	5	1	0	0	0
ITF3	Campania	37	18	0	0	3	0
ITF4	Puglia	17	5	0	0	4	0
ITF5	Basilicata	7	0	0	0	0	0
ITG1	Sicilia	10	4	0	0	0	0
ITG2	Sardegna	0	29	0	1	2	0
ITH1	Provincia Autonoma di Bolzano/Bozen	0	4	0	0	0	0
ITH2	Provincia Autonoma di Trento	0	2	0	0	0	0
ITH3	Veneto	68	17	0	0	0	0
ITH4	Friuli-Venezia Giulia	9	14	0	0	1	0
ITH5	Emilia-Romagna	16	17	0	0	0	0
ITI1	Toscana	0	2	0	0	0	1
ITI2	Umbria	8	3	0	0	0	0
ITI3	Marche	15	6	0	0	1	0
ITI4	Lazio	1	62	0	0	0	0
NO_NUTS	SALINE	25	67	0	0	1	0
	Total	**336**	**271**	**3**	**2**	**14**	**2**

Figure 16. SW hotspot analysis map (top graph) and distribution by NUTS2 (lower graph)

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

Only the NUTS of interest are reported.

Surface Water Stations Removed



NO3 (mg/l) <2 [2,10) [10,25) [25,40) [40,50) ≥ 50 NA

Station Type	Description	Number of removed stations			
		total removed	with measurements	with trends	with trophic status
4	River water	1021	1019	607	964
5	Lake/reservoir water	79	79	71	30
6	Transitional water	37	33	19	31
7	Coastal water	95	95	52	95
8	Marine water	16	16	6	11
9	Not specified	0	0	0	0
	Total	**1248**	**1242**	**755**	**1131**

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

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

Measures in the Action Programme

The main measures of the Action Programme are reported in Table 6.

Table 6. Details of Action Programme

Measure	General details in Action Programme (*)
Period of prohibition of fertiliser application	Fertilizer application is prohibited in Autumn-Winter, as a rule from 1st November to 28th February(Art. 39 of the DM). Notably the bans are as a minimum:
	• 90 days for nitrogen fertilizers and organic amendments, except for green and mixed compost, that regions can apply in winter months if nitrogen content is less than 2.5% DM, of which at least 20% in ammoniacal form;
	• 90 days for solid manure, except for cattle, horse and goat manure, which can be used by regions in winter months, except from 15th December to 15th January, in the presence of pasture or permanent/rotational grassland as well as in horticultural crop pre-planting;
	• 90 days for solid manure-like materials; 120 days for poultry manure subject to fast drying process and with a dry matter content higher than 65%;
	• 120 days for liquid manure;
	• 90 days for liquid manure and similar materials if used on grassland, Autumn-Winter cereals, horticultural crops, tree crops with permanent grassing or with crop residues and during land preparation for anticipated Spring sowing.
Restrictions for application on sloped soils	• The application of liquid manure is prohibited on soils with an average slope higher that 10%, that can be increased up to 20% in the presence of hydraulic-agricultural arrangements, based on best application techniques under the Code of Good Agricultural Practice (CBPA - Decree of 19th April 1999) and further regional measures aimed at avoiding run-off and erosion; the application of solid manure and similar materials, of nitrogen fertilizers and organic amendments is regulated by the regions based on the specific local conditions, the regions define different slope values above which the application is forbidden (Art. 37 of the DM)
Restrictions for application on soaked, frozen, or snow-covered soils	• The application of solid and liquid manure, as well as digestate, is forbidden on: frozen, snow-covered or water-saturated soil, except for crops requiring submersion; soil with outcropping water table and with ongoing landslides (Art. 8 of the DM)
Restrictions for application near watercourses (buffer strips)	• The application of solid manure and similar materials, nitrogen fertilizers and organic amendments is prohibited (buffer strips - minimum distances): within 5 m from surface watercourses and 25 m from the beginning of the sandy shore of lakes, coastal-marine and transitional waters as well as from Wetlands under Ramsar Convention (Art. 35 of the DM)
	• The application of liquid manure and similar materials, as well as digestate is prohibited (minimum distances): within 10 m from surface watercourses and 30 m from the beginning of the sandy shore of lakes, coastal-marine and transitional waters as well as from Wetlands under Ramsar Convention (Art. 37 of the DM)
Effluent storage works	• Solid manure: the storage shall be carried out on a waterproofed base with a carrying-capacity that is sufficient to support the load of the materials and of the handling equipment without cracks. The base shall be equipped with a perimeter wall or a side curb and have a slope for conveying draining liquids and washing water towards adequate storage and treatment systems (Art. 11 of the DM)
	• Liquid manure: the bottom and the walls shall be adequately waterproofed; reinforced concrete containers shall be favoured; when the storage takes place on a natural material base, the permeability coefficient of such material (k) shall be lower than 10^(-7) cm/s. The storage shall be designed taking into account the volumes of rainwater and water for washing facilities, plants and zootechnical equipment. For liquid manure in big farms a double tank shall be provided and the withdrawal for agricultural purposes shall be carried out from the tank in which the liquid manure has been stored for the longest period (Art. 12 of the DM).
	• Digestate: same rules as liquid manure.
Capacity of manure storage	• Liquid manure and similar materials: minimum storage capacity of 180 days for the regions of Northern Italy, 150 days for the regions of Central and Southern Italy (Art. 38 of the DM)
	• For liquid manure from dairy cattle, buffaloes, horses and goats in farms with pasture or medium-long duration grassland and Autumn-Winter cereals, the minimum storage capacity is 120 days for the regions of Central-Northern Italy and 90 days for the regions of Southern Italy (Art. 38 of the DM)
	• Solid manure and similar materials: the Regions establish a minimum storage capacity of 90 days. For poultry manure subject to fast drying process the minimum storage capacity is 120 days (Art. 38 of the DM)
Rational fertilisation (e.g., splitting fertilisation, limitations)	With a view to limiting nutrient release to surface water and groundwater, the application techniques and additional adopted measures shall ensure (Art. 40 of the DM):
	• uniform fertilizer application;
	• high uptake of nutritional elements that can be achieved through a set of good practices that include nitrogen fertilization as near as possible the moment of uptake, dose fractionation during the year and use of equipment that minimizes air emissions;
	• correct application to soil according to the Code of Good Agricultural Practice;
	• liquid manure spreading systems and modalities for limiting air emissions such as near-ground spreading, injection, low-pressure spreading followed by burial within 24 hours, fertigation;
	• crop rotation systems according to the Code of Good Agricultural Practice;
	• irrigation practices according to the Code of Good Agricultural Practice.
Crop rotation, permanent crop enhancement	• The Regions and Autonomous Provinces can adopt specific provisions concerning the land proportions to be destined for permanent crops linked to annual crops, also fostering, where possible, inter-row grassing. For the purpose of manure use, outside the period of the main crop cycle, a soil cover with catch crops or cover crops shall be ensured according to the Code of Good Agricultural Practice or other agricultural practices aimed at reducing nitrates leaching, such as the burial of straw and stalks (Art. 40 of the DM)
Vegetation cover in rainy periods, winter	• In buffer strips, where technically feasible, a permanent plant cover, also spontaneous, is mandatory while the establishment of hedges and other wooded surfaces is recommended (Art. 36 of the DM)
Fertilisation plans, spreading records	• With a view to minimizing nitrogen losses to the environment, manure application to soil shall be balanced based on the actual crop demand, net soil mineralization and contributions from nitrogen-fixing organisms. For this purpose, based on their size expressed as quantity of N from livestock manure produced and/or applied per year, the farms are obliged to submit a notification or, in case of N production/use > 6,000 kg per year, a Fertilisation Plan (PUA-Piano di utilizzazione agronomica). The PUA has to define and justify, for a period of maximum 5 years, the fertilization practices that ensure the respect of limits for livestock manure and organic fertilizer application. Nitrogen crop demand is calculated through methods based on the balance between nitrogen inputs to crops and crop nitrogen uptakes (Art. 5 of the DM)
Other measures	• Specific measures are envisaged for temporary heaping on field of solid manure and exhausted litters from poultry and rabbit rearing, allowed only for agricultural purposes.
NA	• Temporary heaping, carried out for no more than 3 months, after a manure storage of at least 90 days, cannot be repeated in the same place for more than one crop year.
NA	• Spatial bans for the heaping on soil and measures for the correct management of leachate are envisaged too.
Date for application limit of 170 kg N/ha/year:	Livestock manure maximum application limit per hectare and per year is 170 kg, including manure from grazing livestock. Furthermore, manure shall be spread and its application split based on the actual crop demand, never exceeding maximum efficient nitrogen application standards (MAS), reported in tables attached to regional action programmes. Besides, manure dosage, applied in compliance with nitrogen balance or MAS, and the potential addition of mineral fertilizers shall be justified through PUAs. In calculating the limit of 170 kg N/ha/y, also contributions from livestock manure in digestate shall be taken into account. The starting date for application of the limit of 170 kg/ha/year is the same as the starting date for the application of the action programmes in NVZs.

(*) DM (Ministerial Decree) 25 febbraio 2016, Criteri e norme tecniche generali per la disciplina regionale dell'utilizzazione agronomica degli effluenti di allevamento e delle acque reflue, nonché per la produzione e l'utilizzazione agronomica del digestato

Controls

Data on controls are transmitted by the single Regions. Depending on the Region, between 0% and 20% of the farmers located in vulnerable zones were subject to check during the current reporting period.

Designation of NVZ

Italy has increased its designated nitrate vulnerable zones from the last reporting period by 14.6%.

Summary

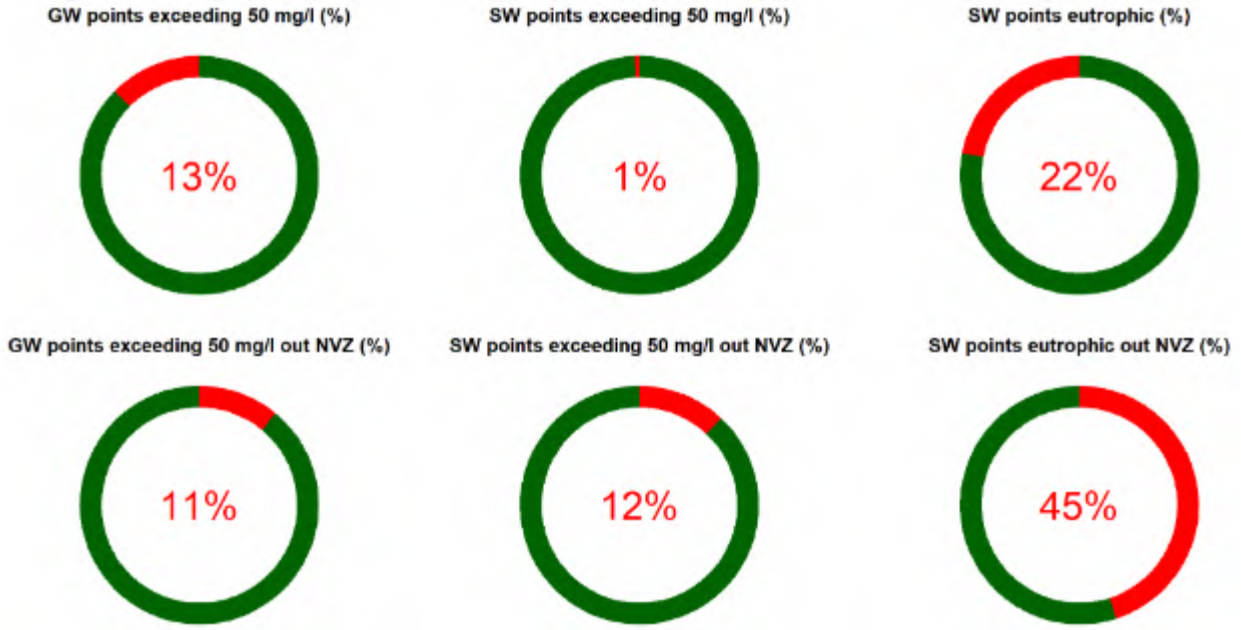


Figure 18. The summary plot for the period 2016-2019

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

Long term analysis

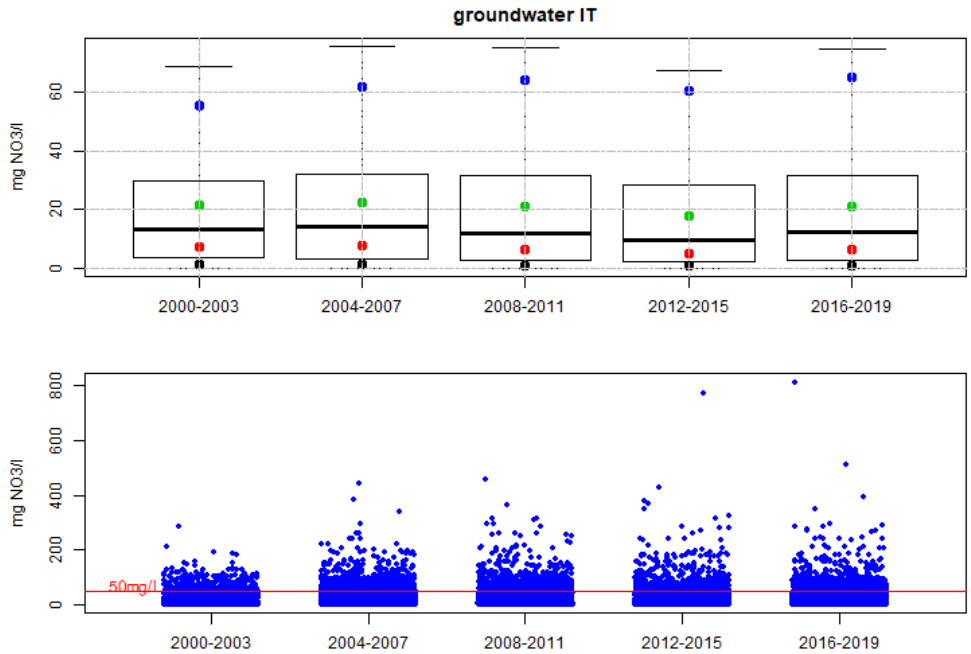


Figure 19. Time series of box whisker plots along with the distribution of the average NO3 annual concentrations for each reporting period for groundwater stations. RPs represent the reporting periods, RP7 being the last period (2016-2019). The blue, red, green and black dots represent the mean of the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

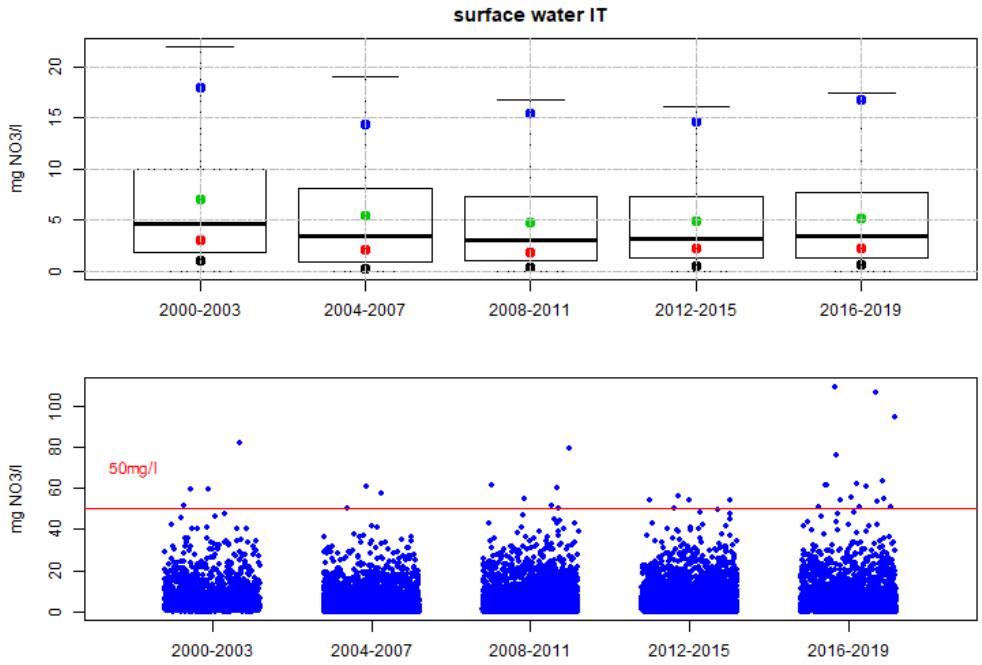


Figure 20. Time series of box whisker plots along with the distribution of the average NO3 annual concentrations for each reporting period for surface water stations. RPs represent the reporting periods, RP7 being the last period (2016-2019). The blue, red, green and black dots represent the mean of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

Conclusions and recommendations

Italy has an average livestock pressure, the surplus of nitrogen is about the EU average, but no data about phosphorus surplus is available for period 2016-2019.

The network of monitoring stations is very well elaborated. The groundwater quality is generally good. However, there are hotspots, with a nitrate concentration above 50 mg/l with a few hotspots that have an increasing trend. A high number of waters that are found to be eutrophic.

A number of ground water monitoring stations with nitrate concentrations above 50 mg/l and a high surface waters found to be eutrophic are located outside the NVZ.

The Commission recommends Italy to review the designation of NVZ and include groundwater stations polluted or at risk and areas that drain into waters that are eutrophic when agriculture pressure is significant.