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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

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Agricultural area and livestock

Table 1: Average livestock numbers (10^6) presented in the article 10 reports of the Member States (MS) for reporting periods 2012-2015 and 2016-2019, and the change between the two reporting periods. In blue, the values taken from the staff working document of reporting period 2012-2015 because not available in the current reports

	Cattle			Pigs			Poultry		
MS	2012-2015	2016-2019	Change %	2012-2015	2016-2019	Change %	2012-2015	2016-2019	Change %
AT	1.96	1.93	-1.5	2.92	2.78	-4.8	15.21	17.46	15
BE-FL	1.3	NA	-	6.3	NA	-	29.88	NA	-
BE-WA	1.22	1.13	-7.4	0.34	0.38	12	4.98	8.12	63
BG	0.55	0.534	-2.9	0.568	0.589	3.7	14.67	14.89	1.46
CY	0.06	NA	-	0.36	NA	-	3.3	NA	-
CZ	1.41	NA	-	1.56	NA	-	22.51	NA	-
DE	12.64	12.08	-4.4	28.11	26.86	-4.5	177	174	-2.1
DK	1.52	1.54	1.3	20.1	17	-15.4	18.6	20.8	11.8
EE	0.26	0.25	-3.8	0.35	0.29	-17	2.2	2.16	-1.8
EL	0.43	0.78	81	0.2	0.55	175	46.6	91	95
ES	NA	NA	-	NA	NA	-	NA	NA	-
FI	0.91	0.88	-3.7	1.24	1.04	-16	12.6	14.14	12
FR	18.91	19.02	0.58	13.47	13.6	0.97	297.08	308.14	3.7
HR	0.46	0.43	-6.1	1.51	1.09	-28	12.9	11.1	-14
HU	0.82	0.88	7.3	3.12	2.82	-9.6	37.12	39.94	7.6
IE	6.9	7.28	5.5	1.58	1.6	1.3	NA	NA	-
IT	5	5	0	9	9	0	177	176	-0.56
LT	0.73	NA	-	0.76	NA	-	9.4	NA	-
LU	0.195	0.198	1.5	0.09	0.091	1.1	0.113	0.123	8.8
LV	0.051	0.048	-5.9	0.11	0.13	12	3.96	4.09	3.2
MT	0.01	NA	-	0.03	NA	-	0.08	NA	-
NL	4	4	0	12.3	12.4	0.8	101	101	0
PL	5.76	6.26	8.6	10.6	11.2	5.9	151	201	31
PT	1.4	NA	-	1.8	NA	-	NA	NA	-
RO	2.048	2.01	-1.7	5.10	4.35	-15	78	74	-5.2
SE	1.496	1.489	-0.51	1.399	1.354	-3.2	16.5	18.8	13
SI	0.46	NA	-	0.29	NA	-	5	NA	-
SK	0.47	0.44	-5.2	0.64	0.61	-4.2	12.0	13.2	9.5
UK-EN									
UK-WA									
UN-SC									
UK-NI	1.609	1.612	0.19	0.57	0.68	18	21.2	24.8	17

(*) NA: not available (no data from MS report); - : not applicable

Table 2: Utilized agricultural area (1 000 ha) in the periods 2008-2011, 2012-2016, 2016-2019, and the change between periods (Source: Eurostat, December 2020).

	Reporting period			Change (%)	
MS	2008-2011	2012-2015	2016-2019	2012-2015 / 2008-2011	2016-2019 / 2012-2015
AT	3093	2791	2663	-9.8	-4.6
BE	1359	1334	1349	-1.8	1.1
BG	5068	5027	5030	-0.8	0.1
CY	120	114	123	-5.2	7.7
CZ	3536	3514	3514	-0.6	0.0
DE	16810	16706	16664	-0.6	-0.2
DK	2668	2644	2629	-0.9	-0.6
EE	933	973	990	4.2	1.8
EL	5306	5262	5228	-0.8	-0.6
ES	24131	23607	24058	-2.2	1.9
FI	2293	2271	2273	-0.9	0.1
FR	30682	29005	29059	-5.5	0.2
HR	1312	1353	1508	3.1	11.5
HU	5563	5343	5339	-4.0	-0.1
IE	4587	4477	4498	-2.4	0.5
IT	12964	12589	12977	-2.9	3.1
LT	2735	2923	2953	6.9	1.0
LU	131	131	131	0.2	0.0
LV	1820	1869	1940	2.7	3.8
MT	11	12	12	6.8	-0.4
NL	1896	1843	1806	-2.8	-2.0
PL	15154	14440	14481	-4.7	0.3
PT	3681	3694	3610	0.4	-2.3
RO	13848	13832	13438	-0.1	-2.8
SE	3070	3033	3009	-1.2	-0.8
SI	475	479	479	0.8	0.0
SK	1929	1926	1916	-0.2	-0.5
UK	17358	17231	17429	-0.7	1.1
EU27+UK	**179292**	**178421**	**171223**	**-0.5**	**-4.0**

Table 3: Number of total cattle (1 000 heads) in the periods 2008-2011, 2012-2016, 2016-2019, and the change between the periods (Source: Eurostat, December 2020).

	Reporting period			Change (%)	
MS	2008-2011	2012-2015	2016-2019	2012-2015 / 2008-2011	2016-2019 / 2012-2015
AT	2003	1958	1923	-2.3	-1.8
BE	2514	2465	2415	-1.9	-2.0
BG	561	561	548	0.0	-2.3
CY	55	58	69	5.0	18.3
CZ	1343	1348	1360	0.4	0.8
DE	12780	12643	12084	-1.1	-4.4
DK	1616	1577	1536	-2.4	-2.6
EE	237	257	251	8.6	-2.3
EL	679	645	546	-5.1	-15.4
ES	6025	5969	6474	-0.9	8.5
FI	907	904	865	-0.3	-4.3
FR	19650	19196	18773	-2.3	-2.2
HR	448	444	432	-0.9	-2.6
HU	695	791	879	13.8	11.1
IE	6095	6307	6610	3.5	4.8
IT	6254	6196	6338	-0.9	2.3
LT	758	725	665	-4.2	-8.3
LU	193	197	197	1.9	-0.2
LV	380	410	402	8.0	-1.9
MT	16	15	14	-5.2	-6.7
NL	3966	4140	3934	4.4	-5.0
PL	5554	5633	6113	1.4	8.5
PT	1491	1531	1653	2.7	8.0
RO	2296	2048	1990	-10.8	-2.8
SE	1478	1438	1431	-2.7	-0.5
SI	469	468	482	-0.1	2.9
SK	473	465	439	-1.5	-5.6
UK	9846	9735	9666	-1.1	-0.7
EU27+UK	**88781**	**88125**	**88087**	**-0.7**	**0.0**

Table 4: Number of dairy cattle (1 000 heads) in the periods 2008-2011, 2012-2016, 2016-2019, and the change between the periods (Source: Eurostat, December 2020).

	Reporting period			Change (%)	
MS	2008-2011	2012-2015	2016-2019	2012-2015 / 2008-2011	2016-2019 / 2012-2015
AT	531	531	535	0.1	0.7
BE	516	517	529	0.2	2.4
BG	310	298	253	-3.7	-15.2
CY	24	25	31	6.3	25.2
CZ	383	371	363	-3.2	-2.1
DE	4193	4260	4132	1.6	-3.0
DK	573	566	568	-1.3	0.4
EE	97	95	86	-2.3	-10.0
EL	143	127	96	-11.3	-24.4
ES	840	840	822	0.0	-2.2
FI	285	282	267	-1.1	-5.2
FR	3747	3660	3568	-2.3	-2.5
HR	204	165	138	-19.1	-16.4
HU	250	252	242	0.8	-4.0
IE	1022	1128	1358	10.3	20.5
IT	1803	2052	1979	13.9	-3.6
LT	370	315	264	-14.7	-16.3
LU	46	47	53	3.8	11.7
LV	166	164	147	-0.9	-10.7
MT	7	6	6	-5.0	-2.1
NL	1543	1616	1650	4.8	2.1
PL	2564	2257	2166	-12.0	-4.0
PT	251	236	237	-6.1	0.3
RO	1313	1178	1166	-10.3	-1.0
SE	354	343	316	-3.1	-7.9
SI	111	110	105	-0.9	-4.8
SK	162	144	129	-11.2	-10.5
UK	1854	1851	1887	-0.1	1.9
EU27+UK	**23661**	**23438**	**23095**	**-0.9**	**-1.5**

Table 5: Number of pigs (1 000 heads) in the periods 2008-2011, 2012-2016, 2016-2019, and the change between the periods (Source: Eurostat, December 2020).

	Reporting period			Change (%)	
MS	2008-2011	2012-2015	2016-2019	2012-2015 / 2008-2011	2016-2019 / 2012-2015
AT	3085	2898	2791	-6.1	-3.7
BE	6235	6378	6145	2.3	-3.7
BG	696	568	589	-18.5	3.8
CY	458	356	354	-22.3	-0.4
CZ	1845	1561	1507	-15.4	-3.5
DE	26966	28114	26863	4.3	-4.4
DK	12427	12524	12621	0.8	0.8
EE	367	349	287	-4.9	-17.8
EL	1085	1000	735	-7.9	-26.4
ES	25743	26420	30313	2.6	14.7
FI	1346	1248	1102	-7.3	-11.7
FR	14402	13453	13342	-6.6	-0.8
HR	1204	1154	1089	-4.2	-5.6
HU	3211	3063	2821	-4.6	-7.9
IE	1517	1486	1582	-2.0	6.5
IT	7125	8643	8513	21.3	-1.5
LT	886	741	600	-16.4	-19.1
LU	87	90	88	3.5	-1.8
LV	381	352	319	-7.8	-9.3
MT	62	46	37	-24.8	-21.2
NL	12038	12159	12002	1.0	-1.3
PL	14082	10996	11315	-21.9	2.9
PT	1950	2103	2184	7.8	3.9
RO	5690	5096	4218	-10.4	-17.2
SE	1623	1462	1429	-9.9	-2.2
SI	398	284	256	-28.5	-10.1
SK	689	636	604	-7.7	-5.0
UK	4421	4383	4660	-0.9	6.3
EU27+UK	**150019**	**147561**	**148365**	**-1.6**	**0.5**

Table 6: Number of sheep (1 000 heads) in the periods 2008-2011, 2012-2016, 2016-2019, and the change between the periods (Source: Eurostat, December 2020).

	Reporting period			Change (%)	
MS	2008-2011	2012-2015	2016-2019	2012-2015 / 2008-2011	2016-2019 / 2012-2015
AT	349	356	397	2.0	11.5
BE	123	116	87	-6.0	-25.2
BG	1424	1350	1327	-5.3	-1.7
CY	313	329	319	5.0	-2.9
CZ	203	224	218	10.6	-2.7
DE	1807	1598	1570	-11.6	-1.7
DK	124	151	147	21.3	-2.4
EE	74	82	77	11.1	-5.8
EL	9356	9123	8547	-2.5	-6.3
ES	18806	15979	15814	-15.0	-1.0
FI	117	140	156	19.7	11.4
FR	7705	7218	7076	-6.3	-2.0
HR	633	628	638	-0.8	1.5
HU	1190	1194	1114	0.3	-6.6
IE	3262	3351	3757	2.7	12.1
IT	8008	7128	7170	-11.0	0.6
LT	55	113	162	107.1	43.3
LU	8	9	9	3.2	0.7
LV	74	91	106	23.5	17.2
MT	12	11	12	-11.5	12.1
NL	1240	1067	889	-13.9	-16.7
PL	230	228	267	-0.9	17.0
PT	2331	2060	2203	-11.6	6.9
RO	8743	9324	10098	6.6	8.3
SE	562	593	483	5.4	-18.6
SI	136	113	112	-16.7	-1.4
SK	382	396	351	3.6	-11.1
UK	21611	22702	22987	5.0	1.3
EU27+UK	**88879**	**85672**	**86095**	**-3.6**	**0.5**

Note:
The blue color indicates where data from Eurostat was completed with FAO data (FAODATA extends until 2018)

Table 7: Number of poultry (1 000 heads) in the 2010, 2013 and 2016, and change between years (Source: Eurostat, December 2020).

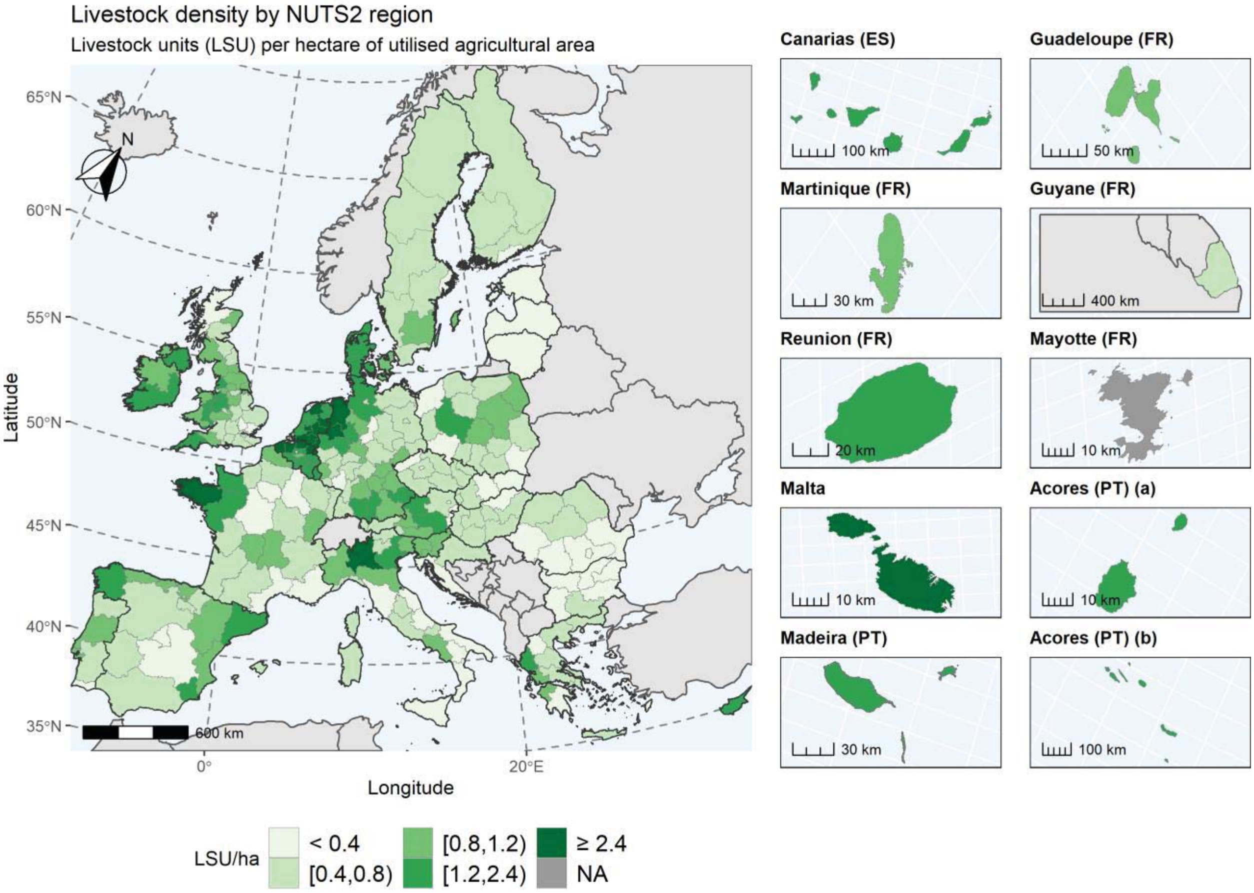
	Reporting period			Change (%)	
MS	2010	2013	2016	2013 / 2010	2016 / 2013
AT	14620	15740	17430	7.7	10.7
BE	34370	35110	42630	2.2	21.4
BG	17490	14290	16610	-18.3	16.2
CY	3220	1850	2600	-42.5	40.5
CZ	25320	25340	25100	0.1	-0.9
DE	128900	177330	169720	37.6	-4.3
DK	18740	19430	18510	3.7	-4.7
EE	1940	2170	1900	11.9	-12.4
EL	36760	27880	30390	-24.2	9.0
ES	200910	205820	203110	2.4	-1.3
FI	9310	13410	15390	44.0	14.8
FR	296130	297080	308140	0.3	3.7
HR	13470	13630	10390	1.2	-23.8
HU	48700	41100	46690	-15.6	13.6
IE	10930	12820	11050	17.3	-13.8
IT	167520	164900	158030	-1.6	-4.2
LT	8600	9340	11250	8.6	20.4
LU	90	110	120	22.2	9.1
LV	5160	5040	4650	-2.3	-7.7
MT	980	910	780	-7.1	-14.3
NL	103620	99430	107340	-4.0	8.0
PL	174300	149190	198360	-14.4	33.0
PT	35350	28610	36050	-19.1	26.0
RO	79190	76300	77200	-3.6	1.2
SE	14290	16590	18780	16.1	13.2
SI	4900	4860	6220	-0.8	28.0
SK	12660	11360	12060	-10.3	6.2
UK	162560	137190	164380	-15.6	19.8
EU27+UK	**1630030**	**1606830**	**1714880**	**-1.4**	**6.7**

Table 8: Number of Livestock Units (1 000) in 2010, 2013 and 2016, and the change between the years (Source: Eurostat, December 2020).

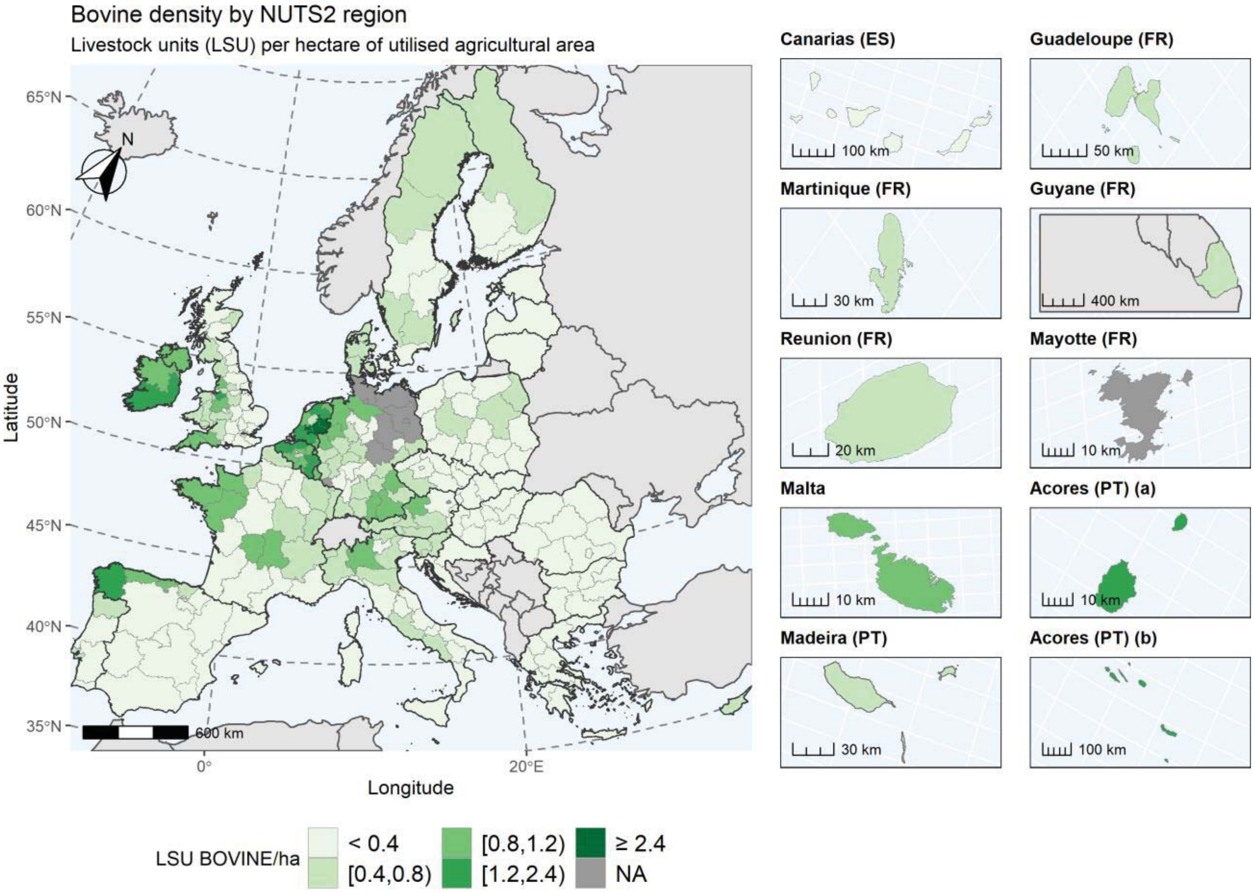
	Reporting period			Change (%)	
MS	2010	2013	2016	2013 / 2010	2016 / 2013
AT	2517	2439	2432	-3.1	-0.3
BE	3799	3584	3773	-5.6	5.3
BG	1149	1025	1094	-10.8	6.8
CY	201	175	172	-13.2	-1.4
CZ	1722	1728	1757	0.4	1.6
DE	17793	18407	18182	3.5	-1.2
DK	4919	4133	4128	-16.0	-0.1
EE	306	310	279	1.3	-9.9
EL	2407	2143	2103	-11.0	-1.9
ES	14831	14502	14443	-2.2	-0.4
FI	1121	1173	1071	4.6	-8.7
FR	22674	21871	22082	-3.5	1.0
HR	1020	864	755	-15.3	-12.7
HU	2484	2259	2445	-9.1	8.2
IE	5787	5865	6196	1.3	5.6
IT	9912	9374	9468	-5.4	1.0
LT	900	839	850	-6.8	1.3
LU	168	165	174	-1.5	5.0
LV	475	486	499	2.3	2.6
MT	42	35	32	-16.8	-7.0
NL	6712	6602	6820	-1.6	3.3
PL	10377	9165	9443	-11.7	3.0
PT	2206	2036	2224	-7.7	9.2
RO	5444	4975	4829	-8.6	-2.9
SE	1752	1715	1706	-2.1	-0.5
SI	518	488	512	-5.8	5.0
SK	668	645	622	-3.5	-3.6
UK	13308	13106	13252	-1.5	1.1
EU27+UK	**135212**	**130109**	**131340**	**-3.8**	**0.9**

Table 9: Livestock density index (LU per ha UAA) in 2010, 2013 and 2016, and the change between the years (Source: Eurostat, December 2020).

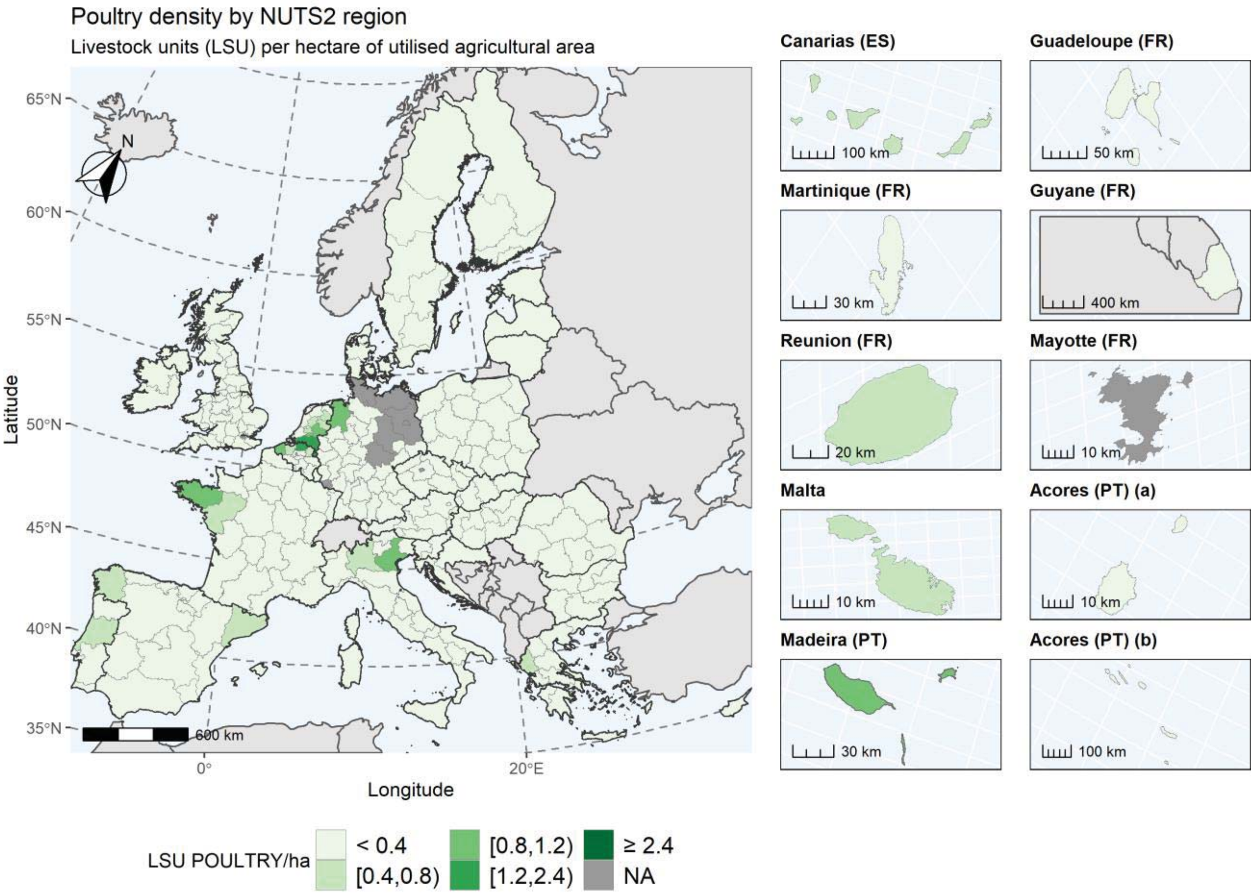
MS	Reporting period 2010	2013	2016	Change (%) 2013 / 2010	2016 / 2013
AT	0.87	0.89	0.91	2.3	2.2
BE	2.80	2.74	2.79	-2.1	1.8
BG	0.26	0.22	0.24	-15.4	9.1
CY	1.70	1.60	1.54	-5.9	-3.8
CZ	0.49	0.50	0.51	2.0	2.0
DE	1.07	1.10	1.09	2.8	-0.9
DK	1.86	1.58	1.58	-15.1	0.0
EE	0.33	0.32	0.28	-3.0	-12.5
EL	0.46	0.44	0.46	-4.3	4.5
ES	0.62	0.62	0.62	0.0	0.0
FI	0.49	0.51	0.48	4.1	-5.9
FR	0.81	0.79	0.79	-2.5	0.0
HR	0.78	0.55	0.48	-29.5	-12.7
HU	0.53	0.49	0.52	-7.5	6.1
IE	1.16	1.20	1.27	3.4	5.8
IT	0.77	0.77	0.75	0.0	-2.6
LT	0.33	0.29	0.29	-12.1	0.0
LU	1.28	1.26	1.33	-1.6	5.6
LV	0.26	0.26	0.26	0.0	0.0
MT	3.64	3.21	2.92	-11.8	-9.0
NL	3.58	3.57	3.80	-0.3	6.4
PL	0.72	0.64	0.66	-11.1	3.1
PT	0.60	0.56	0.61	-6.7	8.9
RO	0.41	0.38	0.39	-7.3	2.6
SE	0.57	0.56	0.57	-1.8	1.8
SI	1.07	1.00	1.05	-6.5	5.0
SK	0.35	0.34	0.33	-2.9	-2.9
UK	0.79	0.76	0.79	-3.8	3.9
EU27+UK	**1.02**	**0.97**	**0.98**	**-5.1**	**0.6**



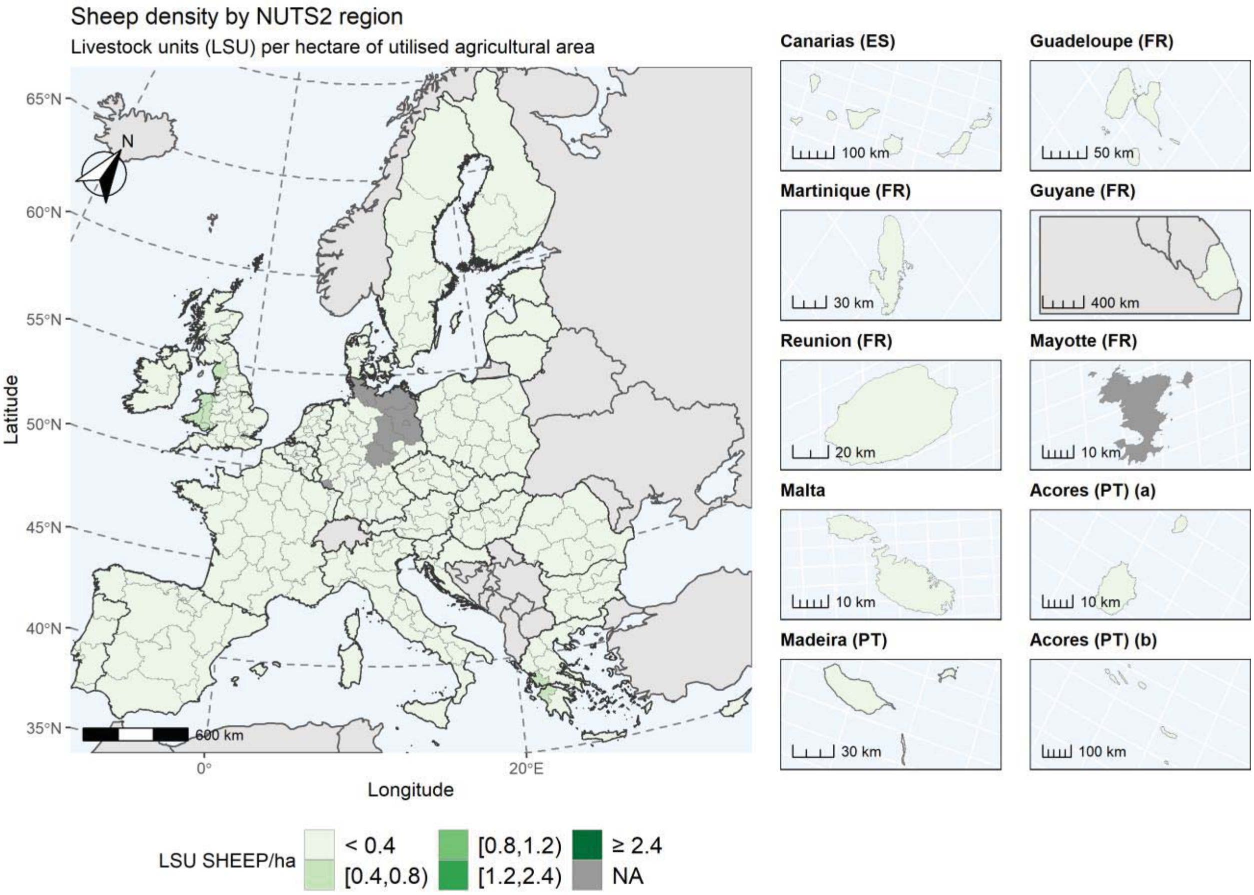
Map 1: Livestock density by NUTS2 expressed as livestock units per hectare of UAA, year 2016 (Source: Eurostat, February 2021)



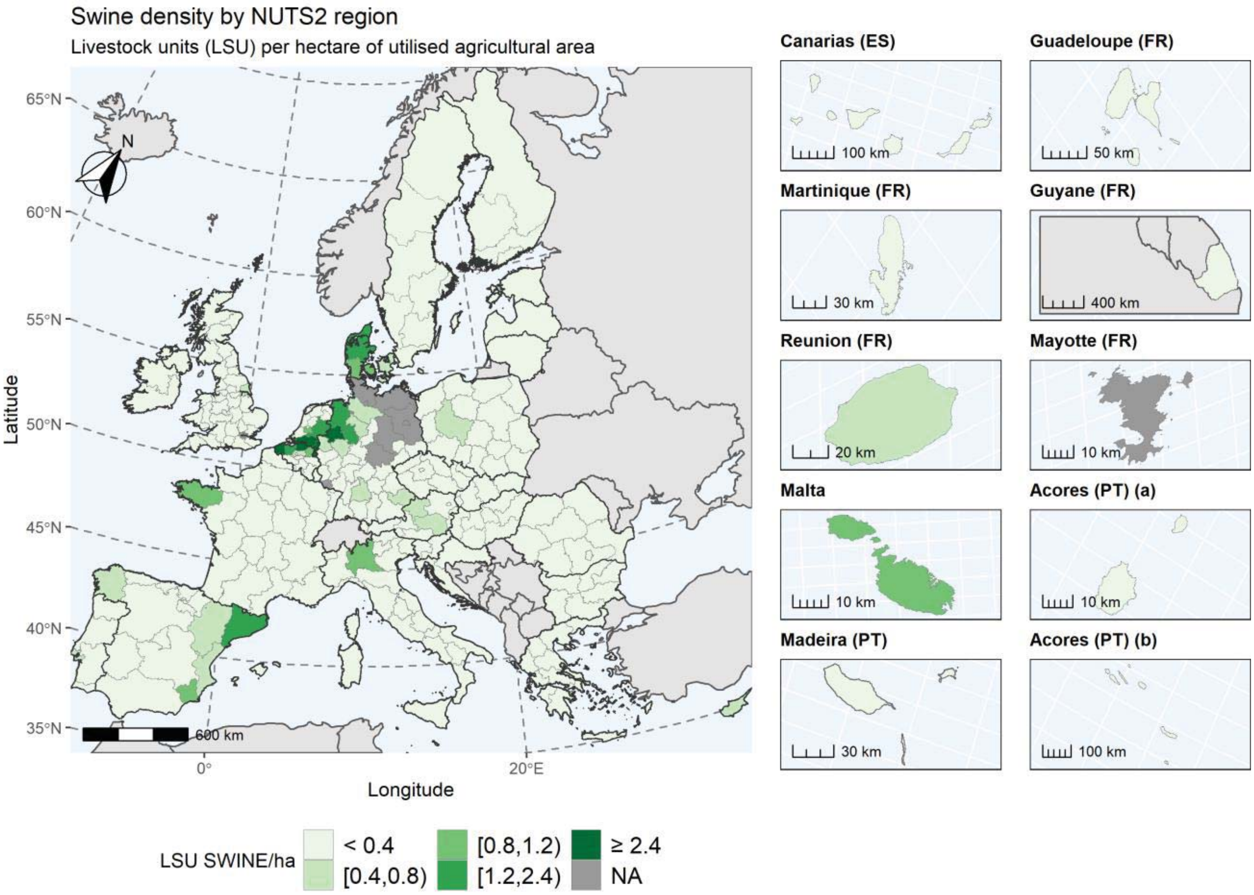
Map 2: Bovine density by NUTS2 expressed as livestock units per hectare of UAA, year 2016 (Source: Eurostat, February 2021). The label 'NA' stands for not available data.



Map 3: Poultry density by NUTS2 expressed as livestock units per hectare of UAA, year 2016 (Source: Eurostat, February 2021). The label 'NA' stands for not available data.



Map 4: Sheep density by NUTS2 expressed as livestock units per hectare of UAA, year 2016 (Source: Eurostat, February 2021). The label 'NA' stands for not available data.



Map 5: Swine density by NUTS2 expressed as livestock units per hectare of UAA, year 2016 (Source: Eurostat, February 2021). The label 'NA' stands for not available data.

Use of fertilisers

Table 10: Average annual animal manure nitrogen and mineral fertiliser nitrogen use (1 000 tons N) presented in the article 10 reports of the Member States for reporting periods 2012-2015 and 2016-2019, and the change between the two reporting periods.

	Animal manure			Mineral fertiliser		
MS	2012-2015	2016-2019	Change %	2012-2015	2016-2019	Change %
AT	169.4	171.1	1.0	107	118	10
BE-FL	95	NA	-	39	NA	-
BE-WA	70.6	68.6	-2.9	76	71	-7.8
BG	73.2	87.9	20.1	289	352	21.8
CY	9	NA	-	7	NA	-
CZ	63	NA	-	397	NA	-
DE	1515.5	1547	2.1	1697	1552	-8.5
DK	217	220	1.4	202	232	14.9
EE	23.1	21.6	-6.5	34.7	37.5	8.1
EL	57.2	NA	-	NA	NA	-
ES	NA	NA	-	NA	NA	-
FI	75.19	73.36	-2.4	147	138	-6.1
FR	1720	NA	-	2200	NA	-
HR	49	55.48	13	74	91.92	24
HU	123	99.4	-19.2	493	635	28.8
IE	489	523	6.9	328	371	13
IT	364	401	10.2	610	640	4.9
LT	47	NA	-	NA	NA	-
LU	12	NA	-	13	NA	-
LV	NA	NA	-	76	NA	-
MT	NA	NA	-	0.6	NA	-
NL	345	367	6.4	218	222	1.8
PL	517	553	7.9	1004	1903	90
PT	NA	NA	-	NA	NA	-
RO	410	NA	-	323.5	398	23
SE	102.7	76.54	-26	155	NA	-
SI	29	NA	-	27	NA	-
SK	19.3	15.79	-18	1.33	3.55	167
UK-EN						
UK-WA						
UN-SC						
UK-NI	97.86	102.9	5.1	71.04	77.73	9.4

(*) NA: not available (no data from MS report); - : not applicable

Table 11: Mineral fertiliser nitrogen use (1 000 kg N) in the periods 2008-2011, 2012-2015 and 2016-2019, and the change between the reporting periods (Source: Eurostat, December 2020).

	Reporting period			Change (%)	
MS	2008-2011	2012-2015	2016-2019	2012-2015 / 2008-2011	2016-2019 / 2012-2015
AT	107020	112898	120164	5.5	6.4
BE	145490	144361	NA	-0.8	NA
BG	185728	272082	351120	46.5	29.0
CY	4568	3725	NA	-18.5	NA
CZ	304597	350853	402385	15.2	14.7
DE	1678333	1696830	1684726	1.1	-0.7
DK	202080	189274	NA	-6.3	NA
EE	30304	34148	NA	12.7	NA
EL	192598	179637	NA	-6.7	NA
ES	830780	991646	1025129	19.4	3.4
FI	150406	141972	138538	-5.6	-2.4
FR	2234186	2141910	2203465	-4.1	2.9
HR	123826	86478	85391	-30.2	-1.3
HU	288126	323962	366043	12.4	13.0
IE	318490	327827	354099	2.9	8.0
IT	547826	578411	547249	5.6	-5.4
LT	135725	152667	NA	12.5	NA
LU	13733	13855	NA	0.9	NA
LV	54675	69267	76755	26.7	10.8
MT	627	636	NA	1.3	NA
NL	209423	218410	233824	4.3	7.1
PL	1089053	1099673	1124123	1.0	2.2
PT	100098	116865	107062	16.8	-8.4
RO	298758	323836	398097	8.4	22.9
SE	166675	170125	189567	2.1	11.4
SI	26965	27624	27090	2.4	-1.9
SK	111209	128571	126172	15.6	-1.9
UK	996880	1026872	1032898	3.0	0.6
EU27+UK	**10548181**	**10802383**	**NA**	**2.4**	**NA**

(*) NA: not available

Table 12: Mineral fertiliser phosphate use (1 000 kg P) in the periods 2008-2011, 2012-2015 and 2016-2019, and the change between the reporting periods (Source: Eurostat, December 2020).

	Reporting period			Change (%)	
MS	2008-2011	2012-2015	2016-2019	2012-2015 / 2008-2011	2016-2019 / 2012-2015
AT	12394	12787	13659	3.2	6.8
BE	5550	5600	NA	0.9	NA
BG	14168	20199	29562	42.6	46.4
CY	1000	867	NA	-13.3	NA
CZ	15660	19551	22437	24.9	14.8
DE	110524	121864	113268	10.3	-7.1
DK	9500	12425	NA	30.8	NA
EE	3002	3286	NA	9.5	NA
EL	28250	24680	NA	-12.6	NA
ES	136777	176733	185718	29.2	5.1
FI	12667	11153	11040	-12.0	-1.0
FR	201743	200313	181598	-0.7	-9.3
HR	14968	14156	10361	-5.4	-26.8
HU	22360	32768	43252	46.5	32.0
IE	25731	34136	39484	32.7	15.7
IT	91000	73651	NA	-19.1	NA
LT	27236	32776	NA	20.3	NA
LU	572	516	NA	-9.7	NA
LV	6736	9841	11297	46.1	14.8
MT	30	31	NA	2.2	NA
NL	8357	4550	4942	-45.6	8.6
PL	174625	153161	146896	-12.3	-4.1
PT	15124	17595	22897	16.3	30.1
RO	49398	52186	66871	5.6	28.1
SE	10700	11700	13933	9.3	19.1
SI	4203	3970	3994	-5.5	0.6
SK	8687	10676	11424	22.9	7.0
UK	78497	85131	87080	8.5	2.3
EU27+UK	**1089457**	**1148391**	**NA**	**5.4**	**NA**

(*) NA: not available

Table 13: Animal manure nitrogen use (1 000 kg N) in the periods 2008-2011, 2012-2015 and 2016-2019, and the change between the reporting periods (Source: Eurostat, December 2020)

	Reporting period			Change (%)	
MS	2008-2011	2012-2015	2016-2019	2012-2015 / 2008-2011	2016-2019 / 2012-2015
AT	161066	170204	172237	5.7	1.2
BE	234751	231894	NA	-1.2	NA
BG	100130	91278	76072	-8.8	-16.7
CY	22188	20046	NA	-9.7	NA
CZ	112133	96996	90486	-13.5	-6.7
DE	1250936	1273535	1203788	1.8	-5.5
DK	267041	261971	NA	-1.9	NA
EE	24094	25660	NA	6.5	NA
EL	293721	293797	NA	0.0	NA
ES	854513	827451	949015	-3.2	14.7
FI	103326	102925	101813	-0.4	-1.1
FR	1798323	1763660	1761385	-1.9	-0.1
HR	59545	57284	58838	-3.8	2.7
HU	115035	125387	129728	9.0	3.5
IE	474359	489166	520786	3.1	6.5
IT	848472	829948	862737	-2.2	4.0
LT	69779	66776	NA	-4.3	NA
LU	15054	14908	NA	-1.0	NA
LV	34009	36238	25932	6.6	-28.4
MT	2636	2371	NA	-10.0	NA
NL	414726	400763	423421	-3.4	5.7
PL	560112	515639	557558	-7.9	8.1
PT	155866	151238	159316	-3.0	5.3
RO	385984	354933	326955	-8.0	-7.9
SE	120974	119578	120475	-1.2	0.8
SI	37702	36112	37461	-4.2	3.7
SK	60239	57919	45649	-3.9	-21.2
UK	995281	995396	1019849	0.0	2.5
EU27+UK	**9571992**	**9384716**	**NA**	**-2.0**	**NA**

(*) NA: not available

Table 14: Animal manure phosphate use (1 000 kg P) in the periods 2008-2011, 2012-2015 and 2016-2019, and the change between the reporting periods (Source: Eurostat, December 2020)

	Reporting period			Change (%)	
MS	2008-2011	2012-2015	2016-2019	2012-2015 / 2008-2011	2016-2019 / 2012-2015
AT	29550	28898	29164	-2.2	0.9
BE	36441	37419	NA	2.7	NA
BG	14437	12890	2409	-10.7	-81.3
CY	3882	3486	NA	-10.2	NA
CZ	22638	19202	18839	-15.2	-1.9
DE	227103	230703	198664	1.6	-13.9
DK	63374	62717	NA	-1.0	NA
EE	4833	5068	NA	4.9	NA
EL	39943	40202	NA	0.6	NA
ES	138454	130160	147260	-6.0	13.1
FI	17866	18081	18051	1.2	-0.2
FR	301432	293387	323994	-2.7	10.4
HR	10761	9767	9200	-9.2	-5.8
HU	22706	24954	25414	9.9	1.8
IE	59841	61869	65209	3.4	5.4
IT	163876	157755	NA	-3.7	NA
LT	12297	11826	NA	-3.8	NA
LU	2176	2163	NA	-0.6	NA
LV	5178	5514	4724	6.5	-14.3
MT	612	567	NA	-7.3	NA
NL	60345	55591	54172	-7.9	-2.6
PL	113283	98147	105497	-13.4	7.5
PT	28350	27182	28319	-4.1	4.2
RO	68697	63953	64469	-6.9	0.8
SE	19994	19390	19485	-3.0	0.5
SI	5511	5242	5445	-4.9	3.9
SK	9350	8906	7401	-4.7	-16.9
UK	170652	170422	174797	-0.1	2.6
EU27+UK	**1653580**	**1602325**	**NA**	**-3.1**	**NA**

(*) NA: not available

Nutrient balance

Table 15: Gross nitrogen balance per hectare UAA (kg/ha N - UAA) in the periods 2008-2011, 2012-2015 and 2015-2019, and the change between the periods in kg N per ha. (Source: Eurostat, December 2020)

	Reporting period			Change (kg/ha N - UAA)	
MS	2008-2011	2012-2015	2016-2019	2012-2015 / 2008-2011	2016-2019 / 2012-2015
AT	33.6	40.1	39.0	6.5	-1.1
BE	134.6	136.2	NA	1.6	NA
BG	15.6	23.9	65.8	8.3	41.9
CY	192.2	187.8	NA	-4.3	NA
CZ	70.8	81.3	97.3	10.5	16.0
DE	78.8	75.4	65.1	-3.4	-10.3
DK	92.7	82.6	NA	-10.1	NA
EE	28.3	23.2	NA	-5.1	NA
EL	64.2	55.9	NA	-8.4	NA
ES	30.7	35.0	44.1	4.4	9.1
FI	49.0	47.8	49.2	-1.3	1.5
FR	46.0	43.0	43.2	-3.0	0.1
HR	87.6	59.5	56.2	-28.0	-3.3
HU	28.9	35.1	30.9	6.2	-4.2
IE	35.4	44.8	58.2	9.3	13.5
IT	61.6	70.3	66.3	8.8	-4.0
LT	38.4	27.6	NA	-10.8	NA
LU	126.8	127.5	NA	0.7	NA
LV	23.9	26.9	26.3	2.9	-0.6
MT	178.8	145.5	NA	-33.3	NA
NL	172.2	173.3	190.6	1.1	17.2
PL	52.5	47.6	51.5	-4.9	3.9
PT	36.6	42.7	46.0	6.0	3.3
RO	5.0	7.1	-2.1	2.1	-9.2
SE	40.6	32.0	43.6	-8.5	11.6
SI	48.9	53.5	53.7	4.7	0.2
SK	34.0	34.6	24.0	0.7	-10.6
UK	85.4	86.0	86.3	0.7	0.2
EU27+UK	**48.9**	**49.0**	**NA**	**0.1**	**NA**

(*) NA = not available

Table 16: Net nitrogen balance per hectare UAA (kg/ha N - UAA) in the periods 2008-2011, 2012-2015 and 2015-2019, and the change between the periods in kg N per ha. (Source: Eurostat, December 2020).

	Reporting period			Change (kg/ha N - UAA)	
MS	2008-2011	2012-2015	2016-2019	2012-2015 / 2008-2011	2016-2019 / 2012-2015
AT	13.8	18.0	15.3	4.3	-2.7
BE	89.4	92.3	NA	2.9	NA
BG	7.8	16.4	55.7	8.5	39.3
CY	152.4	147.3	NA	-5.1	NA
CZ	52.6	64.3	79.4	11.7	15.1
DE	41.4	35.9	25.9	-5.5	-9.9
DK	64.4	56.7	NA	-7.7	NA
EE	17.2	12.1	NA	-5.1	NA
EL	52.8	44.7	NA	-8.0	NA
ES	16.9	21.0	27.6	4.0	6.6
FI	33.9	32.6	33.9	-1.3	1.3
FR	25.3	22.2	24.3	-3.1	2.1
HR	66.3	42.4	37.1	-23.9	-5.3
HU	16.6	21.7	16.4	5.1	-5.3
IE	13.7	22.2	33.8	8.6	11.5
IT	35.4	44.3	39.2	8.9	-5.1
LT	25.2	16.3	NA	-8.9	NA
LU	86.4	86.8	NA	0.4	NA
LV	16.0	18.2	17.7	2.2	-0.5
MT	61.5	33.9	NA	-27.6	NA
NL	114.1	117.6	131.2	3.5	13.6
PL	33.7	28.8	31.9	-4.9	3.1
PT	25.6	31.9	34.5	6.3	2.6
RO	-4.6	-1.8	-12.8	2.9	-11.0
SE	24.4	15.7	27.3	-8.8	11.7
SI	14.9	21.2	20.9	6.4	-0.4
SK	34.0	34.6	14.5	0.7	-20.1
UK	67.9	67.8	78.8	-0.1	11.0
EU27+UK	**29.7**	**29.6**	**NA**	**-0.1**	**NA**

(*) NA = not available

Table 17: Gross phosphate balance per hectare UAA (kg/ha P - UAA) in the periods 2008-2011, 2012-2015 and 2015-2019, and the change between the periods in kg N per ha (Source: Eurostat, December 2020).

	Reporting period			Change (kg/ha P - UAA)	
MS	2008-2011	2012-2015	2016-2019	2012-2015 / 2008-2011	2016-2019 / 2012-2015
AT	0.2	0.6	0.5	0.4	-0.1
BE	4.0	5.5	NA	1.5	NA
BG	-4.8	-6.2	1.0	-1.5	7.2
CY	31.2	30.8	NA	-0.5	NA
CZ	-2.5	-2.3	-1.7	0.2	0.6
DE	-1.8	-2.3	-4.0	-0.5	-1.7
DK	7.2	7.2	NA	0.0	NA
EE	-5.5	-7.0	NA	-1.5	NA
EL	1.5	0.2	NA	-1.2	NA
ES	2.4	3.8	7.6	1.4	3.8
FI	4.0	3.8	4.7	-0.1	0.8
FR	1.2	1.1	1.7	-0.1	0.6
HR	5.7	4.9	0.1	-0.8	-4.8
HU	-3.1	-1.0	-1.4	2.1	-0.4
IE	17.3	20.0	22.4	2.7	2.4
IT	-1.8	-1.5	NA	0.2	NA
LT	4.0	2.8	NA	-1.2	NA
LU	4.2	4.0	NA	-0.2	NA
LV	1.5	2.0	1.8	0.5	-0.2
MT	34.5	29.2	NA	-5.2	NA
NL	8.0	3.2	3.4	-4.8	0.1
PL	5.6	2.1	2.0	-3.4	-0.1
PT	2.5	4.0	6.4	1.6	2.4
RO	-0.5	-0.9	-3.9	-0.4	-2.9
SE	-0.4	-0.8	1.0	-0.4	1.8
SI	3.2	3.1	3.2	-0.1	0.0
SK	-4.8	-5.1	-6.1	-0.3	-1.0
UK	5.5	5.8	5.9	0.2	0.2
EU27+UK	**1.7**	**1.6**	**NA**	**-0.1**	**NA**

(*) NA = not available

N-discharge into the environment from agriculture

Table 18: Annual average nitrogen discharge (kton N) to the aquatic environment and relative contribution of agriculture (%), presented in the article 10 reports of the Member States for reporting periods 2008-2011, 2012-2015 and 2016-2019.

	Nitrogen discharge (kton N)				Contribution agriculture (%)				Contribution agriculture	
MS	2008-2011	2012-2015	2016-2019	Change %	2008-2011	2012-2015	2016-2019	Change %	UAA (1000 ha)	kg/ha N - UAA
AT	80	80	NA	-	50	NA	NA	-	2663	-
BE-FL	19.5	22.3	20	-10.3	65.8	70.5	71	0.71	1349	14.8
BE-WA	24	19	18	-5.3	81	NA	NA	-	1349	13.3
BG	NA	NA	NA	-	NA	NA	NA	-	5030	-
CY	27	15.5	17.4	12.3	NA	NA	NA	-	123	142
CZ	217	223.2	179.8	-19.4	95	95.7	94.9	-0.84	3514	51.2
DE	450	NA	350	-	77.6	NA	75	-	16664	21.0
DK	NA	NA	NA	-	NA	NA	NA	-	2629	-
EE	23	26.8	NA	-	85	96	84	-12.5	990	-
EL	NA	NA	NA	-	NA	NA	NA	-	5213	-
ES	NA	3119	1940	-37.8		92.9	89.4	-3.79	24058	80.7
FI	50.37	42.9	41.9	-2.3	79.6	74.8	76.3	2.0	2273	18.4
FR	1073	1271	NA	-	NA	94.4	NA	-	29062	-
HR	NA	122	NA	-	NA	96	NA	-	1508	-
HU	410	459	541	17.9	93	96	98	2.1	5339	101
IE	767	817	895	9.5	NA	99.5	99.3	-0.20	4498	199
IT	NA	NA	NA	-	NA	NA	NA	-	12977	-
LT	NA	NA	NA	-	NA	NA	NA	-	2953	-
LU	2.88	3	2.97	-1.2	65.3	73	76.2	4.4	131	22.6
LV	NA	26.6	65.8	147	NA	83.6	90.9	8.7	1940	33.9
MT	0.2	NA	NA	-	NA	NA	NA	-	11.6	-
NL	57	51	NA	-	63	62	NA	-	1806	-
PL	1696	1521	1625	6.8	99	98.6	98.7	0.10	14498	112
PT	NA	154.6	164.2	6.2	NA	86.9	87.6	0.81	3610	45.5
RO	NA	NA	16	-	NA	NA	22	-	13535	1.18
SE	60.2	57.4	52.9	-7.8	51.9	49.9	49	-1.8	3009	17.6
SI	7.1	10.3	8.5	-17.5	NA	60.1	66.7	11.0	479	17.7
SK	NA	18.5	18	-2.7	NA	45.7	49.2	7.7	1916	9.4
UK-EN									17529	
UK-NI	16.2	17.1	18.1	5.8	78.7	79.2	79.8	0.76	17529	1.03
UK-SC									17529	
UK-WA									17529	

Note:

The last column represents the kg/ha N from agriculture.

In blue, values taken from the staff working document of reporting period 2012-2015 because not available in the current reports.

UAA data retrieved from Eurostat (March 2021)

For BE and UK, UAA data are available for the whole country

NA: not available, -: not applicable

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PART 2/38

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}

2. WATER QUALITY

Monitoring

Table 1: Number of stations and station density (stations per 1 000 km^2 of land) of reported groundwater monitoring of annual average nitrate measurements in reporting periods 2008-2011, 2012-2015 and 2016-2019, the change (%) between the last two periods, and the annual average sampling frequency in 2016-2019.

		Number of Stations			Stations per 1000 km^2			Change	Sampling per year
MS	Area km^2	2008-2011	2012-2015	2016-2019	2008-2011	2012-2015	2016-2019	(%)	2016-2019
AT	83944	1965	1965	1933	23.4	23.4	23.0	-1.6	1.8
BE	30667	2974	2937	2905	97.0	95.8	94.7	-1.1	4.4
BG	110995	426	406	488	3.8	3.7	4.4	20.2	5.7
CY	9249	244	230	241	26.4	24.9	26.1	4.8	1.8
CZ	78874	611	621	657	7.7	7.9	8.3	5.8	1.9
DE	357746	162	697	692	0.5	1.9	1.9	-0.7	0.7
DK	43162	595	1201	1275	13.8	27.8	29.5	6.2	0.8
EE	45347	297	385	369	6.5	8.5	8.1	-4.2	1.4
EL	131692	370	1078	1764	2.8	8.2	13.4	63.6	0.8
ES	505983	4778	4132	4157	9.4	8.2	8.2	0.6	1.7
FI	337547	79	187	193	0.2	0.6	0.6	3.2	1.4
FR	638474	2509	2598	2582	3.9	4.1	4.0	-0.6	1.1
HR	56539	NA	126	132	NA	2.2	2.3	4.8	6.6
HU	93013	1763	1756	1788	19.0	18.9	19.2	1.8	1.7
IE	69946	211	205	200	3.0	2.9	2.9	-2.4	2.9
IT	300578	5070	5035	4618	16.9	16.8	15.4	-8.3	1.7
LT	64899	62	65	60	1.0	1.0	0.9	-7.7	0.9
LU	2595	20	20	20	7.7	7.7	7.7	0.0	3.0
LV	64586	173	199	232	2.7	3.1	3.6	16.6	1.4
MT	315	41	41	44	130.2	130.2	139.7	7.3	1.8
NL	37368	1297	1318	1217	34.7	35.3	32.6	-7.7	1.4
PL	311928	1258	1563	1421	4.0	5.0	4.6	-9.1	0.7
PT	91971	657	580	520	7.1	6.3	5.7	-10.3	1.6
RO	238368	1809	1256	1384	7.6	5.3	5.8	10.2	1.7
SE	449718	326	436	533	0.7	1.0	1.2	22.2	0.7
SI	20277	104	198	211	5.1	9.8	10.4	6.6	1.8
SK	49026	1717	1717	1788	35.0	35.0	36.5	4.1	1.7
UK	244574	3088	3139	2955	12.6	12.8	12.1	-5.9	3.8
EU27+UK	**4469381**	**32606**	**34091**	**34379**	**7.3**	**7.6**	**7.7**	**0.8**	**2.0**

(*) NA: not available

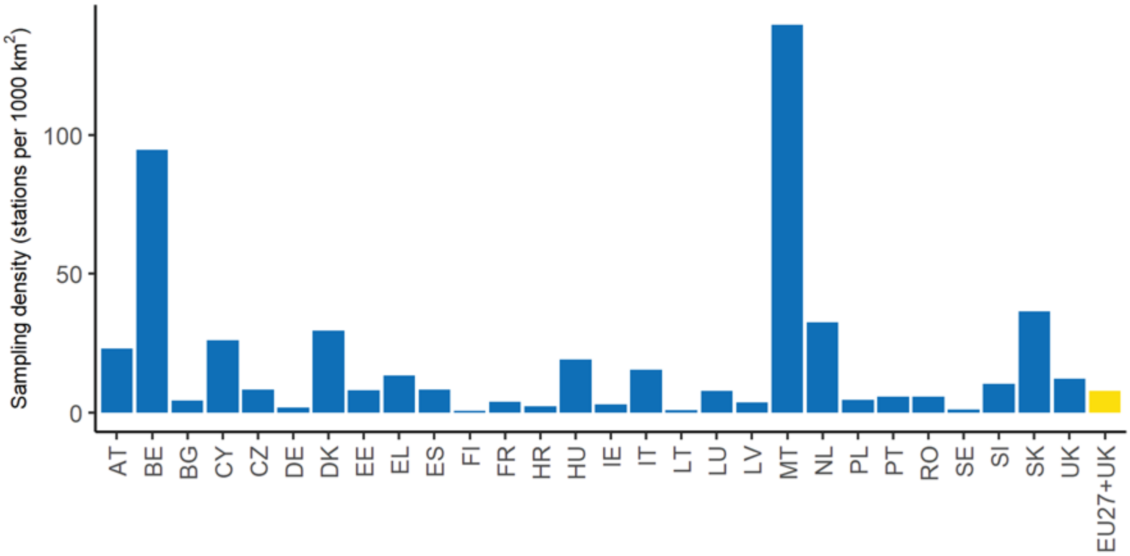

Figure 1: Groundwater station density (stations per 1 000 km^2 of land) in reporting period 2016-2019. Stations with data of average annual nitrate measurements.

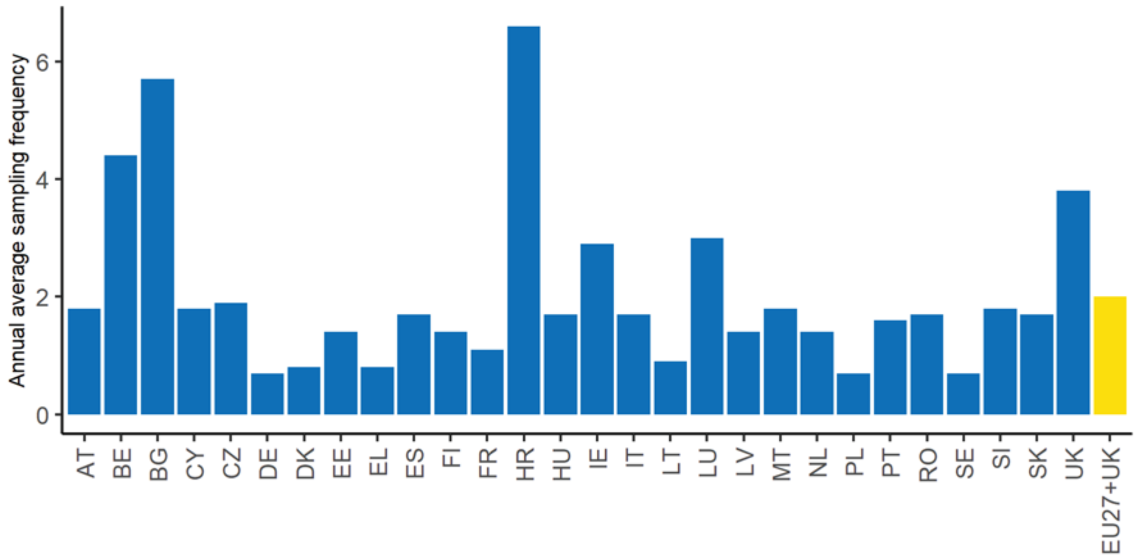

Figure 2: Average annual groundwater sampling frequency in reporting period 2016-2019. Stations with data of average annual nitrate measurements.

Table 2: Number of stations and station density (stations per 1 000 km^2 of land) of reported fresh surface water monitoring of annual average nitrate measurements in reporting periods 2008-2011, 2012-2015 and 2016-2019, the change (%) between the last two periods, and the annual average sampling frequency in 2016 -2019.

		Number of Stations			Stations per 1000 km^2			Change	Sampling per year
MS	Area km^2	2008-2011	2012-2015	2016-2019	2008-2011	2012-2015	2016-2019	(%)	2016-2019
AT	83944	109	108	128	1.3	1.3	1.5	18.5	10.9
BE	30667	857	835	819	27.9	27.2	26.7	-1.9	7.0
BG	110995	305	318	320	2.7	2.9	2.9	0.6	5.6
CY	9249	10	13	13	1.1	1.4	1.4	0.0	8.5
CZ	78874	571	1917	2086	7.2	24.3	26.4	8.8	7.9
DE	357746	303	241	309	0.8	0.7	0.9	28.2	10.5
DK	43162	161	177	445	3.7	4.1	10.3	151.4	15.0
EE	45347	145	324	280	3.2	7.1	6.2	-13.6	2.8
EL	131692	105	479	284	0.8	3.6	2.2	-40.7	1.2
ES	505983	3730	3903	3525	7.4	7.7	7.0	-9.7	3.6
FI	337547	141	167	147	0.4	0.5	0.4	-12.0	6.2
FR	638474	3331	3390	3251	5.2	5.3	5.1	-4.1	2.4
HR	56539	NA	64	75	NA	1.1	1.3	17.2	9.9
HU	93013	525	530	927	5.6	5.7	10.0	74.9	5.0
IE	69946	252	254	254	3.6	3.6	3.6	0.0	14.5
IT	300578	2463	3154	2288	8.2	10.5	7.6	-27.5	4.8
LT	64899	291	320	289	4.5	4.9	4.5	-9.7	3.4
LU	2595	16	16	16	6.2	6.2	6.2	0.0	6.4
LV	64586	338	222	435	5.2	3.4	6.7	95.9	2.1
MT	315	7	5	NA	22.2	15.9	NA	NA	NA
NL	37368	457	850	852	12.2	22.7	22.8	0.2	13.7
PL	311928	2802	2526	3935	9.0	8.1	12.6	55.8	3.0
PT	91971	146	154	158	1.6	1.7	1.7	2.6	4.4
RO	238368	1113	1224	1123	4.7	5.1	4.7	-8.3	6.0
SE	449718	187	2792	2282	0.4	6.2	5.1	-18.3	1.0
SI	20277	139	136	154	6.9	6.7	7.6	13.2	3.5
SK	49026	852	512	842	17.4	10.4	17.2	64.5	4.6
UK	244574	7378	8404	7947	30.2	34.4	32.5	-5.4	5.6
EU27+UK	**4469381**	**26734**	**33035**	**33184**	**6.0**	**7.4**	**7.4**	**0.5**	**6.3**

(*) NA: not available

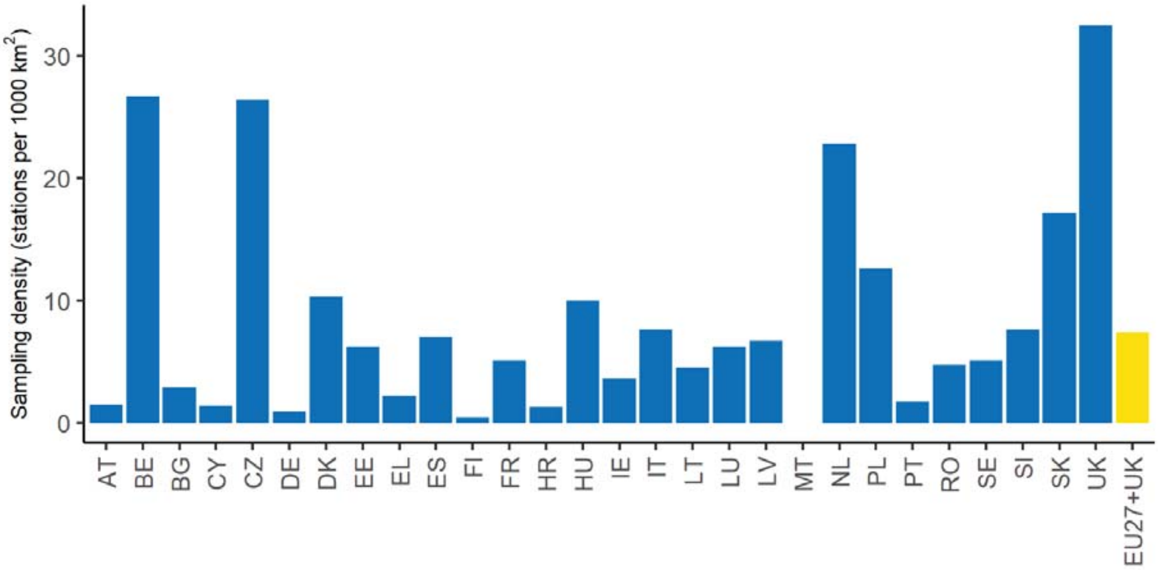

Figure 3: Fresh surface water station density (stations per 1 000 km^2 of land) in reporting period 2016-2019. Stations with data of average annual nitrate measurements.

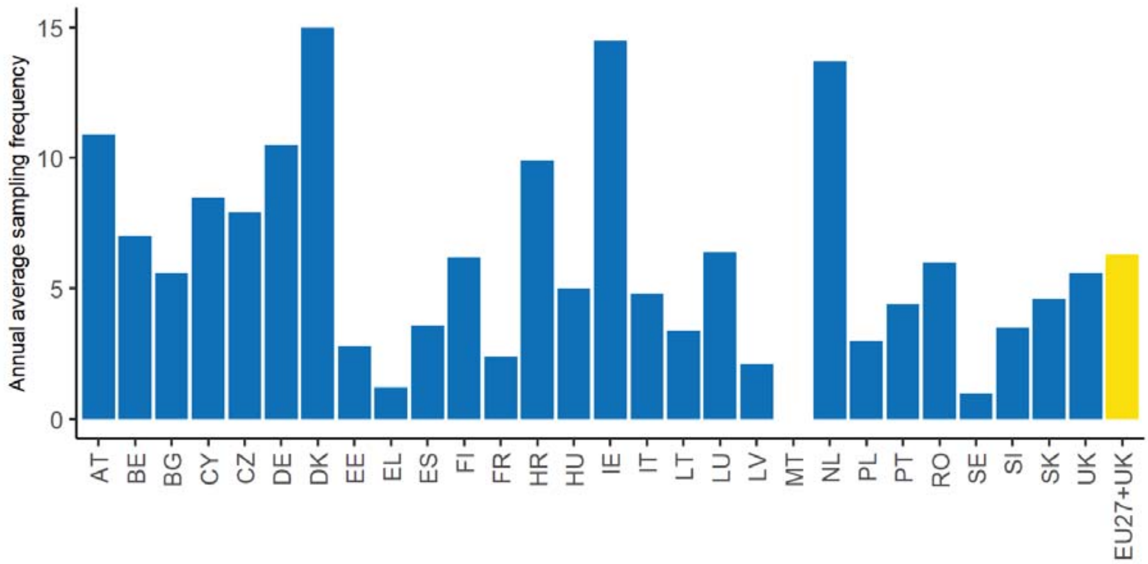

Figure 4: Annual average fresh surface water sampling frequency in reporting period 2016-2019. Stations with data of average annual nitrate measurements.

Table 3: Number of stations of reported saline surface water monitoring of annual average nitrate measurements in reporting periods 2008-2011, 2012-2015 and 2016-2019, and the change (%) between the last two periods.

	Number of Stations			Change	Sampling per year
MS	2008-2011	2012-2015	2016-2019	(%)	2016-2019
AT	NA	NA	NA	NA	NA
BE	10	10	3	-70.0	6.7
BG	7	6	6	0.0	1.8
CY	0	16	16	0.0	2.0
CZ	NA	NA	NA	NA	NA
DE	5	5	51	920.0	5.9
DK	70	44	66	50.0	15.6
EE	23	26	21	-19.2	9.0
EL	11	NA	81	NA	1.1
ES	631	250	594	137.6	2.6
FI	44	75	76	1.3	4.5
FR	21	8	23	187.5	0.7
HR	NA	NA	11	NA	4.5
HU	NA	NA	NA	NA	NA
IE	124	117	122	4.3	3.4
IT	584	577	503	-12.8	5.1
LT	17	16	16	0.0	8.8
LU	NA	NA	NA	NA	NA
LV	45	43	16	-62.8	1.2
MT	31	49	62	26.5	1.4
NL	43	39	34	-12.8	11.7
PL	46	19	19	0.0	28.3
PT	55	6	20	233.3	2.8
RO	54	35	32	-8.6	3.2
SE	233	184	190	3.3	4.5
SI	5	5	5	0.0	12.0
SK	NA	NA	NA	NA	NA
UK	1064	674	586	-13.1	5.4
EU27+UK	**3123**	**2204**	**2553**	**15.8**	**6.2**

(*) NA: not available

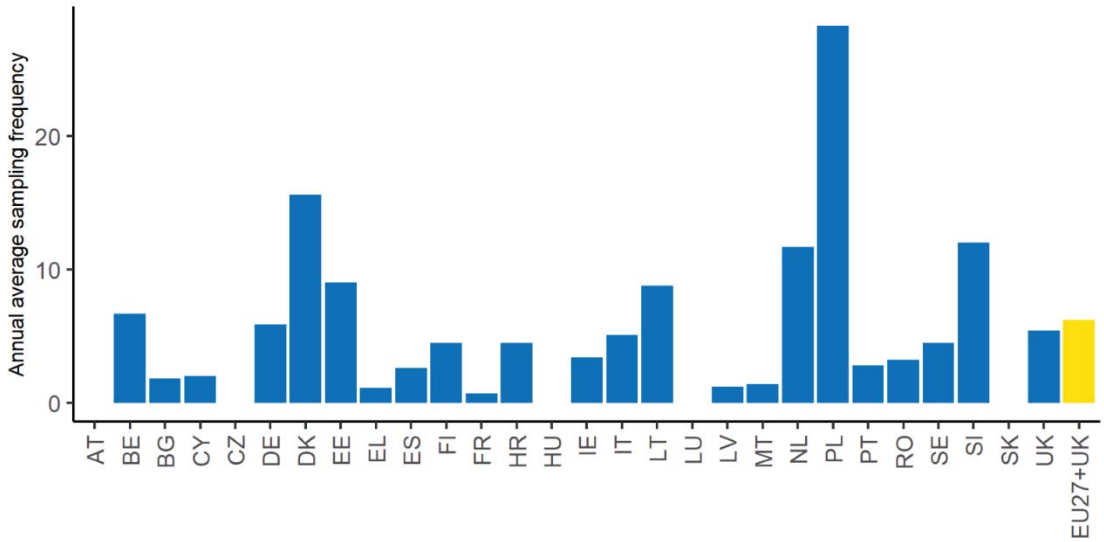

Figure 5: Annual average saline surface water sampling frequency in reporting period 2016-2019. Stations with data of average annual nitrate measurements.

Table 4: Number of stations with trends for groundwater monitoring points in the periods 2008-2011, 2012-2015 and 2016-2019.

	Stations with trends (#)		
MS	2008-2011	2012-2015	2016-2019
AT	1724	1906	1837
BE	2883	2836	2884
BG	115	359	368
CY	221	210	191
CZ	323	607	657
DE	162	692	689
DK	589	1001	1105
EE	45	108	332
EL	369	0	0
ES	2315	3035	3893
FI	52	187	193
FR	1039	2094	2360
HR	0	0	123
HU	1720	1736	1710
IE	204	205	200
IT	4193	4134	3431
LT	62	65	60
LU	19	20	20
LV	140	163	184
MT	0	41	41
NL	1253	1229	1160
PL	1125	1063	1304
PT	586	553	519
RO	929	849	1114
SE	0	99	109
SI	104	98	192
SK	681	1544	1298
UK	2323	2654	2749
EU27+UK	**23176**	**27488**	**28723**

(*) stations with trends between periods can be different

Table 5: Number of stations with trends for surface water monitoring points in the periods 2008-2011, 2012-2015 and 2016-2019.

	Stations with trends (#)		
MS	2008-2011	2012-2015	2016-2019
AT	100	107	102
BE	856	830	815
BG	89	292	318
CY	28	26	29
CZ	554	502	1796
DE	0	0	298
DK	125	182	285
EE	74	138	152
EL	115	0	0
ES	2343	3289	3797
FI	183	240	155
FR	1202	2900	3025
HR	0	0	64
HU	212	313	414
IE	332	349	362
IT	2216	2450	2391
LT	83	233	222
LU	16	16	16
LV	189	199	180
MT	0	0	22
NL	269	204	808
PL	1607	1663	2199
PT	111	145	156
RO	930	962	996
SE	0	45	33
SI	114	121	140
SK	236	378	343
UK	6660	6099	7605
EU27+UK	**18644**	**21683**	**26723**

(*) stations with trends between periods can be different

Groundwater quality

Table 6: Percentage of groundwater monitoring points per water quality class (annual average nitrate concentration in mg nitrate per l) for all stations of the EU 27 Member States and UK for the period 2016-2019.

	2016 - 2019			
MS	<25	[25,40)	[40,50)	≥ 50
AT	76.7	10.7	5.5	7.2
BE	61.5	15.2	7.3	16.0
BG	62.1	18.0	5.3	14.5
CY	71.4	7.9	3.7	17.0
CZ	76.1	7.6	4.6	11.7
DE	49.6	14.0	9.7	26.7
DK	68.3	10.7	6.7	14.3
EE	77.8	12.5	6.8	3.0
EL	75.8	8.9	3.4	11.9
ES	57.7	12.9	6.3	23.1
FI	93.3	3.6	1.6	1.6
FR	49.3	25.1	12.8	12.8
HR	87.9	9.8	0.8	1.5
HU	86.9	4.0	1.9	7.3
IE	81.5	16.0	1.0	1.5
IT	68.1	13.7	5.6	12.5
LT	95.0	1.7	1.7	1.7
LU	40.0	25.0	15.0	20.0
LV	96.6	1.7	0.4	1.3
MT	4.5	18.2	13.6	63.6
NL	73.3	7.6	5.2	14.0
PL	87.1	5.8	2.4	4.6
PT	67.1	11.2	4.2	17.5
RO	75.3	8.7	3.5	12.6
SE	95.3	2.8	0.9	0.9
SI	73.9	10.9	6.2	9.0
SK	74.9	8.8	4.3	12.0
UK	61.5	19.1	7.2	12.2
EU27+UK	**67.4**	**12.7**	**5.8**	**14.1**

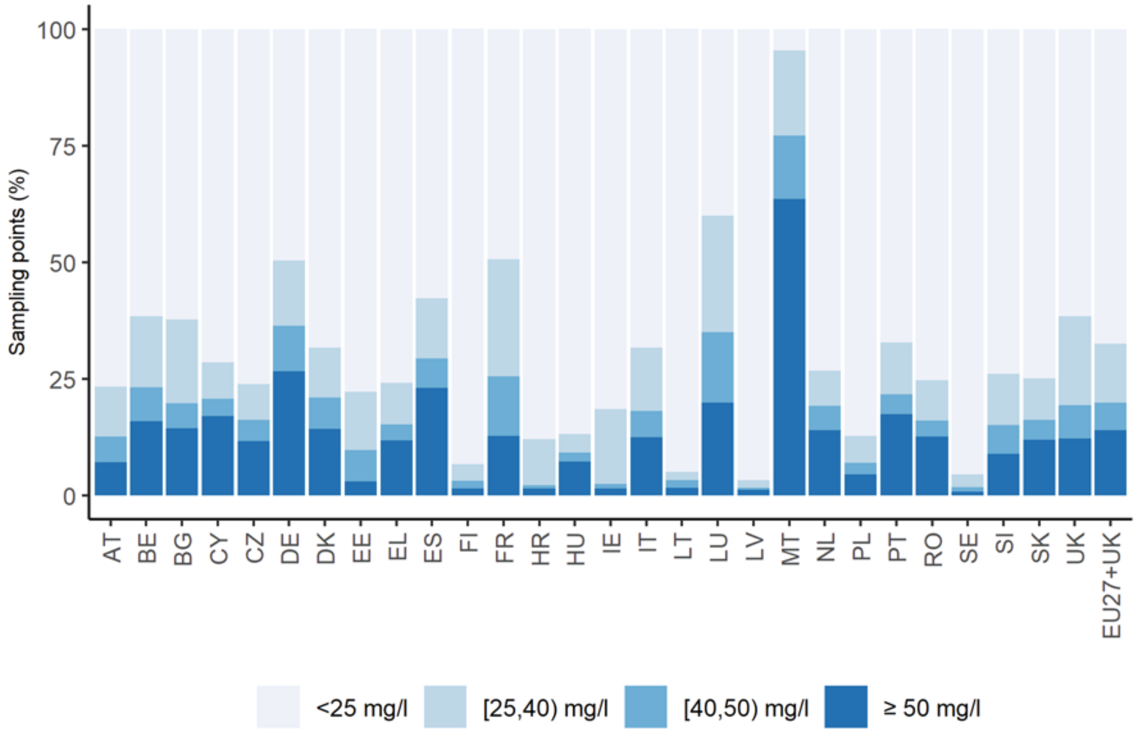

Figure 6: Frequency diagram of annual average nitrate concentrations in groundwater, at all depths, in reporting period 2016-2019.

Table 7: Percentage of groundwater stations (at all depth) with decreasing, stable or increasing trends in average groundwater nitrate concentrations between the reporting periods 2012-2015 and 2016-2019.

	2016 - 2019				
MS	< -5	[-5,1)	[1,-1]	(1,5]	>5
AT	11.3	21.4	48.8	13.6	5.0
BE	16.6	16.9	36.9	15.0	14.5
BG	23.4	16.3	20.1	19.3	20.9
CY	12.0	12.0	44.5	14.1	17.3
CZ	9.1	11.3	63.5	9.7	6.4
DE	18.3	18.4	39.8	12.0	11.5
DK	18.9	12.4	50.4	7.6	10.7
EE	6.9	9.3	60.8	9.6	13.3
EL	NA	NA	NA	NA	NA
ES	18.7	17.0	33.4	15.9	15.0
FI	4.7	12.4	57.5	14.5	10.9
FR	12.6	19.8	34.8	21.5	11.4
HR	19.5	45.5	30.9	4.1	0.0
HU	5.8	9.8	68.7	8.7	7.0
IE	2.0	15.0	45.5	30.0	7.5
IT	17.7	20.2	39.4	13.8	8.9
LT	8.3	18.3	50.0	10.0	13.3
LU	5.0	25.0	45.0	15.0	10.0
LV	2.7	3.8	87.0	2.7	3.8
MT	41.5	26.8	12.2	12.2	7.3
NL	15.4	6.8	59.1	5.7	12.9
PL	6.0	10.2	70.4	8.0	5.4
PT	14.1	14.8	41.4	16.6	13.1
RO	18.5	14.9	32.0	15.4	19.2
SE	0.0	0.9	97.2	1.8	0.0
SI	9.9	21.4	51.6	14.1	3.1
SK	17.5	14.0	38.9	16.7	12.9
UK	9.2	19.9	48.1	15.0	7.8
EU27+UK	**14.1**	**16.3**	**44.8**	**13.9**	**10.9**

(*) NA: not available

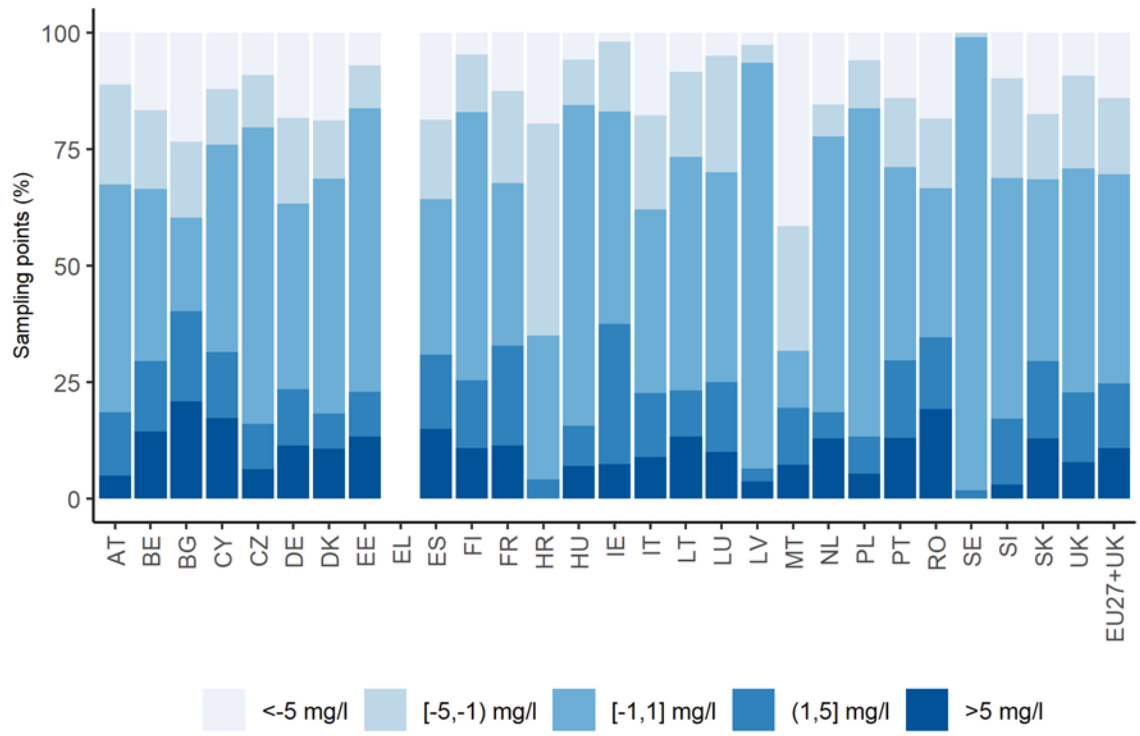

Figure 7: Frequency diagram of trends in annual average nitrate concentrations in groundwater, at all depths, in reporting period 2016-2019.

Table 26: Percentage of groundwater stations by classes of annual nitrate concentration, at different sampling depths, aggregated over all Member States. Reporting period 2016-2019.

	Total stations		Percentage of stations			
Depth	#	%	<25 mg/l	[25,40) mg/l	[40,50) mg/l	≥ 50 mg/l
Phreatic groundwater (shallow): 0-5m	9384	27.3	68.6	12.0	5.8	13.5
Phreatic groundwater (deep): 5-15m	7160	20.8	63.2	12.5	6.4	17.8
Phreatic groundwater (deep): 15-30m	4684	13.6	60.4	14.7	7.9	17.1
Phreatic groundwater (deep): >30m	5511	16.0	62.7	16.9	6.8	13.5
Captive groundwater	4258	12.4	87.2	6.2	2.6	4.0
Karstic groundwater	2618	7.6	80.4	11.2	3.3	5.1
Not indicated	764	2.2	61.6	15.1	6.7	16.6

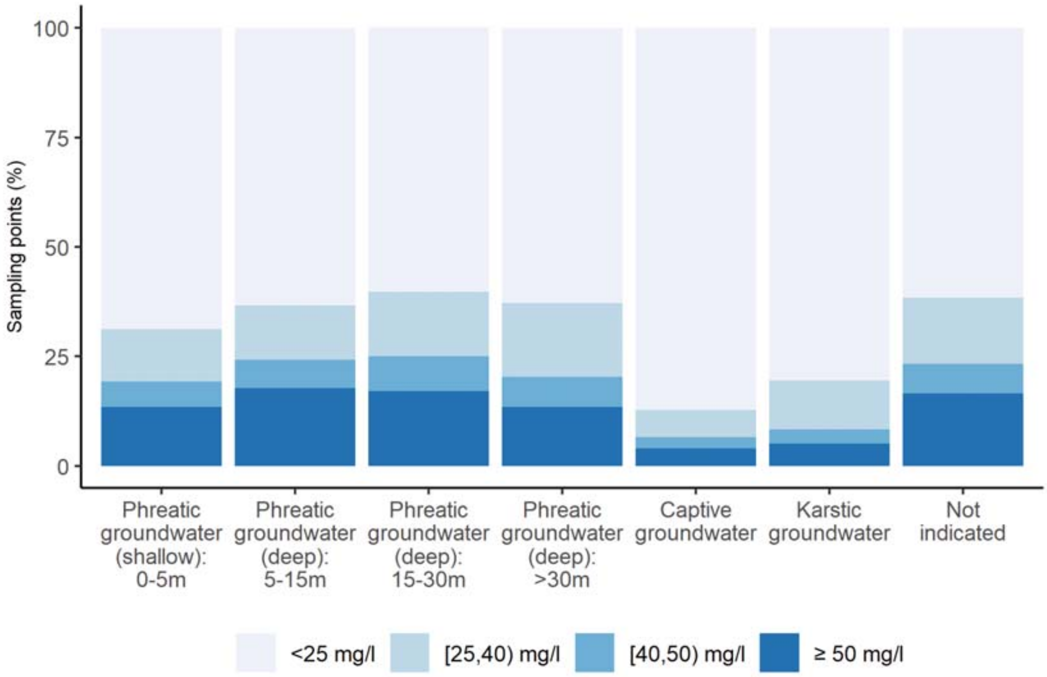

Figure 8: Frequency diagram of annual average nitrate concentrations in groundwater at different depths, aggregated over all Member States. Reporting period 2016-2019

Table 8: Percentage of groundwater stations with decreasing, stable or increasing trends at different depths, aggregated over all Member States. Reporting period 2016-2019

	Total stations		Percentage of stations				
Depth	#	%	< -5 mg/l	[-5,-1) mg/l	[-1,1] mg/l	(1,5] mg/l	>5 mg/l
Phreatic groundwater (shallow): 0-5m	8500	29.6	14.6	17.6	40.3	15.2	12.3
Phreatic groundwater (deep): 5-15m	6069	21.1	20.6	15.9	35.0	13.9	14.5
Phreatic groundwater (deep): 15-30m	3838	13.4	16.4	17.2	41.0	13.7	11.7
Phreatic groundwater (deep): >30m	4567	15.9	11.6	18.9	45.6	14.9	8.9
Captive groundwater	3552	12.4	6.0	10.4	71.6	7.8	4.1
Karstic groundwater	1835	6.4	7.0	14.4	55.0	16.8	6.8
Not indicated	362	1.3	13.8	18.0	30.4	18.0	19.9

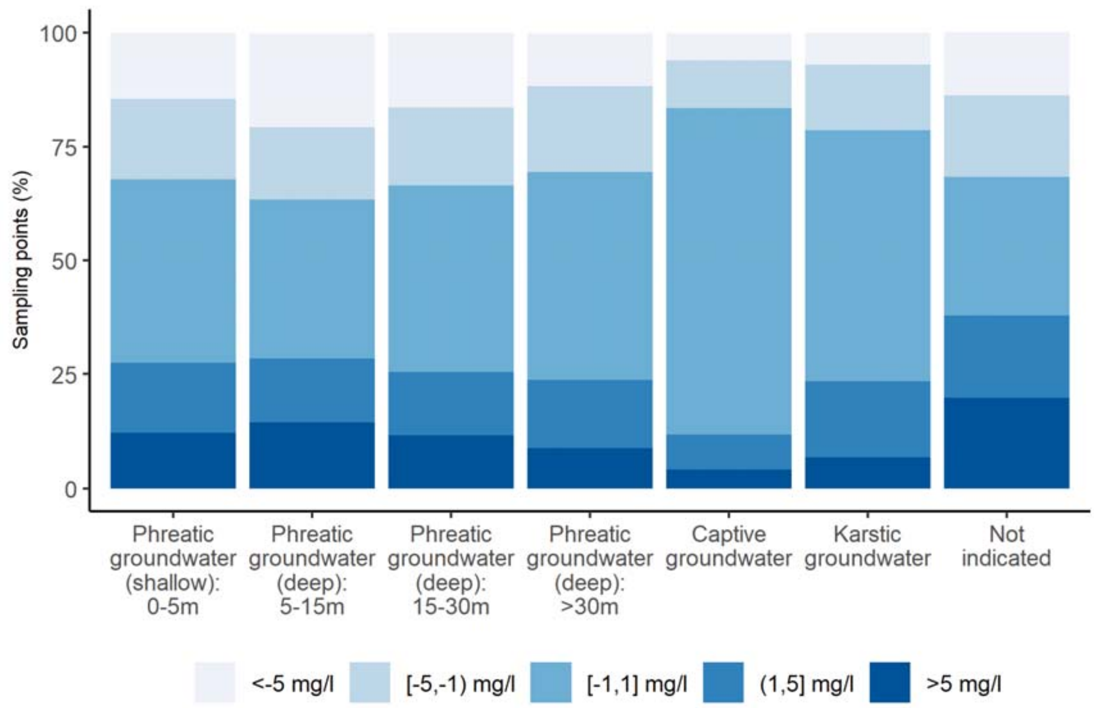

Figure 9: Frequency diagram of trends in annual average nitrate concentrations in groundwater at different depths, aggregated over all Member States. Reporting period 2016-2019

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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

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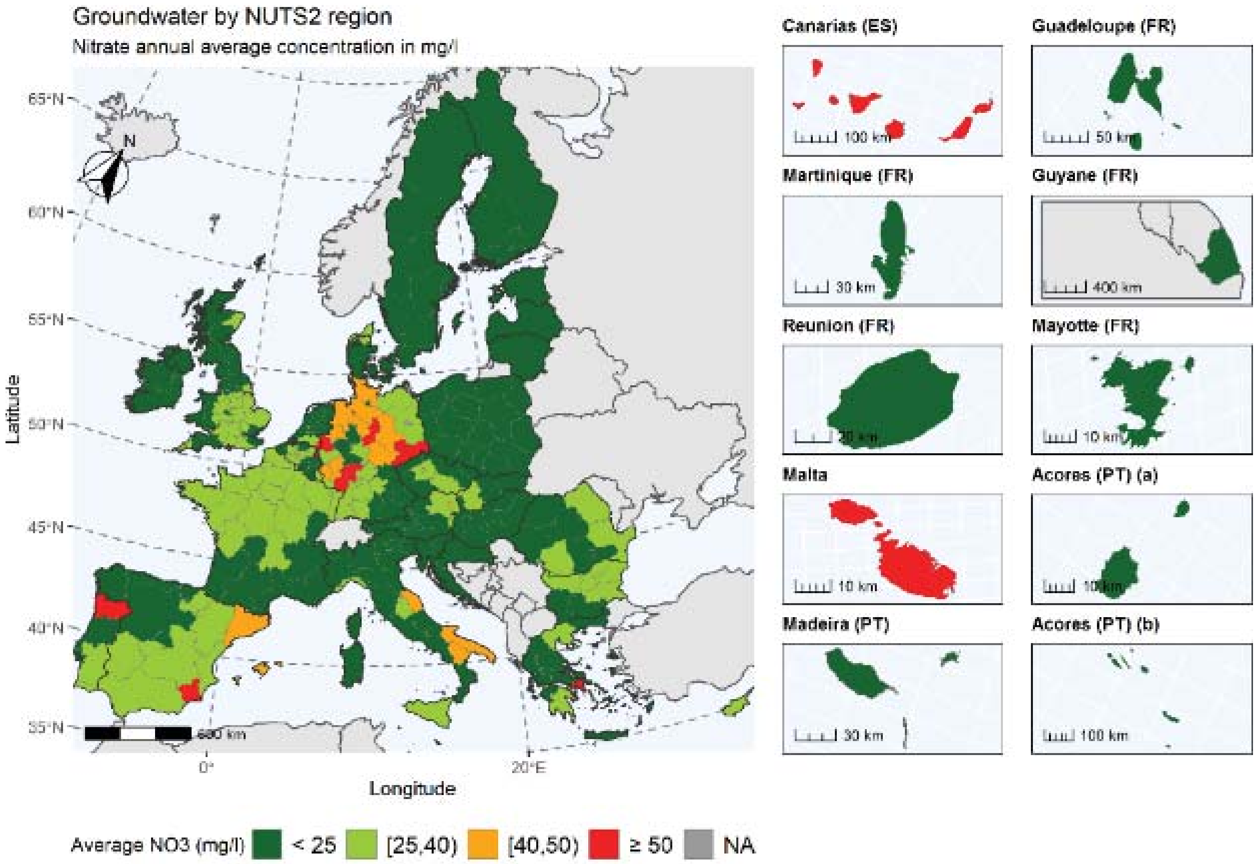
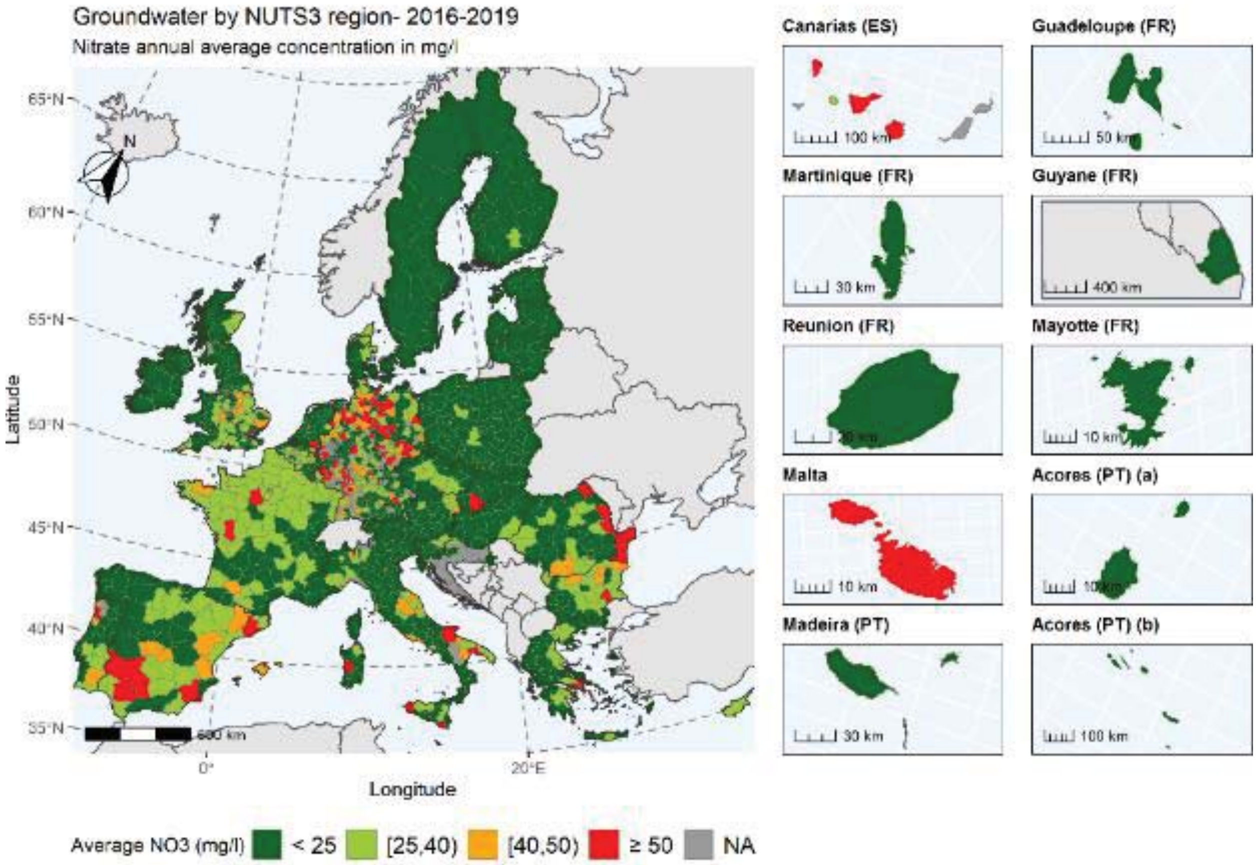
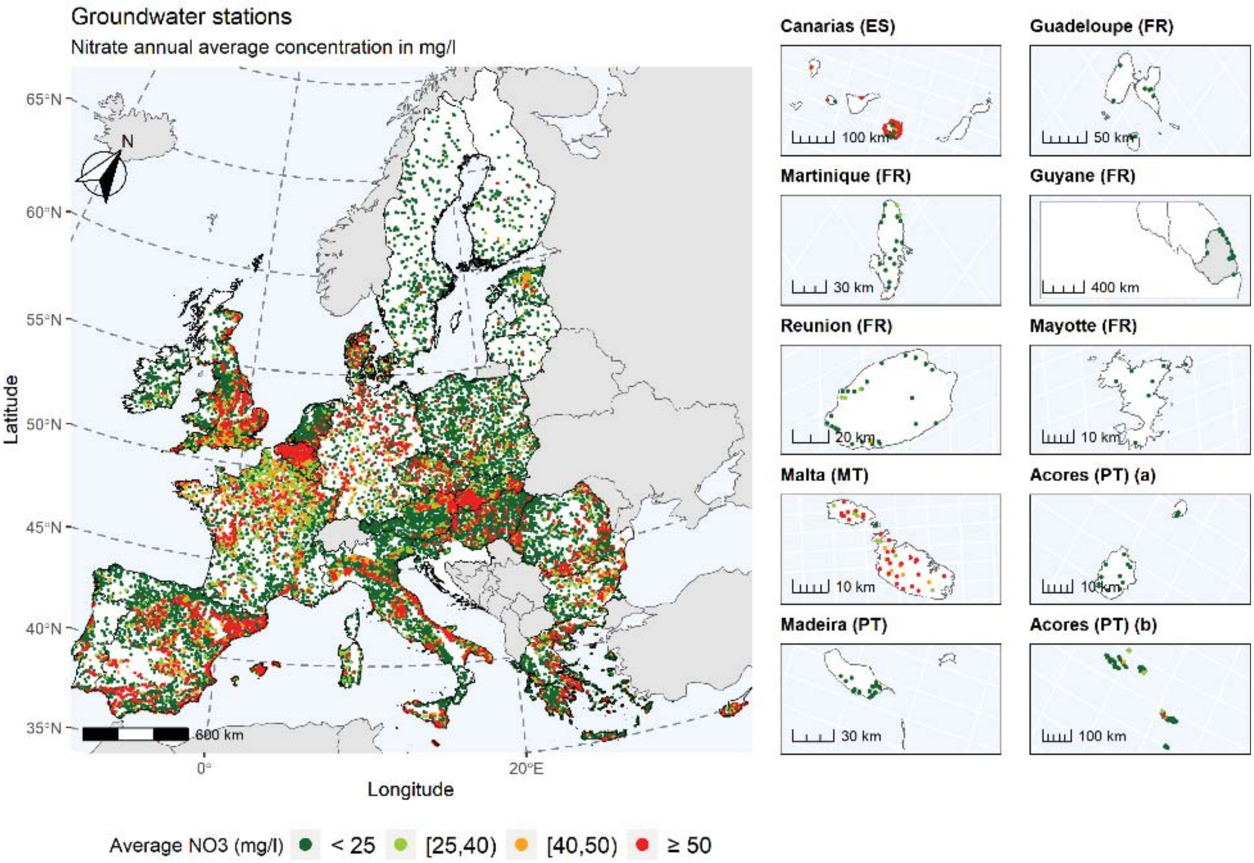


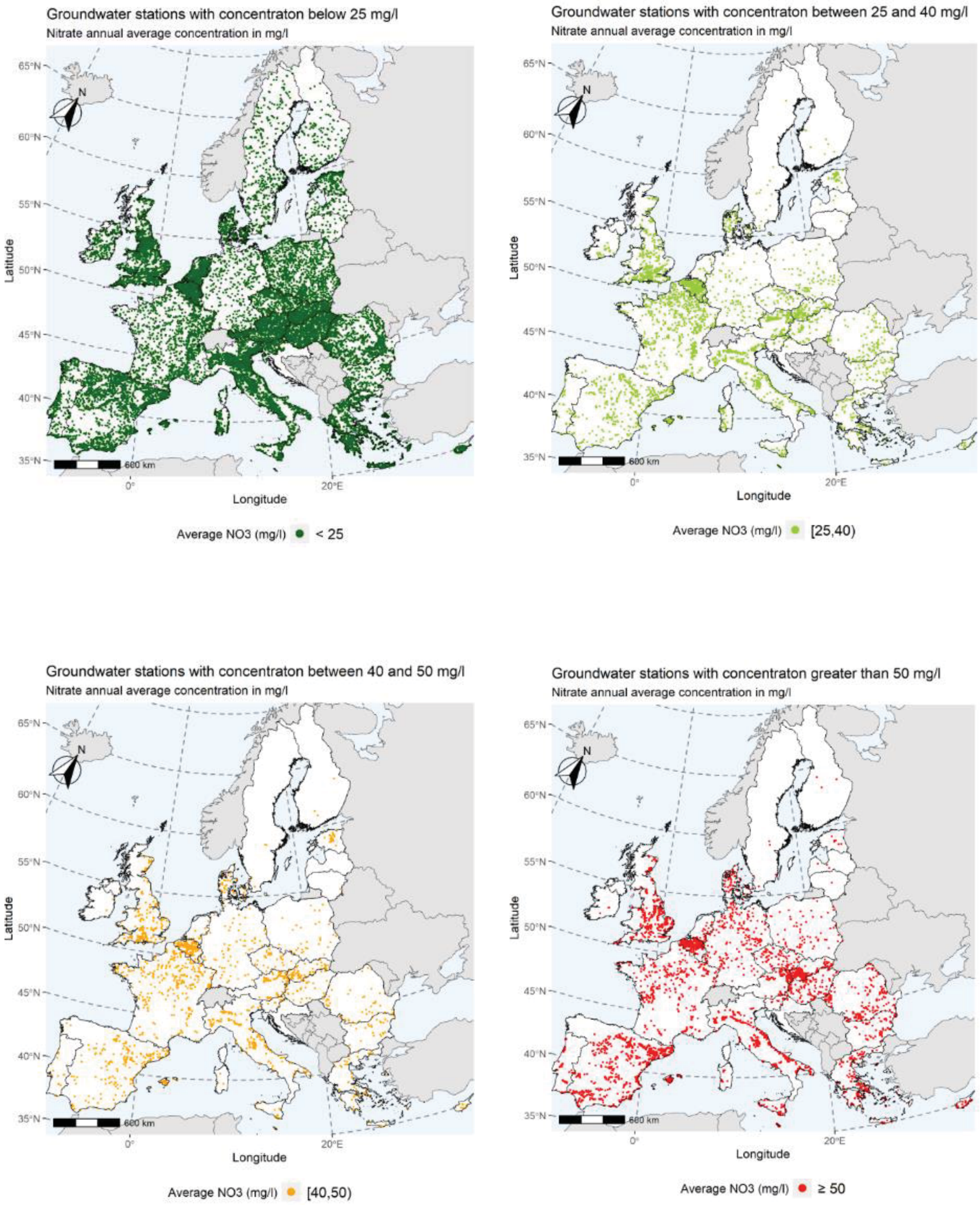
Map 6: Annual average nitrate concentrations in groundwater at the NUTS2 level, for the reporting period 2016-2019. The label 'NA' stands for not available data.



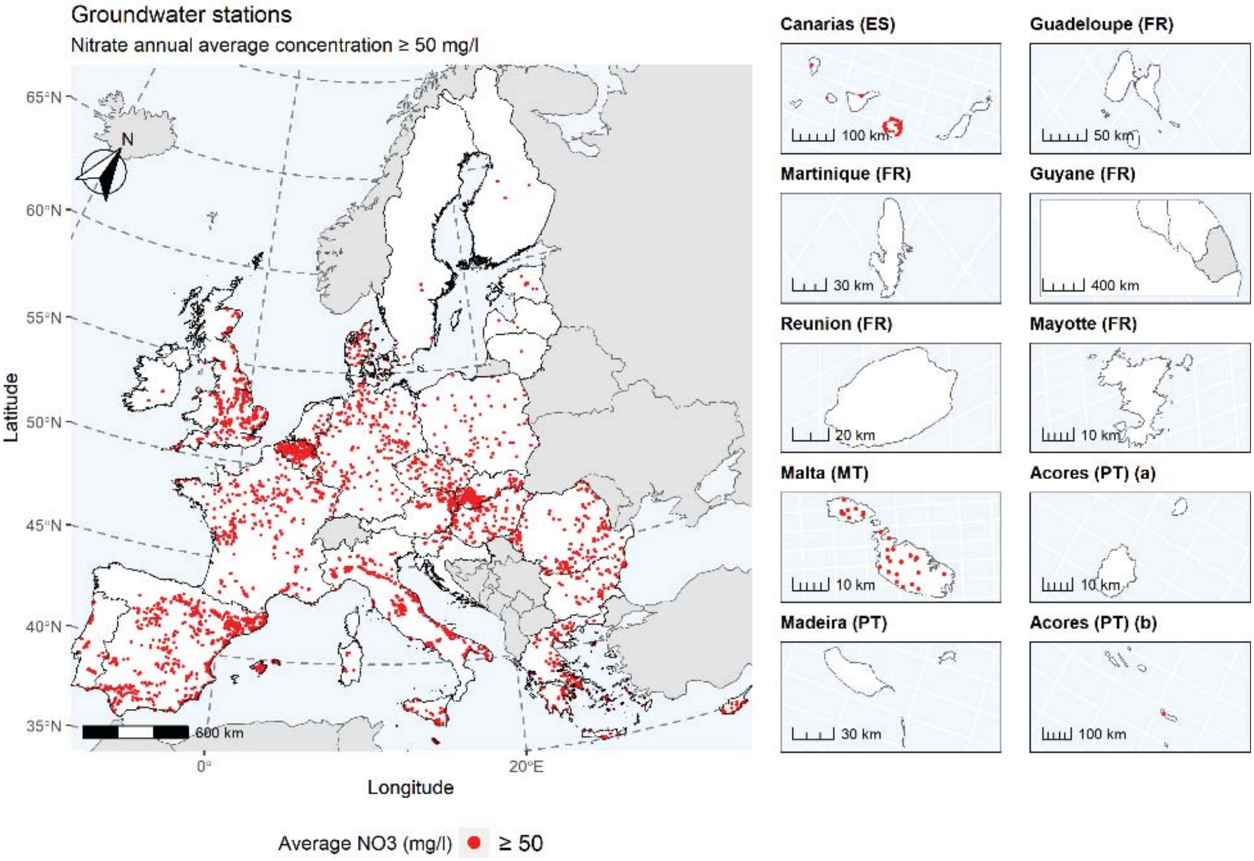
Map 7: Annual average nitrate concentrations in groundwater at the NUTS3 level, for the reporting period 2016-2019. The label 'NA' stands for not available data.



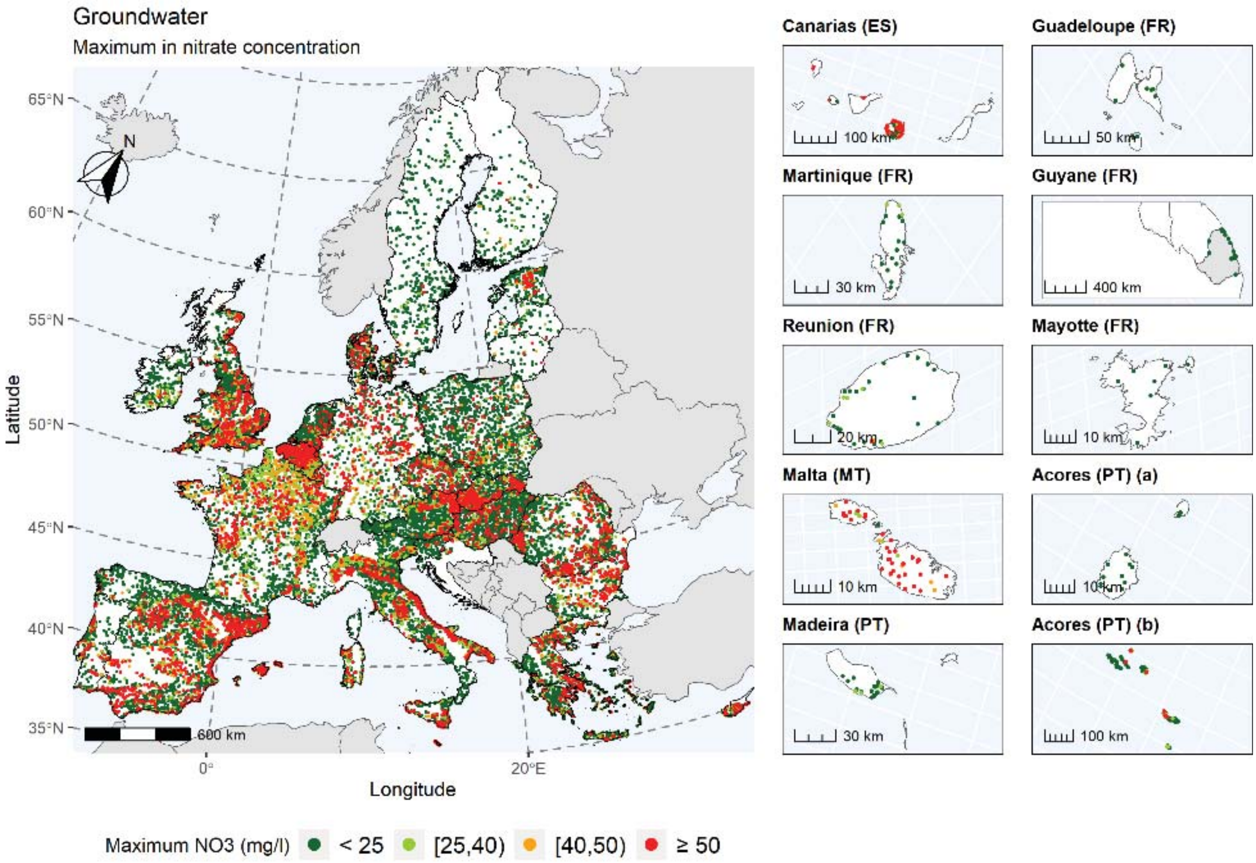
Map 8: Annual average nitrate concentrations in groundwater for the reporting period 2016-2019. Higher values are plotted on the top.



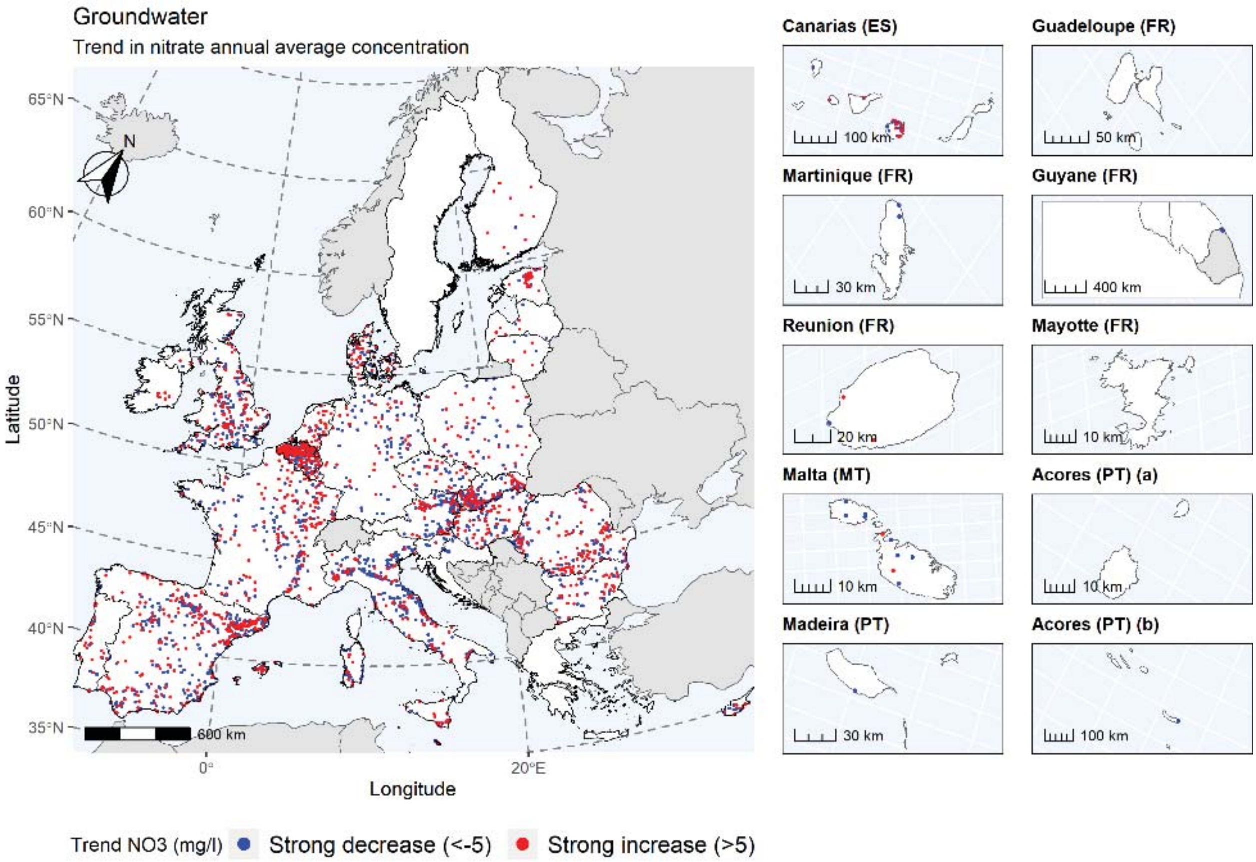
Map 9: Comparison between annual average nitrate concentrations in groundwater for each concentration class separately. Reporting period 2016-2019



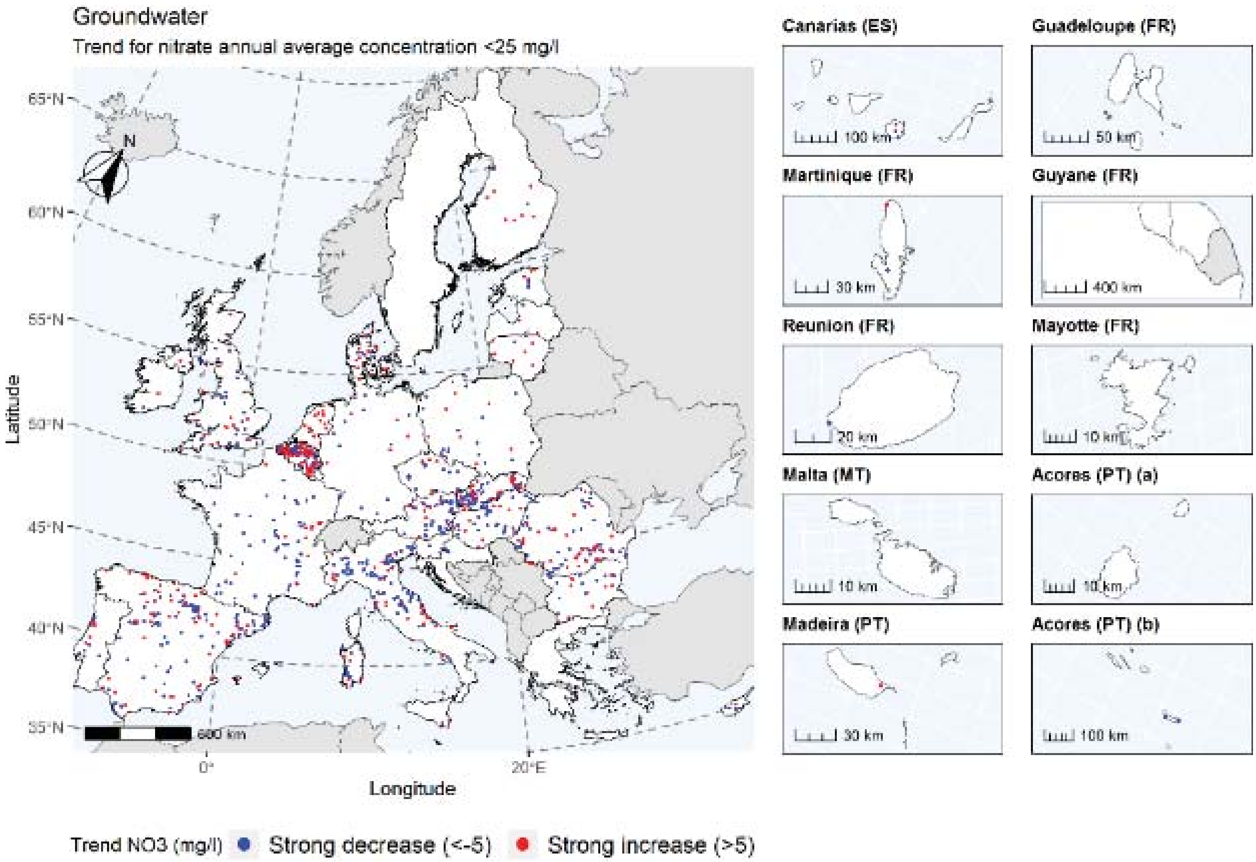
Map 10: Stations with annual average nitrate concentrations equal to or exceeding 50 mg/l in groundwater for the reporting period 2016-2019



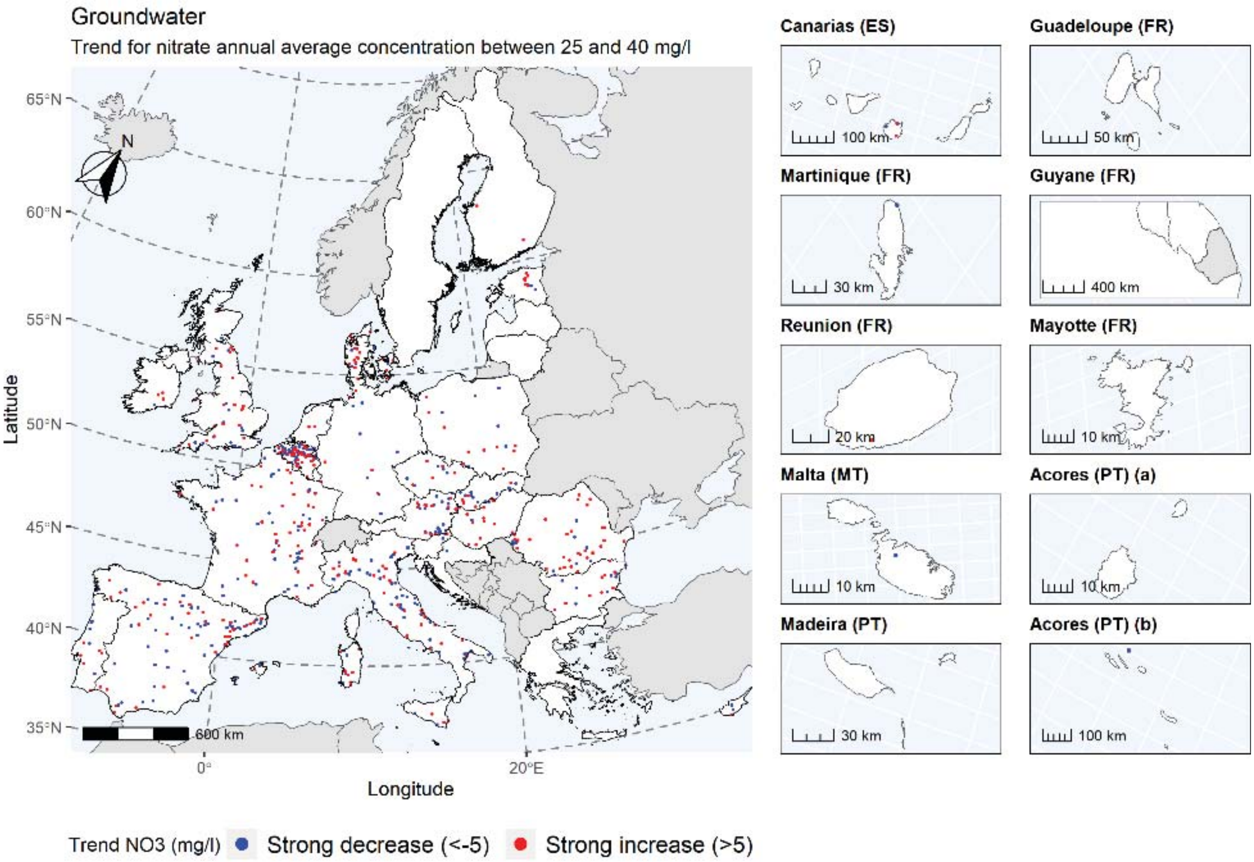
Map 11: Maximum nitrate concentrations in groundwater for the reporting period 2016-2019. Higher values are plotted on the top.



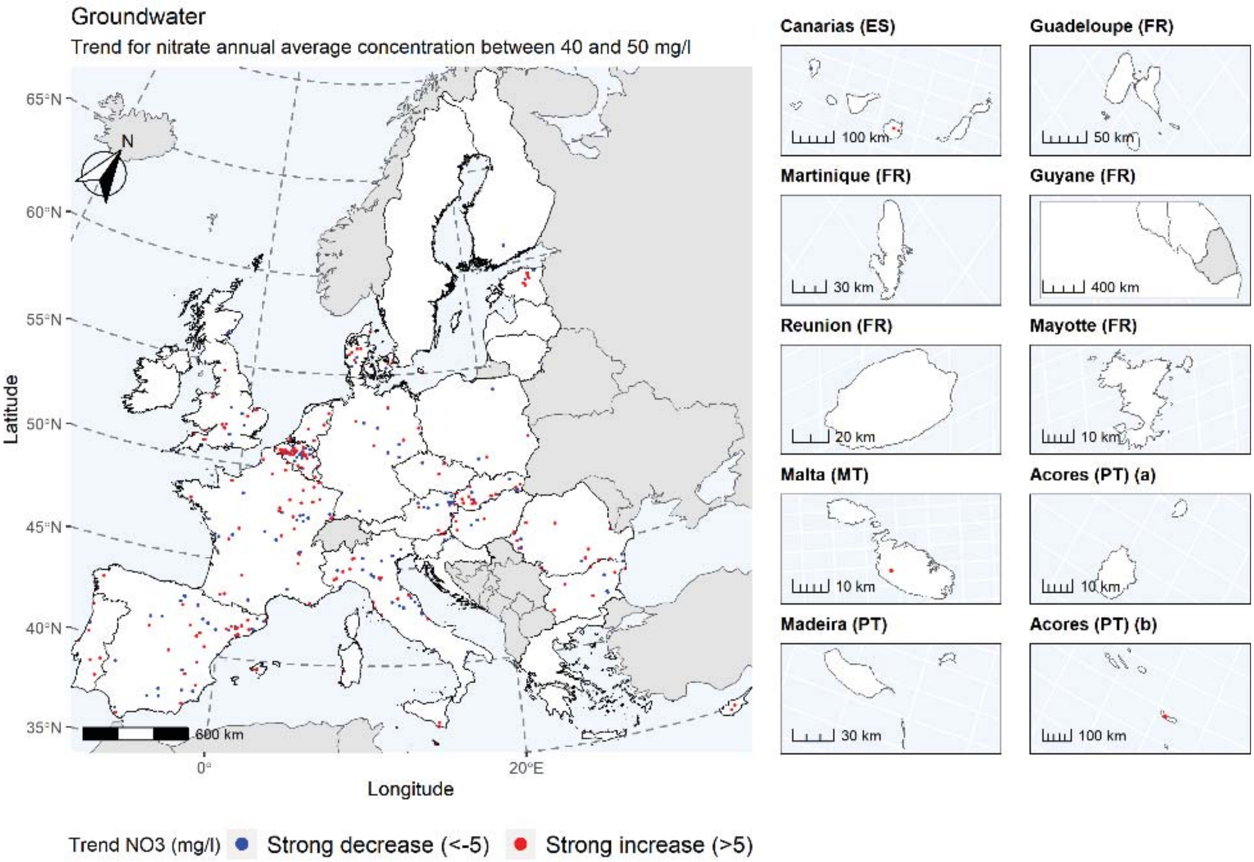
Map 12: Strong trends in nitrates concentrations in groundwater between the reporting periods 2012-2015 and 2016-2019 in all stations.



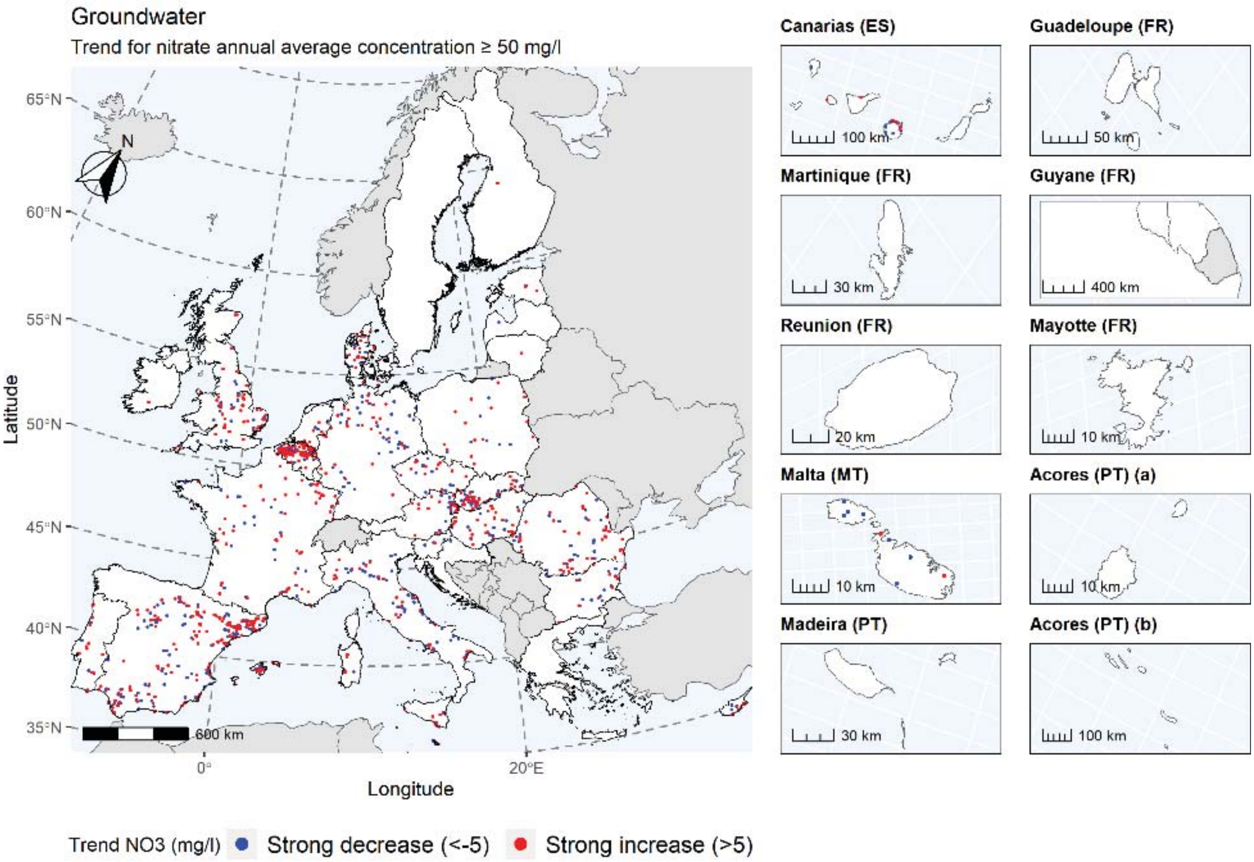
Map 13: Strong trends in nitrates concentrations in groundwater between the reporting periods 2012-2015 and 2016-2019, for stations with an average annual nitrate concentration below 25 mg/l in 2016-2019



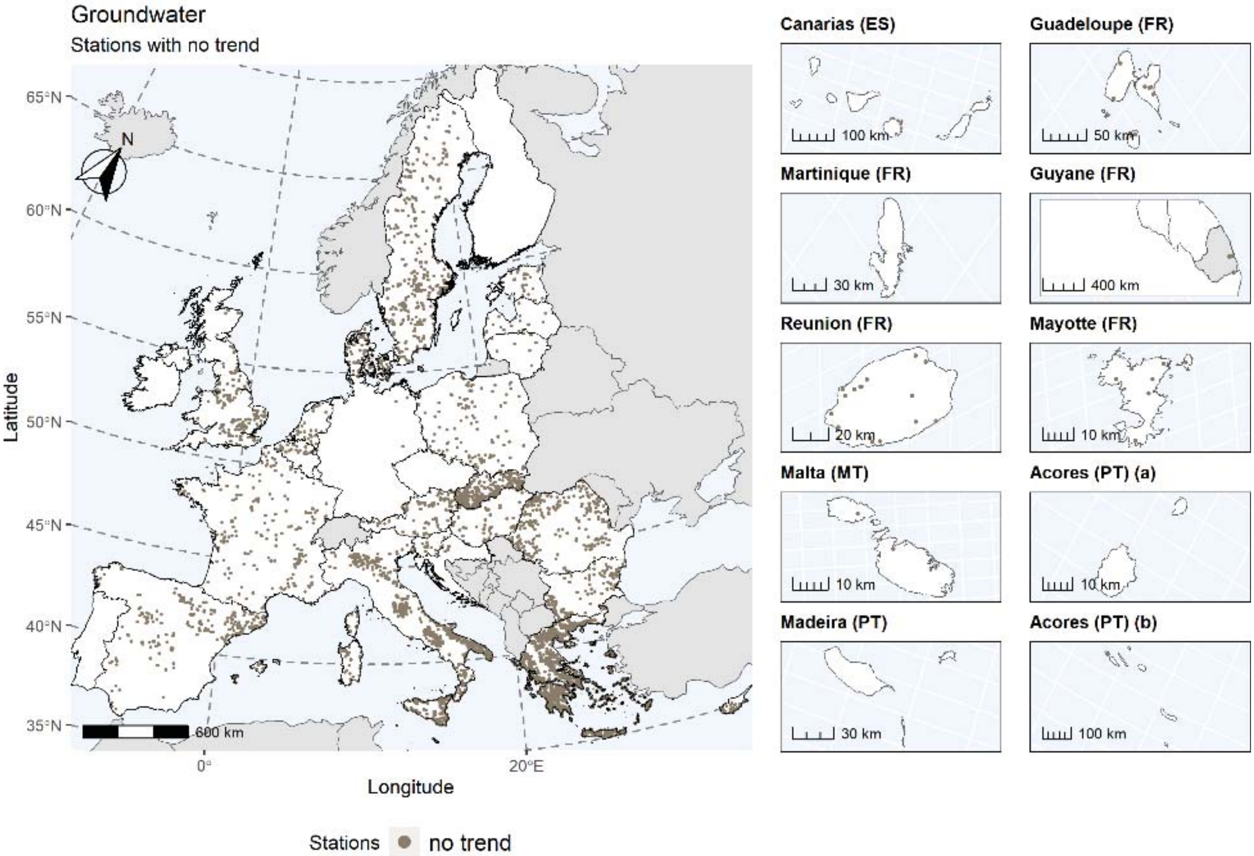
Map 14: Strong trends in nitrates concentrations in groundwater between the reporting periods 2012-2015 and 2016-2019, for stations with an average annual nitrate concentration between 25 and 40 mg/l in 2016-2019



Map 15: Strong trends in nitrates concentrations in groundwater between the reporting periods 2012-2015 and 2016-2019, for stations with an average annual nitrate concentration between 40 and 50 mg/l in 2016-2019



Map 16: Strong trends in nitrates concentrations in groundwater between the reporting periods 2012-2015 and 2016-2019, for stations with an average annual nitrate concentration equal to or above 50 mg/l in 2016-2019



Map 17: Map of stations with no trend in nitrates concentrations in groundwater between the reporting periods 2012-2015 and 2016-2019

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Surface water quality

Table 28: Percentage of fresh surface water monitoring points per water quality class (annual average nitrate concentration in mg nitrate per l) for all stations of the EU27 Member States and UK for the period 2016-2019.

	2016 - 2019					
MS	<2	[2,10)	[10,25)	[25,40)	[40,50)	≥ 50
AT	24.2	56.2	19.5	0.0	0.0	0.0
BE	6.2	29.9	38.0	15.5	5.7	4.6
BG	26.9	49.1	17.2	5.0	1.2	0.6
CY	15.4	69.2	15.4	0.0	0.0	0.0
CZ	2.4	31.8	48.5	13.3	2.2	1.8
DE	12.0	31.7	53.4	2.9	0.0	0.0
DK	8.5	25.4	55.3	10.6	0.0	0.2
EE	45.7	39.6	12.1	2.1	0.4	0.0
EL	84.9	14.8	0.0	0.4	0.0	0.0
ES	39.6	41.2	13.4	3.7	1.0	1.1
FI	67.3	32.0	0.7	0.0	0.0	0.0
FR	9.7	33.3	38.0	14.8	2.9	1.4
HR	9.3	72.0	8.0	6.7	1.3	2.7
HU	16.7	49.2	24.9	7.0	1.0	1.2
IE	50.8	31.9	16.5	0.8	0.0	0.0
IT	22.0	56.2	17.6	3.1	0.4	0.7
LT	68.2	21.8	8.7	1.4	0.0	0.0
LU	0.0	6.2	75.0	18.8	0.0	0.0
LV	62.8	31.0	5.1	1.1	0.0	0.0
MT	NA	NA	NA	NA	NA	NA
NL	17.6	55.5	23.1	2.6	0.2	0.9
PL	70.0	28.0	1.8	0.2	0.0	0.0
PT	60.8	36.7	2.5	0.0	0.0	0.0
RO	34.1	57.5	5.7	1.1	0.9	0.7
SE	95.4	3.6	0.7	0.3	0.0	0.0
SI	7.8	89.0	2.6	0.6	0.0	0.0
SK	4.3	76.7	15.9	2.0	0.2	0.8
UK	11.1	26.5	30.0	19.9	6.0	6.5
EU27+UK	**30.8**	**34.4**	**21.6**	**8.7**	**2.2**	**2.2**

(*) NA: not available

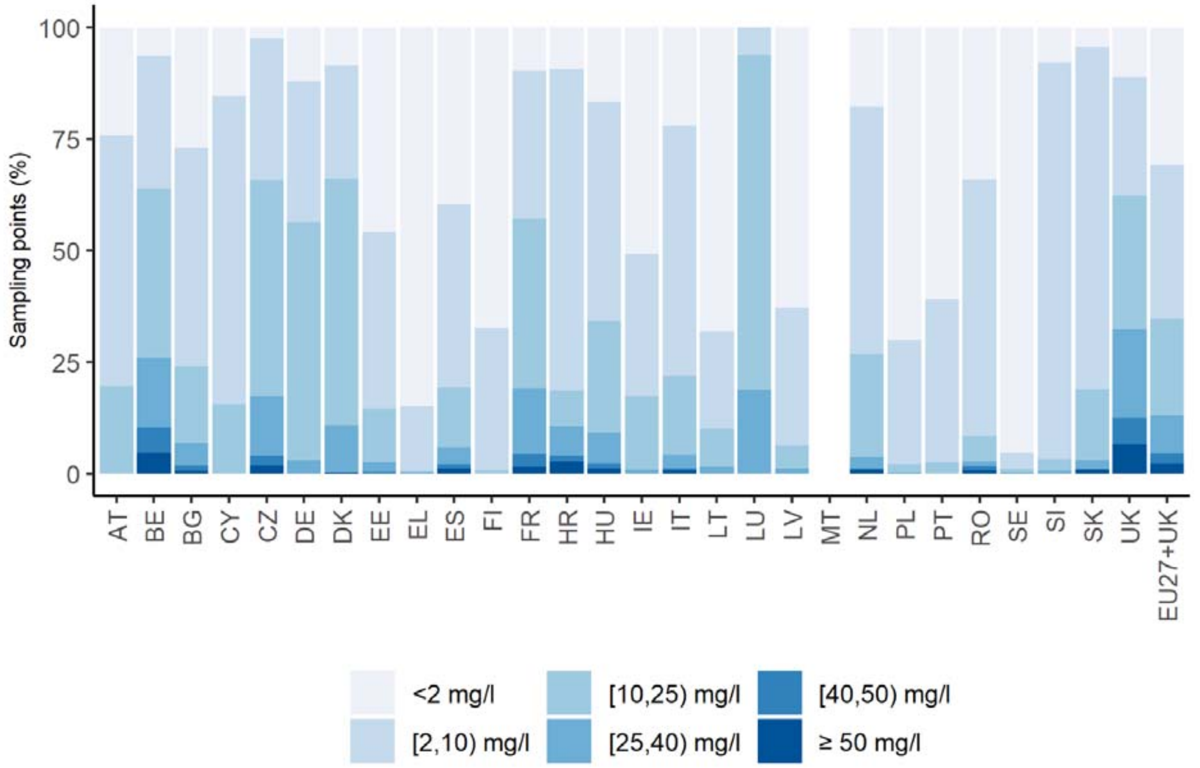


Figure 10: Frequency diagram of annual average nitrate concentrations in fresh surface waters (rivers and lakes), in reporting period 2016-2019.

Table 29: Percentage of saline surface water monitoring points per water quality class (annual average nitrate concentration in mg nitrate per l) for all stations of the EU27 Member States and UK for the period 2016-1019.

	2016 - 2019					
MS	<2	[2,10)	[10,25)	[25,40)	[40,50)	≥ 50
AT	NA	NA	NA	NA	NA	NA
BE	100.0	0.0	0.0	0.0	0.0	0.0
BG	100.0	0.0	0.0	0.0	0.0	0.0
CY	100.0	0.0	0.0	0.0	0.0	0.0
CZ	NA	NA	NA	NA	NA	NA
DE	68.6	23.5	7.8	0.0	0.0	0.0
DK	86.4	13.6	0.0	0.0	0.0	0.0
EE	100.0	0.0	0.0	0.0	0.0	0.0
EL	100.0	0.0	0.0	0.0	0.0	0.0
ES	84.3	11.3	2.9	0.8	0.3	0.3
FI	89.5	10.5	0.0	0.0	0.0	0.0
FR	0.0	26.1	52.2	21.7	0.0	0.0
HR	81.8	18.2	0.0	0.0	0.0	0.0
HU	NA	NA	NA	NA	NA	NA
IE	66.4	26.2	7.4	0.0	0.0	0.0
IT	86.3	13.3	0.2	0.0	0.0	0.2
LT	81.2	18.8	0.0	0.0	0.0	0.0
LU	NA	NA	NA	NA	NA	NA
LV	100.0	0.0	0.0	0.0	0.0	0.0
MT	100.0	0.0	0.0	0.0	0.0	0.0
NL	73.5	20.6	5.9	0.0	0.0	0.0
PL	100.0	0.0	0.0	0.0	0.0	0.0
PT	75.0	25.0	0.0	0.0	0.0	0.0
RO	87.5	12.5	0.0	0.0	0.0	0.0
SE	100.0	0.0	0.0	0.0	0.0	0.0
SI	100.0	0.0	0.0	0.0	0.0	0.0
SK	NA	NA	NA	NA	NA	NA
UK	60.8	30.2	6.8	1.4	0.7	0.2
EU27+UK	**79.9**	**15.6**	**3.3**	**0.7**	**0.2**	**0.2**

(*) NA: not available

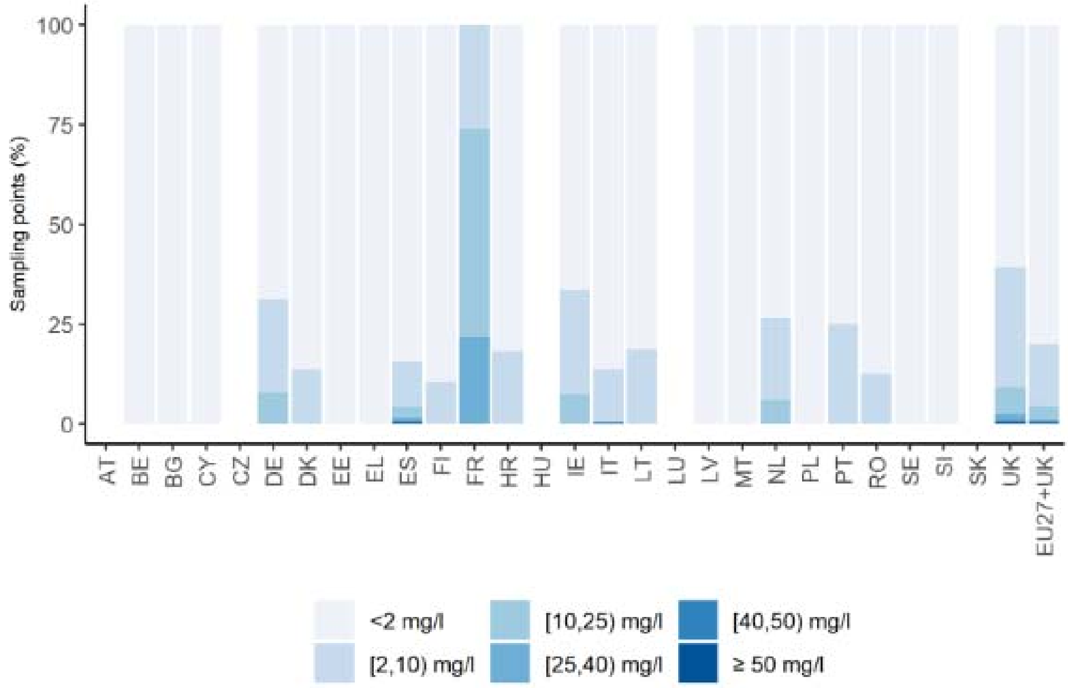


Figure 11: Frequency diagram of annual average nitrate concentrations in saline surface waters, in reporting period 2016-2019.

Table 30: Percentage of fresh surface water stations (rivers and lakes) with decreasing, stable or increasing trends in average fresh surface water nitrate concentrations between the reporting periods 2012-2015 and 2016-2019.

	2016 - 2019				
MS	< -5	[-5,1)	[1,-1]	(1,5]	>5
AT	2.9	14.7	80.4	2.0	0.0
BE	7.6	26.4	28.2	25.1	12.7
BG	1.0	12.8	63.5	16.0	6.7
CY	0.0	23.1	61.5	15.4	0.0
CZ	12.0	19.7	41.4	18.6	8.4
DE	2.4	14.7	70.3	12.6	0.0
DK	1.3	7.4	61.1	26.6	3.5
EE	0.7	7.4	64.7	22.8	4.4
EL	NA	NA	NA	NA	NA
ES	8.2	21.8	44.0	16.1	10.0
FI	0.0	12.4	81.4	6.2	0.0
FR	7.1	19.5	43.2	20.4	9.8
HR	3.1	10.9	70.3	12.5	3.1
HU	12.8	23.7	44.4	15.2	3.9
IE	0.0	2.4	83.9	13.0	0.8
IT	4.5	19.7	56.0	16.0	3.8
LT	0.0	7.3	70.4	16.5	5.8
LU	0.0	31.2	43.8	25.0	0.0
LV	0.6	8.5	57.3	22.6	11.0
MT	NA	NA	NA	NA	NA
NL	3.2	19.6	62.5	13.4	1.2
PL	37.4	42.7	19.2	0.6	0.1
PT	0.7	9.9	84.2	5.3	0.0
RO	2.4	15.8	68.2	11.5	2.2
SE	0.0	0.0	100.0	0.0	0.0
SI	0.0	5.9	84.4	9.6	0.0
SK	1.7	21.9	56.6	14.0	5.8
UK	3.0	12.2	44.5	26.9	13.4
EU27+UK	**8.1**	**19.1**	**46.3**	**18.4**	**8.2**

(*) NA: not available

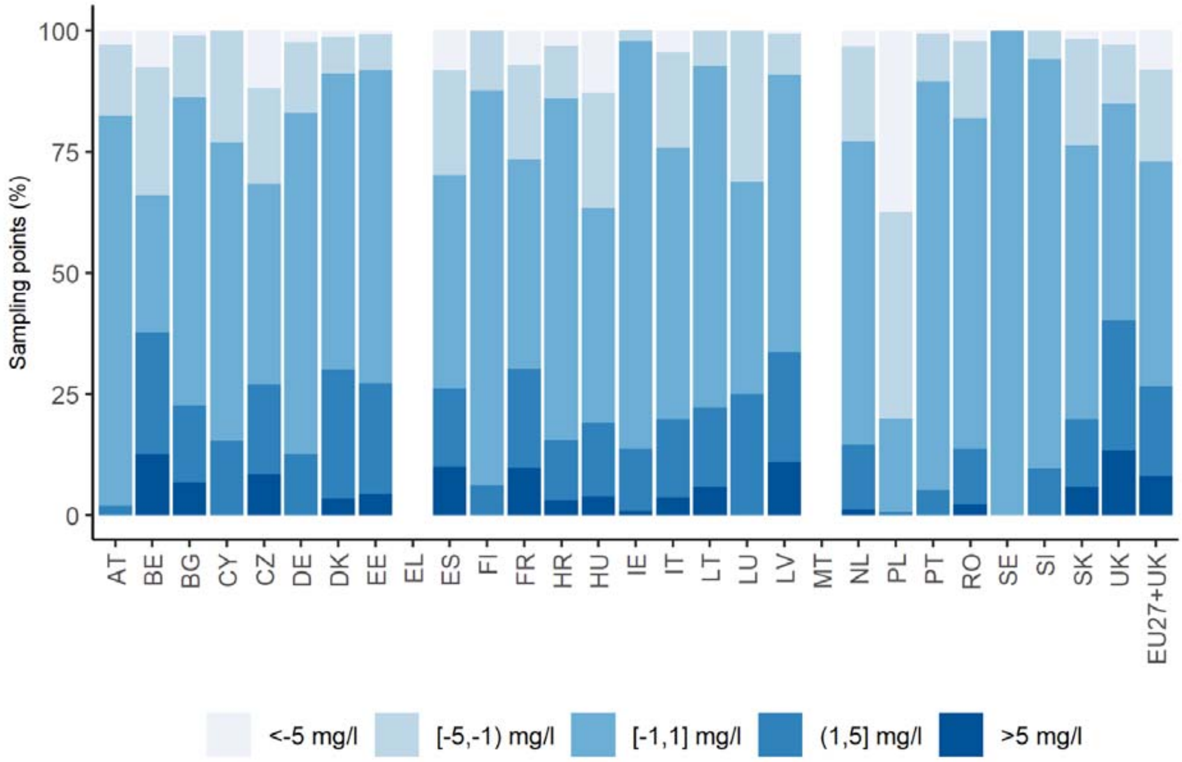


Figure 12: Frequency diagram of trends in annual average nitrate concentrations in fresh surface water (rivers and lakes). Reporting period 2016-2019

Table 31: Percentage of saline surface water stations with decreasing, stable or increasing trends in average saline surface water nitrate concentrations between the reporting periods 2012-2015 and 2016-2019.

	2016 - 2019				
MS	< -5	[-5,1)	[1,-1]	(1,5]	>5
AT	NA	NA	NA	NA	NA
BE	0.0	0.0	100.0	0.0	0.0
BG	0.0	0.0	100.0	0.0	0.0
CY	0.0	0.0	87.5	12.5	0.0
CZ	NA	NA	NA	NA	NA
DE	0.0	20.0	80.0	0.0	0.0
DK	0.0	0.0	100.0	0.0	0.0
EE	0.0	0.0	100.0	0.0	0.0
EL	NA	NA	NA	NA	NA
ES	0.4	5.0	94.3	0.4	0.0
FI	0.0	4.8	92.9	2.4	0.0
FR	28.6	28.6	42.9	0.0	0.0
HR	NA	NA	NA	NA	NA
HU	NA	NA	NA	NA	NA
IE	0.0	3.7	91.7	4.6	0.0
IT	0.0	2.6	91.5	5.2	0.7
LT	0.0	0.0	93.8	6.2	0.0
LU	NA	NA	NA	NA	NA
LV	0.0	0.0	100.0	0.0	0.0
MT	0.0	18.2	81.8	0.0	0.0
NL	0.0	8.8	91.2	0.0	0.0
PL	0.0	0.0	100.0	0.0	0.0
PT	0.0	0.0	100.0	0.0	0.0
RO	3.1	62.5	34.4	0.0	0.0
SE	NA	NA	NA	NA	NA
SI	0.0	0.0	100.0	0.0	0.0
SK	NA	NA	NA	NA	NA
UK	1.4	14.5	76.5	5.3	2.2
EU27+UK	**0.8**	**8.2**	**86.5**	**3.7**	**0.9**

(*) NA: not available

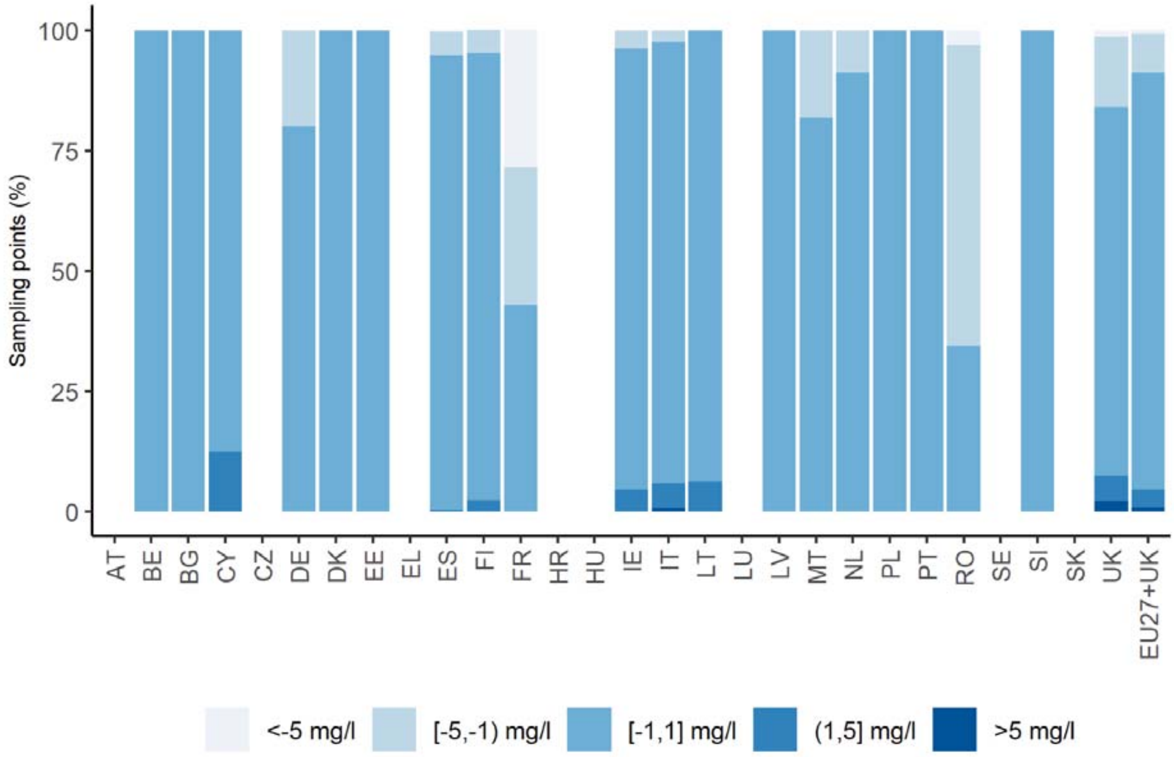


Figure 13: Frequency diagram of trends in annual average nitrate concentrations in saline surface water. Reporting period 2016-2019

Table 32: Percentage of surface water stations by classes of annual nitrate concentrations for different stations type and aggregated over all Member States. Reporting period 2016-2019

	Percentage of stations					
Type	<2 mg/l	[2,10) mg/l	[10,25) mg/l	[25,40) mg/l	[40,50) mg/l	≥ 50 mg/l
Rivers	21.0	37.8	25.5	10.4	2.7	2.6
Lakes	80.2	17.3	2.2	0.3	0	0.1
Transitional waters	58.0	30.6	8.6	1.7	0.6	0.4
Coastal waters	91.8	7.7	0.3	0.1	0	0
Marine waters	100.0	0	0	0	0	0

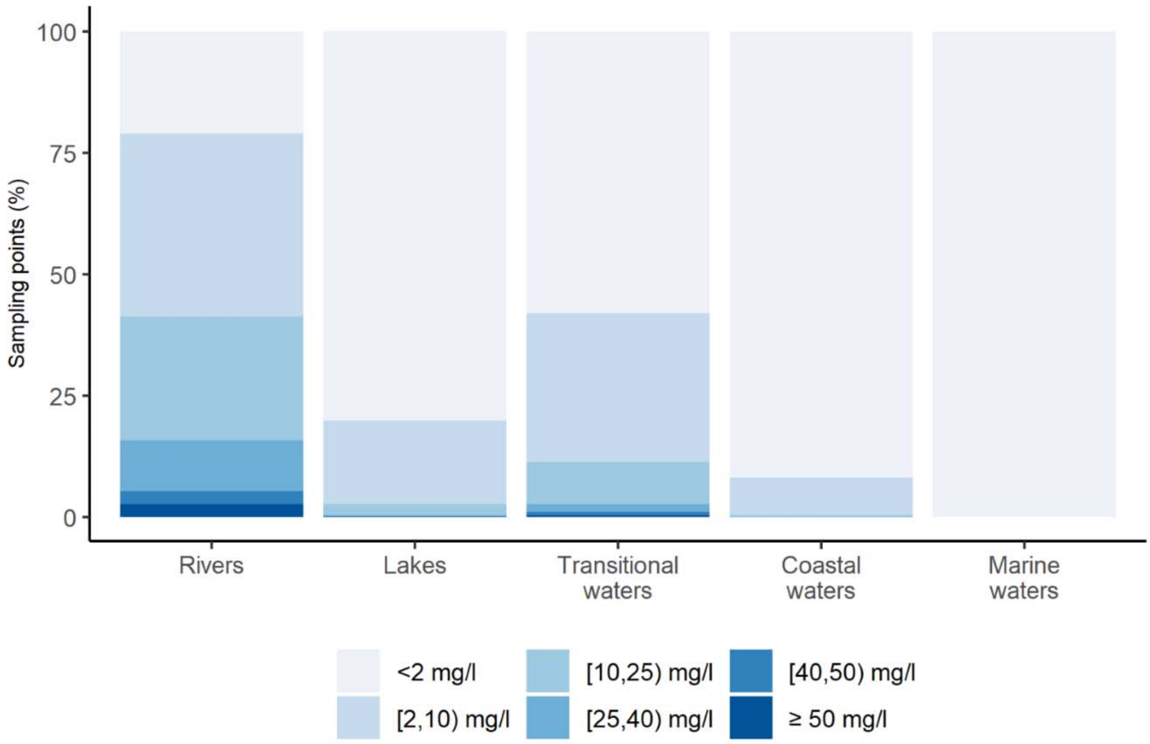


Figure 14: Frequency diagram of annual average nitrate concentrations in different surface waters, aggregated over all Member States. Reporting period 2016-2019.

Table 33: Percentage of river stations at different trophic status for all EU27 Member States and UK in reporting period 2016-2019.

MS	Percentage of stations		
	Eutrophic	Could become eutrophic	Non eutrophic
AT	16.0	7.0	77.0
BE	83.1	3.1	13.8
BG	2.2	9.0	88.8
CY	0.0	0.0	100.0
CZ	89.6	2.6	7.8
DE	51.8	28.5	19.7
DK	72.4	0.0	27.6
EE	8.2	20.7	71.2
EL	19.5	64.1	16.5
ES	NA	NA	NA
FI	82.4	0.0	17.6
FR	8.3	46.9	44.8
HR	32.4	11.3	56.3
HU	77.5	5.1	17.5
IE	16.3	2.8	80.9
IT	23.0	10.7	66.4
LT	25.8	4.8	69.4
LU	75.0	25.0	0.0
LV	29.4	2.5	68.1
MT	NA	NA	NA
NL	60.1	8.6	31.3
PL	55.0	10.5	34.5
PT	15.1	24.5	60.4
RO	40.0	11.4	48.7
SE	22.3	20.3	57.4
SI	17.3	4.5	78.2
SK	17.9	18.7	63.3
UK	22.4	11.2	66.5
EU27+UK	**35.7**	**18.7**	**45.7**

(*) NA: not available

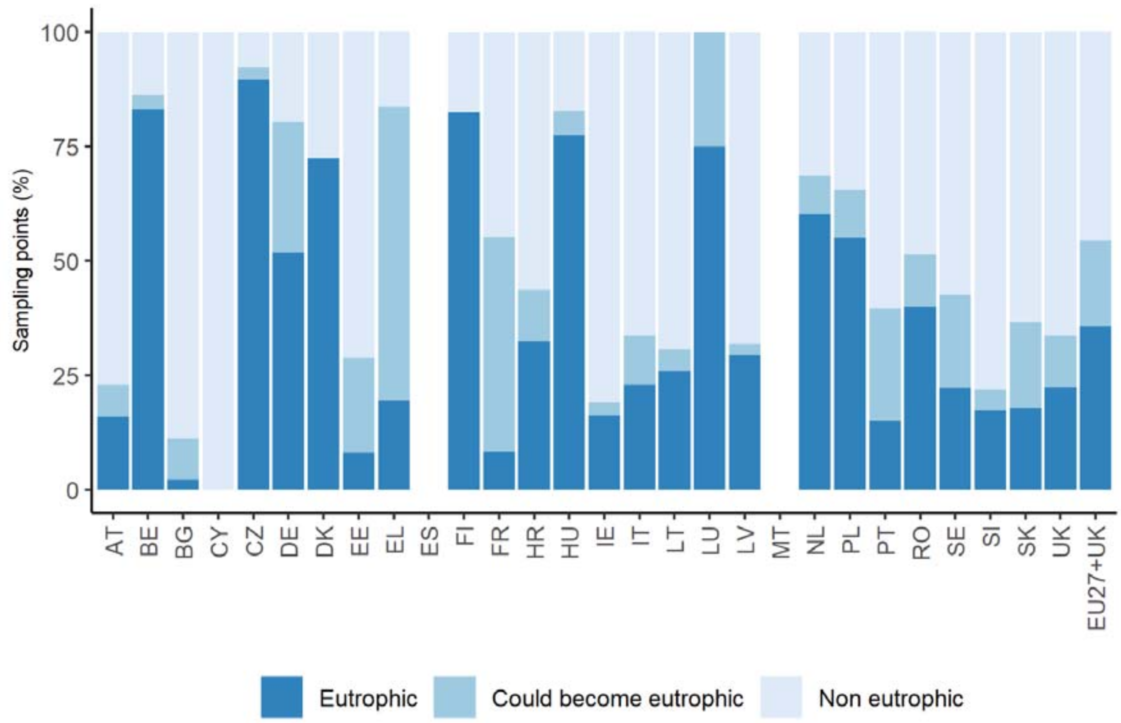


Figure 15: Frequency diagram of the trophic status of rivers in reporting period 2016-2019.

Table 34: Percentage of lake stations at different trophic status for all EU27 Member States and UK in reporting period 2016-2019.

	Percentage of stations		
MS	Eutrophic	Could become eutrophic	Non eutrophic
AT	0.0	3.6	96.4
BE	39.1	0.0	60.9
BG	75.0	21.2	3.8
CY	NA	NA	NA
CZ	NA	NA	NA
DE	33.9	12.9	53.2
DK	84.1	0.0	15.9
EE	37.0	20.5	42.5
EL	39.1	37.0	23.9
ES	23.2	0.0	76.8
FI	68.4	15.2	16.5
FR	0.0	40.0	60.0
HR	0.0	0.0	100.0
HU	33.0	4.5	62.5
IE	8.1	25.7	66.2
IT	21.3	36.8	41.9
LT	22.0	3.1	74.9
LU	NA	NA	NA
LV	64.5	0.0	35.5
MT	NA	NA	NA
NL	58.0	10.3	31.7
PL	73.9	0.0	26.1
PT	56.7	20.0	23.3
RO	38.5	8.1	53.3
SE	3.1	8.2	88.7
SI	45.5	36.4	18.2
SK	45.5	0.0	54.5
UK	15.5	34.5	50.0
EU27+UK	**31.8**	**8.1**	**60.1**

(*) NA: not available

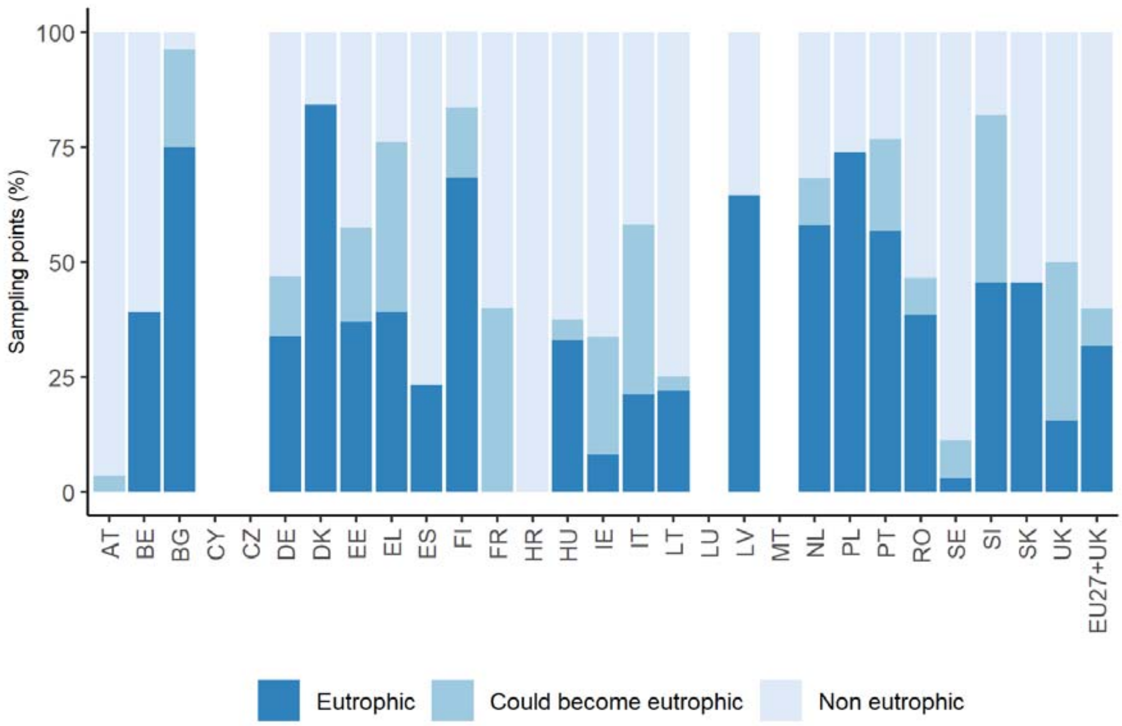


Figure 16: Frequency diagram of the trophic status of lakes in reporting period 2016-2019

Table 35: Percentage of transitional water stations at different trophic status for all EU27 Member States and UK in reporting period 2016-2019.

	Percentage of stations		
MS	Eutrophic	Could become eutrophic	Non eutrophic
AT	NA	NA	NA
BE	100.0	0.0	0.0
BG	NA	NA	NA
CY	NA	NA	NA
CZ	NA	NA	NA
DE	100.0	0.0	0.0
DK	NA	NA	NA
EE	NA	NA	NA
EL	NA	NA	NA
ES	27.0	0.0	73.0
FI	NA	NA	NA
FR	NA	NA	NA
HR	33.3	16.7	50.0
HU	NA	NA	NA
IE	22.2	11.1	66.7
IT	28.3	17.9	53.8
LT	100.0	0.0	0.0
LU	NA	NA	NA
LV	100.0	0.0	0.0
MT	NA	NA	NA
NL	0.0	100.0	0.0
PL	100.0	0.0	0.0
PT	30.0	30.0	40.0
RO	100.0	0.0	0.0
SE	NA	NA	NA
SI	NA	NA	NA
SK	NA	NA	NA
UK	15.6	34.4	50.0
EU27+UK	**32.0**	**11.7**	**56.3**

(*) NA: not available

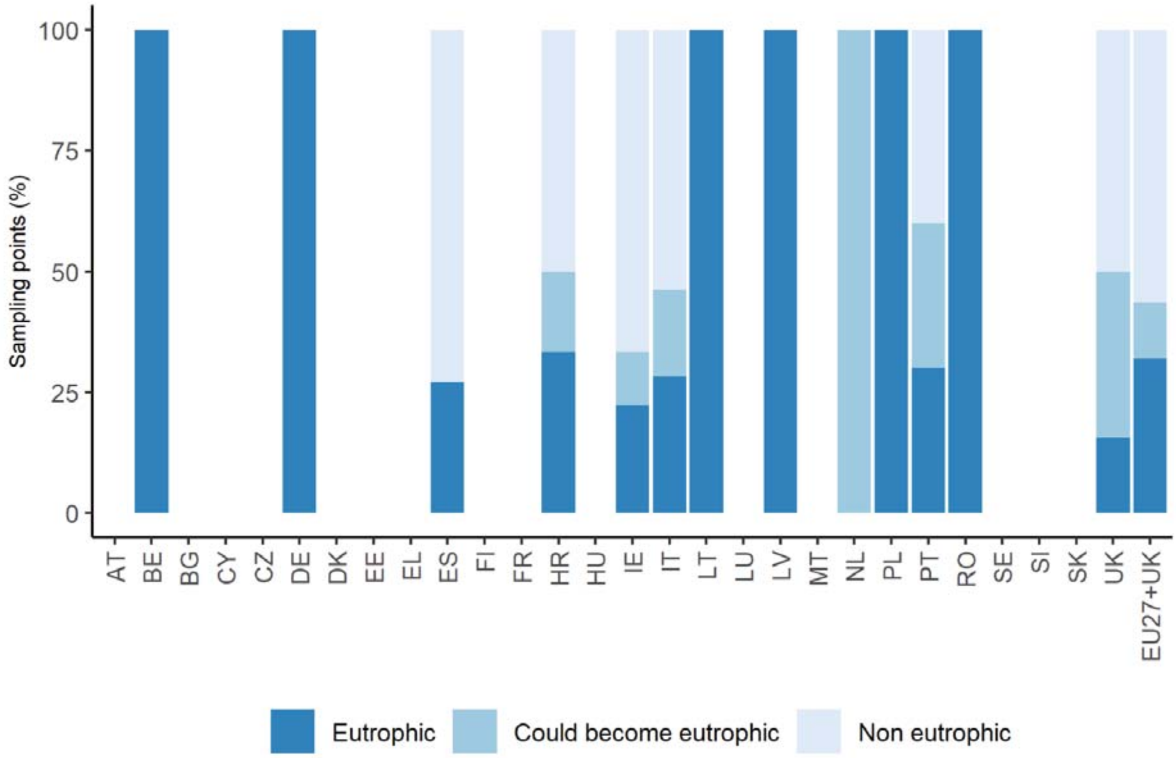


Figure 17: Frequency diagram of trophic status classes of transitional waters in reporting period 2016-2019.

Table 36: Percentage coastal water stations at different trophic status for all EU27 Member States and UK in reporting period 2016-2019.

	Percentage of stations		
MS	Eutrophic	Could become eutrophic	Non eutrophic
AT	NA	NA	NA
BE	0.0	50.0	50.0
BG	16.7	83.3	0.0
CY	0.0	0.0	100.0
CZ	NA	NA	NA
DE	100.0	0.0	0.0
DK	95.8	0.0	4.2
EE	64.3	28.6	7.1
EL	8.2	32.7	59.2
ES	2.3	0.0	97.7
FI	98.7	0.0	1.3
FR	14.0	0.0	86.0
HR	0.0	0.0	100.0
HU	NA	NA	NA
IE	0.0	28.6	71.4
IT	7.5	5.1	87.5
LT	100.0	0.0	0.0
LU	NA	NA	NA
LV	100.0	0.0	0.0
MT	0.0	0.0	100.0
NL	66.7	22.2	11.1
PL	100.0	0.0	0.0
PT	0.0	25.0	75.0
RO	100.0	0.0	0.0
SE	67.5	9.2	23.3
SI	0.0	0.0	100.0
SK	NA	NA	NA
UK	18.2	4.5	77.3
EU27+UK	**30.8**	**5.4**	**63.9**

(*) NA: not available

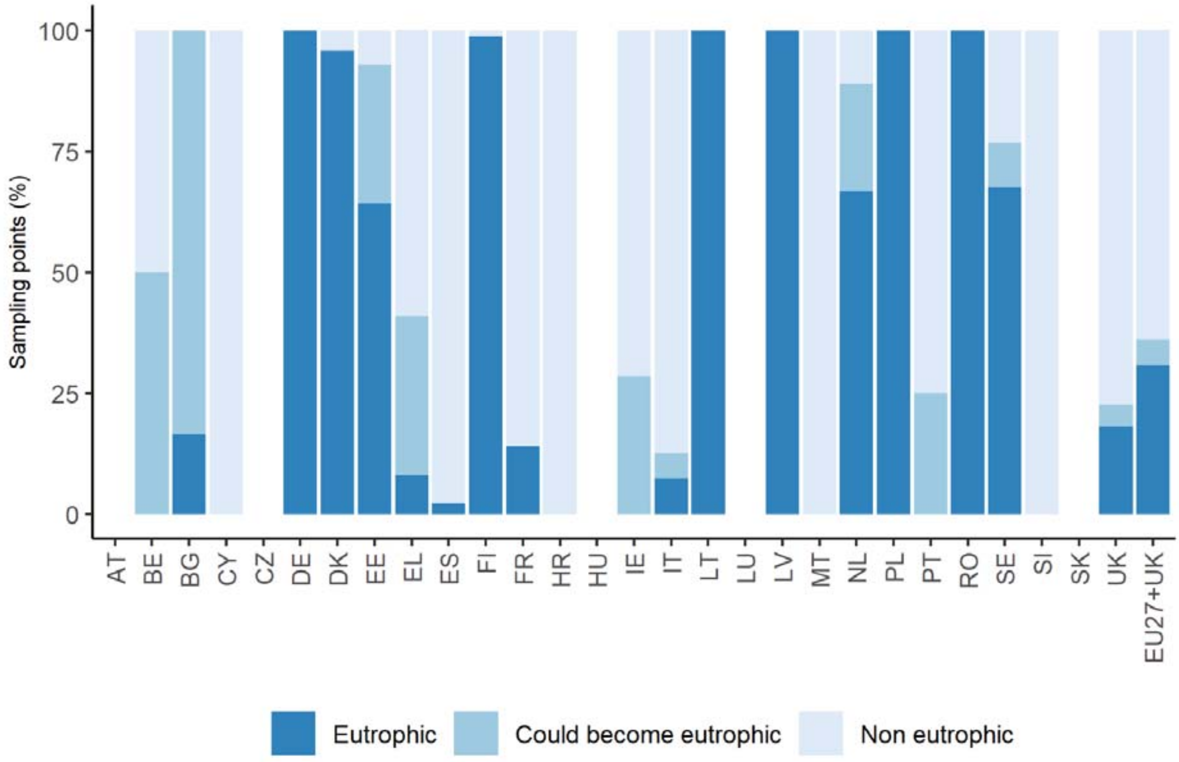


Figure 18: Frequency diagram of trophic status classes of coastal waters in reporting period 2016-2019.

Table 37: Percentage of marine water stations at different trophic status for all EU27 Member States and UK in reporting period 2016-2019.

	Percentage of stations		
MS	Eutrophic	Could become eutrophic	Non eutrophic
AT	NA	NA	NA
BE	0.0	0	100.0
BG	NA	NA	NA
CY	NA	NA	NA
CZ	NA	NA	NA
DE	100.0	0	0.0
DK	85.7	0	14.3
EE	NA	NA	NA
EL	NA	NA	NA
ES	NA	NA	NA
FI	NA	NA	NA
FR	NA	NA	NA
HR	NA	NA	NA
HU	NA	NA	NA
IE	NA	NA	NA
IT	62.5	0	37.5
LT	100.0	0	0.0
LU	NA	NA	NA
LV	100.0	0	0.0
MT	0.0	0	100.0
NL	NA	NA	NA
PL	NA	NA	NA
PT	NA	NA	NA
RO	100.0	0	0.0
SE	94.3	0	5.7
SI	NA	NA	NA
SK	NA	NA	NA
UK	NA	NA	NA
EU27+UK	**80.8**	**0**	**19.2**

(*) NA: not available

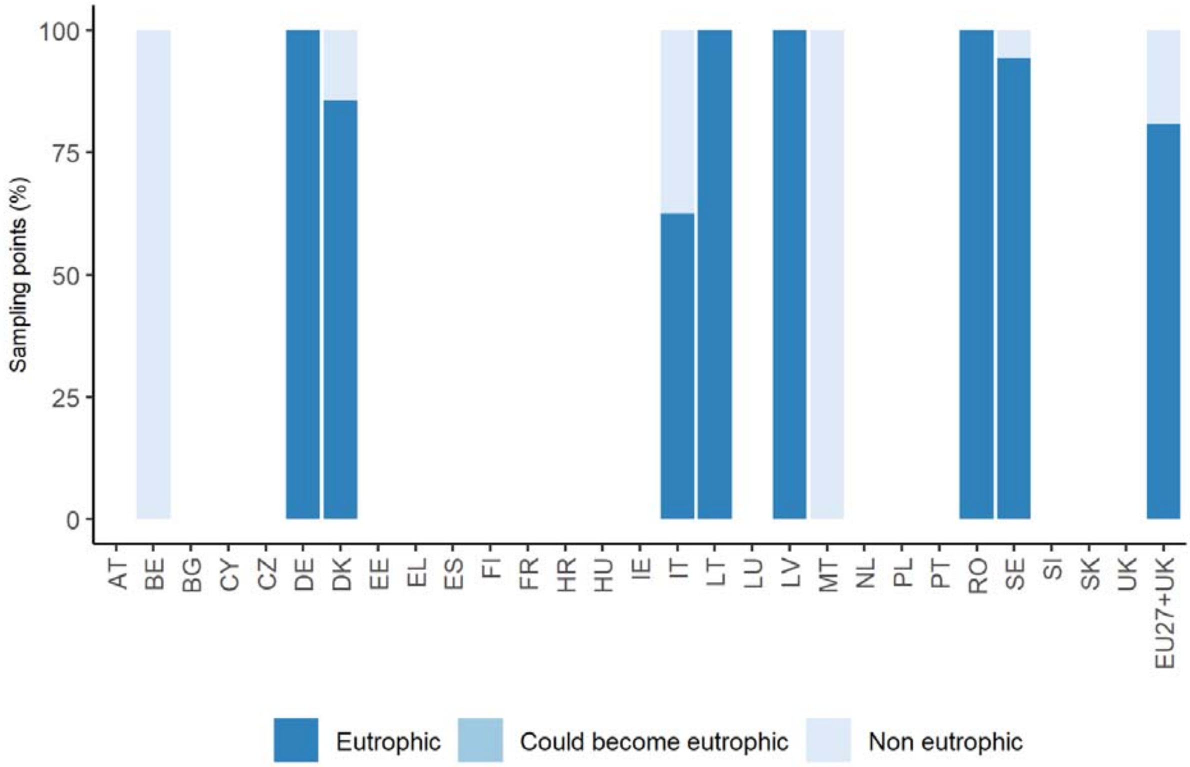


Figure 19: Frequency diagram of trophic status classes of marine waters in reporting period 2016-2019.

Table 38: Percentage of surface water stations at different trophic status for the reporting period 2016-2019. Note that the number of underlying Member States is different per water type.

Type	Percentage of stations		
	Eutrophic	Could become eutrophic	Non eutrophic
Rivers	35.7	18.7	45.7
Lakes	31.8	8.1	60.1
Transitional waters	32.0	11.7	56.3
Coastal waters	30.8	5.4	63.9
Marine waters	80.8	0	19.2

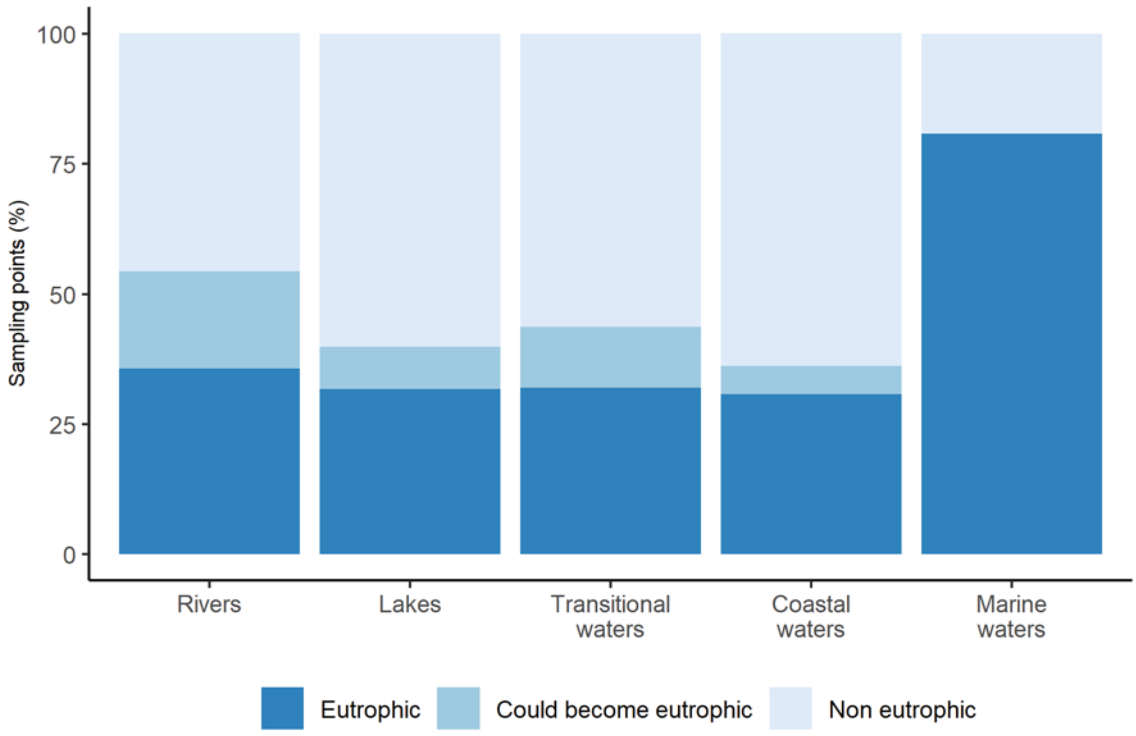


Figure 20: Frequency diagram of trophic status classes of different water types in reporting period 2016-2019. Note that the number of underlying Member States is different per water type.

Table 39: Percentage of fresh surface water monitoring points per water quality class, aggregated by sea regions and sub-regions. Reporting period 2016-2019.

Region	Sub-region	Percentage of stations by classes of NO_3 concentration						Total number of stations
		<2 mg/l	[2,10) mg/l	[10,25) mg/l	[25,40) mg/l	[40,50) mg/l	≥ 50 mg/l	
Artic Ocean	Norwegian Sea	100.0	0	0	0	0	0	11
Baltic Sea	Baltic Proper	68.1	27.3	4.1	0.5	0	0	5232
Baltic Sea	Gulf of Bothnia	97.3	2.6	0.1	0	0	0	1151
Baltic Sea	Gulf of Finland	57.7	31.9	8.5	1.6	0.4	0	248
Baltic Sea	Gulf of Riga	58.1	32.8	6.9	2.2	0	0	494
Baltic Sea	Kattegat	41.1	17.5	34.4	7	0	0	474
Black Sea	Black Sea	17.4	56.4	19.7	4.7	0.9	1	3903
Caribbean Sea	Caribbean Sea	70.4	29.6	0	0	0	0	27
Indian Ocean	Indian Ocean	90.5	9.5	0	0	0	0	21
Indian Ocean	Mozambique Channel	90.0	10	0	0	0	0	20
Mediterranean Sea	Adriatic Sea	16.9	58.8	19.8	3.4	0.5	0.6	1471
Mediterranean Sea	Aegean Sea	56.3	37.5	5.5	0.6	0	0	325
Mediterranean Sea	Alboran Med	40.6	51.2	7.1	1.2	0	0	170
Mediterranean Sea	Central Med	40.9	29.5	18.2	11.4	0	0	44
Mediterranean Sea	Ionian Sea	76.2	16.9	3.1	3.1	0.6	0	160
Mediterranean Sea	North Levantine	15.4	69.2	15.4	0	0	0	13
Mediterranean Sea	Nortwest Med	22.6	44.1	25.5	5.3	1.2	1.4	1702
Mediterranean Sea	South Levantine	100.0	0	0	0	0	0	2
Mediterranean Sea	Southwest Med	25.8	48.9	11.8	5.9	2.7	5	221
Mediterranean Sea	Tyrrhenean	32.5	52.4	13.4	1.2	0	0.6	674
North Atlantic Ocean	Bay of Biscay	7.2	44.1	31.6	12.5	2.9	1.6	1918
North Atlantic Ocean	Bristol Channel	5.2	24.7	41.6	21	4.9	2.6	1369
North Atlantic Ocean	Celtic Sea	1.9	23.5	61.1	12.3	0.6	0.6	162
North Atlantic Ocean	English Channel	3.0	22.1	46.3	23.3	3	2.3	1321
North Atlantic Ocean	Inner Seas off the West Coast of Scotland	33.7	57.4	8.7	0	0.2	0	564
North Atlantic Ocean	Irish Sea and St. George's Channel	19.2	41.5	25.5	10.1	1.8	1.8	1252
North Atlantic Ocean	North Atlantic Ocean	52.3	34.2	9.4	2.9	0.6	0.5	2428
North Sea	North Sea	7.9	25.4	34.7	18.9	6.2	6.9	7464
North Sea	Skagerrak	95.3	2.3	2.3	0	0	0	343

Table 40: Percentage of fresh surface water monitoring points per water quality class, aggregated by sea regions. Reporting period 2016-2019.

Region	Percentage of stations by classes of NO_3 concentration						Total number of stations
	<2 mg/l	[2,10) mg/l	[10,25) mg/l	[25,40) mg/l	[40,50) mg/l	≥ 50 mg/l	
Artic Ocean	100.0	0	0	0	0	0	11
Baltic Sea	69.9	23.4	5.7	1	0	0	7599
Black Sea	17.4	56.4	19.7	4.7	0.9	1	3903
Caribbean Sea	70.4	29.6	0	0	0	0	27
Indian Ocean	90.2	9.8	0	0	0	0	41
Mediterranean Sea	27.3	48.8	18.5	3.7	0.7	1	4782
North Atlantic Ocean	21.7	35.4	27.6	11.7	2.3	1.5	9014
North Sea	11.8	24.4	33.3	18.1	5.9	6.6	7807

Table 41: Percentage of marine, coastal and transitional water monitoring points per water quality class, aggregated by sea regions and sub-regions. Reporting period 2016-2019.

Region	Sub-region	Percentage of stations by classes of NO_3 concentration						Total number of stations
		<2 mg/l	[2,10) mg/l	[10,25) mg/l	[25,40) mg/l	[40,50) mg/l	≥ 50 mg/l	
Baltic Sea	Baltic Proper	97.6	2.4	0	0	0	0	164
Baltic Sea	Gulf of Bothnia	95.0	5	0	0	0	0	100
Baltic Sea	Gulf of Finland	88.9	11.1	0	0	0	0	27
Baltic Sea	Gulf of Riga	100.0	0	0	0	0	0	27
Baltic Sea	Kattegat	92.9	7.1	0	0	0	0	84
Black Sea	Black Sea	89.5	10.5	0	0	0	0	38
Mediterranean Sea	Adriatic Sea	86.1	13.9	0	0	0	0	259
Mediterranean Sea	Aegean Sea	100.0	0	0	0	0	0	44
Mediterranean Sea	Alboran Med	87.5	12.5	0	0	0	0	48
Mediterranean Sea	Central Med	100.0	0	0	0	0	0	67
Mediterranean Sea	Ionian Sea	98.6	1.4	0	0	0	0	69
Mediterranean Sea	North Levantine	100.0	0	0	0	0	0	16
Mediterranean Sea	Nortwest Med	84.7	7.1	3.6	2.6	1	1	196
Mediterranean Sea	Southwest Med	86.6	13.4	0	0	0	0	164
Mediterranean Sea	Tyrrhenean	89.0	9.3	0.8	0	0	0.8	118
North Atlantic Ocean	Bay of Biscay	79.4	15.9	2.9	1.8	0	0	170
North Atlantic Ocean	Bristol Channel	57.7	33.3	6.4	2.6	0	0	78
North Atlantic Ocean	Celtic Sea	43.5	37	19.6	0	0	0	46
North Atlantic Ocean	English Channel	73.6	16.2	8.1	2	0	0	148
North Atlantic Ocean	Inner Seas off the West Coast of Scotland	33.3	48.1	14.8	0	0	3.7	27
North Atlantic Ocean	Irish Sea and St. George's Channel	64.3	29.6	4.7	1.4	0	0	213
North Atlantic Ocean	North Atlantic Ocean	76.1	19.7	4.3	0	0	0	234
North Sea	North Sea	51.2	35	10.8	1	2	0	203
North Sea	Skagerrak	100.0	0	0	0	0	0	13

Table 42: Percentage of marine, coastal and transitional water monitoring points per water quality class, aggregated by sea regions. Reporting period 2016-2019.

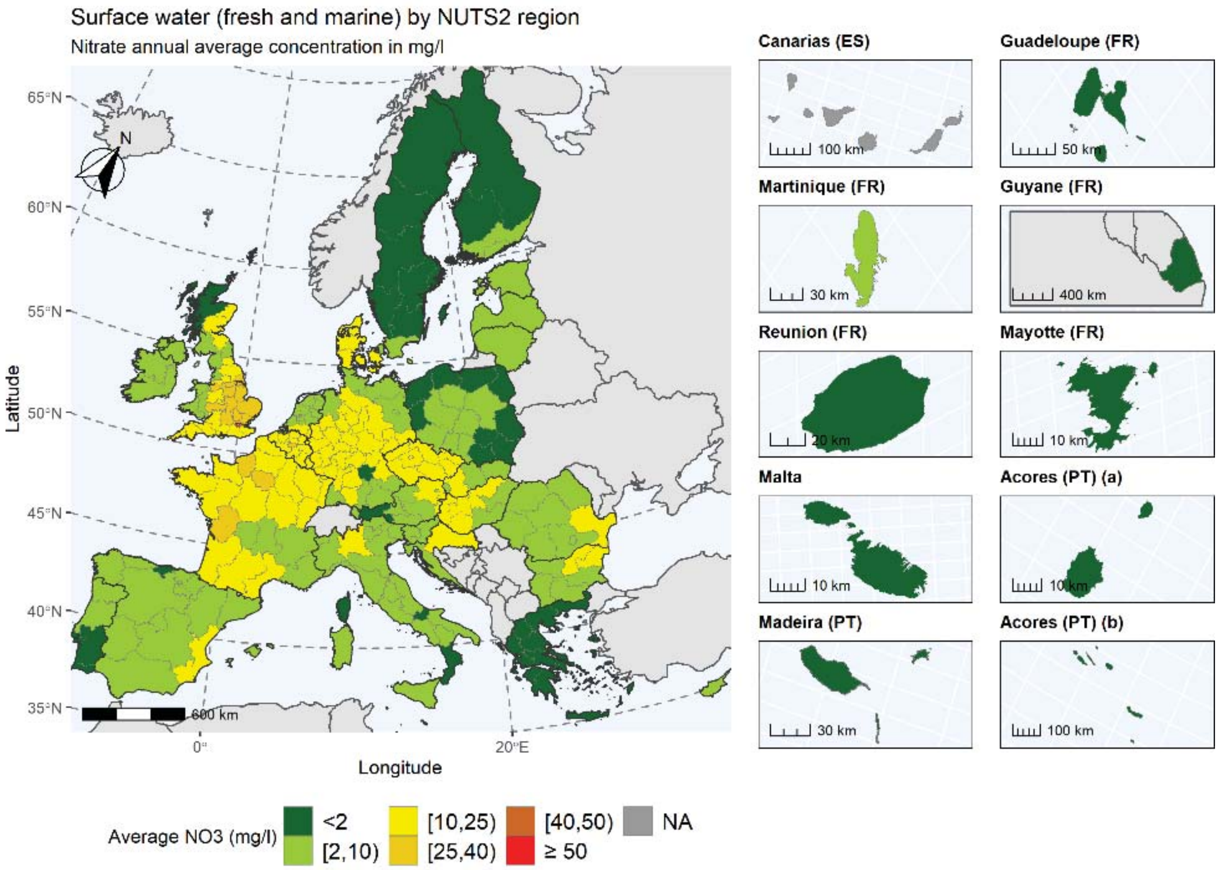
Region	Percentage of stations by classes of NO_3 concentration						Total number of stations
	<2 mg/l	[2,10) mg/l	[10,25) mg/l	[25,40) mg/l	[40,50) mg/l	≥ 50 mg/l	
Baltic Sea	95.5	4.5	0	0	0	0	402
Black Sea	89.5	10.5	0	0	0	0	38
Mediterranean Sea	89.0	9.2	0.8	0.5	0.2	0.3	981
North Atlantic Ocean	69.1	23.6	6	1.2	0	0.1	916
North Sea	54.2	32.9	10.2	0.9	1.9	0	216

Table 43: Percentage of marine, coastal and transitional water monitoring points per water trophic status classes, aggregated by sea regions and sub-regions. Reporting period 2016-2019.

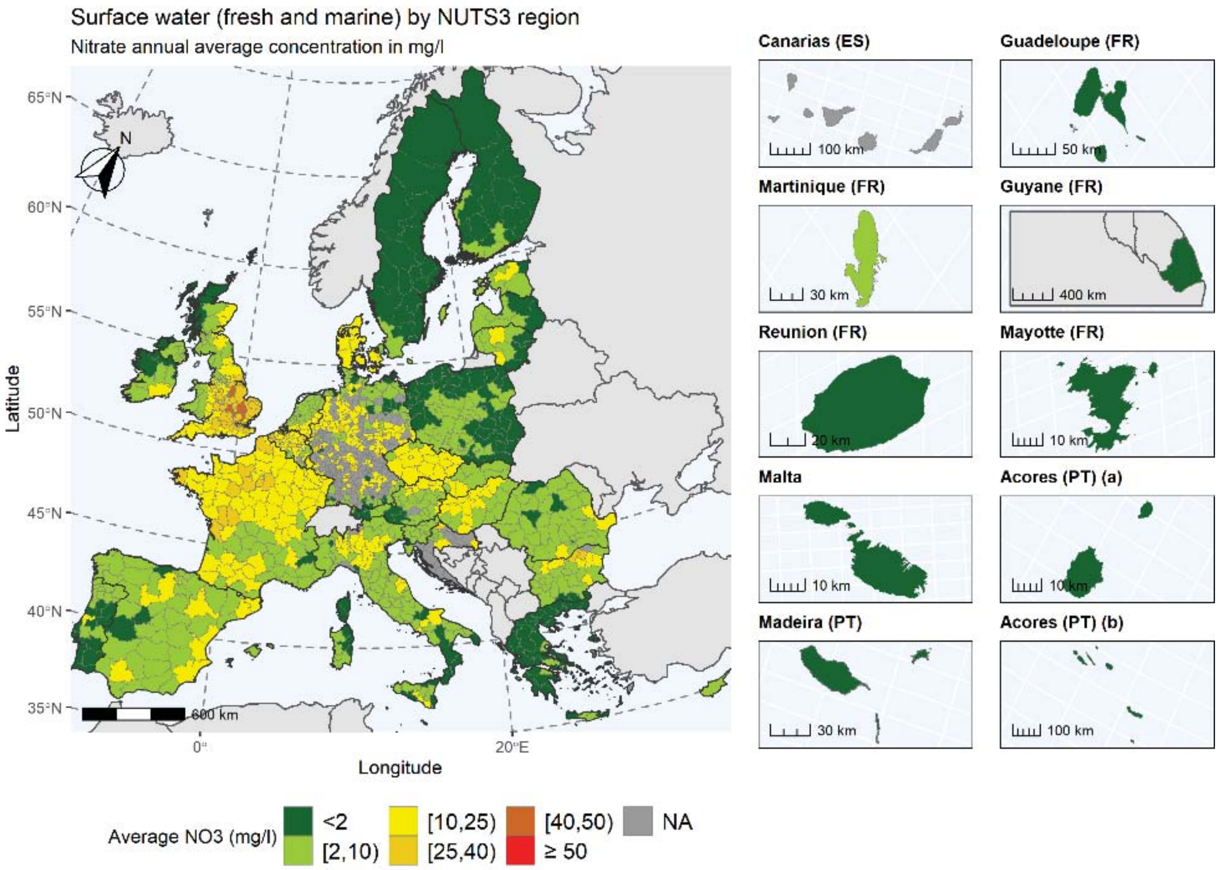
Region	Sub-region	Percentage of stations by trophic status			Total number of stations
		Eutrophic	Could become eutrophic	Non eutrophic	
Baltic Sea	Baltic Proper	95.8	2.4	1.8	167
Baltic Sea	Gulf of Bothnia	84	6	10	100
Baltic Sea	Gulf of Finland	79.4	20.6	0	34
Baltic Sea	Gulf of Riga	92.5	7.5	0	53
Baltic Sea	Kattegat	79.2	0	20.8	77
Black Sea	Black Sea	86.8	13.2	0	38
Mediterranean Sea	Adriatic Sea	18.7	11.7	69.6	257
Mediterranean Sea	Aegean Sea	0	29	71	31
Mediterranean Sea	Alboran Med	10.4	0	89.6	48
Mediterranean Sea	Central Med	4.5	3	92.5	67
Mediterranean Sea	Ionian Sea	12	10	78	50
Mediterranean Sea	North Levantine	0	0	100	16
Mediterranean Sea	Nortwest Med	1.8	0	98.2	163
Mediterranean Sea	Southwest Med	12.2	10.4	77.4	164
Mediterranean Sea	Tyrrhenean	18.5	8.4	73.1	119
North Atlantic Ocean	Bay of Biscay	5.6	0	94.4	177
North Atlantic Ocean	Celtic Sea	44.4	44.4	11.1	9
North Atlantic Ocean	English Channel	25	0	75	20
North Atlantic Ocean	Inner Seas off the West Coast of Scotland	18.5	40.7	40.7	27
North Atlantic Ocean	Irish Sea and St. George's Channel	45.5	0	54.5	11
North Atlantic Ocean	North Atlantic Ocean	28.7	3	68.3	167
North Sea	North Sea	61.2	11.2	27.5	80
North Sea	Skagerrak	7.7	15.4	76.9	13

Table 44: Percentage of marine, coastal and transitional water monitoring points per water trophic status classes, aggregated by sea regions. Reporting period 2016-2019

Region	Percentage of stations by trophic status			Total number of stations
	Eutrophic	Could become eutrophic	Non eutrophic	
Baltic Sea	88.4	4.9	6.7	431
Black Sea	86.8	13.2	0	38
Mediterranean Sea	11.7	8.0	80.3	915
North Atlantic Ocean	18.7	4.9	76.4	411
North Sea	53.8	11.8	34.4	93



Map 18: Annual average nitrate concentrations in surface water (all categories) at the NUTS2 level, for the reporting period 2016-2019. The label 'NA' stands for not available data.



Map 19: Annual average nitrate concentrations in surface water (all categories) at the NUTS3 level, for the reporting period 2016-2019. The label 'NA' stands for not available data.

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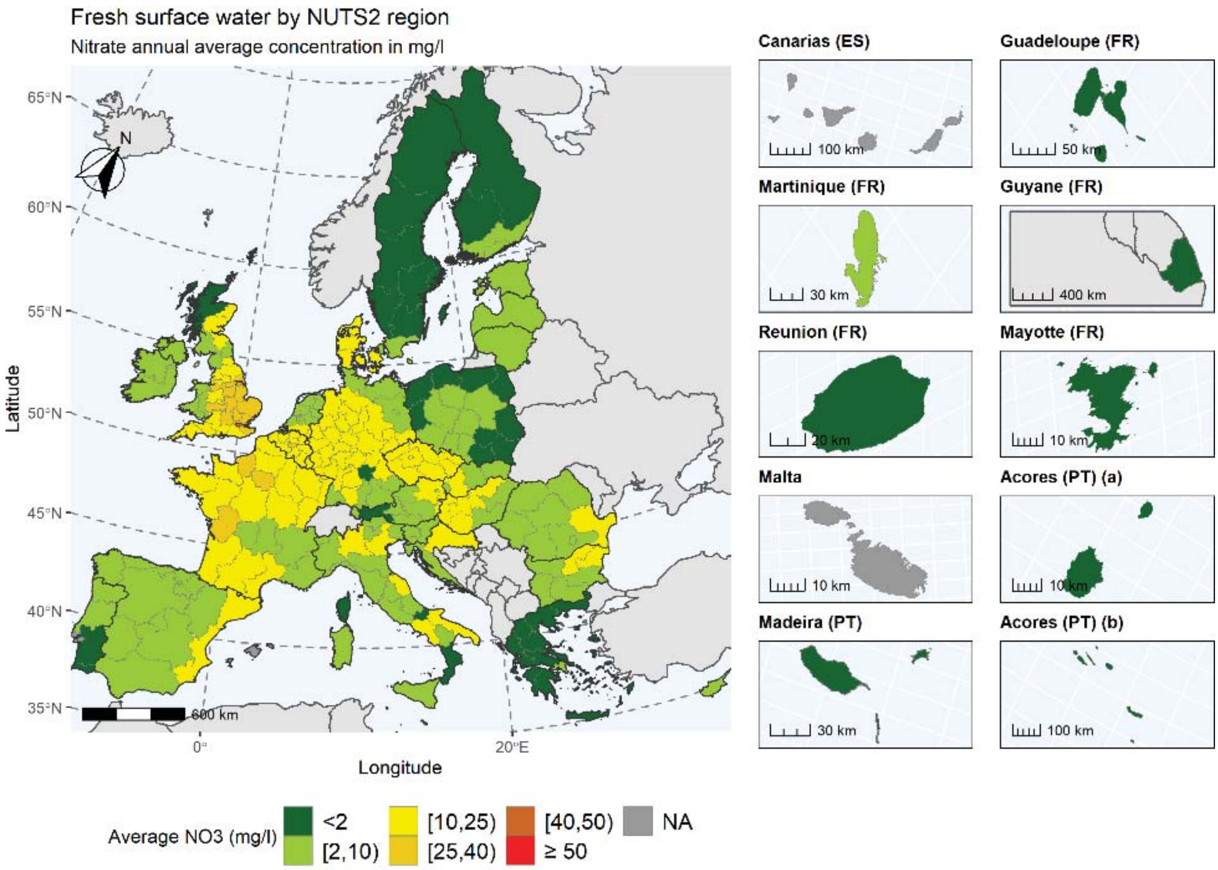
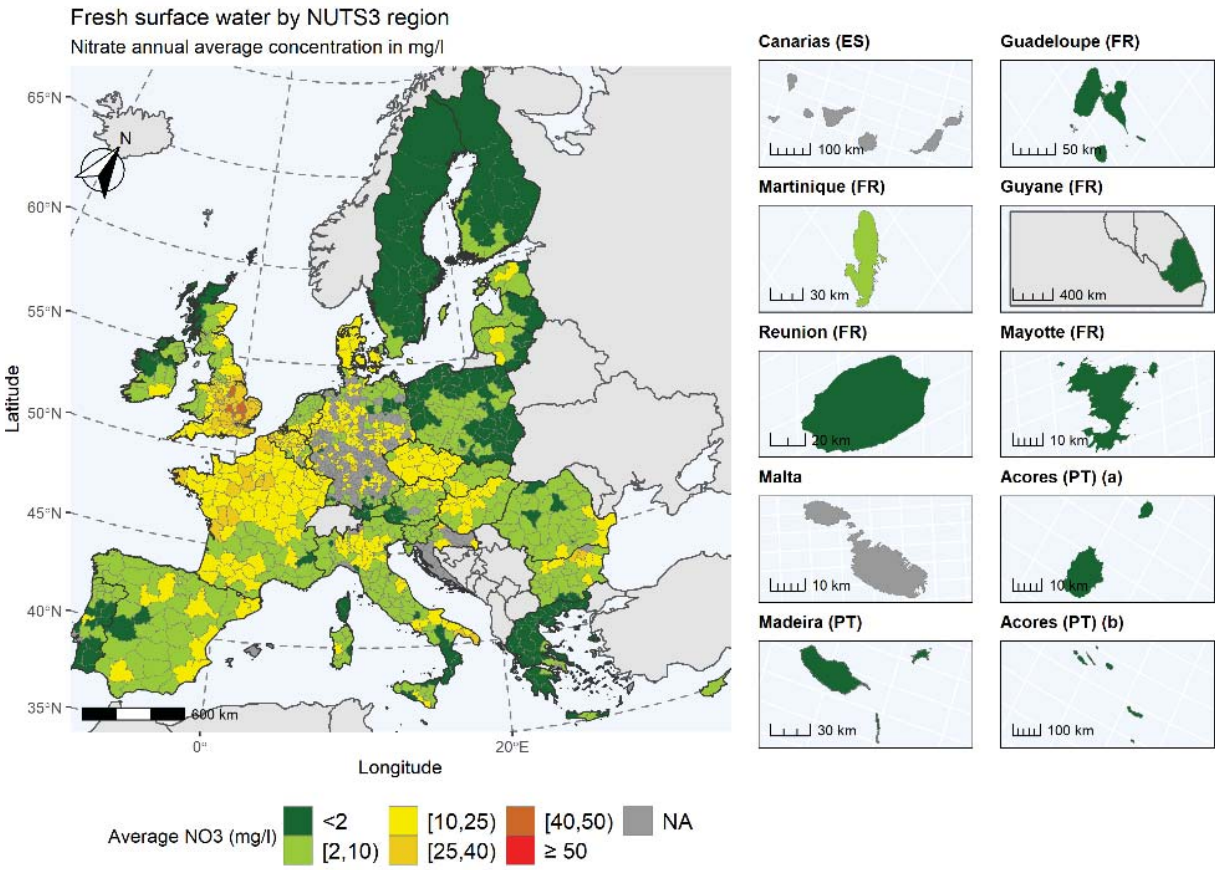
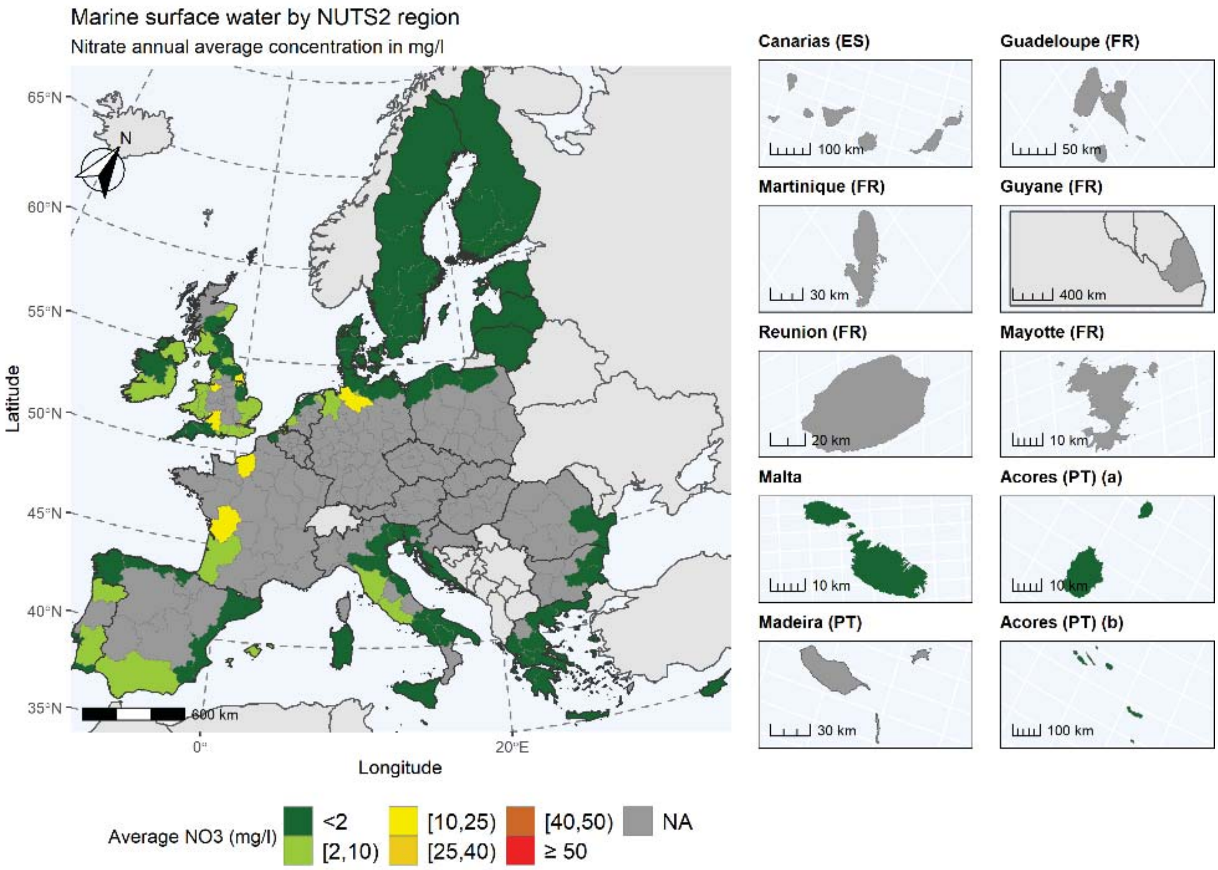


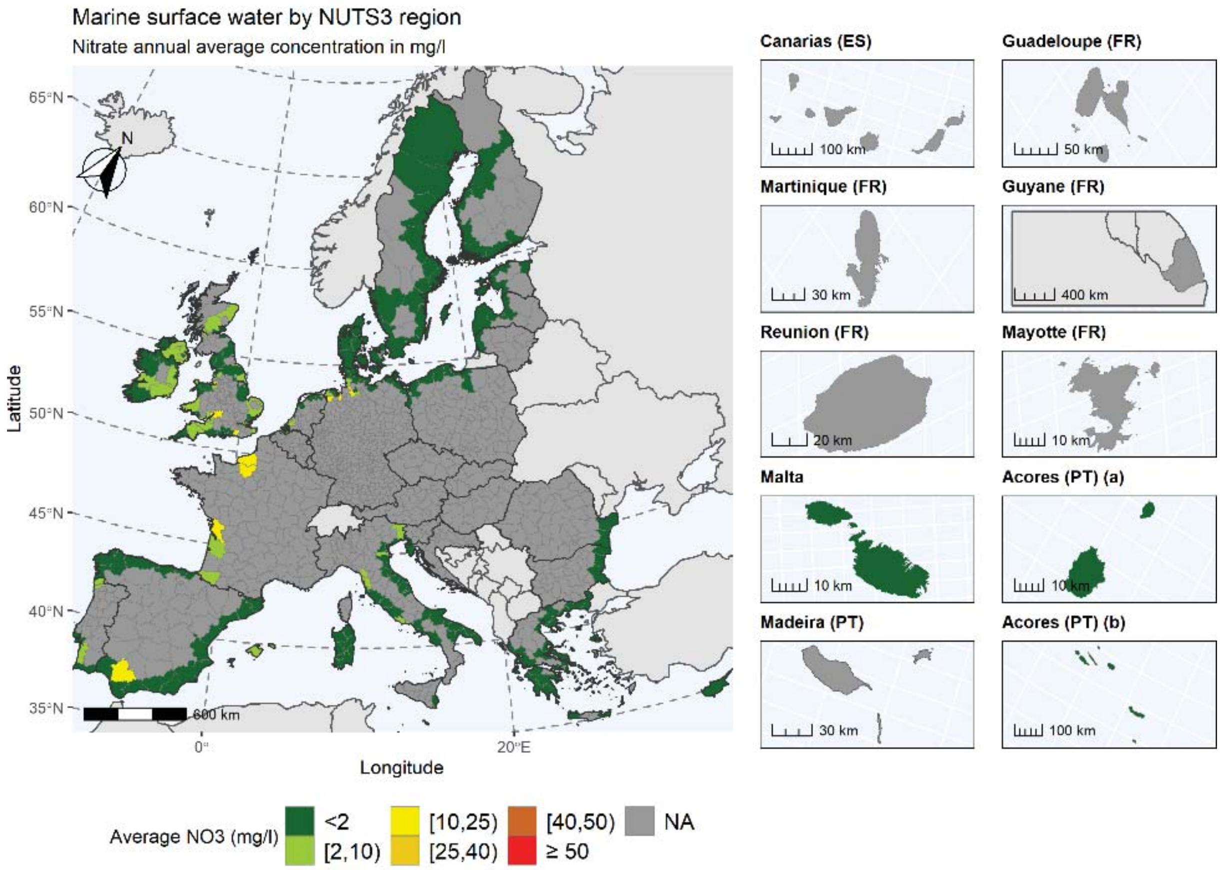
Map 20: Annual average nitrate concentrations in fresh surface water (river, lake/reservoir) at the NUTS2 level, for the reporting period 2016-2019. The label 'NA' stands for not available data.



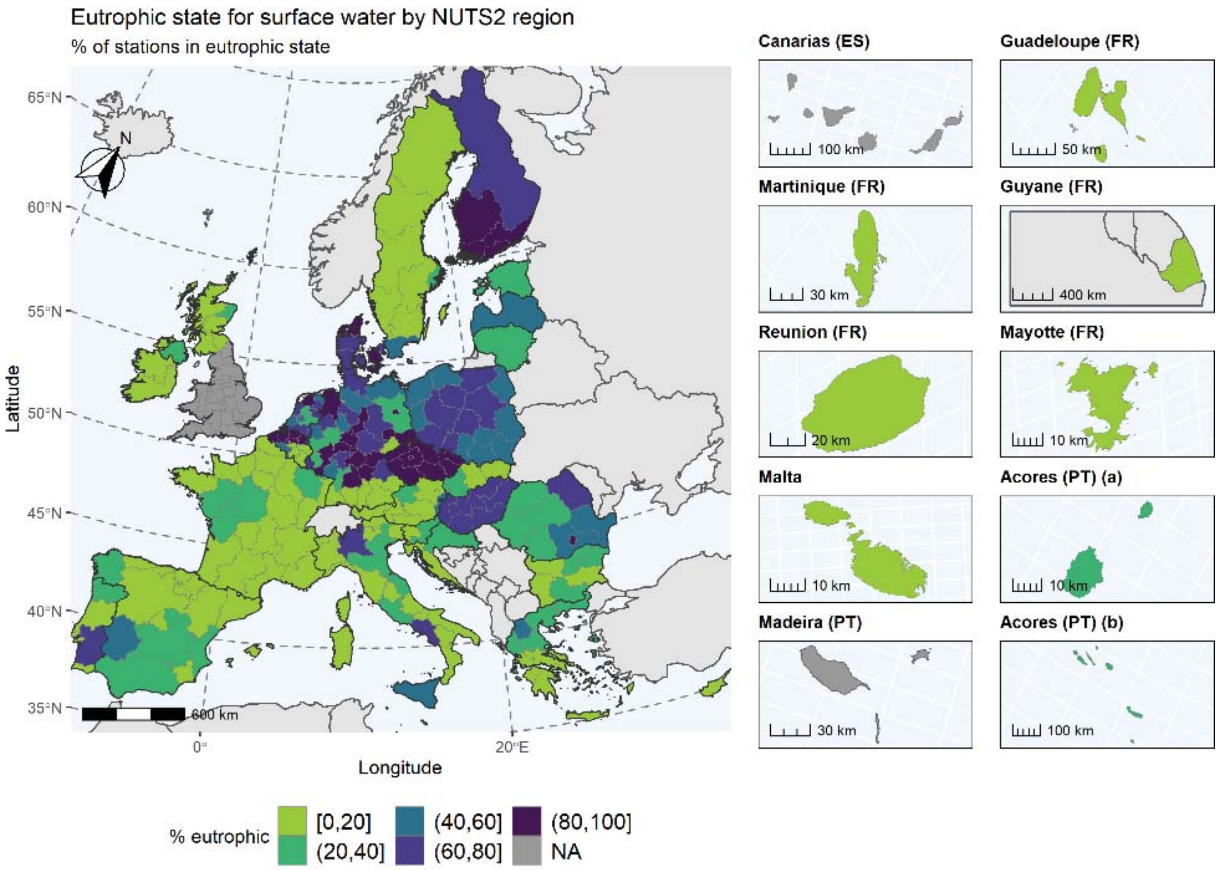
Map 21: Annual average nitrate concentrations in fresh surface water (river, lake/reservoir) at the NUTS3 level, for the reporting period 2016-2019. The label 'NA' stands for not available data.



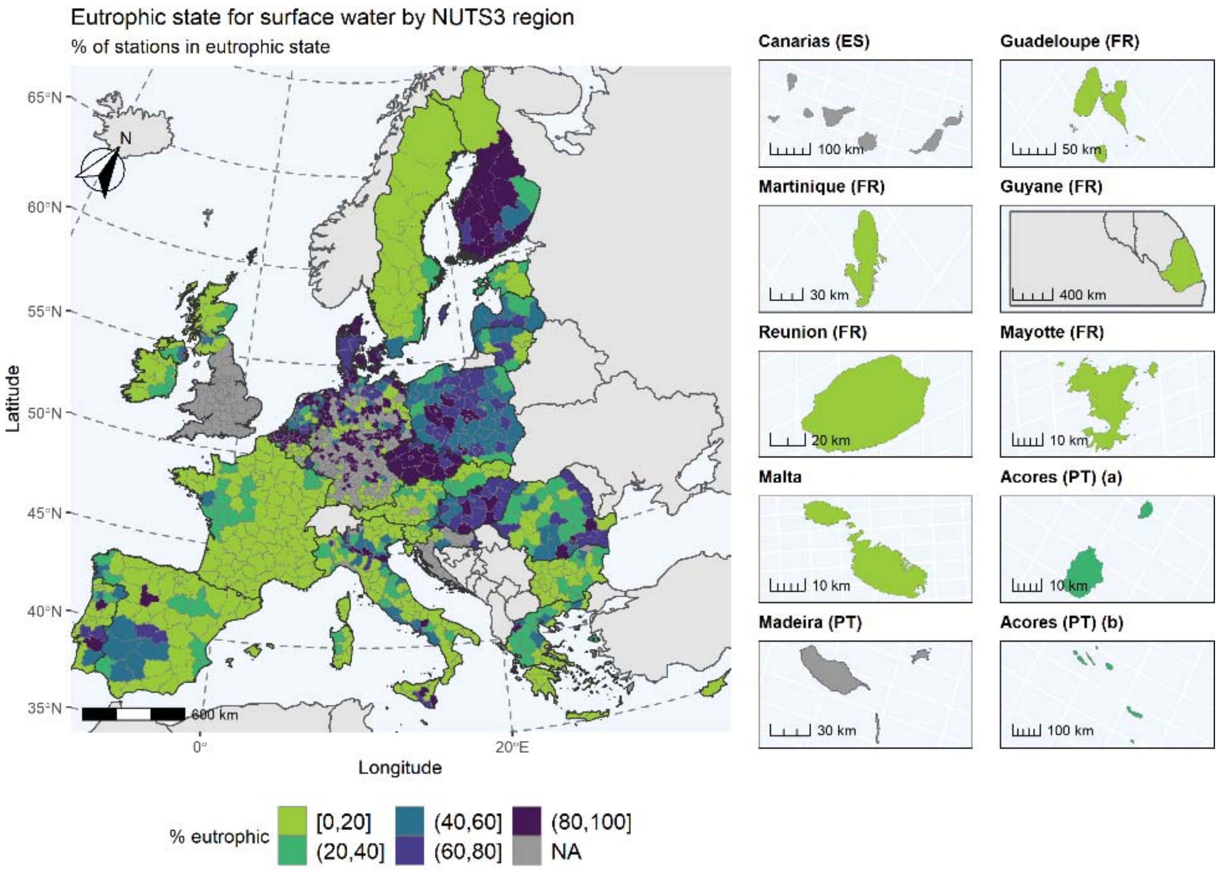
Map 22: Annual average nitrate concentrations in saline surface water (transitional, coastal, and marine waters) at the NUTS2 level, for the reporting period 2016-2019. The label 'NA' stands for not available data.



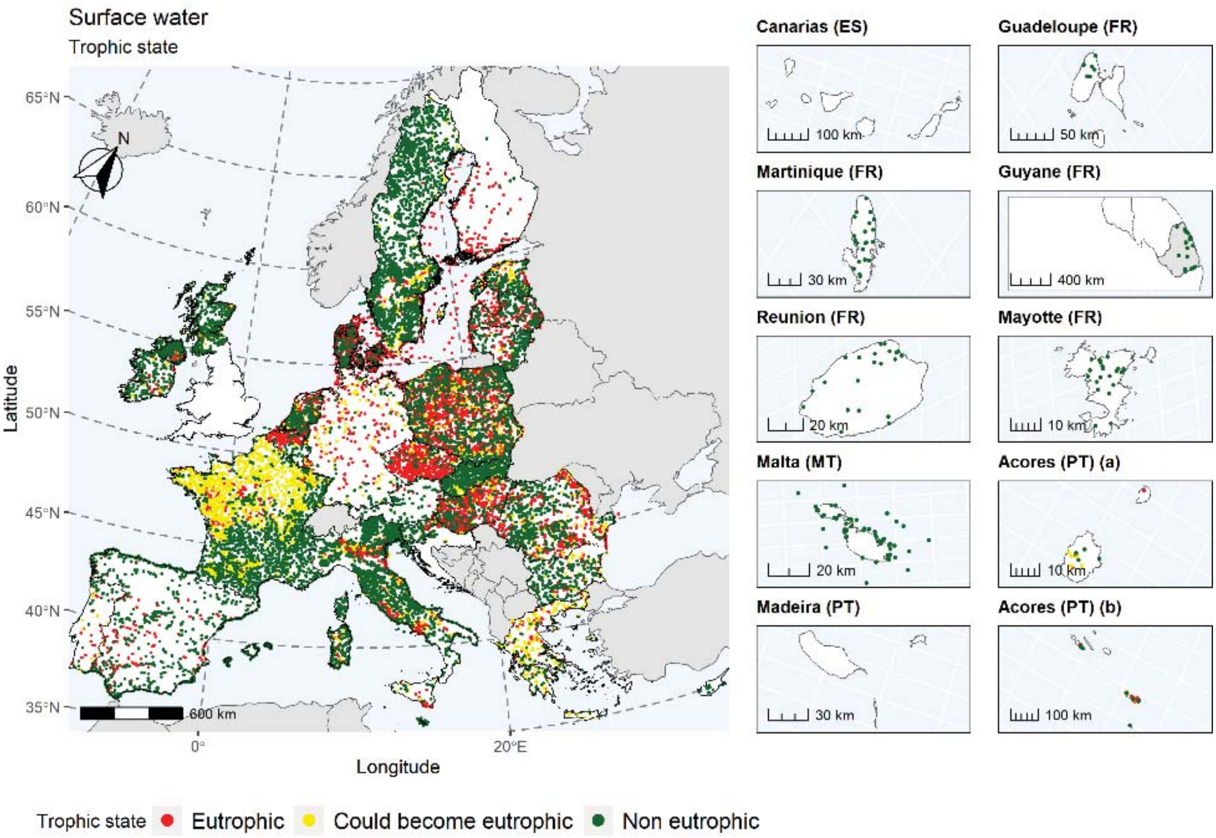
Map 23: Annual average nitrate concentrations in saline surface water (transitional, coastal, and marine waters) at the NUTS3 level, for the reporting period 2016-2019. The label 'NA' stands for not available data.



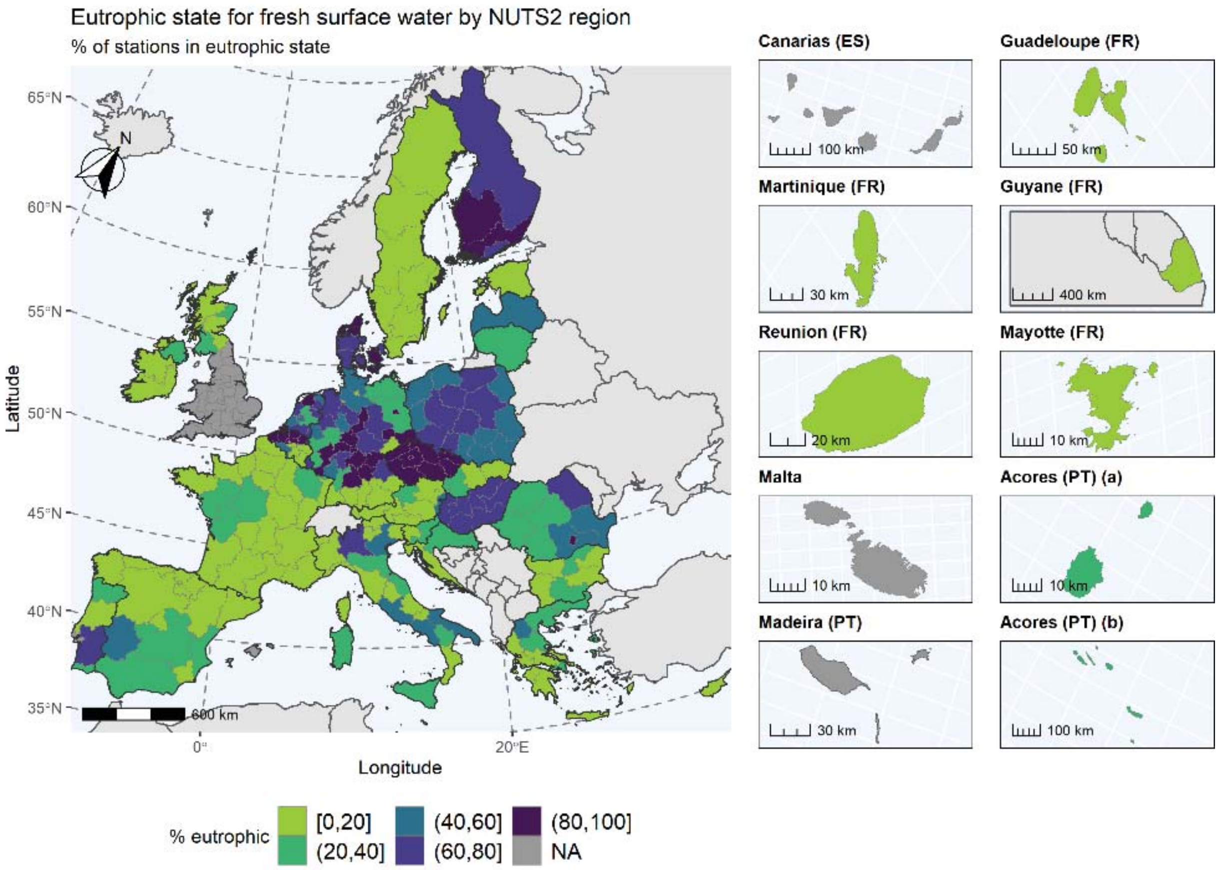
Map 24: Percentage of surface waters stations (all categories) in eutrophic status at the NUTS2 level, for the reporting period 2016-2019. The label 'NA' stands for not available data.



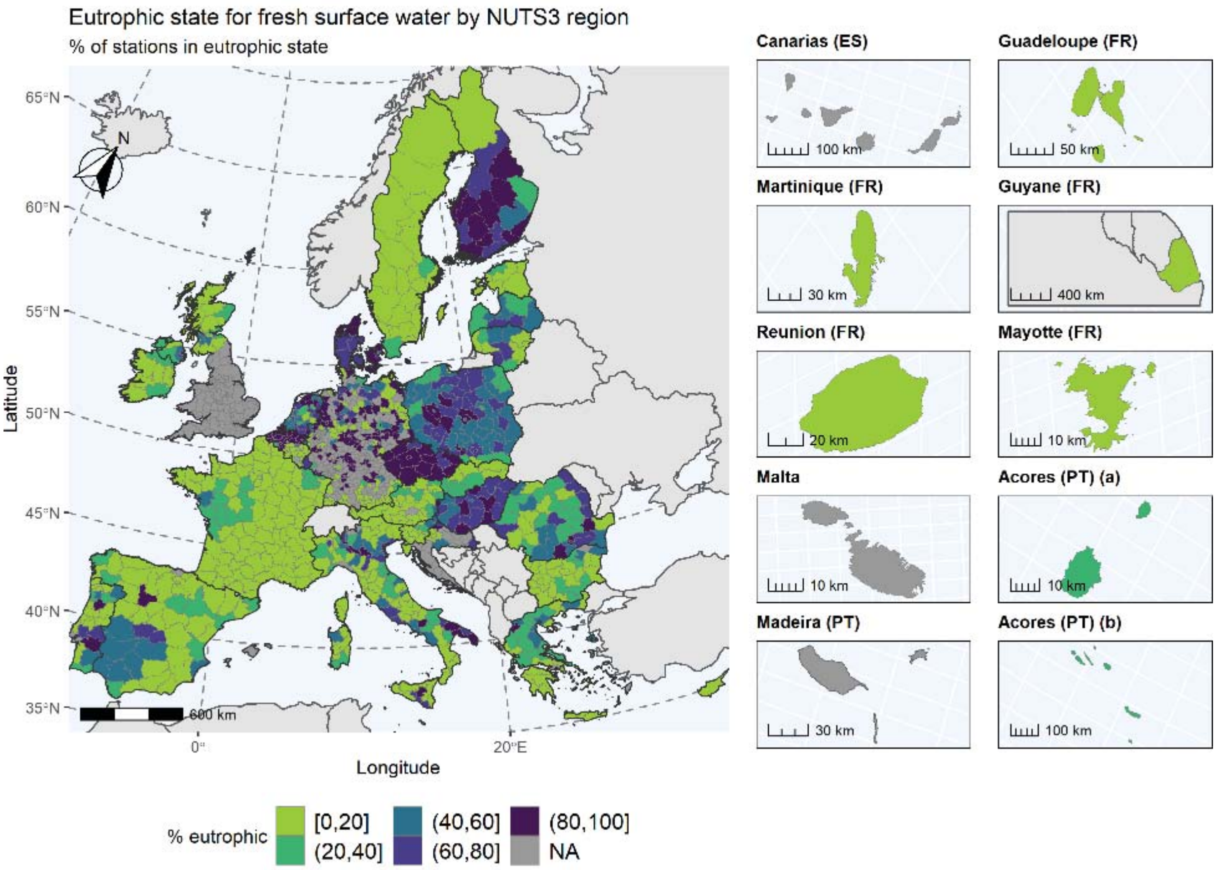
Map 25: Percentage of surface waters stations (all categories) in eutrophic status at the NUTS3 level, for the reporting period 2016-2019. The label 'NA' stands for not available data.



Map 26: Trophic status in surface water (all categories) for the reporting period 2016-2019



Map 27: Percentage of fresh surface water stations (river, lake/reservoir) in eutrophic status at the NUTS2 level, for the reporting period 2016-2019. The label 'NA' stands for not available data.



Map 28: Percentage of fresh surface water stations (river, lake/reservoir) in eutrophic status at the NUTS3 level, for the reporting period 2016-2019. The label 'NA' stands for not available data.

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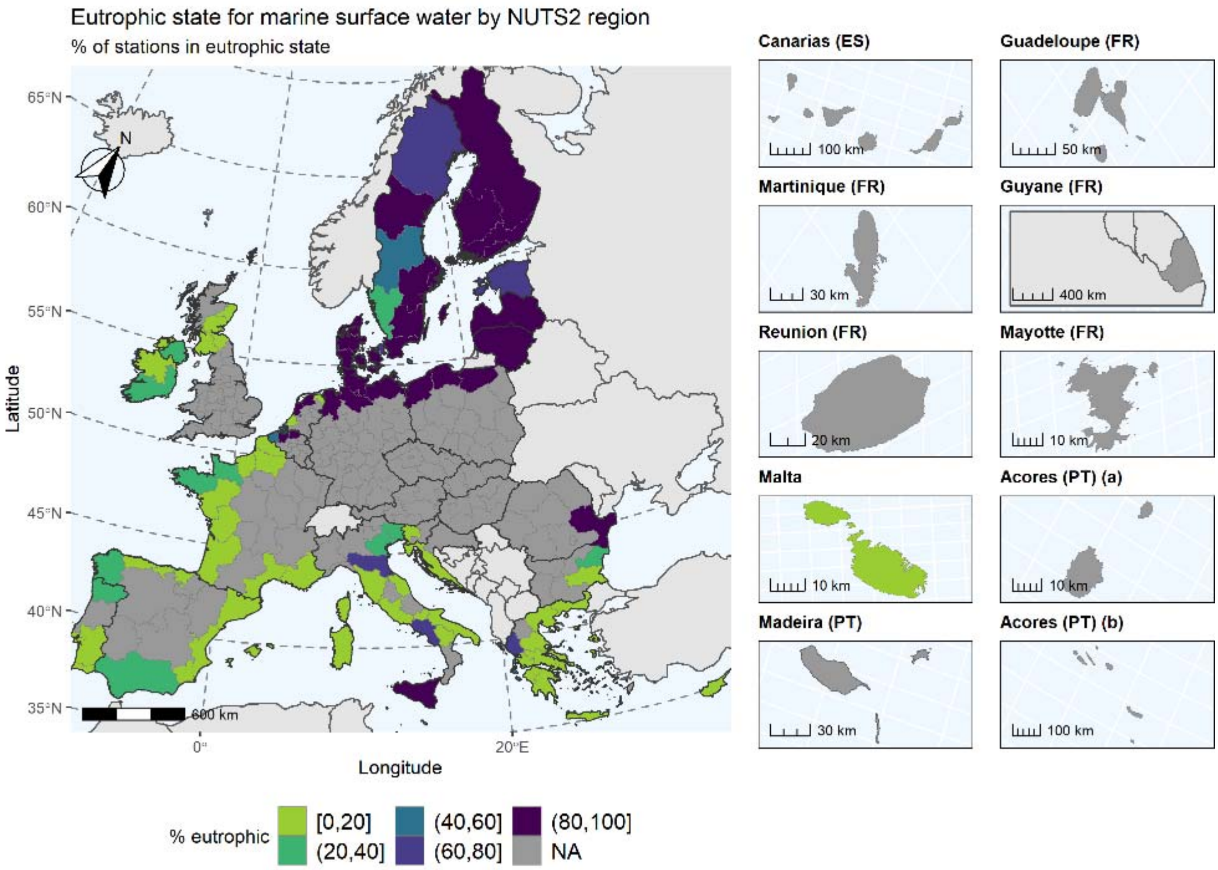
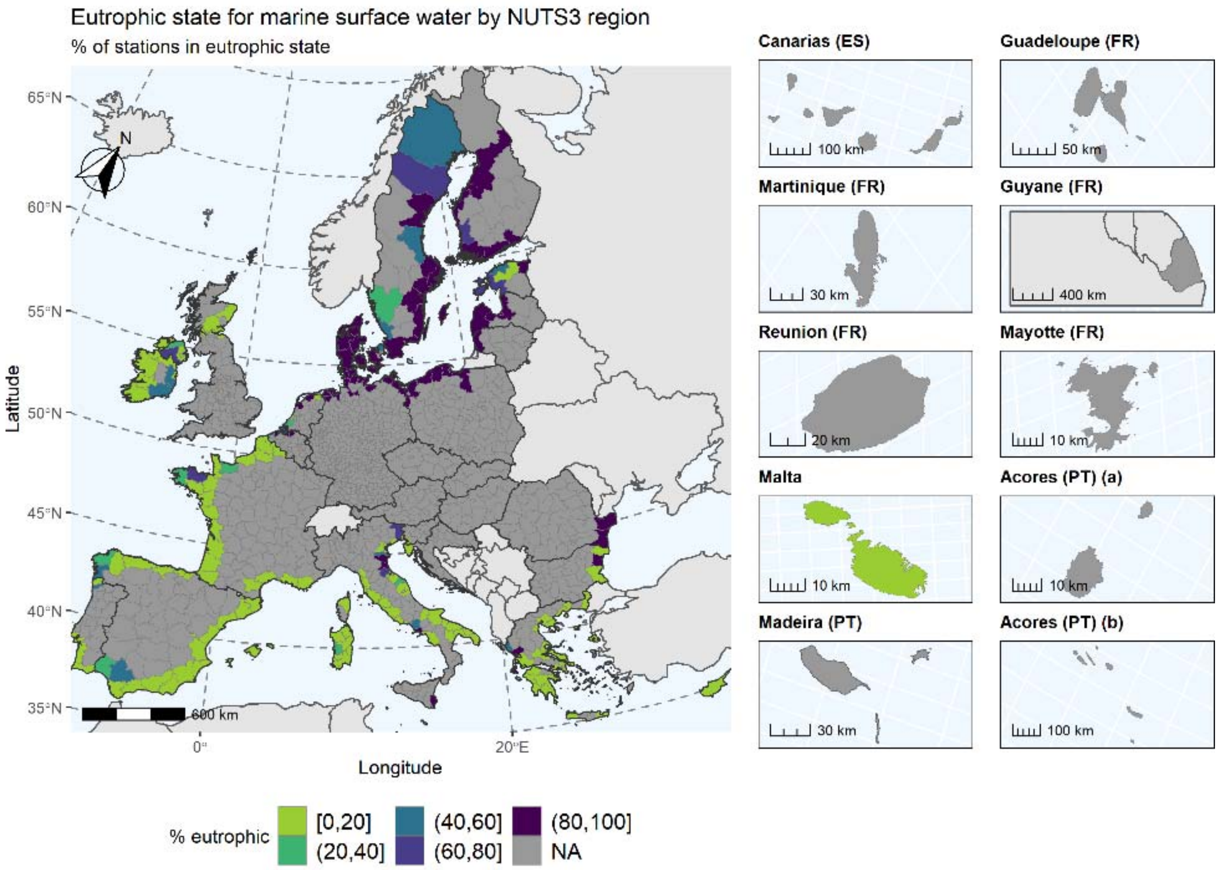
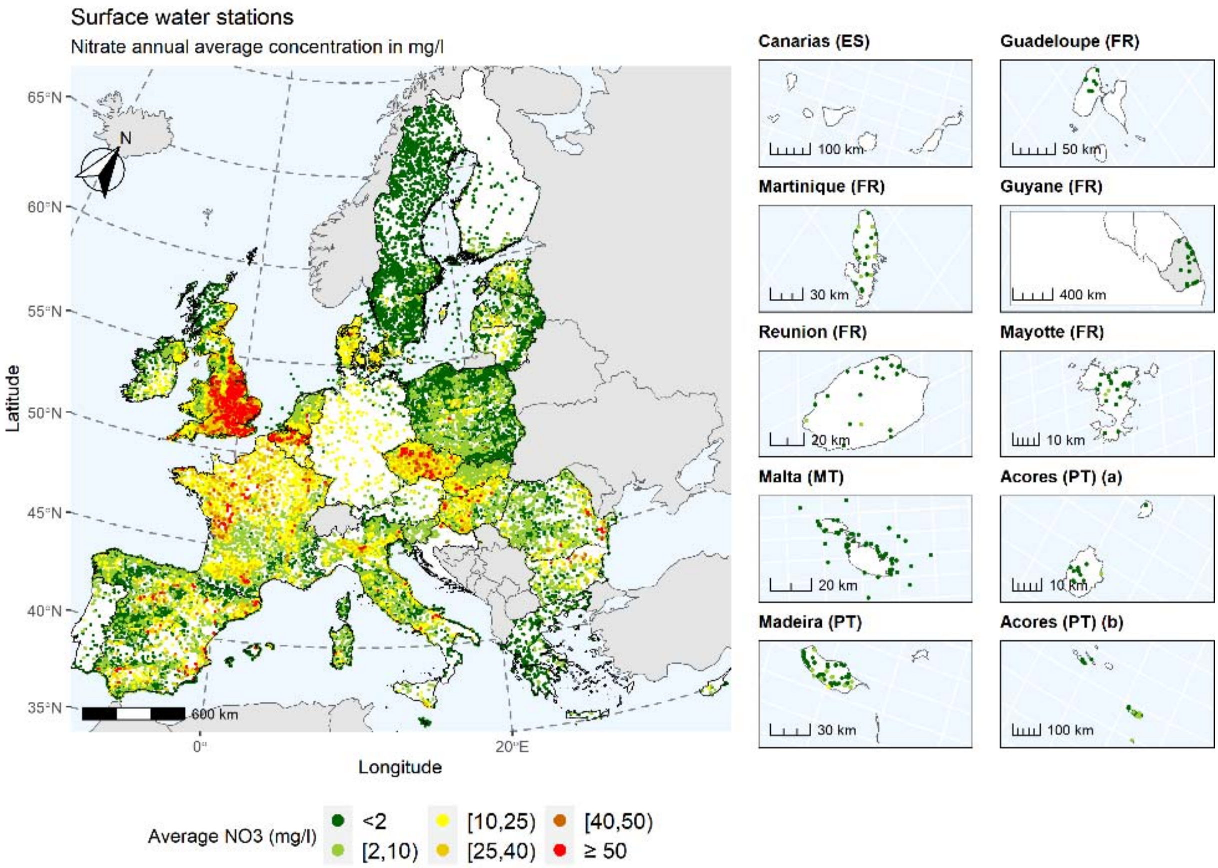


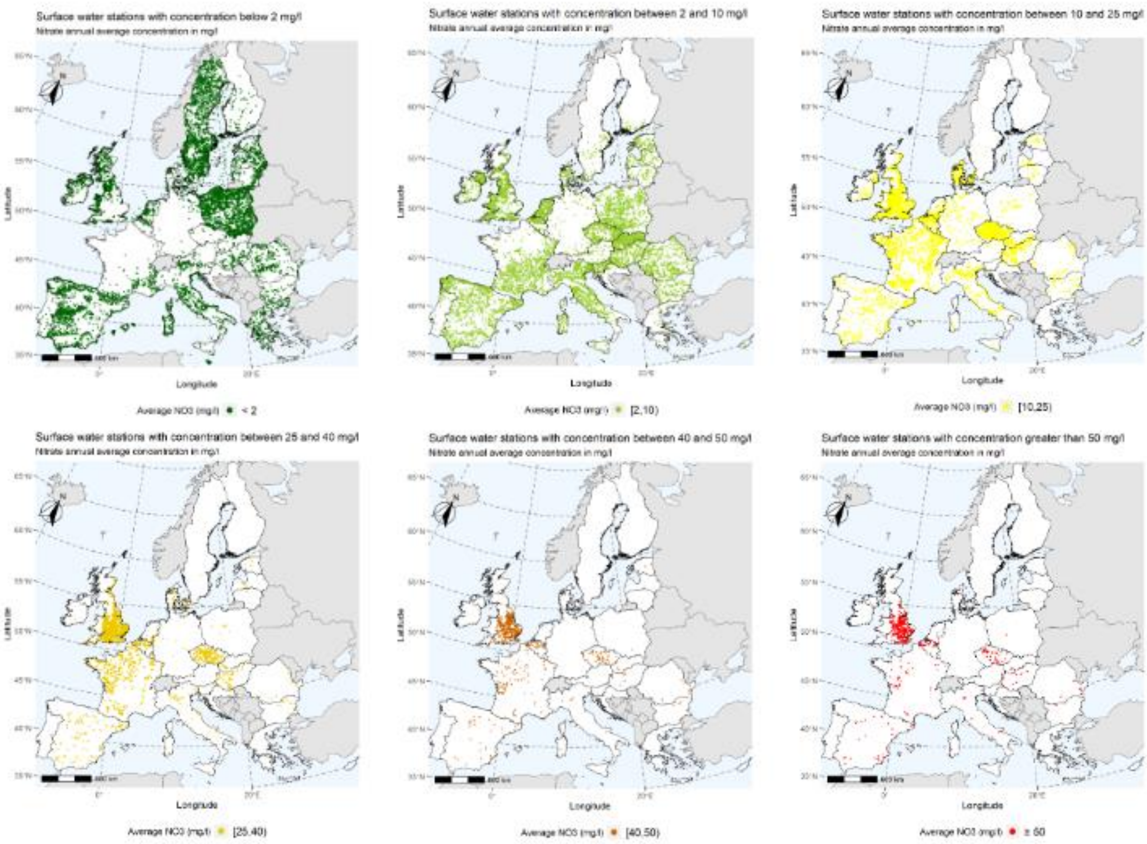
Map 29: Percentage of saline surface waters stations (transitional, coastal, and marine waters) in eutrophic status at the NUTS2 level, for the reporting period 2016-2019. The label 'NA' stands for not available data.



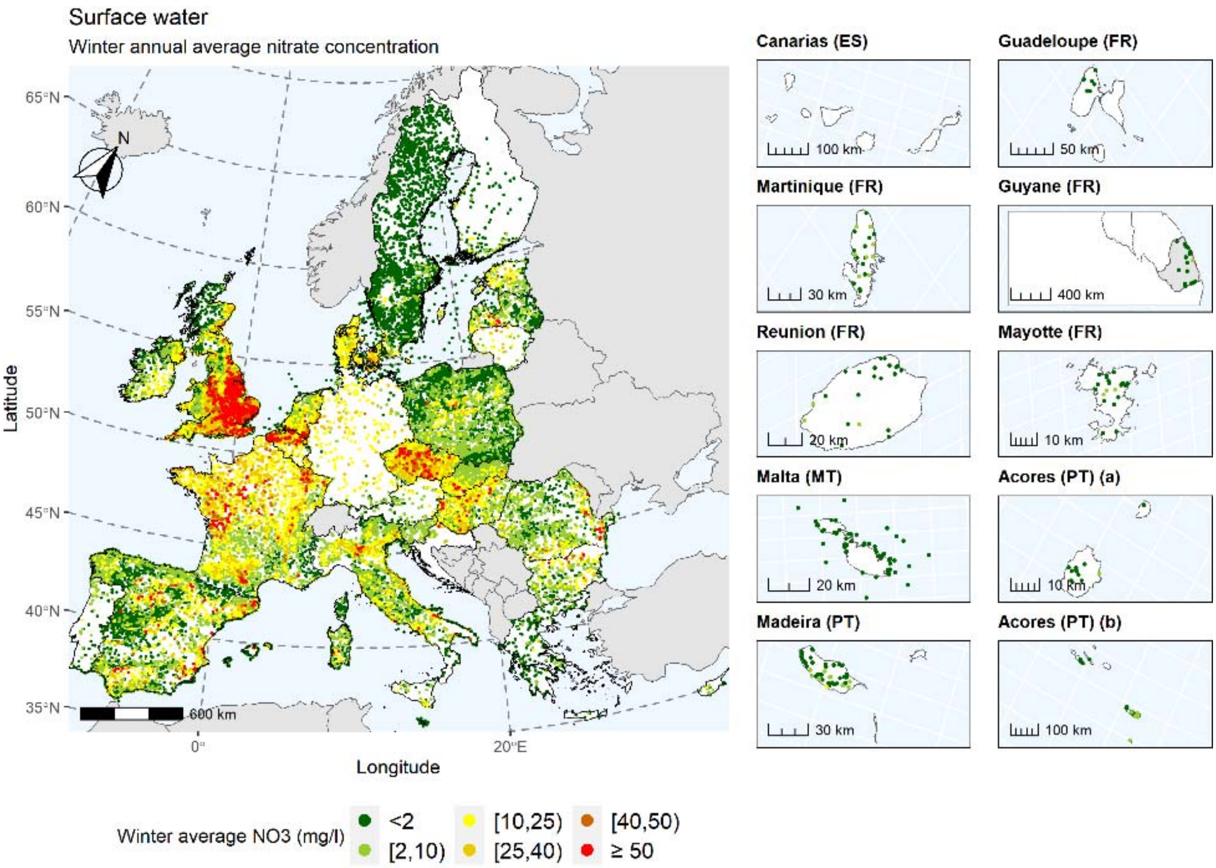
Map 30: Percentage of saline surface waters stations (transitional, coastal, and marine waters) in eutrophic status at the NUTS3 level, for the reporting period 2016-2019. The label 'NA' stands for not available data.



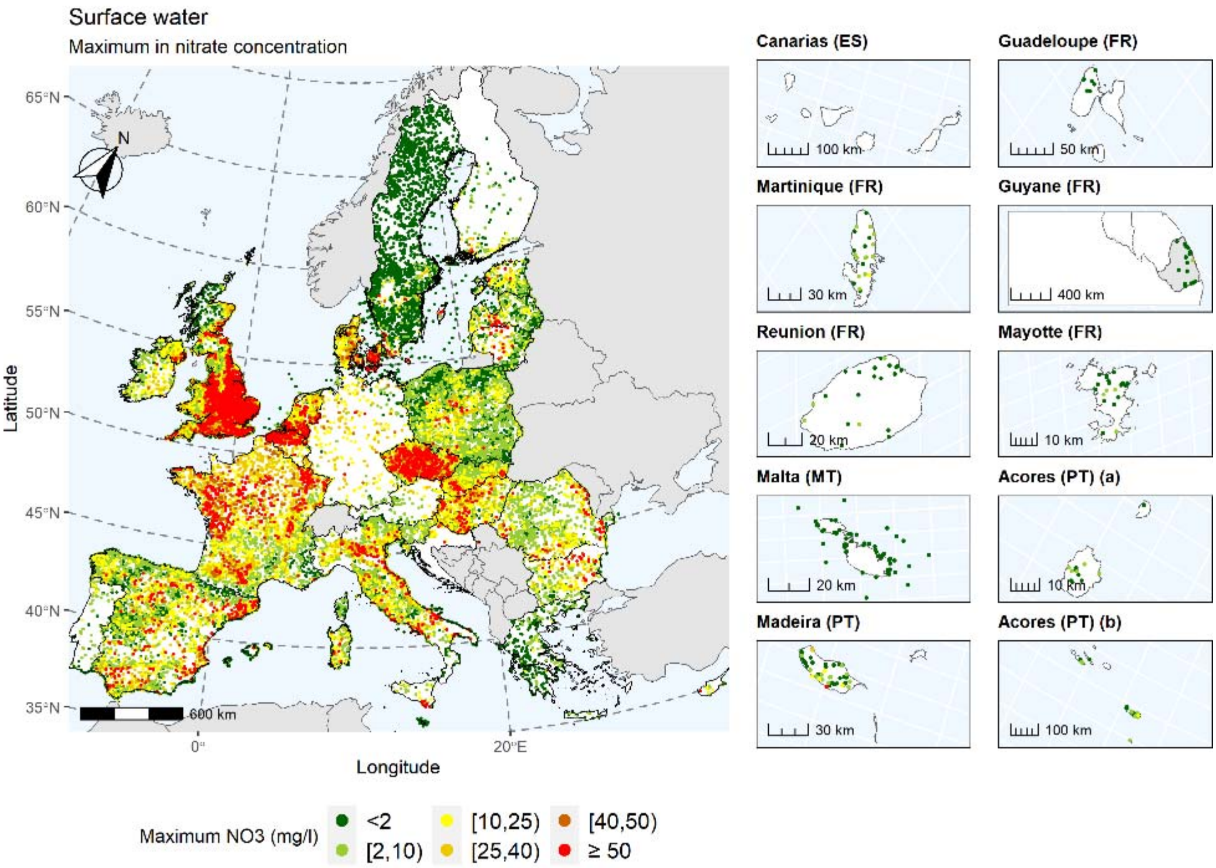
Map 31: Annual average nitrate concentrations in surface water (all categories) for the reporting period 2016-2019. Higher values are plotted on the top



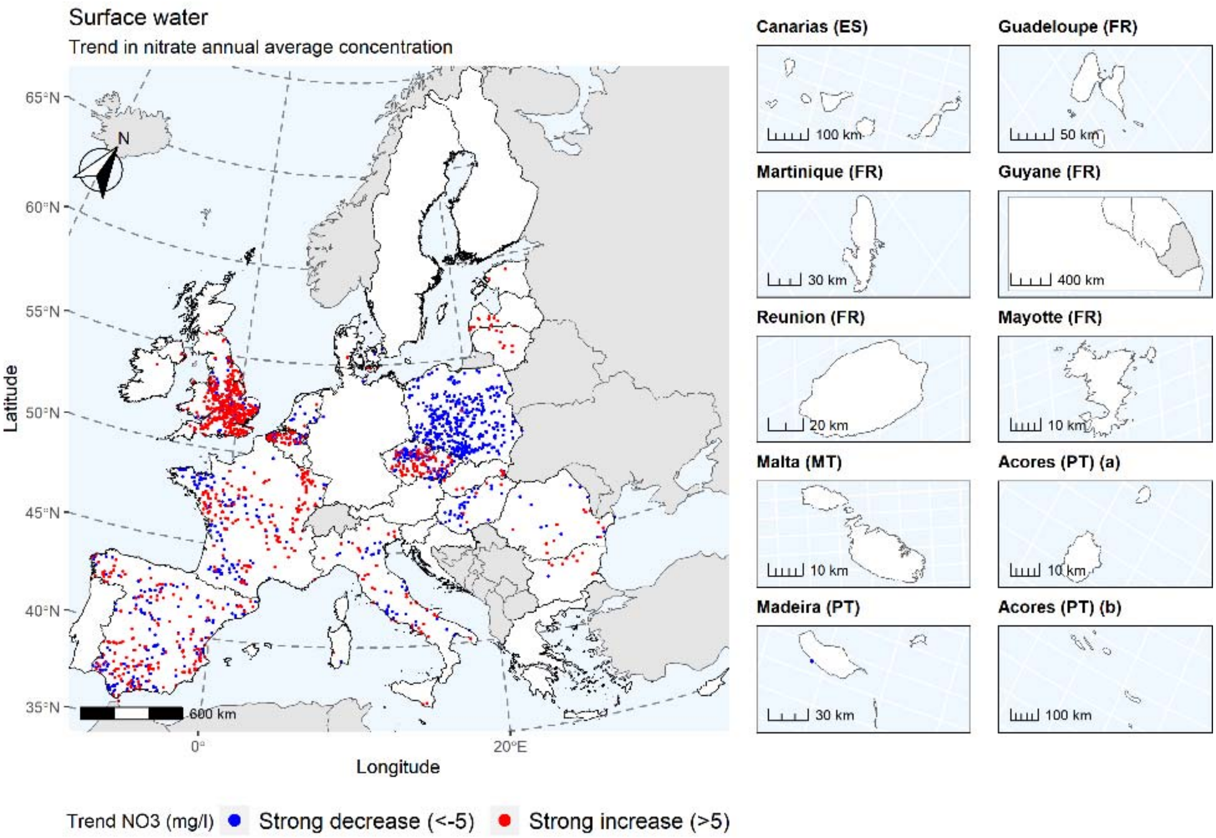
Map 32: Comparison between annual average nitrate concentrations in surface water for each concentration class separately. Reporting period 2016-2019



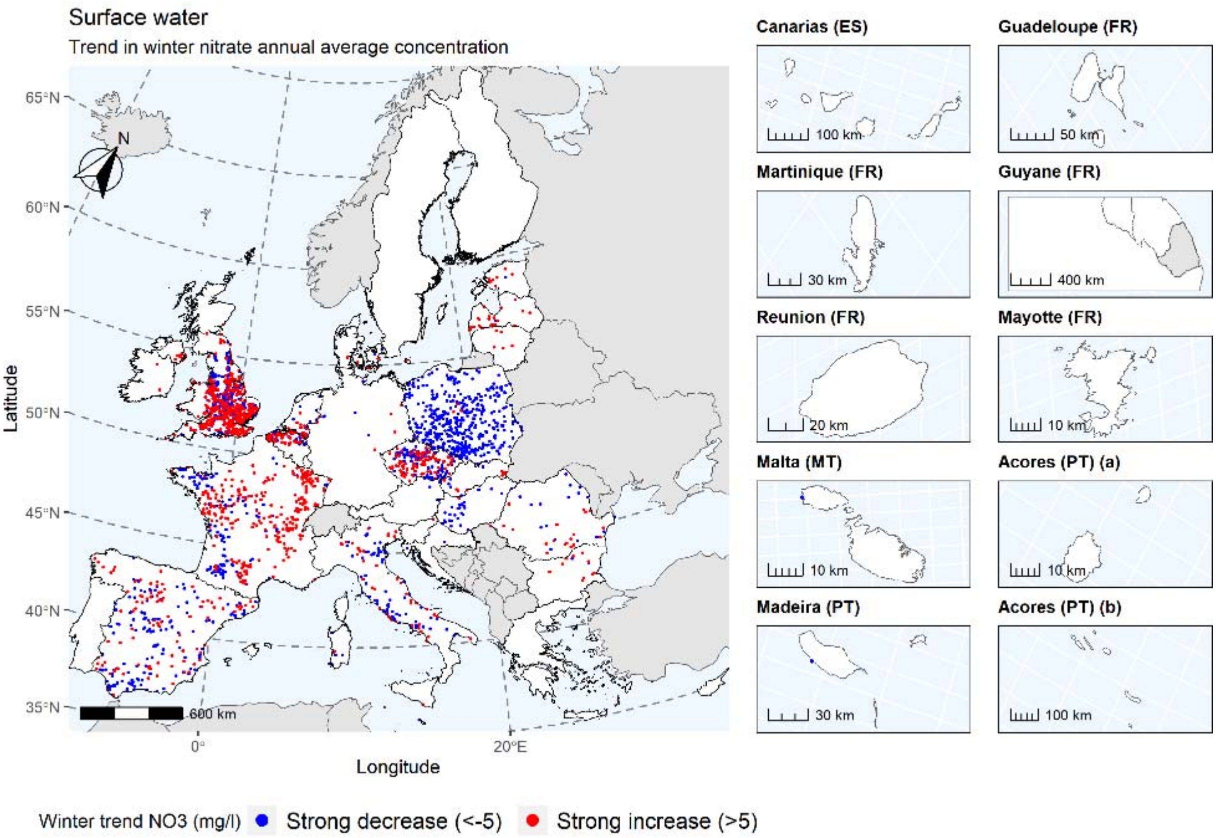
Map 33: Winter average nitrate concentrations in surface water for the reporting period 2016-2019. Higher values are plotted on the top



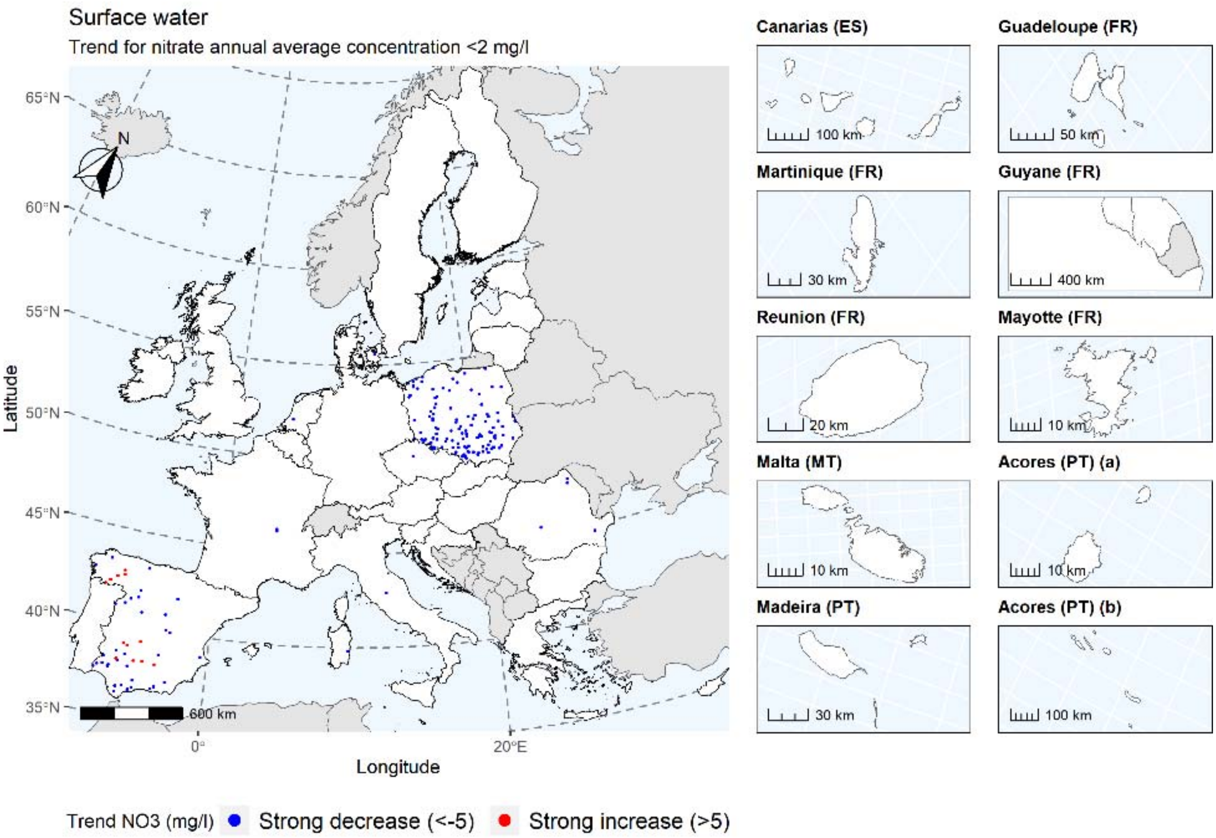
Map 34: Maximum nitrate concentrations in surface water for the reporting period 2016-2019



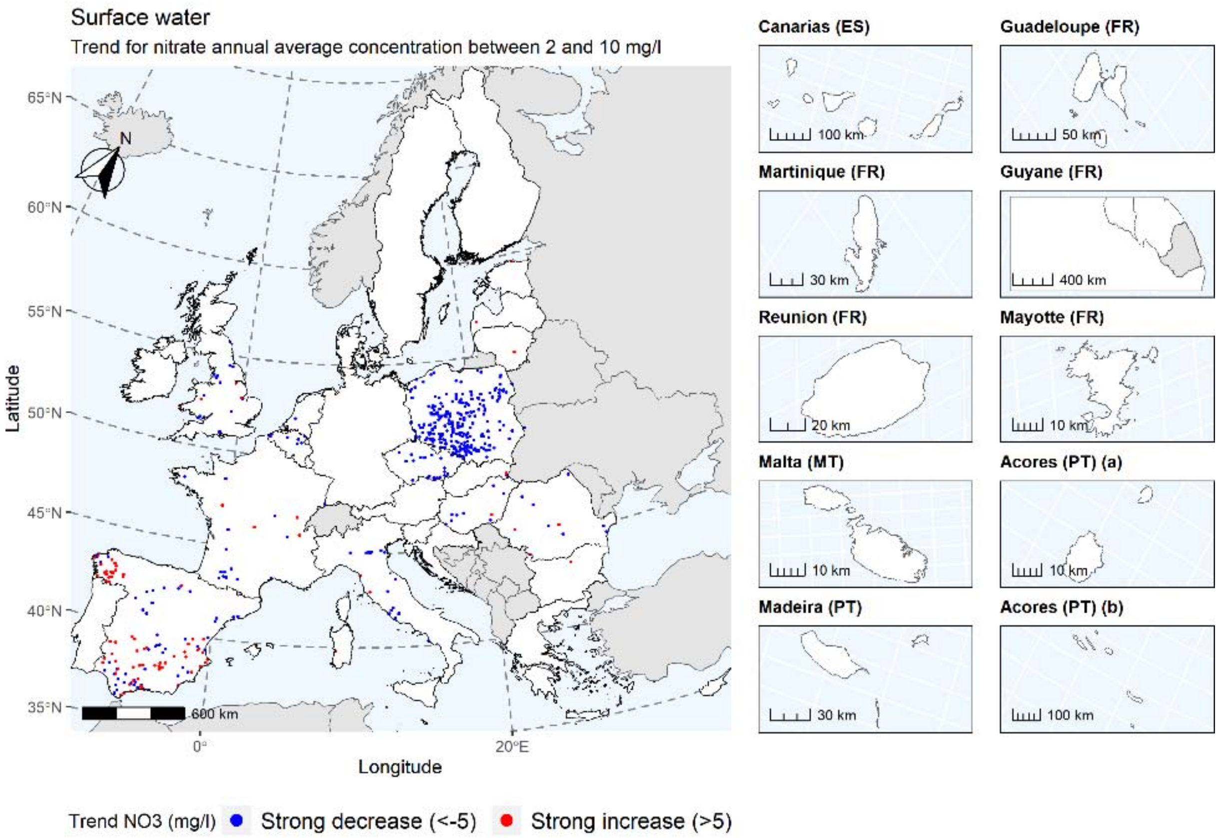
Map 35: Strong trends in annual average nitrate concentrations in surface water (all categories) between the reporting periods 2012-2015 and 2016-2019 for all stations



Map 36: Strong trends in winter average nitrate concentrations in surface water (all categories) between the reporting periods 2012-2015 and 2016-2019



Map 37: Strong trends in annual average nitrate concentrations in surface water (all categories) between the reporting periods 2012-2015 and 2016-2019 for stations with an average annual nitrate concentration below 2 mg/l in 2016-2019



Map 38: Strong trends in annual average nitrate concentrations in surface water (all categories) between the reporting periods 2012-2015 and 2016-2019 for stations with an average annual nitrate concentration between 2 and 10 mg/l in 2016-2019

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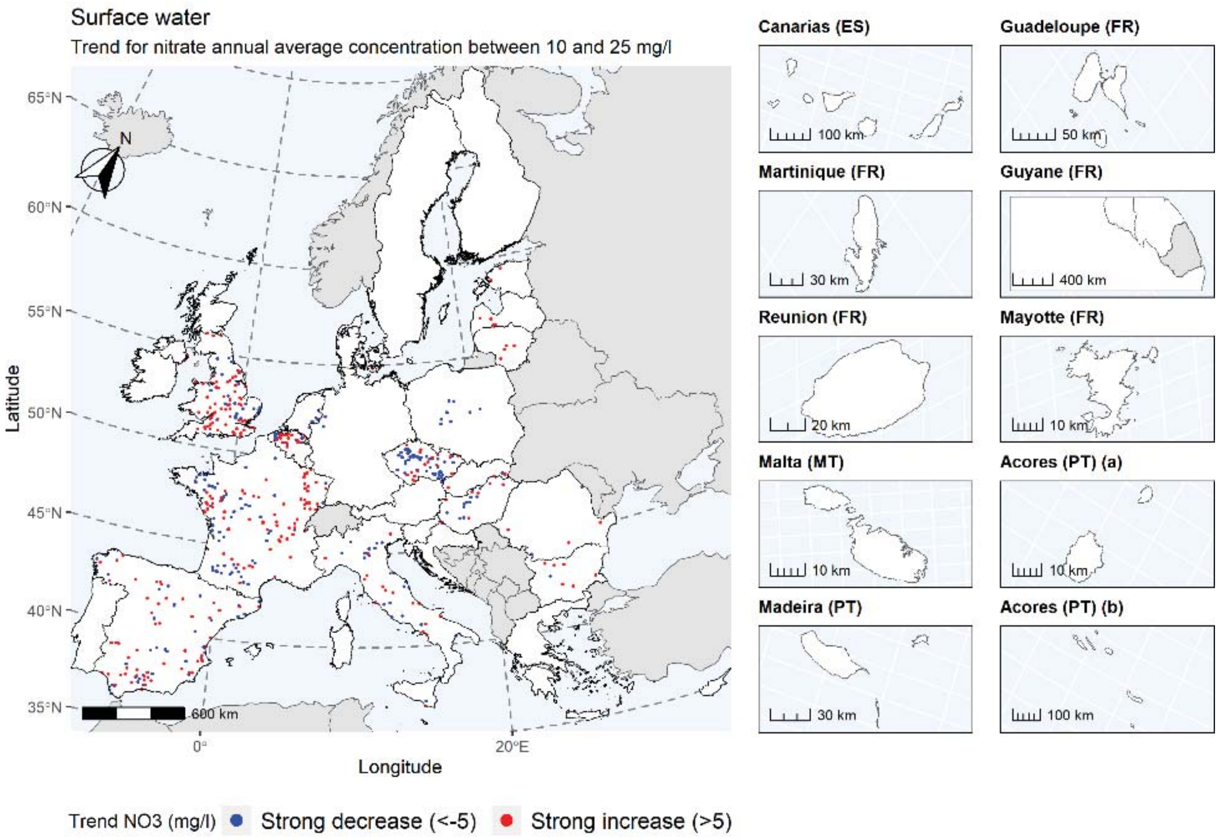
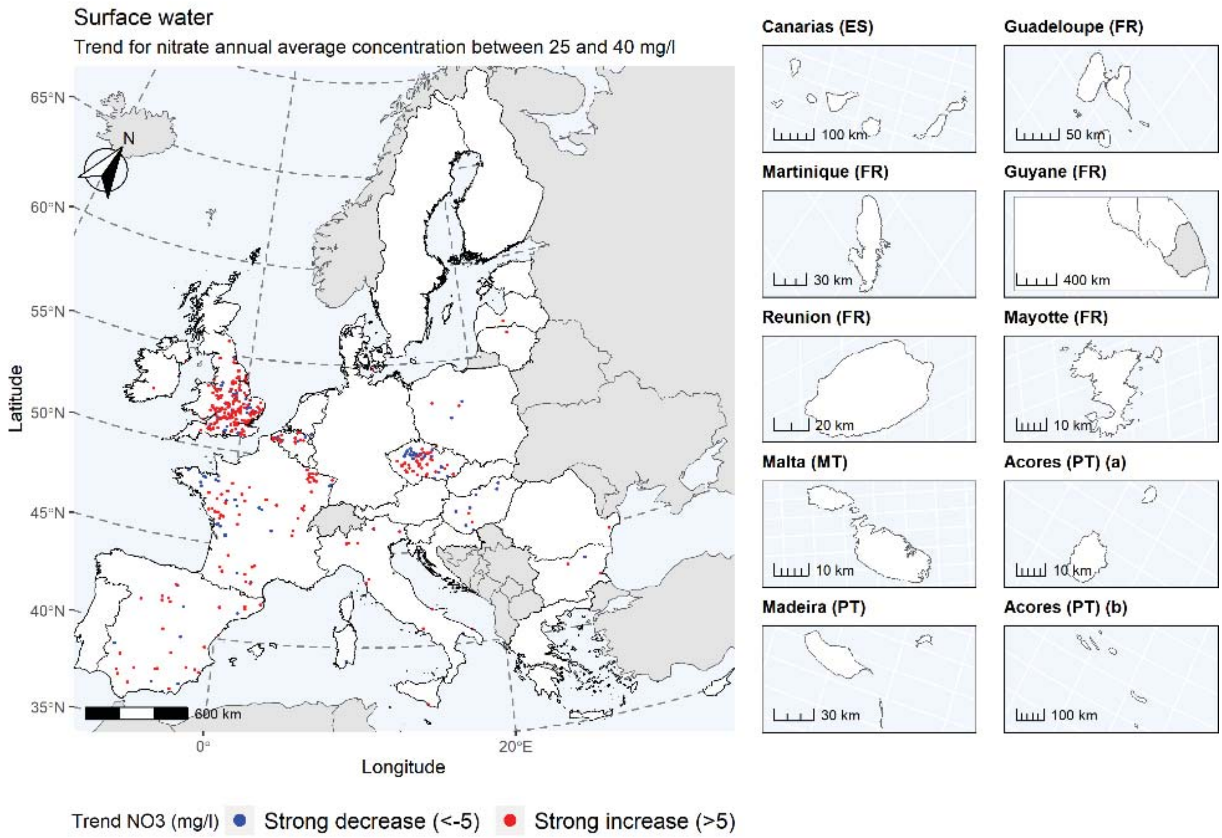
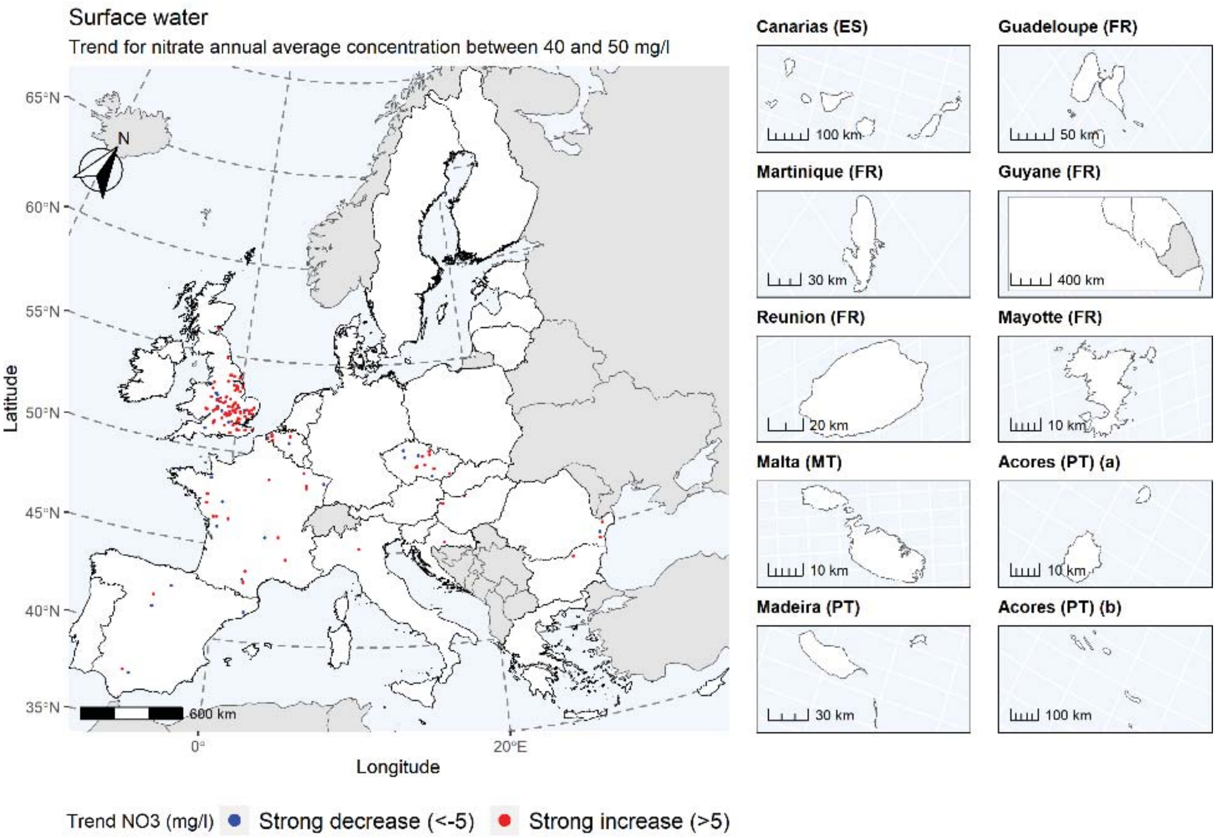


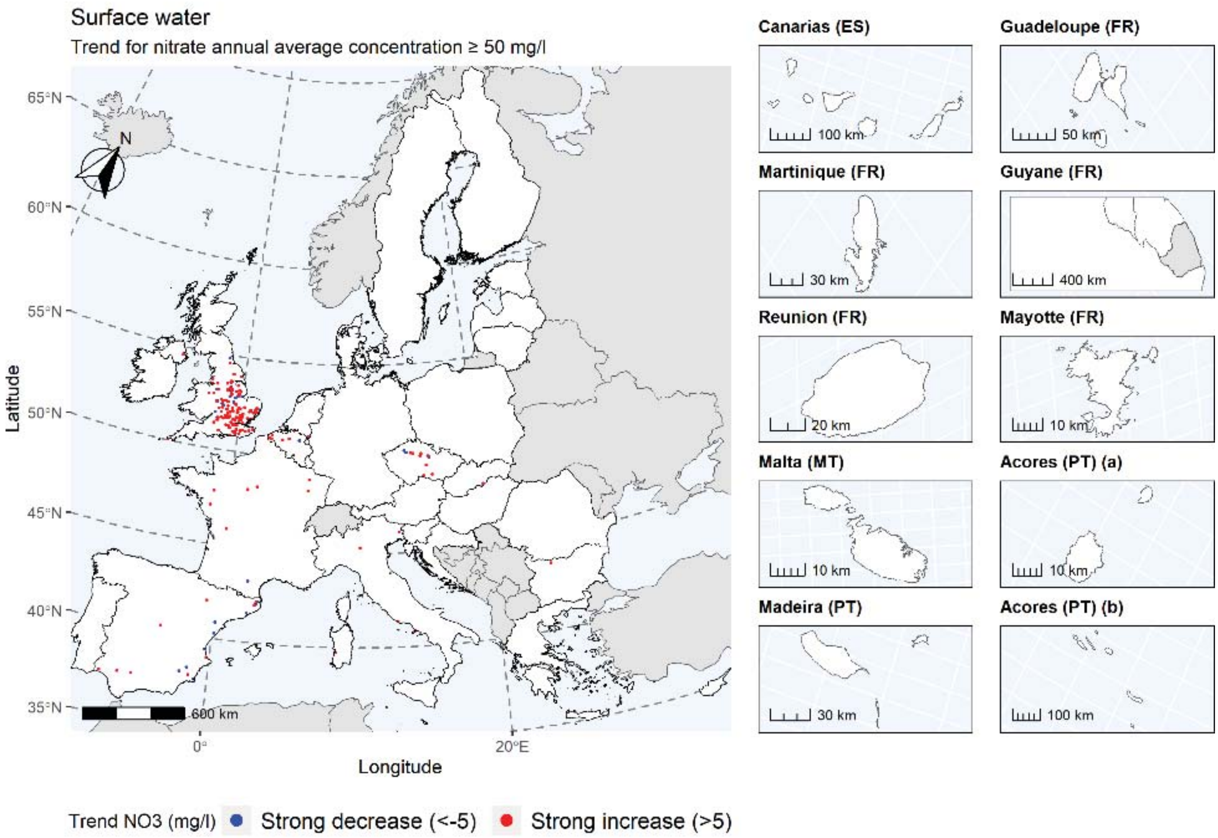
Map 39: Strong trends in annual average nitrate concentrations in surface water (all categories) between the reporting periods 2012-2015 and 2016-2019 for stations with an average annual nitrate concentration between 10 and 25 mg/l in 2016-2019



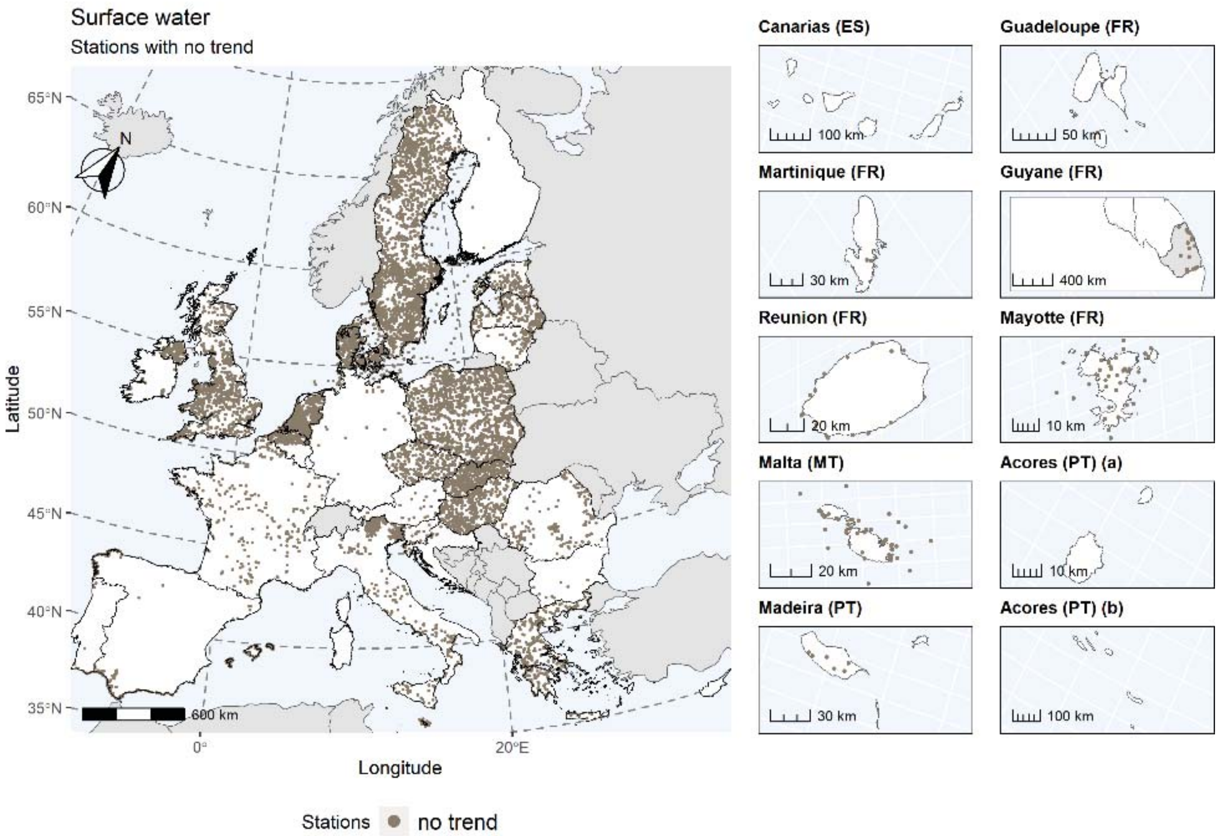
Map 40: Strong trends in annual average nitrate concentrations in surface water (all categories) between the reporting periods 2012-2015 and 2016-2019 for stations with an average annual nitrate concentration between 25 and 40 mg/l in 2016-2019



Map 41: Strong trends in annual average nitrate concentrations in surface water (all categories) between the reporting periods 2012-2015 and 2016-2019 for stations with an average annual nitrate concentration between 40 and 50 mg/l in 2016-2019



Map 42: Strong trends in annual average nitrate concentrations in surface water (all categories) between the reporting periods 2012-2015 and 2016-2019 for stations with an average annual nitrate concentration equal to or above 50 mg/l in 2016-2019



Map 43: Map of stations with no trend in nitrates concentrations in surface water between the reporting periods 2012-2015 and 2016-2019

3. NITRATE VULNERABLE ZONES

Table 45: Implementation of Article 3 of the Nitrates Directive in 2016-2019. In blue the MS that changed NVZ in RP7, in grey the not valid or drafted zone that are excluded from the total value. (Source: JRC)

Country	Detail	Note	Designated Area 2012-2015 (km^2)	Designated Area 2016-2019 (km^2)	Difference (%)
AT	AT	art. 3.5	83,861.5	83,861.5	0
BE	Flanders	art. 3.5	13,566.3	13,624.7	0.4
	Wallonia		9,597.2	9,597.2	0
BG	BG		38,351.6	38,627.6	0.7
CY	CY		444.0	457.2	3
CZ	CZ		35,638.8	33,153.6	-7
DE	DE	art. 3.5	357,783.2	357,783.2	0
DK	DK	art. 3.5	43,117.6	43,117.6	0
EE	EE		3,267.4	3,267.4	0
ES	ES		80,619.3	121,563.3	50.8
	ES	drafted zone	NA	1,323.0	
FI	FI	art. 3.5	337,414.7	337,414.7	0
FR	FR		313,891.0	292,661.0	-6.8
GR	GR		42,287.5	42,287.5	0
HR	HR		5,088.9	5,088.9	0
HU	HU		65,268.0	65,048.8	-0.3
IE	IE	art. 3.5	69,969.8	69,969.8	0
IT	IT		39,767.0	46,130.0	16
	IT	not valid zone	NA	33.0	
LT	LT	art. 3.5	64,921.9	64,921.9	0
LU	LU	art. 3.5	2,605.9	2,605.9	0
LV	LV		8,265.0	8,265.0	0
MT	MT	art. 3.5	312.5	312.5	0
NL	NL	art. 3.5	37,371.2	37,371.2	0
PL	PL	art. 3.5	21,320.0	311,928.0	>100
PT	PT		4,047.4	4,047.4	0
RO	RO	art. 3.5	238,315.8	238,315.8	0
SE	SE		101,461.7	97,182.7	-4.2
	SE	not valid zone	NA	4,508.8	
SI	SI	art. 3.5	20,249.1	20,249.1	0
SK	SK		14,622.8	20,936.2	43.2
	SK	not valid zone	NA	3,157.8	
UK	England		74,697.3	72,441.2	-3
	Northern Ireland	art. 3.5	14,131.3	14,131.3	0
	Scotland		11,263.1	8,409.0	-25.3
	Wales		479.0	479.0	0
	Total		**2,153,997.9**	**2,465,250.3**	**14.4**

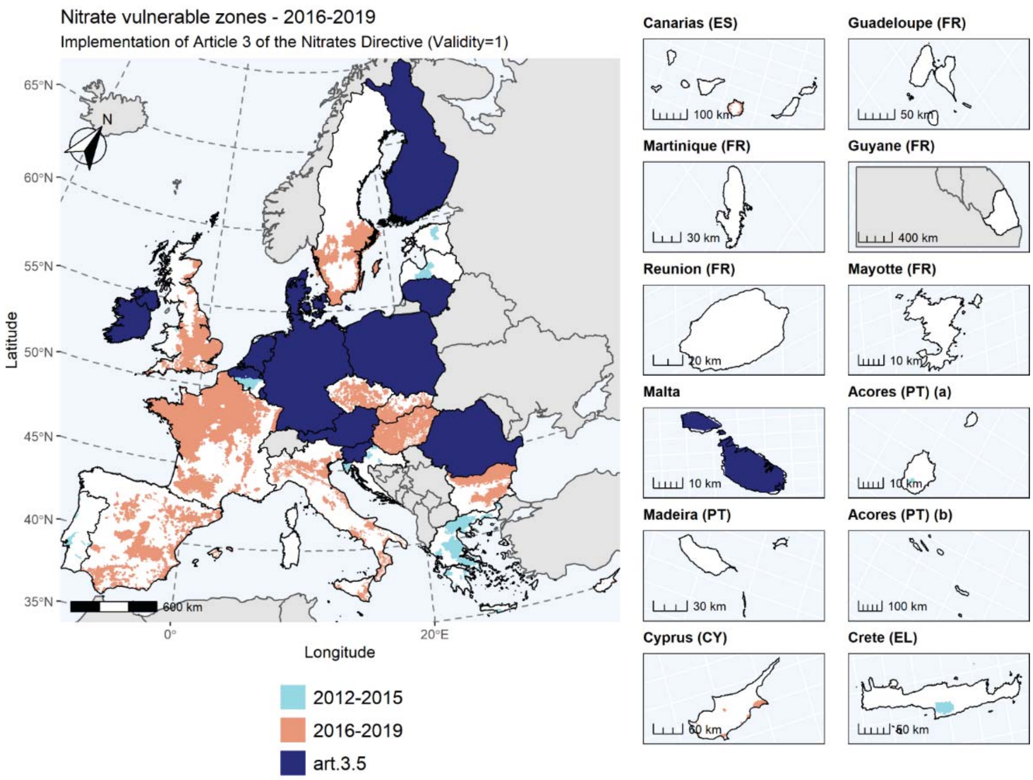
(*)

Poland is the unique country that changed the NVZ approach adopting a territory approach in 2016-2019

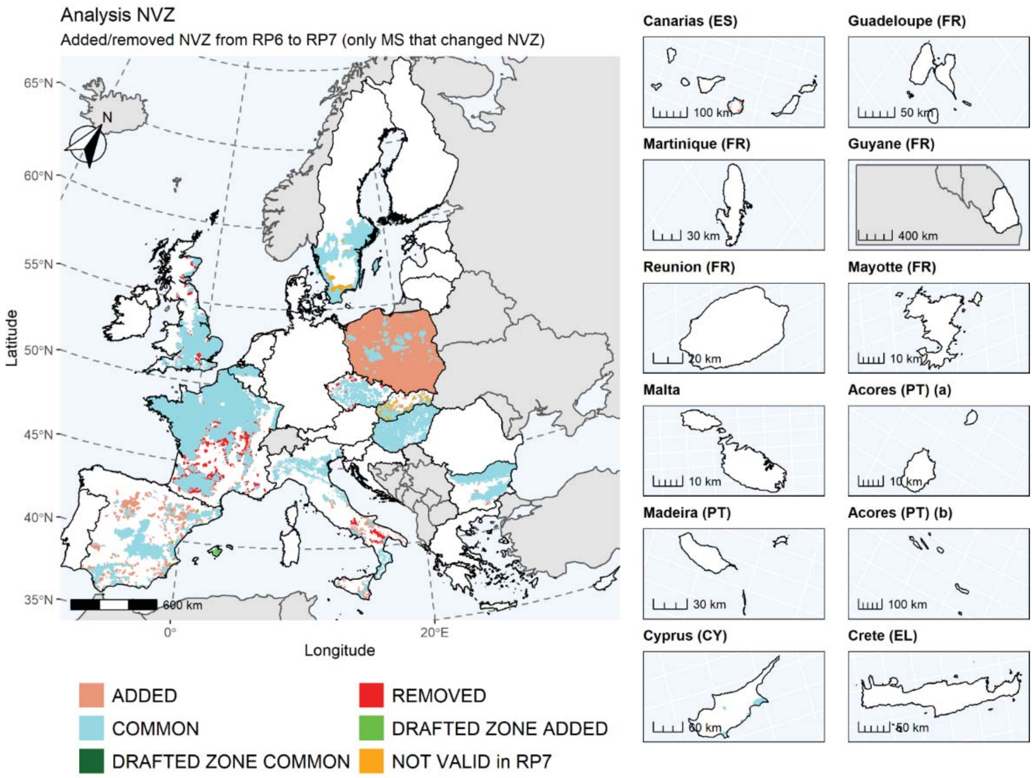
NA: not available

Table 46: Analysis of added and removed NVZ respect to the previous reporting periods. In the table only the countries that changed NVZ. See countries in blue in Table 45 (Source: JRC)

	Area NVZ (km2)						
Country Code	ADDED	REMOVED	COMMON	DRAFTED ZONE ADDED	DRAFTED ZONE COMMON	NOT VALID in RP7	Grand Total
BE	93.9	198.7	23,128.0	0	0	0.0	23,221.9
BG	1,198.6	922.6	37,429.0	0	0	0.0	38,627.6
CY	13.2	0.0	444.0	0	0	0.0	457.2
CZ	730.8	3,216.0	32,422.8	0	0	0.0	33,153.6
ES	41,163.0	219.0	80,400.3	1,323	0	0.0	121,563.3
FR	8,211.5	29,441.6	284,449.4	0	0	0.0	292,660.9
HU	59.9	279.0	64,988.9	0	0	0.0	65,048.8
IT	10,431.5	4,035.3	35,698.7	0	0	32.9	46,130.2
PL	290,608.0	0.0	21,320.0	0	0	0.0	311,928.0
SE	0.1	0.1	97,182.6	0	0	4,508.8	97,182.7
SK	8,227.4	2.8	12,708.8	0	0	3,157.8	20,936.2
UK	1,338.8	6,447.9	79,511.2	0	0	0.0	80,850.0
Total	**362,076.7**	**44,763.0**	**769,683.7**	**1,323**	**0**	**7,699.5**	**1,131,760.4**



Map 44: Implementation of Article 3 of the Nitrates Directive in 2016-2019 (Source: JRC)



Map 45: Analysis of added and removed NVZ respect to the previous reporting periods. In the map only the countries that changed NVZ in RP7. (Source: JRC)

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4. COUNTRY FICHES

Pressure from Agriculture

Austria's utilised agricultural area amounts to 2.7 Mha in 2016 and has been reduced by 17% since 2007. The major outputs of the agricultural industry excluding services and secondary activities include in a decreasing order milk (18.5%), cattle (11.5%) and cereals (10.5%). Eurostat

Major land use statistics for Austria

Table 1.Utilized agricultural area (abbreviated as UAA)

Austria	2005	2007	2010	2013	2016
Utilised agricultural area UAA (1000 ha)	NA	3239	3166	2862	2689
arable land (1000 ha)	NA	1376	1364	1354	1336
permanent grass (1000 ha)	NA	1789	1731	1441	1284
permanent crops (1000 ha)	NA	68	66	65	67
kitchen gardens (1000 ha)	NA	5	NA	NA	2

Note:

Eurostat (FSS)

While Austria's arable land has remained stable since 2007, the permanent grass land area has decreased by 28 % since 2007.

Animal distribution in Austria

Austria's live poultry has increased by 19% since 2005. The livestock index has steadily increased since 2005 and is higher than the EU average of 0.8.

Table 2. Livestock statistics

Austria	2005	2007	2010	2013	2016
Livestock index	0.75	0.78	0.87	0.89	0.91
dairy cows (10^6 heads)	0.53	0.52	0.53	0.53	0.54
live bovines (10^6 heads)	2.01	2.00	2.01	1.96	1.95
live pigs (10^6 heads)	3.17	3.29	3.13	2.90	2.79
live poultry (10^6 heads)	NA	NA	14.62	15.74	17.43

Note:

Eurostat (FSS)

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

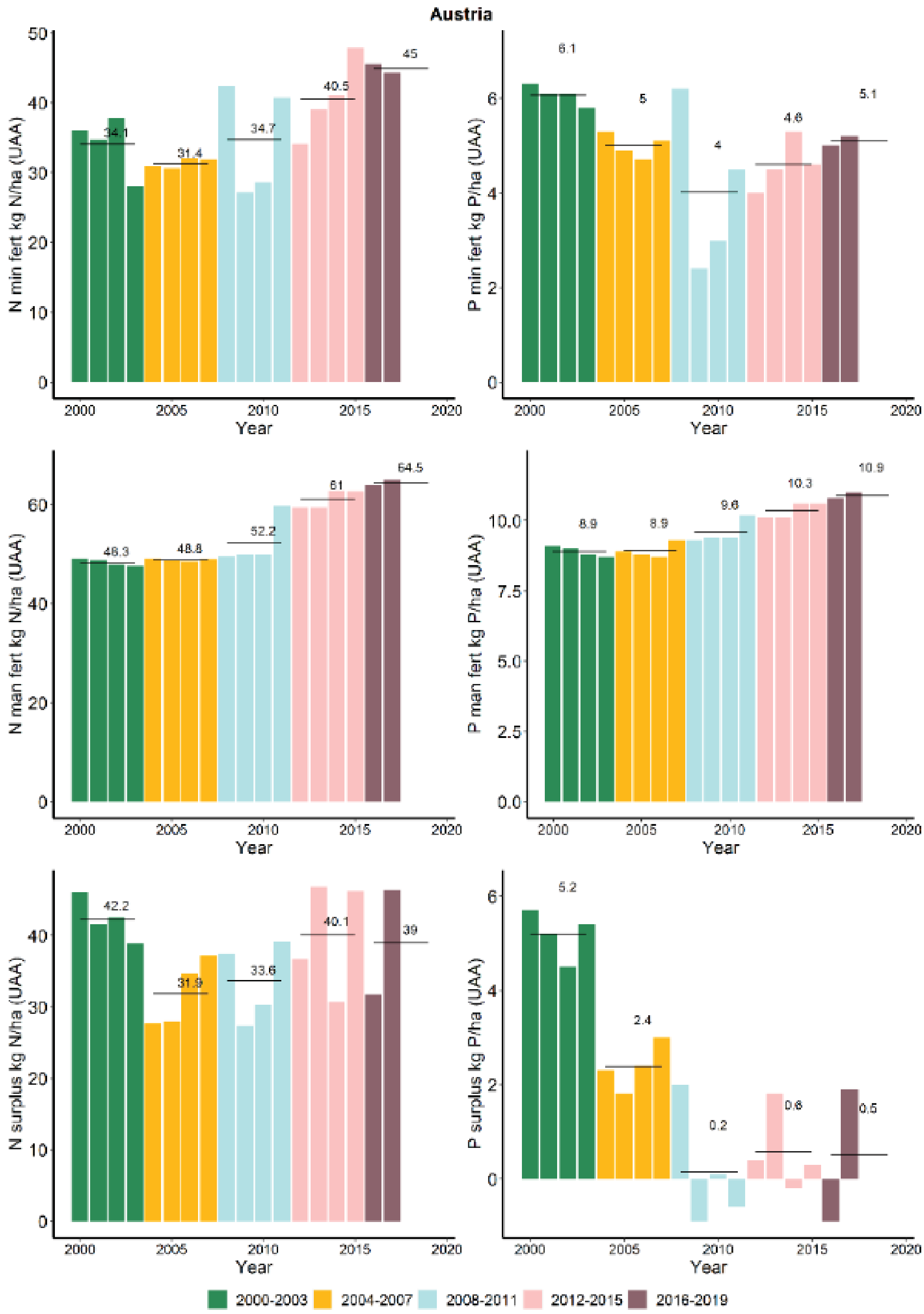


Figure 1. N and P fertilizers and gross surplus (kg/ha)

The gross nitrogen and phosphorus surpluses originate form EUROSTAT data for the years 2000-2017. The nitrogen mineral and manure fertilizer continue their steady increase since 2005. The same trend was observed for phosphorus mineral and manure fertilizer. The nitrogen surplus remained stable from the last reporting period, as well as phosphorus. 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

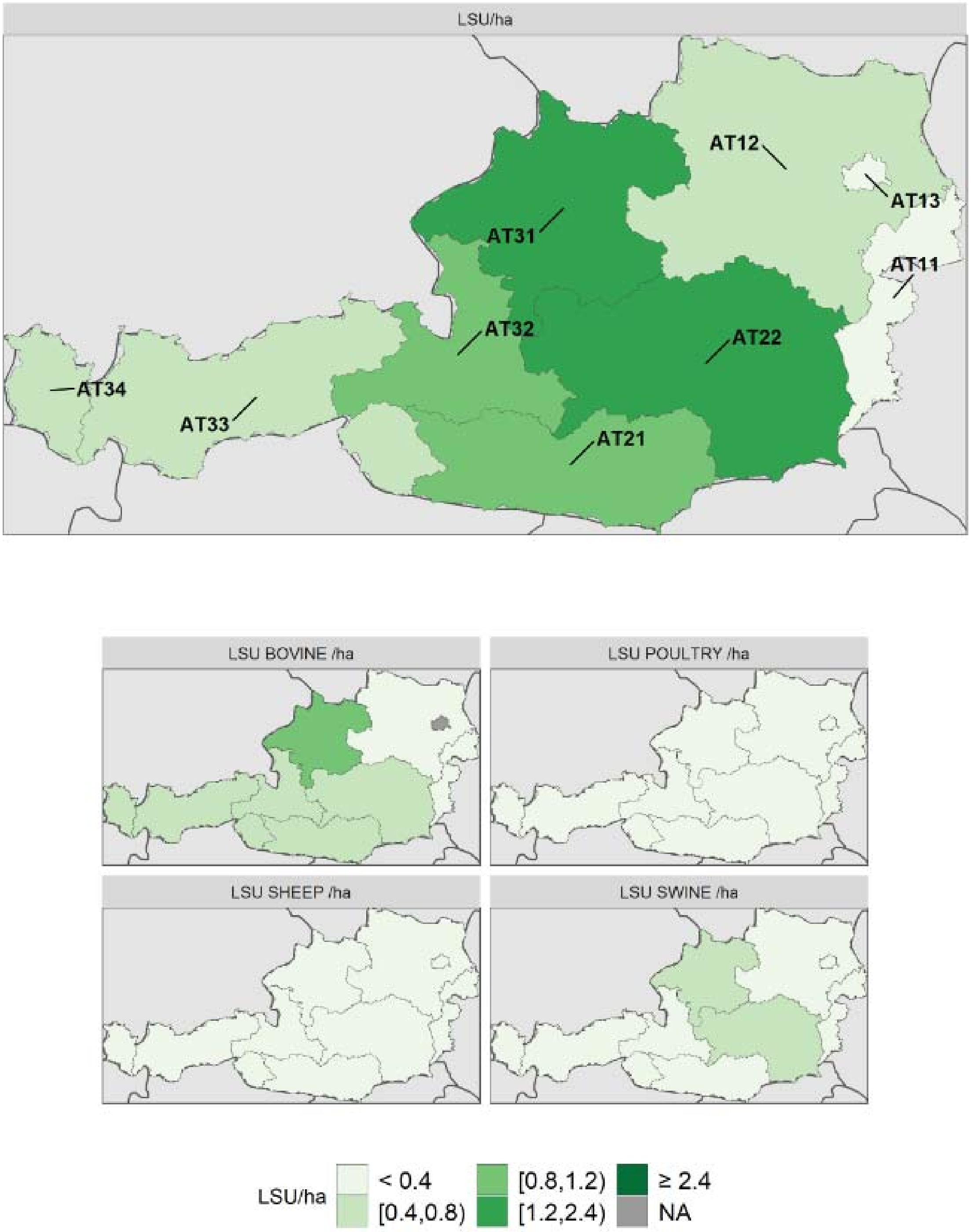


Figure 2. Map of livestock unit distribution, year 2016 (Source: Eurostat, February 2021)

Animal production is dominated by bovine and swine (total LSU and LSU by animal type were retrieved individually from EUROSTAT).
In this document, the NUTS-2013 version is used.
(https://ec.europa.eu/eurostat/web/gisco/geodata/reference-data/administrative-units-statistical-units/nuts)

Water Quality Monitoring

Austria maintains three types of monitoring stations including Surveillance, Operative and Investigative monitoring, all with a different aim. As from 2016, new surveillance sampling sites are being monitored to better cover smaller catchment areas and bioregions/types not sufficiently covered previously. Surveillance and operative monitoring are implemented nationwide while investigative monitoring is carried out on an ad hoc basis under the provincial governor's water supervisory responsibility. At the surveillance sampling sites, the entire available range of parameters, general physical and chemical parameters, are measured continuously on a monthly basis. For the operative monitoring quality elements with highest sensitivity in terms of respective pressure are measured. General physical and chemical parameters are measured on a monthly basis over a 1-year period, whereas biological parameters are examined only once a year. The chemical status of groundwater is measured in all groundwater bodies. Sampling is carried out with comprehensive set of parameters at regular intervals up to four times a year. For groundwater bodies not in a good chemical status an operative monitoring is conducted after the first year of surveillance monitoring including a set of parameters indicative for the respective pressure until the groundwater body achieves a good chemical status.

For groundwater 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

Station Type	Description	Number of stations with measurements			Number of stations with Trends		
		2008-2011	2012-2015	2016-2019	2008-2011	2012-2015	2016-2019
0	Phreatic groundwater (shallow): 0-5 m	780	754	726	705	732	694
1a	Phreatic groundwater (deep) 5-15 m	483	507	511	450	485	463
1b	Phreatic groundwater (deep) 15-30 m	152	143	144	135	140	133
1c	Phreatic groundwater (deep) >30 m	63	70	71	55	68	68
2	Captive groundwater	142	143	138	132	139	138
3	Karstic groundwater	345	348	343	247	342	341
9	Not specified	0	0	0	0	0	0
	Total	**1965**	**1965**	**1933**	**1724**	**1906**	**1837**

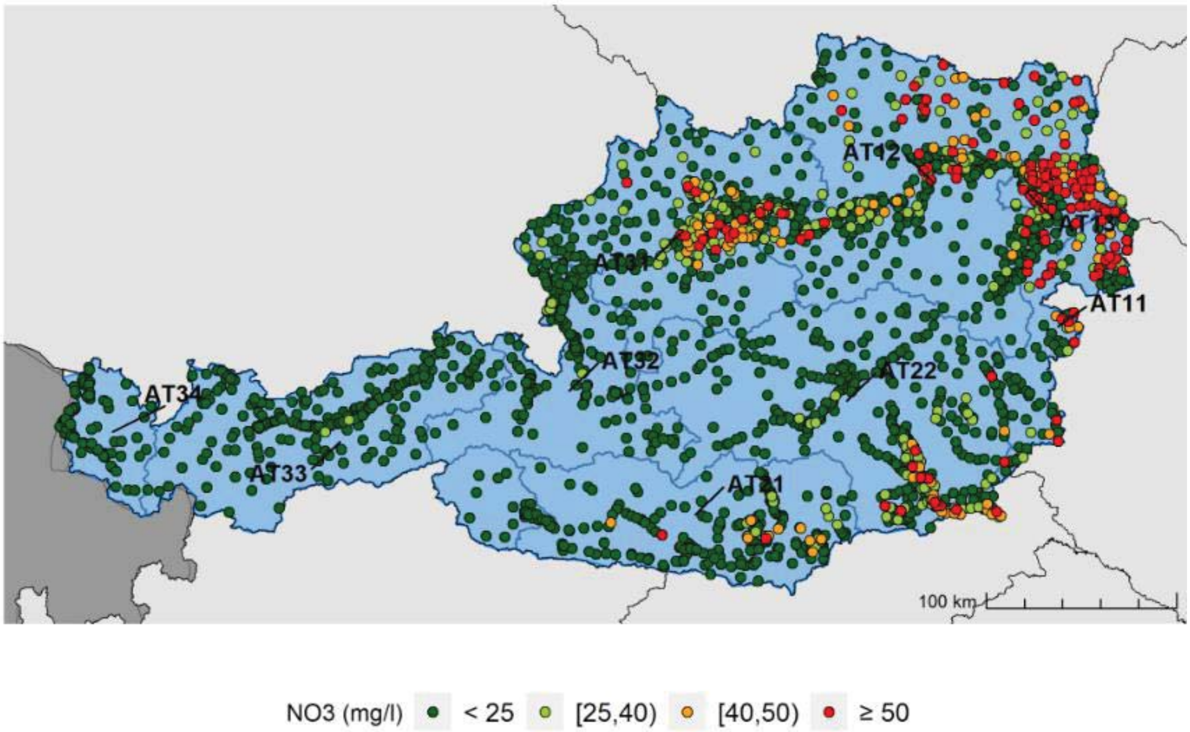
Surface water quality monitoring network

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

Station Type	Description	Number of stations with measurements			Number of stations with Trends			Number of stations with Trophic status		
		2008-2011	2012-2015	2016-2019	2008-2011	2012-2015	2016-2019	2008-2011	2012-2015	2016-2019
4	River water	81	80	100	75	79	74	71	79	100
5	Lake/reservoir water	28	28	28	25	28	28	27	28	28
6	Transitional water	NA	NA	NA	NA	NA	NA	NA	NA	NA
7	Coastal water	NA	NA	NA	NA	NA	NA	NA	NA	NA
8	Marine water	NA	NA	NA	NA	NA	NA	NA	NA	NA
9	Not specified	0	0	0	0	0	0	0	0	0
	Total	**109**	**108**	**128**	**100**	**107**	**102**	**98**	**107**	**128**

Groundwater Quality

Groundwater average annual nitrate concentration



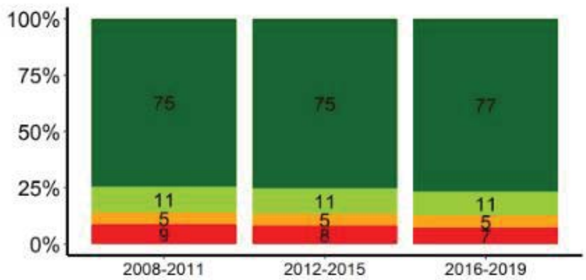


Figure 3. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information.

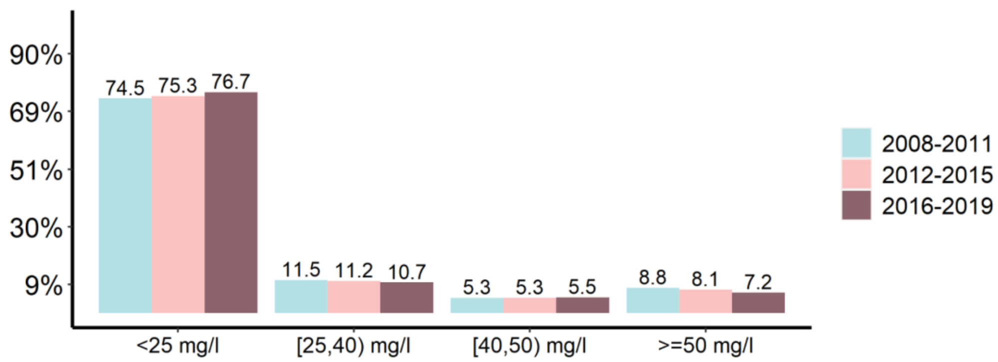


Figure 4. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis)

Groundwater average annual nitrate concentration trend

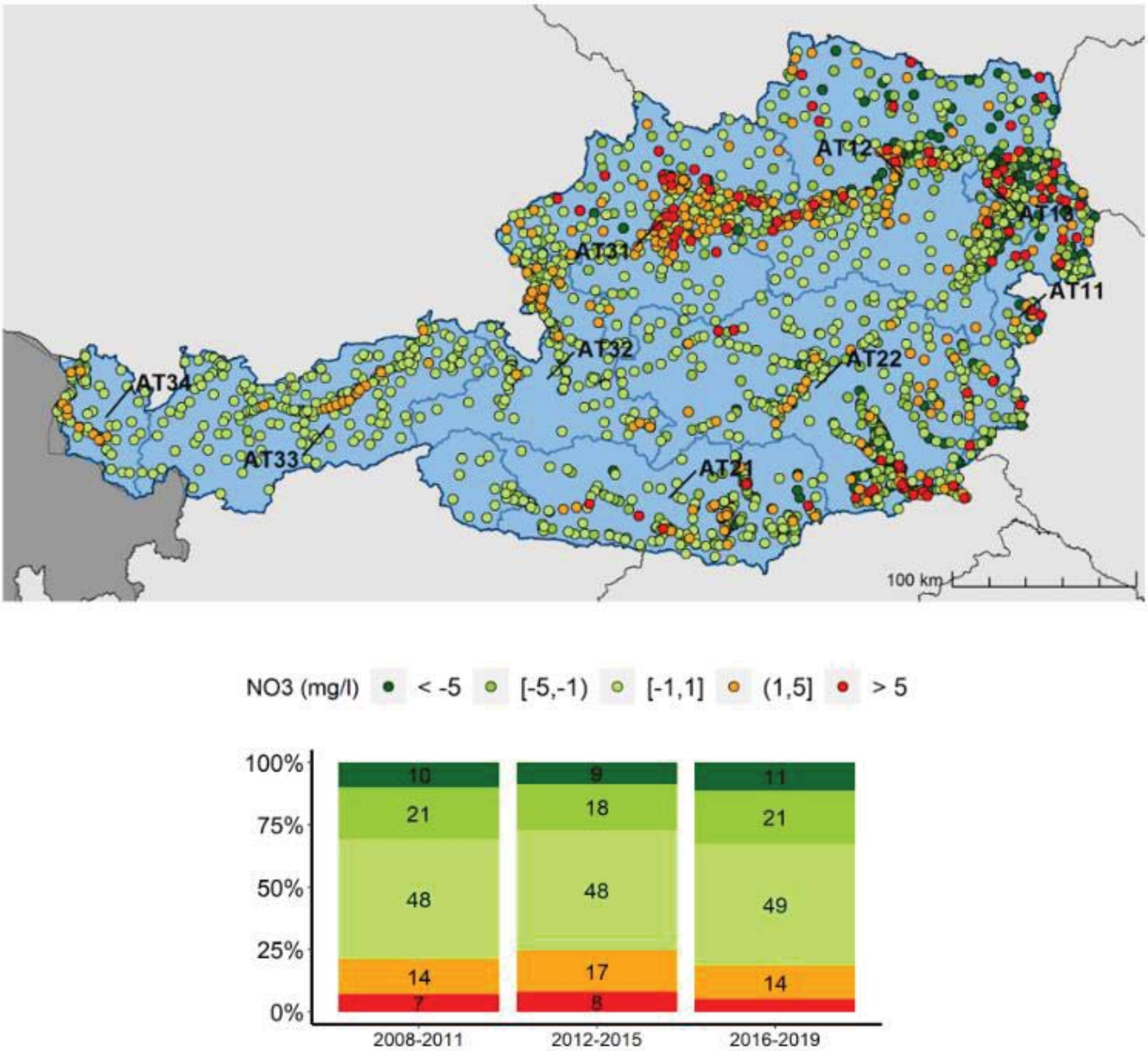


Figure 5. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information.

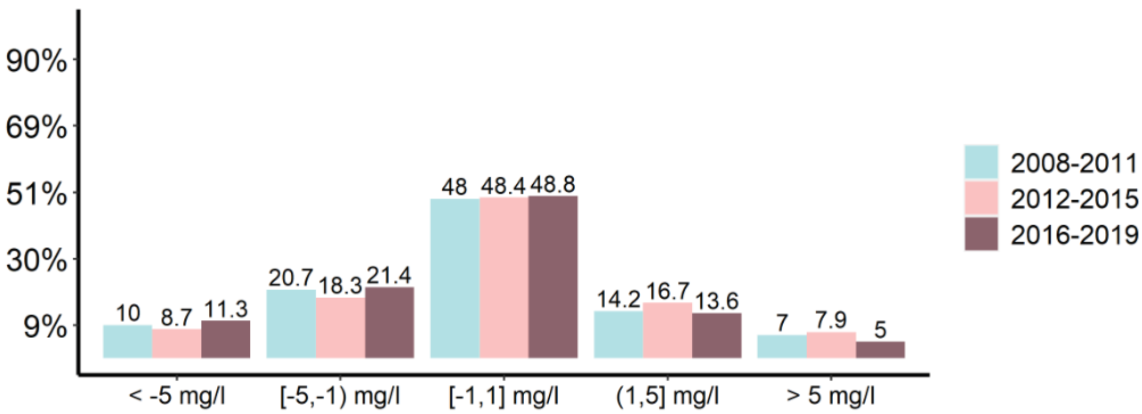
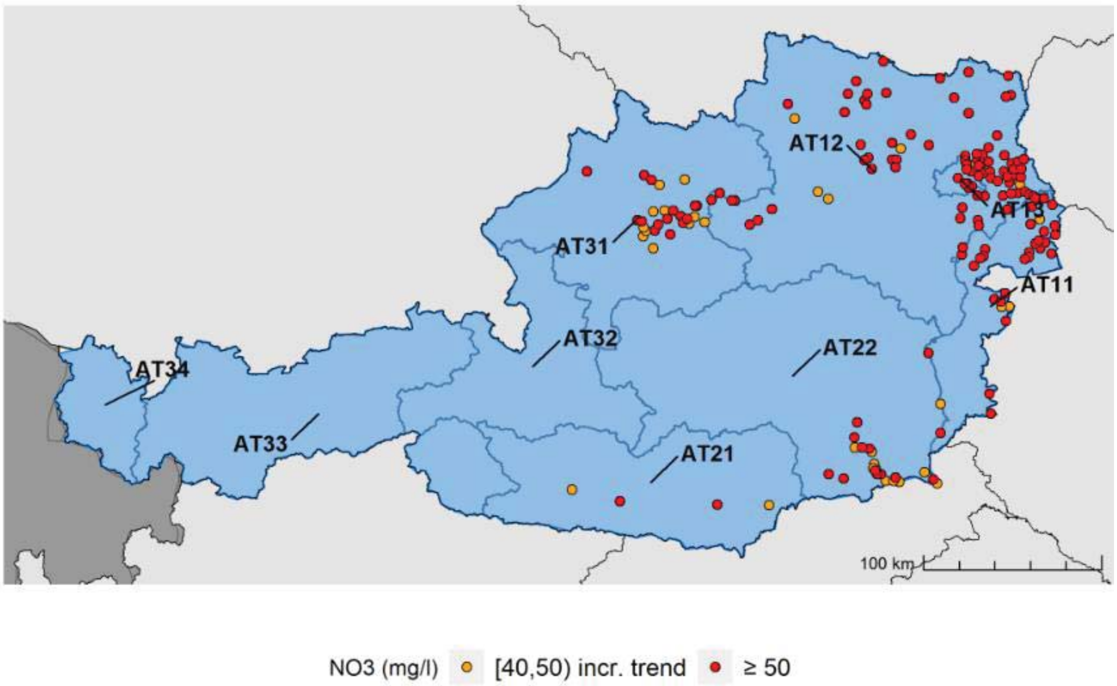


Figure 6. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis)

Groundwater hotspot



NUTS ID	NUTS NAME	>=40 and < 50 mg/l incr.trend	>=50 mg/l
AT11	Burgenland (AT)	4	27
AT12	Niederösterreich	5	71
AT13	Wien	1	11
AT21	Kärnten	2	2
AT22	Steiermark	10	11
AT31	Oberösterreich	11	17
	Total	**33**	**139**

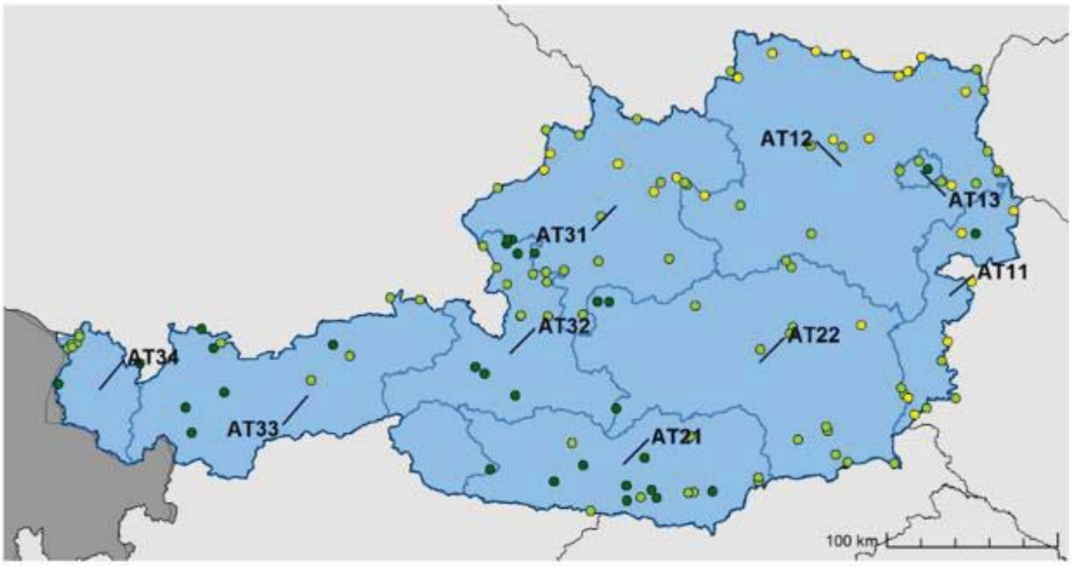
Figure 7. GW hotspot analysis map (top graph) and distribution by NUTS2 (lower graph) of average NO3 annual concentration greater than 40 mg/l.

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

Only the NUTS of interest are reported.

Surface Water Quality

Surface water average annual nitrate concentration



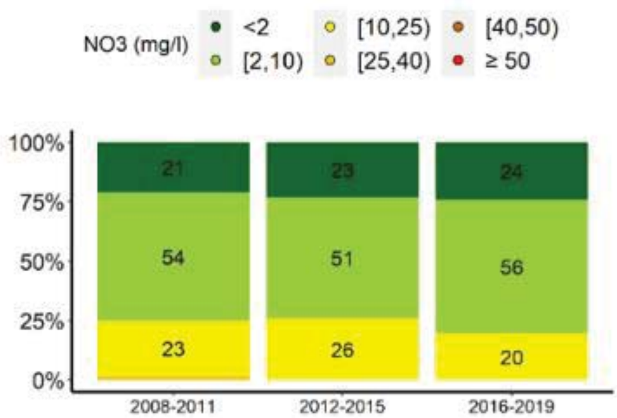


Figure 8. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information.

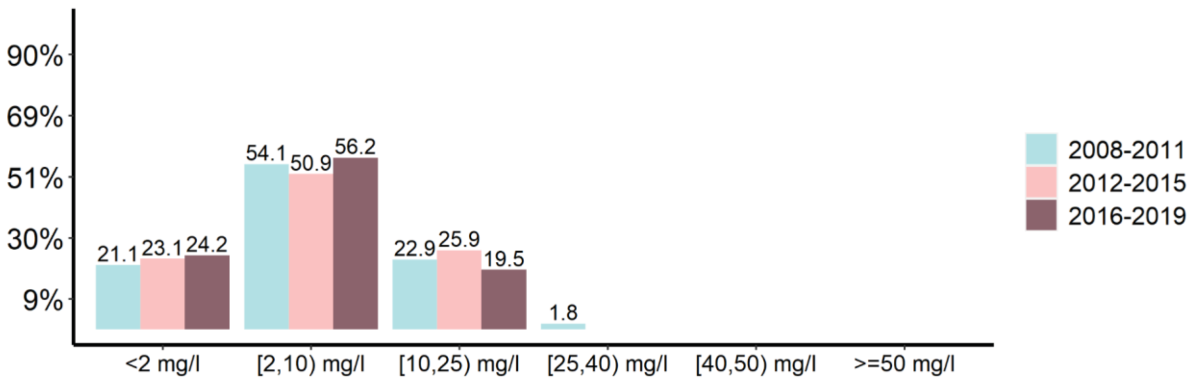


Figure 9. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis)

Surface water average annual nitrate concentration trend

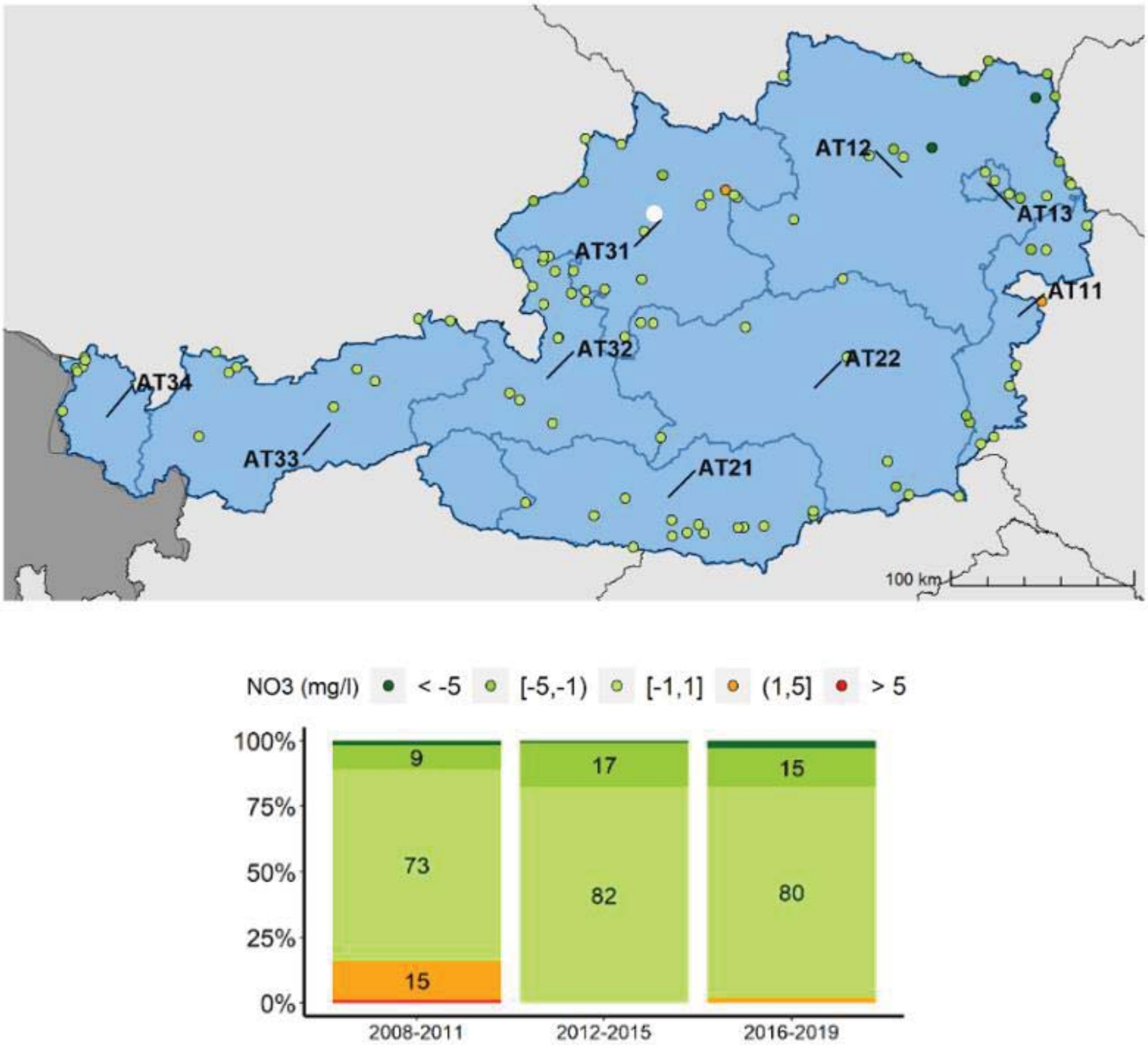


Figure 10. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information.

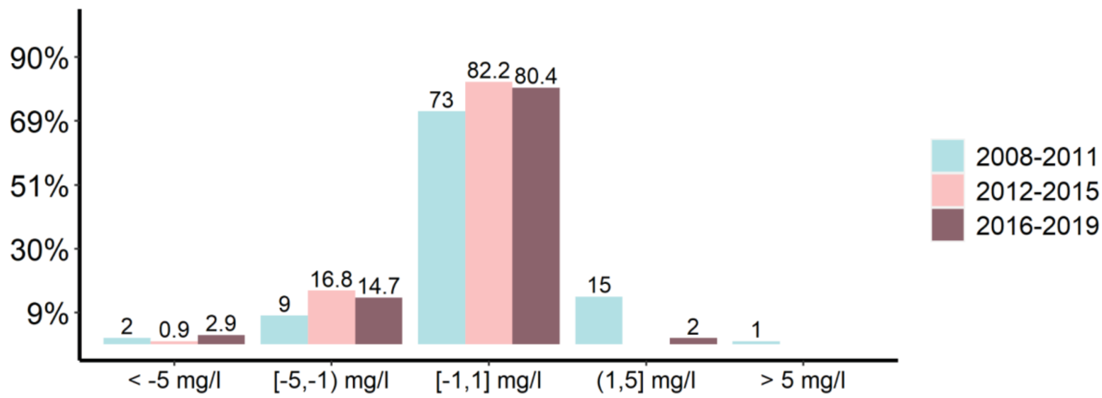


Figure 11. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis)

Surface Water Eutrophication

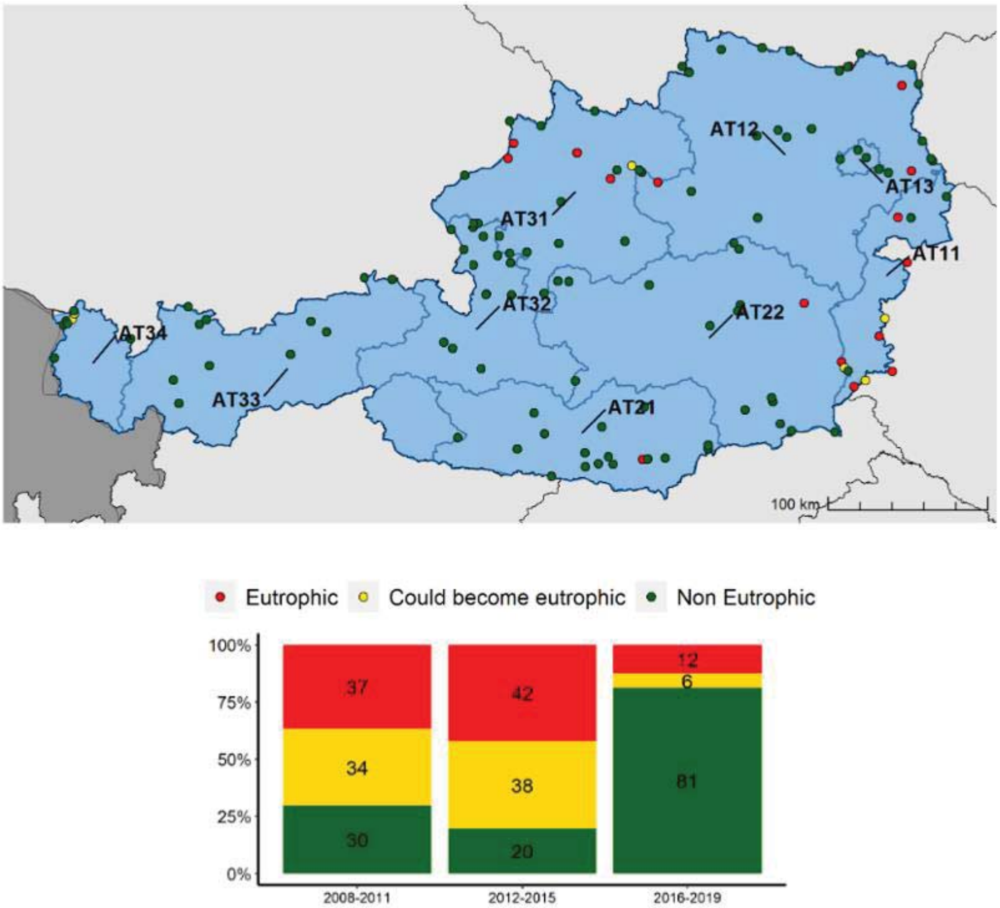


Figure 12. Spatial distribution of eutrophic status (map) and corresponding percentage of monitoring points per classes of status by reporting period (x axis).

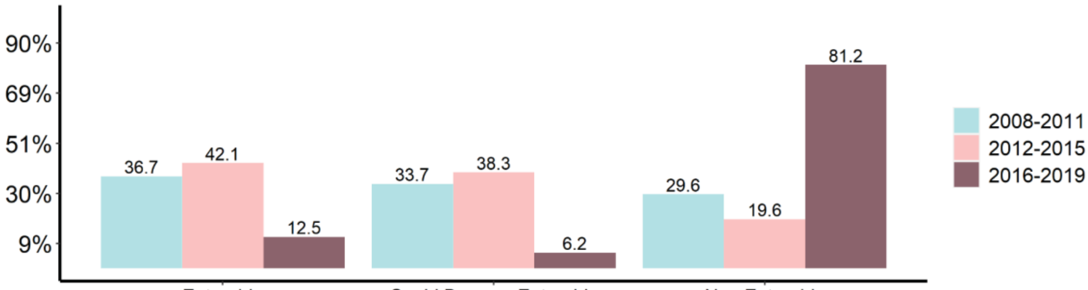
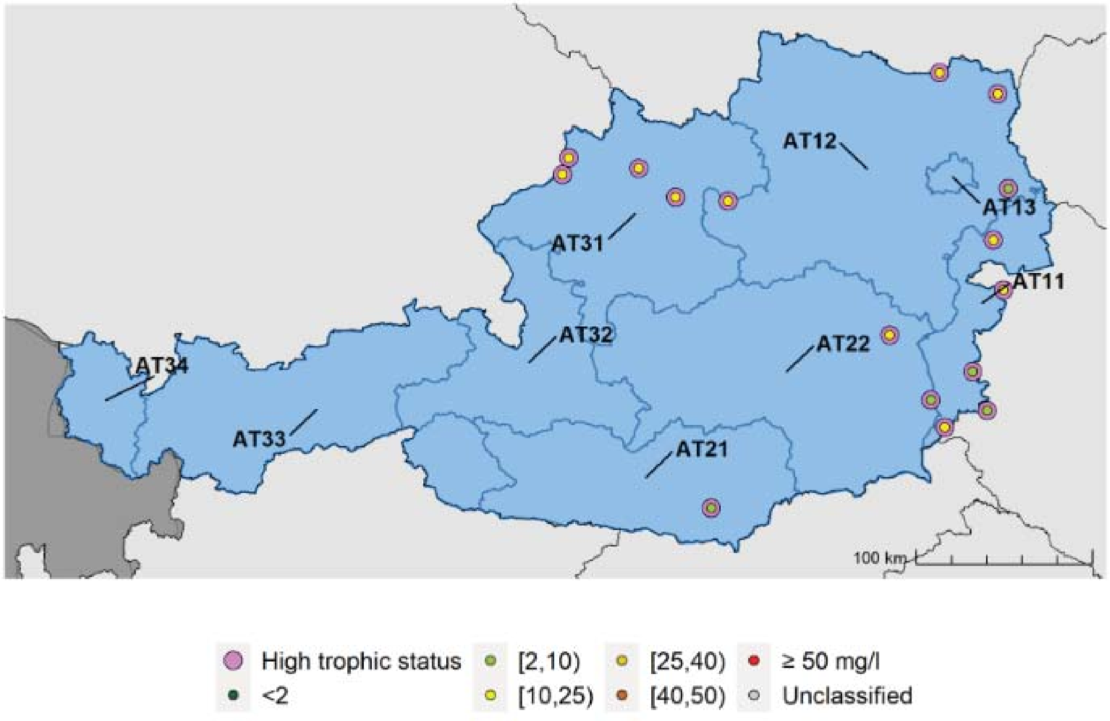


Figure 13. Comparison of percentage of monitoring points in the three reporting periods by classes of status (x axis)

Classification of the eutrophic status reported in Figures 12 and 13, have been carried out using different methodologies in the considered reporting periods. For the current reporting period, eutrophication status was assessed based on biological quality elements (phytobenthos for rivers, phytoplankton for lakes) according to the Water Framework Directive requirements (deviation in trophic status from trophic reference condition expressed as Ecological Quality Ratio, EQR). For the previous reporting periods, 2012-2015 and 2008-2011, eutrophication was evaluated based on the mean total phosphorus concentrations, without consideration of the trophic reference conditions for sampling stations.

The Eutrophic status vs average NO3 annual concentration



NUTS ID	NUTS NAME	High trophic status	Number of stations by classes of concentration						
			<2 mg/l	[2,10) mg/l	[10,25) mg/l	[25,40) mg/l	[40,50) mg/l	>=50 mg/l	Unclassified
AT11	Burgenland (AT)	6	0	3	3	0	0	0	0
AT12	Niederösterreich	4	0	1	3	0	0	0	0
AT21	Kärnten	1	0	1	0	0	0	0	0
AT22	Steiermark	1	0	0	1	0	0	0	0
AT31	Oberösterreich	4	0	0	4	0	0	0	0
	Total	**16**	**0**	**5**	**11**	**0**	**0**	**0**	**0**

Figure 14. The SW monitoring stations with eutrophic status versus the average NO3 annual concentration.

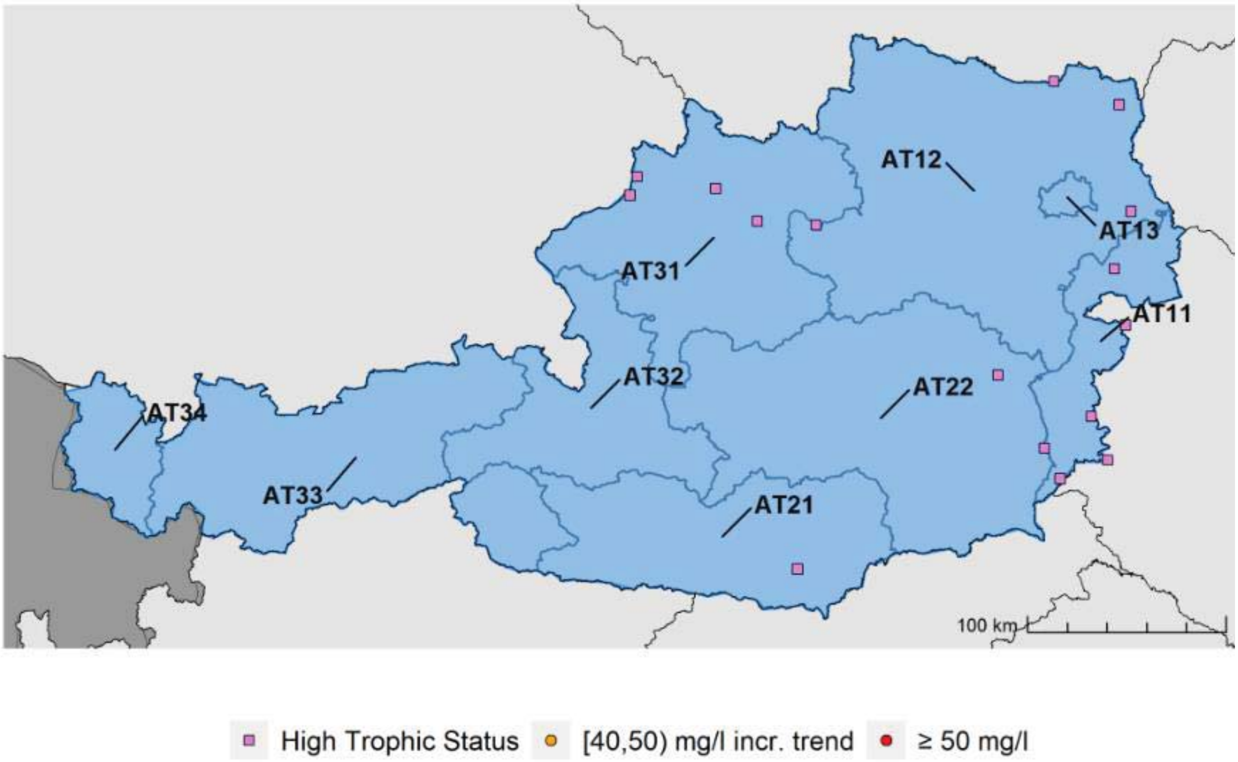
The analysis shows all the SW monitoring stations with the higher trophic status and the corresponding value of NO3 concentration. The map shows the spatial distribution of these points, and the table reports the number of stations with measurements with higher trophic status and the corresponding stations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

As required by the Water Framework Directive and in line with the instructions for the ecological assessment of Austrian rivers, the phytobenthos method was used for rivers and phytoplankton was used for lakes to assess whether the current status deviates from the basic or reference status. The phytobenthos quality element is measured at the surveillance monitoring sampling sites in rivers at regular intervals. The trophic status results for 2016 were used in the assessments for rivers. For lakes results for 2016-2018 were used in the assessments. The large majority of rivers and lakes are non-eutrophic.

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	16	7	77
5	Lake/reservoir water	0	1	27
6	Transitional water	NA	NA	NA
7	Coastal water	NA	NA	NA
8	Marine water	NA	NA	NA
9	Not specified	0	0	0
	Total	**16**	**8**	**104**

Surface Water quality hotspot



NUTS ID	NUTS NAME	High trophic status	>=40 and < 50 mg/l incr.trend	>=50 mg/l
AT11	Burgenland (AT)	6	0	0
AT12	Niederösterreich	4	0	0
AT21	Kärnten	1	0	0
AT22	Steiermark	1	0	0
AT31	Oberösterreich	4	0	0
	Total	**16**	**0**	**0**

Figure 15. SW hotspot analysis map (top graph) and distribution by NUTS2 (lower graph) of average NO3 annual concentration greater than 40 mg/l and trophic status.

The hotspot analysis identifies all the SW monitoring stations that have high trophic status, 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.

Measures in the Action Programme

The Code of Good Agricultural Practice (CAGP) has been incorporated into the Austrian Action Programme, which applies throughout the national territory. The Action Programme was last revised in 2016/2017, and the current programme entered into force on 1 January 2018 as the Nitrates Action Programme Regulation (NAPV). This is implemented throughout the country and the revision mainly puts in place regionally differentiated requirements, allowing stricter measures to be taken in areas with a higher nitrate concentration in groundwater or increased load risk to groundwater due to agricultural land use. In particular, for the first time areas where stricter measures are required in terms of necessary storage capacity and record-keeping obligations have been identified. The key measures are summarised in the table below, however additional measures can be taken on a voluntary basis to promote environmentally friendly and extensive agriculture that protects natural habitats. The AP is available online: Nitrat-Aktionsprogramm-Verordnung, bmlrt.gv.at. Cost effectiveness analysis was not reported.

Table 6. Details of Action Programme

Measure	General details in Action Programme (*)
Period of prohibition of fertiliser application	• The prohibition period depends on the type of land, crops and weather conditions. Periods are reported in Section 2 of the NAPV.
Restrictions for application on sloped soils	• Restrictions for application on steeply sloping agricultural land are listed in Section 3 of the NAPV
Restrictions for application on soaked, frozen, or snow-covered soils	• Not allowed in these situations (Section 3 of the NAPV)
Restrictions for application near watercourses (buffer strips)	• 5 m for watercourses (3 m for ditches) (it can be reduced in case of inject of fertilizer and permanent buffer strip). Section 5 of the NAPV
	• 20 m for lakes, measured from the upper edge of the bank (it can be reduced in case of inject of fertilizer and permanent buffer strip,except for areas with a gradient towards a lake of more than 10%). Section 5 of the NAPV
Effluent storage works	• Slurry has to be collected on farm in slurry tanks, farmyard manure on impermeable surface with collection of leakage water in slurry tanks (Section 6 of NAPV)
Capacity of manure storage	• Storage tanks for farm manure must have storage capacity for at least 6 months (Section 6 of NAPV)
	• Specific requirements in areas with a higher nitrate concentration in groundwater or increased load risk to groundwater due to agricultural land use. In those areas storage capacity of at least 10 months is required (Section 6 of NAPV)
Rational fertilisation (e.g., splitting fertilisation, limitations)	• Procedure for applying nitrogen fertilisers are specified in section 7 of the NAPV. In particualr, the amount of nitrogen fertiliser required must be calculated on the basis of advisory documents, competent bodies' recommendations or fertilisation guides
	• Specific requirements in areas with high nitrate concentrations in GW and high load risk : record keeping is required for all holdings with more than 5 ha arable land and more than 2 ha vegetables in these regions (Section 9 of the NAPV)
Crop rotation, permanent crop enhancement	• Not specified
Vegetation cover in rainy periods, winter	• Not specified
Fertilisation plans, spreading records	• All holdings that have more than 15 hectares of agricultural land or which grow vegetables on more than 2 hectares are required to keep land management and crop-specific records; grassland farms (90% permanent grassland) are exempt (Section 7 of the NAPV)
	• There are specific requirements in areas with high nitrate concentrations in gw and high load risk : record keeping is required for all holdings with more than 5ha arable land and more than 2 ha vegetables in these regions (Section 9 of the NAPV)
Other measures	• Caps on total amount of fertiliser that can be used per crop, in the form of farm manure and all other types of fertiliser (Section 7 of the NAPV)
Date for application limit of 170 kg N/ha/year:	• Not specified

(*) NAPV - Nitrates Action Programme Regulation (Nitrataktionsprogramm-Verordnung)

Controls

Compliance with the Action Programme's requirements is monitored by the Water Inspectorate, as well as by Agrarmarkt Austria, the agency managing payments under the common agricultural policy pursuant to Regulation (EU) No 1306/2013. The implementation of the provisions of the nitrate Action Programme is monitored both through administrative controls and through on-site checks. The average annual number of holdings subject to on-site cross-compliance checks is 1391 in average in the period 2016-2019.

Designation of NVZ

Austria has adopted a whole territory approach.

Forecast of Water Quality

It is expected that nitrate loads can fall further, in particular in areas that currently have high nitrate concentrations, thanks to the measures taken. In most porous aquifers, however, it will take some time for the expected decline to become apparent due to the sometimes long retention times in groundwater. The favourable conditions reported so far in large parts of Austria, where nitrate concentrations have been comparatively low and stable for years, are expected to continue.

Summary

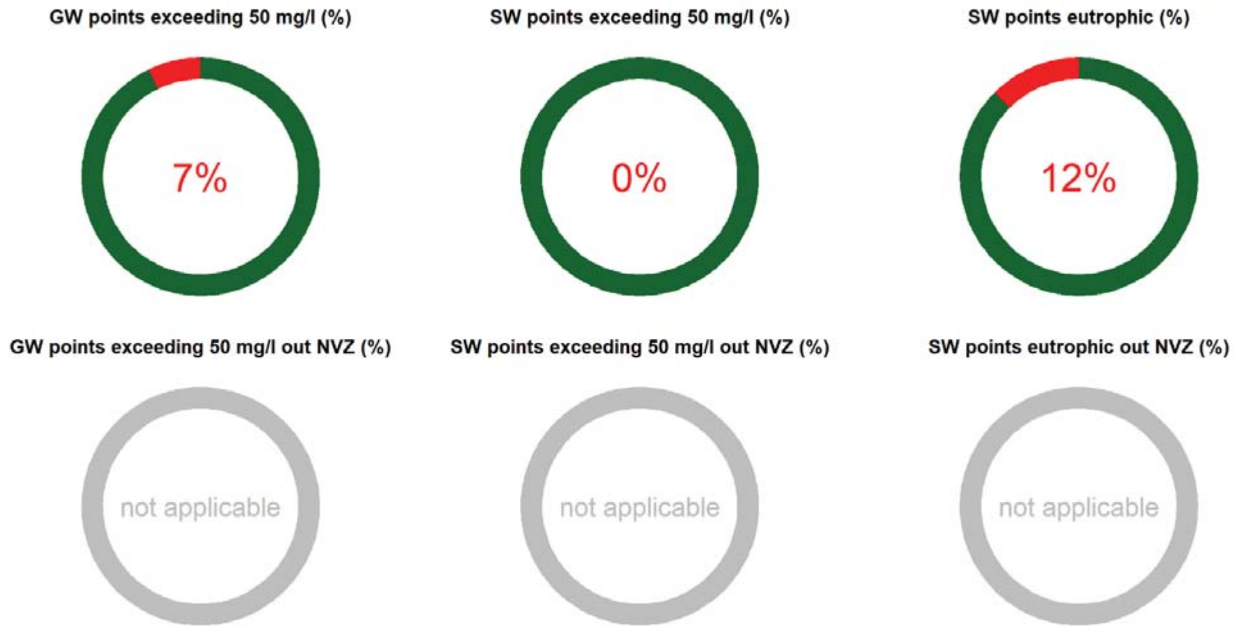


Figure 16. The summary plot for the period 2016-2019

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

Long term analysis

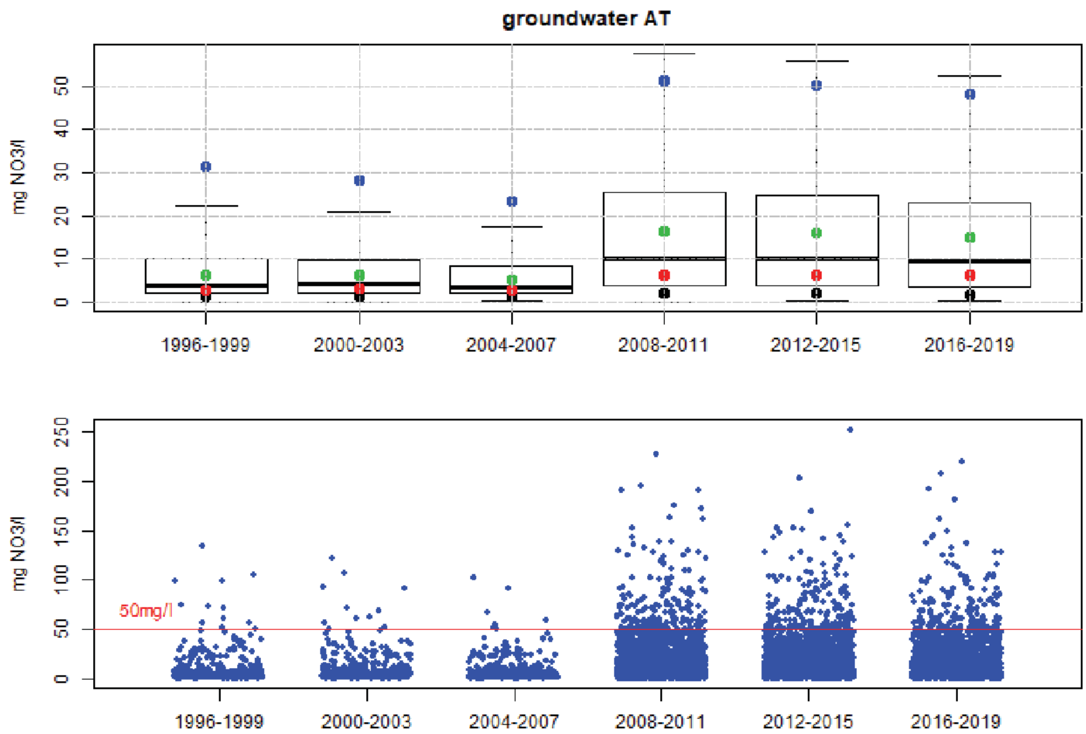


Figure 17. Time series of box whisker plots along with the distribution of the average NO3 annual concentrations for each reporting period, for groundwater stations. RPs represent the reporting periods, RP7 being the last period (2016-2019). The blue, red, green and black dots represent the mean of the fourth third, second and first quartiles, respectively.

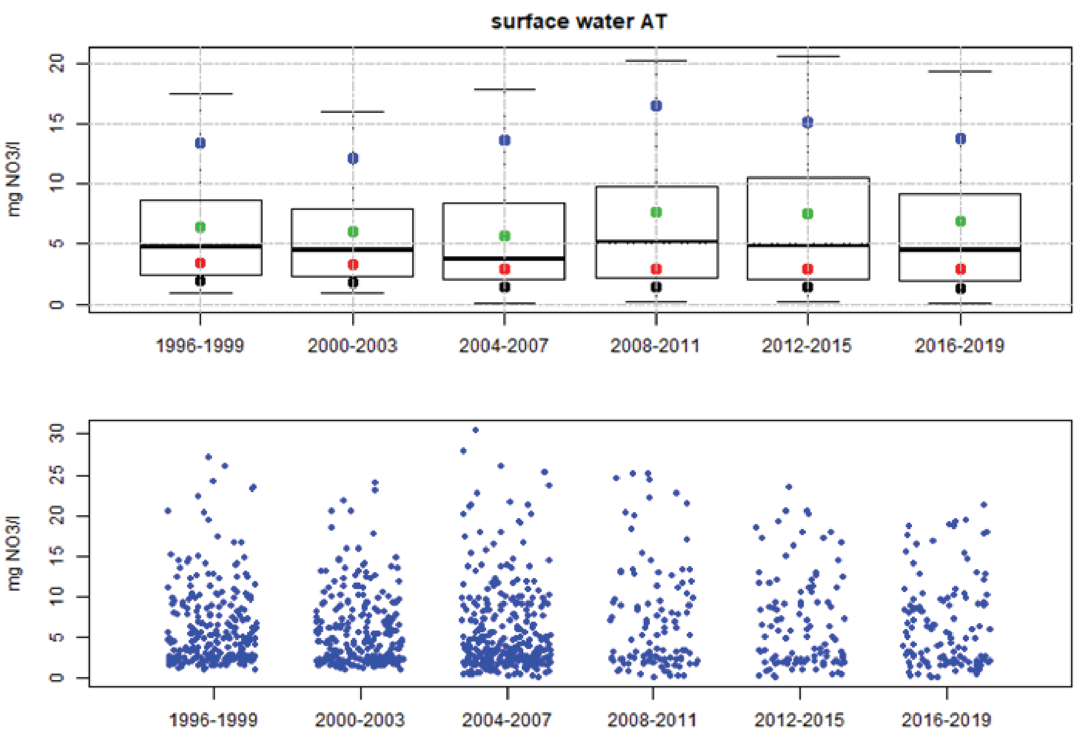


Figure 18. Time series of box whisker plots along with the distribution of the average NO3 annual concentrations for each reporting period, for surface water stations. RPs represent the reporting periods, RP7 being the last period (2016-2019). The blue, red, green and black dots represent the mean of the fourth third, second and first quartiles, respectively.

Conclusions and recommendations

Austria has an average livestock pressure, the phosphorus surplus is below the average for the EU.

There is a well-elaborated network of monitoring stations. The groundwater quality is good in most of the regions; however, hotspots remain in certain regions. All surface waters comply with the maximum nitrate level set in the Nitrates Directive and most of these waters have a good trophic status.

The Nitrate Action Programme was reviewed in 2018 and includes stricter measures for hotspots.

The Commission encourages Austria to continue to follow-up these hotspots and to take appropriate actions if it appears necessary.

EUROPEAN
COMMISSION

Brussels, 11.10.2021
SWD(2021) 1001 final

PART 9/38

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}

EN EN

PRESSURE FROM AGRICULTURE

Belgium's utilised agricultural area amounts to 1353 Mha, representing 44% of the total land area and has remained stable since 2007. The major outputs of the agricultural industry excluding services and secondary activities include in a decreasing order: cereals (24.8%), industrial crops (13.5%) and milk (12%).
Eurostat

Major land use statistics for Belgium

Table 1.Utilized agricultural area (abbreviated as UAA)

Belgium	2005	2007	2010	2013	2016
Utilised agricultural area UAA (1000 ha)	NA	1370	1358	1339	1353
arable land (1000 ha)	NA	840	836	818	855
permanent grass (1000 ha)	NA	507	500	498	478
permanent crops (1000 ha)	NA	21	18	18	19
kitchen gardens (1000 ha)	NA	0	0	NA	0

Note:
Eurostat (FSS)

Belgium's arable land has remained stable since 2007, while permanent grassland decreased slightly with 4%.

Animal distribution in Belgium

Belgium's live poultry has increased by 21.4% since 2013. The livestock density index (livestock unit per hectare of Utilized Agricultural Area) has increased by 1.9% since 2013 and is significantly higher than the EU average of 0.8.

Table 2. Livestock statistics

Belgium	2005	2007	2010	2013	2016
Livestock index	2.80	2.76	2.80	2.74	2.79
dairy cows (10^6 heads)	0.55	0.52	0.52	0.52	0.53
live bovines (10^6 heads)	2.60	2.57	2.51	2.44	2.50
live pigs (10^6 heads)	6.25	6.20	6.18	6.35	6.18
live poultry (10^6 heads)	NA	NA	34.37	35.11	42.63

Note:
Eurostat (FSS)

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

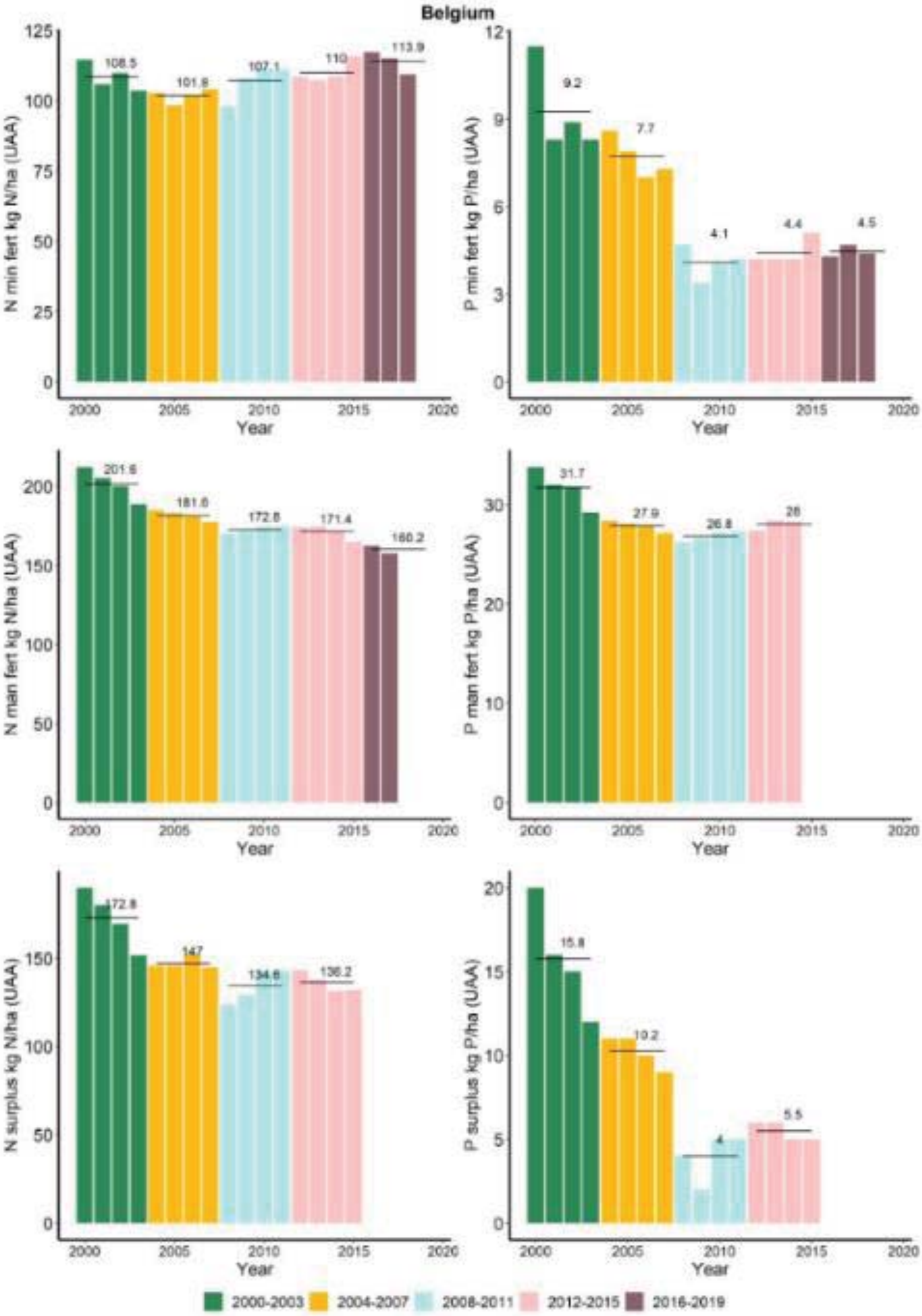


Figure 1. N and P fertilizers and gross surplus (kg/ha)

The gross nitrogen and phosphorus surpluses originate form EUROSTAT data for the years 2000-2014. It is noteworthy that Belgium provided also other statistics for N and P mineral fertilizers. However, comparing these statistics with Eurostat values for common years, they differ significantly. Consequently, the data of Eurostat were kept. N and P mineral fertilizers, manure and N surplus remained stable since 2010, while P surplus increased. In the plots: N/P min and N/P man are respectively the N/P mineral fertilizers and N/P manure.

Livestock unit - LSU /ha – Belgium Flanders

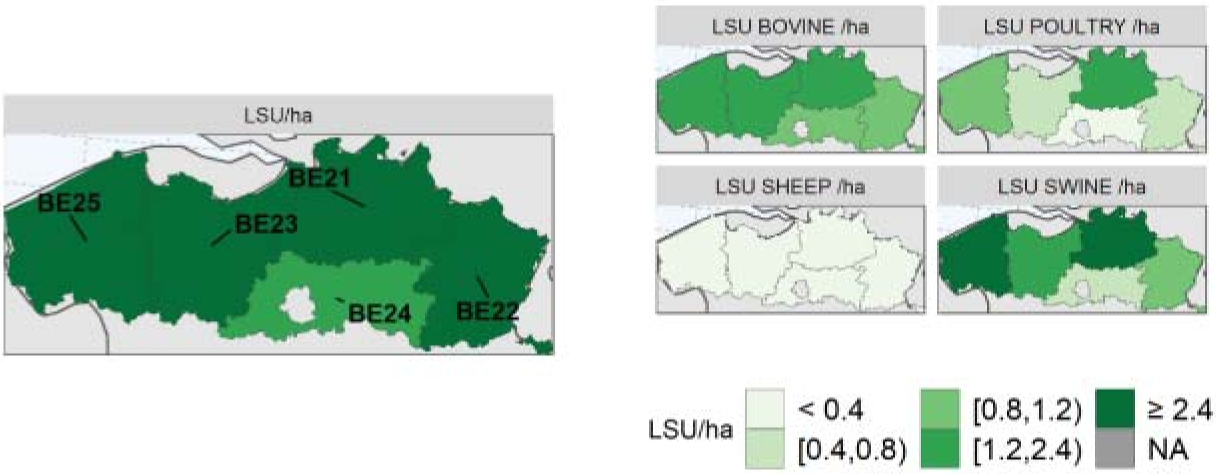


Figure 2. Map of livestock unit distribution, year 2016 (Source: Eurostat, February 2021)

Animal production is concentrated in BE25 and BE21 with highest value of LSU/ha of bovine, swine, followed by poultry (total LSU and LSU by animal type were retrieved individually from EUROSTAT).

Livestock unit - LSU /ha – Belgium Wallonia

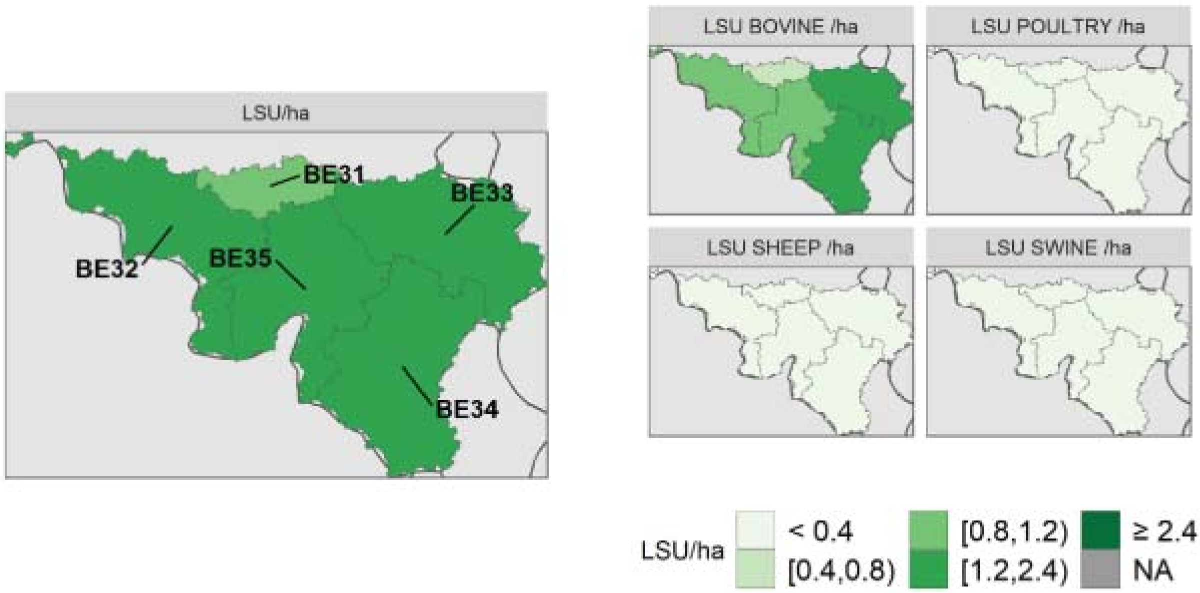


Figure 3. Map of livestock unit distribution, year 2016 (Source: Eurostat, February 2021)

Animal production is concentrated in the eastern part with highest values of LSU/ha of bovine (total LSU and LSU by animal type were retrieved individually from EUROSTAT).
In this document, the NUTS-2013 version is used.
(https://ec.europa.eu/eurostat/web/gisco/geodata/reference-data/administrative-units-statistical-units/nuts)

Water Quality Monitoring - Flanders

Monitoring for the Nitrates Directive is managed by The Flanders Environment Agency (Vlaamse Milieumaatschappij, VMM) who maintains the Manure Action Plan (MAP) monitoring network. Samples are taken from the MAP surface sampling points on a monthly basis. For those points with concentrations lower than 40 mg nitrate/l for at least three consecutive years, samples are taken only three times per winter year. The MAP monitoring network was extended specifically to assess the impact of agricultural activities on the nitrate concentration in small water systems. The results are used to report on the most recent reporting period (2016-2019) and the previous periods. The monitoring network for eutrophication assessment is that of the Water Framework Directive. For groundwater, samples are taken twice a year for all wells.

For groundwater water measurements, some stations have same coordinates due to different depths. In this case, the average values covers 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 coordinated: 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	999	991	992	967	950	979
1a	Phreatic groundwater (deep) 5-15 m	751	752	747	735	719	743
1b	Phreatic groundwater (deep) 15-30 m	219	221	219	209	209	217
1c	Phreatic groundwater (deep) >30 m	106	109	109	100	103	107
2	Captive groundwater	0	0	0	0	0	0
3	Karstic groundwater	0	0	0	0	0	0
9	Not specified	0	0	0	0	0	0
	Total	**2075**	**2073**	**2067**	**2011**	**1981**	**2046**

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	793	769	760	789	757	753	227	222	214
5	Lake/reservoir water	0	0	0	0	0	0	13	11	11
6	Transitional water	0	0	0	0	0	0	7	7	7
7	Coastal water	0	0	0	0	0	0	0	0	0
8	Marine water	0	0	0	0	0	0	0	0	0
9	Not specified	0	0	0	0	0	0	0	0	0
	Total	**793**	**769**	**760**	**789**	**757**	**753**	**247**	**240**	**232**

European Commission

Groundwater Quality - Flanders

Groundwater average annual nitrate concentration

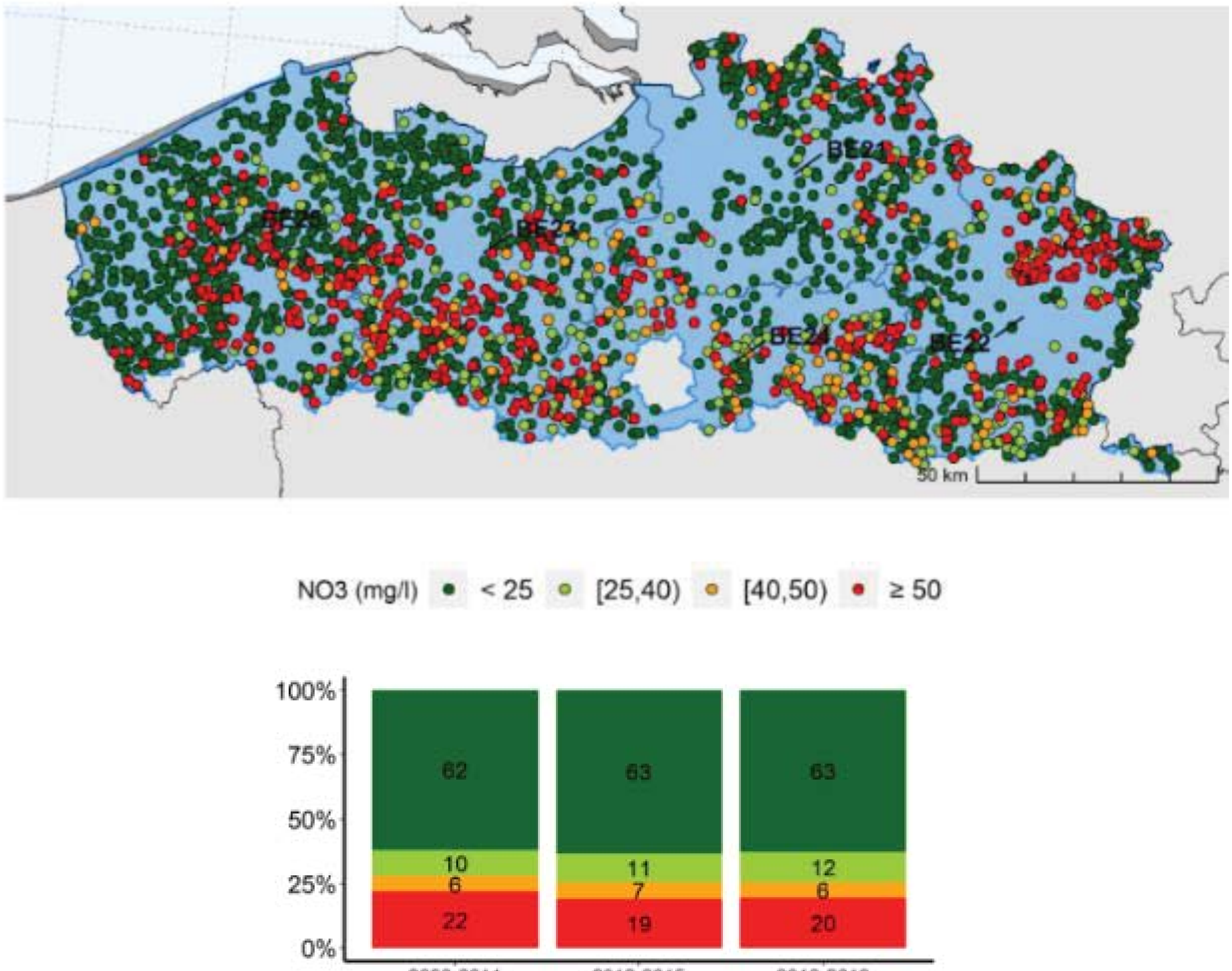


Figure 4. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). In the map in blue the NVZ.

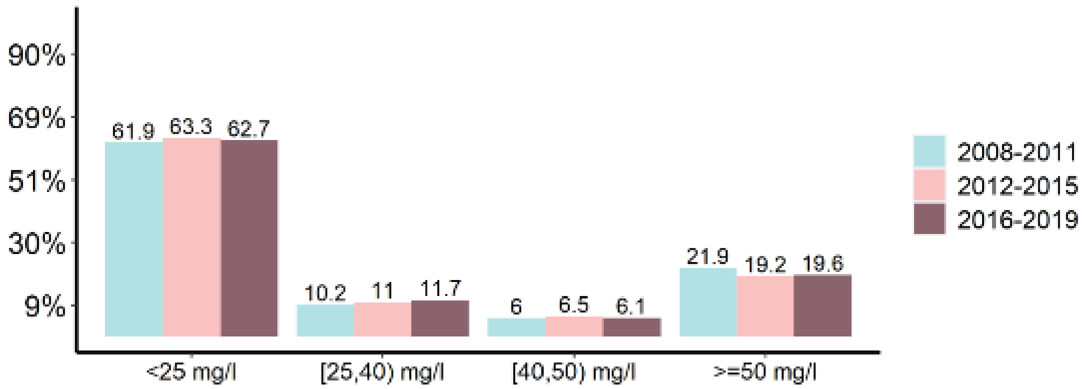


Figure 5. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis)

Groundwater average annual nitrate concentration trend

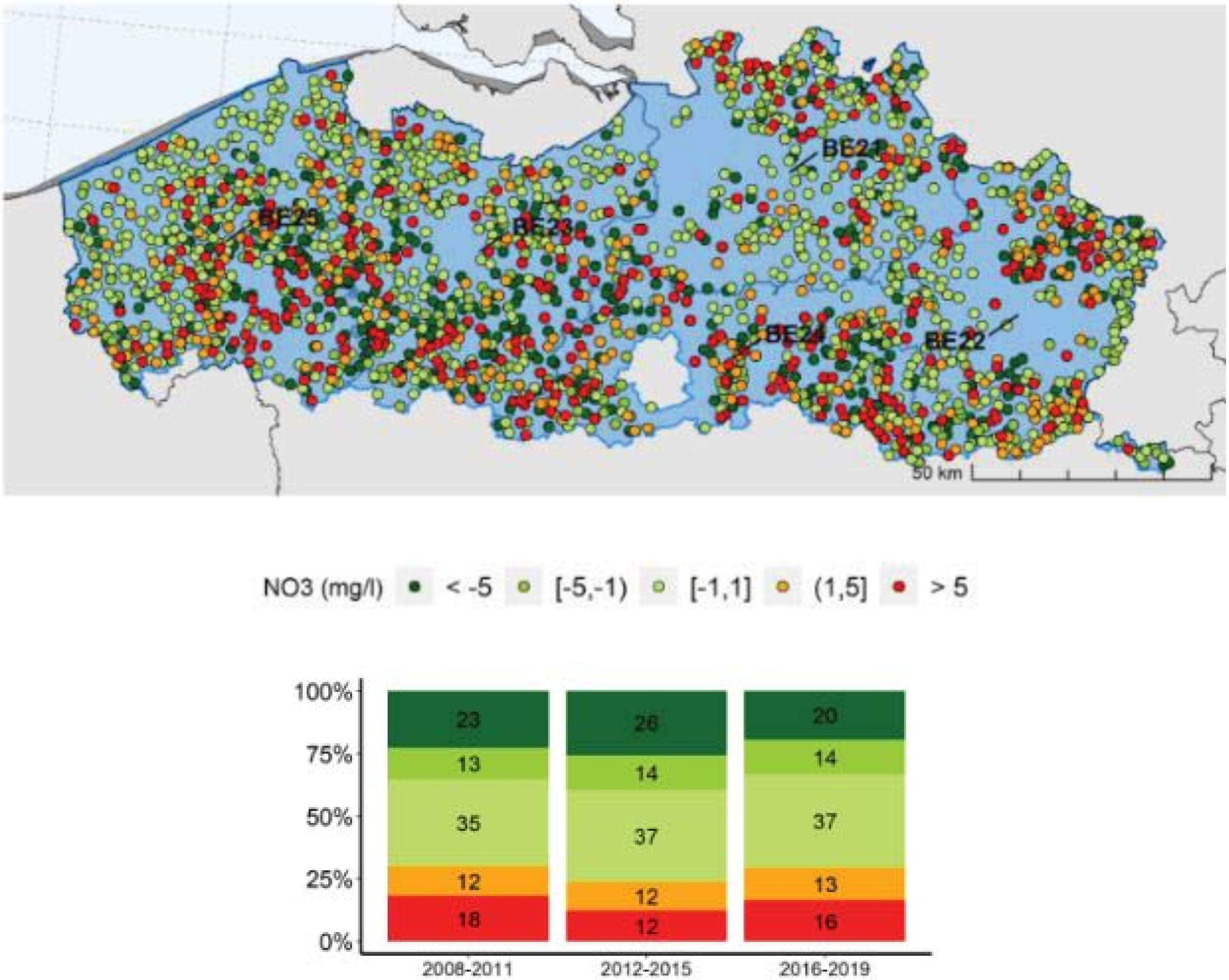


Figure 6. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis). In the map in blue the NVZ.

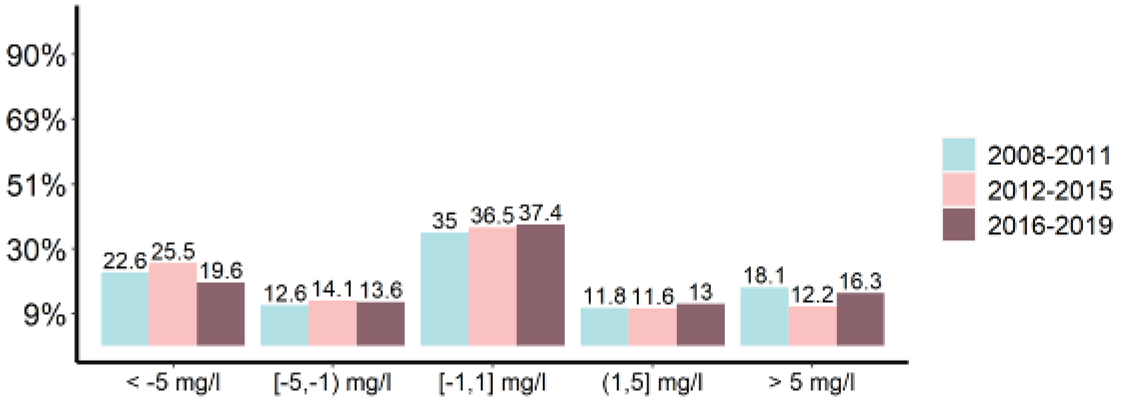
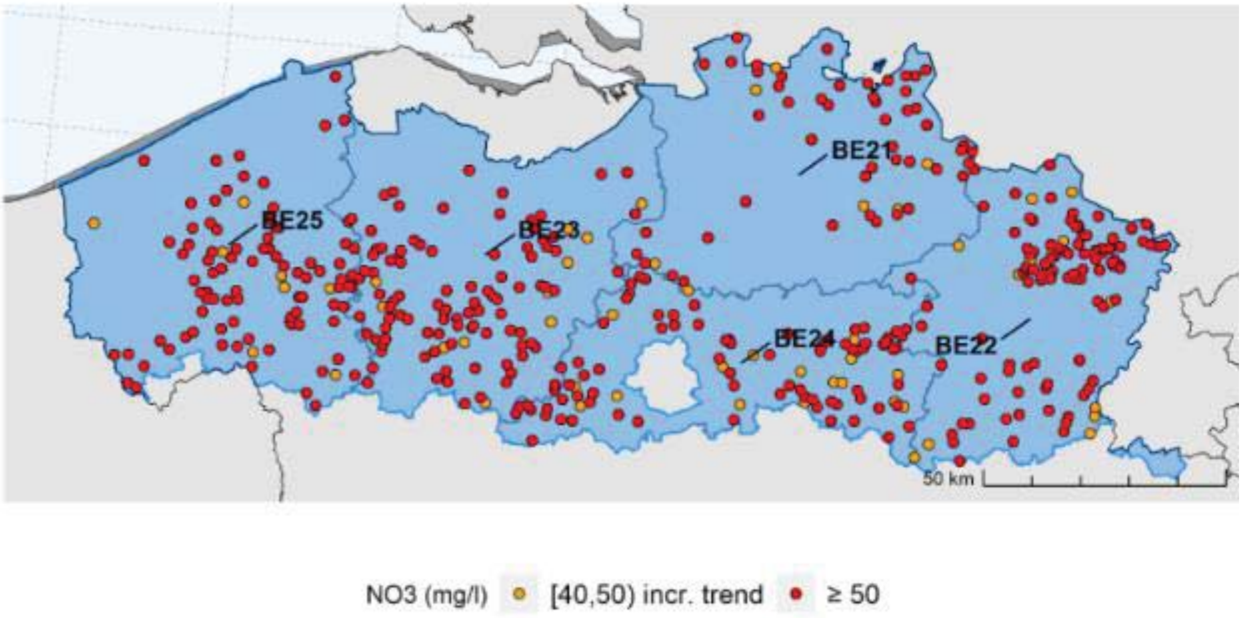


Figure 7. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis)

Groundwater hotspot

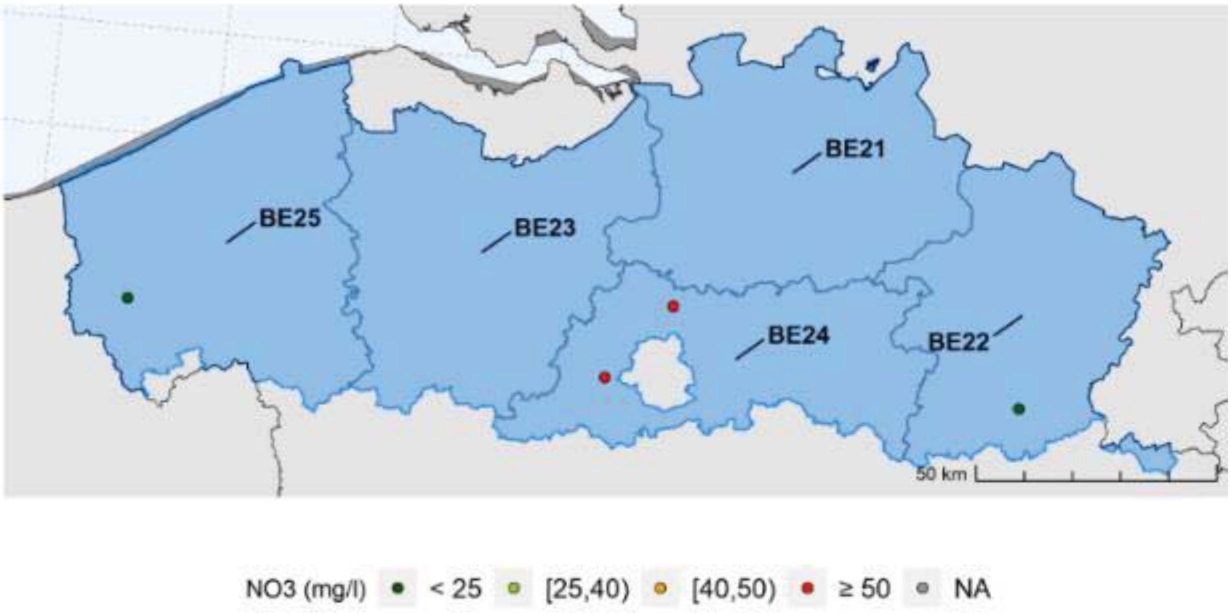


NUTS ID	NUTS NAME	>=40 and < 50 mg/l incr.trend	>=50 mg/l
BE21	Prov. Antwerpen	7	49
BE22	Prov. Limburg (BE)	13	97
BE23	Prov. Oost-Vlaanderen	11	101
BE24	Prov. Vlaams-Brabant	16	75
BE25	Prov. West-Vlaanderen	9	83
	Total	**56**	**405**

Figure 8. 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



Station Type	Description	Number of removed stations: total removed	with measurements	with trends
0	Phreatic groundwater (shallow): 0-5 m	1	1	0
1a	Phreatic groundwater (deep) 5-15 m	2	2	1
1b	Phreatic groundwater (deep) 15-30 m	1	1	0
1c	Phreatic groundwater (deep) >30 m	0	0	0
2	Captive groundwater	0	0	0
3	Karstic groundwater	0	0	0
9	Not specified	0	0	0
	Total	**4**	**4**	**1**

Figure 9. GW removed stations map (top graph) and 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 - Flanders

Surface water average annual nitrate concentration

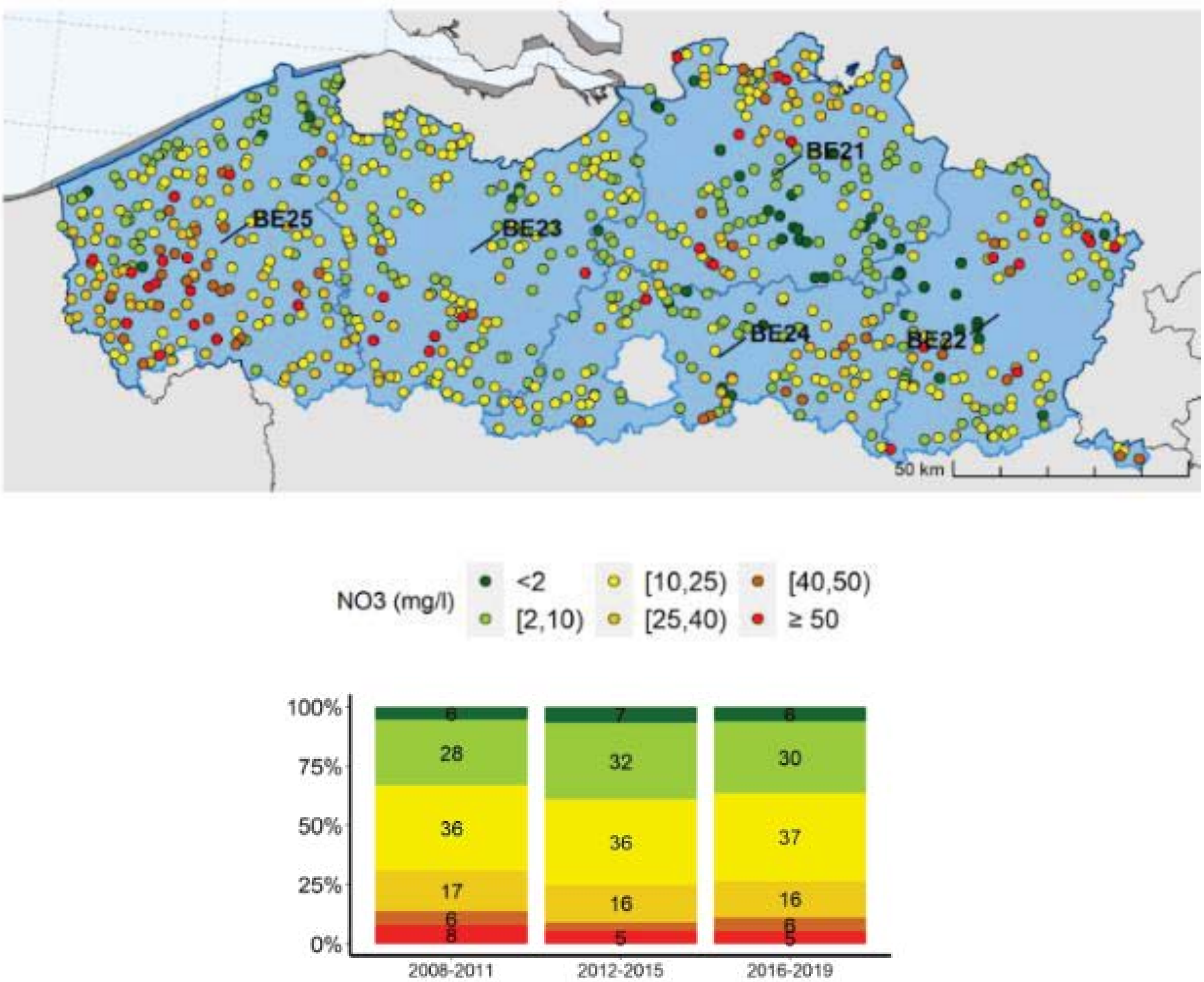


Figure 10. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information. In the map in blue the NVZ.

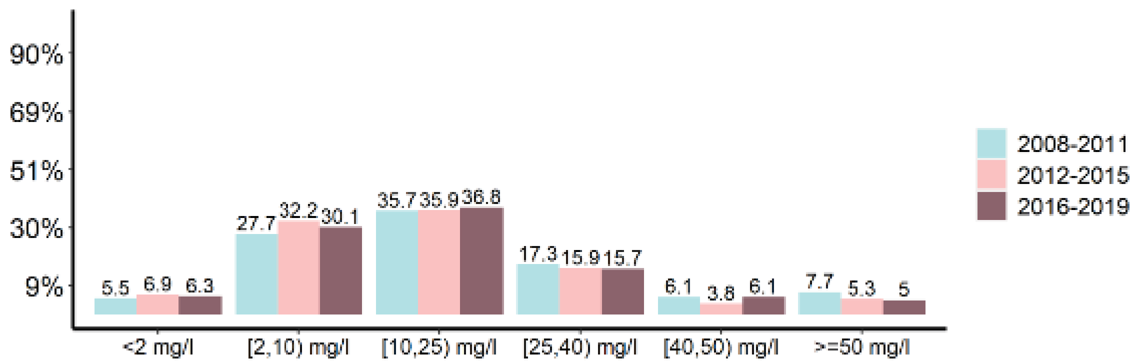


Figure 11. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis)

Surface water average annual nitrate concentration trend

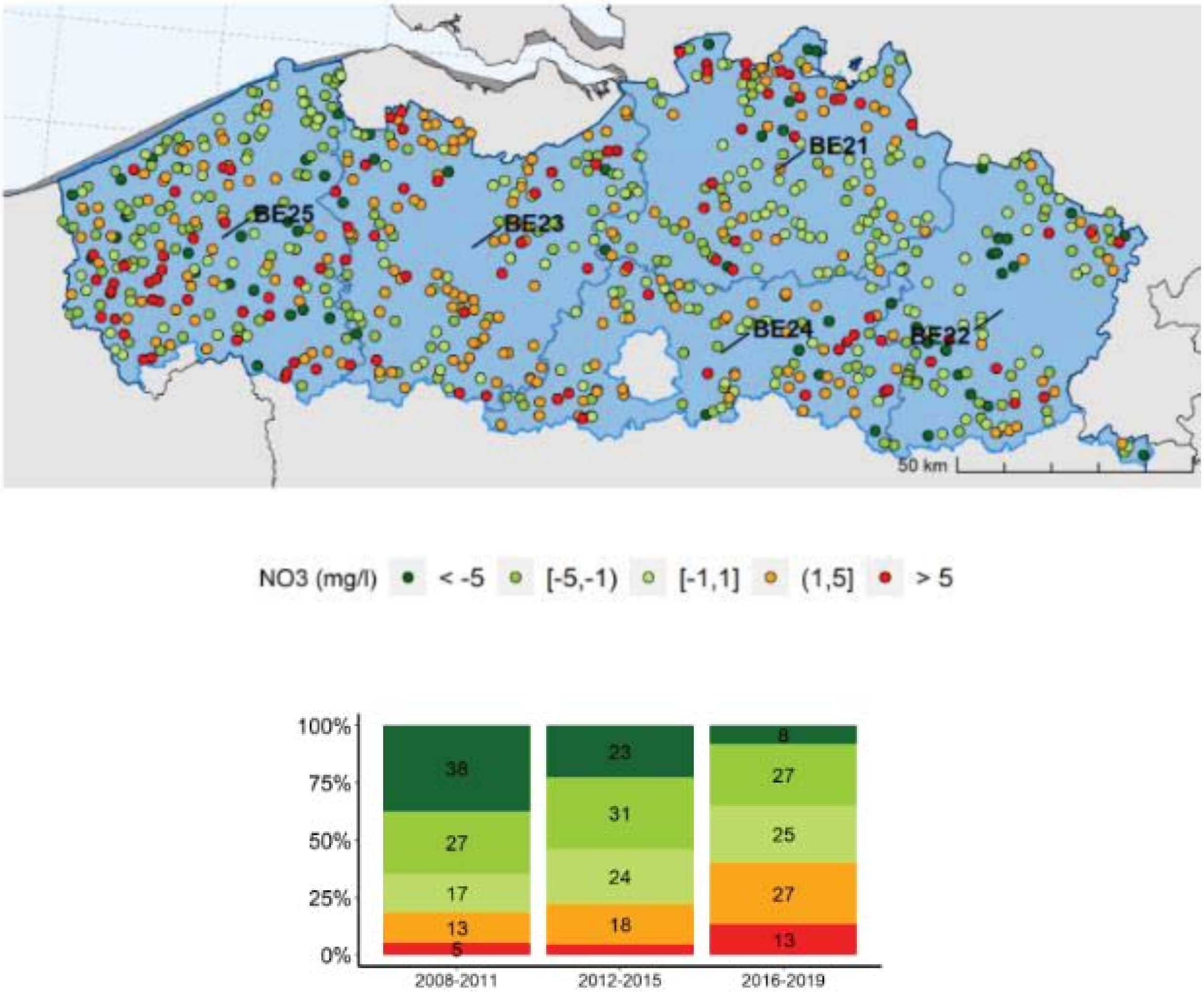


Figure 12. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information. In the map in blue the NVZ.

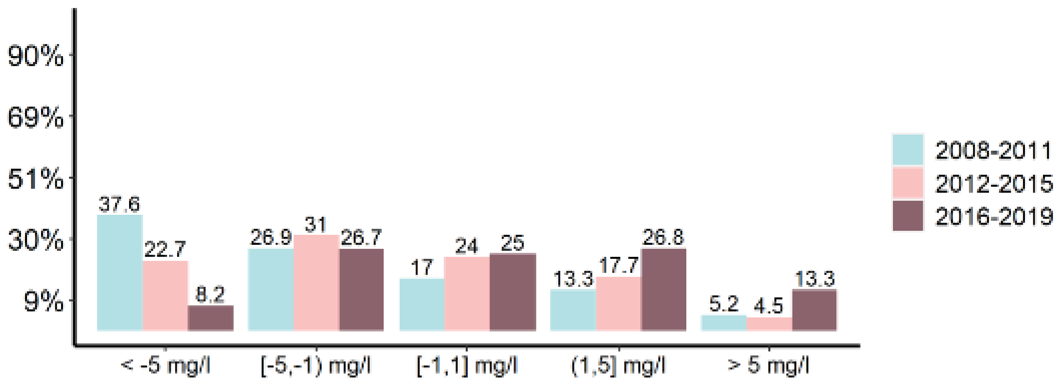


Figure 13. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis)

Surface Water Eutrophication

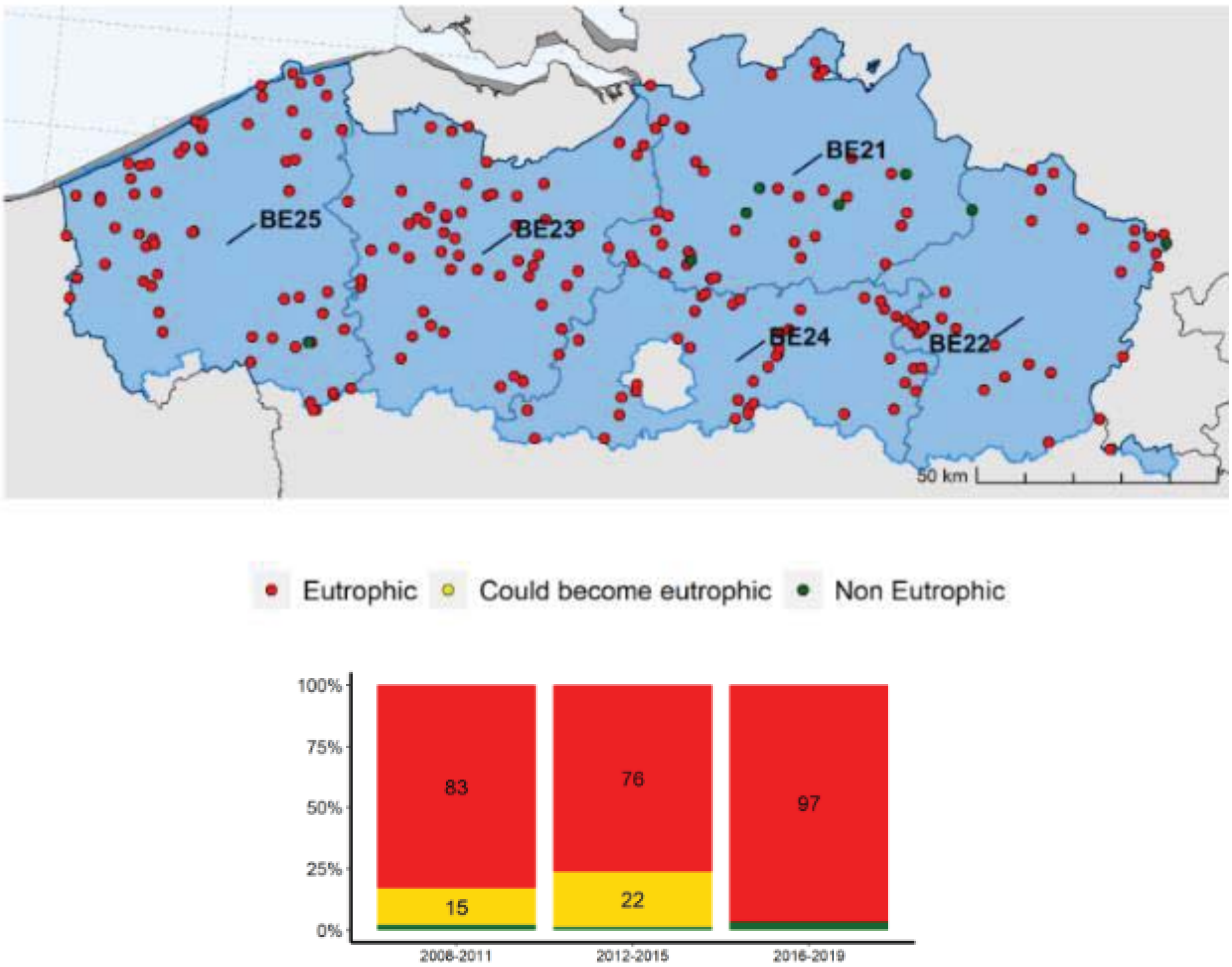


Figure 14. Spatial distribution of eutrophic status (map) and corresponding percentage of monitoring points per classes of status by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information. In the map in blue the NVZ.

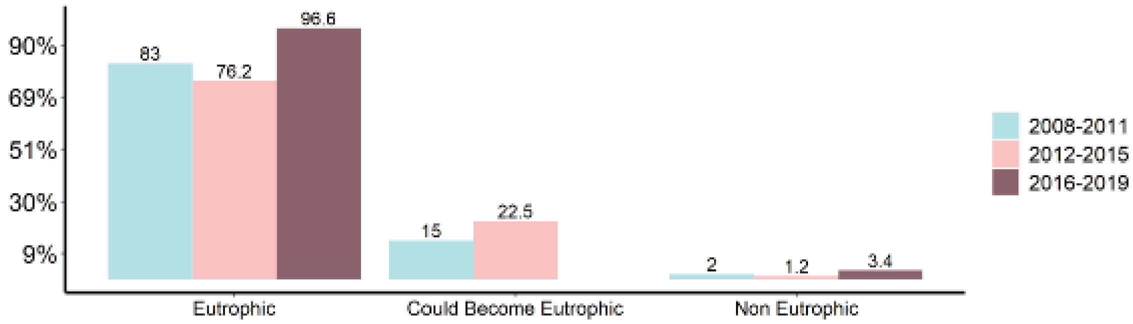
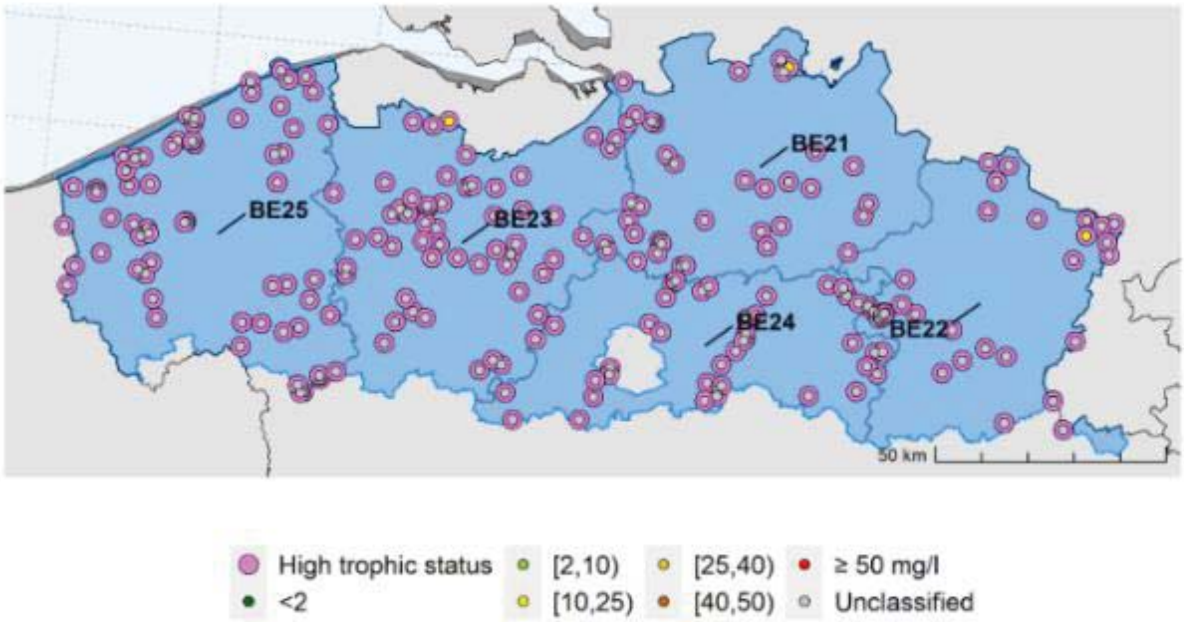


Figure 15. Comparison of percentage of monitoring points in the three reporting periods by classes of status (x axis)

The Eutrophic status vs average NO3 annual concentration



NUTS ID	NUTS NAME	High trophic status	Number of stations by classes of concentration						
			<2 mg/l	[2,10) mg/l	[10,25) mg/l	[25,40) mg/l	[40,50) mg/l	>=50 mg/l	Unclassified
BE21	Prov. Antwerpen	33	0	0	1	0	0	0	32
BE22	Prov. Limburg (BE)	32	0	0	1	0	0	0	31
BE23	Prov. Oost-Vlaanderen	54	0	0	1	0	0	0	53
BE24	Prov. Vlaams-Brabant	42	0	0	0	0	0	0	42
BE25	Prov. West-Vlaanderen	56	0	0	0	0	0	0	56
NO_NUTS	SALINE	7	0	0	0	0	0	0	7
	Total	**224**	**0**	**0**	**3**	**0**	**0**	**0**	**221**

Figure 16. The SW monitoring stations with eutrophic status versus the average NO3 annual concentration. In the map in blue the NVZ.

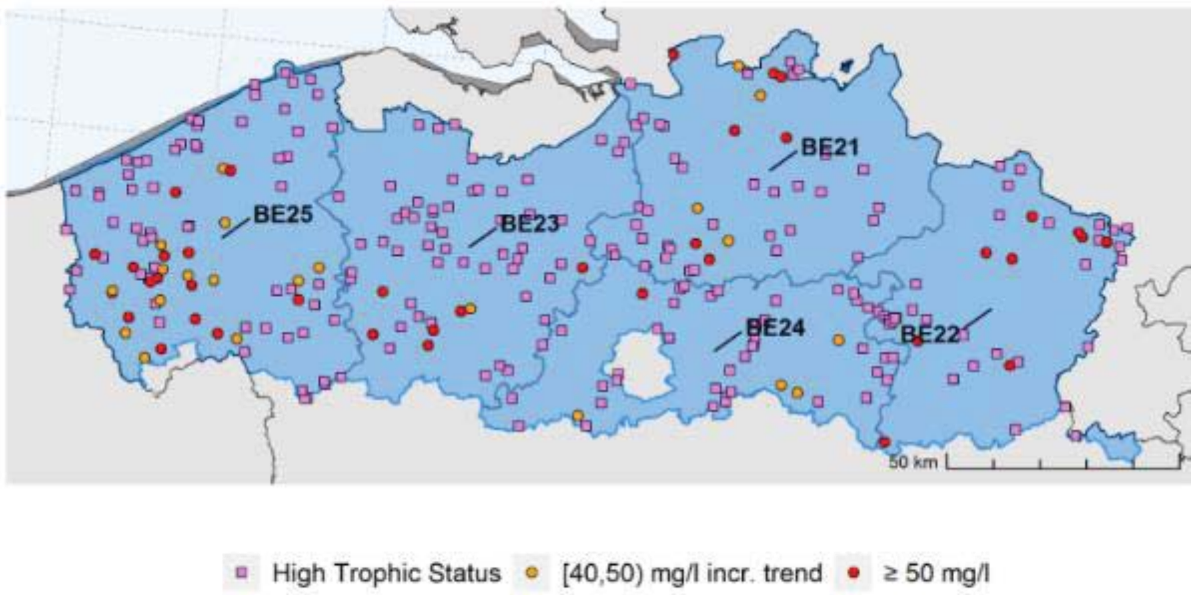
The analysis shows all the SW monitoring stations with the highest trophic status and the corresponding value of NO3 concentration. The map shows the spatial distribution of these points, and the table reports the number of stations with measurements with highest trophic status and the corresponding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

Like for the previous report the eutrophication criteria are those used for the Water Framework Directive. For all river types except mesotidal lowland estuaries, eutrophication is evaluated based on total phosphorus. For mesotidal lowland estuaries nitrate, nitrite and ammonium are used in addition to total phosphorus to assess the trophic state. Lakes are also evaluated using total phosphorus as criteria. The large majority of rivers is classified as eutrophic (97.2%) while all transitional waters are eutrophic. Only 20% of lakes are non-eutrophic while the rest is eutrophic. No surface water body type was classified as “may become eutrophic”.

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	208	0	6
5	Lake/reservoir water	9	0	2
6	Transitional water	7	0	0
7	Coastal water	0	0	0
8	Marine water	0	0	0
9	Not specified	0	0	0
	Total	**224**	**0**	**8**

Surface Water quality hotspot

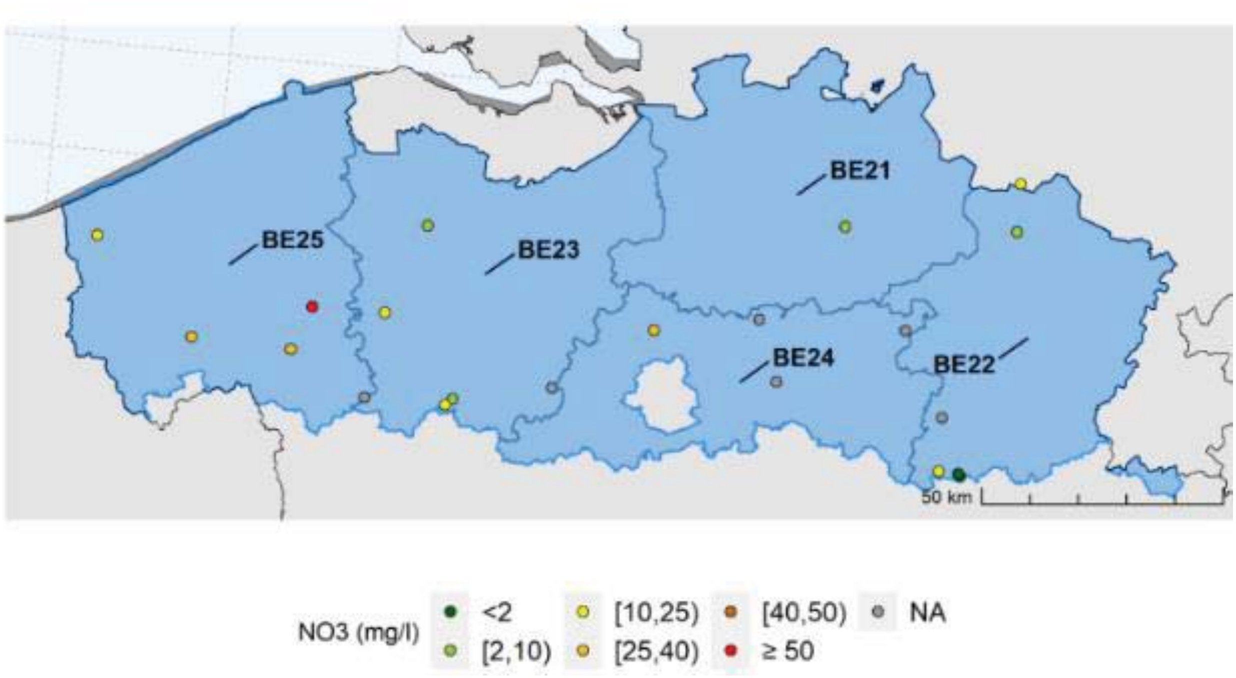


NUTS ID	NUTS NAME	High trophic status	>=40 and < 50 mg/l incr.trend	>=50 mg/l
BE21	Prov. Antwerpen	33	4	7
BE22	Prov. Limburg (BE)	32	0	10
BE23	Prov. Oost-Vlaanderen	54	1	6
BE24	Prov. Vlaams-Brabant	42	4	1
BE25	Prov. West-Vlaanderen	56	14	14
NO_NUTS	SALINE	7	0	0
	Total	**224**	**23**	**38**

Figure 17. SW hotspot analysis map (top graph) and distribution by NUTS2 (lower graph) of average NO3 annual concentration greater than 40 mg/l and trophic status. In the map in blue the NVZ.

The hotspot analysis identifies all the SW monitoring stations that have high eutrophic 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



		Number of removed stations			
Station Type	Description	total removed	with measurements	with trends	with trophic status
4	River water	21	15	15	6
5	Lake/reservoir water	0	0	0	0
6	Transitional water	0	0	0	0
7	Coastal water	0	0	0	0
8	Marine water	0	0	0	0
9	Not specified	0	0	0	0
	Total	**21**	**15**	**15**	**6**

Figure 18. SW removed stations map (top graph) and distribution by type (lower graph). In the map in blue the NVZ.

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

Measures in the Action Programme – Flanders

For Belgium-Flanders the 5th AP was valid between 2015 and 2018 and was followed up by the 6th AP for the period 2019-2022 adopted on May 2019. The 5th Action Programme contains stricter measures to reduce the pollution of water by nitrates and phosphates from agricultural sources and to prevent further pollution. The 5th action programme aims to have a maximum of 5% of surface water sites exceeding 50 mg/l by the end of 2018 and the overall target for groundwater is a 10% reduction of the nitrate concentration in the shallow groundwater, compared to 2010. In addition, measures for phosphorus, aligned with the objectives of the Water Framework Directive, were also adopted in the 5th Action Programme. The measures of the 5th Action Programme were summarised using four core concepts: area-oriented approach, judicious fertilisation with nitrogen and phosphorus, farm approach and better compliance with the manure legislation.

In the period during which the action programme for 2015-2018 was executed, no further improvement in water quality was observed. The 6th Action Programme therefore contains stricter measures to reduce nutrient losses from agriculture and horticulture and to bring water quality in line with the European targets. To guarantee good area-oriented monitoring of water quality, the mean nitrate concentration of the sampling points in each of the run-off zones of the Flemish water bodies is used as the key indicator. The main objectives of 6th AP are for surface water a decrease of 4 mg of nitrate per litre in the mean distance to the target (18 mg/l), and for groundwater an overall downward trend of at least 0.75 mg nitrate/l per year in all run-off zones with inadequate groundwater quality.

The specific measures, in accordance with Article 5 of the Nitrates Directive, are valid for the entire territory. It is noteworthy that during 2016-2019, the provisions of the Manure Decree amended by the Decree of 12 June 2015 apply for the 2016-2018 period, and the provisions of the Manure Decree amended by the Decree of 26 April 2019 apply from 2019 onwards.

The details of measures are reported in the Table below.

Table 6. Details of the Flemish Action Programme

Measure	General details in Action Programme
Period of prohibition of fertiliser application	• Provisions valid from 2016 to 2018: Section 3.2.2.1.1 MS report
	• Amended provisions from 2019 onwards: Section 3.2.2.1.2 MS report
Restrictions for application on sloped soils	• Provisions valid from 2016 to 2018: 15% or more (except for grazing). Section 3.2.2.2.1 MS report
	• Amended provisions from 2019 onwards: no amendments
Restrictions for application on soaked, frozen, or snow-covered soils	• Provisions valid from 2016 to 2018: not on water-saturated, flooded, frozen or snow-covered ground. Section 3.2.2.3.1 MS report
	• Amended provisions from 2019 onwards: no amendments
Restrictions for application near watercourses (buffer strips)	• Provisions valid from 2016 to 2018: 5-10 m. Section 3.2.2.4.1 MS report
	• Amended provisions from 2019 onwards: no amendments
Effluent storage works	• Provisions valid from 2016 to 2018: section 3.2.2.5.1 MS report
	• Amended provisions from 2019 onwards: section 3.2.2.5.2 MS report
Capacity of manure storage	• Provisions valid from 2016 to 2018: section 3.2.2.5.1 MS report
	• Amended provisions from 2019 onwards: section 3.2.2.5.2 MS report
Rational fertilisation (e.g., splitting fertilisation, limitations)	• Provisions valid from 2016 to 2018: section 3.2.2.6.1 MS report
	• Amended provisions from 2019 onwards: section 3.2.2.6.2 MS report
Crop rotation, permanent crop enhancement	• Provisions valid from 2016 to 2018: section 3.2.2.7.1 MS report
	• Amended provisions from 2019 onwards: section 3.2.2.7.2 MS report
Vegetation cover in rainy periods, winter	• Provisions valid from 2016 to 2018: section 3.2.2.8.1 MS report
	• Amended provisions from 2019 onwards: section 3.2.2.8.2 MS report
Fertilisation plans, spreading records	• Provisions valid from 2016 to 2018: section 3.2.2.9.1 MS report
	• Amended provisions from 2019 onwards: section 3.2.2.9.2 MS report
Other measures	NA
Date for application limit of 170 kg N/ha/year:	• Not specified

Controls- Flanders

The number of checks on the application of fertilisers on agricultural land varied from 2398 in 2016 to 3409 in 2019 (large increase from the previous reporting period). The non-compliance went down from 10% in 2016 to 7% in 2019. The largest number of non-compliance deals with no low application emission and fertilisation too close to water courses. The percentage of checks with infringements of the fertlisation transport rules ranges from 7% in 2016 to 9% in 2019.

Designation of NVZ - Flanders

Flanders adopted a whole territory approach (13,522 km^2). Since 2011, Flanders uses focus areas to indicate areas with poor surface water quality (based on the evaluation of the exceedance of the threshold of 50 mg nitrate per L) or poor groundwater quality. The focus area went from 2720 km^2 for the previous reporting period to 2250 km^2 for the current period (2016-2018). Stricter measures are applied in focus areas including provisions relating to the fertiliser spreading prohibition period, requirement under certain conditions to sow catch crops, maintain stricter nitrate residue thresholds at parcel level.

Forecast of Water Quality - Flanders

No information is yet available regarding the future evolution of water quality in Flanders. A model setup is being developed to provide answer for the next reporting period.

Summary – Flanders

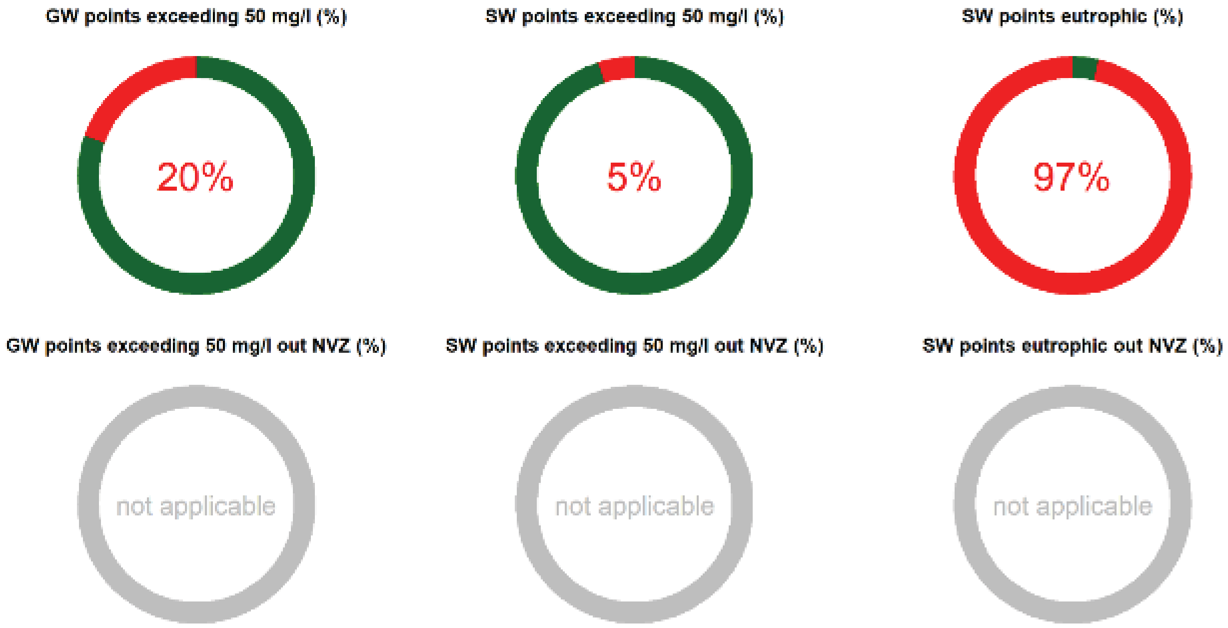


Figure 19. The summary plot for the period 2016-2019

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

Long term analysis - Flanders

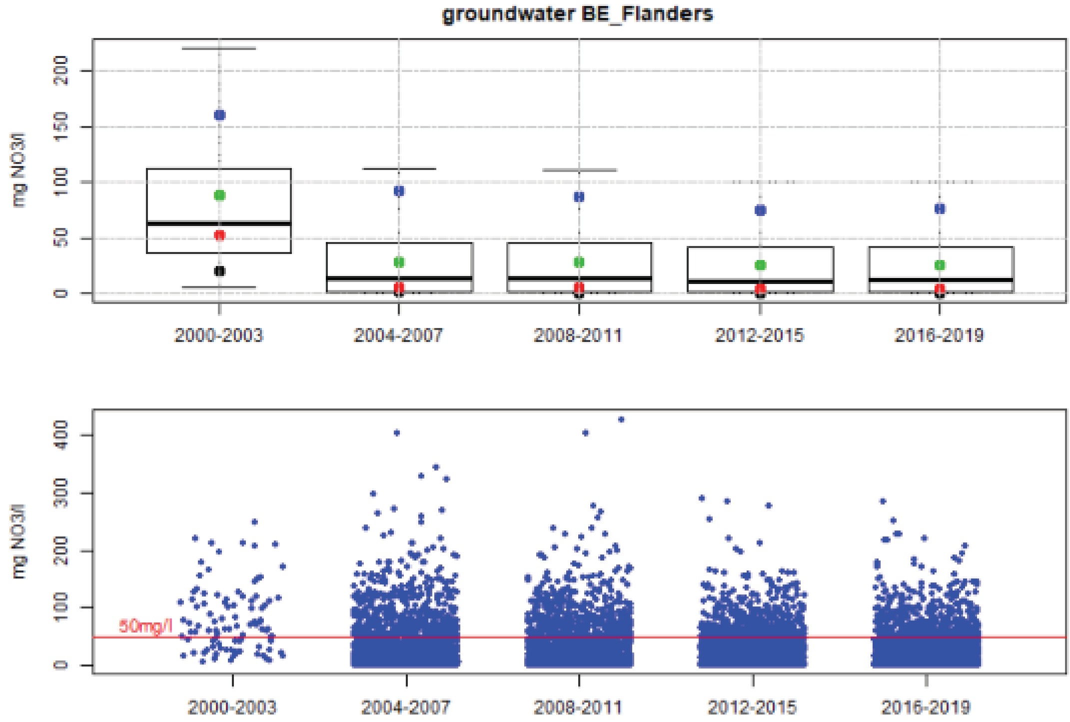


Figure 20. Time series of box whisker plots along with the distribution of the average NO3 annual concentrations for each reporting period for groundwater stations. RPs represent the reporting periods, RP7 being the last period (2016-2019). The blue, red, green and black dots represent the mean of the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

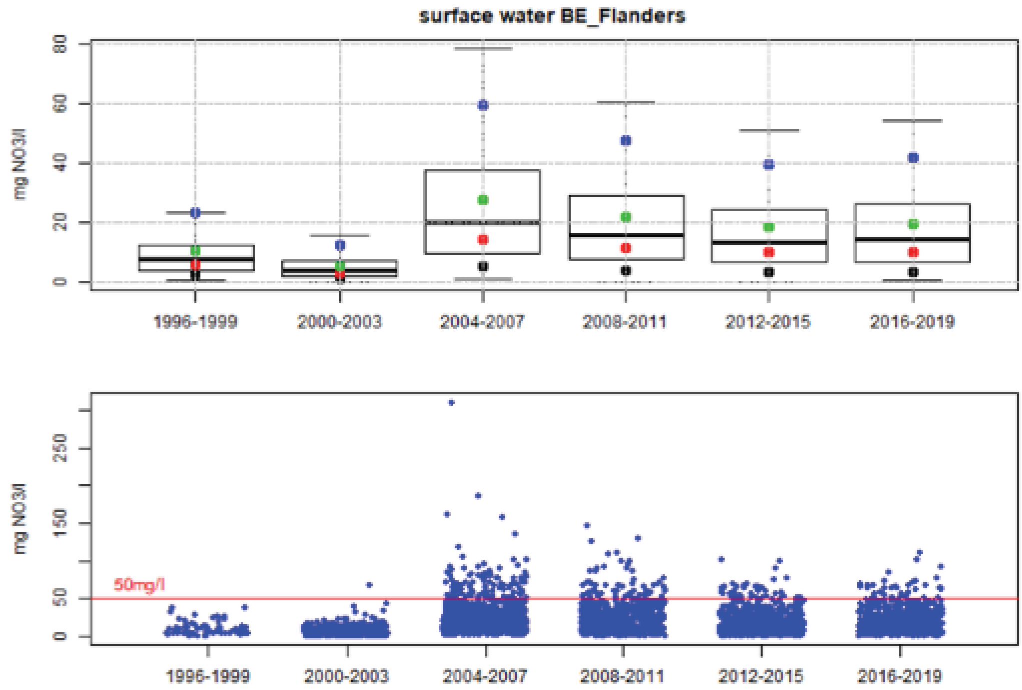


Figure 21. Time series of box whisker plots along with the distribution of the average NO3 annual concentrations for each reporting period for surface water stations. RPs represent the reporting periods, RP7 being the last period (2016-2019). The blue, red, green and black dots represent the mean of the fourth third, second and first quartiles, respectively.

EUROPEAN
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Brussels, 11.10.2021
SWD(2021) 1001 final

PART 10/38

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}

EN EN

Water Quality Monitoring - Wallonia

In Wallonia, nitrate monitoring to support the implementation of the Nitrates Directive is organized by the "Service Public de Wallonie Agriculture, Ressources Naturelles Environnement (SPWARNE), either directly or relying on local potable water producers. For groundwater, drinking water producers represent almost 70% of the groundwater monitoring network. Groundwater monitoring frequency is highly variable and range from 4 measurements per year to 4 measurements every 3 to 4 years depending on the location of the well and the concentration. For surface water, the network was designed to have long time series and ensuring that the network covers the whole territory of Wallonia. Monitoring frequency for surface water is 12 samples per year.

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 7. 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	518	499	470	503	494	470
1a	Phreatic groundwater (deep) 5-15 m	95	91	93	92	90	93
1b	Phreatic groundwater (deep) 15-30 m	71	91	89	70	90	89
1c	Phreatic groundwater (deep) >30 m	117	117	120	112	116	120
2	Captive groundwater	12	12	12	12	12	12
3	Karstic groundwater	54	54	54	52	53	54
9	Not specified	32	0	0	31	0	0
	Total	**899**	**864**	**838**	**872**	**855**	**838**

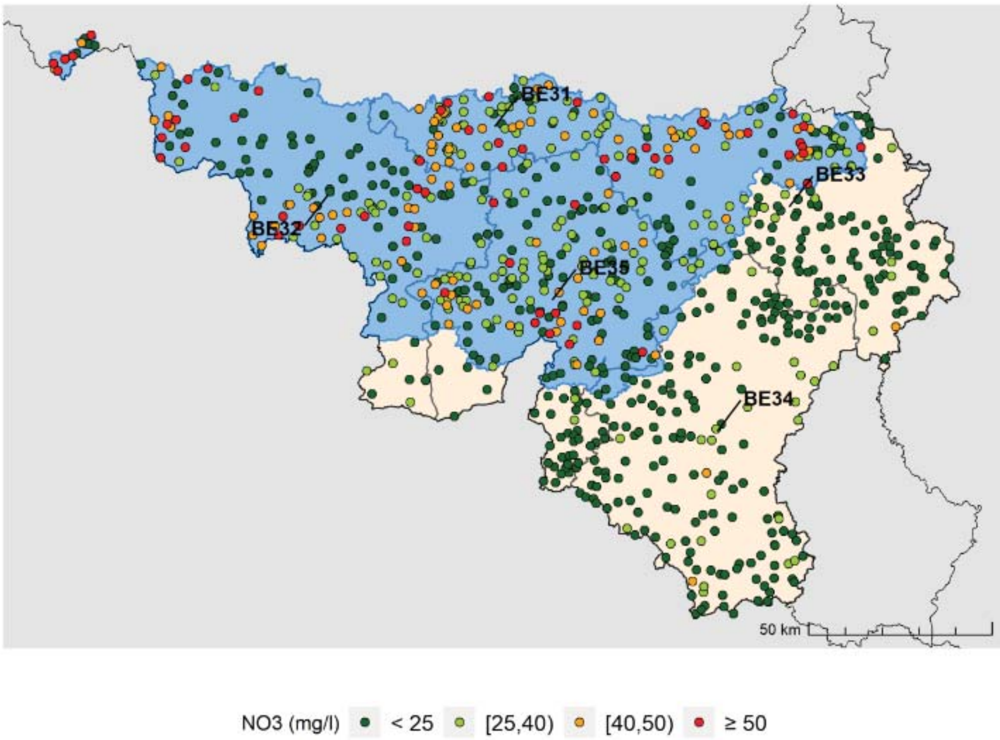
Surface water quality monitoring network

Table 8. 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	64	66	47	58	63	47	52	66	47
5	Lake/reservoir water	0	0	12	0	0	12	0	0	12
6	Transitional water	NA	NA	NA	NA	NA	NA	NA	NA	NA
7	Coastal water	NA	NA	NA	NA	NA	NA	NA	NA	NA
8	Marine water	NA	NA	NA	NA	NA	NA	NA	NA	NA
9	Not specified	0	0	0	0	0	0	0	0	0
	Total	**64**	**66**	**59**	**58**	**63**	**59**	**52**	**66**	**59**

Groundwater Quality - Wallonia

Groundwater average annual nitrate concentration



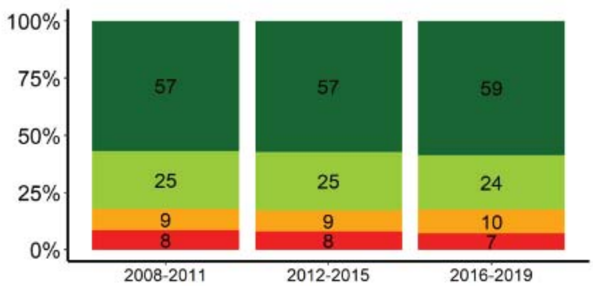


Figure 22. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). In the map in blue the NVZ.

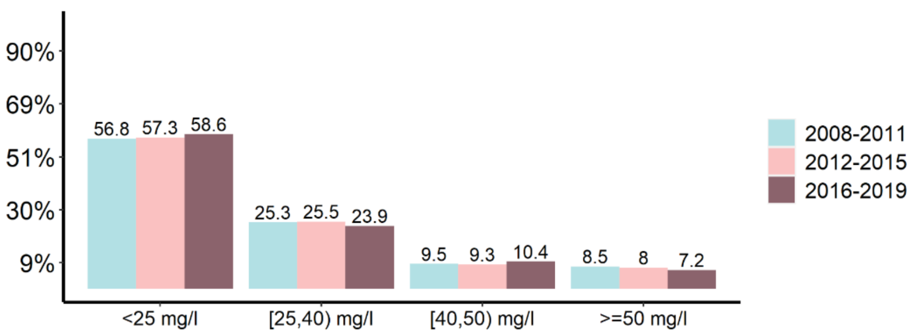


Figure 23. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis)

Groundwater concentration trend

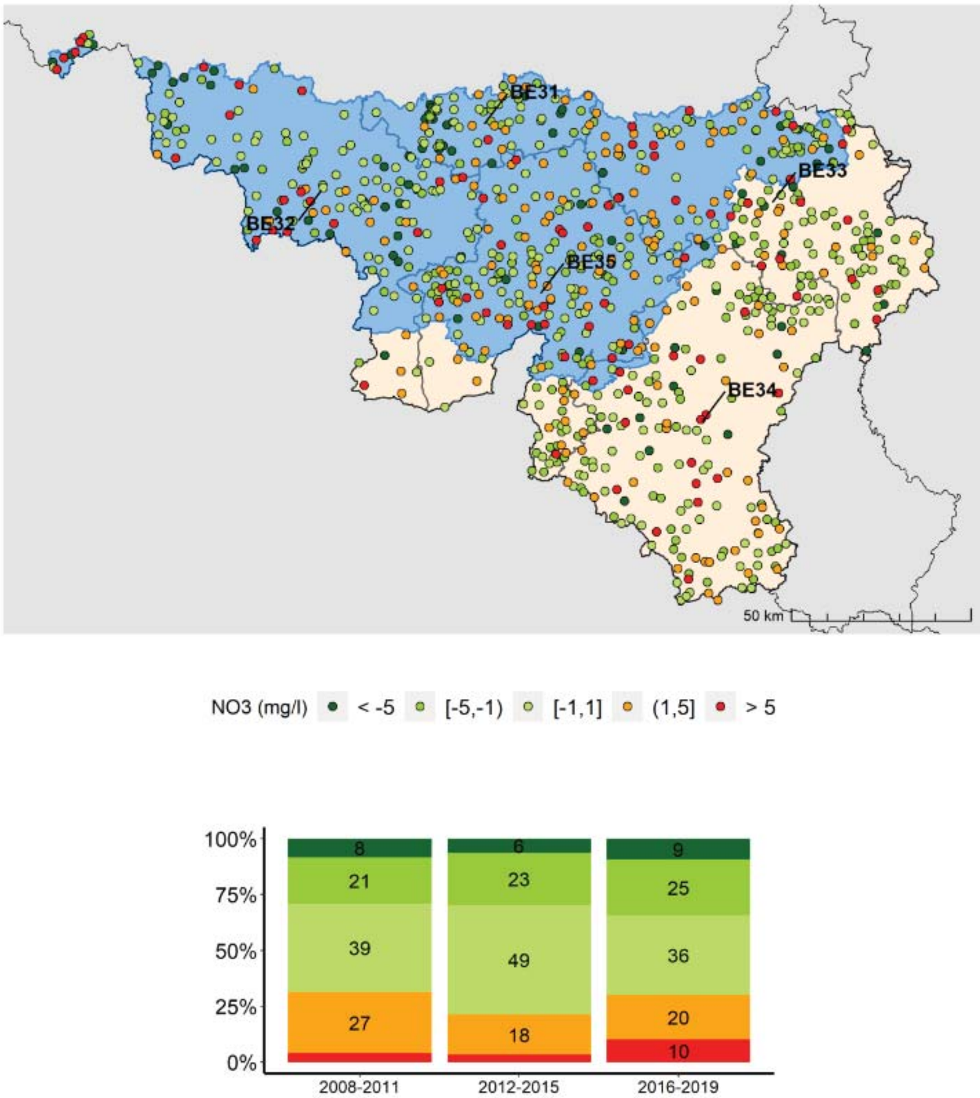


Figure 24. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information. In the map in blue the NVZ.

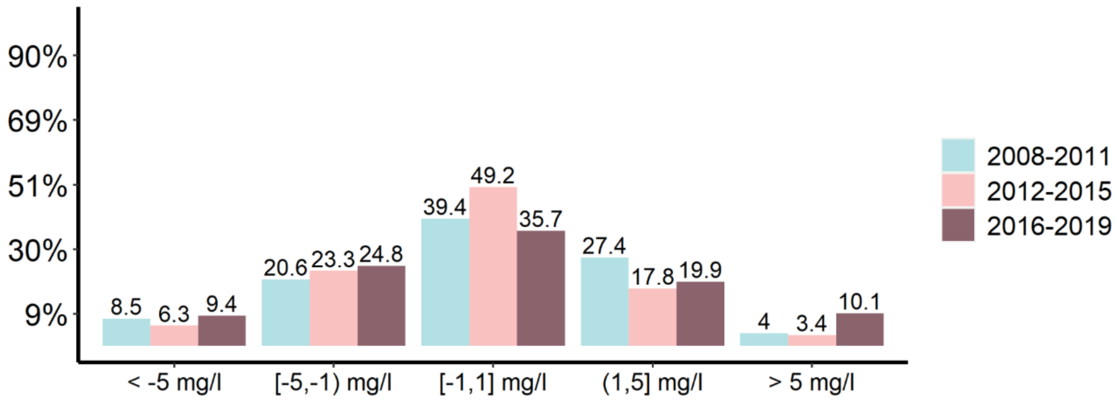
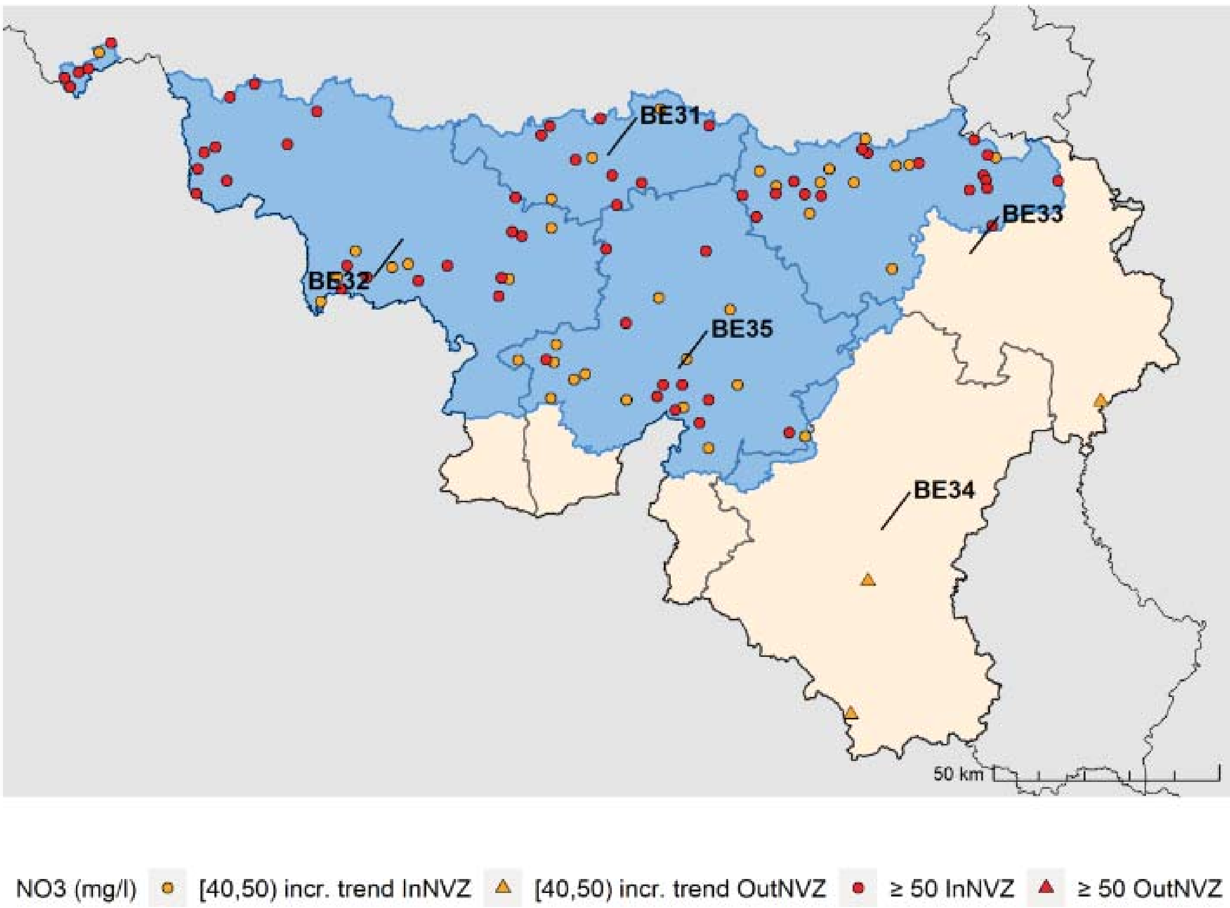


Figure 25. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis)

Groundwater hotspot



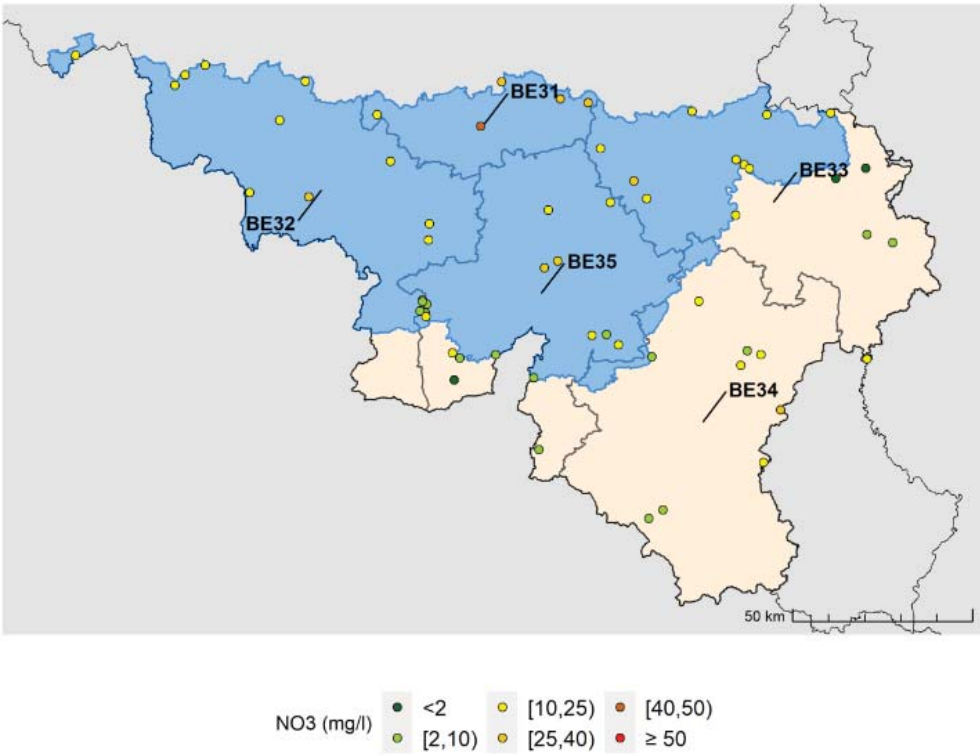
NUTS ID	NUTS NAME	>=40 and < 50 mg/l incr.trend		>=50 mg/l	
		InNVZ	OutNVZ	InNVZ	OutNVZ
BE31	Prov. Brabant Wallon	3	0	9	0
BE32	Prov. Hainaut	8	0	23	0
BE33	Prov. Liège	11	1	17	0
BE34	Prov. Luxembourg (BE)	1	2	0	0
BE35	Prov. Namur	13	0	11	0
	Total	**36**	**3**	**60**	**0**

Figure 26. 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.

Surface Water Quality - Wallonia

Surface water average annual nitrate concentration



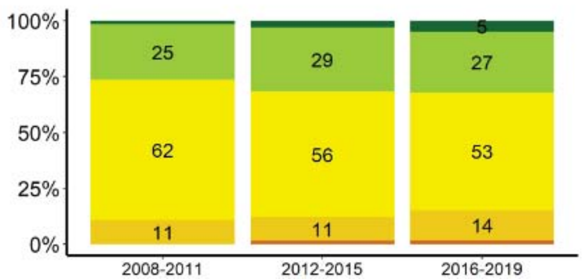


Figure 27. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information. In the map in blue the NVZ.

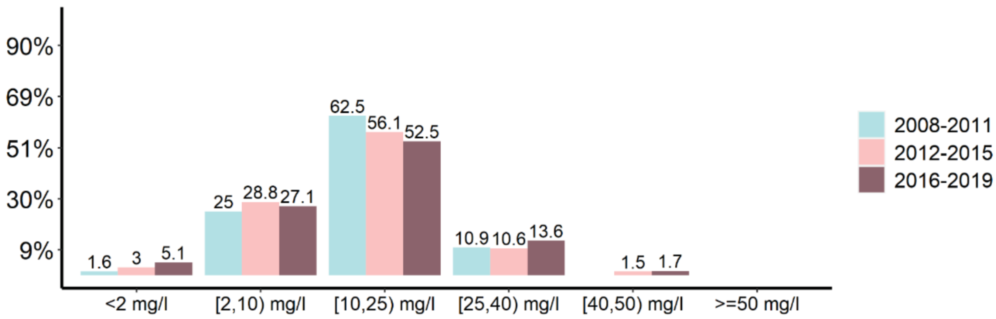
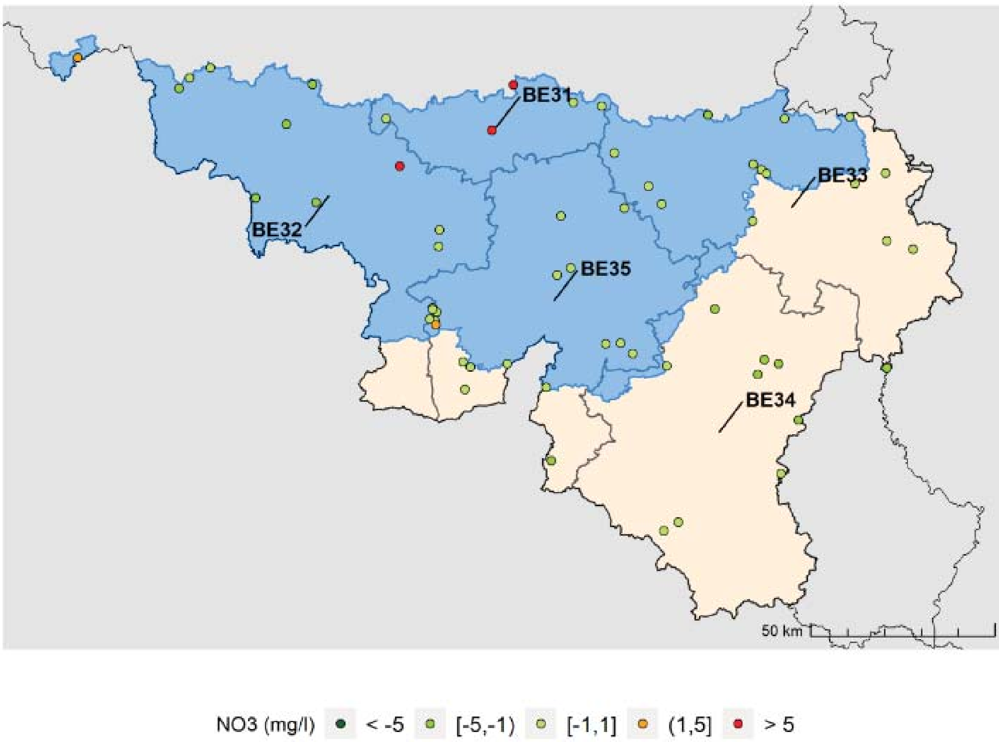


Figure 28. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis)

Surface water average annual nitrate concentration trend



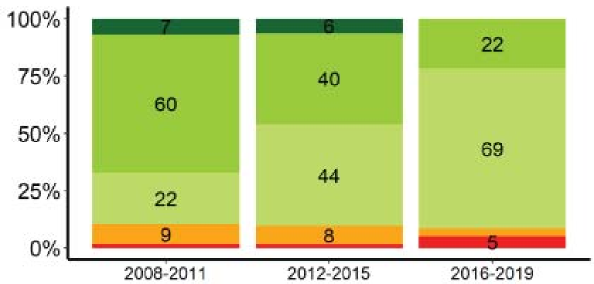


Figure 29. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information. In the map in blue the NVZ.

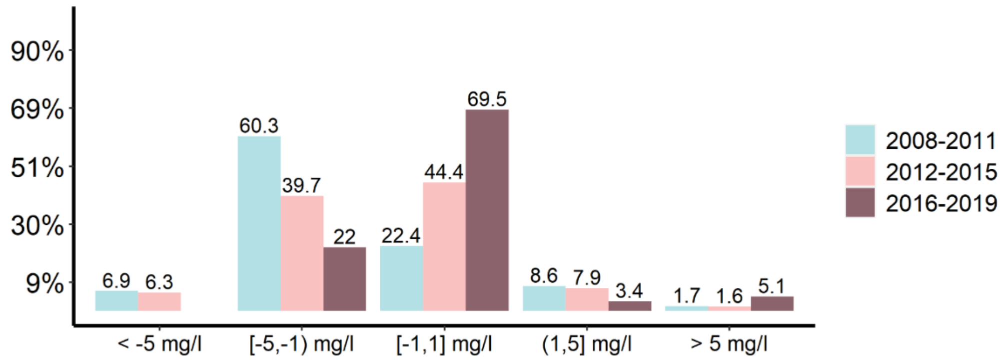
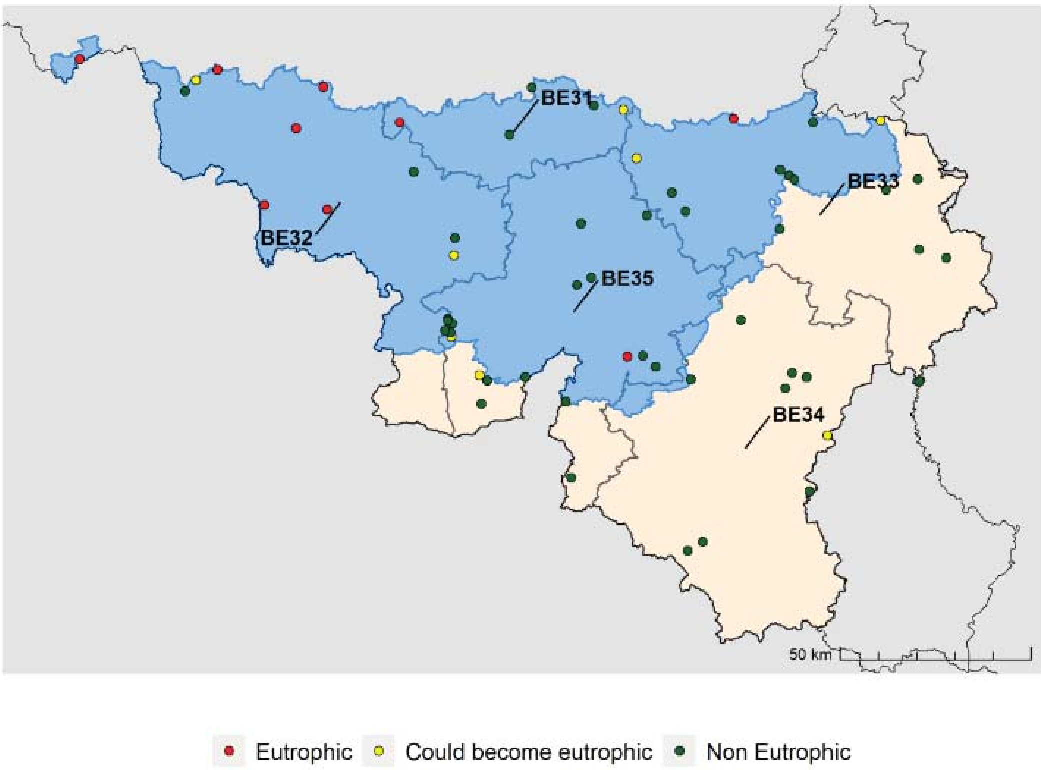


Figure 30. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis)

Surface Water Eutrophication



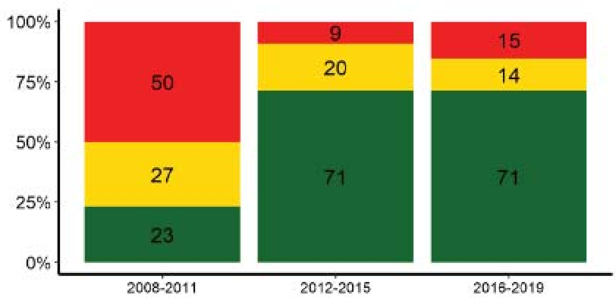


Figure 31. Spatial distribution of eutrophic status (map) and corresponding percentage of monitoring points per classes of status by reporting period (x axis). In the map in blue the NVZ.

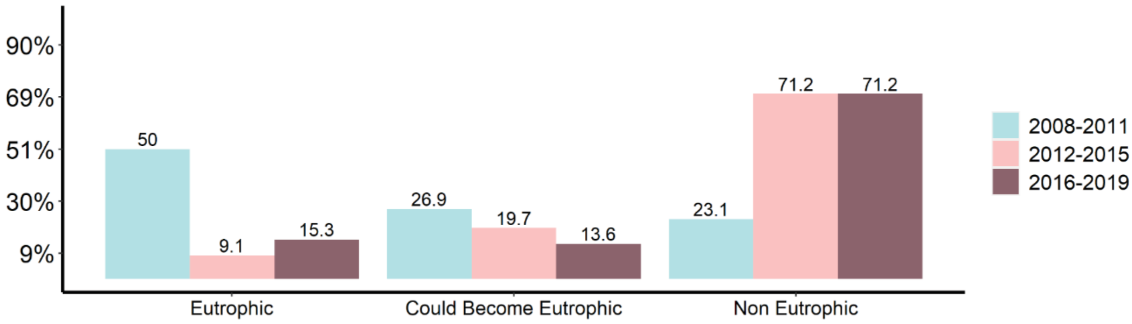
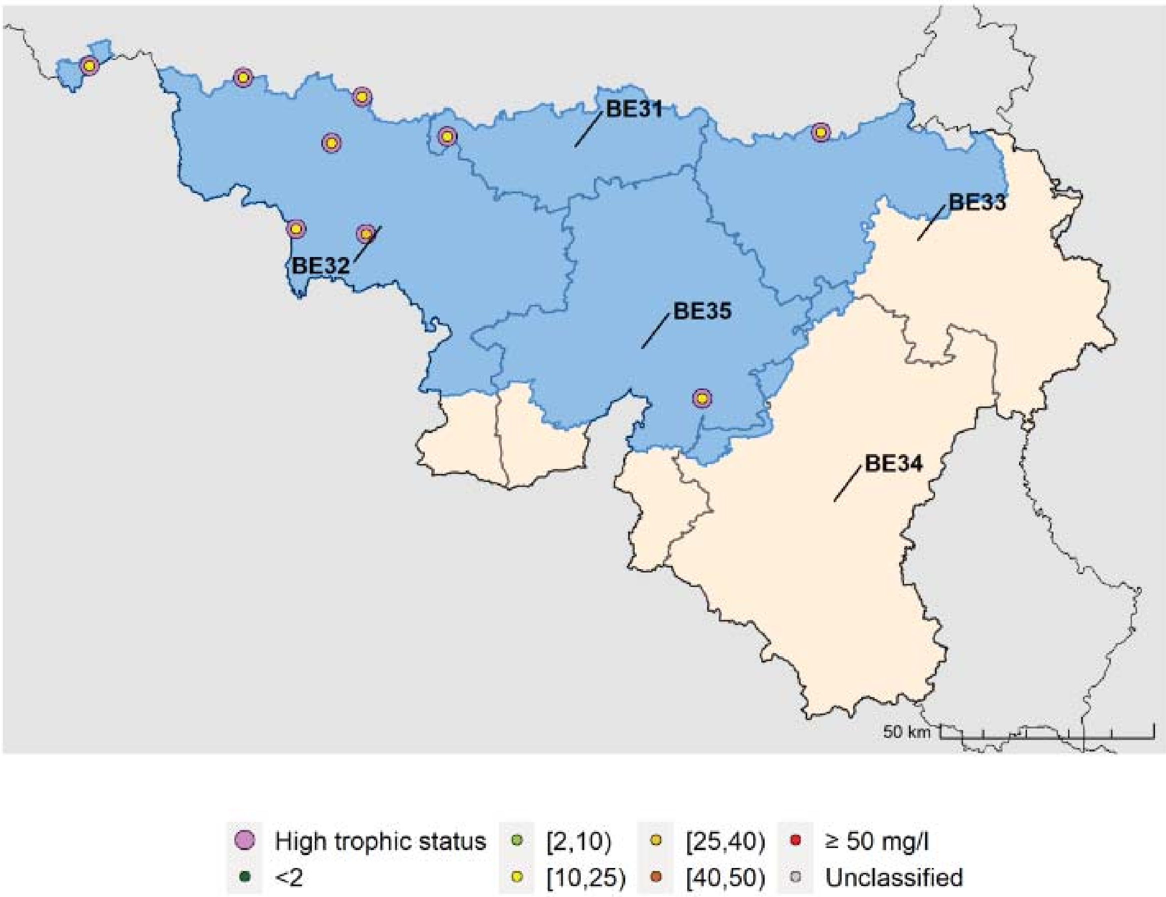


Figure 32. Comparison of percentage of monitoring points in the three reporting periods by classes of status (x axis)

The Eutrophic status vs average NO3 annual concentration



			Number of stations by classes of concentration						
NUTS ID	NUTS NAME	High trophic status	<2 mg/l	[2,10) mg/l	[10,25) mg/l	[25,40) mg/l	[40,50) mg/l	>=50 mg/l	Unclassified
BE31	Prov. Brabant Wallon	1	0	0	1	0	0	0	0
BE32	Prov. Hainaut	6	0	0	5	1	0	0	0
BE33	Prov. Liège	1	0	0	1	0	0	0	0
BE35	Prov. Namur	1	0	0	1	0	0	0	0
	Total	**9**	**0**	**0**	**8**	**1**	**0**	**0**	**0**

Figure 33. The SW monitoring stations with eutrophic status versus the average NO3 annual concentration. In the map in blue the NVZ.

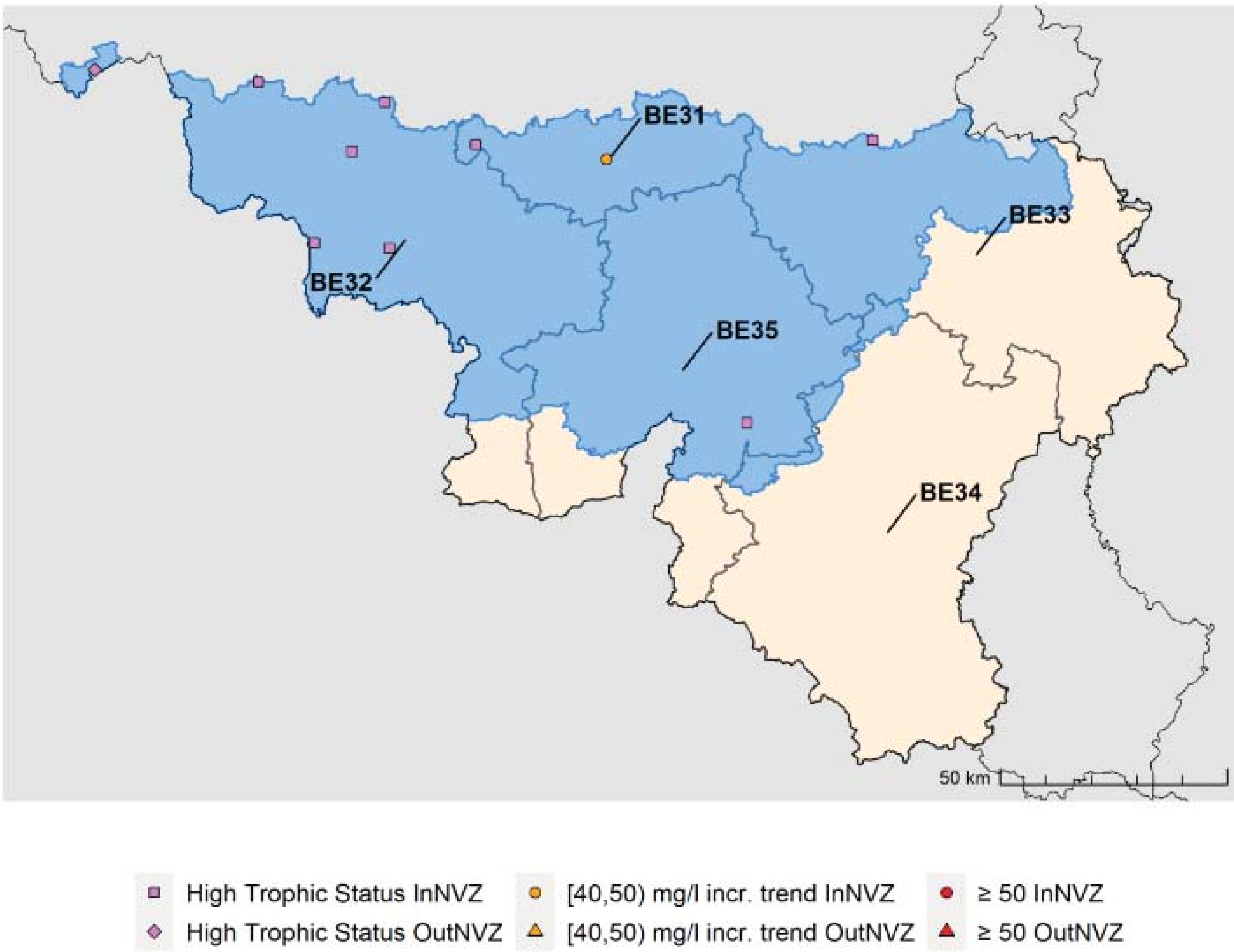
The analysis shows all the SW monitoring stations with the highest trophic status and the corresponding value of NO3 concentration. The map shows the spatial distribution of these points, and the table reports the number of stations with measurements with highest trophic status and the corresponding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

Like for the previous report the eutrophication criteria are those used for the Water Framework Directive. For rivers, eutrophication is evaluated by river type based on orthophosphate and total phosphorus thresholds. For surface water reservoirs, eutrophication is based on summer chlorophyll-a concentration.

Table 9. 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	9	8	30
5	Lake/reservoir water	0	0	12
6	Transitional water	NA	NA	NA
7	Coastal water	NA	NA	NA
8	Marine water	NA	NA	NA
9	Not specified	0	0	0
	Total	**9**	**8**	**42**

Surface Water quality hotspot



		High trophic status		>=40 and < 50 mg/l incr.trend		>=50 mg/l	
NUTS ID	NUTS NAME	InNVZ	OutNVZ	InNVZ	OutNVZ	InNVZ	OutNVZ
BE31	Prov. Brabant Wallon	1	0	1	0	0	0
BE32	Prov. Hainaut	5	1	0	0	0	0
BE33	Prov. Liège	1	0	0	0	0	0
BE35	Prov. Namur	1	0	0	0	0	0
	Total	**8**	**1**	**1**	**0**	**0**	**0**

Figure 34. SW hotspot analysis map (top graph) and distribution by NUTS2 (lower graph) of average NO3 annual concentration greater than 40 mg/l and trophic status. In the map in blue the NVZ.

The hotspot analysis identifies all the SW monitoring stations that have high trophic status (eutrophic and hypertrophic), 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.

Measures in the Action Programme - Wallonia

Wallonia implements an Action Programme throughout its territory. The Action Programme includes basic measures to be implemented in the whole territory and additional measures to be implemented in NVZ areas. No changes were made to the Action Programme from the last reporting period.

Control-Wallonia

Controls of implementation of the code of good agricultural practices are performed under the framework of cross-compliance. Around 1% of the concerned farmers are visited on a yearly basis. Compliance was 100% for all criteria but for the storage capacity criteria for which compliance was 99.1%. In addition to these checks, addition checks are performed controlling potential nitrogen leaching for farms partially in NVZ areas. The proportion of samples that were compliant with the soil- and crop-specific reference levels was around 80% for the 2016-2020 period.

Designation of NVZs-Wallonia

Wallonia (Belgium) has not modified the designation of the nitrate vulnerable zones during the reporting period. The NVZs extend over an area of 9596.15 km^2, representing 57% of the whole territory and 69.2% of the UAA.

Forecast of Water Quality-Wallonia

Future water quality is predicted based on the use of the EPIC-Grid model. The model was run for a period extending until 2050 including scenarios of climate change. It was assumed that land use and fertilization practices were those of 2017, while the introduction of intercropping in a rotation sequence led to a decrease of mineral fertilization by 20 kgN/ha. The results are variable and depend on the selection of the climate change scenario. However, it is expected that climate change will have a significant impact of surface water and groundwater quality.

Summary – Wallonia

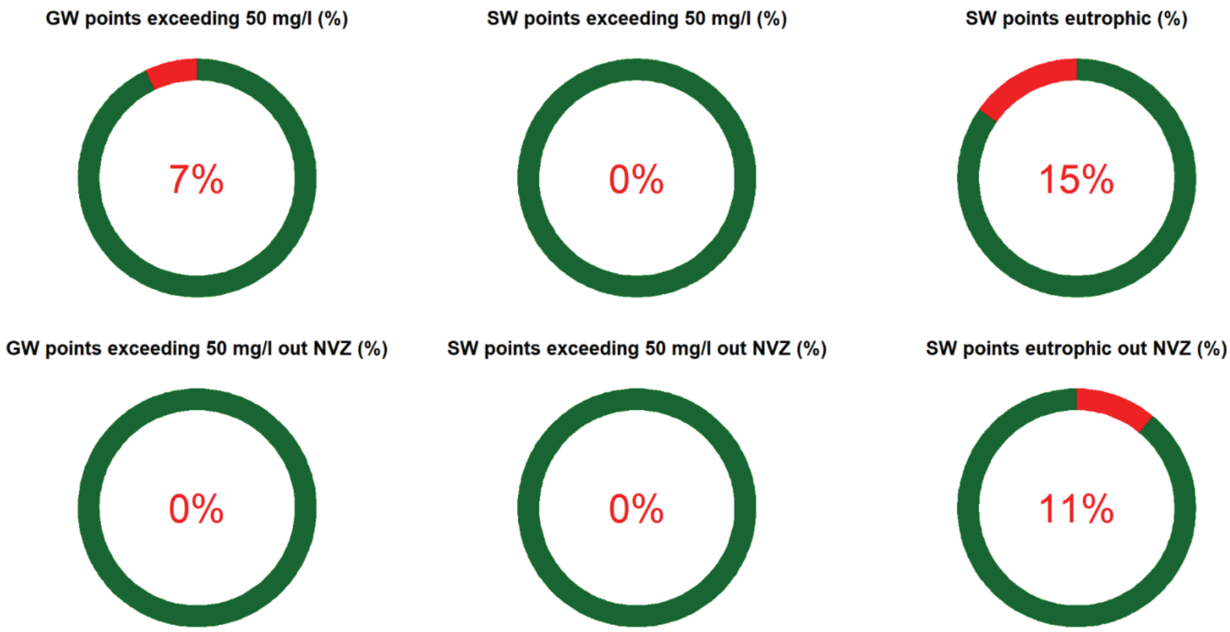


Figure 35. Summary plot

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

Long term analysis - Wallonia

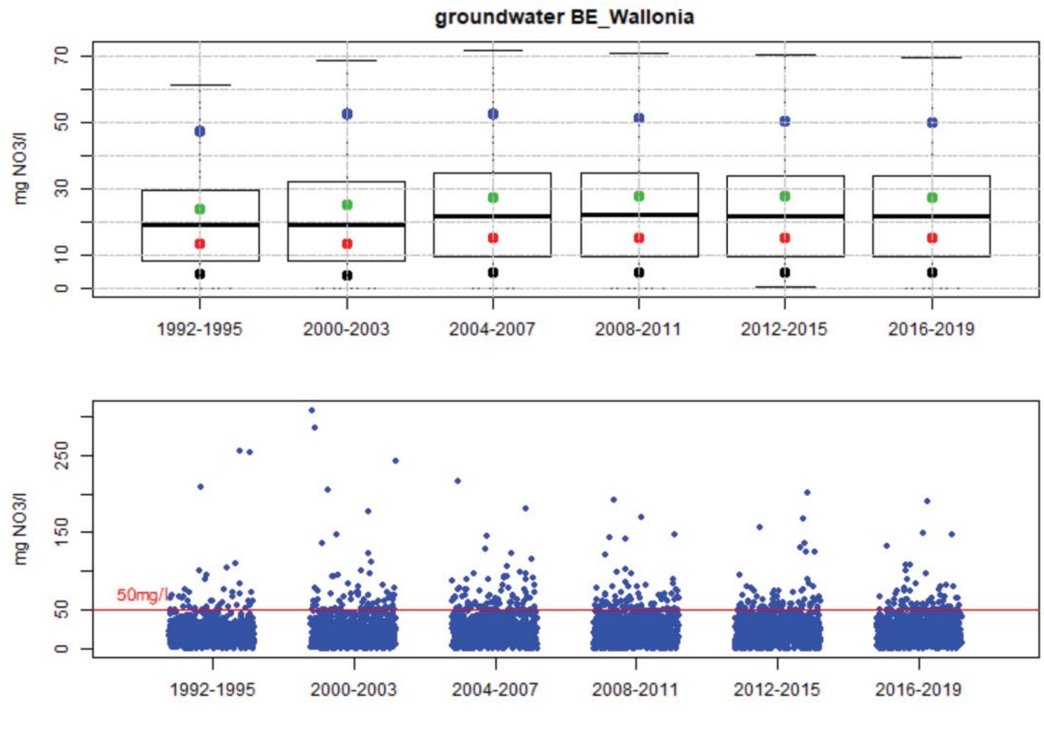


Figure 36. Time series of box whisker plots along with the distribution of the measured values for groundwater stations. RPs represent the reporting periods, RP7 being the last period (2016-2019). The blue, red, green and black dots represent the mean of the fourth third, second and first quartiles, respectively.

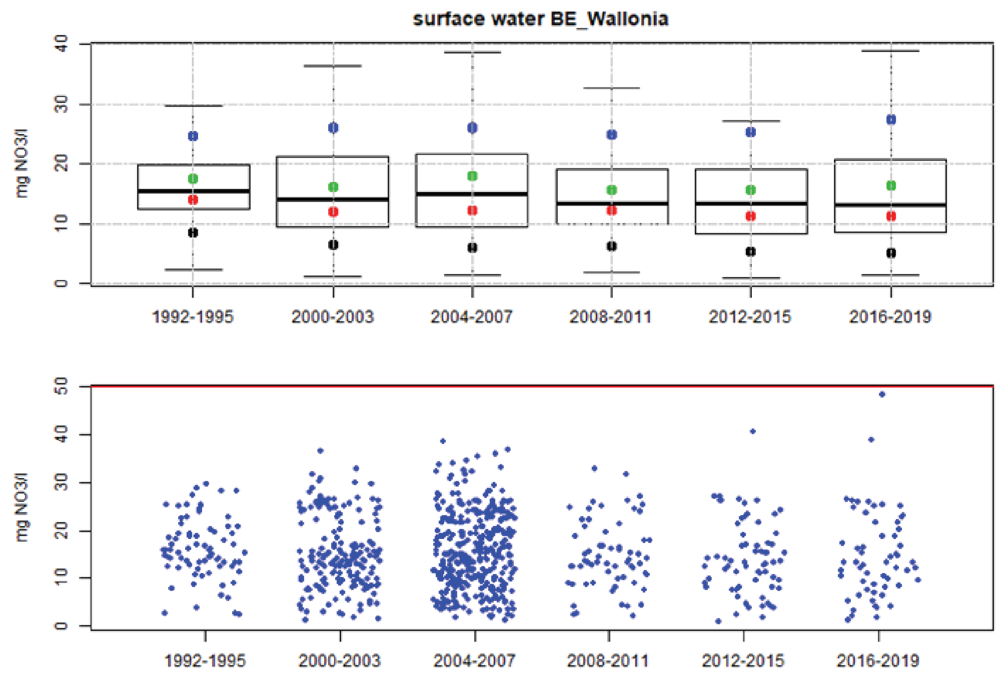


Figure 37. Time series of box whisker plots along with the distribution of the measured values for surface water stations. RPs represent the reporting periods, RP7 being the last period (2016-2019). The blue, red, green and black dots represent the mean of the fourth third, second and first quartiles, respectively.

Water Quality Monitoring - Federal

The Belgian Federal report presents the water quality of coastal and marine waters. Currently only 3 stations have measurement of concentrations and trends. There is no eutrophic station. The stations have NO3 concentration < 2 mg/l and stable trends.

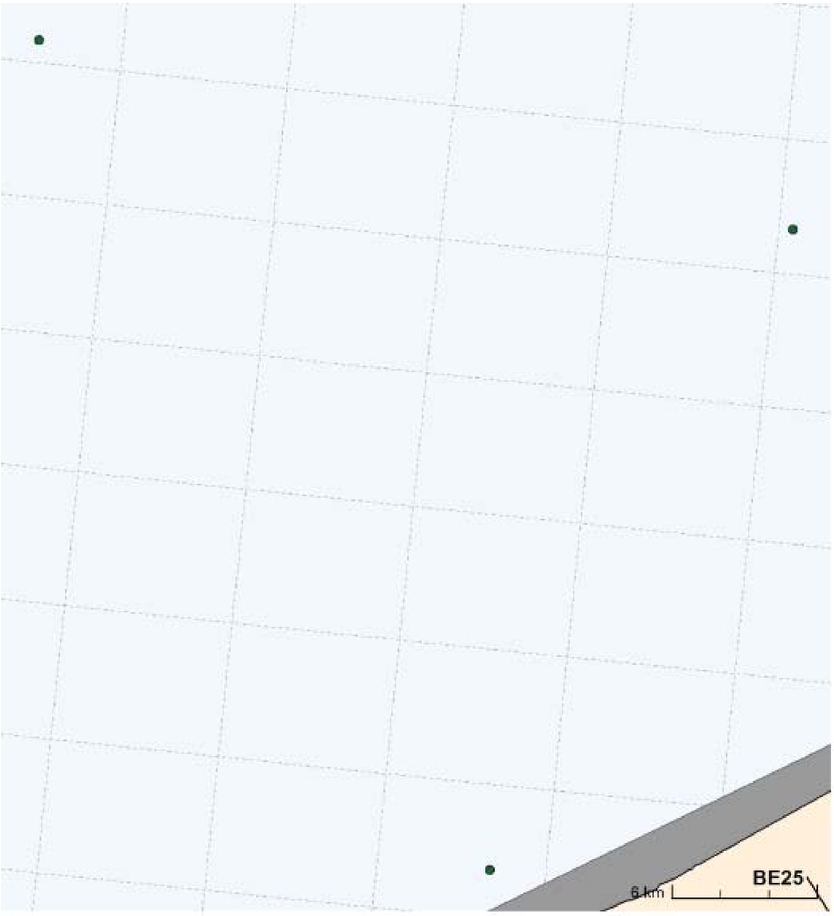
Surface water quality monitoring network

Table 10. 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	0	0	0	0	0	0	0	0	0
5	Lake/reservoir water	0	0	0	0	0	0	0	0	0
6	Transitional water	0	0	0	0	0	0	0	0	0
7	Coastal water	6	6	2	6	6	2	0	0	2
8	Marine water	4	4	1	3	4	1	0	0	1
9	Not specified	0	0	0	0	0	0	0	0	0
	Total	**10**	**10**	**3**	**9**	**10**	**3**	**0**	**0**	**3**

Surface Water Quality

Surface water average annual nitrate concentration



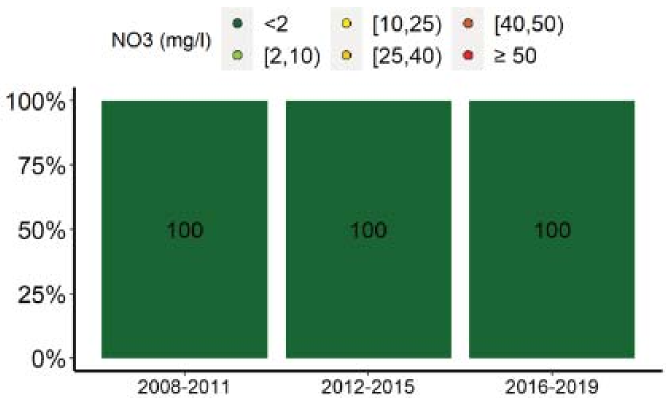
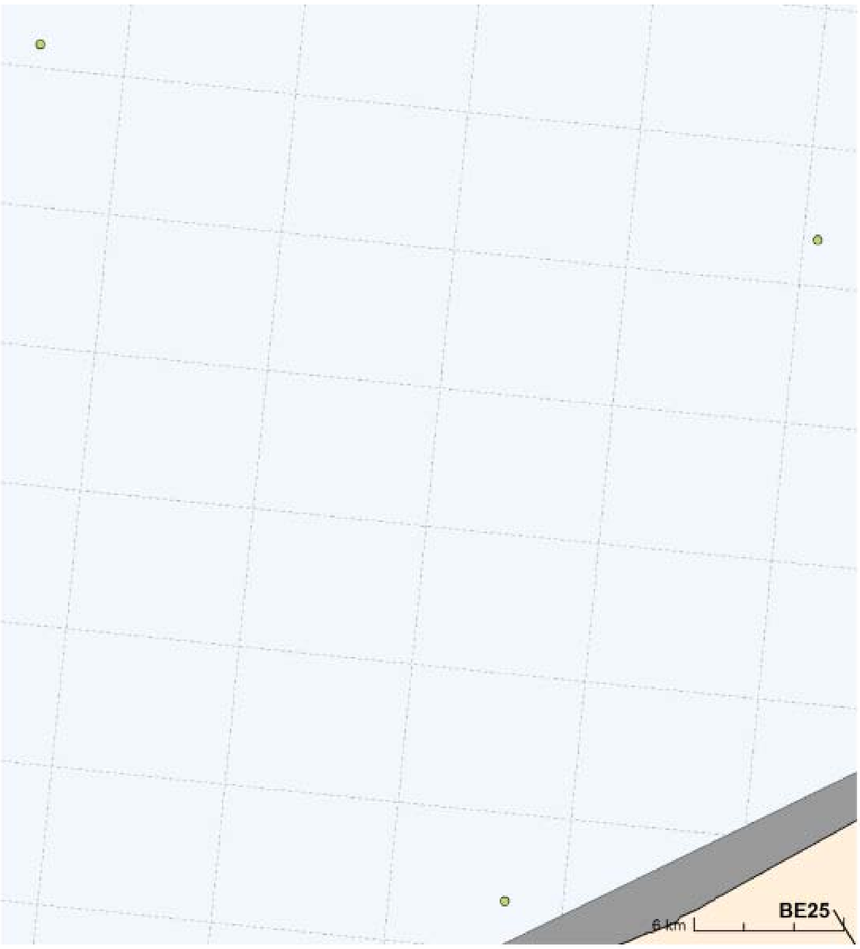


Figure 38. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis).

Surface water average annual nitrate concentration trend



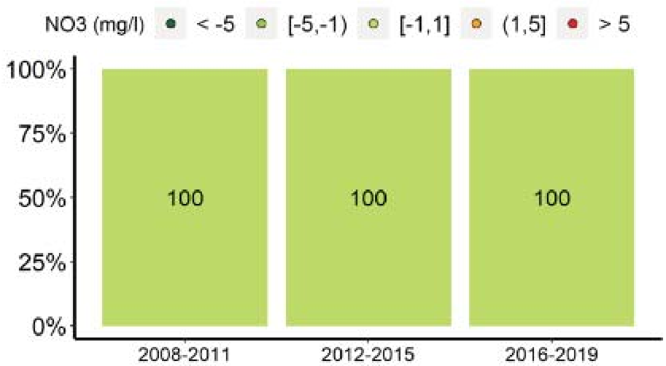
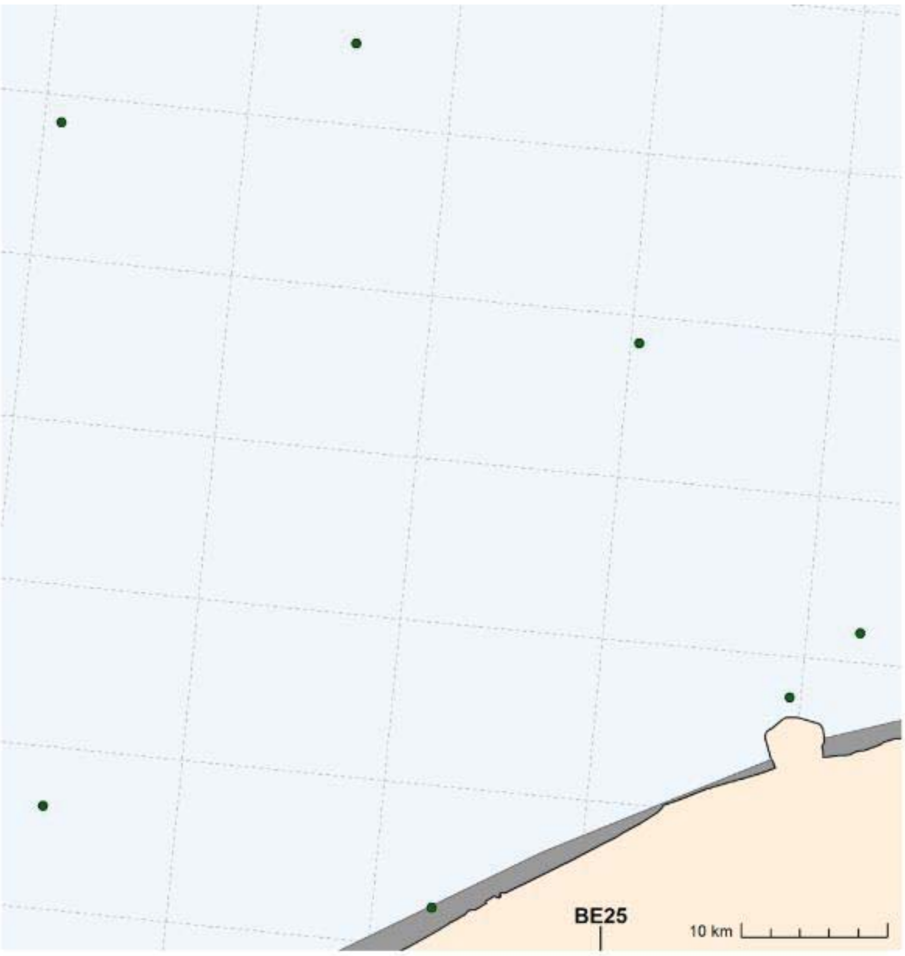


Figure 39. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis).

Surface Water Eutrophication

Figure 40. Spatial distribution of eutrophic status (map) and corresponding percentage of monitoring points per classes of status by reporting period (x axis).

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	0	0	0	0
5	Lake/reservoir water	0	0	0	0
6	Transitional water	0	0	0	0
7	Coastal water	4	4	4	0
8	Marine water	3	3	3	0
9	Not specified	0	0	0	0
	Total	**7**	**7**	**7**	**0**

Figure 41. SW removed stations map (top graph) and distribution by type (lower graph).

Long term analysis - Federal

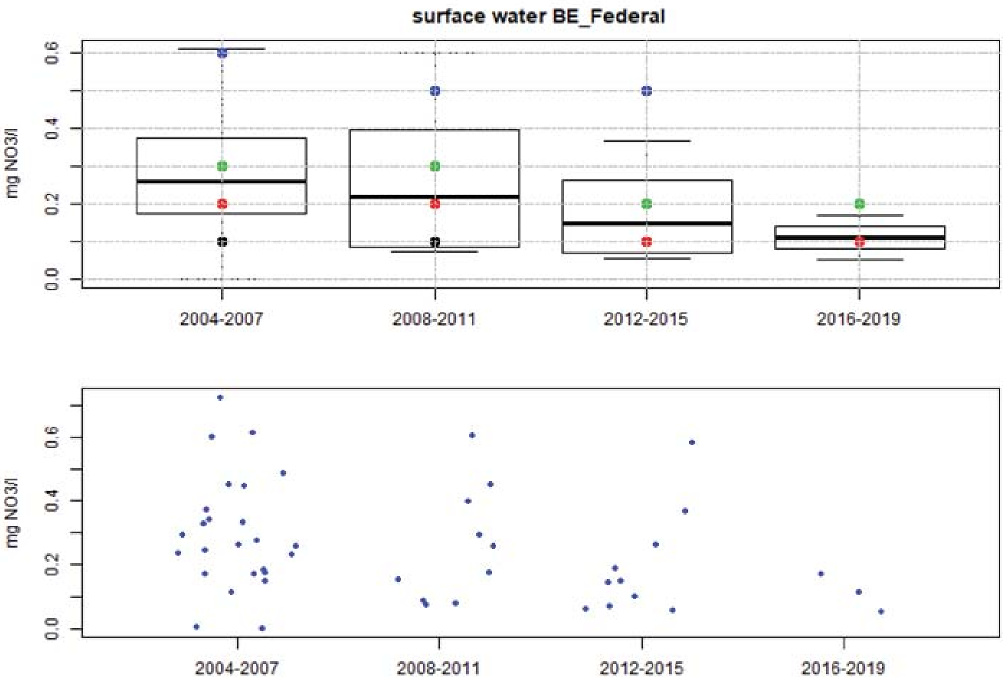


Figure 39. Time series of box whisker plots along with the distribution of the measured values for surface water stations. RPs represent the reporting periods, RP7 being the last period (2016-2019). The blue, red, green and black dots represent the mean of the fourth third, second and first quartiles, respectively.

Conclusions and recommendations

Belgium has a very high livestock pressure and the nitrogen surplus is above the average for the EU.

There is a very well elaborated network of monitoring stations. The groundwater quality is bad in particular in Flanders, where also the nitrate concentration in many monitoring points exhibit a strong increasing trend. The water quality in Wallonia is better than the average in the EU and remained stable or improved during the recent years.

Nitrate levels in the surface waters of Flanders are also too high and increased over the last reporting period. While the trophic status is generally good in Wallonia, almost all surface waters are eutrophic in Flanders.

Flanders reviewed its nitrate action programme 2019, including a gradual introduction of reinforced measures in the most polluted areas. Even though a number of deficiencies in the Nitrate Action Program of Wallonia have been identified, this region did not review its action programme during this reporting period.

The Commission urges Flanders to take additional measures that match the severity of the problems and to support farmers switching to more resilient and less intensive production models. Wallonia is required to adapt its programme in accordance with the nitrate Directive.

EUROPEAN
COMMISSION

Brussels, 11.10.2021
SWD(2021) 1001 final

PART 11/38

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}

EN EN

Pressure from Agriculture

Bulgaria's utilized agricultural area amounts to 5.0 Mha, representing 46% of the total land area and has remained stable since 2007. The major outputs of the agricultural industry include in a decreasing order cereal (33.4%), industrial crops (21.6%) and animals (13%).

Eurostat

Major land use statistics for Bulgaria

Table 1.Utilized agricultural area (abbreviated as UAA)

Bulgaria	2005	2007	2010	2013	2016
Utilised agricultural area UAA (1000 ha)	NA	5116	5052	4995	5021
arable land (1000 ha)	NA	3058	3163	3462	3481
permanent grass (1000 ha)	NA	1835	1702	1381	1384
permanent crops (1000 ha)	NA	195	164	135	140
kitchen gardens (1000 ha)	NA	26	22	17	15

Note:

Eurostat (FSS)

Bulgaria's arable land has increased by 13.8% since 2007. The permanent grass and crops areas have remained stable since 2013.

Animal distribution in Bulgaria

Bulgaria's live bovines remained stable since 2013. The livestock density index has remained stable since 2010 and it is significantly lower than the EU average of 0.8.

Table 2. Livestock statistics

Bulgaria	2005	2007	2010	2013	2016
Livestock index	0.49	0.41	0.26	0.22	0.24
dairy cows (10^6 heads)	0.35	0.34	0.31	0.31	0.28
live bovines (10^6 heads)	0.63	0.61	0.55	0.59	0.57
live pigs (10^6 heads)	0.93	0.89	0.66	0.59	0.62
live poultry (10^6 heads)	NA	NA	17.49	14.29	16.61

Note:

Eurostat (FSS)

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

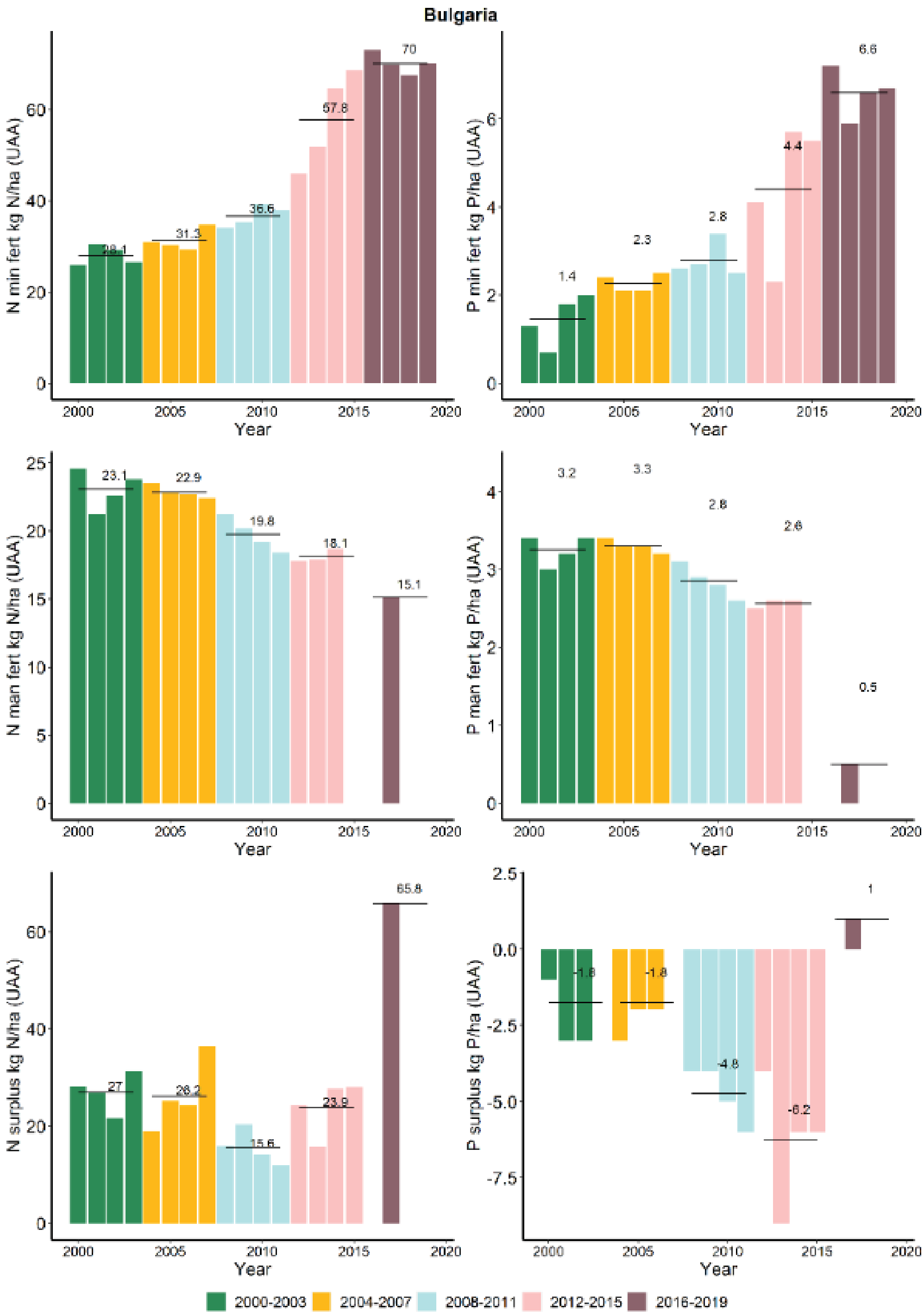


Figure 1. N and P fertilizers and gross surplus (kg/ha)

The N and P fertilizers and gross surpluses originate from EUROSTAT data for the years 2000-2014 and 2017. Data provided by Bulgaria have been used to complete the N and P mineral fertilizer trend for the period 2015-2019 (excluding 2017) because of correspondence, for the previous years, with Eurostat statistics. As regard to N and P manure values, they were comparable only for year 2014 and a difference by 52% and 9% was found, respectively

The mineral fertilizers increased significantly from 2000-2003. Both manure nitrogen and phosphorus have decreased from 2004. The nitrogen and phosphorus surpluses have increased in year 2017 with respect to the period 2012-2015. 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 south-central part of the Bulgaria (total LSU and LSU by animal type were retrieved individually from EUROSTAT).
In this document, the NUTS-2013 version is used.
(https://ec.europa.eu/eurostat/web/gisco/geodata/reference-data/administrative-units-statistical-units/nuts)

Water Quality Monitoring

The total number of groundwater monitoring points for the current period is 496 (406 points for the previous period). Total number of points common to both periods is 375 (76.6 %). The total number of surface water monitoring points for the current period is 326 (324 points for the previous period). The total number of points common to both periods is 318.

For groundwater 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

Station Type	Description	Number of stations with measurements			Number of stations with Trends		
		2008-2011	2012-2015	2016-2019	2008-2011	2012-2015	2016-2019
0	Phreatic groundwater (shallow): 0-5 m	36	30	40	8	26	27
1a	Phreatic groundwater (deep) 5-15 m	91	83	92	31	76	74
1b	Phreatic groundwater (deep) 15-30 m	62	68	83	15	56	62
1c	Phreatic groundwater (deep) >30 m	76	71	83	24	57	63
2	Captive groundwater	23	27	23	6	24	20
3	Karstic groundwater	138	127	167	31	120	122
9	Not specified	0	0	0	0	0	0
	Total	**426**	**406**	**488**	**115**	**359**	**368**

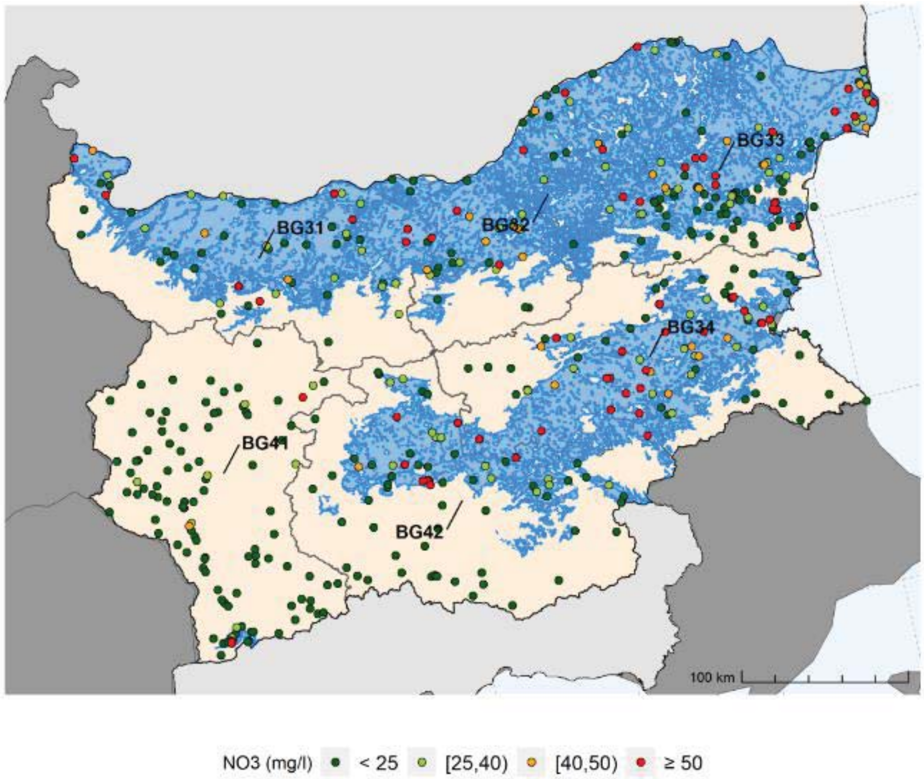
Surface water quality monitoring network

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

Station Type	Description	Number of stations with measurements			Number of stations with Trends			Number of stations with Trophic status		
		2008-2011	2012-2015	2016-2019	2008-2011	2012-2015	2016-2019	2008-2011	2012-2015	2016-2019
4	River water	264	267	268	81	242	261	264	267	268
5	Lake/reservoir water	41	51	52	5	47	51	41	51	52
6	Transitional water	0	0	0	0	0	0	0	0	0
7	Coastal water	7	6	6	3	3	6	7	6	6
8	Marine water	0	0	0	0	0	0	0	0	0
9	Not specified	0	0	0	0	0	0	0	0	0
	Total	**312**	**324**	**326**	**89**	**292**	**318**	**312**	**324**	**326**

Groundwater Quality

Groundwater average annual nitrate concentration



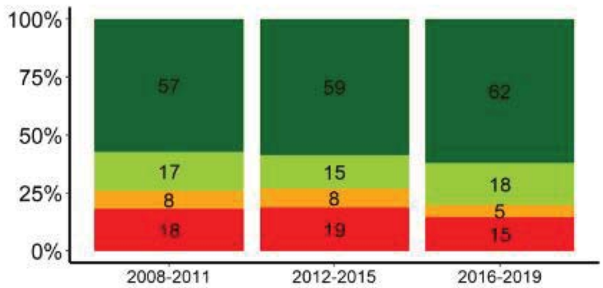


Figure 3. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information. In the map in blue the NVZ.

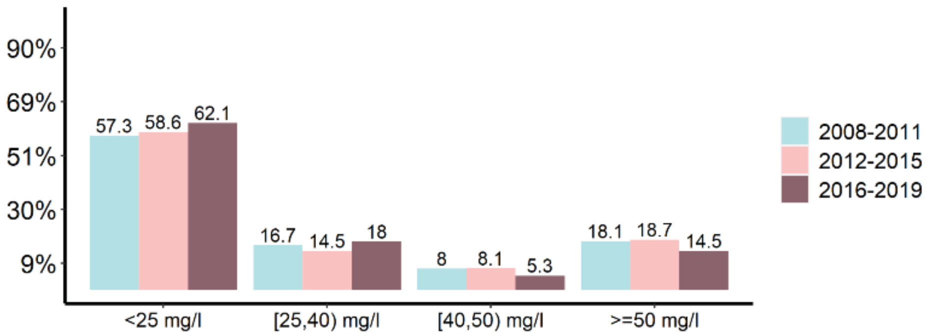


Figure 4. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis)

Groundwater average annual nitrate concentration trend

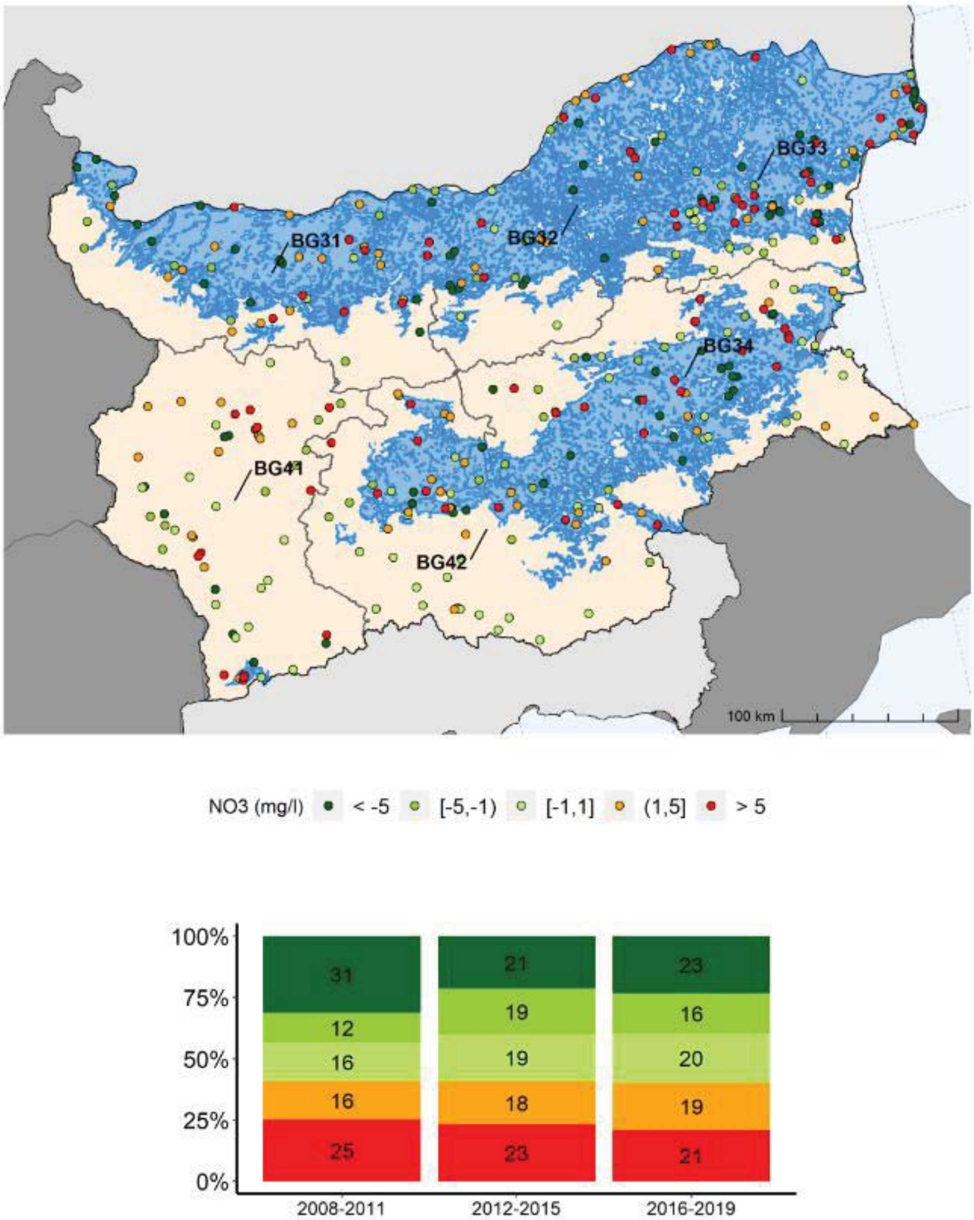


Figure 5. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis). In the map in blue the NVZ.

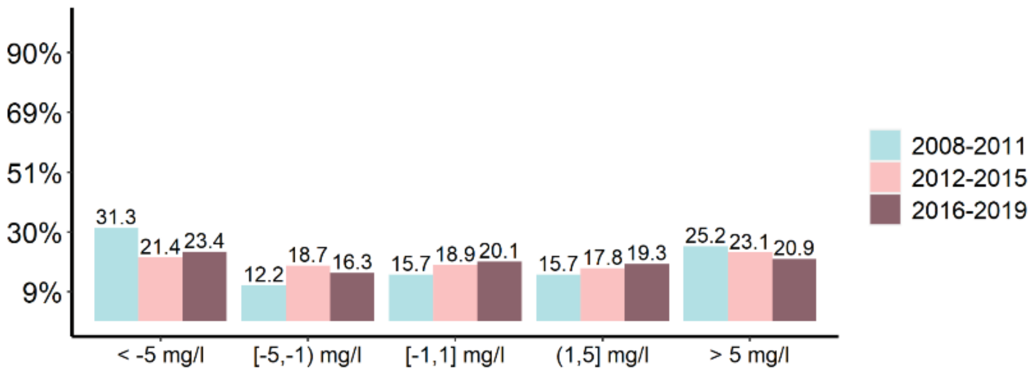
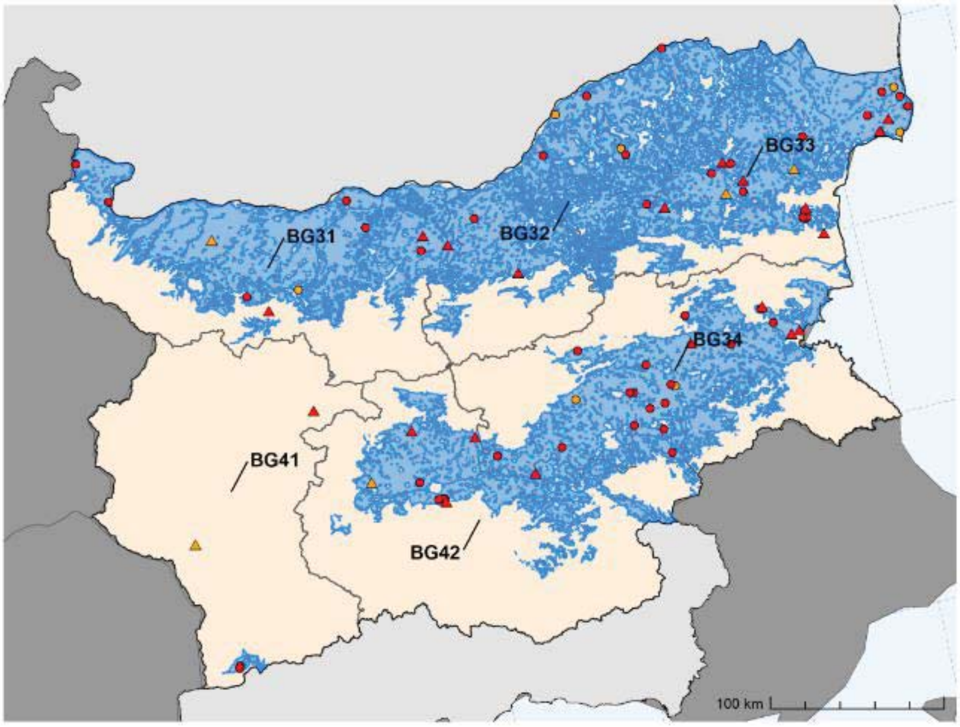


Figure 6. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis)

Groundwater hotspot



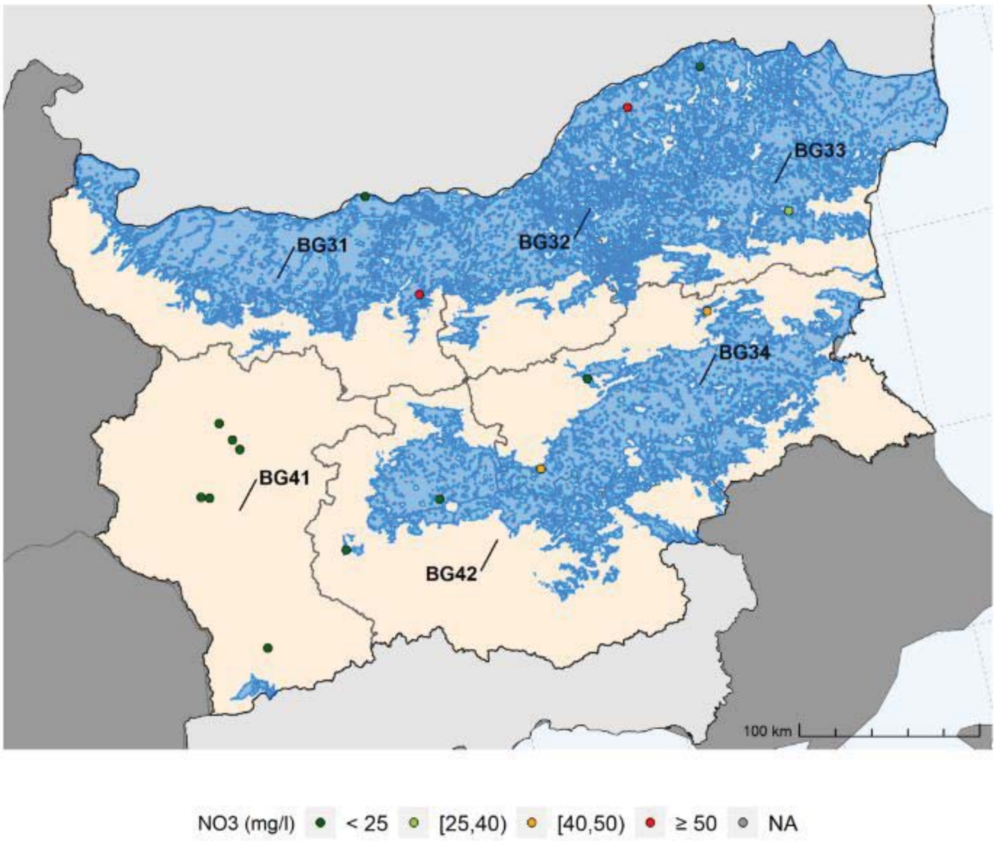
NO3 (mg/l) ● [40,50) incr. trend InNVZ ▲ [40,50) incr. trend OutNVZ ● ≥ 50 InNVZ ▲ ≥ 50 OutNVZ

		>=40 and < 50 mg/l incr.trend		>=50 mg/l	
NUTS ID	NUTS NAME	InNVZ	OutNVZ	InNVZ	OutNVZ
BG31	Severozapaden	1	1	6	3
BG32	Severen tsentralen	2	0	6	1
BG33	Severoiztochen	2	2	13	9
BG34	Yugoiztochen	2	0	15	5
BG41	Yugozapaden	0	1	3	1
BG42	Yuzhen tsentralen	0	1	5	4
	Total	**7**	**5**	**48**	**23**

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



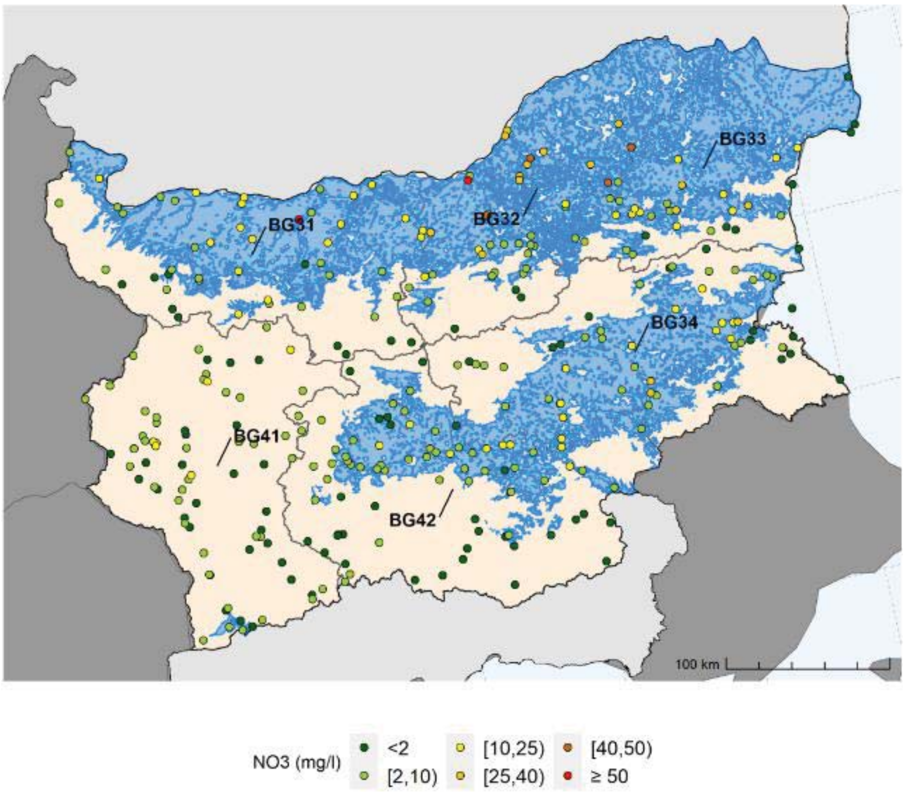
Station Type	Description	Number of removed stations		
		total removed	with measurements	with trends
0	Phreatic groundwater (shallow): 0-5 m	2	2	1
1a	Phreatic groundwater (deep) 5-15 m	5	5	3
1b	Phreatic groundwater (deep) 15-30 m	3	3	2
1c	Phreatic groundwater (deep) >30 m	2	2	2
2	Captive groundwater	1	1	1
3	Karstic groundwater	3	3	3
9	Not specified	0	0	0
	Total	**16**	**16**	**12**

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



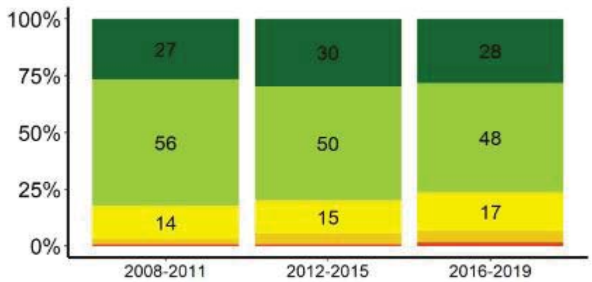


Figure 9. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information. In the map in blue the NVZ.

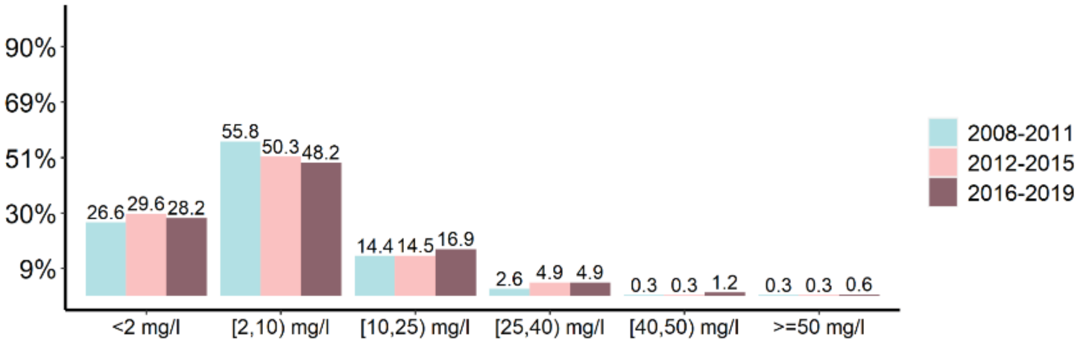


Figure 10. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis)

Surface water average annual nitrate concentration trend

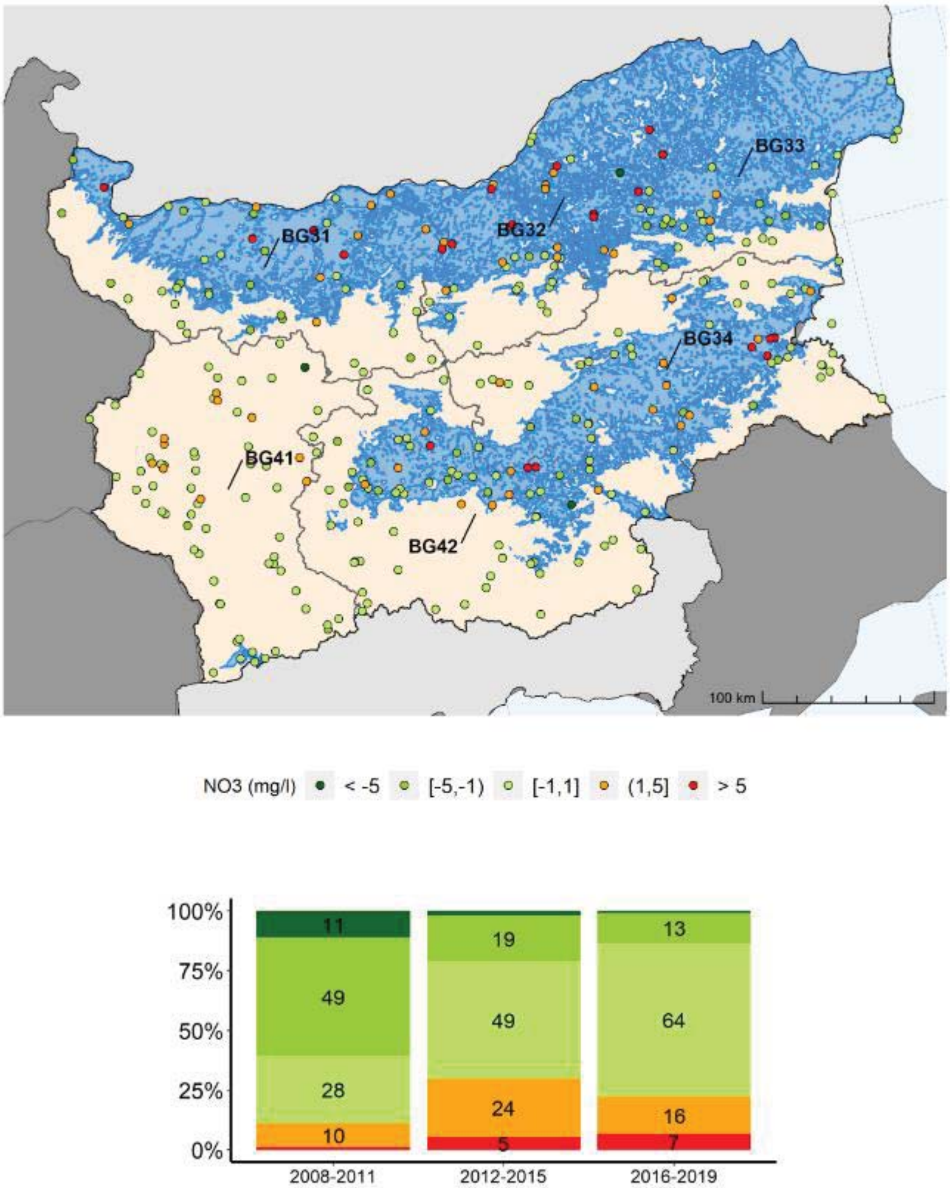


Figure 11. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information. In the map in blue the NVZ.

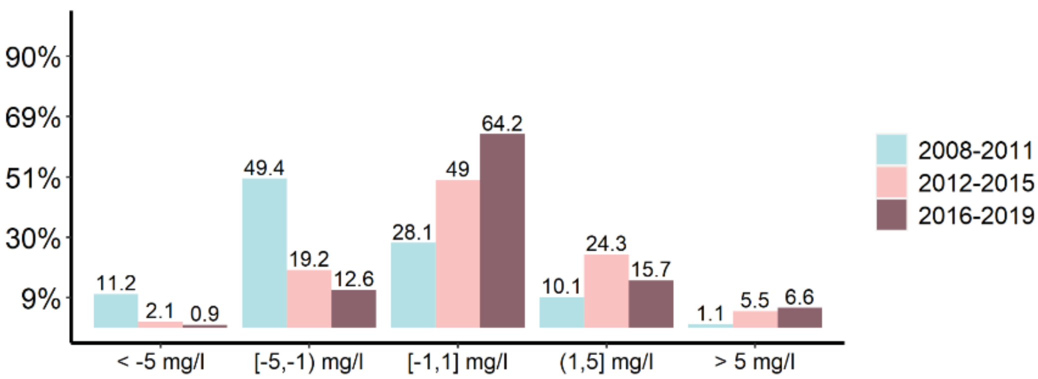


Figure 12. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis)

Surface Water Eutrophication

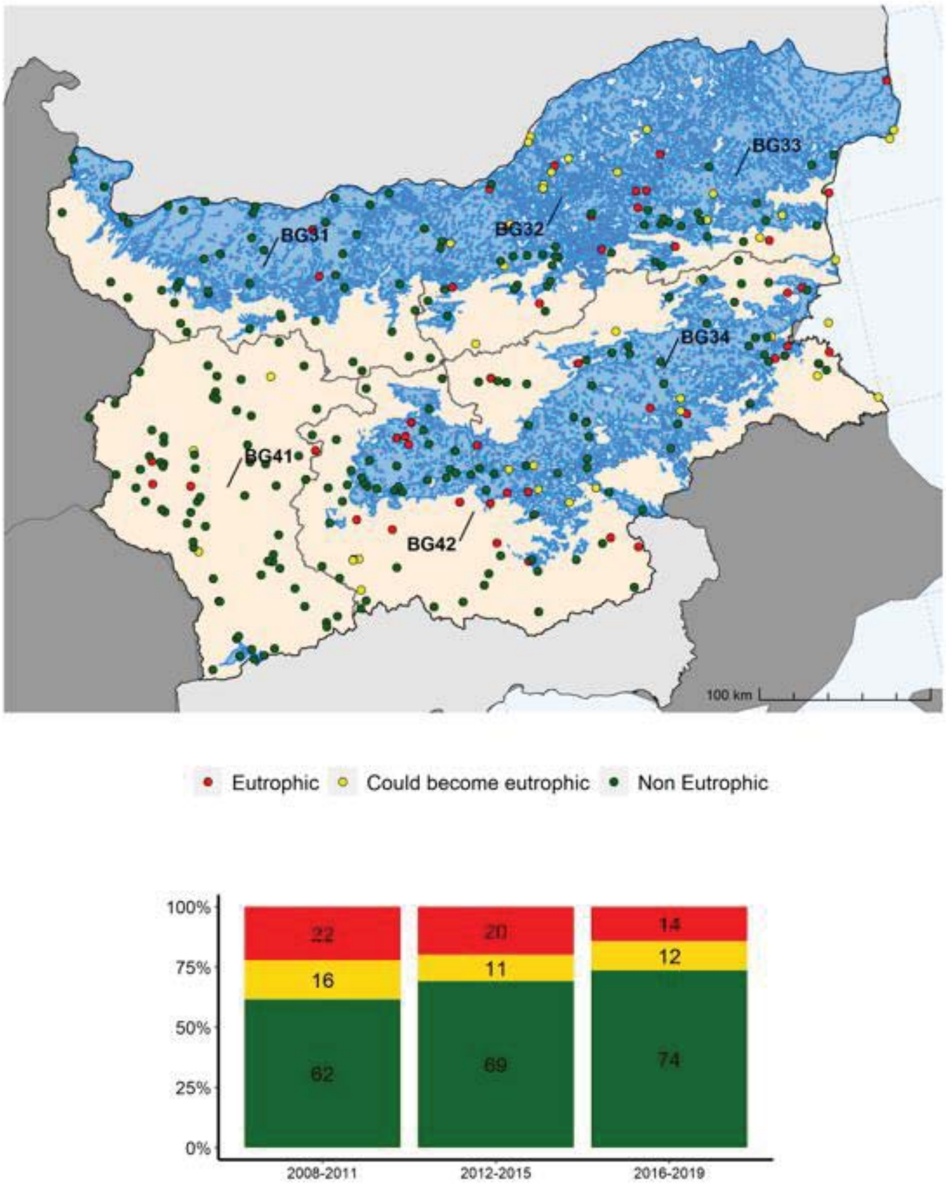


Figure 13. Spatial distribution of eutrophic status (map) and corresponding percentage of monitoring points per classes of status by reporting period (x axis). In the map in blue the NVZ.

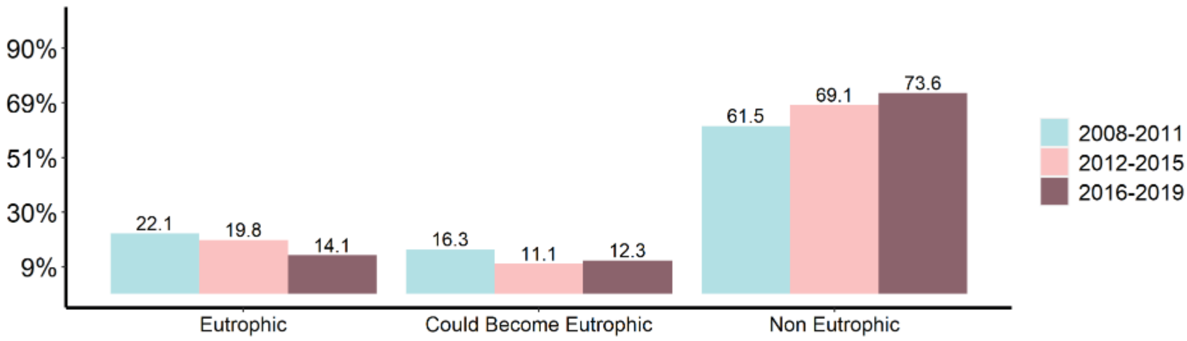
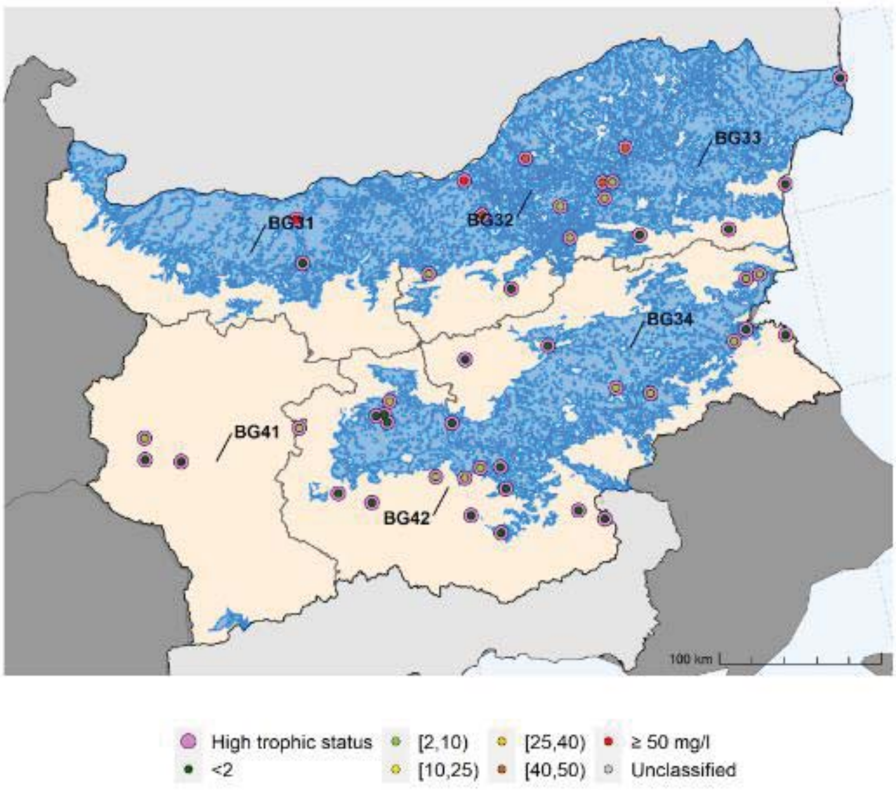


Figure 14. Comparison of percentage of monitoring points between the three reporting periods by classes of status (x axis)

The Eutrophic status vs average NO3 annual concentration



NUTS ID	NUTS NAME	High trophic status	Number of stations by classes of concentration						
			<2 mg/l	[2,10) mg/l	[10,25) mg/l	[25,40) mg/l	[40,50) mg/l	>=50 mg/l	Unclassified
BG31	Severozapaden	2	1	0	0	0	0	1	0
BG32	Severen tsentralen	8	1	2	0	0	4	1	0
BG33	Severoiztochen	6	3	3	0	0	0	0	0
BG34	Yugoiztochen	9	4	5	0	0	0	0	0
BG41	Yugozapaden	4	2	2	0	0	0	0	0
BG42	Yuzhen tsentralen	16	12	4	0	0	0	0	0
NO_NUTS	SALINE	1	1	0	0	0	0	0	0
	Total	**46**	**24**	**16**	**0**	**0**	**4**	**2**	**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 the higher trophic status and the corresponding value of NO3 concentration. The map shows the spatial distribution of these points, and the table reports the number of stations with measurements with highest trophic status and the corresponding stations by classes of NO3 concentration. Only the NUTS of interest are reported.

Bulgaria uses the methodology of the 2015 reporting period for assessing eutrophication in rivers, lakes and coastal waters. However, in order to comply with the terminology used in the Guidance Document of Member States' reporting on the implementation of the Nitrates Directive 91/676/EEC, the status is provided as follows:

- points designated as Ultra-oligotrophic and Oligotrophic are classified as Non-Eutrophic;
- the points designated as Mesotrophic are classified May become eutrophic;
- all Eutrophic and Hypertrophic monitoring stations are classified as Eutrophic.

The trophic status of rivers was assessed using the combination of two parameters, nitrate and orthophosphate concentrations. The "less favourable of the two" approaches was adopted, i.e. the classification was made at the highest value of either of the two parameters. The two parameters were selected on the basis of the available monitoring information in the period 2016-2019 and their concentrations were determined for most of the points.

Nitrate, orthophosphate, total phosphorus, chlorophyll-a and transparency were analysed in the lakes, but the classification was carried out according to indicators of total phosphorus, chlorophyll-a and transparency. The 'less favourable indicator' approach was adopted, i.e. a classification was made at the highest value of any of the parameters.

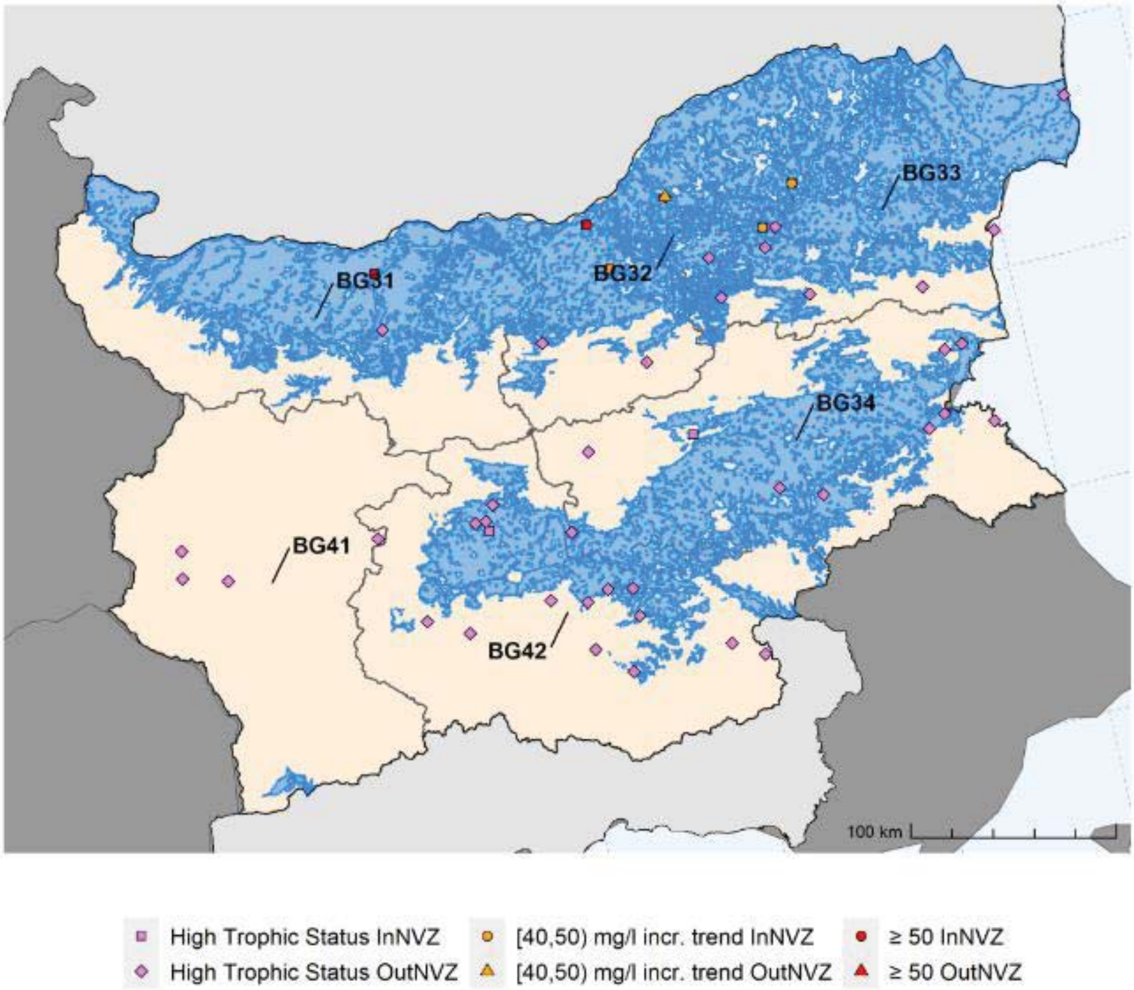
For eutrophication in coastal marine waters the parameters nitrate, orthophosphate, total phosphorus and chlorophyll-a were used, but the classification has been carried out based on the following indicators: nitrate, orthophosphate and chlorophyll-a.

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	6	24	238
5	Lake/reservoir water	39	11	2
6	Transitional water	0	0	0
7	Coastal water	1	5	0
8	Marine water	0	0	0
9	Not specified	0	0	0
	Total	**46**	**40**	**240**

European Commission

Surface Water quality hotspot



		High trophic status		>=40 and < 50 mg/l incr.trend		>=50 mg/l	
NUTS ID	NUTS NAME	InNVZ	OutNVZ	InNVZ	OutNVZ	InNVZ	OutNVZ
BG31	Severozapaden	1	1	0	0	1	0
BG32	Severen tsentralen	4	4	3	1	1	0
BG33	Severoiztochen	0	6	0	0	0	0
BG34	Yugoiztochen	1	8	0	0	0	0
BG41	Yugozapaden	0	4	0	0	0	0
BG42	Yuzhen tsentralen	1	15	0	0	0	0
NO_NUTS	SALINE	0	1	0	0	0	0
	Total	**7**	**39**	**3**	**1**	**2**	**0**

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

The hotspot analysis identifies all the SW monitoring stations that have high eutrophic 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.

Measures in the Action Programme

The programme of measures for limiting and preventing pollution caused by nitrates from agricultural sources in vulnerable zones was published in 2006. The measures under the programme are mandatory for all farmers on the territory of nitrate vulnerable zones (NVZs). The NVZ areas were designed by Order No RD-660/28.8.2019 of the Minister for the Environment and Water.

The requirements under Part III, Section A concerning the availability of manure storage facilities have been obligatory for farmers since 31 December 2010. The programme is optional for farmers pasture-rearing endangered local species in accordance with Regulation No 7 of 2015 on the implementation of Measure 10 ‘Agri-environment-climate’ of the Rural Development Programme 2014-2020. The details of Action Programme are reported in Table 6.

Cost effectiveness analysis was not reported.

Table 6. Details of Action Programme

Measure	General details in Action Programme (*)
Period of prohibition of fertiliser application	• Different periods of prohibition are selected based on the municipalities and type of crops
Restrictions for application on sloped soils	• On slopes with a gradient from 3° to 6°: anti-erosion crop rotation and basic tillagefor crop
	• On slopes with a gradient above 6°, fertilisers must be applied at least 50 m away from surface water bodies
	• On slopes with a gradient from 6° to 12°: anti-erosion crop rotation where applicable, soil tillage across the slope, strip farming
	• Forbidden on slopes with gradient above 12°
Restrictions for application on soaked, frozen, or snow-covered soils	• Nitrogen fertilisers must not be applied to completely frozen or completely or partially snow-covered ground
Restrictions for application near watercourses (buffer strips)	• On flat terrain, nitrogen fertilisers should not be used next to surface water bodies (rivers, brooks, canals, lakes, dam lakes, the sea, etc.) at a distance of less than 5 m
	• On flat terrain, when applying liquid livestock manure or when irrigating vegetables and other crops with manure diluted with water, the distance to surface water bodies must be at least 5 m. In cases where the liquid fraction of livestock manure is applied on flat terrain, the distance to water bodies must be at least 10 m
	• on terrains with sloped, when applying solid and liquid fertilizers the distance to surface water bodies must be at least 10 m
Effluent storage works	• Solid livestock manure should be stored in normal conditions for a period of at least 6 months before being applied to the soil. Liquid manure should be applied to the soil after a 4-month storage period
Capacity of manure storage	• Depending on the species and number of livestock, agricultural holdings must have specific manure storage facilities and arrangements
	• Following the production of biogas, the by-product (organic mass) of manure may be applied to the soil without time-limits for storage, while respecting the prohibition period
Rational fertilisation (e.g., splitting fertilisation, limitations)	• Specific maximum rates for applicatio of N fertilizer for main agricultural crops
Crop rotation, permanent crop enhancement	• Crop rotation on sloped soils
Vegetation cover in rainy periods, winter	• Not specified
Fertilisation plans, spreading records	• Not specified
Other measures	• Recommendation for fertiliser application and application rates for nitrogen-containing fertilisers
	• In the developed Rules for Good Agricultural Practice are addressed issues related to vegetation cover in rainy periods and keeping diaries for fertilization
Date for application limit of 170 kg N/ha/year:	• Not specified

Controls

During the period 2016-2019, inspectors from the Regional Food Safety Directorates carried out a total of 7 146 inspections (compared to 7 729 in the previous reporting period), of which 3 820 used to check the compliance with the Rules of Good Agricultural Practice for the implementation of Measure 214 ‘Agri-environmental payments’ under the Rural Development Programme 2007-2013 and Measure 10 ‘Agri-environment-climate’ of the RDP 2020-2014 and 3 326 cross-compliance checks for compliance with the Programme of Measures for the Restriction and Prevention of Pollution by Nitrates Pollution of Agricultural Holdings (ZPZs) and for agricultural holdings.

Designation of NVZ

The vulnerable zones were initially designated by Order No RD-795 of 10.08.2004 of the Minister for the Environment and Water. Subsequently, by Order No RD-930 of 25.10.2010 of the Minister of Environment and Water, the NVZ was revised and updated. A subsequent review was carried out in 2015 by Order No RD 146/25.2.2015. During the course of this review, the boundaries of the NVZ were not changed and were kept identical to the territories of municipalities and parts thereof designated in 2010. By Order No 660/28.08.2019 of the Minister for the Environment and Water, a new review and update of the waters contaminated and threatened with pollution on the territory of the country were carried out. In the context of this revision, the boundaries of the NVZ were changed and the territories and 6 additional municipalities (compared to the 2015 NVZ) were included. The current area of NVZ is about 38 627.6 km^2, increasing of about 276 km^2 with respect to the previous reporting period.

Forecast of Water Quality

There was no forecast of water quality. Bulgaria used the trend determined during the reporting period to provide an overall picture of the water status.

Summary

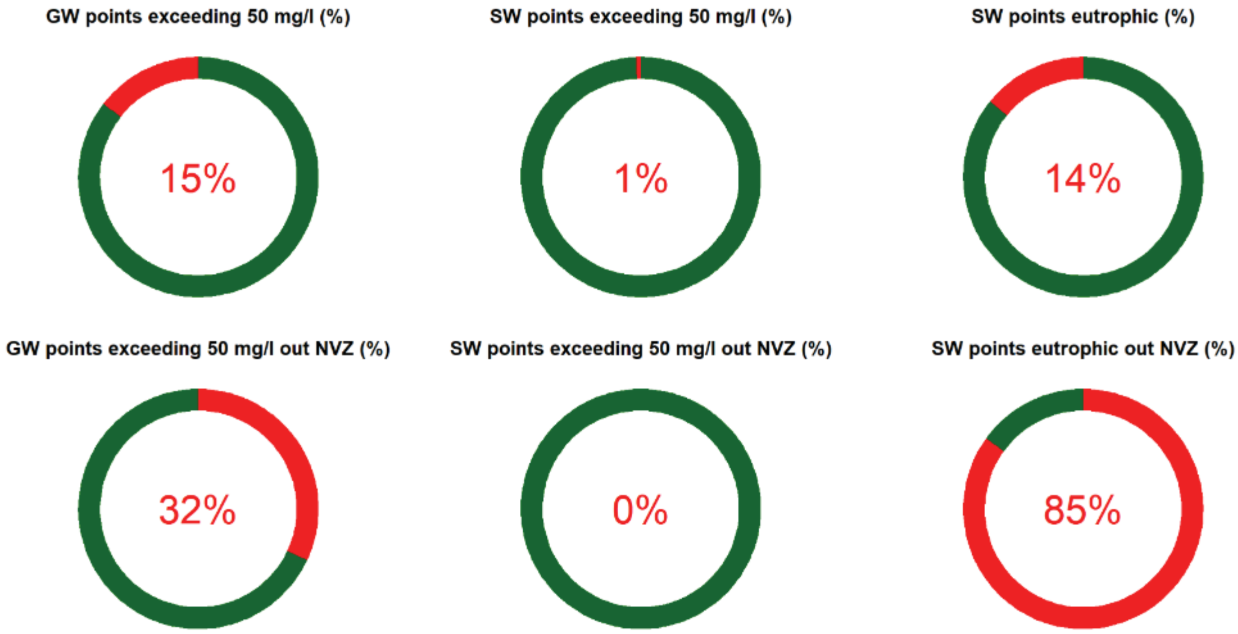


Figure 17. The summary plot for the period 2016-2019

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

Long term analysis

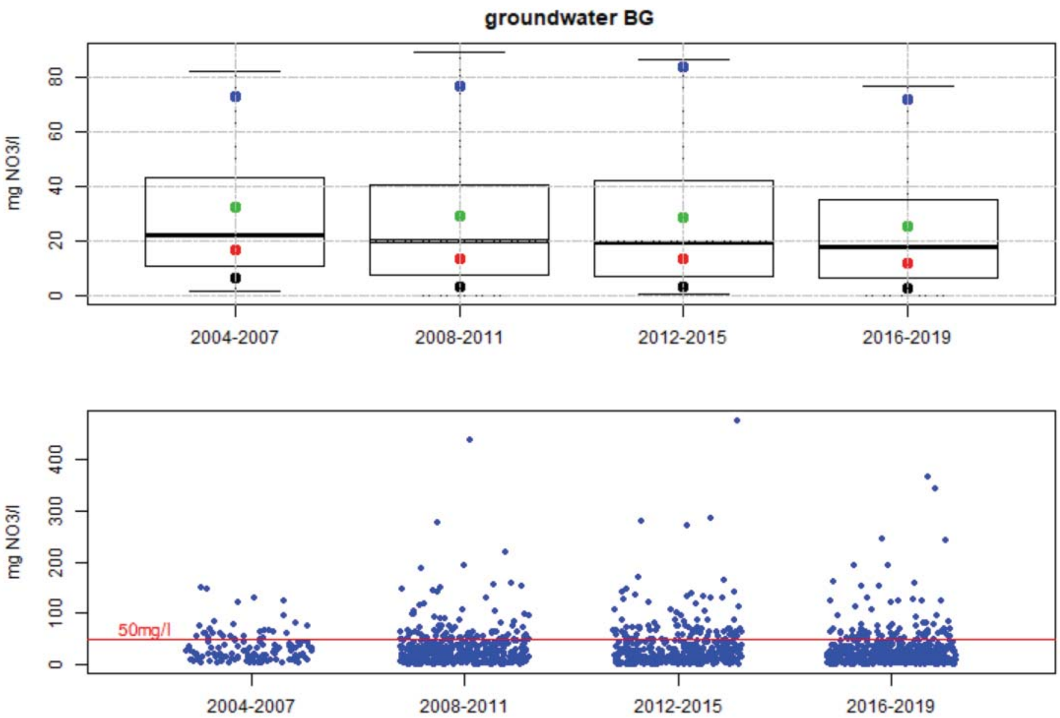


Figure 18. Time series of box whisker plots along with the distribution of the average NO3 annual concentrations for each reporting period, for groundwater stations. The blue, red, green and black dots represent the mean of the fourth third, second and first quartiles, respectively.

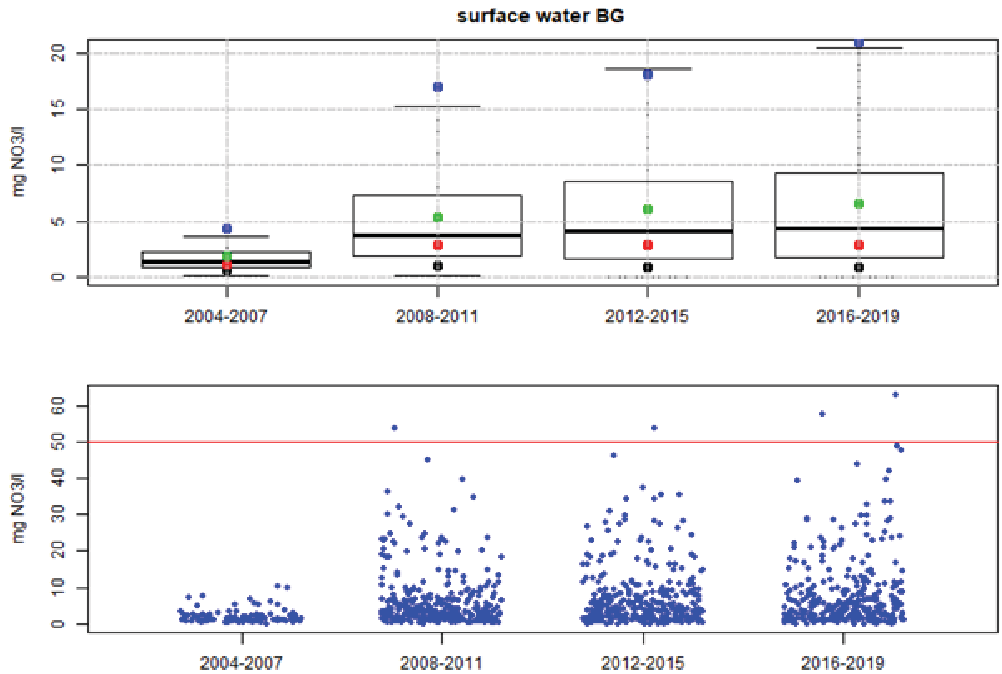


Figure 19. Time series of box whisker plots along with the distribution of the average NO3 annual concentrations for each reporting period, for surface water stations. The blue, red, green and black dots represent the mean of the fourth third, second and first quartiles, respectively.

Conclusions and recommendations

Bulgaria has a low livestock density, the surplus of nitrogen is average for the EU and there is low surplus of for phosphorus.

There is a well-elaborated network of monitoring stations. The groundwater quality is generally good. However, there are hotspots, with a nitrate concentration > 50 mg/l and many monitoring points have a strong increasing trend.

A very high number polluted groundwater and of surface waters found to be eutrophic are located outside the NVZ, which were extended in 2015 and reviewed in 2019.

A revised action programme was published in 2020.

The Commission recommends Bulgaria to focus on the hotspots and to review the designation of NVZ and include areas that drain into waters that are eutrophic where agricultural pressure is significant.

EUROPEAN
COMMISSION

Brussels, 11.10.2021
SWD(2021) 1001 final

PART 12/38

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}

EN EN

Pressure from Agriculture

Croatia's utilized agricultural area amounts to 1.5 Mha, representing 27.6% of the total land area and has increased by 18.8% since 2013. 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 Croatia

Table 1.Utilized agricultural area (abbreviated as UAA)

Croatia	2005	2007	2010	2013	2016
Utilised agricultural area UAA (1000 ha)	NA	1202	1334	1301	1546
arable land (1000 ha)	NA	847	900	875	872
permanent grass (1000 ha)	NA	270	345	350	600
permanent crops (1000 ha)	NA	80	84	73	72
kitchen gardens (1000 ha)	NA	5	5	NA	2

Note:
Eurostat (FSS)

Croatia's arable land has remained stable since 2013. The permanent grass land area has increased by 55% since 2007.

Animal distribution in Croatia

Croatia's has seen a decrease in all livestock. The livestock density index has continued its steady decrease since 2007. It is below the EU average of 0.8 since 2010.

Table 2. Livestock statistics

Croatia	2005	2007	2010	2013	2016
Livestock index	NA	0.90	0.78	0.55	0.48
dairy cows (10^6 heads)	NA	0.22	0.21	0.17	0.15
live bovines (10^6 heads)	0.47	0.47	0.44	0.44	0.44
live pigs (10^6 heads)	1.21	1.35	1.23	1.11	1.16
live poultry (10^6 heads)	NA	NA	13.47	13.63	10.39

Note:
Eurostat (FSS)

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

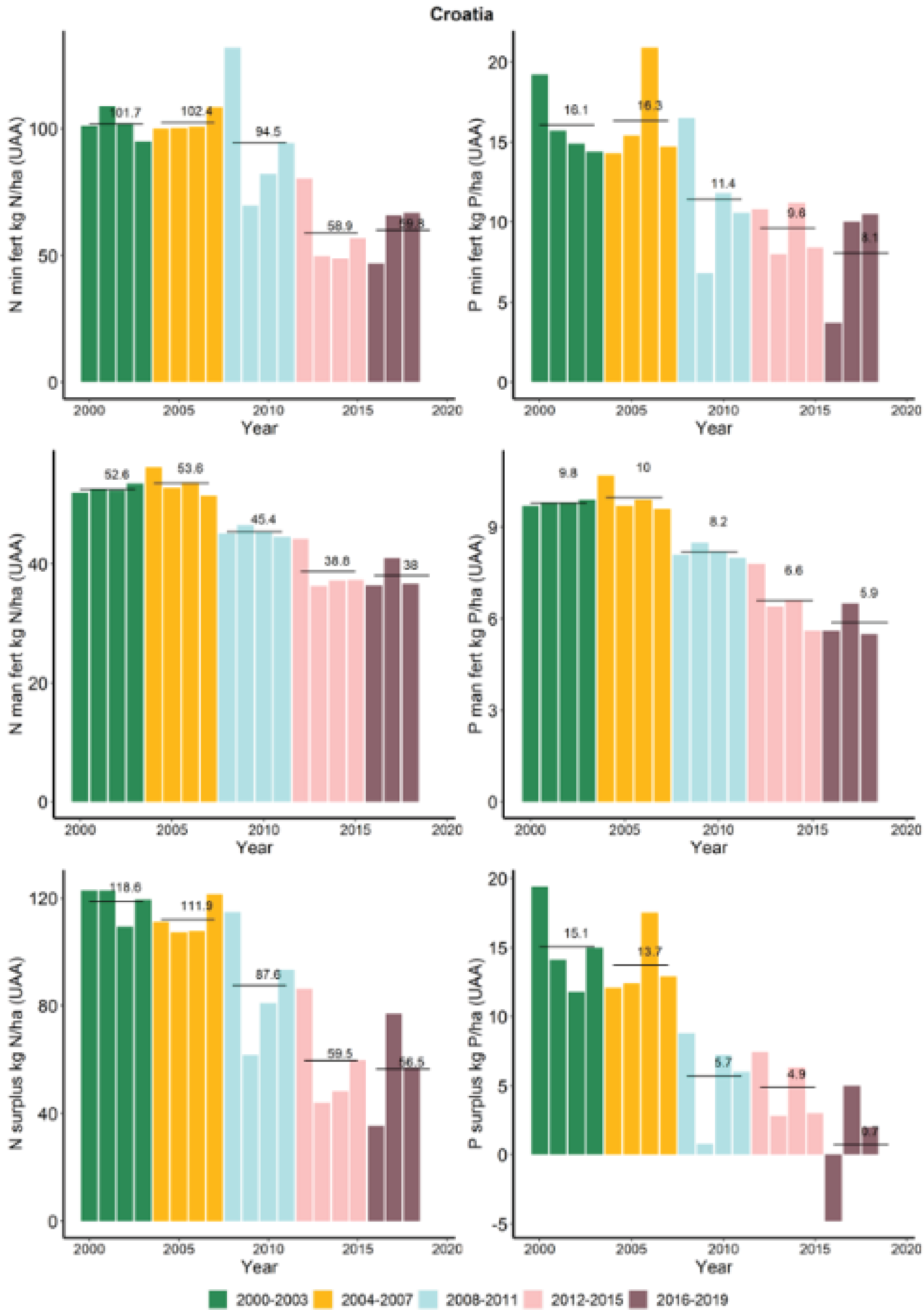


Figure 1. N and P fertilizers and gross surplus (kg/ha)

Nitrogen and phosphorus fertilizer and gross surplus data originate from EUROSTAT data for the years 2000-2017. Data for year 2018 have been retrieved from the Croatian Bureau of Statistics. The consumption of inorganic nitrogen and phosphorus has decreased since the 2004-2007 reporting period. Both nitrogen and phosphorus from manure have decreased since the 2004-2007 reporting period. Both the nitrogen and phosphorus surpluses continue to decrease since the 2000-2003 reporting period. 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

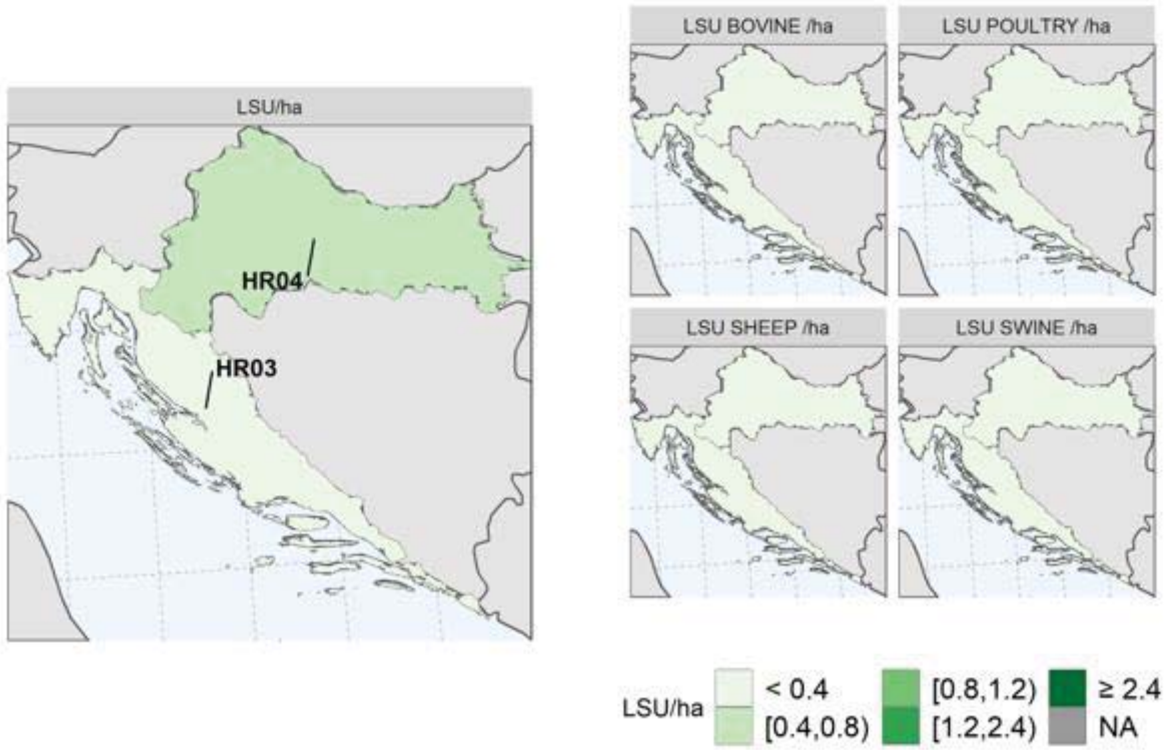


Figure 2. Map of livestock unit distribution, year 2016 (Source: Eurostat, February 2021)

Animal production density is low for all animal types (total LSU and LSU by animal type were retrieved individually from EUROSTAT, year 2016, February 2021).

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 legal basis, as well as the scope, type and methodology of water testing in Croatia are laid down in the Water Act (NN No 66/19) and in the Decree establishing water quality standards (NN No 96/2019). Monitoring is the responsibility of Croatian Waters, in line with a monitoring plan adopted by that agency.

Water monitoring in vulnerable zones is conducted as part of surveillance and operational monitoring and focuses on indicators in surface and groundwater, in accordance with the “status and trends of aquatic environment and agricultural practice” guide. Nitrates in groundwater are tested less frequently than in surface waters. Samples are collected in the shallower and deeper parts of unconfined and confined aquifers.

For groundwater 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	0	68	85	0	0	79
1a	Phreatic groundwater (deep) 5-15 m	0	33	25	0	0	25
1b	Phreatic groundwater (deep) 15-30 m	0	6	6	0	0	6
1c	Phreatic groundwater (deep) >30 m	0	7	3	0	0	3
2	Captive groundwater	0	1	1	0	0	0
3	Karstic groundwater	0	11	12	0	0	10
9	Not specified	0	0	0	0	0	0
	Total	**0**	**126**	**132**	**0**	**0**	**123**

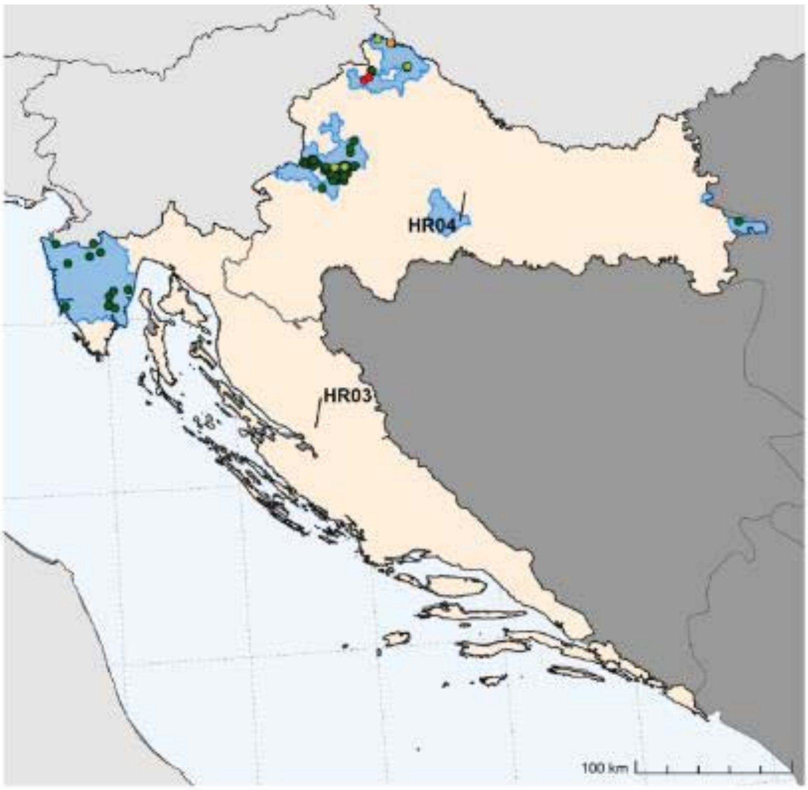
Surface water quality monitoring network

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	0	60	71	0	0	60	0	60	71
5	Lake/reservoir water	0	4	4	0	0	4	0	4	4
6	Transitional water	0	0	6	0	0	0	0	0	6
7	Coastal water	0	0	5	0	0	0	0	0	5
8	Marine water	0	0	0	0	0	0	0	0	0
9	Not specified	0	0	0	0	0	0	0	0	0
	Total	**0**	**64**	**86**	**0**	**0**	**64**	**0**	**64**	**86**

Groundwater Quality

Groundwater average annual nitrate concentration



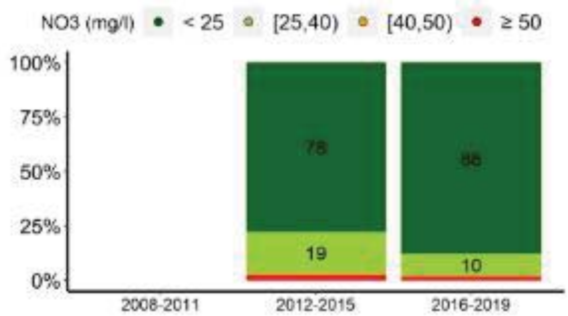


Figure 3. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information. In the map in blue the NVZ.

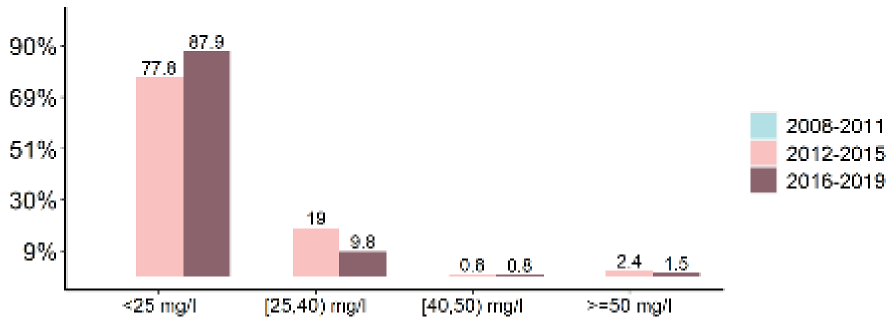


Figure 4. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis). *

Groundwater average annual nitrate concentration trend

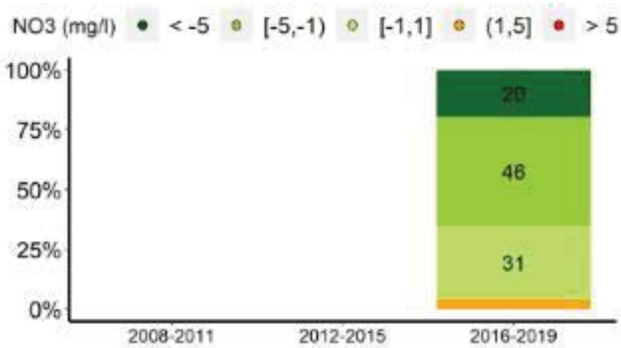


Figure 5. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information. In the map in blue the NVZ.

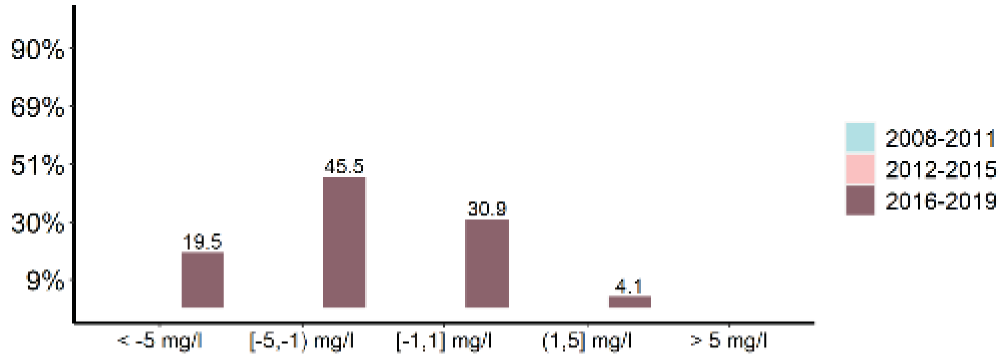
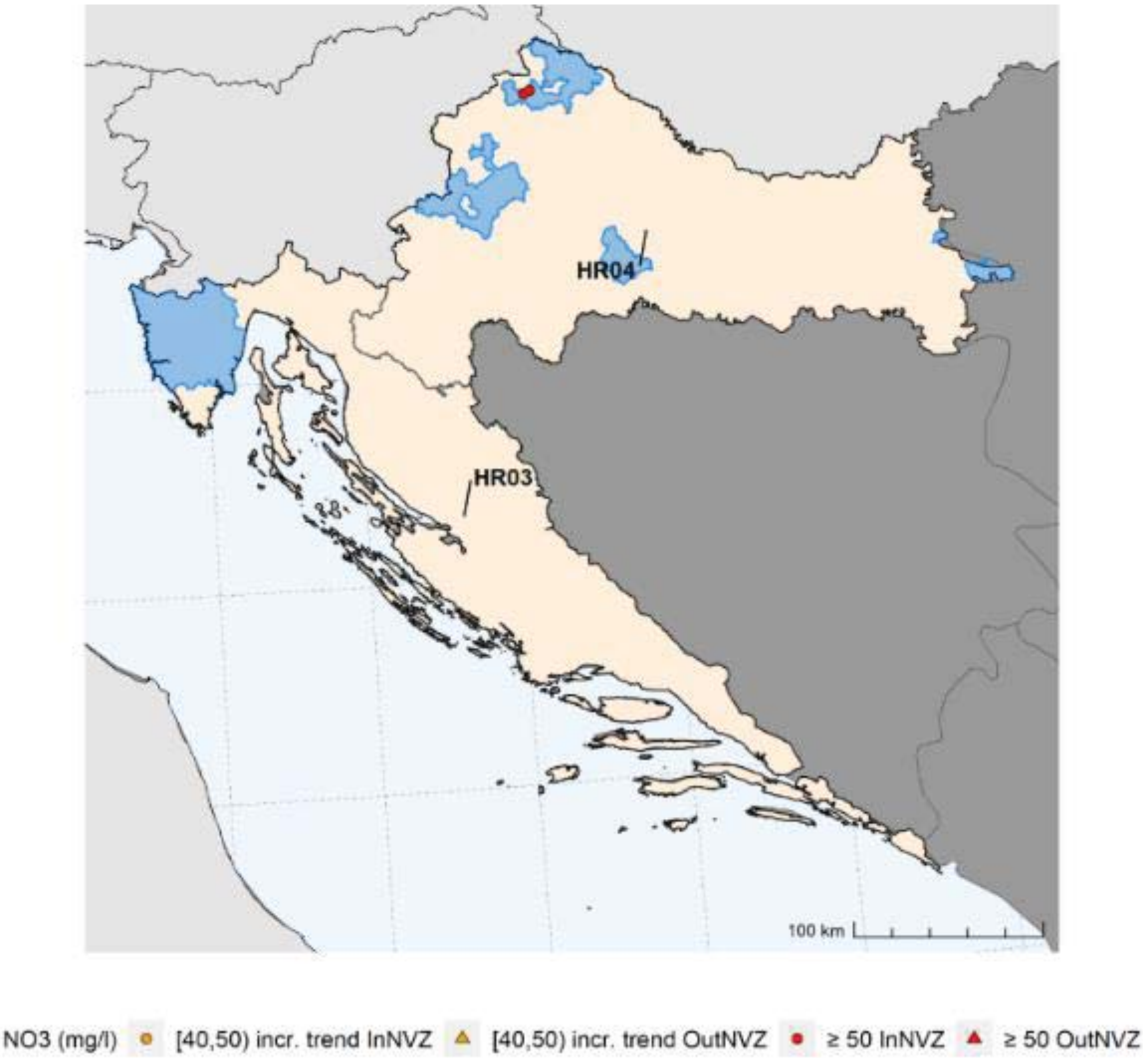


Figure 6. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis)

Groundwater hotspot



		>=40 and < 50 mg/l incr.trend		>=50 mg/l	
NUTS ID	NUTS NAME	InNVZ	OutNVZ	InNVZ	OutNVZ
HR04	Kontinentalna Hrvatska	0	0	2	0
	Total	**0**	**0**	**2**	**0**

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

Station Type	Description	Number of removed stations		
		total removed	with measurements	with trends
0	Phreatic groundwater (shallow): 0-5 m	1	1	0
1a	Phreatic groundwater (deep) 5-15 m	0	0	0
1b	Phreatic groundwater (deep) 15-30 m	0	0	0
1c	Phreatic groundwater (deep) >30 m	0	0	0
2	Captive groundwater	1	1	0
3	Karstic groundwater	1	1	0
9	Not specified	0	0	0
	Total	**3**	**3**	**0**

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

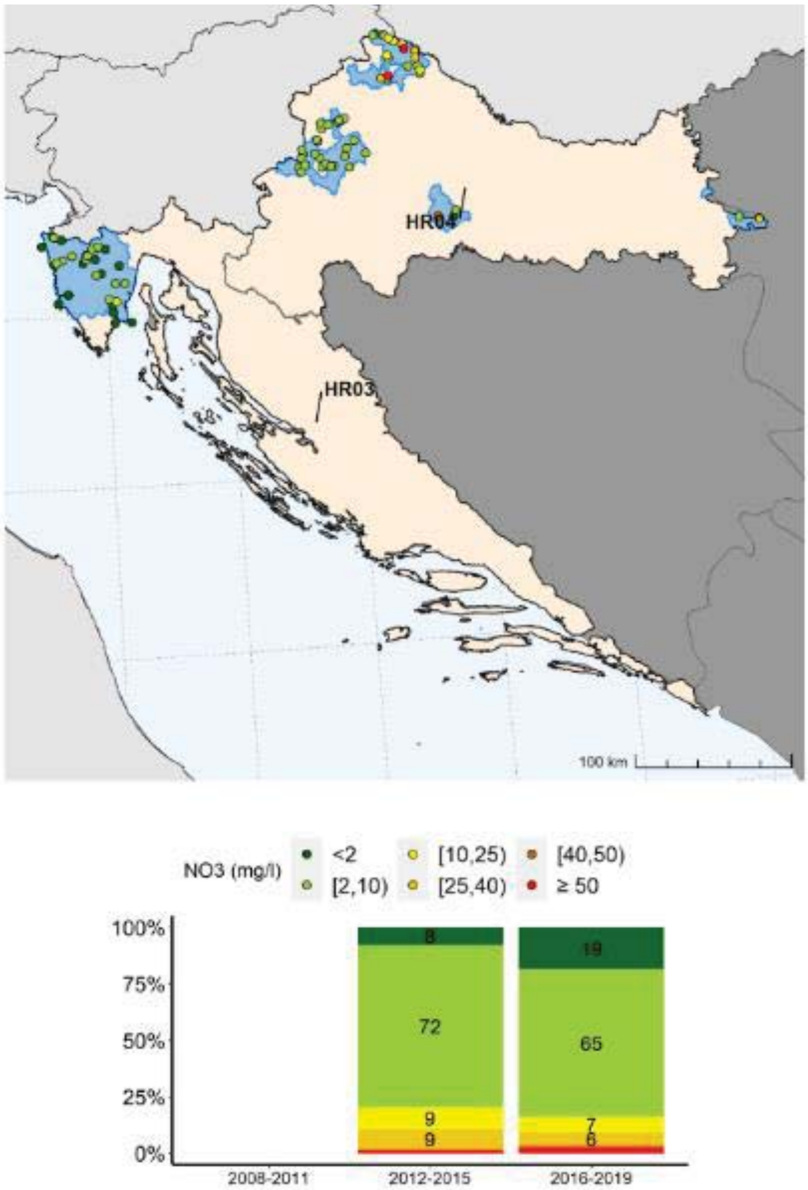


Figure 9. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information. In the map in blue the NVZ.

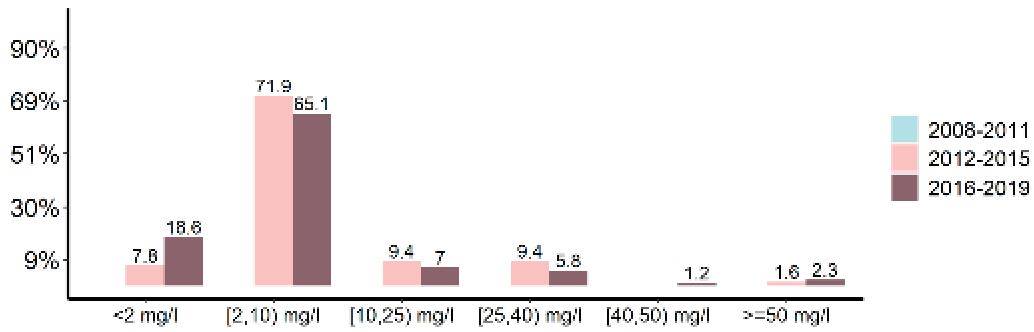


Figure 10. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis)

Surface water average annual nitrate concentration trend

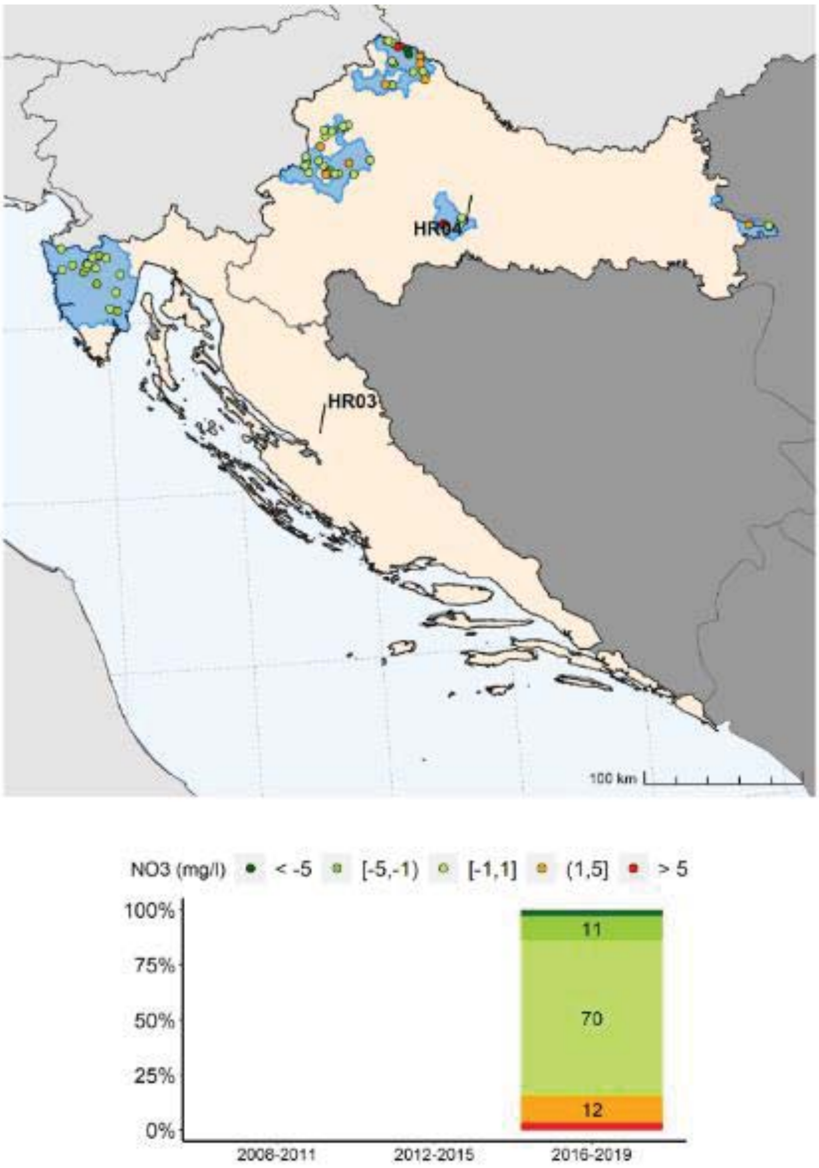


Figure 11. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis). In the map in blue the NVZ.

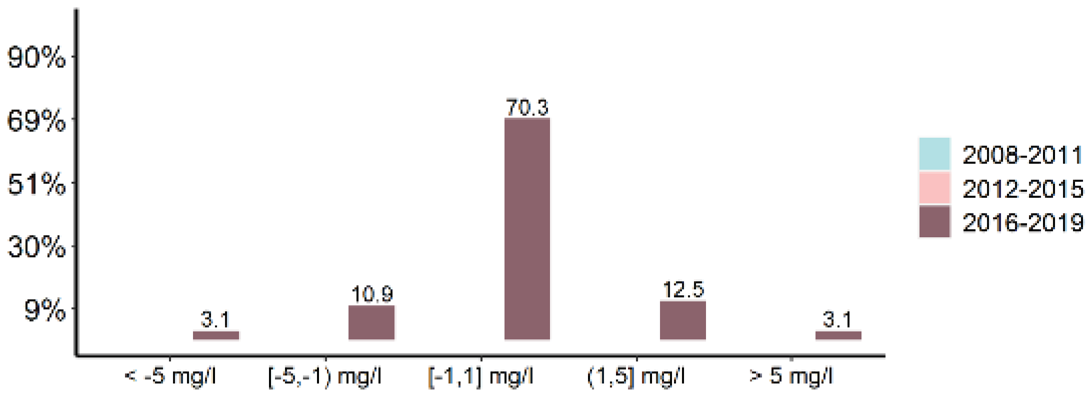
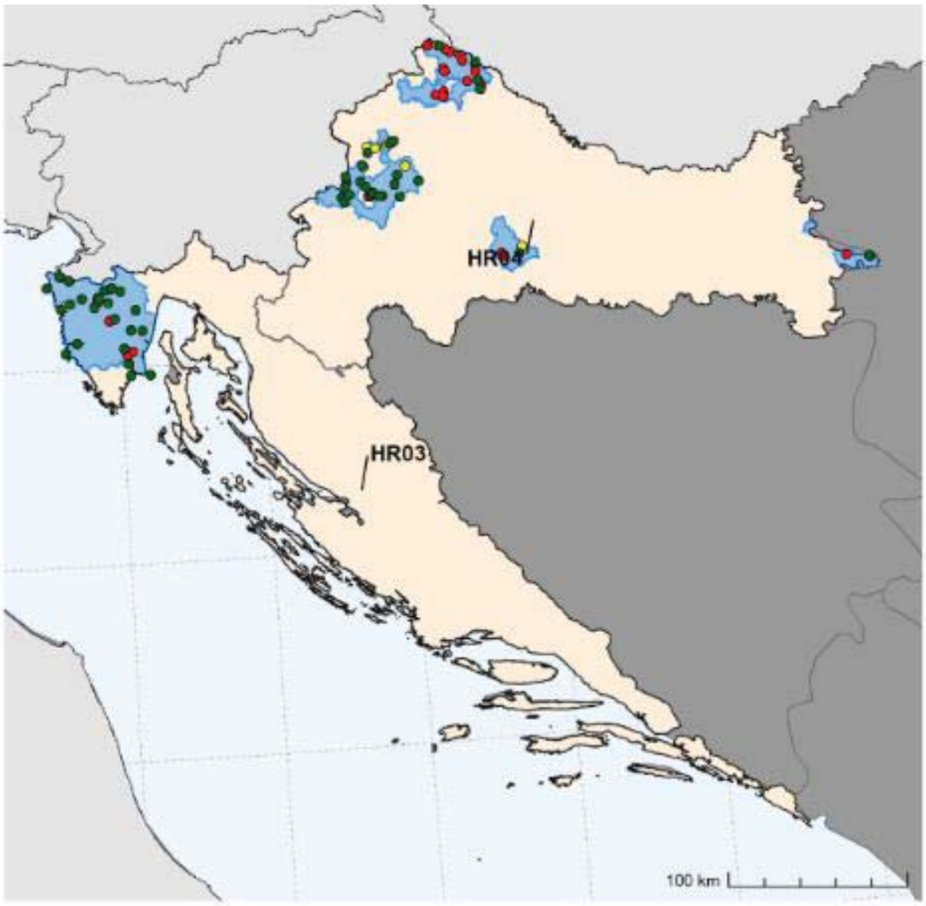


Figure 12. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis)

Surface Water Eutrophication



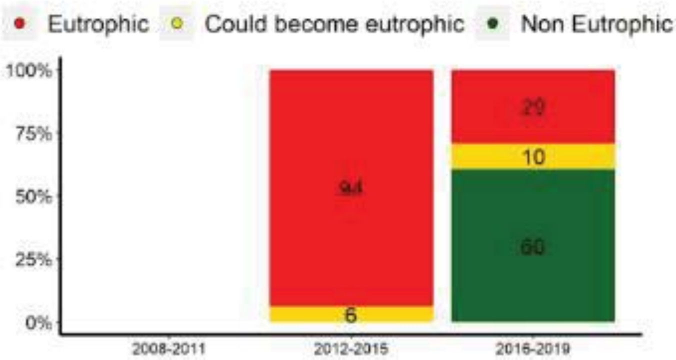


Figure 13. Spatial distribution of eutrophic status (map) and corresponding percentage of monitoring points per classes of status by reporting period (x axis). In the map in blue the NVZ.

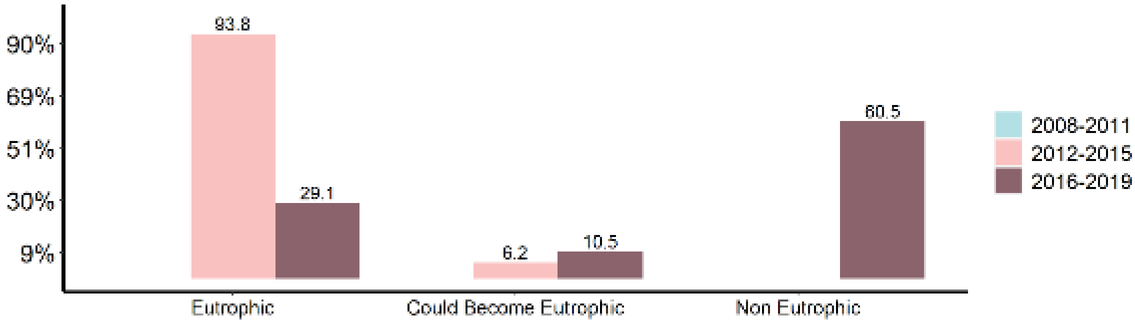
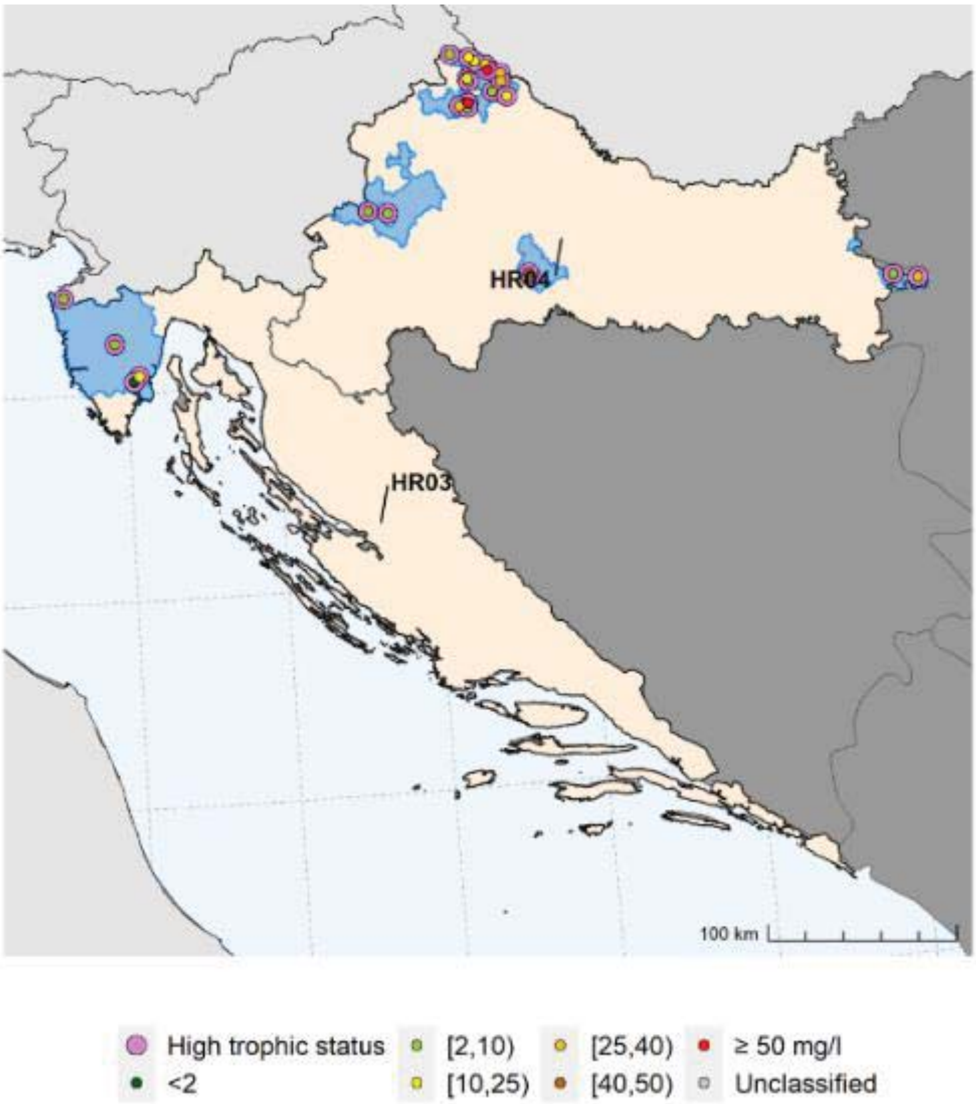


Figure 14. Comparison of percentage of monitoring points in the three reporting periods by classes of status (x axis)

European Commission

The Eutrophic status vs average NO3 annual concentration



			Number of stations by classes of concentration							
NUTS ID	NUTS NAME	High trophic status	<2 mg/l	[2,10) mg/l	[10,25) mg/l	[25,40) mg/l	[40,50) mg/l	>=50 mg/l	Unclassified
HR03	Jadranska Hrvatska	2	0	1	1	0	0	0	0
HR04	Kontinentalna Hrvatska	21	0	8	5	5	1	2	0
NO_NUTS	SALINE	2	1	1	0	0	0	0	0
	Total	**25**	**1**	**10**	**6**	**5**	**1**	**2**	**0**

Figure 15. The SW monitoring stations with eutrophic status versus the average NO3 annual concentration. In the map in blue the NVZ. The “high trophic status” refers to Eutrophic status.

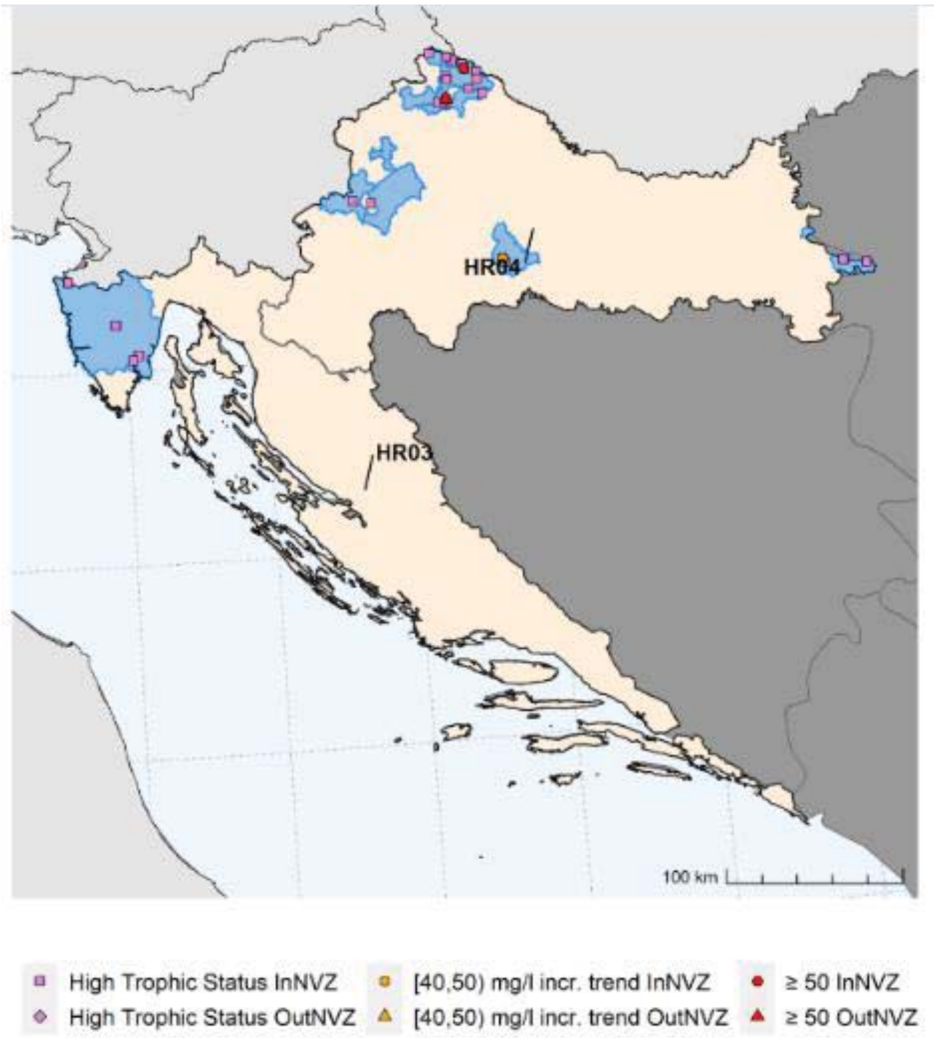
The analysis shows all the SW monitoring stations with the higher trophic status and the corresponding value of NO3 concentration. The map shows the spatial distribution of these points, and the table reports the number of stations with measurements with highest trophic status and the corresponding stations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

The indicators of eutrophication for rivers are nitrate, total phosphorus and chlorophyll a, while lake-related indicators are total phosphorus and chlorophyll a.
It is noteworthy that the Faculty of Science of the University of Zagreb launched a study on the development of criteria for determining the trophic degrees of lakes and rivers water bodies. The study served as the basis for the assessment of river eutrophication in vulnerable zones in this reporting period. The approach and the classification system applied in the study will be incorporated into the Decree establishing water quality standards to be used in the development of the River Basins Management Plan 2022 - 2027.
Given that there are two clearly distinct biogeographical regions in Croatia, namely the Pannonian and the Dinaric ecoregions, the limits used to determine the trophic degree of rivers waters are split into two groups. Both indicators (total nitrogen and total phosphorus) are examined together in the assessment of the trophic status. Where the trophic degree of the two indicators differs, the assessment is made based on the less favourable indicator.

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	23	8	40
5	Lake/reservoir water	0	0	4
6	Transitional water	2	1	3
7	Coastal water	0	0	5
8	Marine water	0	0	0
9	Not specified	0	0	0
	Total	**25**	**9**	**52**

Surface Water quality hotspot



		High trophic status		>=40 and < 50 mg/l incr.trend		>=50 mg/l	
NUTS ID	NUTS NAME	InNVZ	OutNVZ	InNVZ	OutNVZ	InNVZ	OutNVZ
HR03	Jadranska Hrvatska	2	0	0	0	0	0
HR04	Kontinentalna Hrvatska	20	1	1	0	1	1
NO_NUTS	SALINE	2	0	0	0	0	0
	Total	**24**	**1**	**1**	**0**	**1**	**1**

Figure 16. SW hotspot analysis map (top graph) and distribution by NUTS2 (lower graph) of average NO3 annual concentration greater than 40 mg/l and trophic status. In the map in blue the NVZ. The “high trophic status” refers to Eutrophic status.

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.

Measures in the Action Programme

The First Action Programme for the protection of waters against pollution caused by nitrates from agricultural sources (NN No 15/13) was adopted in accordance with Article 5 of Council Directive 91/676/EEC. The Action Programme, which entered into force on the date of Croatia's accession to the European Union, covers a period of four years from the date of its entry into force.

In 2017, the Second Action Programme for the protection of waters against pollution caused by nitrates from agricultural sources (NN No 60/17) was adopted for a period of four years. It entered into force on 1 July 2017.It is noteworthy that in accordance with the provisions of Article 5(4) of the Nitrates Directive, the Second Action Programme sets the new limit values for the application of nitrogen from livestock manure at 170 kg N/ha per year, compared to 210 kg N/ha per year in the First Action Programme. See details in the table below.

The conditions and measures laid down in the Programme are binding on agricultural holdings with agricultural land and/or facilities located within the areas designated as nitrates vulnerable zones under the Decision NN No 130/12. The conditions and measures laid out in the Programme are considered as recommendations for agricultural holdings with agricultural land and/or facilities outside nitrates vulnerable zones. The details of the Action Programme are reported in Table 6.

No cost-effectiveness studies were carried out in this reporting period.

Table 6. Details of Action Programme

Measure	General details in Action Programme (*)
Period of prohibition of fertiliser application	• Fertilisation with slurry and liquid manure on any part of the agricultural land irrespective of the soil cover between 15 September and 15 February (Article 10 of AP)
	• Fertilisation with slurry and liquid manure by spreading it on the surface of the soil without input into the soil on any part of agricultural land between 1 May and 1 September (Article 10 of AP)
Restrictions for application on sloped soils	• Prohibited on sloping ground in proximity to watercourses with an angle of more than 10%, at less than 10 m from the outer edge of the bed of a watercourse (Article 11 of AP)
Restrictions for application on soaked, frozen, or snow-covered soils	• Prohibited on water-saturated, snow-covered, frozen and flooded soil (Article 11 of AP)
Restrictions for application near watercourses (buffer strips)	• > 20 m from the outer edge of the bed of a lake or other standing water body
	• > 3 m from the outer edge of the bed of a watercourse 5 m wide or wider
Effluent storage works	• In Table 4. of the II. Action Programme the requirement for manure storage vessels is prescribed according to the type of the farm animal and type of manure
Capacity of manure storage	• The storage capacity is prescribed for the 6 months period. The period for manure storing is not prescribed. However, it is recomended to use composted manure on agricultural soil (Article 13 of AP)
	• The size of storage vessels for livestock manure depends on the type of farm animal and the form of livestock manure (Article 13 of AP)
Rational fertilisation (e.g., splitting fertilisation, limitations)	• Limit values and calculation of the annual nitrogen input into soil (Article 9 of AP)
	• Maximum amount of livestock manure permitted by type of livestock manure (Table 2 of the AP Annex). The chemical analysis of livestock manure for the following parameters is carried out at least twice a year, prior to the application of livestock manure on agricultural land
Crop rotation, permanent crop enhancement	• Planned crop rotation
Vegetation cover in rainy periods, winter	• A minimum amount of vegetation cover should be maintained
Fertilisation plans, spreading records	• Fertilisation plan drawn up taking into consideration the requirements of the plant and the properties of the soil and fertilise
Other measures	• Other preventive measures are listed in Article 8 of AP
Date for application limit of 170 kg N/ha/year:	• 1 July 2017

(*) Second Action Programme for the protection of waters against pollution caused by nitrates from agricultural sources (NN No 60/17)

Controls

Agricultural producers are subject to the inspection of compliance with the provisions the Action Programme within the scope of the Water Act and to the control of cross-compliance with SMR1 and GAEC1 rules. During the current reporting period, an average of 27% of the farmers located in vulnerable zones, or a group of vulnerable zones, were subjected to administrative inspection.

Designation of NVZ

Under the Decision designating vulnerable zones in the Republic of Croatia (NN No 130/2012), the zones designated as being vulnerable to nitrates account for around 10% of Croatia's total land area. The NVZ area did not change with respect to the previous report period and it is about 5090 km^2.

Forecast of Water Quality

The effects of climate change, which are already identifiable and measurable, make it difficult to predict the future quality of surface waters and groundwater. A study interpreting the analysis of climate change for the purposes of water management planning conducted by the Croatian Meteorological and Hydrological Service[1] predicts a greater increase in temperature in the Adriatic river basin district during the warm months (April-November) than in the territory of the River Sava sub-basin, as well as those of the River Drava and the River Danube sub-basin. During the cold season, river sub-basin districts in inland areas will experience higher temperatures, with those in the River Sava sub-basin exceeding those in the sub-basin of the River Drava and the River Danube.

Also, precipitation in the warm season is expected to fall, more so in the south of the country than in the north, while northern parts of the country are likely to see more pronounced precipitation than southern ones in the colder season.

Given that the expected effects of climate change on water regime point to greater vulnerability of water resources to water pollution, and thus to water pollution caused by nitrates from agricultural sources, a revision of vulnerable zones will be undertaken in the next period, taking into account increased risks associated with the synergies between climate change and agricultural practice.

[1]https://www.voda.hr/sites/default/files/dokumenti/interpretacija_analize_klimatskih_promjena_za_planske_potrebe_upravljanja_vodama.pdf

Summary

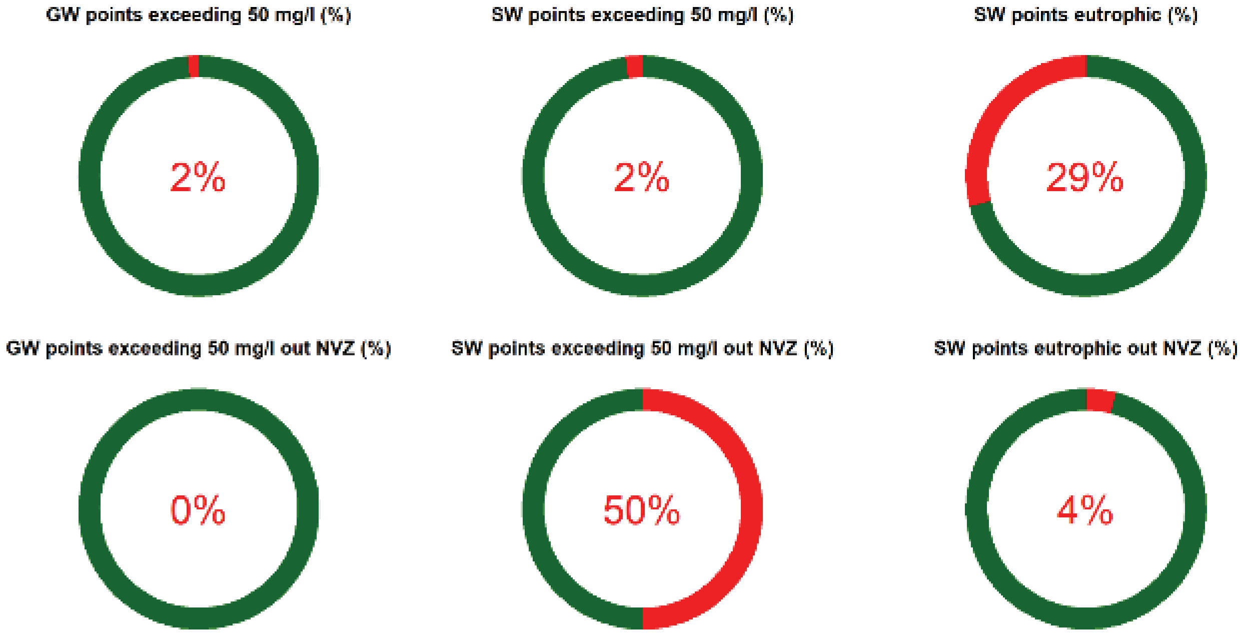


Figure 17. The summary plot for the period 2016-2019

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 (one station in this case) with respect to the total of stations exceeding 50 mg/ (two stations in this case), and the percentage of SW eutrophic stations that are outside NVZ with respect to the total that are eutrophic.

Long term analysis

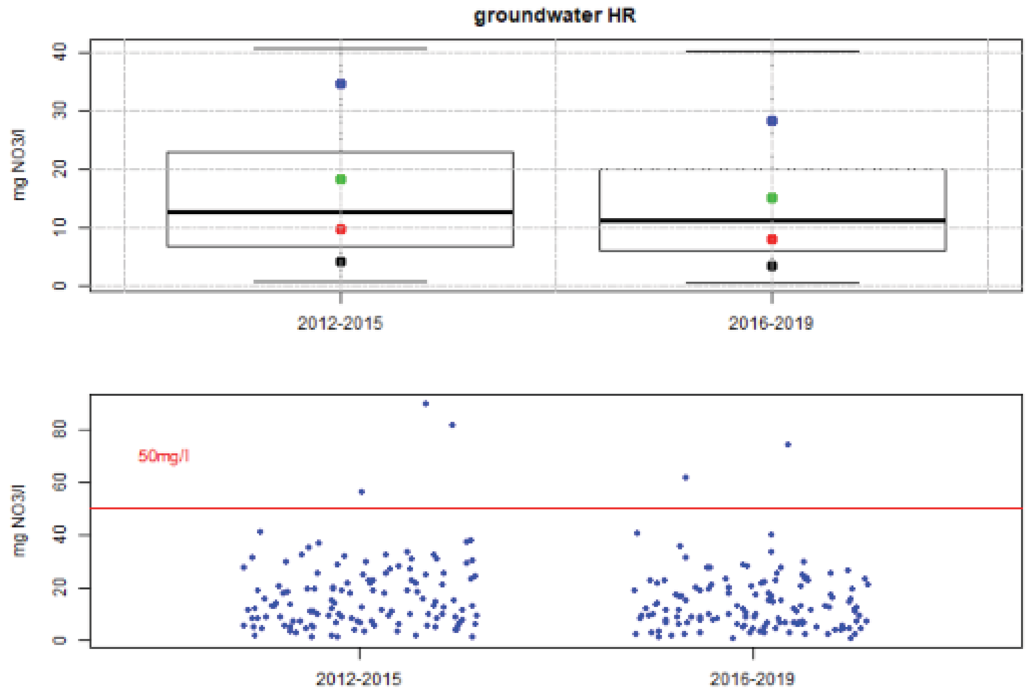


Figure 18. Time series of box whisker plots along with the distribution of the average NO3 annual concentrations for each reporting period for groundwater stations. RPs represent the reporting periods, RP7 being the last period (2016-2019). The blue, red, green and black dots represent the mean of the fourth third, second and first quartiles, respectively.

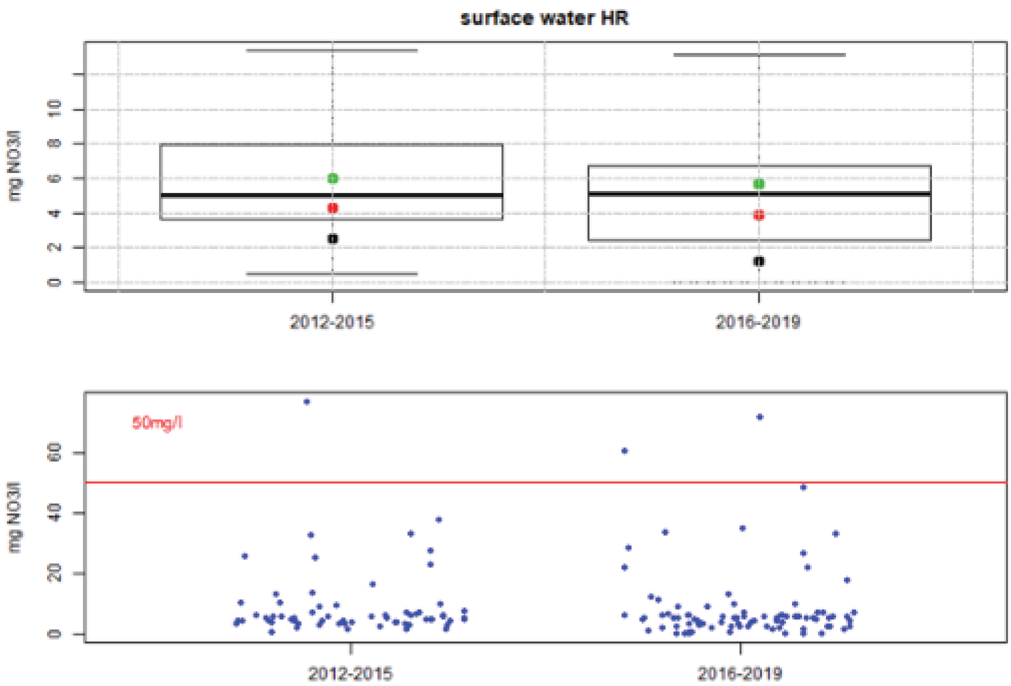


Figure 19. Time series of box whisker plots along with the distribution of the average NO3 annual concentrations for each reporting period for surface water stations. RPs represent the reporting periods, RP7 being the last period (2016-2019). The blue, red, green and black dots represent the mean of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

Conclusions and recommendations

Croatia has a low livestock density, the surplus of nitrogen is about the EU average, while there is a low surplus of phosphorus.

There is a well-elaborated network of monitoring stations in NVZ, but no monitoring station outside these NVZs. The groundwater quality is generally good. However, a high number of surface waters are eutrophic.

A revised action programme was published in 2017.

The Commission recommends Croatia to expend its water monitoring network to include monitoring stations outside NVZ in order to follow possible nitrates pollution development in these zones.

EUROPEAN
COMMISSION

Brussels, 11.10.2021
SWD(2021) 1001 final

PART 13/38

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}

EN EN

Pressure from Agriculture

Cyprus's utilised agricultural area amounts to $112 \cdot 10^3$ ha, representing 12.1% of the total land area and has remained stable since 2007. The outputs of the agricultural industry are largely dominated by milk (25.1%).
Eurostat

Major land use statistics for Cyprus

Table 1.Utilized agricultural area (abbreviated as UAA)

Cyprus	2005	2007	2010	2013	2016
Utilised agricultural area UAA (1000 ha)	NA	150	115	107	112
arable land (1000 ha)	NA	112	83	79	84
permanent grass (1000 ha)	NA	2	2	2	1
permanent crops (1000 ha)	NA	35	30	26	26
kitchen gardens (1000 ha)	NA	0	0	0	0

Note:
Eurostat (FSS)

Arable land increased by 6% from 2013. The permanent grass area has decreased by 50% since 2013. The area dedicated to permanent crops has decreased by 25.7% since 2007.

Animal distribution in Cyprus

The number of dairy cows has increased while the number of live pigs continued its steady decrease since 2007. The livestock density index is at its lowest since 2006. However, it is higher than the EU average of 0.8.

Table 2. Livestock statistics

Cyprus	2005	2007	2010	2013	2016
Livestock index	1.61	1.69	1.70	1.60	1.54
dairy cows (10^6 heads)	0.02	0.02	0.02	0.02	0.03
live bovines (10^6 heads)	0.06	0.06	0.06	0.06	0.06
live pigs (10^6 heads)	0.43	0.47	0.46	0.36	0.35
live poultry (10^6 heads)	NA	NA	3.22	1.85	2.60

Note:
Eurostat (FSS)

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

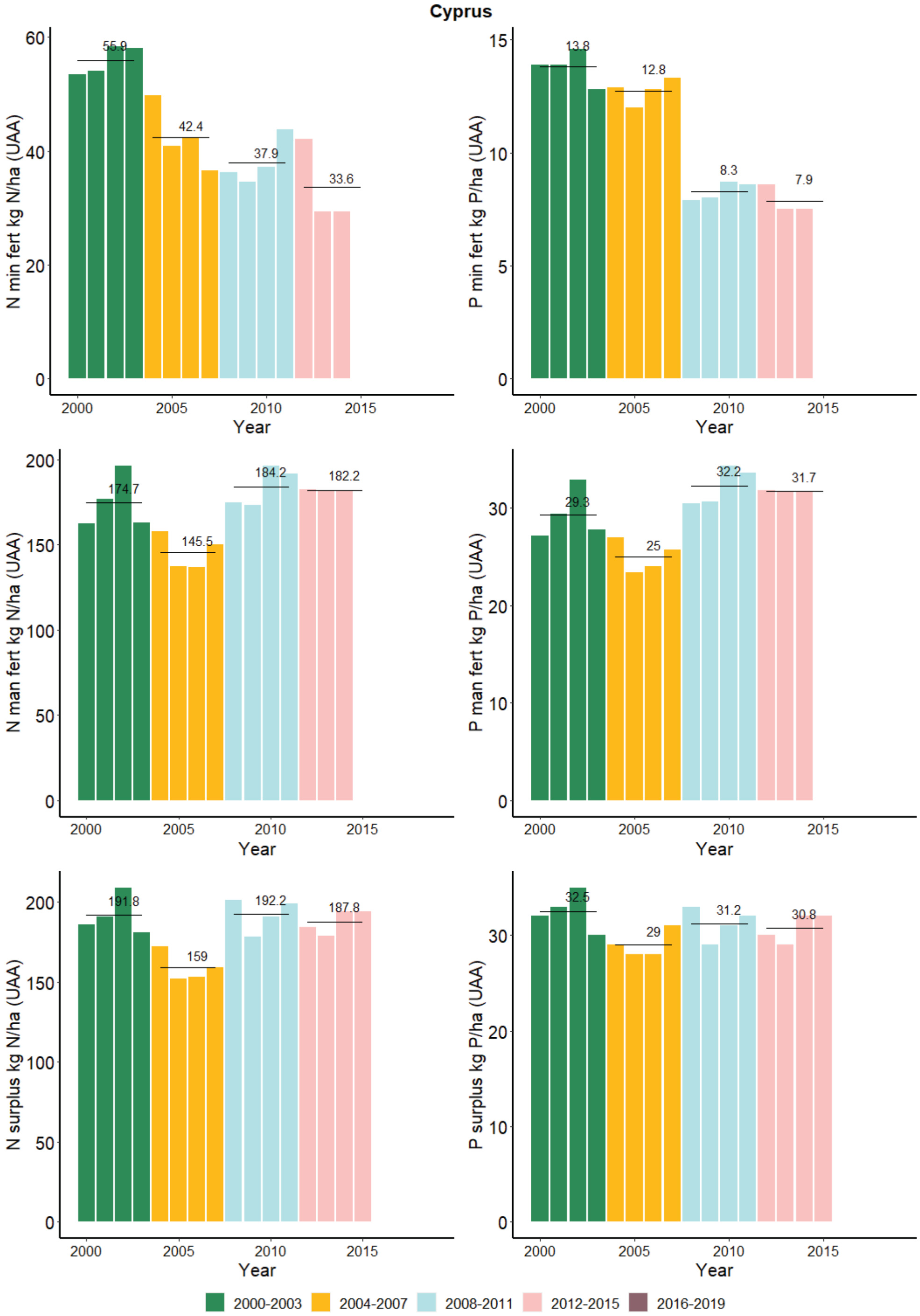


Figure 1. N and P fertilizers and gross surplus (kg/ha)

The gross nitrogen and phosphorus surpluses originate from EUROSTAT data for the years 2000-2015. The use of inorganic nitrogen and phosphorus fertilizers has decreased for the three previous reporting periods covering the years 2000-2015. The usage of manure has remained from the last reporting period. The nitrogen surplus decreased for the 2012-2015 reporting period by 2%. The phosphorus surplus remains stable around 30 kg/ha. 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

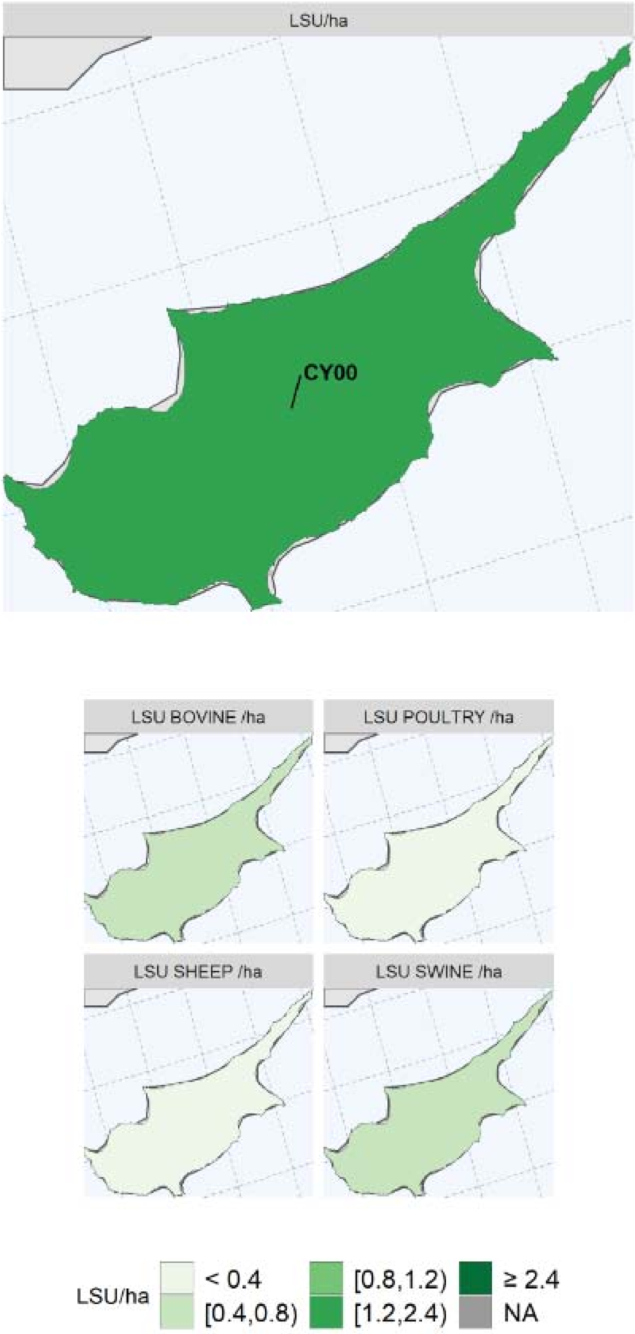


Figure 2. Map of livestock unit distribution, year 2016 (Source: Eurostat, February 2021)

Animal production is mostly dominated by bovine and swine breeding (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

It must be noted that the Directive applies only in the areas of the Republic of Cyprus in in which the Government of the Republic of Cyprus exercises effective control and in the areas of the British Sovereign Bases. There were changes in the groundwater monitoring network due to the restructuring of the network that started early during this reporting period. No changes were reported for the surface and coastal waters monitoring.

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	0	0	3	0	0	0
1a	Phreatic groundwater (deep) 5-15 m	2	5	15	0	3	2
1b	Phreatic groundwater (deep) 15-30 m	61	57	57	58	56	51
1c	Phreatic groundwater (deep) >30 m	39	38	35	34	32	33
2	Captive groundwater	44	48	116	34	45	100
3	Karstic groundwater	3	4	15	0	3	5
9	Not specified	95	78	0	95	71	0
	Total	**244**	**230**	**241**	**221**	**210**	**191**

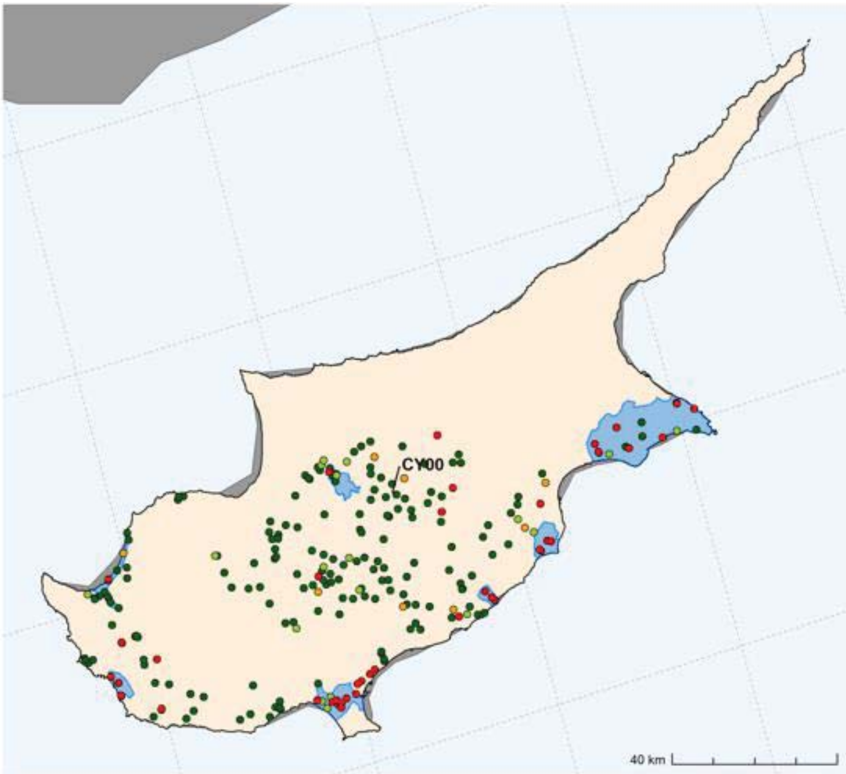
Surface water quality monitoring network

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	10	13	13	10	10	13	0	11	13
5	Lake/reservoir water	0	0	0	0	0	0	0	0	0
6	Transitional water	0	0	0	0	0	0	0	0	0
7	Coastal water	0	16	16	18	16	16	0	0	16
8	Marine water	0	0	0	0	0	0	0	0	0
9	Not specified	0	0	0	0	0	0	0	0	0
	Total	**10**	**29**	**29**	**28**	**26**	**29**	**0**	**11**	**29**

Groundwater Quality

Groundwater average annual nitrate concentration



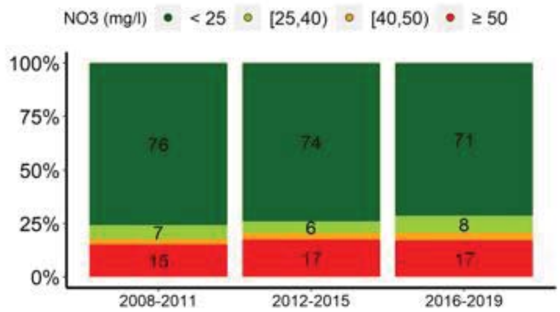


Figure 3. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information. In the map in blue the NVZ.

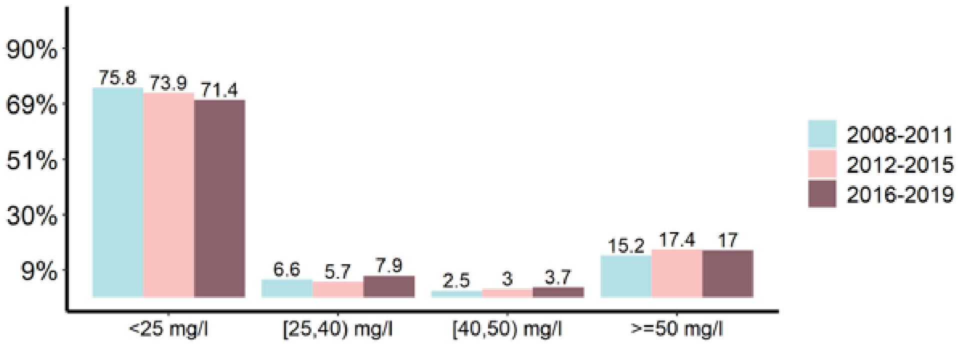


Figure 4. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis)

Groundwater average annual nitrate concentration trend

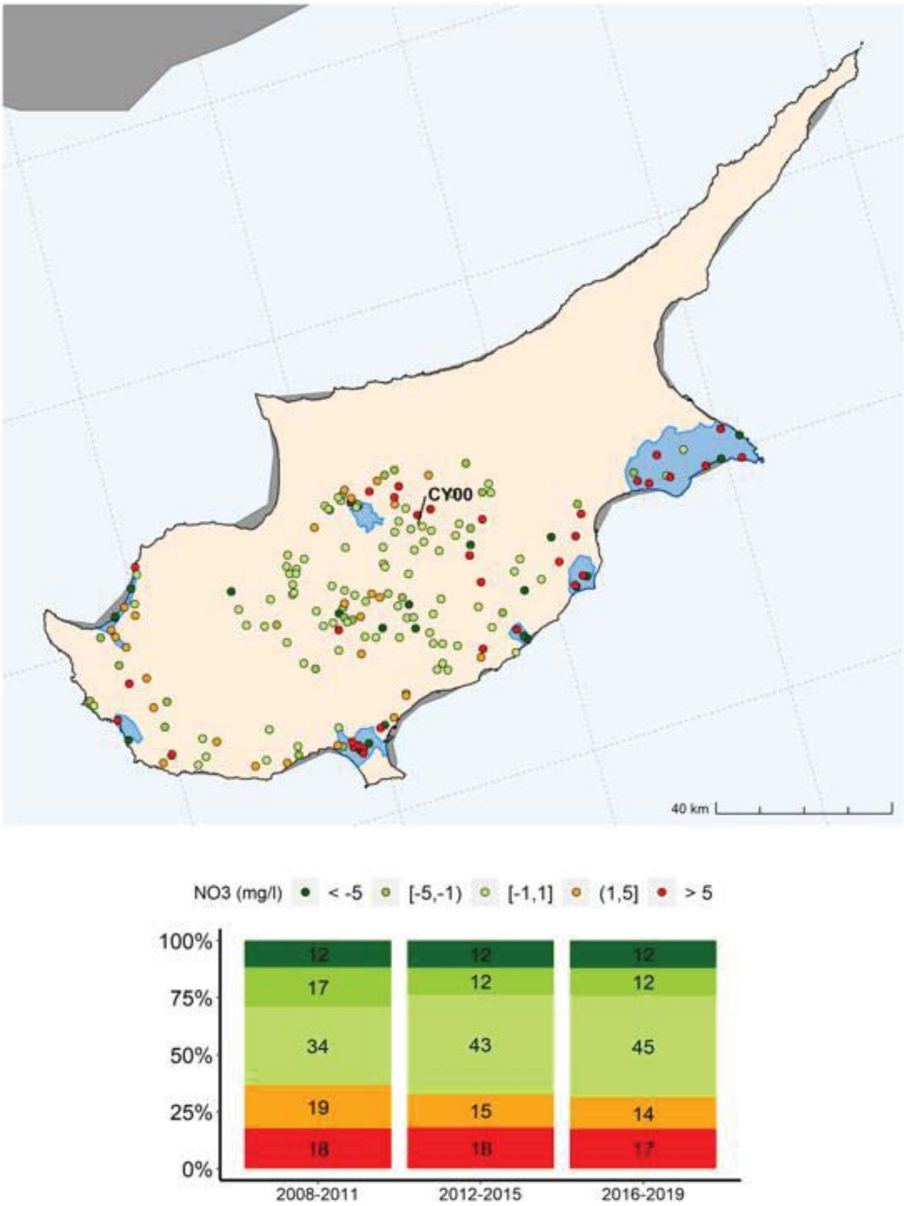


Figure 5. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis). In the map in blue the NVZ.

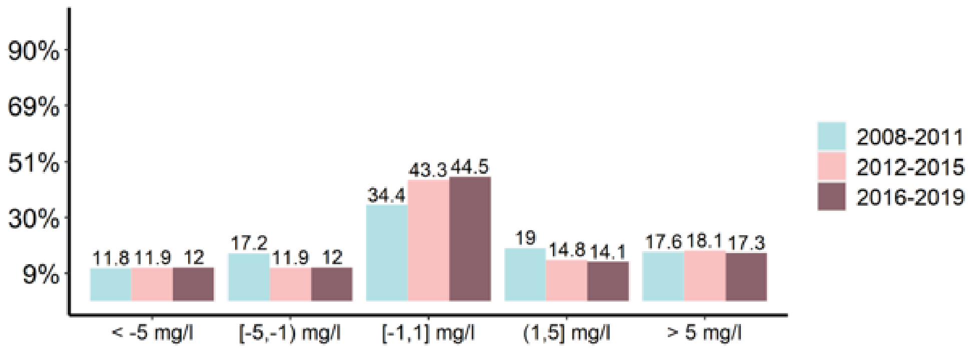
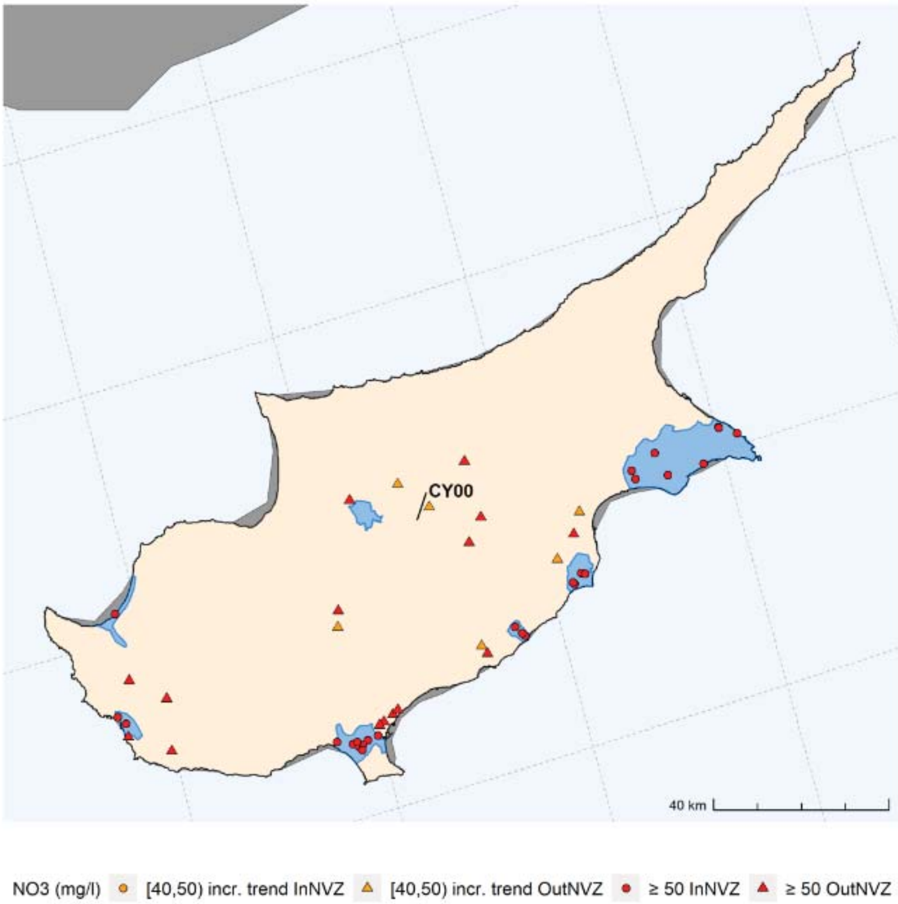


Figure 6. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis)

Groundwater hotspot

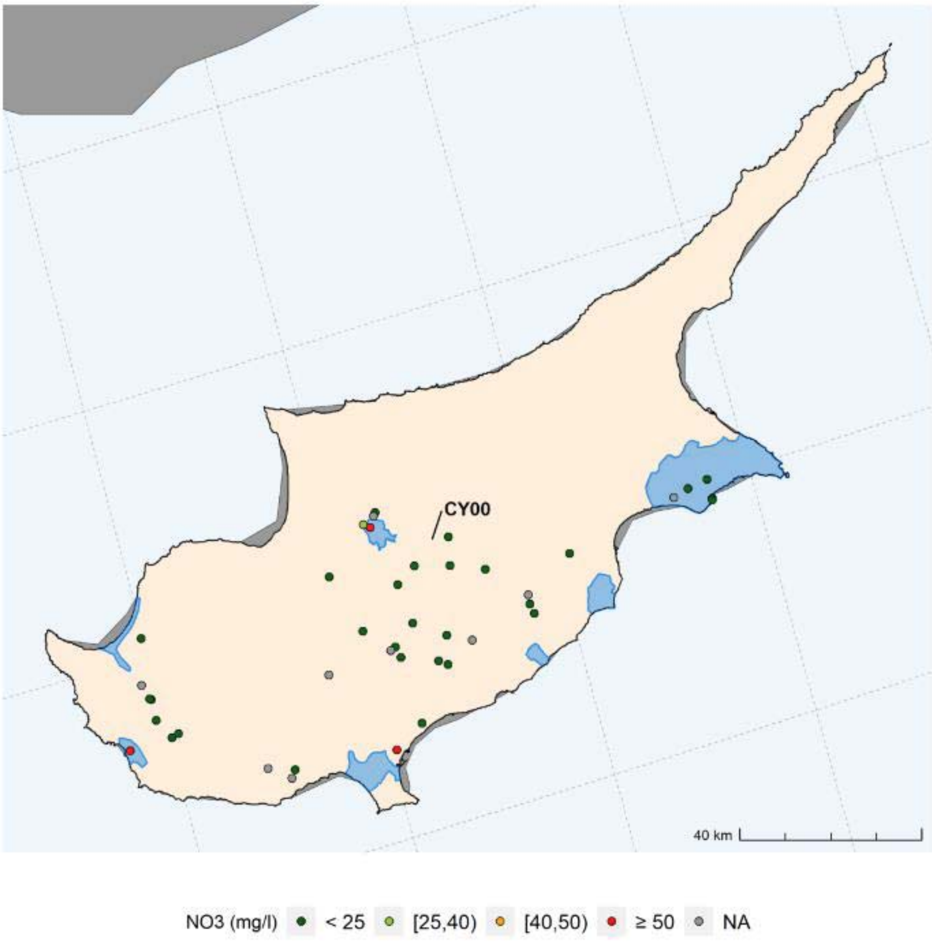


NUTS ID	NUTS NAME	>=40 and < 50 mg/l incr.trend		>=50 mg/l	
		InNVZ	OutNVZ	InNVZ	OutNVZ
CY00	Kýpros	0	6	26	15
	Total	**0**	**6**	**26**	**15**

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



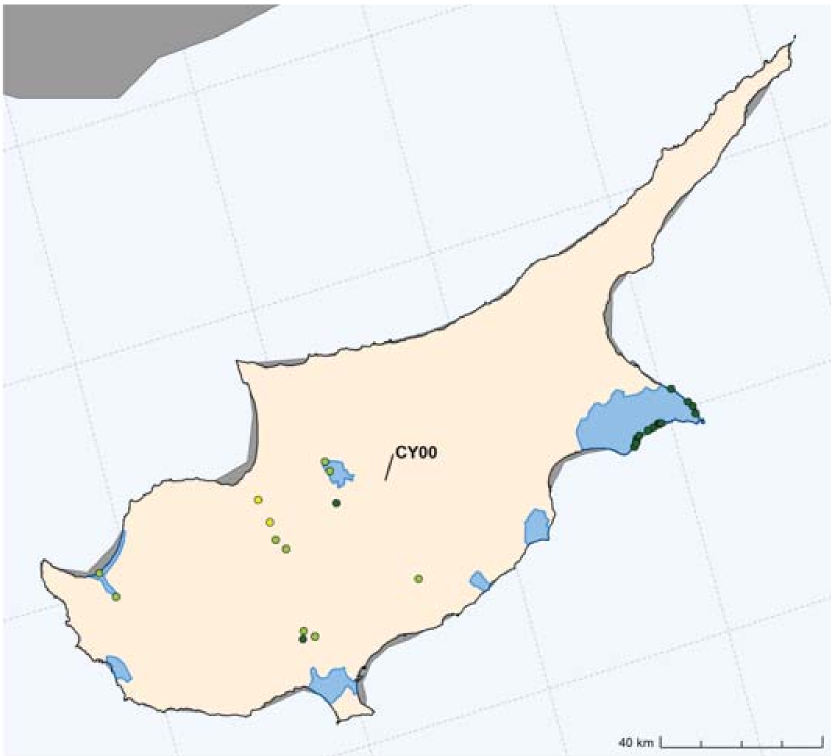
Station Type	Description	Number of removed stations		
		total removed	with measurements	with trends
0	Phreatic groundwater (shallow): 0-5 m	0	0	0
1a	Phreatic groundwater (deep) 5-15 m	3	3	2
1b	Phreatic groundwater (deep) 15-30 m	6	5	5
1c	Phreatic groundwater (deep) >30 m	6	4	4
2	Captive groundwater	27	21	20
3	Karstic groundwater	0	0	0
9	Not specified	0	0	0
	Total	**42**	**33**	**31**

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



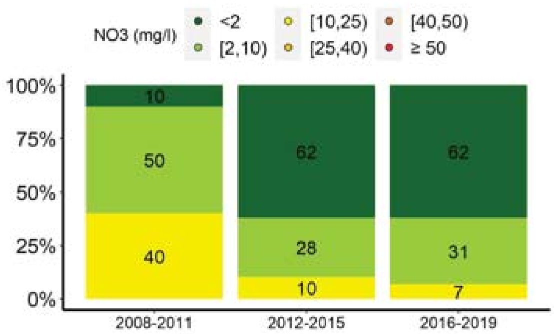


Figure 9. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). In the map in blue the NVZ.

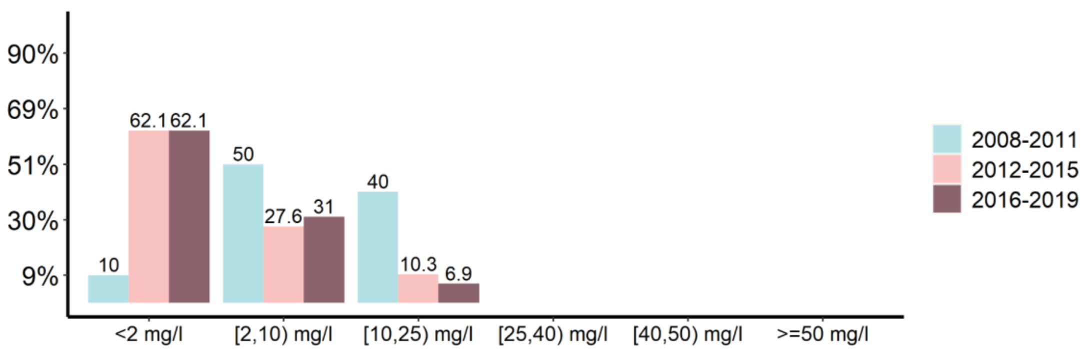


Figure 10. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis)

Surface water average annual nitrate concentration trend

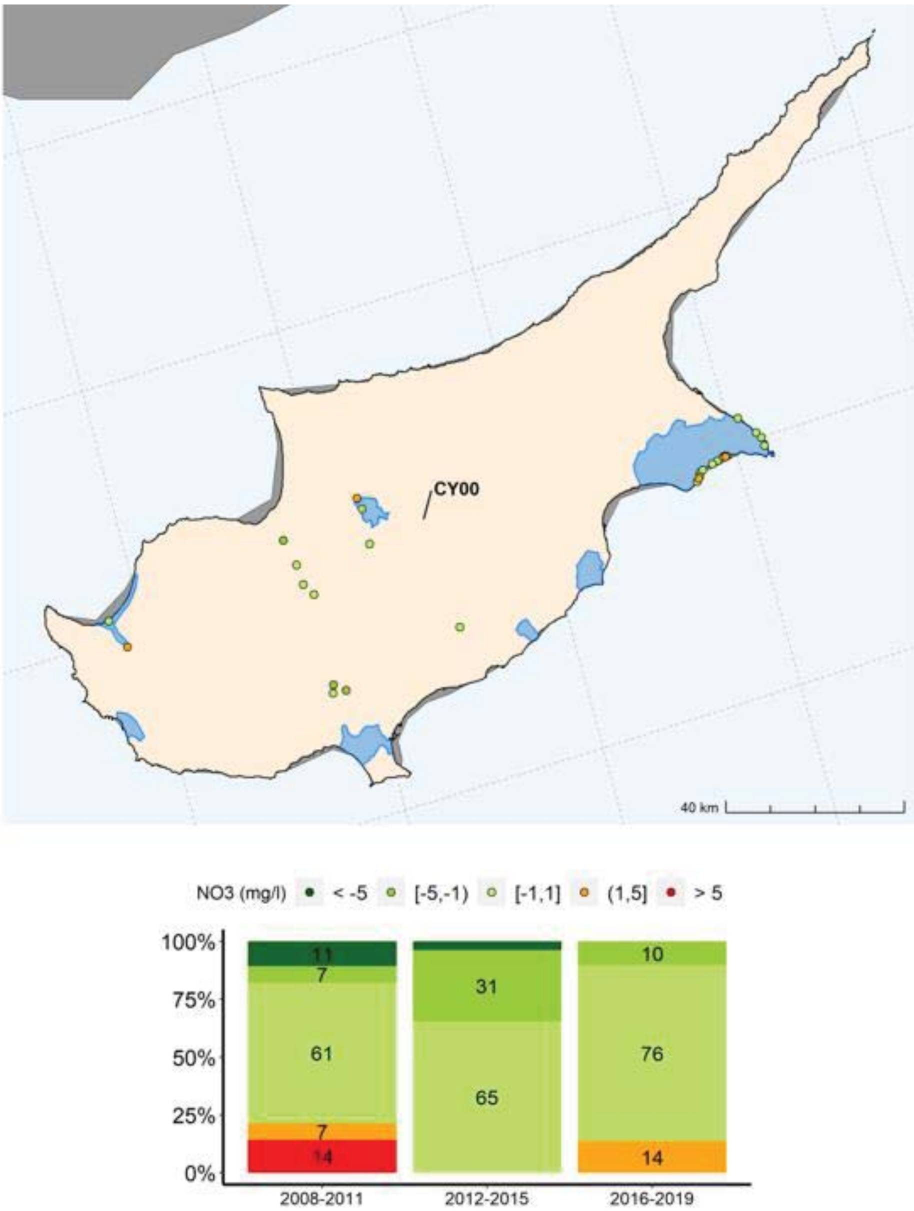


Figure 11. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information. In the map in blue the NVZ.

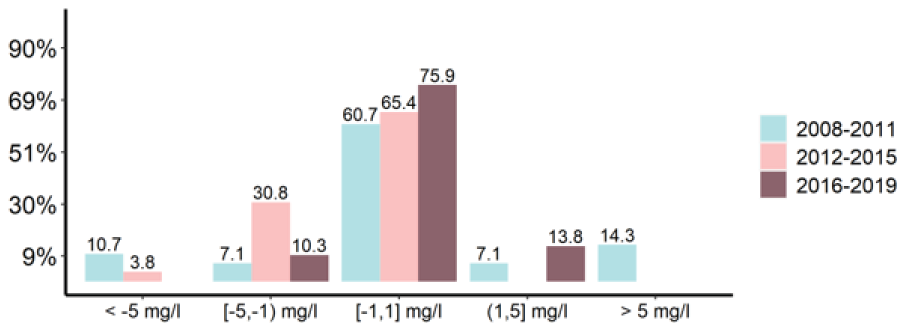


Figure 12. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis)

Surface Water Eutrophication

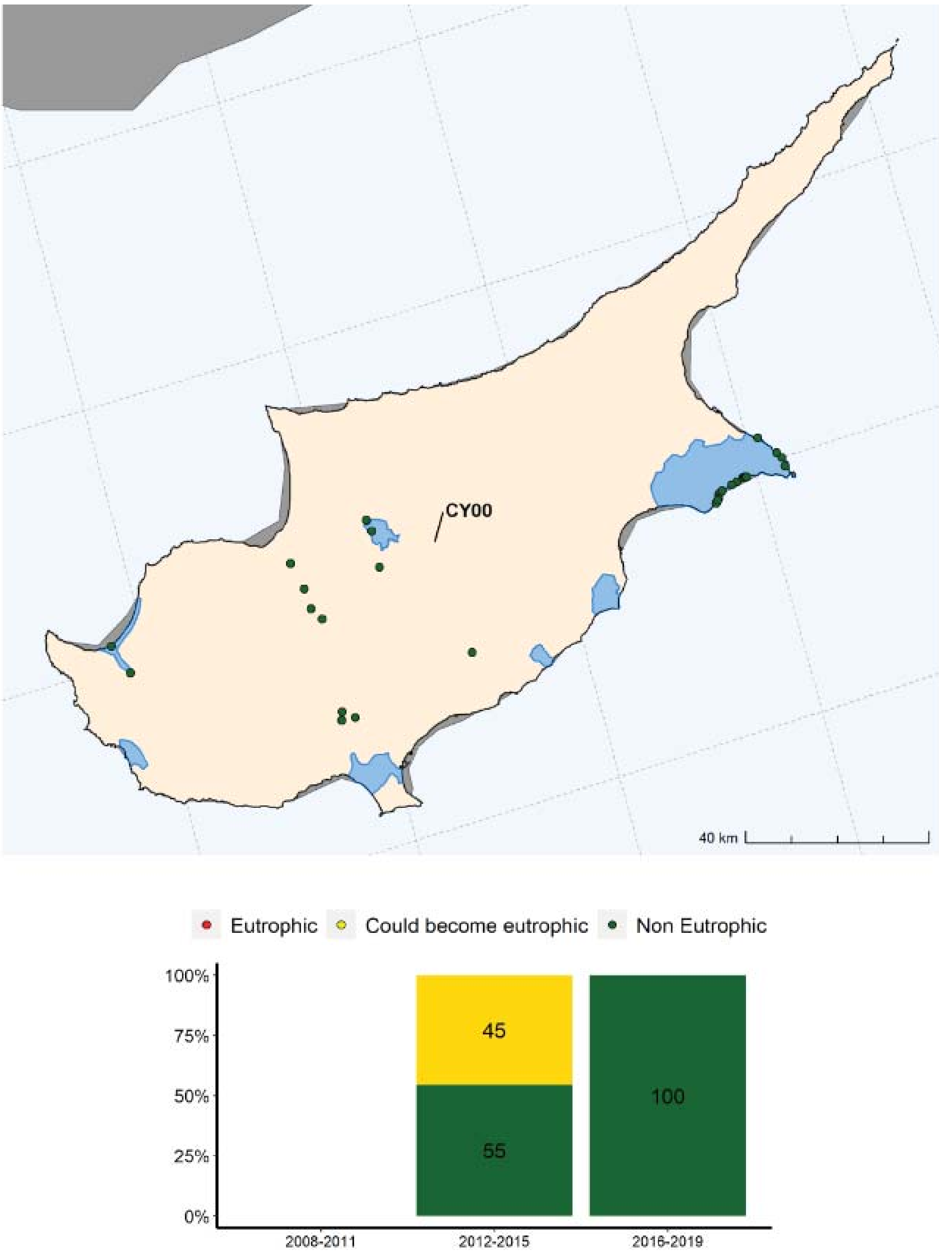


Figure 13. Spatial distribution of eutrophic status (map) and corresponding percentage of monitoring points per classes of status by reporting period (x axis). In the map in blue the NVZ.

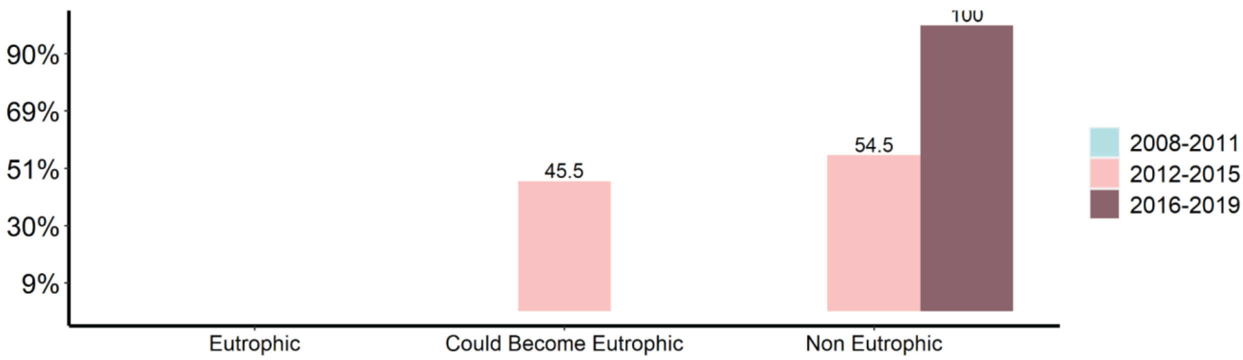


Figure 14. Comparison of percentage of monitoring points in the three reporting periods by classes of status (x axis)

The strong variation in the flow of water and the lack of flow for most of the year in the majority of rivers, makes it difficult to monitor a number of parameters, e.g. chlorophyll-a. Therefore, it is impossible for surface waters to create a reliable eutrophication model or to adopt models similar to those existing and used in Central European countries. Other analyses were carried out including biochemical oxygen demand (BOD5), total nitrogen (N-tot) and ortho-phosphorus (P-PO4). In terms of water classification, the waters that showed a mean ortho-phosphorus concentration (PO4-) below the oligotrophic/mesotrophic limit (0.1 mg/l) were classified as ultra-oligotrophic and those that showed a mean ortho-phosphorus concentration (PO4-) above the oligotrophic/mesotrophic limit (0.1 mg/l) were classified as mesotrophic. The oligotrophic mesotrophic classes were then reclassified as non-eutrophic to be consistent with the WFD classification system. For coastal water monitored determinands included nitrate, chlorophyll-a and orthophosphate concentrations. All river and coastal waters were found to be non-eutrophic. Idem for coastal water, where no eutrophication was detected.

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	0	0	13
5	Lake/reservoir water	0	0	0
6	Transitional water	0	0	0
7	Coastal water	0	0	16
8	Marine water	0	0	0
9	Not specified	0	0	0
	Total	**0**	**0**	**29**

European Commission

Measures in the Action Programme

The first Code of Good Agricultural Practice (CAGP) was drawn up in 2002 on the basis of Decree RAA 407/2002 and was revised in 2007 on the basis of Decree RAA 263/2007. Currently, the Cypriot authorities are in the process of revising the Code of Good Agricultural Practice. The Action Programme (AP) was published for the first time on 30/01/2004 and was revised on 10/08/2012 and 17/07/2013 before the last revision done on 06/06/2014 by the Decree RAA 281/2014. The measures include the proper storage and controlled use of fertilizers and livestock manure the use of streamlined irrigation systems, the preparation of irrigation programmes. It also includes closed periods for using nitrogen fertilizers, providing farmers and livestock farmers with detailed and constant information. In particular, inorganic fertilizers and manure must be stored in closed safe storage facilities located at least 50 m far from surface waters and 300 m far from springs or boreholes used for water supply purposes. The use of fertilizers is also prohibited in areas within 50 m of surface waters and 300 m from spring and boreholes used for water supply. The use of crop rotation is recommended in order to reduce the use of fertilizers. The details are reported in the following table.

Table 6. Details of the Action Programme

Measure	General details in Action Programme
Period of prohibition of fertiliser application	• From 1st of November until 31st of January the next year (Part 1, Section A1 of Action Plan)
Restrictions for application on sloped soils	• On sloped soils with slope above 10% (Part 1, Section A1 of Action Plan)
Restrictions for application on soaked, frozen, or snow-covered soils	• See Part 1, Section A1 of Action Plan
Restrictions for application near watercourses (buffer strips)	• > 10 m from path ways where there is water flow
	• > 50 m from lakes, rivers where there is water flow
	• > 300 m from springs for drinking
	(Part 1, Sections A1, B1.1, B1.2, of Action Plan)
Effluent storage works	• > 50 m from surface waters
	• > 300 m from springs for drinking
	(Part 1, Section B3.1 of Action Plan)
Capacity of manure storage	• Six months (Part 1, Section B3.1 and B.3.2 of Action Plan)
Rational fertilisation (e.g., splitting fertilisation, limitations)	• See Table in Annex III including limitations for every crop
Crop rotation, permanent crop enhancement	• Crop rotation is recommended with examples in the A.P. (Part 1, Section A.1 of Action Plan)
Vegetation cover in rainy periods, winter	• For 2016-2019 is 0,3%
	• 7,2% of cultivated areas without plant cover in the winter season (section 8.5.5 MS Report) was for the previous report
Fertilisation plans, spreading records	• The Action Plan includes examples in Annex I
Other measures	• Integrated information programme
	• Analyses of Nitrogen concentration in wastewater per 100 livestock farms: 40
	• Streamlined irrigation systems and the preparation of irrigation programs
Date for application limit of 170 kg N/ha/year:	• Not specified

Cost effectiveness analysis was not reported. The measures are applied equally in all NVZs. Cyprus did not report changes on the measures with respect to the reporting period 2012-2015. Cypriot authorities have discontinued the soil analysis on grounds that it was difficult to draw any conclusions regarding the excessive use of fertilizers. The interruption of the nitrate soil analysis concerned those carried out by the Department of Agriculture for monitoring purposes. The obligation of soil and water analysis by farmers remains in force and is carried out normally.

In addition, it was not possible to calculate the amount of nitrogen from inorganic fertilizers. Nevertheless, the farmers are required by the Action Program to carry out soil analysis in order to be able to calculate the quantities of fertilizers they can apply according to their Nitrogen crops needed.

Controls

Administrative controls carried out during the 2016-2919 amounted to 515 (a yearly average of 129 controls). About 16% of the controls resulted in penalties. The main problems associated with the implementation of the action plan are linked to the amount applied of manure and mineral nitrogen.

Designation of NVZ

Cyprus has increased its designated nitrate vulnerable zones from the last reporting period from 444 km^2 to 457 km^2.

Forecast of Water Quality

There is no information given concerning the forecast of water quality since due to complex climatic, agronomic and complex hydrogeological conditions it is difficult to correctly estimate developments in terms of nitrate concentrations in groundwater.

Summary

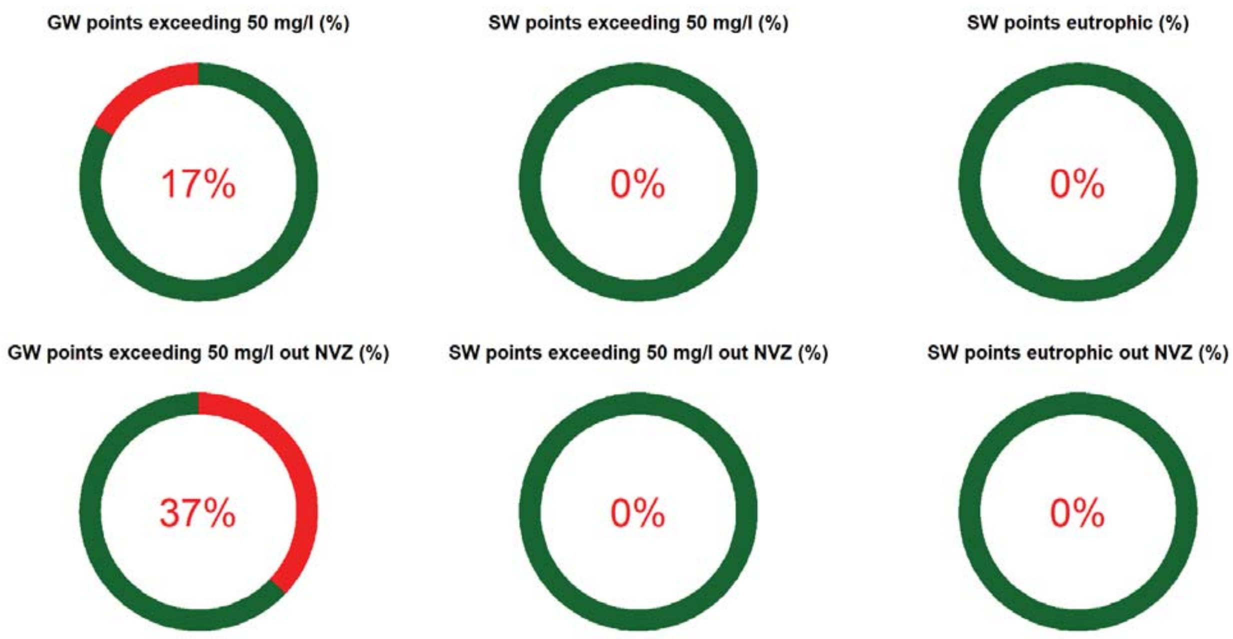


Figure 15. The summary plot for the period 2016-2019

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

Long term analysis

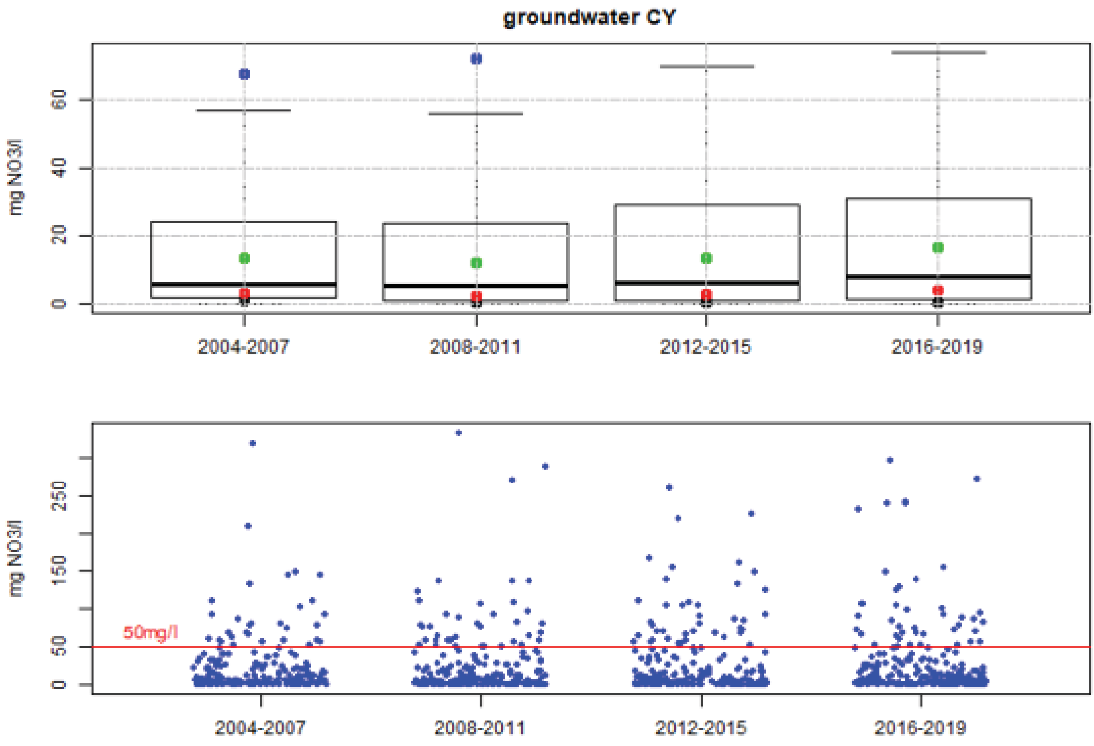


Figure 16. Time series of box whisker plots along with the distribution of the average NO3 annual concentrations for each reporting period for groundwater stations. The blue, red, green and black dots represent the mean of the fourth third, second and first quartiles, respectively.

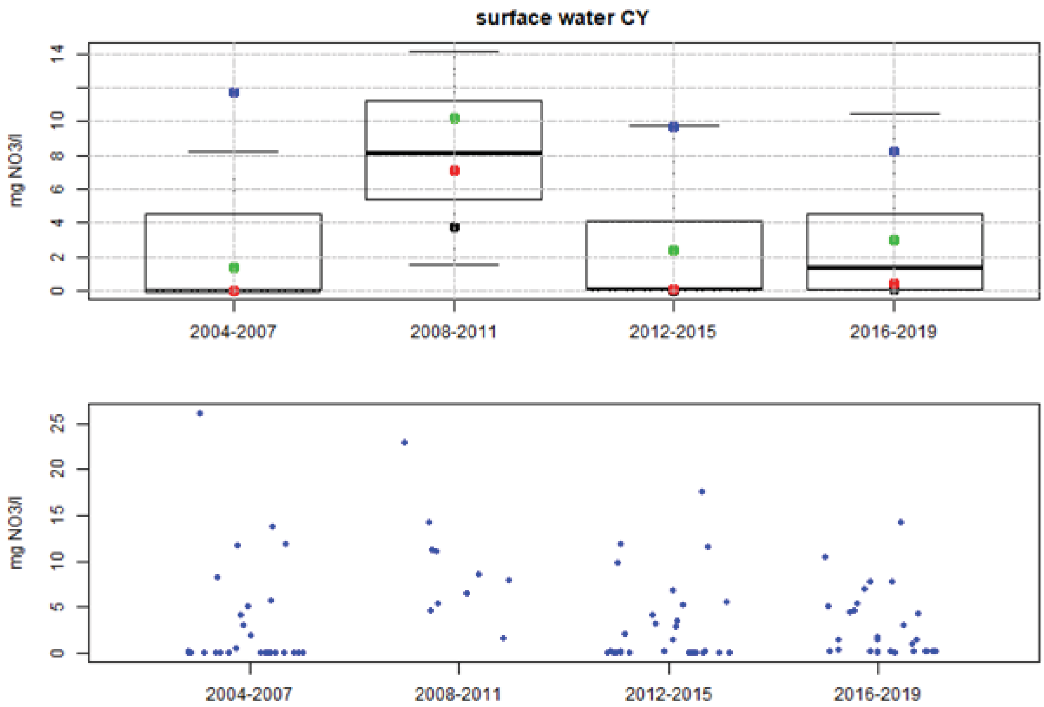


Figure 17. Time series of box whisker plots along with the distribution of the average NO3 annual concentrations for each reporting period for surface water stations. The blue, red, green and black dots represent the mean of the fourth third, second and first quartiles, respectively.

Conclusions and recommendations

Cyprus has a high livestock pressure, the nutrient surpluses are high EU for nitrogen and phosphorus.

There is a well-elaborated network of monitoring stations. The groundwater quality is generally good. However, there are a number of hotspots, with a nitrate concentration > 50 mg/l and/ or with a strong increasing trend. Surface waters, on the other hand, remain of good quality.

A very high number of groundwater hotspots are located outside the NVZ.

Cyprus did not review its action programme since 2014.

There is no information given concerning the forecast of water quality.

The Commission recommends Cyprus to revise the designation of NVZ, to review its action programme in particular to reduce the high nutrients surpluses and to reduce and prevent the contamination in groundwater hotspots where agriculture pressure is significant. Cyprus should also provide a forecast of the water quality.

EUROPEAN
COMMISSION

Brussels, 11.10.2021
SWD(2021) 1001 final

PART 14/38

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

Czech Republic's utilised agricultural area amounts to 3.5 Mha, representing 45% of the total land area and has decreased by 3% since 2007. The major outputs of the agricultural industry include in a decreasing order: cereals (22.3%), milk (19.7%), and industrial crops (14.8%).
Eurostat

Major land use statistics for Czech Republic

Table 1.Utilized agricultural area (abbreviated as UAA)

Czech Republic	2005	2007	2010	2013	2016
Utilised agricultural area UAA (1000 ha)	NA	3597	3524	3521	3489
arable land (1000 ha)	NA	2624	2547	2505	2497
permanent grass (1000 ha)	NA	932	936	974	949
permanent crops (1000 ha)	NA	38	40	41	42
kitchen gardens (1000 ha)	NA	2	1	1	1

Note:
Eurostat (FSS)

Arable land decreased by 5% from 2007. The area dedicated to permanent crops, permanent grass, and kitchen gardens remain stable since 2010.

Animal distribution in Czech Republic

The number of live pigs has decreased while the number of other animals is stable since 2010. The livestock density index is around 0.5. It is lower than the EU average of 0.8.

Table 2. Livestock statistics

Czech Republic	2005	2007	2010	2013	2016
Livestock index	0.58	0.58	0.49	0.50	0.51
dairy cows (10^6 heads)	0.44	0.41	0.38	0.38	0.37
live bovines (10^6 heads)	1.35	1.37	1.32	1.33	1.34
live pigs (10^6 heads)	2.72	2.66	1.85	1.55	1.48
live poultry (10^6 heads)	NA	NA	25.32	25.34	25.10

Note:
Eurostat (FSS)

European Commission

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

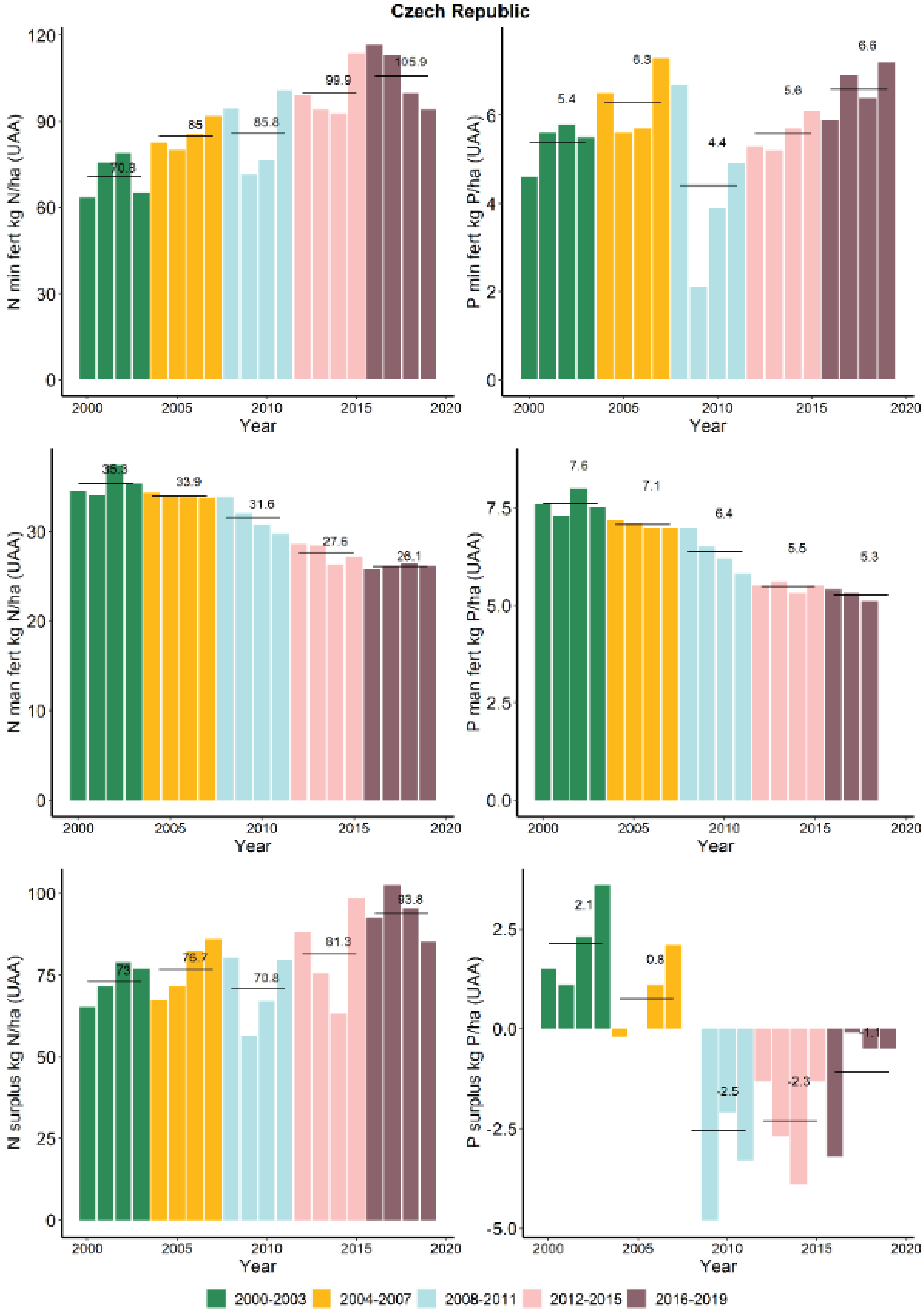


Figure 1. N and P fertilizers and gross surplus (kg/ha)

The gross nitrogen and phosphorus surpluses originate from EUROSTAT data for the years 2000-2017. Data for years 2018-2019 are supplementary data provided by the Czech Republic, which have been included in the figure because of correspondence, for the previous years, with Eurostat statistics. The use of N and P inorganic nitrogen and phosphorus fertilizers have increased for the last three reporting periods covering the years 2000-2015. The usage of manure has decreased since the first reporting period. The nitrogen surplus increased for the 2012-2015 reporting period by 15% in average. The phosphorus deficit decreased to around -1 kg/ha in 2016-2019. 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

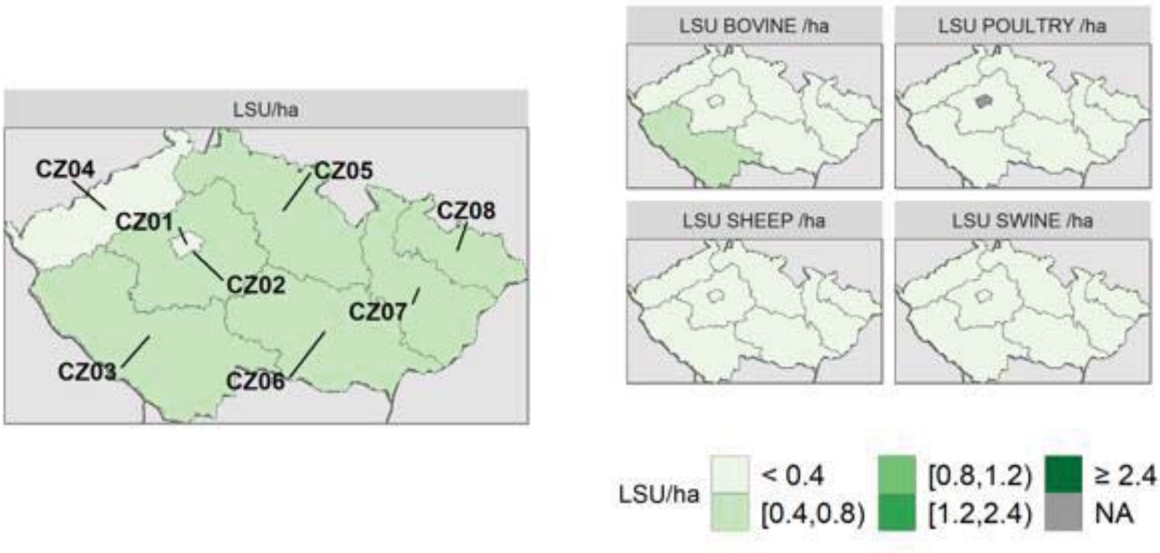


Figure 2. Map of livestock unit distribution, year 2016 (Source: Eurostat, February 2021)

Animal production is mostly dominated by bovine in particular in the southern part (total LSU and LSU by animal type were retrieved individually from EUROSTAT).

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

Water Quality Monitoring

Surface water is monitored through the network of the Povodí state-owned enterprises (formerly the Agricultural Water Management Administration – ZVHS). The network has been in operation since 1993. In addition, groundwater and surface water are also monitored through the framework monitoring programme operated by the Czech Hydrometeorological Institute (ČHMÚ). The monitoring network for groundwater quality was gradually rebuilt between 2005 and 2009 and has been in full operation since 2010. It is the same network used for reporting under the WFD, and measurements are usually performed twice a year: in the spring and in the autumn. Surface water monitoring is based on a network of main and auxiliary profiles. The main profiles monitor major water courses and sampling is performed regularly once a month. These points are representative for the monitoring of water bodies according to the EU Water Framework Directive with emphasis on water bodies with a greater proportion of agricultural land. Auxiliary profiles include major side streams of water bodies, parts of river basins in vulnerable zones, and small isolated vulnerable zones. They are monitored regularly once every four years; emphasis is placed on areas with predominant agricultural activities.

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

Station Type	Description	Number of stations with measurements			Number of stations with Trends		
		2008-2011	2012-2015	2016-2019	2008-2011	2012-2015	2016-2019
0	Phreatic groundwater (shallow): 0-5 m	201	201	224	138	200	224
1a	Phreatic groundwater (deep) 5-15 m	214	201	206	109	195	206
1b	Phreatic groundwater (deep) 15-30 m	68	35	36	37	30	36
1c	Phreatic groundwater (deep) >30 m	100	32	33	31	31	33
2	Captive groundwater	28	152	149	8	151	149
3	Karstic groundwater	0	0	9	0	0	9
9	Not specified	0	0	0	0	0	0
	Total	**611**	**621**	**657**	**323**	**607**	**657**

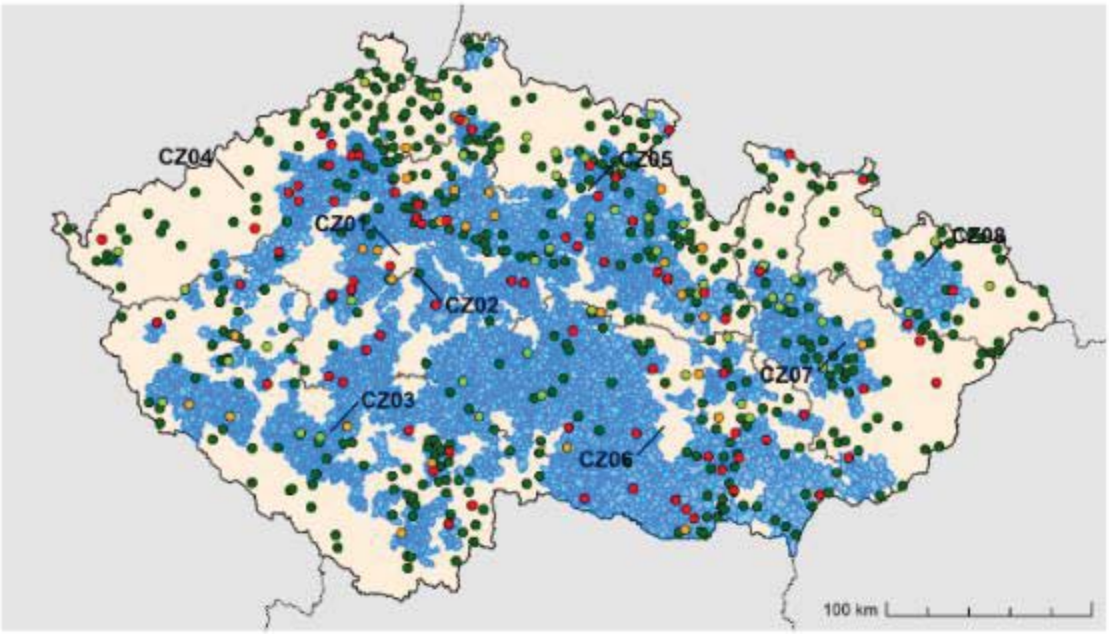
Surface water quality monitoring network

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

Station Type	Description	Number of stations with measurements			Number of stations with Trends			Number of stations with Trophic status		
		2008-2011	2012-2015	2016-2019	2008-2011	2012-2015	2016-2019	2008-2011	2012-2015	2016-2019
4	River water	571	1917	2086	554	502	1796	571	748	683
5	Lake/reservoir water	0	0	0	0	0	0	0	0	0
6	Transitional water	NA	NA	NA	NA	NA	NA	NA	NA	NA
7	Coastal water	NA	NA	NA	NA	NA	NA	NA	NA	NA
8	Marine water	NA	NA	NA	NA	NA	NA	NA	NA	NA
9	Not specified	0	0	0	0	0	0	0	0	0
	Total	**571**	**1917**	**2086**	**554**	**502**	**1796**	**571**	**748**	**683**

Groundwater Quality

Groundwater average annual nitrate concentration



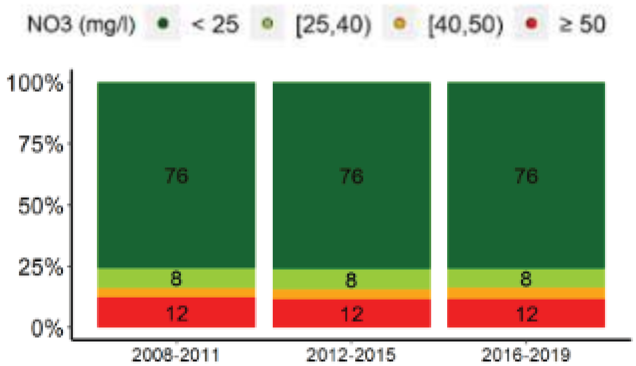


Figure 3. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information. In the map in blue the NVZ.

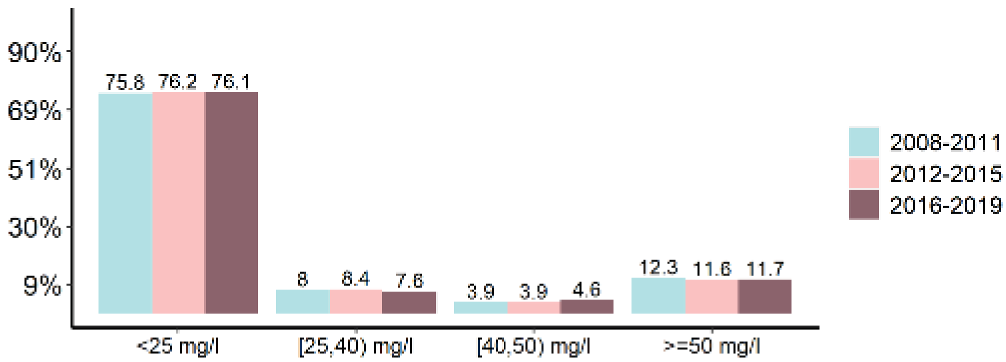
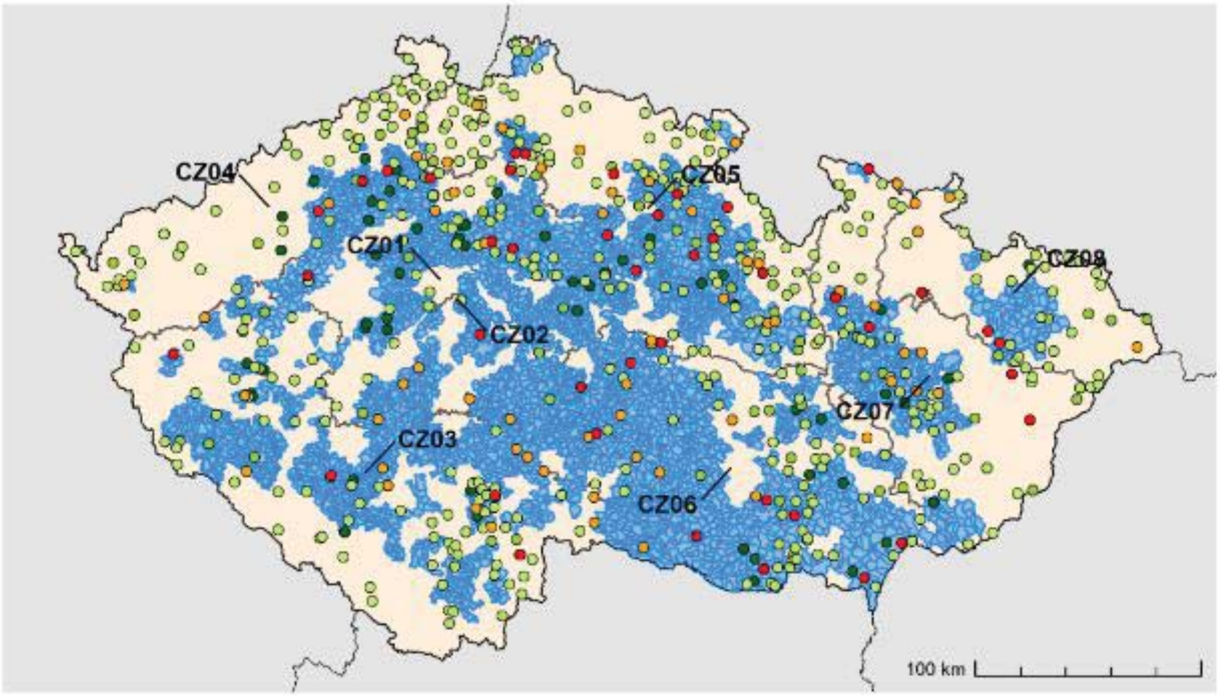


Figure 4. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis)

Groundwater average annual nitrate concentration trend



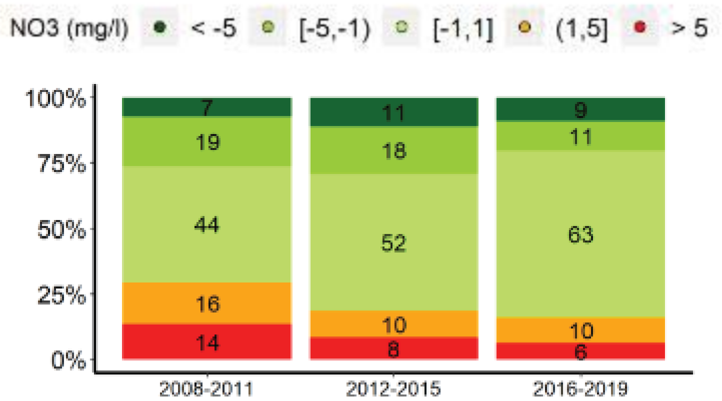


Figure 5. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis). In the map in blue the NVZ.

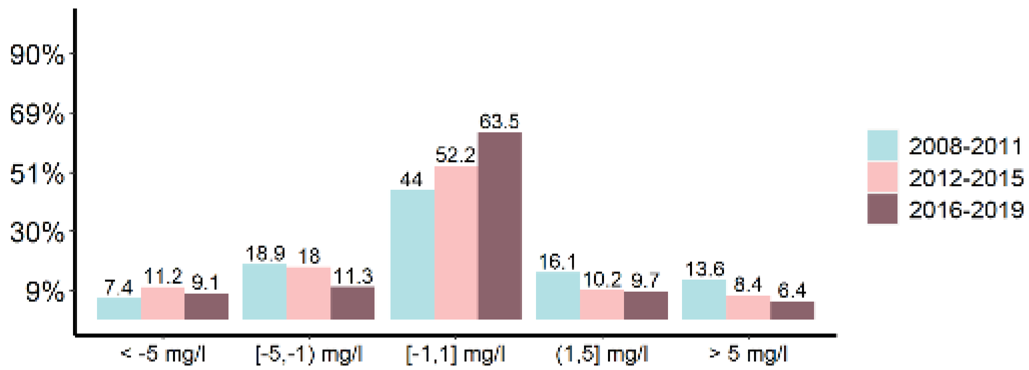
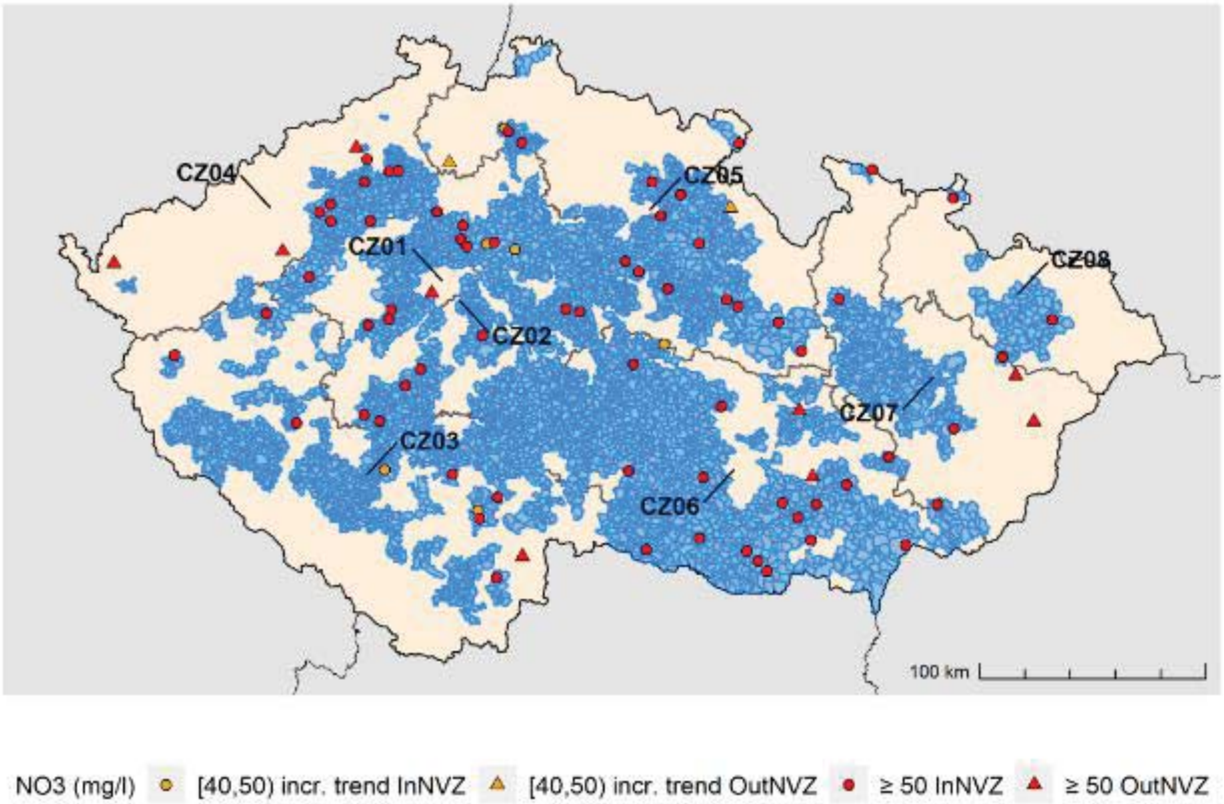


Figure 6. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis)

Groundwater hotspot

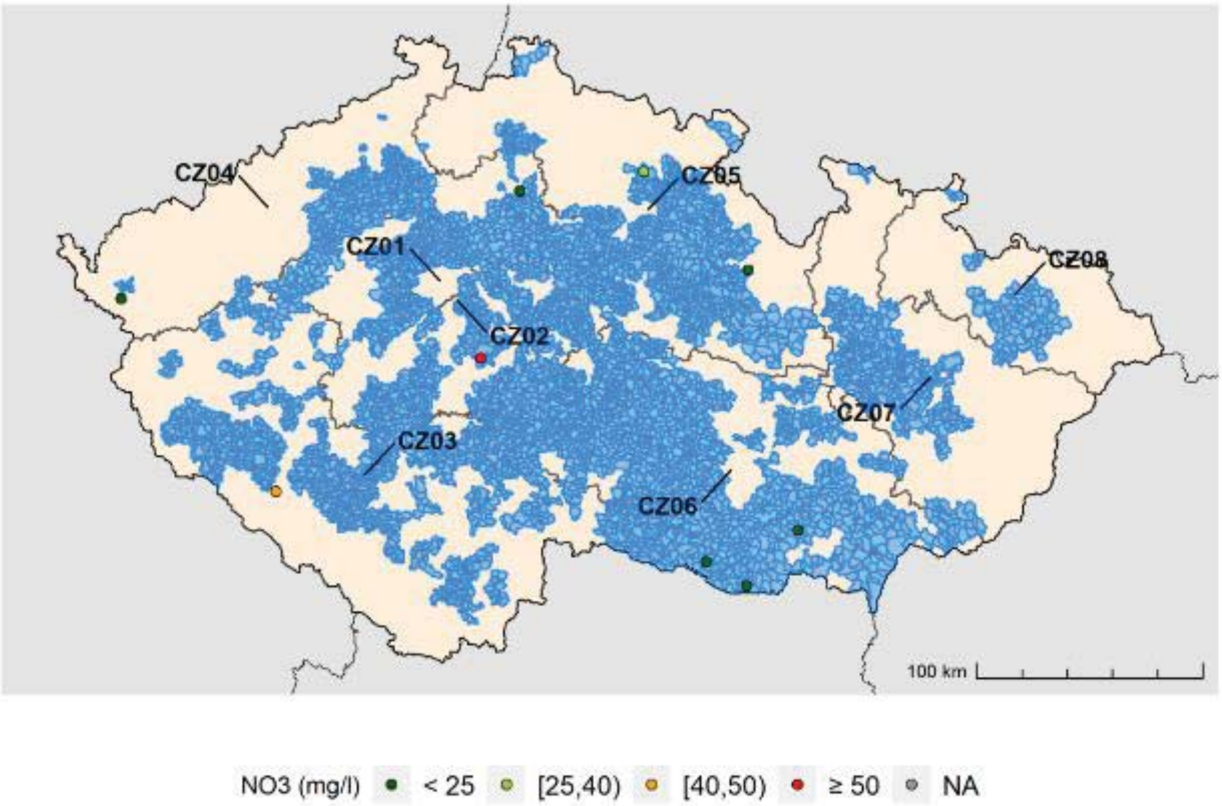


		>=40 and < 50 mg/l incr.trend		>=50 mg/l	
NUTS ID	NUTS NAME	InNVZ	OutNVZ	InNVZ	OutNVZ
CZ01	Praha	0	0	0	1
CZ02	Stredni Cechy	2	0	16	0
CZ03	Jihozápad	2	0	8	1
CZ04	Severozápad	0	0	7	3
CZ05	Severovýchod	1	2	14	0
CZ06	Jihovýchod	1	0	16	2
CZ07	Stredni Morava	0	0	4	2
CZ08	Moravskoslezsko	0	0	3	0
	Total	**6**	**2**	**68**	**9**

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



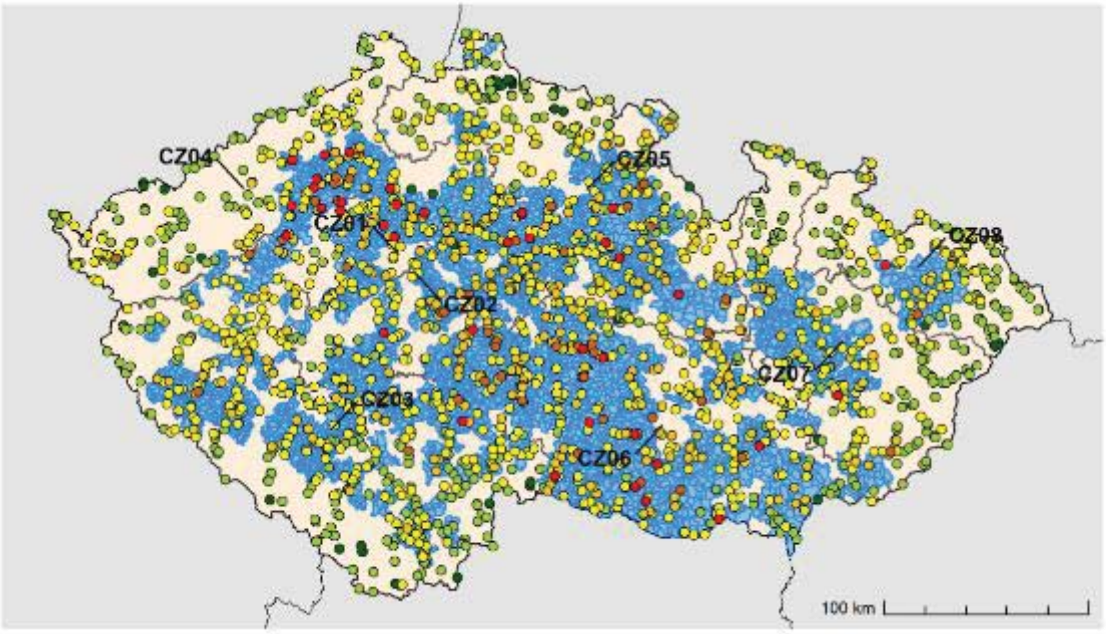
Station Type	Description	Number of removed stations		
		total removed	with measurements	with trends
0	Phreatic groundwater (shallow): 0-5 m	3	3	3
1a	Phreatic groundwater (deep) 5-15 m	2	2	2
1b	Phreatic groundwater (deep) 15-30 m	0	0	0
1c	Phreatic groundwater (deep) >30 m	1	1	1
2	Captive groundwater	3	3	3
3	Karstic groundwater	0	0	0
9	Not specified	0	0	0
	Total	**9**	**9**	**9**

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



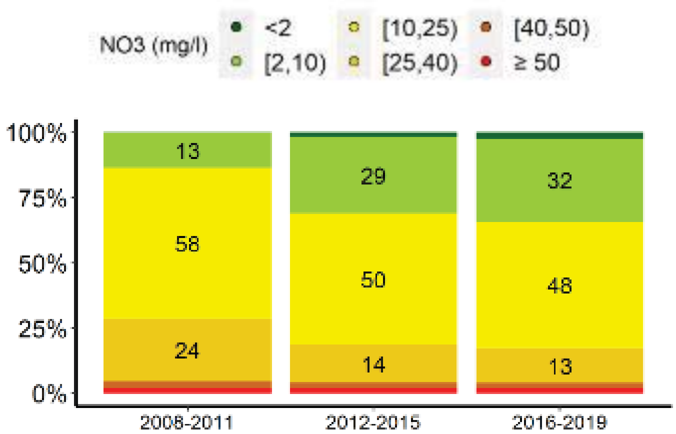


Figure 9. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information. In the map in blue the NVZ.

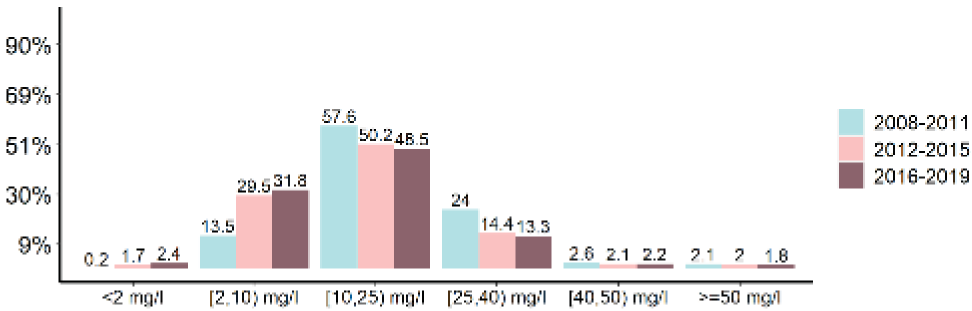
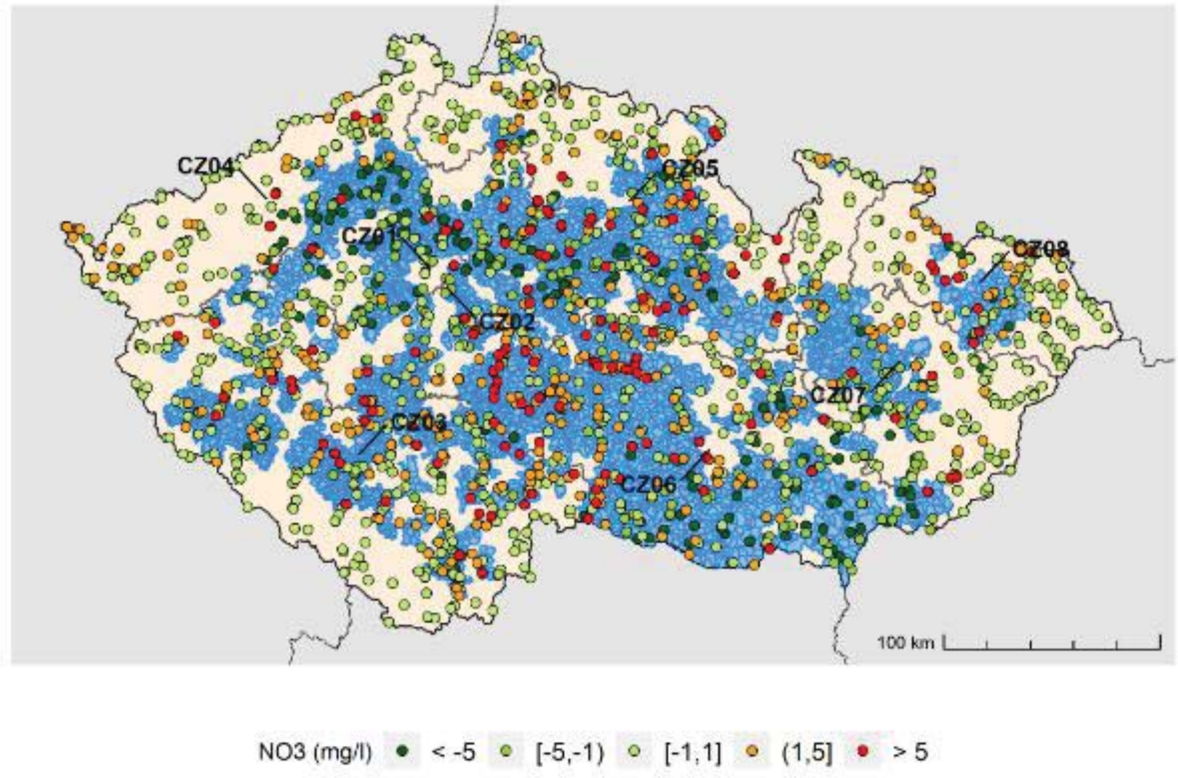


Figure 10. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis)

Surface water average annual nitrate concentration trend



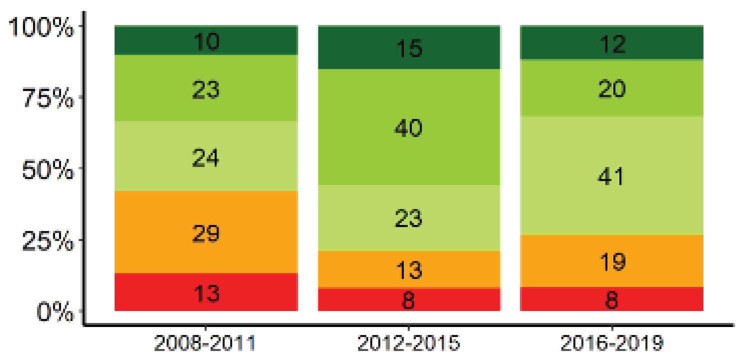


Figure 11. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis). In the map in blue the NVZ.

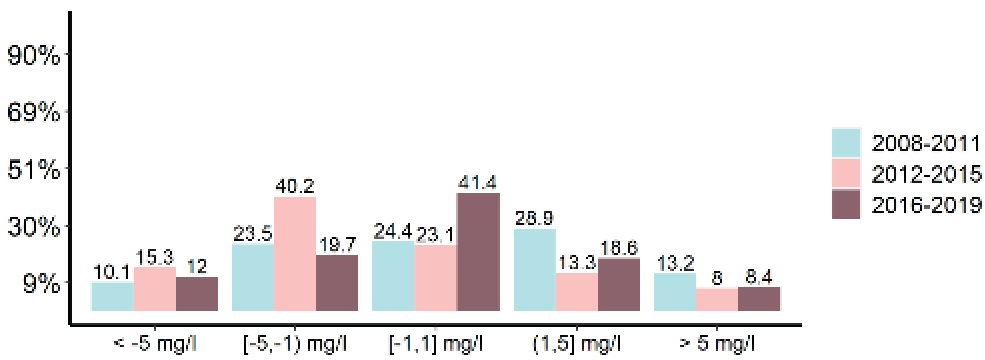


Figure 12. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis)

Surface Water Eutrophication

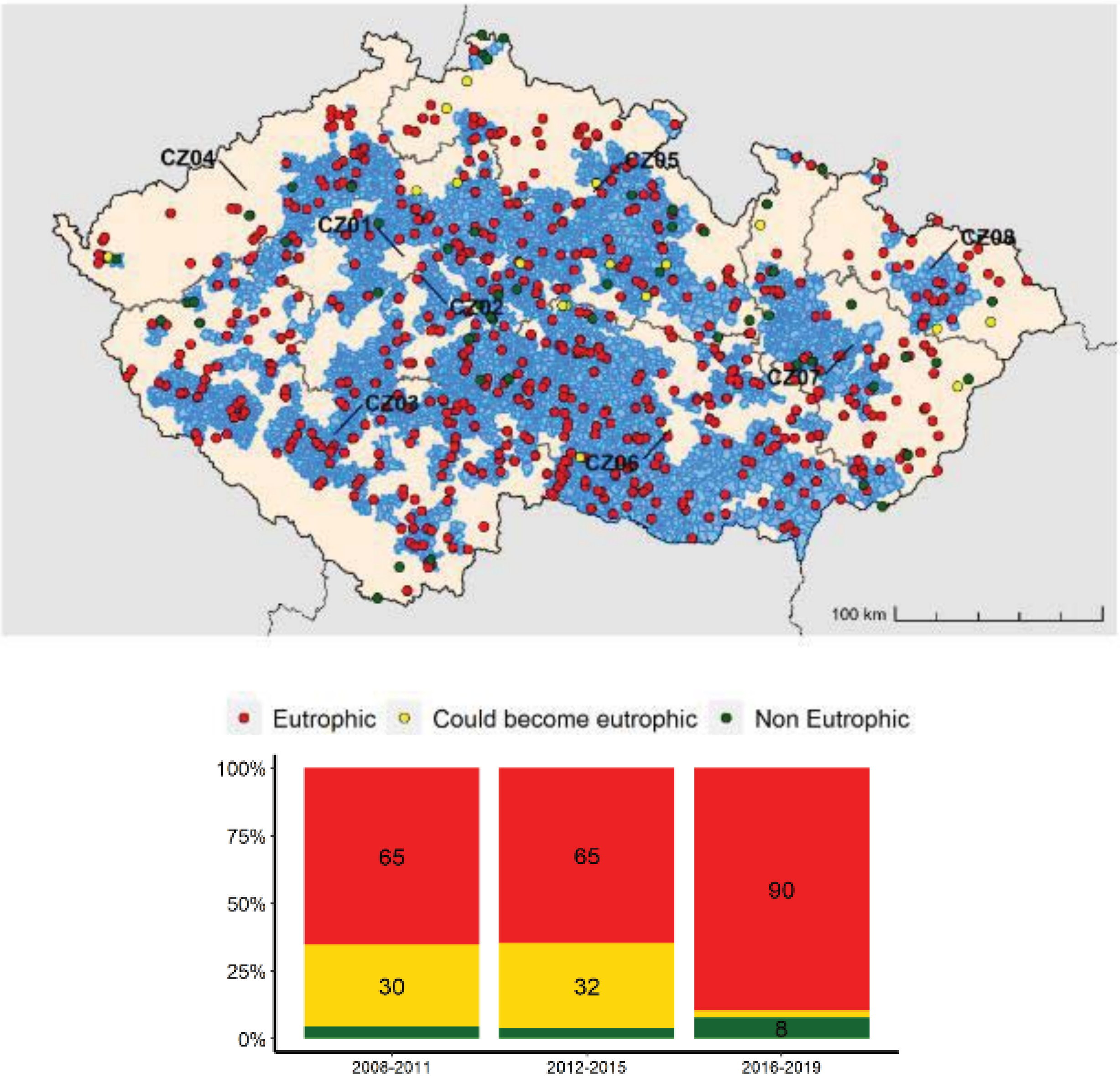


Figure 13. Spatial distribution of eutrophic status (map) and corresponding percentage of monitoring points per classes of status by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information. In the map in blue the NVZ.

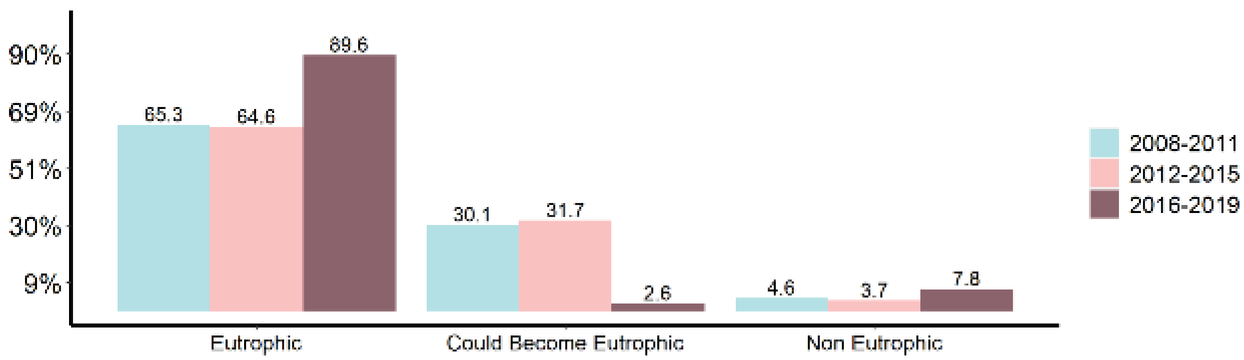
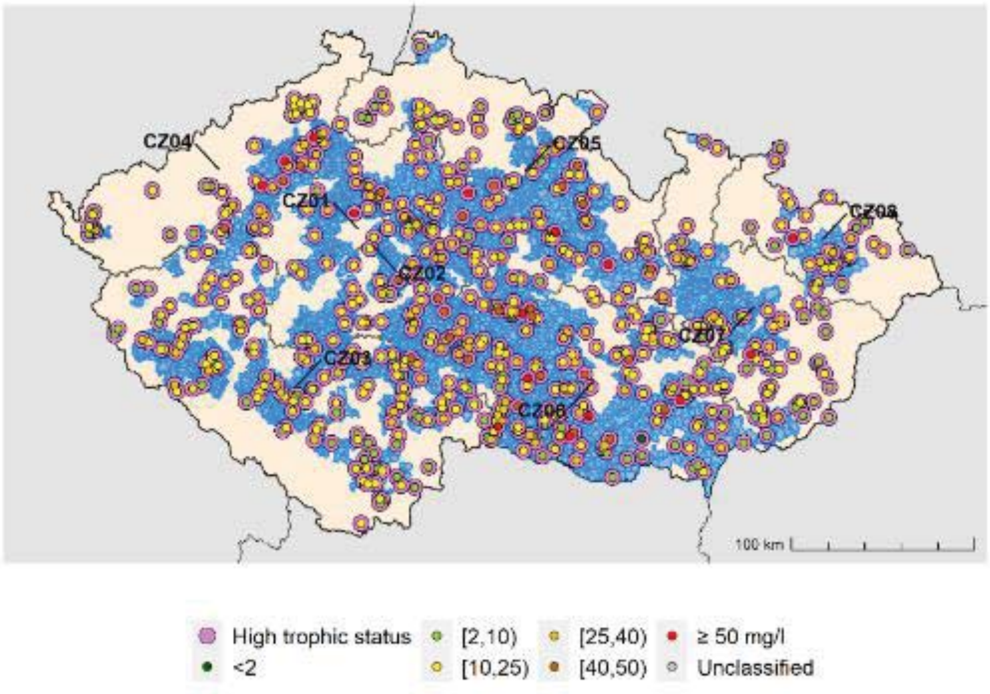


Figure 14. Comparison of percentage of monitoring points in the three reporting periods by classes of status (x axis)

The Eutrophic status vs average NO3 annual concentration



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
CZ01	Praha	2	0	0	1	0	0	1	0
CZ02	Stredni Cechy	95	1	5	58	24	6	1	0
CZ03	Jihozápad	141	0	30	84	25	1	1	0
CZ04	Severozápad	44	0	6	23	10	2	3	0
CZ05	Severovýchod	80	0	15	43	15	5	2	0
CZ06	Jihovýchod	158	1	25	80	35	12	5	0
CZ07	Stredni Morava	62	0	20	33	8	0	1	0
CZ08	Moravskoslezsko	30	0	7	18	4	0	1	0
	Total	**612**	**2**	**108**	**340**	**121**	**26**	**15**	**0**

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

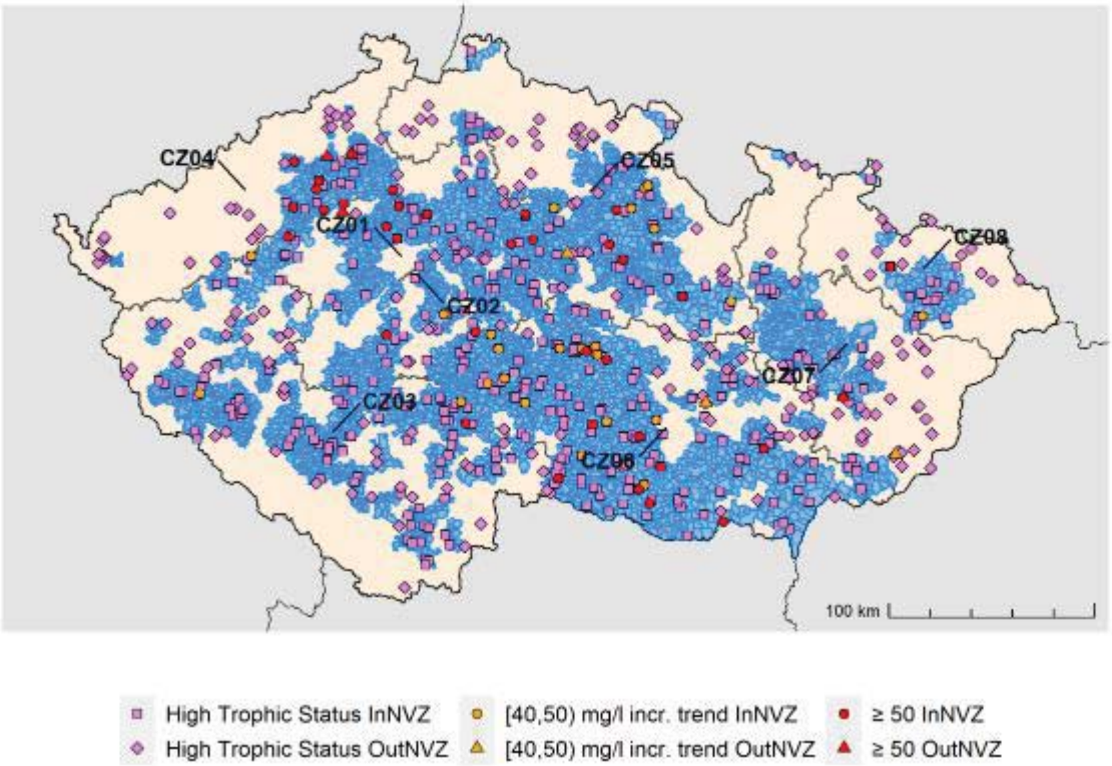
The analysis shows all the SW monitoring stations with the higher trophic status and the corresponding value of NO3 concentration. The map shows the spatial distribution of these points, and the table reports the number of stations with measurements with higher trophic status and the corresponding stations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

The same profiles were used for eutrophication assessment as those used to assess nitrate concentrations in minor and medium water courses in agricultural areas. For the purposes of designating vulnerable zones, the trophic state of water was assessed according to the concentrations of total phosphorus in terms of the type-specific conditions of each water course in which the assessment profile was located. The boundary between good and moderate ecological status constituted the eutrophication level threshold for designating vulnerable zones due to eutrophication in 2019. Water bodies with total phosphorus concentration above 0.1 mg/l are eutrophic or hypertrophic (total P concentration above 0.2 mg/l).

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	612	18	53
5	Lake/reservoir water	0	0	0
6	Transitional water	NA	NA	NA
7	Coastal water	NA	NA	NA
8	Marine water	NA	NA	NA
9	Not specified	0	0	0
	Total	**612**	**18**	**53**

Surface Water quality hotspot

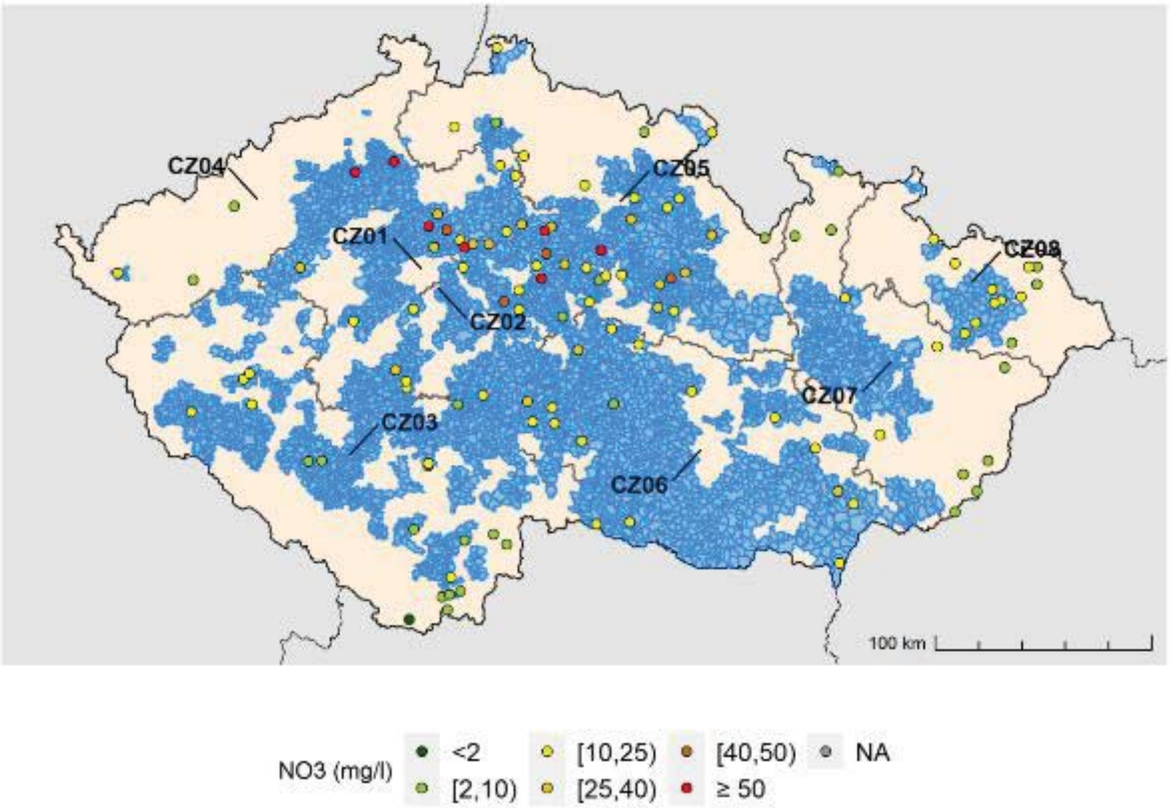


NUTS ID	NUTS NAME	High trophic status InNVZ	High trophic status OutNVZ	>=40 and < 50 mg/l incr.trend InNVZ	>=40 and < 50 mg/l incr.trend OutNVZ	>=50 mg/l InNVZ	>=50 mg/l OutNVZ
CZ01	Praha	2	0	0	0	1	0
CZ02	Stredni Cechy	74	21	4	0	12	1
CZ03	Jihozápad	95	46	2	0	2	0
CZ04	Severozápad	17	27	0	0	5	2
CZ05	Severovýchod	43	37	6	1	4	0
CZ06	Jihovýchod	131	27	11	1	9	0
CZ07	Stredni Morava	28	34	0	1	0	1
CZ08	Moravskoslezsko	16	14	1	0	1	0
	Total	**406**	**206**	**24**	**3**	**34**	**4**

Figure 16. SW 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 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



Station Type	Description	Number of removed stations			
		total removed	with measurements	with trends	with trophic status
4	River water	121	121	38	56
5	Lake/reservoir water	0	0	0	0
6	Transitional water	0	0	0	0
7	Coastal water	0	0	0	0
8	Marine water	0	0	0	0
9	Not specified	0	0	0	0
	Total	**121**	**121**	**38**	**56**

Figure 17. SW removed stations map (top graph) and distribution by surface water type (lower graph). In the map in blue the NVZ.

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

Measures in the Action Programme

The first Code of Good Agricultural Practice (CAGP) was drawn up in 2003 and was revised five times, the last in 2016. The new elements of the last revision concern: period of prohibition of application, proximity of watercourses, effluent storage works, and fertilization plans and spreading records. It was also estimated that 60% of farmers voluntarily comply with the code outside vulnerable zones.

The Action Programme (AP) was published for the first time on 30/01/2014 and was revised on 01/08/2016 (fourth Action Programme). However, the technical revision was published with the Government Regulation No 27/2018 on 1 March 2018.

Only one action programme has been published in the Czech Republic and applies to all the designated vulnerable zones, albeit several variants of measures are applied taking into account the soil and climatic conditions of each agricultural parcel. The new measures introduced concern: periods of prohibition of fertilizer application that is different depending on climate region, type of crops, slope, and if a fertilizer has a rapid or slow release of nitrogen; capacity of manure storage, and requirement regarding construction and tightness; rational fertilization, including input/output balance, suitable crop rotation of crops and soil analysis; soil analysis; limitation of total fertilization by type of crops taking into account weather, state of the soils and slope; update of rules on fertilization on slopes; provisions on application of fertilizers near watercourses. All the other measures were not changed with respect to the previous reporting period. The main measures are summarized in the following table.

No cost-effectiveness studies were carried out in this reporting period

Table 6. Details of the Action Programme

Measure	General details in Action Programme (*)
Period of prohibition of fertiliser application	• Periods of prohibition depending of climate region, slope, type of crops, fertilizers rapid or slow release (table 1 in Annex 2 of the Regulation)
	• Start and end dates did not change from previous AP and details are reported in table 1 in Annex 2 of the Regulation
Restrictions for application on sloped soils	• Deletion of requirements for anti-erosion measures on soils moderately and highly endangered by erosion
	• Prohibition of fertilisation of permanent grassland shifted from 10° to 12° (section 11(2) of the Regulation)
Restrictions for application on soaked, frozen, or snow-covered soils	• No change respect to the previous AP
Restrictions for application near watercourses (buffer strips)	• Additional requirement for preventing spontaneous access of animals to bodies of surface water, damage to stream beds and floodplains, destruction of bank vegetation, or water pollution (section 12(2) of the Regulation)
Effluent storage works	• Specification of criteria for the location of a storage place are listed in section 9 of the Regulation
Capacity of manure storage	• The duration of storage of livestock manure on agricultural parcel during intermediate storage thereof was changed from 12 to 9 months (section 9 of the Regulation)
	• Specific criteria for location of a storage (section 9 of the regulation)
Rational fertilisation (e.g., splitting fertilisation, limitations)	Limitations of total fertilization by type of crops (tables 4 to 6 in Annex 3 of the Regulation): • Setting the limits according to three yield levels
	• If vegetation is ploughed in because it is damaged, the input of nitrogen from previous fertilisation of the ploughed-in crops shall not be included in the limit for the replacement crops (section 7(1) of the Regulation)
	• Laying down requirements for fertilisation of vegetables
	• Adjusted set-off of nitrogen from the digestate from 70% to 60% of total nitrogen (section 7(5) of the Regulation)
	• Restricted fertilisation newly also applies to vegetables; elevated doses were permitted in application zone III for winter onion and garlic
	• Use of mineral nitrogenous fertilisers was also permitted for catch crop and to support decomposition of straw in application zone III.b
	• Prohibited application of mineral nitrogenous fertilisers in the summer and autumn (if the soil is left bare in winter).
	• Increased limit of nitrogen input for soya (to 80 kg N/ha) (table 5 in annex 3 of the Regulation)
Crop rotation, permanent crop enhancement	• No change respect to the previous AP
Vegetation cover in rainy periods, winter	• No change respect to the previous AP
Fertilisation plans, spreading records	• Soil sampling and analysis shall be performed by a professionally qualified person with a certificate of accreditation pursuant to Section 16 of Act No 22/1997 on technical requirements on products (section 7(6) of the regulation)
Other measures	• No change respect to the previous AP
Date for application limit of 170 kg N/ha/year:	• 1 November 2004

(*) Government Regulation No 262/2012 of 4 July 2012 on designation of vulnerable zones and on action programme (Technical amendment: Government Regulation No 27/2018)

Controls

The percentage of farmers visited each year in the NVZ areas is 1%. All of them resulted compliant with all the measures excluding those related to winter vegetation cover and irrigation control for which the inspections were not performed by the Central Institute for Supervising and Testing in Agriculture (ÚKZÚZ). However, the inspections revealed inappropriate manure storage both spatially and temporally. In terms of the use of fertilisers, the inspections revealed violations of the prohibition of application during specified periods, as well as non-compliance with the permitted applied quantity of N/ha.

Designation of NVZ

The first NVZs was designated in 2003. Amendments took place in 2007 and 2011. A third revision of vulnerable zones took place in the Czech Republic in March 2015. This was followed by their approval process, which was confirmed in August 2016. The proportion of agricultural land in vulnerable zones with respect to the total area of agricultural land in the Czech Republic went up from 42.5% in 2003 to 50.2 in 2015. A fourth revision of the area of vulnerable zones took place in 2019 and the legislative procedure has not been completed yet.

The NVZ area for Czech Republic extends over 33153.6 km^2, 7.0 % less than in 2012-2015.

Forecast of Water Quality

The assessment of future water quality was performed using trends of long-term time series of nitrate concentrations. The time required for water quality recovery (maximum concentration below 50 mg/l) was performed according to the extrapolated values based on the calculated linear long-term trends. The large majority (79%) of the stations are below the threshold of 50 mg/l with stable or decreasing trends. About 14% of the station have a recovery time below two years while 5% of the monitoring stations will take 15 years and more to recover.

Summary

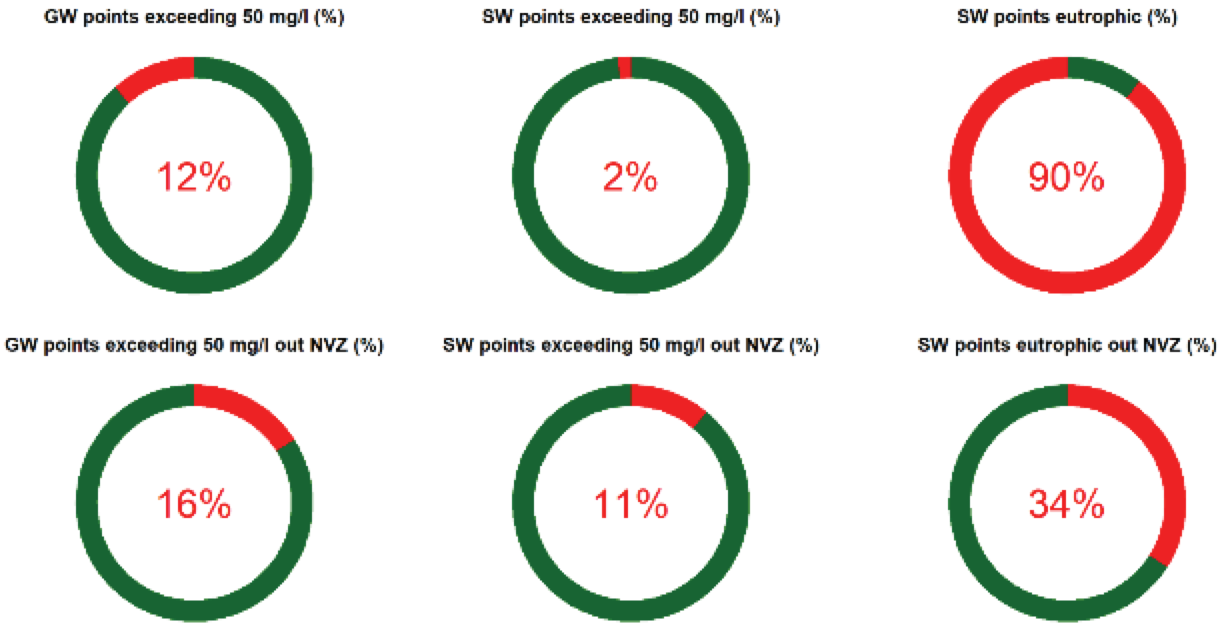


Figure 18. The summary plot for the period 2016-2019

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

Long term analysis

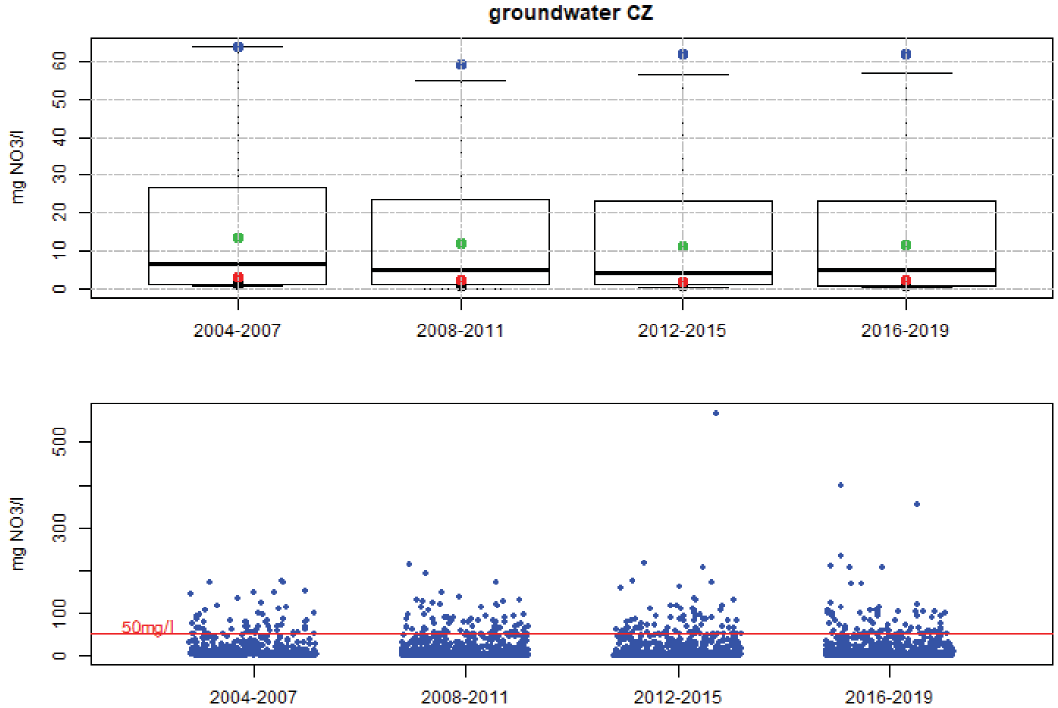


Figure 19. Time series of box whisker plots along with the distribution of the average NO3 annual concentrations for each reporting period for groundwater stations. The blue, red, green and black dots represent the mean of the fourth third, second and first quartiles, respectively.

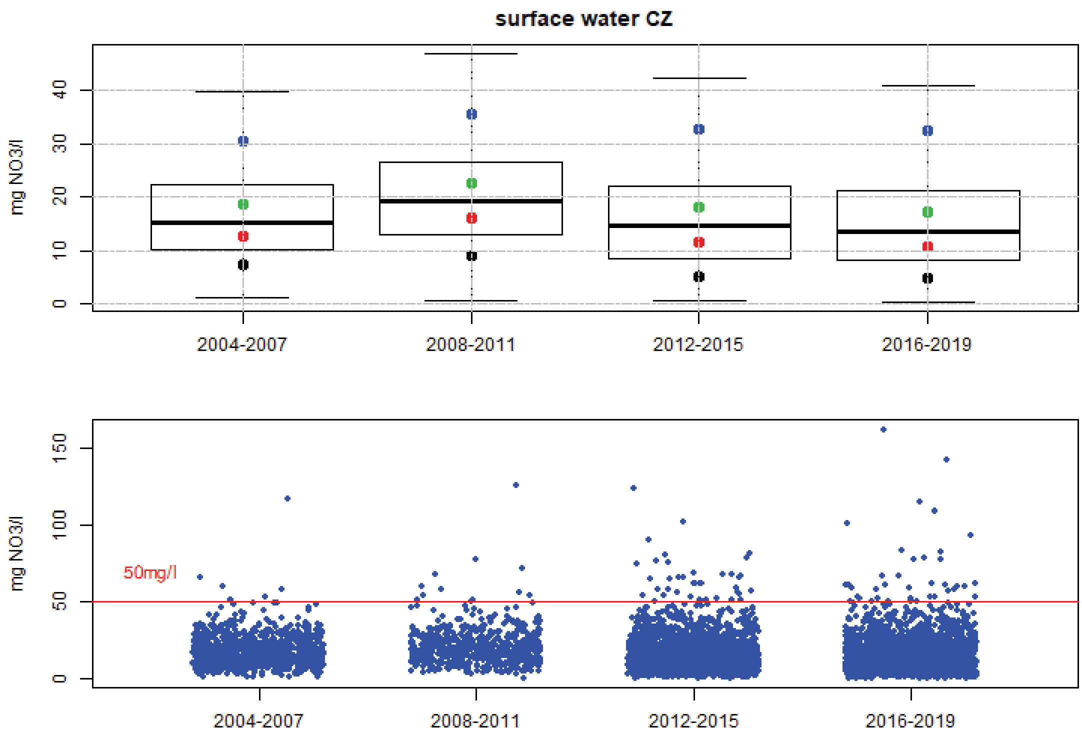


Figure 20. Time series of box whisker plots along with the distribution of average NO3 annual concentrations for each reporting period for surface water stations. The blue, red, green and black dots represent the mean of the fourth third, second and first quartiles, respectively.

Conclusions and recommendations

The Czech Republic has a low livestock density and the surplus of nitrogen is above the EU average, while there is a deficit for phosphorus.

There is a well-elaborated network of monitoring stations. There are a large number of groundwater hotspots, with a nitrate concentration > 50 mg/l. The nitrate concentrations in surface waters are increasing and a very high number of the surface waters are found to be eutrophic.

A high number of polluted ground waters and of surface waters found to be eutrophic are located outside the NVZ.

A revised action programme was published in 2018.

The Commission recommends Czech Republic to revise the designation of NVZ to include areas that drain into waters that are eutrophic and where the agricultural pressure is significant, and to revise its action programme in particular to reduce and prevent the contamination of surface waters.

EUROPEAN
COMMISSION

Brussels, 11.10.2021
SWD(2021) 1001 final

PART 15/38

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}

EN EN

Pressure from Agriculture

Denmark's utilized agricultural area amounts to 2.6 Mha, representing 62.5% of the total land area and has remained stable since 2013. The major outputs of the agricultural industry excluding services and secondary activities include in a decreasing order pigs (26.9%), milk (20.7%), and cereals (11.4%).

Major land use statistics for Denmark

Table 1.Utilized agricultural area (abbreviated as UAA)

Denmark	2005	2007	2010	2013	2016
Utilised agricultural area UAA (1000 ha)	NA	2694	2676	2628	2625
arable land (1000 ha)	NA	2451	2446	2406	2372
permanent grass (1000 ha)	NA	233	217	196	226
permanent crops (1000 ha)	NA	10	7	27	28
kitchen gardens (1000 ha)	NA	0	0	0	NA

Note:
Eurostat (FSS)

Denmark's arable land has decreased by 2.6% since 2007. The permanent grass land area has increased by 15.3% since 2013.

Animal distribution in Denmark

All Denmark's livestock have decreased since 2013. The livestock density index has remained stable since the last reporting period and is significantly higher than the EU average of 0.8.

Table 2. Livestock statistics

Denmark	2005	2007	2010	2013	2016
Livestock index	1.69	1.72	1.86	1.58	1.58
dairy cows (10^6 heads)	0.56	0.55	0.57	0.57	0.56
live bovines (10^6 heads)	1.57	1.54	1.63	1.58	1.55
live pigs (10^6 heads)	12.60	13.17	12.29	12.40	12.28
live poultry (10^6 heads)	NA	NA	18.74	19.43	18.51

Note:
Eurostat (FSS)

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

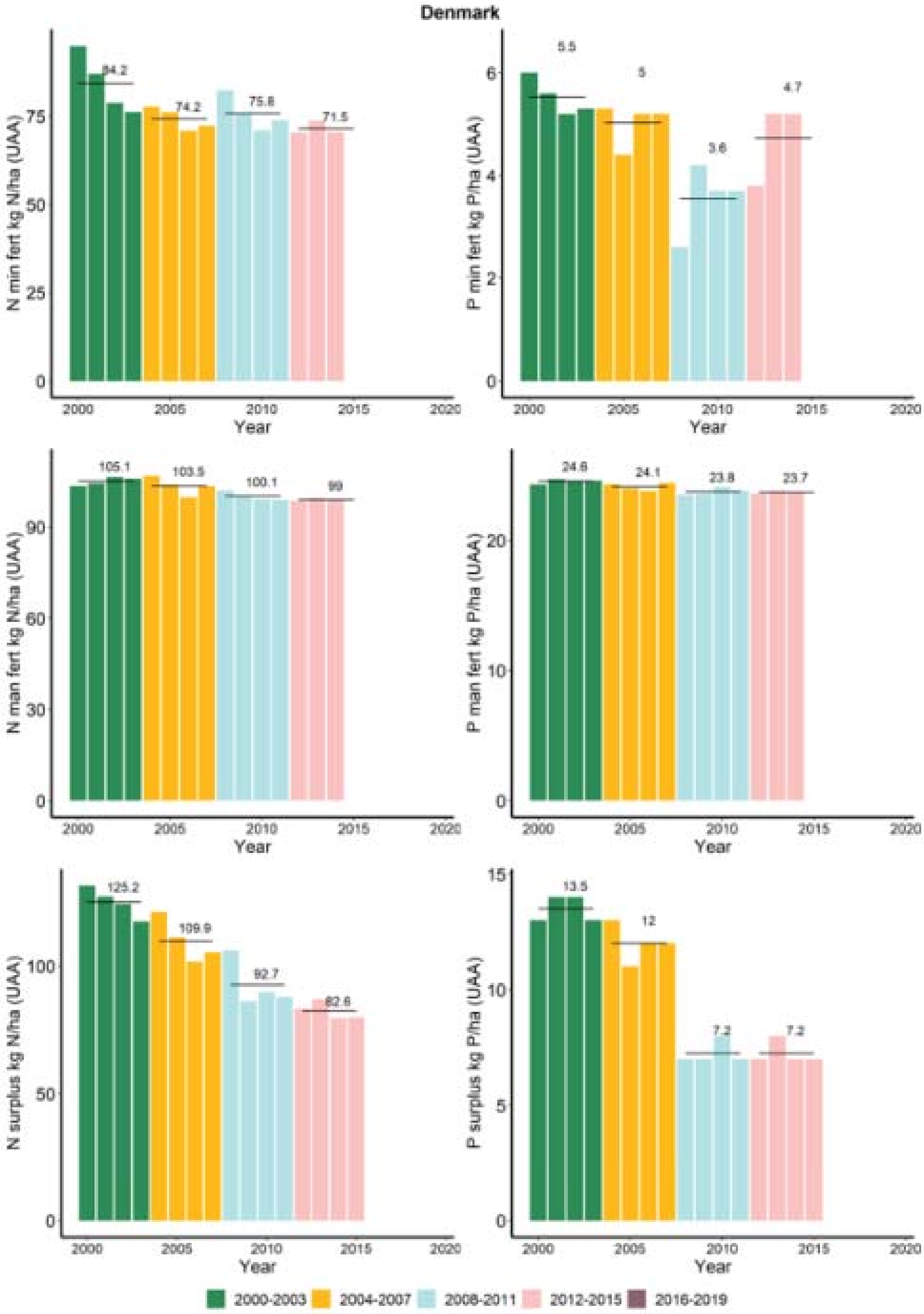


Figure 1. N and P fertilizers and gross surplus (kg/ha)

The gross nitrogen and phosphorus surpluses originate form EUROSTAT data for the years 2000-2015. No data for the period 2016-2019 is available. 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

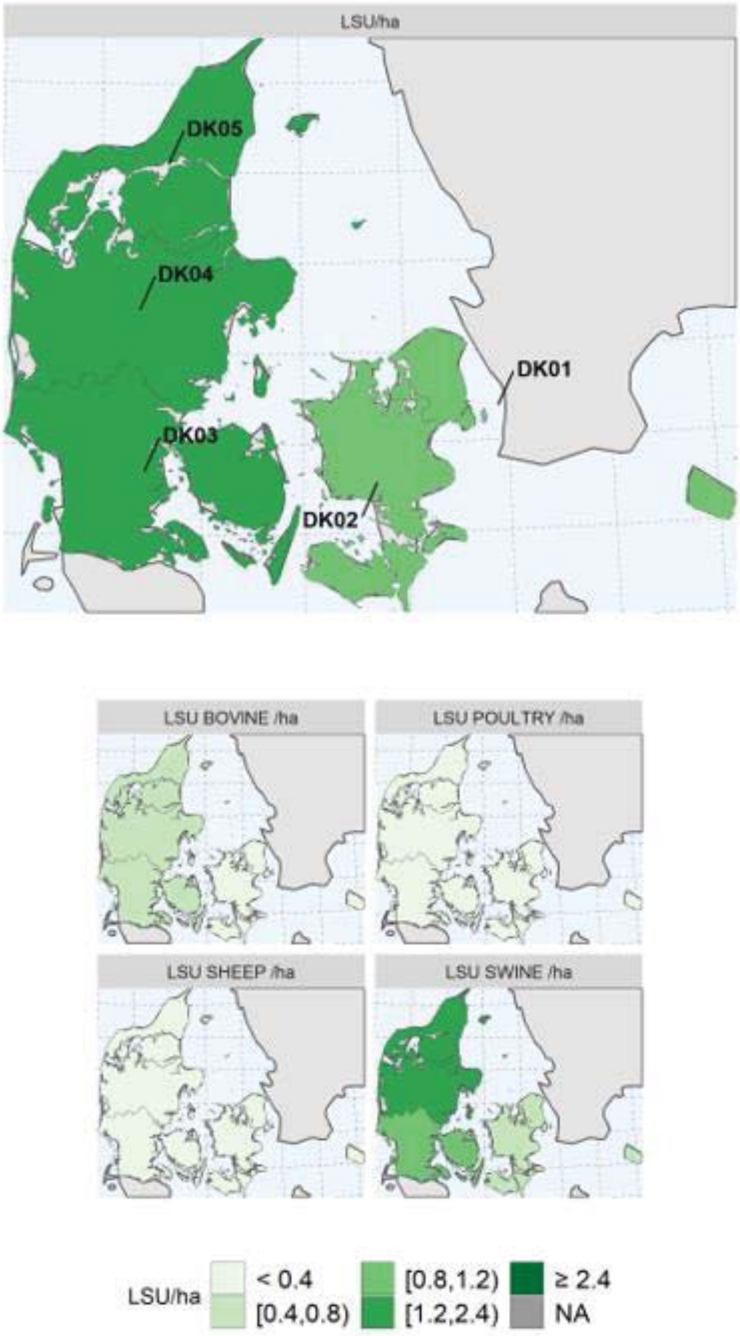


Figure 2. Map of livestock unit distribution, year 2016 (Source: Eurostat, February 2021)

Animal production is concentrated in the western part of the Denmark (total LSU and LSU by animal type were retrieved individually from EUROSTAT).

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

Water Quality Monitoring

The groundwater monitoring network used for meeting the monitoring requirements of the Nitrates Directive, ND, also serves to assess groundwater quality according to the Water Framework Directive, WFD. Implementation of the WFD has required large adjustments of the groundwater-monitoring network. The major adjustments took place in the period 2010-17, and involved establishment of new monitoring wells, as well as closure of existing monitoring wells.

Watercourses are dominated by numerous small streams and only very few larger rivers, which still – on a European scale – have relatively short distance between source and outlet. Therefore, Danish streams are generally not liable to eutrophication, and nitrate constitutes a major part of total nitrogen during all seasons. The lakes included are a selection of Danish lakes > 5 hectares covered by the Water Framework Directive.

For groundwater 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	33	73	77	33	69	68
1a	Phreatic groundwater (deep) 5-15 m	129	362	392	129	321	338
1b	Phreatic groundwater (deep) 15-30 m	118	438	462	118	389	412
1c	Phreatic groundwater (deep) >30 m	56	328	344	56	222	287
2	Captive groundwater	258	0	0	252	0	0
3	Karstic groundwater	0	0	0	0	0	0
9	Not specified	1	0	0	1	0	0
	Total	**595**	**1201**	**1275**	**589**	**1001**	**1105**

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	111	111	425	111	111	209	0	0	391
5	Lake/reservoir water	50	66	20	14	27	20	200	0	403
6	Transitional water	0	0	0	0	0	0	0	0	0
7	Coastal water	36	27	48	0	27	43	0	0	48
8	Marine water	34	17	18	0	17	13	0	0	7
9	Not specified	0	0	0	0	0	0	0	0	0
	Total	**231**	**221**	**511**	**125**	**182**	**285**	**200**	**0**	**849**

Groundwater Quality

Groundwater average annual nitrate concentration

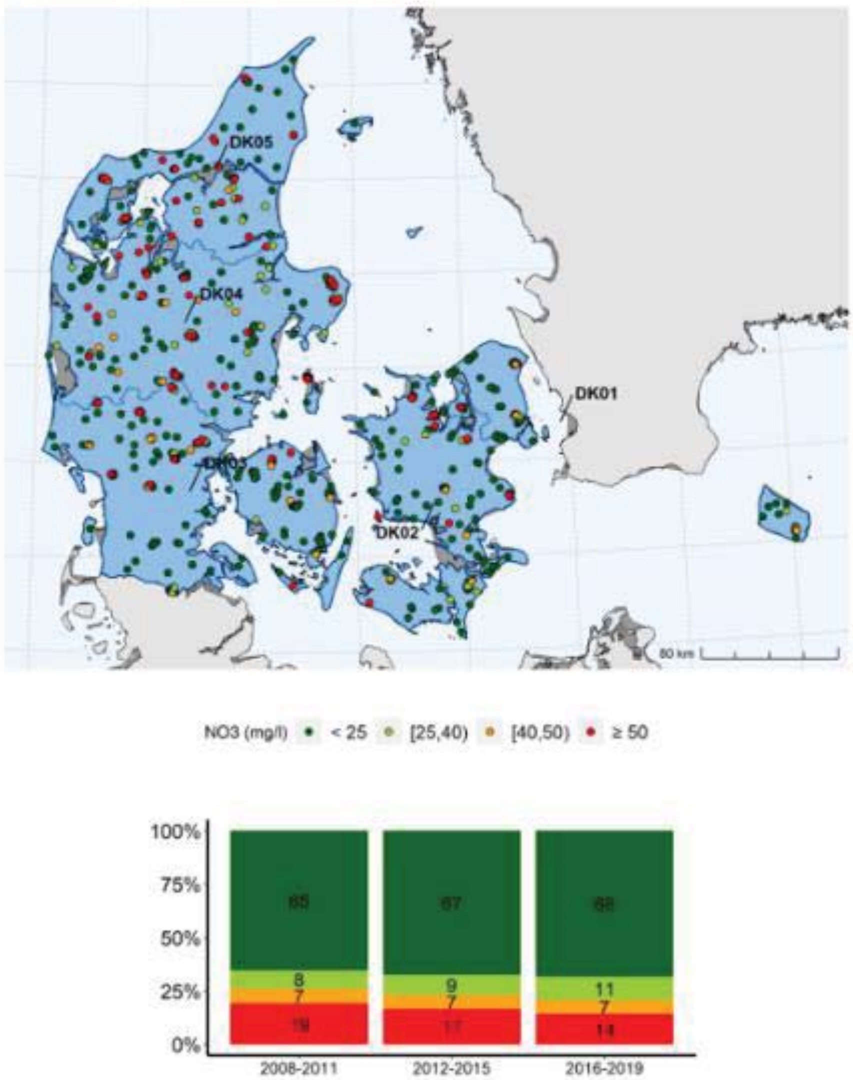


Figure 3. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis).

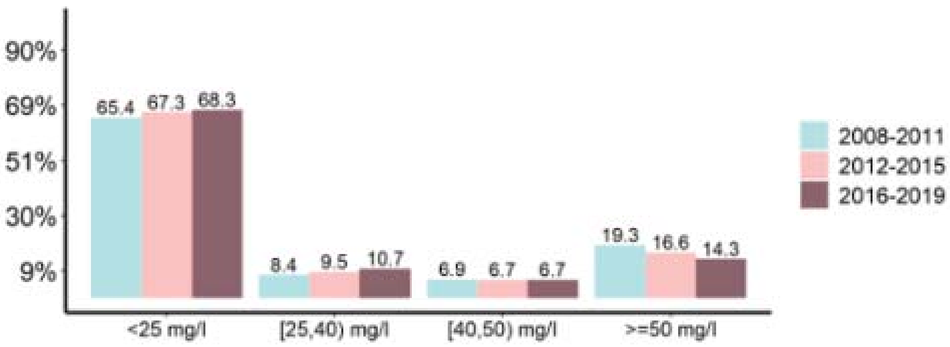


Figure 4. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis)

Groundwater average annual nitrate concentration trend

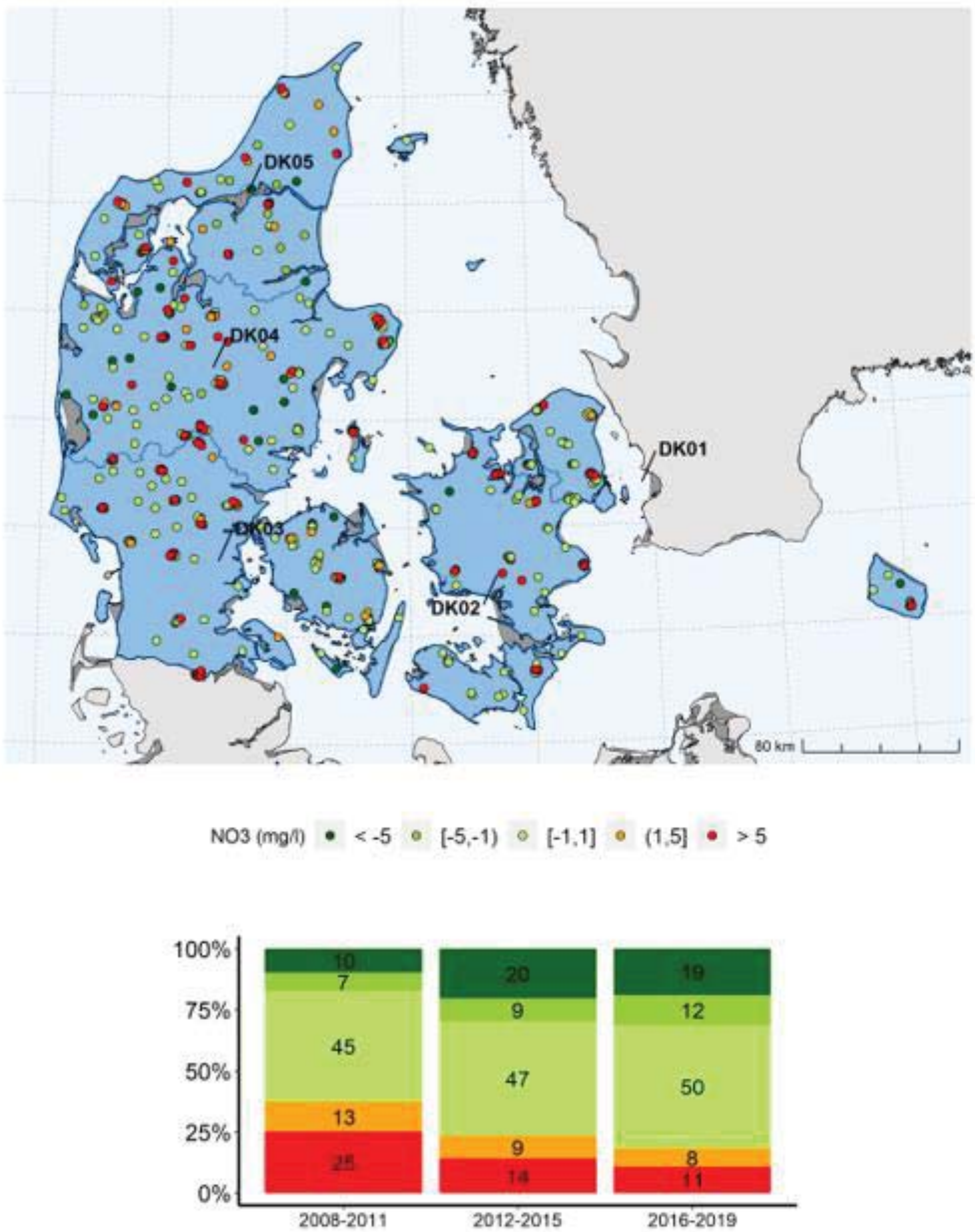


Figure 5. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis).

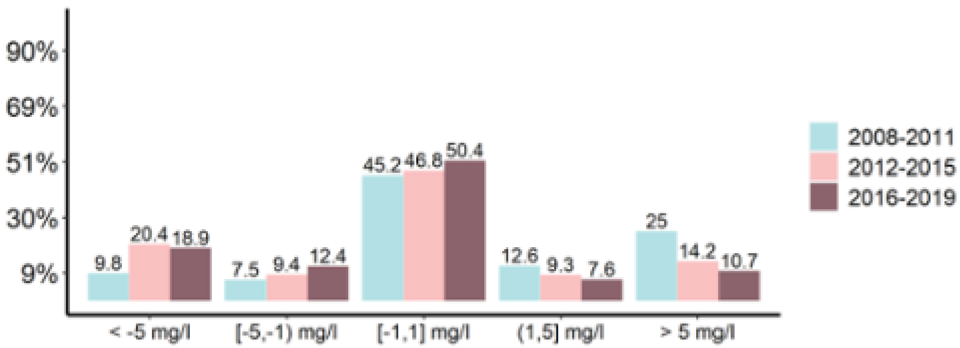
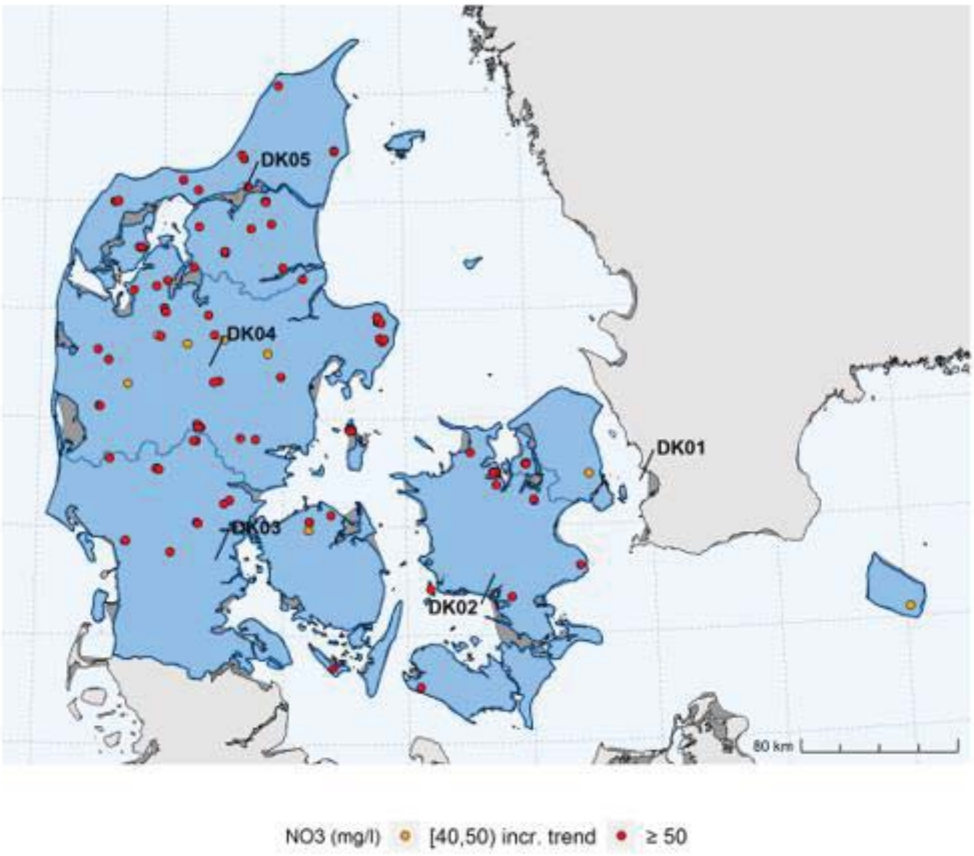


Figure 6. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis)

Groundwater hotspot

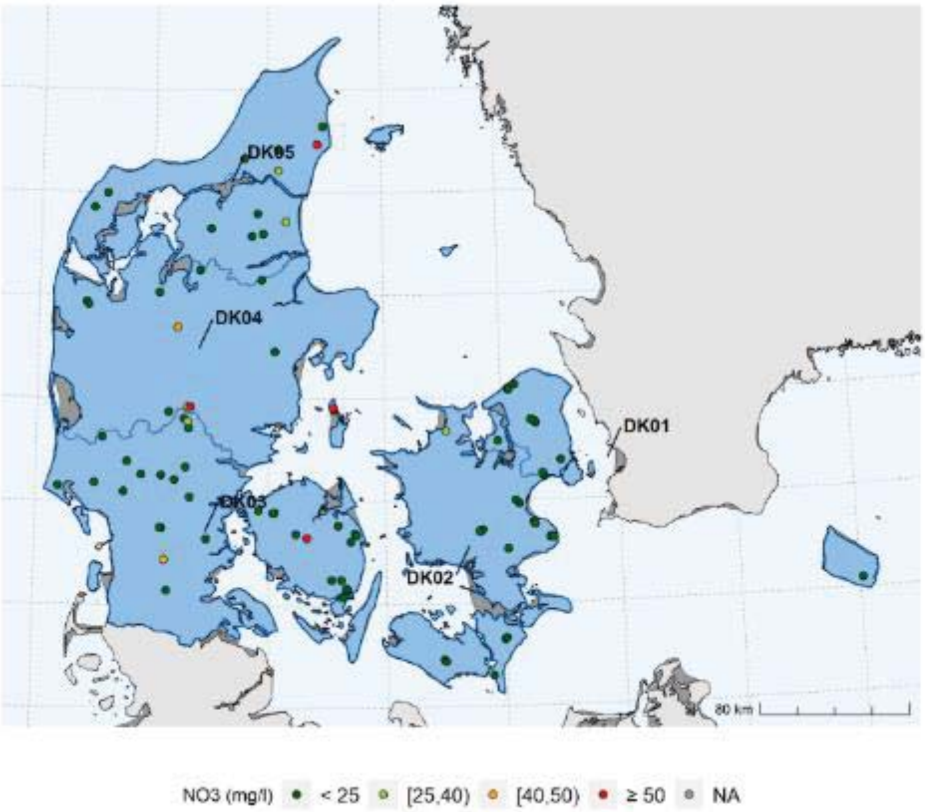


NUTS ID	NUTS NAME	>=40 and < 50 mg/l incr.trend	>=50 mg/l
DK01	Hovedstaden	1	7
DK02	Sjælland	2	24
DK03	Syddanmark	6	32
DK04	Midtjylland	20	67
DK05	Nordjylland	3	52
	Total	**32**	**182**

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

The hotspot analysis identifies all the GW monitoring stations that have NO3 concentration in the range of 40-50 mg/l with increasing trends 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



Station Type	Description	Number of removed stations		
		total removed	with measurements	with trends
0	Phreatic groundwater (shallow): 0-5 m	5	5	4
1a	Phreatic groundwater (deep) 5-15 m	24	24	20
1b	Phreatic groundwater (deep) 15-30 m	26	26	22
1c	Phreatic groundwater (deep) >30 m	47	47	26
2	Captive groundwater	0	0	0
3	Karstic groundwater	0	0	0
9	Not specified	0	0	0
	Total	**102**	**102**	**72**

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

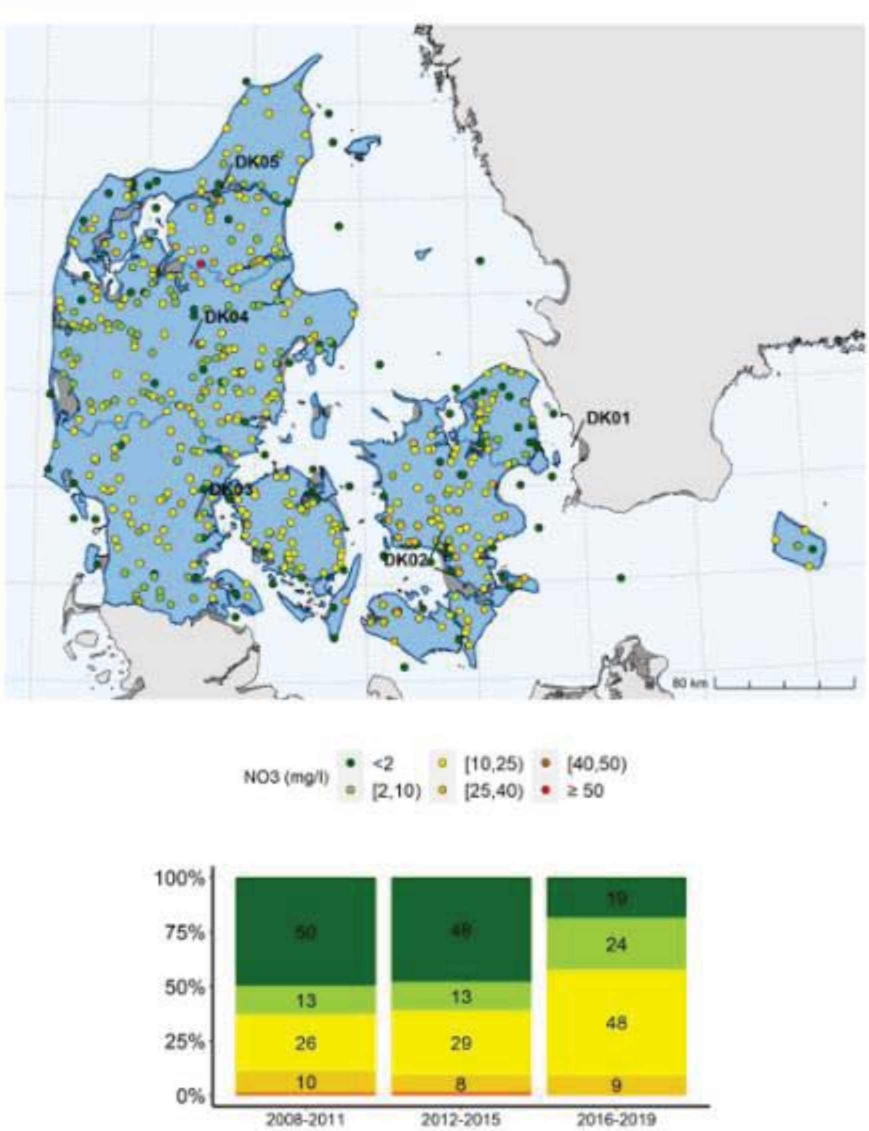


Figure 9. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information.

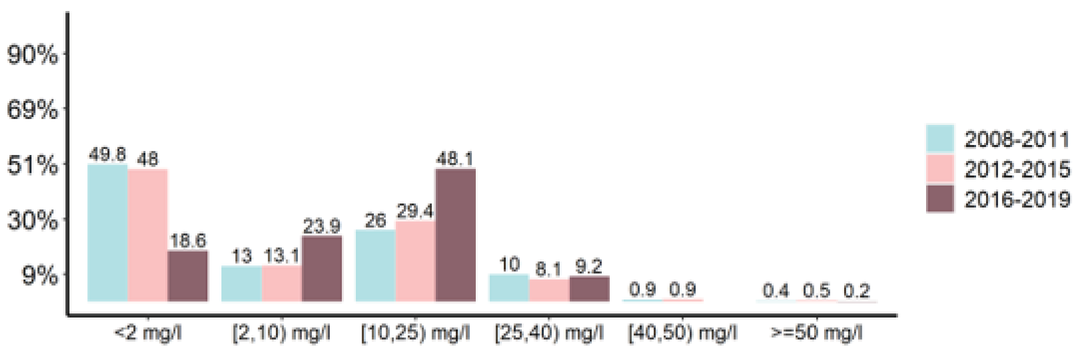


Figure 10. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis)

Surface water average annual nitrate concentration trend

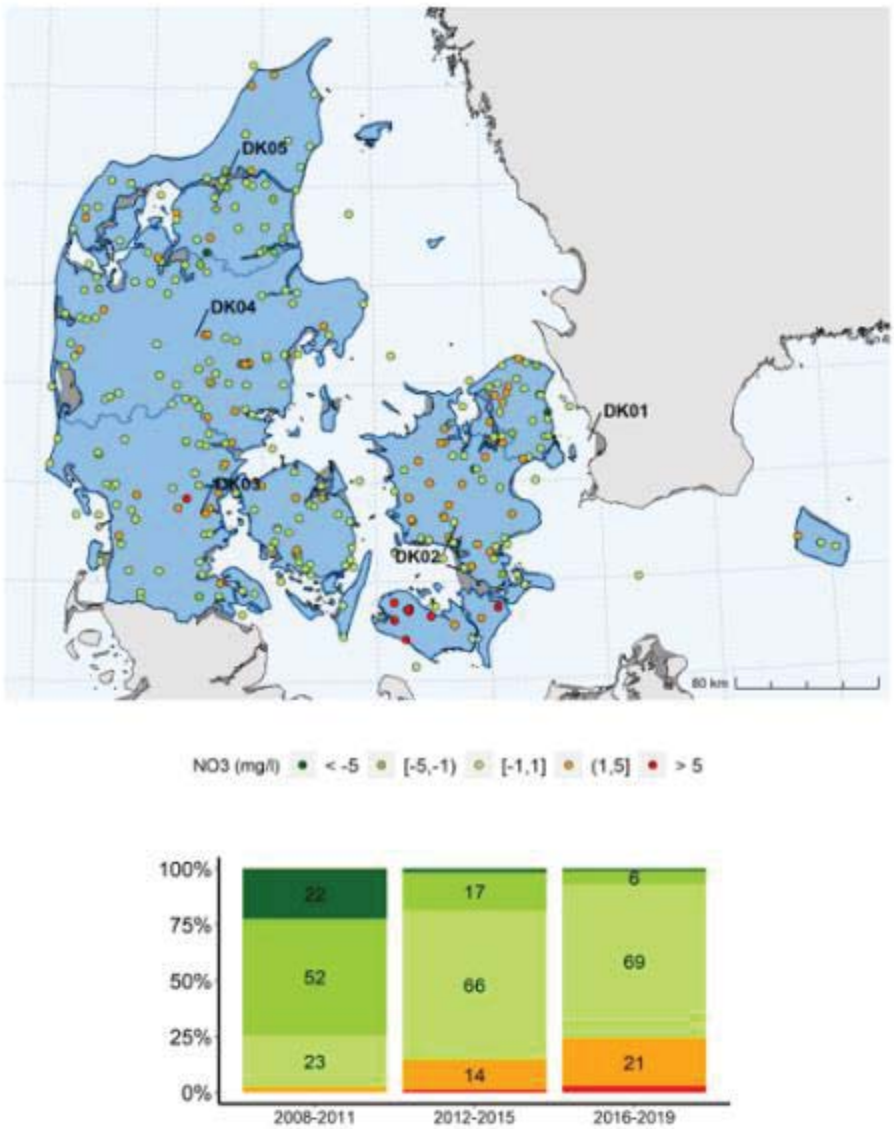


Figure 11. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information.

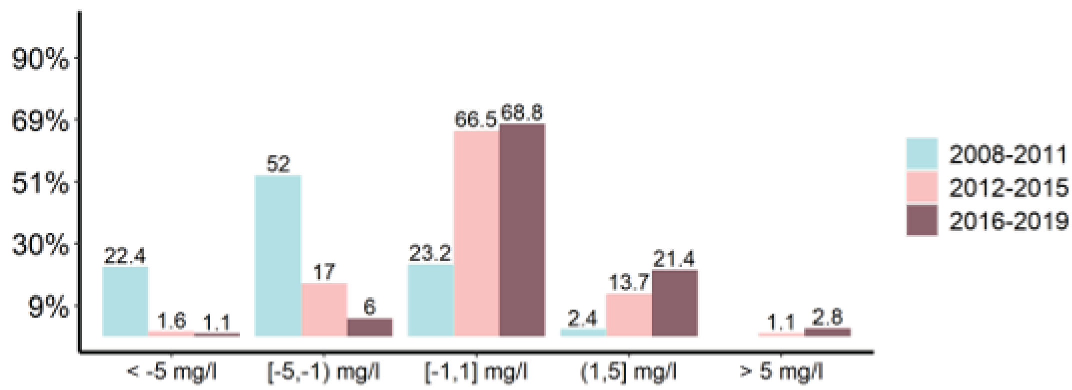


Figure 12. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis)

Surface Water Eutrophication

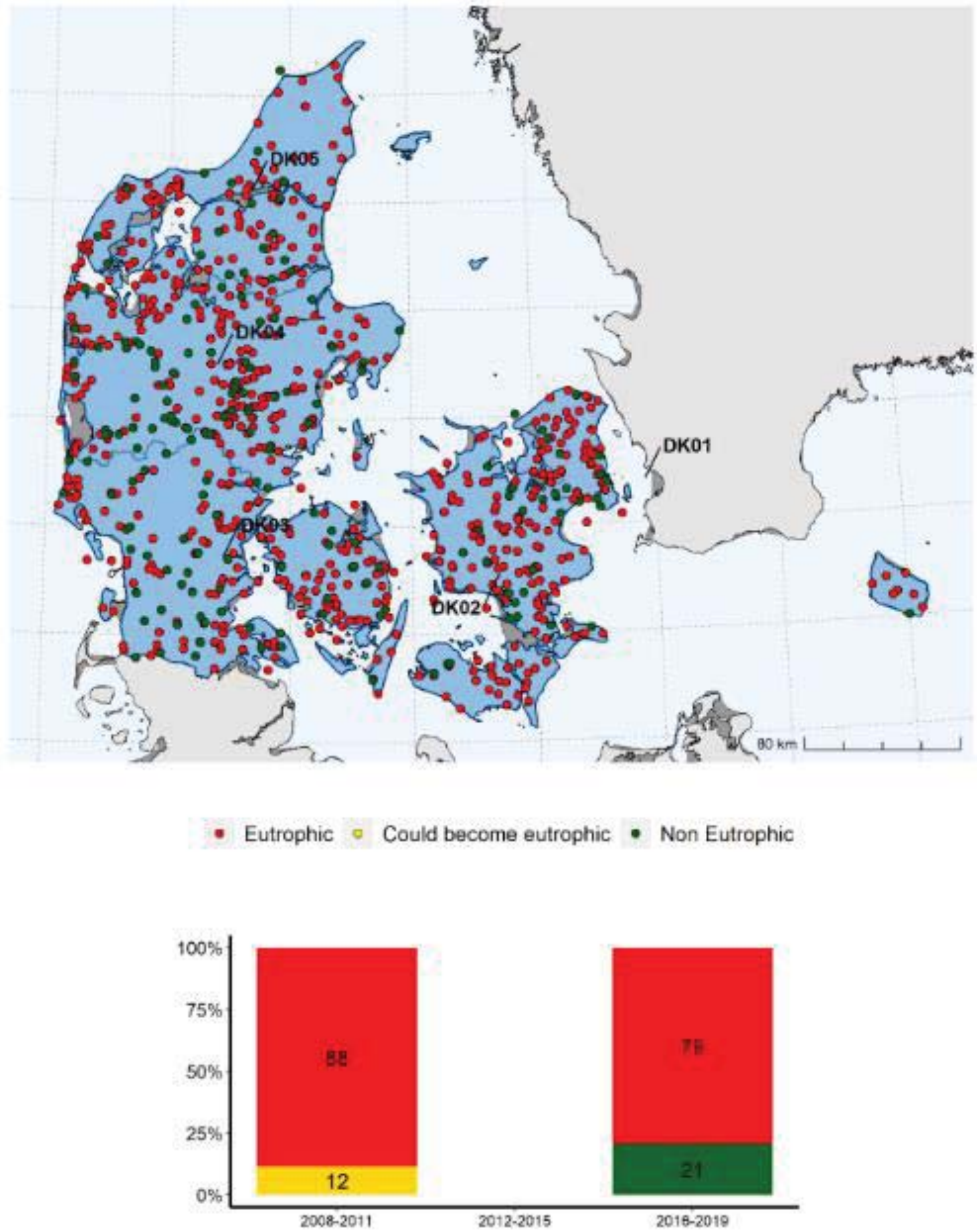


Figure 13. Spatial distribution of eutrophic status (map) and corresponding percentage of monitoring points per classes of status by reporting period (x axis).

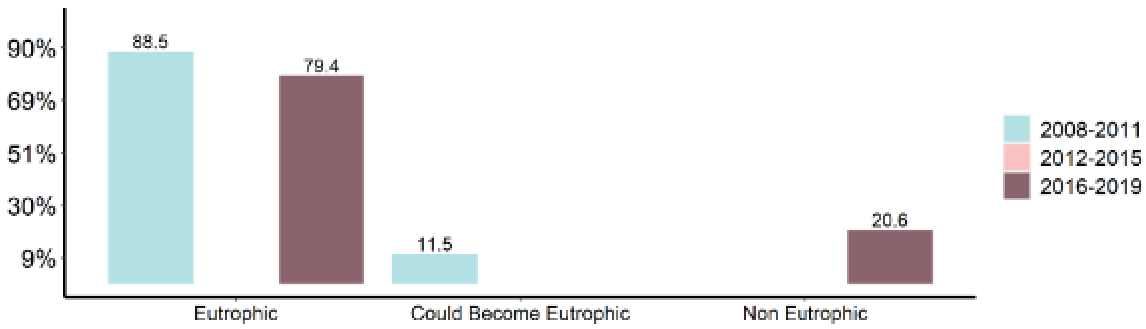
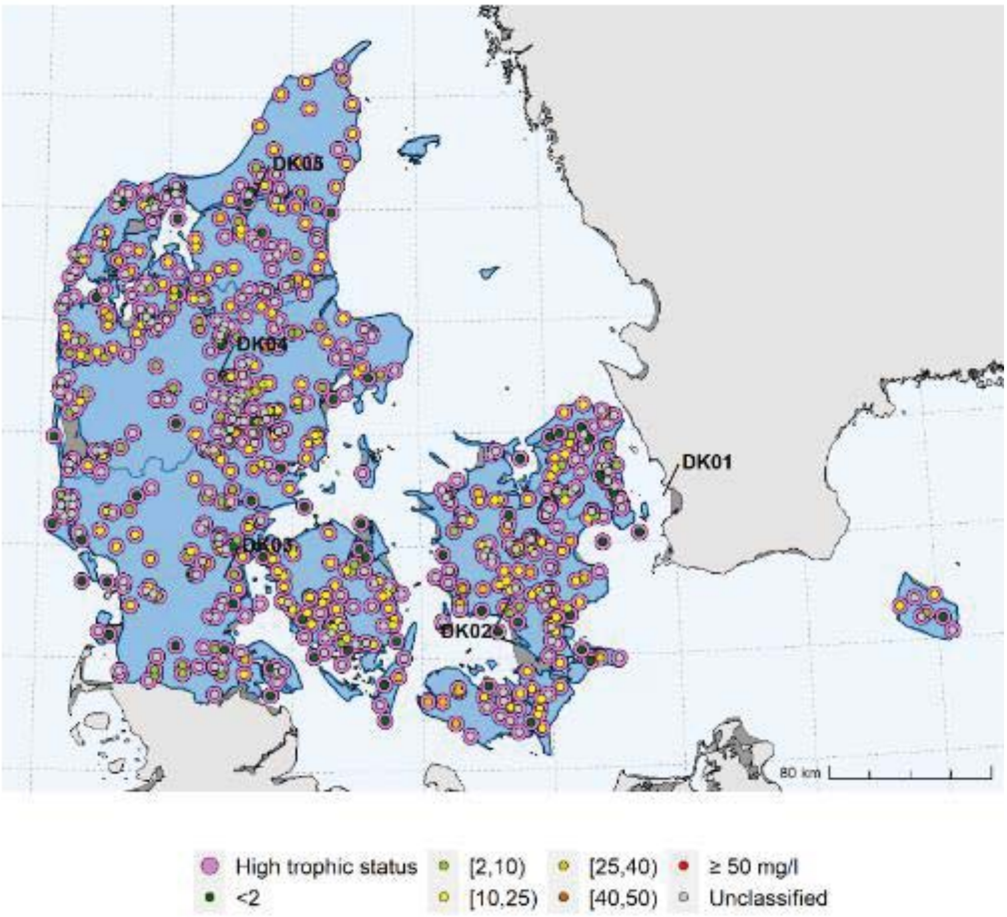


Figure 14. Comparison of percentage of monitoring points in the three reporting periods by classes of status (x axis)

The Eutrophic status vs average NO3 annual concentration



NUTS ID	NUTS NAME	High trophic status	Number of stations by classes of concentration						
			<2 mg/l	[2,10) mg/l	[10,25) mg/l	[25,40) mg/l	[40,50) mg/l	>=50 mg/l	Unclassified
DK01	Hovedstaden	55	8	7	11	0	0	0	29
DK02	Sjælland	123	1	5	41	16	0	0	60
DK03	Syddanmark	148	5	19	46	3	0	0	75
DK04	Midtjylland	192	6	31	43	8	0	0	104
DK05	Nordjylland	104	6	8	33	5	0	0	52
NO_NUTS	SALINE	52	43	9	0	0	0	0	0
	Total	**674**	**69**	**79**	**174**	**32**	**0**	**0**	**320**

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

Eutrophication caused by excess amounts of nutrients is mainly a problem in lakes and marine waters, and large or slowly flowing rivers. In Danish streams, the residence time is too short for planktonic algae to become a problem. Thus, monitoring of eutrophication indicators such as chlorophyll-a concentration is only relevant in lakes, coastal waters and large rivers. Dissolved nutrients may have an effect on benthic algae and macrophytes in streams, but Denmark has not yet established a classification scheme for this kind of nutrient enrichment effects in watercourses.

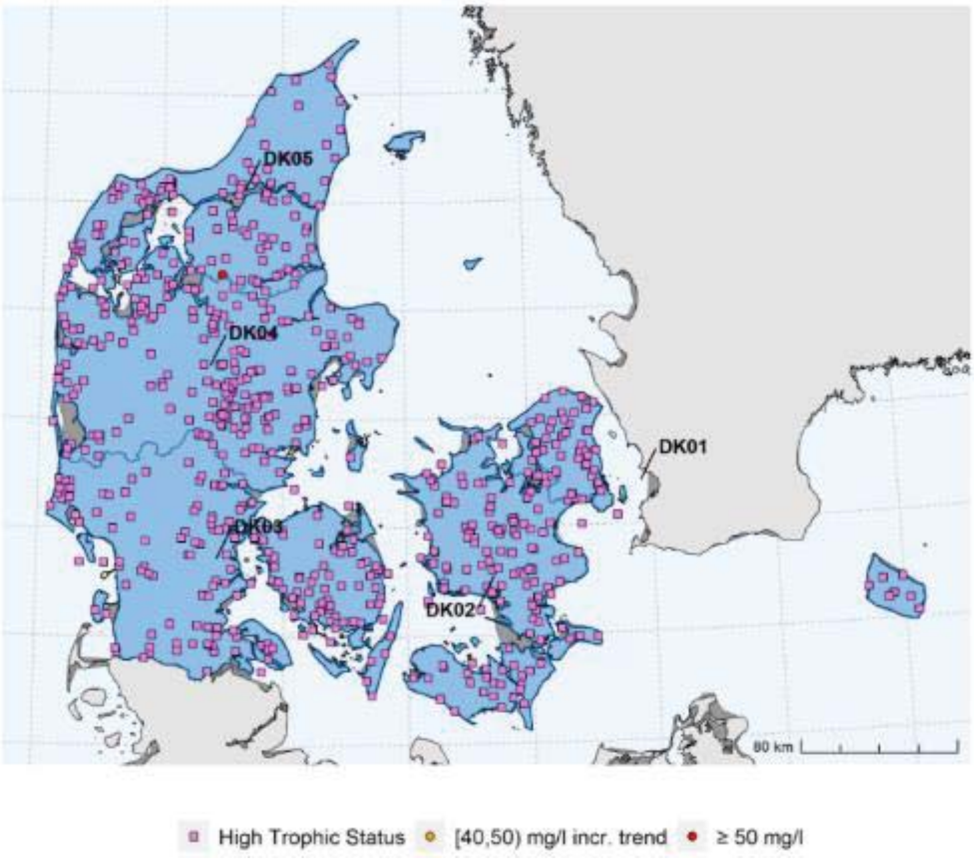
The classification of ecological state are based on data from the third River Basement Management Plans (RBMP) in line with the Guidelines. The same approach for classification of ecological state are used for watercourses, lakes and Estuarine, coastal and marine waters.

The classification of the ecological state of lakes is based on monitoring data sampled during the period 2014-2019. If there are no data from this period, data dating back until 2008 may have been used.

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	283	0	108
5	Lake/reservoir water	339	0	64
6	Transitional water	0	0	0
7	Coastal water	46	0	2
8	Marine water	6	0	1
9	Not specified	0	0	0
	Total	**674**	**0**	**175**

Surface Water quality hotspot

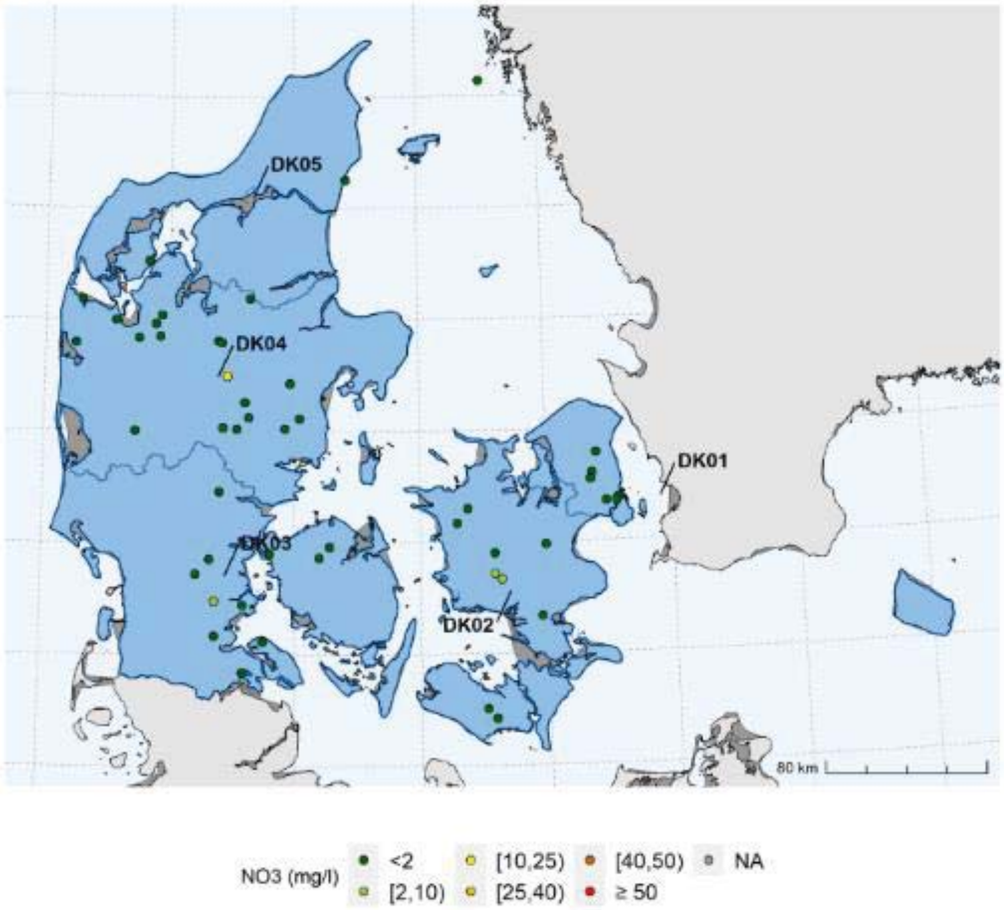


NUTS ID	NUTS NAME	High trophic status	>=40 and < 50 mg/l incr.trend	>=50 mg/l
DK01	Hovedstaden	55	0	0
DK02	Sjælland	123	0	0
DK03	Syddanmark	148	0	0
DK04	Midtjylland	192	0	1
DK05	Nordjylland	104	0	0
NO_NUTS	SALINE	52	0	0
	Total	**674**	**0**	**1**

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

The hotspot analysis identifies all the SW monitoring stations that have high trophic status, 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



Station Type	Description	Number of removed stations: total removed	with measurements	with trends	with trophic status
4	River water	1	1	1	0
5	Lake/reservoir water	46	46	8	0
6	Transitional water	0	0	0	0
7	Coastal water	0	0	0	0
8	Marine water	2	2	2	0
9	Not specified	0	0	0	0
	Total	**49**	**49**	**11**	**0**

Figure 17. SW removed stations map (top graph) and distribution by surface water type (lower graph). In the map NVZ in blue.

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

Measures in the Action Programme

According to article 3 (5) in the Nitrates Directive the Danish Nitrates Action Programme applies to the whole national territory. Measures according to code of good practice pursuant to the Nitrates Directive, are included in the Nitrate Action Programme as mandatory measures equivalent to the measures included in the programme pursuant to the directive.

The cost effectiveness shows that the higher N-quota has increased income and N-losses, but in both cases less than expected. The increased income is likely to be around 400-600 million DKK. The increased use of nitrogen has been around 30-35.000 tones N.

The period from 2015 to 2019 has seen a transition towards more targeted measures and this has insured that the implementation has become more flexible and cheaper to implement. At the same time, it has only been a first step towards targeting as the variation in the measures efficiency across soils and the nitrogen retention map has not been fully used in the targeting. The increased flexibility was a process that already started before 2016 allowing farmers to replace catch crops with other measures if the measures had the same environmental effect. The targets regarding collective measures have been ambitious and especially the creation of mini wet lands, which in 2015 was a new measure. It is not uncommon that new measures are faced with implementation challenges, which also happened in this case despite a large effort to get farmers on board

Table 6. Details of Action Programme

Measure	General details in Action Programme (*)
Period of prohibition of fertiliser application	• In the period from harvest, though no later than 1. October, to 1. February, liquid manure or digestate from vegetable biomass may not be applied – with exemptions (§ 28 of EO No 760)
Restrictions for application on sloped soils	• Manure, degassed plant biomass, and mineral fertilizer must not be applied on sloping areas (§ 29 (6) (7) of EO No 760)
Restrictions for application on soaked, frozen, or snow-covered soils	• Manure, digestate from plant biomass, silage effluent, residual water and mineral fertilizer must not be applied in a manner with risk of run-off, including water-saturated, flooded, frozen or snow-covered soil (§ 29 (5) of EO No 760)
Restrictions for application near watercourses (buffer strips)	• Manure, digestate, silage effluent, residual water and mineral fertilizer must not be applied 2 m from watercourses (§ 29 (5) (8) of EO No 760)
Effluent storage works	§ 8-9,11-16,18-19, 22-26 of Order No 1318
	• Stables, stalls, etc. shall be designed in such a way that ground-water and surface water is not polluted.
	• Silage must be stored in a silage storage facility or wrapped in waterproof material. Silage effluent must be discharged through purpose-designed drainage.
	• Storage vessels for liquid manure, silage effluent, digestate and residual water must be constructed of materials which are re-sistant, impermeable to moisture. The vessels must be dimen-sioned in relation to capacity, so that they can withstand the in-fluence, including from stirring, covering and emptying. Drains from stables/stalls, manure yards, silage stocks, cesspools, and pump wells shall be run through impermeable closed pipes and shall lead to liquid manure containers.
Capacity of manure storage	§ 8-9,11-16,18-19, 22-26 of Order No 1318
	• Solid manure must be stored in accordance with the correct provisions. When storing manure it must be ensured that surface water from the surrounding areas cannot seap into the manure storage. Compost with a dry matter content of at least 30% may be stored in the field, if complying with certain requirements.
	• Manure stored in the field, deep litter and processed manure, compost with a dry matter percentage greater than or equal to 12 must be covered with waterproof material.
	• Capacity of storage facilities for manure must be adequate (specified). Adequate storage capacity may be satisfied by storage on other property or delivery to the biogas plant, manure treatment plant or manure storage facility.
Rational fertilisation (e.g., splitting fertilisation, limitations)	• In each plan period, farms subject to registration in the Fertilizer Register pursuant to the Act must not apply more nitrogen for fertilizer purposes than the fertilizer quota calculated for the farm. For each plan period, a farm's total fertilizer quota for nitrogen must be calculated as the sum of the quotas for each farm field. For each field the quota must be calculated on basis of the size of the field, the crop, the pre-crop and the nitrogen standard of the crop (§ 12 of Act No. 338)
	• Application of liquid manure and digestate may only be carried out by means of trailing hoses, trailing foot/shoe applicators or by injection (§ 27 (2) , 29 (1) of EO No 760)
Crop rotation, permanent crop enhancement	• Agricultural enterprises with crop or livestock or combinations thereof with a certain annual turnover from crops or livestock, or combinations thereof and a total area of 10 hectares or more, shall establish a minimum amount of catch crops (§ 38 of Act No 338)
Vegetation cover in rainy periods, winter	• Not specified
Fertilisation plans, spreading records	• Requirement to prepare a fertilizer plan and a fertilizer account for each holding (§ 11, 12, 14 of EO No. 762)
	• Farms subject to registration in the Fertilizer Register pursuant to the Fertilizers Act must report a fertilizer plan in a dedicated template showing all cultivated and uncultivated areas, a field map and the field crops. The farms must do this no later than 10 September after the end of the planning period. The farms must submit the plan electronically using a self-service IT facility on the Danish Agricultural Agency website (§ 11, 12, 14 of EO No. 762)
	• By the end of March each year, farmers are obliged to submit their farm fertilization account containing information on the pre-vious cropping season (planning period August-July) to the Dan-ish Agricultural Agency for registration and control (§ 11, 12, 14 of EO No. 762)
Other measures	• Agricultural enterprises with crop or livestock or combinations thereof with a certain annual turnover from crops or livestock, or combinations thereof and a total area of 10 hectares or more, shall establish a minimum amount of catch crops (§ 38 in Act No 338)
Date for application limit of 170 kg N/ha/year:	• The planning period is from 1st of August to 31st of July. The compliance with the limit in the planning period is calculated, when the fertilizer account for the planning period is submitted latest April 1, the year after the planning period.

(*) Executive Order (EO) No 760 of 30 June 2019 on Environmental Regulation of Animal Husbandry and the Storage and Use of Fertilisers, "Bekendtgørelse om miljøregulering af dyrehold og om opbevaring og anvendelse af gødning"

Executive Order (EO) No 762 of 29 July 2019 on Agricultural Use of Fertilisers in the planning period 2019/2020, “Bekendtgørelse om jordbrugets anvendelse af gødning i planperioden 2019/2020”.

Order No. 1318 on commercial keeping of livestock, manure, silage, of /06/2015.

Act No. 338 of 2. April 2019 on agricultural use of fertilizer and plant cover. “Lov nr. 338 af 2. april 2019 om jordbrugets an-vendelse af gødning og om næringsstofreducerende tiltag”

Controls

In the period2016/2017, the Danish Agricultural Agency carried out 121 inspections on the spot, 1.7 % were reported to the police for severe violations and 0.8 % receives an administrative fine for a severe violation of the provisions on rational fertilizer use. This share illustrates a decrease in farms with severe violations, compared to the previous data from 2014 (9.6 %).

586 Danish farmers over the 35.866, which were obliged to submit a fertilizer account in the period 2016/2017, were controlled for fertilization accounts and for the amount of livestock manure applied to land each year.

In 2019, a total of 235 on-site inspections on catch crops was carried out involving three national schemes on catch crops: Mandatory catch crops, livestock catch crops and the targeted nitrogen regulation (targeted catch crops).

Designation of NVZ

Denmark applies a whole territory approach (43,908 km^2).

Forecast of Water Quality

In the 2nd River Basin Management Plans (RBMPs) for 2015-2021 it was estimated that land-based Danish nitrogen losses to Danish coastal waters should be reduced to approximately 44,700 tons N/year (target load) to support the coastal waters to meet good ecological status. In the model calculations it is assumed that other member states reduce their load correspondingly to a level that supports the achievement of the targets (burden-sharing).

As regard to the environmental objectives in groundwater, it was presupposed in the 2nd RBMP that on a long term basis, the new targeted regulation along with the baseline 2021 and the existing general regulation will meet the need of measures for groundwater bodies as proposed in the draft river basin management plans 2015-2021. Thus, groundwater bodies in poor chemical status in general are expected to reach good chemical status after 2021.

Summary

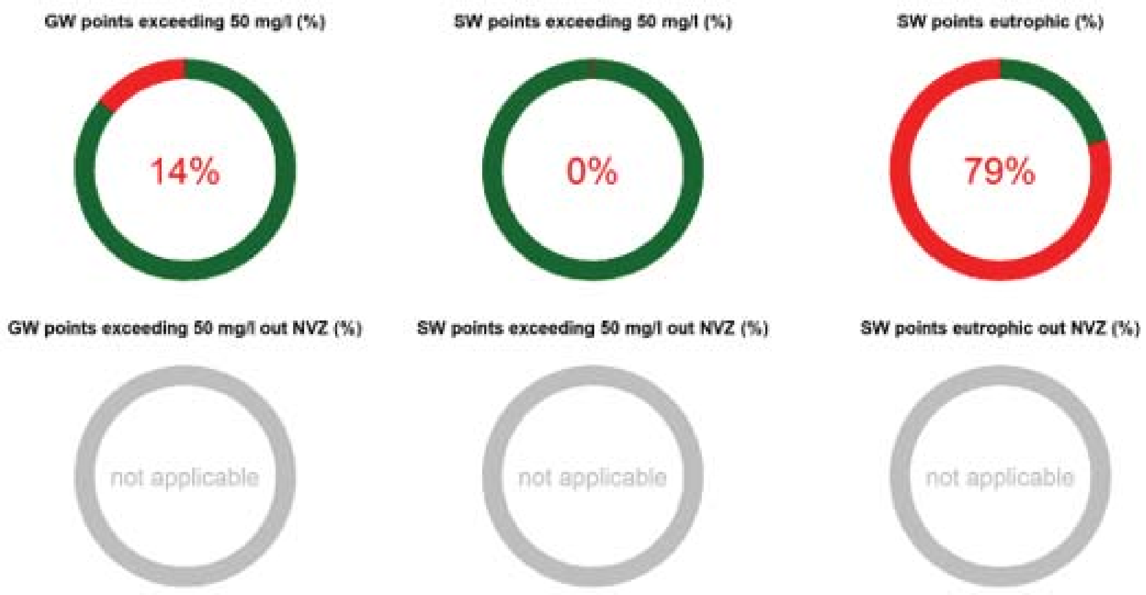


Figure 18. The summary plot for the period 2016-2019

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

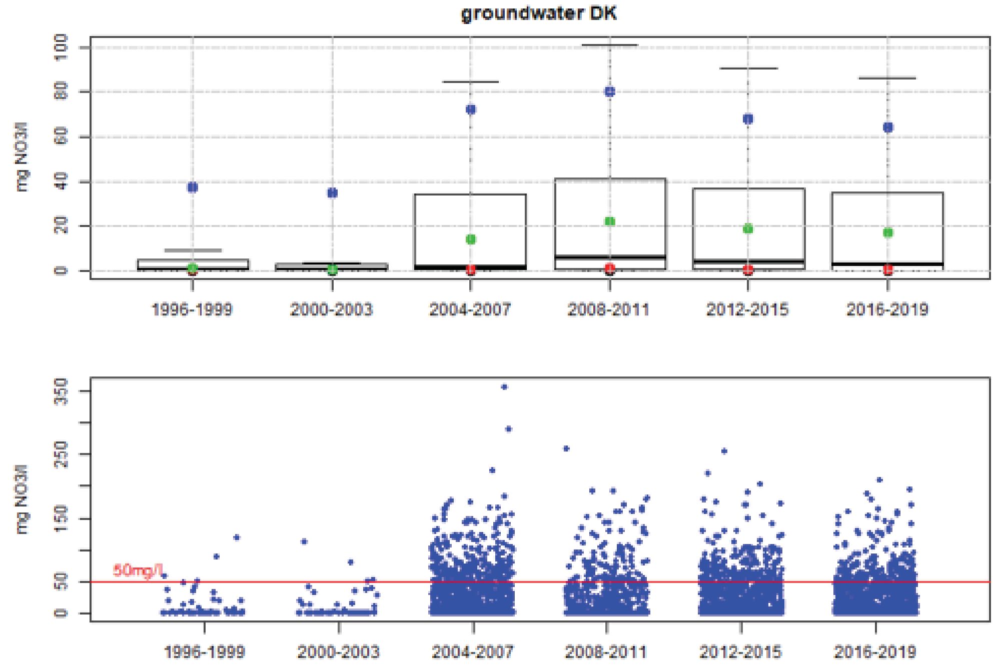


Figure 19. Time series of box whisker plots along with the distribution of the average NO3 annual concentrations for each reporting period for groundwater stations. RPs represent the reporting periods, RP7 being the last period (2016-2019). The blue, red, green and black dots represent the mean of the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

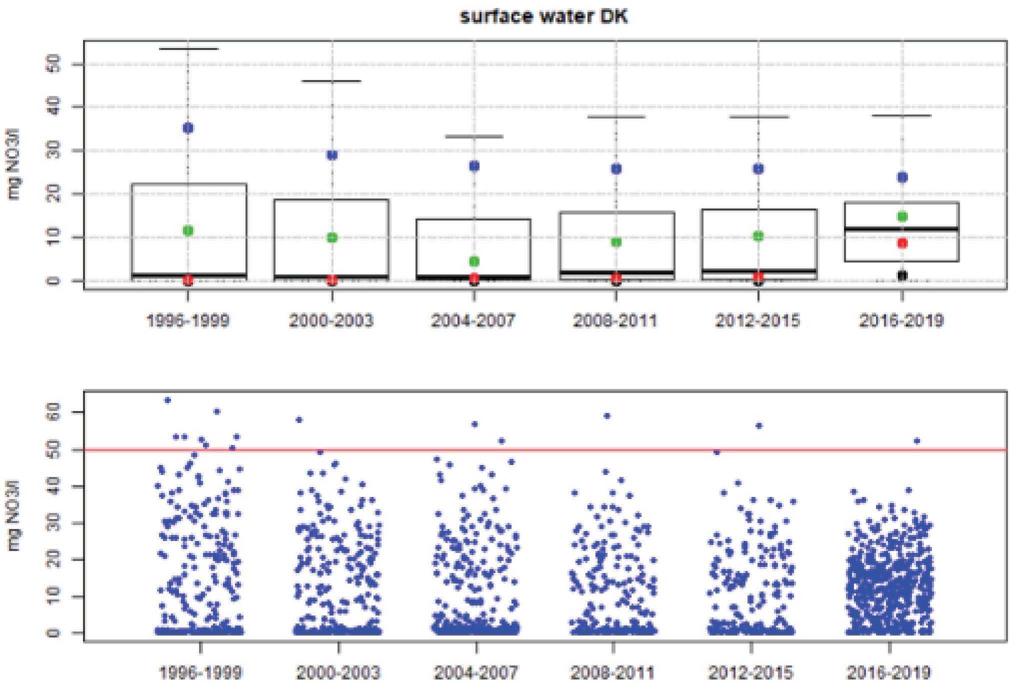


Figure 20. Time series of box whisker plots along with the distribution of the average NO3 annual concentrations for each reporting period for surface water stations. RPs represent the reporting periods, RP7 being the last period (2016-2019). The blue, red, green and black dots represent the mean of the fourth third, second and first quartiles, respectively. « Note that all types of surface waters are pooled. For the last period (2016-2019), considerable more water courses were monitored compared to previous periods. This might have biased the average towards higher NO3 concentration"

Conclusions and recommendations

Denmark has a high livestock pressure and the nitrogen surplus is about the average for the EU.

There is a very well elaborated network of monitoring stations. The groundwater quality is generally good. However, there are a high number of groundwater monitoring points with increasing trend. A very high number of the surface waters are found to be eutrophic.

The action programme was revised in 2020.

The Commission recommends Denmark to further reinforce its action programme to tackle the eutrophication of both inland and marine waters where the agricultural pressure is significant.

EUROPEAN
COMMISSION

Brussels, 11.10.2021
SWD(2021) 1001 final

PART 16/38

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

Estonia's utilized agricultural area amounts to 1 Mha, representing 23% of the total land area and increased of 10% since 2007. The major outputs of the agricultural industry excluding services and secondary activities include in a decreasing order milk (27.3%), and cereals (17.3%).
Eurostat

Major land use statistics for Estonia

Table 1.Utilized agricultural area (abbreviated as UAA)

Estonia	2005	2007	2010	2013	2016
Utilised agricultural area UAA (1000 ha)	NA	915	949	966	1004
arable land (1000 ha)	NA	594	640	628	687
permanent grass (1000 ha)	NA	306	296	325	304
permanent crops (1000 ha)	NA	3	3	3	3
kitchen gardens (1000 ha)	NA	11	10	10	9

Note:
Eurostat (FSS)

Estonia's arable land has increased since 2013 by 9.4%. The permanent grass land area has decreased by 6.5% 2013.

Animal distribution in Estonia

Estonia's livestock decreased since that last reporting period for all animal types. The livestock density index has continued its steady decrease since 2005 and is significantly lower than the EU average of 0.8.

Table 2. Livestock statistics

Estonia	2005	2007	2010	2013	2016
Livestock index	0.38	0.35	0.33	0.32	0.28
dairy cows (10^6 heads)	0.11	0.10	0.10	0.10	0.09
live bovines (10^6 heads)	0.25	0.24	0.24	0.26	0.25
live pigs (10^6 heads)	0.35	0.38	0.37	0.36	0.27
live poultry (10^6 heads)	NA	NA	1.94	2.17	1.90

Note:
Eurostat (FSS)

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

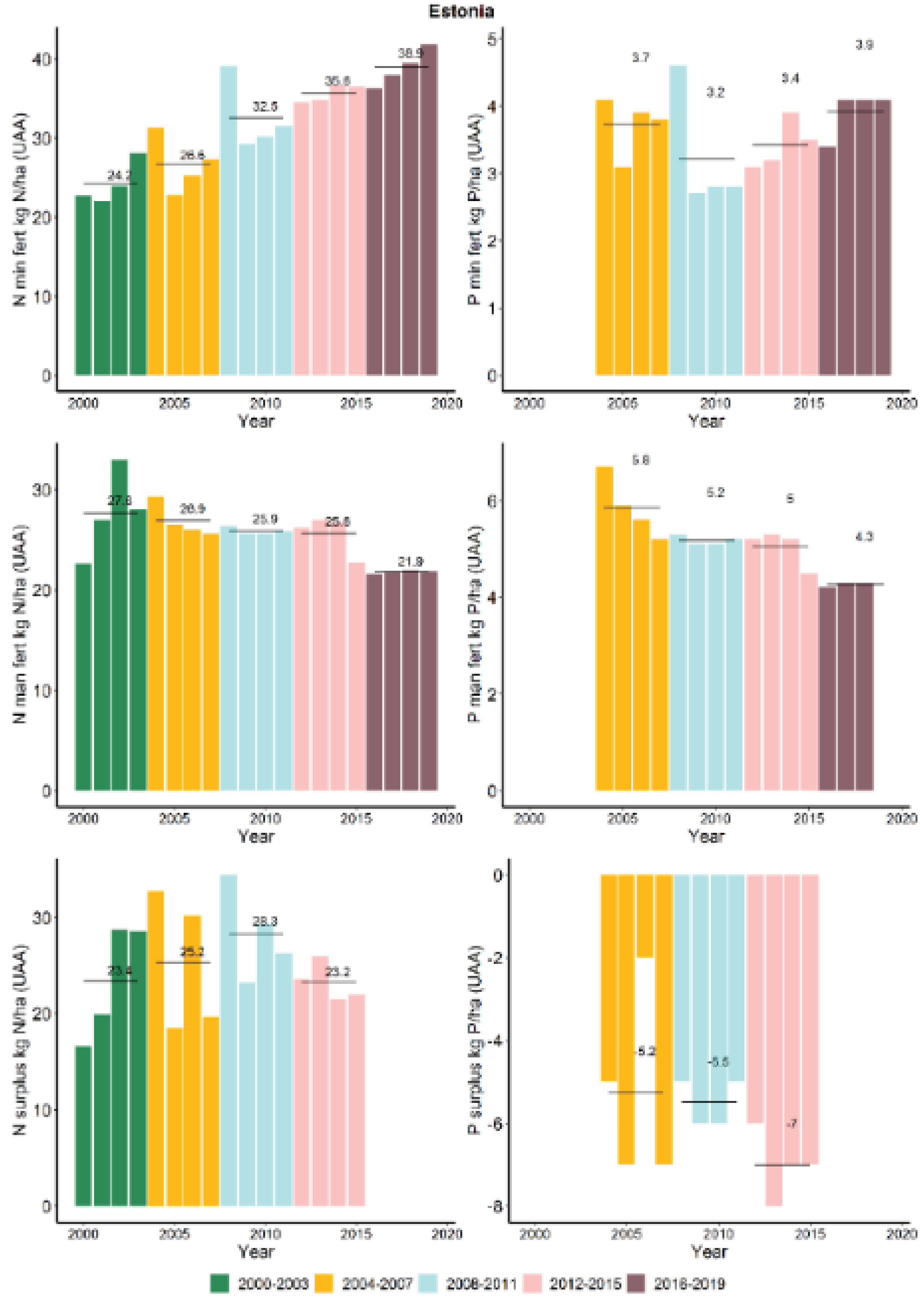


Figure 1. N and P fertilizers and gross surplus (kg/ha)

The gross nitrogen and phosphorus surpluses originate from EUROSTAT data for the years 2000-2014. No data are available beyond 2015. Data provided by Estonia have been used to complete the N and P mineral fertilizer and manure for the period 2015-2019. As regard to N and P manure values of year 2014, for which both Eurostat and national statistic were available, differences of 52% for N and 9% for P between the two sources were found.

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

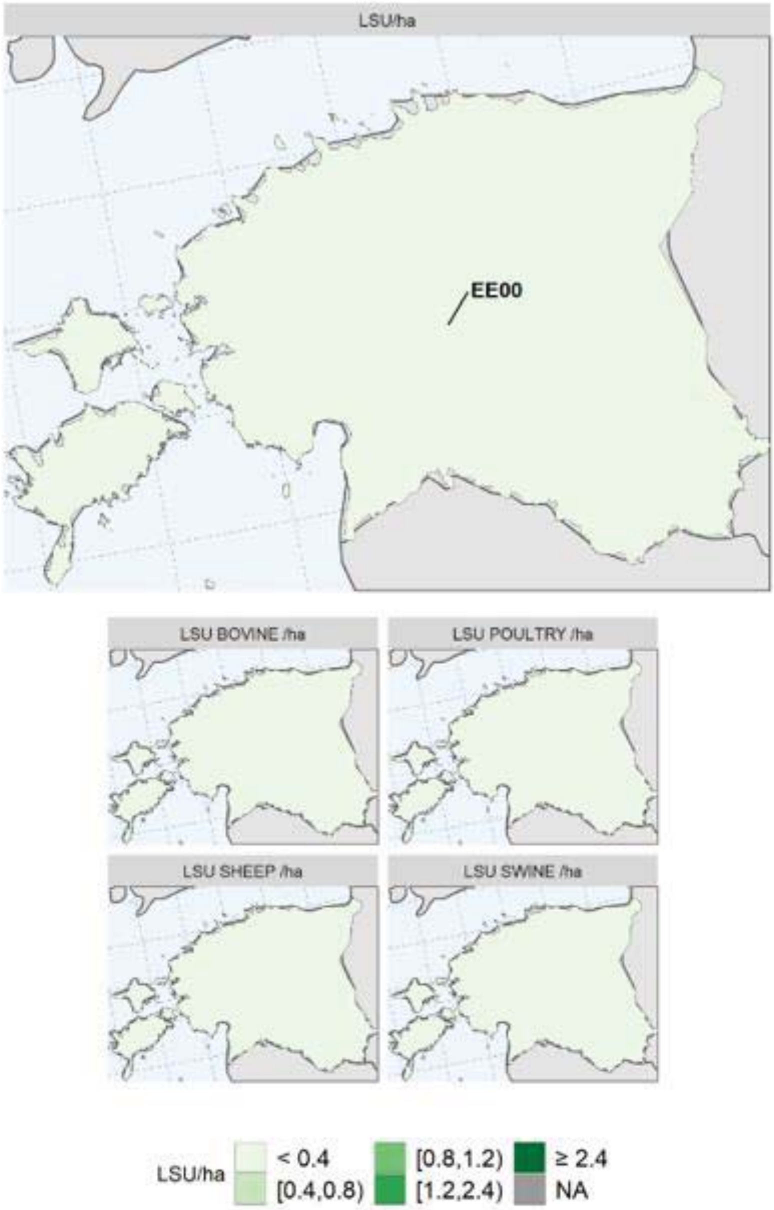


Figure 2. Map of livestock unit distribution, year 2016 (Source: Eurostat, February 2021)

Animal density is low throughout the country (total LSU and LSU by animal type were retrieved individually from EUROSTAT).
In this document, the NUTS-2013 version is used.
(https://ec.europa.eu/eurostat/web/gisco/geodata/reference-data/administrative-units-statistical-units/nuts)

Water Quality Monitoring

In Estonia, groundwater is monitored under the groundwater monitoring sub-programme of the national environmental monitoring programme; both in the bodies of groundwater established in accordance with the Water Framework Directive and in the Nitrate Vulnerable Zones (NVZ). The monitoring of groundwater covers the chemical and quantitative status of all 31 bodies of groundwater in Estonia. Given the higher agricultural pressure in the NVZ, the density of the network is higher in designated NVZ areas where sampling is performed up to four times a year (only once a year for groundwater bodies located outside NVZ areas).

The surface waters are subject to continuous monitoring. Trends are estimated every year at continuous monitoring stations. Status monitoring (on a rotational basis, at least once during each river basin management plan period, i.e. once every 6 years) is carried out on all major flowing and standing surface water bodies and coastal waters. This surveillance monitoring as defined in the WFD is designed to determine the ecological and/or chemical status of the water bodies; the monitoring of hydrobiological and hydrochemical parameters is also included. The sampling frequency at the continuous monitoring trend stations is four to 12 times a year.

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 in the whole country

		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	59	38	31	16	24	28
1a	Phreatic groundwater (deep) 5-15 m	45	37	24	0	10	22
1b	Phreatic groundwater (deep) 15-30 m	124	94	102	13	59	92
1c	Phreatic groundwater (deep) >30 m	38	211	210	10	11	188
2	Captive groundwater	0	0	0	0	0	0
3	Karstic groundwater	6	2	2	5	2	2
9	Not specified	25	3	0	1	2	0
	Total	**297**	**385**	**369**	**45**	**108**	**332**

Surface water quality monitoring network

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

		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	64	238	198	60	111	110	64	283	208
5	Lake/reservoir water	81	86	82	5	5	26	81	64	73
6	Transitional water	0	0	0	0	0	0	0	0	0
7	Coastal water	23	26	21	9	22	16	38	43	42
8	Marine water	0	0	0	0	0	0	0	0	0
9	Not specified	0	0	0	0	0	0	0	0	0
	Total	**168**	**350**	**301**	**74**	**138**	**152**	**183**	**390**	**323**

Groundwater Quality

Groundwater average annual nitrate concentration

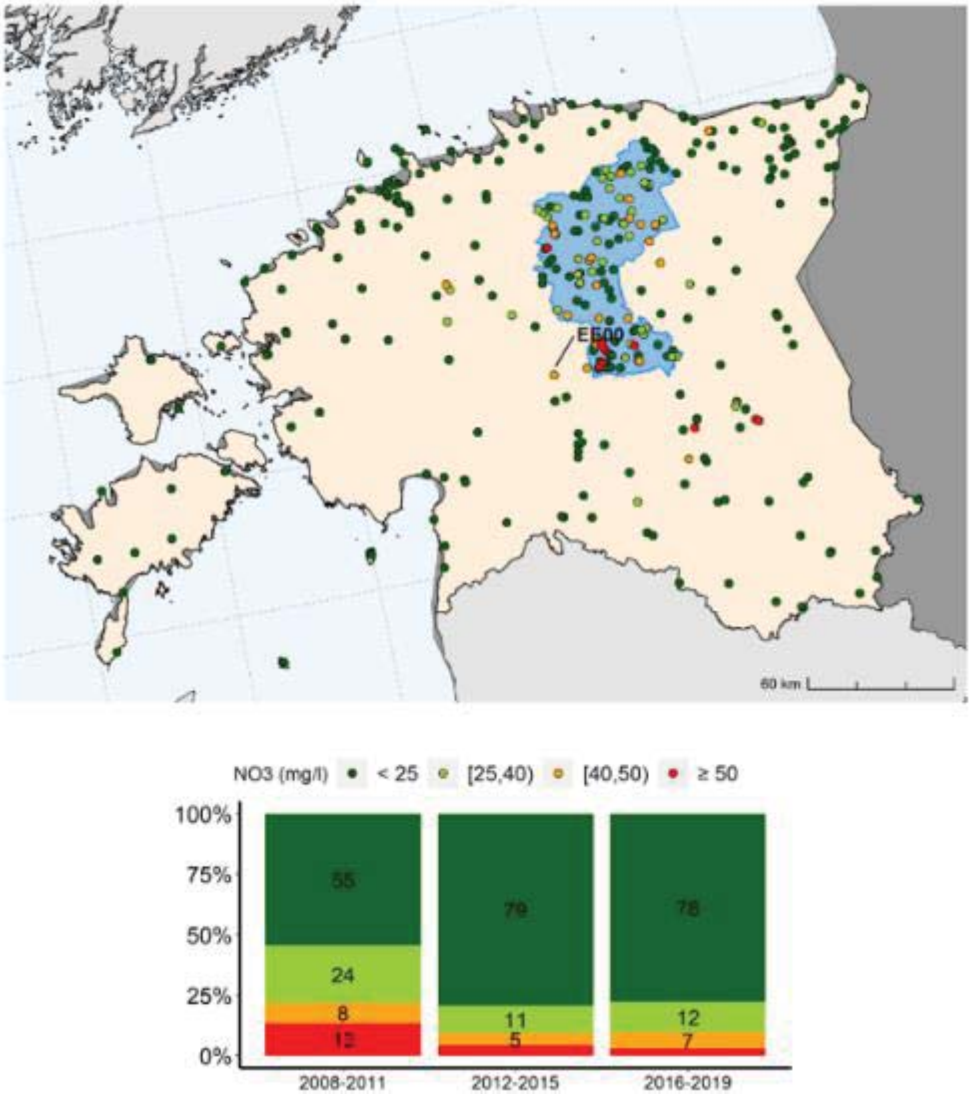


Figure 3. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information. In the map in blue the NVZ.

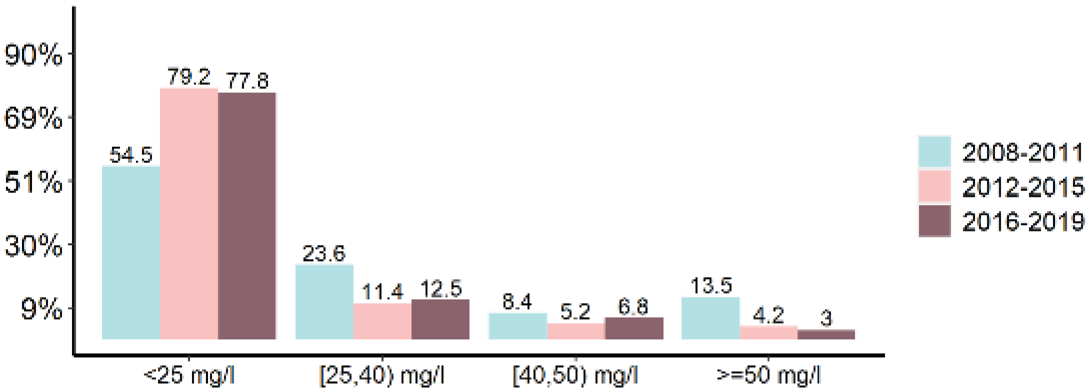


Figure 4. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis)

Groundwater average annual nitrate concentration trend

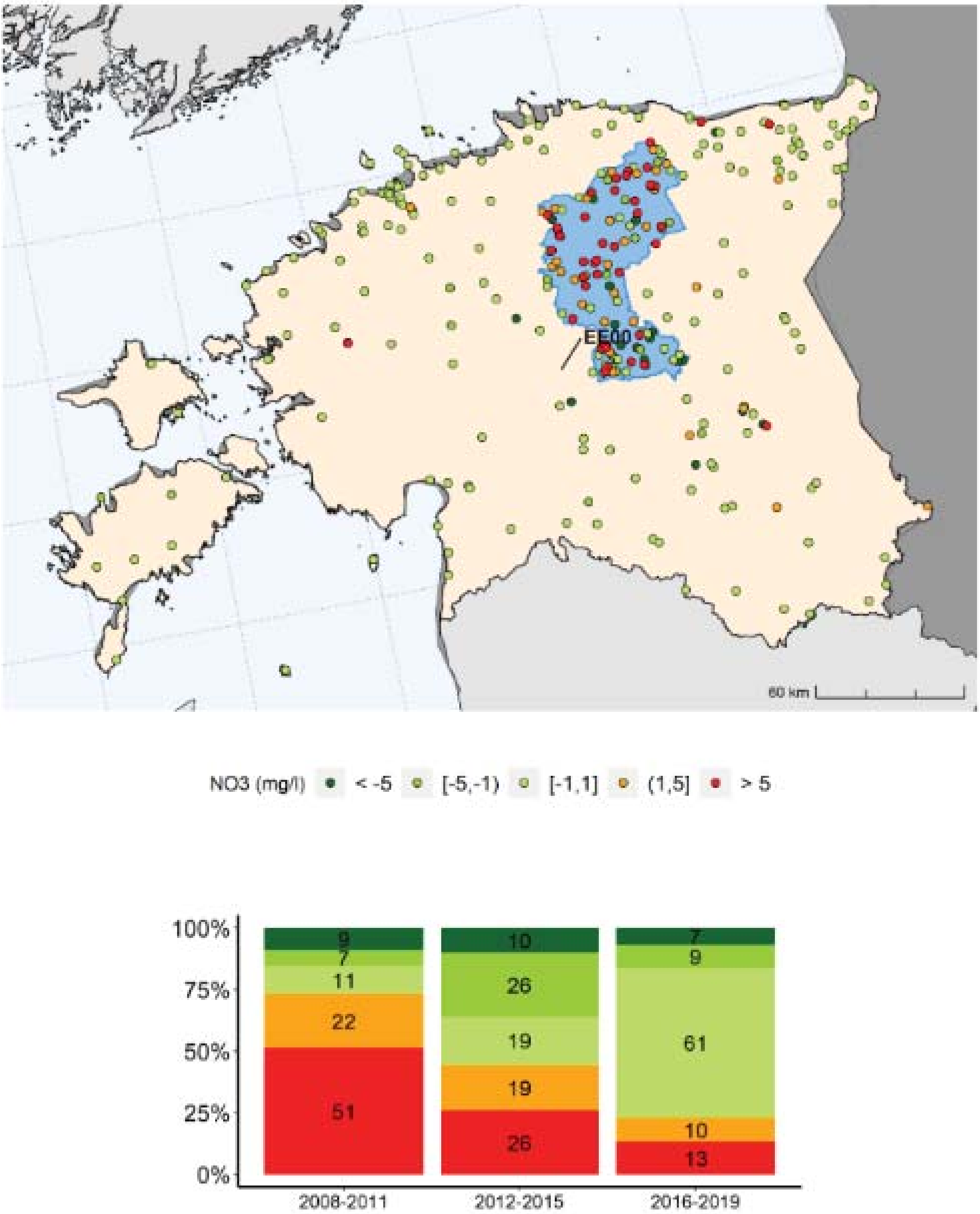


Figure 5. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis). In the map in blue the NVZ.

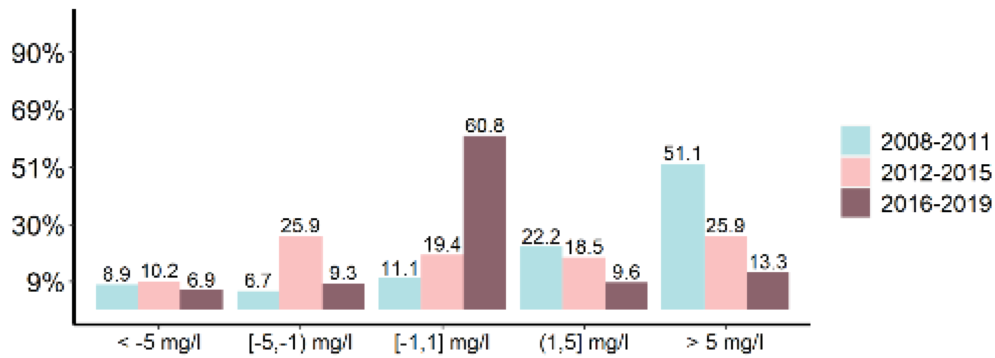
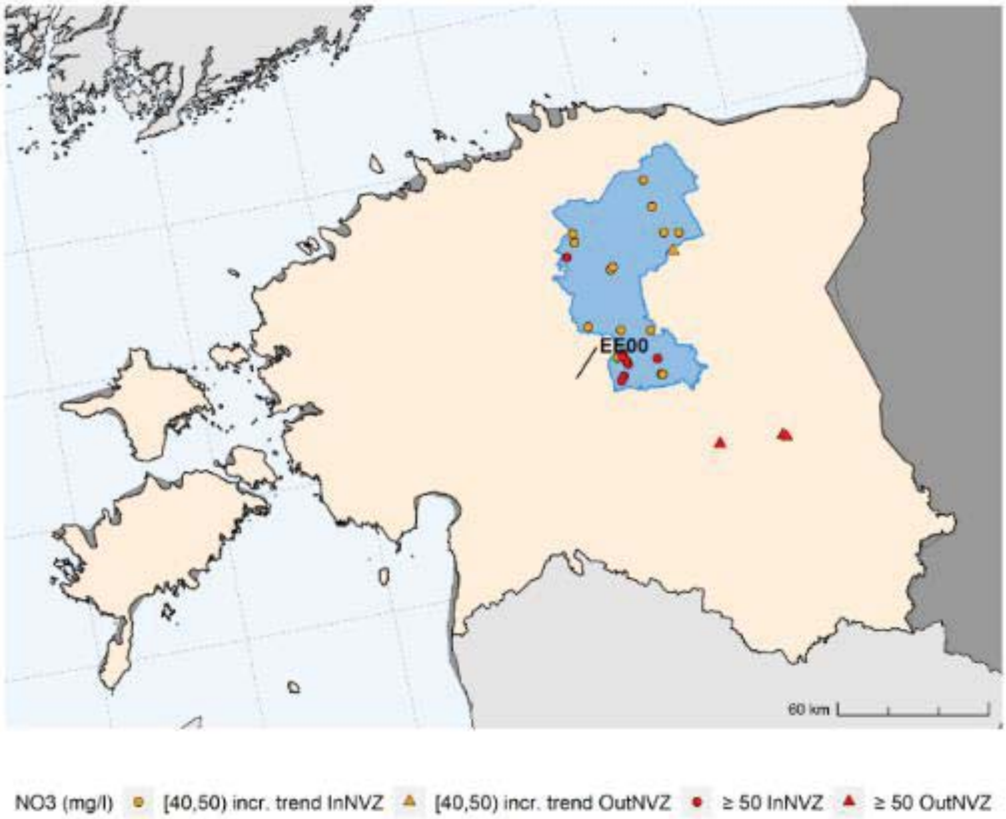


Figure 6. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis)

Groundwater hotspot



		>=40 and < 50 mg/l incr.trend		>=50 mg/l	
NUTS ID	NUTS NAME	InNVZ	OutNVZ	InNVZ	OutNVZ
EE00	Eesti	14	1	8	3
	Total	**14**	**1**	**8**	**3**

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.

Surface Water Quality

Surface water average annual nitrate concentration

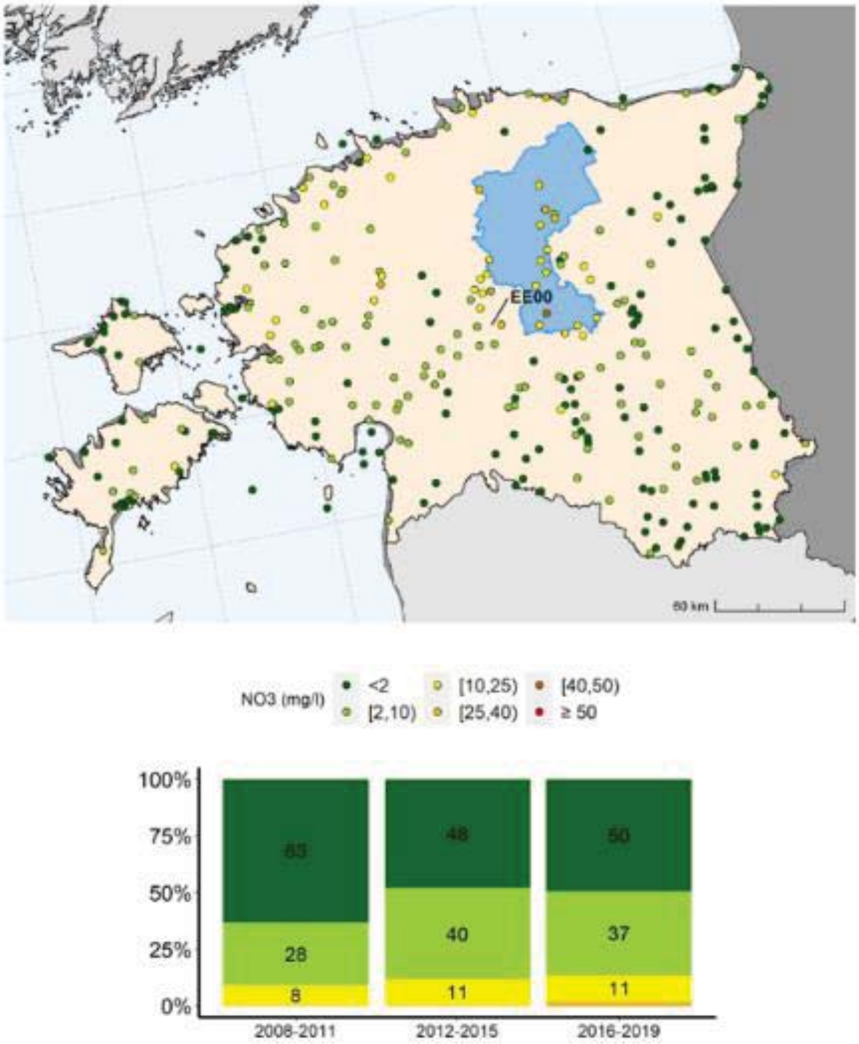


Figure 8. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information. In the map in blue the NVZ.

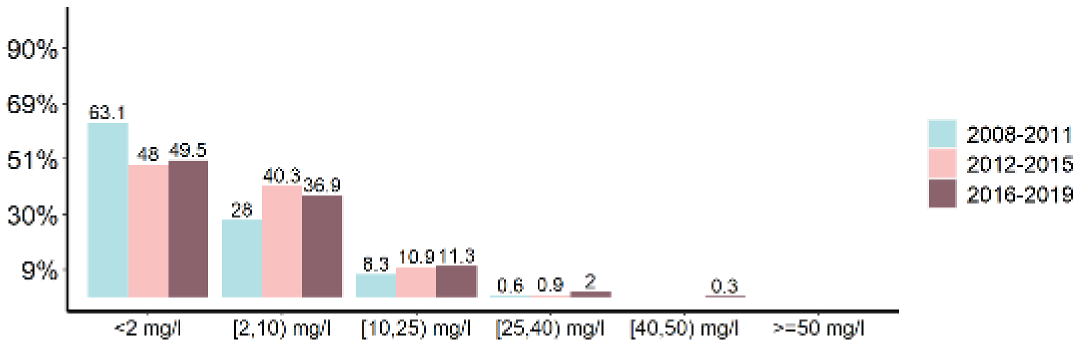
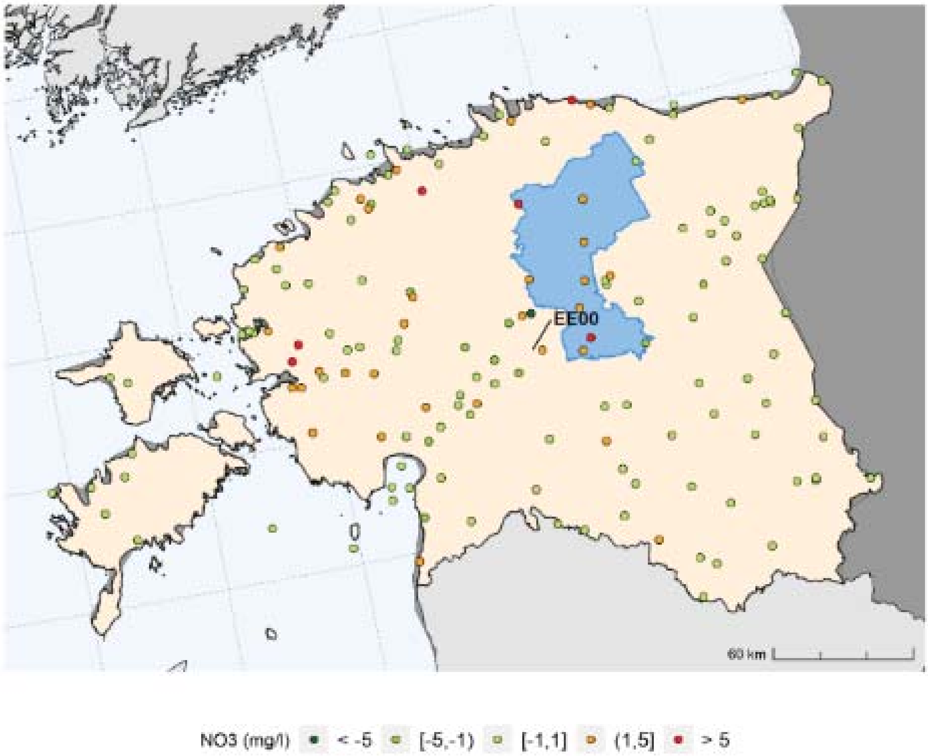


Figure 9. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis)

Surface water average annual nitrate concentration trend



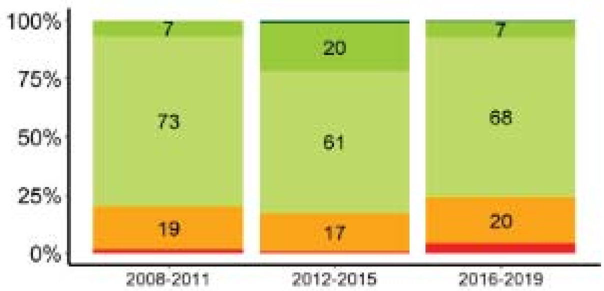


Figure 10. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis The percentages below 5% are not labelled, see the next plot for more information. In the map in blue the NVZ.

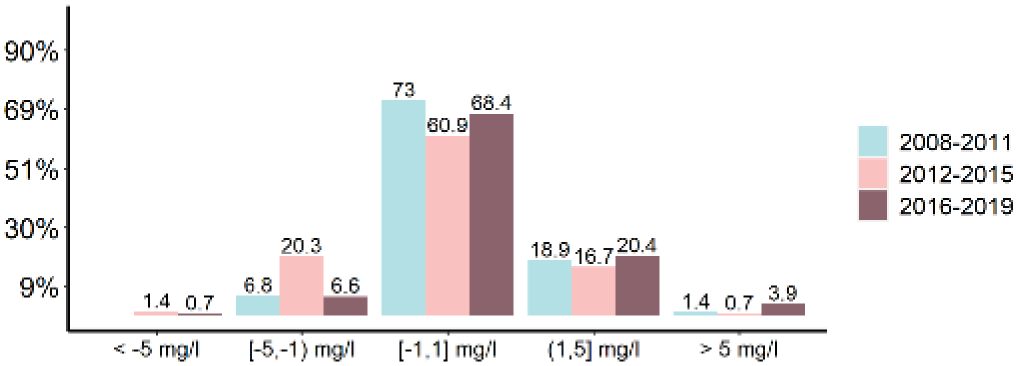
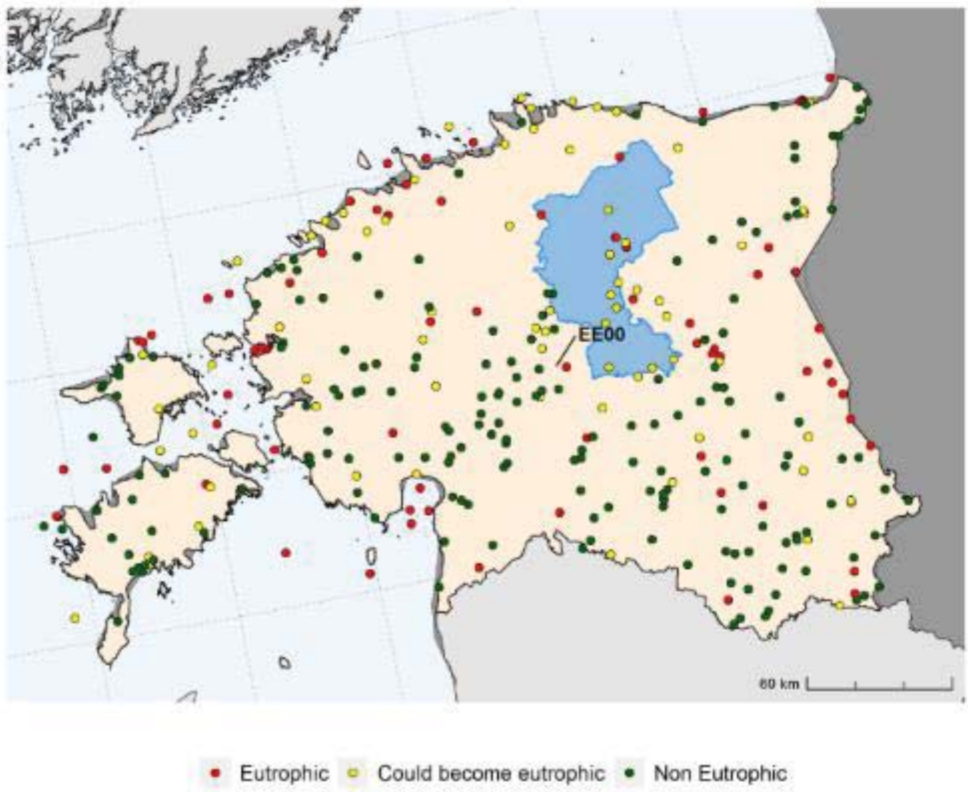


Figure 11. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis)

Surface Water Eutrophication



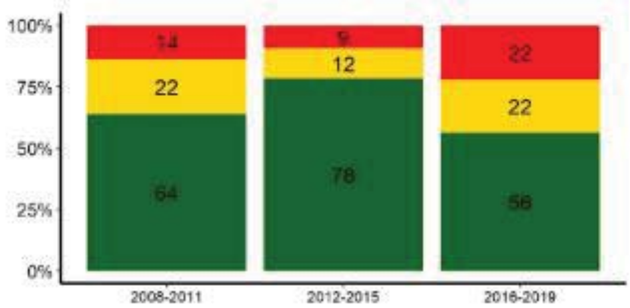


Figure 12. Spatial distribution of eutrophic status (map) and corresponding percentage of monitoring points per classes of status by reporting period (x axis). In the map in blue the NVZ.

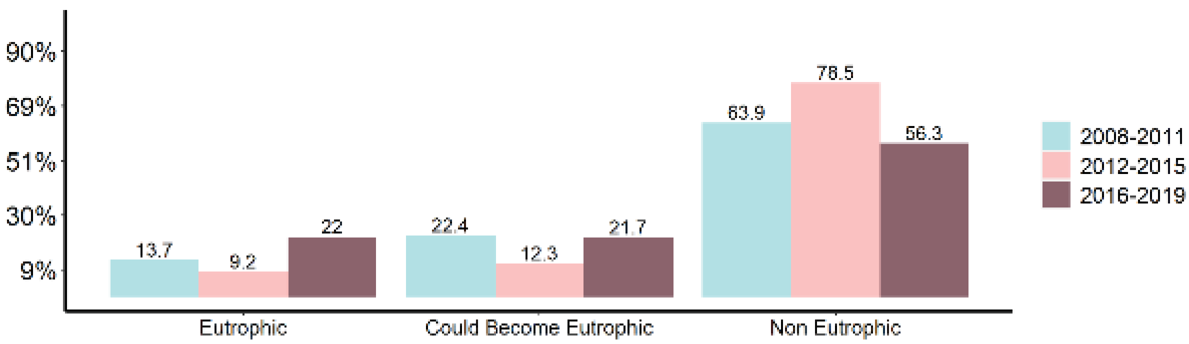
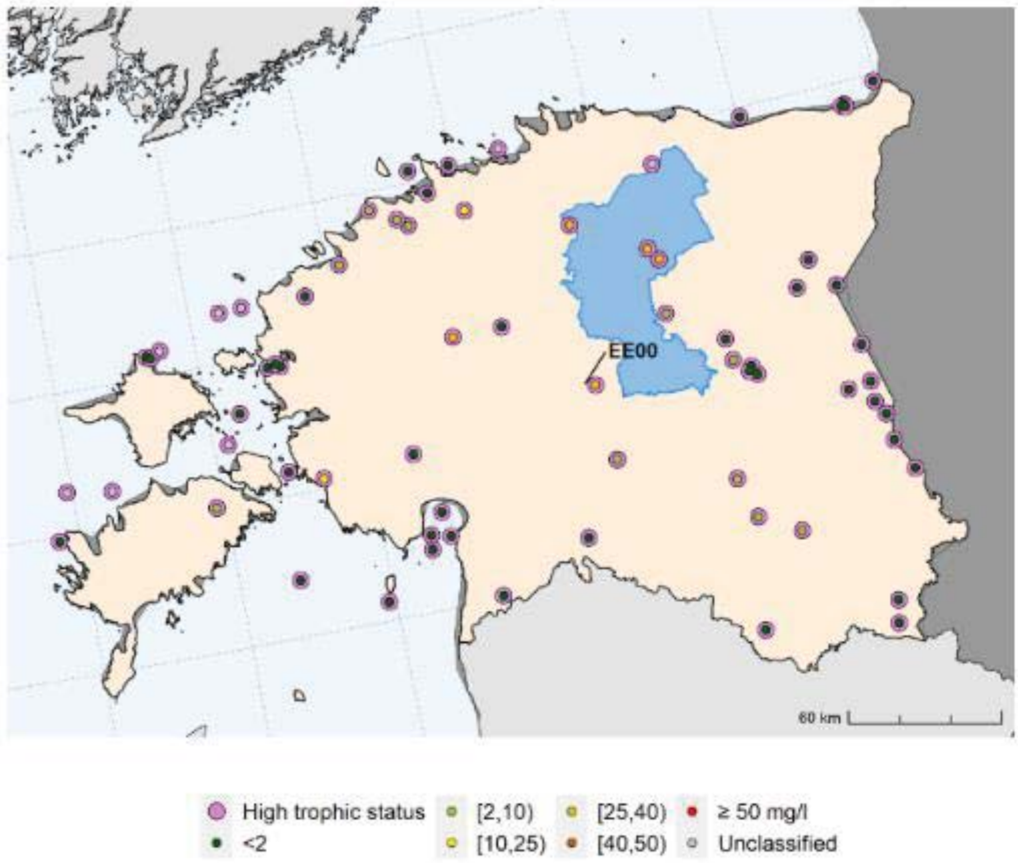


Figure 13. Comparison of percentage of monitoring points in the three reporting periods by classes of status (x axis)

The Eutrophic status vs average NO3 annual concentration



NUTS ID	NUTS NAME	High trophic status	Number of stations by classes of concentration						
			<2 mg/l	[2,10) mg/l	[10,25) mg/l	[25,40) mg/l	[40,50) mg/l	>=50 mg/l	Unclassified
EE00	Eesti	44	25	11	2	5	0	0	1
NO_NUTS	SALINE	27	20	0	0	0	0	0	7
	Total	**71**	**45**	**11**	**2**	**5**	**0**	**0**	**8**

Figure 14. The SW monitoring stations with eutrophic status versus the average NO3 annual concentration. In the map in blue the NVZ.

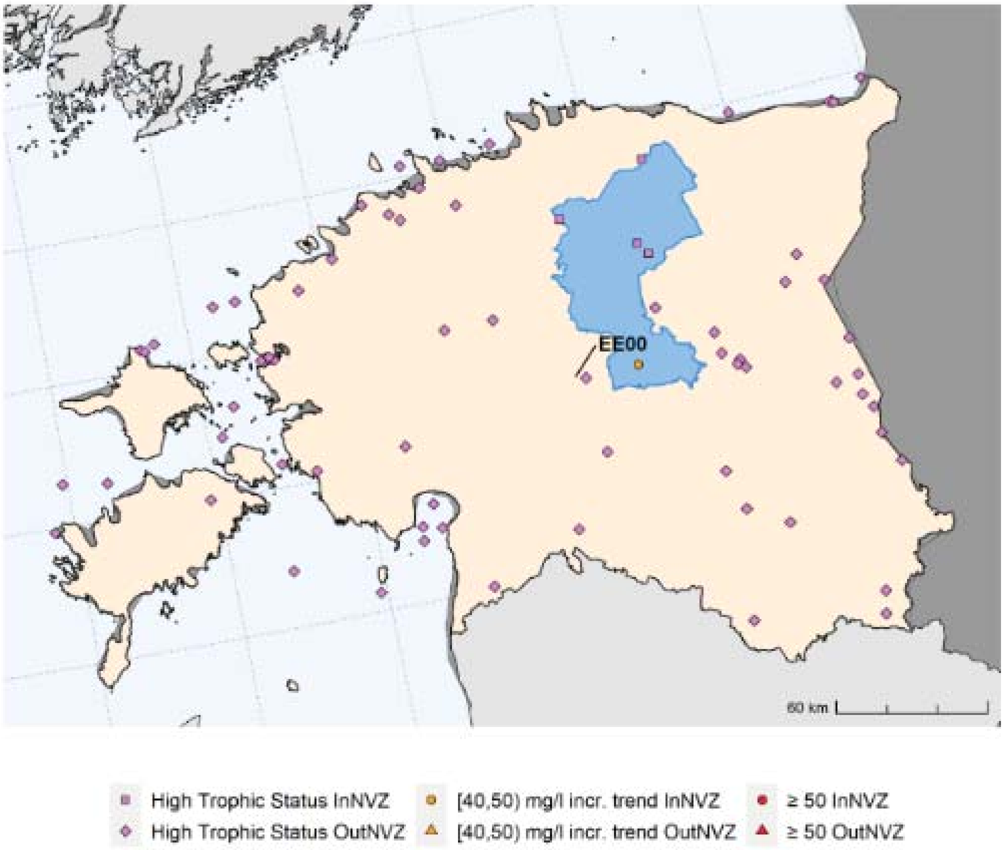
The analysis shows all the SW monitoring stations with the highest trophic status and the corresponding value of NO3 concentration. The map shows the spatial distribution of these points, and the table reports the number of stations with measurements with highest trophic status and the corresponding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

In Estonia, the methods for assessing the ecological status of bodies of water in accordance with the WFD have been laid down in Regulation No 19 of the Minister of the Environment of 16 April 2020 'List of surface water bodies, procedure for determination of surface water bodies and territorial sea status categories, values of quality indicators for ecological status categories of bodies of surface water and values of quality indicators for bodies of water not included in a surface water body'.
The trophic assessment of rivers takes into account only those years where at least four measurements of each assessment parameter. Only data on total nitrogen and total phosphorus were used to assess river eutrophication, because the small size of Estonian rivers means that phytoplankton and chlorophyll a concentrations are not representative enough to be used in the assessment of water quality status. The trophic assessment of lakes is based on the annual average concentration of total nitrogen, total phosphorus and chlorophyll a in the water column). The assessments of the trophic classes of lakes and coastal waters are given as an average of the assessments of three indicators (total phosphorus, total nitrogen and chlorophyll
Data from 208 monitoring stations have been used in the trophic assessment of rivers and reported on Eionet. Most of the river in Estonia are non-eutrophic. The majority of lakes are either eutrophic or could become eutrophic, while coastal waters are mostly eutrophic. The assessment of the Estonian coastal waters trophic status reflects the large eutrophication problem of the Baltic Sea.

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	17	43	148
5	Lake/reservoir water	27	15	31
6	Transitional water	0	0	0
7	Coastal water	27	12	3
8	Marine water	0	0	0
9	Not specified	0	0	0
	Total	**71**	**70**	**182**

Surface Water quality hotspot

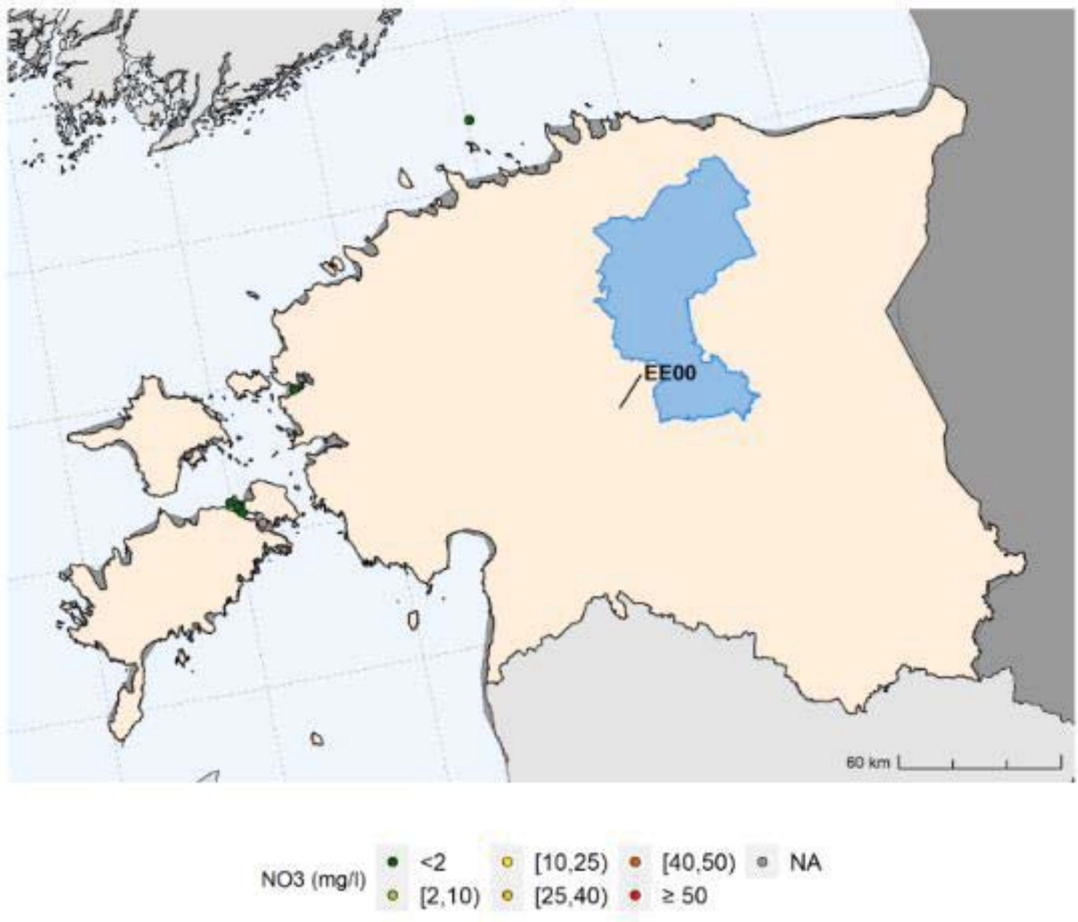


		High trophic status		>=40 and < 50 mg/l incr.trend		>=50 mg/l	
NUTS ID	NUTS NAME	InNVZ	OutNVZ	InNVZ	OutNVZ	InNVZ	OutNVZ
EE00	Eesti	4	40	1	0	0	0
NO_NUTS	SALINE	0	27	0	0	0	0
	Total	**4**	**67**	**1**	**0**	**0**	**0**

Figure 15. SW hotspot analysis map (top graph) and distribution by NUTS2 (lower graph) of average NO3 annual concentration greater than 40 mg/l and trophic status. In the map in blue the NVZ.

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



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

Figure 16. SW removed stations map (top graph) and distribution by surface water type (lower graph). In the map in blue the NVZ.

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

Measures in the Action Programme

The first Code of Good Agricultural Practice was published in 2001. A revised version of the GAP aligned with legislative amendments was published in 2007. In 2020, a new modernised Code of Good Agricultural Practice was published in cooperation with the Estonian Crop Research Institute and the Ministry of Rural Affairs. The publication is not a Code of Good Agricultural Practice within the meaning of the Nitrates Directive but a publication of the same name summarising agri-environmental requirements and recommended guidelines. Good Agricultural Practice within the meaning of the Nitrates Directive has been integrated into the Water Act and a provision has been added to the new Water Act, which entered into force on 1 October 2019, indicating in which sections of the Act the measures of good agricultural practice set out in the Nitrates Directive are provided.
The details of AP are reported in the following table.

Table 6. Details of Action Programme

Measure	General details in Action Programme (*)
Period of prohibition of fertiliser application	• Periods when the land application of certain types of fertiliser is prohibited are listed in Water Act § 158 and § 159
Restrictions for application on sloped soils	• Restrictions for application of fertiliser to steeply sloping ground are listed in Water Act § 160
Restrictions for application on soaked, frozen, or snow-covered soils	• Not when the ground is frozen, covered with snow, periodically flooded or saturated with water (Water Act § 158 and § 159)
Restrictions for application near watercourses (buffer strips)	• Conditions for land application of fertiliser near watercourses are listed in Water Act § 118 and § 158
Effluent storage works	• The area of land used by an agricultural undertaking for keeping livestock shall enable the spreading of manure in accordance with the maximum levels of nitrogen and phosphorus provided by manure as established under Section 161(1) and (8) of the Water Act
Capacity of manure storage	According to Water Act § 164. Requirements for storage of manure (1) All livestock buildings where more than ten livestock units of livestock are kept shall have storage facilities for manure or for manure and liquid manure, depending on the type of manure. (2) The storage facilities for manure or for manure and liquid manure shall enable the storage of manure and liquid manure excreted by the livestock during a period of at least eight months, and if necessary, depending on the technology used in the livestock building, also the storage of wastewater from the building. The quantities of manure left by the livestock on the grazing land during the grazing period may be excluded for the purpose of calculating the capacity of a manure storage facility. (3) A livestock building where livestock is kept on deep litter and which enables the storage of the quantity of manure set out in subsection (2) of this section, need not have a manure storage facility. (4) If a livestock building where livestock is kept on deep litter does not enable the storage of the quantity of manure set out in subsection (2) of this section, it is necessary to have a storage facility enabling the storage of the remaining quantity. (6) If there are ten or less livestock units of livestock kept in a livestock building and solid manure or deep litter manure is created there, such manure may be stored, temporarily before spreading or before taking it to a manure stack, in an area with a water-proof bottom and protected against storm water, next to the building. (7) If the keeper of livestock transfers, on the basis of a contract, manure for storage or processing to a storage or processing facility of another person, a leak-tight storage facility holding a manure quantity of at least one month must be ensured when using the livestock building.
Rational fertilisation (e.g., splitting fertilisation, limitations)	• Procedures for the land application, including rate and uniformity of spreading, of both chemical fertiliser and livestock manure, that will maintain nutrient losses to water at an acceptable level are described in sections 9 and 159 of the Water Act.
Crop rotation, permanent crop enhancement	• Not defined
Vegetation cover in rainy periods, winter	• From 1 November until 31 March, at least 30% of the area under cultivation situated in a NVZ and used by a person engaged in agriculture shall be under plant cover. One-third of the above percentage may be covered by stubble. (Water Act sectio 168)
Fertilisation plans, spreading records	• Field record and, spreading plan for liquid manure and fertilisation plan are described in sections 155 and 162 of Water Act
Other measures	• Maximum levels of nitrogen and phosphorus provided by fertilisers (Water Act section 163)
Date for application limit of 170 kg N/ha/year:	• 17 January 2001

The 2016-2019 reporting period covers the Pandivere and Adavere-Põltsamaa NVZ action programme (NVZ action programme) for 2016–2020, approved by Government of the Republic Order No 263 of 21 July 2016. The 2016-2020 NVZ action programme is a continuation of the previous NVZ action programme for 2012-2015. The NVZ action programme has been adapted in light of the experience gained in carrying out the previous plan. The plan has been published on the website of the Ministry of the Environment. By the time of submission of this report, a new NVZ action programme for 2021-2024 is planned to be approved in December 2020.

In Estonia, a large part of the water conservation requirements is established by legal acts; therefore, there are no relevant cost-effectiveness studies that go beyond the legal requirements.

Controls

A total of 560 inspections were carried out in the NVZ in the 2016-2019 period, including cross-compliance inspections (CC) in 70 enterprises each year. A total of 71 violations were identified. Most of the problems were related to compliance with manure handling requirements, followed by violations related to silo handling.

Designation of NVZ

In Estonia, the Nitrate Vulnerable Zone (NVZ) was designated in accordance with Government of the Republic Regulation No 17 of 21 January 2003 'Protection Rules for the Pandivere and Adavere-Põltsamaa Nitrate Vulnerable Zone', which was revised in 2019. The total area of the Pandivere and Adavere-Põltsamaa NVZ is 3 250 km^2, which represents 7.2% of mainland Estonia. The NVZ covers 33 local regions either in full or in part, including 31 rural municipalities and two cities (Rakvere and Põltsamaa). Since the establishment of the NVZ, its borders have not been changed and no new areas have been designated.

Forecast of Water Quality

In Estonia, there is no model based on statistical or dynamic simulations that could be used in this report to prepare forecasts for groundwater or surface water quality. However, a forecast study improvement of the nitrate concentration and eutrophication status of groundwater and surface water was developed based on the agricultural forecasts and the future climate scenarios of Estonia. The main findings can be summarized as follows:

- Concerning groundwater where the nitrate concentration is or may rise above 50 mg/L, some increase in NO3 concentration in the NVZ areas can still be predicted;
- Concerning surface water bodies where the nitrate concentration is or may exceed 25 mg/L and which are used for the abstraction of drinking water, no

stabilisation or decrease of nitrate levels is likely to occur in the next decade, but the situation may temporarily stabilise under suitable climatic conditions;

- Concerning natural freshwater lakes, other freshwater bodies, estuarine waters, coastal waters and marine waters which are or may become eutrophic in the near future, the risk of eutrophication is 4% in watercourses, 34% in stagnant water bodies and 29% in coastal water bodies. In the case of stagnant waters and coastal waters, it is extremely difficult to achieve improvement, as phosphorus pollution from earlier periods is often released by sediments. Removal of nutrient-rich sludge is very expensive, so a reduction in residual nutrient contamination is unlikely.

Summary

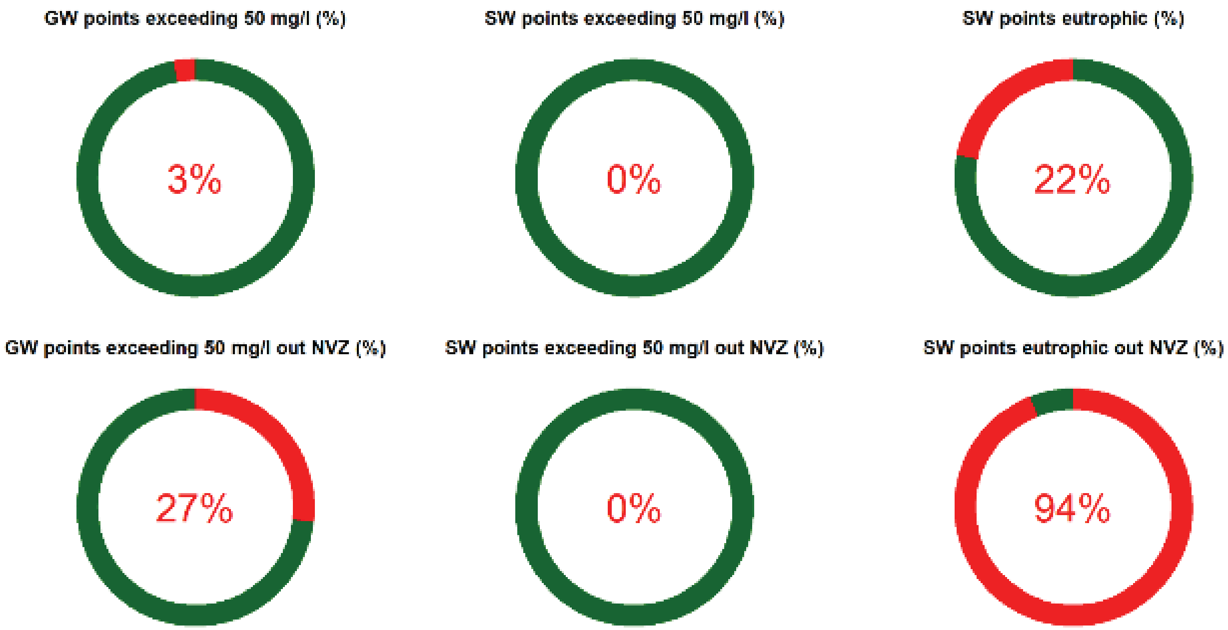


Figure 17. The summary plot for the period 2016-2019

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

Long term analysis

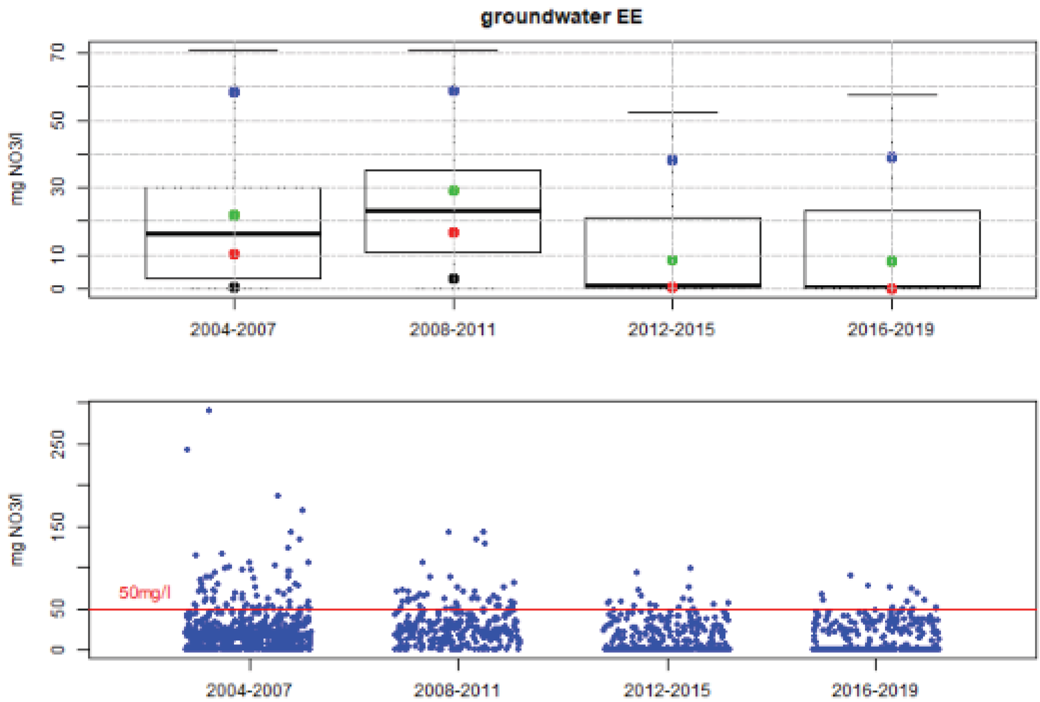


Figure 18. Time series of box whisker plots along with the distribution of the average NO3 annual concentrations for each reporting period, for groundwater stations. RPs represent the reporting periods, RP7 being the last period (2016-2019). The blue, red, green and black dots represent the mean of the fourth third, second and first quartiles, respectively.

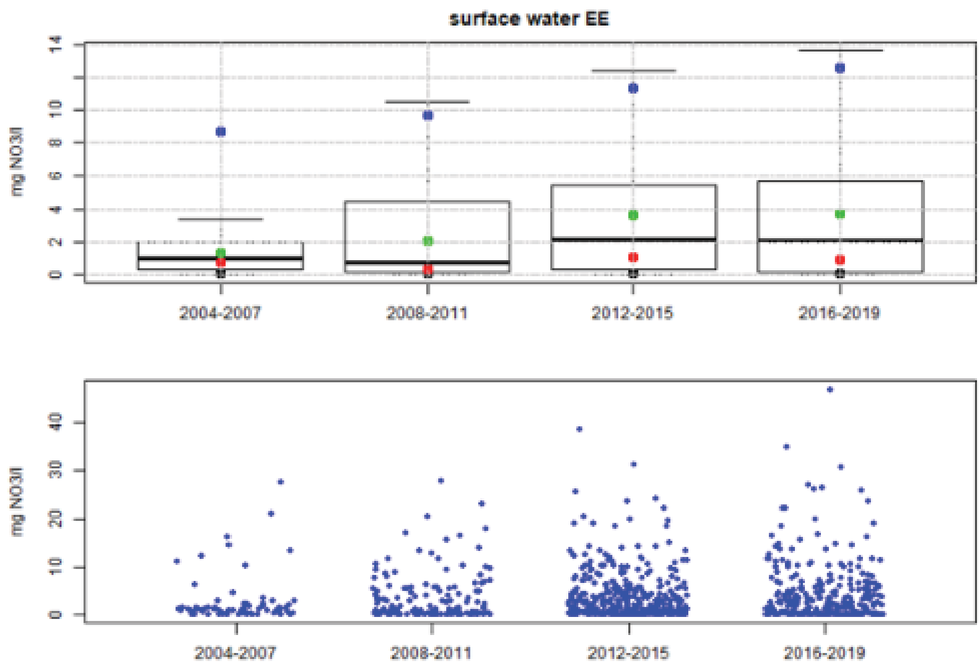


Figure 19. Time series of box whisker plots along with the distribution of the average NO3 annual concentrations for each reporting period, for surface water stations. RPs represent the reporting periods, RP7 being the last period (2016-2019). The blue, red, green and black dots represent the mean of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

Conclusions and recommendations

Estonia has a low livestock density, the surplus of nitrogen is low and there is a deficit of phosphorus.

There is a well-elaborated network of monitoring stations. The groundwater quality is generally good. However, a high number of surface waters are eutrophic, in and outside NVZ and for both inland and marine waters.

A revised action programme was published in 2016.

The Commission recommends Estonia to revise the designation of NVZ to include areas that drain into waters that are eutrophic and to revise its action programme in particular to reduce and prevent eutrophication of inland and marine surface waters where the agricultural pressure is significant.

EUROPEAN
COMMISSION

Brussels, 11.10.2021
SWD(2021) 1001 final

PART 17/38

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}

EN EN

Pressure from Agriculture

Finland's utilised agricultural area amounts to 2.27 Mha, representing 9.1% of the total land area and has remained stable since 2007. The major outputs of the agricultural industry excluding services and secondary acts include in a decreasing order milk (24.8%), horticulture and vegetables (11.6%) and cereals (10.0%). Eurostat

Major land use statistics for Finland

Table 1.Utilized agricultural area (abbreviated as UAA)

Finland	2005	2007	2010	2013	2016
Utilised agricultural area UAA (1000 ha)	NA	2255	2292	2259	2274
arable land (1000 ha)	NA	2255	2253	1969	2244
permanent grass (1000 ha)	NA	34	33	31	26
permanent crops (1000 ha)	NA	4	4	3	3
kitchen gardens (1000 ha)	NA	1	1	NA	1

Note:
Eurostat (FSS)

There were no major changes in the extent arable land of Finland. Permanent grass has decreased by 21% since 2007.

Animal distribution in Finland

Finland's bovine and pigs remained stable from the last reporting period. The livestock density index (livestock unit per hectare of Utilized Agricultural Area) has also remained stable and is below the EU average of 0.8.

Table 2. Livestock statistics

Finland	2005	2007	2010	2013	2016
Livestock index	0.51	0.50	0.49	0.51	0.48
dairy cows (10^6 heads)	0.31	0.29	0.28	0.28	0.28
live bovines (10^6 heads)	0.94	0.90	0.91	0.90	0.89
live pigs (10^6 heads)	1.44	1.43	1.34	1.26	1.20
live poultry (10^6 heads)	NA	NA	9.31	13.41	15.39

Note:
Eurostat (FSS)

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

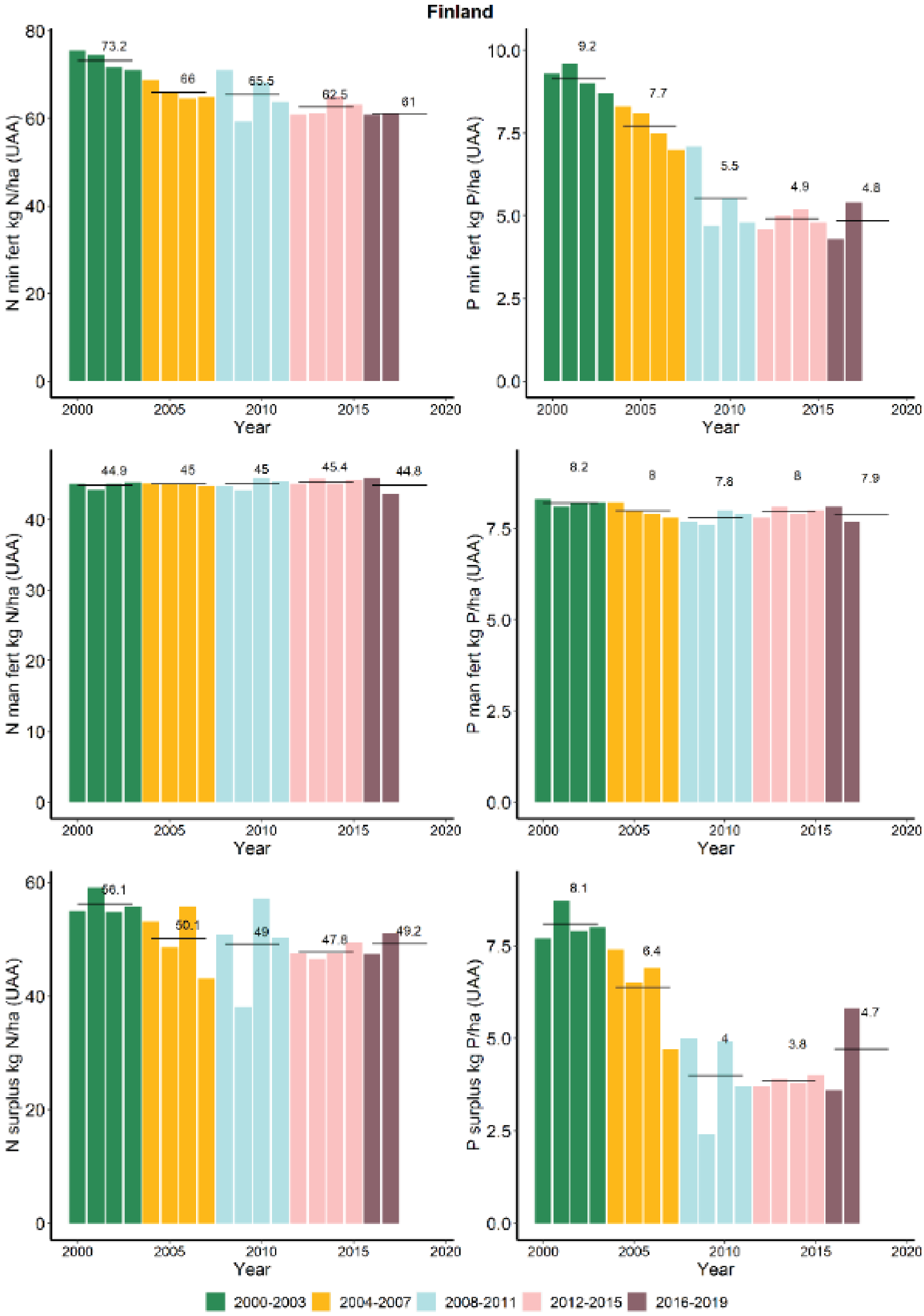


Figure 1. N and P fertilizers and gross surplus (kg/ha)

The gross nitrogen and phosphorus surpluses originate from EUROSTAT data for the years 2000-2017. The mineral fertilizers decreased significantly from 2000-2003 but are stable with respect to the last reporting period. Both manure nitrogen and phosphorus remained unchanged from 2000. The nitrogen surplus for the current period is similar to that of the previous reporting period. In the plots: N/P min and N/P man are respectively the N/P mineral fertilizers and N/P manure.

For comparison purposes, Finland provided N and P mineral fertilizers, manure and surplus data from the Natural Resources Institute Finland (Luke). Small differences occurred between the Eurostat and Luke dataset in the period 2000-2017. In particular, N and P manure fertiliser input are systematically lower on average of around 10% respect Eurostat, while N and P mineral fertiliser resulted 12% (average) lower than Eurostat.

Livestock unit - LSU /ha

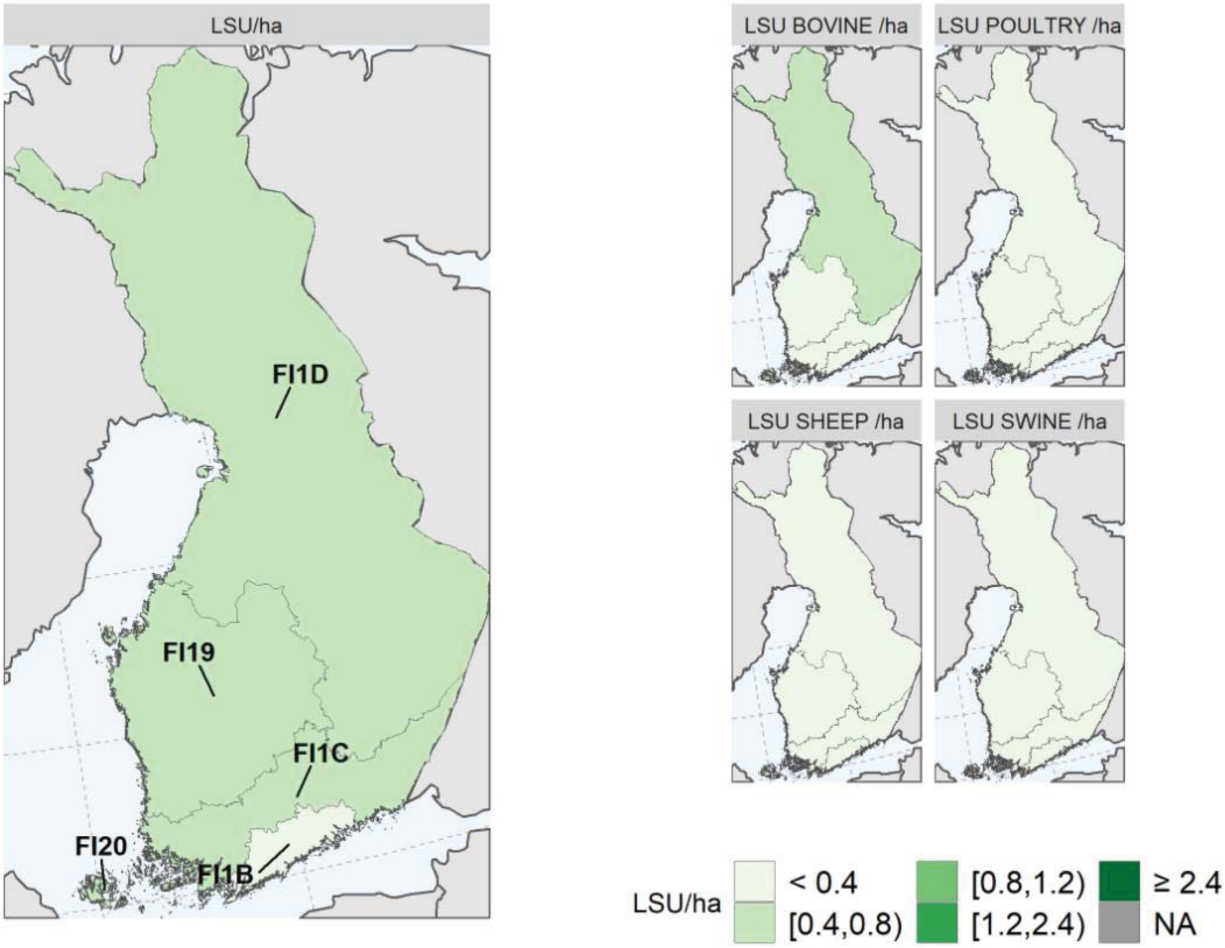


Figure 2. Map of livestock unit distribution, year 2016 (Source: Eurostat, February 2021)

Animal production is mostly dominated by bovine breeding (total LSU and LSU by animal type were retrieved individually from EUROSTAT).
In this document, the NUTS-2013 version is used.
(https://ec.europa.eu/eurostat/web/gisco/geodata/reference-data/administrative-units-statistical-units/nuts)

Water Quality Monitoring

The monitoring network used for reporting under the Nitrates Directive covers the whole territory. For this reporting period only sites that are clearly affected by agricultural loads were used for the reporting. These sites are also included in the monitoring required under the Water Framework Directive (WFD).

Some of the monitoring sites have been used for many years dating back to the period 2000–2003. However, some of the monitoring sites are no longer reported as they are principally forestry sites. In addition, the measured concentrations at these sites did not exceed 25 mg/l NO3. The trophic level of surface waters was assessed based on the ecological status classification laid down in the Water Framework Directive (WFD)

While surface waters monitoring is presented only for monitoring locations affected by agriculture, groundwater monitoring includes locations affected by agriculture and background stations (stations with no human impact). Since 2016, the Finnish Government outsourced sampling and sample analysis. However, collected data did not reveal any changes on the results of concentrations and trends.

The river monitoring sites are shallow, and all the sampling depths used were included in the data. In lakes, samples were taken at depths ranging from 0 to 2 meters, including both composite samples and grab samples. In lakes and coastal waters, oxygen content was calculated at a layer close to the bottom.

The nutrient and chlorophyll-a samples of coastal waters were taken from the surface. Nutrient sampling included taking grab samples at depths of 0 and 5 meters and composite samples with the maximum depth of 5 meters. The data on the chlorophyll-a concentration of phytoplankton contain composite samples (max depth 10 m) and grab samples ranging from the surface to the depth of 5 meters.

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

Station Type	Description	Number of stations with measurements			Number of stations with Trends		
		2008-2011	2012-2015	2016-2019	2008-2011	2012-2015	2016-2019
0	Phreatic groundwater (shallow): 0-5 m	37	121	49	31	121	49
1a	Phreatic groundwater (deep) 5-15 m	35	59	140	18	59	140
1b	Phreatic groundwater (deep) 15-30 m	7	7	4	3	7	4
1c	Phreatic groundwater (deep) >30 m	0	0	0	0	0	0
2	Captive groundwater	0	0	0	0	0	0
3	Karstic groundwater	0	0	0	0	0	0
9	Not specified	0	0	0	0	0	0
	Total	**79**	**187**	**193**	**52**	**187**	**193**

Surface water quality monitoring network

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

Station Type	Description	Number of stations with measurements			Number of stations with Trends			Number of stations with Trophic status		
		2008-2011	2012-2015	2016-2019	2008-2011	2012-2015	2016-2019	2008-2011	2012-2015	2016-2019
4	River water	81	79	68	80	79	68	62	79	68
5	Lake/reservoir water	60	88	79	59	86	45	59	88	79
6	Transitional water	0	0	0	0	0	0	0	0	0
7	Coastal water	44	75	76	44	75	42	43	75	76
8	Marine water	0	0	0	0	0	0	0	0	0
9	Not specified	0	0	0	0	0	0	0	0	0
	Total	**185**	**242**	**223**	**183**	**240**	**155**	**164**	**242**	**223**

Groundwater Quality

Groundwater average annual nitrate concentration

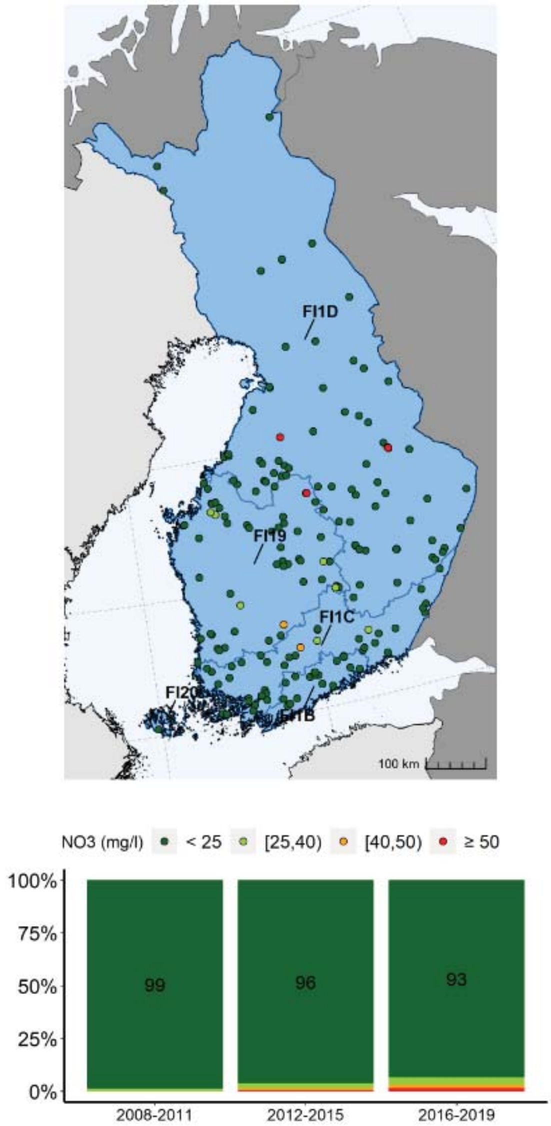


Figure 3. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information.

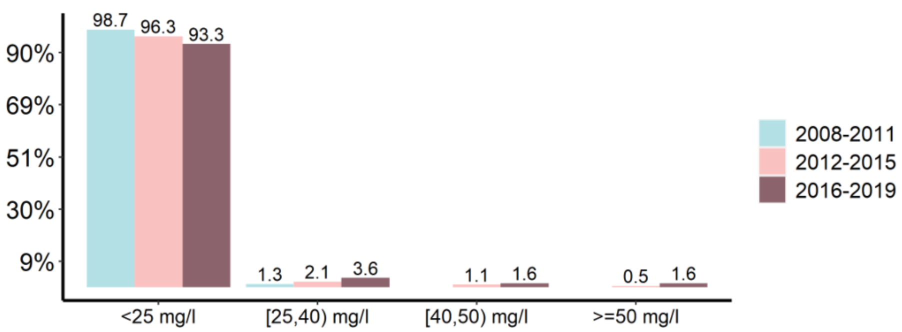


Figure 4. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis)

Groundwater average annual nitrate concentration trend

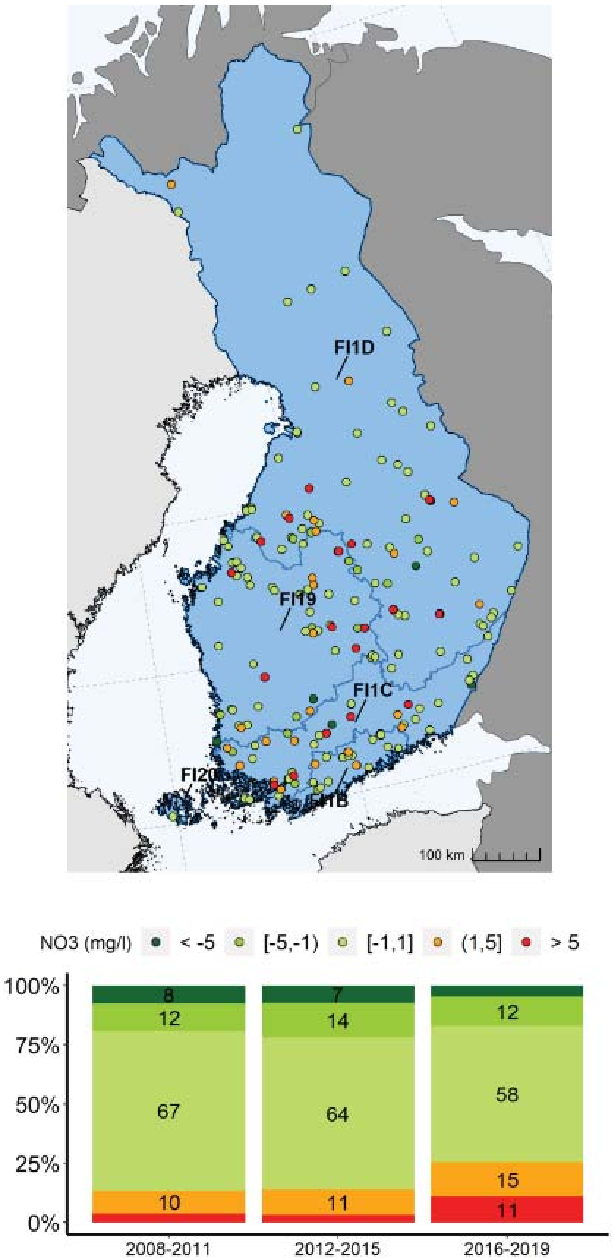


Figure 5. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information.

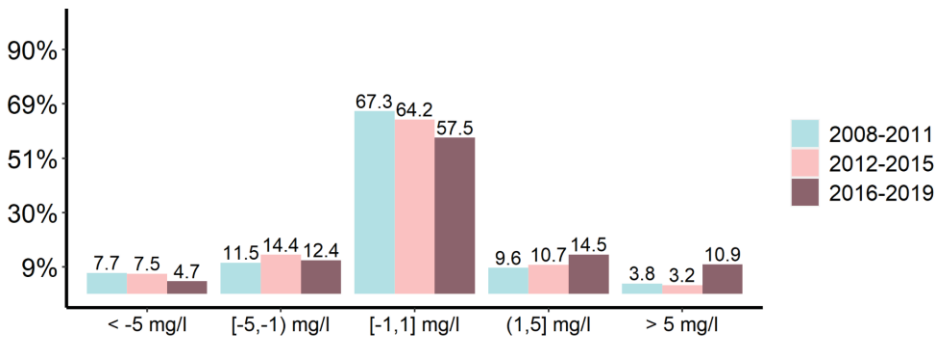
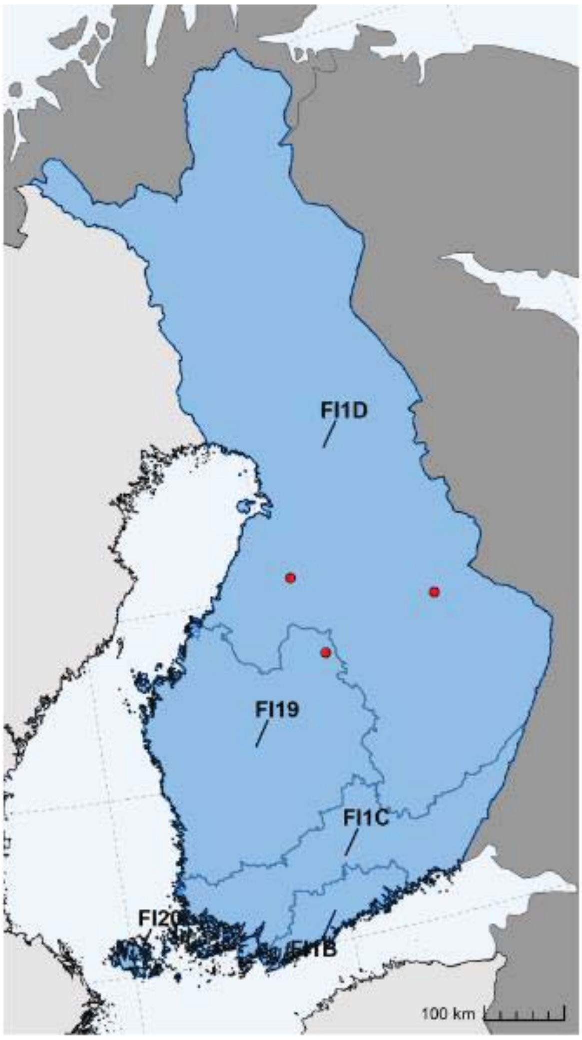


Figure 6. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis)

Groundwater hotspot

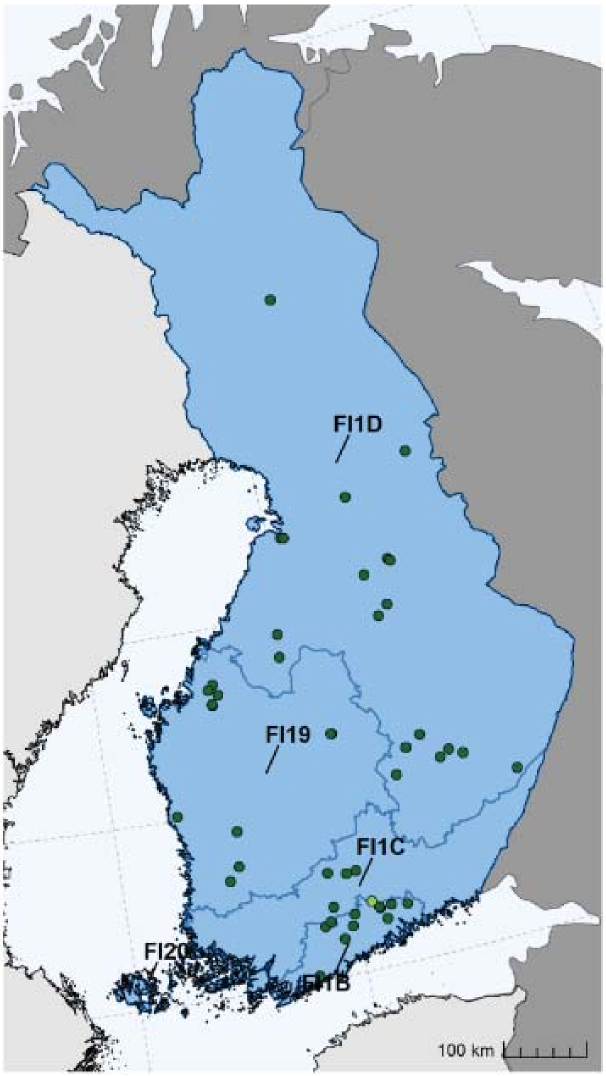


NUTS ID	NUTS NAME	>=40 and < 50 mg/l incr.trend	>=50 mg/l
FI19	Länsi-Suomi	0	1
FI1D	Pohjois- ja Itä-Suomi	0	2
	Total	**0**	**3**

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

The hotspot analysis identifies all the GW monitoring stations that have NO3 concentration in the range of 40-50 mg/l with increasing trends 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	35	35	35
1a	Phreatic groundwater (deep) 5-15 m	13	13	13
1b	Phreatic groundwater (deep) 15-30 m	3	3	3
1c	Phreatic groundwater (deep) >30 m	0	0	0
2	Captive groundwater	0	0	0
3	Karstic groundwater	0	0	0
9	Not specified	0	0	0
	Total	**51**	**51**	**51**

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

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

Surface Water Quality

Surface water average annual nitrate concentration

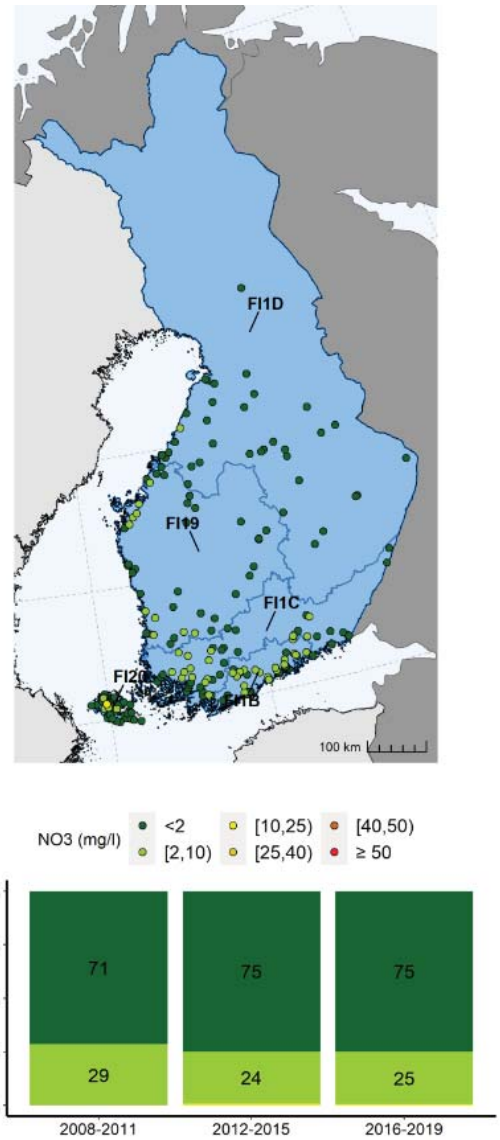


Figure 9. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis The percentages below 5% are not labelled, see the next plot for more information.

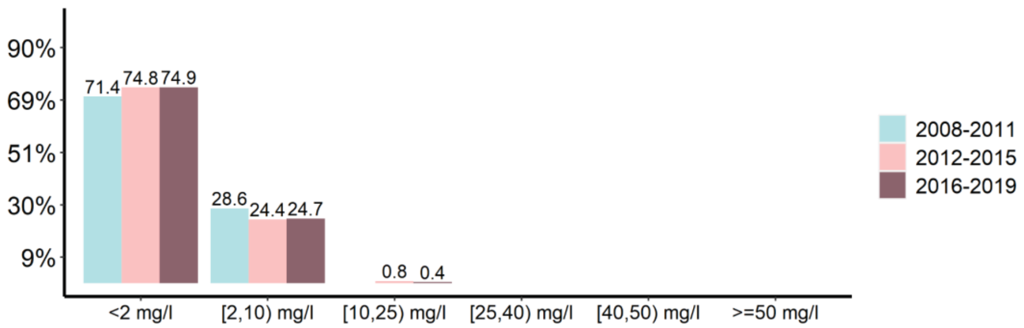
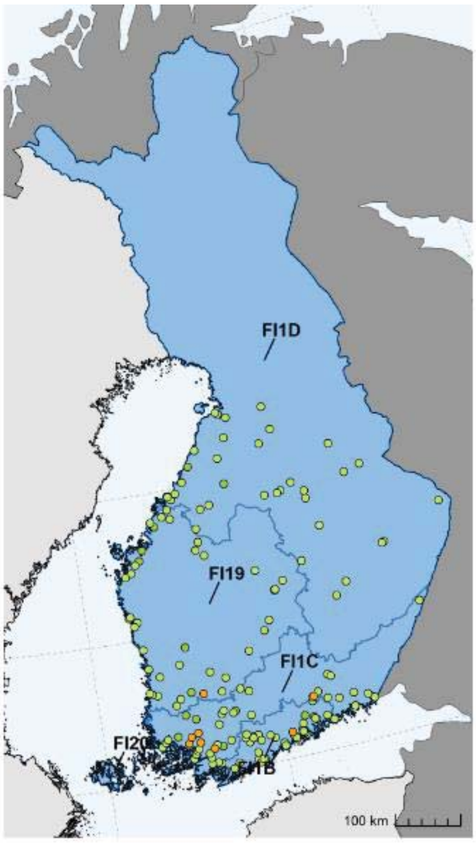


Figure 10. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis)

Surface water average annual nitrate concentration trend



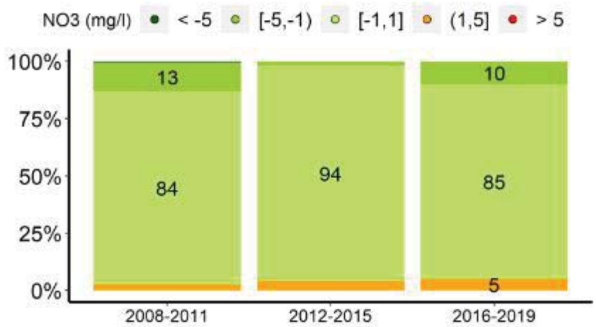


Figure 11. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information.

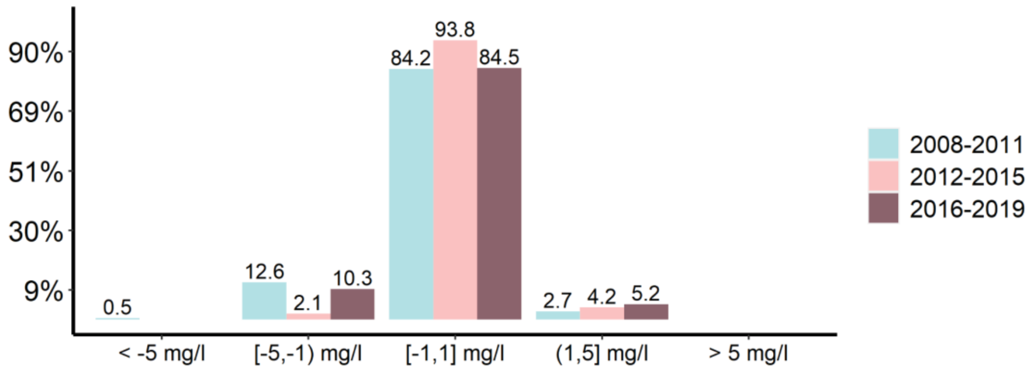


Figure 12. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis)

Surface Water Eutrophication

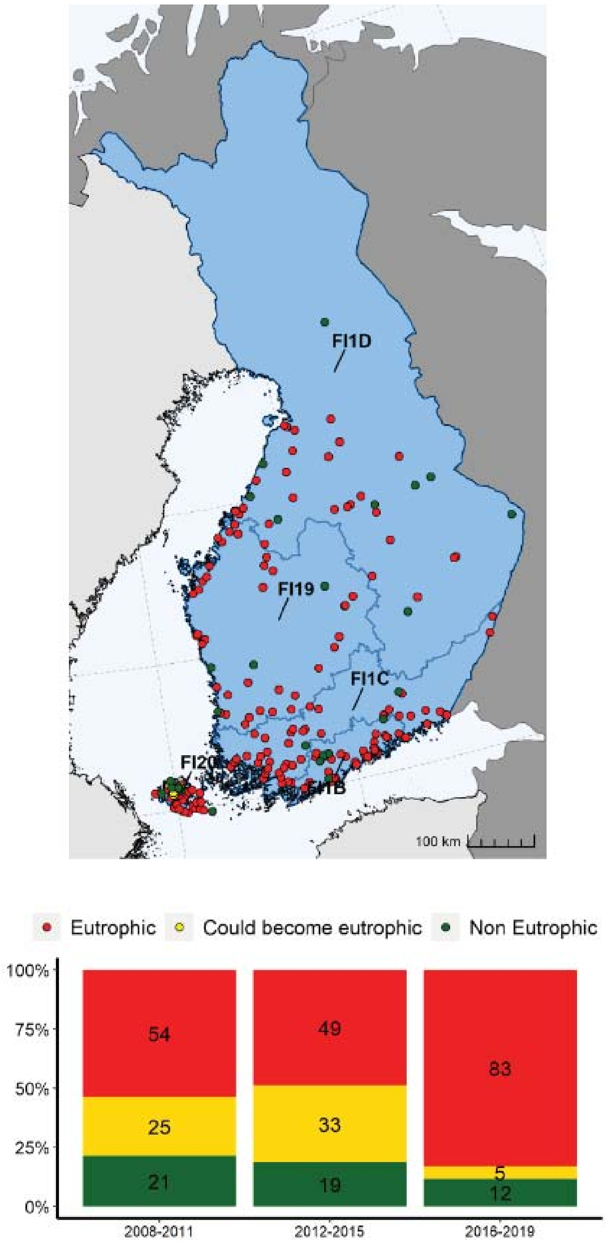


Figure 13. Spatial distribution of eutrophic status (map) and corresponding percentage of monitoring points per classes of status by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information.

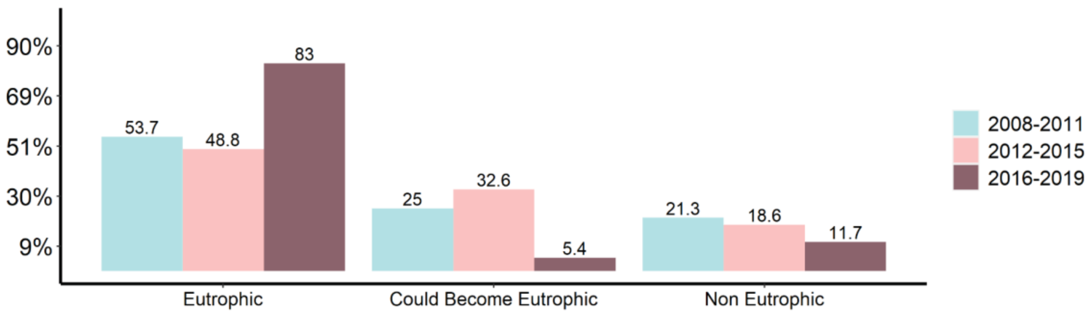
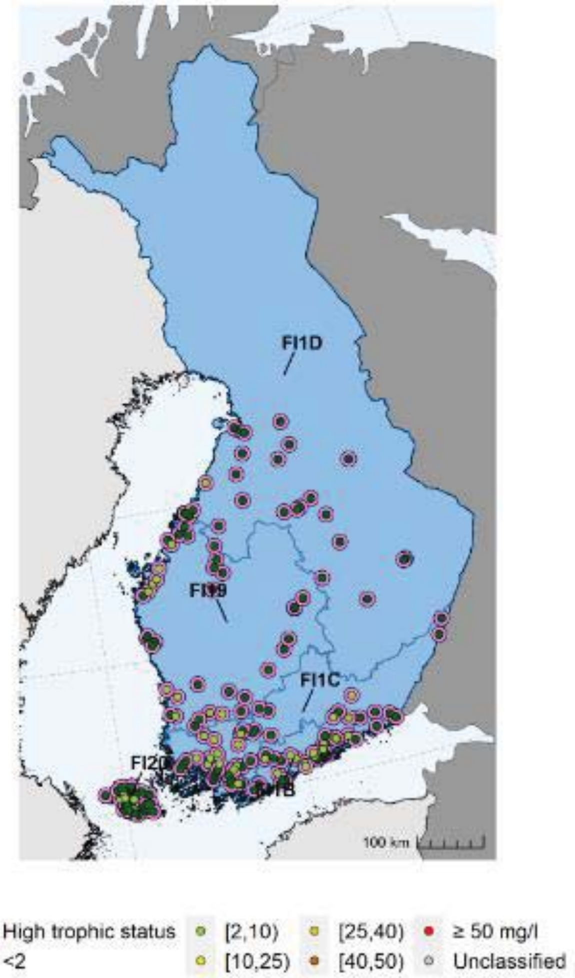


Figure 14. Comparison of percentage of monitoring points in the three reporting periods by classes of status (x axis)

The Eutrophic status vs average NO3 annual concentration



NUTS ID	NUTS NAME	High trophic status	Number of stations by classes of concentration						
			<2 mg/l	[2,10) mg/l	[10,25) mg/l	[25,40) mg/l	[40,50) mg/l	>=50 mg/l	Unclassified
FI19	Länsi-Suomi	29	21	8	0	0	0	0	0
FI1B	Helsinki-Uusimaa	16	5	11	0	0	0	0	0
FI1C	Etelä-Suomi	31	16	15	0	0	0	0	0
FI1D	Pohjois- ja Itä-Suomi	22	21	1	0	0	0	0	0
FI20	Åland	12	10	2	0	0	0	0	0
NO_NUTS	SALINE	75	67	8	0	0	0	0	0
	Total	**185**	**140**	**45**	**0**	**0**	**0**	**0**	**0**

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

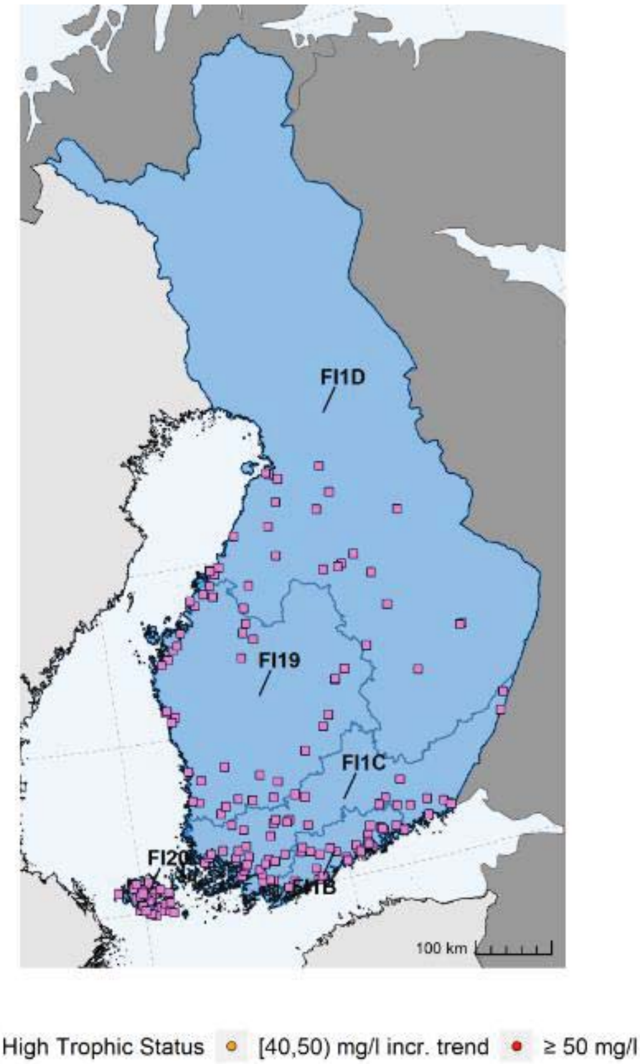
The analysis shows all the SW monitoring stations with the higher trophic status and the corresponding value of NO3 concentration. However, it is noteworthy that phosphorus concentration has also an important role for trophic status. The map shows the spatial distribution of these points, and the table 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 level of eutrophication of surface waters was assessed in the reporting period 2016–2019 in accordance with the new guidelines issued by the Commission using the ecological status classification laid down in the Water Framework Directive. The eutrophication level of surface waters has been assessed using the most recent results of ecological status classification. The results of ecological status classification will be reported to the EU in connection with WFD reporting in 2022. The results will be included in the plans of the third period of water resources management, which will be approved by the Government in December 2021. The national classification variables for lakes and coastal waters are chlorophyll-a and total nutrients. For rivers, only total nutrients are used. The results of chlorophyll in lakes and coastal waters were reported for summertime (June to September) and the other water quality variables describing eutrophication were reported as annual mean values. The results of national algae monitoring were also used in this report to assess the general eutrophication status, especially in coastal waters. The large majority of the rivers, lakes and coastal waters are eutrophic. More non-eutrophic surface water monitoring sites were found in lakes and rivers than in coastal waters.

		Number of stations with Trophic status		
Station Type	Description	Eutrophic	Could become eutrophic	Non Eutrophic
4	River water	56	0	12
5	Lake/reservoir water	54	12	13
6	Transitional water	0	0	0
7	Coastal water	75	0	1
8	Marine water	0	0	0
9	Not specified	0	0	0
	Total	**185**	**12**	**26**

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

Surface Water quality hotspot



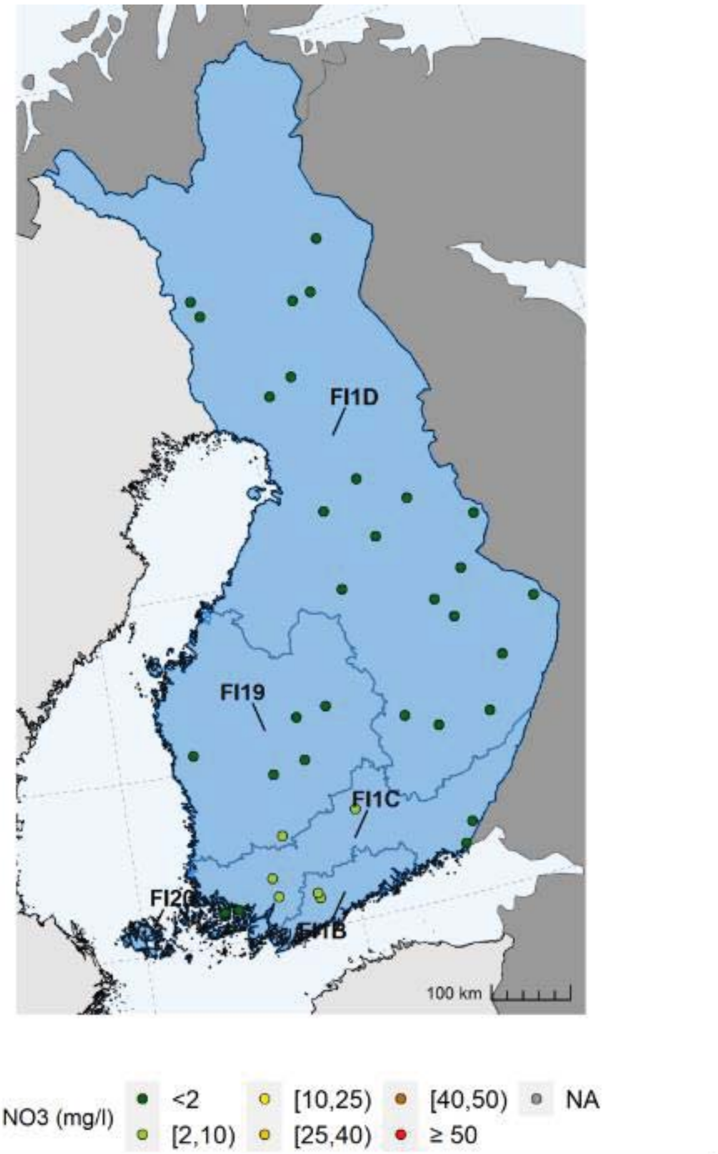
NUTS ID	NUTS NAME	High trophic status	>=40 and < 50 mg/l incr.trend	>=50 mg/l
FI19	Länsi-Suomi	29	0	0
FI1B	Helsinki-Uusimaa	16	0	0
FI1C	Etelä-Suomi	31	0	0
FI1D	Pohjois- ja Itä-Suomi	22	0	0
FI20	Åland	12	0	0
NO_NUTS	SALINE	75	0	0
	Total	**185**	**0**	**0**

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

The hotspot analysis identifies all the SW monitoring stations that have high eutrophic 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



Station Type	Description	Number of removed stations: total removed	with measurements	with trends	with trophic status
4	River water	20	20	20	20
5	Lake/reservoir water	15	15	13	15
6	Transitional water	0	0	0	0
7	Coastal water	1	1	1	1
8	Marine water	0	0	0	0
9	Not specified	0	0	0	0
	Total	**36**	**36**	**34**	**36**

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

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

Measures in the Action Programme

The first Code of Good Agricultural Practice was drawn up in 1998 and was revised six times from 2000 to 2015. In Finland, provisions on the code of good agricultural practice required by the Nitrates Directive (91/676/EEC) and the action programme referred to in Article 5 of the Directive are laid down in Government Decree 1250/2014. The Finnish Government approved the river basin management plans and the Finnish marine strategy in December 2015. No amendments were made to the Decree during the reporting period 2016–2019, thus Finland did not introduce new elements or made modifications to the code of good agricultural practice and action programmes during the reporting period 2016–2019. However, the action programmes will be updated by the end of 2021. A summary of the action programme is given below.

Cost effectiveness was not reported.

It is noteworthy that the Province of Aland is currently working on a specific action programme based on the targets in the form of preliminary interim targets up to 2021. There is an ongoing process of funding, carrying out, establishing, and implementing the proposals.

Table 6. Details of the Action Programme

Measure	General details in Action Programme (*)
Period of prohibition of fertiliser application	• 1 November to 31 March (section 10 of the Decree)
Restrictions for application on sloped soils	• In parts of the field with a slope of at least 15%, the application of manure, urine and liquid organic fertilizers by means other than placement is always prohibited. Other manure and organic fertilizer preparations applied to sloping parts of the arable land must be applied to the soil within twelve hours of application (section 10 of the Decree).
Restrictions for application on soaked, frozen, or snow-covered soils	• Not allowed in these situations (section 10 of the Decree).
Restrictions for application near watercourses (buffer strips)	• Nitrogen fertilizers must not be applied five meters closer to water. In the next zone of five meters from the water body, the surface application of manure and organic fertilizers is prohibited unless the field is cultivated within 24 hours of application (section 10 of the Decree).
Effluent storage works	• Not allow in groundwater areas (section 4 of the Decree)
	• Distance to flood risk area (section 4 of the Decree)
	> 50 metres from a water body, a well for domestic water supply or a spring (section 4 of the Decree)
	> 25 metres from a main ditch or streamlet (section 4 of the Decree)
Capacity of manure storage	• Other details section 4 of the Decree
Rational fertilisation (e.g., splitting fertilisation, limitations)	• Maximum mineral and manure applications by crops (section 11 of the Decree)
Crop rotation, permanent crop enhancement	• Not specified
Vegetation cover in rainy periods, winter	• 32% of crop land left bare in winter (year 2018)
Fertilisation plans, spreading records	• Manure analyses every 5 years (section 12 of the Decree)
Other measures	• Not specified
Date for application limit of 170 kg N/ha/year:	• 1 April 1998

(*) Government Decree on Limiting Certain Emissions from Agriculture and Horticulture (1250/2014) issued on 18 December 2014 entered into force on 1 April 2015

Controls

Administrative controls on the implementation of the Action Programme (AP) measures are carried out in the frame of the cross-compliance check. About 520 farmers were controlled every year. Non-conformities for analysis of nitrogen content of manure were detected for 6.3% of the case, manure storage leakage 3.8% and fertilizer usage for 3.8% of the cases.

Designation of NVZ

Finland has adopted a whole territory approach.

Forecast of Water Quality

According to the previous programme of measures of the Finnish marine strategy (2016–2021), the agricultural nitrogen load is estimated to be reduced through water management measures by an average of 5%, in different sea areas, and the phosphorus load by 7%, which is not sufficient to meet the reduction needs required by water resources and sea management. In coastal bodies of water primarily affected by agriculture, the total nitrogen and total phosphorus concentrations should decrease by approximately 30% on average, and chlorophyll concentrations by 58%, in order to achieve a good ecological status Through modeling, it was predicted that the expected increase in rainfall and nutrient leaching caused by climate change will reduce the impact of the nutrient loading reduction scheme of the Baltic Sea countries. The forecasts for the northern Baltic Sea predict an increase or lack of change in the external dissolved inorganic nitrogen load and a reduction in the dissolved inorganic phosphorus loading.

Climate change will increase the likelihood of extreme weather phenomena impacting groundwater reserves and increasing surface water levels. As a result of rising water levels and flooding, the loading of nutrient generated by agriculture might be transported to groundwater reducing or destroying the quality of groundwater in larger areas than before. The washout in wintertime poses significant risks of water quality deterioration. In addition, under climate change a longer growing season is expected, leading to higher fertilizer loads.

Long periods of drought in the summer will lower water levels, in which case groundwater quality may deteriorate in a natural manner as a result of higher concentrations of iron and manganese, as well as rising temperatures. The lowering of water levels may lead to changes in flow directions, in which case pollutants may be carried into groundwater areas from areas that were previously considered safe. More research should, however, be conducted into the impacts of climate change on groundwater reserves and groundwater quality.

Summary

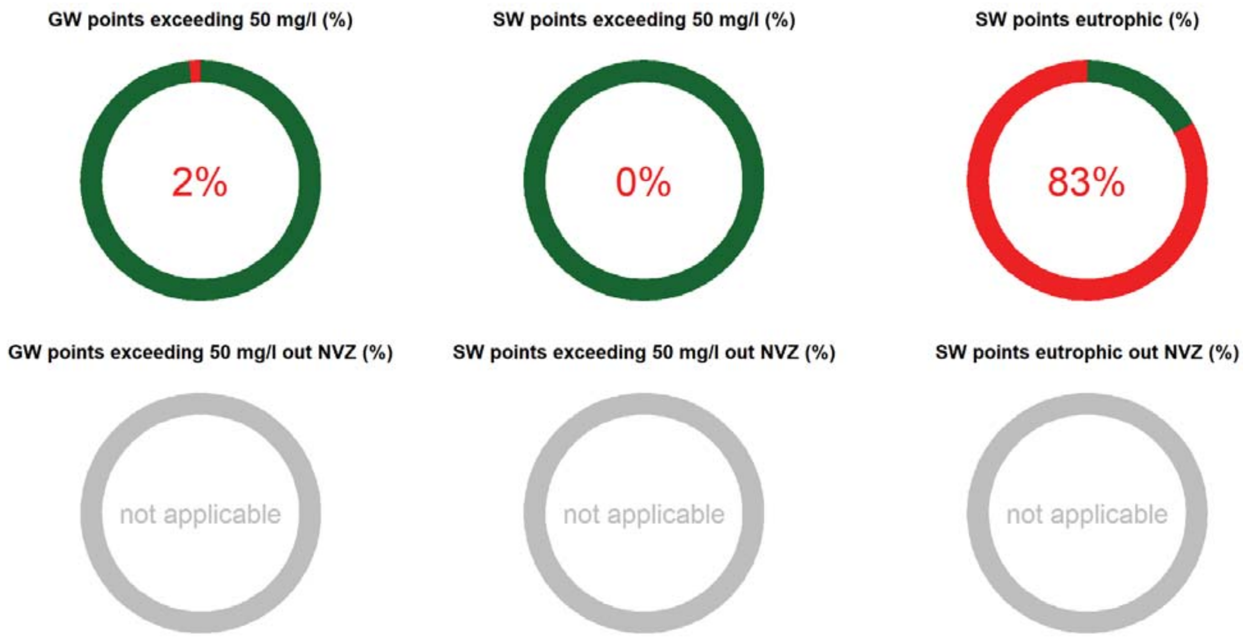


Figure 18. The summary plot for the period 2016-2019

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

Long term analysis

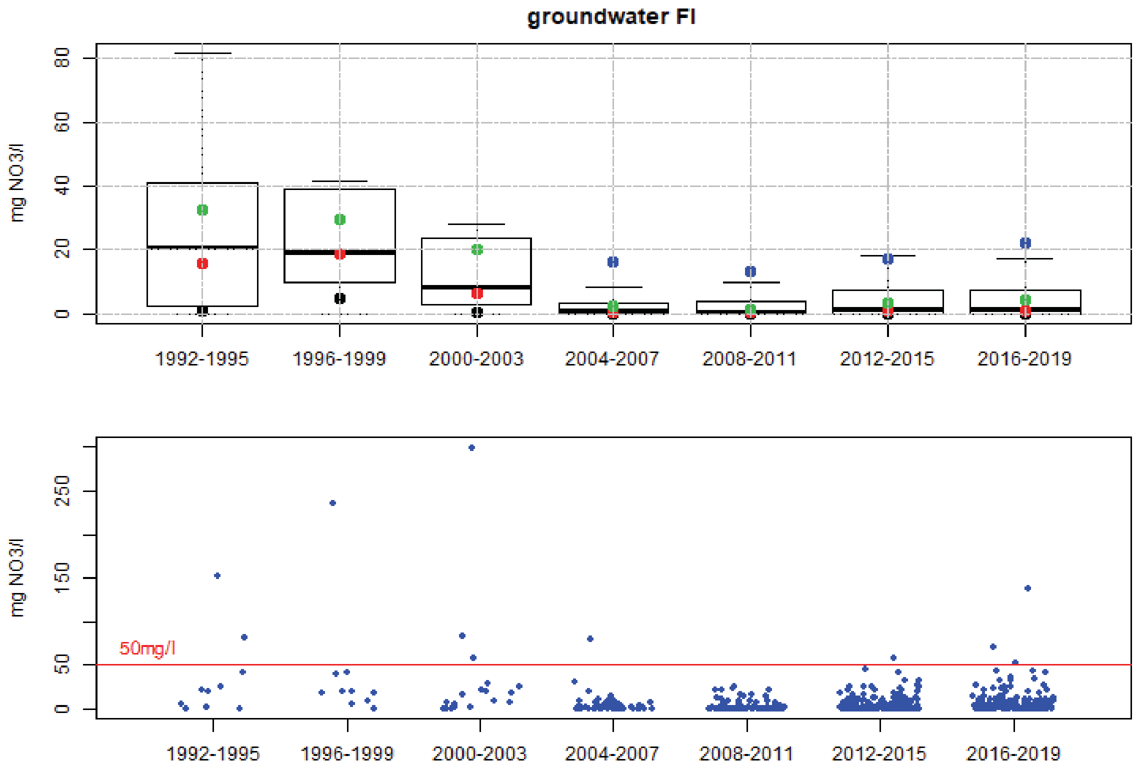


Figure 19. Time series of box whisker plots along with the distribution of the average NO3 annual concentrations for each reporting period, for groundwater stations. The blue, red, green and black dots represent the mean of the fourth third, second and first quartiles, respectively.

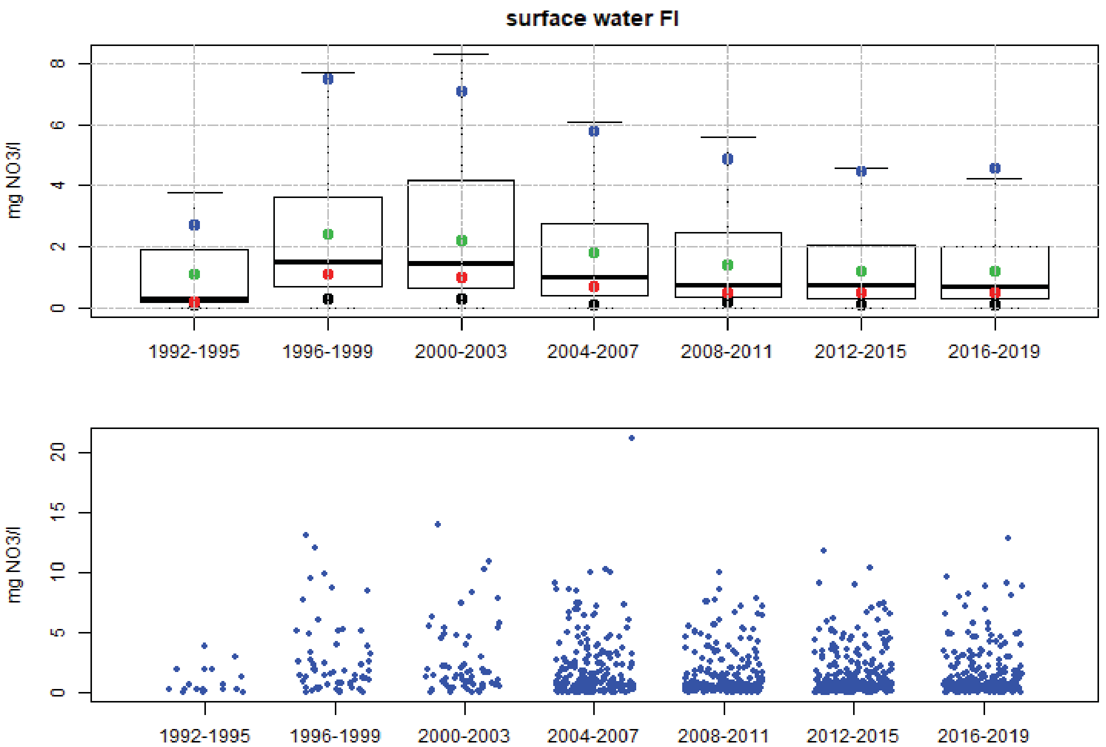


Figure 20. Time series of box whisker plots along with the distribution of the average NO3 annual concentrations for each reporting period, for surface water stations. The blue, red, green and black dots represent the mean of the fourth third, second and first quartiles, respectively.

Conclusions and recommendations

Finland has a low livestock density, the surplus of nitrogen and phosphorus are close to the EU averages.

There is a well-elaborated network of monitoring stations. Groundwater quality is good. Surface waters, inland like marine waters, suffer from eutrophication, which is recorded for 83% of monitoring stations.

The current action programme was set in 2014 and will be updated in 2021.

The Commission recommends that Finland reinforces its action programme to tackle the eutrophication issues for both inland and marine waters where the agricultural pressure is significant.

EUROPEAN
COMMISSION

Brussels, 11.10.2021
SWD(2021) 1001 final

PART 18/38

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}

EN EN

Pressure from Agriculture

France's utilised agricultural area amounts to 29.1 Mha, representing 53.1% of the total land area and has remained stable since 2007. The major outputs of the agricultural industry include in a decreasing order wine (16.1%), other crops (13.8%) and cereals (13.1%).

Eurostat

Major land use statistics for France

Table 1.Utilized agricultural area (abbreviated as UAA)

France	2005	2007	2010	2013	2016
Utilised agricultural area UAA (1000 ha)	NA	29414	29311	28976	29089
arable land (1000 ha)	NA	18292	18701	18373	18612
permanent grass (1000 ha)	NA	9937	9811	9439	9296
permanent crops (1000 ha)	NA	1091	1050	1015	1029
kitchen gardens (1000 ha)	NA	24	24	16	152

Note:

Eurostat (FSS)

There were no major changes in the extent arable land in France. Permanent grassland continued to decrease, while kitchen garden has increased considerably from 2013.

Animal distribution in France

France live bovine number is stable from the last reporting period. There is a decrease in the number of live pigs while the number of live poultry has increased by 4%. The livestock density index has also remained stable and is close to the EU average of 0.8.

Table 2. Livestock statistics

France	2005	2007	2010	2013	2016
Livestock index	0.82	0.82	0.81	0.79	0.79
dairy cows (10^6 heads)	3.90	3.76	3.72	3.70	3.64
live bovines (10^6 heads)	18.93	19.12	19.60	19.10	19.37
live pigs (10^6 heads)	15.12	14.97	14.28	13.43	12.79
live poultry (10^6 heads)	NA	NA	296.13	297.08	308.14

Note:

Eurostat (FSS)

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

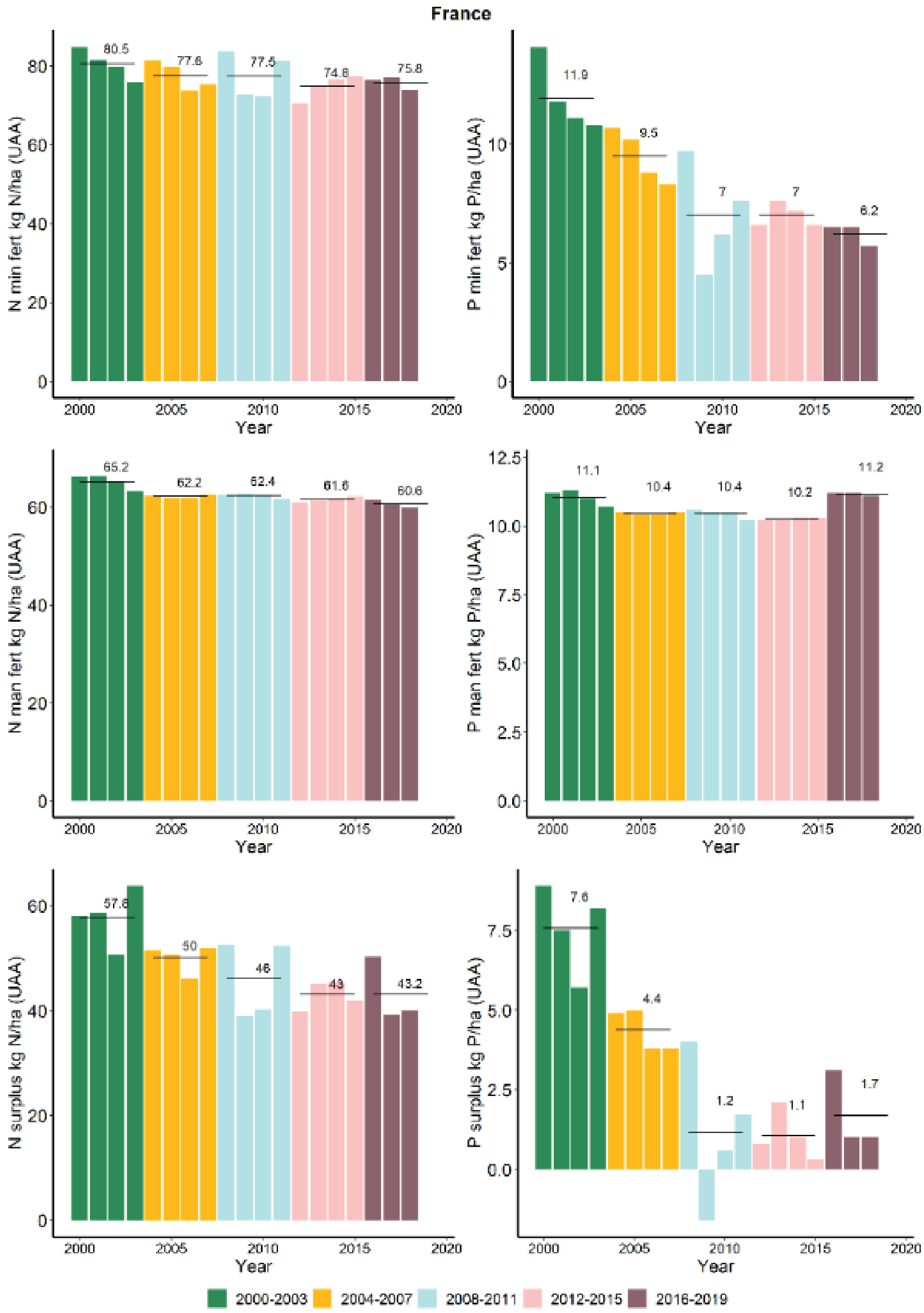


Figure 1. N and P fertilizers and gross surplus (kg/ha)

The gross nitrogen and phosphorus surpluses originate from EUROSTAT data for the years 2000-2018. Both N mineral fertilizers and manure remain stable with respect to the previous reporting period. There is an increase in the P manure for the last reporting period. The nitrogen surplus remains stable from the last reporting period, while phosphorus surplus slightly increased. In the plots: N/P min and N/P man are respectively the N/P mineral fertilizers and N/P manure.

Livestock unit - LSU /ha

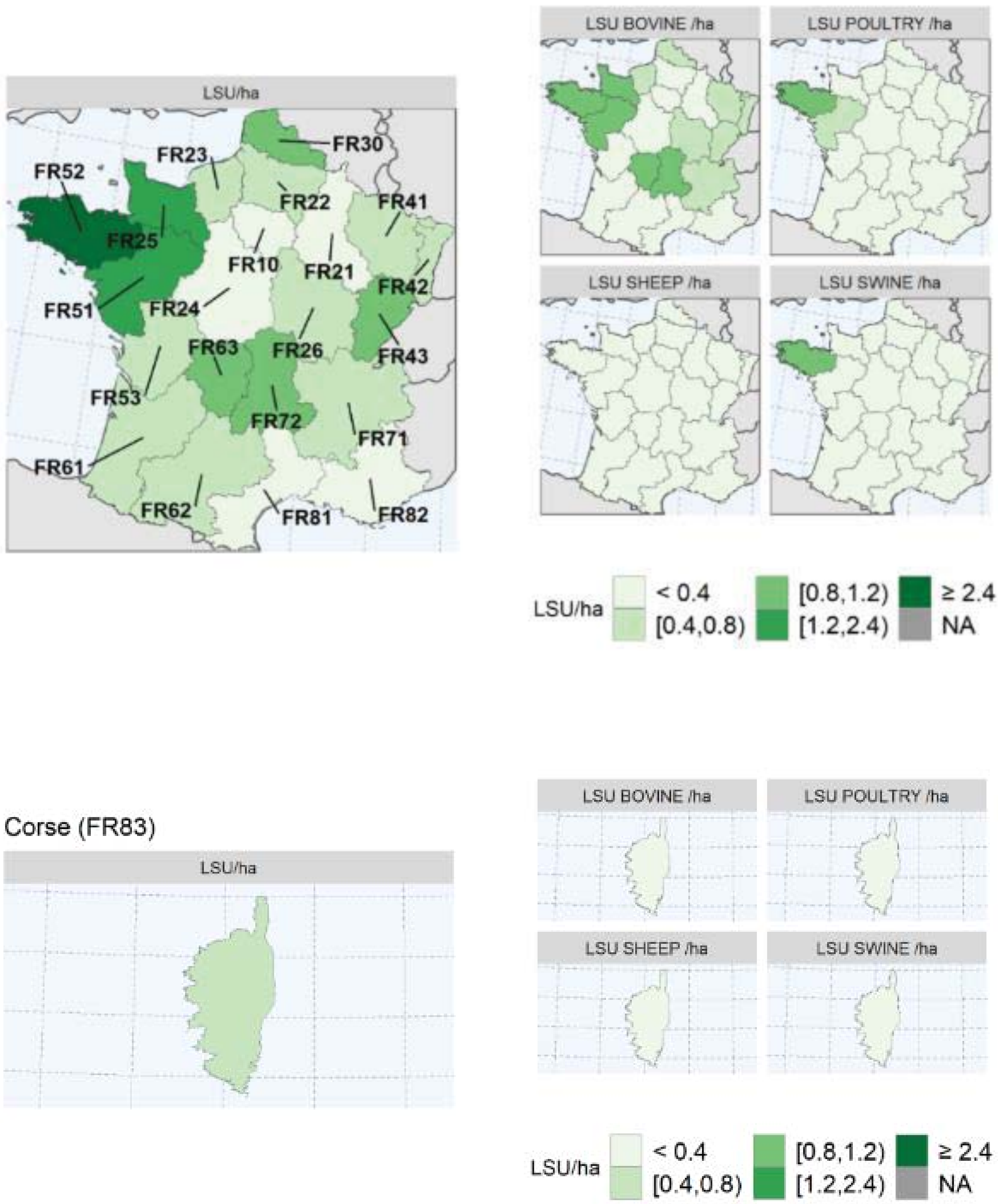


Figure 2. Map of livestock unit distribution for France and Corse, year 2016 (Source: Eurostat, February 2021)

Animal production is concentrated in the north west part of the mainland France (total LSU and LSU by animal type were retrieved individually from EUROSTAT). Animal production is dominated by bovine production.

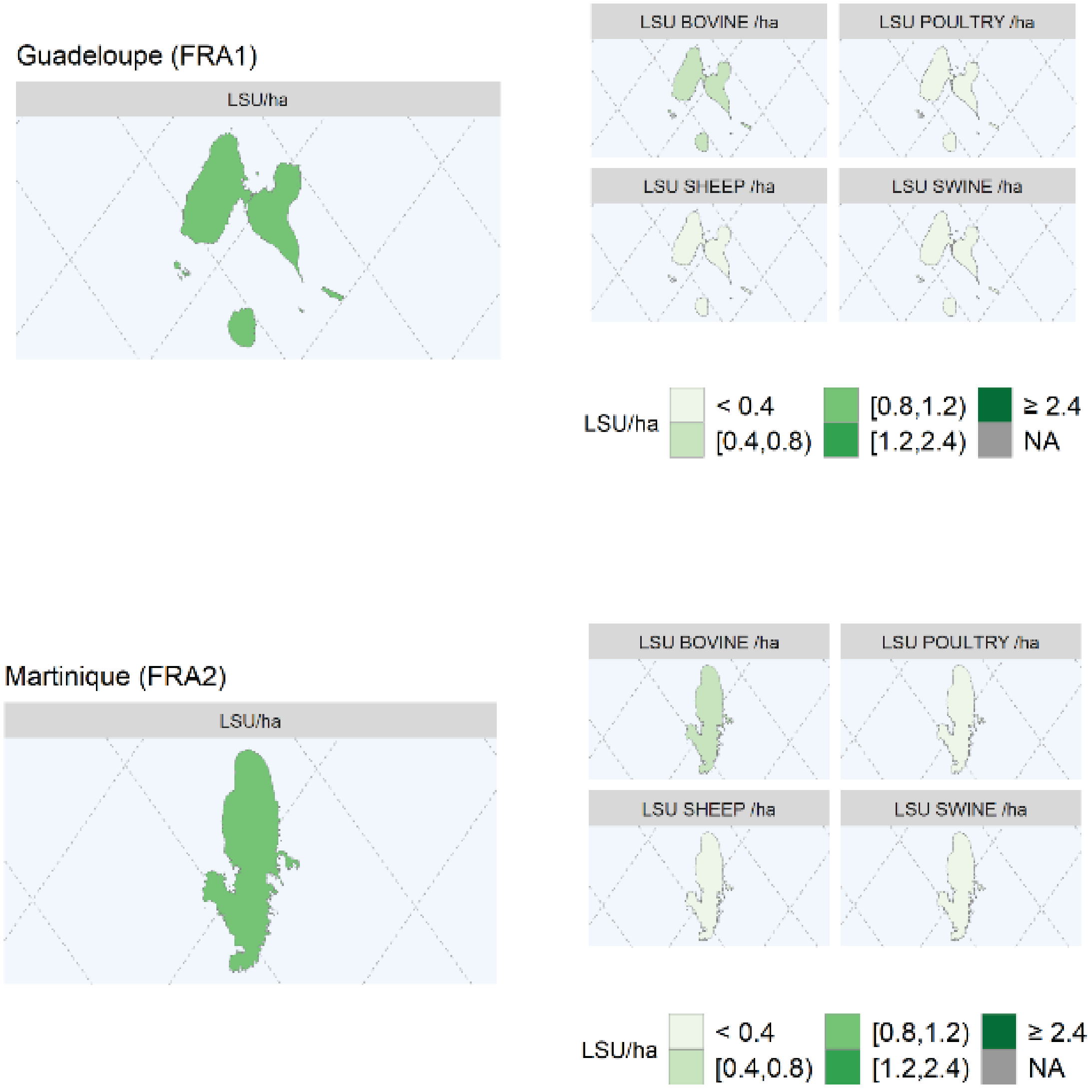


Figure 3. Map of livestock unit distribution for Guadeloupe and Martinique, year 2016 (Source: Eurostat, February 2021)

LSU for the Guadeloupe and Martinique Islands is dominated by bovine production (total LSU and LSU by animal type were retrieved individually from EUROSTAT).

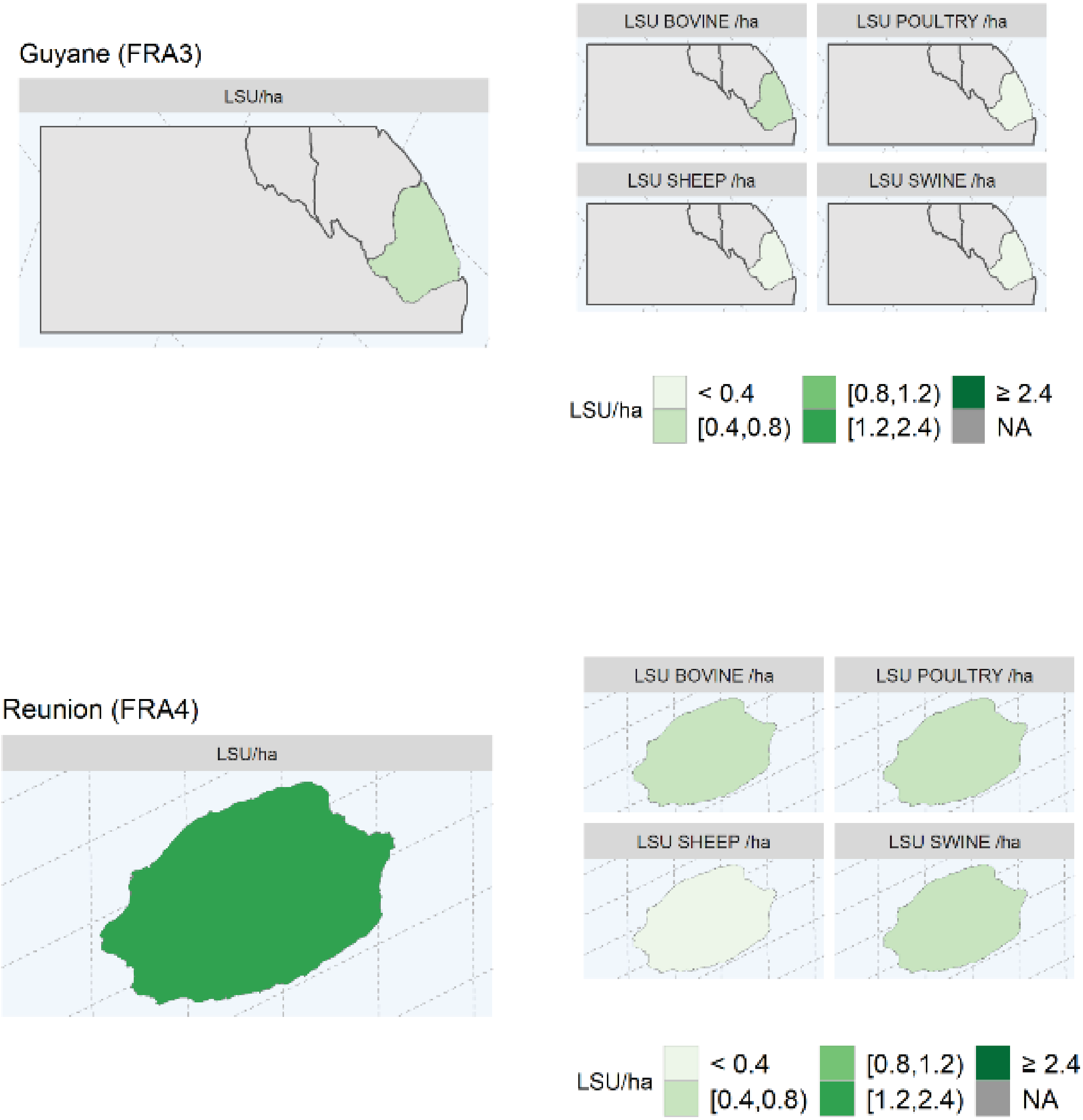


Figure 4. Map of livestock unit distribution for Guyana and Reunion, year 2016 (Source: Eurostat, February 2021)

LSU for the French Guyana and the Reunion Island is dominated by bovine production (total LSU and LSU by animal type were retrieved individually from EUROSTAT).

For Mayotte (FRA5) no data available 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

Monitoring data are produced by the local water agencies and the local health agencies. Data are then managed by DREAL (regional directorates of environment and land planning). Since 2010, the network has evolved to include when possible more common stations with the network of the Water Framework Directive. For surface water, sampling took place at least six times for the large majority of the stations. Groundwater sampling frequency is at least six samples for the large majority of the stations. France for the first time reported data about the trophic state of surface waters. Concentration measurements are provided for one single year for all water types.

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	1162	1616	1099	637	1219	1028
1a	Phreatic groundwater (deep) 5-15 m	0	117	343	0	112	316
1b	Phreatic groundwater (deep) 15-30 m	0	61	185	0	56	176
1c	Phreatic groundwater (deep) >30 m	572	74	294	81	74	256
2	Captive groundwater	118	607	272	41	541	254
3	Karstic groundwater	657	123	229	280	92	211
9	Not specified	0	0	160	0	0	119
	Total	**2509**	**2598**	**2582**	**1039**	**2094**	**2360**

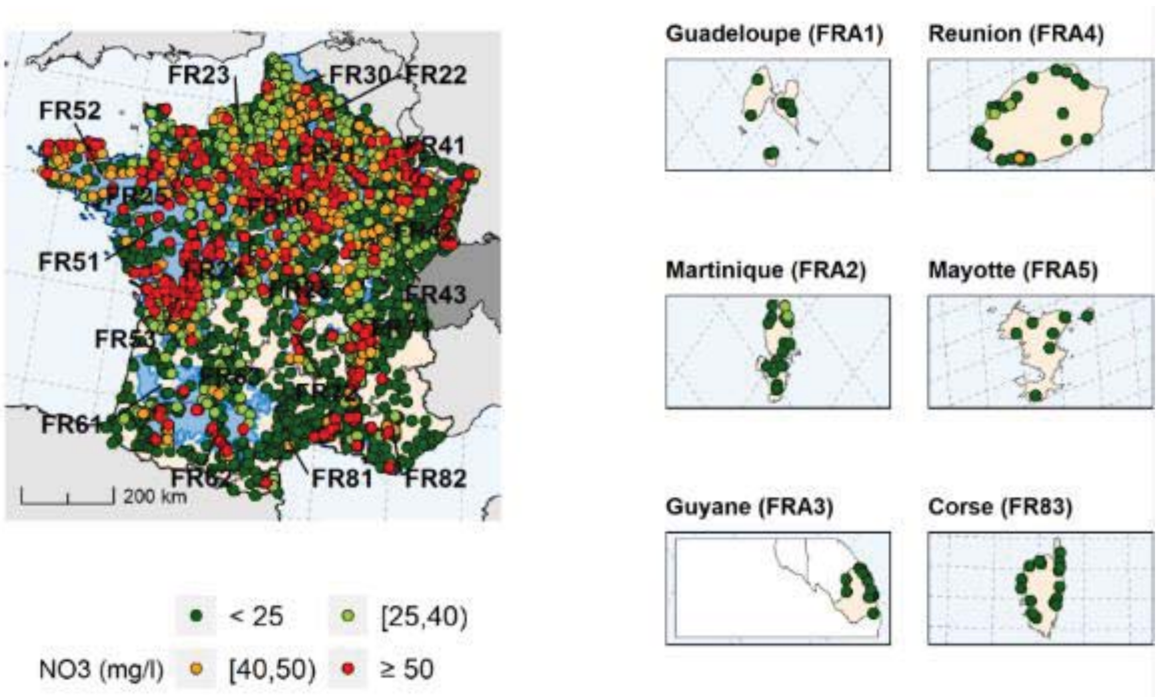
Surface water quality monitoring network

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	3331	3390	3246	1181	2897	3010	0	0	3246
5	Lake/reservoir water	0	0	5	0	0	1	0	0	5
6	Transitional water	4	8	23	4	3	14	0	0	0
7	Coastal water	17	0	0	17	0	0	0	0	50
8	Marine water	0	0	0	0	0	0	0	0	0
9	Not specified	0	0	0	0	0	0	0	0	0
	Total	**3352**	**3398**	**3274**	**1202**	**2900**	**3025**	**0**	**0**	**3301**

Groundwater Quality

Groundwater average annual nitrate concentration



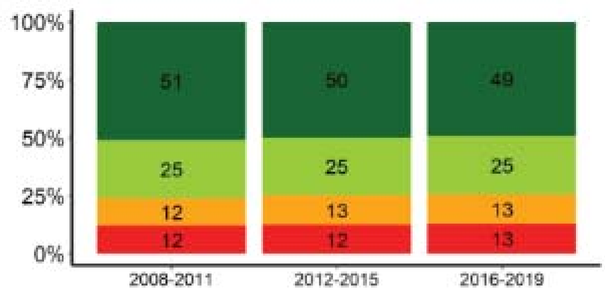


Figure 5. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). In the map in blue the NVZ.

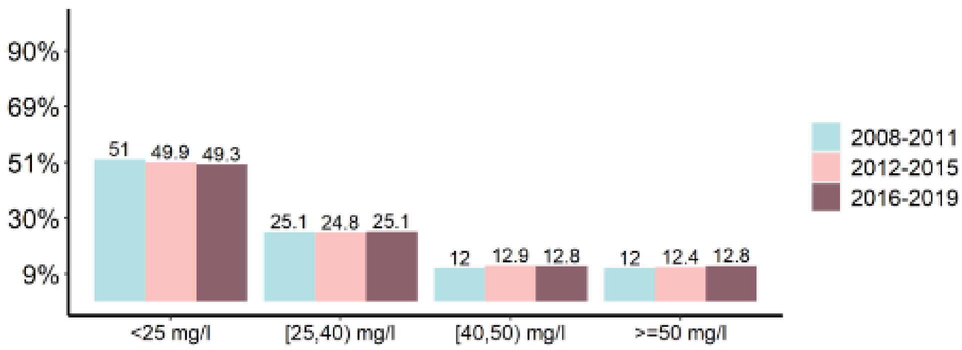


Figure 6. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis)

Groundwater average annual nitrate concentration trend

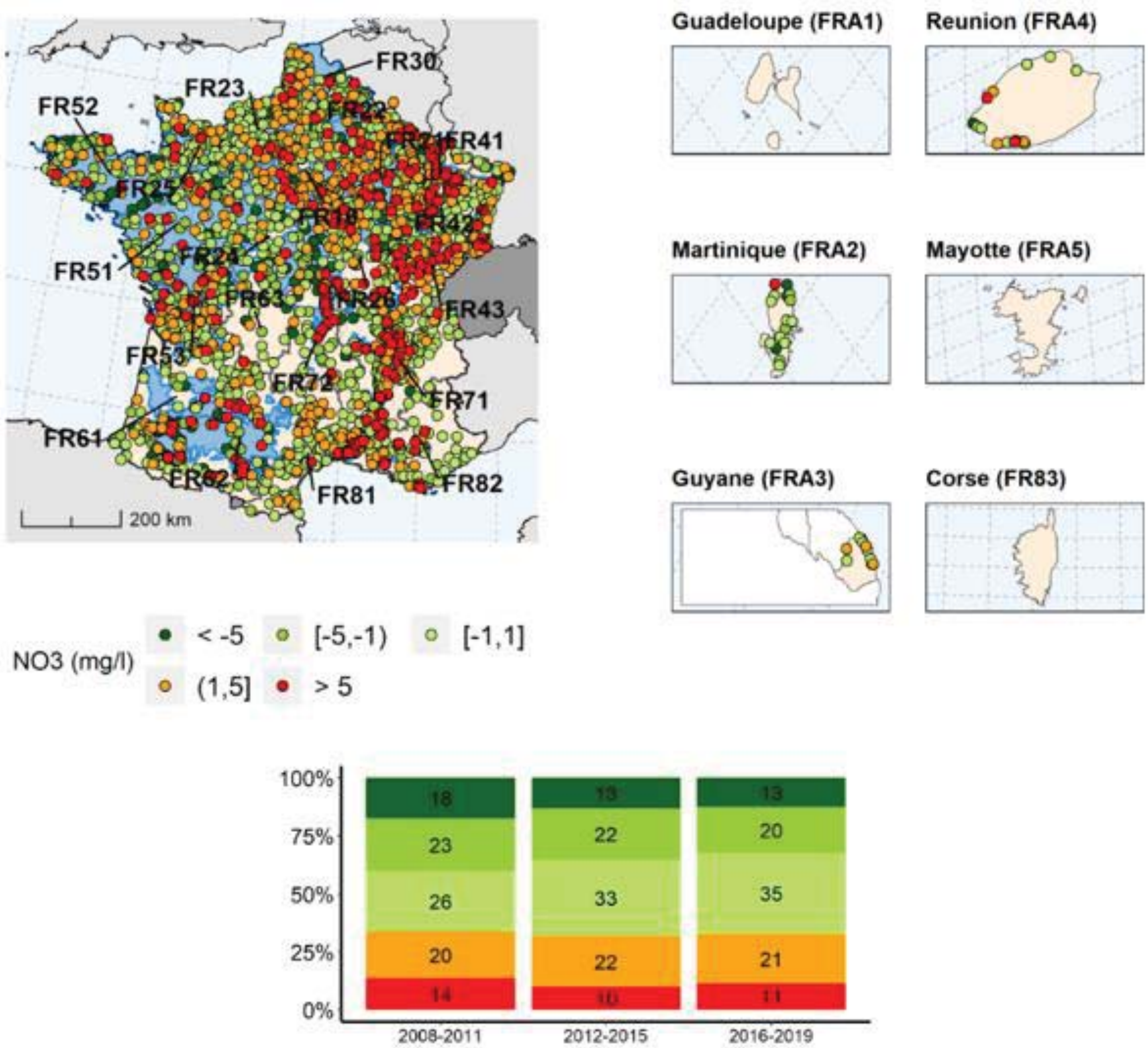


Figure 7. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis). In the map in blue the NVZ.

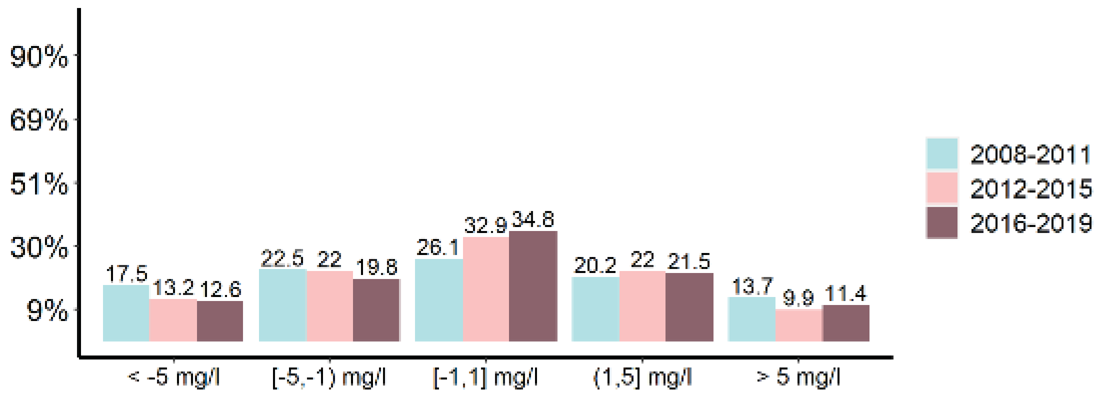
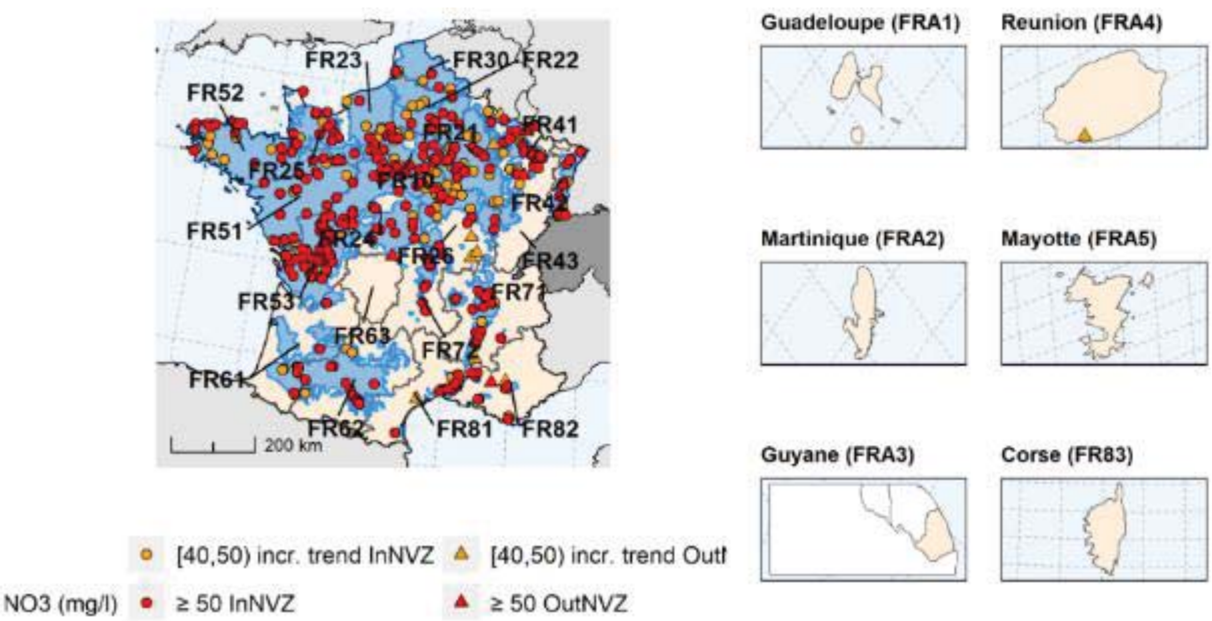


Figure 8. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis)

European Commission

Groundwater hotspot

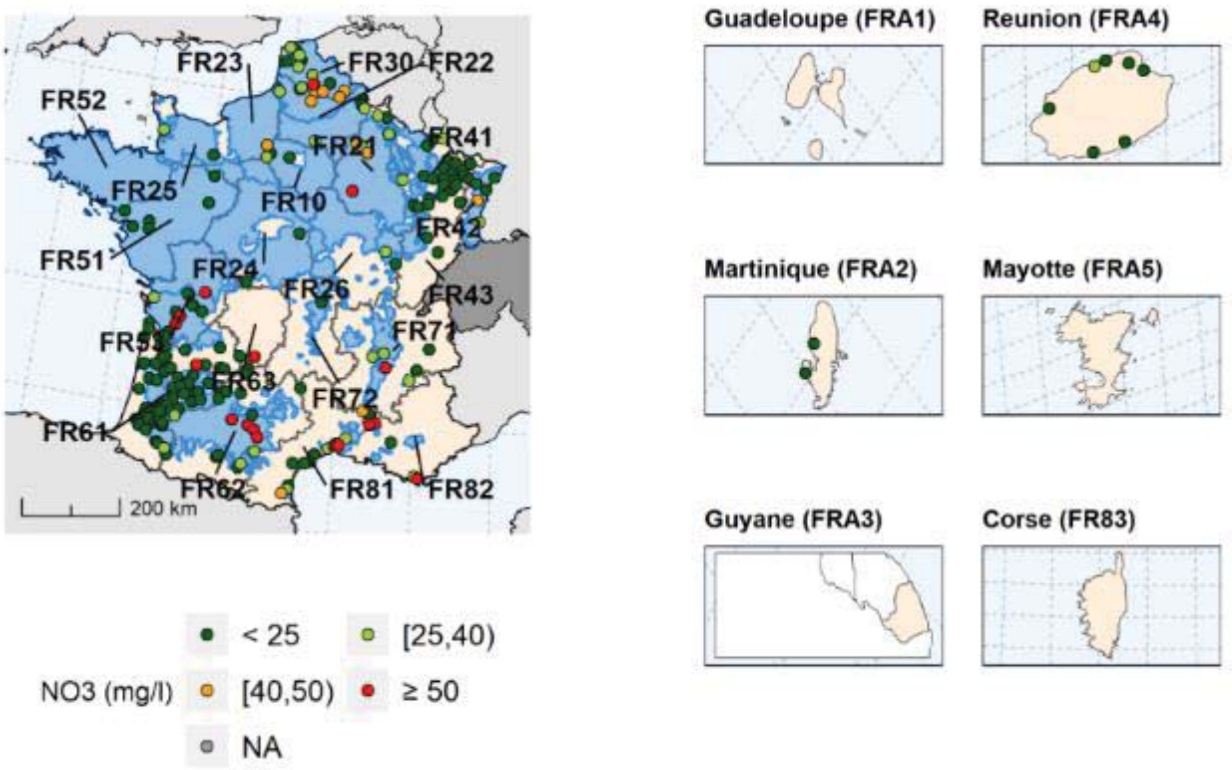


NUTS ID	NUTS NAME	>=40 and < 50 mg/l incr.trend		>=50 mg/l	
		InNVZ	OutNVZ	InNVZ	OutNVZ
FR10	Île de France	5	0	17	0
FR21	Champagne-Ardenne	13	1	17	0
FR22	Picardie	8	0	7	0
FR23	Haute-Normandie	6	0	3	0
FR24	Centre	2	0	38	0
FR25	Basse-Normandie	3	0	14	0
FR26	Bourgogne	13	3	10	0
FR30	Nord - Pas-de-Calais	3	0	3	0
FR41	Lorraine	17	1	36	3
FR42	Alsace	8	0	11	0
FR51	Pays de la Loire	6	0	22	0
FR52	Bretagne	8	0	16	0
FR53	Poitou-Charentes	9	0	43	0
FR61	Aquitaine	5	0	7	0
FR62	Midi-Pyrénées	4	0	12	0
FR63	Limousin	0	0	0	1
FR71	Rhône-Alpes	6	0	14	0
FR72	Auvergne	3	0	26	0
FR81	Languedoc-Roussillon	5	1	19	0
FR82	Provence-Alpes-Côte d'Azur	1	2	10	2
FRA4	La Réunion	0	1	0	0
	Total	**125**	**9**	**325**	**6**

Figure 9. 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



Station Type	Description	Number of removed stations		
		total removed	with measurements	with trends
0	Phreatic groundwater (shallow): 0-5 m	140	140	114
1a	Phreatic groundwater (deep) 5-15 m	10	10	10
1b	Phreatic groundwater (deep) 15-30 m	8	8	8
1c	Phreatic groundwater (deep) >30 m	13	13	13
2	Captive groundwater	24	24	20
3	Karstic groundwater	15	15	12
9	Not specified	0	0	0
	Total	**210**	**210**	**177**

Figure 10. 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

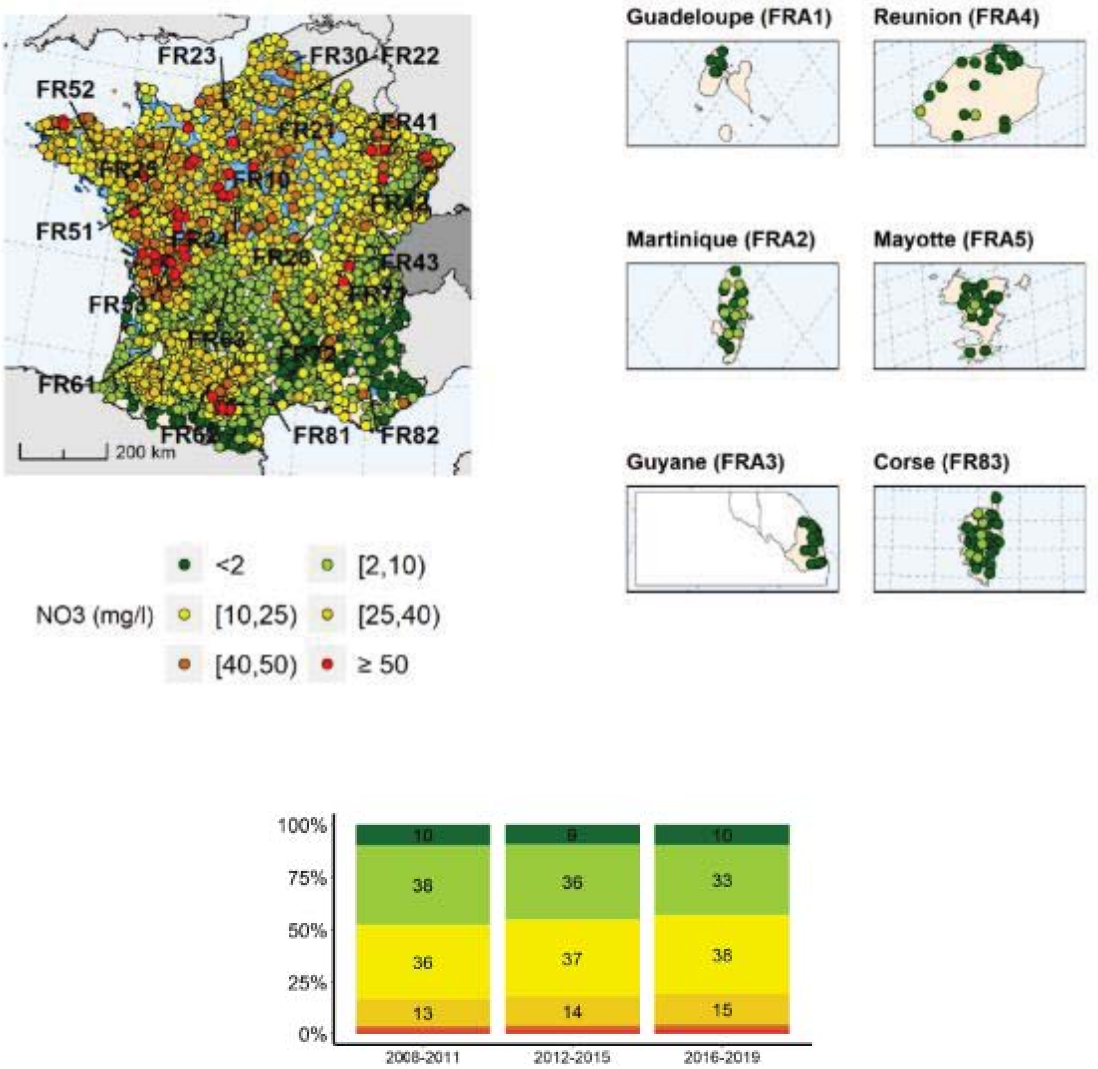


Figure 11. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information. In the map in blue the NVZ.

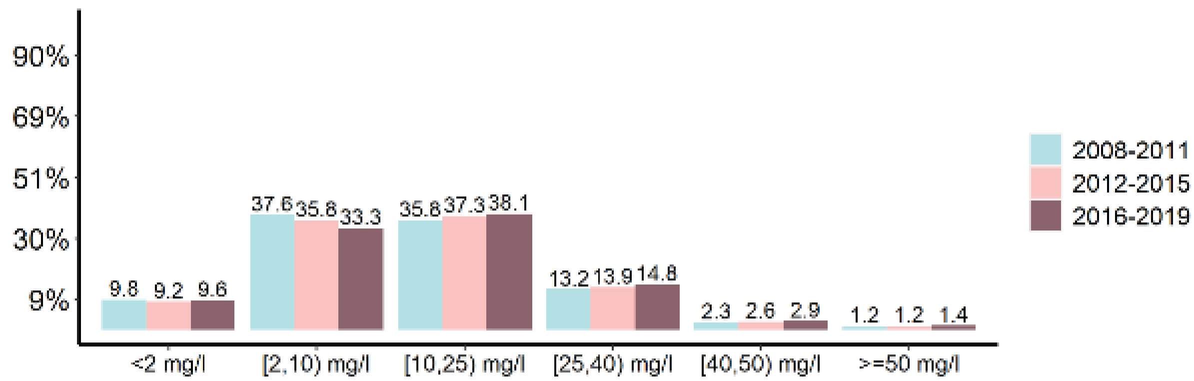


Figure 12. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis)

Surface water average annual nitrate concentration trend

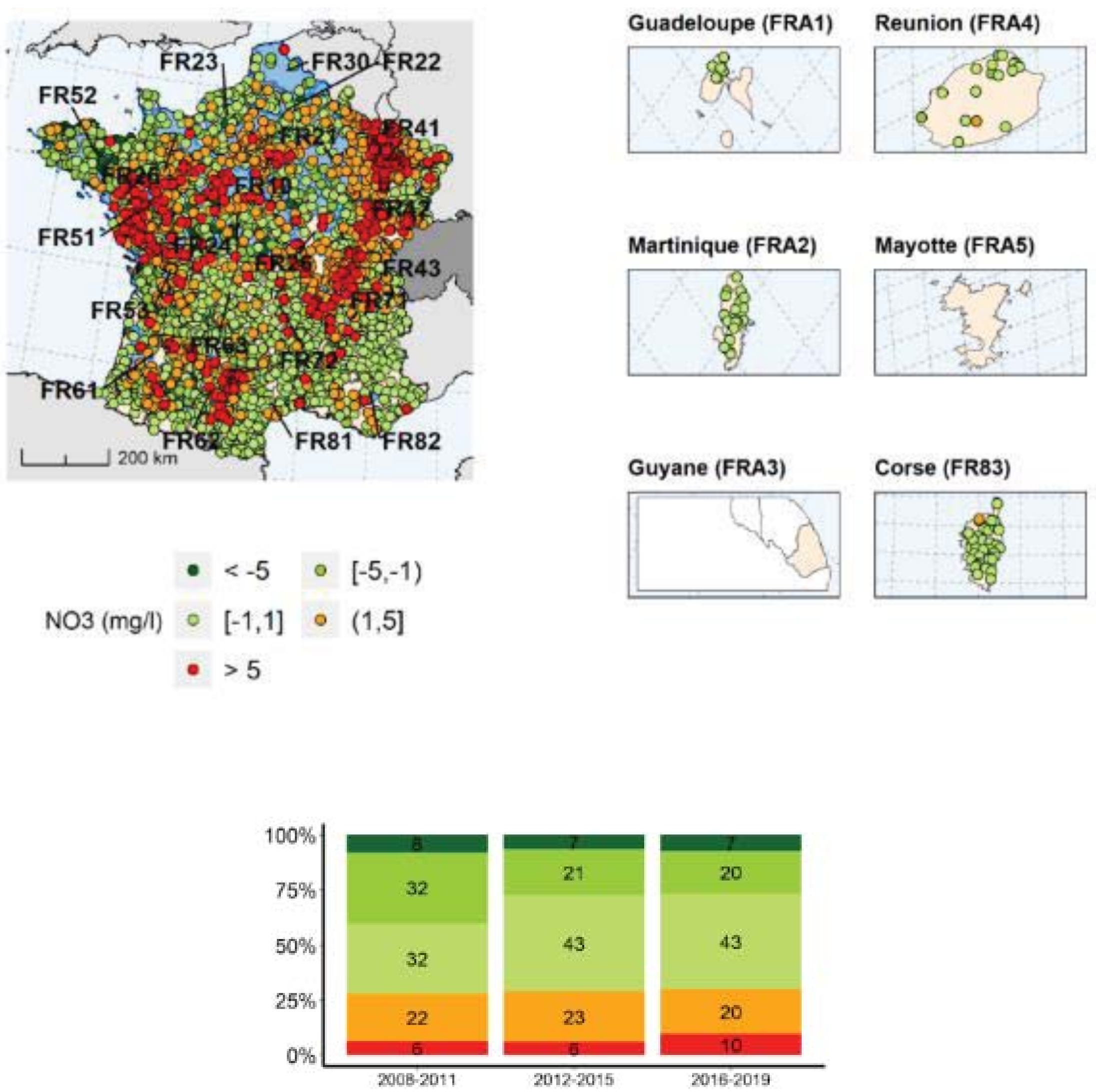


Figure 13. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis). In the map in blue the NVZ.

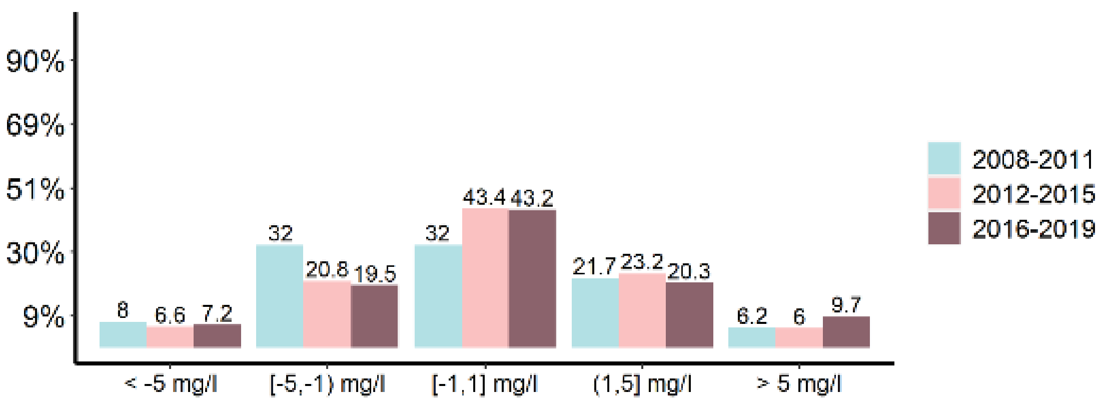


Figure 14. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis)

Surface Water Eutrophication

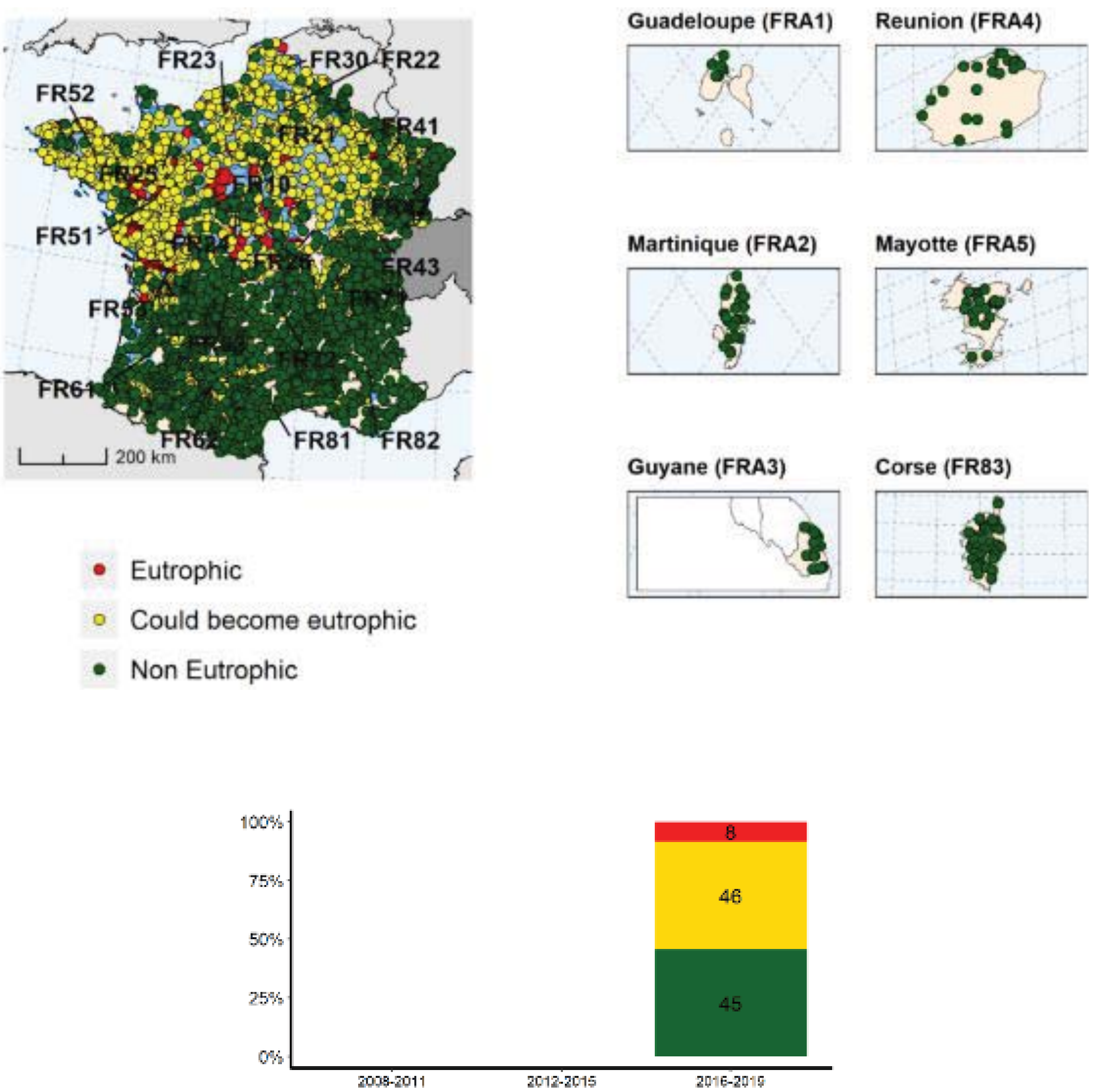


Figure 15. Spatial distribution of eutrophic status (map) and corresponding percentage of monitoring points per classes of status by reporting period (x axis). In the map in blue the NVZ.

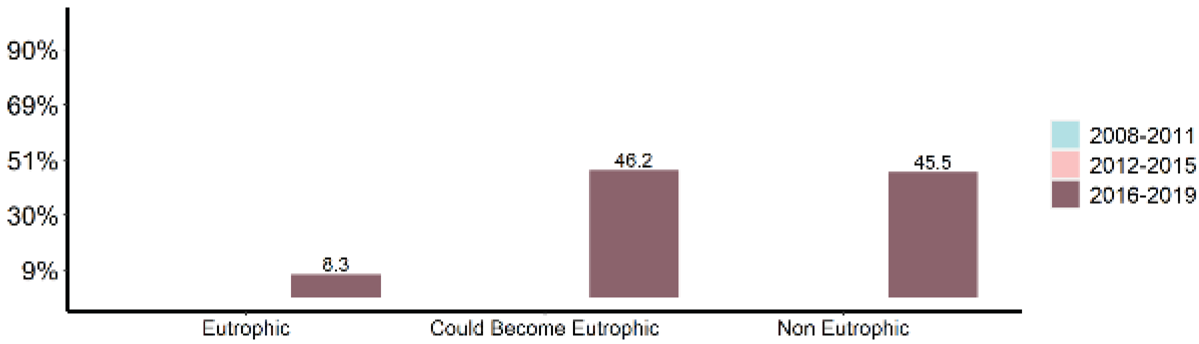
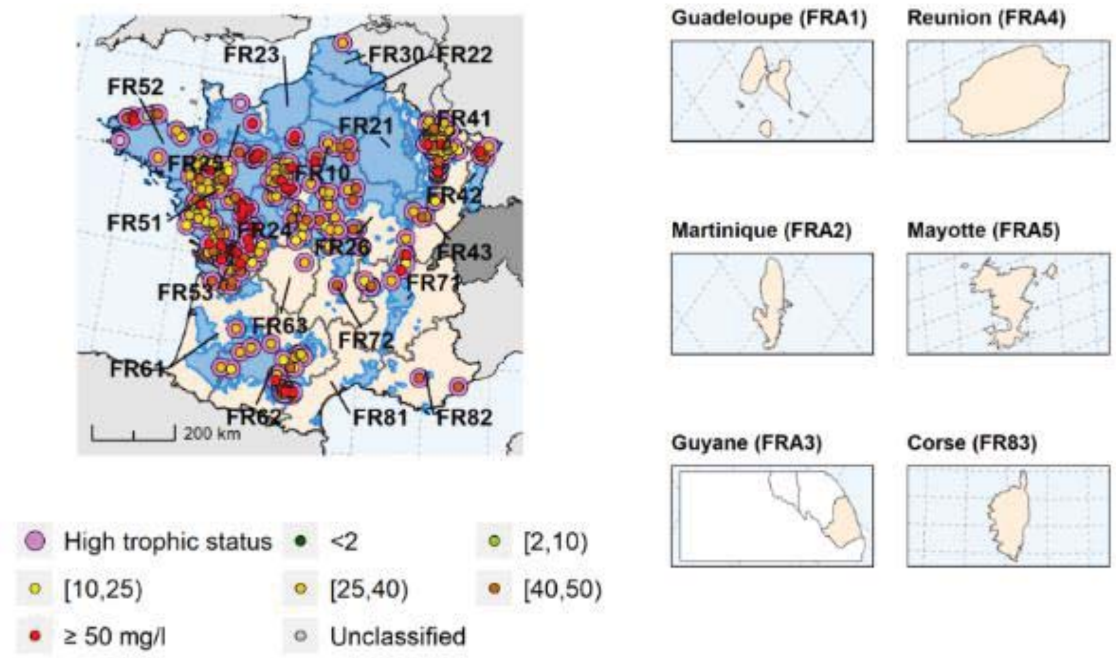


Figure 16. Comparison of percentage of monitoring points in the three reporting periods by classes of status (x axis)

The Eutrophic status vs average NO3 annual concentration



NUTS ID	NUTS NAME	High trophic status	Number of stations by classes of concentration						
			<2 mg/l	[2,10) mg/l	[10,25) mg/l	[25,40) mg/l	[40,50) mg/l	>=50 mg/l	Unclassified
FR10	Île de France	6	0	0	0	2	4	0	0
FR23	Haute-Normandie	1	0	0	0	0	0	1	0
FR24	Centre	40	0	0	6	21	8	5	0
FR25	Basse-Normandie	2	0	0	0	0	1	1	0
FR26	Bourgogne	9	0	0	2	4	3	0	0
FR30	Nord - Pas-de-Calais	1	0	0	0	1	0	0	0
FR41	Lorraine	43	0	0	8	27	5	3	0
FR42	Alsace	5	0	0	0	2	2	1	0
FR43	Franche-Comté	3	0	0	2	0	1	0	0
FR51	Pays de la Loire	58	0	0	24	18	11	5	0
FR52	Bretagne	15	0	0	4	3	5	3	0
FR53	Poitou-Charentes	42	0	0	3	9	13	17	0
FR61	Aquitaine	2	0	0	0	2	0	0	0
FR62	Midi-Pyrénées	14	0	0	4	7	2	1	0
FR63	Limousin	1	0	0	0	1	0	0	0
FR71	Rhône-Alpes	9	0	0	4	2	1	2	0
FR72	Auvergne	3	0	1	1	0	1	0	0
FR81	Languedoc-Roussillon	12	0	0	1	1	4	6	0
FR82	Provence-Alpes-Côte d'Azur	2	0	0	0	0	2	0	0
NO_NUTS	SALINE	7	0	0	0	0	0	0	7
	Total	**275**	**0**	**1**	**59**	**100**	**63**	**45**	**7**

Figure 17. 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 the higher trophic status and the corresponding value of NO3 concentration. The map shows the spatial distribution of these points, and the table reports the number of stations with measurements with highest trophic status and the corresponding stations by classes of NO3 concentration. Only the NUTS of interest are reported.

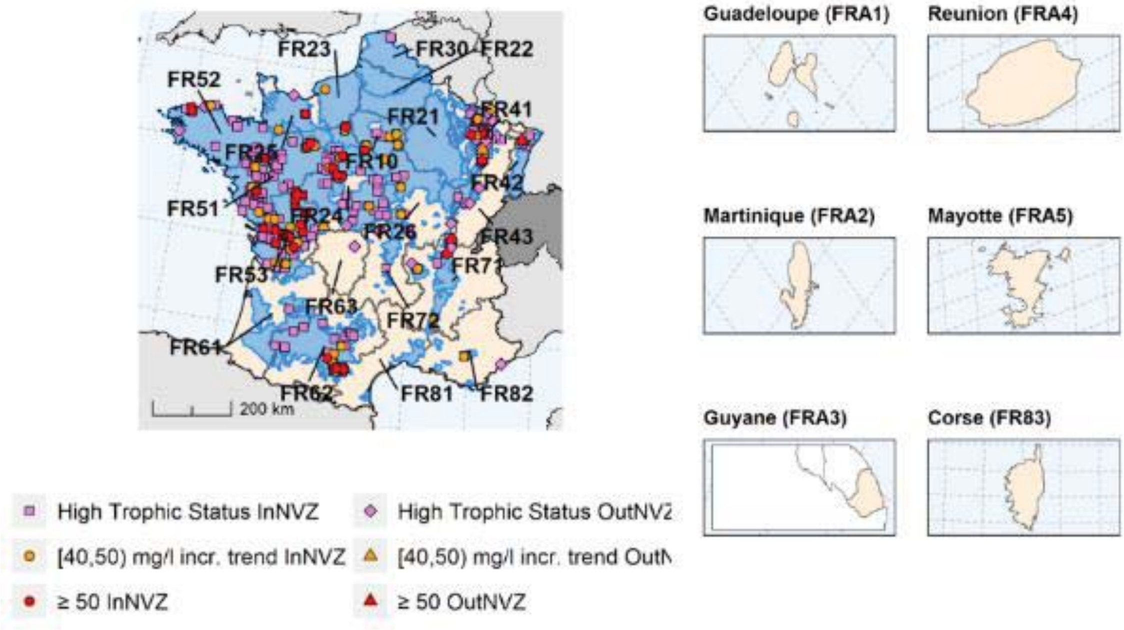
In its latest report, France used nitrate concentration for eutrophication assessment, as defined in the French regulation transposing the Nitrates Directive. In particular, water bodies with concentrations below 18 mg NO3/L were considered non-eutrophic. Water bodies with nitrate concentrations between 18 and 50 mg NO3/l are considered potentially eutrophic, and all water bodies with concentrations above 50 mg NO3/L are eutrophic. Considering that no method is available in France for defining the trophic status of transitional water, no data were reported. No data are reported for coastal water as one year of data is not enough for the determination of the trophic state of coastal waters. The assessment of the trophic state based on six years measurements are reported for the French Metropolitan area. The criteria used in the classification include among others, nutrients, chlorophyll-a, presence of toxic algae, photic limit in the water column, dissolved oxygen, the benthic macrophyte and macrofauna habitats. About 14% of coastal waters are eutrophic with large spatial variability. A concentration of eutrophic stations occurs in the English Channel and certain areas in southern Brittany. A large majority of the coastal stations are characterised by a non-eutrophic state.

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

Station Type	Description	Number of stations with Trophic status		
		Eutrophic	Could become eutrophic	Non Eutrophic
4	River water	268	1523	1455
5	Lake/reservoir water	0	2	3
6	Transitional water	0	0	0
7	Coastal water	7	0	43
8	Marine water	0	0	0
9	Not specified	0	0	0
	Total	**275**	**1525**	**1501**

European Commission

Surface Water quality hotspot

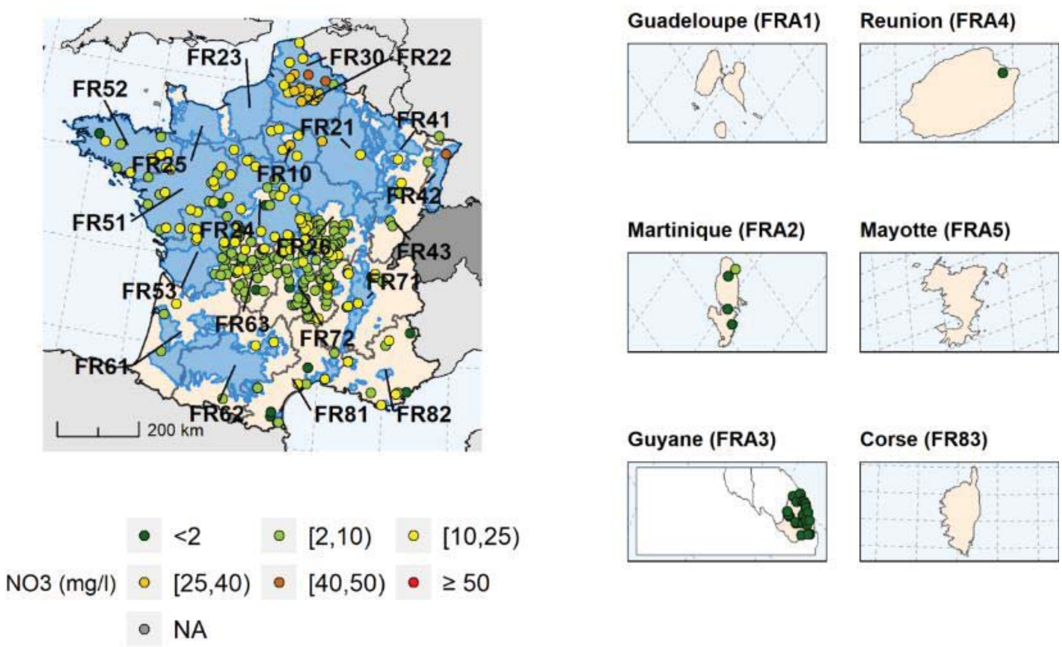


		High trophic status		>=40 and < 50 mg/l incr.trend		>=50 mg/l	
NUTS ID	NUTS NAME	InNVZ	OutNVZ	InNVZ	OutNVZ	InNVZ	OutNVZ
FR10	Île de France	6	0	5	0	0	0
FR23	Haute-Normandie	1	0	2	0	1	0
FR24	Centre	39	1	5	0	5	0
FR25	Basse-Normandie	2	0	1	0	1	0
FR26	Bourgogne	8	1	2	0	0	0
FR30	Nord - Pas-de-Calais	1	0	0	0	0	0
FR41	Lorraine	27	16	3	3	2	1
FR42	Alsace	4	1	0	0	0	1
FR43	Franche-Comté	1	2	0	0	0	0
FR51	Pays de la Loire	58	0	8	0	5	0
FR52	Bretagne	15	0	1	0	3	0
FR53	Poitou-Charentes	42	0	9	1	17	0
FR61	Aquitaine	2	0	0	0	0	0
FR62	Midi-Pyrénées	14	0	3	0	1	0
FR63	Limousin	0	1	0	0	0	0
FR71	Rhône-Alpes	4	5	2	0	0	2
FR72	Auvergne	1	2	0	0	0	0
FR81	Languedoc-Roussillon	12	0	1	0	6	0
FR82	Provence-Alpes-Côte d'Azur	1	1	1	0	0	0
NO_NUTS	SALINE	0	7	0	0	0	0
	Total	**238**	**37**	**43**	**4**	**41**	**4**

Figure 18. SW hotspot analysis map (top graph) and distribution by NUTS2 (lower graph) of average NO3 annual concentration greater than 40 mg/l and trophic status. In the map in blue the NVZ.

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



Station Type	Description	Number of removed stations			
		total removed	with measurements	with trends	with trophic status
4	River water	333	333	309	0
5	Lake/reservoir water	0	0	0	0
6	Transitional water	0	0	0	0
7	Coastal water	0	0	0	0
8	Marine water	0	0	0	0
9	Not specified	0	0	0	0
	Total	**333**	**333**	**309**	**0**

Figure 19. SW removed stations map (top graph) and distribution by surface water type (lower graph). In the map NVZ in blue.

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

Measures in the Action Programme

The Code of Good Agricultural Practice was defined by the decree of 22 November 1993. It was established at the national level and it has not been changed since its release. Many organizations participated to the definition of the Code, as for instance COMIFER, INRAE, IDELE. In addition, the specific regulations under the ICPE "regulated installations for environmental protection" allows the mandatory applications of these good agriculture practices and under the directive 2010/78/UE 6950 industrial plants are controlled for reducing the nitrogen emissions from agricultural sources.

France has had 6 action programmes since 1996. The latest action programme was adopted in December 2018. The national action programme is complemented by regional action programmes (PARs). Due to restructuring of merging of the French regions, the number of regions in nitrate vulnerable zones went from 21 to 12. So, the sixth action programme is composed by the national action programme and 12 regional action programmes. It is highlighted that the measures can be reinforced in specific "Zones d'Actions Renforcées" (ZAR), that can be also inside NVZ.

In the 2016–2019 period no study of cost-effectiveness was conducted. The following table summarizes the main measure of the action programme.

Table 6. Details of the Action Programme

Measure	General details in Action Programme (*)
Period of prohibition of fertiliser application	• During periods of risk of nitrate leakage into the water. These periods vary depending on the type of crop and the type of nitrogen fertilizer
Restrictions for application on sloped soils	• Any application of nitrogenous fertilizers in vulnerable areas must respect conditions linked to the distance from water courses (depends on the type of fertilizers and the slope of the soil) in order to reduce the risk of runoff into the water
	• Nine regions have chosen to reinforce this measure: water bodies of more than ten ha and "GAEC" rivers (Good Agro-Environmental Conditions) must be bordered by a grassland strip with a minimum width of 5 m
Restrictions for application on soaked, frozen, or snow-covered soils	• Any application of nitrogenous fertilizers in vulnerable areas must respect conditions linked on the condition of the soil encountered (soggy, flooded, snow-covered, frozen) in order to reduce the risk of runoff into the water
	• Nine regions have chosen to reinforce this measure: water bodies of more than ten ha and "GAEC" rivers (Good Agro-Environmental Conditions) must be bordered by a grassland strip with a minimum width of 5 m
Restrictions for application near watercourses (buffer strips)	•Any application of nitrogenous fertilizers in vulnerable areas must respect conditions linked to the distance from water courses (depends on the type of fertilizers and the slope of the soil), in order to reduce the risk of runoff into the water
	• Nine regions have chosen to reinforce this measure: water bodies of more than ten ha and "GAEC" rivers (Good Agro-Environmental Conditions) must be bordered by a grassland strip with a minimum width of 5 m
	• Some regions have a larger buffer strip (10 m)
Effluent storage works	• Not specified
Capacity of manure storage	• The storage capacities for livestock effluents are designed to comply with the periods when spraying is prohibited and designed to avoid direct runoff to the environment
Rational fertilisation (e.g., splitting fertilisation, limitations)	• Reinforcement of measure in 8 regions
Crop rotation, permanent crop enhancement	• Not specified
Vegetation cover in rainy periods, winter	• It is mandatory to cover the soil during rainy periods
Fertilisation plans, spreading records	• Not specified
Other measures	• The fertilization plan (PPF) and the practice registration book (CEP)
Date for application limit of 170 kg N/ha/year:	• Not specified

Controls

Administrative controls on the implementation of the Action Programme measures are carried out in the frame of the CAP cross-compliance check. About 520 farmers were controlled every year. Non-conformities for analysis of nitrogen content of manure were detected for 6.3% of the cases, manure storage leakage for 3.8% of the cases and fertilizer usage for 3.8% of the cases.

Designation of NVZ

France has designated 184260 km^2 of Nitrates Vulnerable zones representing about 33.9% of the entire territory. The designated area is lower than the previous designation of NVZ areas that extended over 188793 km^2, representing about 34.7% of the territory.

Forecast of Water Quality

The evolution of water quality was done through the analysis performed for the Water Framework Directive implementation. A decrease by 32% of the number of groundwater bodies affected by diffuse agricultural pollution and 31% of the number of surface water bodies affected by agricultural diffuse contamination is expected in 2021.

Summary

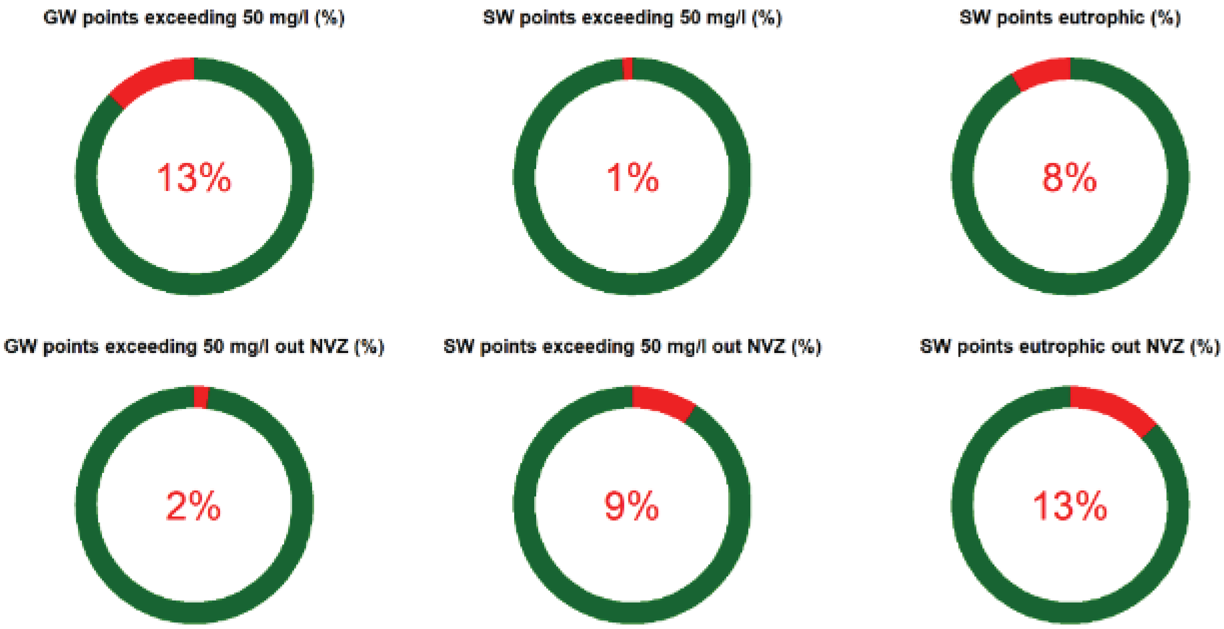


Figure 20. The summary plot for the period 2016-2019

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

Long term analysis

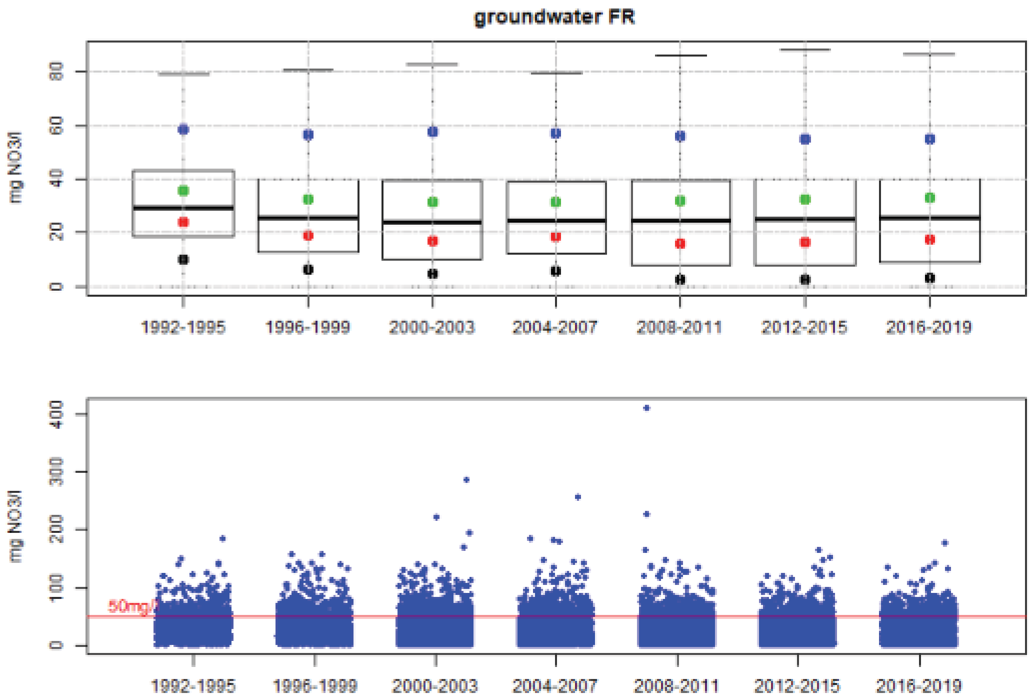


Figure 21. Time series of box whisker plots along with the distribution of the average NO3 annual concentrations for each reporting period for groundwater stations. The blue, red, green and black dots represent the mean of the fourth third, second and first quartiles, respectively.

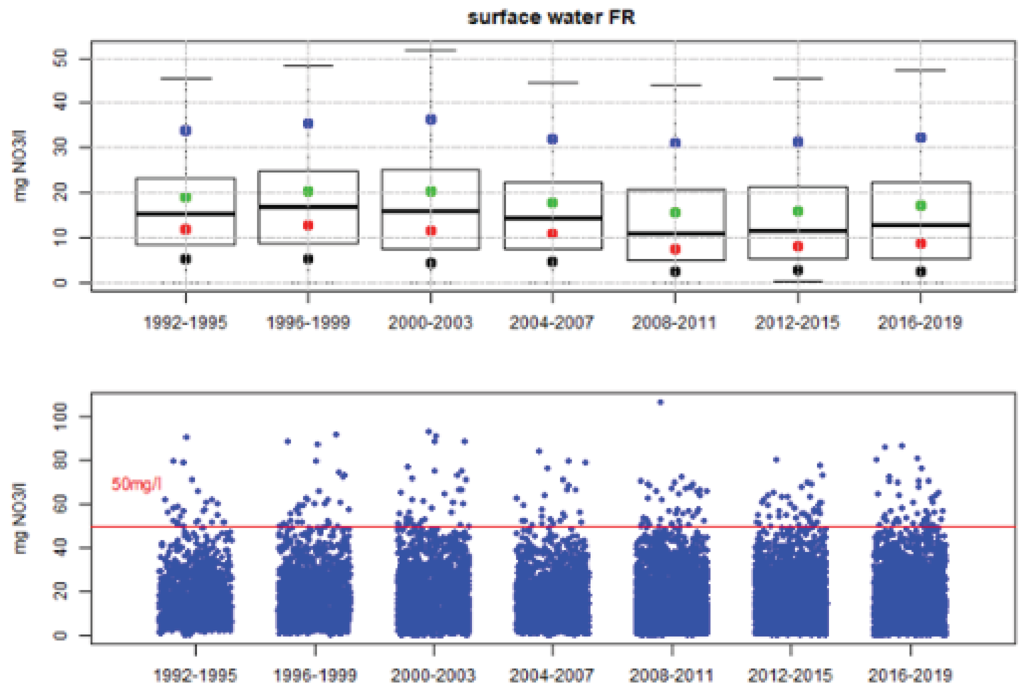


Figure 22.Time series of box whisker plots along with the distribution of average NO3 annual concentrations for each reporting period for surface water stations. The blue, red, green and black dots represent the mean of the fourth third, second and first quartiles, respectively.

Conclusions and recommendations

The livestock density is close to the EU average but very high in the north west of the country, especially in Brittany. The surplus of nitrogen is close to the EU average, while there is almost no surplus of phosphorus.

The current reporting period includes data only for year 2019.

There is a well-elaborated network of monitoring stations. Groundwater water is of average quality, with a lot of historical (Brittany, centre west) and new (north, north east) hotspots. Eutrophication of marine water is an issue in the north coast of Brittany.

France revised its actions programmes in 2018.

The Commission recommends France to revise its NVZ based on the latest nitrates pollution data and to reinforce its action programmes for groundwater in hot spots where nitrates pollution is high and for inland and marine surface waters affected by eutrophication where the agricultural pressure is significant. It also recommends extending the monitoring data to include the four years of the reporting period.

EUROPEAN
COMMISSION

Brussels, 11.10.2021
SWD(2021) 1001 final

PART 19/38

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

Germany's utilized agricultural area amounts to 16.7 Mha, representing 47.7% of the total land area and has remained stable since 2007. The major outputs of the agricultural industry excluding services and secondary activities include in a decreasing order milk (19.8%), pigs (13.3%) and cereals (10.6%).
Eurostat

Major land use statistics for Germany

Table 1.Utilized agricultural area (abbreviated as UAA)

Germany	2005	2007	2010	2013	2016
Utilised agricultural area UAA (1000 ha)	NA	16954	16704	16700	16659
arable land (1000 ha)	NA	11877	11847	11876	11763
permanent grass (1000 ha)	NA	4875	4655	4621	4694
permanent crops (1000 ha)	NA	198	199	200	200
kitchen gardens (1000 ha)	NA	5	4	3	2

Note:
Eurostat (FSS)

Germany's arable land has remained stable since 2007. Permanent grass and crops also remained stable while kitchen gardens decreased.

Animal distribution in Germany

Germany's livestock remained more or less stable. The livestock density index (livestock unit per hectare of Utilized Agricultural Area) has also remained stable and is higher than the EU average of 0.8.

Table 2. Livestock statistics

Germany	2005	2007	2010	2013	2016
Livestock index	1.07	1.06	1.07	1.10	1.09
dairy cows (10^6 heads)	4.16	4.09	4.18	4.27	4.22
live bovines (10^6 heads)	12.92	12.71	12.71	12.69	12.47
live pigs (10^6 heads)	26.99	27.11	26.90	28.13	27.38
live poultry (10^6 heads)	NA	NA	128.90	177.33	169.72

Note:
Eurostat (FSS)

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

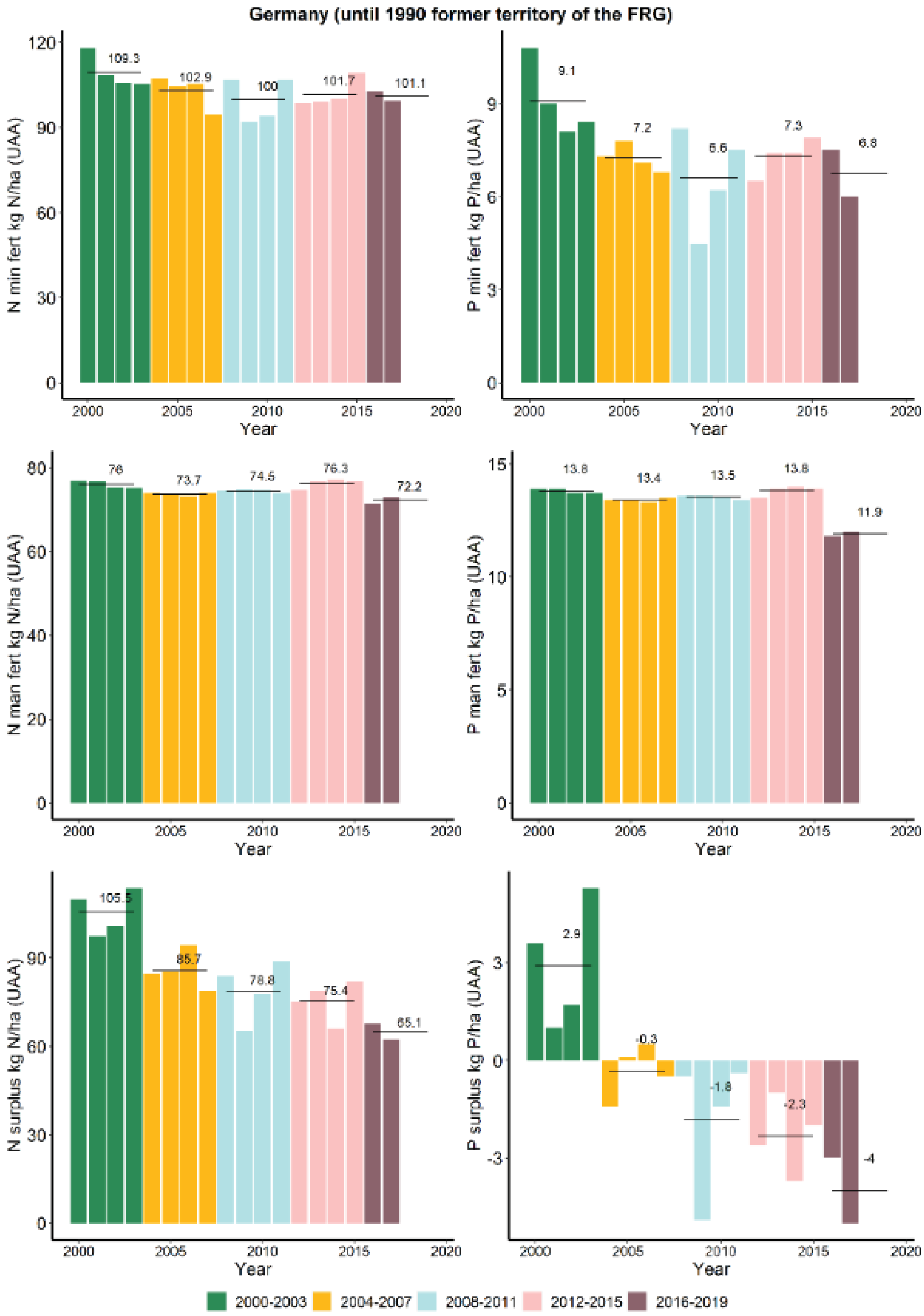


Figure 1. N and P fertilizers and gross surplus (kg/ha)

The gross nitrogen and phosphorus surpluses originate from EUROSTAT data for the years 2000-2017. N mineral fertilizers and manure are stable with respect to the previous reporting period, while P mineral fertilizers and manure decreased. The nitrogen and phosphorus surplus decreased significantly from the last reporting period by 13% and 74% respectively. This clearly indicates that the nutrient use efficiency has increased. In the plots: N/P min and N/P man are respectively the N/P mineral fertilizers and N/P manure. It is noteworthy that Germany reported different values of N and P fertilizers and surplus in the report due to different methods of calculation.

Livestock unit - LSU /ha

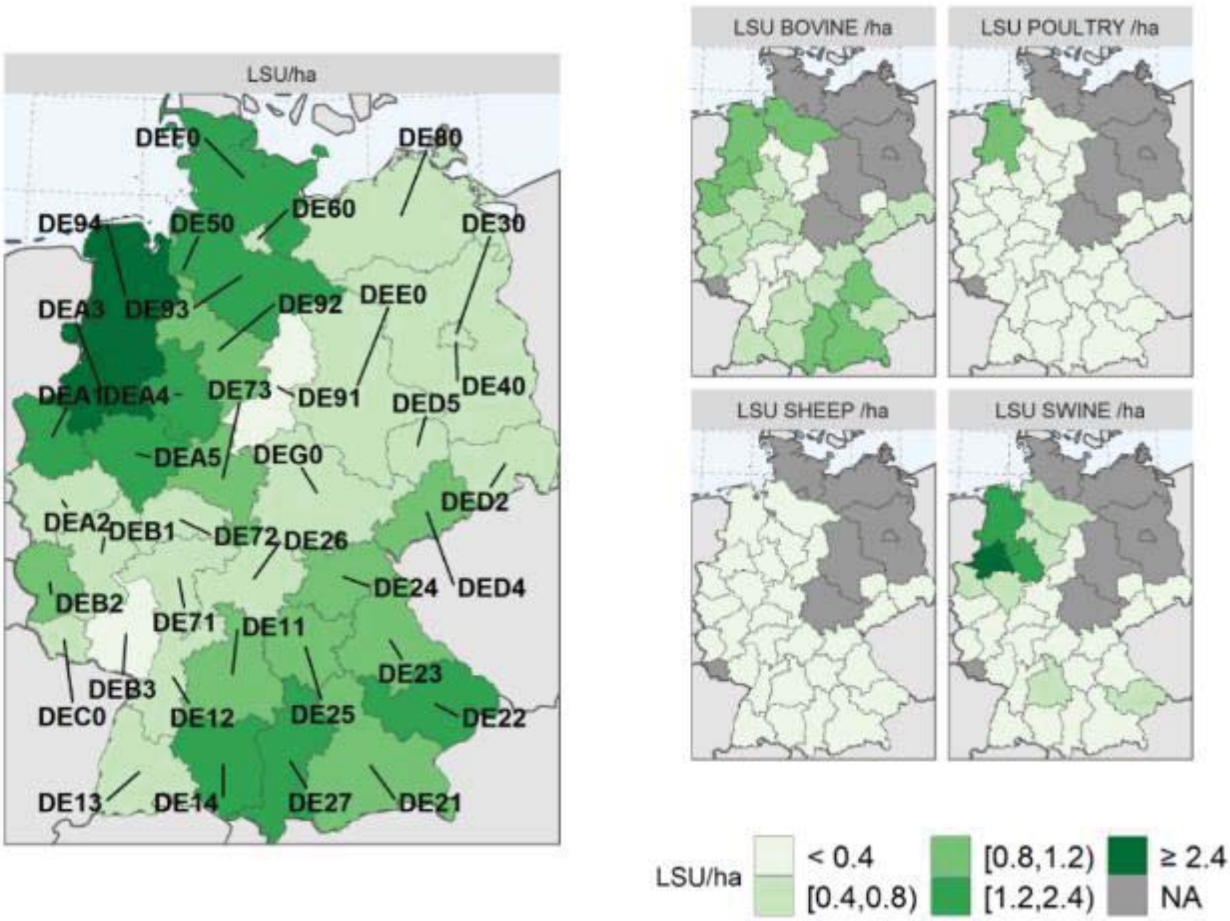


Figure 2. Map of livestock unit distribution, year 2016 (Source: Eurostat, February 2021)

Animal production is concentrated in the North West part of the country (total LSU and LSU by animal type were retrieved individually from EUROSTAT).
In this document, the NUTS-2013 version is used.
(https://ec.europa.eu/eurostat/web/gisco/geodata/reference-data/administrative-units-statistical-units/nuts)

Water Quality Monitoring

The current assessment period covers only the years 2016-2018, because the 2019 measurement results were not available at the time the Report was compiled. When performing the comparison between this reporting period and the previous reporting year 2015 was considered while it was not in the official data delivery and report in 2016. So the data mentioned in the current report for the previous report will be different than that mentioned in the previous report.

For surface measurements, two stations have same coordinates due to different measured waterbodies. In these cases, the average values covers 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 coordinated: 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	66	247	236	66	247	236
1a	Phreatic groundwater (deep) 5-15 m	66	246	232	66	244	230
1b	Phreatic groundwater (deep) 15-30 m	21	137	135	21	136	135
1c	Phreatic groundwater (deep) >30 m	7	67	89	7	65	88
2	Captive groundwater	2	0	0	2	0	0
3	Karstic groundwater	0	0	0	0	0	0
9	Not specified	0	0	0	0	0	0
	Total	**162**	**697**	**692**	**162**	**692**	**689**

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	251	239	249	0	0	249	0	0	249
5	Lake/reservoir water	52	2	60	0	0	44	17	0	62
6	Transitional water	5	5	5	0	0	5	0	0	5
7	Coastal water	0	0	39	0	0	0	0	0	33
8	Marine water	0	0	7	0	0	0	0	0	2
9	Not specified	0	0	0	0	0	0	0	0	0
	Total	**308**	**246**	**360**	**0**	**0**	**298**	**17**	**0**	**351**

Groundwater Quality

Groundwater average annual nitrate concentration

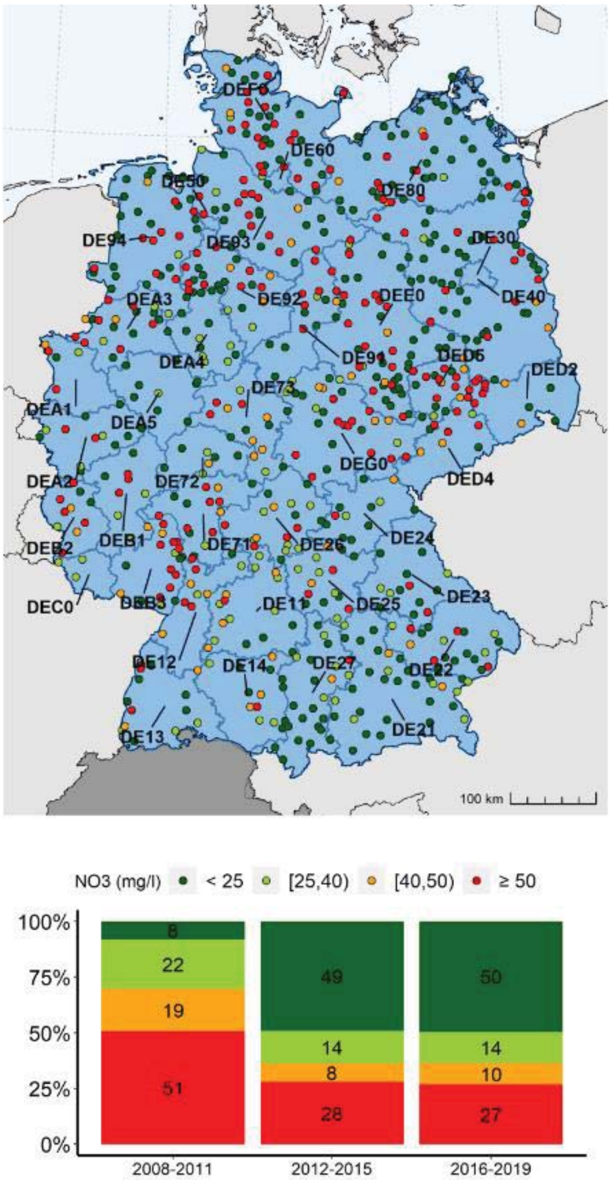


Figure 3. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis)

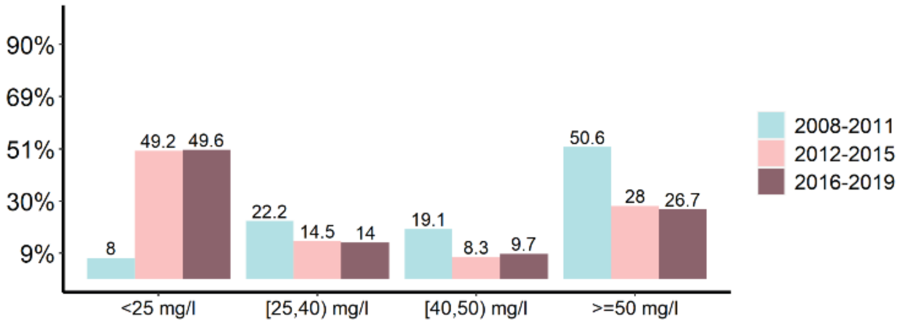


Figure 4. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis)

Groundwater average annual nitrate concentration trend

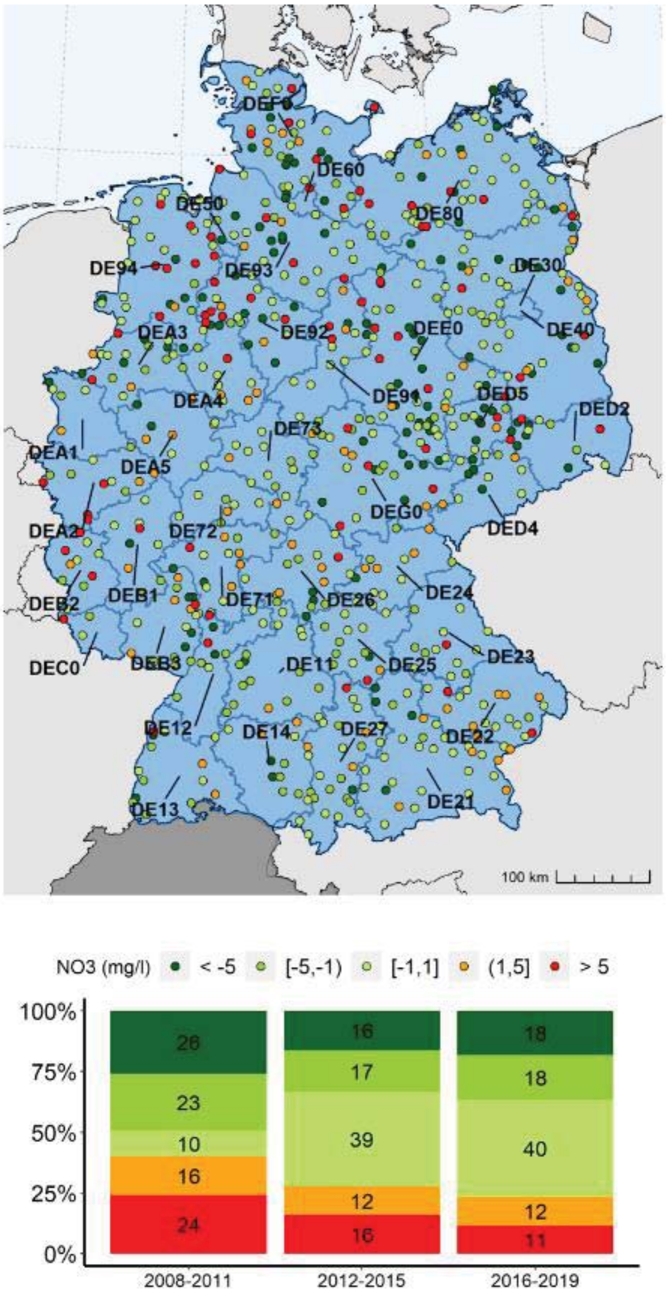


Figure 5. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis).

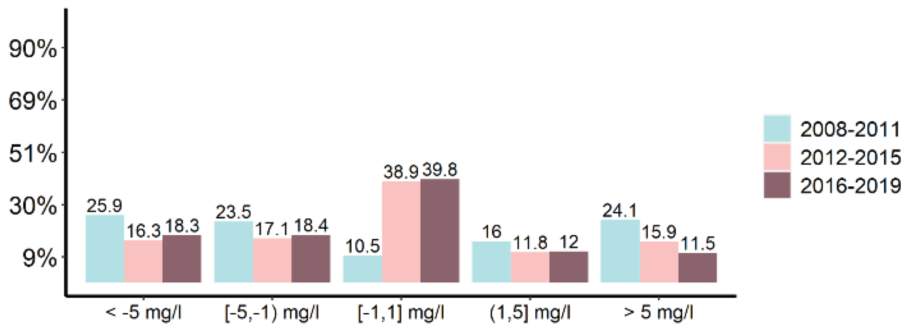
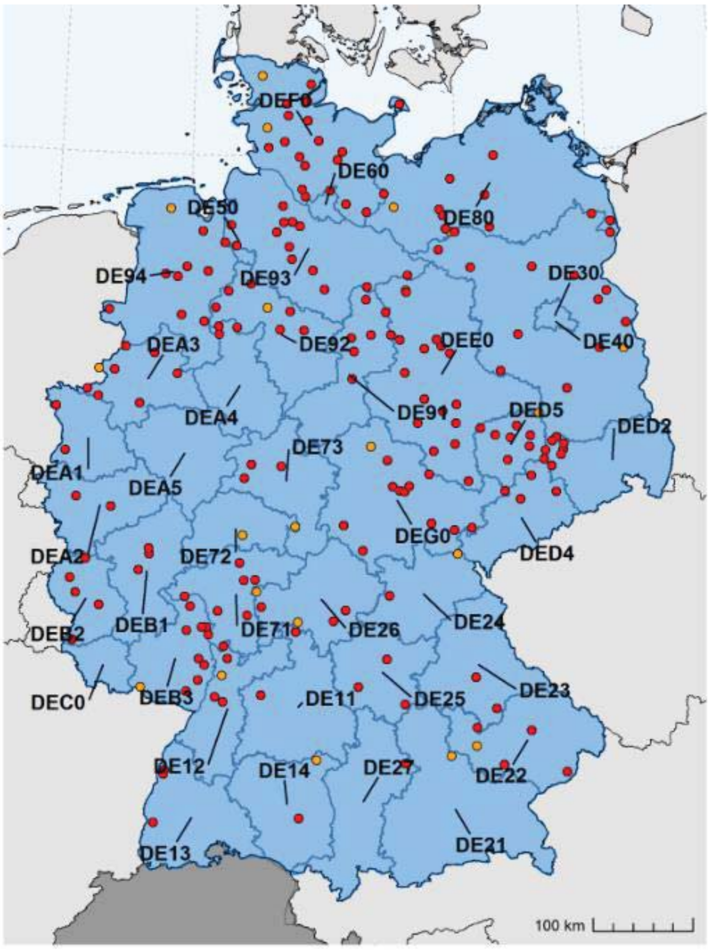


Figure 6. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis)

Groundwater hotspot

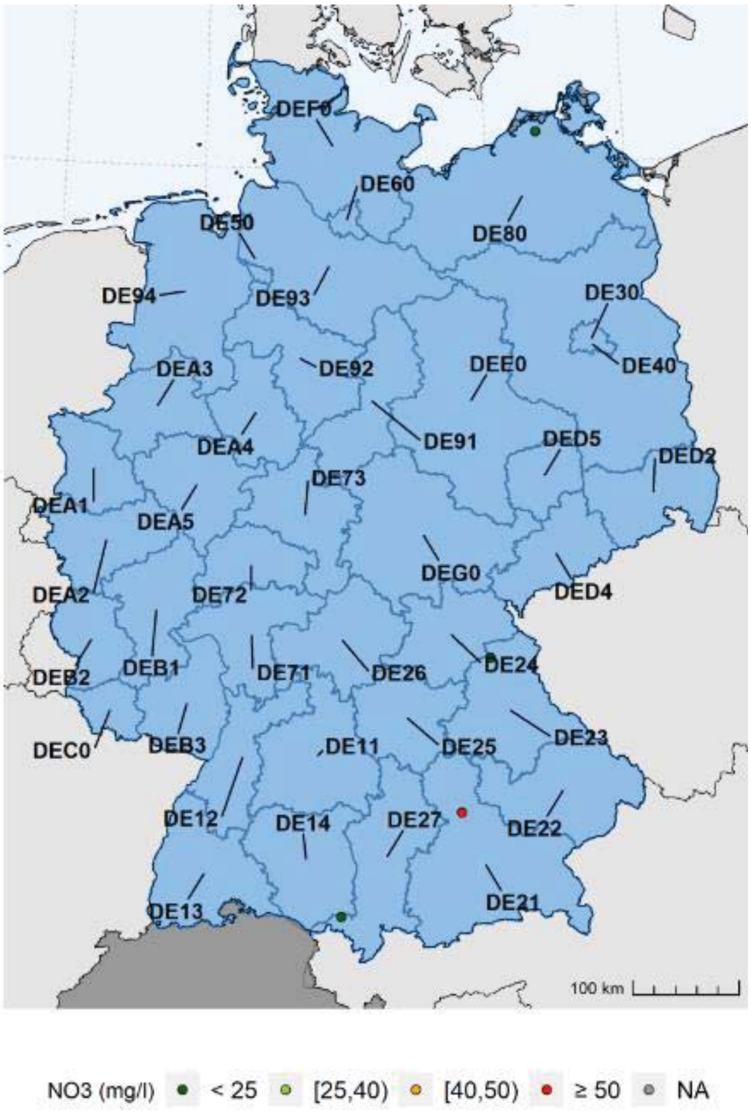


NUTS ID	NUTS NAME	>=40 and < 50 mg/l incr.trend	>=50 mg/l
DE11	Stuttgart	0	2
DE12	Karlsruhe	1	3
DE13	Freiburg	0	3
DE14	Tübingen	1	1
DE21	Oberbayern	1	0
DE22	Niederbayern	1	4
DE23	Oberpfalz	0	2
DE24	Oberfranken	1	1
DE25	Mittelfranken	0	3
DE26	Unterfranken	2	3
DE27	Schwaben	0	1
DE40	Brandenburg	2	13
DE50	Bremen	0	1
DE60	Hamburg	0	1
DE71	Darmstadt	0	8
DE72	Gießen	2	0
DE73	Kassel	0	3
DE80	Mecklenburg-Vorpommern	2	9
DE91	Braunschweig	0	7
DE92	Hannover	1	8
DE93	Lüneburg	0	13
DE94	Weser-Ems	1	9
DEA1	Düsseldorf	0	2
DEA2	Köln	0	2
DEA3	Münster	1	6
DEA4	Detmold	0	1
DEB1	Koblenz	0	3
DEB2	Trier	0	5
DEB3	Rheinhessen-Pfalz	1	8
DED2	Dresden	0	6
DED4	Chemnitz	0	4
DED5	Leipzig	0	8
DEE0	Sachsen-Anhalt	1	16
DEF0	Schleswig-Holstein	2	18
DEG0	Thüringen	1	11
	Total	**21**	**185**

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

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

Groundwater stations removed



Station Type	Description	Number of removed stations: total removed	with measurements	with trends
0	Phreatic groundwater (shallow): 0-5 m	1	1	1
1a	Phreatic groundwater (deep) 5-15 m	0	0	0
1b	Phreatic groundwater (deep) 15-30 m	2	2	2
1c	Phreatic groundwater (deep) >30 m	1	1	1
2	Captive groundwater	0	0	0
3	Karstic groundwater	0	0	0
9	Not specified	0	0	0
	Total	**4**	**4**	**4**

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

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

Surface Water Quality

Surface water average annual nitrate concentration

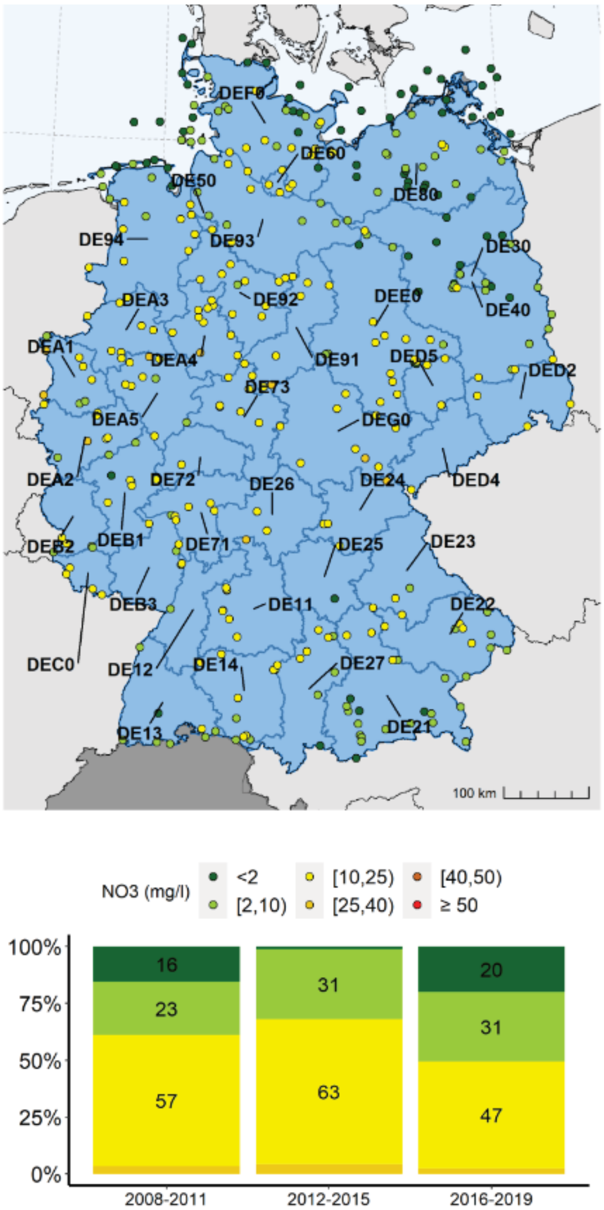


Figure 9. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis).). The percentages below 5% are not labelled, see the next plot for more information.

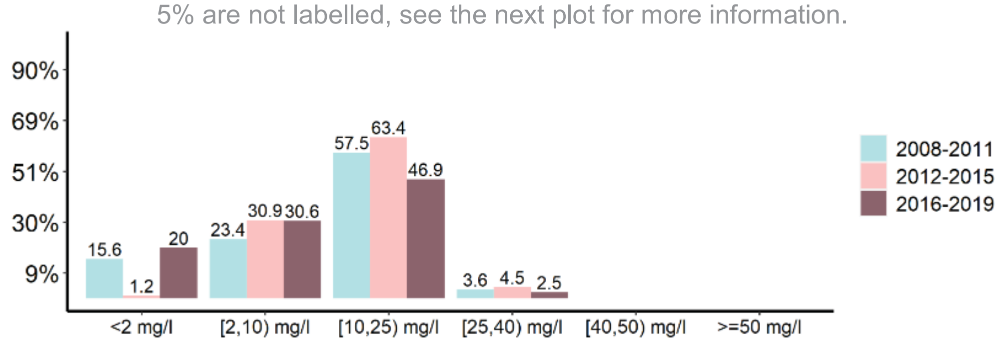


Figure 10. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis). In the map NVZ in blue.

Surface water average annual nitrate concentration trend

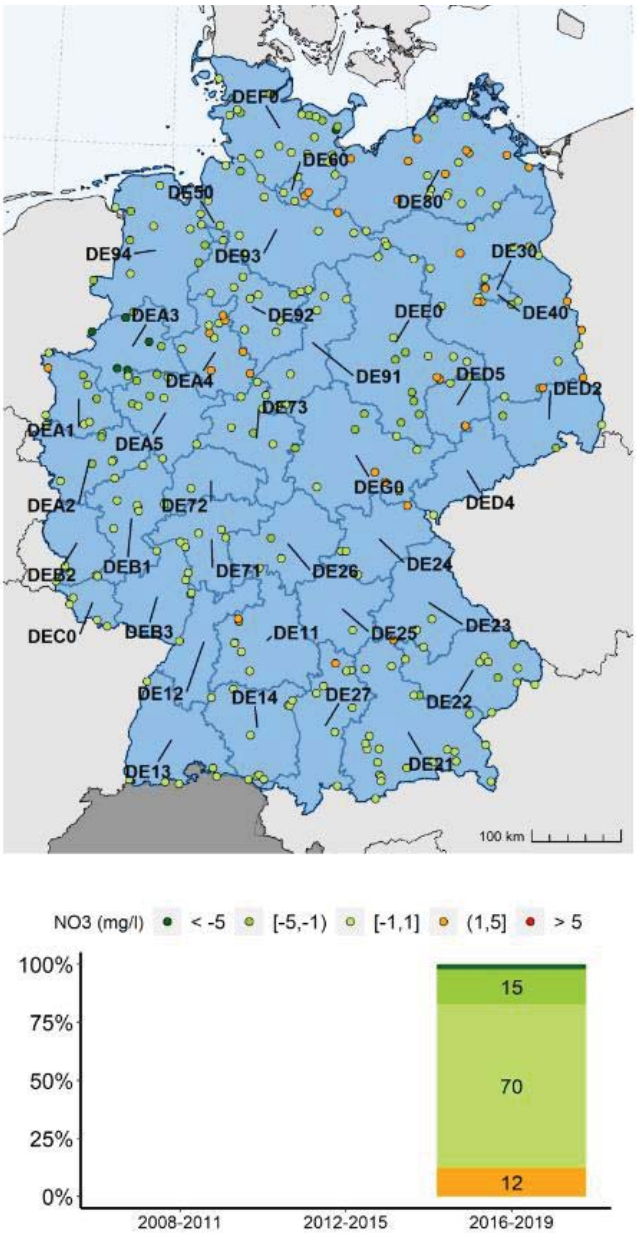


Figure 11. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis).). The percentages below 5% are not labelled, see the next plot for more information.

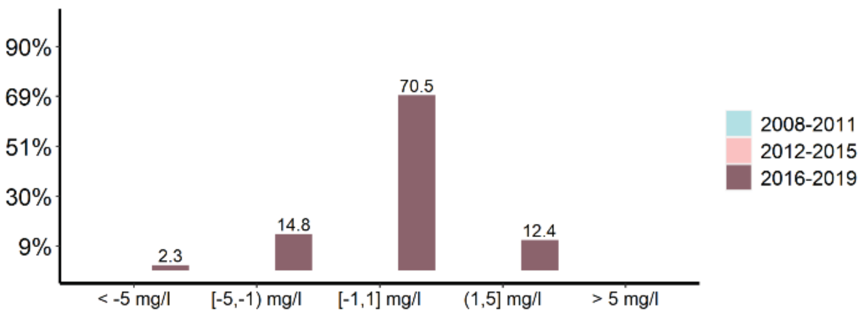


Figure 12. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis).

Surface Water Eutrophication

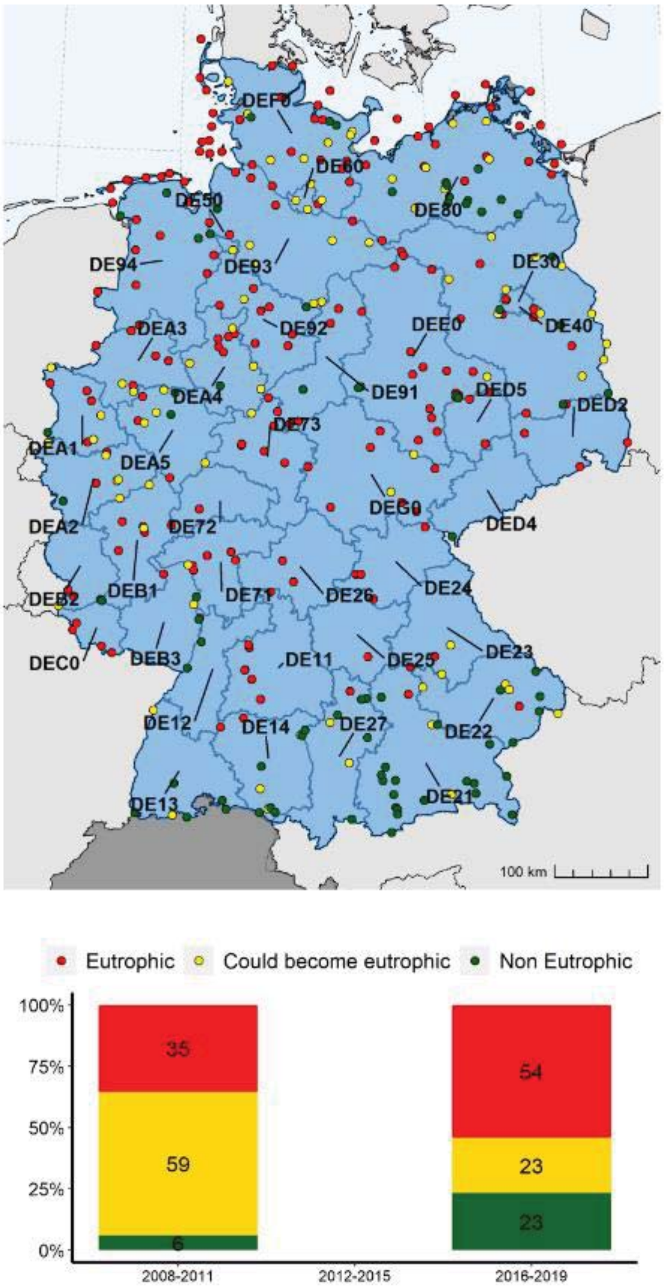


Figure 13. Spatial distribution of eutrophic status (map) and corresponding percentage of monitoring points per classes of status by reporting period (x axis).

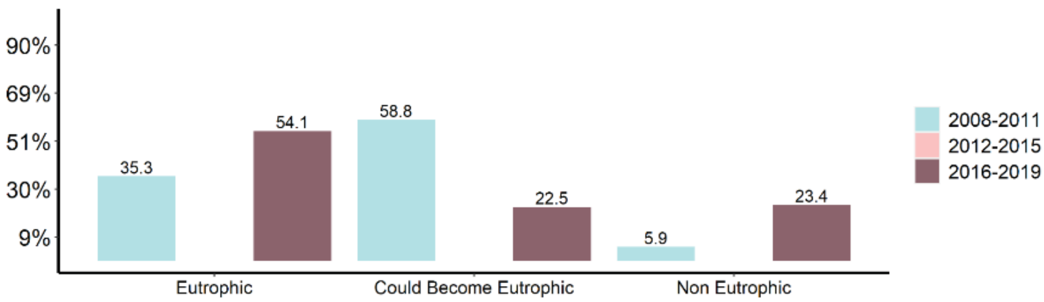
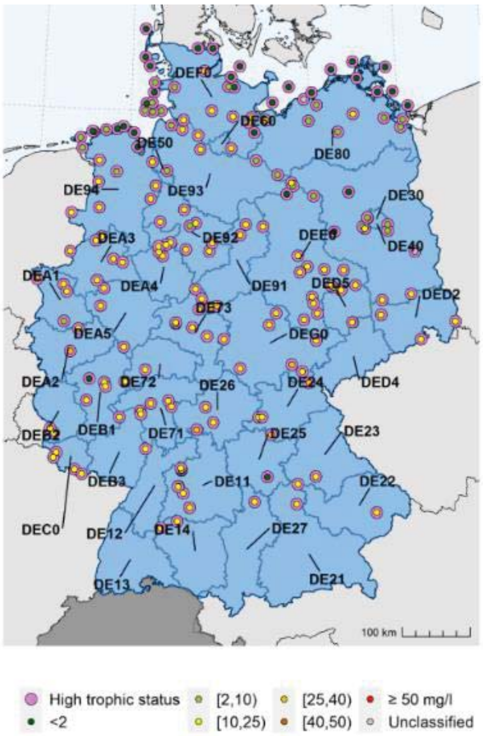


Figure 14. Comparison of percentage of monitoring points in the three reporting periods by classes of status (x axis)

The Eutrophic status vs average NO3 annual concentration



			Number of stations by classes of concentration						
NUTS ID	NUTS NAME	High trophic status	<2 mg/l	[2,10) mg/l	[10,25) mg/l	[25,40) mg/l	[40,50) mg/l	>=50 mg/l	Unclassified
DE11	Stuttgart	8	0	0	7	1	0	0	0
DE12	Karlsruhe	1	0	0	1	0	0	0	0
DE14	Tübingen	2	0	0	2	0	0	0	0
DE21	Oberbayern	1	0	0	1	0	0	0	0
DE22	Niederbayern	1	0	0	1	0	0	0	0
DE23	Oberpfalz	2	0	0	2	0	0	0	0
DE24	Oberfranken	4	0	0	3	1	0	0	0
DE25	Mittelfranken	1	1	0	0	0	0	0	0
DE26	Unterfranken	3	0	0	3	0	0	0	0
DE27	Schwaben	1	0	0	1	0	0	0	0
DE30	Berlin	6	0	5	1	0	0	0	0
DE40	Brandenburg	5	2	0	2	0	0	0	1
DE71	Darmstadt	4	0	0	4	0	0	0	0
DE72	Gießen	1	0	0	1	0	0	0	0
DE73	Kassel	7	0	1	6	0	0	0	0
DE80	Mecklenburg-Vorpommern	10	0	7	2	0	0	0	1
DE91	Braunschweig	5	0	0	4	1	0	0	0
DE92	Hannover	7	0	1	6	0	0	0	0
DE93	Lüneburg	5	0	2	3	0	0	0	0
DE94	Weser-Ems	6	0	1	5	0	0	0	0
DEA1	Düsseldorf	4	0	1	2	1	0	0	0
DEA2	Köln	2	0	0	1	1	0	0	0
DEA3	Münster	7	0	0	7	0	0	0	0
DEA4	Detmold	5	0	0	5	0	0	0	0
DEA5	Arnsberg	3	0	0	3	0	0	0	0
DEB1	Koblenz	5	1	0	4	0	0	0	0
DEB2	Trier	2	0	0	2	0	0	0	0
DEB3	Rheinhessen-Pfalz	1	0	0	1	0	0	0	0
DEC0	Saarland	4	0	0	4	0	0	0	0
DED2	Dresden	3	0	0	3	0	0	0	0
DED5	Leipzig	4	0	0	4	0	0	0	0
DEE0	Sachsen-Anhalt	14	1	2	11	0	0	0	0
DEF0	Schleswig-Holstein	9	2	1	6	0	0	0	0
DEG0	Thüringen	7	0	0	6	1	0	0	0
NO_NUTS	SALINE	40	25	11	4	0	0	0	0
	Total	**190**	**32**	**32**	**118**	**6**	**0**	**0**	**2**

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

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

In Germany eutrophication of watercourses and lakes is predominantly due to excessively high phosphorus inputs. If the values for good ecological status in accordance with Annex 7 of the German Surface Water Ordinance (OGewV) are exceeded, waters will be at risk of becoming eutrophic or will have already become eutrophic. Germany uses a water type-specific upper phosphorus value, varying from 0.045 to 0.3 mg totP/L for rivers and 0.009 to 0.06 mg totP/L for lakes. The majority of sampling stations for watercourses show a decrease in pollution in terms of total phosphorus concentrations. About 52% of water courses are eutrophic, while the majority of lakes are non-eutrophic (54%).

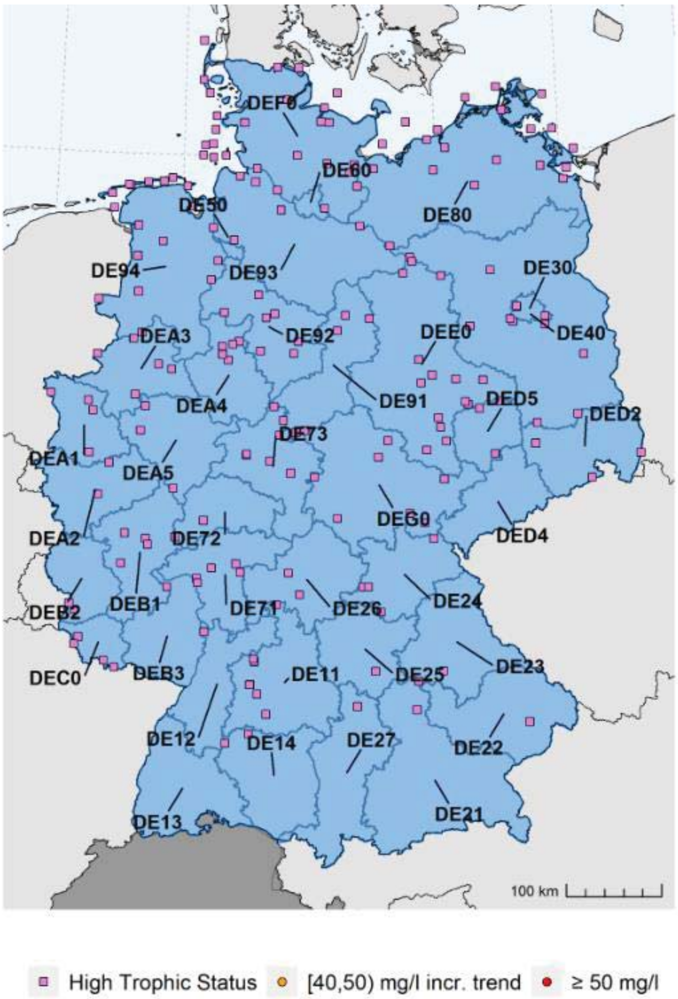
Concerning transitional and coastal waters of the North Sea, national thresholds have been calculated for the eutrophication assessment, in accordance with the OSPAR Common Procedure, for coastal and marine water. According to the assessment of the eutrophication based on the MSFD, only 6% of Germany’s North Sea waters achieve good status with regard to eutrophication, 55% continue to be eutrophic and there is no conclusive assessment for 39%. The nutrient inputs via rivers, the atmosphere and other marine areas continue to be too high.

100% of Germany's Baltic Sea waters continue to be eutrophic. Nutrient inputs via rivers, the atmosphere and other marine areas are too high.
Nutrient concentrations in the estuaries of most rivers exceed the management targets for total nitrogen and total phosphorus, and eutrophication is one the biggest ecologic problems for the marine environment of Germany's Baltic and North Sea waters, and the nutrient reduction targets set out in the Action Plans have not yet been met. According to the reported data (excluding data with no reported status) all transitional coastal and marine stations are eutrophic.

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	129	71	49
5	Lake/reservoir water	21	8	33
6	Transitional water	5	0	0
7	Coastal water	33	0	0
8	Marine water	2	0	0
9	Not specified	0	0	0
	Total	**190**	**79**	**82**

Surface Water quality hotspot

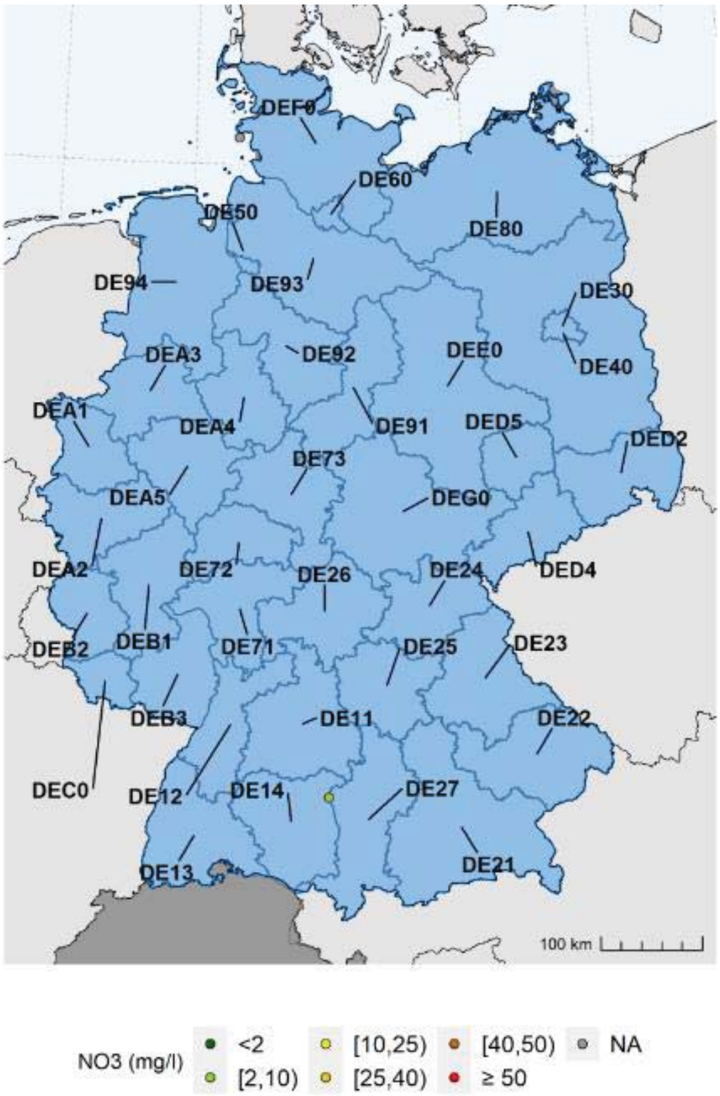


NUTS ID	NUTS NAME	High trophic status	>=40 and < 50 mg/l incr.trend	>=50 mg/l
DE11	Stuttgart	8	0	0
DE12	Karlsruhe	1	0	0
DE14	Tübingen	2	0	0
DE21	Oberbayern	1	0	0
DE22	Niederbayern	1	0	0
DE23	Oberpfalz	2	0	0
DE24	Oberfranken	4	0	0
DE25	Mittelfranken	1	0	0
DE26	Unterfranken	3	0	0
DE27	Schwaben	1	0	0
DE30	Berlin	6	0	0
DE40	Brandenburg	5	0	0
DE71	Darmstadt	4	0	0
DE72	Gießen	1	0	0
DE73	Kassel	7	0	0
DE80	Mecklenburg-Vorpommern	10	0	0
DE91	Braunschweig	5	0	0
DE92	Hannover	7	0	0
DE93	Lüneburg	5	0	0
DE94	Weser-Ems	6	0	0
DEA1	Düsseldorf	4	0	0
DEA2	Köln	2	0	0
DEA3	Münster	7	0	0
DEA4	Detmold	5	0	0
DEA5	Arnsberg	3	0	0
DEB1	Koblenz	5	0	0
DEB2	Trier	2	0	0
DEB3	Rheinhessen-Pfalz	1	0	0
DEC0	Saarland	4	0	0
DED2	Dresden	3	0	0
DED5	Leipzig	4	0	0
DEE0	Sachsen-Anhalt	14	0	0
DEF0	Schleswig-Holstein	9	0	0
DEG0	Thüringen	7	0	0
NO_NUTS	SALINE	40	0	0
	Total	**190**	**0**	**0**

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

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

Surface Water Stations Removed



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

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

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

Measures in the Action Programme

In Germany the rules of good agricultural practice for fertiliser use and the measures under the Action Programme are regulated at national level in the federal ordinance on the use of fertilizers (DüV) and the ordinance on facilities handling substances hazardous to water (AwSV). The AwSV came into force on 1 August 2017, and replaces the federal state ordinances on the storage of liquid manure, slurry, farmyard manure, and silage effluent. The DüV was amended in 2017. After that, the European Court of Justice found that the Federal Republic of Germany had failed to meet its obligations arising under the Directive, the DüV was further amended in May 2020. In areas that are highly polluted with nitrates, the federal states are required, as from 2021, to implement seven compulsory measures to improve water status including: reducing the N fertilizer requirement by a farm average of 20%; upper limit of 170 kg N per hectare from organic fertilizers; extension of the restricted period on grassland by four weeks; extension of the restricted period for solid dung and compost by six weeks; prohibition of nitrogenous fertilizer use in the autumn for winter rape, winter barley and catch crops not used as a feed crop; limit to 60 kg/ha of liquid organic fertilizers applied to grassland in the autumn; mandatory intercropping prior to summering. See some details in the table below.

Table 6. Details of the Action Programme

Measure	General details in Action Programme (*)
Period of prohibition of fertiliser application	• Different dates considering fertilizers with substantial nitrogen or phospahte content, and differentiating cropland and grassland (sections 6.8 - of the Ordinance)
Restrictions for application on sloped soils	• Several rules as combination of degree of slope, distance to watercourses and for cultivated and uncultivated areas (section 5.3 of the ordinance)
Restrictions for application on soaked, frozen, or snow-covered soils	• Not allowed in these situations (section 5.1 of the Ordinance)
Restrictions for application near watercourses (buffer strips)	• Minimum distance of 4 metres, or 1 metre if a precision fertiliser spreader is used (other details in sections 5.2 and 5.3 of the Ordinance)
Effluent storage works	• Not available
Capacity of manure storage	• The capacity of tanks must be sufficient for at least six months and other rules based on LSU (section 12 of the Ordinance)
	• Specific rules by federal states
Rational fertilisation (e.g., splitting fertilisation, limitations)	• Specific permitted fertilizers quantities (section 13a of the Ordinance)
Crop rotation, permanent crop enhancement	• Additional regulations by federal states for crop rotation
Vegetation cover in rainy periods, winter	• The amount of available nitrogen applied in the autumn must be fully taken into for the determination of the fertiliser requirement in the spring (other details in section 6.9 of the Ordinance)
Fertilisation plans, spreading records	• Fertiliser-spreading methods and equipment (sections 6.2 and 6.3 of the Ordinance) and specific soil analysis by federal states
Other measures	• Regulation in polluted areas: from 2021, stipulation of 7 compulsory measures and 2 freely selectable measures (section 13.2 of the Ordinance)
	• The federal states have also introduced additional regulations which farmers apply on a voluntary basis or with which compliance is mandatory
Date for application limit of 170 kg N/ha/year:	• 2020 (allow "derogation" is specific cases)

(*) Fertiliser ordinance, amendment 2020 (Düngeverordnung - DüV)

Verordnung über die Anwendung von Düngemitteln, Bodenhilfsstoffen, Kultursubstraten und Pflanzenhilfsmitteln nach den Grundsätzen der guten fachlichen Praxis beim Düngen (Düngeverordnung - DüV)

The federal states have also introduced additional regulations which farmers apply on a voluntary basis (for example, in the context of supporting agri-environmental and climate measures) or with which compliance is mandatory (for example, owing to regulations applying to water protection areas). They specified different measures and control actions by federal states as reported in detailed tables in the report (section “C) Application of the action programmes”)

Since the new Fertiliser Ordinance was amended in 2017 and 2020, no validated data are yet available for the current reporting period 2015 to 2018 (that is different from the official requested: 2016-2019) on the cost-benefit analysis but they reported the following studies: Osterburg et al. (2007), Bach et al. (2016), and Oelmann et al. (2017).

Controls

Administrative controls on the implementation of the Action Programme (AP) measures are carried out in the frame of the cross-compliance check. About 10749 control checks were performed between 2016 and 2018. Around 2089 cases of non-compliance with GAEC1 (nitrates) were detected, 1825 cases resulting in penalties. About 67 cases were subject to penalties concerning the non-compliance with the nitrogen balance.

Designation of NVZ

Germany has adopted a whole territory approach.

Forecast of Water Quality

There was no information given in the German report concerning the forecast of water quality. For the future forecast of both nitrogen and phosphorus will be done through the combined used of several models.

Summary

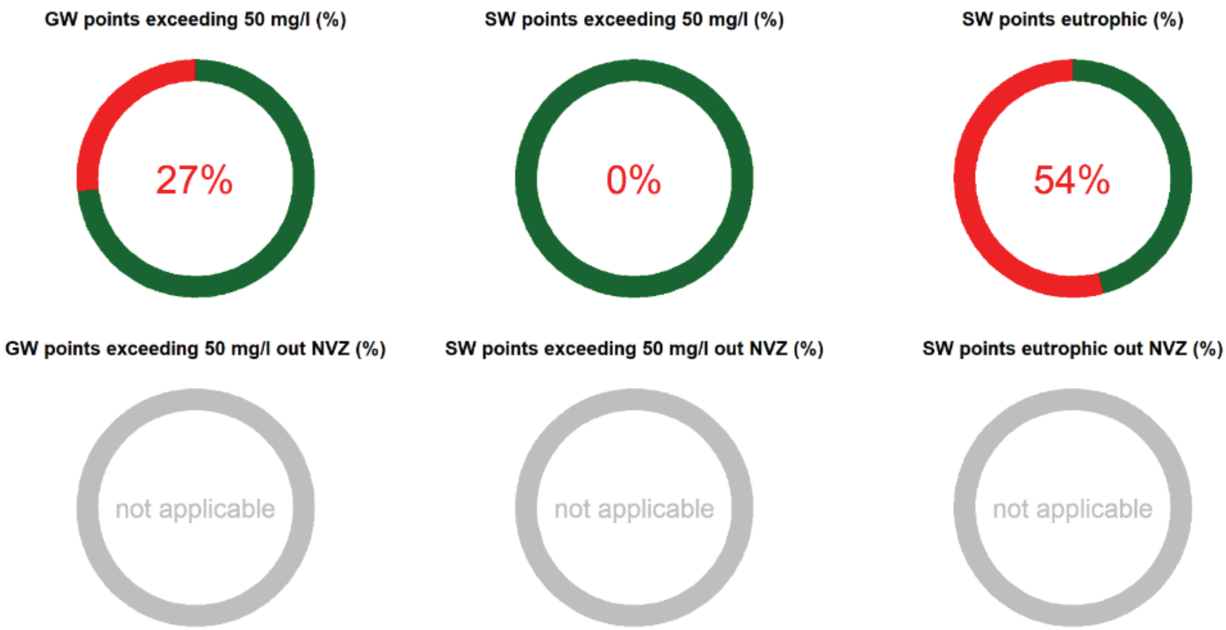


Figure 18. The summary plot for the period 2016-2019

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

Long term analysis

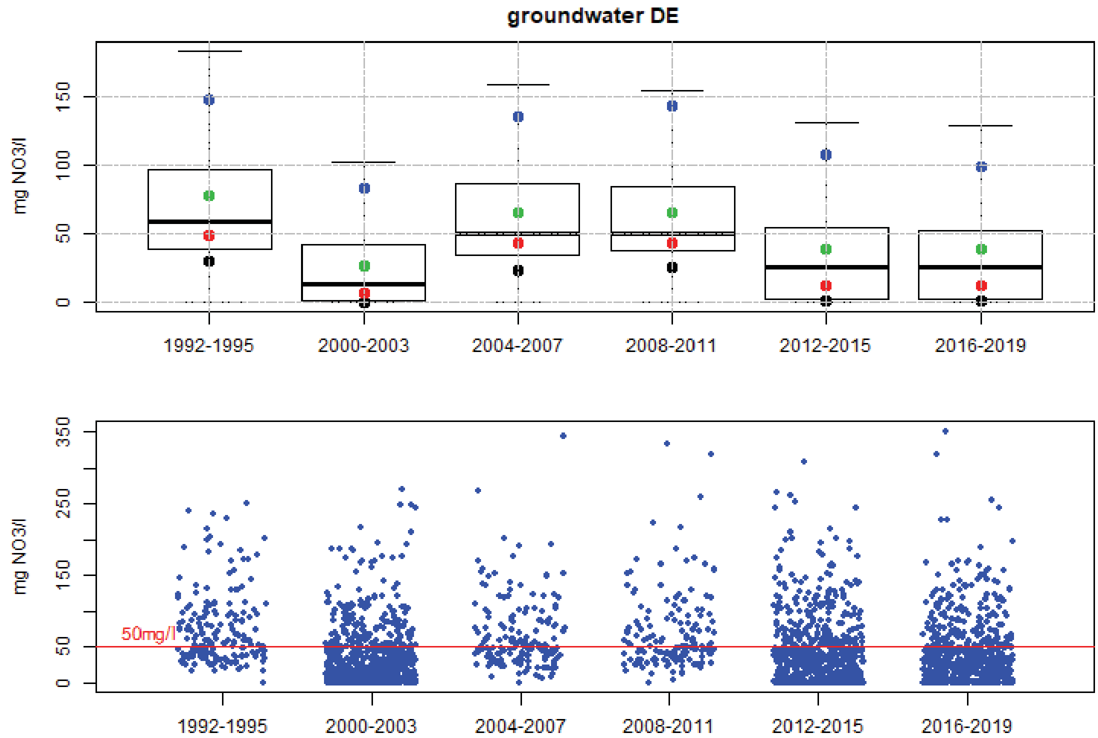


Figure 19. Time series of box whisker plots along with the distribution of the average NO3 annual concentrations for each reporting period, for groundwater stations. The blue, red, green and black dots represent the mean of the fourth third, second and first quartiles, respectively.

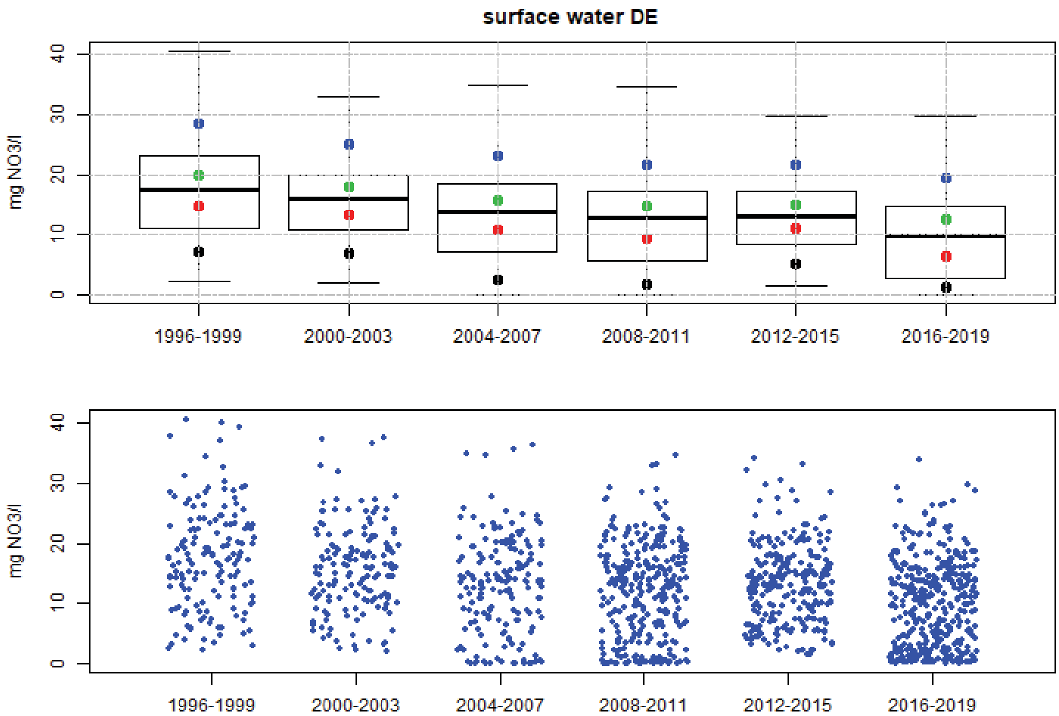


Figure 20. Time series of box whisker plots along with the distribution of the average NO3 annual concentrations for each reporting period, for surface water stations. The blue, red, green and black dots represent the mean of the fourth third, second and first quartiles, respectively.

Conclusions and recommendations

Germany has an average livestock density, the surplus of nitrogen is around the EU average, while there is a deficit for phosphorus.

The number of monitoring stations used for the nitrate report is low and the dataset does not include year 2019. Germany has a high number of groundwater monitoring stations with nitrate concentrations above 50 mg/l and a high number of monitoring stations have a strong increasing trend. A very high number of the surface waters are found to be eutrophic.

Germany revised it action programme in 2018.

The Commission recommends Germany to take reinforced measures to reduce the pollution of groundwater and in areas that drain into waters that are eutrophic. Germany must identify the polluted areas in accordance with the criteria that are set in the Nitrates Directive. It also recommends extending the monitoring data to include the four years of the reporting period.

EUROPEAN
COMMISSION

Brussels, 11.10.2021
SWD(2021) 1001 final

PART 20/38

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}

EN EN

Pressure from Agriculture

Greece's utilized agricultural area amounts to 5.3 Mha, representing 40.8% of the total land area and has remained stable since 2007. The major outputs of the agricultural industry excluding services and secondary activities include in a decreasing order fruit (20.5%), vegetable and horticultural plants (16.7%) and other crops/crop products (16.1%).
Eurostat

Major land use statistics for Greece

Table 1.Utilized agricultural area (abbreviated as UAA)

Greece	2005	2007	2010	2013	2016
Utilised agricultural area UAA (1000 ha)	NA	3969	5426	5213	5260
arable land (1000 ha)	NA	2027	1864	1896	1978
permanent grass (1000 ha)	NA	840	2451	2092	2021
permanent crops (1000 ha)	NA	1101	1110	1225	1252
kitchen gardens (1000 ha)	NA	12	9	9	9

Note:
Eurostat (FSS)

Greece's arable land has decreased since 2010. Permanent grass has decreased since 2013 while the area of permanent crops has increased.

Animal distribution in Greece

All Greece's livestock beside poultry have decreased since the previous reporting period. The livestock density index (livestock unit per hectare of Utilized Agricultural Area) has also remained stable and is lower than the EU average of 0.8.

Table 2. Livestock statistics

Greece	2005	2007	2010	2013	2016
Livestock index	0.62	0.64	0.46	0.44	0.46
dairy cows (10^6 heads)	0.15	0.15	0.14	0.13	0.11
live bovines (10^6 heads)	0.66	0.68	0.68	0.65	0.55
live pigs (10^6 heads)	0.95	1.04	1.09	1.03	0.74
live poultry (10^6 heads)	NA	NA	36.76	27.88	30.39

Note:
Eurostat (FSS)

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

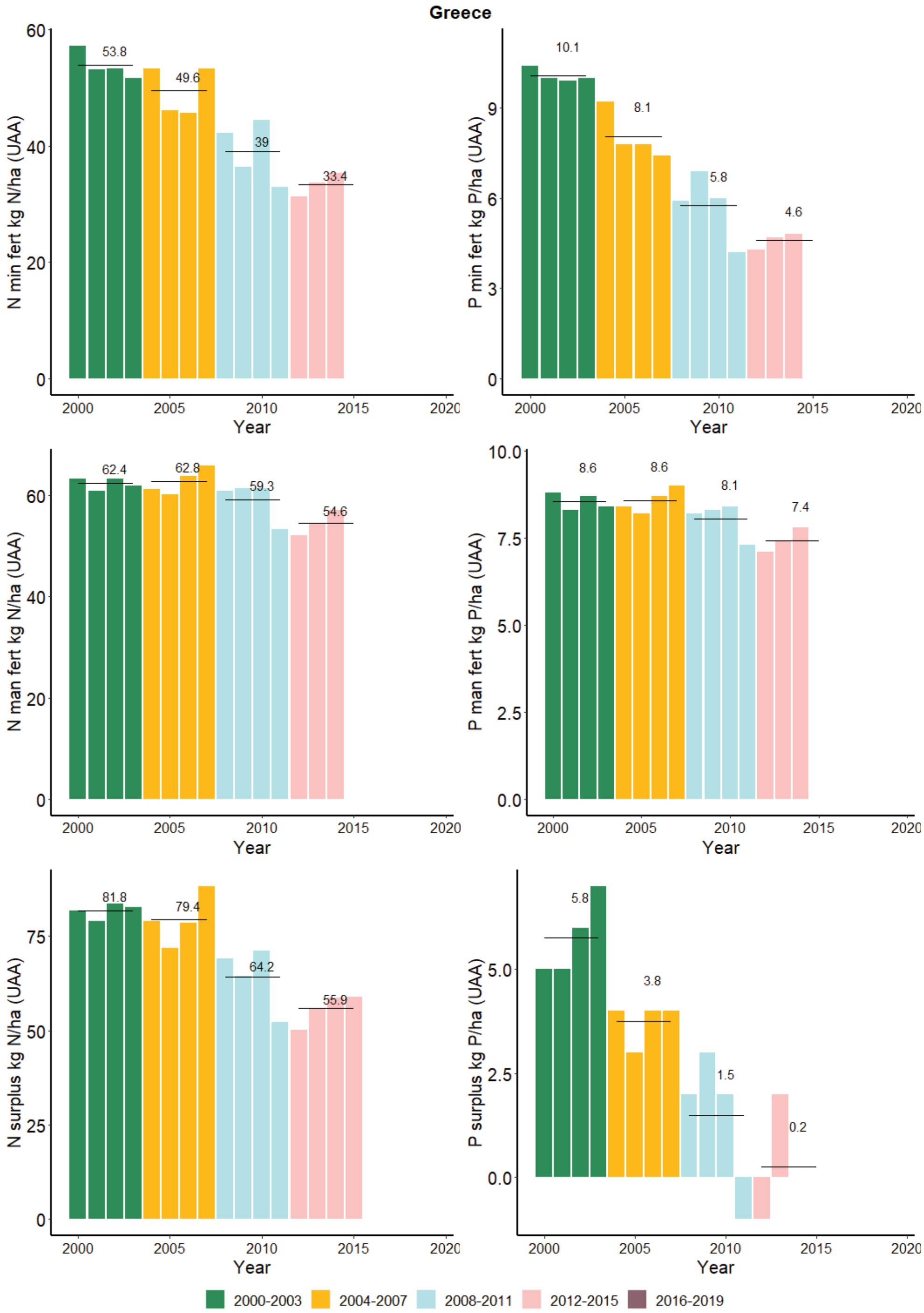


Figure 1. N and P fertilizers and gross surplus (kg/ha)

The gross nitrogen and phosphorus surpluses originate from EUROSTAT data for the years 2000-2015. N and P mineral fertilizers, manure and surplus decreased from the last reporting periods and generally, there is a continuing reduction. 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

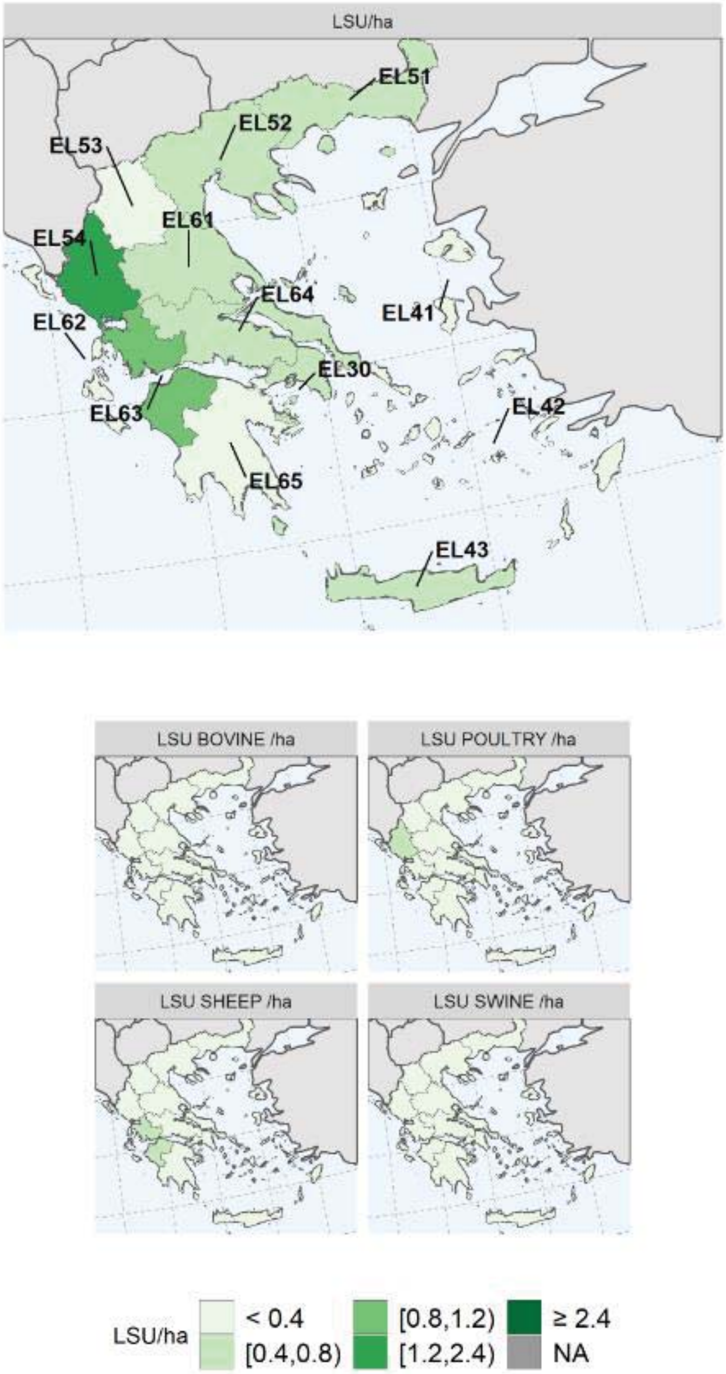


Figure 2. Map of livestock unit distribution, year 2016 (Source: Eurostat, February 2021)

Animal production is concentrated in western part of the Greece and is dominated by sheep and poultry (total LSU and LSU by animal type were retrieved individually from EUROSTAT).

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

Water Quality Monitoring

The monitoring of inland, transitional, coastal and ground waters in Greece is under the responsibility of the National Monitoring Network (NMM) who reports to the Ministry of Environment and Energy. The National Monitoring Network operates since 2012, and no measurements were performed in the period 2016-2017. As of 2018, the monitoring sites and measurements of the NMN have been modified both for surface and groundwater bodies to align with the requirements of the Water Framework Directive. Operational stations that constitute the majority of the network for rivers and transitional waters are monitored every year, once in spring and once in summer. Surveillance stations are also monitored twice a year but for only one year.

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	57	355	18	56	0	0
1a	Phreatic groundwater (deep) 5-15 m	60	241	174	60	0	0
1b	Phreatic groundwater (deep) 15-30 m	37	164	335	37	0	0
1c	Phreatic groundwater (deep) >30 m	140	318	413	140	0	0
2	Captive groundwater	60	0	313	60	0	0
3	Karstic groundwater	16	0	511	16	0	0
9	Not specified	0	0	0	0	0	0
	Total	**370**	**1078**	**1764**	**369**	**0**	**0**

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	78	426	232	78	0	0	78	426	231
5	Lake/reservoir water	27	53	52	26	0	0	26	53	46
6	Transitional water	11	0	32	11	0	0	11	0	0
7	Coastal water	0	0	49	0	0	0	0	0	49
8	Marine water	0	0	0	0	0	0	0	0	0
9	Not specified	0	0	0	0	0	0	0	0	0
	Total	**116**	**479**	**365**	**115**	**0**	**0**	**115**	**479**	**326**

Groundwater Quality

Groundwater average annual nitrate concentration

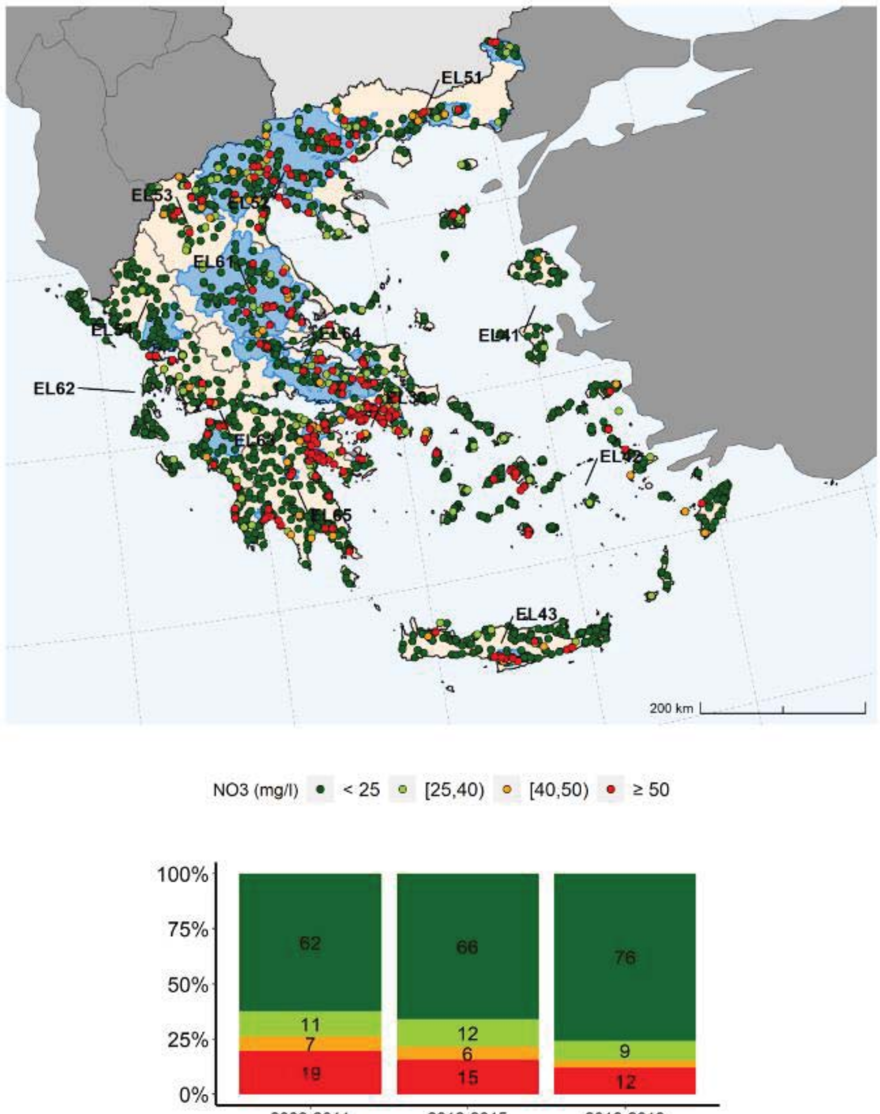


Figure 3. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information. In the map in blue the NVZ

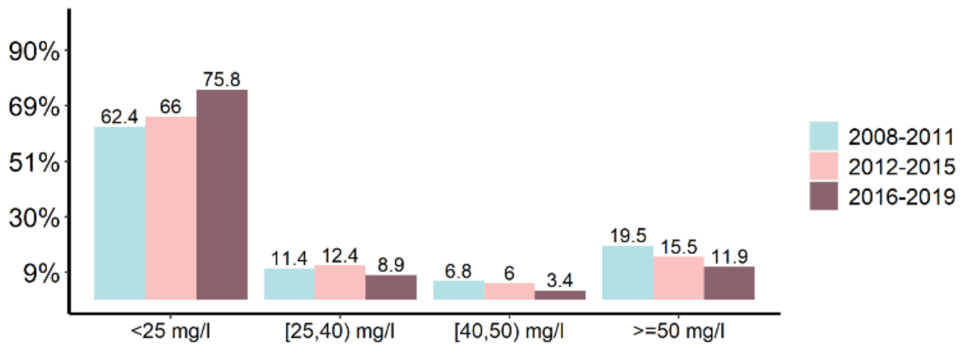


Figure 4. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis)

Groundwater average annual nitrate concentration trend

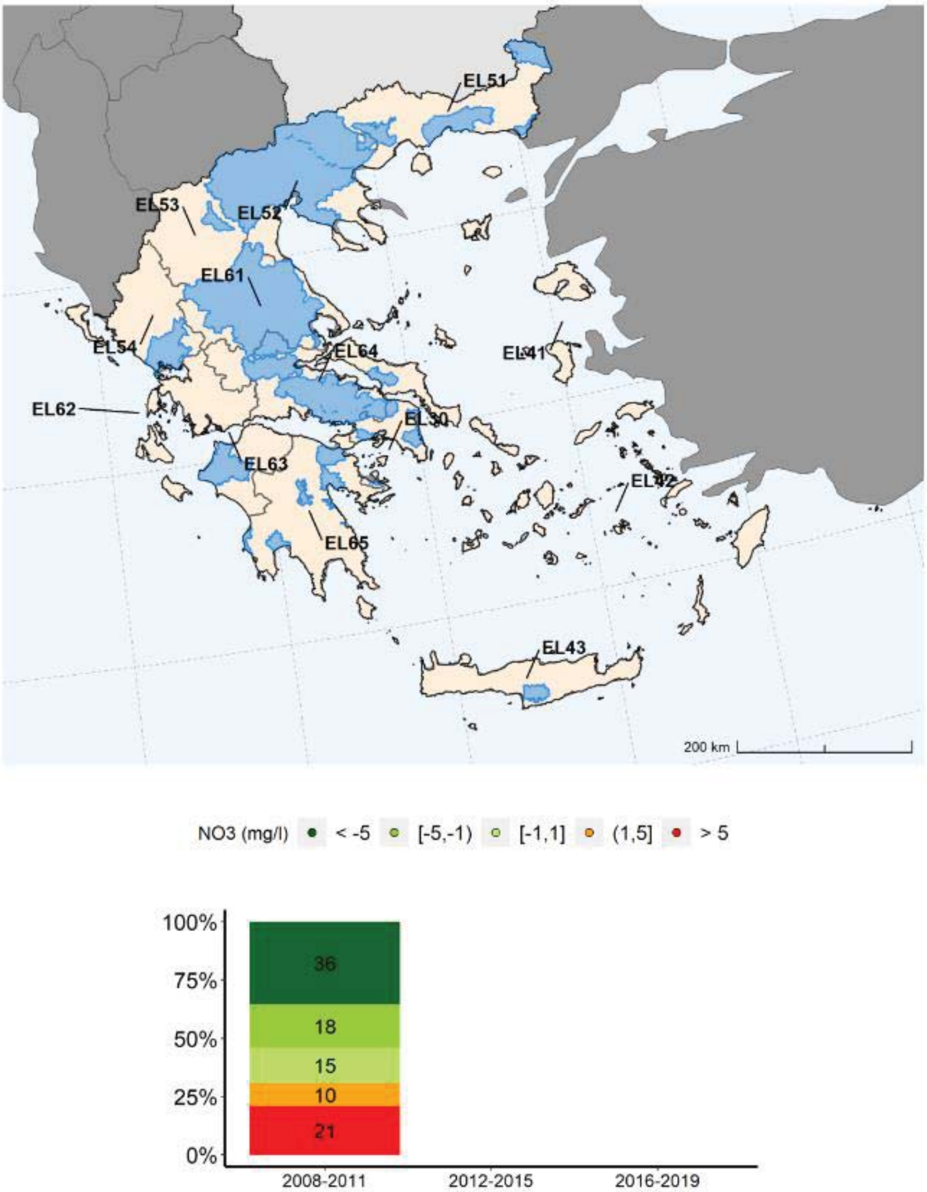


Figure 5. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis). In the map in blue the NVZ.

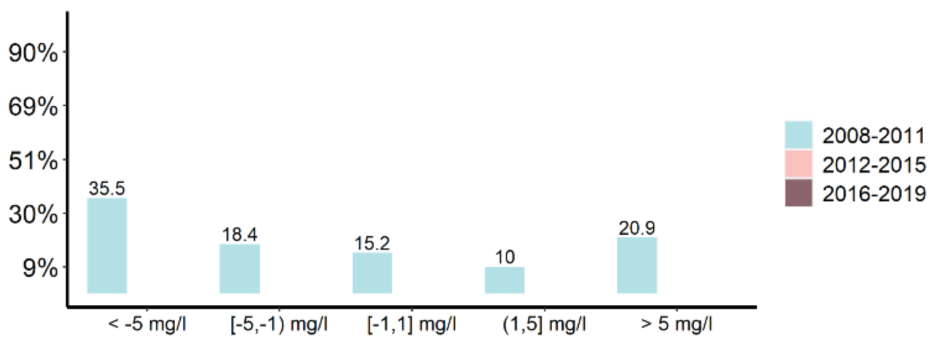
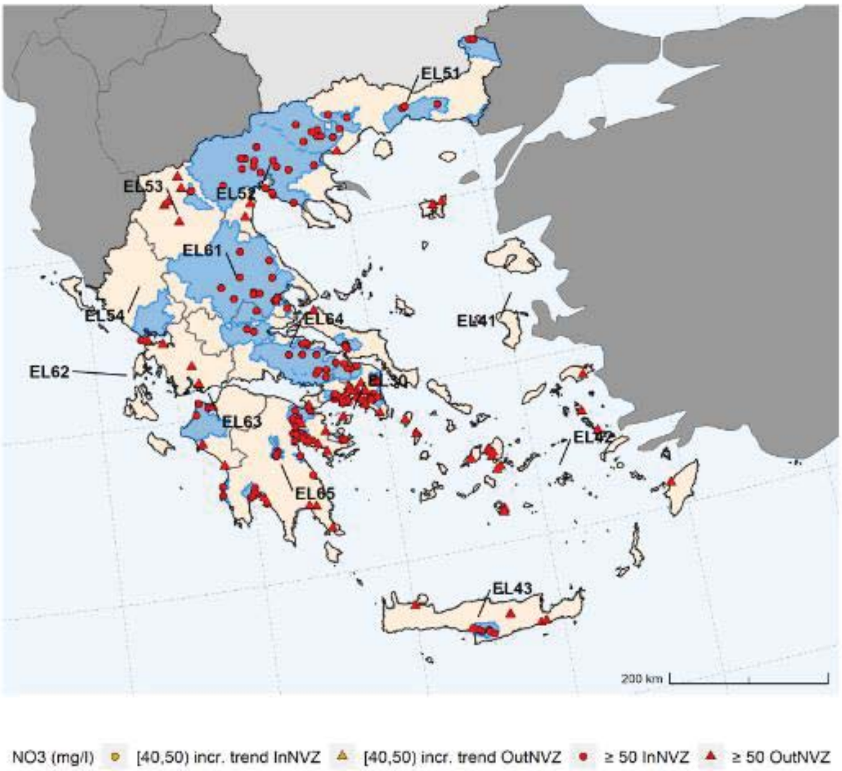


Figure 6. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis)

Groundwater hotspot



		>=40 and < 50 mg/l incr.trend		>=50 mg/l	
NUTS ID	NUTS NAME	InNVZ	OutNVZ	InNVZ	OutNVZ
EL30	Attiki	0	0	19	23
EL41	Voreio Aigaio	0	0	0	3
EL42	Notio Aigaio	0	0	0	18
EL43	Kriti	0	0	5	7
EL51	Anatoliki Makedonia, Thraki	0	0	7	1
EL52	Kentriki Makedonia	0	0	24	2
EL53	Dytiki Makedonia	0	0	2	5
EL54	Ipeiros	0	0	1	1
EL61	Thessalia	0	0	14	0
EL63	Dytiki Ellada	0	0	3	7
EL64	Sterea Ellada	0	0	22	1
EL65	Peloponnisos	0	0	35	10
	Total	**0**	**0**	**132**	**78**

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 or are above 50 mg/l. The map shows the spatial distribution of these points, and the table reports the number of stations by NUTS inside and outside NVZ.
Only the NUTS of interest are reported.

Surface Water Quality

Surface water average annual nitrate concentration

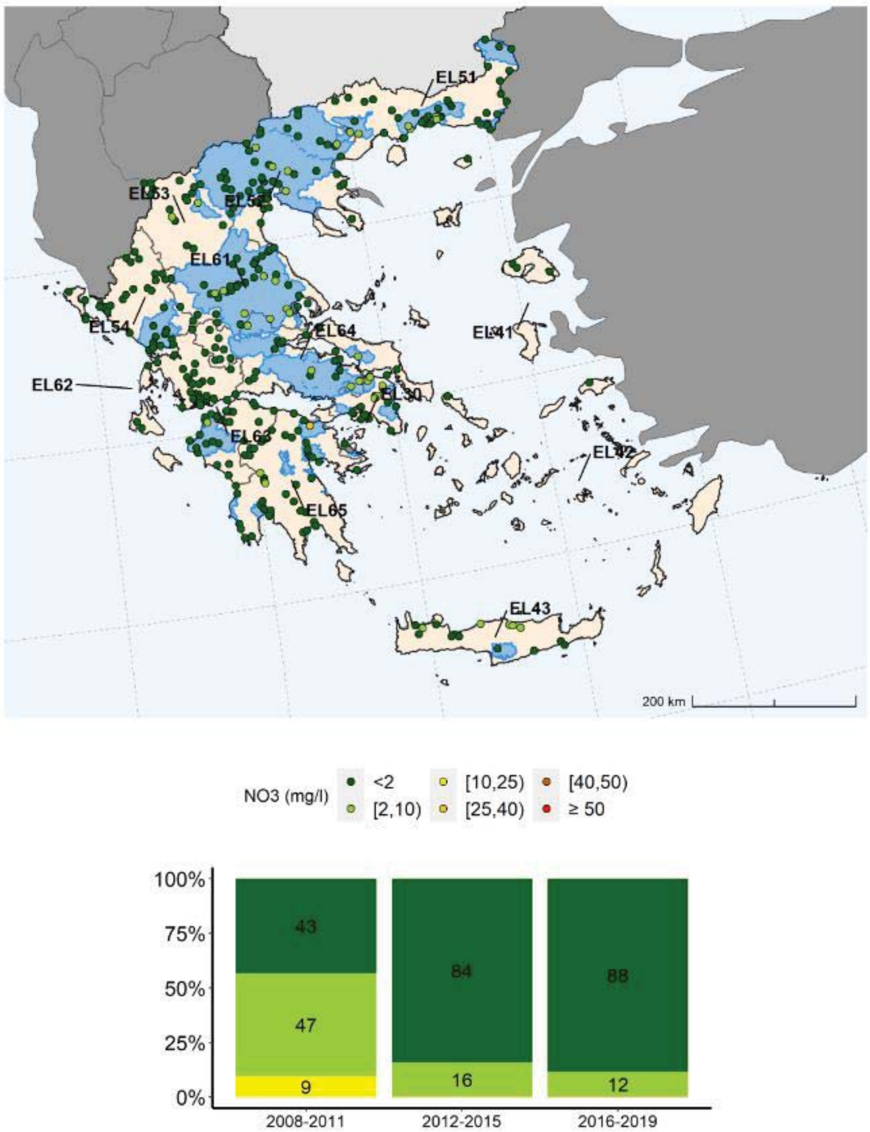


Figure 8. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). In the map in blue the NVZ.

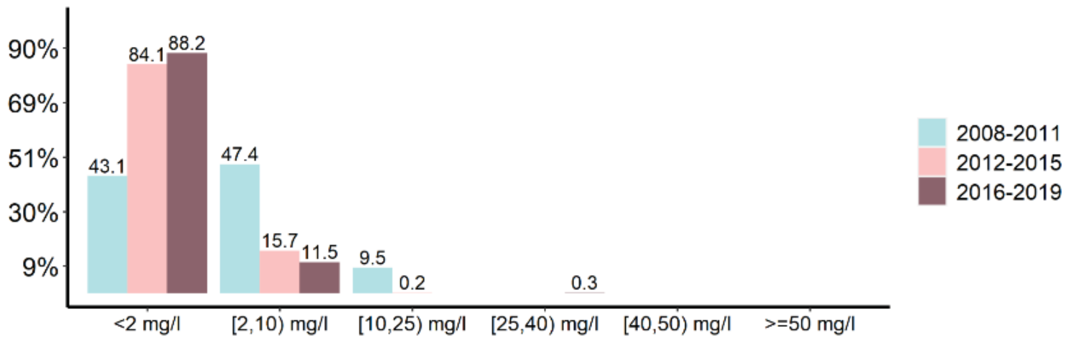


Figure 9. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis)

Surface water average annual nitrate concentration trend

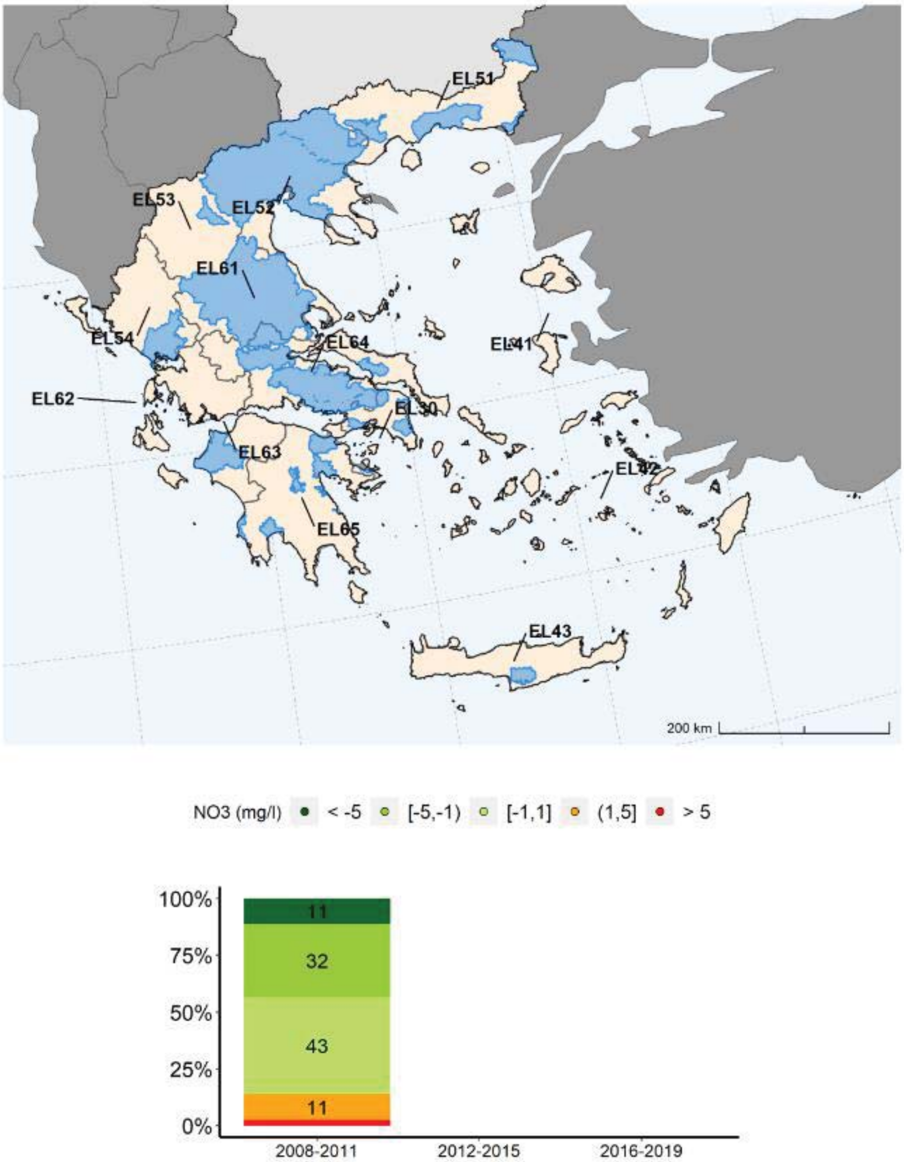


Figure 10. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information. In the map in blue the NVZ.

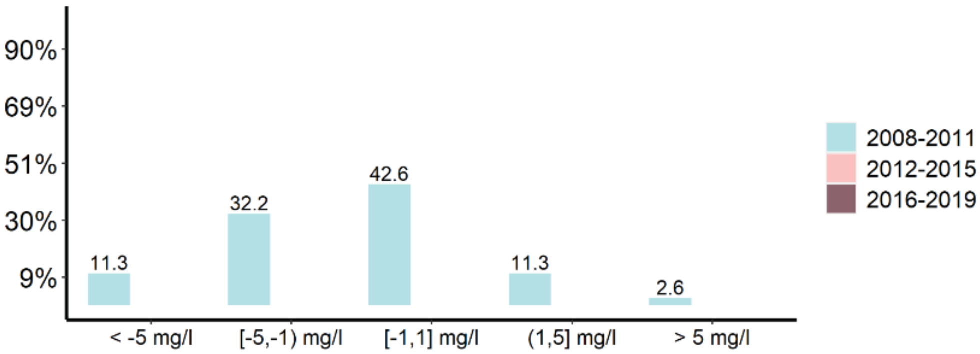
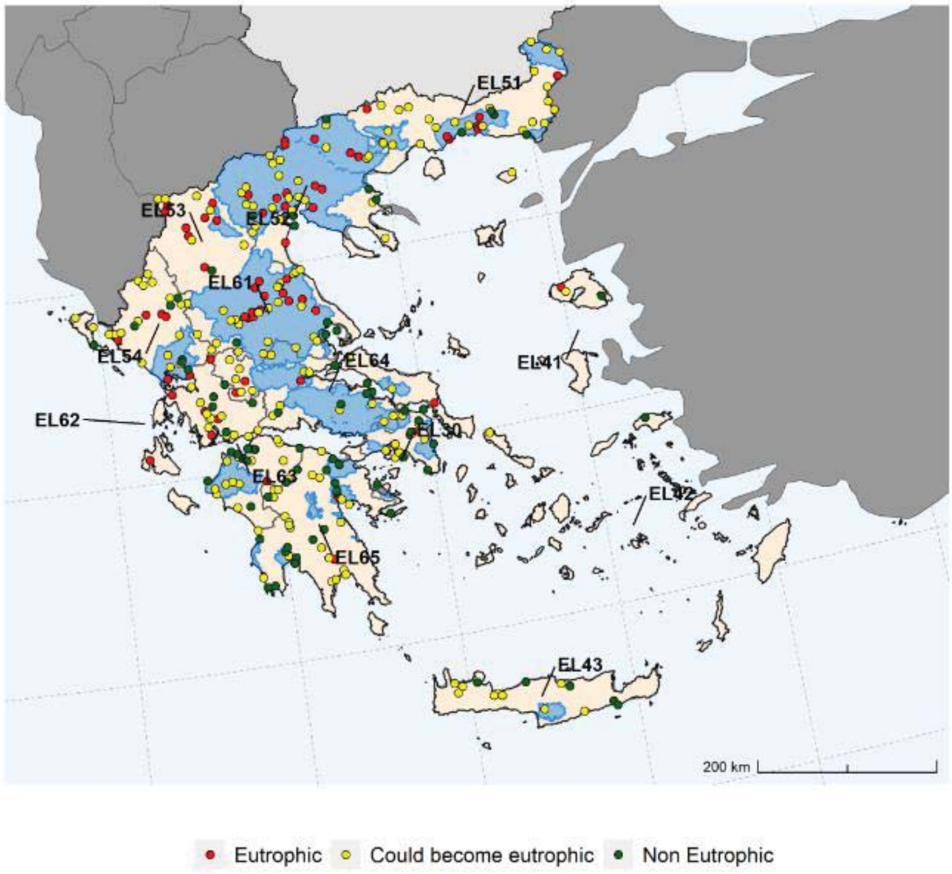


Figure 11. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis)

Surface Water Eutrophication



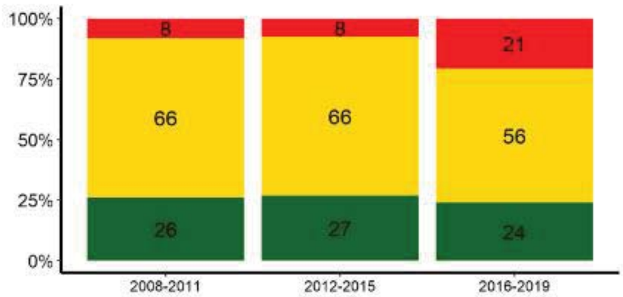


Figure 12. Spatial distribution of eutrophic status (map) and corresponding percentage of monitoring points per classes of status by reporting period (x axis). In the map in blue the NVZ.

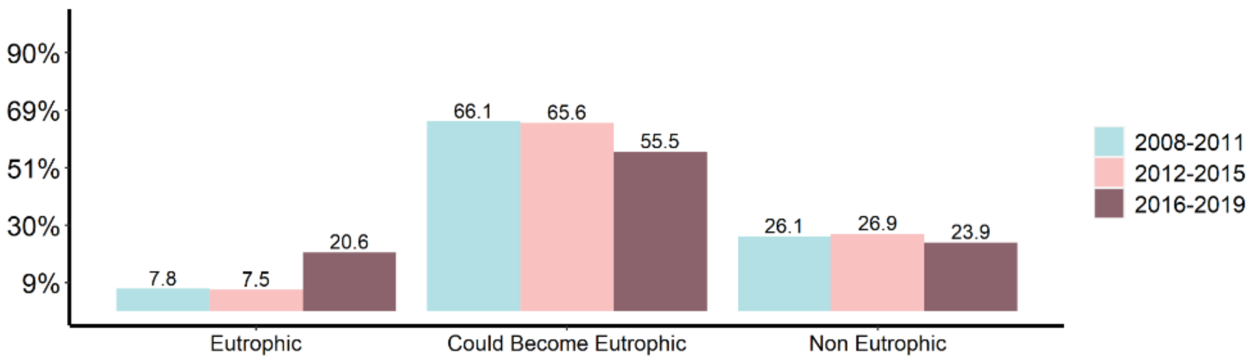
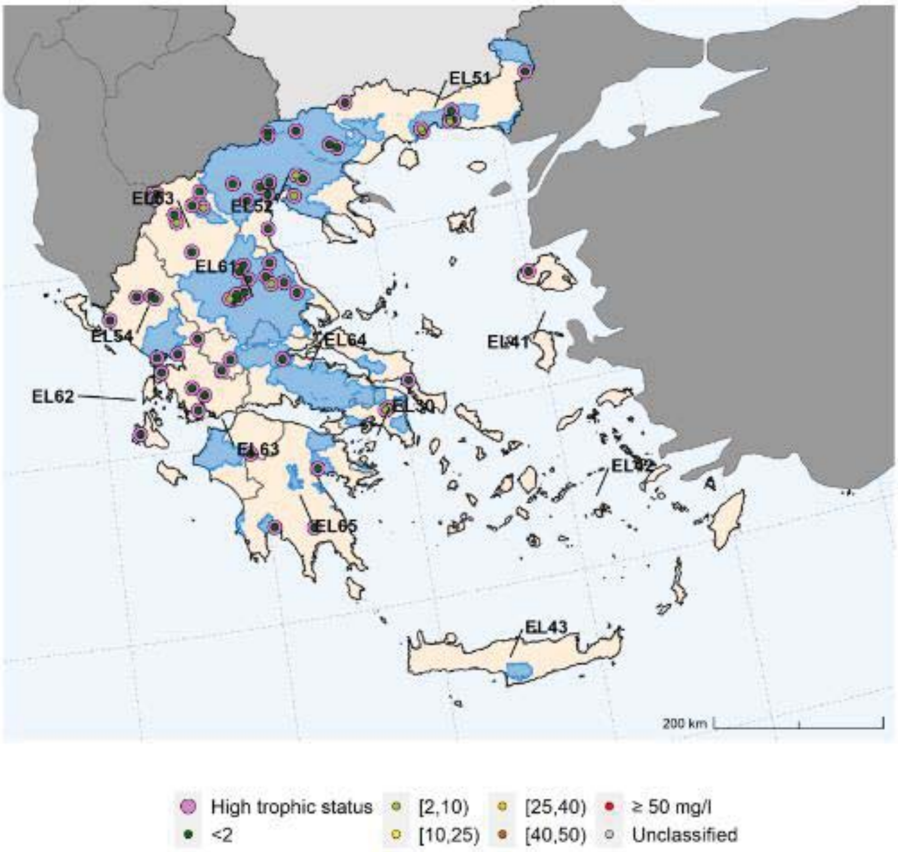


Figure 13. Comparison of percentage of monitoring points in the three reporting periods by classes of status (x axis)

The Eutrophic status vs average NO3 annual concentration



			Number of stations by classes of concentration							
NUTS ID	NUTS NAME	High trophic status	<2 mg/l	[2,10) mg/l	[10,25) mg/l	[25,40) mg/l	[40,50) mg/l	>=50 mg/l	Unclassified
EL30	Attiki	2	0	2	0	0	0	0	0
EL41	Voreio Aigaio	1	1	0	0	0	0	0	0
EL51	Anatoliki Makedonia, Thraki	8	4	4	0	0	0	0	0
EL52	Kentriki Makedonia	15	13	2	0	0	0	0	0
EL53	Dytiki Makedonia	8	6	2	0	0	0	0	0
EL54	Ipeiros	3	3	0	0	0	0	0	0
EL61	Thessalia	14	12	2	0	0	0	0	0
EL63	Dytiki Ellada	5	5	0	0	0	0	0	0
EL64	Sterea Ellada	4	4	0	0	0	0	0	0
EL65	Peloponnisos	3	3	0	0	0	0	0	0
NO_NUTS	SALINE	4	4	0	0	0	0	0	0
	Total	**67**	**55**	**12**	**0**	**0**	**0**	**0**	**0**

Figure 14. The SW monitoring stations with eutrophic status versus the average NO3 annual concentration. In the map in blue the NVZ.

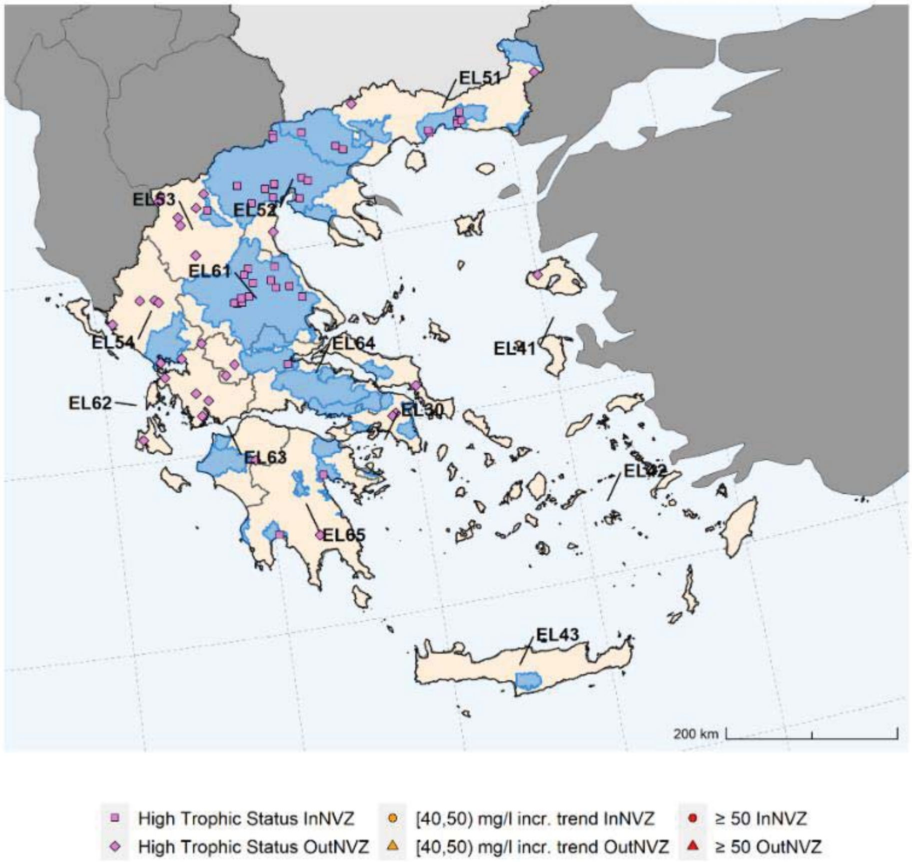
The analysis shows all the SW monitoring stations with the higher trophic status and the corresponding value of NO3 concentration. The map shows the spatial distribution of these points, and the table reports the number of stations with measurements with highest trophic status and the corresponding stations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

The trophic state of surface water bodies was assessed based on a criterion used by Greece to designate a water body as eutrophic, in combination with the physicochemical parameter classification criteria used in River Basin Management Plans (1st Review). The parameters taken into consideration for the classification of rivers include NO3, NH4, total P and BOD5 concentrations. For lakes the classification uses NO3, total P and chlorophyll-a concentrations. The classification of coastal waters relies on NO3, chlorophyll-a and NH4 concentrations. The majority of rivers fall in the category "could become eutrophic". The "could become eutrophic" class for rivers is mostly controlled by NO3 and BOD5 concentrations. The large majority of lake stations fall in the categories "could become eutrophic" or "eutrophic". Lakes fall in the eutrophic class mostly because of high chlorophyll-a and total P concentrations. Most of coastal water monitoring stations falls in the category "non-eutrophic". While the "eutrophic" and "could become eutrophic" classes for coastal waters are controlled by the higher chlorophyll-a concentration.

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	45	148	38
5	Lake/reservoir water	18	17	11
6	Transitional water	0	0	0
7	Coastal water	4	16	29
8	Marine water	0	0	0
9	Not specified	0	0	0
	Total	**67**	**181**	**78**

Surface Water quality hotspot



NUTS ID	NUTS NAME	High trophic status		>=40 and < 50 mg/l incr.trend		>=50 mg/l	
		InNVZ	OutNVZ	InNVZ	OutNVZ	InNVZ	OutNVZ
EL30	Attiki	0	2	0	0	0	0
EL41	Voreio Aigaio	0	1	0	0	0	0
EL51	Anatoliki Makedonia, Thraki	6	2	0	0	0	0
EL52	Kentriki Makedonia	14	1	0	0	0	0
EL53	Dytiki Makedonia	1	7	0	0	0	0
EL54	Ipeiros	0	3	0	0	0	0
EL61	Thessalia	13	1	0	0	0	0
EL63	Dytiki Ellada	0	5	0	0	0	0
EL64	Sterea Ellada	1	3	0	0	0	0
EL65	Peloponnisos	2	1	0	0	0	0
NO_NUTS	SALINE	0	4	0	0	0	0
	Total	**37**	**30**	**0**	**0**	**0**	**0**

Figure 15. SW hotspot analysis map (top graph) and distribution by NUTS2 (lower graph) of average NO3 annual concentration greater than 40 mg/l and trophic status. In the map in blue the NVZ.

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 or are above 50 mg/l. The map shows the spatial distribution of these points, and the table reports the number of stations by NUTS inside and outside NVZ.
Only the NUTS of interest are reported.

Measures in the Action Programme

The first Code of Good Agricultural Practice (CGAP) was drawn up in 2000 and a new code was published in 2015. The Code includes compulsory measures for producers with holdings in vulnerable zones, in order to ensure compliance with the requirements and obligations laid down in Annexes II and III to the Directive. Among the measures, a particular attention is dedicated to good agricultural practices for surface irrigation.

The mandatory provisions of the CGAP have been incorporated into the cross-compliance document for the 2014-2020 Programming Period and are, therefore, part of the environmental standards producers must comply with in order to be entitled to direct payments and financial support under the Common Agricultural Policy (CAP).

The new Action Programme (AP) was drawn up in 2019 and includes the measures summarized in the table below.

Table 6. Details of the Action Programme

Measure	General details in Action Programme (*)
Period of prohibition of fertiliser application	• Specific periods of limited use of N inputs are applied in different NVZ (Table of Chapter D of AP Annex)
Restrictions for application on sloped soils	• Not when slope >8% if liquid fertilizers (exception in case of drip irrigation or injection). Recomanded apply solid fertilizers that must be incorpored into the soil at the time of applicaiton; in areas with a slope exceeding 10%, a plant cover, even of non-cultivated species, must be applied during the rainy period and until the soil is prepared for the next sowing. Where possible, autumn legumes must be cultivated (Chapter A of AP).
Restrictions for application on soaked, frozen, or snow-covered soils	• Not on frozen or snow-covered surfaces, and on water-saturated soils with poor drainage or flooded (Chapter A of AP).
Restrictions for application near watercourses (buffer strips)	• Mineral:
	>= 2 m in flat surfaces
	>= 50 m from springs /wells/boreholes
	• Processed livestock waste:
	>= 10 m from all water bodies in the case of solid waste
	>= 20 m in the case of liquid waste
Effluent storage works	• Chapter A of AP
Capacity of manure storage	• Chapter A of AP
Rational fertilisation (e.g., splitting fertilisation, limitations)	• Application of nitrogenous fertilisers and livestock waste (Chapter A of AP).
	• Maximum N-total applied during the growing period
	• Good irrigation practices (Chapter A of AP).
Crop rotation, permanent crop enhancement	• Dry crop rotation applied to at least 30% of the irrigated area (Chapter A of AP).
Vegetation cover in rainy periods, winter	• The rational use of fertilisers on winter vegetables and flowers, as well as on crops cultivated under cover, is permitted, in so far as no poultry farm waste or livestock liquid waste is applied (Chapter A of AP).
Fertilisation plans, spreading records	• It is recommended to apply fertilisers using fertiliser spreading devices
	- granular spreaders for solids; or
	- fertiliser spreading devices equipped with special liquid sprinklers/injectors, penetrating at a depth of 12-15 cm into the ground
Other measures	• See Chapter A of AP, in particualr related to irrigation measures
	• Other measures (emission controls and the code of good practice) are also adopted under the river basin management plans
Date for application limit of 170 kg N/ha/year:	• Not specified

(*) Action Programmes (JMD No 38552/265, Government Gazette, Series II, No 1496, 03.05.2019)

In particular the AP contains the following measures for reducing pollution caused by nitrates in NVZ areas: limiting the amount of nitrogenous fertilizers; determining the method and time of application of the necessary fertilizer units per crop; establishing a prohibition period for spreading certain types of fertilizer; adapting cultivation practices; managing agricultural and livestock waste and defining the capacity of manure storage tanks; establishing the obligations of producers; and the control and sanction monitoring mechanism. Specific rules for irrigation were also introduced.

Other measures (emission controls and the code of good practice) are also adopted under the river basin management plans. Specific voluntary measures and actions have also been adopted in the 1st Management plan to control diffuse pollution from agricultural sources. However, the information related to complaint farmers are not reported as well as of cost-effectiveness analyses.

Controls

The mandatory provisions of the Code of Good Agricultural Practices have been incorporated into the cross-compliance document for the 2014-2020 Programming Period. No information was given concerning the controls and controls resulting in non-compliance.

Designation of NVZ

Greece has not changed the areas designated as Nitrate Vulnerable Zones since the last reporting period. The total designated area represents a total surface of 42 274.5 km^2.

Forecast of Water Quality

There was no information given concerning the forecast of water quality.

Summary

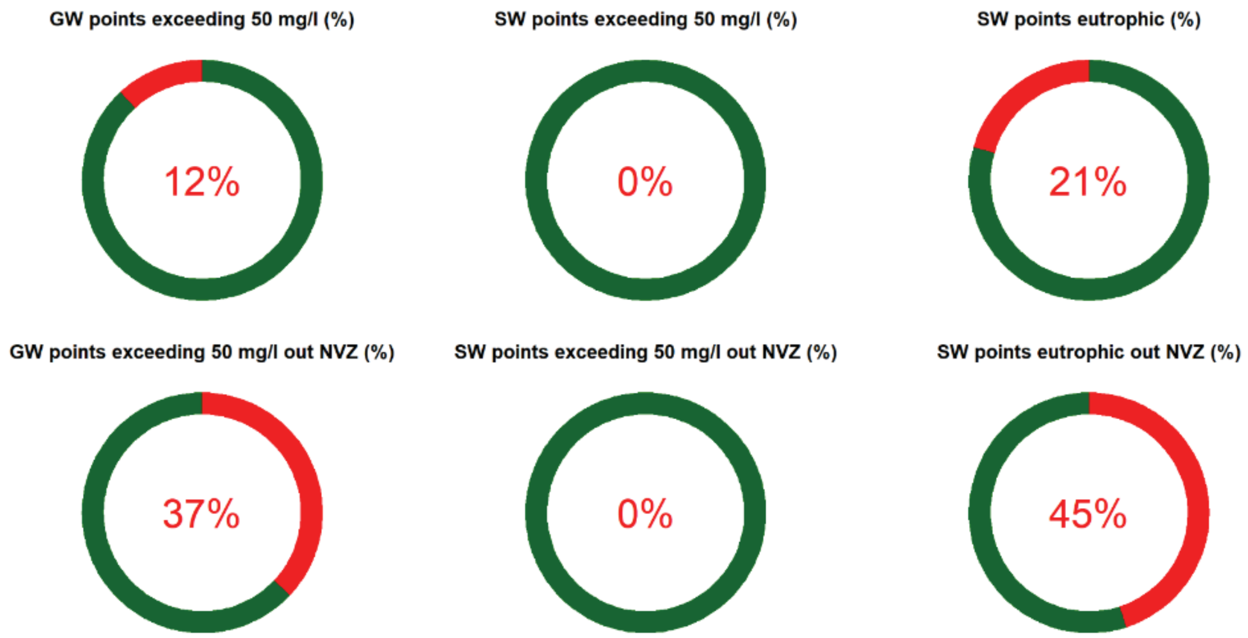


Figure 16. The summary plot for the period 2016-2019

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

Long term analysis

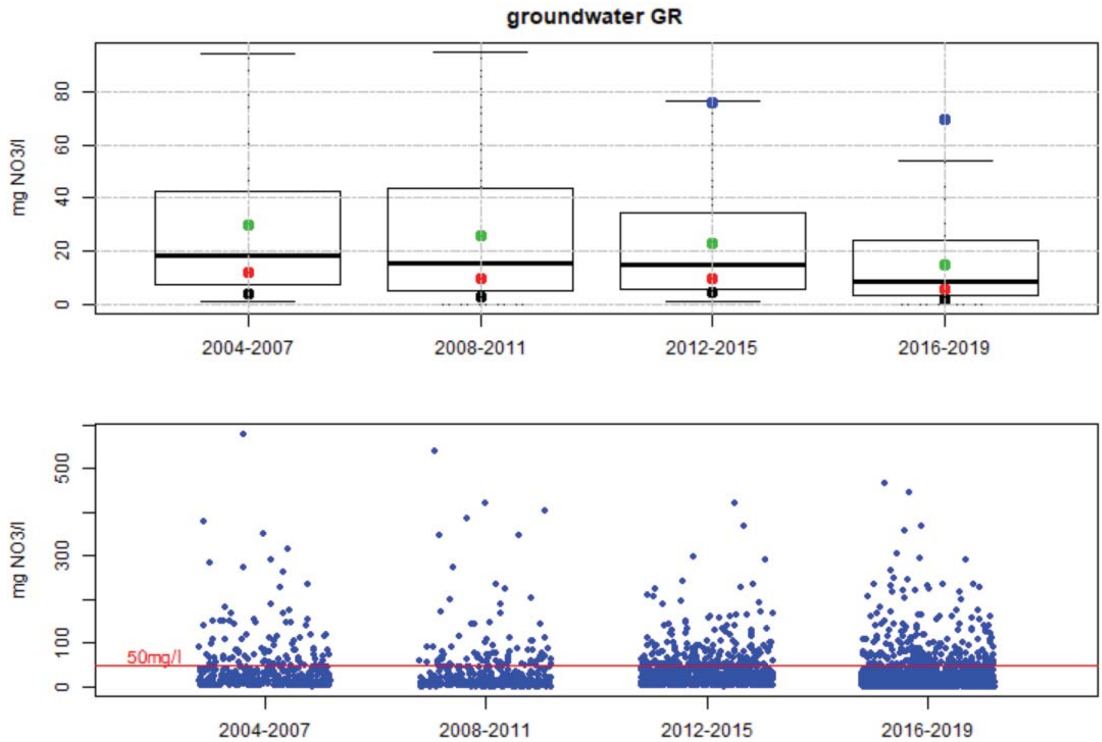


Figure 17. Time series of box whisker plots along with the distribution of the average NO3 annual concentrations for each reporting period, for groundwater stations. The blue, red, green and black dots represent the mean of the fourth third, second and first quartiles, respectively.

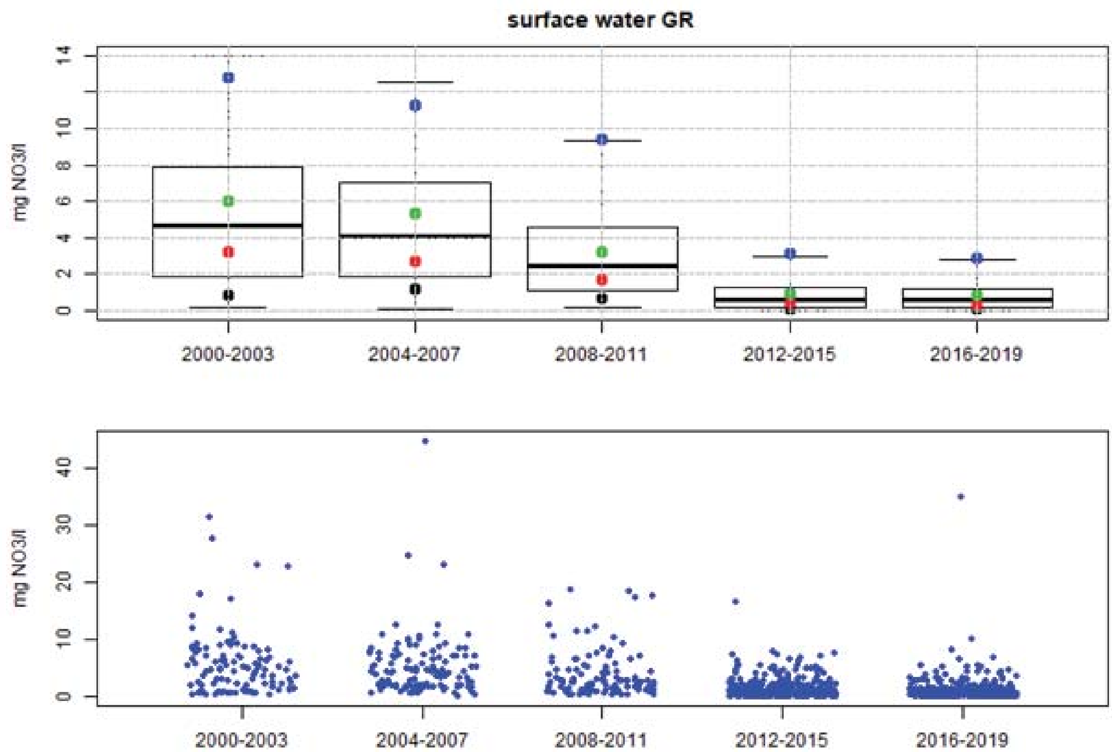


Figure 18. Time series of box whisker plots along with the distribution of the average NO3 annual concentrations for each reporting period, for surface water stations. The blue, red, green and black dots represent the mean of the fourth third, second and first quartiles, respectively.

Conclusions and recommendations

Greece has a low livestock density and the surplus of nitrogen is about the EU average, while there is almost no surplus of phosphorus.

There is a well-elaborated network of monitoring stations. The current reporting period reports data only for year 2018-2019, missing 2016-2017. There are a number of hotspots, with a nitrate concentration > 50 mg/l. A high number of surface waters are eutrophic. Trends are missing both for groundwater and surface waters as in the previous reporting period.

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

A revised action programme was published in 2019.

The Commission recommends Greece verify the designation of NVZ, considering that not all the ground waters with nitrate concentrations above 50 mg/l and surface waters found to be eutrophic are included in the NVZ's. It also recommends extending the monitoring data to include the four years of the reporting period and need report the trends.

EUROPEAN
COMMISSION

Brussels, 11.10.2021
SWD(2021) 1001 final

PART 21/38

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}

EN EN

Pressure from Agriculture

Hungary's utilized agricultural area amounts 5.3 Mha, representing 68% of the total land area and has remained stable since 2010. The major outputs of the agricultural industry include in a decreasing order milk (31%), forage plants (22%) and cattle (14.9%).

Eurostat

Major land use statistics for Hungary

Table 1.Utilized agricultural area (abbreviated as UAA)

Hungary	2005	2007	2010	2013	2016
Utilised agricultural area UAA (1000 ha)	NA	5807	5343	5340	5349
arable land (1000 ha)	NA	4494	4308	4326	4332
permanent grass (1000 ha)	NA	1017	763	759	783
permanent crops (1000 ha)	NA	199	176	182	176
kitchen gardens (1000 ha)	NA	96	NA	81	65

Note:

Eurostat (FSS)

Hungary's arable land has remained stable since 2010.

Animal distribution in Hungary

Hungary's live poultry have increased since 2013. The livestock density index (livestock unit per hectare of Utilized Agricultural Area) has remained stable and is lower than the EU average of 0.8.

Table 2. Livestock statistics

Hungary	2005	2007	2010	2013	2016
Livestock index	0.59	0.57	0.53	0.49	0.52
dairy cows (10^6 heads)	0.28	0.27	0.24	0.25	0.24
live bovines (10^6 heads)	0.71	0.70	0.68	0.78	0.85
live pigs (10^6 heads)	3.85	3.87	3.17	3.00	2.91
live poultry (10^6 heads)	NA	NA	48.70	41.10	46.69

Note:

Eurostat (FSS)

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

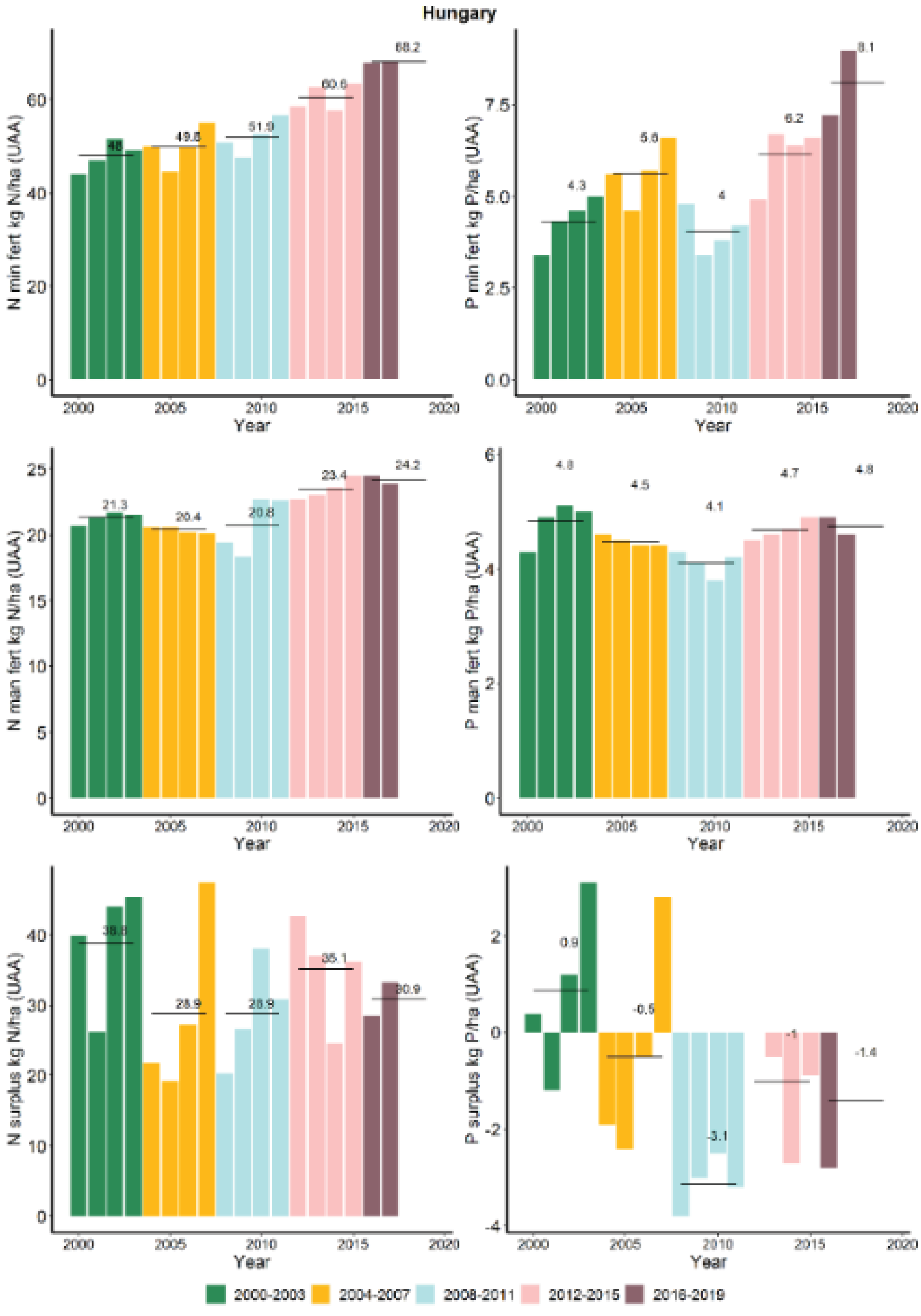


Figure 1. N and P fertilizers and gross surplus (kg/ha)

The gross nitrogen and phosphorus surpluses originate from EUROSTAT data for the years 2000-2017. N and P mineral fertilizers increased by around 13% and 30% with respect to the previous reporting period, while manure N and P remained stable. The nitrogen and phosphorus surplus decreased significantly from the last reporting period by 12% and 40% respectively. 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

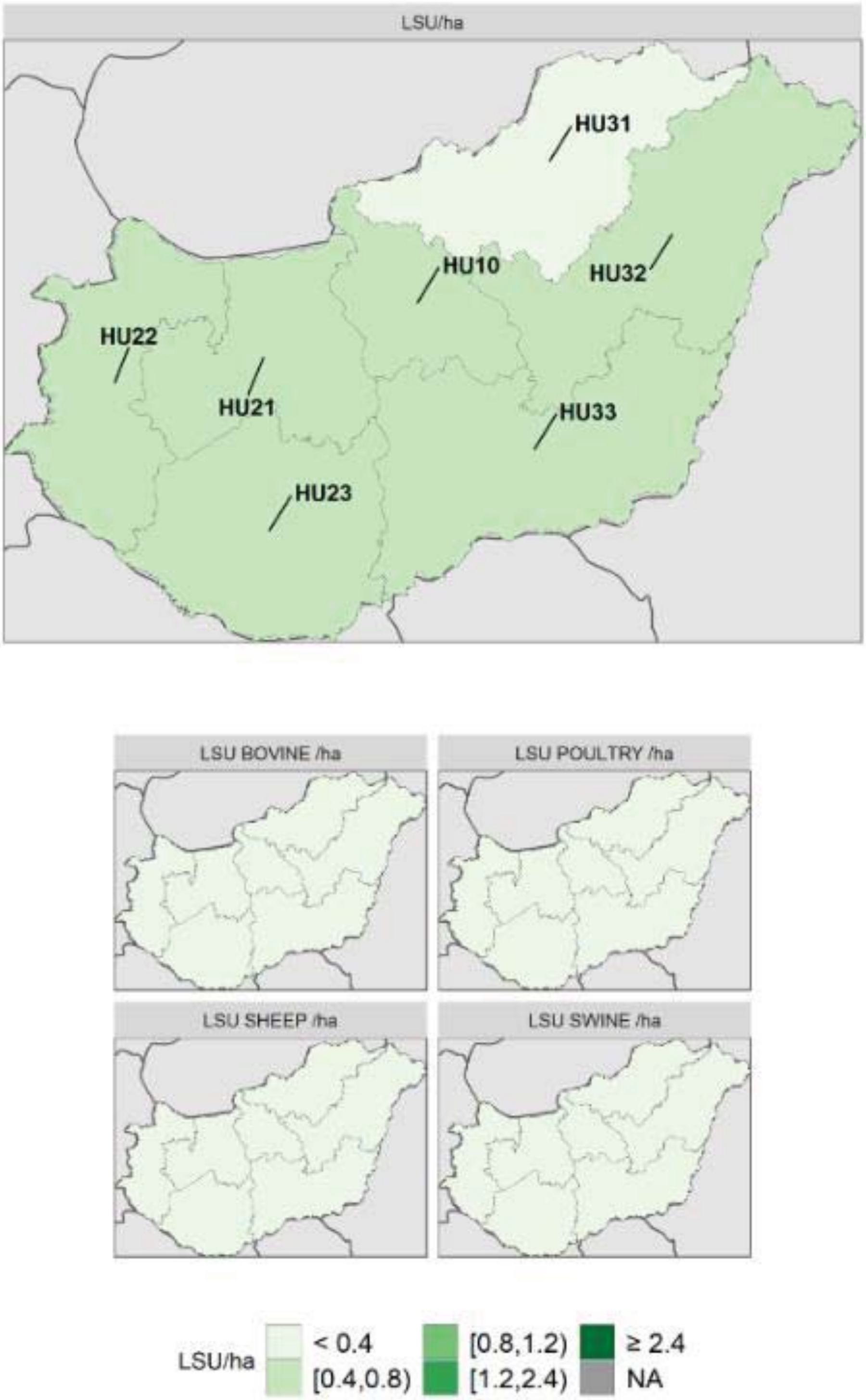


Figure 2. Map of livestock unit distribution, year 2016 (Source: Eurostat, February 2021)

Animal production is generally in the range of 0.4-0.8 LSU/ha Hungary (total LSU and LSU by animal type were retrieved individually from EUROSTAT).

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

Water Quality Monitoring

For groundwater and surface water measurements, some stations have same coordinates due to different depth. 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

Station Type	Description	Number of stations with measurements			Number of stations with Trends		
		2008-2011	2012-2015	2016-2019	2008-2011	2012-2015	2016-2019
0	Phreatic groundwater (shallow): 0-5 m	227	225	220	217	222	210
1a	Phreatic groundwater (deep) 5-15 m	416	404	434	405	398	401
1b	Phreatic groundwater (deep) 15-30 m	225	221	235	223	220	224
1c	Phreatic groundwater (deep) >30 m	24	32	68	21	31	68
2	Captive groundwater	714	718	669	700	709	646
3	Karstic groundwater	157	156	162	154	156	161
9	Not specified	0	0	0	0	0	0
	Total	**1763**	**1756**	**1788**	**1720**	**1736**	**1710**

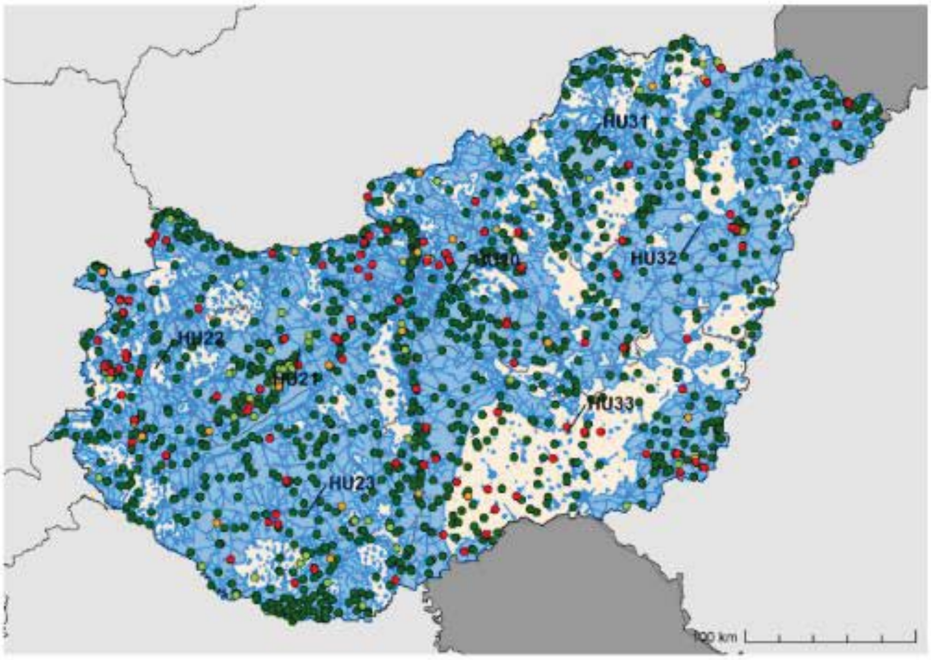
Surface water quality monitoring network

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

Station Type	Description	Number of stations with measurements			Number of stations with Trends			Number of stations with Trophic status		
		2008-2011	2012-2015	2016-2019	2008-2011	2012-2015	2016-2019	2008-2011	2012-2015	2016-2019
4	River water	480	480	810	187	282	378	480	480	808
5	Lake/reservoir water	45	50	117	25	31	36	45	45	112
6	Transitional water	NA	NA	NA	NA	NA	NA	NA	NA	NA
7	Coastal water	NA	NA	NA	NA	NA	NA	NA	NA	NA
8	Marine water	NA	NA	NA	NA	NA	NA	NA	NA	NA
9	Not specified	0	0	0	0	0	0	0	0	0
	Total	**525**	**530**	**927**	**212**	**313**	**414**	**525**	**525**	**920**

Groundwater Quality

Groundwater average annual nitrate concentration



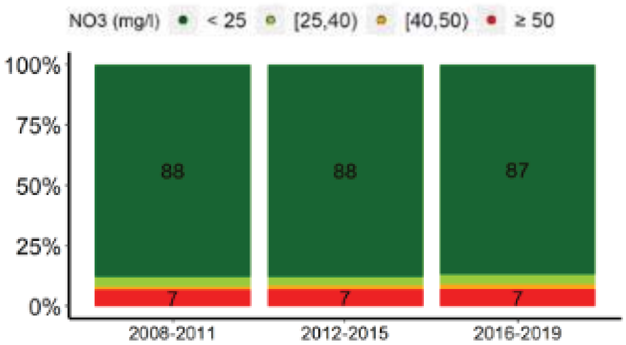


Figure 3. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information. In the map in blue the NVZ

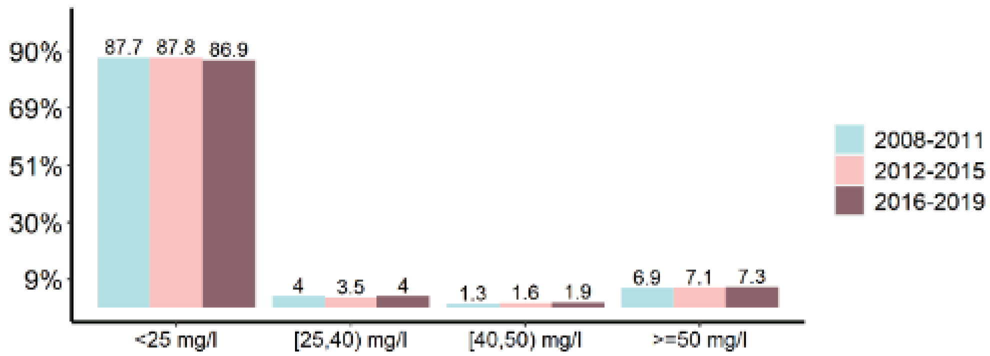


Figure 4. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis).

Groundwater average annual nitrate concentration trend

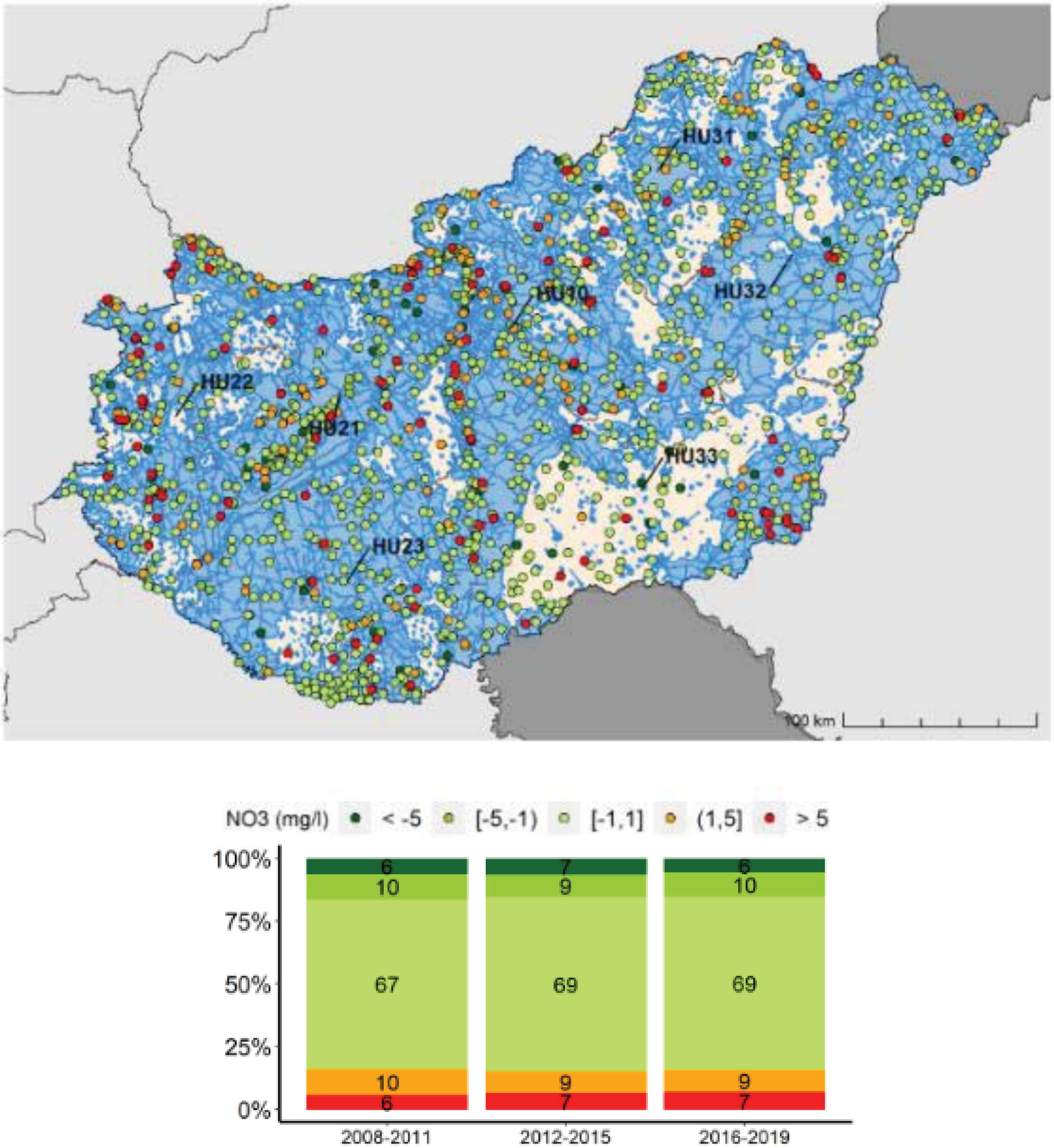


Figure 5. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis). In the map in blue the NVZ

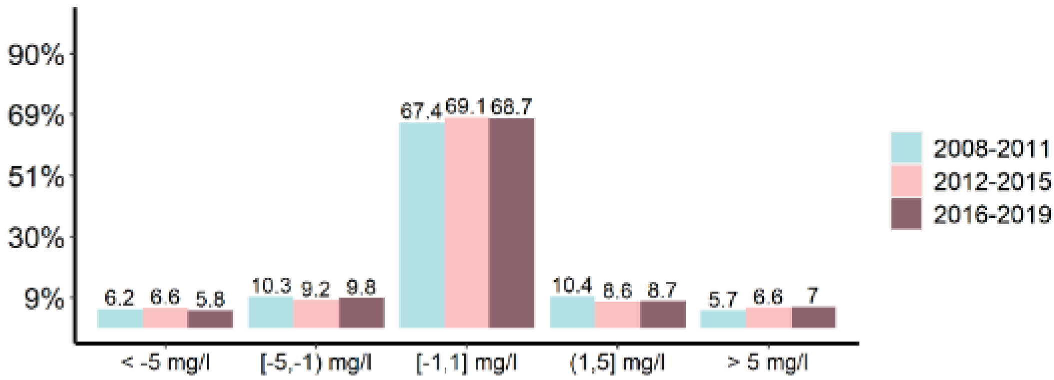
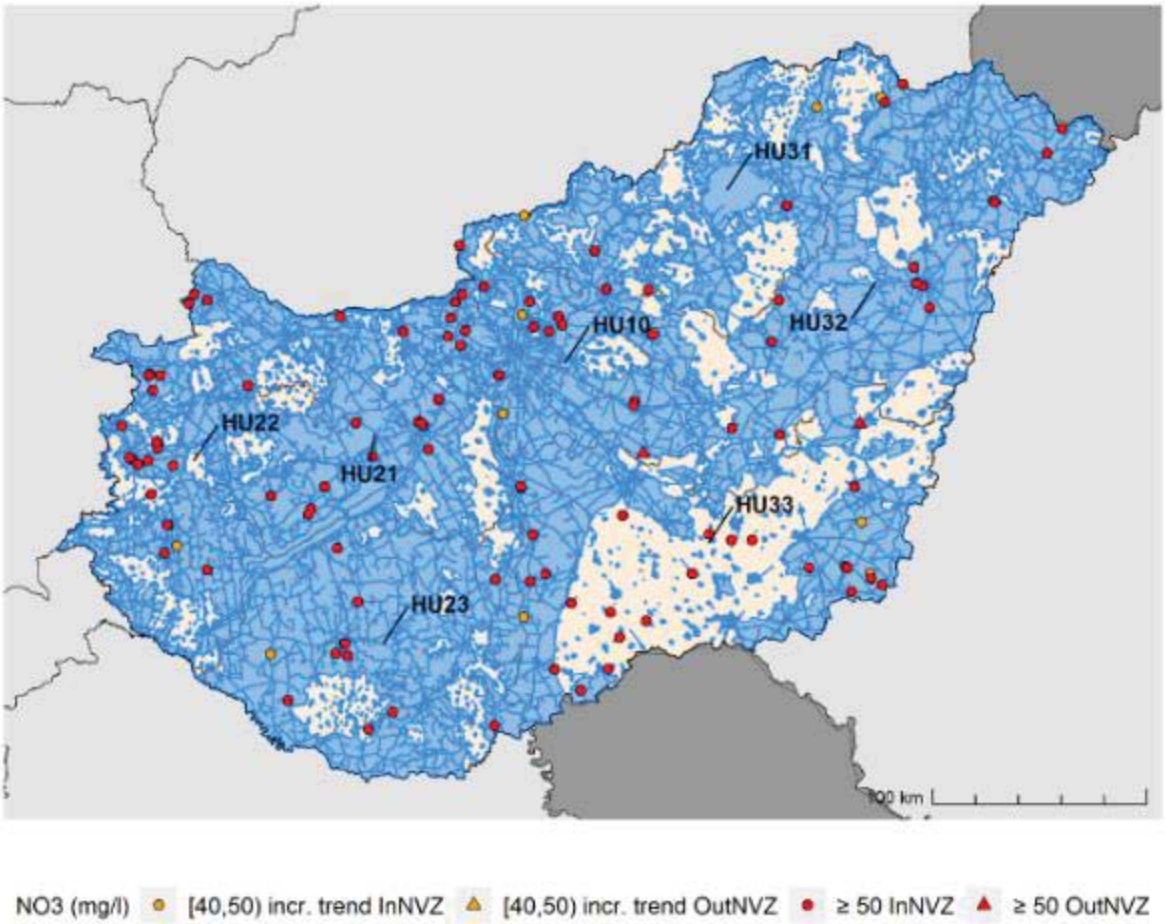


Figure 6. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis)

Groundwater hotspot

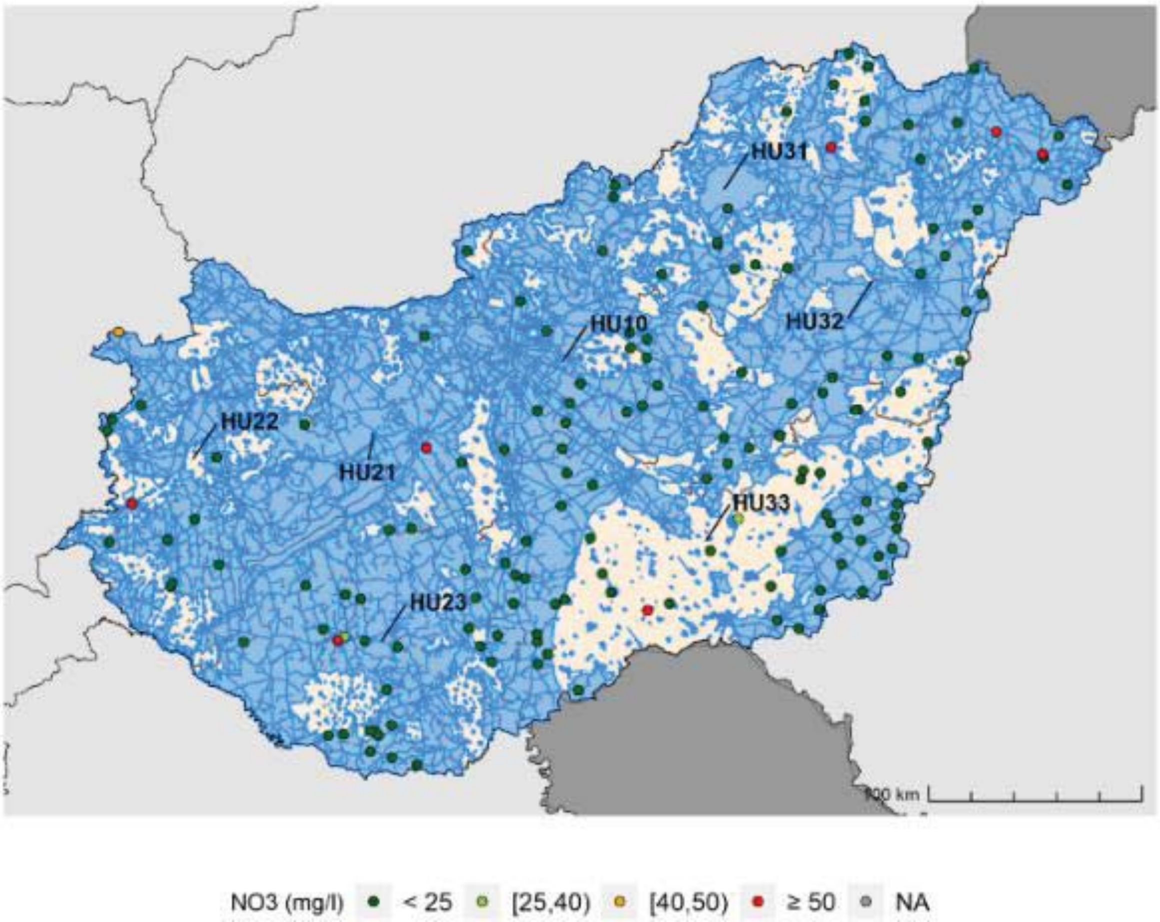


		>=40 and < 50 mg/l incr.trend		>=50 mg/l	
NUTS ID	NUTS NAME	InNVZ	OutNVZ	InNVZ	OutNVZ
HU10	Közép-Magyarország	2	0	14	1
HU21	Közép-Dunántúl	1	0	21	0
HU22	Nyugat-Dunántúl	5	0	23	0
HU23	Dél-Dunántúl	1	0	15	0
HU31	Észak-Magyarország	3	0	7	0
HU32	Észak-Alföld	2	0	18	0
HU33	Dél-Alföld	3	0	30	1
	Total	**17**	**0**	**128**	**2**

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

The hotspot analysis identifies all the GW monitoring stations that have NO3 concentration in the range of 40-50 mg/l with increasing trends 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



Station Type	Description	Number of removed stations		
		total removed	with measurements	with trends
0	Phreatic groundwater (shallow): 0-5 m	16	16	16
1a	Phreatic groundwater (deep) 5-15 m	13	13	12
1b	Phreatic groundwater (deep) 15-30 m	15	15	15
1c	Phreatic groundwater (deep) >30 m	1	1	1
2	Captive groundwater	117	117	115
3	Karstic groundwater	4	4	4
9	Not specified	0	0	0
	Total	**166**	**166**	**163**

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

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

Surface Water Quality

Surface water average annual nitrate concentration

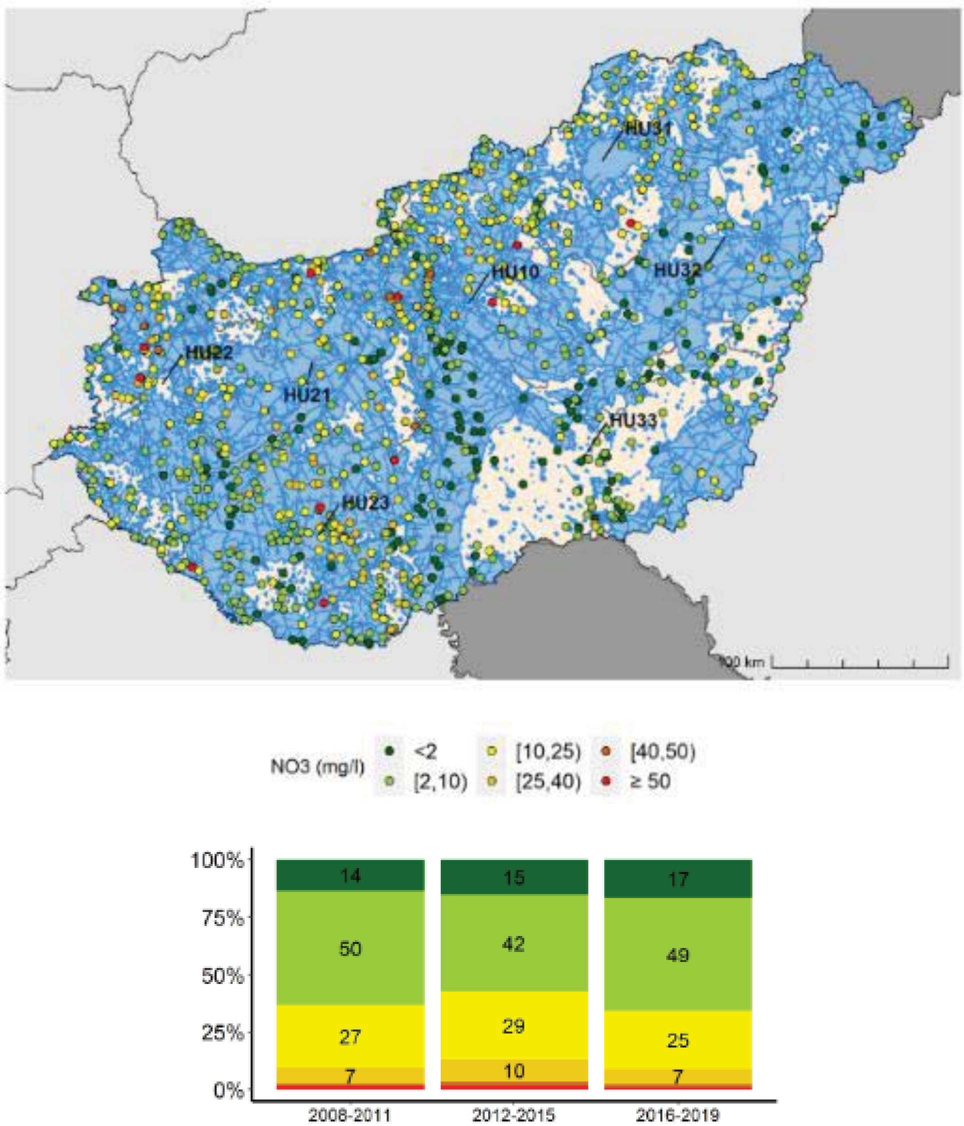


Figure 9. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information. In the map in blue the NVZ

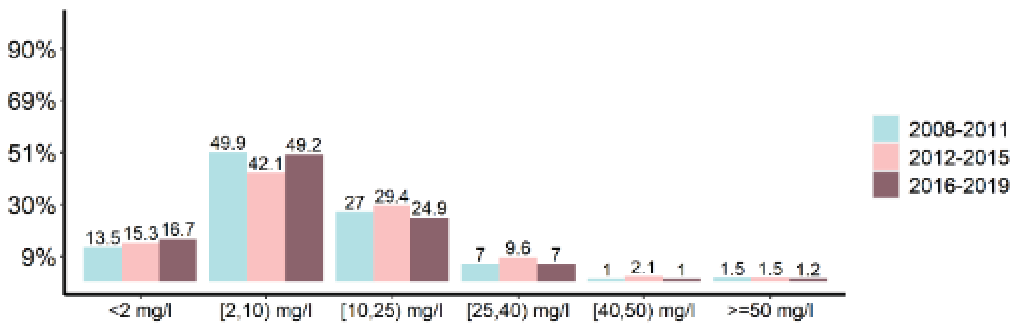


Figure 10. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis)

European Commission

Surface water average annual nitrate concentration trend

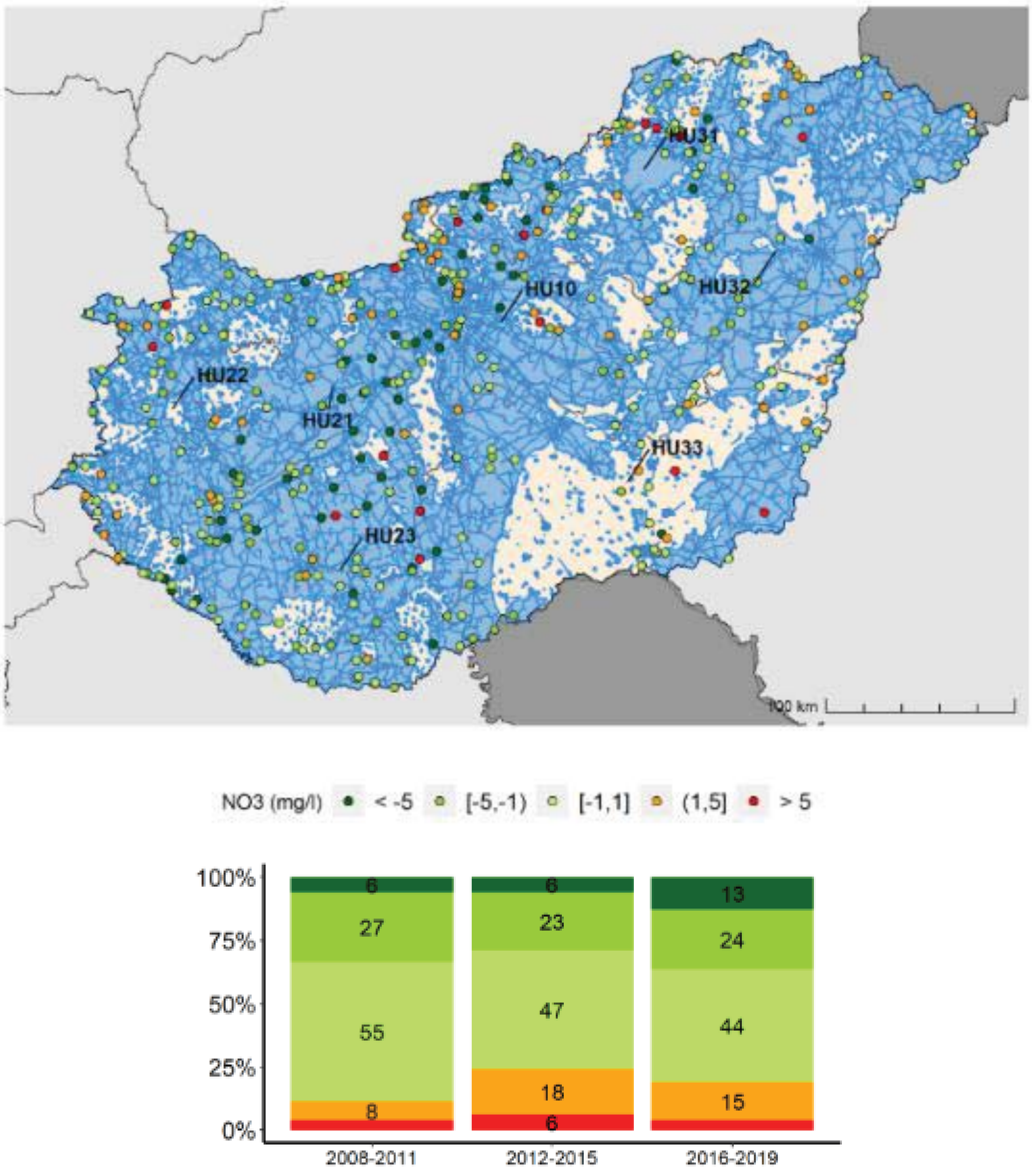


Figure 11. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information. In the map in blue the NVZ

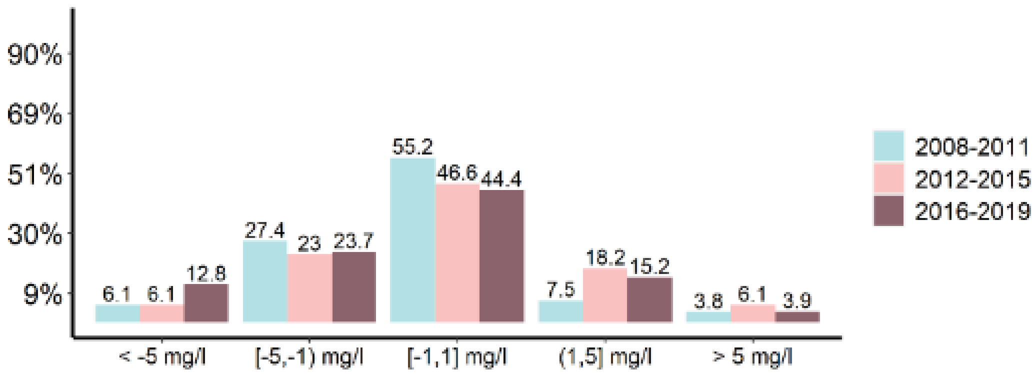


Figure 12. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis)

Surface Water Eutrophication

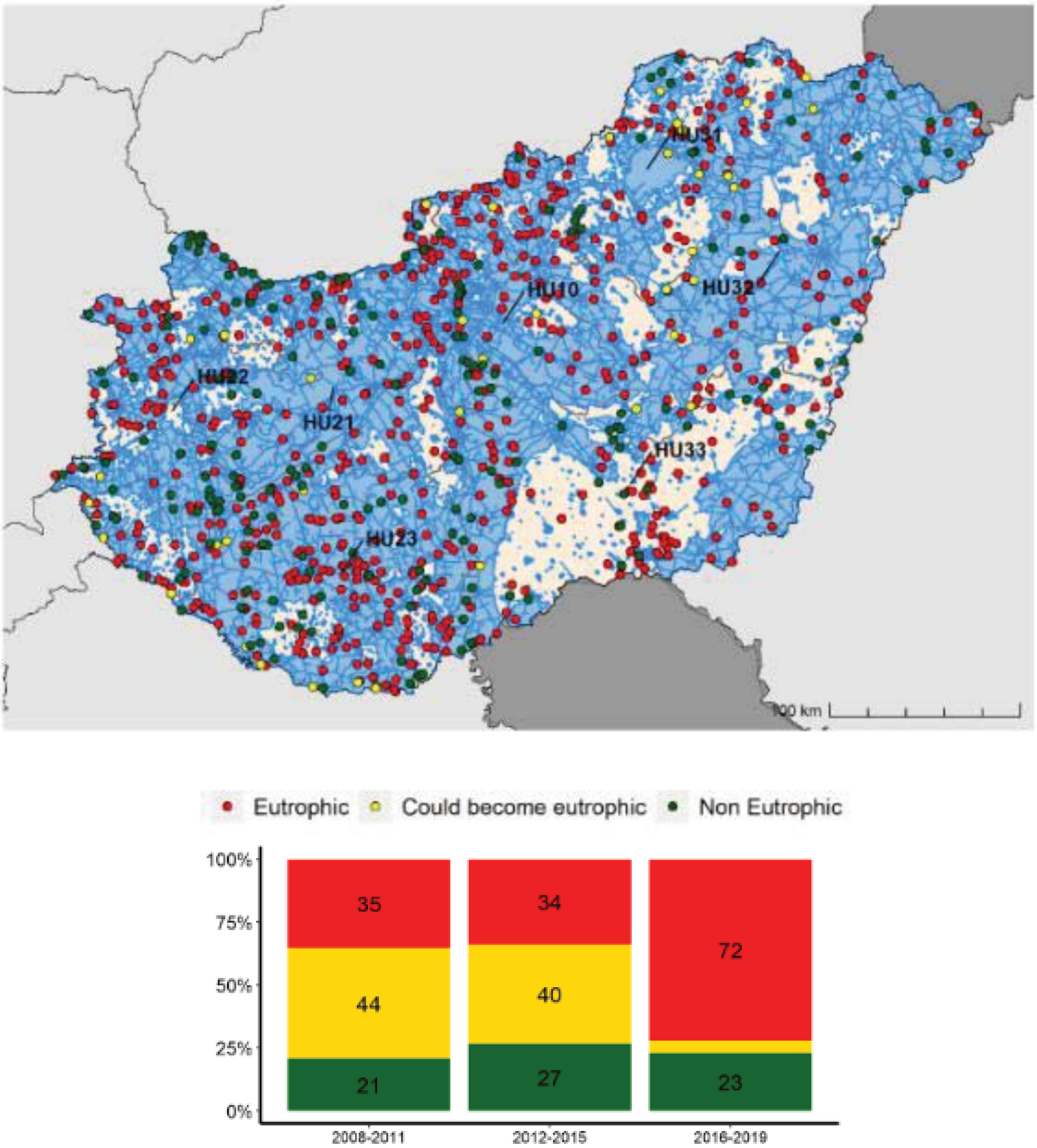


Figure 13. Spatial distribution of eutrophic status (map) and corresponding percentage of monitoring points per classes of status by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information. In the map in blue the NVZ

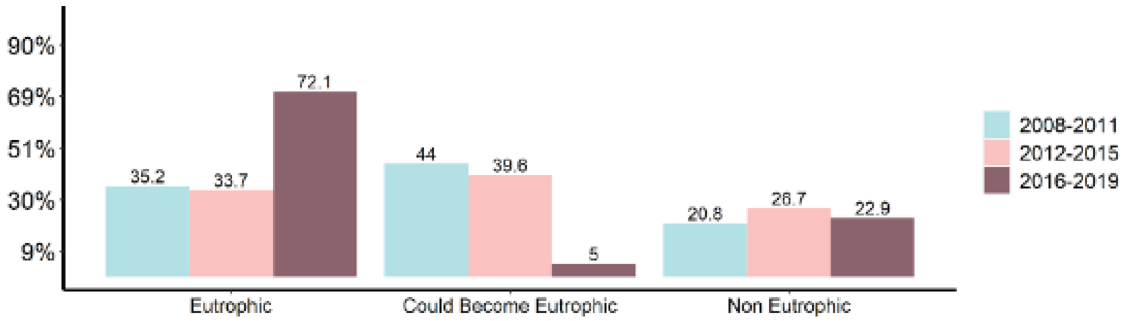
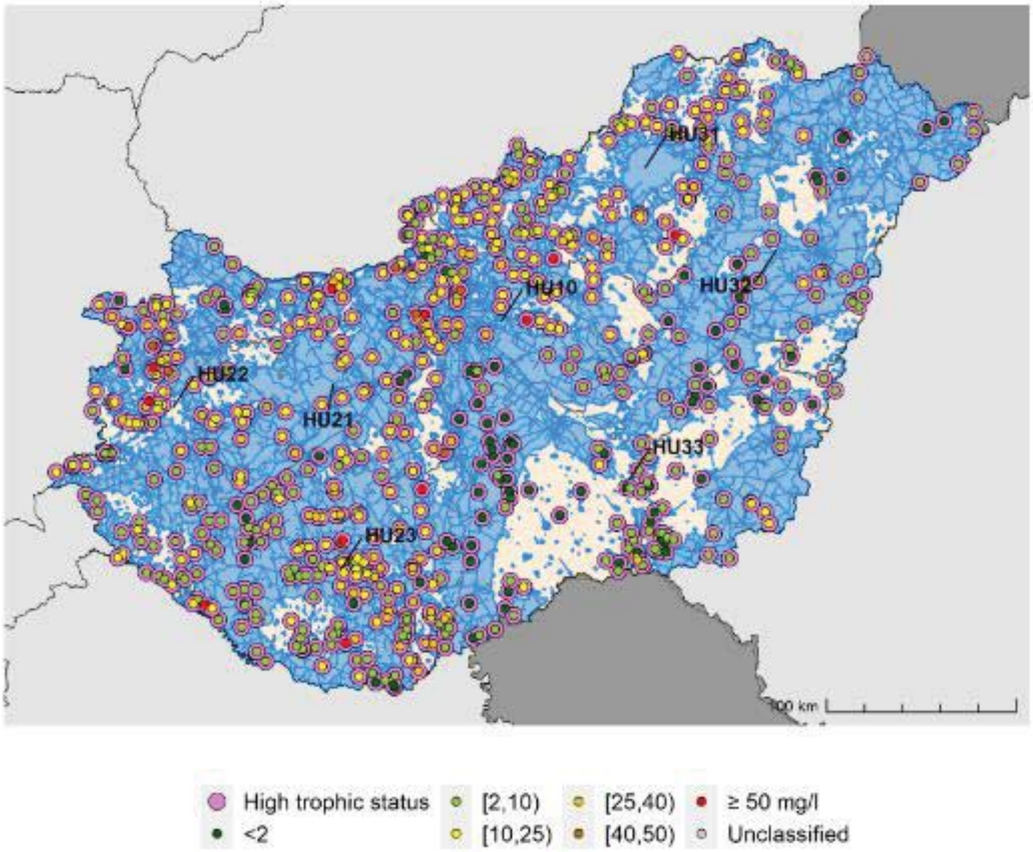


Figure 14. Comparison of percentage of monitoring points in the three reporting periods by classes of status (x axis)

The Eutrophic status vs average NO3 annual concentration



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
HU10	Közép-Magyarország	66	4	23	25	10	2	2	0
HU21	Közép-Dunántúl	71	3	16	39	10	2	1	0
HU22	Nyugat-Dunántúl	103	4	47	35	11	4	2	0
HU23	Dél-Dunántúl	156	13	73	43	22	1	4	0
HU31	Észak-Magyarország	108	0	40	56	10	0	2	0
HU32	Észak-Alföld	62	19	35	7	1	0	0	0
HU33	Dél-Alföld	97	42	48	6	1	0	0	0
	Total	**663**	**85**	**282**	**211**	**65**	**9**	**11**	**0**

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

The analysis shows all the SW monitoring stations with the highest 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 assessment of eutrophication was carried out in accordance with the methodology of the integrated ecological status assessment under the Water Framework Directive, linking the ecological status assessment to the trophic categories given in Table 5 of Guide 23 “Guidelines on the assessment of eutrophication in the context of European water policies” (WFD CIS Guidance Document No. 23).

In the 2016 report, waters with a moderate status according to the WFD were classified in the potentially eutrophic category and were classified as eutrophic according to the new definition of the guidance (point 5.3.2 of the Nitrate Reporting Guidelines, Article 23 of the Common Implementation Strategy), unless there was no degree of eutrophic in the previous report.

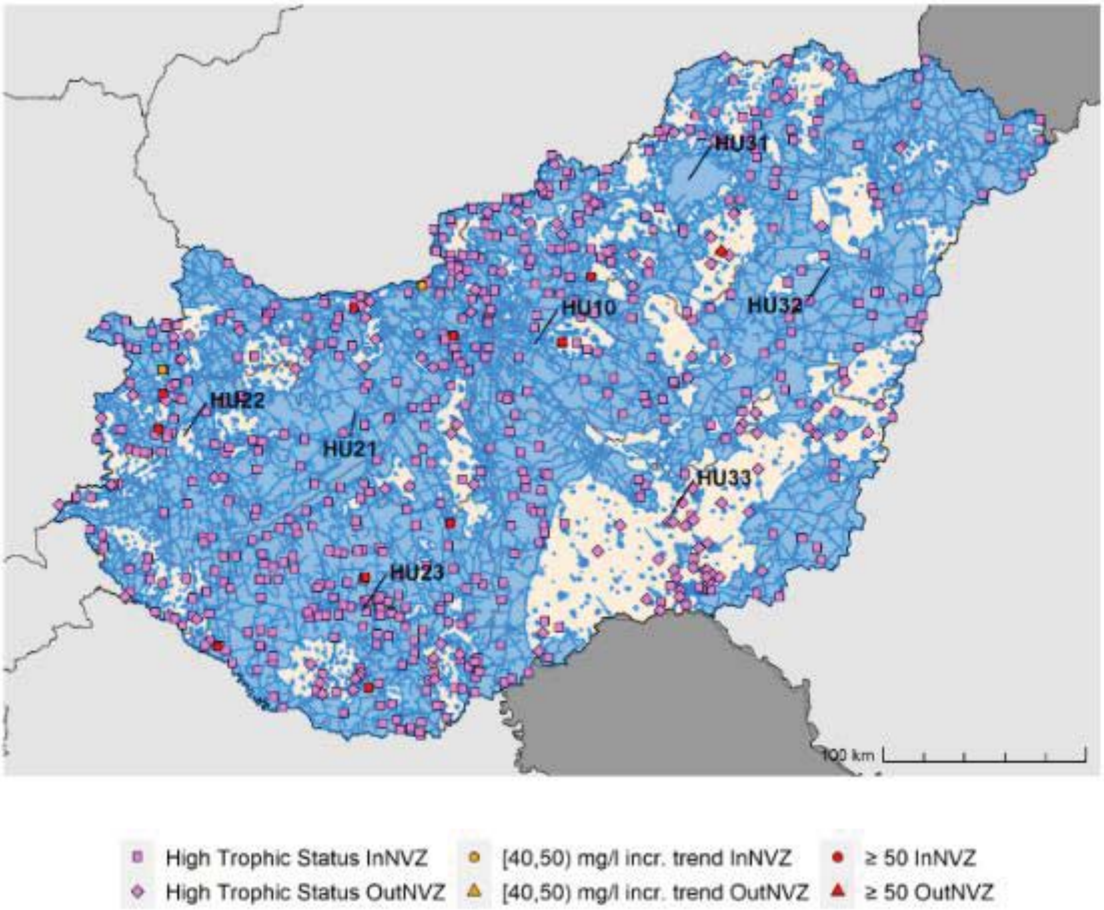
When assessing trophic status according to the requirements of the Nitrate Reporting Guidelines, three quarters of the watercourses are eutrophic, mostly due to the application of the new classification system.

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	626	41	141
5	Lake/reservoir water	37	5	70
6	Transitional water	NA	NA	NA
7	Coastal water	NA	NA	NA
8	Marine water	NA	NA	NA
9	Not specified	0	0	0
	Total	**663**	**46**	**211**

European Commission

Surface Water quality hotspot

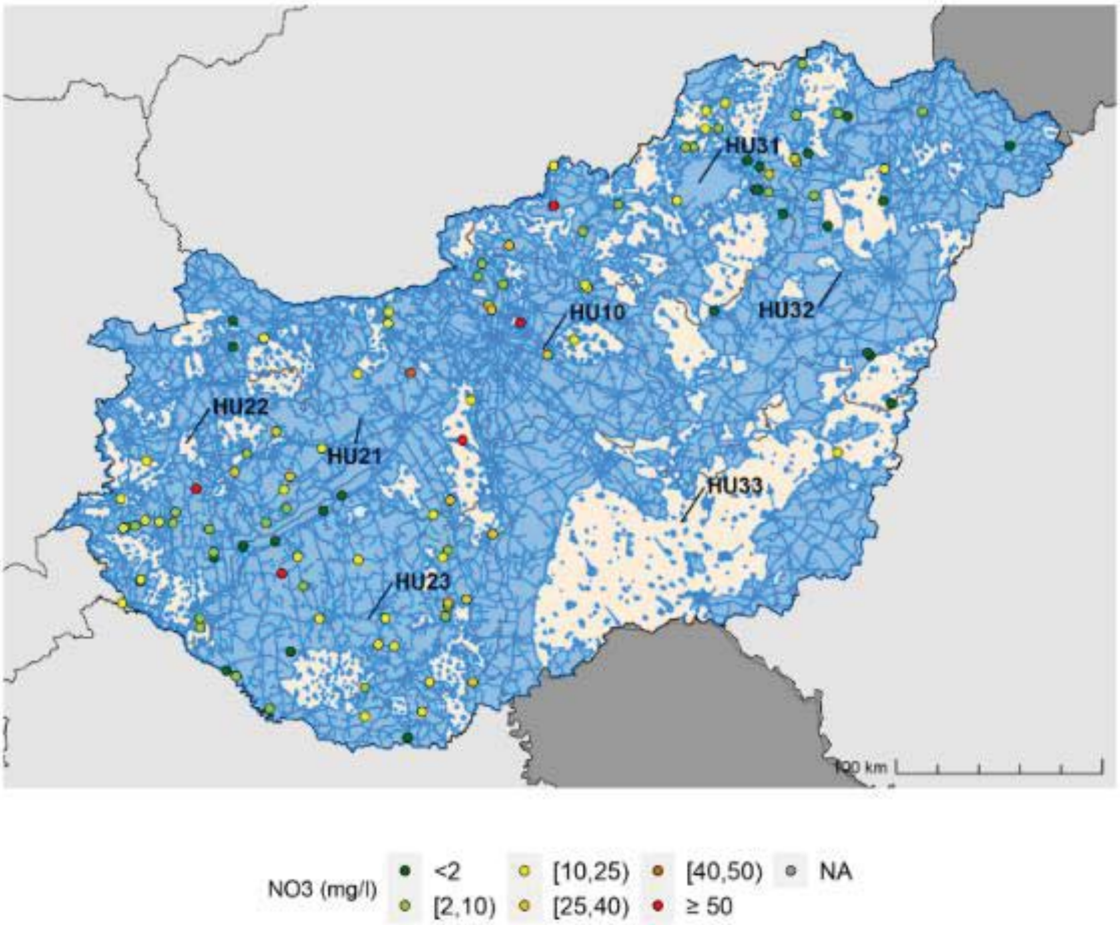


		High trophic status		>=40 and < 50 mg/l incr.trend		>=50 mg/l	
NUTS ID	NUTS NAME	InNVZ	OutNVZ	InNVZ	OutNVZ	InNVZ	OutNVZ
HU10	Közép-Magyarország	63	3	0	0	2	0
HU21	Közép-Dunántúl	58	13	1	0	1	0
HU22	Nyugat-Dunántúl	88	15	1	0	2	0
HU23	Dél-Dunántúl	145	11	0	0	4	0
HU31	Észak-Magyarország	85	23	0	0	1	1
HU32	Észak-Alföld	53	9	0	0	0	0
HU33	Dél-Alföld	58	39	0	0	0	0
	Total	**550**	**113**	**2**	**0**	**10**	**1**

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

The hotspot analysis identifies all the SW monitoring stations that have high trophic status, 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



Station Type	Description	Number of removed stations			
		total removed	with measurements	with trends	with trophic status
4	River water	103	103	26	103
5	Lake/reservoir water	12	12	0	11
6	Transitional water	0	0	0	0
7	Coastal water	0	0	0	0
8	Marine water	0	0	0	0
9	Not specified	0	0	0	0
	Total	**115**	**115**	**26**	**114**

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 Hungarian Action Programme was published for the first time in 2001 and was reviewed in 2017.

The main measures are summarized in the following table.

According to Directive 2016/2284 (National Emission Ceilings, NEC), Hungary is required to reduce ammonia emissions by 32 % by 2030. The Ministry of Agriculture funded a number of studies for the preliminary analysis of emission control measures on ammonia reduction. For the selected measures, the impact on farmers' income and production costs, and the impact on the national budget were analysed.

Table 6. Details of Action Programme

Measure	General details in Action Programme (*)
Period of prohibition of fertiliser application	• Fertilisation is prohibited from 31 October until 15 February. Top dressing of winter cereals is allowed from 1 February. No temporary manure stacks are allowed at land parcel edges during this period. Winter grazing is not allowed either unless annual N pressures remain below 120 kg/ha. (section 4(2) of the Decree)
	• Winter grazing is not allowed either unless annual N pressures remain below 120 kg/ha. (section 4(2) of the Decree)
Restrictions for application on sloped soils	• Fertiliser application in plantations with a slope above 15% is allowed only if anti-erosion safeguards are put in place. Slurry application in areas with gradients above 6% is allowed only with injection or sliding hose technique. (sections 4(4)-(7) of the Decree)
	• Slurry application on slopes below 12% is allowed only on the basis of soil protection plans. (sections 4(4)-(7) of the Decree)
	• The fertilisers must be immediately incorporated on slopes above 12%. Fertiliser application is not allowed on slopes above 17%. (sections 4(4)-(7) of the Decree)
	• No temporary manure stacks are allowed if the surface water is within 100 m or if the highest groundwater level is below 1.5 m. (sections 4(4)-(7) of the Decree)
Restrictions for application on soaked, frozen, or snow-covered soils	• Applying fertiliser or creating and maintaining temporary manure stacks on soaked, frozen or snow-covered soil are not permitted (section 4(8) of the Decree)
Restrictions for application near watercourses (buffer strips)	• At the time of fertiliser application, no nutrient is allowed to reach surface waters either directly or indirectly, i.e. via infiltration or erosion. For such purpose it is not allowed to apply: - fertilisers in the 2-m strip of the shoreline of surface waters; - livestock manure: a)in the 20-m strip of the shoreline of lakes; b)in the 5-m strip measured from other surface waters; the safety distance may be reduced to 3 m if the cultivated land parcel is not wider than 50 m and not larger than 1 ha; c) within a 25 m radius from any spring or any well used for the supply of drinking water for animals or human consumption (section 5(1) of the Decree)
Effluent storage works	• Not specified
Capacity of manure storage	• Insulated and leak-free manure storage vessels are necessary with the required technical specifications and a capacity to store manure for at least 6 months (sections 8(1)-(9) of the Decree)
Rational fertilisation (e.g., splitting fertilisation, limitations)	• The applied nutrient volume may not exceed the nutrient demand adjusted for crop yield levels under the actual site conditions, which must be reduced with the nutrient volume supplied by the soil. (section 6(1) of the Decree)
	• For intensive grazing, the livestock density may not exceed 15 LSUwhen the number of animals to be considered for livestock density at the livestock farm does not exceed 15 LU (section 6(8) of the Decree)
	• The period between fertiliser application and sowing may not be longer than 15 days. The applied volume of active substance may not exceed the volume required for autumn-winter growth (section 6(9) of the Decree)
Crop rotation, permanent crop enhancement	• Not specified
Vegetation cover in rainy periods, winter	• Not specified
Fertilisation plans, spreading records	• The permitted maximum nutrient volumes are shown by soil type and nutrient supply in Annex 3 (section 6(2) of the Decree)
	• The nutrient management plan should be drawn up on the basis of soil analyses (section 6(7) of the Decree)
Other measures	• On slopes above 2% the cultivation method must facilitate the input of precipitation into the soil. (section 4(9) of the Decree)
	• Creation of buffer strips in sites where fertilisation is prohibited (section 5(1)-(3) of the Decree)
Date for application limit of 170 kg N/ha/year:	• 03 April 2001

(*) Decree No. 59/2008. (IV. 29.) of the Ministry of Agriculture

Controls

The soil protection authority conducts checks on compliance with the rules of good agricultural practice on arable land, while the water protection authority is responsible for carrying out checks on livestock farms.

During the current reporting period, 6.4% of the livestock farms located in vulnerable zones were subjected to administrative checks, while 3% were subjected to on/site checks. Arable land control rates in vulnerable zones were 35% and 4.3% for administrative and on/site checks, respectively.

Based on the experience of the checks, nutrient management based on soil testing remains the biggest problem for farmers and non-compliance with the maximum levels in nutrient management was to a lesser extent.

Based on the experience of the on-the-spot checks, 0.58 % of the animal holdings checked did not comply with the legal requirements in force, which shows a significant improvement compared to the previous cycle.

Designation of NVZ

Following the second report on the implementation of the Nitrates Directive of 2012, covering the period 2008-2011, Hungary has revised the nitrate vulnerable zones. The area increased by 23.1 % (representing about 70 % of the country's territory).

Forecast of Water Quality

Nitrogen emission tests were carried out for the periods 2016 to 2018 and 2025 to 2027. The MONERIS model, adapted to national conditions, was used for the forecast. The analysis is based on a simple linear extrapolation (with a conservative approach, implying a more moderate change) in terms of population, point emissions and land use. In the case of nitrogen, changes in nutrient balances are uncertain and cannot be predicted with certainty based on recent trends.

Due to the future evolution of the loads, a model calculation that uses the lower balances was carried out. The results show that low nutrient balances will significantly reduce the nitrogen load of agricultural origin. The time-scale may vary greatly from one water body to another, but at least few decades are necessary, as groundwater may have a residence time of up to hundreds of years.

Summary

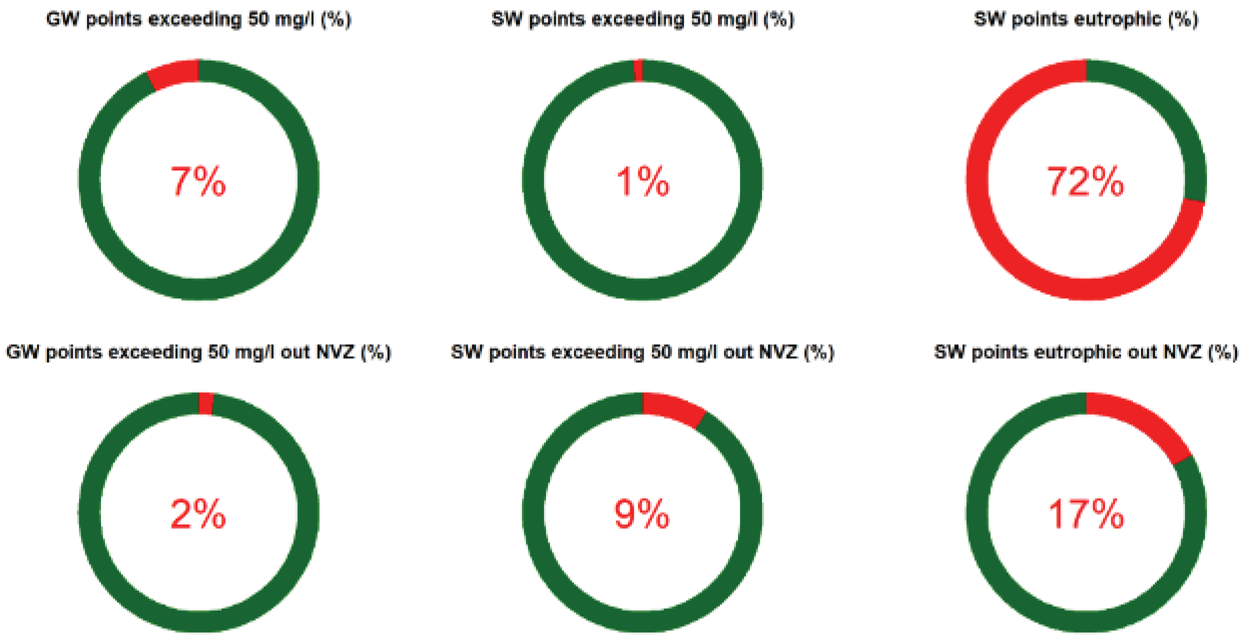


Figure 18. The summary plot for the period 2016-2019

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

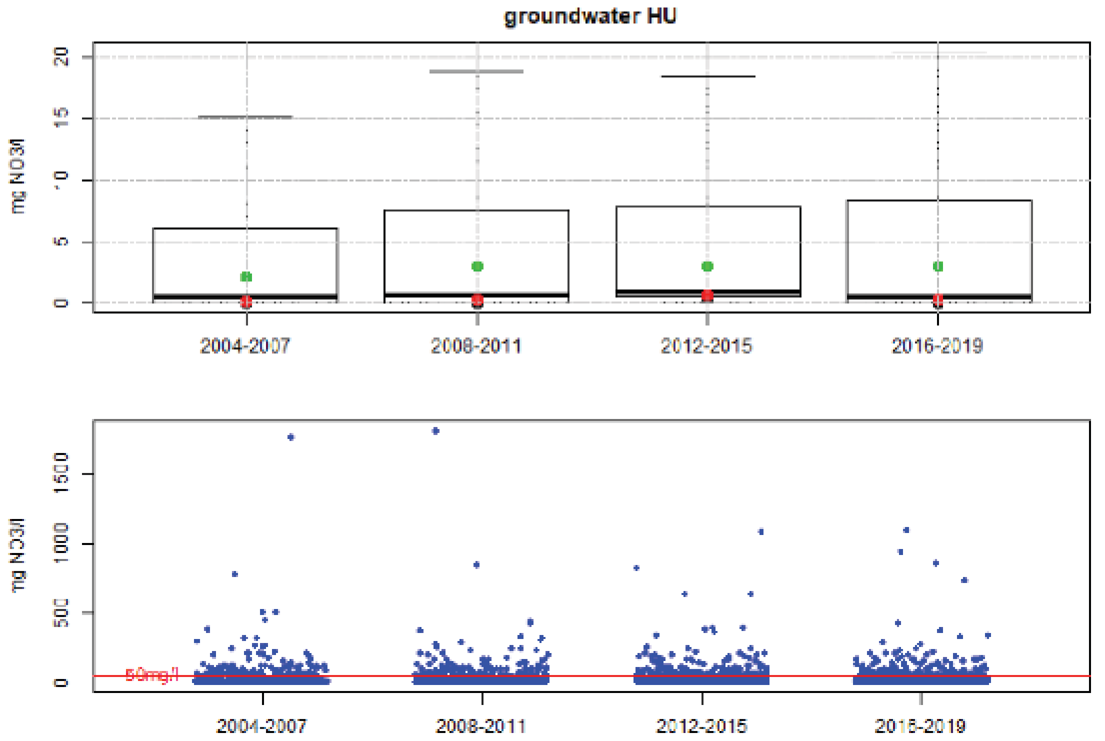


Figure 19. Time series of box whisker plots along with the distribution of the average NO3 annual concentrations for each reporting period for groundwater stations. RPs represent the reporting periods, RP7 being the last period (2016-2019). The blue, red, green and black dots represent the mean of the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

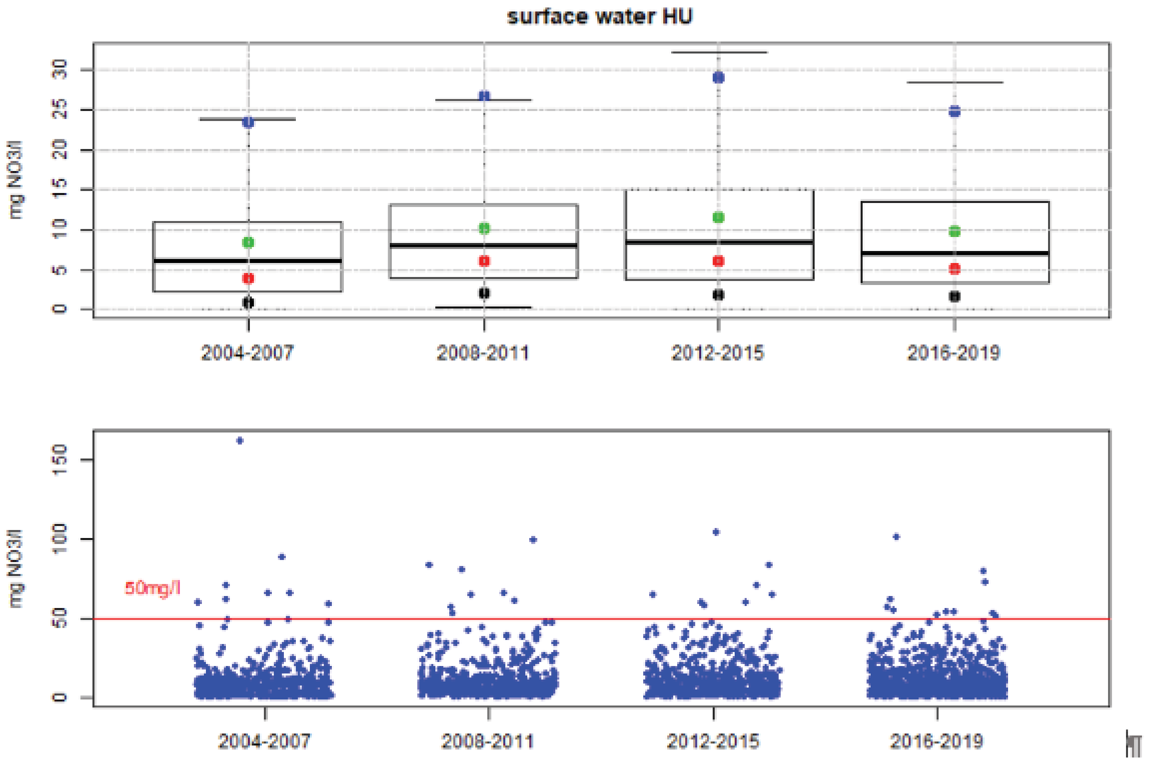


Figure 20. Time series of box whisker plots along with the distribution of the of the average NO3 annual concentrations for surface water stations. RPs represent the reporting periods, RP7 being the last period (2016-2019). The blue, red, green and black dots represent the mean of the fourth third, second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

Conclusions and recommendations

Hungary has a low livestock density, the surplus of nitrogen is below the average for the EU and there is a deficit of phosphorus.

There is a well-elaborated network of monitoring stations. The groundwater quality is generally good. However, there are some hotspots, with a nitrate concentration > 50 mg/l. A very high number of surface waters our found to be eutrophic

A number of surface waters found to be eutrophic are located outside the NVZ.

A revised action programme was published in 2019.

The Commission recommends Hungary to review the designation of NVZ and include areas that drain into waters that are eutrophic when agriculture pressure is significant.

EUROPEAN
COMMISSION

Brussels, 11.10.2021
SWD(2021) 1001 final

PART 22/38

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}

EN EN

European Commission

Pressure from Agriculture

Ireland's utilized agricultural area amounts to 4.5 Mha, representing 64.8% of the total land area and has remained stable since 2013. The major outputs of the agricultural industry include in a decreasing order milk (29.3%), cattle (26.4%) and forage plants (14.3%).

Eurostat

Major land use statistics for Ireland

Table 1.Utilized agricultural area (abbreviated as UAA)

Ireland	2005	2007	2010	2013	2016
Utilised agricultural area UAA (1000 ha)	NA	4276	4569	4478	4461
arable land (1000 ha)	NA	466	435	474	460
permanent grass (1000 ha)	NA	3808	4127	4002	3999
permanent crops (1000 ha)	NA	NA	1	2	2
kitchen gardens (1000 ha)	NA	0	0	0	0

Note:

Eurostat (FSS)

Ireland's arable land has decreased by 3% since 2013. Permanent grassland and crops remained stable since 2013.

Animal distribution in Ireland

Table 2. Livestock statistics

Ireland	2005	2007	2010	2013	2016
Livestock index	1.47	1.43	1.16	1.20	1.27
dairy cows (10^6 heads)	1.00	1.02	1.01	1.08	1.29
live bovines (10^6 heads)	6.39	6.25	5.92	6.31	6.61
live pigs (10^6 heads)	1.67	1.50	1.50	1.47	1.53
live poultry (10^6 heads)	NA	NA	10.93	12.82	11.05

Note:

Eurostat (FSS)

Ireland's livestock has remained stable since 2010 and it is higher than the EU average of 0.8.

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

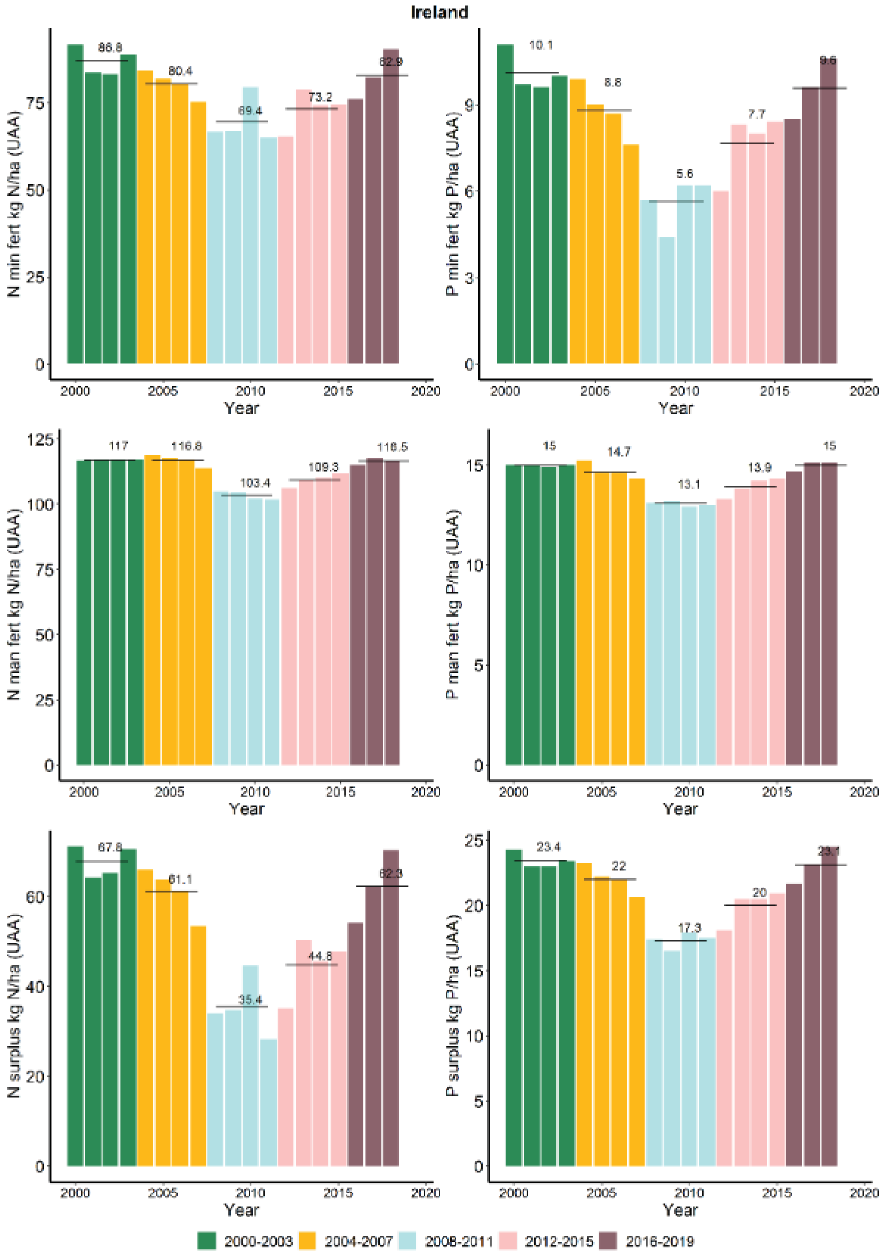


Figure 1. N and P fertilizers and gross surplus (kg/ha)

The N and P fertilizers and gross surpluses are originated from EUROSTAT data for the years 2000-2017. Data provided by Ireland have been used to complete the figure for the year 2018 because of correspondence, for the previous years, with Eurostat statistics.

The consumption of inorganic nitrogen and phosphorus has increased since the last reporting period. The usage of organic nitrogen and phosphorus fertilizer has also increased from the last reporting period. The nitrogen and phosphorus surplus increased from the last reporting period by 39% and 15% respectively. 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

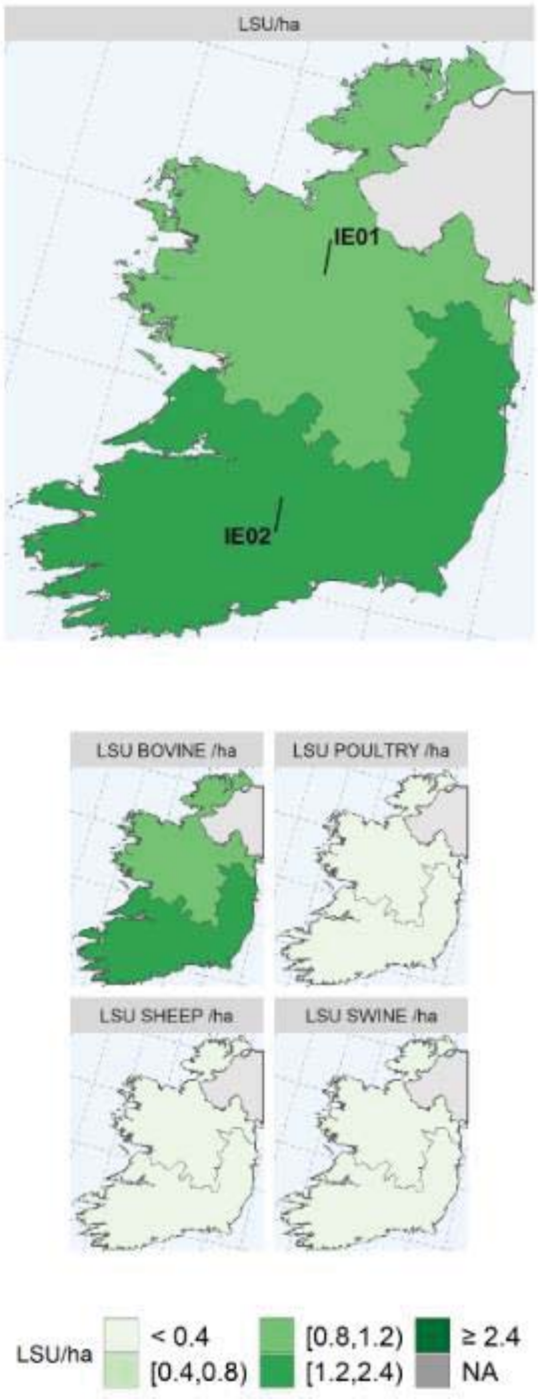


Figure 2. Map of livestock unit distribution, year 2016 (Source: Eurostat, February 2021)

Animal production is concentrated in the south part of Ireland. Animal production is dominated by bovine livestock type (total LSU and LSU by animal type were retrieved individually from EUROSTAT).
In this document, the NUTS-2013 version is used. (https://ec.europa.eu/eurostat/web/gisco/geodata/reference-data/administrative-units-statistical-units/nuts)

Water Quality Monitoring

The water quality monitoring is under the responsibility of the EPA. A total of 200 groundwater stations are included in this report, spanning the 2016-2019 reporting period, which are a subset of the overall WFD Groundwater Monitoring Programme. The surface water monitoring network has remained relatively stable with a few minor amendments to stations based on safety grounds and to make it more representative of Irish rivers and lakes. Monitoring data for the current reporting period were obtained for 122 WFD surveillance monitoring stations for transitional and coastal stations from the WFD National Monitoring Programme.

For groundwater 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	26	25	25	25	25	25
1a	Phreatic groundwater (deep) 5-15 m	7	7	7	7	7	7
1b	Phreatic groundwater (deep) 15-30 m	12	11	11	12	11	11
1c	Phreatic groundwater (deep) >30 m	71	70	69	68	70	69
2	Captive groundwater	0	0	0	0	0	0
3	Karstic groundwater	95	92	88	92	92	88
9	Not specified	0	0	0	0	0	0
	Total	**211**	**205**	**200**	**204**	**205**	**200**

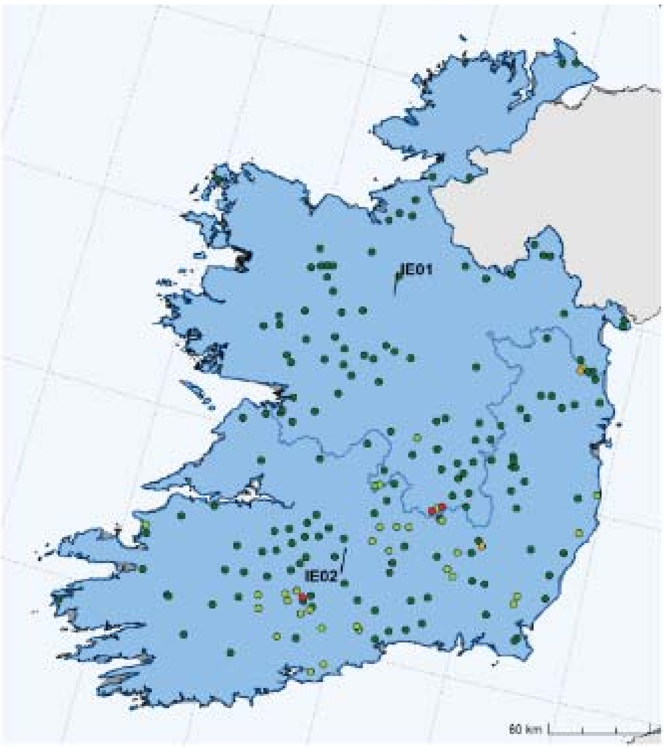
Surface water quality monitoring network

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	178	180	180	148	176	180	178	179	178
5	Lake/reservoir water	74	74	74	61	74	74	74	74	74
6	Transitional water	99	89	95	98	76	83	0	20	18
7	Coastal water	25	28	27	25	23	25	0	5	7
8	Marine water	0	0	0	0	0	0	0	0	0
9	Not specified	0	0	0	0	0	0	0	0	0
	Total	**376**	**371**	**376**	**332**	**349**	**362**	**252**	**278**	**277**

Groundwater Quality

Groundwater average annual nitrate concentration



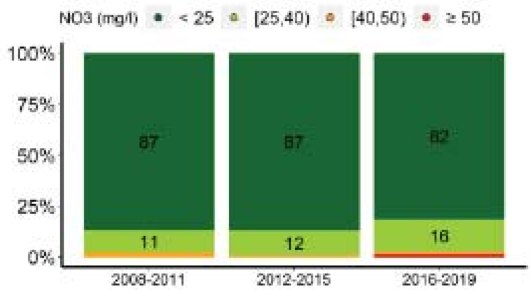


Figure 3. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information.

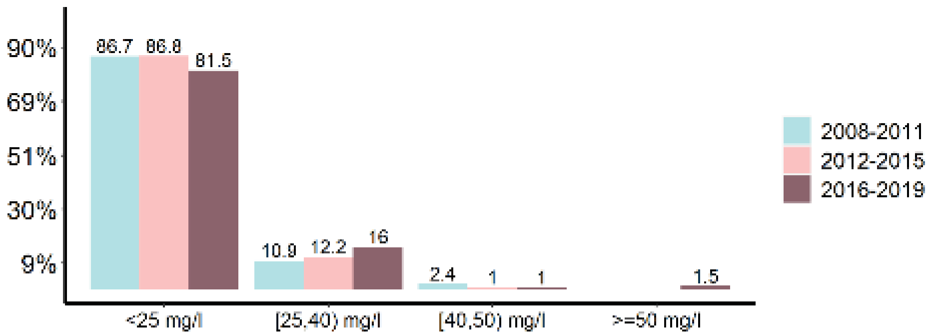


Figure 4. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis)

Groundwater average annual nitrate concentration trend

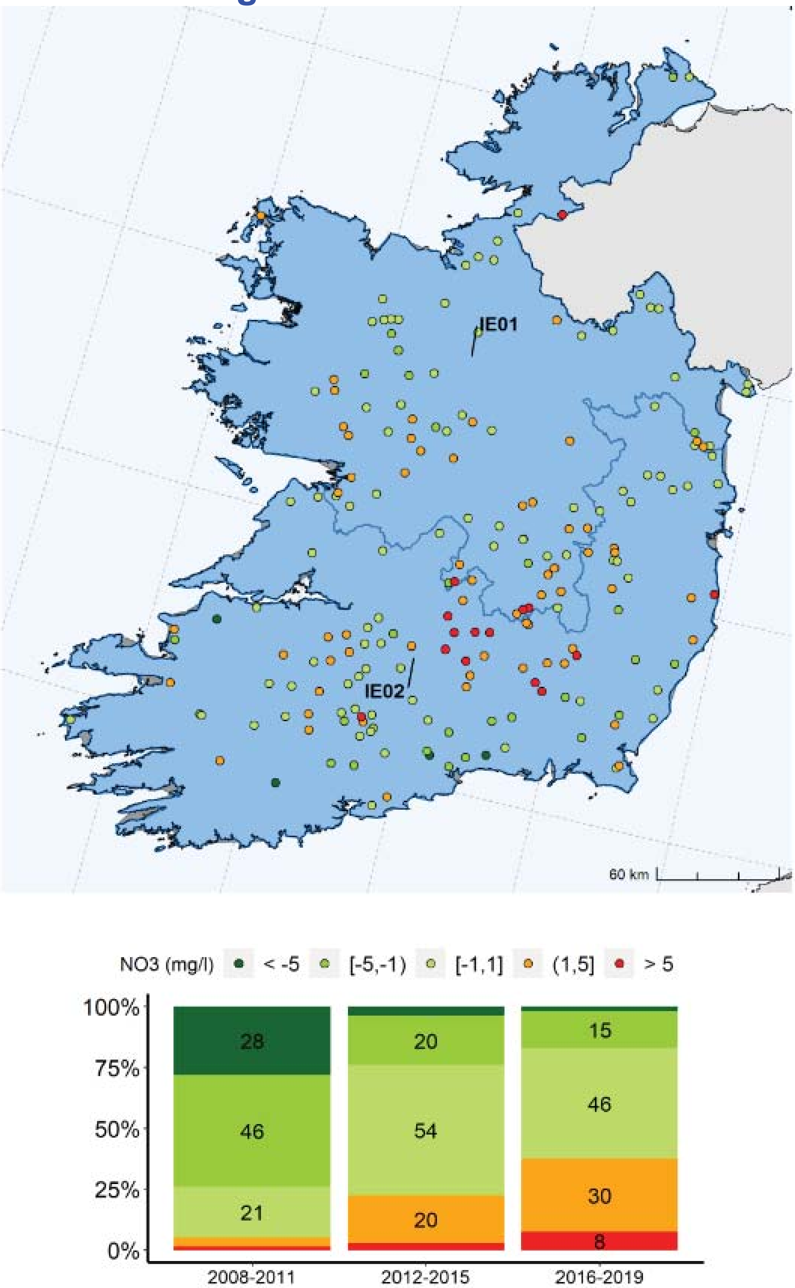


Figure 5. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information.

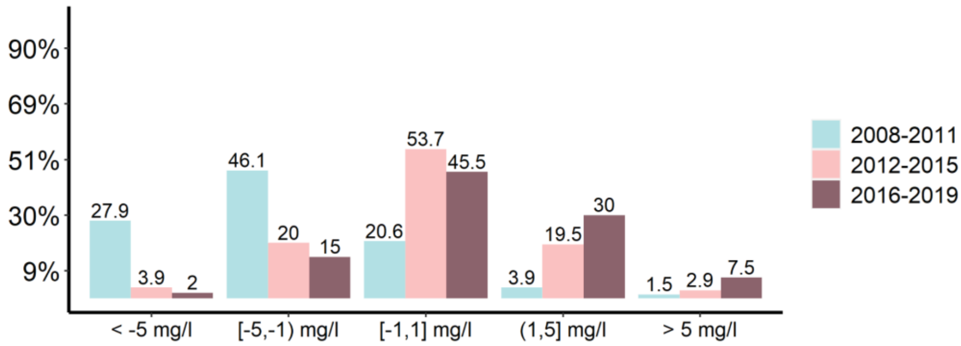
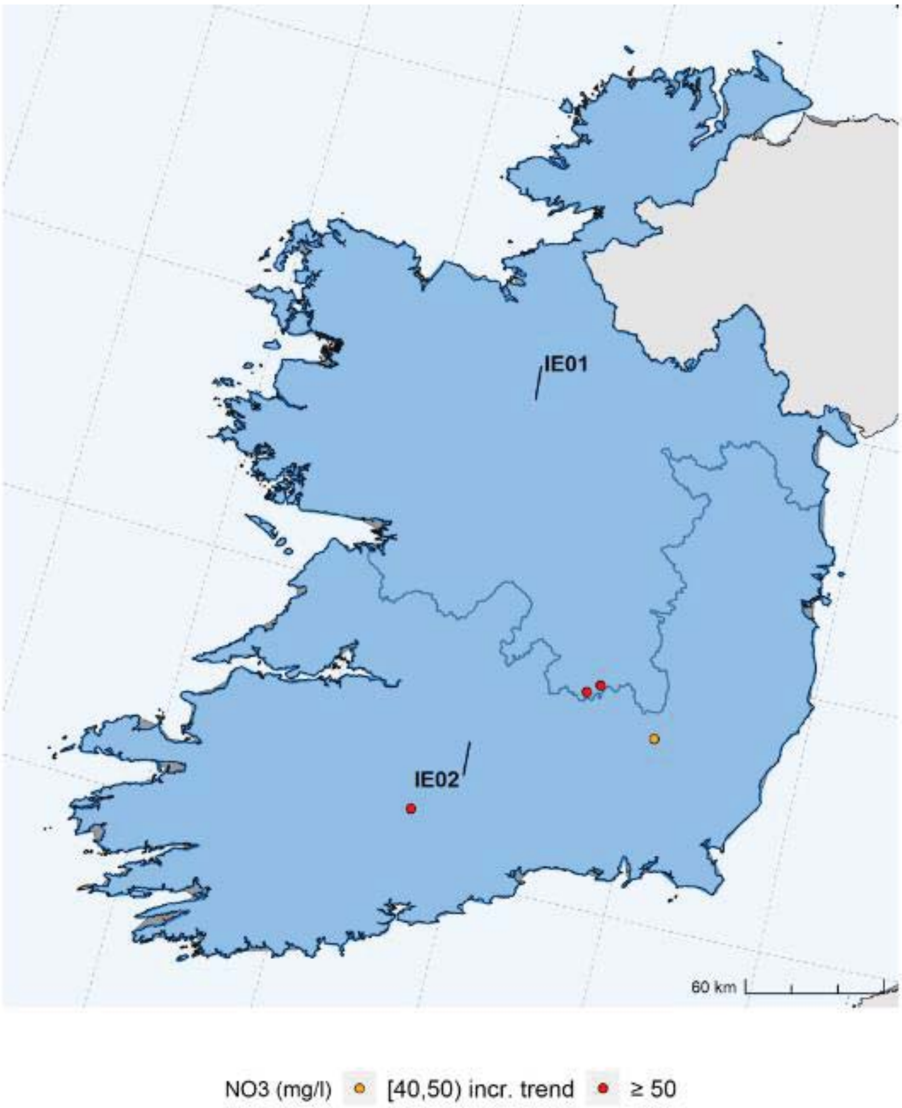


Figure 6. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis)

Groundwater hotspot

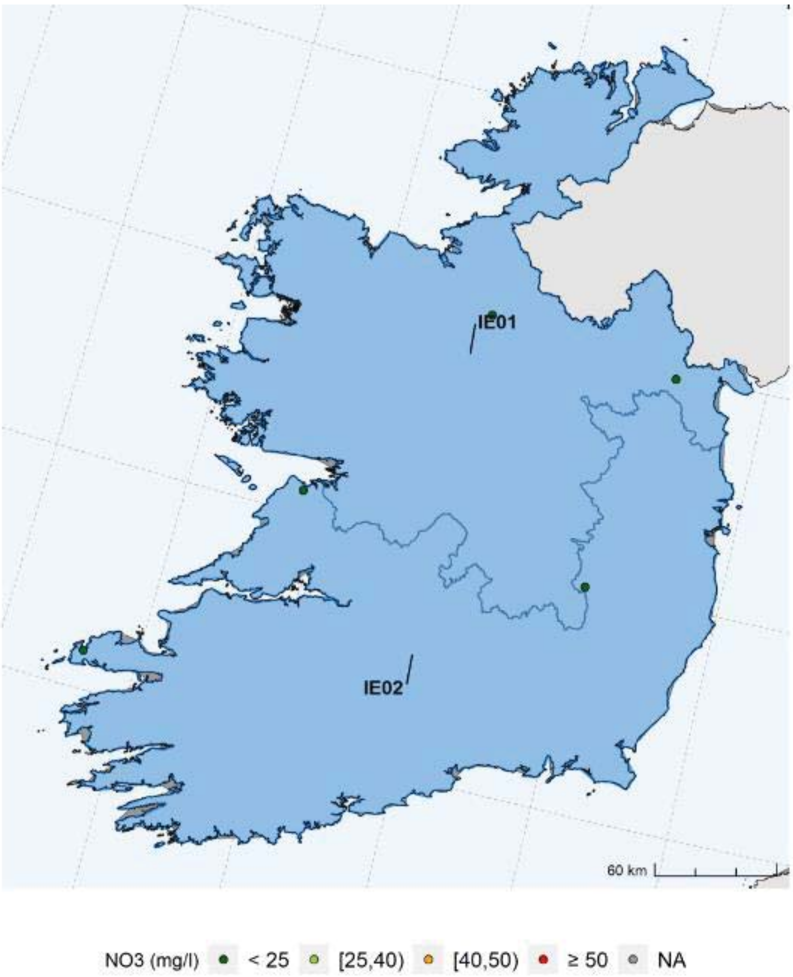


NUTS ID	NUTS NAME	>=40 and < 50 mg/l incr.trend	>=50 mg/l
IE01	Border, Midland and Western	0	2
IE02	Southern and Eastern	1	1
	Total	**1**	**3**

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

The hotspot analysis identifies all the GW monitoring stations that have NO3 concentration in the range of 40-50 mg/l with increasing trends 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



Station Type	Description	Number of removed stations		
		total removed	with measurements	with trends
0	Phreatic groundwater (shallow): 0-5 m	0	0	0
1a	Phreatic groundwater (deep) 5-15 m	0	0	0
1b	Phreatic groundwater (deep) 15-30 m	0	0	0
1c	Phreatic groundwater (deep) >30 m	1	1	1
2	Captive groundwater	0	0	0
3	Karstic groundwater	4	4	4
9	Not specified	0	0	0
	Total	**5**	**5**	**5**

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

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

Surface Water Quality

Surface water average annual nitrate concentration

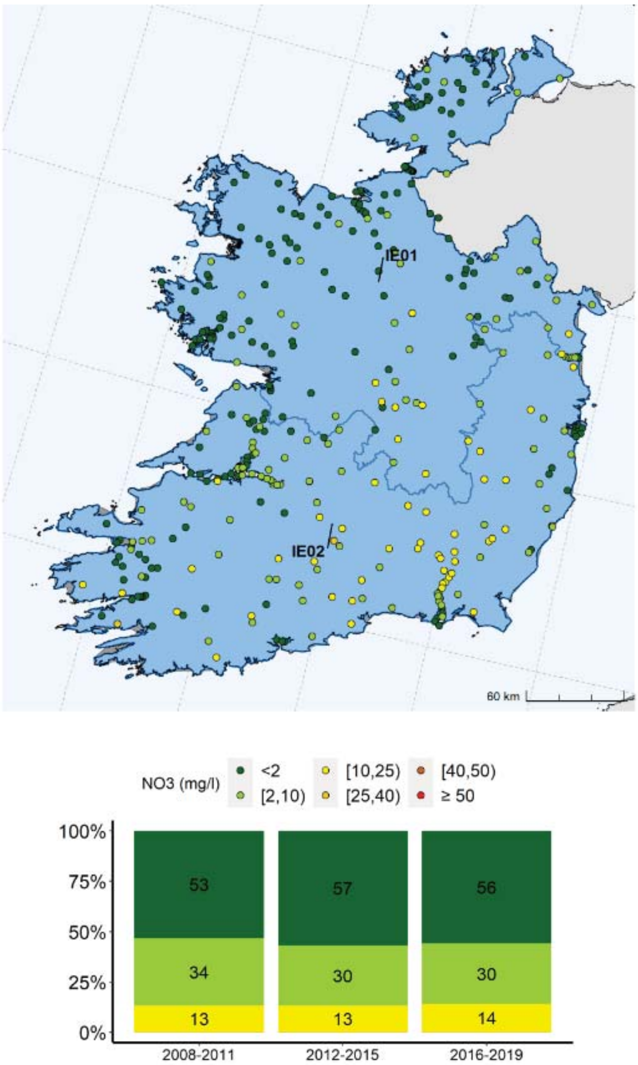


Figure 9. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information.

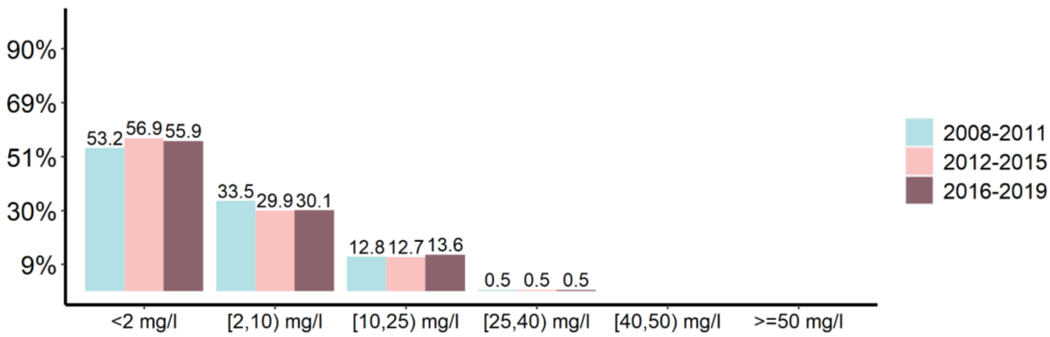


Figure 10. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis)

Surface water average annual nitrate concentration trend

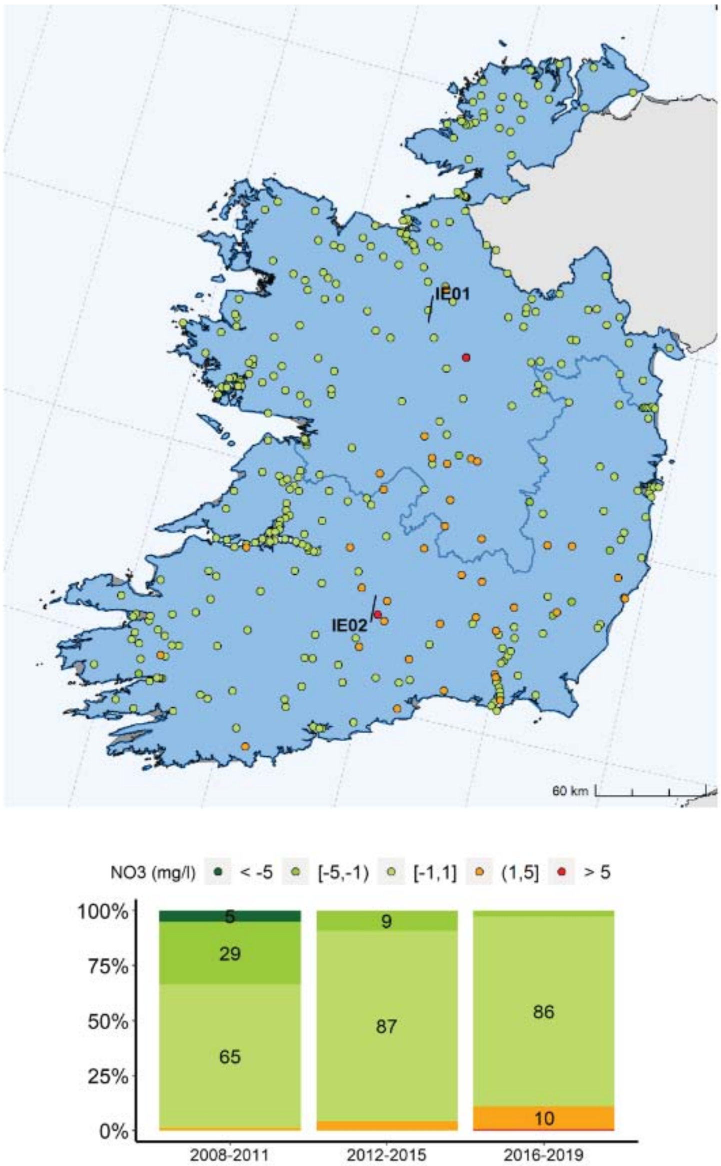


Figure 11. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information.

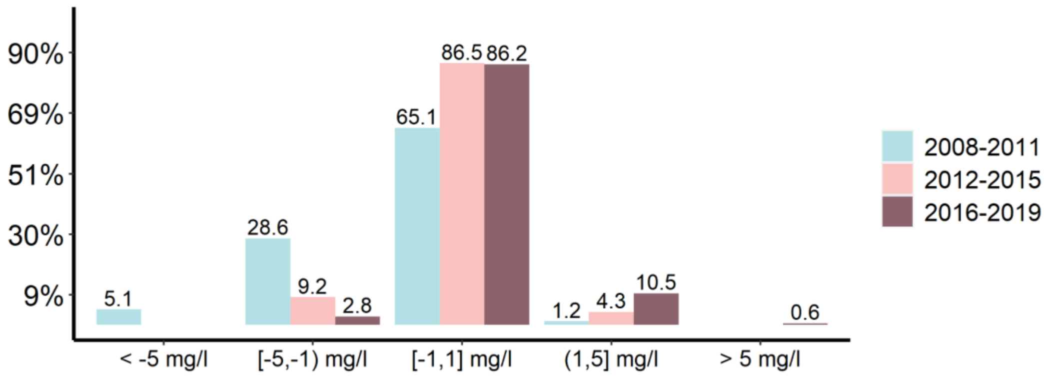


Figure 12. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis)

Surface Water Eutrophication

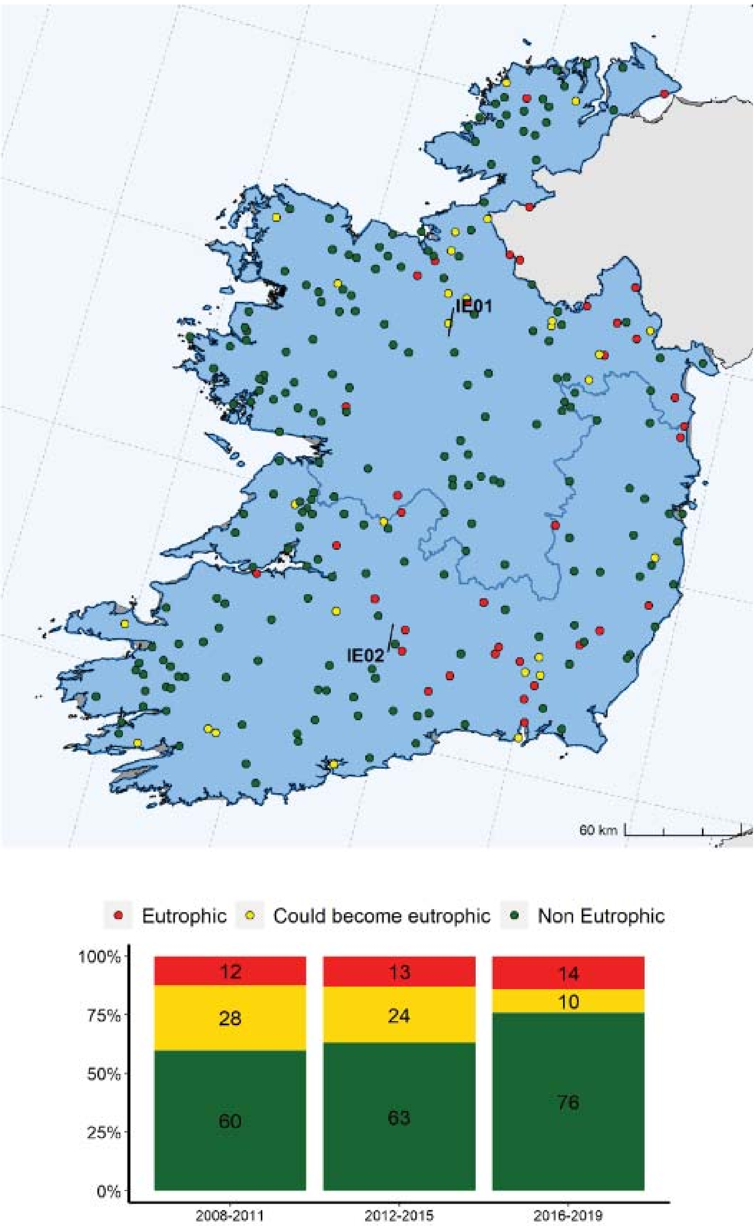


Figure 13. Spatial distribution of eutrophic status (map) and corresponding percentage of monitoring points per classes of status by reporting period (x axis).

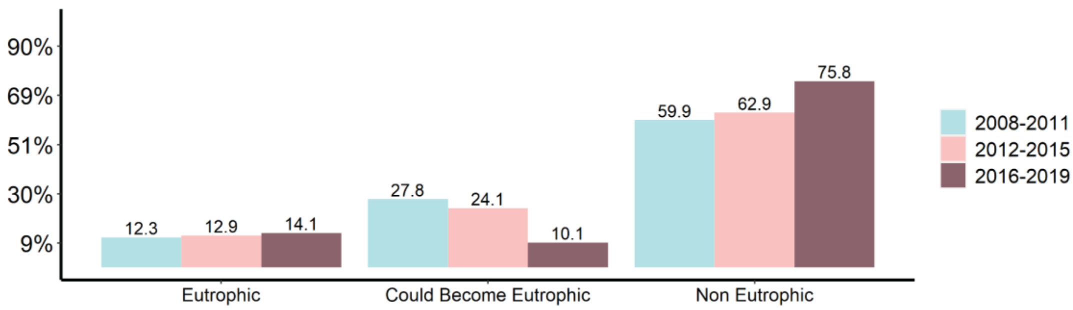
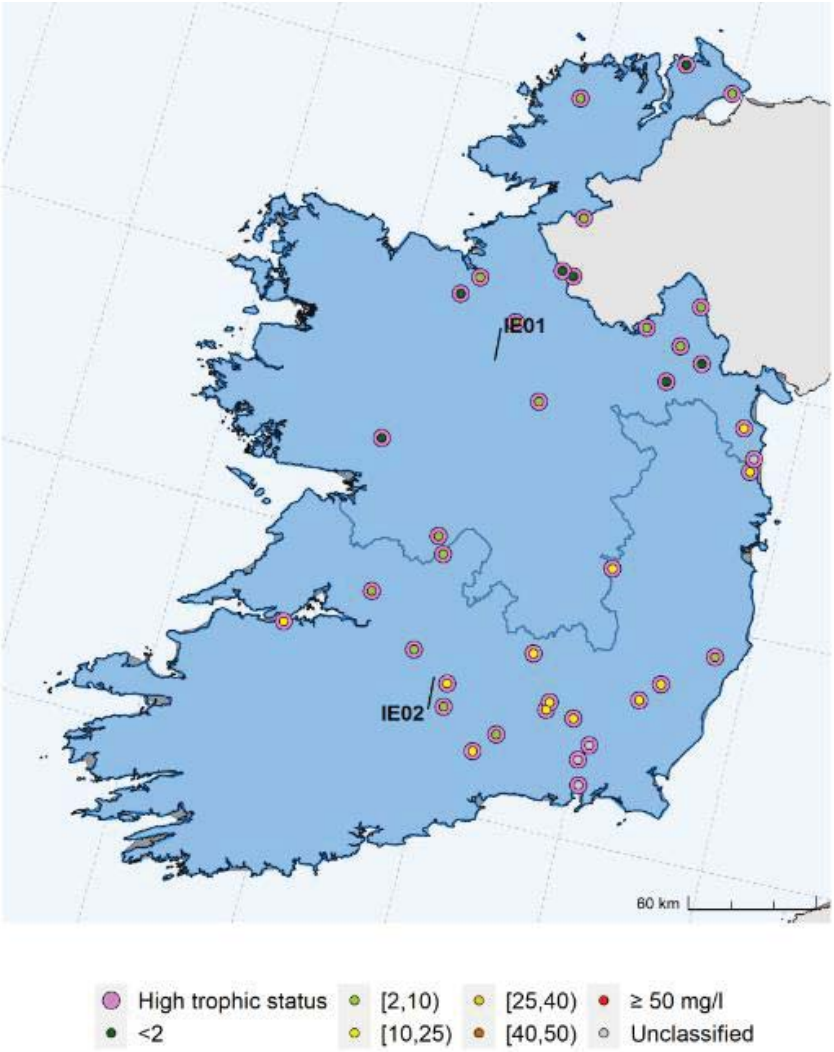


Figure 14. Comparison of percentage of monitoring points in the three reporting periods by classes of status (x axis)

The Eutrophic status vs average NO3 annual concentration



NUTS ID	NUTS NAME	High trophic status	Number of stations by classes of concentration						
			<2 mg/l	[2,10) mg/l	[10,25) mg/l	[25,40) mg/l	[40,50) mg/l	>=50 mg/l	Unclassified
IE01	Border, Midland and Western	18	7	10	1	0	0	0	0
IE02	Southern and Eastern	17	0	6	11	0	0	0	0
NO_NUTS	SALINE	4	0	0	0	0	0	0	4
	Total	**39**	**7**	**16**	**12**	**0**	**0**	**0**	**4**

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

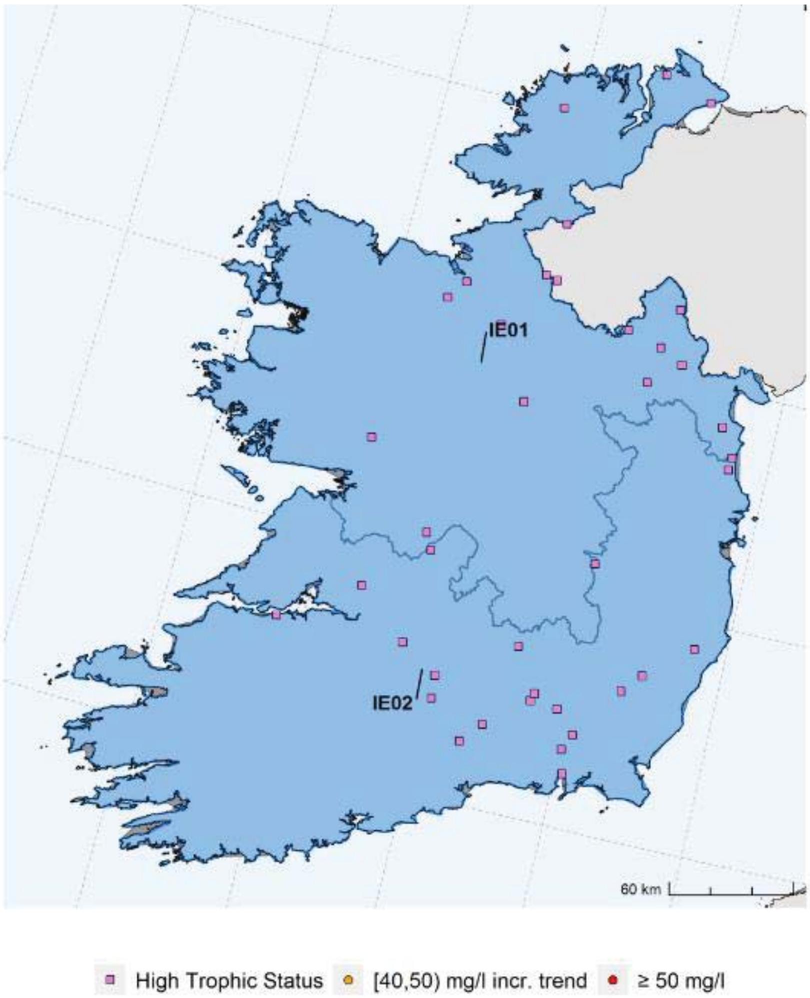
The analysis shows all the SW monitoring stations with the higher trophic status and the corresponding value of NO3 concentration. The map shows the spatial distribution of these points, and the table reports the number of stations with measurements with highest trophic status and the corresponding stations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

The assessment of trophic condition in Irish rivers is based on biological assessments using a biotic index scheme using aquatic macroinvertebrate communities. The EPA Quality Rating System (Q-Value) enables an assessment of the biological response to eutrophication and organic pollution in a predictable manner. The method has been inter-calibrated for the pressure 'organic enrichment' at an EU level under the WFD. In accordance with the Nitrates Directive Article 10 assessment and reporting guidelines, the five classes historically used to indicate trophic condition have been modified to the three classes; "Non-eutrophic"; "Could become eutrophic"; and "Eutrophic".
29 stations on rivers resulted in eutrophic status as well as 6 SW stations on lakes. 4 transitional costal stations in south eastern seaboard resulted also eutrophic.

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	29	5	144
5	Lake/reservoir water	6	19	49
6	Transitional water	4	2	12
7	Coastal water	0	2	5
8	Marine water	0	0	0
9	Not specified	0	0	0
	Total	**39**	**28**	**210**

Surface Water quality hotspot

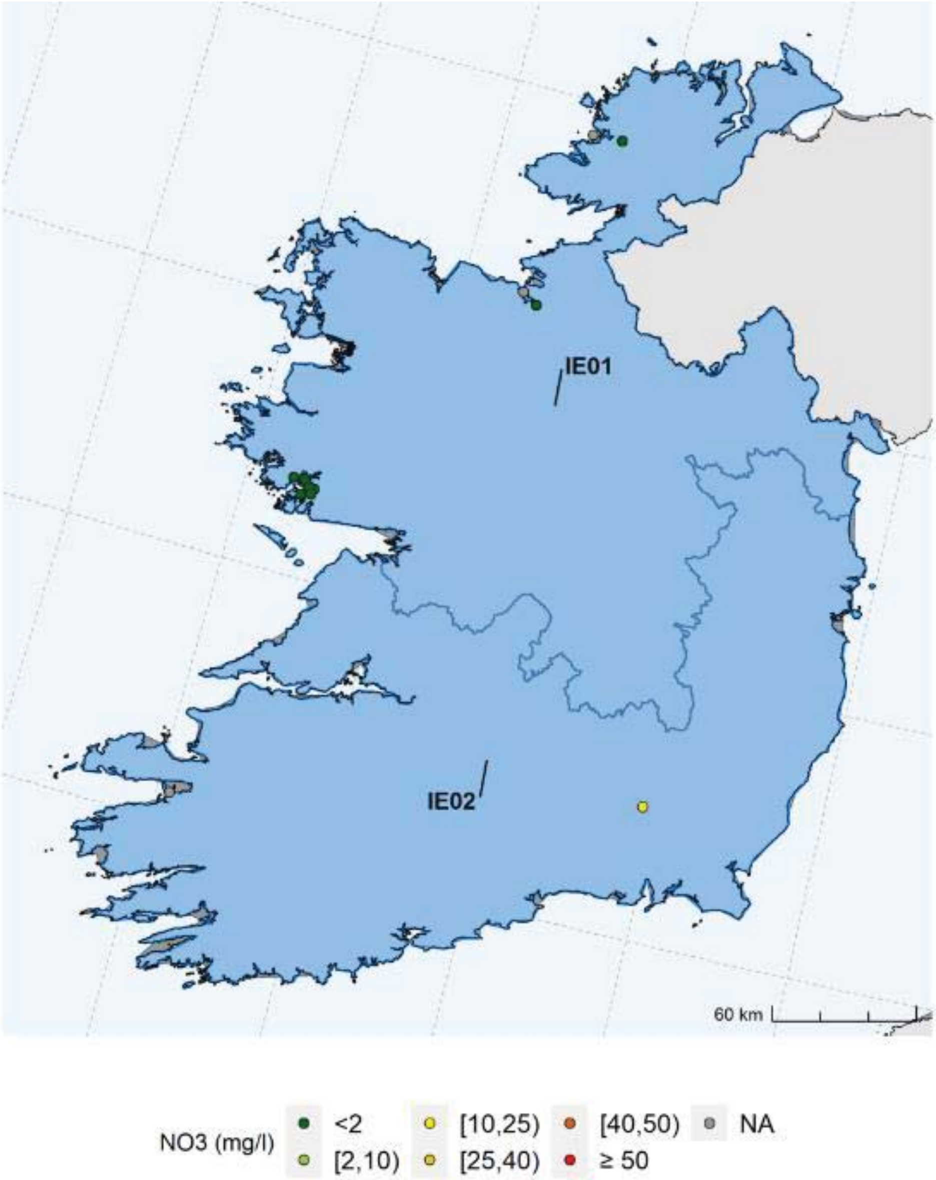


NUTS ID	NUTS NAME	High trophic status	>=40 and < 50 mg/l incr.trend	>=50 mg/l
IE01	Border, Midland and Western	18	0	0
IE02	Southern and Eastern	17	0	0
NO_NUTS	SALINE	4	0	0
	Total	**39**	**0**	**0**

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

The hotspot analysis identifies all the SW monitoring stations that have high eutrophic status, NO3 concentration in the range of 40-50 mg/l with increasing trends and above 50 mg/l are not present. The map shows the spatial distribution of these points, and the table reports the number of stations by NUTS inside and outside NVZ. Only the NUTS of interest are reported.

Surface Water Stations Removed



Station Type	Description	Number of removed stations: total removed	with measurements	with trends	with trophic status
4	River water	0	0	0	0
5	Lake/reservoir water	0	0	0	0
6	Transitional water	8	6	5	1
7	Coastal water	4	3	3	1
8	Marine water	0	0	0	0
9	Not specified	0	0	0	0
	Total	**12**	**9**	**8**	**2**

Figure 17. SW removed stations map (top graph) and distribution by NUTS2 (lower graph).

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

Measures in the Action Programme

The Code of Good Agricultural Practice was developed in 1996. In 2003, Ireland adopted a whole territory approach in the context of the Nitrates Directive. A National Action Programme (NAP) was finalised in 2005. Elements of this first NAP were given statutory effect by the European Communities (Good Agricultural Practice for Protection of Waters) Regulations 2006. The NAP was revised starting in 2010 at least every four years. The last revision of the NAP was carried out in 2018 and further amendments were published in 2020. Several measures introduced in the last NAP are to be implemented on a phased basis to allow time to make necessary changes on the holdings. Consequently, they fall outside of the 2016-2019 reporting period but are included for reference and consideration. In the following table the details of AP are reported.

In addition, Ireland monitors the implementation of the Nitrates Regulations in part through the Agricultural Catchments Programme (ACP) tasked with monitoring the effectiveness of Ireland's measures since 2008.

No representative national data is currently available on the cost-effectiveness of practices beyond the minima of the code of practice.

Table 6. Details of Action Programme

Measure	General details in Action Programme
Period of prohibition of fertiliser application	• Period of prohibition are zone-specific and are listed in section 5.2.1, paragraph 1, of the MS report
Restrictions for application on sloped soils	• Organic fertilisers cannot be applied when the ground slopes steeply and, taking into account factors such as proximity to waters, soil condition, ground cover and rainfall, there is significant risk of causing water pollution (section 5.2.1, paragraph 6, ot the MS report)
Restrictions for application on soaked, frozen, or snow-covered soils	• Provisions on application of fertilisers on water-saturated, flooded, frozen and snow-covered ground are listed in section 5.2.1, paragraph 4, of the MS report
Restrictions for application near watercourses (buffer strips)	• Chemical fertiliser must not be applied to land within 2 metres of a surface watercourse. • Details listed in section 5.2.1, paragraph 7, of the MS report
Effluent storage works	• Storage facilities characteristics are listed in section 5.2.1, paragraph 2, of the MS report
Capacity of manure storage	• See paragraph 2 of section 5.2.1, MS report
Rational fertilisation (e.g., splitting fertilisation, limitations)	• See section 5.2.1, paragraphs 3 and 5, of the MS report • Soil tests are considered valid for a period of four years.
Crop rotation, permanent crop enhancement	• P build up annual maximum fertilization rates were included • Maximum fertilisation rates of available nitrogen and phosphorus for grassland, tillage, vegetable and fruit crops are set out in the Regulations
Vegetation cover in rainy periods, winter	• Winter coverage of soils conditions are listed in section 5.2.1, paragraph 9, of the MS report
Fertilisation plans, spreading records	• Soil tests are considered valid for a period of four years.
Other measures	• Provisions on procedure for land application of fertilizers, both chemical and livestock manure: section 5.2.1, paragraph 8, of the MS report • Other preventive measures for all holdings are listed in section 5.2.1, paragraphs 10 and 11, of the MS report (e.g. The required use of low emission slurry spreading equipment has been phased in since 2019 for holdings in derogation, and 2021 for non-derogated holdings)
Dates for application limits 170 kg N/ha/year:	• In 2020 several AP measures were extended to include all farms stocked at or above 170 kg organic N per hectare (section 5.2.1, paragraph 11, of the MS repor)

Controls

As part of the controls under the Good Agricultural Practice Regulations, the Department of Agriculture, Food and the Marine (DAFM) carries out checks on the application rates of all herd owners with livestock on an annual basis. Herd owners in breach of the 170/250 kg per hectare limit incur penalties. The average number of penalties issued for the 2016-2018 period was 1,810 per annum. In 2018 and 2019 55% and 73% of the inspections were non-compliances due to insufficient storage for livestock manure.

Designation of NVZ

Ireland has adopted a whole territory approach in implementing the Nitrates Directive. This decision was given legal effect in 2003 by the European Communities (Protection of Waters against Pollution from Agricultural Sources) Regulations, 2003 (S.I. No. 213 of 2003). There has been no revision to this decision and the Action Programme is being applied across the whole national territory.

Forecast of Water Quality

Ireland provided a water quality analysis for understanding better the complexity of the factors affecting nutrient loss to water in the diverse agricultural landscape. There have been some encouraging signs with water quality improvement in 152 of 726 water bodies that were prioritised areas for action in the WFD River Basin Management Plan (RBMP) 2018-21 (EPA, 2020). This reflects the positive efforts of local authorities, other public bodies, local communities and landholders. However, it is explained that there is a good relationship between farming intensity and nitrate concentrations in waters, but there is water quality variability within and between sub-catchments. Detailed research work in the Agricultural Catchments Programme has highlighted that soils, weather and farming practices also have a significant influence on nitrate concentrations at the local scale. This has important implications for selecting the right measures in the right place, at the right times. In the context of the development of new CAP knowledge transfer mechanisms will be developed to link research and findings to the advisory and farming communities.

Summary

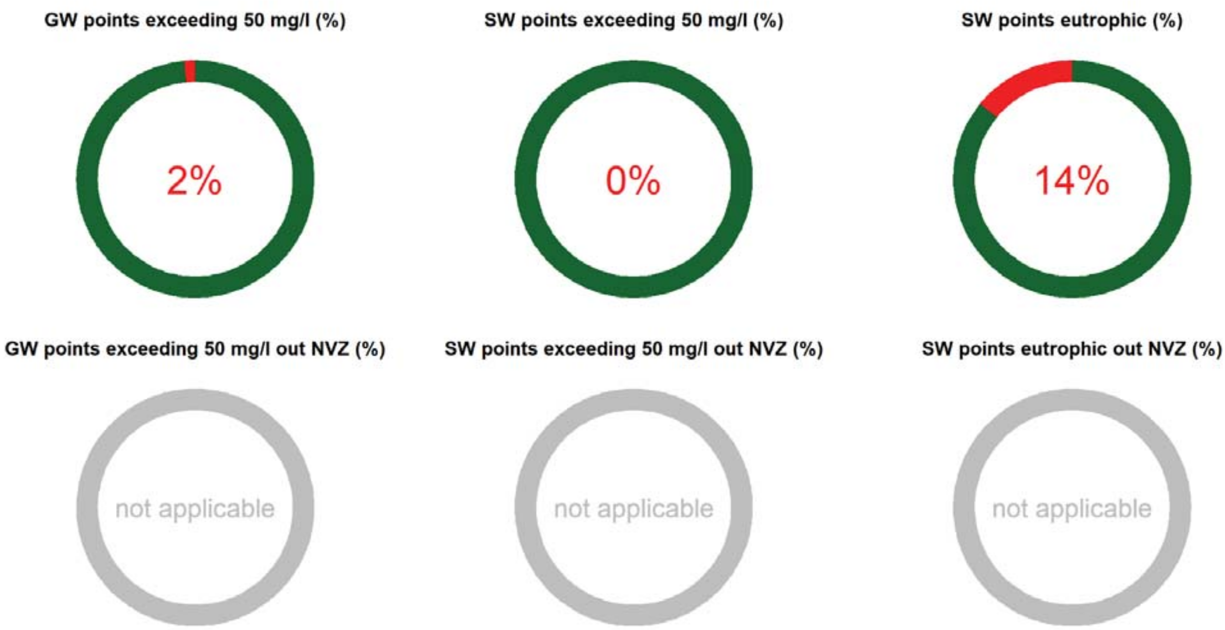


Figure 18. The summary plot for the period 2016-2019

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

Long term analysis

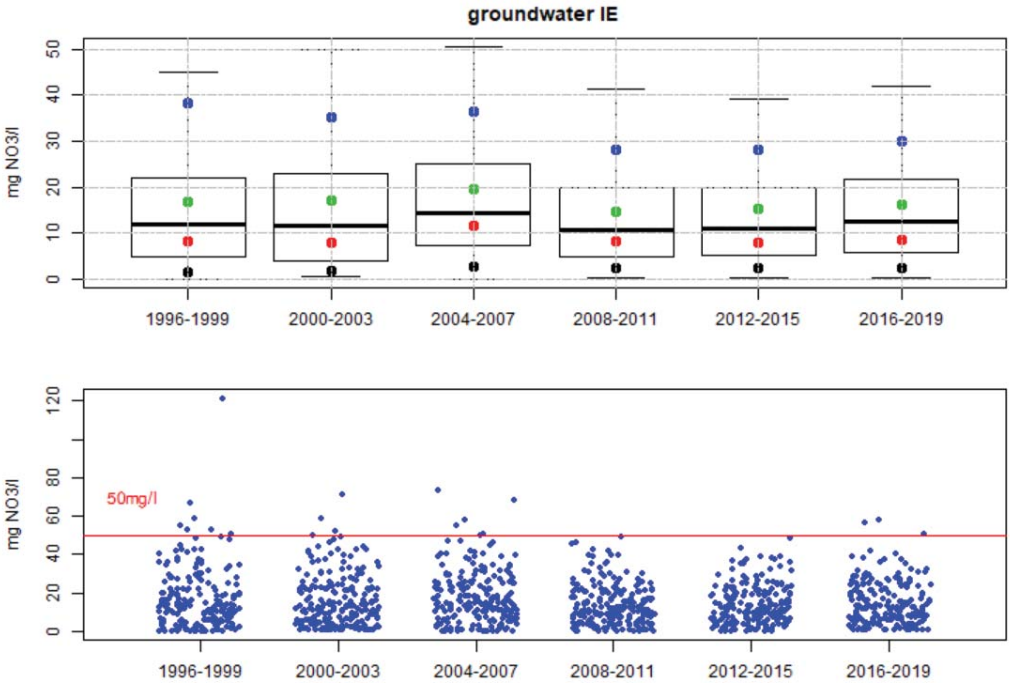


Figure 19. Time series of box whisker plots along with the distribution of the average NO3 annual concentrations for each reporting period, for groundwater stations. The blue, red, green and black dots represent the mean of the fourth third, second and first quartiles, respectively.

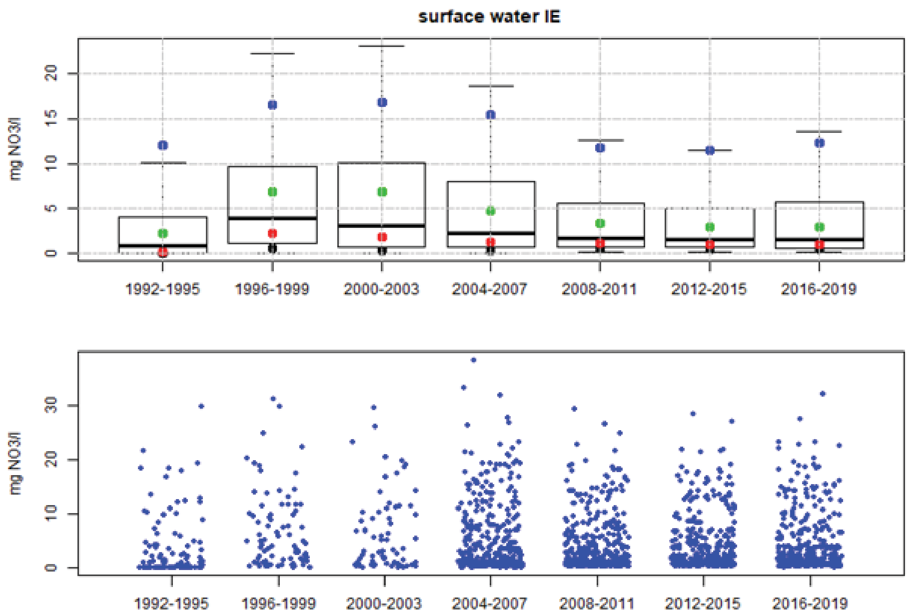


Figure 20. Time series of box whisker plots along with the distribution of the average NO3 annual concentrations for each reporting period, for surface water stations. The blue, red, green and black dots represent the mean of the fourth third, second and first quartiles, respectively.

Conclusions and recommendations

Livestock pressure in Irelands is above the EU average. The surplus of nitrogen is about the EU average, while the surplus of phosphorus is among the highest in the EU.

The network of monitoring stations is sufficiently elaborated. The groundwater quality is generally good, with a number of monitoring stations have an increasing trend. Surface waters also have a low nitrate concentrations and the number of waters that are eutrophic remains limited.

The last revision of the action programme dates from 2018.

The Commission encourages Ireland to review its action programme in relation to the high nutrients phosphorus surplus and to continue to follow-up hotspots area's that show increasing nitrate concentrations.

EUROPEAN
COMMISSION

Brussels, 11.10.2021
SWD(2021) 1001 final

PART 23/38

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}

EN EN

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)

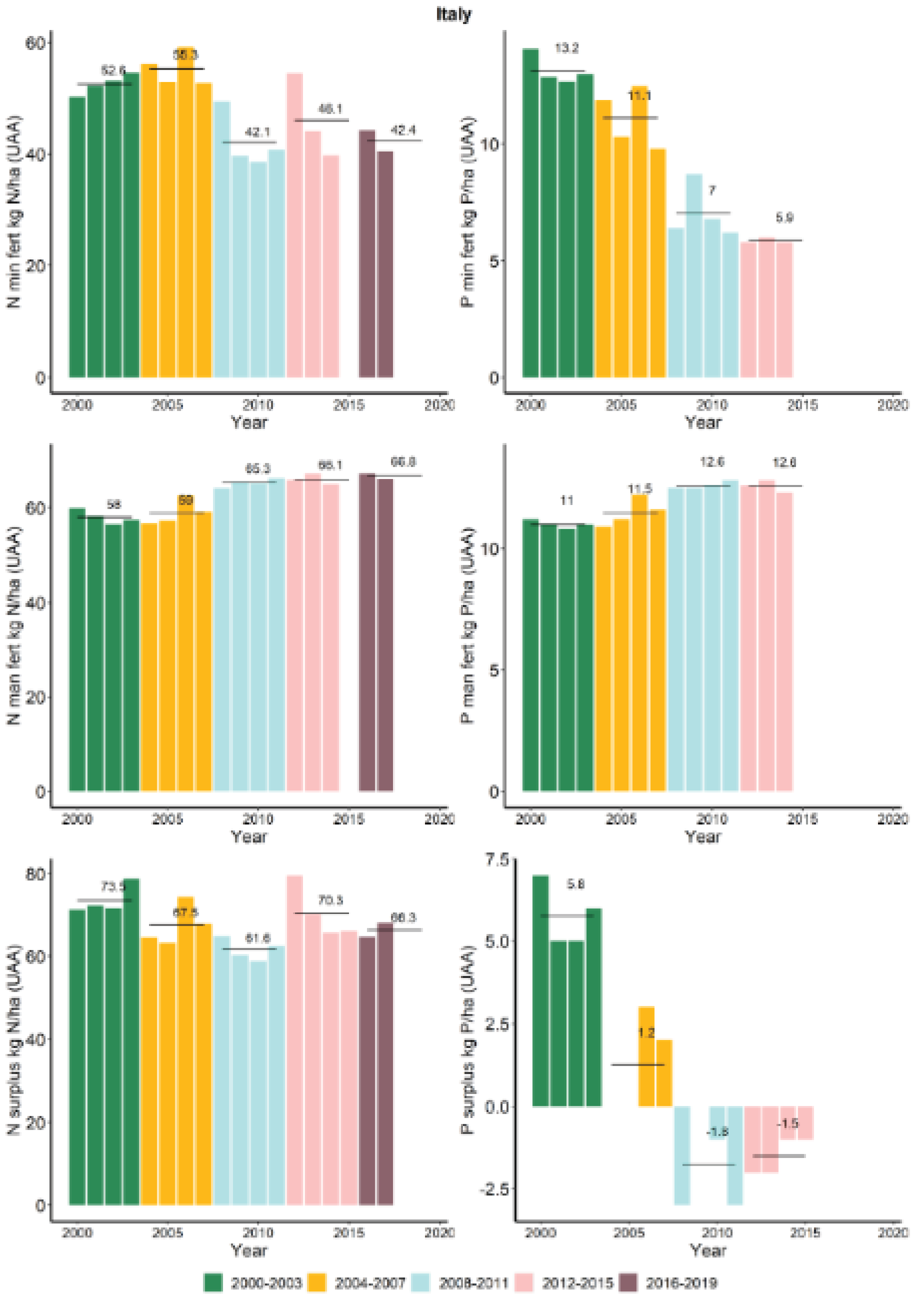


Figure 1. N and P fertilizers and gross surplus (kg/ha)

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

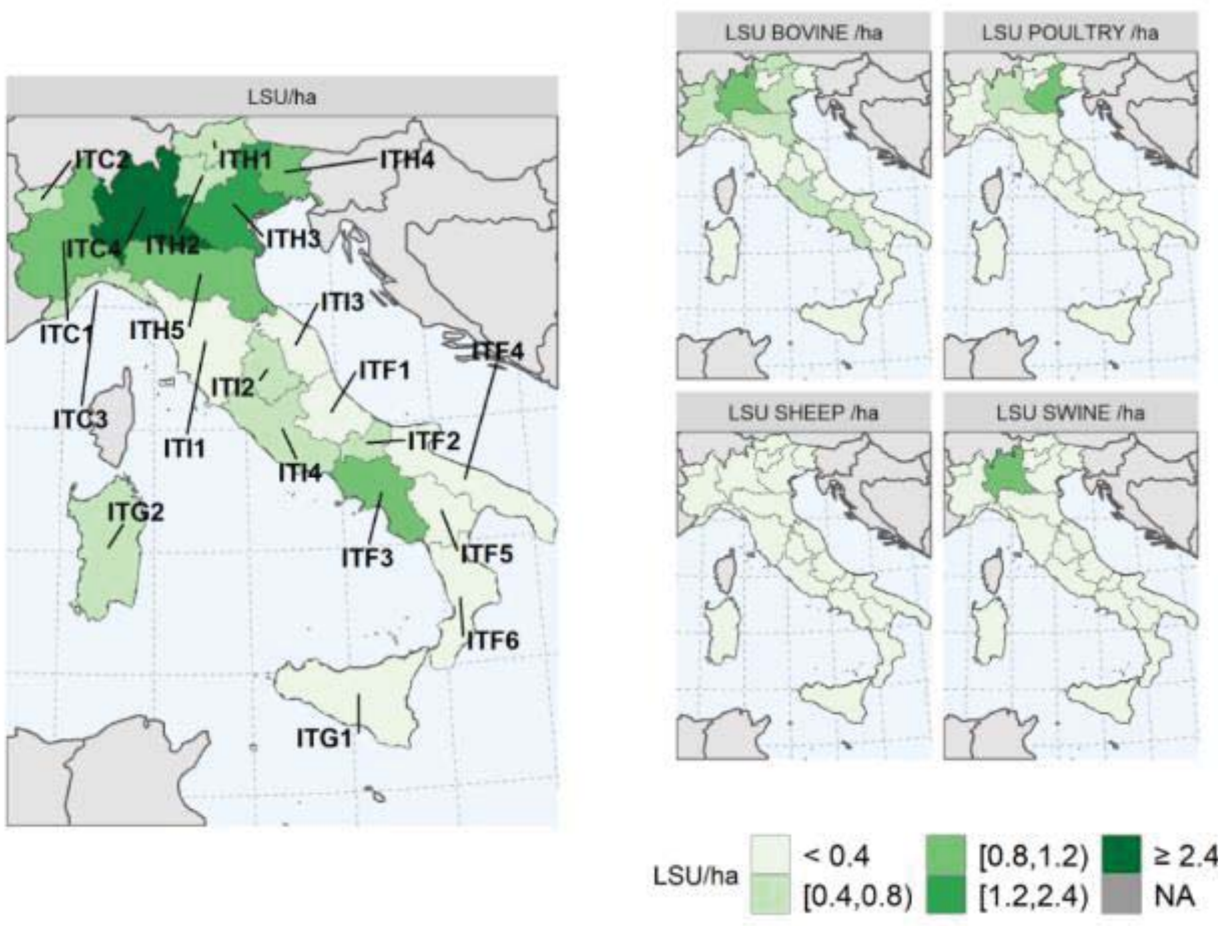


Figure 2. Map of livestock unit distribution, year 2016 (Source: Eurostat, February 2021)

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

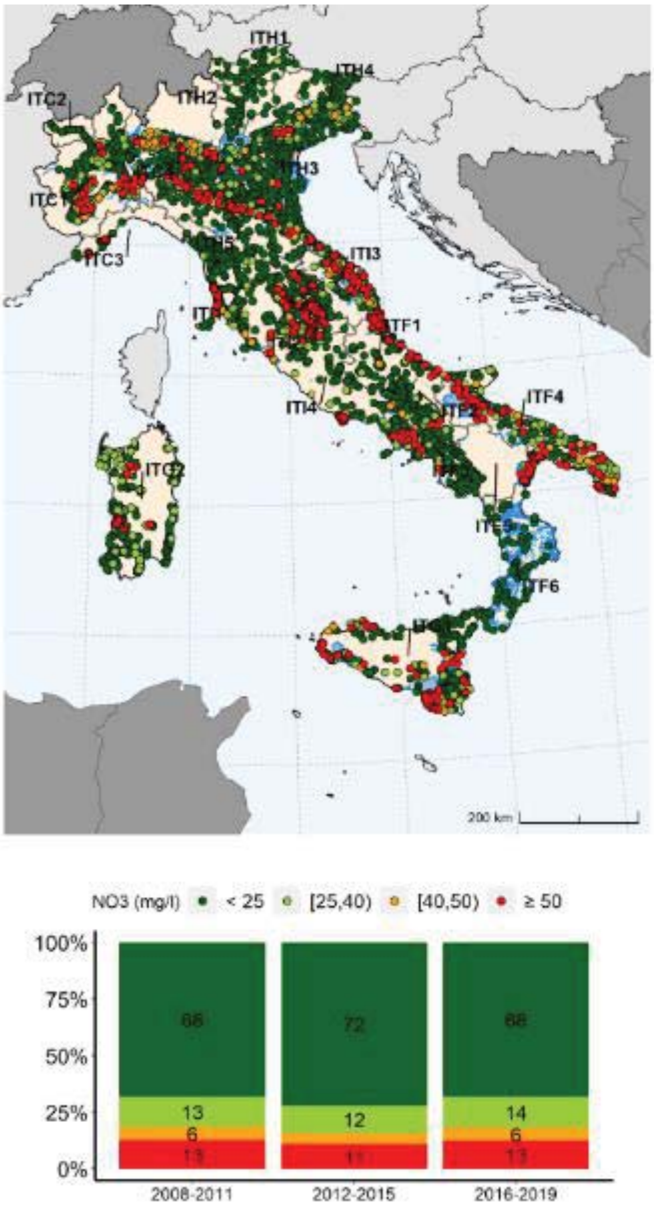


Figure 3. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information. In the map in blue the NVZ

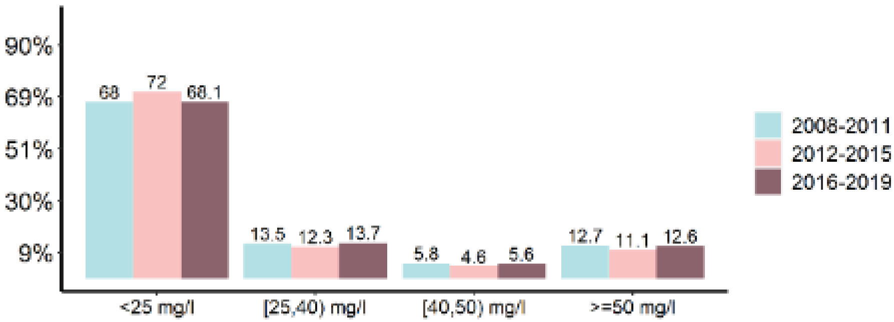


Figure 4. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis)

Groundwater average annual nitrate concentration trend

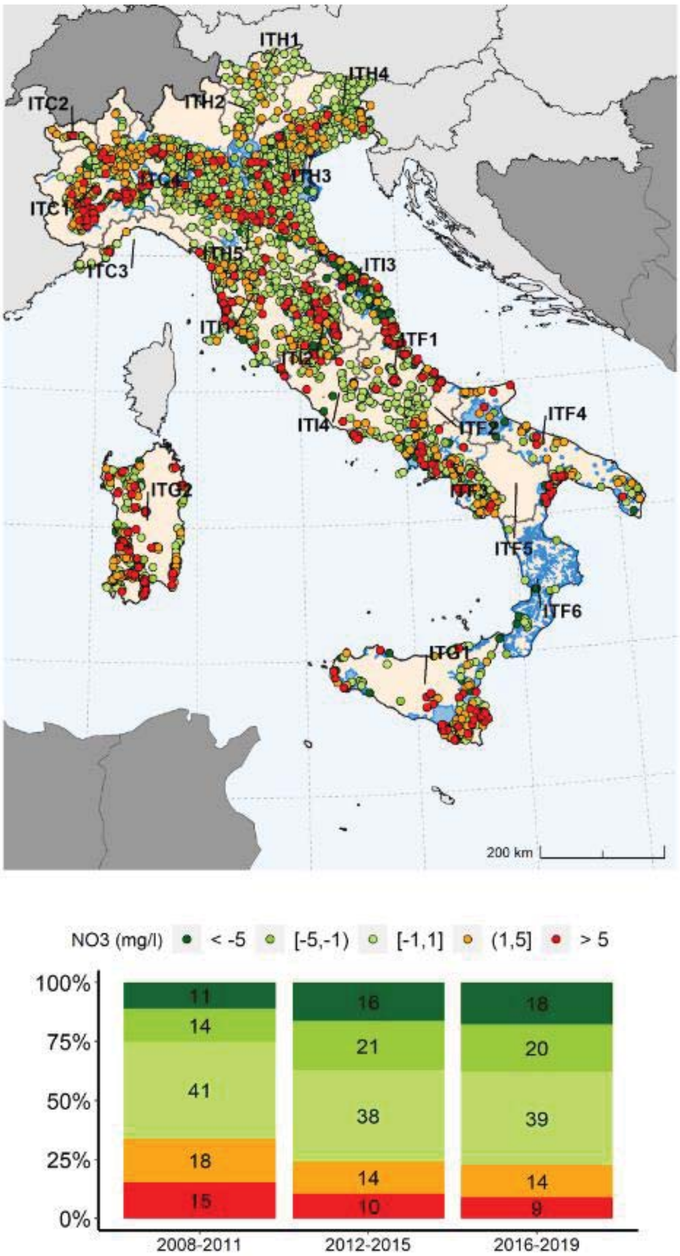


Figure 5. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis). In the map in blue the NVZ.

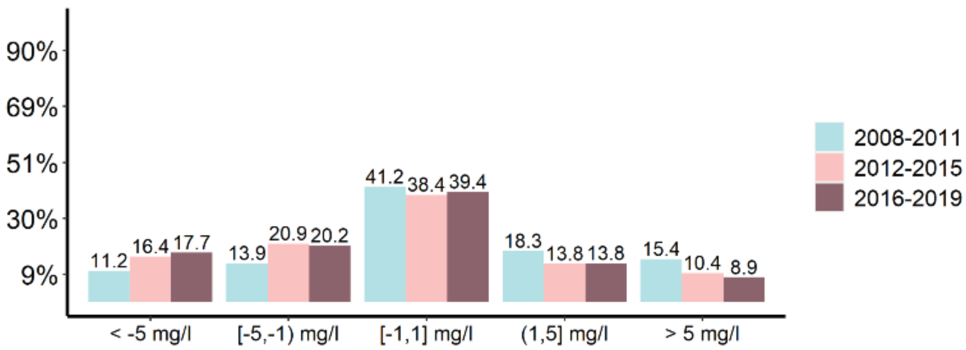
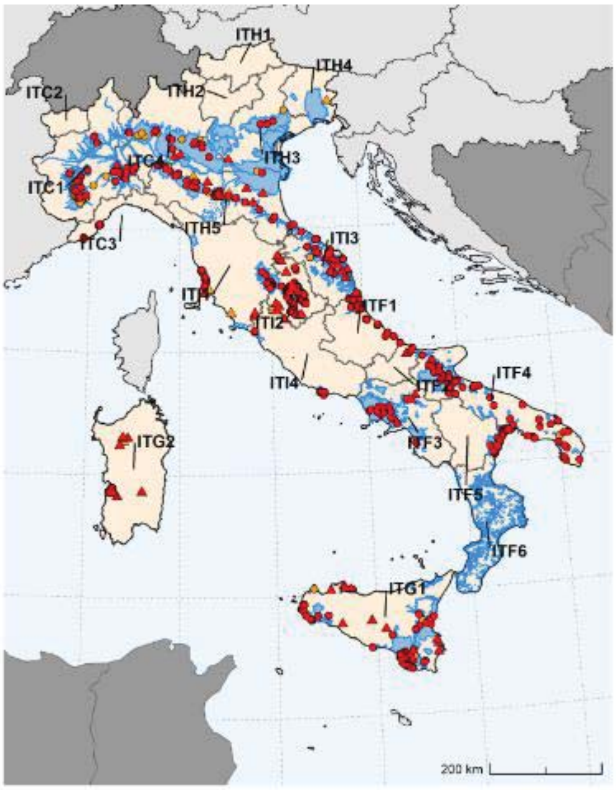


Figure 6. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis).

European Commission

Groundwater hotspot



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

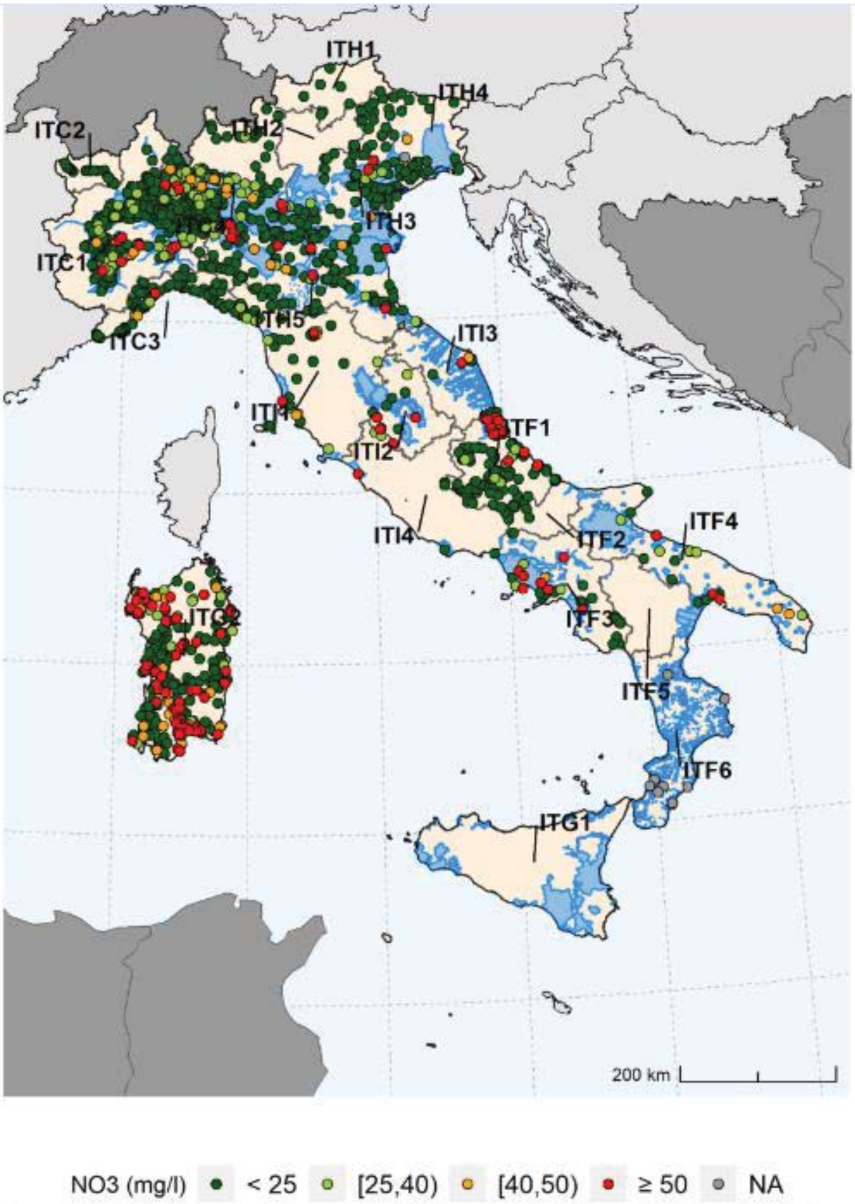
		>=40 and < 50 mg/l incr.trend		>=50 mg/l	
NUTS ID	NUTS NAME	InNVZ	OutNVZ	InNVZ	OutNVZ
ITC1	Piemonte	10	2	27	1
ITC3	Liguria	0	0	10	0
ITC4	Lombardia	7	0	14	2
ITF1	Abruzzo	3	0	37	0
ITF2	Molise	0	0	2	2
ITF3	Campania	1	0	14	3
ITF4	Puglia	1	0	65	0
ITF5	Basilicata	0	0	21	0
ITG1	Sicilia	6	1	57	14
ITG2	Sardegna	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



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

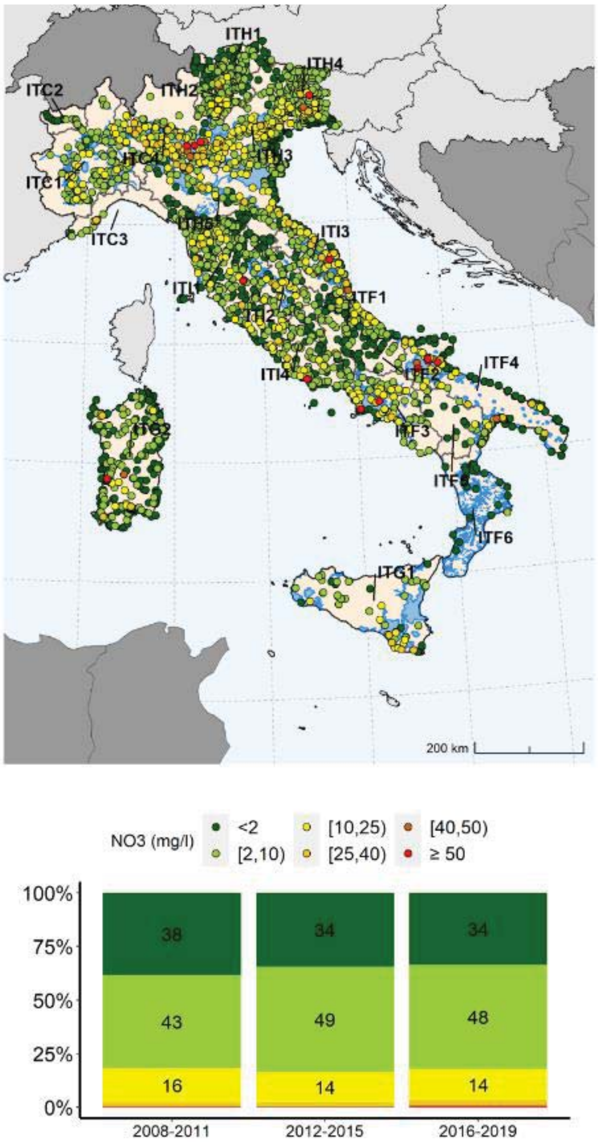


Figure 9. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information. In the map in blue the NVZ

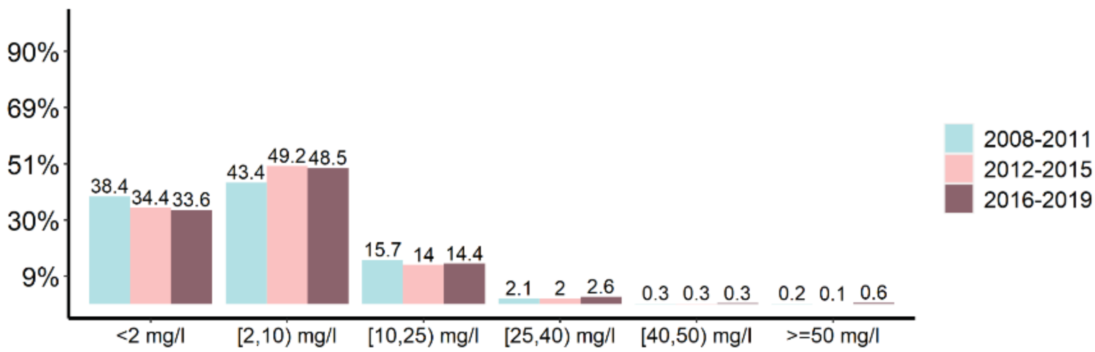


Figure 10. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis)

Surface water average annual nitrate concentration trend

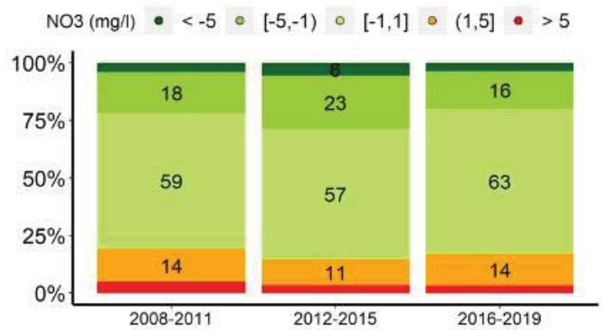


Figure 11. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information. In the map in blue the NVZ

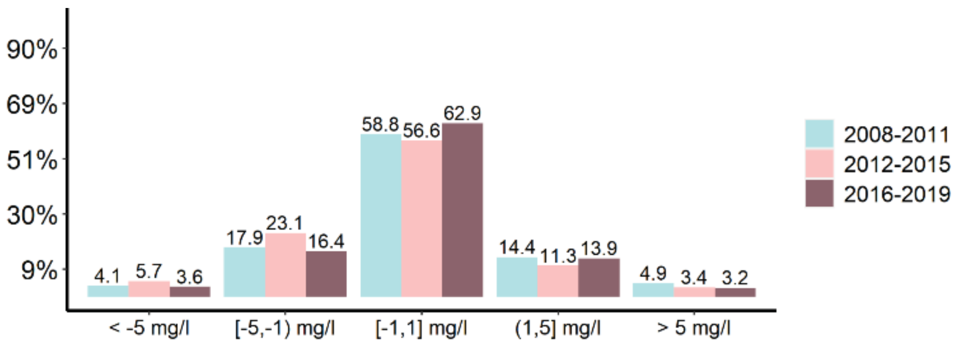


Figure 12. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis)

Surface Water Eutrophication

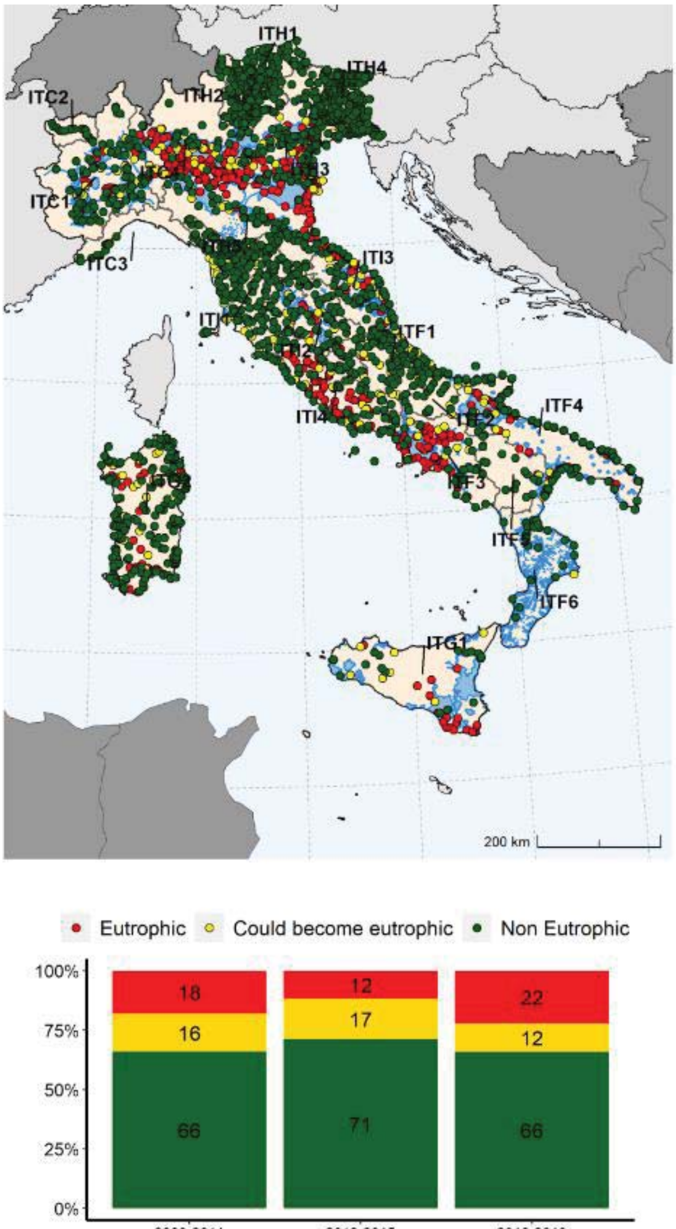


Figure 13. Spatial distribution of eutrophic status (map) and corresponding percentage of monitoring points per classes of status by reporting period (x axis). In the map in blue the NVZ

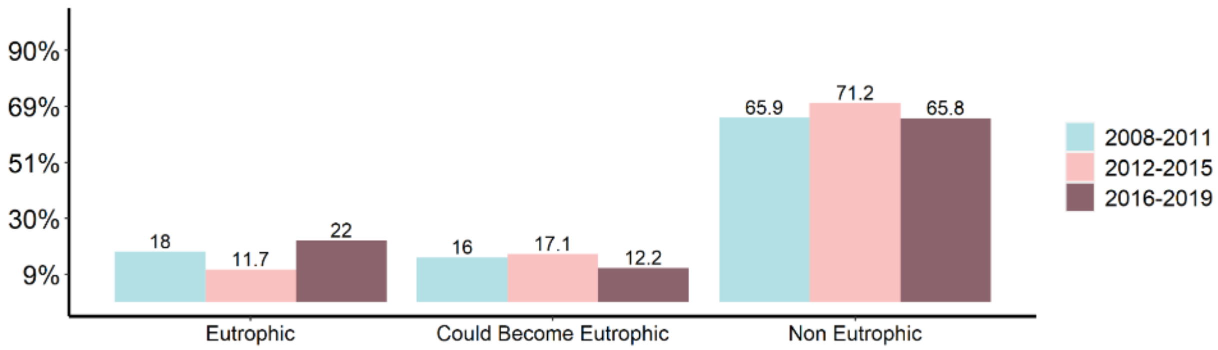
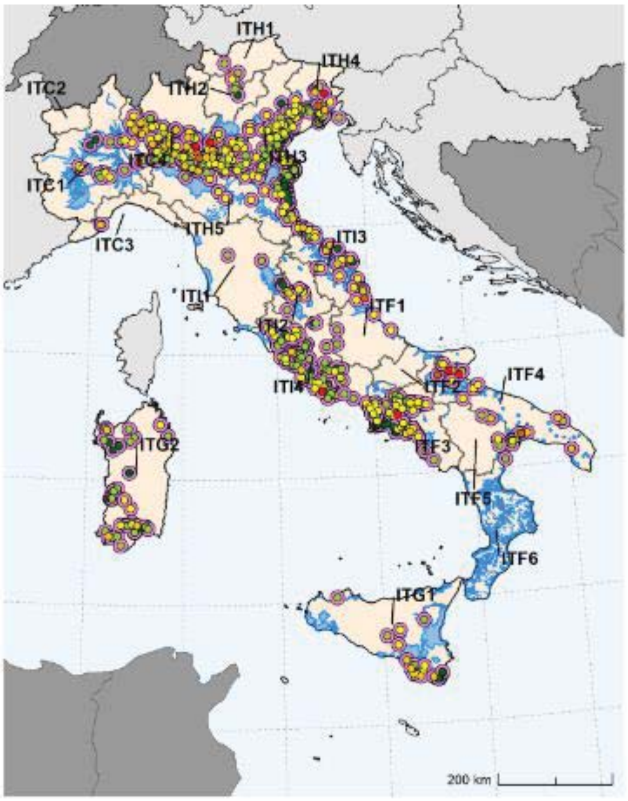


Figure 14. Comparison of percentage of monitoring points in the three reporting periods by classes of status (x axis)

The Eutrophic status vs average NO3 annual concentration



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)

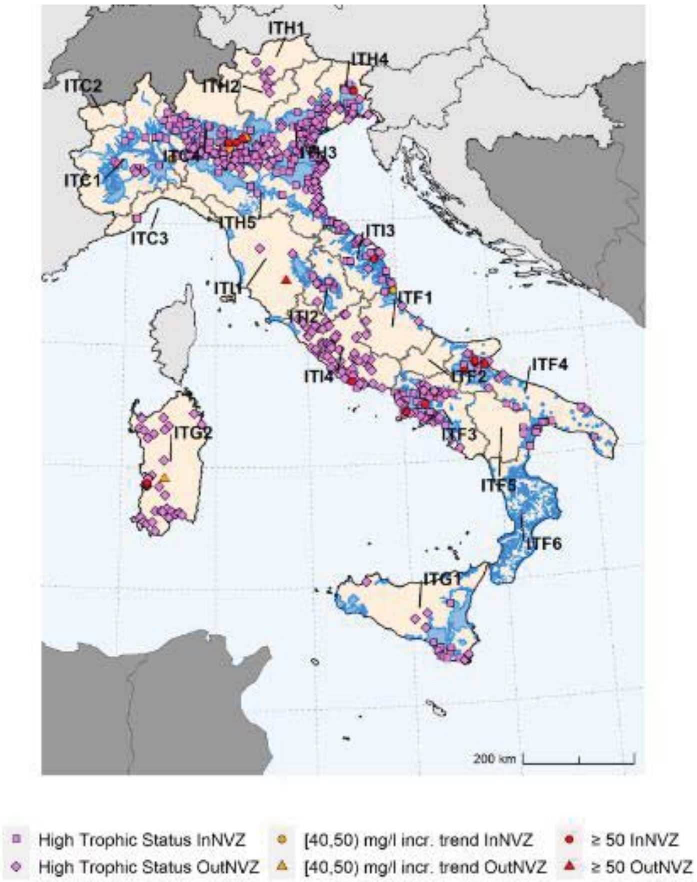
The methodology shall be carried out for the evaluation of the trophic State using the aquatic flora and physical-chemical quality elements to support biological elements.

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



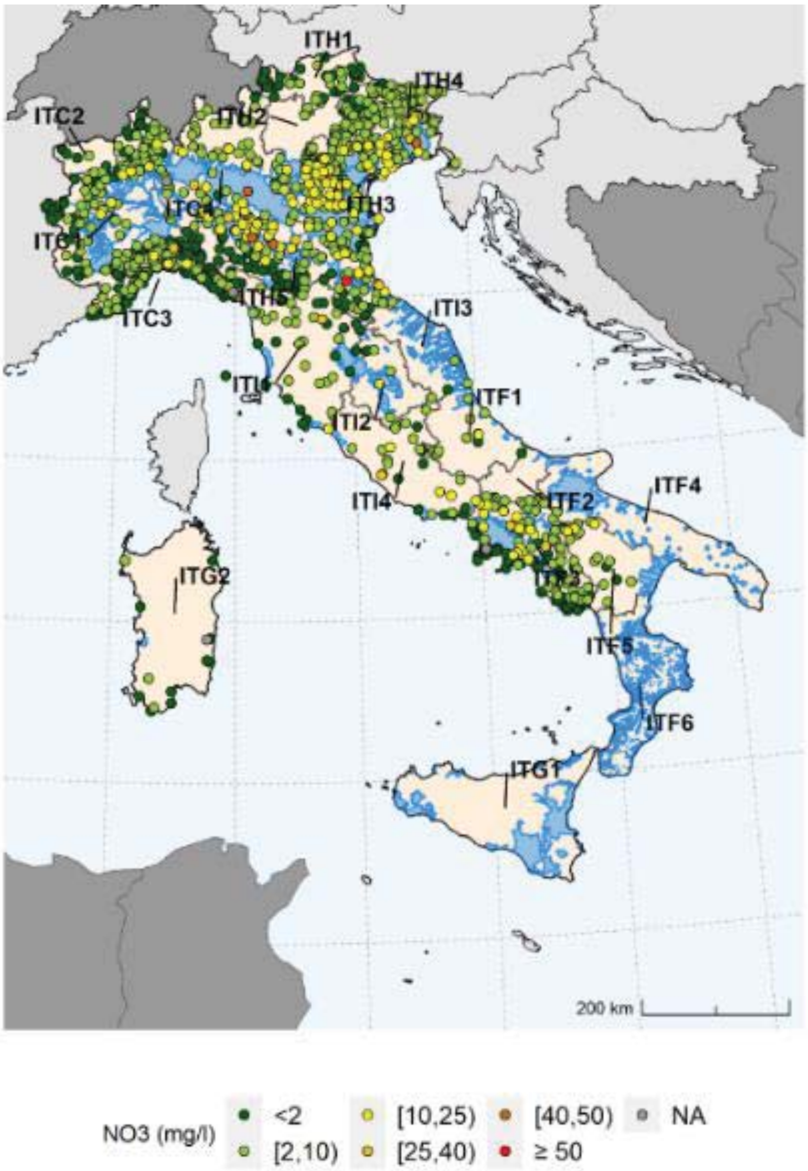
NUTS ID	NUTS NAME	High trophic status		>=40 and < 50 mg/l incr.trend		>=50 mg/l	
		InNVZ	OutNVZ	InNVZ	OutNVZ	InNVZ	OutNVZ
ITC1	Piemonte	21	3	0	0	0	0
ITC3	Liguria	2	0	0	0	0	0
ITC4	Lombardia	98	13	2	1	2	1
ITF1	Abruzzo	2	5	1	0	0	0
ITF3	Campania	37	18	0	0	3	0
ITF4	Puglia	17	5	0	0	4	0
ITF5	Basilicata	7	0	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



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

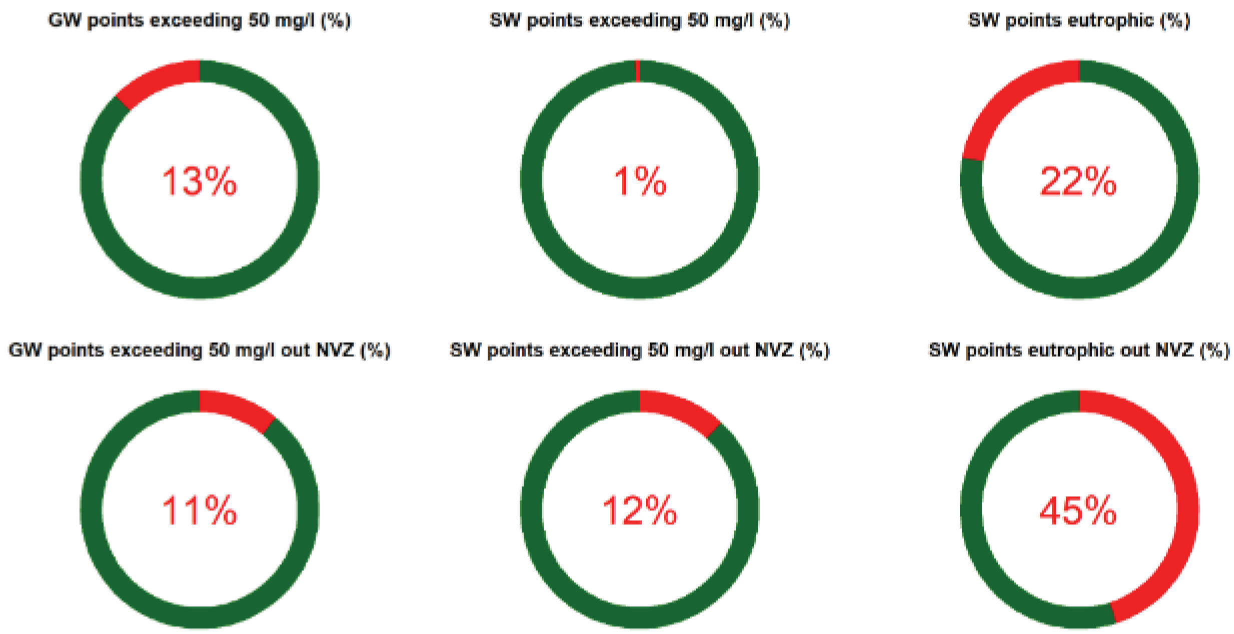


Figure 18. The summary plot for the period 2016-2019

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

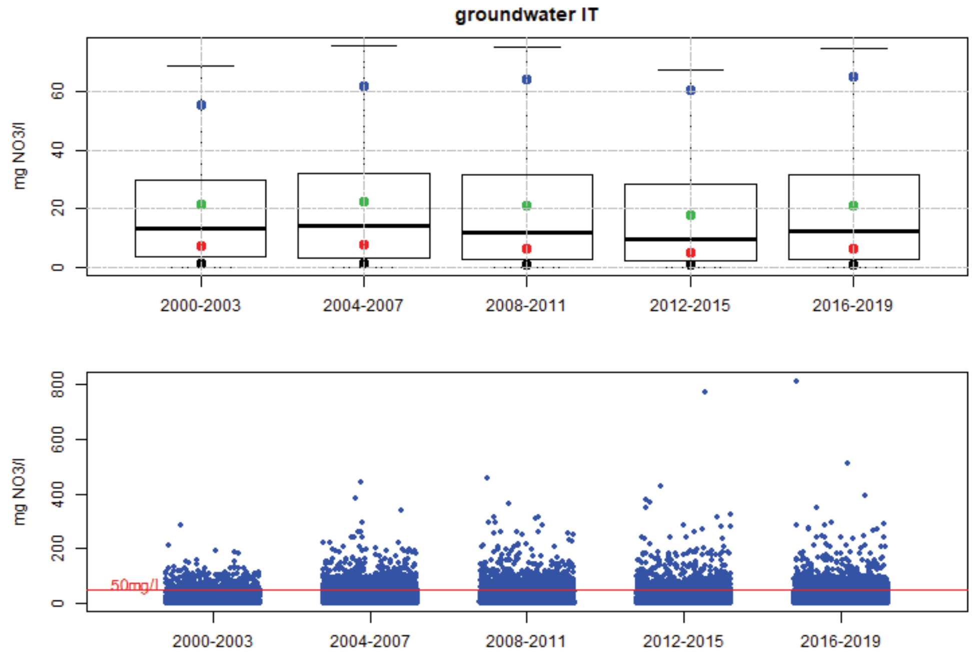


Figure 19. Time series of box whisker plots along with the distribution of the average NO3 annual concentrations for each reporting period for groundwater stations. RPs represent the reporting periods, RP7 being the last period (2016-2019). The blue, red, green and black dots represent the mean of the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

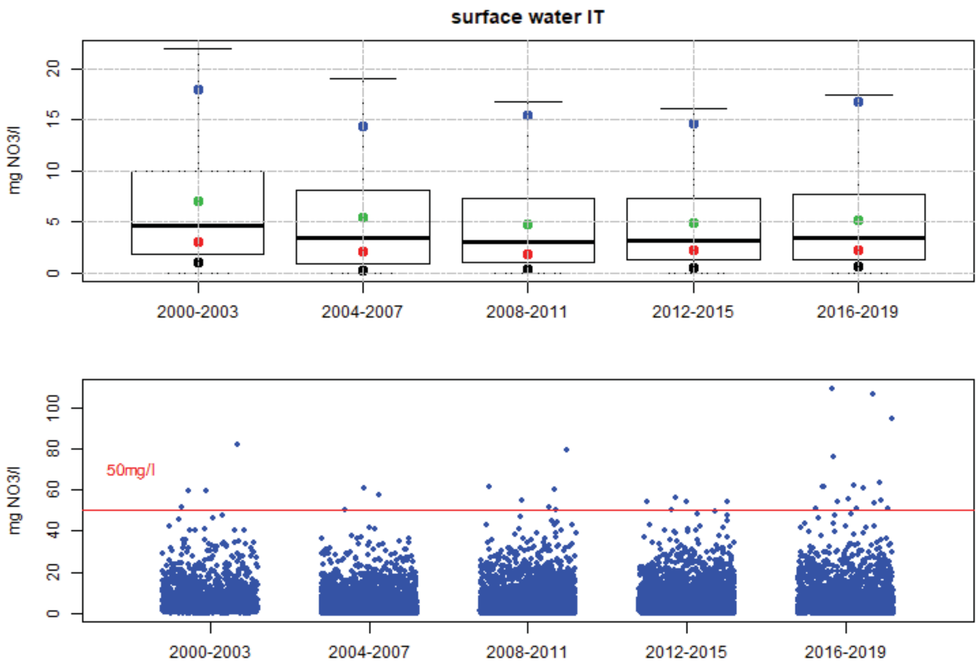


Figure 20. Time series of box whisker plots along with the distribution of the average NO3 annual concentrations for each reporting period for surface water stations. RPs represent the reporting periods, RP7 being the last period (2016-2019). The blue, red, green and black dots represent the mean of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

EUROPEAN
COMMISSION

Brussels, 11.10.2021
SWD(2021) 1001 final

PART 24/38

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}

EN EN

Pressure from Agriculture

Latvia's utilised agricultural area amounts to 1.9 Mha, representing 31% of the total land area. The major outputs of the agricultural industry excluding services and secondary activities include in a decreasing order: cereals (25.3%) and milk (20.7%).

Eurostat

Major land use statistics for Latvia

Table 1.Utilized agricultural area (abbreviated as UAA)

Latvia	2005	2007	2010	2013	2016
Utilised agricultural area UAA (1000 ha)	NA	1839	1806	1878	1931
arable land (1000 ha)	NA	1188	1173	1208	1288
permanent grass (1000 ha)	NA	641	625	663	635
permanent crops (1000 ha)	NA	10	7	6	8
kitchen gardens (1000 ha)	NA	NA	NA	NA	0

Note:

Eurostat (FSS)

Latvia's arable land has increased by 8% since 2007. The permanent grass land area has remained stable since 2007.

Animal distribution in Latvia

Latvia's live bovine has remained stable since 2013. Live pigs and poultry decreased since 2010. The livestock density index (livestock unit per hectare of Utilized Agricultural Area) has also remained stable and is lower than the EU average of 0.8.

Table 2. Livestock statistics

Latvia	2005	2007	2010	2013	2016
Livestock index	0.27	0.28	0.26	0.26	0.26
dairy cows (10^6 heads)	0.18	0.18	0.16	0.16	0.15
live bovines (10^6 heads)	0.38	0.40	0.38	0.41	0.41
live pigs (10^6 heads)	0.43	0.41	0.39	0.37	0.34
live poultry (10^6 heads)	NA	NA	5.16	5.04	4.65

Note:

Eurostat (FSS)

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

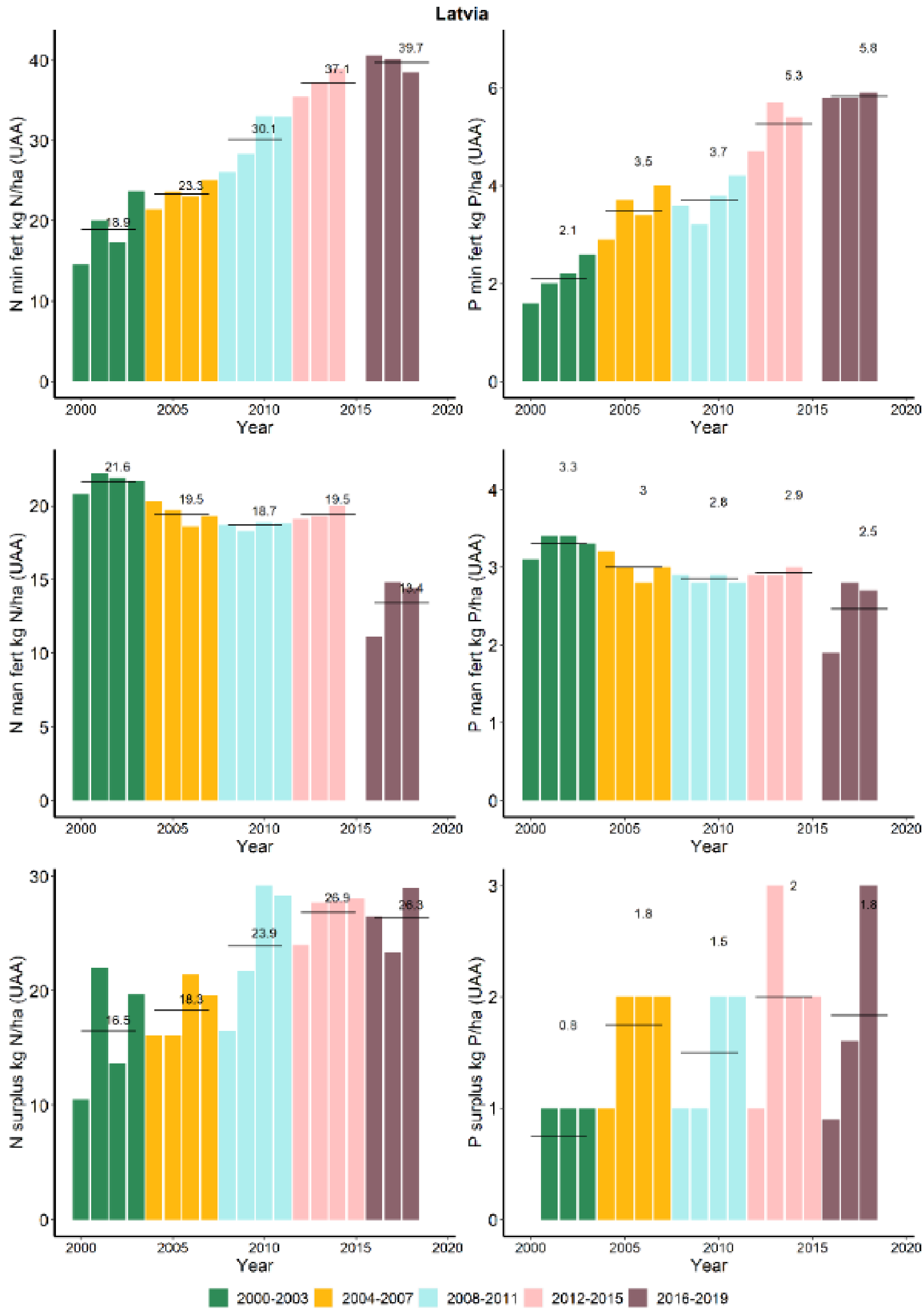


Figure 1. N and P fertilizers and gross surplus (kg/ha)

The gross nitrogen and phosphorus surpluses originate from EUROSTAT data for the years 2000-2018. N and P mineral fertilizers significantly increased from the last reporting period, while manure decreased. Both the nitrogen and phosphorus surpluses decreased from the last reporting period, by 6.3 and 15% respectively. 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

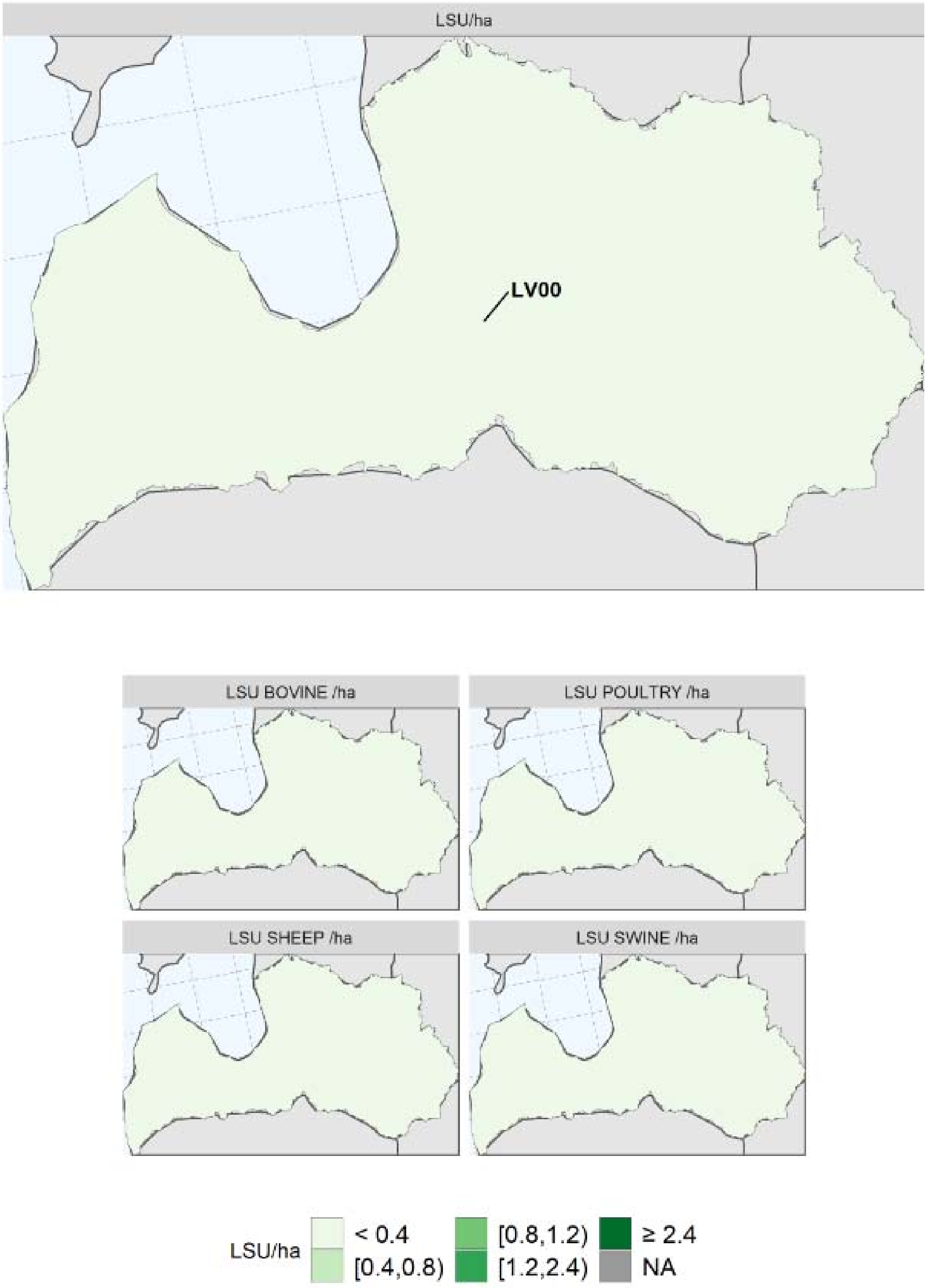


Figure 2. Map of livestock unit distribution, year 2016 (Source: Eurostat, February 2021)

Animal production density is low for all animal types (total LSU and LSU by animal type were retrieved individually from EUROSTAT).

In this document, the NUTS-2013 version is used.

(https://ec.europa.eu/eurostat/web/gisco/geodata/reference-data/administrative-units-statistical-units/nuts)

Water Quality Monitoring

The monitoring of nitrates in surface waters and groundwater is performed by the Latvian Environment, Geology and Meteorology Centre (LEGMC). The monitoring of agricultural runoffs under Latvia's Environmental Monitoring Programme is conducted by the Latvia University of Life Sciences and Technologies (LLU) while the monitoring of marine waters is conducted by the Latvian Institute of Aquatic Ecology (LIAE). Most of surface water stations had data available for one year, and the sampling frequency varied from 4 to 12 times per year. 11 stations were surveyed along the Baltic coast (within one nautical mile) while the Gulf of Riga was investigated more thoroughly (network density).

However, it is noteworthy that the monitoring points and results of the Agricultural Runoff monitoring have not been included in this fiche. Monitoring activities within the Agricultural Runoff monitoring consist of water sampling at 20 groundwater monitoring sites of which 15 sites sit at a depth of up to 5 m, 4 sites at a depth of 5 -15 m, 1 site in artesian waters. These groundwater monitoring sites mostly are located in the central and southwestern parts of the NVZ. Water sampling has been carried out at 9 drainage fields and small catchments, and 22 rivers in terms of surface waters as part of the Agricultural Runoff monitoring.

For groundwater 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

Station Type	Description	Number of stations with measurements			Number of stations with Trends		
		2008-2011	2012-2015	2016-2019	2008-2011	2012-2015	2016-2019
0	Phreatic groundwater (shallow): 0-5 m	29	28	36	17	24	26
1a	Phreatic groundwater (deep) 5-15 m	27	29	34	21	28	28
1b	Phreatic groundwater (deep) 15-30 m	5	5	7	3	5	5
1c	Phreatic groundwater (deep) >30 m	3	2	2	2	2	1
2	Captive groundwater	109	135	153	97	104	124
3	Karstic groundwater	0	0	0	0	0	0
9	Not specified	0	0	0	0	0	0
	Total	**173**	**199**	**232**	**140**	**163**	**184**

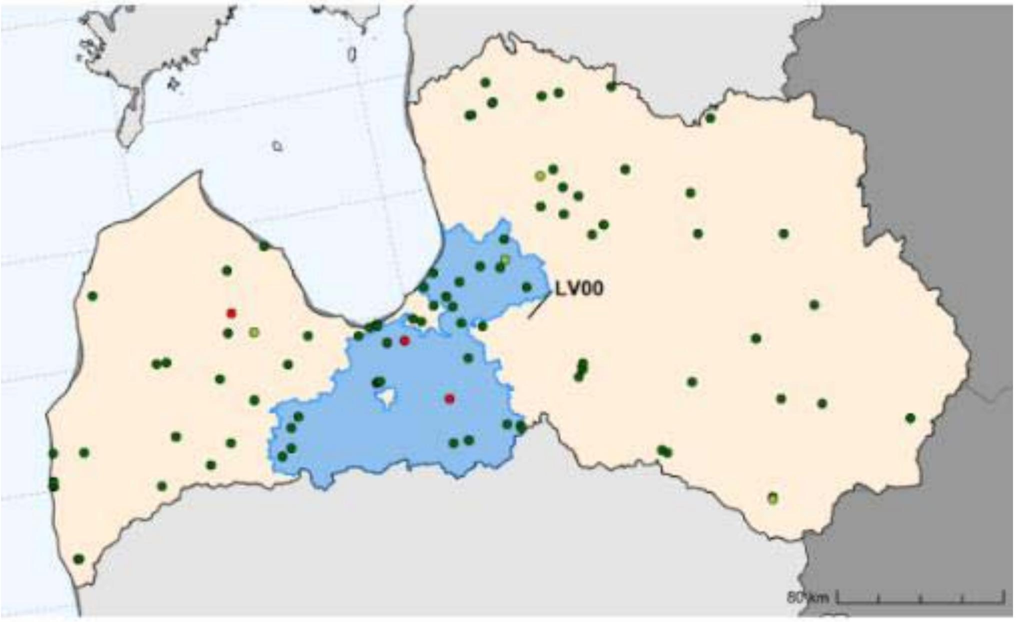
Surface water quality monitoring network

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

Station Type	Description	Number of stations with measurements			Number of stations with Trends			Number of stations with Trophic status		
		2008-2011	2012-2015	2016-2019	2008-2011	2012-2015	2016-2019	2008-2011	2012-2015	2016-2019
4	River water	162	109	207	89	74	89	162	109	204
5	Lake/reservoir water	176	113	228	70	85	75	177	113	228
6	Transitional water	7	8	6	5	8	6	7	8	8
7	Coastal water	24	21	3	14	21	3	24	21	21
8	Marine water	14	14	7	11	11	7	16	14	13
9	Not specified	0	0	0	0	0	0	0	0	0
	Total	**383**	**265**	**451**	**189**	**199**	**180**	**386**	**265**	**474**

Groundwater Quality

Groundwater average annual nitrate concentration[1]



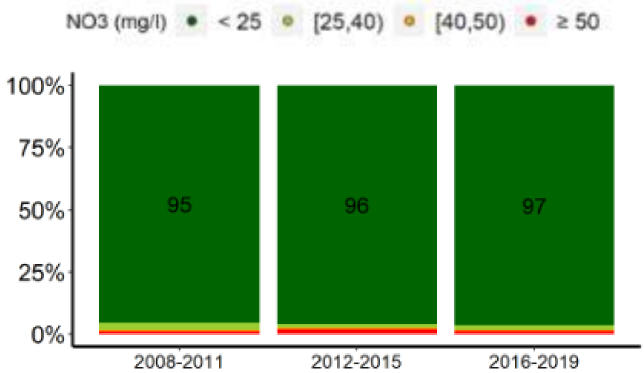


Figure 3. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information. In the map in blue the NVZ.

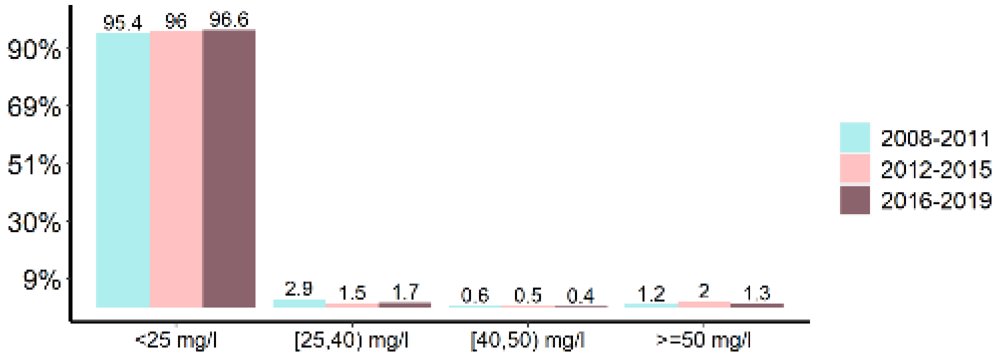
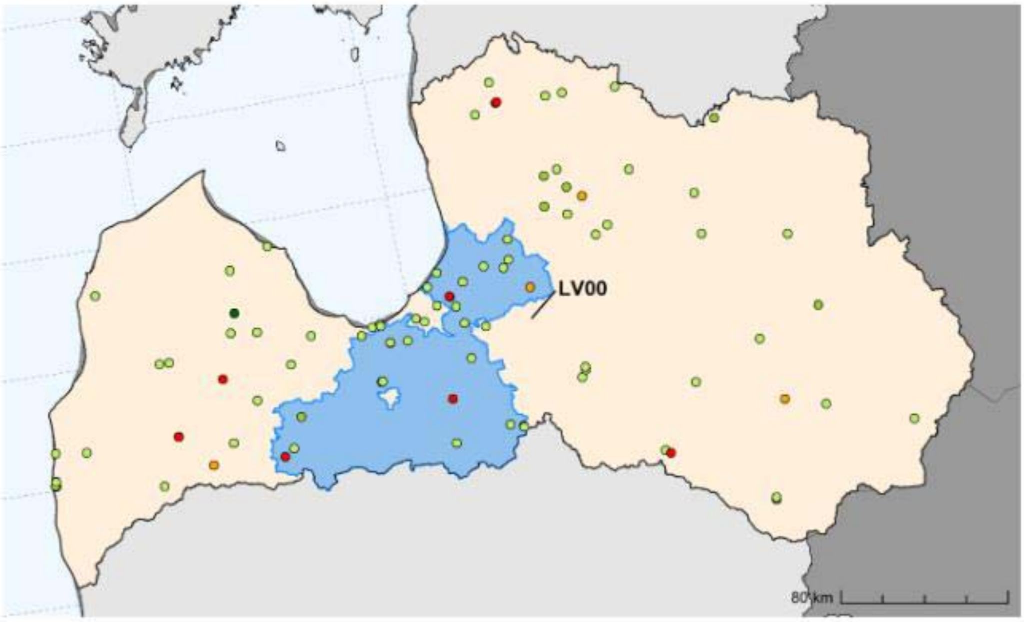


Figure 4. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis).

Groundwater average annual nitrate concentration trend[1]



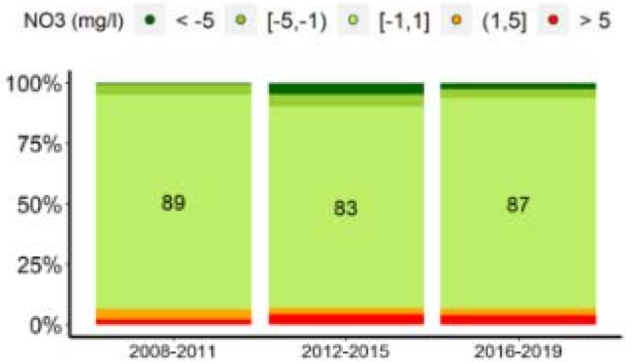


Figure 5. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information. In the map in blue the NVZ.

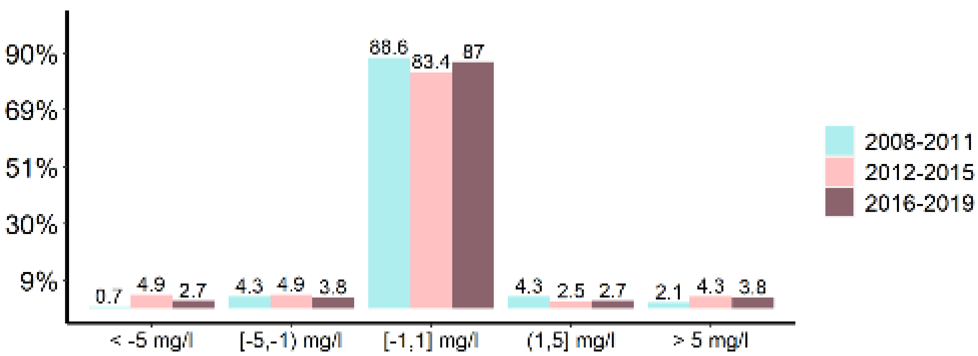
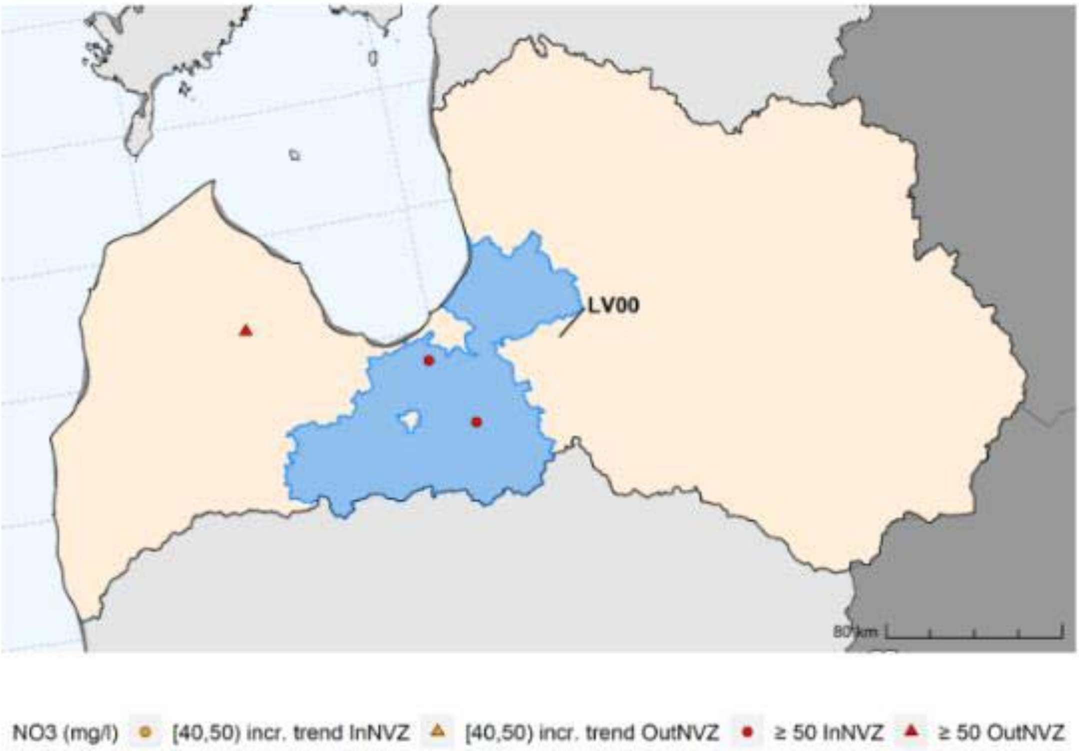


Figure 6. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis)

Groundwater hotspot

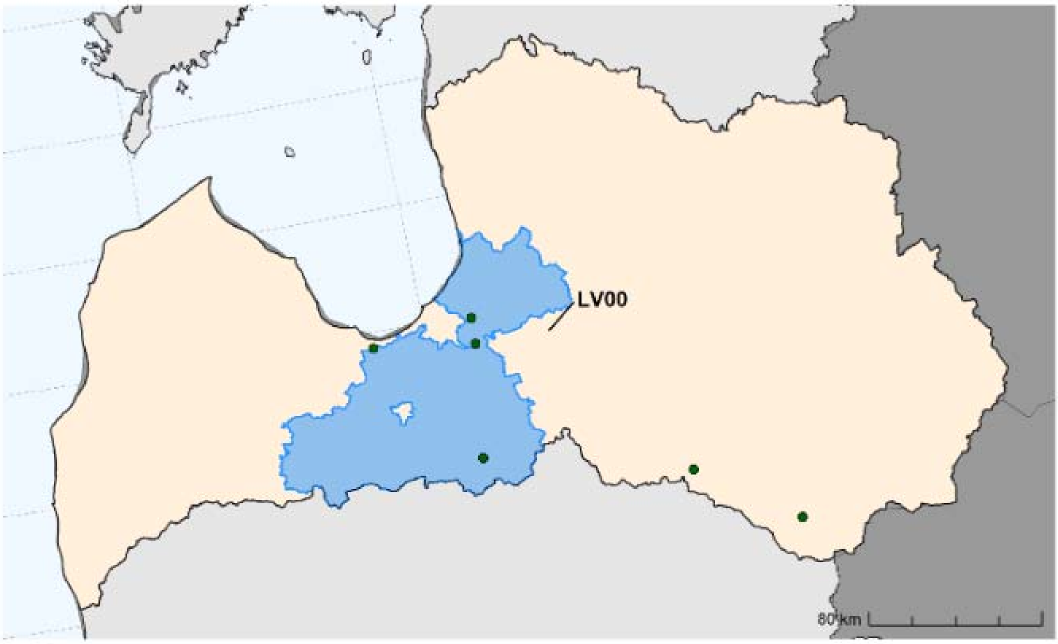


NUTS ID	NUTS NAME	>=40 and < 50 mg/l incr.trend		>=50 mg/l	
		InNVZ	OutNVZ	InNVZ	OutNVZ
LV00	Latvija	0	0	2	1
	Total	**0**	**0**	**2**	**1**

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 or are above 50 mg/l. The map shows the spatial distribution of these points, and the table reports the number of stations by NUTS inside and outside NVZ.
Only the NUTS of interest are reported.

Groundwater stations removed[1]



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	1	1	1
1a	Phreatic groundwater (deep) 5-15 m	1	1	1
1b	Phreatic groundwater (deep) 15-30 m	0	0	0
1c	Phreatic groundwater (deep) >30 m	1	1	1
2	Captive groundwater	11	11	5
3	Karstic groundwater	0	0	0
9	Not specified	0	0	0
	Total	**14**	**14**	**8**

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

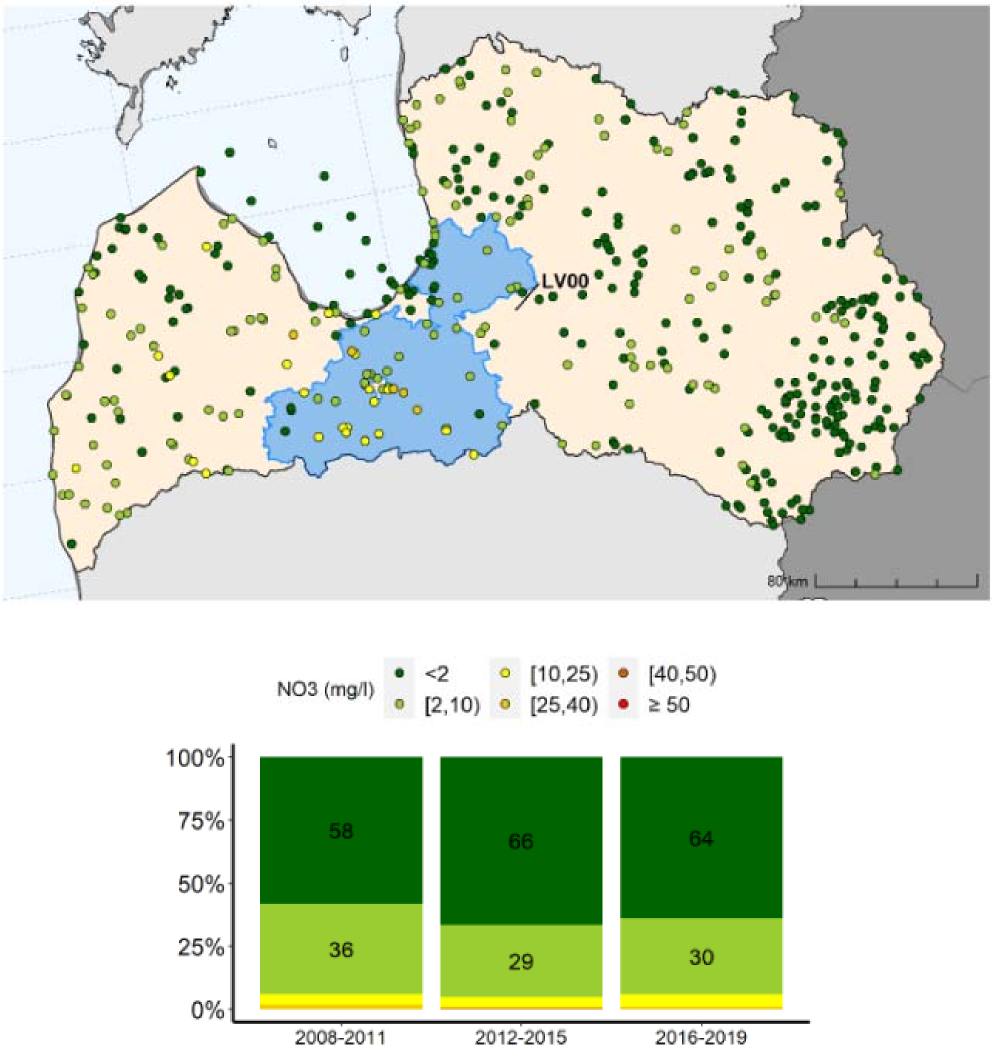


Figure 9. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information. In the map in blue the NVZ.

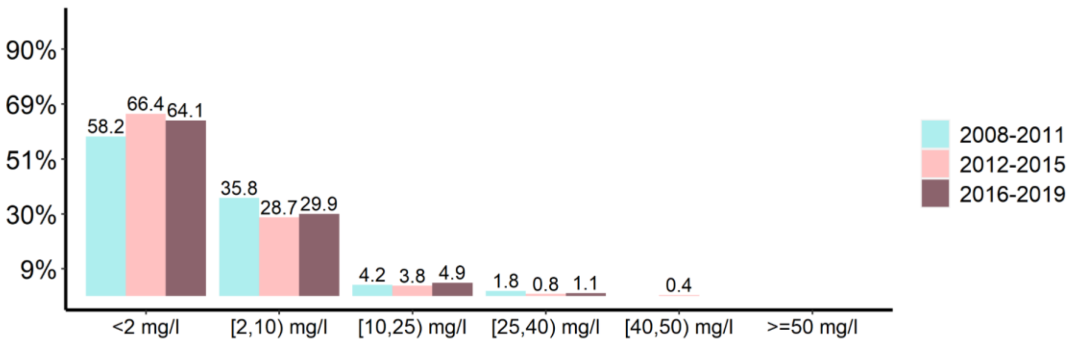
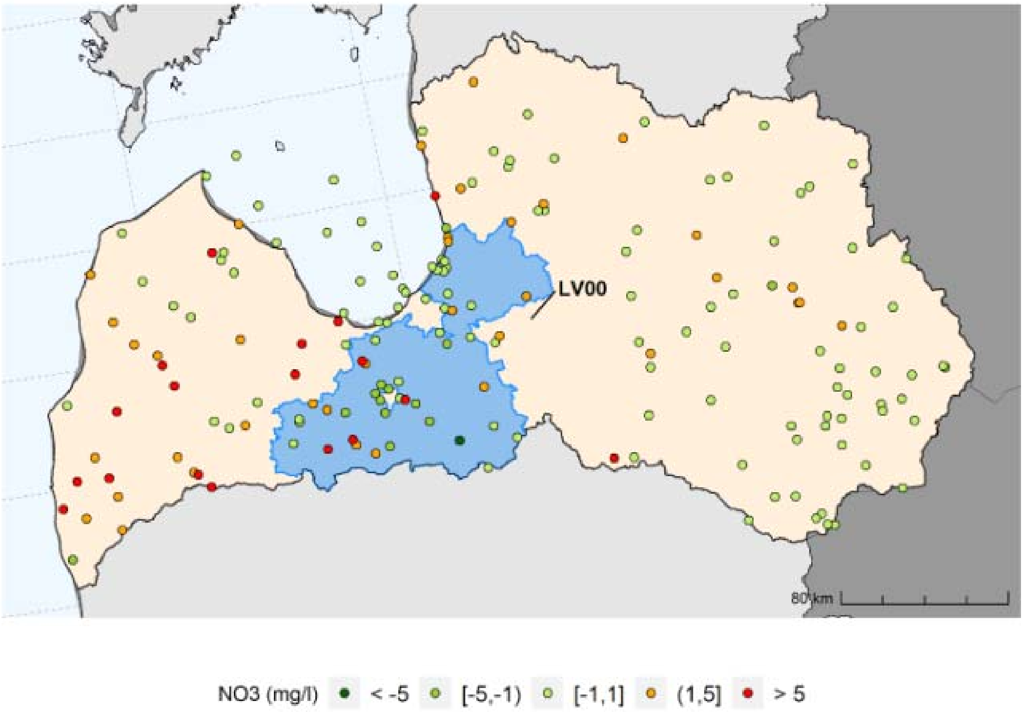


Figure 10. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis)

Surface water average annual nitrate concentration trend



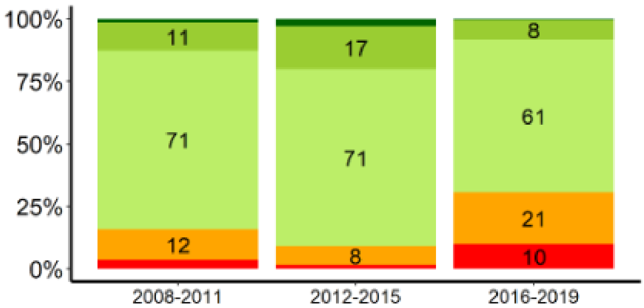


Figure 11. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information. In the map in blue the NVZ.

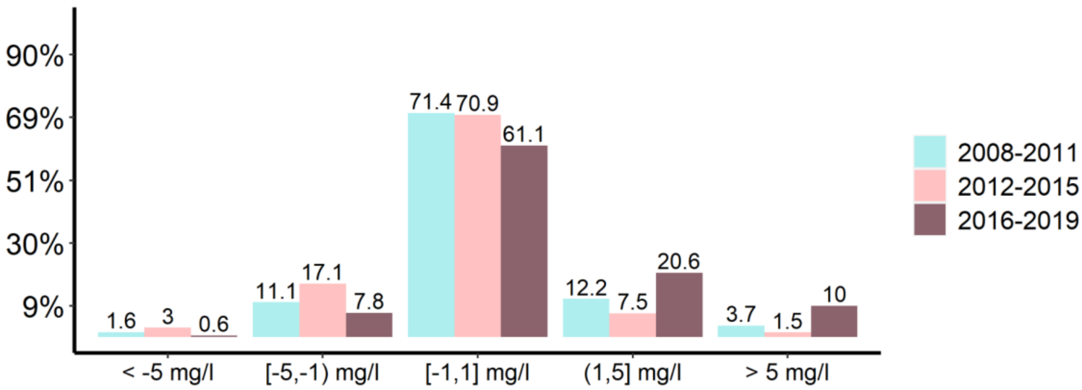


Figure 12. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis)

Surface Water Eutrophication

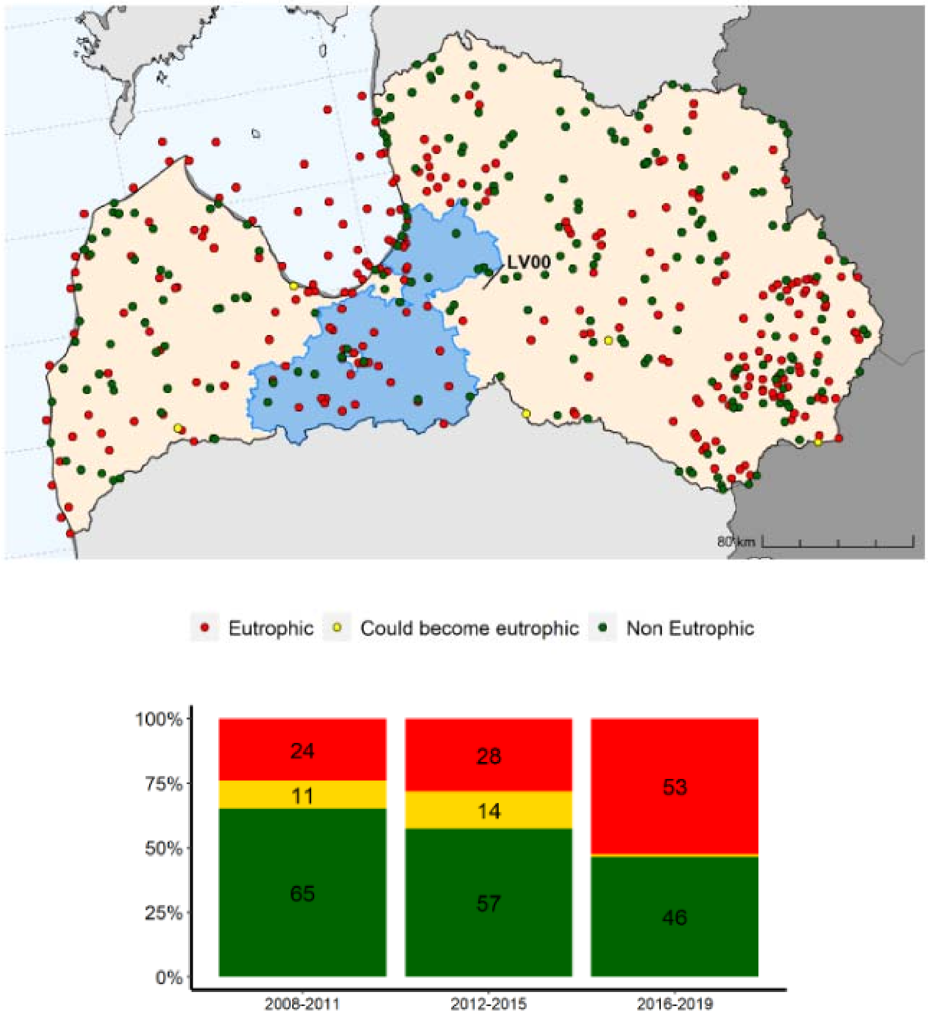


Figure 13. Spatial distribution of eutrophic status (map) and corresponding percentage of monitoring points per classes of status by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information. In the map in blue the NVZ.

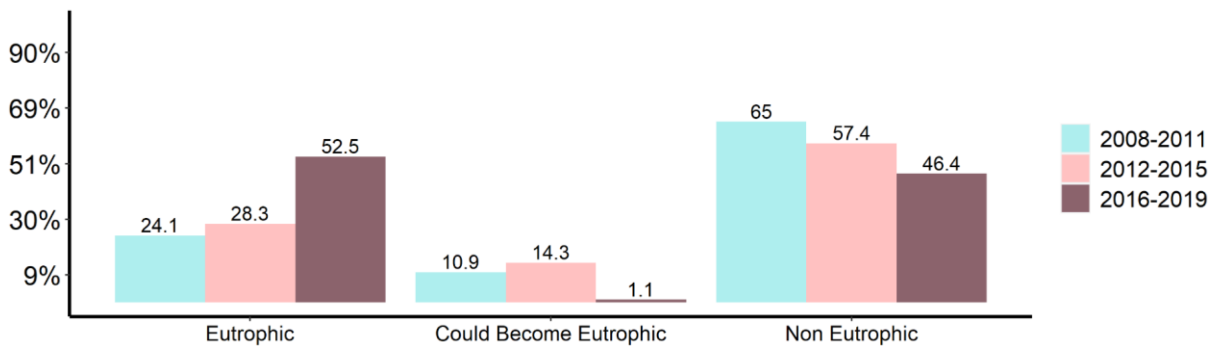
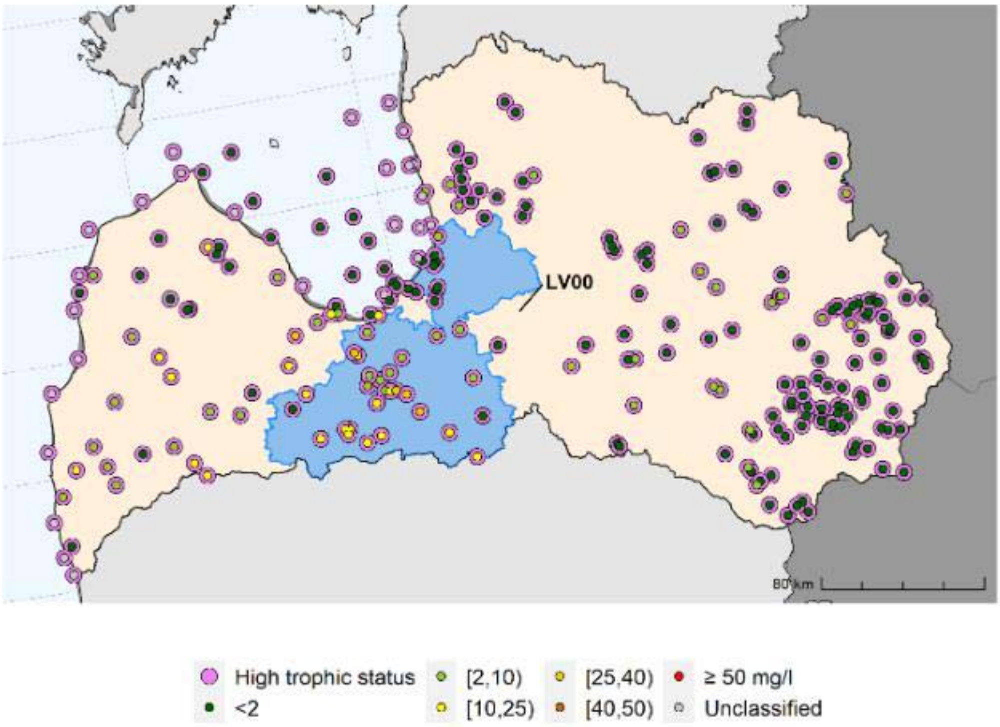


Figure 14. Comparison of percentage of monitoring points in the three reporting periods by classes of status (x axis)

It is noteworthy that the main differences in the classification of trophic status in the current reporting period respect to the previous is due to a different methodology.

The Eutrophic status vs average NO3 annual concentration



NUTS ID	NUTS NAME	High trophic status	Number of stations by classes of concentration						
			<2 mg/l	[2,10) mg/l	[10,25) mg/l	[25,40) mg/l	[40,50) mg/l	>=50 mg/l	Unclassified
LV00	Latvija	207	136	45	21	5	0	0	0
NO_NUTS	SALINE	42	16	0	0	0	0	0	26
	Total	**249**	**152**	**45**	**21**	**5**	**0**	**0**	**26**

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

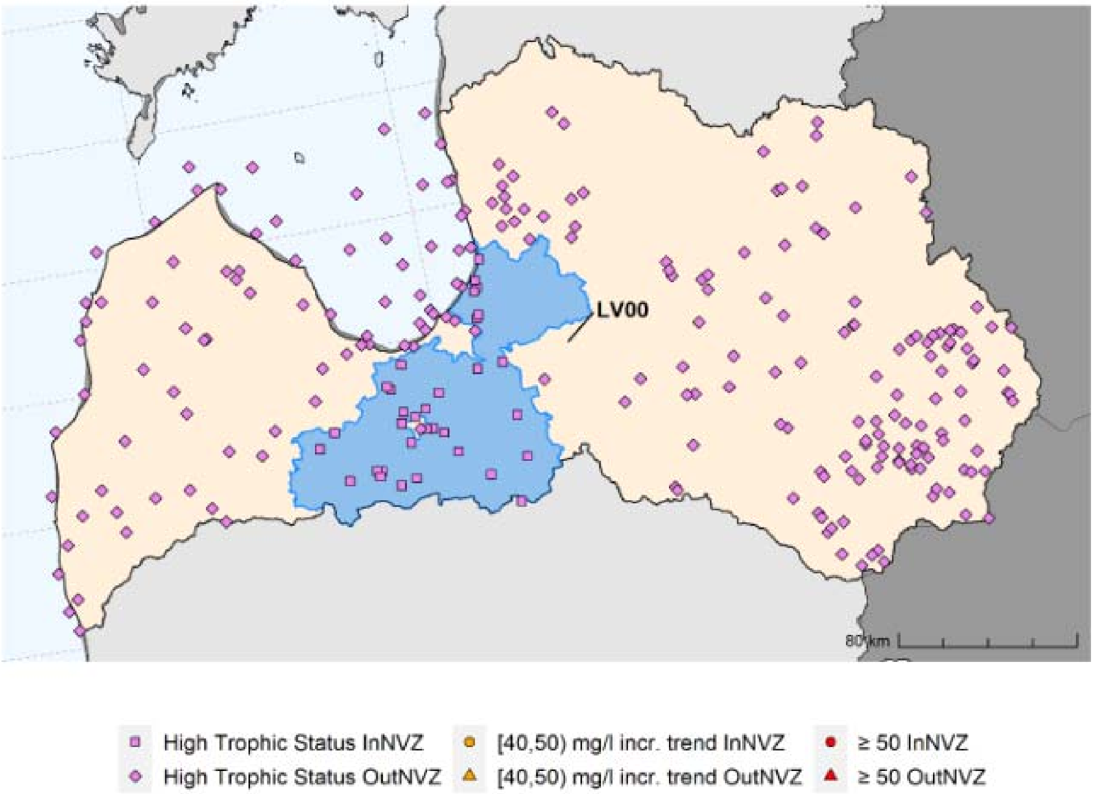
The analysis shows all the SW monitoring stations with the higher trophic status and the corresponding value of NO3 concentration. The map shows the spatial distribution of these points, and the table reports the number of stations with measurements with higher trophic status and the corresponding stations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

The assessment of eutrophication is based on the physical and chemical parameters used to assess the ecological state of rivers and lakes, as well as transitional, coastal and marine waters, and also on the presence of chlorophyll-a. The annual averages, except for Chl-a and transparency parameters, were used to assess the eutrophication processes. Only the average values measured in July and August have been used for Chl-a and transparency. The determinands used in the chemical assessment include for rivers O2, BOD5, N/NH4, Ntotal and Ptotal. The threshold values vary according to the river type. In lakes, the parameters used include Ntotal Ptotal, chlorophyll-a and Secchi depth. The threshold values vary also according to the lake type. Due to the availability of data, only summer chlorophyll-a and summer bottom water layer O2 concentrations were used for the assessment of eutrophication in the coastal areas of the Baltic.
A eutrophic state or risk of eutrophication was identified in 32.4% of all the river and 64% of all the lake stations inspected. The overall assessment of the coastal water body of the Baltic Sea indicates the status most still remains poor. The status of the Gulf of Riga still remains poor for both transitional and coastal waters.

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	60	5	139
5	Lake/reservoir water	147	0	81
6	Transitional water	8	0	0
7	Coastal water	21	0	0
8	Marine water	13	0	0
9	Not specified	0	0	0
	Total	**249**	**5**	**220**

Surface Water quality hotspot

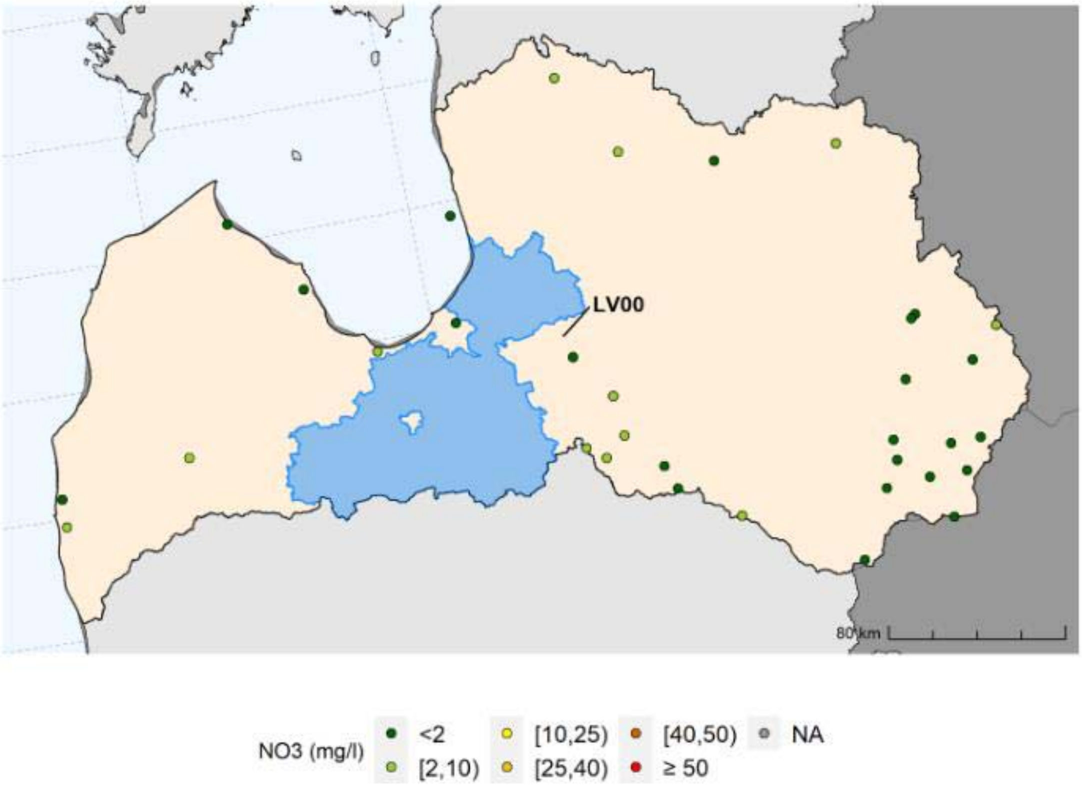


		High trophic status		>=40 and < 50 mg/l incr.trend		>=50 mg/l	
NUTS ID	NUTS NAME	InNVZ	OutNVZ	InNVZ	OutNVZ	InNVZ	OutNVZ
LV00	Latvija	33	174	0	0	0	0
NO_NUTS	SALINE	0	42	0	0	0	0
	Total	**33**	**216**	**0**	**0**	**0**	**0**

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

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

Surface Water Stations Removed



Station Type	Description	Number of removed stations			
		total removed	with measurements	with trends	with trophic status
4	River water	14	14	9	14
5	Lake/reservoir water	19	19	16	19
6	Transitional water	0	0	0	0
7	Coastal water	0	0	0	0
8	Marine water	1	1	0	1
9	Not specified	0	0	0	0
	Total	**34**	**34**	**25**	**34**

Figure 17. SW removed stations map (top graph) and distribution by surface water type (lower graph). In the map in blue the NVZ.

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

Measures in the Action Programme

The first edition of the Code of Good Agricultural Practices (CGAP) was published in Latvia in 1999 and revised in 2008. Some of the measures included in the CGAP were defined as mandatory and incorporated in the laws and regulations and some of the measures were included in the agri-environmental measures of the 2004–2006 Rural Development Plan, the 2007–2013 Rural Development Programme and the 2014–2020 Rural Development Programme of Latvia.

The Action Programme (AP) for vulnerable zones was published in 2004. The AP has expired from 2010 as the Cabinet Regulation No. 834 and Cabinet Regulation No.829 were adopted, covering all the measures in the AP. The table below summarizes the measures. General details are reported in Measure: “General details in Cabinet Regulation No. 834 and Cabinet Regulation No.829”.

In the requirements of the Nitrates Directive to be implemented, measures are defined throughout the country with additional requirements in NVZ.

The assessment of the implementation and impact of the measures of the Action Programme for Vulnerable Zones was carried out for the period 2016–2019.

Individual cost-effectiveness studies were conducted for different practices.

Table 6. Details of the Action Programme

Measure	General details in Action Programme (*)
Period of prohibition of fertiliser application	Only for NVZ (Cabinet Regulation No 834, Section III)
	Livestock manure or fermentation residues
	• 20 October to 15 March
	• 5 November to 15 March: respect of grassland
	N-containing mineral fertilisers
	• 15 October to 15 March: on winter crops
	• 15 September to 15 March: on cultivated plants and grass
Restrictions for application on sloped soils	Only for NVZ (Cabinet Regulation No 834, Section III)
Restrictions for application on soaked, frozen, or snow-covered soils	• Not on frozen, waterlogged or snow-covered soil (Cabinet Regulation No 834, Section II)
	• Fertiliser may only be spread on floodplains and flood-prone areas after the season of possible floods has passed (Cabinet Regulation No 834, Section II)
Restrictions for application near watercourses (buffer strips)	• 10 m for fertiliser and chemical plant protection products (Cabinet Regulation No 834, Section II)
Effluent storage works	• For the animal housing in which more than 10 animal units are located or, if the animal housing is located in a NVZ - more than five animal units (Cabinet Regulation No 829, Section II)
Capacity of manure storage	• For the animal housing in which more than 10 animal units are located or, if the animal housing is located in a NVZ - more than five animal units (Cabinet Regulation No 829, Section II)
Rational fertilisation (e.g., splitting fertilisation, limitations)	• Requirements for the amount of nitrogen that may be applied to the soil with fertiliser, whole country + additional requirements for NVZ (Cabinet Regulation No 834, Sections II and III)
	• Methods (and uniformity) of spreading mineral fertiliser and livestock manure for the whole country (Cabinet Regulation No 834, Section II)
Crop rotation, permanent crop enhancement	• Application of crop rotation and cultivation of perennial crops for the whole country are included in the GCAP
Vegetation cover in rainy periods, winter	Only for NVZ (Cabinet Regulation No 834, Section III)
	• In autumn and winter, at least 50 % of the agricultural land in a farm must be green areas, except for farms where potatoes, fruit trees, berry bushes and vegetables are grown in at least 50% of the total sown or planted area;
	• The CGAP includes a recommendation on maintaining a minimum amount of vegetative crop cover (green areas) during non-vegetative periods to prevent soil erosion and leaching of plant nutrients
Fertilisation plans, spreading records	• For the whole country: farms have to register and record any applied, purchased, sold or otherwise used amount of livestock manure and fermentation residues and store the registration documents for at least three years (Cabinet Regulation No 834, Section II)
	• Only for NVZ: farms which manage the agricultural land with an area of 20 hectares and more and/or grows vegetables, potatoes, fruit trees or fruit bushes in an area of three hectares and more, have to document field history for each field and keep field history documentation for at least three years and, if using fertilisers (Cabinet Regulation No 834, Section III)
Other measures	• Not specified
Date for application limit of 170 kg N/ha/year:	• 2001 (Cabinet Regulation No 834)

(*) Cabinet Regulation No. 834: Regulation Regarding Protection of Water and Soil from Pollution with Nitrates Caused by Agricultural Activity

Cabinet Regulation No. 829: Special Requirements for the Performance of Polluting Activities in Animal Housing

Controls

The State Environmental Service (SES) ensures the implementation and control over the implementation of the state environmental protection policy. During the last reporting period, nearly 299 inspections were carried out in NVZ areas (263 inspections less than the previous reporting period). About 45.5% of the inspections performed showed compliance with the requirements. The majority of non-compliance dealt with the failure to ensure adequate storage of manure. Non-compliance resulted in a penalty in 27 cases. In addition to the SES, the State Plant Protection Service (SPPS) is in charge of verifying the compliance of fertiliser use. About 168 inspections based on complaints by residents or planned controls by SPPS were conducted, resulting in 38 violations. Inspections in NVZ areas to assess cross-compliance led to the identification of 4.3% of serious violations (14 out of 336 inspections).

Designation of NVZ

The area of vulnerable zones in Latvia is 8258.7 km^2, including 7963 km^2 land area and 295.6 km^2 of surface water area. The designated area of NVZs has not changed compared to the previous reporting period.

Forecast of Water Quality

It was not possible to make predictions of nitrate content trends in groundwater in the next reporting period, as the monitoring programme implemented is not optimal for assessing the impact of agricultural pollution on groundwater. Most monitoring points (66%) are located in artesian waters, whereas only 16 % of all monitoring points sit in shallow groundwater (at a depth of up to 5 m). In addition, number of observation points in the southern and south-western parts of the NVZ area is too low.

Summary

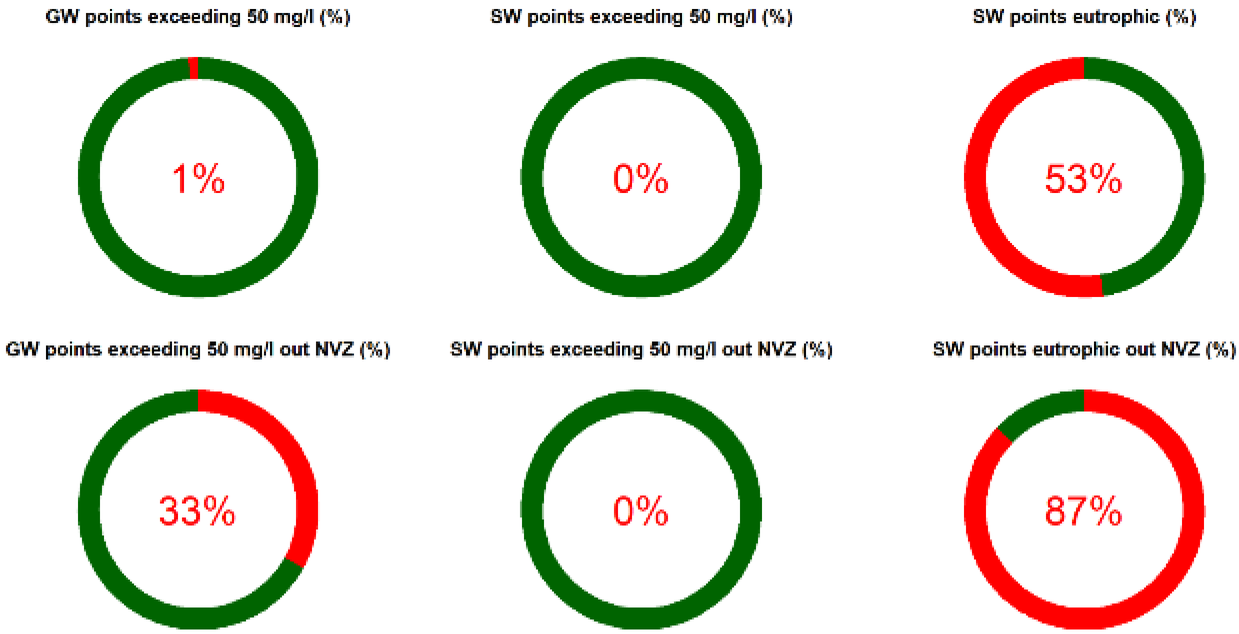


Figure 18. The summary plot for the period 2016-2019

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

Long term analysis

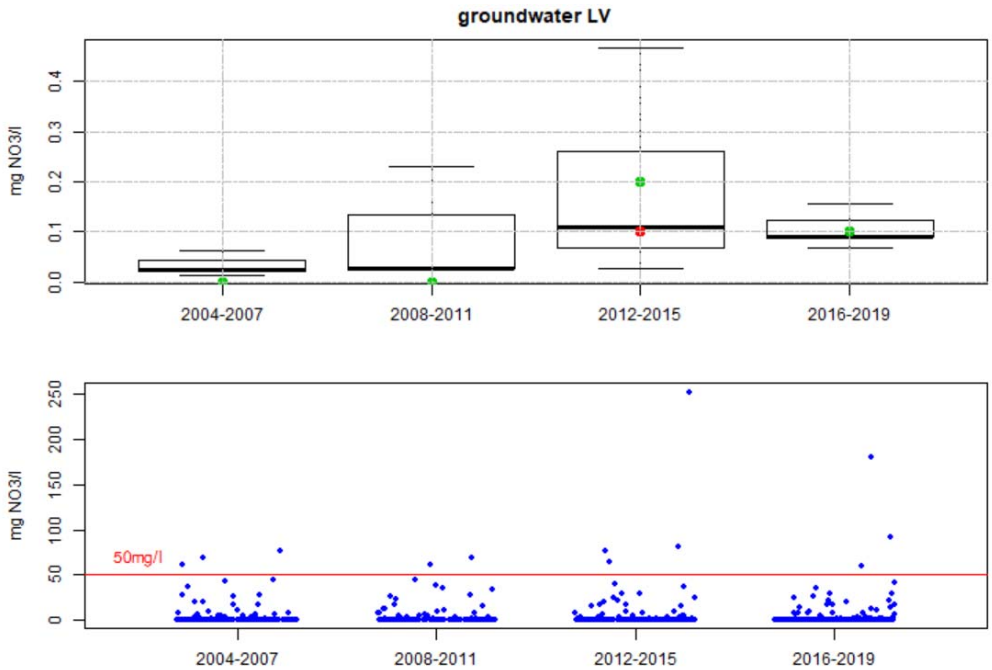


Figure 19. Time series of box whisker plots along with the distribution of the average NO3 annual concentrations for each reporting period, for groundwater stations. The blue, red, green and black dots represent the mean of the fourth third, second and first quartiles, respectively.

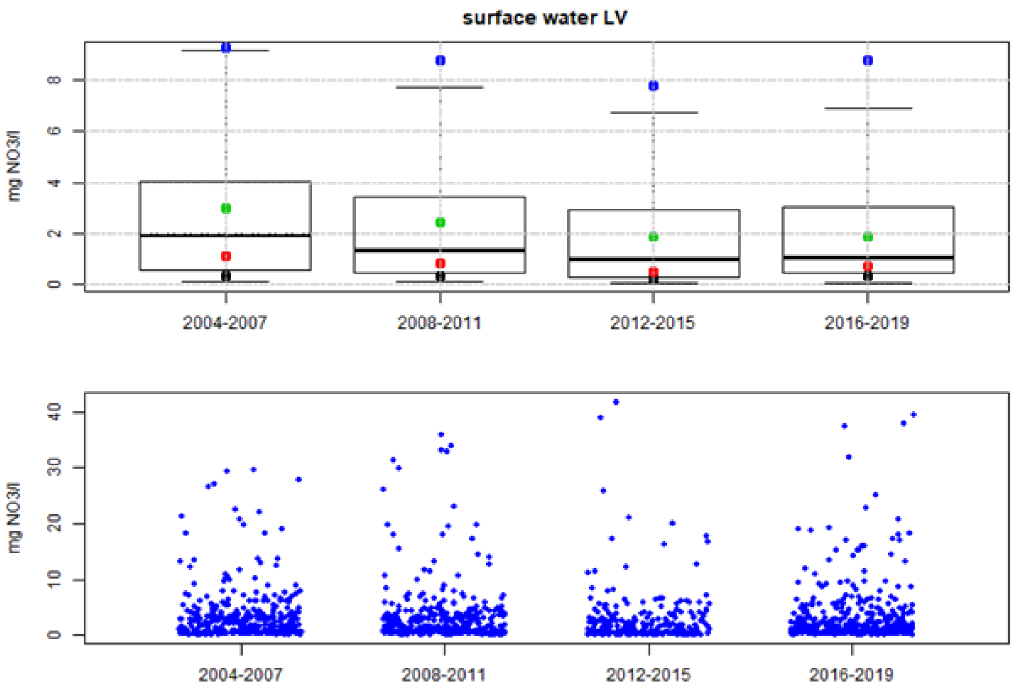


Figure 20. Time series of box whisker plots along with the distribution of the average NO3 annual concentrations for each reporting period, for surface water stations. The blue, red, green and black dots represent the mean of the fourth third, second and first quartiles, respectively.

Conclusions and recommendations

Latvia has a low livestock density, the surpluses of nitrogen and phosphorus are low.

There is a well elaborated network of monitoring stations. . A very high number of the surface waters are found to be eutrophic. Eutrophication is affecting both inland and marine waters. A very high of waters found to be eutrophic are located outside NVZ.

Latvia updated its action programme dates in 2018.

The Commission recommends that Latvia revises its NVZ to address eutrophication of surface waters where agriculture pressure is significant.

EUROPEAN
COMMISSION

Brussels, 11.10.2021
SWD(2021) 1001 final

PART 25/38

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}

EN EN

Pressure from Agriculture

Lithuania's utilized agricultural area amounts to 2.95 Mha, representing 47% of the total land area. The major outputs of the agricultural industry excluding services and secondary activities include in a decreasing order cereals (28%), milk (4.6%) and industrial crops (10.7%).
Eurostat

Major land use statistics for Lithuania

Table 1.Utilized agricultural area (abbreviated as UAA)

Lithuania	2005	2007	2010	2013	2016
Utilised agricultural area UAA (1000 ha)	NA	2696	2772	2891	2954
arable land (1000 ha)	NA	1833	2125	2288	2141
permanent grass (1000 ha)	NA	829	613	567	776
permanent crops (1000 ha)	NA	25	26	28	30
kitchen gardens (1000 ha)	NA	8	8	8	8

Note:
Eurostat (FSS)

Lithuania's arable land has increased by 16.8% since 2007. Permanent grassland increased by 37% since 2013, while permanent crops and kitchen gardens remained stable.

Animal distribution in Lithuania

Lithuania has seen a decrease in all bovine and pig production while poultry has been increasing since 2010. The livestock density index has decreased by 35% and is below the EU average of 0.8.

Table 2. Livestock statistics

Lithuania	2005	2007	2010	2013	2016
Livestock index	0.46	0.39	0.33	0.29	0.29
dairy cows (10^6 heads)	0.42	0.40	0.36	0.32	0.29
live bovines (10^6 heads)	0.80	0.79	0.75	0.71	0.70
live pigs (10^6 heads)	1.12	0.92	0.93	0.76	0.66
live poultry (10^6 heads)	NA	NA	8.60	9.34	11.25

Note:
Eurostat (FSS)

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

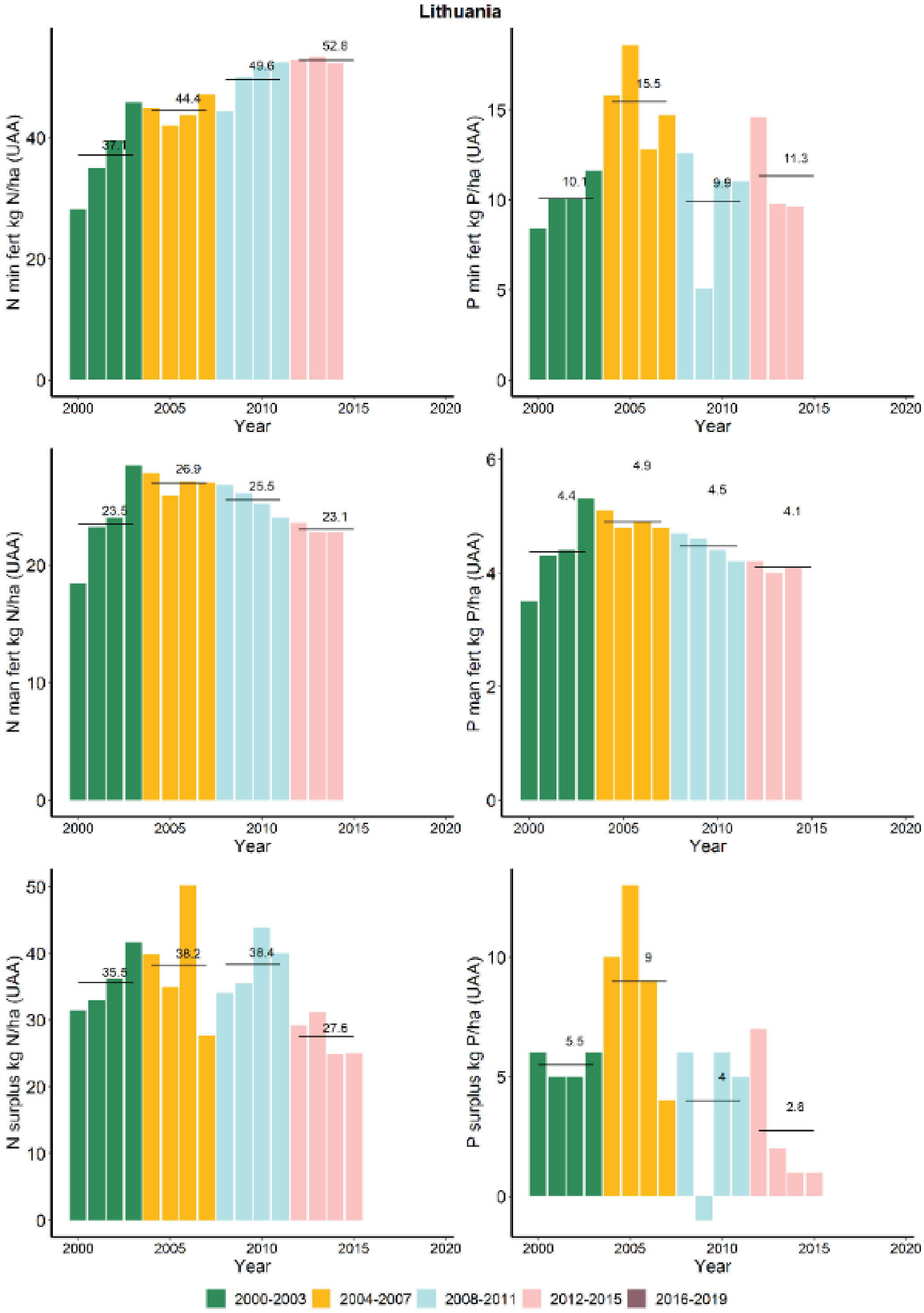


Figure 1. N and P fertilizers and gross surplus (kg/ha)

The gross nitrogen and phosphorus surpluses originate from EUROSTAT data for the years 2000-2018. N and P mineral fertilizers increased from last reporting period in average by 6% and 14% respectively. Both N and P manure decreased from the last reporting period by 9%. Also, N and P surplus decreased from last reporting period by 28% and 30% respectively. 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

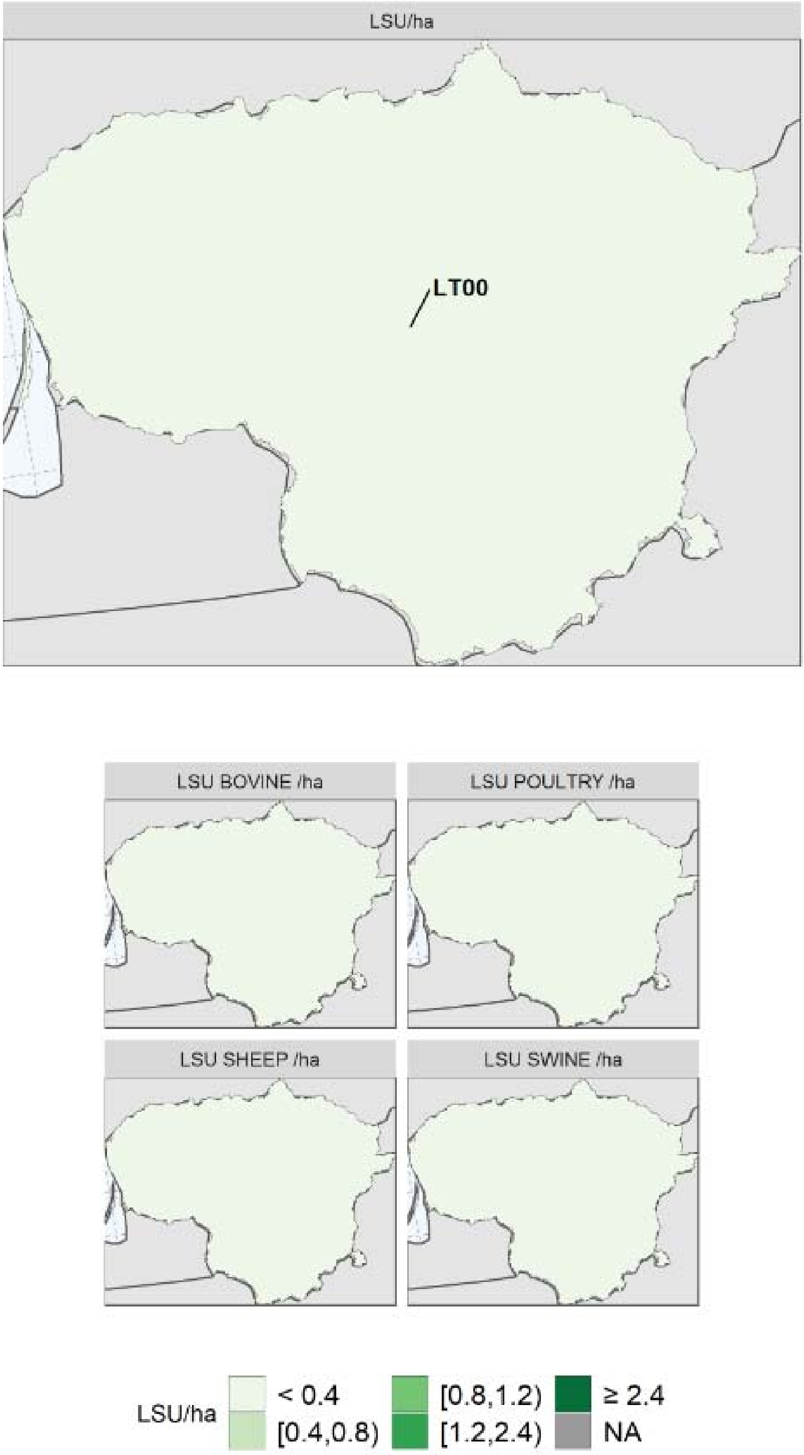


Figure 2. Map of livestock unit distribution, year 2016 (Source: Eurostat, February 2021)

Animal production is low for all animal types (total LSU and LSU by animal types were retrieved individually from EUROSTAT).

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

Water Quality Monitoring

The programme for monitoring rivers, lakes and reservoirs covered by the Nitrates Directive is part of the River Basin District (RBD) management plan monitoring of the WFD and the State environmental monitoring programmes for 2011–2017 and 2018–2023. River monitoring sites located in areas subject to the impact of intensive agricultural activity are monitored 12 times a year. In the other areas subject to the impact of mixed human activity, monitoring is carried out 12 times a year for most of the stations, and four times a year at intervals of 6 or 3 years based on a rotation principle. For most lakes, monitoring is conducted in accordance with a rotation principle, four times a year at intervals of six or three years.

For groundwater 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	47	47	44	47	47	44
1a	Phreatic groundwater (deep) 5-15 m	14	17	15	14	17	15
1b	Phreatic groundwater (deep) 15-30 m	1	1	1	1	1	1
1c	Phreatic groundwater (deep) >30 m	0	0	0	0	0	0
2	Captive groundwater	0	0	0	0	0	0
3	Karstic groundwater	0	0	0	0	0	0
9	Not specified	0	0	0	0	0	0
	Total	**62**	**65**	**60**	**62**	**65**	**60**

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	70	66	62	39	66	61	4	3	62
5	Lake/reservoir water	221	254	227	27	151	145	221	254	227
6	Transitional water	7	7	7	7	7	7	4	4	7
7	Coastal water	8	8	8	8	8	8	0	0	8
8	Marine water	2	1	1	2	1	1	0	0	1
9	Not specified	0	0	0	0	0	0	0	0	0
	Total	**308**	**336**	**305**	**83**	**233**	**222**	**229**	**261**	**305**

Groundwater Quality

Groundwater average annual nitrate concentration

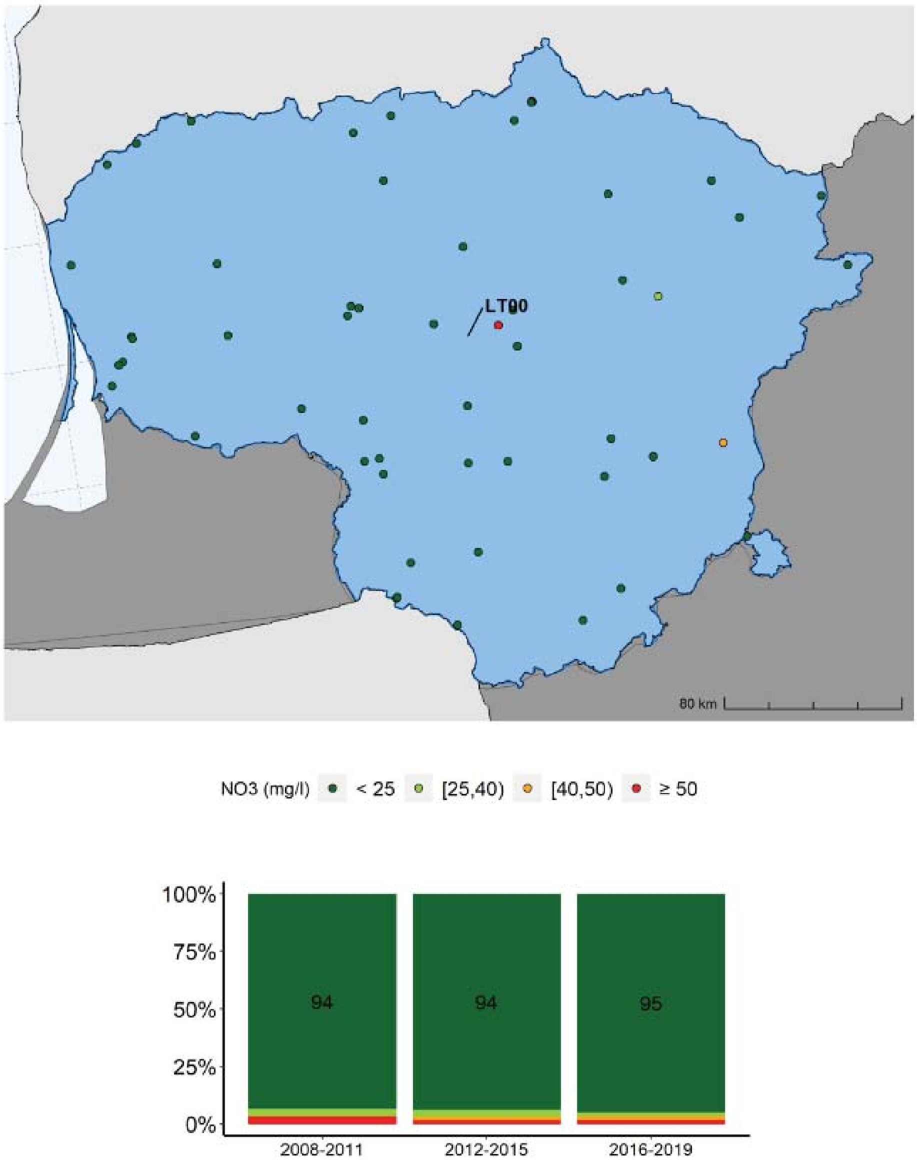


Figure 3. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information.

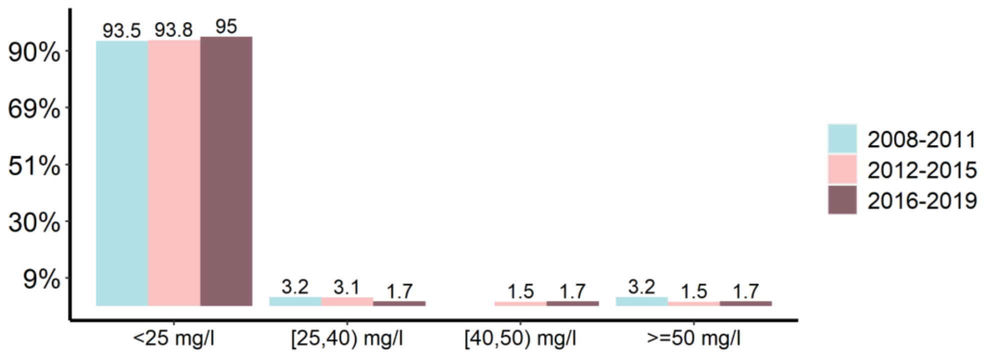


Figure 4. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis)

Groundwater average annual nitrate concentration trend

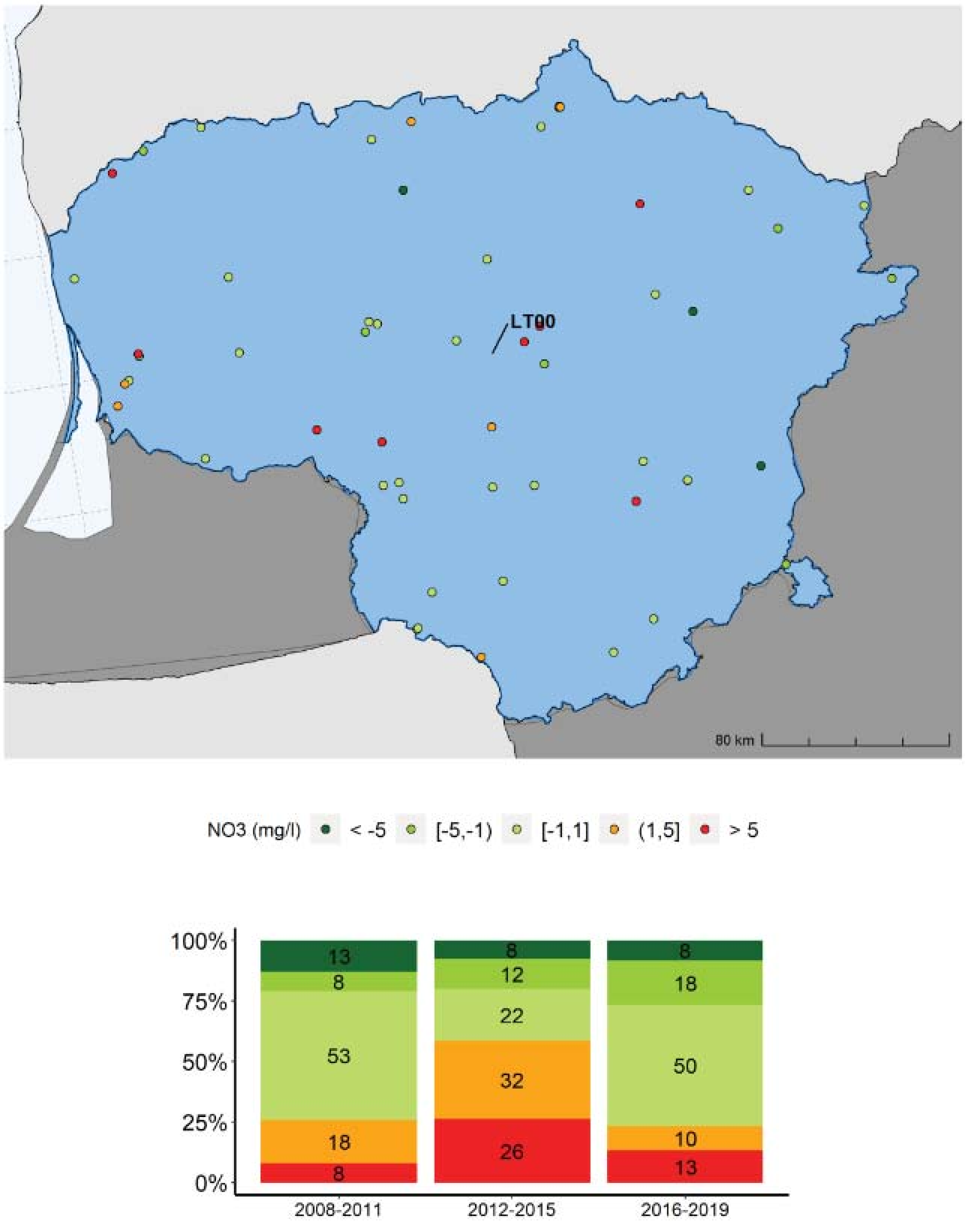


Figure 5. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis).

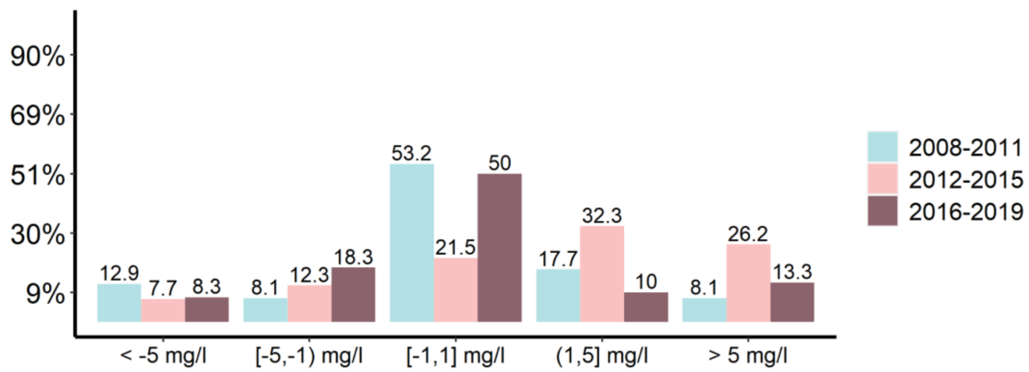
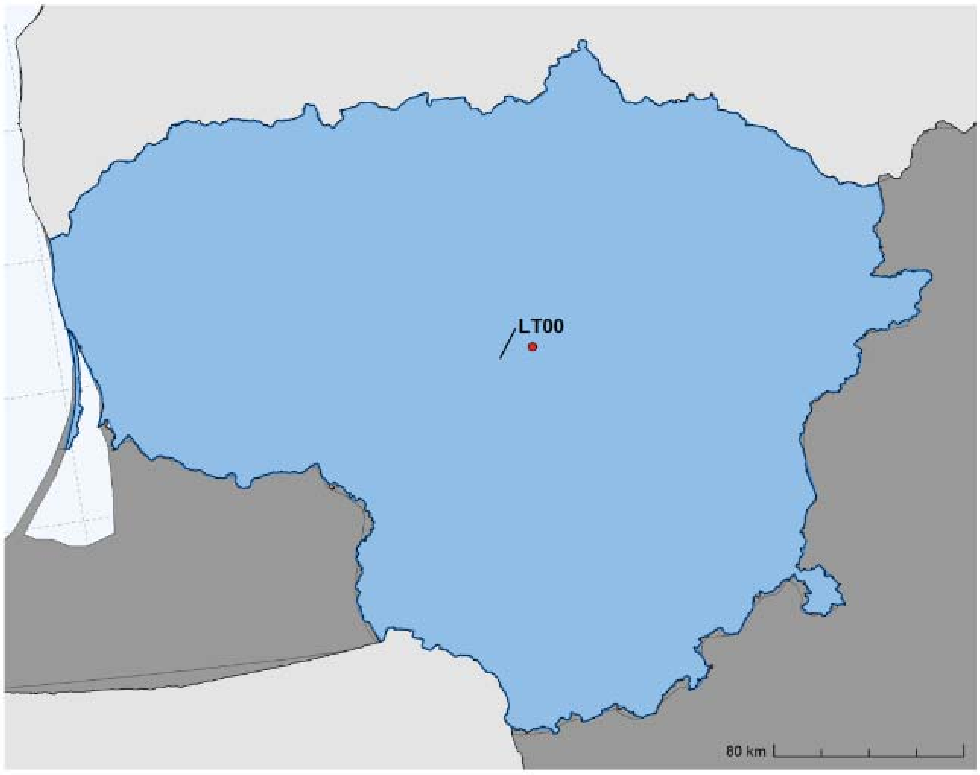


Figure 6. Comparison of percentage of monitoring points in the three reporting periods by classes of annual NO3 average trends (x axis)

Groundwater hotspot



NO3 (mg/l) [40,50) incr. trend ≥ 50

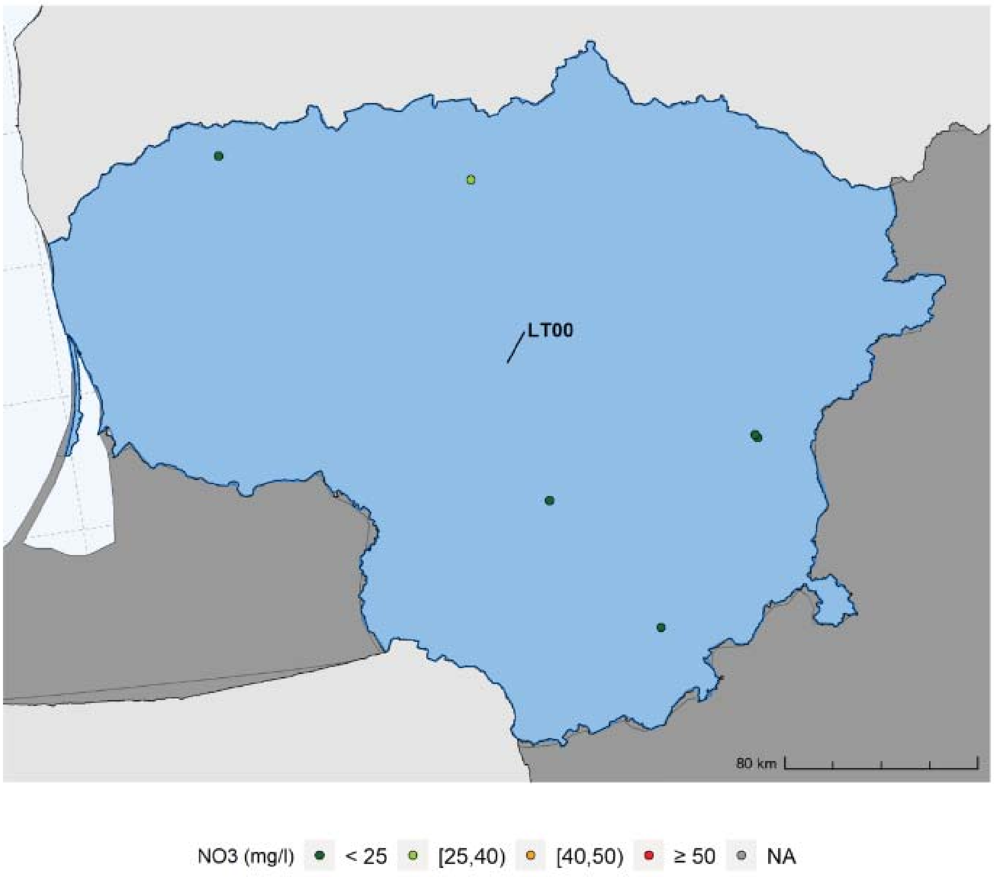
NUTS ID	NUTS NAME	>=40 and < 50 mg/l incr.trend	>=50 mg/l
LT00	Lietuva	0	1
	Total	**0**	**1**

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

The hotspot analysis identifies all the GW monitoring stations that have NO3 concentration in the range of 40-50 mg/l with increasing trends 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



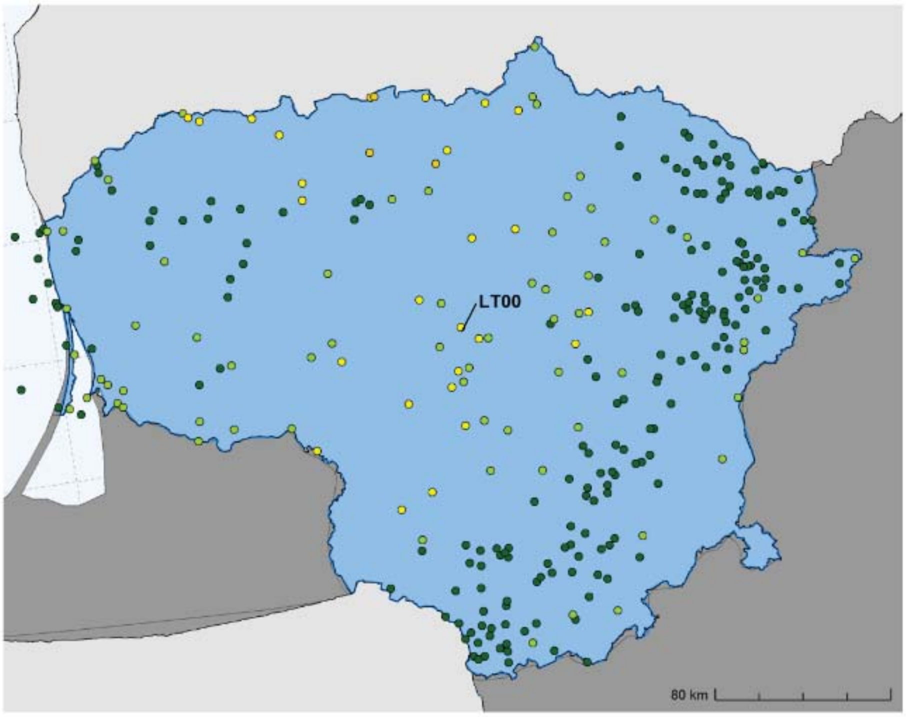
Station Type	Description	Number of removed stations		
		total removed	with measurements	with trends
0	Phreatic groundwater (shallow): 0-5 m	4	4	4
1a	Phreatic groundwater (deep) 5-15 m	2	2	2
1b	Phreatic groundwater (deep) 15-30 m	0	0	0
1c	Phreatic groundwater (deep) >30 m	0	0	0
2	Captive groundwater	0	0	0
3	Karstic groundwater	0	0	0
9	Not specified	0	0	0
	Total	**6**	**6**	**6**

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

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

Surface Water Quality

Surface water average annual nitrate concentration



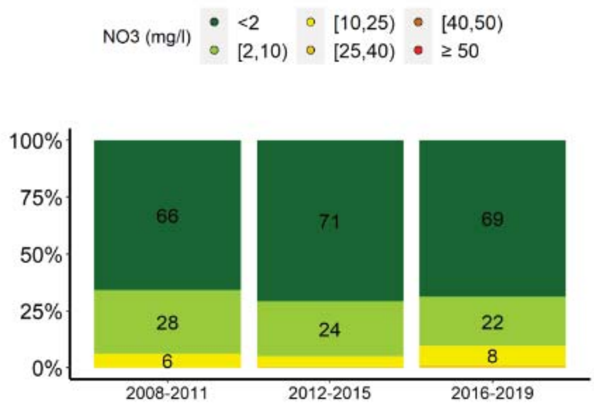


Figure 9. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information.

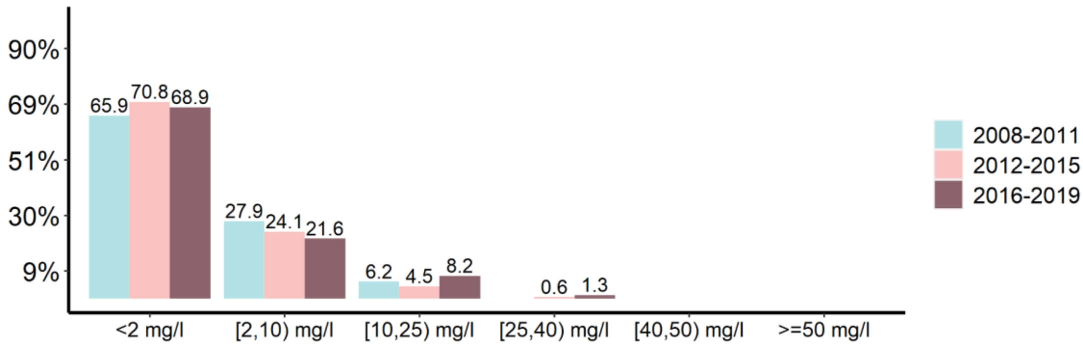
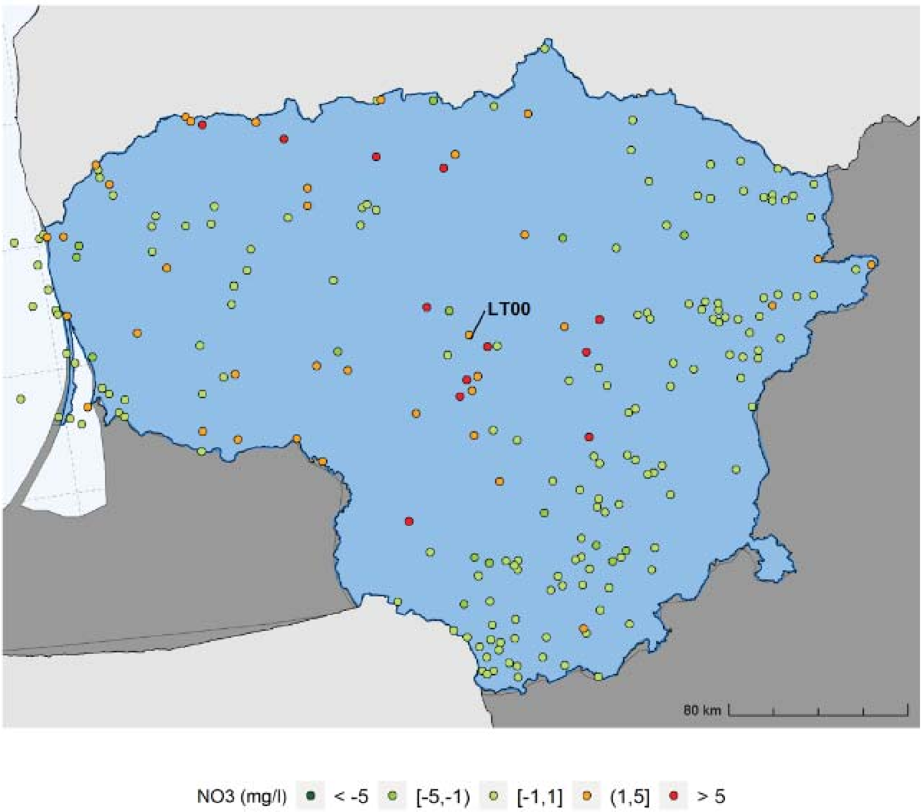


Figure 10. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis).

Surface water average annual nitrate concentration trend



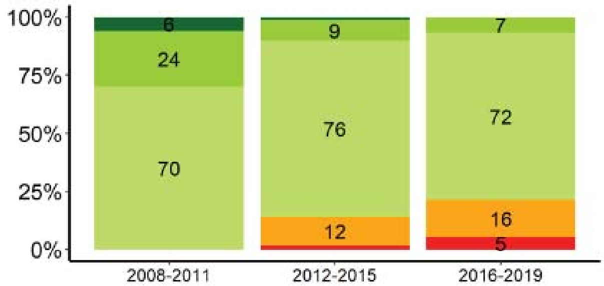


Figure 11. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information.

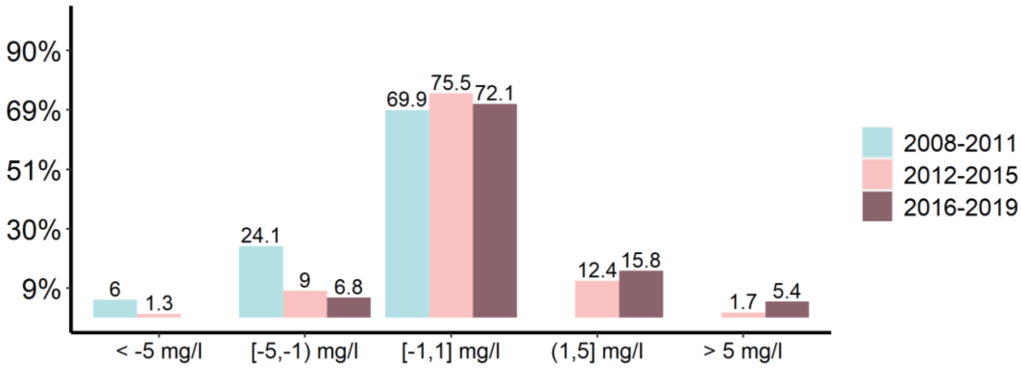
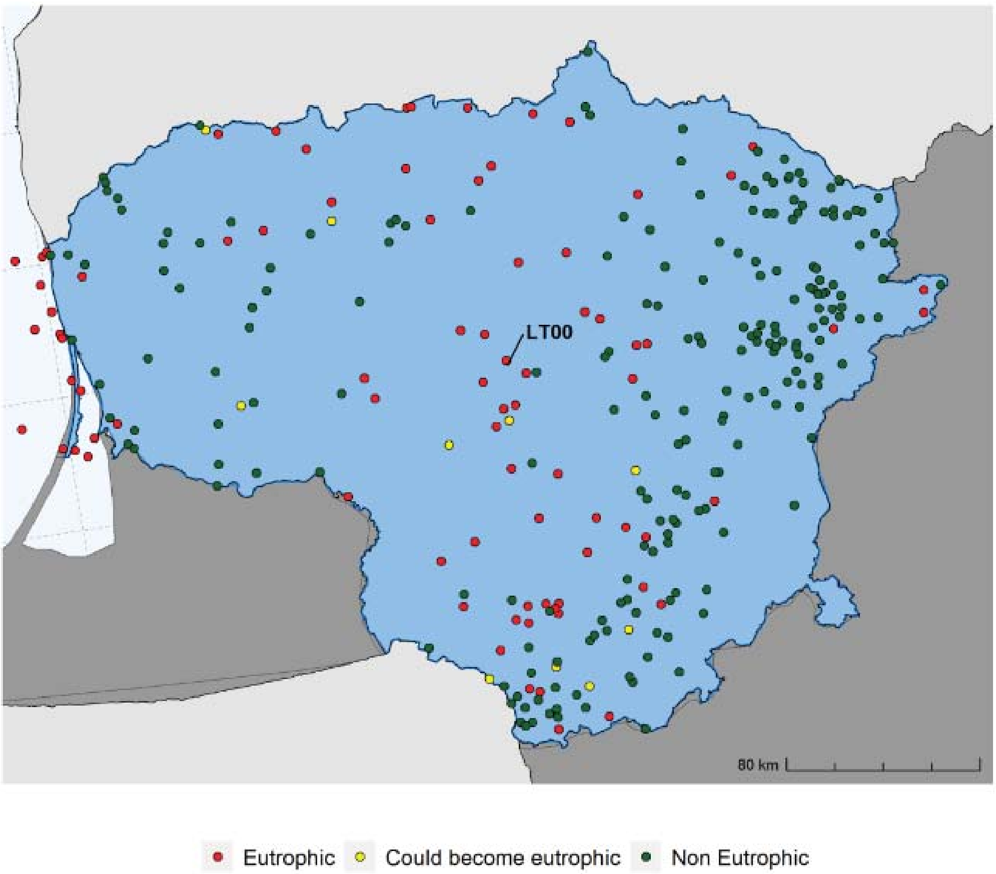


Figure 12. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis).

Surface Water Eutrophication



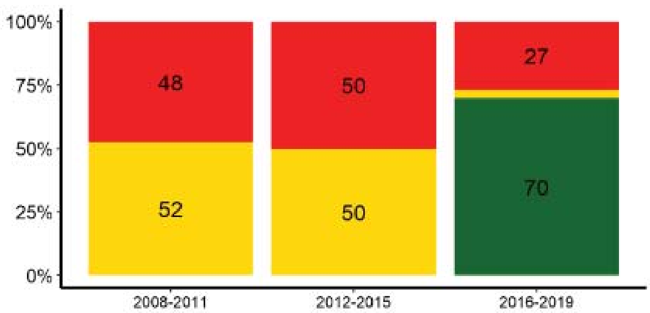


Figure 13. Spatial distribution of eutrophic status (map) and corresponding percentage of monitoring points per classes of status by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information.

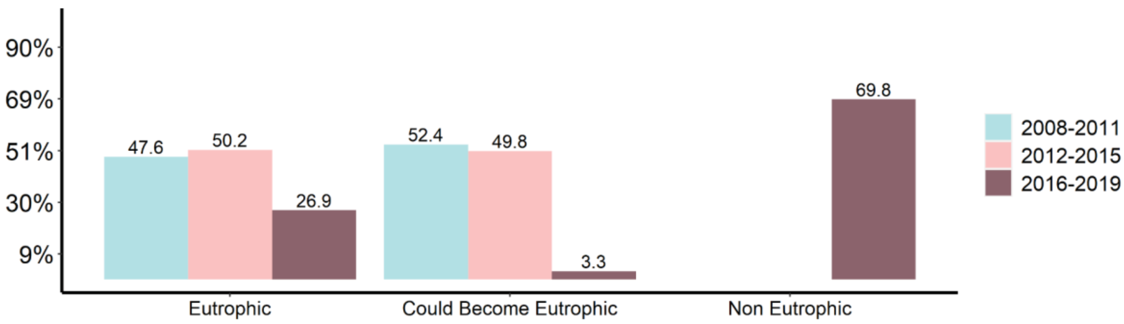
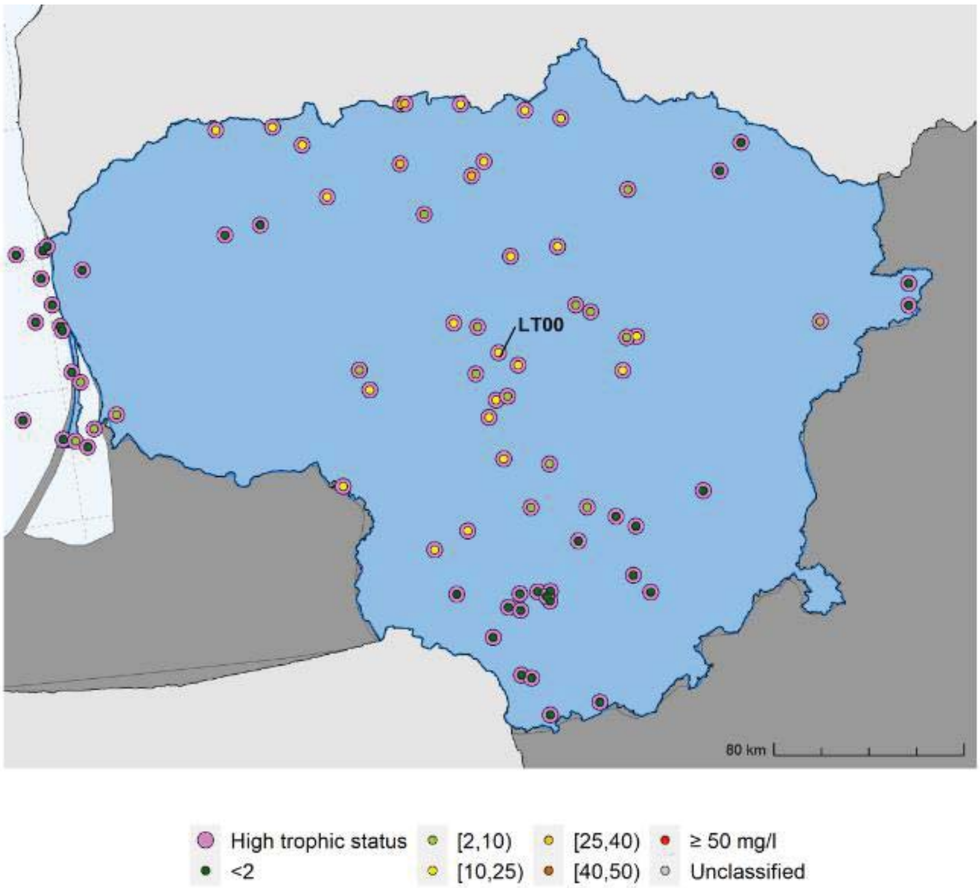


Figure 14. Comparison of percentage of monitoring points in the three reporting periods by classes of status (x axis)

The Eutrophic status vs average NO3 annual concentration



NUTS ID	NUTS NAME	High trophic status	Number of stations by classes of concentration						
			<2 mg/l	[2,10) mg/l	[10,25) mg/l	[25,40) mg/l	[40,50) mg/l	>=50 mg/l	Unclassified
LT00	Lietuva	66	26	14	22	4	0	0	0
NO_NUTS	SALINE	16	13	3	0	0	0	0	0
	Total	**82**	**39**	**17**	**22**	**4**	**0**	**0**	**0**

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

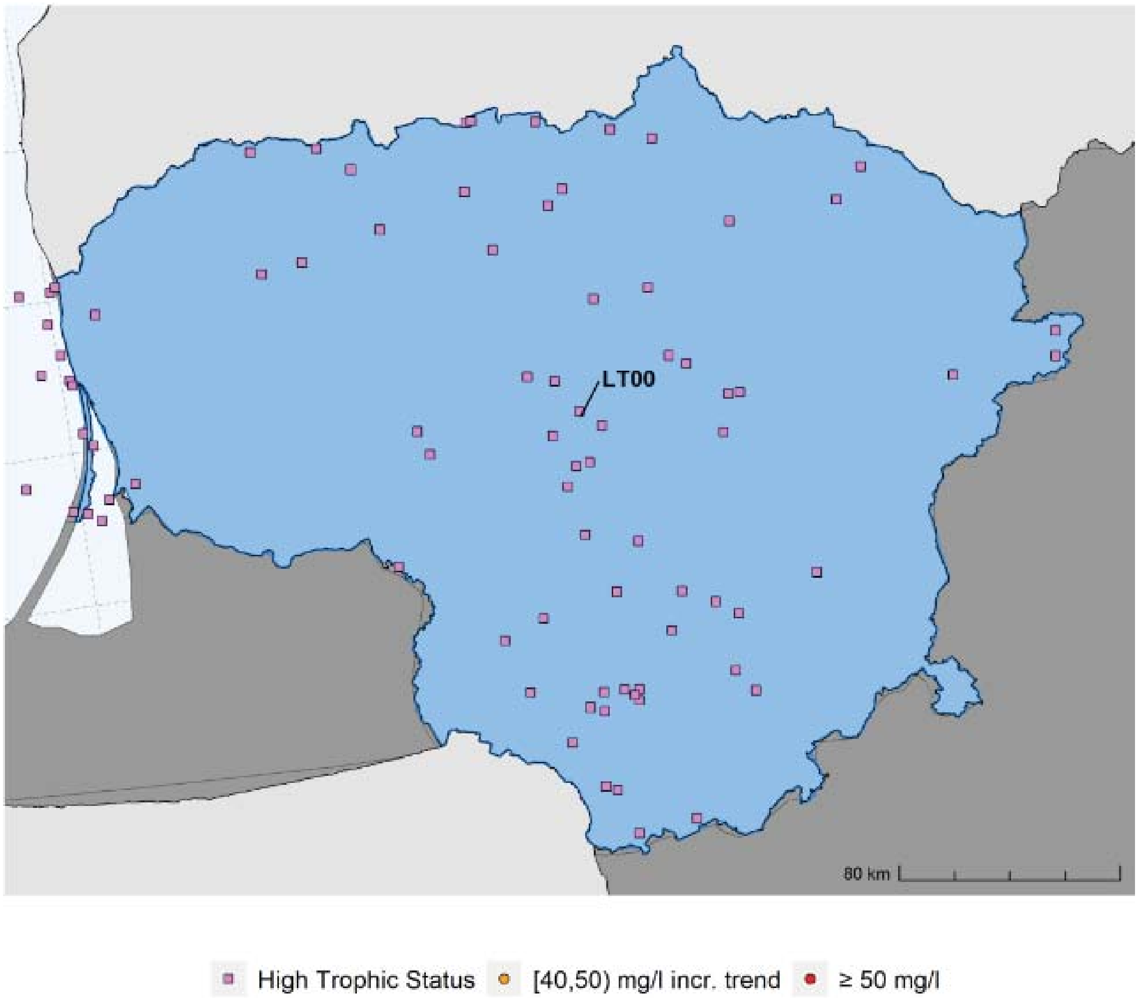
The analysis shows all the SW monitoring stations with the higher trophic status and the corresponding value of NO3 concentration. The map shows the spatial distribution of these points, and the table reports the number of stations with measurements with highest trophic status and the corresponding stations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

The trophic level of rivers, lakes and reservoirs has been assessed in terms of the mean annual concentrations of total nitrogen (TN) and total phosphorus (TP) by assigning the water body to one of five ecological status classes based on the water body type and water body category. The high and good classes are reclassified as non-eutrophic while the rest of the classes fall into the eutrophic category. The majority of rivers and lakes/reservoirs are non-eutrophic while all transitional, coastal and marine are eutrophic. The same was observed in 2012-2015 for transitional waters.
A different methodology was used for transitional waters in the periods 2008-2011 and 2012-2015 using Winberg scale in terms of the amount of chlorophyll-a. The trophic status of the surface waters was assessed using Vinberg's scale by chlorophyll-a concentrations.
The trophic status of water bodies in 2016-2019 was assessed using indicators of eutrophication (chlorophyll a, total nitrogen and total phosphorus) by comparing them to the targets set for the implementation of the Water Framework Directive (2000/60/EC) and the Marine Strategy Framework Directive (2008/56/EC).

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	16	3	43
5	Lake/reservoir water	50	7	170
6	Transitional water	7	0	0
7	Coastal water	8	0	0
8	Marine water	1	0	0
9	Not specified	0	0	0
	Total	**82**	**10**	**213**

Surface Water quality hotspot



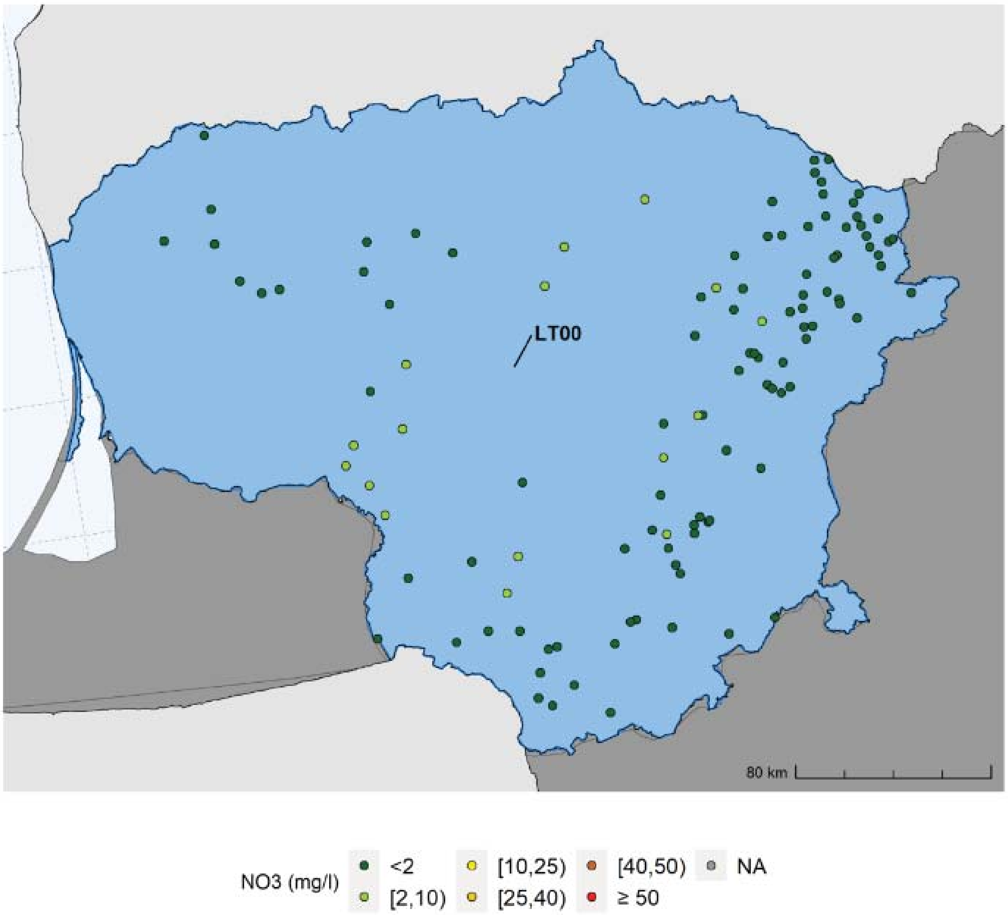
NUTS ID	NUTS NAME	High trophic status	>=40 and < 50 mg/l incr.trend	>=50 mg/l
LT00	Lietuva	66	0	0
NO_NUTS	SALINE	16	0	0
	Total	**82**	**0**	**0**

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

The hotspot analysis identifies all the SW monitoring stations that have high trophic status, 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



Station Type	Description	Number of removed stations			
		total removed	with measurements	with trends	with trophic status
4	River water	5	5	5	0
5	Lake/reservoir water	109	109	68	109
6	Transitional water	0	0	0	0
7	Coastal water	0	0	0	0
8	Marine water	0	0	0	0
9	Not specified	0	0	0	0
	Total	**114**	**114**	**73**	**109**

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

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

Measures in the Action Programme

The first Action Programme for Lithuania was published in 2003 and the last revision was made in 2017. The first Code of Good Agricultural Practice was drawn up in 2000 and was recently revised on 8 April 2019. Particular attention was paid to improving soil fertility in an environmentally friendly and resource-friendly way, promoting anti-erosion and sustainable farming, the rational application of fertiliser to crops, plant protection, water and waste management, the utilisation of renewable energy sources and the maintenance and care of landscapes and biodiversity. The recommendations on methods and the time for incorporating manure and slurry, land governance and the application of crop rotation have been updated for the purpose of adapting to and mitigating the consequences of climate change. On the basis of the recommendations of the updated Code, the manure and slurry management requirements are scheduled to be reviewed during the period of implementation of the next Action Programme. The training programme on promoting the application of the Code's recommendations is also scheduled to be updated or, if necessary, a new one is to be drawn up.

Since all of Lithuania has been designated as nitrate vulnerable zone (NVZ), so a common action programme has been approved and is in force for the entire territory of Lithuania. The measures under the updated Action Programme are summarized in the following table. The updated measures concern: restrictions for application on sloped soils, crop rotation, cultivated areas without plant cover in the winter season, fertilization plans and spreading, and other specific new measures.

No individual cost-effectiveness analyses of good practices were carried out in Lithuania. However, in the process of implementing the WFD and drawing up the third river basin district management plans, new measures for reducing diffuse-source pollution will be identified.

Table 6. Details of the Action Programme

Measure	General details in Action Programme (*)
Period of prohibition of fertiliser application	• Prohibited: 15 November to 1 April (Order D1-367/3D-342, para.18-19) • Restricted in summer: 15 June to 1 August (Order D1-367/3D-342, para.18-19)
Restrictions for application on sloped soils	• No cultiveted crops when =12% (Order No 3D-932, para. 2.5)
Restrictions for application on soaked, frozen, or snow-covered soils	• Not allowed in these situations (Order D1-367/3D-342, para.18)
Restrictions for application near watercourses (buffer strips)	• The description of the procedure for establishing surface water body protection zones and coastal buffer zones (hereinafter referred to as 'the Description of the procedure') lays down the principles for establishing surface water body (excluding the Baltic Sea and the Curonian Lagoon) protection zones and coastal buffer zones (Order No 540)
Effluent storage works	• Not specified
Capacity of manure storage	• Manure tanks must be sufficient for at least six months (Order D1-367/3D-342, para.15) • Solid manure may be kept temporarily in field stacks but for no longer than six months (Order D1-367/3D-342, para.16)
Rational fertilisation (e.g., splitting fertilisation, limitations)	• Rules consistent with the Code of Good Agricultural Practice taking into account the characteristics of the vulnerable zone concerned, in particular soil conditions, soil type and slope
Crop rotation, permanent crop enhancement	• Recommendations on crop rotation, cultivation and the application of fertiliser on slopes to combat erosion, as set out in the Code of Good Agricultural Practice
Vegetation cover in rainy periods, winter	• Encouraged to maintain stubble fields through the winter (Order No 3D-254)
Fertilisation plans, spreading records	• A fertiliser plan is mandatory when applying fertiliser to 30 or more hectares. It is drawn up on the basis of soil survey or monitoring data, not more than three years old, on the accumulation of nitrogen and phosphorus in fertilised fields (Order D1-367/3D-342, para. 22) Crops must be fertilised using optimal doses of fertilising products recommended by scientific institutions, or on the basis of manufacturers' requirements, or in accordance with an established fertiliser plan (Order 3D-332, para. 5) An agricultural operator using mineral fertiliser must fill in a logbook of the fertilisers used no less than twice during the current year: once by 1 July and once by 31 December (Order 3D-332, para. 16)
Other measures	• Minimum soil cover - arable land (Order 3D-932, para. 2.4) • Restrictions on the amount of phosphorus
Date for application limit of 170 kg N/ha/year:	• Not specified

(*) Order No D1-367/3D-342 of the Minister for the Environment and the Minister for Agriculture of 14 July 2005

Order No 3D-932 of the Minister for Agriculture of 5 December 2014

Order No 3D-254 of the Minister for Agriculture of 3 April 2015

Order No 3D-332 of the Minister for Agriculture of 29 May 2019

Order No 540 of the Minister for the Environment of 7 November 2001

Controls

Administrative controls on the implementation of the Action Programme measures are carried out in the frame of the cross-compliance check. Checks to see whether agricultural operators are implementing the requirements of the Nitrates Directive are carried out by the Environmental Protection Department (AAD) under the Ministry of the Environment. Checks of compliance by operators applying for aid with cross-compliance requirements are carried out by the National Paying Agency. According to the AAD most of non-compliance dealt with manure storage and collection capacity (4.8%) followed by periods of land application (2.3%). The financial cost of applying the environmental measures remains one of the main reasons for incorrect implementation of the corresponding requirements within a complex competitive environment.

Designation of NVZ

Lithuania has adopted a whole territory approach.

Forecast of Water Quality

According to the national report of Lithuania if additional pollution reduction measures are not taken, nitrate concentrations in surface water bodies are not expected to diminish.

Summary

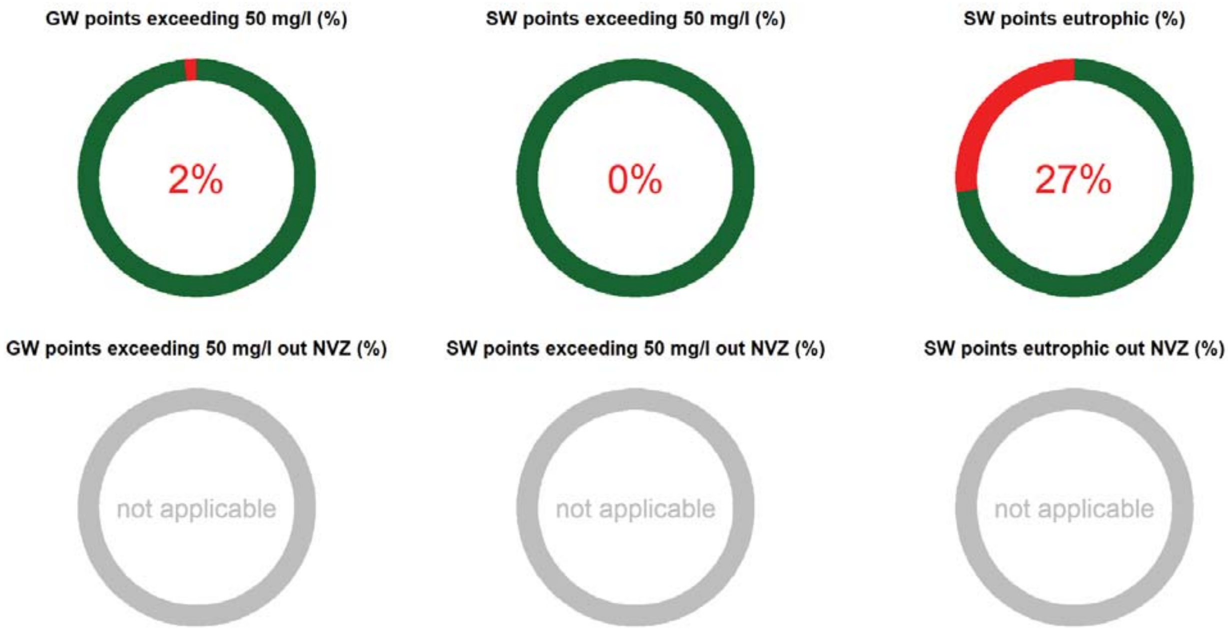


Figure 18. The summary plot for the period 2016-2019

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

Long term analysis

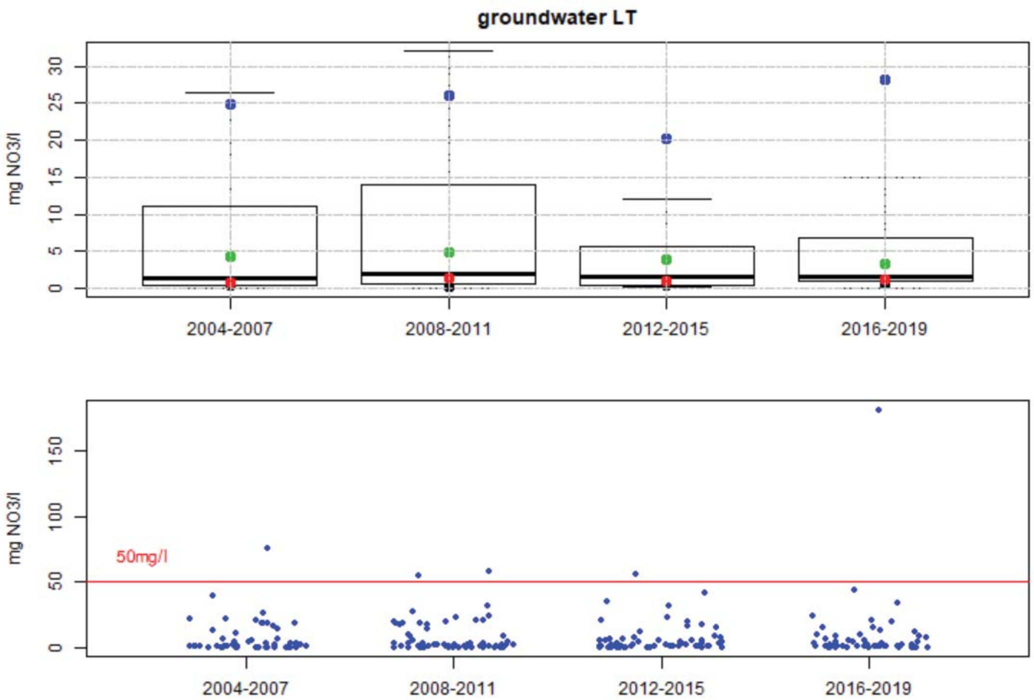


Figure 19. Time series of box whisker plots along with the distribution of the average NO3 annual concentrations for each reporting period for groundwater stations. The blue, red, green and black dots represent the mean of the fourth third, second and first quartiles, respectively.

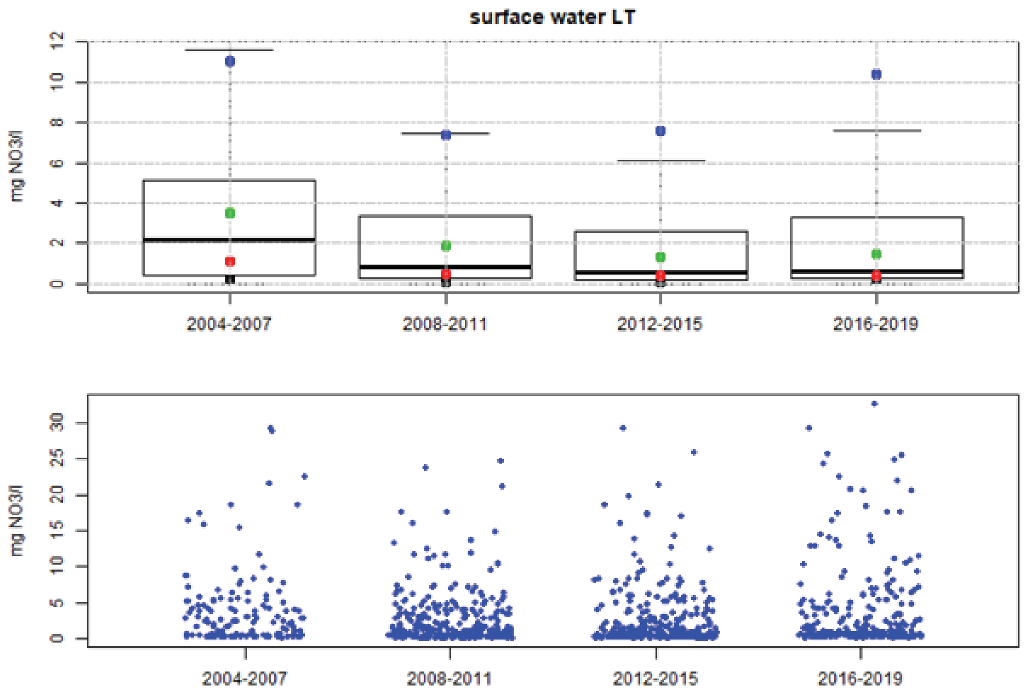


Figure 20. Time series of box whisker plots along with the distribution of the average NO3 annual concentrations for each reporting period for surface water stations. The blue, red, green and black dots represent the mean of the fourth third, second and first quartiles, respectively.

Conclusions and recommendations

Lithuania has a low livestock density, the surplus of nitrogen and phosphorus is not available for 2016-2019.

There is a well elaborated network of monitoring stations. The groundwater quality is good, however there is a high number of groundwater monitoring stations with an increasing trend. A high number of the surface waters are found to be eutrophic. Eutrophication is affecting both inland and marine waters.

Lithuania updated its action programme dates in 2017.

The Commission recommends that Lithuania reinforces its action programme to better address eutrophication of surface waters where agriculture pressure is significant.

EUROPEAN
COMMISSION

Brussels, 11.10.2021
SWD(2021) 1001 final

PART 26/38

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}

EN EN

Pressure from Agriculture

Luxembourg's utilized agricultural area amounts to 0.13 Mha, representing 54% of the total land area. The major outputs of the agricultural industry, excluding services, ranked in descending order are milk (31%), forage (22%) and cattle (14.9%). Eurostat

Major land use statistics for Luxembourg

Table 1.Utilized agricultural area (including agricultural land abroad, abbreviated as UAA)

Luxembourg	2005	2007	2010	2013	2016
Utilised agricultural area UAA (1000 ha)	NA	131	131	131	131
arable land (1000 ha)	NA	61	62	63	62
permanent grass (1000 ha)	NA	68	68	67	67
permanent crops (1000 ha)	NA	2	2	2	2
kitchen gardens (1000 ha)	NA	0	0	0	0

Note:
Eurostat (FSS)

Luxembourg's arable land has remained stable since 2005. Permanent grassland and crops were also stable.

Animal distribution in Luxembourg

Luxembourg has experienced seen a decrease in the number of pigs and poultry over last years. The livestock density index (livestock unit per hectare of Utilized Agricultural Area) has risen by 5.5% since 2013 and it is higher than the EU average of 0.8.

Table 2. Livestock statistics

Luxembourg	2005	2007	2010	2013	2016
Livestock index	1.22	1.23	1.28	1.26	1.33
dairy cows (10^6 heads)	0.04	0.04	0.05	0.05	0.05
live bovines (10^6 heads)	0.18	0.19	0.19	0.20	0.20
live pigs (10^6 heads)	0.08	0.09	0.09	0.09	0.10
live poultry (10^6 heads)	NA	NA	0.09	0.11	0.12

Note:
Eurostat (FSS)

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

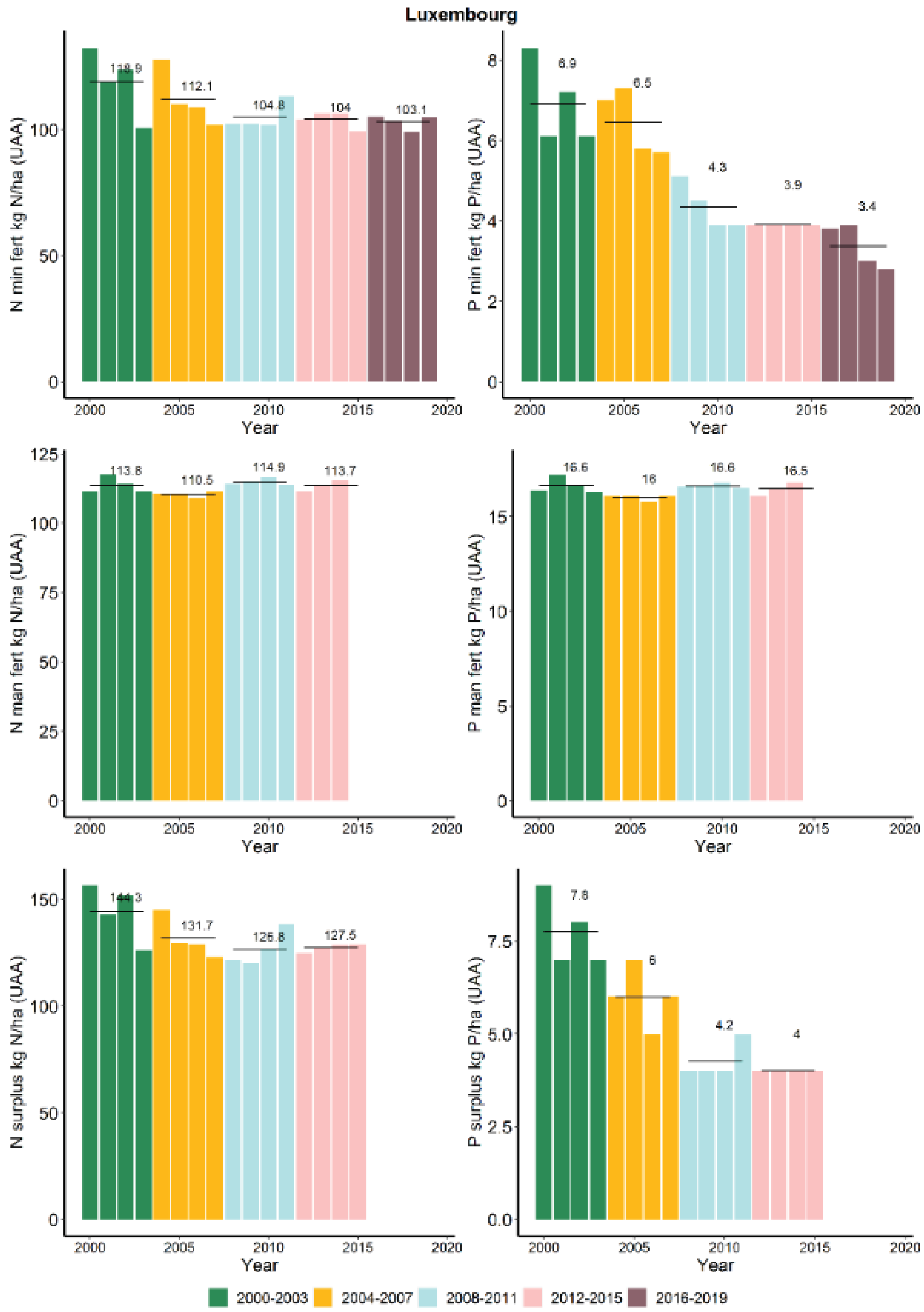


Figure 1. N and P fertilizers and gross surplus (kg/ha)

The nitrogen and phosphorus fertiliser data stem from EUROSTAT for the years 2000-2014; for the gross surplus, values are also available for year 2015. Data provided by Luxembourg have been used to complete N and P mineral fertiliser for the years 2015-2018. While the consumption of inorganic phosphorus during the last reporting period is lower than that of the previous reporting period, the consumption of manure remained stabled. The nitrogen surplus has remained stable during the period 2008-2015. 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

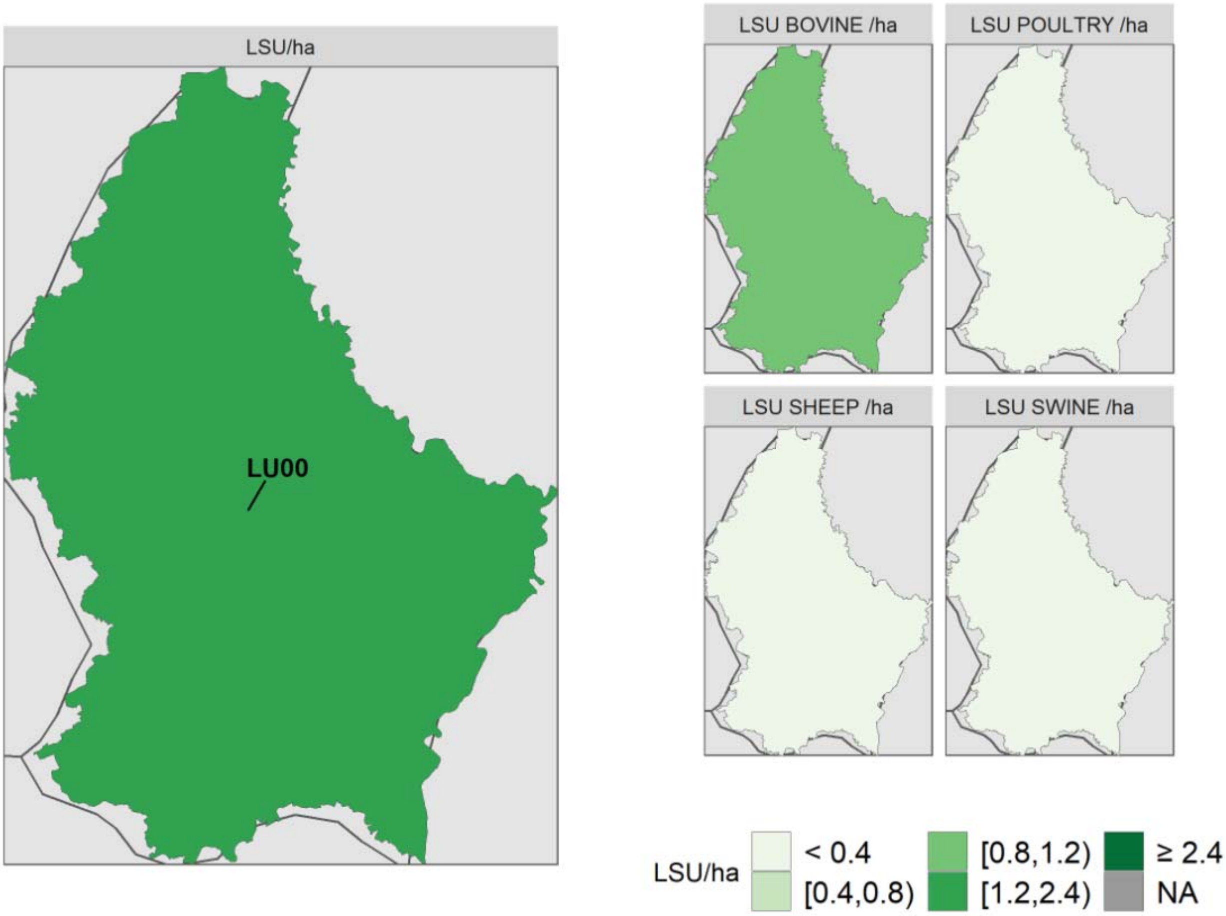


Figure 2. Map of livestock unit distribution, year 2016 (Source: Eurostat, February 2021)

Bovine represents the largest share of animal production (total LSU and LSU by animal type were retrieved individually from EUROSTAT).
In this document, the NUTS-2013 version is used.
(https://ec.europa.eu/eurostat/web/gisco/geodata/reference-data/administrative-units-statistical-units/nuts)

Water Quality Monitoring

Water bodies are monitored regularly by the Water Management Authority. The monitoring campaigns aim fulfil the requirements of both the Nitrates Directive and the Water Framework Directive. The sampling frequency ranges is normally 20 or 13 times per year. In some years WFD stations were only monitored 4 times per year. It is also foreseen to streamline as far as possible the groundwater monitoring network with that of the WFD.

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	15	15	15	15	15	15
1a	Phreatic groundwater (deep) 5-15 m	1	1	1	1	1	1
1b	Phreatic groundwater (deep) 15-30 m	0	0	0	0	0	0
1c	Phreatic groundwater (deep) >30 m	3	0	0	2	0	0
2	Captive groundwater	0	4	4	0	4	4
3	Karstic groundwater	1	0	0	1	0	0
9	Not specified	0	0	0	0	0	0
	Total	**20**	**20**	**20**	**19**	**20**	**20**

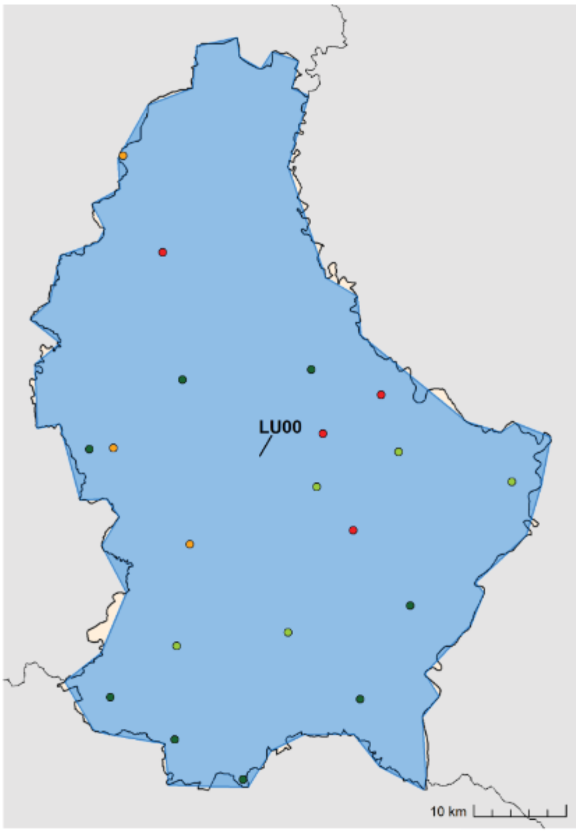
Surface water quality monitoring network

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	16	16	16	16	16	16	16	16	16
5	Lake/reservoir water	0	0	0	0	0	0	0	0	0
6	Transitional water	NA	NA	NA	NA	NA	NA	NA	NA	NA
7	Coastal water	NA	NA	NA	NA	NA	NA	NA	NA	NA
8	Marine water	NA	NA	NA	NA	NA	NA	NA	NA	NA
9	Not specified	0	0	0	0	0	0	0	0	0
	Total	**16**	**16**	**16**	**16**	**16**	**16**	**16**	**16**	**16**

Groundwater Quality

Groundwater average annual nitrate concentration



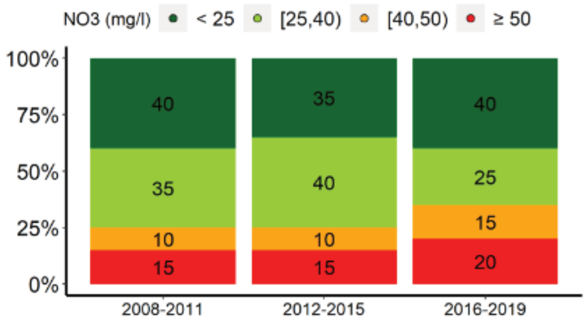


Figure 3. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis).

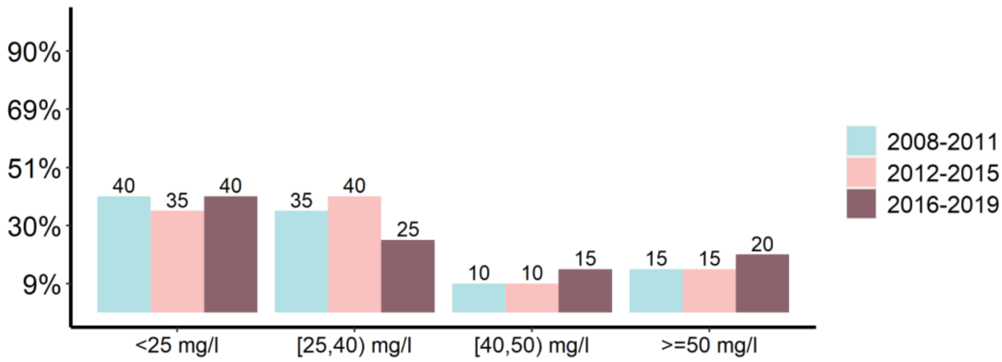
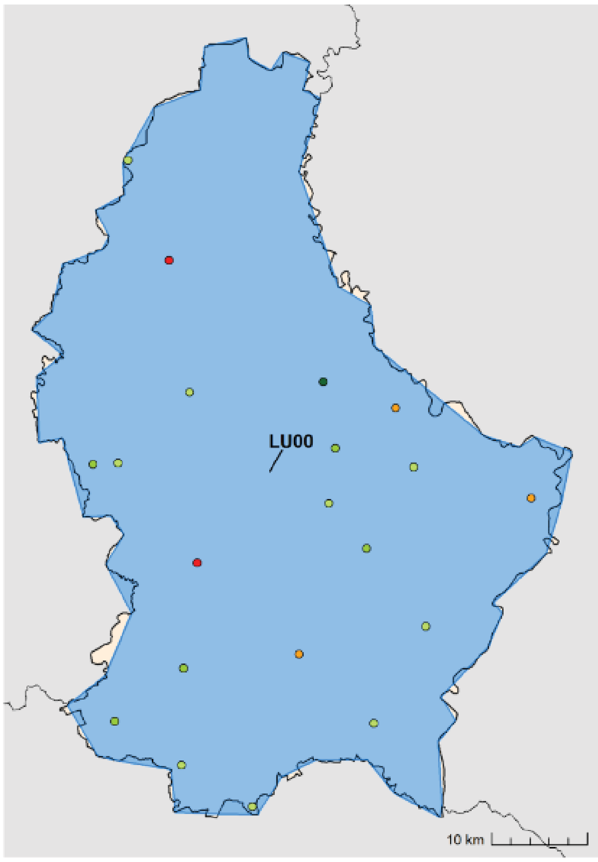


Figure 4. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis)

Groundwater average annual nitrate concentration trend



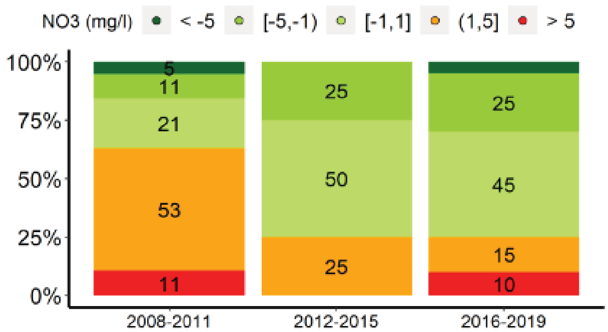


Figure 5. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information.

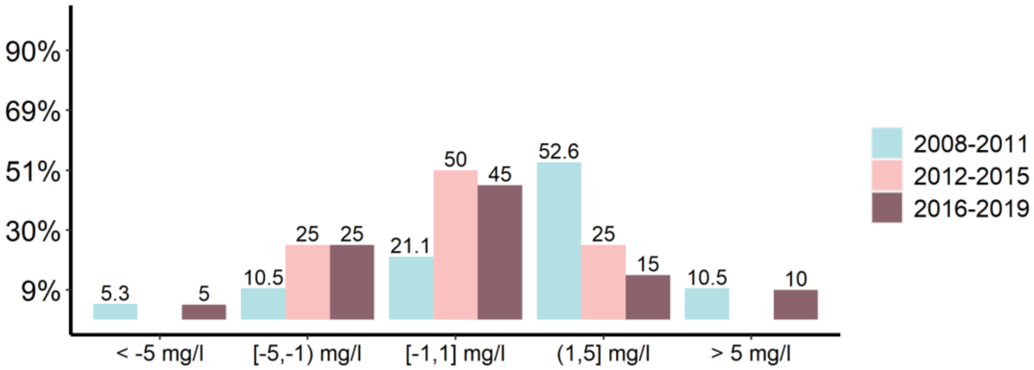
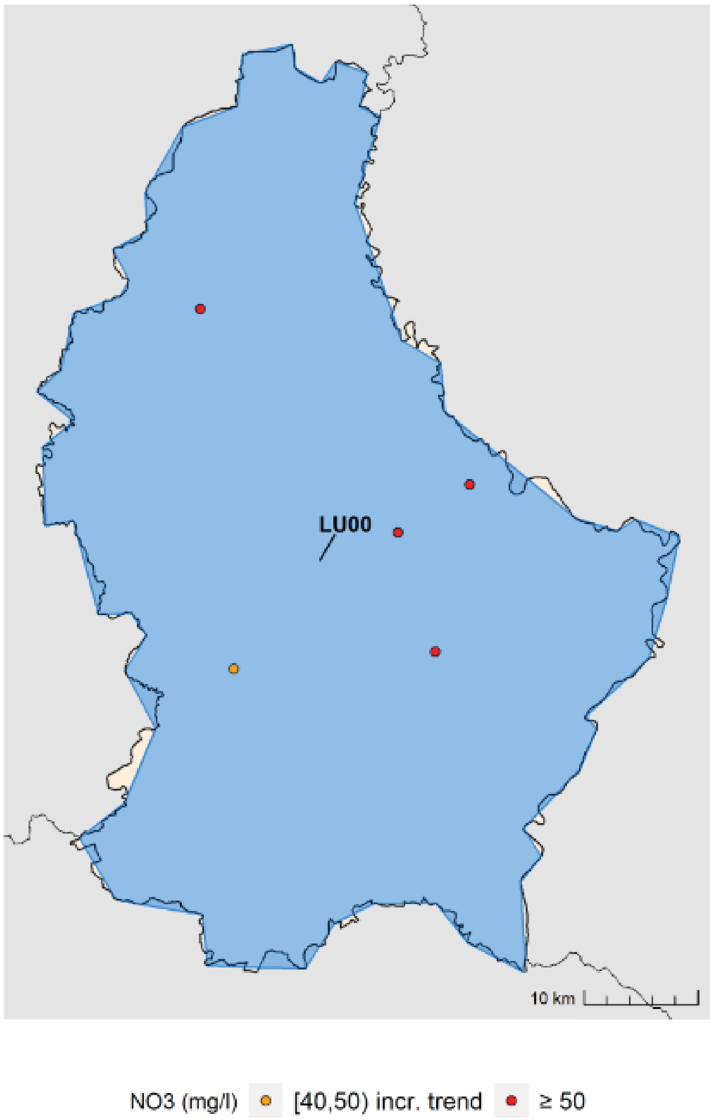


Figure 6. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis)

Groundwater hotspot



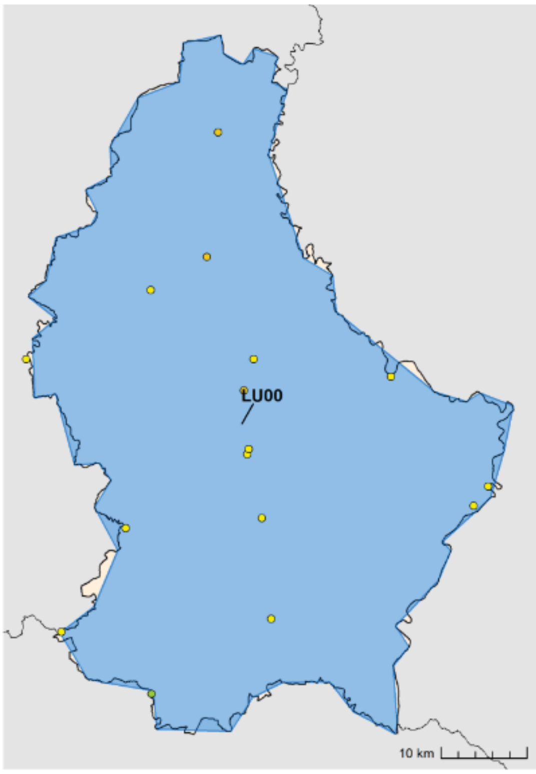
NUTS ID	NUTS NAME	>=40 and < 50 mg/l incr.trend	>=50 mg/l
LU00	Luxembourg	1	4
	Total	**1**	**4**

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

The hotspot analysis identifies all the groundwater (GW) monitoring stations that have NO3 concentration in the range of 40-50 mg/l with increasing trends and those 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 Quality

Surface water average annual nitrate concentration



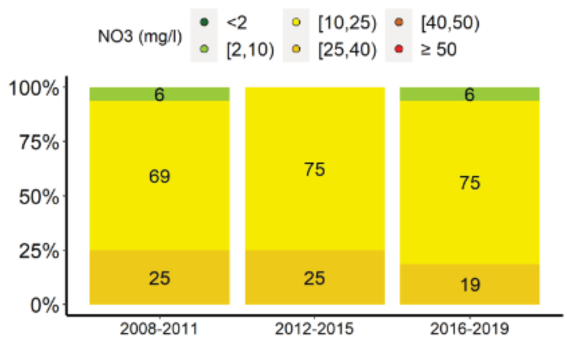


Figure 8. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis).

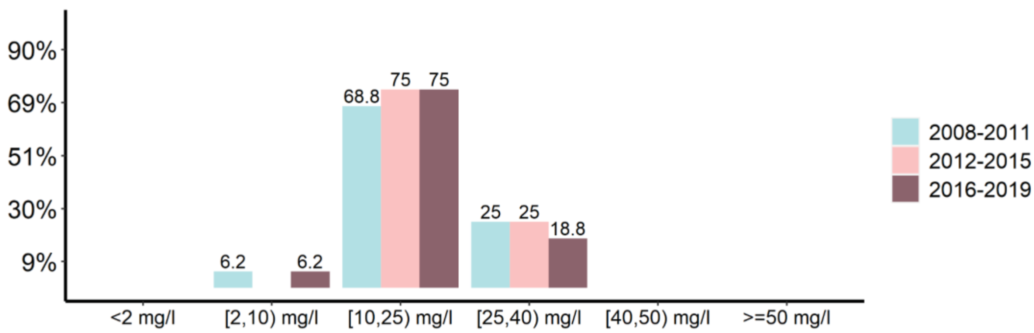


Figure 9. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis)

Surface water average annual nitrate concentration trend

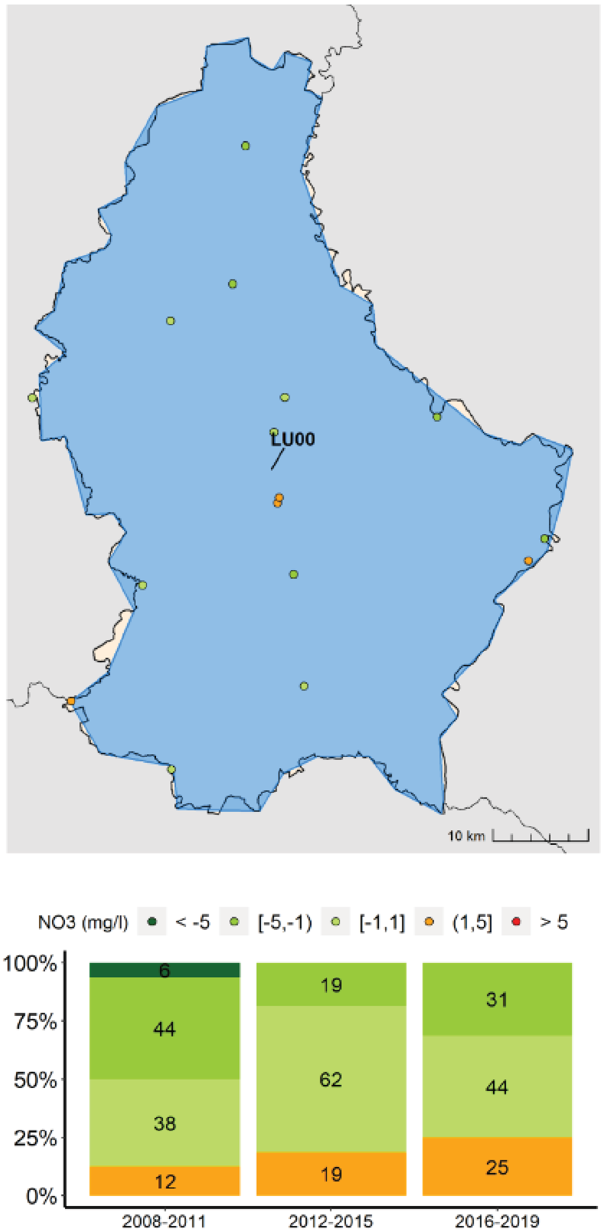


Figure 10. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis).

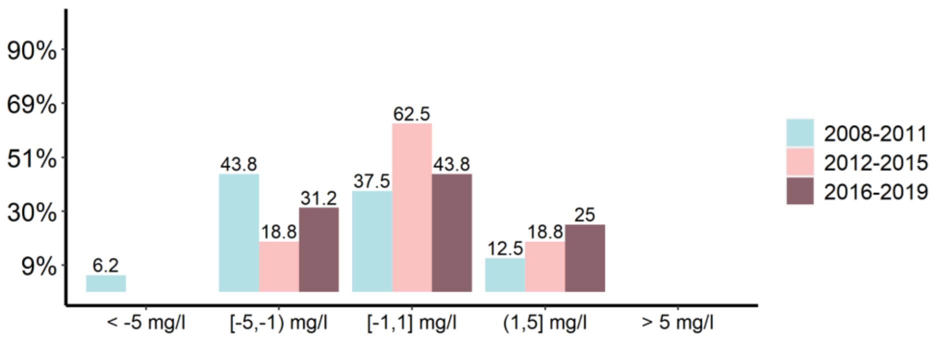


Figure 11. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis).

Surface Water Eutrophication

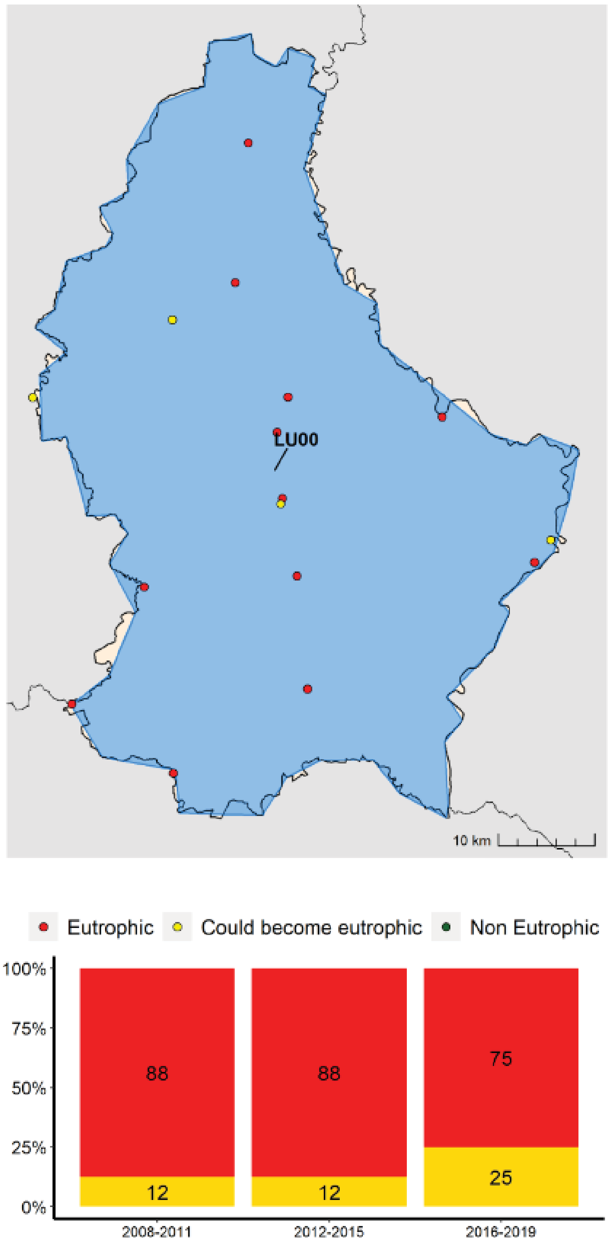


Figure 12. Spatial distribution of eutrophic status (map) and corresponding percentage of monitoring points per classes of status by reporting period (x axis).

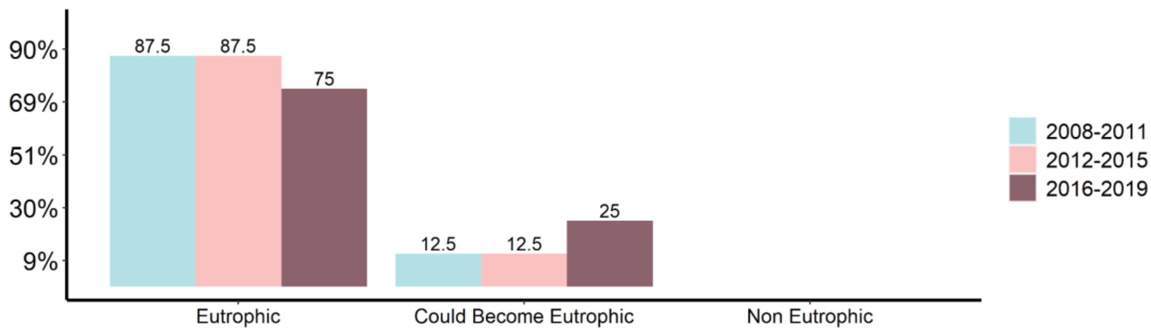
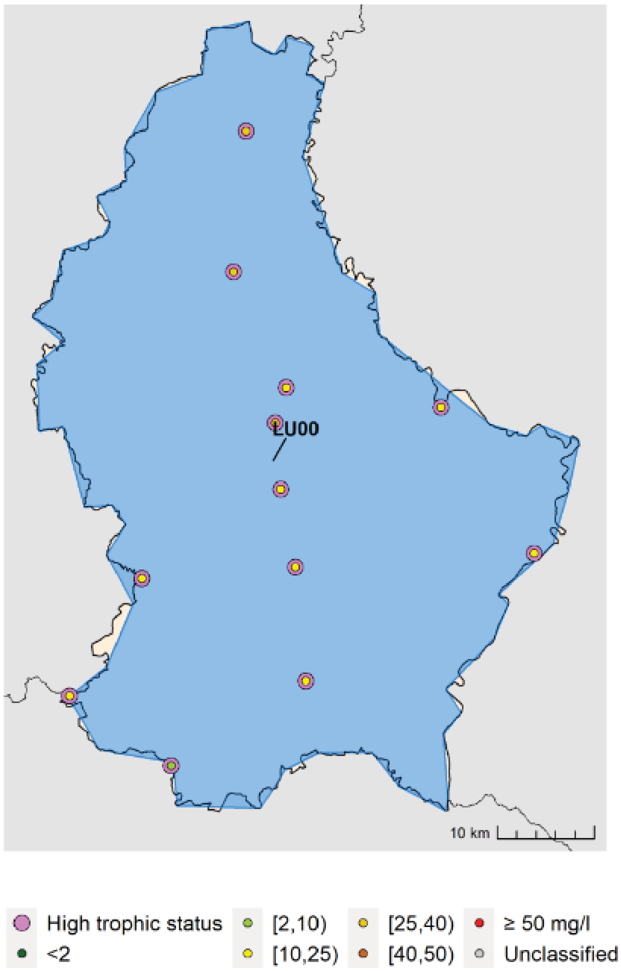


Figure 13. Comparison of percentage of monitoring points in the three reporting periods by classes of status (x axis)

The Eutrophic status vs average NO3 annual concentration



NUTS ID	NUTS NAME	High trophic status	Number of stations by classes of concentration						
			<2 mg/l	[2,10) mg/l	[10,25) mg/l	[25,40) mg/l	[40,50) mg/l	>=50 mg/l	Unclassified
LU00	Luxembourg	12	0	1	8	3	0	0	0
	Total	**12**	**0**	**1**	**8**	**3**	**0**	**0**	**0**

Figure 14. The SW monitoring stations with eutrophic status versus the average NO3 annual concentration.

The analysis shows all the surface water (SW) monitoring stations with the highest 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.

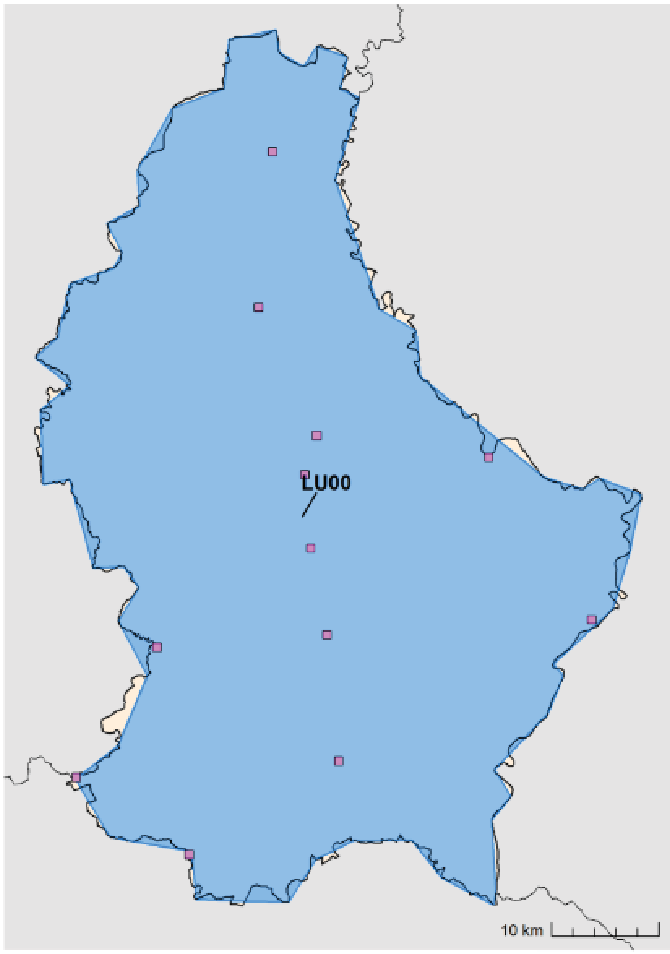
Only the NUTS of interest are reported.

The eutrophication evaluation has been put in place since 2005 and is based on nitrate, orthophosphate, total phosphorus concentration with the same classification criteria for all surface waters. The impact on the potential eutrophication for each determinant was evaluated, and the final assessment of eutrophication was done using the worst scoring parameter. Nitrate leads to eutrophication in only 3 of the sixteen monitoring stations while total phosphorus is deemed responsible for eutrophication in 9 stations (out of sixteen). A total of 12 stations are classified as eutrophic. An alternative method, the Kubiniok method has been put in place since 2015. In addition to the chemical parameters nitrate, ortho-phosphate and total phosphorus, this method introduces biological elements like macrophytes and diatoms. According to this classification 10 out 16 stations are classified as eutrophic. The two methods agreed on the classification for 14 stations.

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	12	4	0
5	Lake/reservoir water	0	0	0
6	Transitional water	NA	NA	NA
7	Coastal water	NA	NA	NA
8	Marine water	NA	NA	NA
9	Not specified	0	0	0
	Total	**12**	**4**	**0**

Surface Water quality hotspot



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

NUTS ID	NUTS NAME	High trophic status	>=40 and < 50 mg/l incr.trend	>=50 mg/l
LU00	Luxembourg	12	0	0
	Total	**12**	**0**	**0**

Figure 15. SW hotspot analysis map (top graph) and distribution by NUTS2 (lower graph) of average NO3 annual concentration greater than 40 mg/l and trophic status.

The hotspot analysis identifies all the SW monitoring stations that have high trophic status, NO3 concentration in the range of 40-50 mg/l with increasing trends and above 50 mg/l. The map displays 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.

In Luxembourg, none of the surface water monitoring stations exceed the limit of 40 mg/l.

Measures in the Action Programme

The Code of Good Agricultural Practice was defined by national legislation in 2000 and has been amended several times. During the recent years a greater number of water protection zones have been delimited. In these areas stricter restrictions often apply. Recently, out of the framework of the Nitrates Directive, but with an impact on water quality, new rules were introduced in 2018 establishing protected biotopes and habitats specifically targeted certain types of permanent grassland, stagnant water with a minimum surface area of 25 m^2, springs and natural rivers. For example, fertilization is prohibited within a radius of ten meters from a spring and for ten meters on either side of the banks of the natural stream.

Controls

Administrative controls are conducted in the framework of CAP cross compliance. About 85 yearly controls were performed for this current reporting period. No information was given concerning the number of non-compliance. The report mentions about 11 cases of accidental spills of manure and of silage leachate in the neighbouring water courses.

Designation of NVZ

Luxembourg has adopted a whole territory approach.

Forecast of Water Quality

After a careful evaluation of the monitoring data, the report by Luxemburg concludes that technical improvements including manure spreading as well as the environmental legislation should lead to a significant improvement of water quality. Additionally, the enhancement of public farm advisory services may also contribute considerably to an improvement of water quality. It is expected that the ongoing monitoring along with modelling (already in place or being developed) will help explain the lack of results in certain areas.

Summary

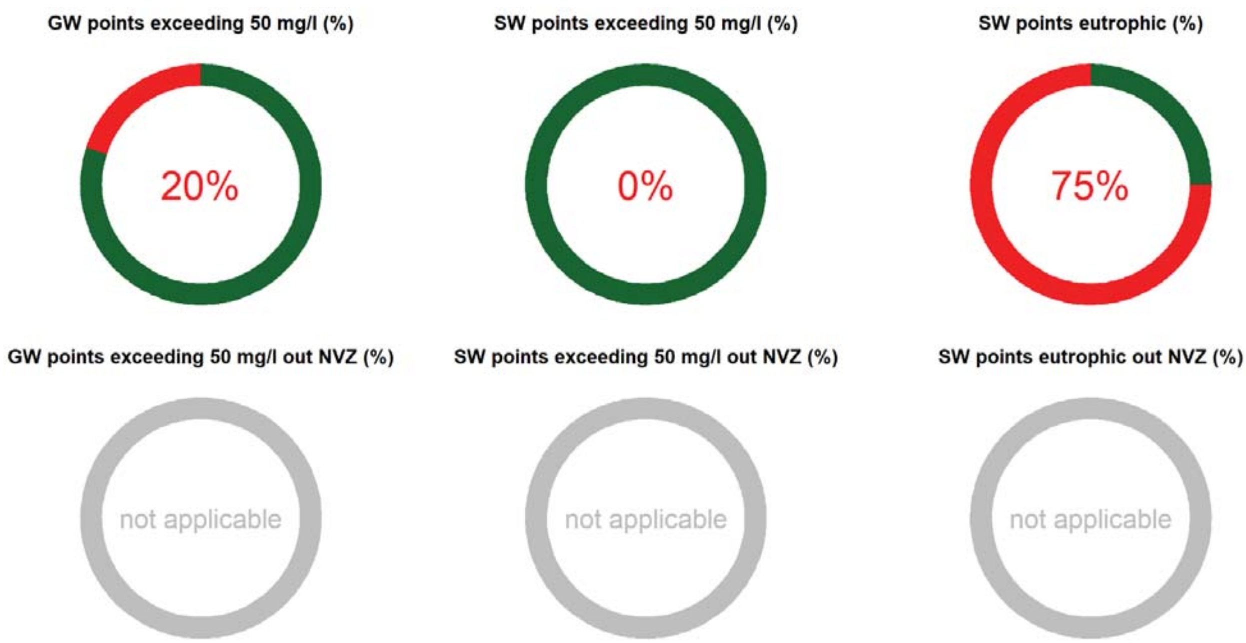


Figure 16. The summary plot for the period 2016-2019

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

Long term analysis

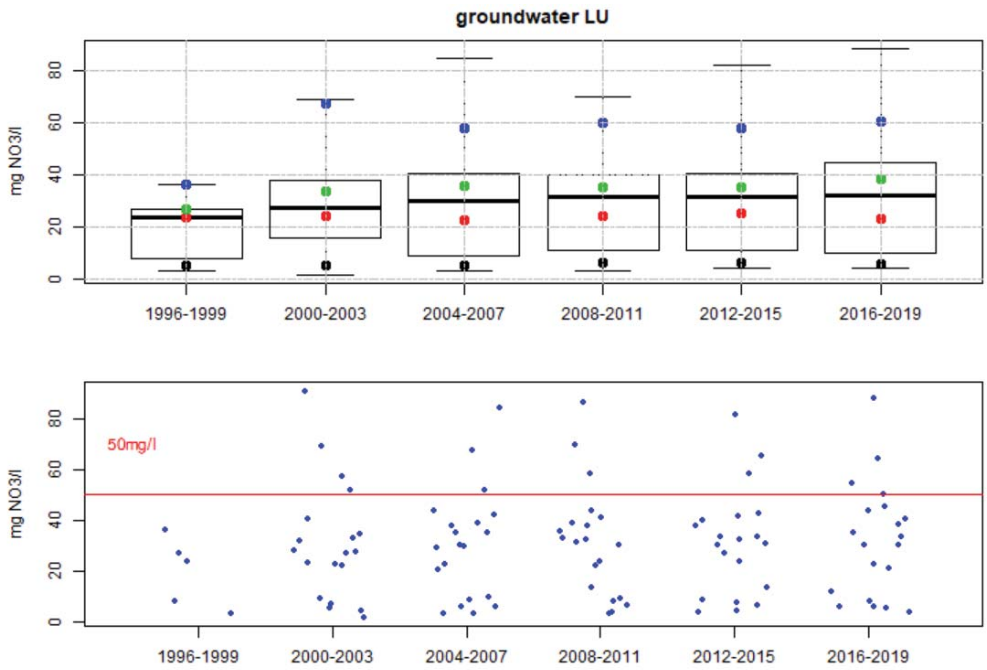


Figure 17. Time series of box whisker plots along with the distribution of the average NO3 annual concentrations for each reporting period for groundwater stations. The blue, red, green and black dots represent the mean of the fourth third, second and first quartiles, respectively.

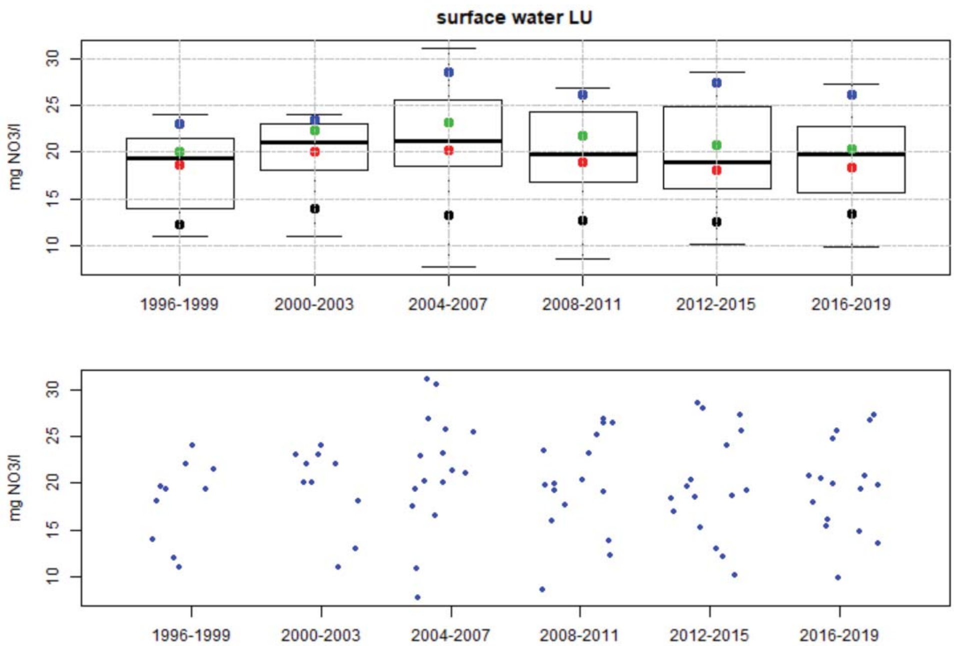


Figure 18. Time series of box whisker plots along with the distribution of the average NO3 annual concentrations for each reporting period for surface water stations. The blue, red, green and black dots represent the mean of the fourth third, second and first quartiles, respectively.

Conclusions and recommendations

Livestock pressure in Luxemburg is above the EU average. The nitrogen and phosphorus surplus are not available for 2016-2019.

There is a well elaborated network of monitoring stations. Luxemburg has a high number of groundwater monitoring stations with nitrate concentrations above 50 mg/l and a high number of monitoring stations have an increasing trend. A very high number of the surface waters are found to be eutrophic.

Luxembourg updated its action programme dates in 2018.

The Commission recommends that Luxembourg reinforces its action programme to better address of ground waters polluted hot spots and surface waters eutrophication where agriculture pressure is significant.

EUROPEAN
COMMISSION

Brussels, 11.10.2021
SWD(2021) 1001 final

PART 27/38

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

Malta's utilized agricultural area amounts 0.012 Mha, representing 37.5% of the total land area and has remained stable since 2013. The major outputs of the agricultural industry include in a decreasing order vegetables and horticultural plants (25.1%), other animal (18.6%). and milk (16.5%).

Eurostat

Major land use statistics for Malta

Table 1.Utilized agricultural area (abbreviated as UAA)

Malta	2005	2007	2010	2013	2016
Utilised agricultural area UAA (1000 ha)	NA	10	11	12	12
arable land (1000 ha)	NA	8	9	9	9
permanent grass (1000 ha)	NA	0	0	0	0
permanent crops (1000 ha)	NA	1	1	1	1
kitchen gardens (1000 ha)	NA	1	1	1	1

Note:

Eurostat (FSS)

Malta's arable land has remained stable since 2010. The permanent grassland and crops have also remained stable rom 2007.

Animal distribution in Malta

All Malta's livestock have decreased since 2013. The livestock density index has decreased since 2007 and it is significantly higher than the EU average of 0.8.

Table 2. Livestock statistics

Malta	2005	2007	2010	2013	2016
Livestock index	4.50	4.80	3.64	3.21	2.92
dairy cows (10^6 heads)	0.01	0.01	0.01	0.01	0.01
live bovines (10^6 heads)	0.02	0.02	0.02	0.02	0.01
live pigs (10^6 heads)	0.07	0.08	0.07	0.05	0.04
live poultry (10^6 heads)	NA	NA	0.98	0.91	0.78

Note:

Eurostat (FSS)

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

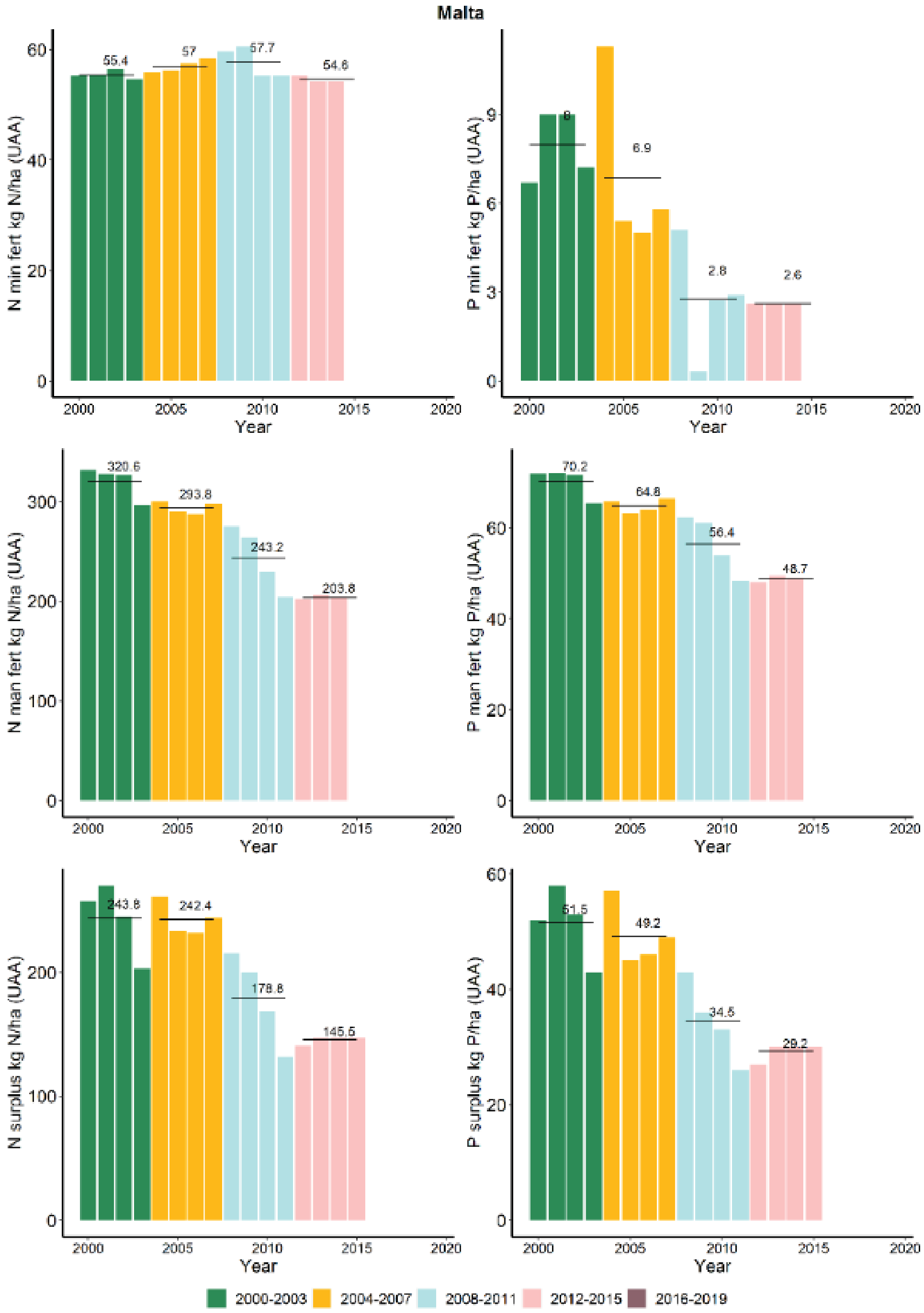


Figure 1. N and P fertilizers and gross surplus (kg/ha)

The gross nitrogen and phosphorus surpluses originate from EUROSTAT data for the years 2000-2015. Both N and P mineral fertilizers slightly decreased from the last reporting period. The usage of N and P manure has decreased since the first reporting period, but N manure exceeds the limit of 170 kg N/ha as required by Nitrates Directive. The nitrogen and phosphorus surplus decreased by 19% and 15% from the 2012-2015 reporting period. 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

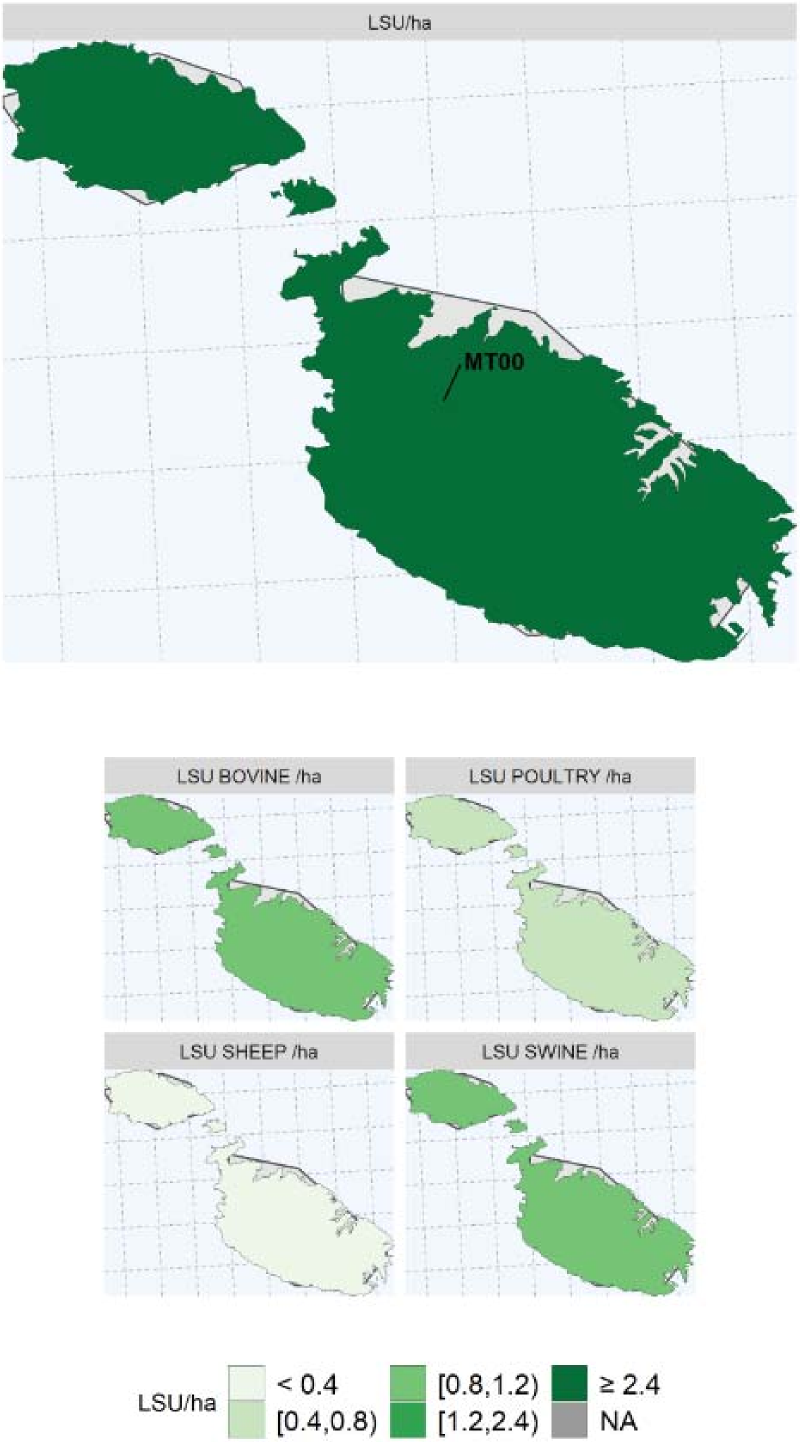


Figure 2. Map of livestock unit distribution, year 2016 (Source: Eurostat, February 2021)

Animal production is dominated by bovine and swine livestock types (total LSU and LSU by animal types were retrieved individually from EUROSTAT).
In this document, the NUTS-2013 version is used.
(https://ec.europa.eu/eurostat/web/gisco/geodata/reference-data/administrative-units-statistical-units/nuts)

Water Quality Monitoring

As part of the operational groundwater quality monitoring network developed in Malta according to Article 8 of the Water Framework Directive, nitrate concentrations are monitored in all fifteen groundwater bodies in the Malta River Basin District. There is a minimum of one monitoring station for each groundwater body, with an overall average monitoring density of one station, roughly every 8 square kilometres (for the smaller groundwater bodies, the monitoring density is even higher). Monitoring stations are sampled every six months.

An integrated approach towards monitoring of surface waters is adopted, whereby monitoring in relation to the Nitrates Directive is incorporated within the monitoring programmes for inland surface and coastal waters as reported in Malta's second Water Catchment Management Plan (WCMP) pursuant to the EU Water Framework Directive. For coastal waters, all monitoring stations in Malta's nine WFD coastal water bodies are used in this report to contribute to the assessment of effectiveness of the action programme in line with Article 5 of the Nitrates Directive and as part of the monitoring requirements set through Article 6. Such monitoring network enables the establishment of the extent of nitrate pollution in coastal waters. Malta's inland surface waters are not used for abstraction of drinking water and monitoring is undertaken in WFD inland surface and transitional water bodies as representative of surface waters in Malta. The monitoring network as reported through Malta's second Water Catchment Management Plan thus applies. Due to issues with procurement processes, the implementation of the monitoring programme has been delayed with the consequence that data for the period 2016-2019 is not available for inland surface and transitional waters. In order to address this shortcoming, Malta is seeking additional data collection processes in parallel to the implementation of the WFD monitoring network.

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

Station Type	Description	Number of stations with measurements			Number of stations with Trends		
		2008-2011	2012-2015	2016-2019	2008-2011	2012-2015	2016-2019
0	Phreatic groundwater (shallow): 0-5 m	0	0	0	0	0	0
1a	Phreatic groundwater (deep) 5-15 m	11	11	11	0	11	9
1b	Phreatic groundwater (deep) 15-30 m	4	4	4	0	4	4
1c	Phreatic groundwater (deep) >30 m	26	26	29	0	26	28
2	Captive groundwater	0	0	0	0	0	0
3	Karstic groundwater	0	0	0	0	0	0
9	Not specified	0	0	0	0	0	0
	Total	**41**	**41**	**44**	**0**	**41**	**41**

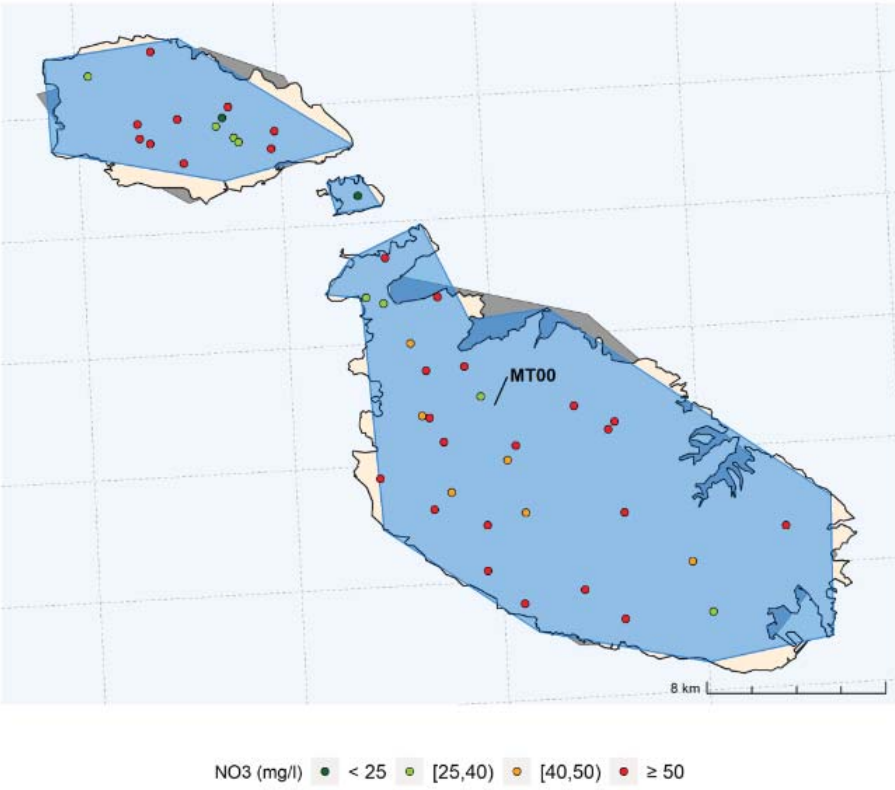
Surface water quality monitoring network

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

Station Type	Description	Number of stations with measurements			Number of stations with Trends			Number of stations with Trophic status		
		2008-2011	2012-2015	2016-2019	2008-2011	2012-2015	2016-2019	2008-2011	2012-2015	2016-2019
4	River water	7	3	0	0	0	0	7	3	0
5	Lake/reservoir water	0	2	0	0	0	0	0	2	0
6	Transitional water	3	5	0	0	0	0	3	5	0
7	Coastal water	28	44	48	0	0	22	18	41	48
8	Marine water	0	0	14	0	0	0	0	0	14
9	Not specified	0	0	0	0	0	0	0	0	0
	Total	**38**	**54**	**62**	**0**	**0**	**22**	**28**	**51**	**62**

Groundwater Quality

Groundwater average annual nitrate concentration



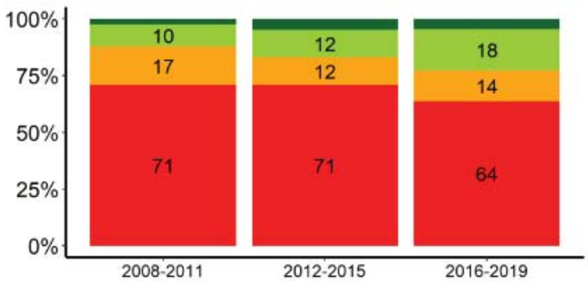


Figure 3. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information.

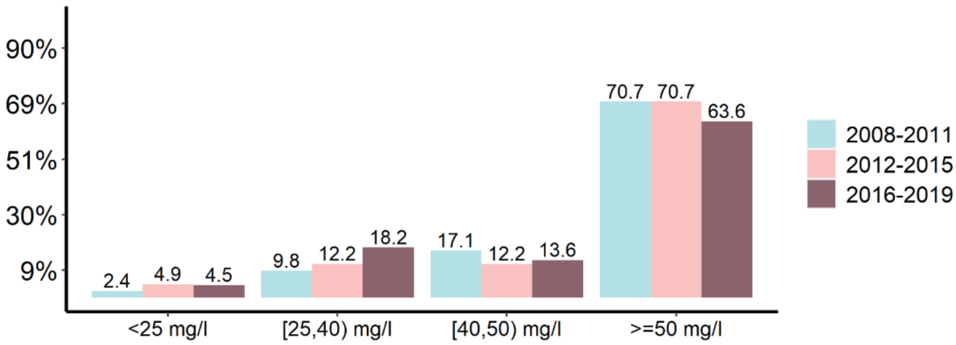
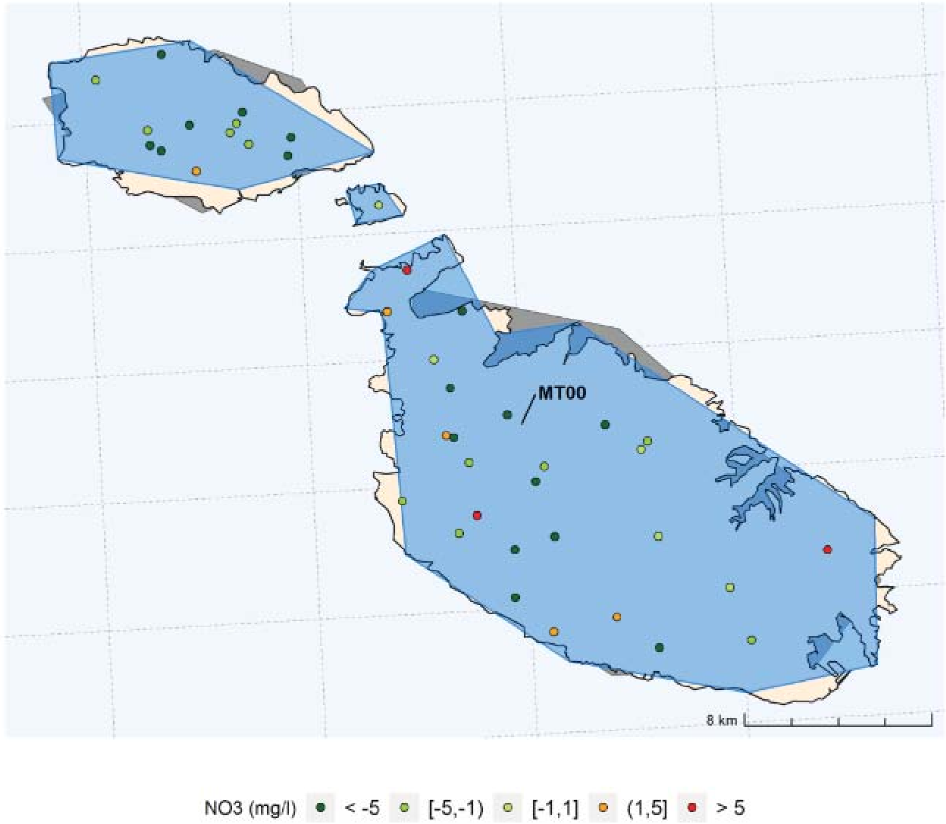


Figure 4. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis)

Groundwater average annual nitrate concentration trend



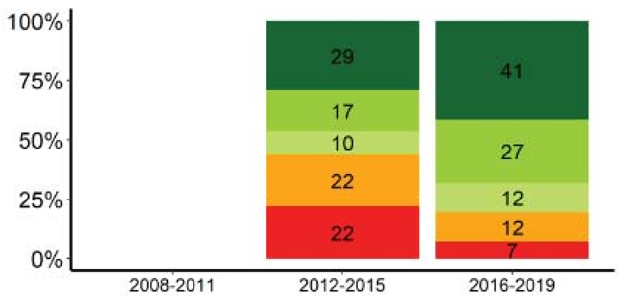


Figure 5. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis).

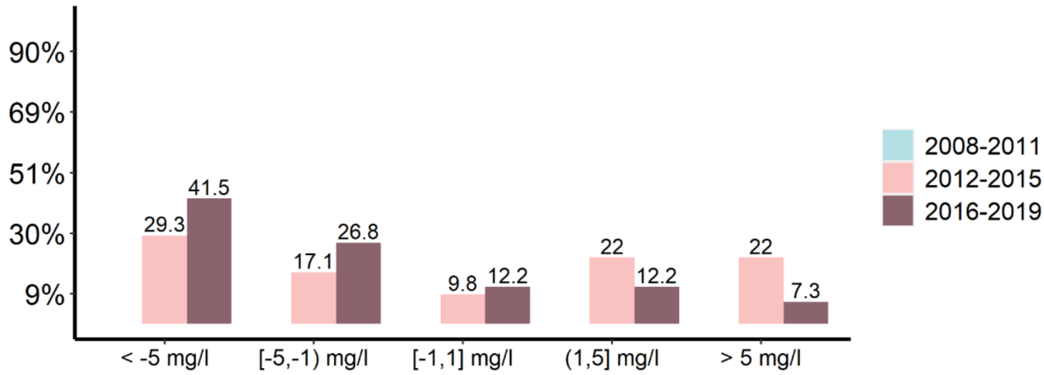
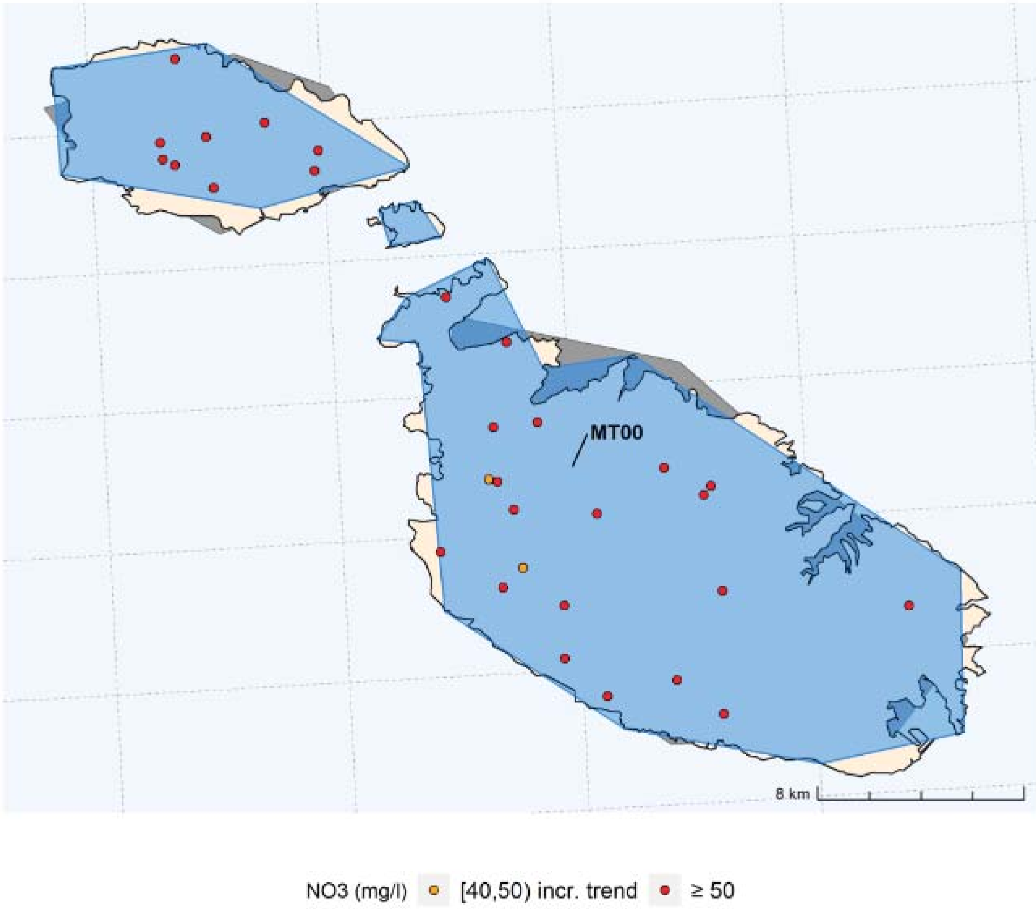


Figure 6. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis).

Groundwater hotspot



NUTS ID	NUTS NAME	>=40 and < 50 mg/l incr.trend	>=50 mg/l
MT00	Malta	2	28
	Total	**2**	**28**

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

The hotspot analysis identifies all the GW monitoring stations that have NO3 concentration in the range of 40-50 mg/l with increasing trends 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 Quality

Surface water average annual nitrate concentration

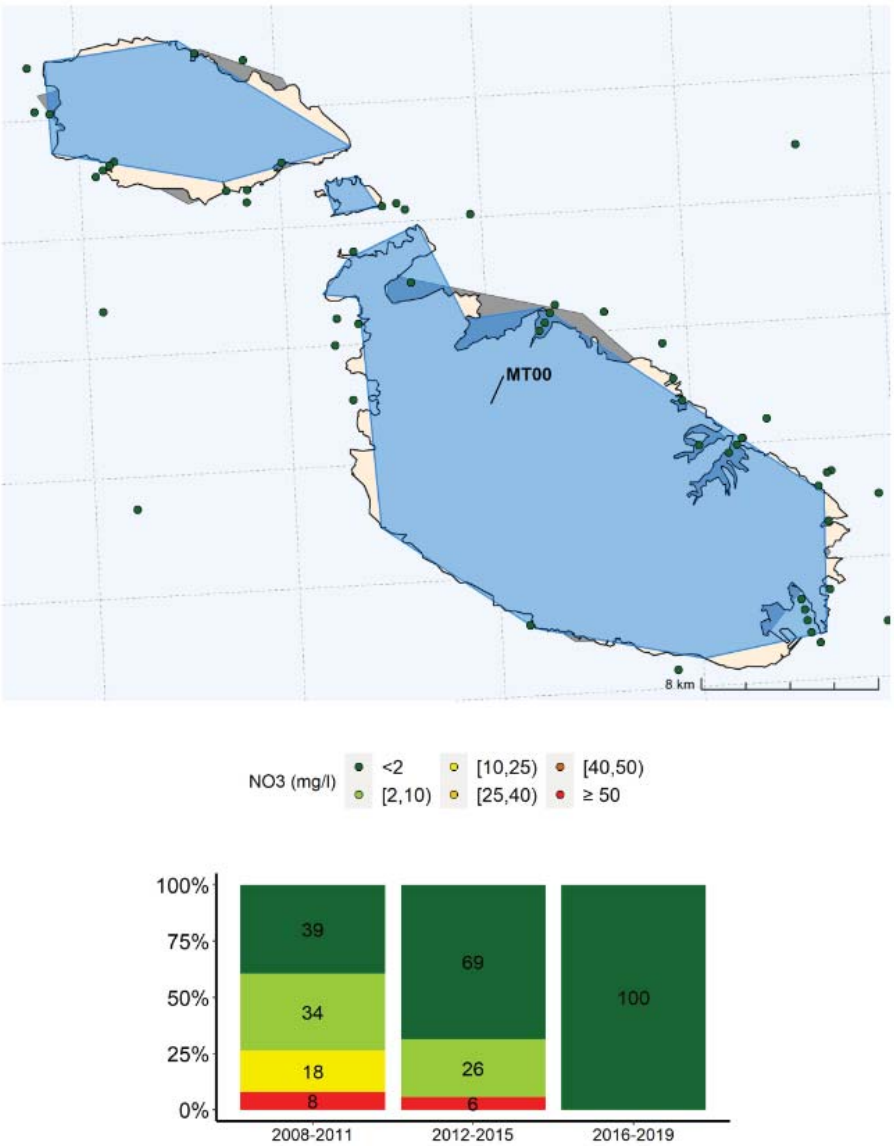


Figure 8. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis).
In the period 2016-2019, only coastal and marine water stations were submitted.

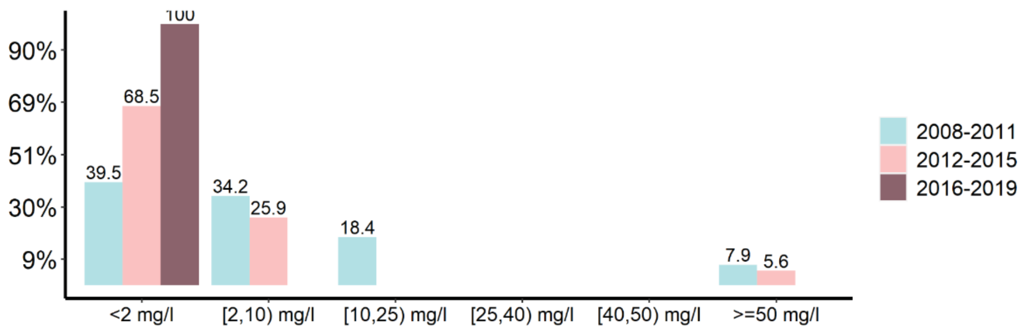
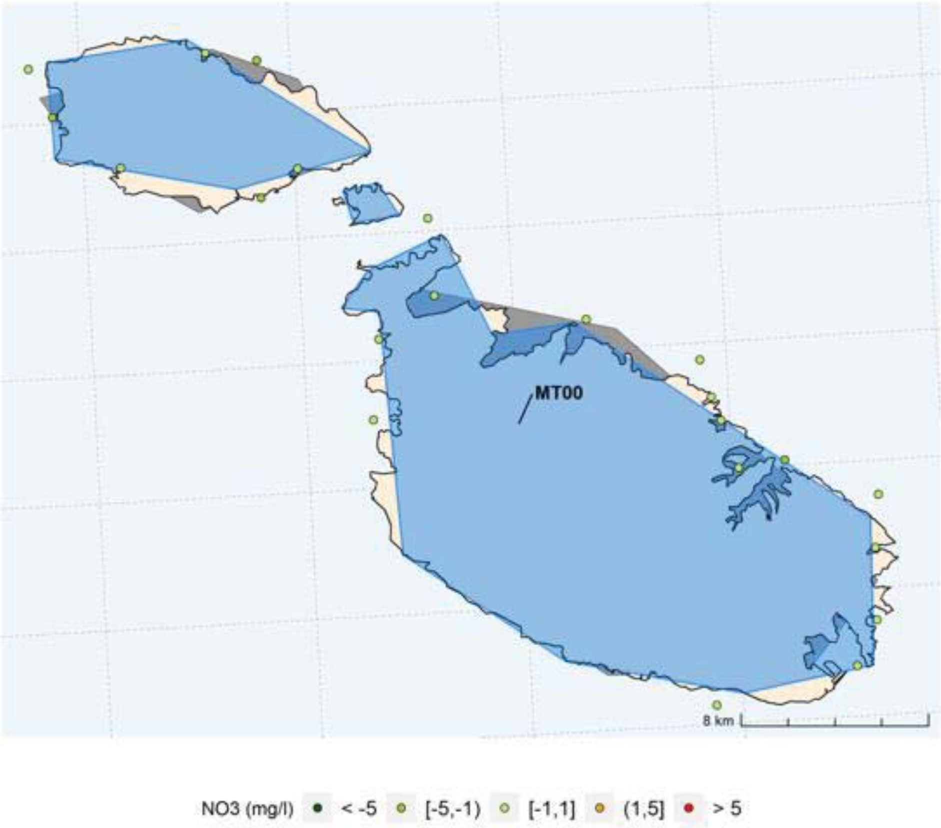


Figure 9. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis)

Surface water average annual nitrate concentration trend



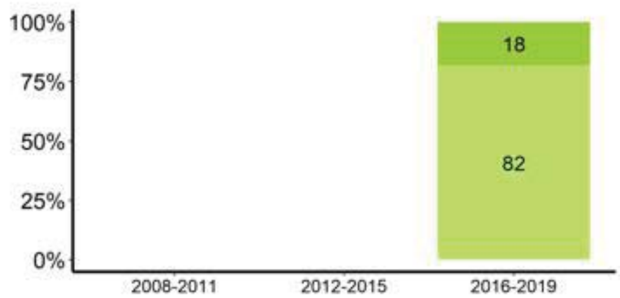


Figure 10. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis)

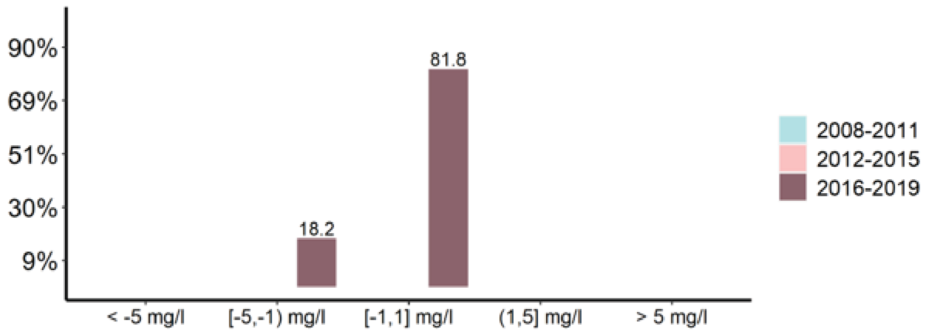
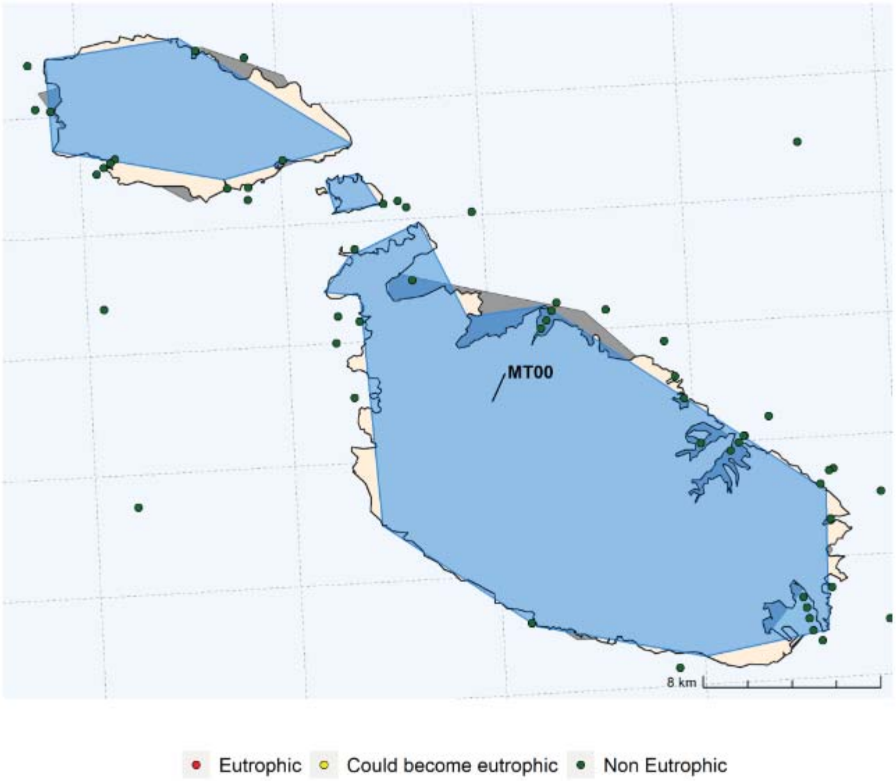


Figure 11. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis)

Surface Water Eutrophication



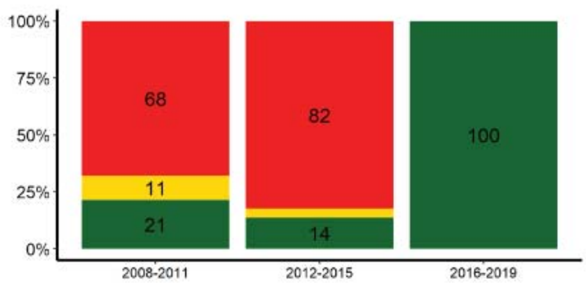


Figure 12. Spatial distribution of eutrophic status (map) and corresponding percentage of monitoring points per classes of status by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information. In the map in blue the NVZ
Note that a different methodology has been applied in the current reporting period because the TRIX index used previously did not reflect the actual concentrations of nitrates in coastal waters, hence did not reflect the trophic status.

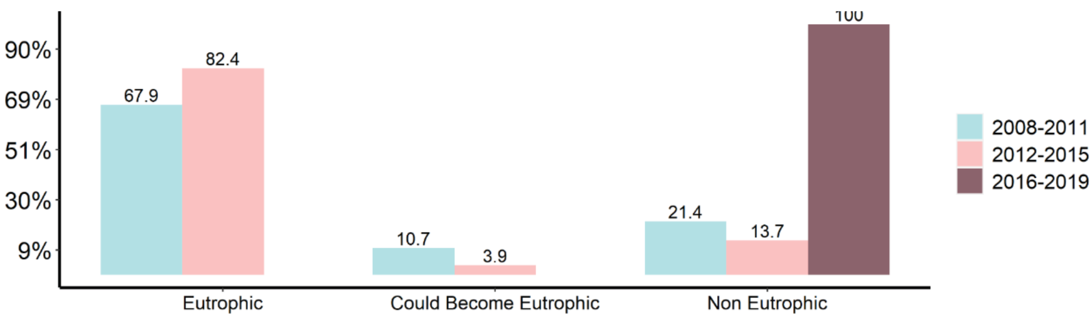


Figure 13. Comparison of percentage of monitoring points in the three reporting periods by classes of status (x axis)

Malta has not yet adopted nutrient standards under WFD processes. However, interim thresholds were used to assess nutrient conditions. The 'Good'/'Not Good' boundary for chlorophyll-a represents the WFD Good/Moderate boundary set for Type IIIE waters by Cyprus and Greece through the WFD intercalibration process. At the time of reporting, Malta is working on the adoption of such boundaries which are considered applicable to Maltese waters. However, thresholds for nutrient concentrations in the water column and secchi depth (transparency) were determined for the eastern parts of the Mediterranean as quoted by UNEP/MAP online groups. Applicability of such thresholds to Maltese waters is less likely, hence the need for expert judgement in the application of such thresholds.

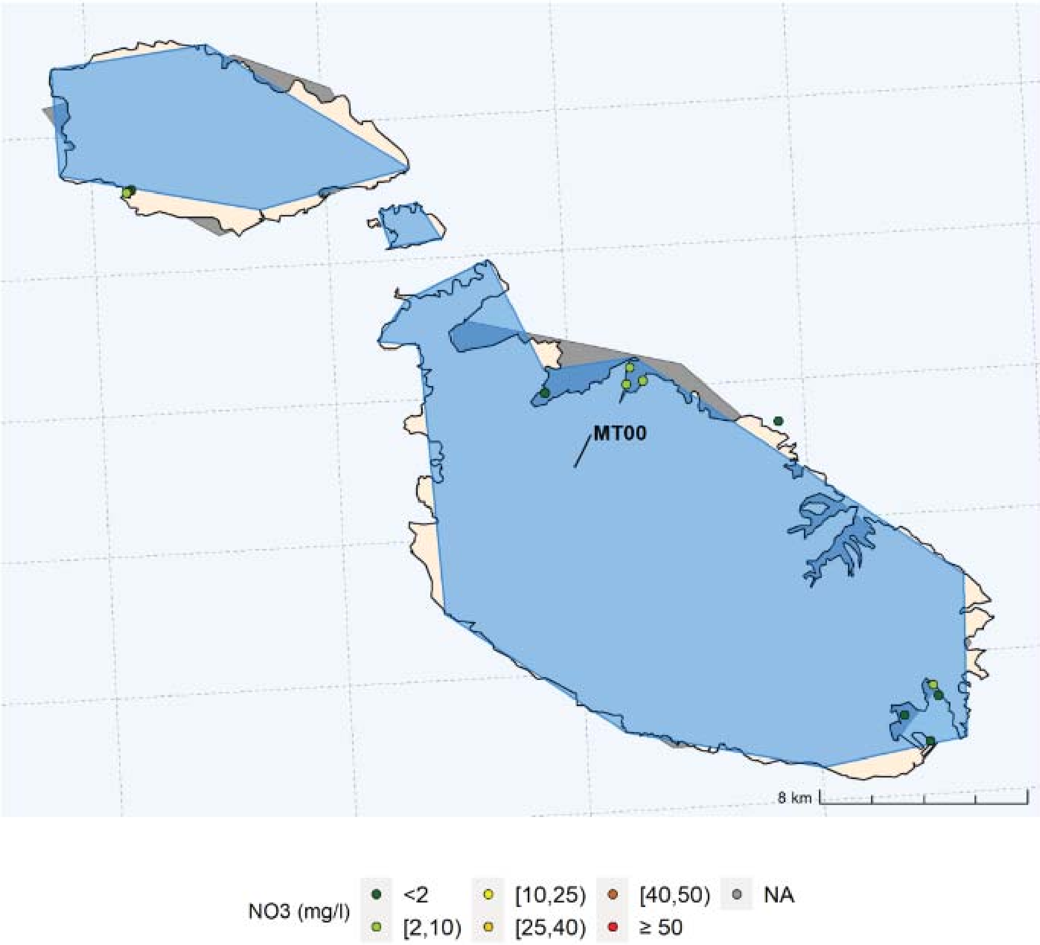
In addition, the trophic index method (TRIX) for Mediterranean coastal waters as described in Giovanardi, F. and Vollenweider, A. [1] is applied to ensure consistency with the Malta's 2016 report. The TRIX index is a linear combination of four variables (chlorophyll a, dissolved inorganic nitrogen, total phosphorus and the absolute percentage of deviation of oxygen from oxygen saturation values).

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	0	0	0
5	Lake/reservoir water	0	0	0
6	Transitional water	0	0	0
7	Coastal water	0	0	48
8	Marine water	0	0	14
9	Not specified	0	0	0
	Total	**0**	**0**	**62**

[1] Giovanardi, F. and Vollenweider, A. 2004. Trophic conditions of marine coastal waters: experience in applying the trophic index TRIX to two areas of the Adriatic and Tyrrhenian seas.

Surface Water Stations Removed



Station Type	Description	Number of removed stations			
		total removed	with measurements	with trends	with trophic status
4	River water	0	0	0	0
5	Lake/reservoir water	0	0	0	0
6	Transitional water	0	0	0	0
7	Coastal water	21	21	0	20
8	Marine water	0	0	0	0
9	Not specified	0	0	0	0
	Total	**21**	**21**	**0**	**20**

Figure 14. SW removed stations map (top graph) and distribution by surface water type (lower graph)

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

Measures in the Action Programme

The Code of Good Agriculture Practice for Malta (CoGAP) was developed through a Twinning Light Project between Malta and Germany in 2003 (MT 2001/IB/AGRI/01/TL). The aim of this Twinning Light Project was to compile in one document an exhaustive list of good agricultural practices that incorporates all the requirements of EU and national legislation related to agricultural practices, as well as other best practice techniques that are voluntary for the farmer.

The Nitrates Action programme is currently being reviewed to ensure that there is synchronisation between the legal obligations and content of the Nitrates Action Programme. Latest developments for better efficacy for the implementation of these regulations were made through Legal Notice 104 of 2018.

No cost-effectiveness was reported.

Table 6. Details of Action Programme

Measure	General details in Action Programme (*)
Period of prohibition of fertiliser application	• The land application of organic fertiliser to any holding shall not be permitted between 15 October of a particular year and 15 March of the following year (S.L. 549.66: 7)
	• The land application of inorganic fertiliser to any holding shall not be permitted between 15 October of a particular year and 15 March of the following year (S.L. 549.66: 7)
	• Prohobition is also applicable on water staurated soils regardless of the period.
Restrictions for application on sloped soils	• To be considered in the nutrient management plan as per schedule III of the National Legislation S.L. 549.66, whereby 'Identify the 'Land Management Units' (LMU's) for the holding, i.e. areas of the holding that are under similar management and that will respond to management in similar ways. One should consider such elements as soil types, slope, management activities (e.g. dryland or irrigated, significantly different crop types, areas receiving slurry) and differences in historical management
Restrictions for application on soaked, frozen, or snow-covered soils	Prohibition of application to water saturated soils as per S.L. 549.66 Regulation 8. (1). The land application of organic and inorganic fertiliser shall not be permitted when:
	• the surface of the field sloping to a degree of 7% or greater, taking into account factors such as proximity to watercourses, soil condition, ground cover and rainfall, or if there is a significant risk of causing water pollution;
	• the land is located or is in a manner which would make it likely that the nitrogen fertiliser will directly enter a watercourse or any underground water body;
	• the land is water saturated or flooded and such prohibition shall remain in force until such land remains saturated or flooded.
Restrictions for application near watercourses (buffer strips)	• When stored in a field, livestock manure shall not be stored in the same location of the field in consecutive years, it shall be stored in a compact heap and such heaps shall not be placed within (S.L 549.66 Regulation 6 (2)): - 20m of water courses; - 30m of a borehole, spring or well; - 100m of a borehole used for a public water supply; - 100m of the coast.
	• The land application of organic and inorganic fertiliser shall not be permitted when organic and inorganic fertilisers shall not be applied (S.L 549.66 Regulation 8. (1)): - to any type of natural water courses; - within a minimum distance of 5m of natural water courses; - within 5m of springs, galleries, gallery shafts, boreholes and karst features; - within 30m of any borehole used for public water supply; - within 100m of the coast.
Effluent storage works	• Not specified
Capacity of manure storage	Established in The Nitrates Action programme For Malta
Rational fertilisation (e.g., splitting fertilisation, limitations)	• Not specified
Crop rotation, permanent crop enhancement	• Not specified
Vegetation cover in rainy periods, winter	• Not specified
Fertilisation plans, spreading records	• Any farmer responsible for agricultural activities taking place on a holding shall prepare a fertilizer plan, in respect of such holding for that particular year, which satisfies the following conditions (S.L 549.66, Regulations 4(1)): - a fertilizer plan is valid if the crop plan is not altered for a maximum period of three years, alterations to the crop must be considered and fertilizer plan updated accordingly throughout the three years; - a soil test which is to be used as the basis for the calculation of the fertilizer plan must be performed every three years; - a fertiliser plan shall be compiled by a qualified technical advisor as may be approved by the Director who will also retain a public register of such persons which shall be published on an annual basis. Such approved qualified technical advisor shall: (i) notify the Director by the end of each calender year his intention to provide such service the following year; and (ii) submit a copy of any fertiliser plans prepared on behalf of farmers to the Director as may be directed from time to time; (d) the fertiliser plan shall be kept at the holding and should be presented for inspection as necessary together with the relevant soil test and crop plan.
	• The fertiliser plan required in terms of subregulation (1) shall determine the crop fertilisation requirement for each crop type on each production unit of the holding for that year and shall establish safe methods of land application of fertiliser (S.L 549.66, Regulations 4(1))
	• Farmers shall keep adequate and updated farm management records, and shall make them readily available for inspection to the Department upon request (S.L 549.66, Regulation 12(1))
	• Farm management records shall include the following information, as applicable (S.L 549.66, Regulation 12(2)): - the farmer for the calendar year in question; - the total agricultural area including the size and location of each field; - the cropping regimes and their individual areas; - the number of livestock kept on the holding, their species and type, and the length of time for which they were kept on the holding; - the capacity of livestock manure storage, and where applicable the details of rented storage, livestock manure production, manure separation, the details of any rental or contractual agreement; - the quantity of each type of fertiliser moved on or off the holding, the amount of each type of fertiliser applied, the nutrient content of the inorganic fertiliser, the location used; - the date of movement of organic fertiliser, the name and address of the consignee, the consignor and any third party transporter of the manure.
	• Farm management records for a particular year shall be completed by the 30th October of the following year and shall be retained on the holding for a minimum period of five years (S.L 549.66, Regulation 12(3))
Other measures	• S.L 549.66 and Nitrates Action programme For Malta
Date for application limit of 170 kg N/ha/year:	• Implemented and ongoing. As per fertiliser plan provisions

(*) Subsidiary Legislation (S.L.) 549.66 Nitrates Action Programme Regulation, 2011

Controls

As part of the implementation of the Nitrates Action Programme, farmers are visited by the Directorate of Agriculture to assess on-site implementation of measures. An average of 7.6% of farmers is visited each year, indicating an increase in visits in the current reporting period (2% of visits per year in 2012-2015).

As for the previous reporting period, the highest amount of non-compliance is related to record keeping, which in turn is presenting difficulties to the Competent Authorities to assess the effectiveness of the Nitrates Action Programme.

Designation of NVZ

Malta has adopted a whole territory approach.

Forecast of Water Quality

Groundwater bodies in Malta are characterized by relatively long response times and as such it is expected that the implementation of the envisaged management measures will not immediately be reflected in an improvement in the qualitative status of the underlying groundwater body. The timeframes involved, as inferred from the conceptual models of these groundwater systems, are such as to preclude the achievement of good status within the second planning cycle of the Water Framework Directive (2021) for all those groundwater bodies which have been assessed as currently being in ‘poor’ status. However, meaningful first indicators of improvements in groundwater quality can be identified from the data analysed for the purpose of this report. These first indicators should however be treated with caution and their long-term nature confirmed with subsequent reports under the Nitrates Directive.

The future evolution of water body quality can only be qualitatively evaluated for coastal waters. The data available to date, indicates that Malta's coastal waters are generally oligotrophic in nature and are thus not subject to nitrogen input that may result in eutrophication. The no-deterioration trends are expected to persist in the future, also in view of the measures that are in place as part of the implementation of the Nitrates Directive.

Summary

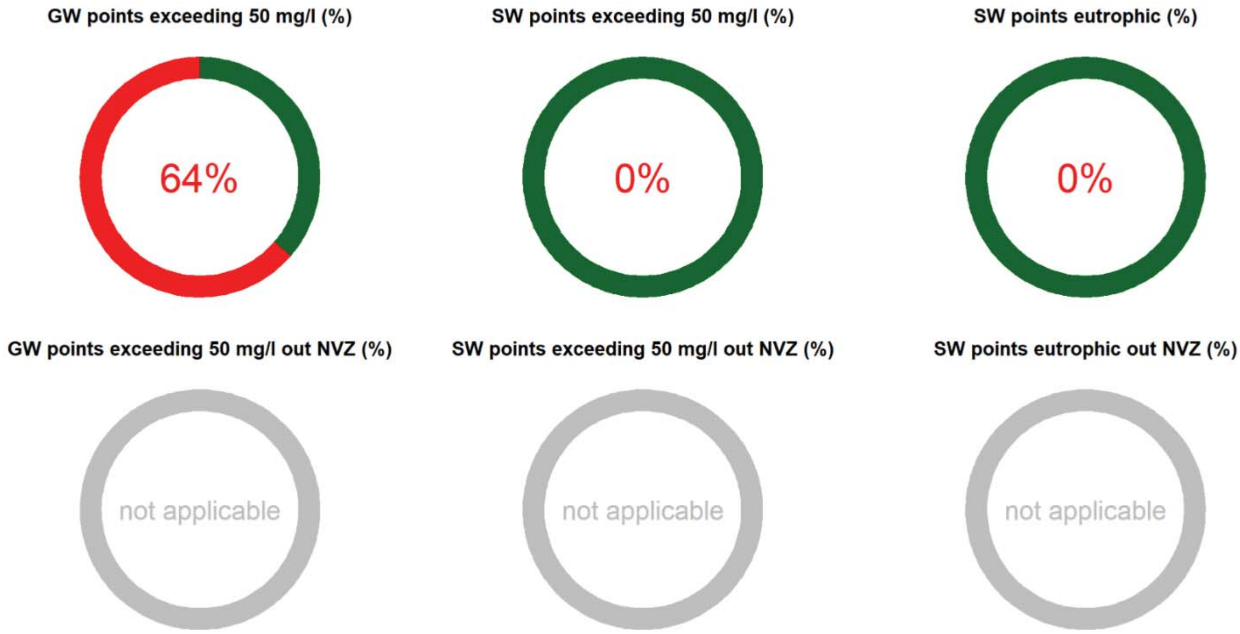


Figure 15. The summary plot for the period 2016-2019

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

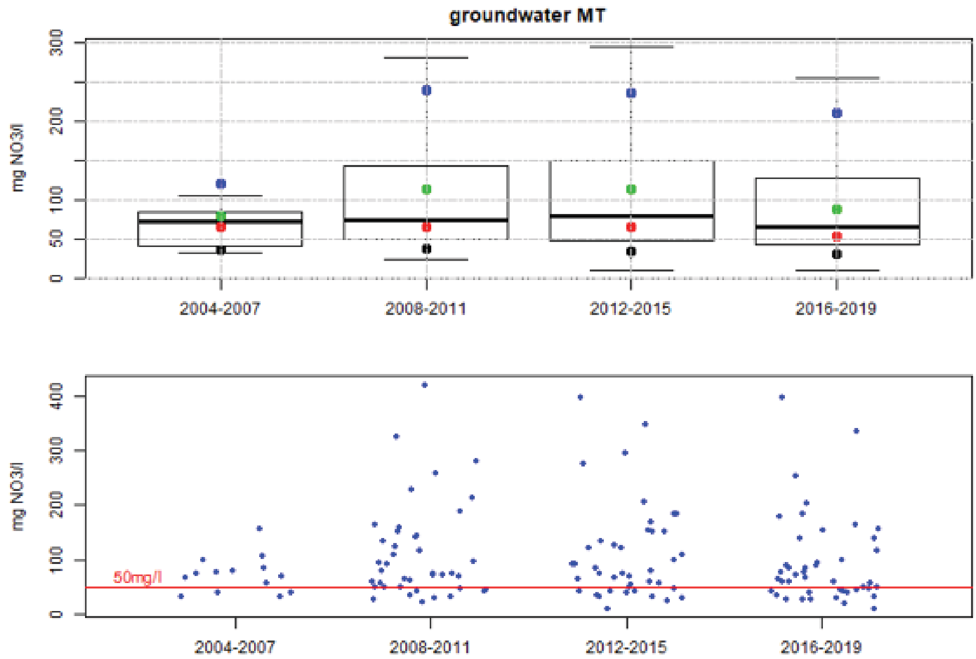


Figure 16. Time series of box whisker plots along with the distribution of the average NO3 annual concentrations for each reporting period for groundwater stations. RPs represent the reporting periods, RP7 being the last period (2016-2019). The blue, red, green and black dots represent the mean of the fourth third, second and first quartiles, respectively.

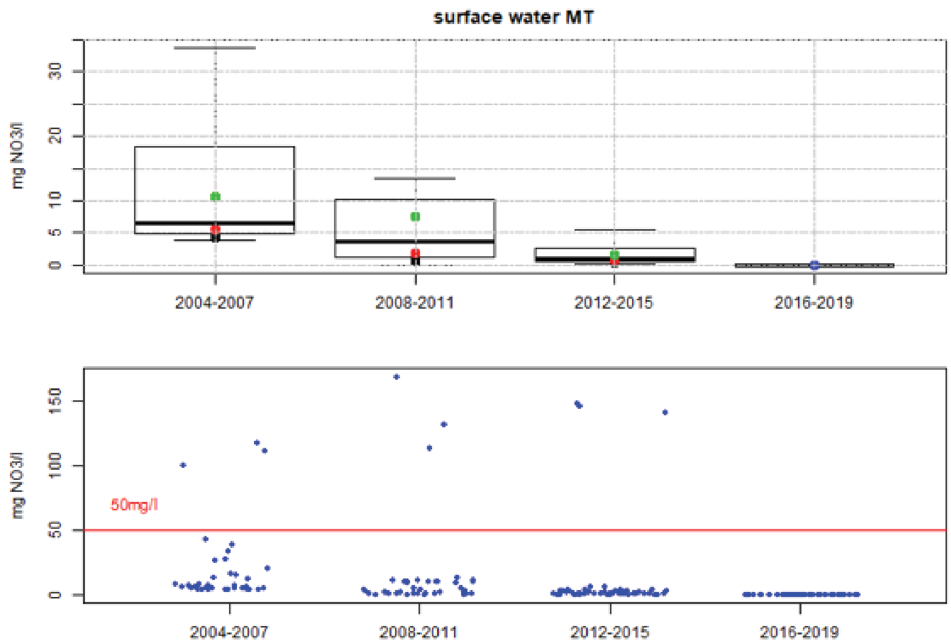


Figure 17. Time series of box whisker plots along with the distribution of the average NO3 annual concentrations for each reporting period for surface water stations. RPs represent the reporting periods, RP7 being the last period (2016-2019). The blue, red, green and black dots represent the mean of the fourth third, second and first quartiles, respectively.

Conclusions and recommendations

Malta has a very high livestock pressure and a high surplus for nitrogen as well as phosphorus from 2000 to 2015. No data for 2016-2019 are available.

There is a very well elaborated network of groundwater monitoring stations. Nitrate concentrations of groundwater are very high but slightly improved compared to 2012 – 2015. None of the coastal or marine waters are eutrophic.

The action programme is currently being reviewed.

The Commission encourages Malta to continue its efforts to reduce pollution of groundwater with nitrates. Malta is recommended to monitor inland and transitional waters.

EUROPEAN
COMMISSION

Brussels, 11.10.2021
SWD(2021) 1001 final

PART 28/38

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

Netherlands's utilized agricultural area amounts 1.8 Mha, representing 53.3% of the total land area and has slightly decreased since 2007. The major outputs of the agricultural industry excluding services and secondary activities include in a decreasing order vegetables and horticultural plants (33.5%), milk (17.8%) and pigs (8.1%).

Eurostat

Major land use statistics for Netherlands

Table 1.Utilized agricultural area (abbreviated as UAA)

Netherlands	2005	2007	2010	2013	2016
Utilised agricultural area UAA (1000 ha)	NA	1886	1872	1848	1796
arable land (1000 ha)	NA	1040	1012	1029	1028
permanent grass (1000 ha)	NA	794	813	773	730
permanent crops (1000 ha)	NA	37	37	37	38
kitchen gardens (1000 ha)	NA	4	4	NA	NA

Note:

Eurostat (FSS)

Netherlands's arable land has remained stable since 2007. The permanent grass has slightly decreased since 2013, while permanent crops remained stable since 2007.

Animal distribution in Netherlands

Table 2. Livestock statistics

Netherlands	2005	2007	2010	2013	2016
Livestock index	3.26	3.35	3.58	3.57	3.80
dairy cows (10^6 heads)	1.49	1.49	1.52	1.60	1.79
live bovines (10^6 heads)	3.75	3.82	3.96	4.09	4.29
live pigs (10^6 heads)	11.00	11.71	12.21	12.01	11.88
live poultry (10^6 heads)	NA	NA	103.62	99.43	107.34

Note:

Eurostat (FSS)

All Netherlands's livestock have increased since 2013. The livestock density index is almost 5 times higher than the EU average of 0.8.

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

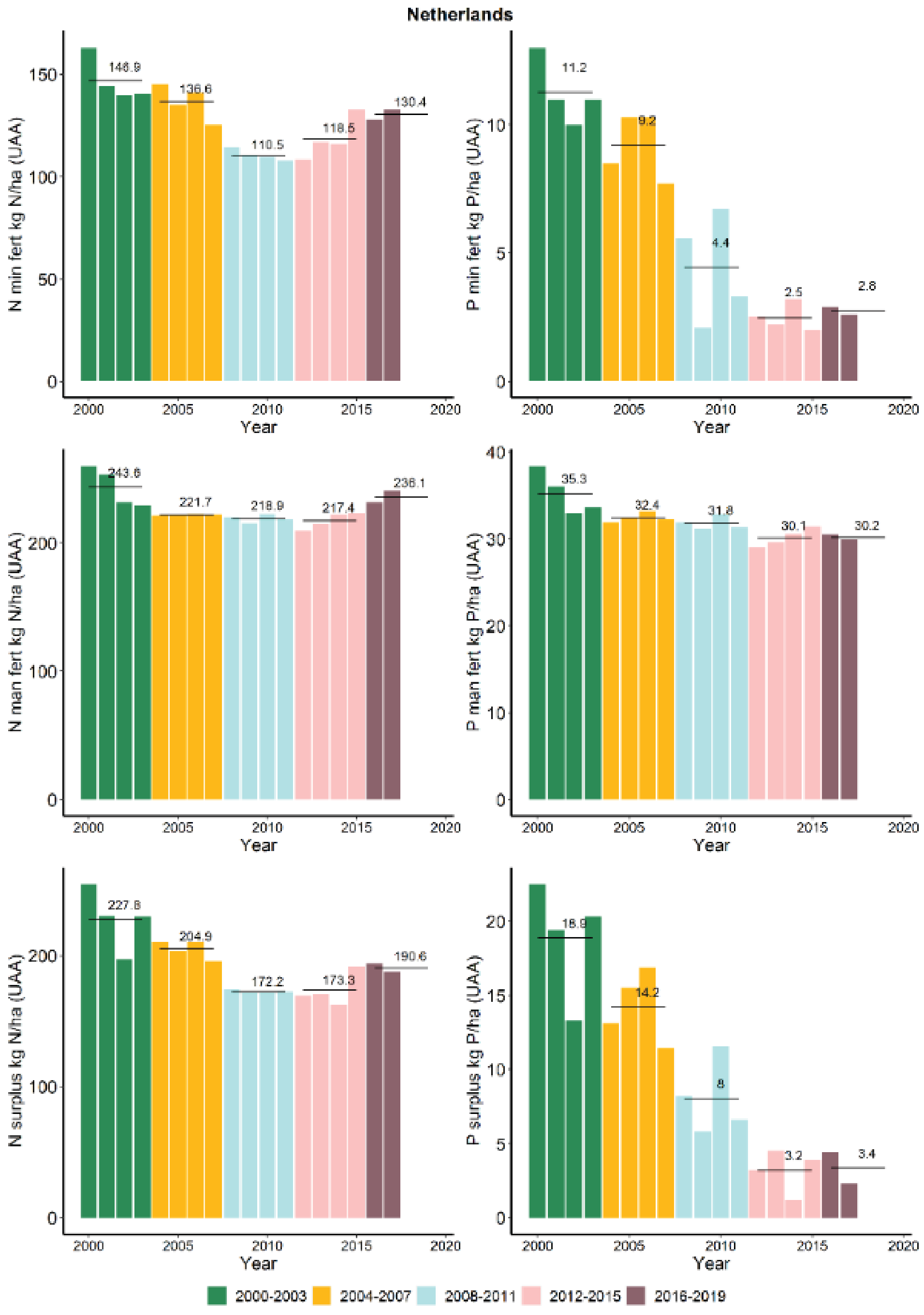


Figure 1. N and P fertilizers and gross surplus (kg/ha)

The gross nitrogen (N) and phosphorus (P) surpluses originate from EUROSTAT data for the years 2000-2017. The consumption of inorganic and organic N fertilizers during the last reporting period increased with respect to the previous reporting period. The consumption of inorganic and organic P fertilizers remained stable since the 2010-2015 period. The N surplus is higher than that of the previous reporting period, while the P surplus is stable. 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

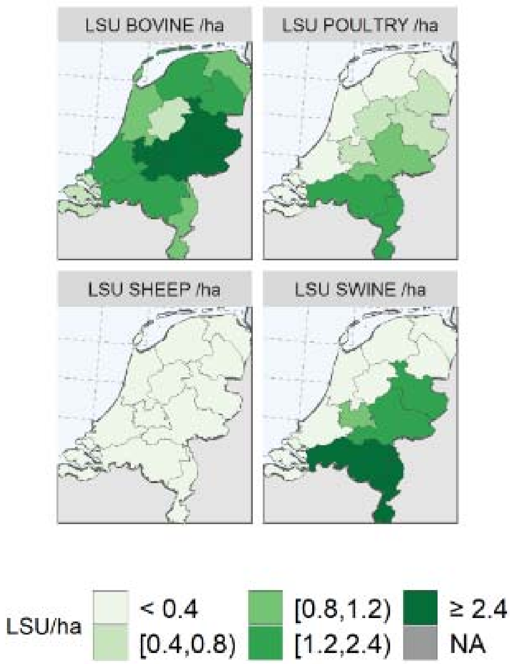


Figure 2. Map of livestock unit distribution, year 2016 (Source: Eurostat, February 2021)

Animal production is concentrated in the south-east and central-north parts of the Netherlands. The production is dominated by bovine and swine (total LSU and LSU by animal type were retrieved individually from EUROSTAT, year 2016, February 2021).

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

European Commission

Water Quality Monitoring

The effects of the Action Programme are evaluated through the regular monitoring programmes for groundwater and surface waters and by a specific programme, the Minerals Policy Monitoring Programme (hereinafter also “LMM”). The LMM was developed for measuring the effects of Dutch fertiliser policy on nutrient emissions (nitrate emissions in particular) from agricultural sources into groundwater and surface water and to monitor the effects of changes in agricultural practices on such emissions.
In the following tables, we report the summary of GW and SW stations with measurements and trends. However, due to errors by the Netherlands in reporting data for the previous periods, no comparison can be made with the actual dataset.
For groundwater measurements, some stations have same coordinates due to privacy regulations. For surface water measurements, some stations have same coordinates because they are representative of different waterbodies. In these cases, 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

Station Type	Description	Number of stations with measurements 2016-2019	Number of stations with Trends 2016-2019
0	Phreatic groundwater (shallow): 0-5 m	438	381
1a	Phreatic groundwater (deep) 5-15 m	317	317
1b	Phreatic groundwater (deep) 15-30 m	301	301
1c	Phreatic groundwater (deep) >30 m	161	161
2	Captive groundwater	0	0
3	Karstic groundwater	0	0
9	Not specified	0	0
	Total	**1217**	**1160**

Surface water quality monitoring network

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

Station Type	Description	Number of stations with measurements 2016-2019	Number of stations with Trends 2016-2019	Number of stations with Trophic status 2016-2019
4	River water	377	344	243
5	Lake/reservoir water	475	430	448
6	Transitional water	10	10	5
7	Coastal water	12	12	9
8	Marine water	12	12	0
9	Not specified	0	0	0
	Total	**886**	**808**	**705**

Groundwater Quality

Groundwater average annual nitrate concentration

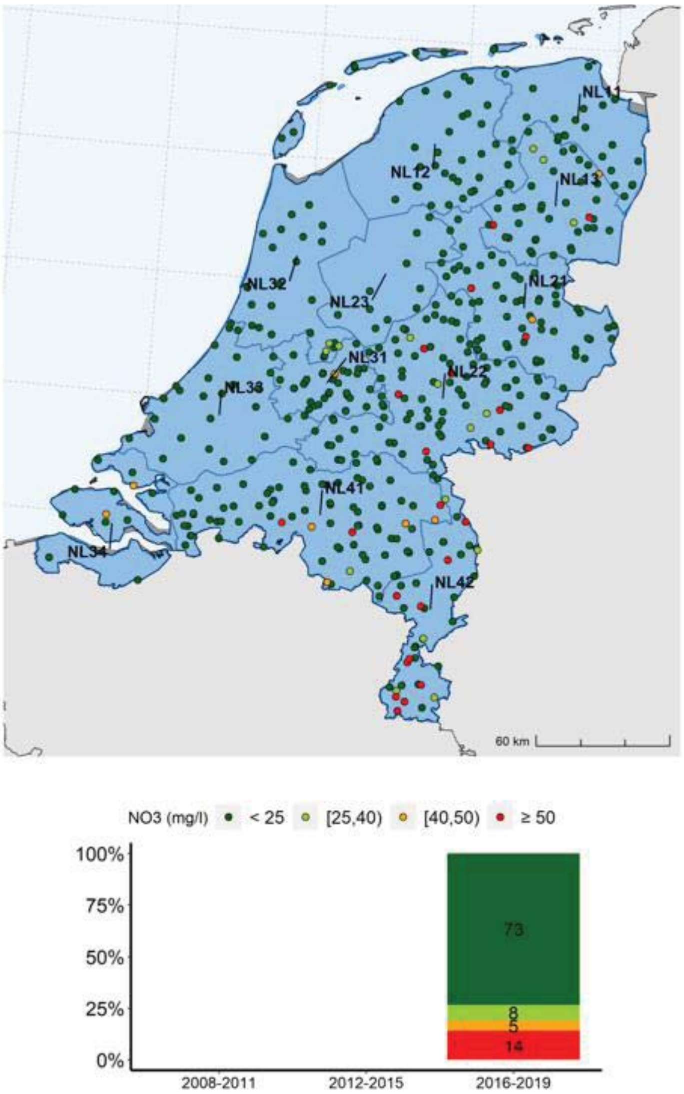


Figure 3. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information.

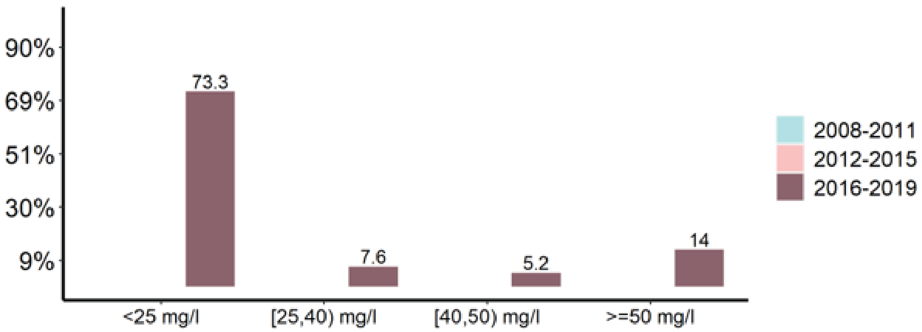


Figure 4. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis)

Groundwater average annual nitrate concentration trend

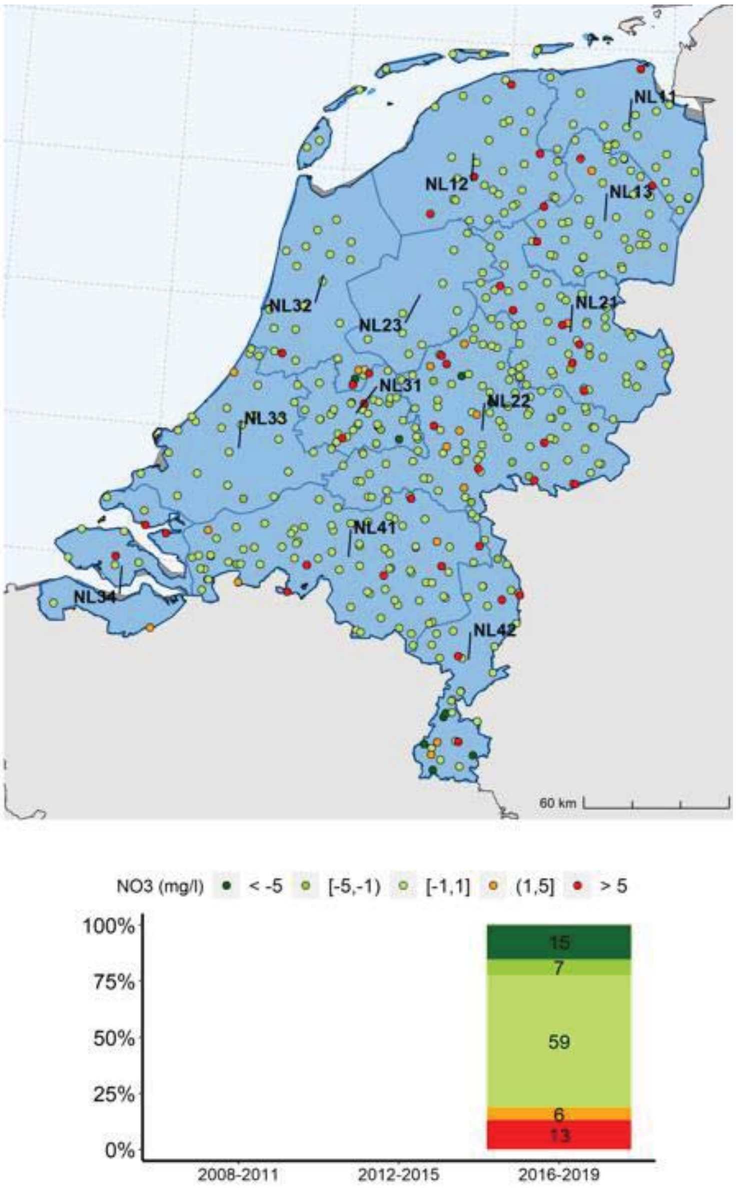


Figure 5. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis).

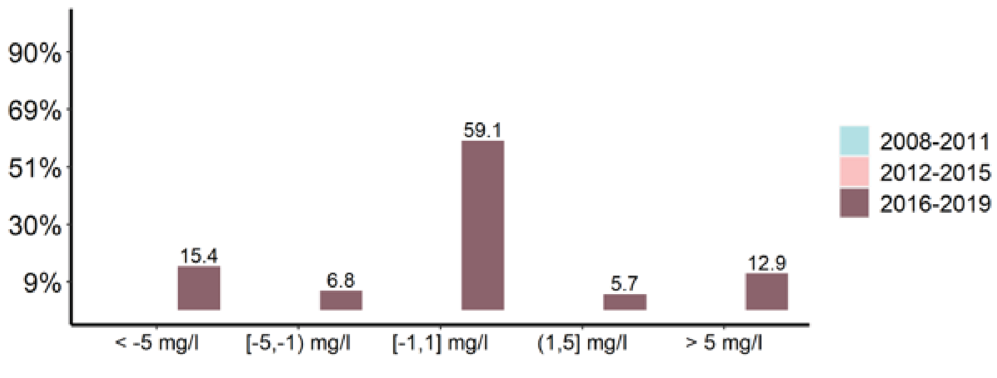
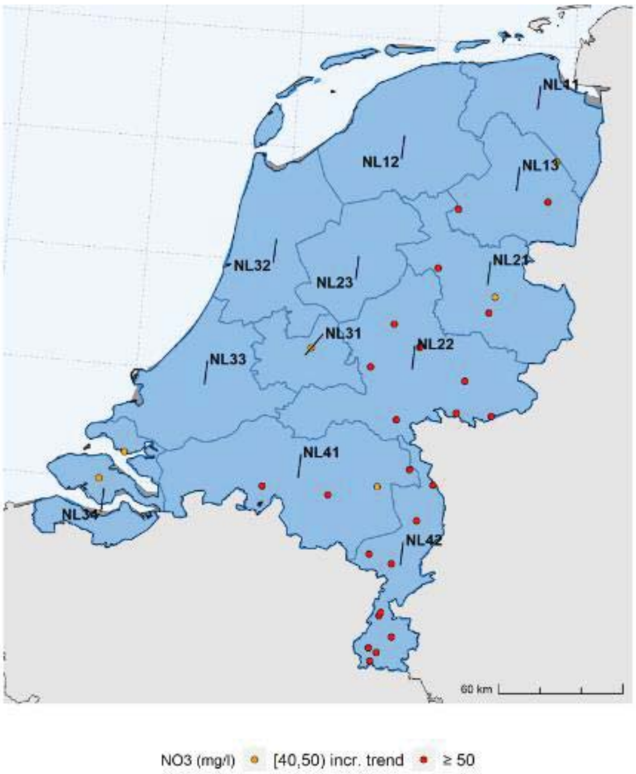


Figure 6. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis)

Groundwater hotspot



NUTS ID	NUTS NAME	>=40 and < 50 mg/l incr.trend	>=50 mg/l
NL11	Groningen	1	0
NL12	Friesland (NL)	1	2
NL13	Drenthe	1	13
NL21	Overijssel	3	36
NL22	Gelderland	3	18
NL31	Utrecht	2	2
NL32	Noord-Holland	0	2
NL34	Zeeland	5	5
NL41	Noord-Brabant	3	54
NL42	Limburg (NL)	4	38
	Total	**23**	**170**

Figure 7. GW hotspot analysis map (top graph) and distribution by NUTS2 (lower graph) of average NO3 annual concentration greater than 40 mg/l. Due to privacy regulation, some coordinates are not accurate and most of the points are overlapping (same coordinates)

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

Station Type	Description	Number of removed stations total removed	with measurements	with trends
0	Phreatic groundwater (shallow): 0-5 m	63	0	0
1a	Phreatic groundwater (deep) 5-15 m	0	0	0
1b	Phreatic groundwater (deep) 15-30 m	0	0	0
1c	Phreatic groundwater (deep) >30 m	5	0	0
2	Captive groundwater	0	0	0
3	Karstic groundwater	0	0	0
9	Not specified	0	0	0
	Total	**68**	**0**	**0**

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

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

Surface Water Quality

Surface water average annual nitrate concentration

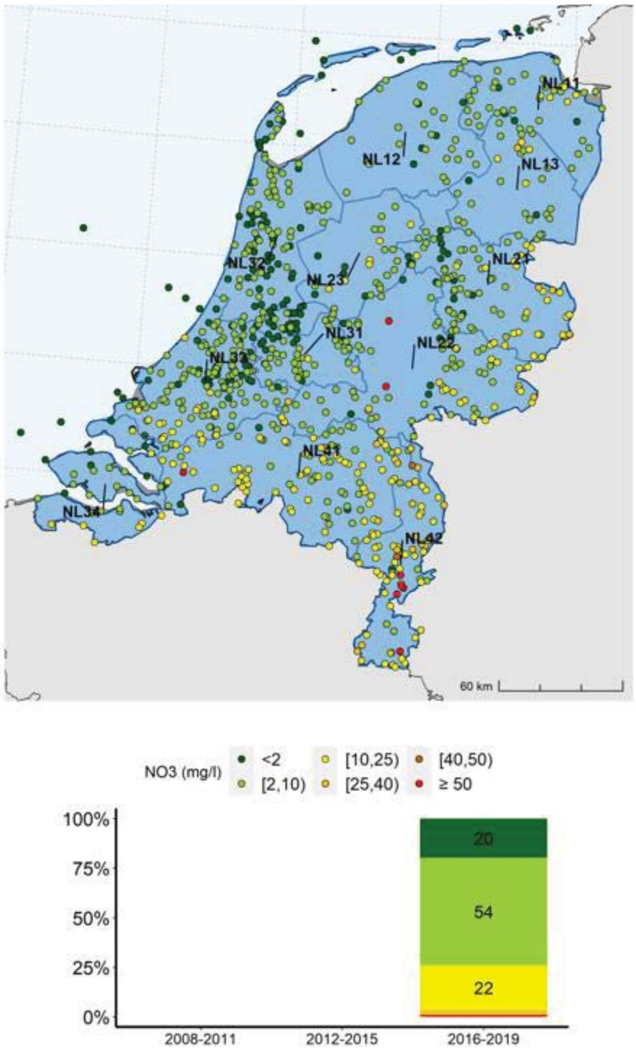


Figure 9. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information.

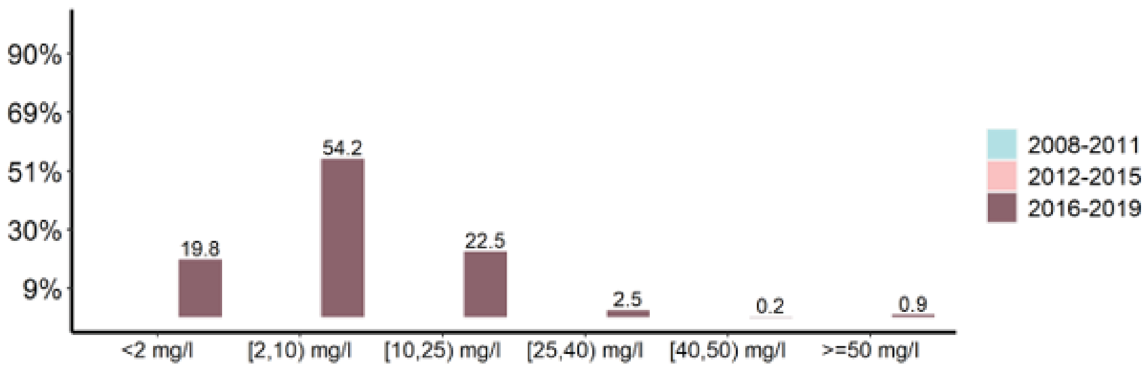
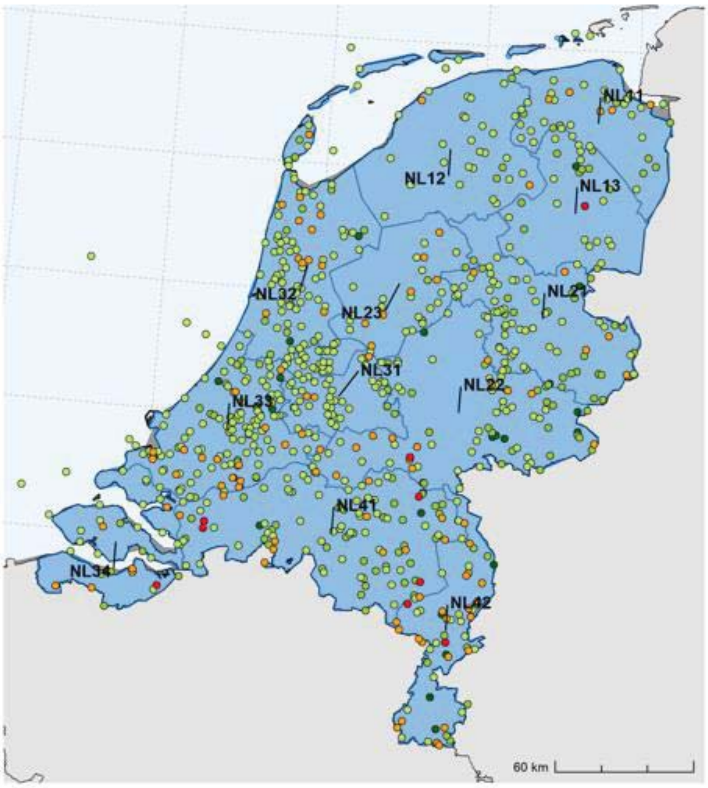


Figure 10. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis)

Surface water average annual nitrate concentration trend



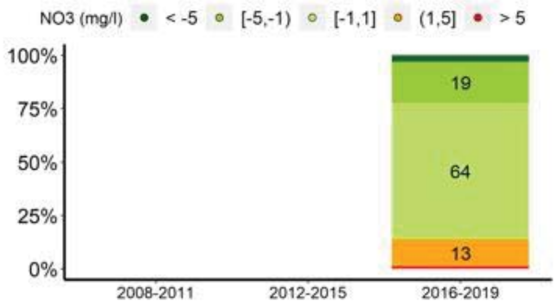


Figure 11. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information.

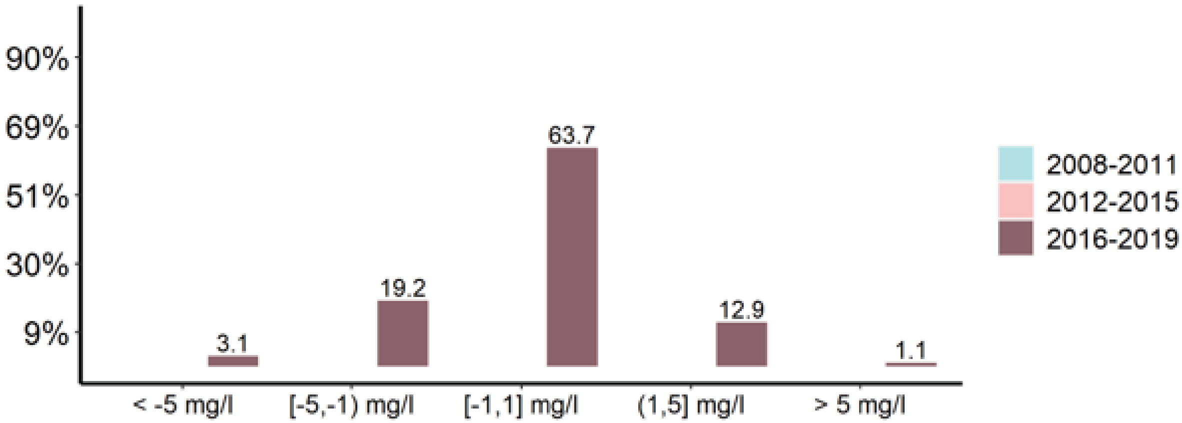


Figure 12. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis)

Surface Water Eutrophication

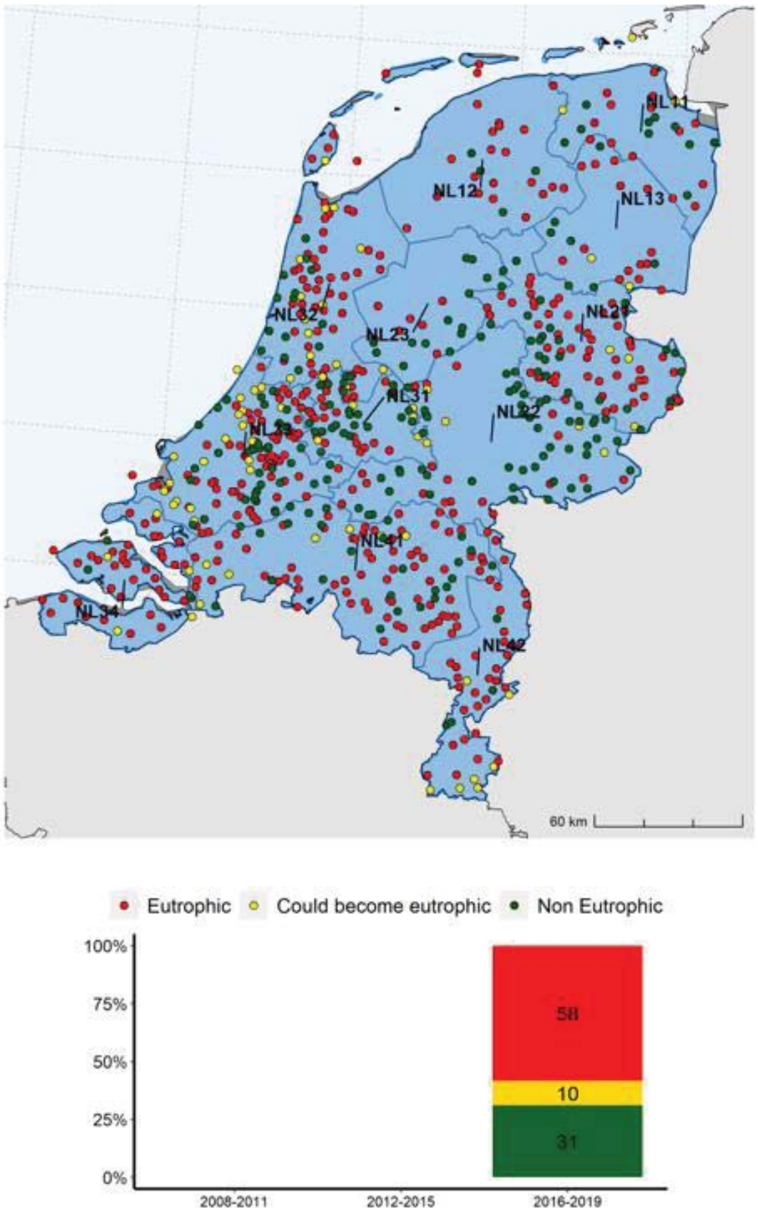


Figure 13. Spatial distribution of eutrophic status (map) and corresponding percentage of monitoring points per classes of status by reporting period (x axis).

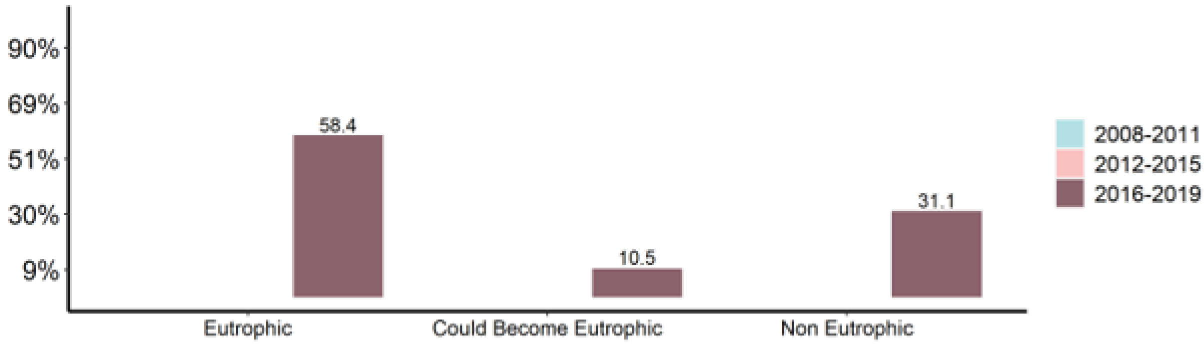
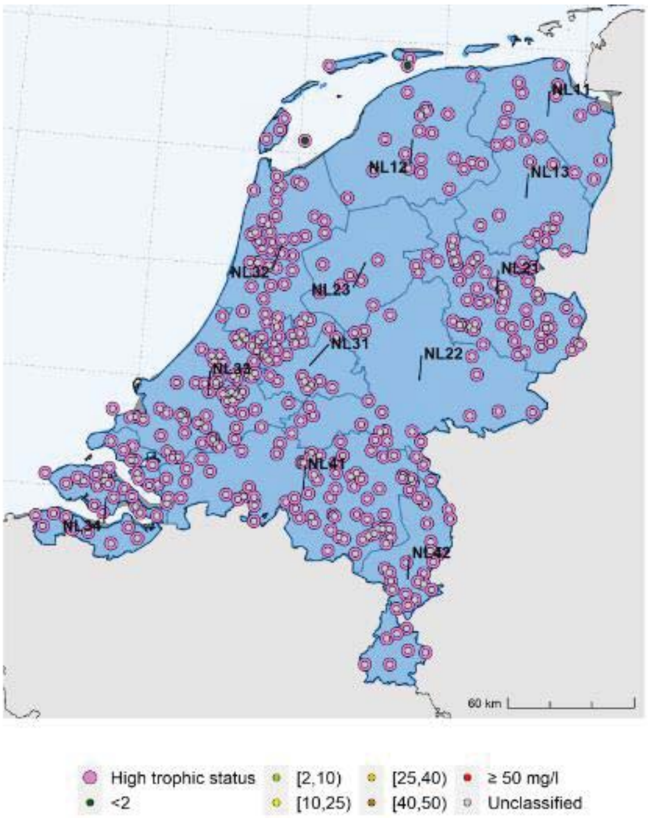


Figure 14. Comparison of percentage of monitoring points in the three reporting periods by classes of status (x axis)

European Commission

The Eutrophic status vs average NO3 annual concentration



NUTS ID	NUTS NAME	High trophic status	Number of stations by classes of concentration						
			<2 mg/l	[2,10) mg/l	[10,25) mg/l	[25,40) mg/l	[40,50) mg/l	>=50 mg/l	Unclassified
NL11	Groningen	14	0	0	0	0	0	0	14
NL12	Friesland (NL)	20	0	0	0	0	0	0	20
NL13	Drenthe	15	0	0	0	0	0	0	15
NL21	Overijssel	55	0	0	0	0	0	0	55
NL22	Gelderland	20	0	0	0	0	0	0	20
NL23	Flevoland	7	0	0	0	0	0	0	7
NL31	Utrecht	21	0	0	0	0	0	0	21
NL32	Noord-Holland	50	0	0	0	0	0	0	50
NL33	Zuid-Holland	66	0	0	0	0	0	0	66
NL34	Zeeland	35	0	0	0	0	0	0	35
NL41	Noord-Brabant	71	0	0	0	0	0	0	71
NL42	Limburg (NL)	32	0	0	0	0	0	0	32
NO_NUTS	SALINE	6	0	0	0	0	0	0	6
	Total	**412**	**0**	**0**	**0**	**0**	**0**	**0**	**412**

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

The analysis shows all the SW monitoring stations with the 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.

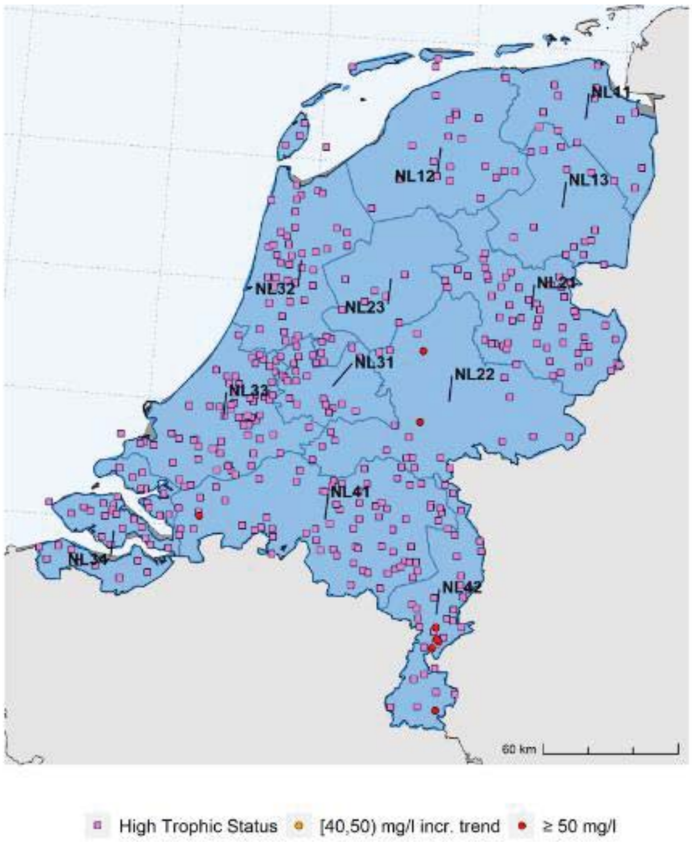
The eutrophication status is assessed in accordance with the WFD methodology, using an evaluation of the biological conditions and nutrient status in the water bodies. The benchmarks are based on the average summer values for total nitrogen and total phosphorus, expressed in mg/l as N and mg/l as P respectively.

To allow an assessment to be made of the biological condition, measurements are made at the WFD locations of phytoplankton (in lakes, canals, coastal waters and transitional waters) and phytobenthos or other water plants (in rivers). For phytoplankton, both the abundance (chlorophyll-α concentration) and the species composition are determined.

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	146	21	76
5	Lake/reservoir water	260	46	142
6	Transitional water	0	5	0
7	Coastal water	6	2	1
8	Marine water	0	0	0
9	Not specified	0	0	0
	Total	**412**	**74**	**219**

Surface Water quality hotspot



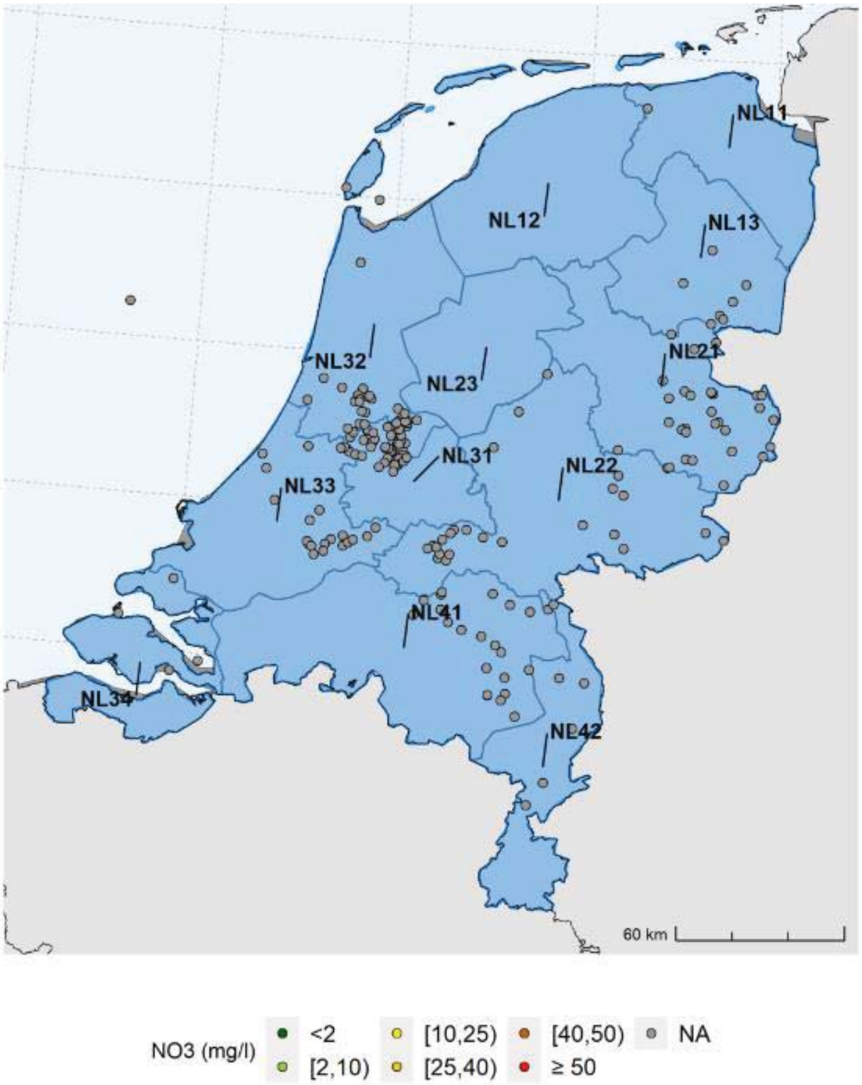
NUTS ID	NUTS NAME	High trophic status	>=40 and < 50 mg/l incr.trend	>=50 mg/l
NL11	Groningen	14	0	0
NL12	Friesland (NL)	20	0	0
NL13	Drenthe	15	0	0
NL21	Overijssel	55	0	0
NL22	Gelderland	20	0	2
NL23	Flevoland	7	0	0
NL31	Utrecht	21	0	0
NL32	Noord-Holland	50	0	0
NL33	Zuid-Holland	66	0	0
NL34	Zeeland	35	0	0
NL41	Noord-Brabant	71	0	1
NL42	Limburg (NL)	32	0	5
NO_NUTS	SALINE	6	0	0
	Total	**412**	**0**	**8**

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

The hotspot analysis identifies all the SW monitoring stations that have high trophic status, 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



Station Type	Description	Number of removed stations			
		total removed	with measurements	with trends	with trophic status
4	River water	65	0	0	0
5	Lake/reservoir water	128	0	0	0
6	Transitional water	2	0	0	0
7	Coastal water	3	0	0	0
8	Marine water	3	0	0	0
9	Not specified	0	0	0	0
	Total	**201**	**0**	**0**	**0**

Figure 17. SW removed stations map (top graph) and distribution by surface water (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 and the table reports the number of stations with measurements and trends per type.

Measures in the Action Programme

The 5th (2014 - 2017) and the 6th (2018 - 2021) action programmes aimed at contributing to the achievement of the goals of the Water Framework Directive in 2027. An approach was chosen which is a balance between what is feasible without major short-term economic impact on agriculture and what is necessary to have all measures taken in agriculture by 2027 at the latest, to ensure that the goals of the Water Framework Directive will be achieved

The measures in the sixth Nitrates Directive action program build on the measures deployed in the previous action programs.

A number of measures of the 6th action program entered into force during this reporting period: adjustment of nitrogen application standards for green manures, stricter requirements for catch crops in or after maize on sand and loess soils, shifting of the slurry spreading period on arable land, adjustment of rules for destroying grassland and improving awareness, knowledge and skills to reduce leaching and run-off of nutrients, including stimulation of precision fertilization, cultivation of catch crops and green manures, and dissemination of knowledge to prevent yard runoff.

The system of phosphate rights for dairy farming was introduced on 1 January 2018. This system must ensure that phosphorus production remains below the phosphorus ceiling. The production of phosphate in manure is regulated per dairy farm by (tradable) phosphate rights.

Controls

The implementation by the Netherlands of its manure management policy suffered some set-backs leading to a situation where there were concerns over possible fraud. This situation required the Netherlands to step up its efforts in preventing fraud in the implementation of its manure policy. While the 6th Dutch Action Programme, already provides for measures aimed at reinforcing the control and inspections with a view to improving overall compliance with the rules of the Dutch manure policy, additional efforts were needed to be deployed to foster effective implementation and full compliance. Those efforts included the establishment of an enhanced enforcement strategy, with specific measures aiming at further strengthening inspections and controls and a clear methodology to establish sufficiently dissuasive penalties and sanctions.

The proportion non-compliances upon inspection has increased. This may be linked to the risk-based approach introduced in 2018.

Designation of NVZ

Netherlands has adopted a whole territory approach.

Forecast of Water Quality

A national analysis of water quality was carried out with the purpose of drawing up the packages of measures for the next round of the river basin management plans (2022-2027) for the Water Framework Directive (WFD). The conclusion of the analysis is that as a result of the existing and proposed measures, the model calculations indicate a steady improvement of the biological WFD standards. Compared to the situation in 2018, this improvement, together with technical adjustments to the standards, leads to an increase in the number of waters in which the biological standards are met.
However, according to the model calculations, the planned measures will not achieve all targets everywhere: the share of regional waters that will be compliant by 2027 is between 30 and 60% for biological standard; for fresh national waters, the target range is calculated at almost 100%. The analysis also shows that the WFD standards will not be met everywhere for nutrients either.
According to national analysis, the measures of the sixth Nitrate Action Program show a limited effect on the national load from agriculture. The mandatory measures are deployed in a targeted manner, targeting specific sectors and areas, and therefore do not have national coverage; this means that the effect can be greater regionally or locally. This picture is in line with the results of the Environmental Impact Assessment of measures from the sixth action program.

Summary

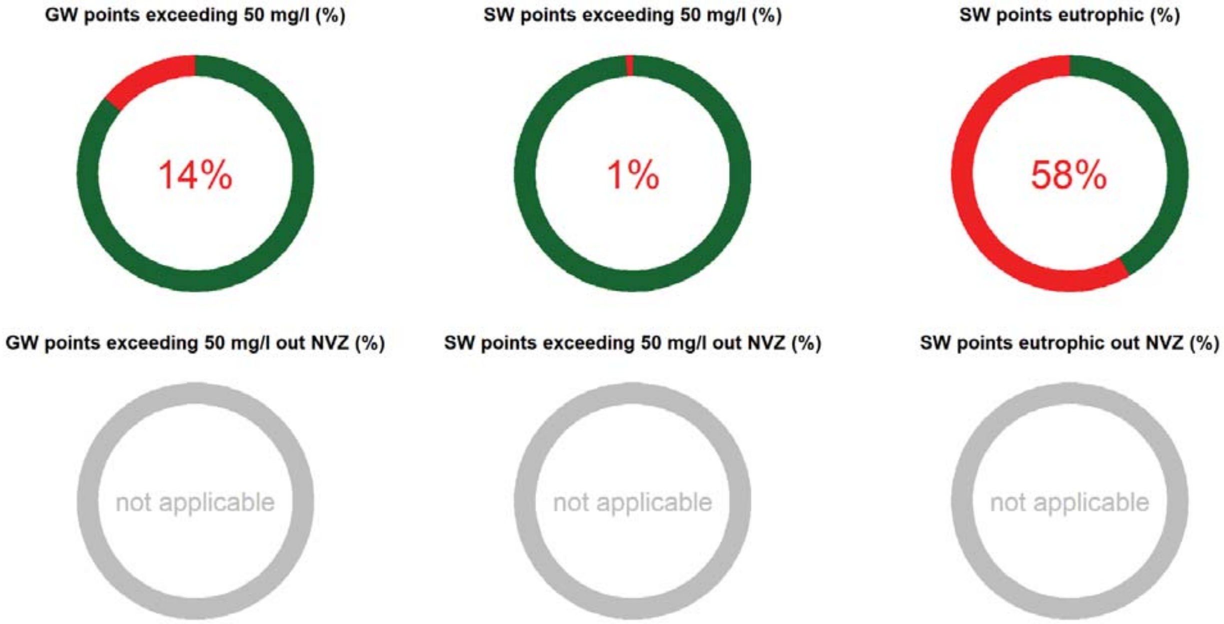


Figure 18. The summary plot for the period 2016-2019

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

Long term analysis

Is not possible to perform a long term analysis due to errors in the previous reporting periods.

Conclusions and recommendations

The Netherlands has a very high livestock pressure, and a high surplus of nitrogen. The phosphorus surplus remains limited.

There is a well elaborated network of monitoring stations. There are groundwater hotspots with nitrate concentration > 50 mg/l and/or have an increasing trend, in particular in the southern and central sand regions and in the loess region. A very high number of the surface waters are found to be eutrophic.

The Netherlands reviewed its action programme 2018.

The Commission recommends the Netherlands to reinforce it action programme to reduce nitrate pollution in particular in the ground waters of the sand and loess regions, to tackle eutrophication and to support farmers switching to more sustainable and less intensive production

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PART 29/38

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}

EN EN

Pressure from Agriculture

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

Major land use statistics for Poland

Table 1.Utilized agricultural area (abbreviated as UAA)

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

Note:
Eurostat (FSS)

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

Animal distribution in Poland

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

Table 2. Livestock statistics

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

Note:
Eurostat (FSS)

European Commission

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

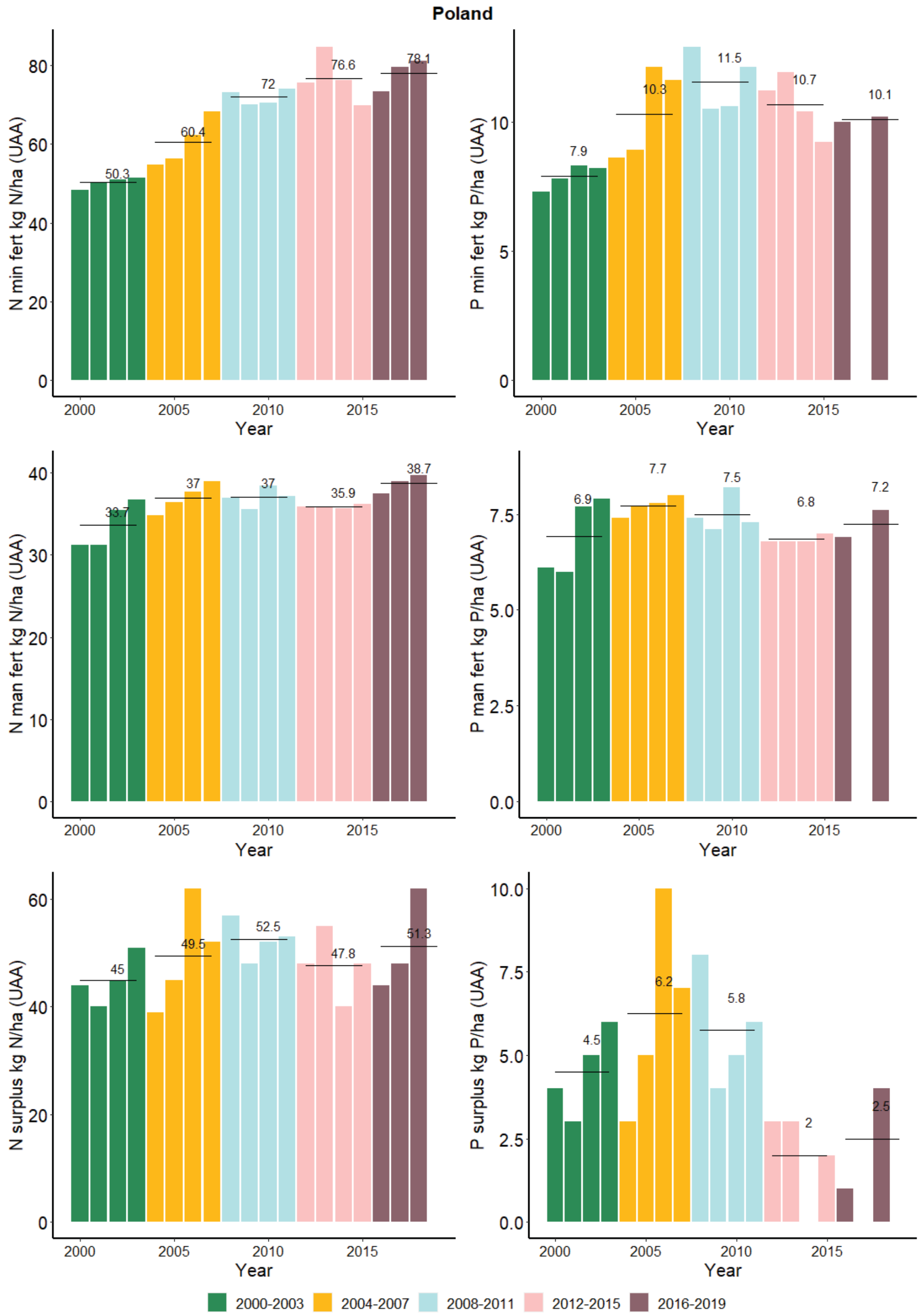


Figure 1. N and P fertilizers and gross surplus (kg/ha)

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

European Commission

Livestock unit - LSU /ha

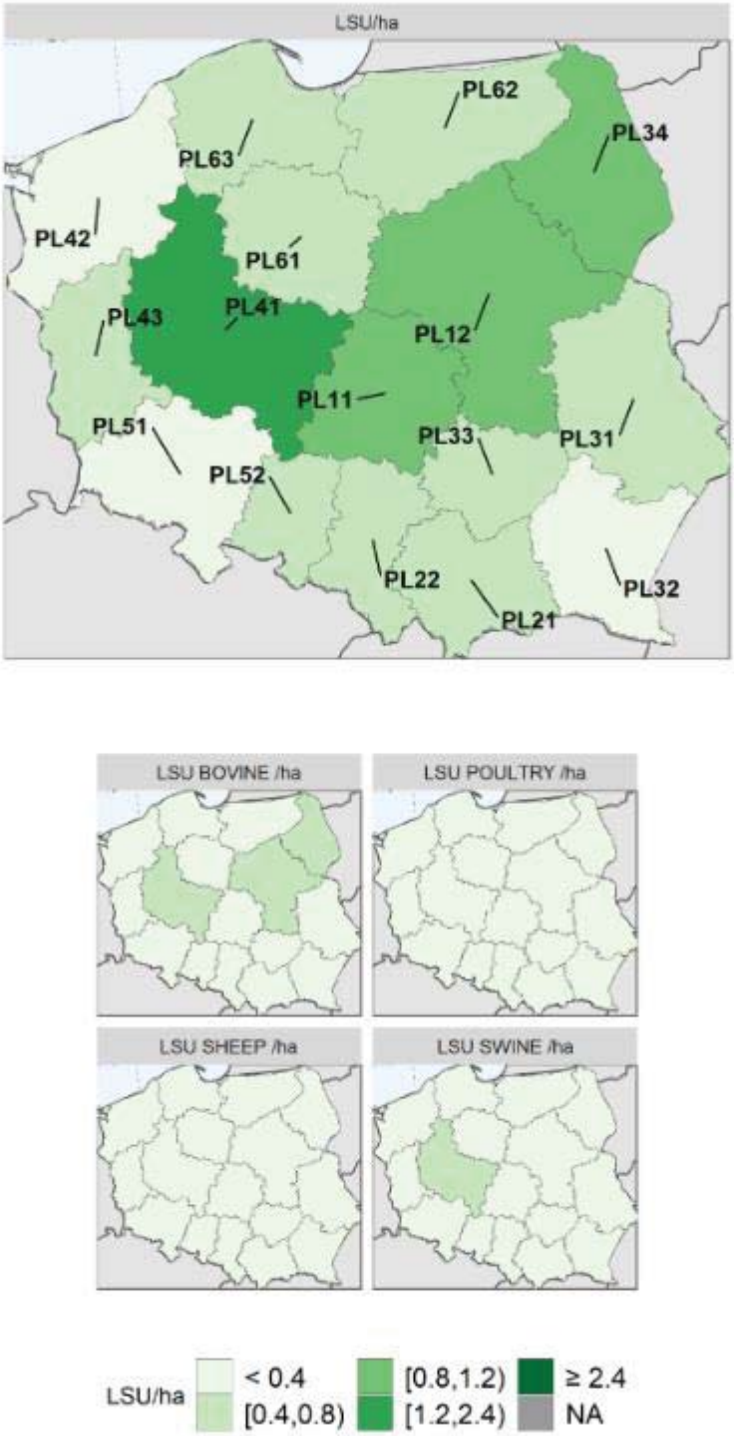


Figure 2. Map of livestock unit distribution, year 2016 (Source: Eurostat, February 2021)

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

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

Water Quality Monitoring

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

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

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

Groundwater quality monitoring network

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

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

Surface water quality monitoring network

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

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

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

Groundwater Quality

Groundwater average annual nitrate concentration

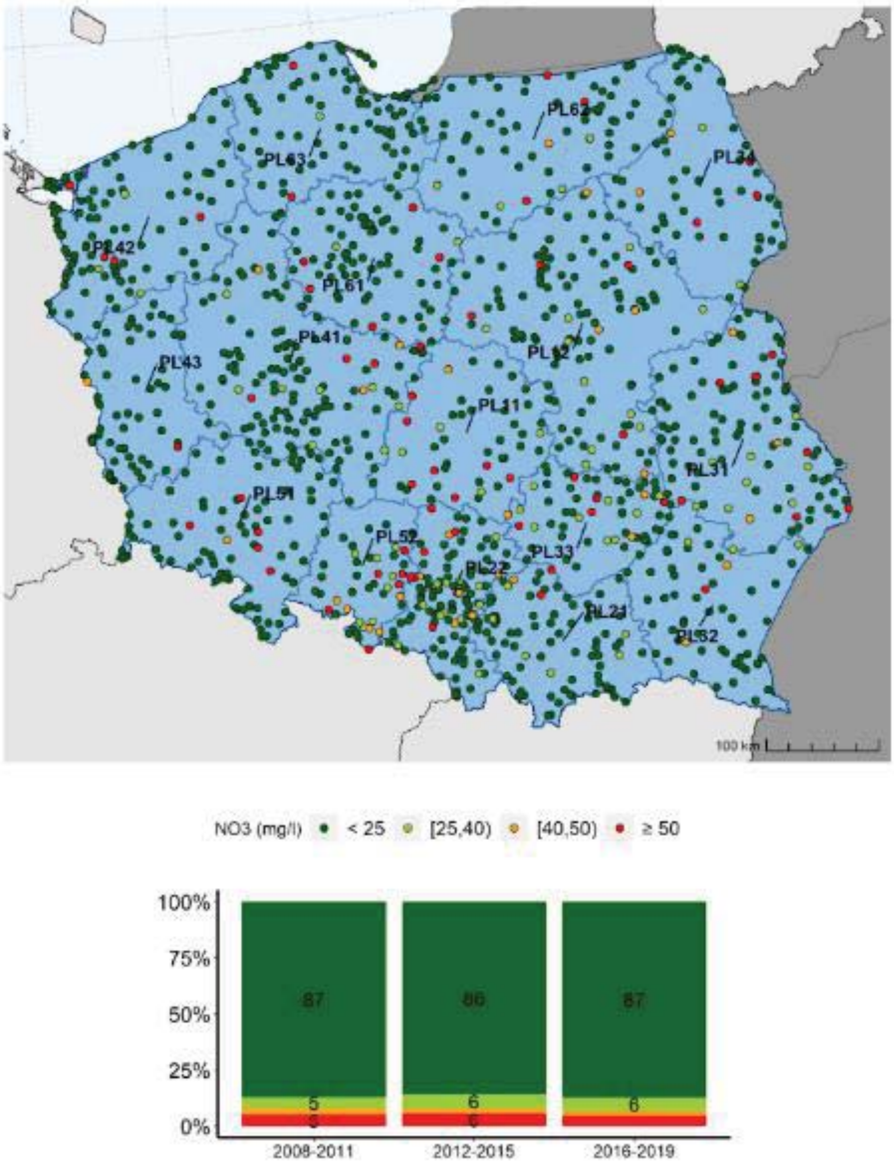


Figure 3. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information.

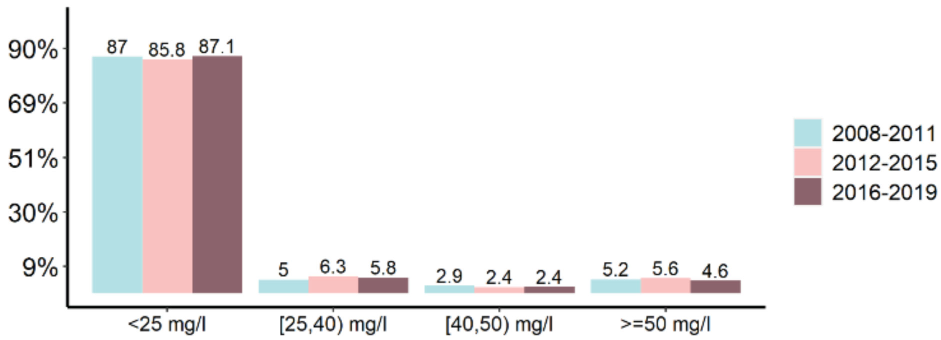


Figure 4. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis)

Groundwater average annual nitrate concentration trend

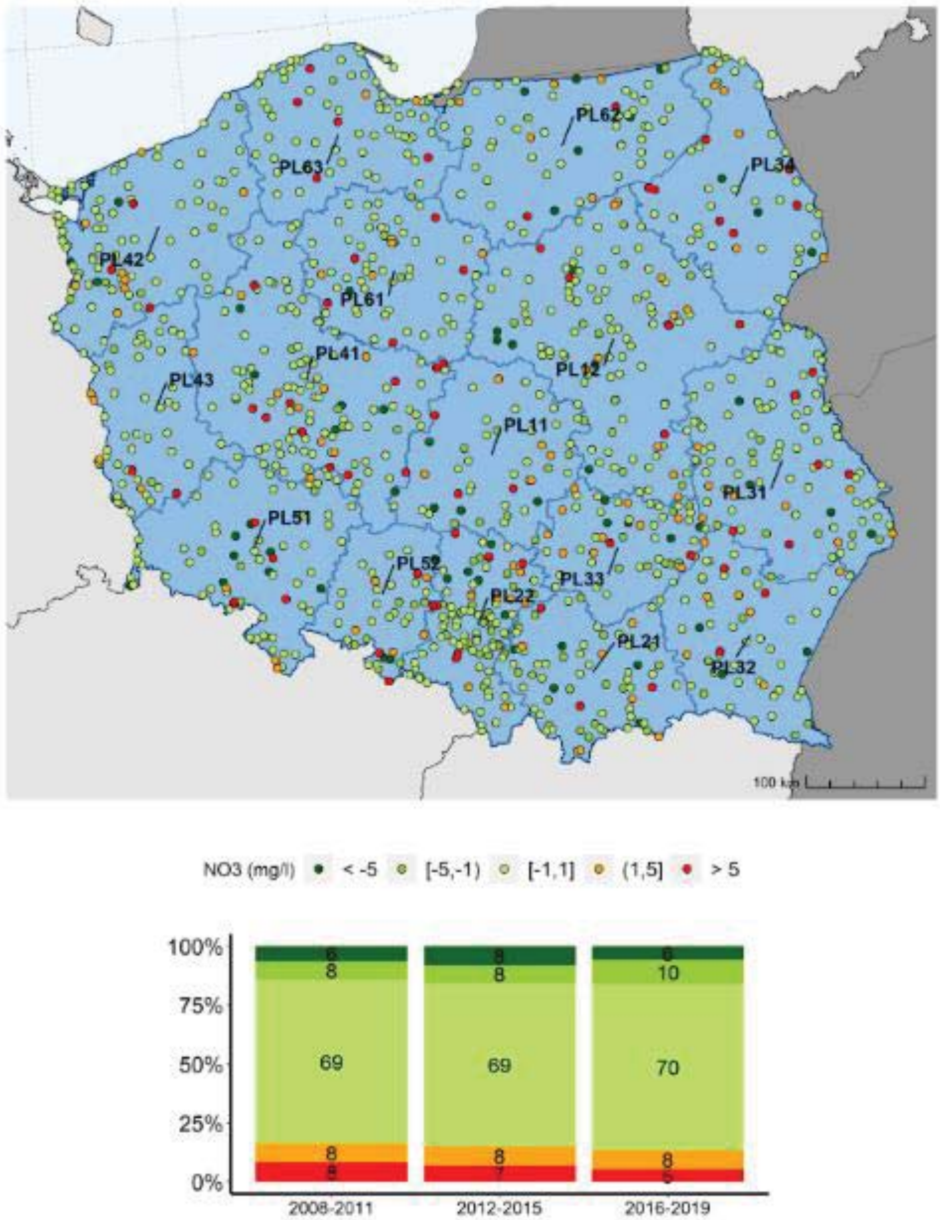


Figure 5. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information.

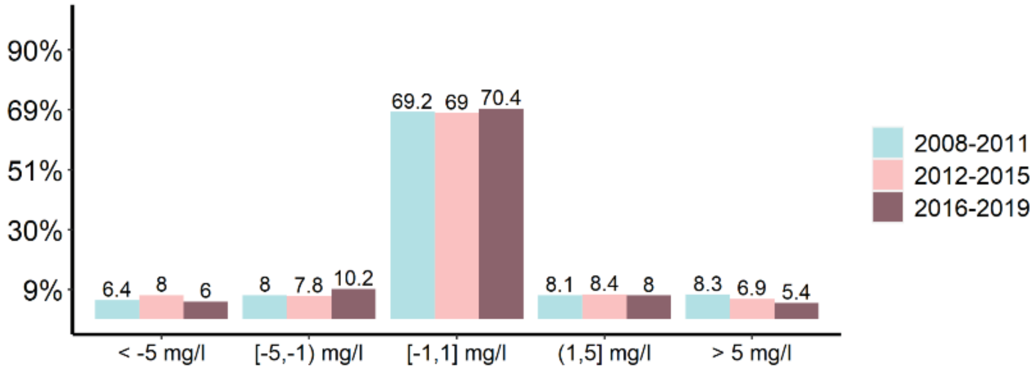
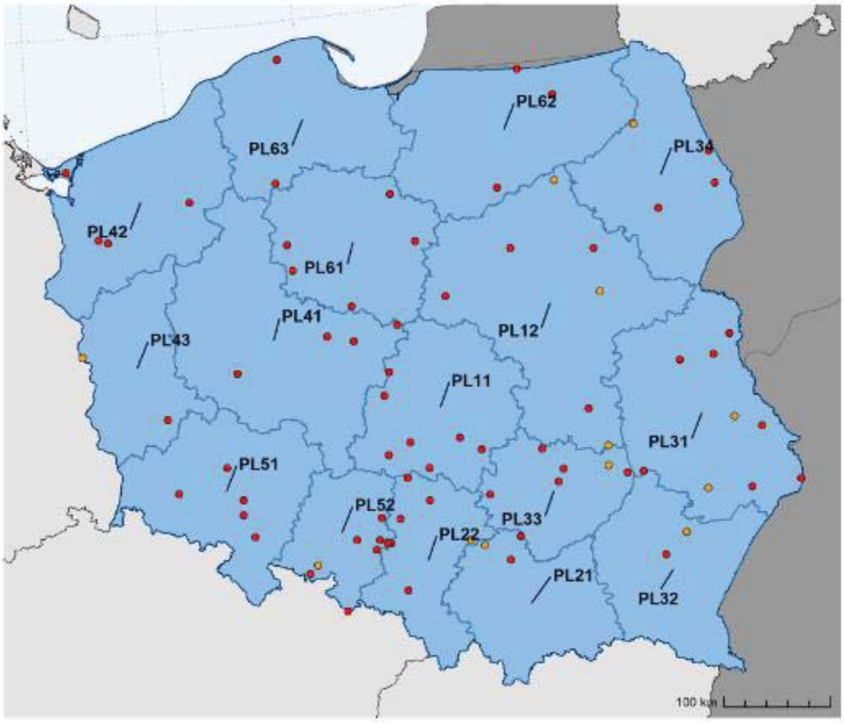


Figure 6. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis)

Groundwater hotspot



NO3 (mg/l) [40,50) incr. trend ≥ 50

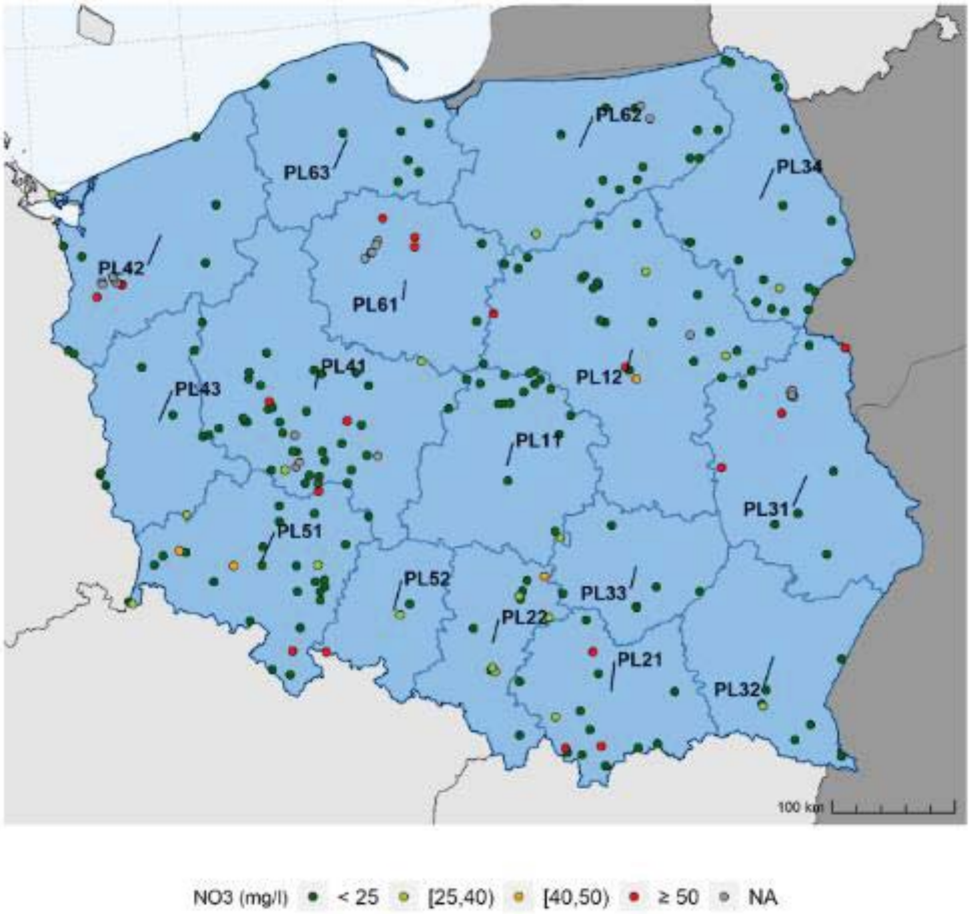
NUTS ID	NUTS NAME	>=40 and < 50 mg/l incr.trend	>=50 mg/l
PL11	Lódzkie	0	7
PL12	Mazowieckie	3	4
PL21	Malopolskie	1	2
PL22	Slaskie	1	6
PL31	Lubelskie	2	7
PL32	Podkarpackie	1	1
PL33	Swietokrzyskie	1	5
PL34	Podlaskie	1	3
PL41	Wielkopolskie	0	5
PL42	Zachodniopomorskie	0	4
PL43	Lubuskie	1	1
PL51	Dolnoslaskie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

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

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

European Commission

Groundwater stations removed



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

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

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

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

Surface Water Quality

Surface water average annual nitrate concentration

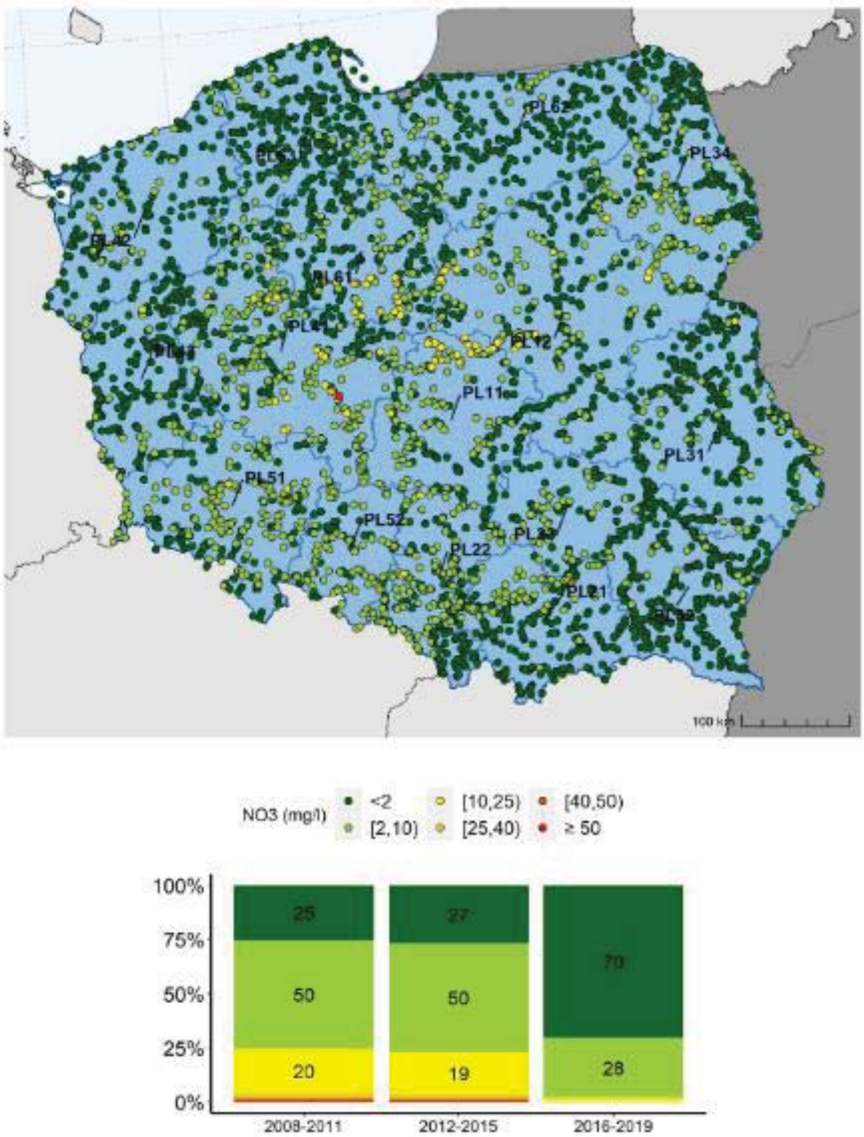


Figure 9. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information.

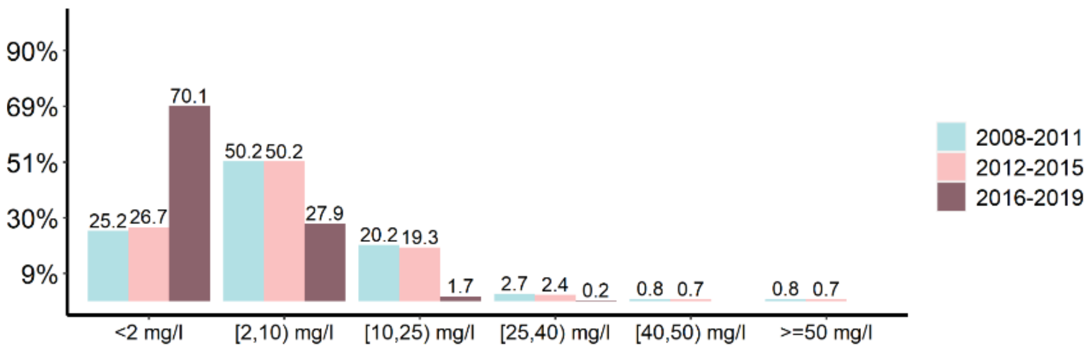
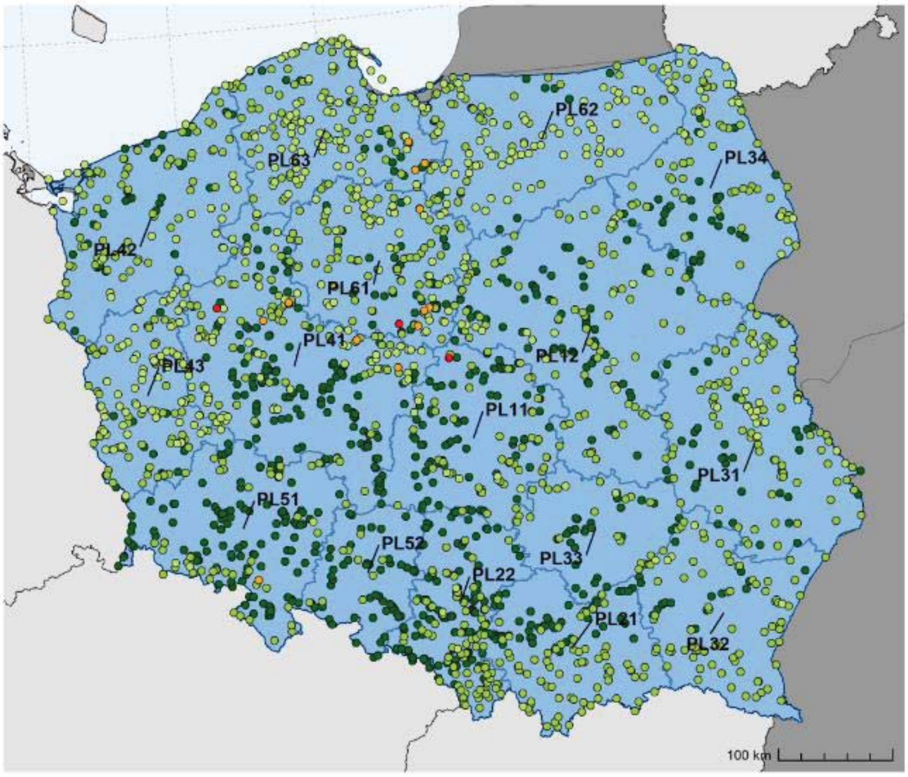


Figure 10. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis)

Surface water average annual nitrate concentration trend



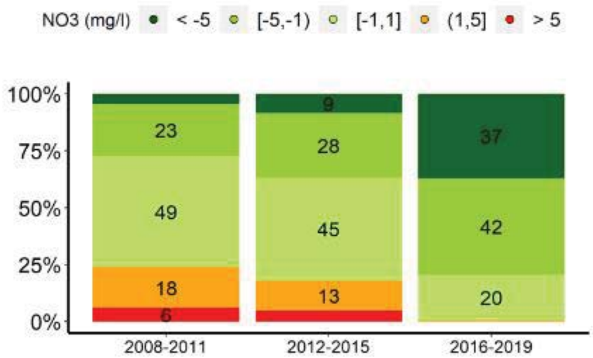


Figure 11. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information.

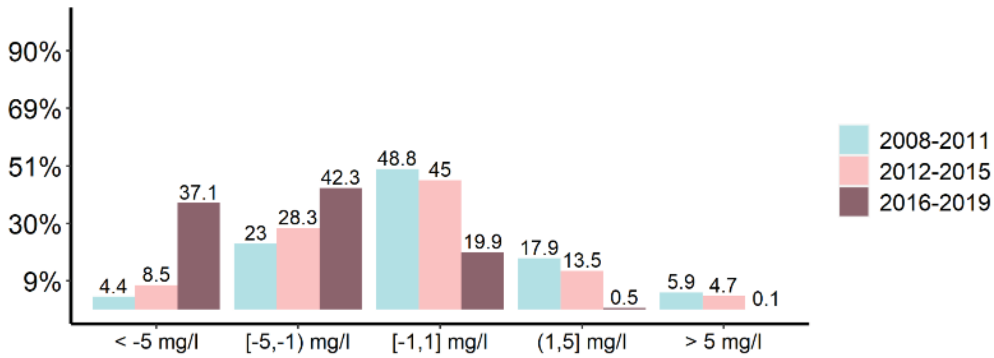
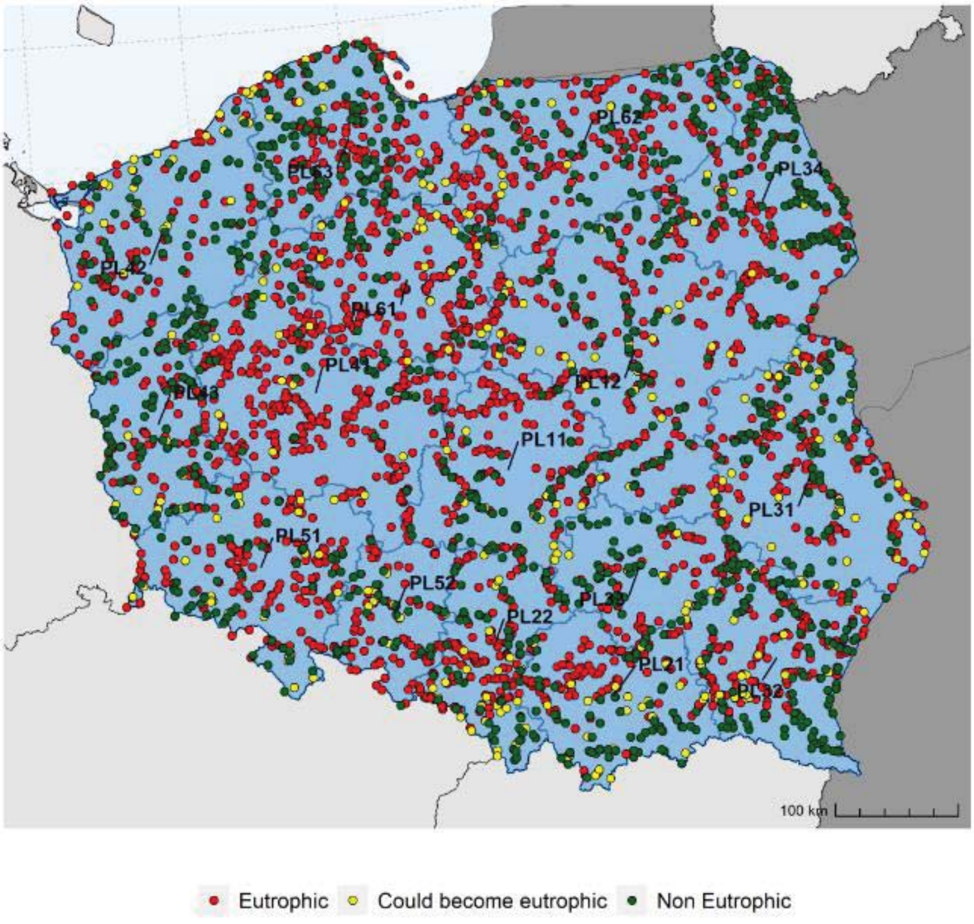


Figure 12. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis)

Surface Water Eutrophication



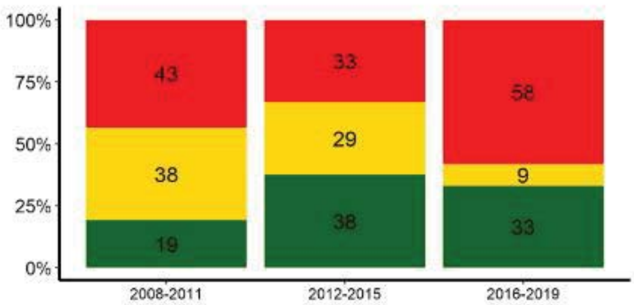


Figure 13. Spatial distribution of eutrophic status (map) and corresponding percentage of monitoring points per classes of status by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information.

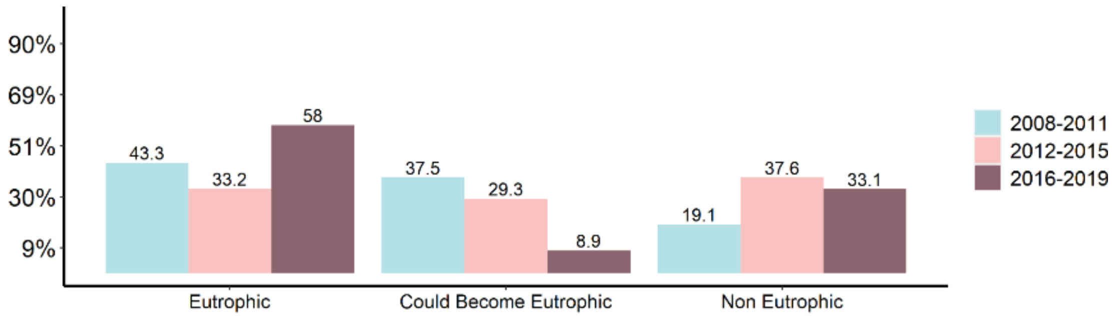
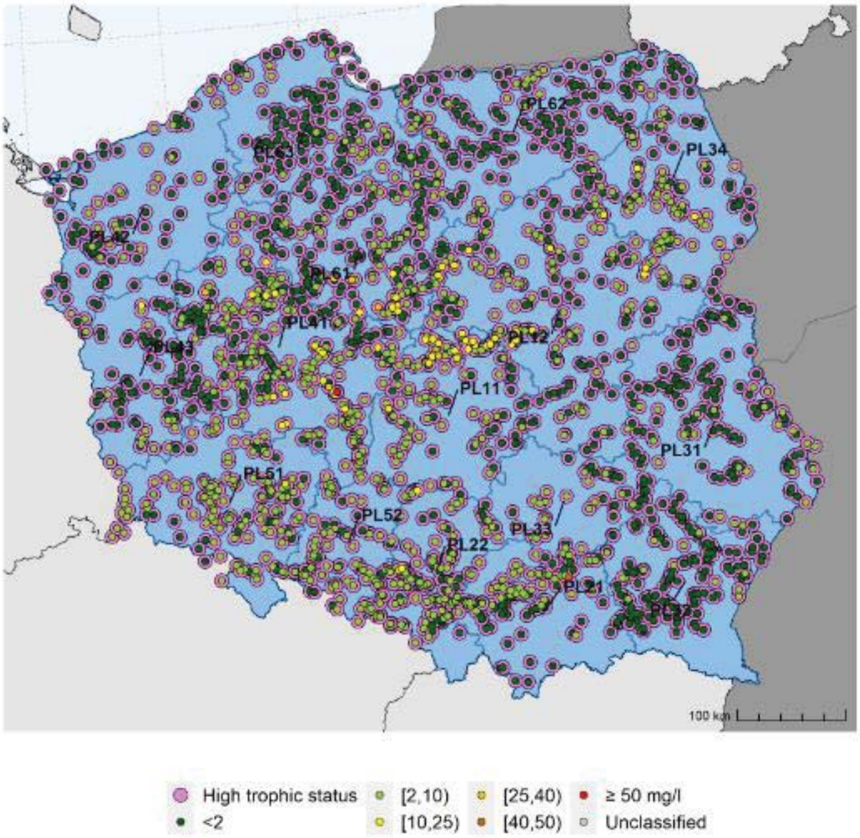


Figure 14. Comparison of percentage of monitoring points in the three reporting periods by classes of status (x axis)

The Eutrophic status vs average NO3 annual concentration



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

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

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

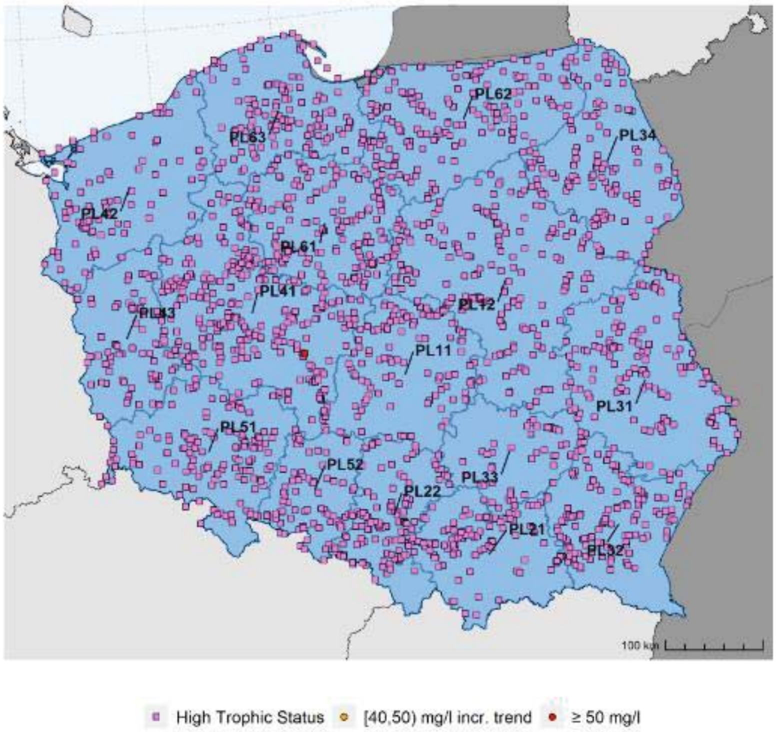
Eutrophication in surface waters is determined based on the results of the assessment carried out by GIOŚ (Chief Inspectorate of Environmental Protection). The assessment is based on a classification of selected ecological status/potential indicators on a scale of 1-5. The bioindicators analyses include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

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

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

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

Surface Water quality hotspot

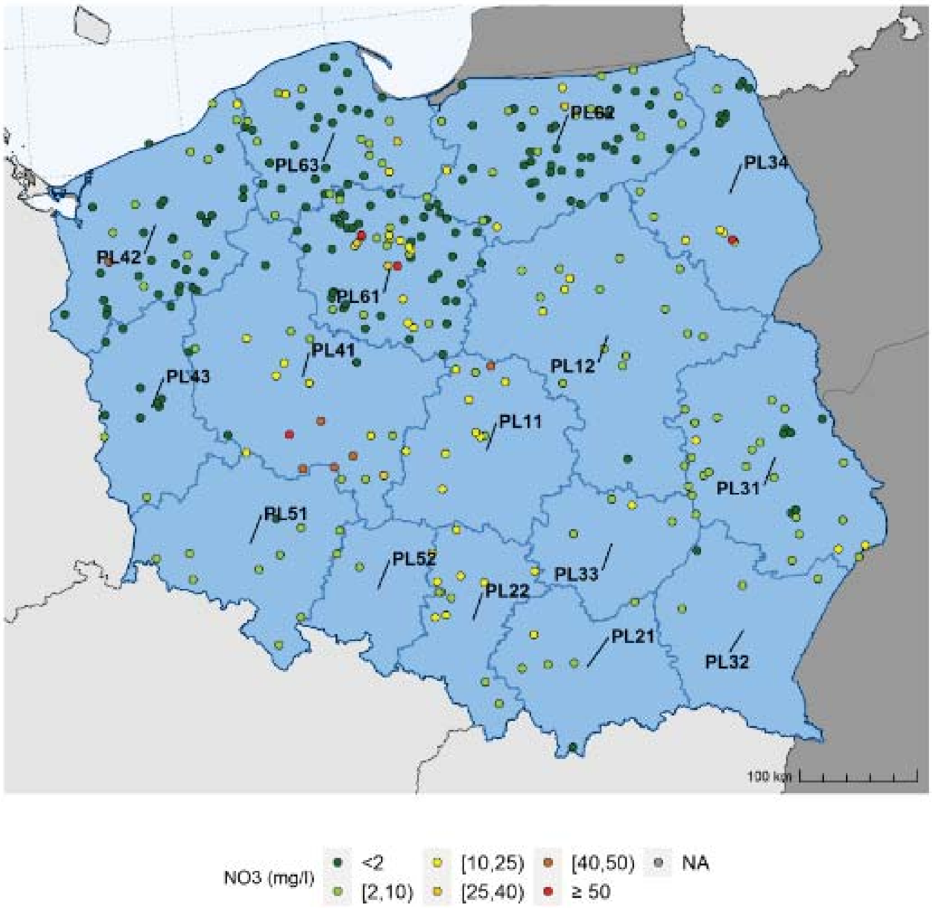


NUTS ID	NUTS NAME	High trophic status	>=40 and < 50 mg/l incr.trend	>=50 mg/l
NO_NUTS	SALINE	19	0	0
PL11	Lódzkie	121	0	0
PL12	Mazowieckie	182	0	0
PL21	Malopolskie	100	0	0
PL22	Slaskie	125	0	0
PL31	Lubelskie	145	0	0
PL32	Podkarpackie	138	0	0
PL33	Swietokrzyskie	50	0	0
PL34	Podlaskie	125	0	0
PL41	Wielkopolskie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

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

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

Surface Water Stations Removed



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

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

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

Measures in the Action Programme

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

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

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

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

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

Table 6. Details of the Action Programme

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

Controls

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

Designation of NVZ

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

Forecast of Water Quality

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

Summary

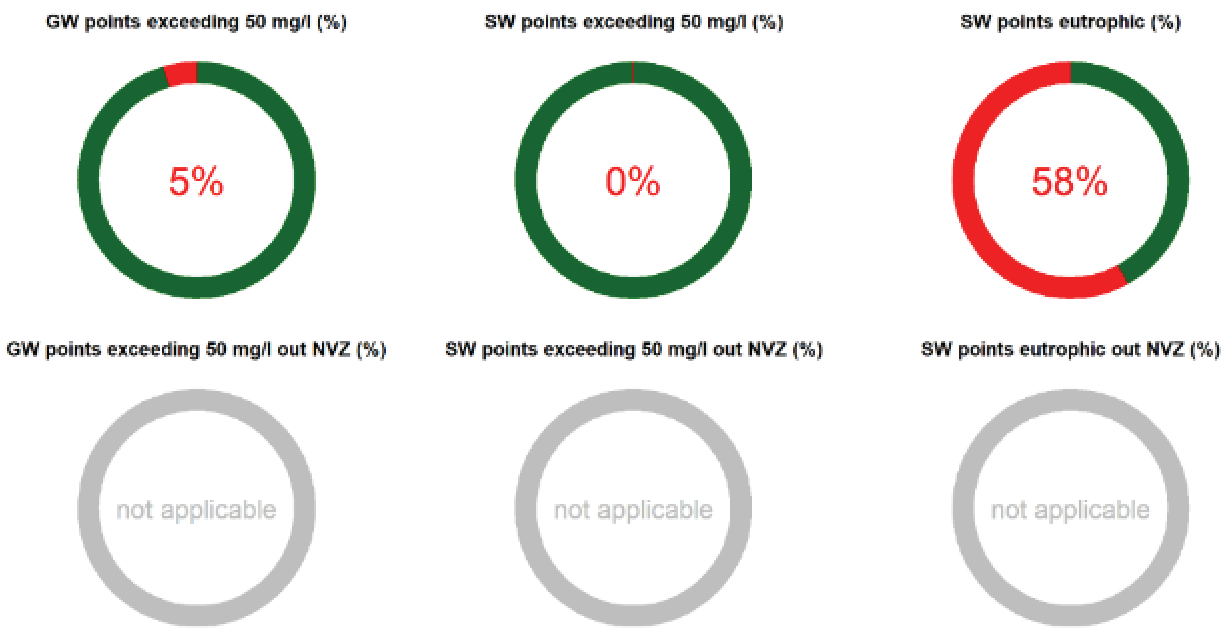


Figure 18. The summary plot for the period 2016-2019

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

Long term analysis

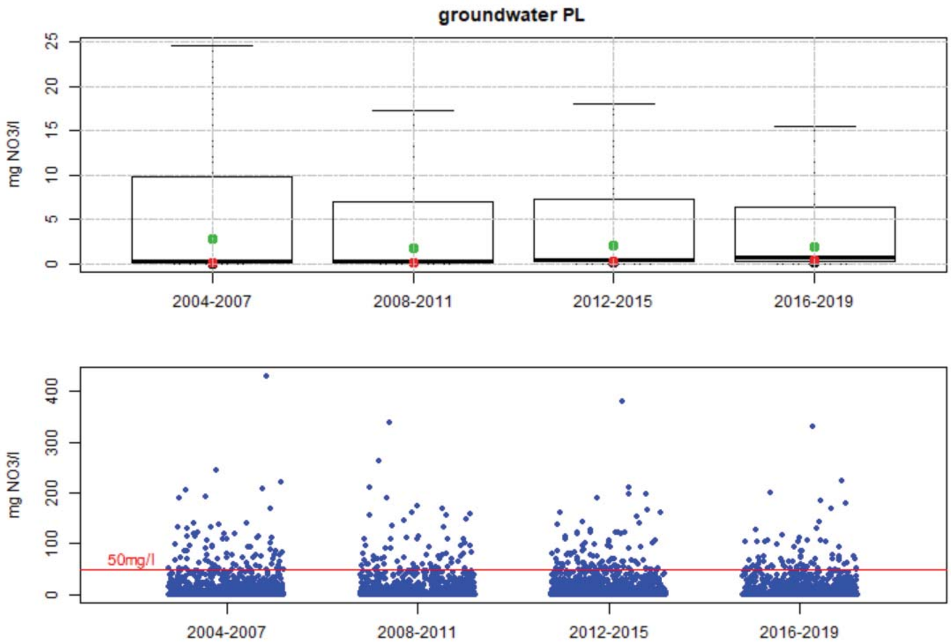


Figure 19. Time series of box whisker plots along with the distribution of the average NO3 annual concentrations for each reporting period, for groundwater stations. RPs represent the reporting periods, RP7 being the last period (2016-2019). The blue, red, green and black dots represent the mean of the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

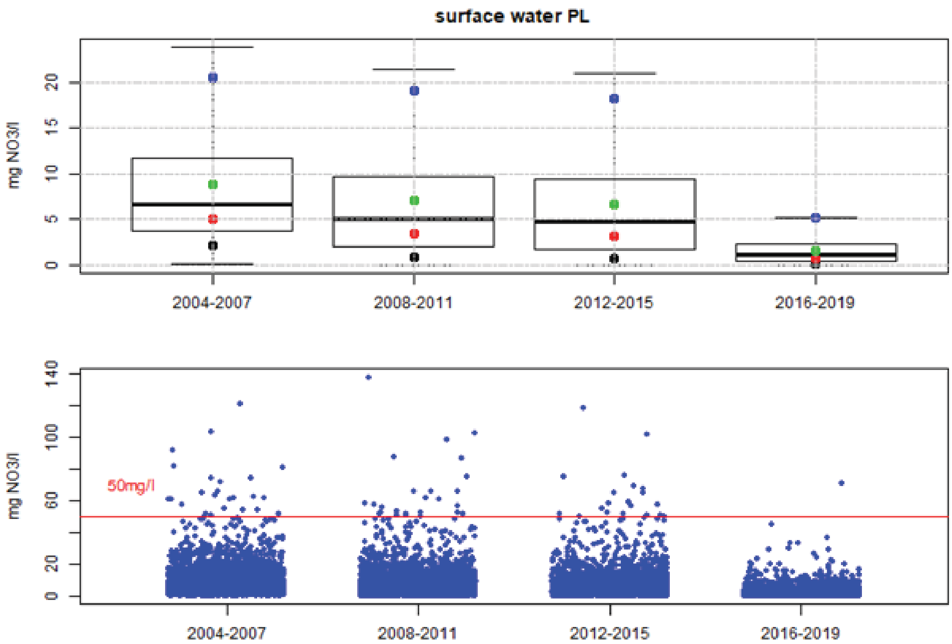


Figure 20. Time series of box whisker plots along with the distribution of the average NO3 annual concentrations for each reporting period, for surface water stations. RPs represent the reporting periods, RP7 being the last period (2016-2019). The blue, red, green and black dots represent the mean of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

Conclusions and recommendations

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

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

The action programme was revised in 2018.

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

EUROPEAN
COMMISSION

Brussels, 11.10.2021
SWD(2021) 1001 final

PART 30/38

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}

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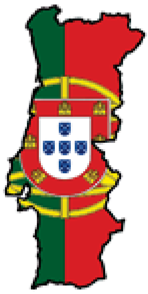
Pressure from Agriculture



Portugal's utilized agricultural area amounts to 3.6 Mha, representing 40% of the total land area. The major outputs of the agricultural industry excluding services include in a decreasing order fruit (19.3%), vegetables and horticultural plants (16.6%) and other crops (14.9%).

Major land use statistics for Portugal

Table 1.Utilized agricultural area (abbreviated as UAA)

Portugal	2005	2007	2010	2013	2016
Utilised agricultural area UAA (1000 ha)	NA	3661	3654	3718	3636
arable land (1000 ha)	NA	1127	1129	1139	982
permanent grass (1000 ha)	NA	1782	1793	1817	1877
permanent crops (1000 ha)	NA	731	714	748	761
kitchen gardens (1000 ha)	NA	21	19	15	16

Note:

Eurostat (FSS)

Portugal's arable land has decreased from the last reporting period by 14%. Permanent grassland, crops and kitchen gardens remained stable.

Animal distribution in Portugal

Portugal has seen an increase in all livestock numbers. Consequently, the livestock density index has increased by 8.9% since 2013. The livestock intensity index is lower than the EU average of 0.8.

Table 2. Livestock statistics

Portugal	2005	2007	2010	2013	2016
Livestock index	0.56	0.58	0.60	0.56	0.61
dairy cows (10^6 heads)	0.28	0.27	0.24	0.23	0.24
live bovines (10^6 heads)	1.50	1.49	1.50	1.47	1.64
live pigs (10^6 heads)	1.96	1.98	1.92	2.01	2.15
live poultry (10^6 heads)	NA	NA	35.35	28.61	36.05

Note:

Eurostat (FSS)

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

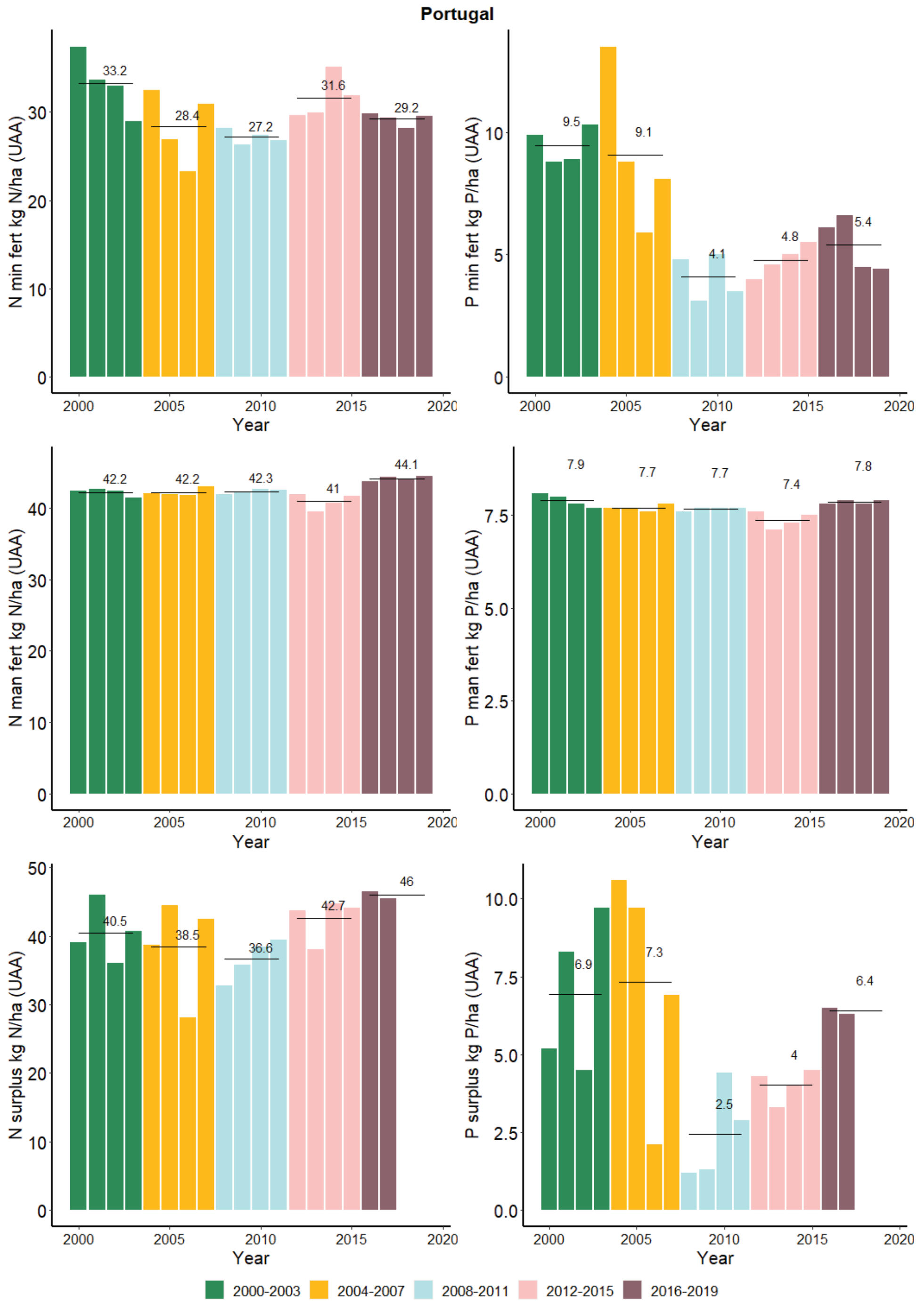


Figure 1. N and P fertilizers and gross surplus (kg/ha)

The N and P mineral fertilizer, manure and gross nitrogen (N) and phosphorus (P) surpluses originate from EUROSTAT data for the years 2000-2017, while for years 2018-2019 from the National Institute of Statistics (INE). The consumption of inorganic N during the last reporting period is lower than that of the previous. The consumption of inorganic P fertilizer has increased by 13%. Both N and P from manure have increased since the last reporting period. The N surplus continues to increase since 2010. The phosphorus surplus is higher than that of the previous reporting period. 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

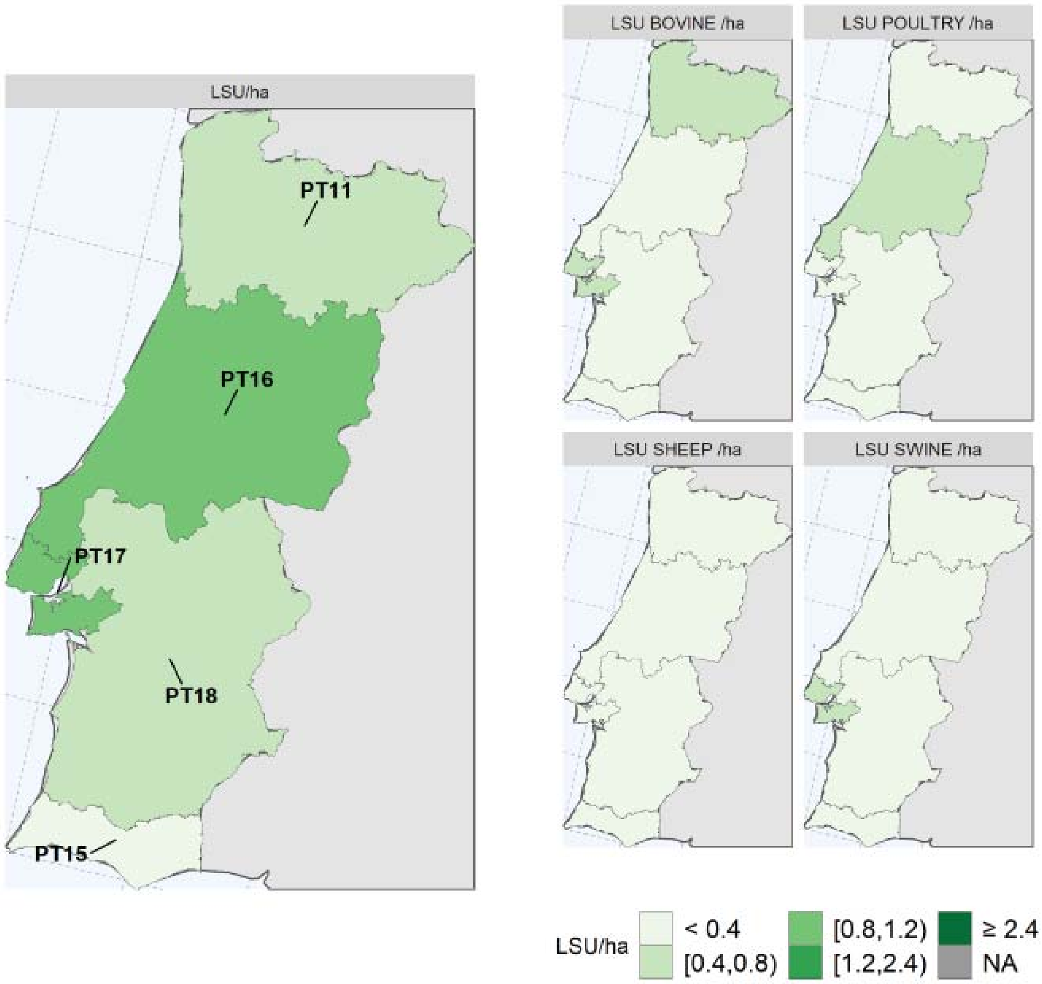


Figure 2. Map of livestock unit distribution in the Continent part, year 2016 (Source: Eurostat, February 2021)

Animal production is concentrated in the south-western part of the Portugal (total LSU and LSU by animal type were retrieved individually from EUROSTAT).
In this document, the NUTS-2013 version is used.
(https://ec.europa.eu/eurostat/web/gisco/geodata/reference-data/administrative-units-statistical-units/nuts)

Livestock unit - LSU /ha

Acores and Madeira

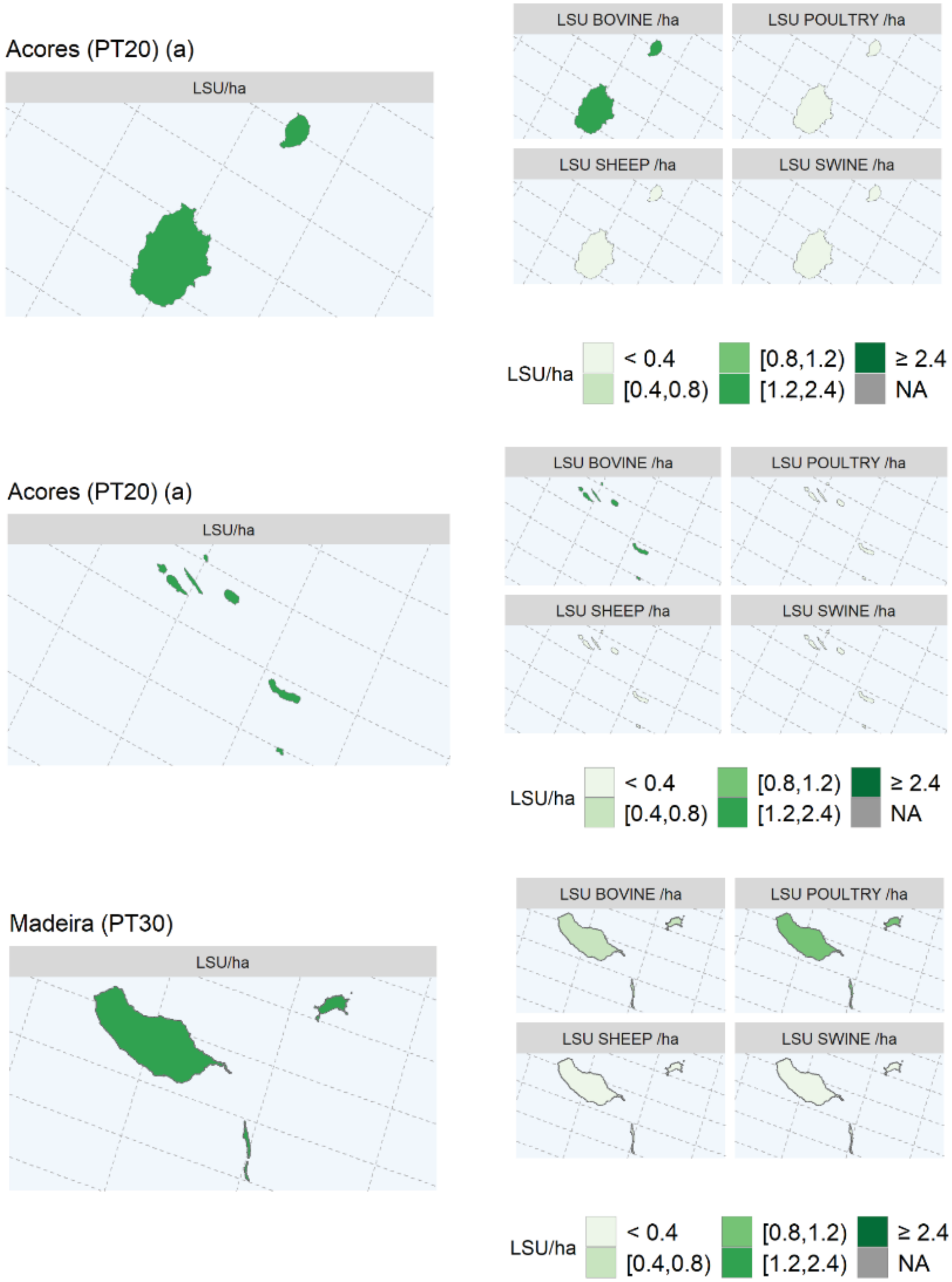


Figure 3. Map of livestock unit distribution in Acores and Madeira, year 2016 (Source: Eurostat, February 2021)

Bovine production is dominating in Acores while poultry is dominating in Madeira (total LSU and LSU by animal type were retrieved individually from EUROSTAT).

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

Water Quality Monitoring

The Regional Directorates of Water Resources and Spatial Planning including the Azores Regional Directorate are in charge of maintaining an up to date record of the results obtained from the region's monitoring programmes and provide it to the competent national authority, the Portuguese Environment Agency.

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	251	249	229	208	231	229
1a	Phreatic groundwater (deep) 5-15 m	83	70	60	79	70	60
1b	Phreatic groundwater (deep) 15-30 m	90	58	46	90	58	46
1c	Phreatic groundwater (deep) >30 m	86	85	81	74	76	80
2	Captive groundwater	3	7	6	3	7	6
3	Karstic groundwater	144	111	98	132	111	98
9	Not specified	0	0	0	0	0	0
	Total	**657**	**580**	**520**	**586**	**553**	**519**

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	89	92	96	61	89	90	28	55	53
5	Lake/reservoir water	57	62	62	49	54	62	50	62	60
6	Transitional water	45	5	12	1	2	4	0	0	10
7	Coastal water	10	1	8	0	0	0	0	0	8
8	Marine water	0	0	0	0	0	0	0	0	0
9	Not specified	0	0	0	0	0	0	0	0	0
	Total	**201**	**160**	**178**	**111**	**145**	**156**	**78**	**117**	**131**

Groundwater Quality

Groundwater average annual nitrate concentration

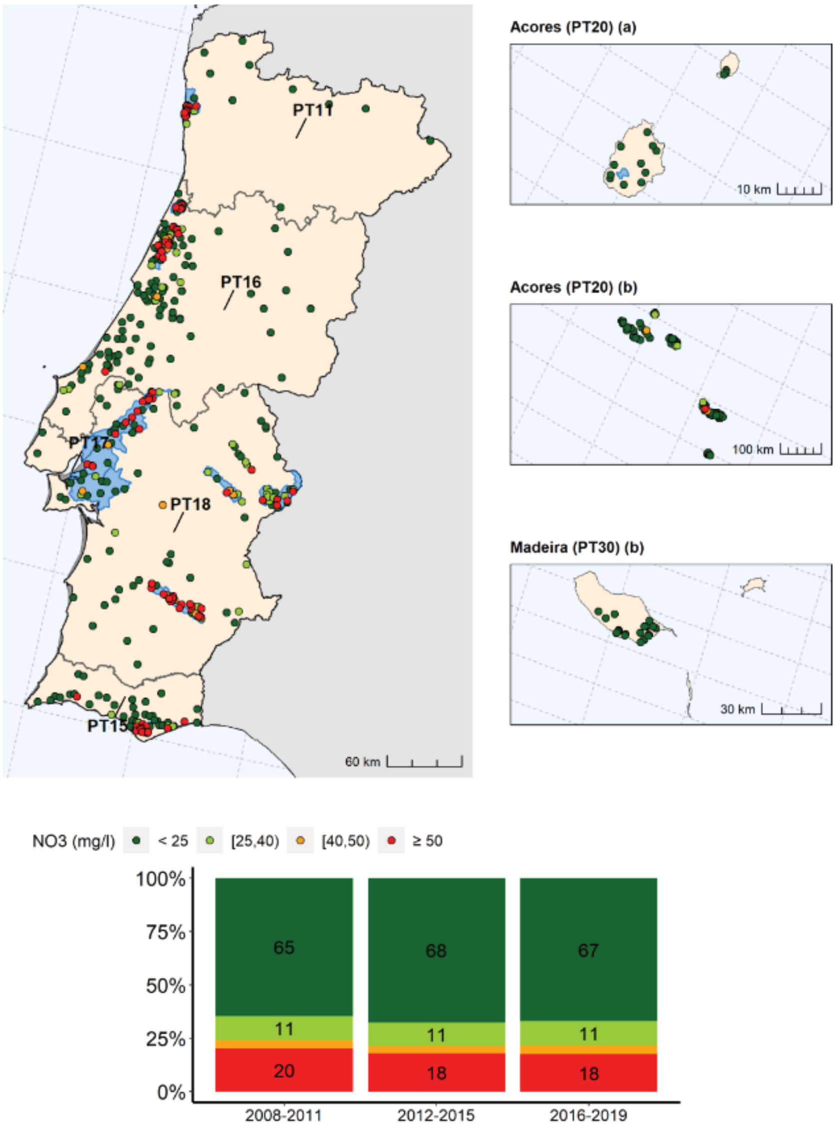


Figure 4. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information. In the map in blue the NVZ.

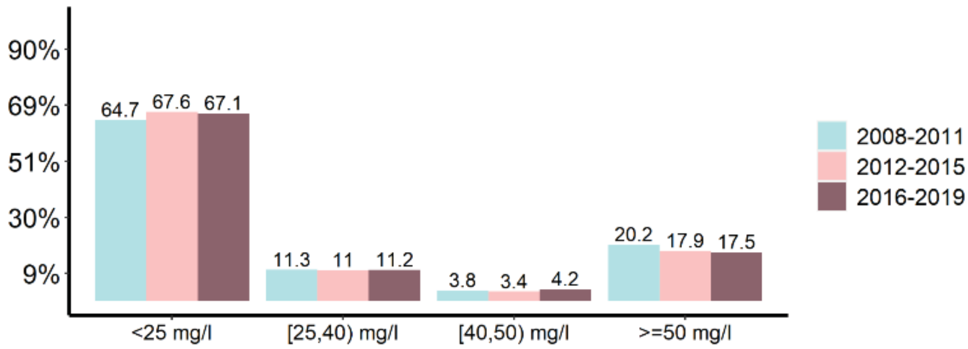


Figure 5. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis)

Groundwater average annual nitrate concentration trend

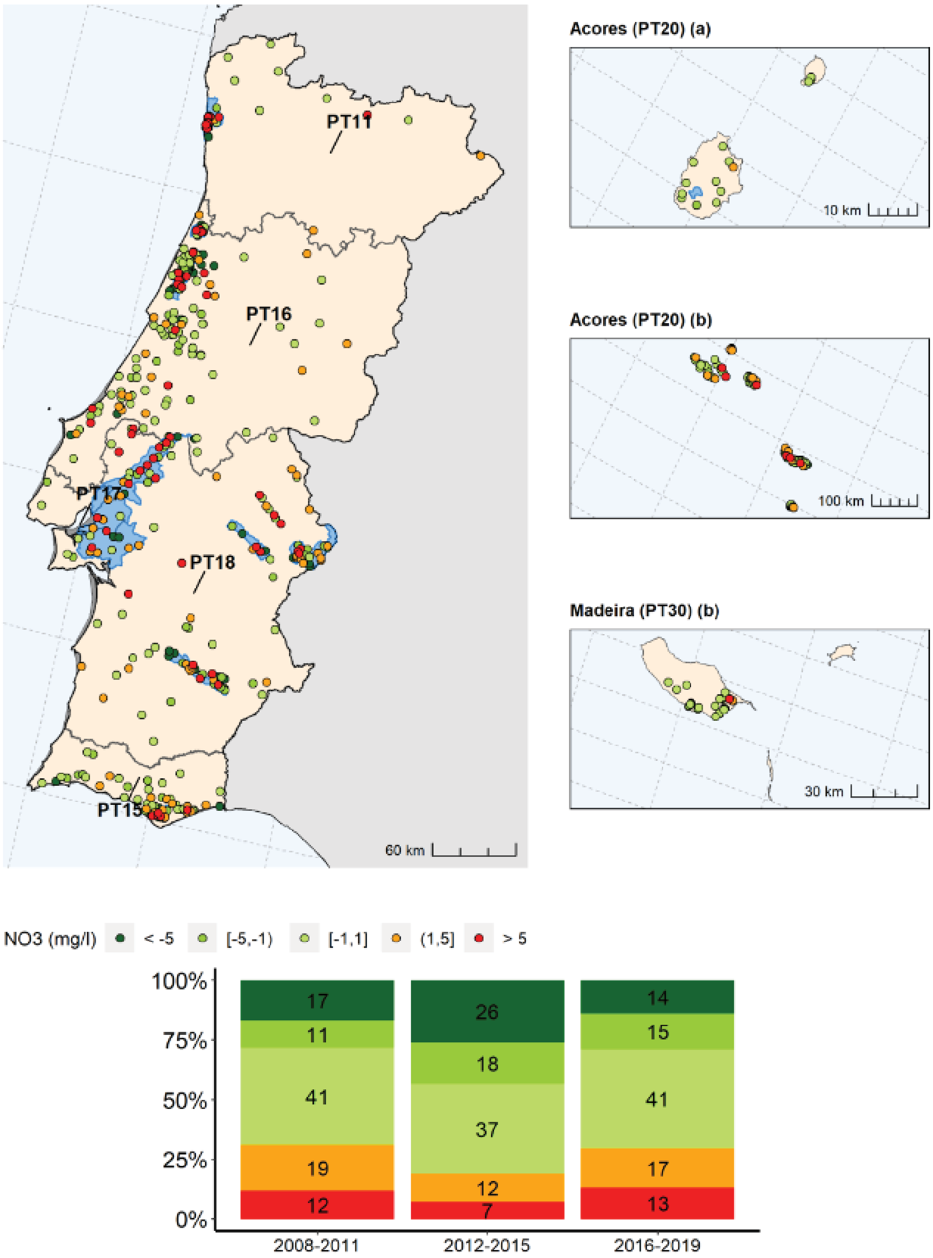


Figure 6. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis). In the map in blue the NVZ.

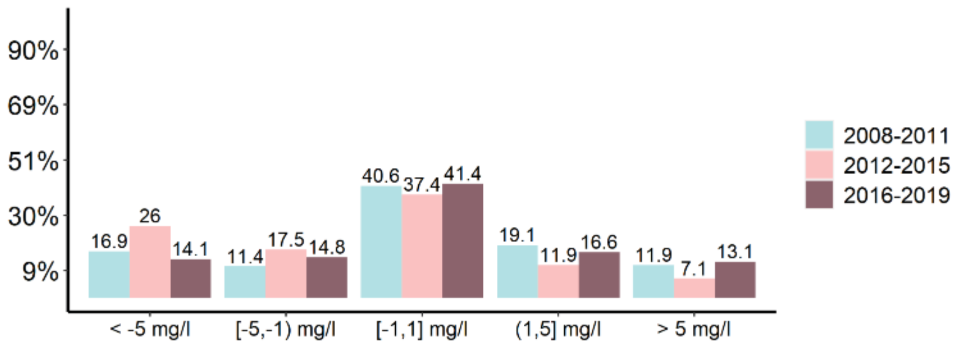
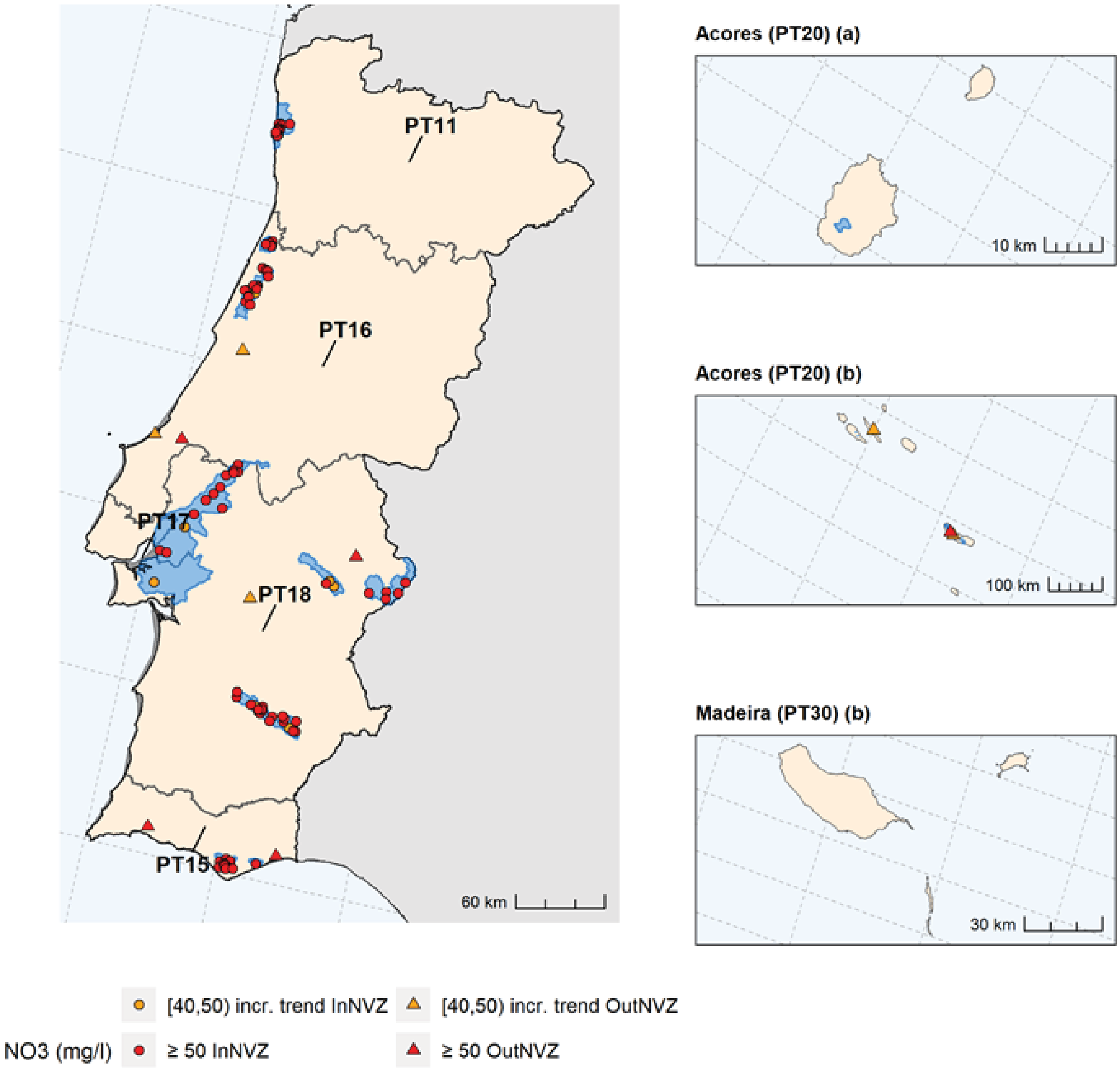


Figure 7. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis)

Groundwater hotspot

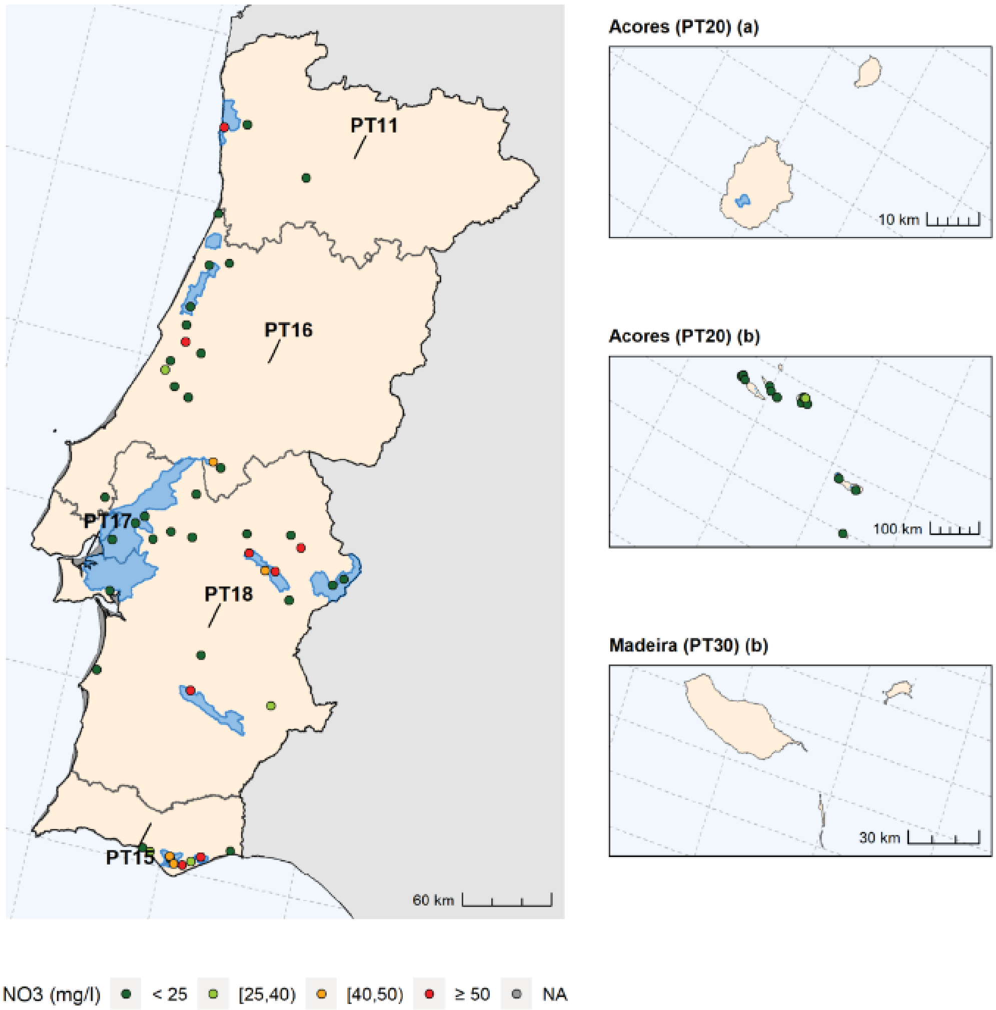


NUTS ID	NUTS NAME	>=40 and < 50 mg/l incr.trend		>=50 mg/l	
		InNVZ	OutNVZ	InNVZ	OutNVZ
PT11	Norte	1	0	15	0
PT15	Algarve	1	0	16	2
PT16	Centro (PT)	2	2	20	1
PT17	Área Metropolitana de Lisboa	1	0	0	0
PT18	Alentejo	6	1	35	1
PT20	Região Autónoma dos Açores	0	2	0	1
	Total	**11**	**5**	**86**	**5**

Figure 8. 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 or are above 50 mg/l. The map shows the spatial distribution of these points, and the table reports the number of stations by NUTS inside and outside NVZ. Only the NUTS of interest are reported.

Groundwater stations removed



Station Type	Description	Number of removed stations		
		total removed	with measurements	with trends
0	Phreatic groundwater (shallow): 0-5 m	20	20	20
1a	Phreatic groundwater (deep) 5-15 m	10	10	10
1b	Phreatic groundwater (deep) 15-30 m	13	13	13
1c	Phreatic groundwater (deep) >30 m	4	4	4
2	Captive groundwater	1	1	1
3	Karstic groundwater	13	13	13
9	Not specified	0	0	0
	Total	**61**	**61**	**61**

Figure 9. 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

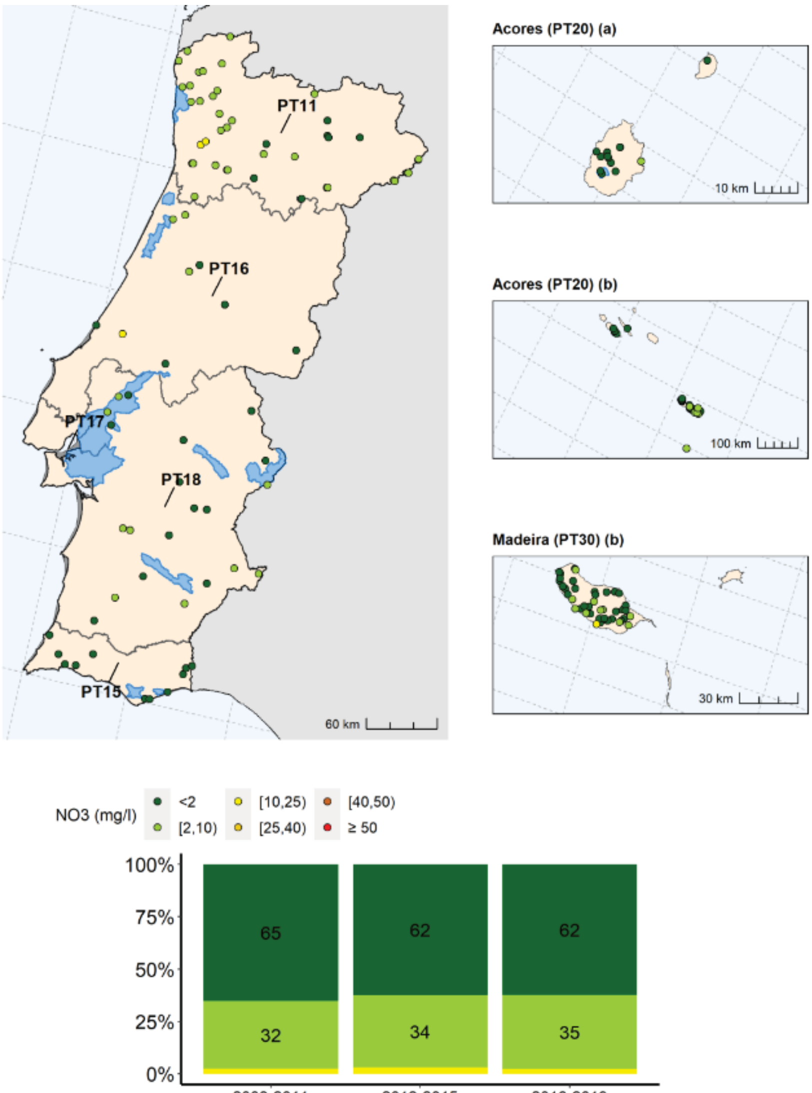


Figure 10. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information. In the map in blue the NVZ.

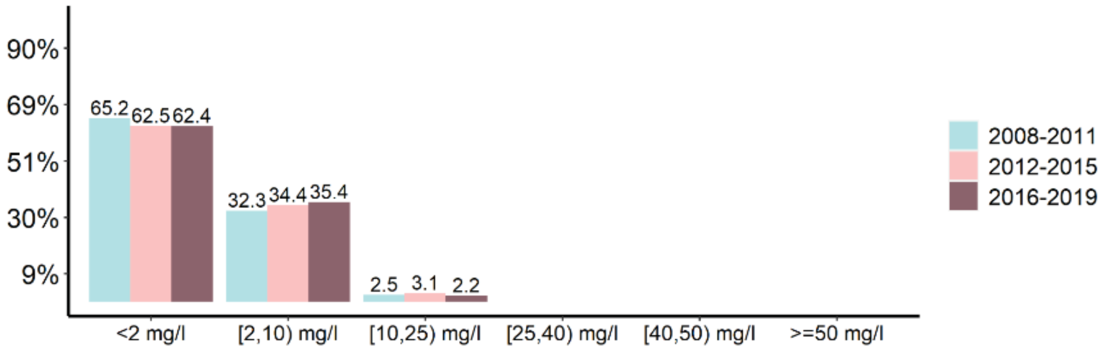


Figure 11. Comparison of percentage of monitoring points between the three reporting periods by classes of NO3 concentration (x axis)

Surface water average annual nitrate concentration trend

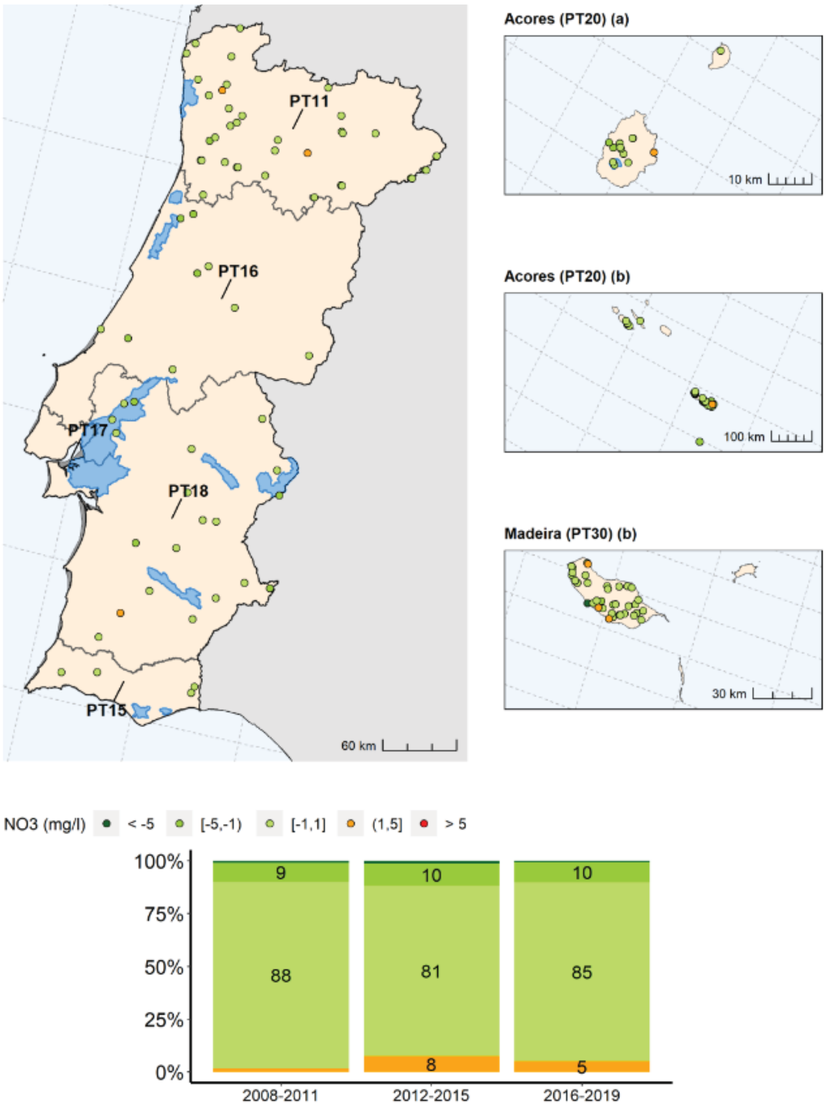


Figure 12. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information. In the map in blue the NVZ.

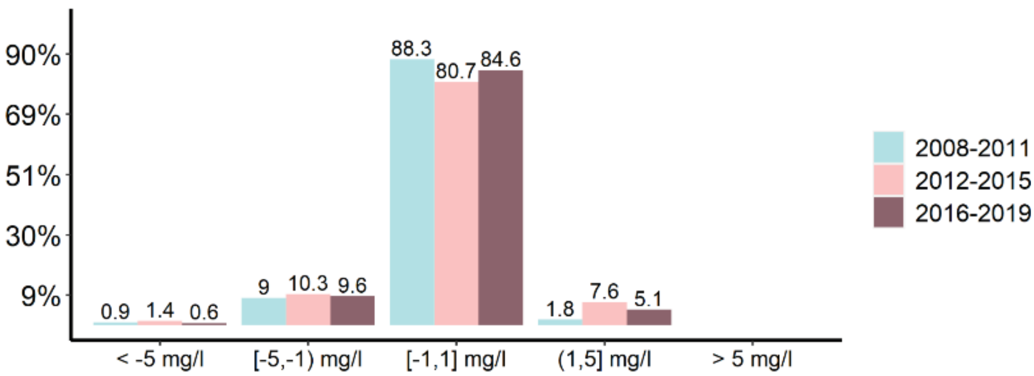


Figure 13. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis)

Surface Water Eutrophication

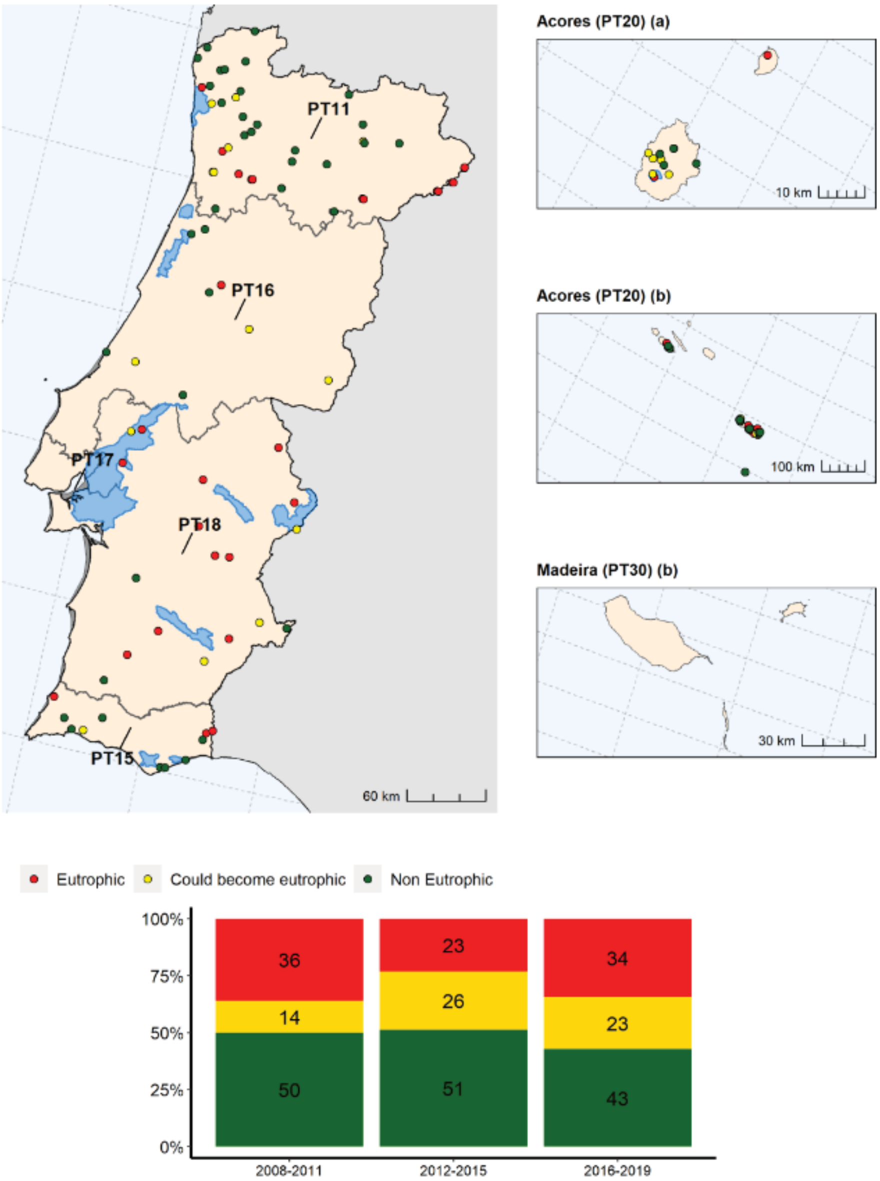


Figure 14. Spatial distribution of eutrophic status (map) and corresponding percentage of monitoring points per classes of status by reporting period (x axis). In the map in blue the NVZ.

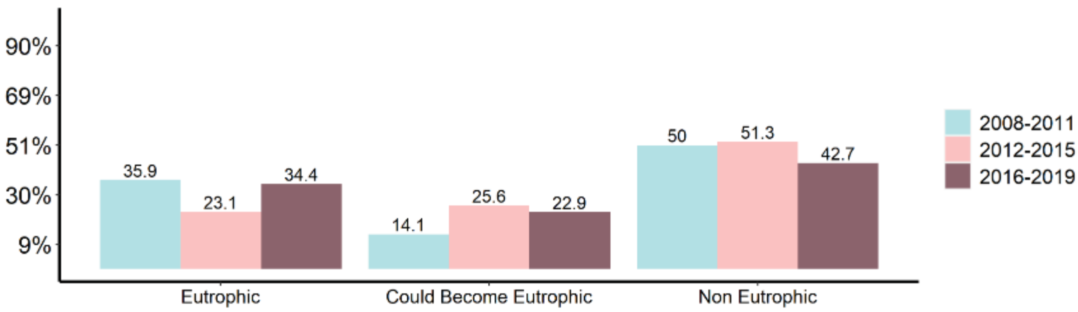
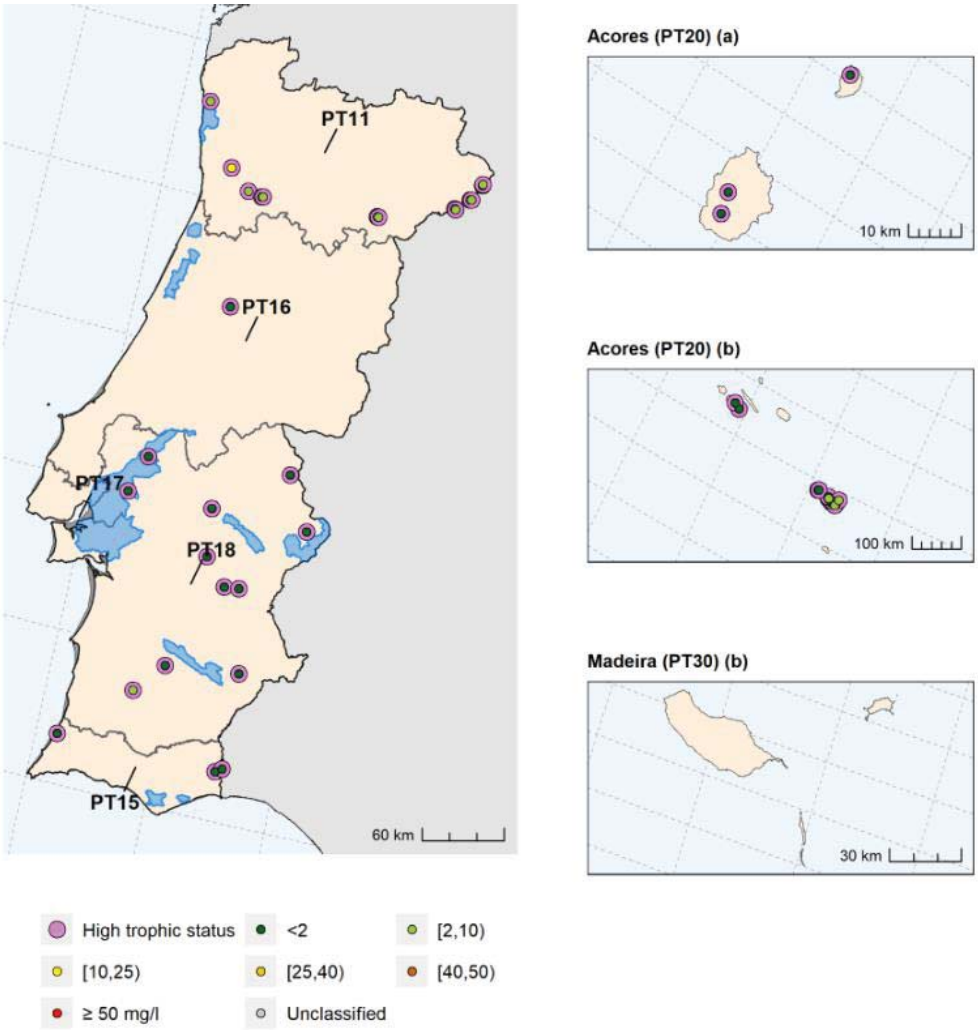


Figure 15. Comparison of percentage of monitoring points in the three reporting periods by classes of status (x axis)

The Eutrophic status vs average NO3 annual concentration



NUTS ID	NUTS NAME	High trophic status	Number of stations by classes of concentration						
			<2 mg/l	[2,10) mg/l	[10,25) mg/l	[25,40) mg/l	[40,50) mg/l	>=50 mg/l	Unclassified
NO_NUTS	SALINE	3	2	1	0	0	0	0	0
PT11	Norte	12	0	11	1	0	0	0	0
PT15	Algarve	1	1	0	0	0	0	0	0
PT16	Centro (PT)	1	1	0	0	0	0	0	0
PT18	Alentejo	11	10	1	0	0	0	0	0
PT20	Região Autónoma dos Açores	17	13	4	0	0	0	0	0
	Total	**45**	**27**	**17**	**1**	**0**	**0**	**0**	**0**

Figure 16. The SW monitoring stations with eutrophic status versus the average NO3 annual concentration. In the map in blue the NVZ.

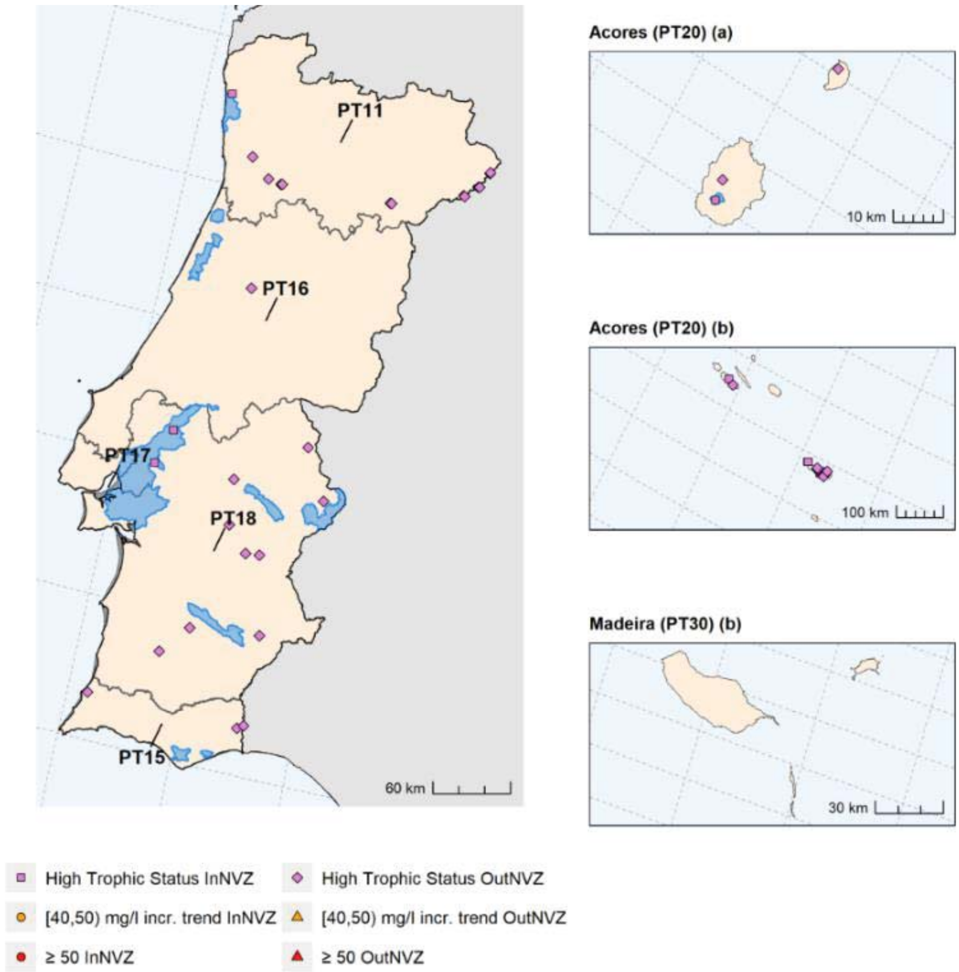
The analysis shows all the SW monitoring stations with the higher trophic status and the corresponding value of NO3 concentration. The map shows the spatial distribution of these points, and the table reports the number of stations with measurements with highest trophic status and the corresponding stations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

The classification criteria implemented under the WFD were considered as the basis to assess the trophic status of both rivers and reservoirs. Two geographical zones were considered for the classification in which both nitrate and total phosphorus concentrations were used. For the northern rivers the lowest limits for eutrophication were 25 mg NO3/l and 0.2 mg P/L for nitrate and total phosphorus, respectively. For southern rivers the lowest criteria for total phosphorus is 0.23 mgP/L while the criteria of nitrate is identical to that of northern rivers. For reservoirs, chlorophyll-a is considered in addition to the nitrate and total phosphorus criteria. Again, two zones are used to determine the trophic classes boundaries. For reservoirs, the nitrate limit for eutrophication is the same as for rivers. For total phosphorus the concentrations limits are 0.05 and 0.08 mgP/L for northern and southern reservoirs, respectively. The chlorophyll-a limits for eutrophication are 7.9 and 9.66 mg/L for northern and southern reservoirs, respectively. Nitrate, phosphate and chlorophyll-a parameters were considered pertinent in the trophic status classification system of coastal and transitional water, using as a basis the reference values defined in the implementation of the WFD for the different types of water bodies and classes of salinity. While most rivers are classified as non-eutrophic the large majority of lakes are eutrophic. There are no eutrophic coastal waters while transitional waters had almost the same distribution for the eutrophic, non-eutrophic and could become eutrophic classes.

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	8	13	32
5	Lake/reservoir water	34	12	14
6	Transitional water	3	3	4
7	Coastal water	0	2	6
8	Marine water	0	0	0
9	Not specified	0	0	0
	Total	**45**	**30**	**56**

Surface Water quality hotspot

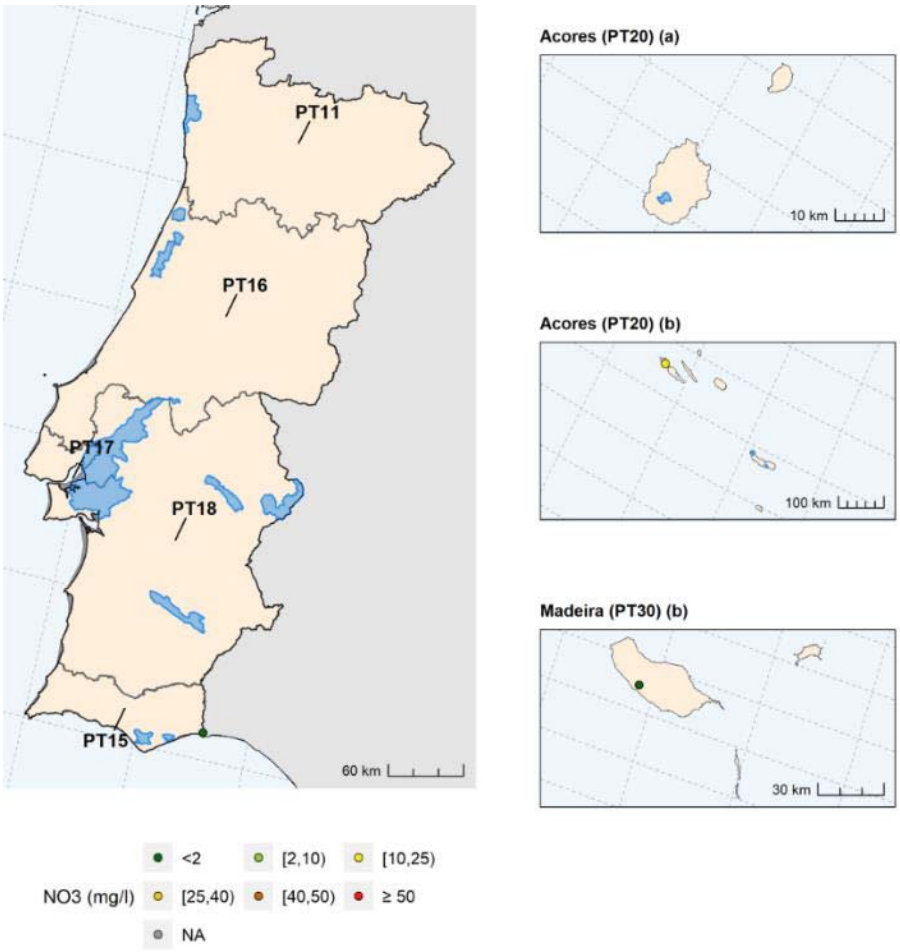


		High trophic status		>=40 and < 50 mg/l incr.trend		>=50 mg/l	
NUTS ID	NUTS NAME	InNVZ	OutNVZ	InNVZ	OutNVZ	InNVZ	OutNVZ
NO_NUTS	SALINE	1	2	0	0	0	0
PT11	Norte	0	12	0	0	0	0
PT15	Algarve	0	1	0	0	0	0
PT16	Centro (PT)	0	1	0	0	0	0
PT18	Alentejo	2	9	0	0	0	0
PT20	Região Autónoma dos Açores	7	10	0	0	0	0
	Total	**10**	**35**	**0**	**0**	**0**	**0**

Figure 17. SW hotspot analysis map (top graph) and distribution by NUTS2 (lower graph) of average NO3 annual concentration greater than 40 mg/l and trophic status. In the map in blue the NVZ.

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 or are above 50 mg/l. The map shows the spatial distribution of these points, and the table reports the number of stations by NUTS inside and outside NVZ.
Only the NUTS of interest are reported.

Surface Water Stations Removed



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

Figure 18. SW removed stations map (top graph) and distribution by surface water type (lower graph). In the map in blue the NVZ.

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

Measures in the Action Programme

The first Code of Good Agricultural Practice was drawn up on 23/11/1997, revised in 2016 and approved in 2018. The new version of CGAP contains updates with regard to:

- Periods in which the application of fertiliser is inappropriate
- Application of fertiliser on steep slopes
- Fertiliser application on water-saturated, flooded, frozen or snow-covered soil
- Conditions for fertiliser application on land adjacent to watercourses
- The capacity and the construction of manure storage tanks, including measures to prevent water pollution by run-off and seepage into the groundwater and surface water of liquids containing livestock manures and effluents from stored plant materials such as silage
- Fertiliser application methods, including dosage and uniformity of spreading, of both chemical fertiliser and livestock manure in order to maintain nutrient losses to water at an acceptable level
- Land use management, including crop rotation systems and the relative proportion between the area devoted to permanent crops and annual crops
- Maintaining a minimum level of vegetation cover during (rainy) periods that will absorb soil nitrogen that otherwise could cause water pollution by nitrates
- Establishment of fertiliser plans at farm level and maintaining a record of the application of fertilisers
- Prevention of water pollution caused by drainage or by infiltration beyond the roots of the plants in irrigation systems

Portuguese authorities have pointed out that they assume that the voluntary implementation of CGAP by farmers and livestock producers located outside NVZs has grown since it was first published in 1997, due to the evolution seen in the agricultural and livestock sector.

The Action Programme (AP) was published for the first time in 1998 and was revised in 2001 for NVZ: Esposende Villa do Conde, Aveiro, Faro. In 2003 Mira was included. During the four-year period of 2008-2011 the following NVZ were included: Tagus, Beja, Elvas-Villa Boim, Luz-Tavira. Revisions of NVZ areas were also made in this period. Recently, a single Action Programme was drawn up for all NVZs on mainland Portugal, while in Azores three different Action Programmes are available for different NVZ.

The Action Programme was drawn up taking into account crop requirements during their growth cycle and the maximum quantities of nitrogen to be applied. It also limits the amount of organic fertilisers which can be used and considers the need to draw up fertilisation plans and balances. It further prohibits the application of fertilisers in specific seasons, in soils which are flooded or susceptible to flooding, in snow-covered or frozen soils and on land adjacent to watercourses, groundwater wells, reservoirs, lakes (buffer strips). The AP also sets out the requirement for the sustainable management of livestock manure and slurry and the correct management of irrigation while also making compulsory certain agricultural practices on sloping land. It also sets out procedures for monitoring and controlling nitrates in waters and on agricultural land parcels.

For each NVZ, measurable criteria for assessing impact of the programmes on practices in the field have been reported, as well as the percentage of farmers respecting the rules.

No cost effectiveness was reported.

Controls

Portugal reported by NVZ regions the controls performed to assess the implementation of the Action Programme. The percentage of farms visited in each zone varied from 0 to 25% of the farmers concerned. The percentage of non-compliance varies widely between the regions and ranges from 0% to 20% of non-compliance. The most frequent reason of non-compliance deals with the need of a balanced fertilization.

Designation of NVZ

Portugal has made no adjustment to the nitrate vulnerable zones designated in the previous report. So, Portugal designated 4,047 km^2 as NVZ, which represents 4.4% of the national territory.

Forecast of Water Quality

A groundwater model was used to simulate the nine vulnerable zones designated in mainland Portugal. The groundwater model was calibrated against actual measurements of piezometric levels and nitrate concentration. Then it was assumed that no additional nitrate input occurred in the groundwater and the model was used to estimate nitrate concentrations in 2040. Six aquifers out of 9 have nitrate concentrations above 50mg/l. Calculated concentrations of nitrate above 50mg/L covered from 1.5 to 6.7% of the area of the remaining aquifers.

Summary

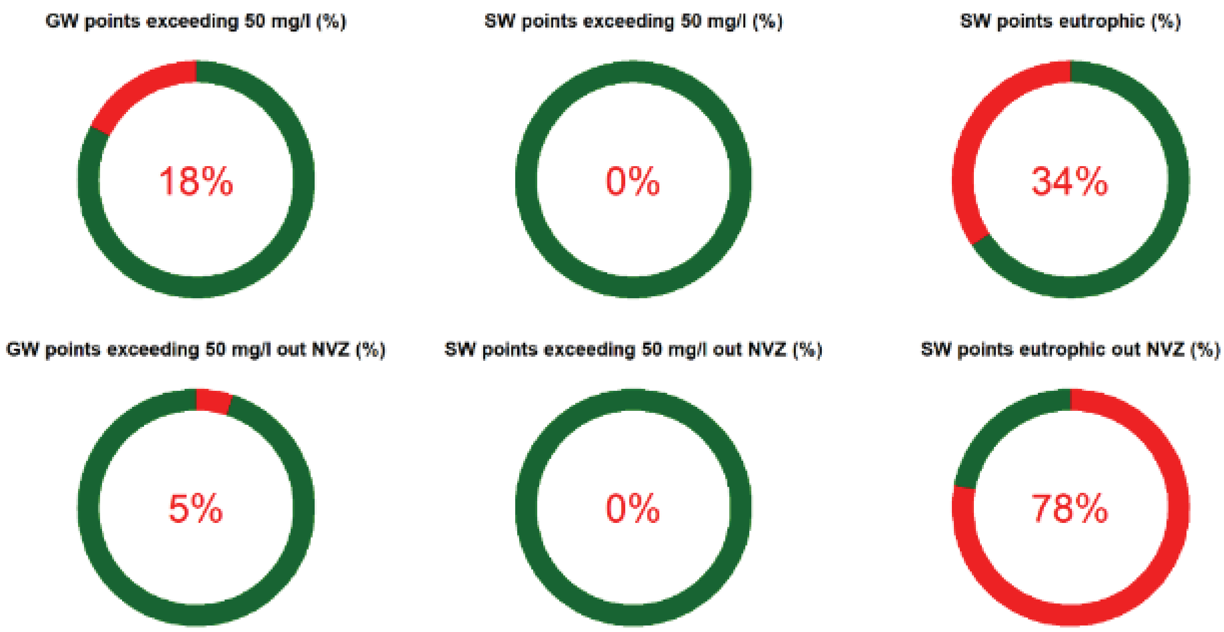


Figure 19. The summary plot for the period 2016-2019

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

Long term analysis

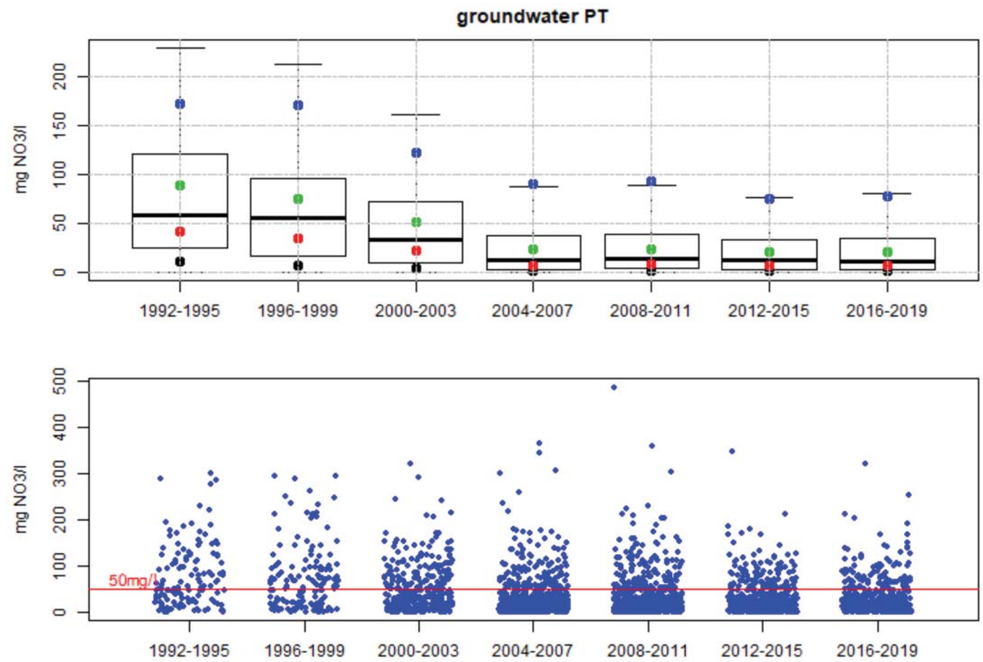


Figure 20. Time series of box whisker plots along with the distribution of the average NO3 annual concentrations for each reporting period, for groundwater stations. The blue, red, green and black dots represent the mean of the fourth third, second and first quartiles, respectively.

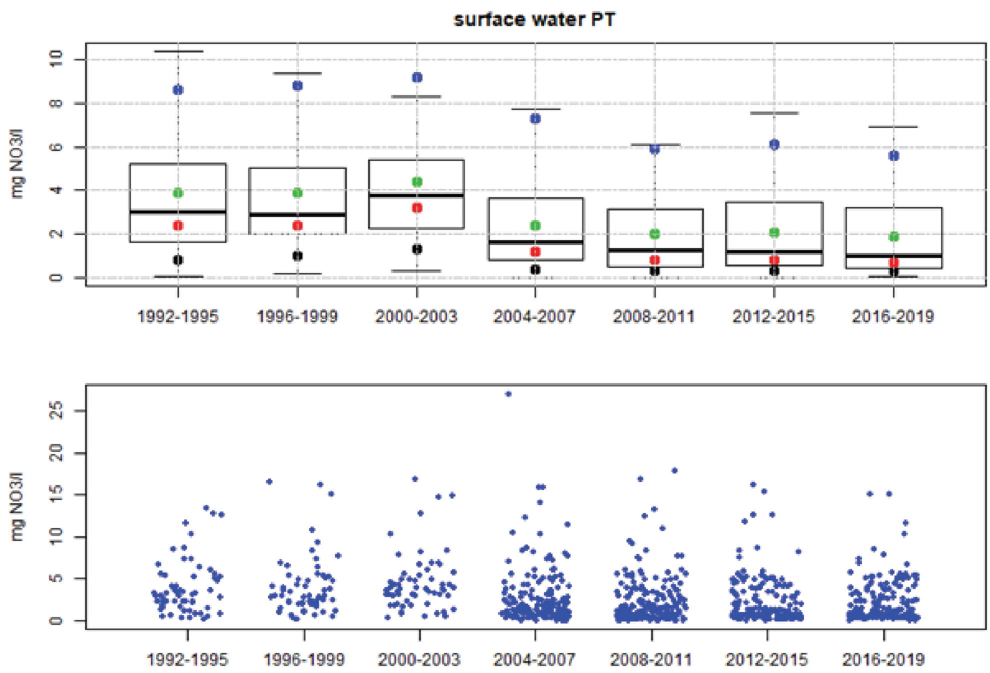


Figure 21. Time series of box whisker plots along with the distribution of the average NO3 annual concentrations for each reporting period, for surface water stations. The blue, red, green and black dots represent the mean of the fourth third, second and first quartiles, respectively.

Conclusions and recommendations

The livestock density close to the EU average and a nitrogen and phosphorus surplus which is slightly lower than the EU average.

The network of monitoring stations is concentrated in NVZ but there are also station outside NVZ to follow the development of the possible nitrates pollution. There is a high number of groundwater hotspots showing nitrates concentration above 50 mg/l in NVZ, also a high number of stations show an increasing trend. A high number of surface waters are affected by eutrophication of which very high number is outside NVZ.

The action programmes was revised in 2012.

The Commission recommends that Portugal revises and reinforces its action programme to tackle the groundwater pollution in hot spots and revises NVZ designation to address eutrophication of surface waters where agriculture pressure is significant.

EUROPEAN
COMMISSION

Brussels, 11.10.2021
SWD(2021) 1001 final

PART 31/38

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

Romania's utilized agricultural area amounts to 13.5 Mha, representing 58% of the total land area. The major outputs of the agricultural industry include in a decreasing order forage (14.7%), milk (13.1%) and wine production (13.1%).
Eurostat

Major land use statistics for Romania

Table 1.Utilized agricultural area (abbreviated as UAA)

Romania	2005	2007	2010	2013	2016
Utilised agricultural area UAA (1000 ha)	NA	13630	14156	13905	13521
arable land (1000 ha)	NA	8675	9146	8746	8582
permanent grass (1000 ha)	NA	4494	4547	4717	4521
permanent crops (1000 ha)	NA	358	345	328	316
kitchen gardens (1000 ha)	NA	104	119	113	101

Note:
Eurostat (FSS)

Romania's arable land has decreased by 1.1% since 2007. Permanent grassland and crops decreased by 2% and 4%, respectively.

Animal distribution in Romania

Romania has seen a decrease in all livestock. The livestock density index (livestock unit per hectare of Utilized Agricultural Area) has decreased by 17% and is below the EU average of 0.8.

Table 2. Livestock statistics

Romania	2005	2007	2010	2013	2016
Livestock index	0.47	0.44	0.41	0.38	0.39
dairy cows (10^6 heads)	1.62	1.57	1.18	1.17	1.19
live bovines (10^6 heads)	2.86	2.82	2.00	2.02	2.05
live pigs (10^6 heads)	6.60	6.57	5.43	5.18	4.71
live poultry (10^6 heads)	NA	NA	79.19	76.30	77.20

Note:
Eurostat (FSS)

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

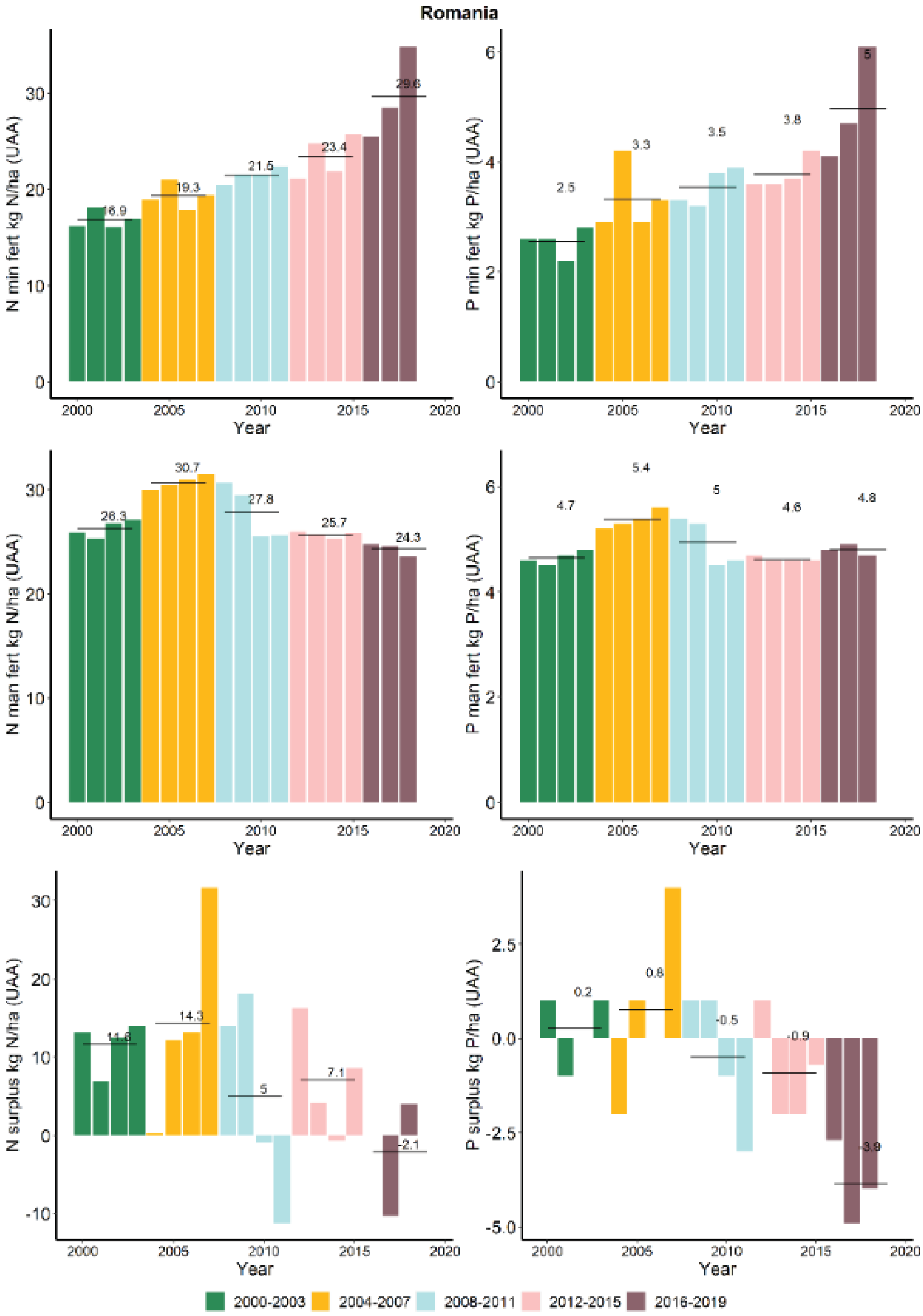


Figure 1. N and P fertilizers and gross surplus (kg/ha)

The gross nitrogen and phosphorus gross surpluses originate from EUROSTAT data for the years 2000-2018. The consumption of inorganic nitrogen and phosphorus has increased since the 2000-2003 reporting period. The organic fertilizer consumption has decreased for the last reporting period for nitrogen and remained stable for phosphorus. Both the gross nitrogen and phosphorus surpluses resulted negative for the last reporting period. This is explained by the higher yields observed this reporting period. 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

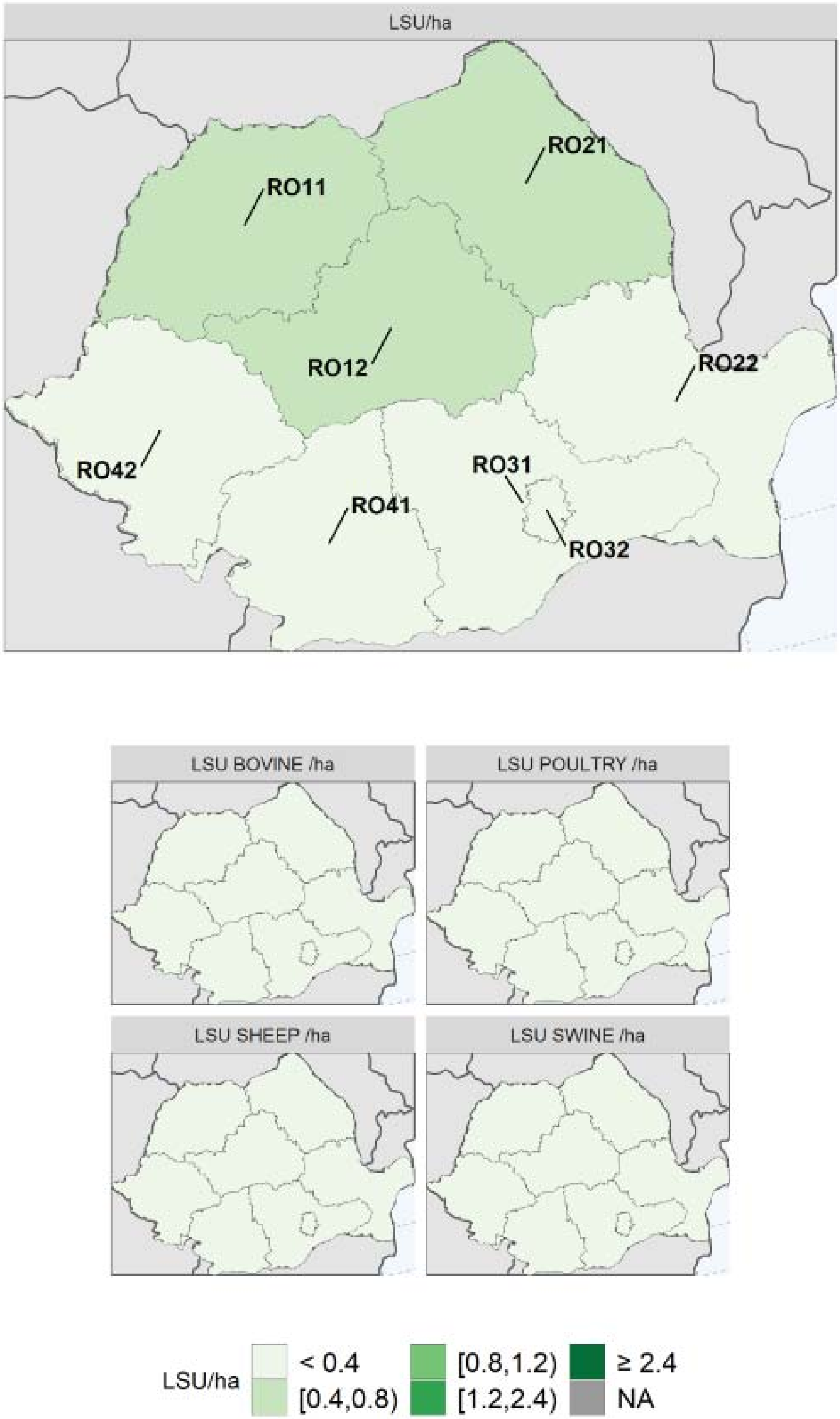


Figure 2. Map of livestock unit distribution, year 2016 (Source: Eurostat, February 2021)

Animal production is concentrated in the northern part of the Romania (total LSU and LSU by animal type were retrieved individually from EUROSTAT).

In this document, the NUTS-2013 version is used.

(https://ec.europa.eu/eurostat/web/gisco/geodata/reference-data/administrative-units-statistical-units/nuts)

Water Quality Monitoring

The National Administration 'Romanian Waters' manages the National Integrated Monitoring System of Romanian Waters. The actual monitoring network was established in 2006 and covers 11 river basins covering the requirement of the WFD and the Nitrates Directive. The groundwater monitoring is carried out with a frequency of 1-2 times per year for the surveillance programme, and a frequency of 2 times per year for the monitoring points under the operational programme. For surface water, monitoring frequencies range generally between 4-26 times/year.

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	242	150	173	143	85	117
1a	Phreatic groundwater (deep) 5-15 m	852	511	572	461	376	464
1b	Phreatic groundwater (deep) 15-30 m	396	291	305	178	207	258
1c	Phreatic groundwater (deep) >30 m	151	134	123	51	82	111
2	Captive groundwater	125	139	152	79	78	122
3	Karstic groundwater	43	31	59	17	21	42
9	Not specified	0	0	0	0	0	0
	Total	**1809**	**1256**	**1384**	**929**	**849**	**1114**

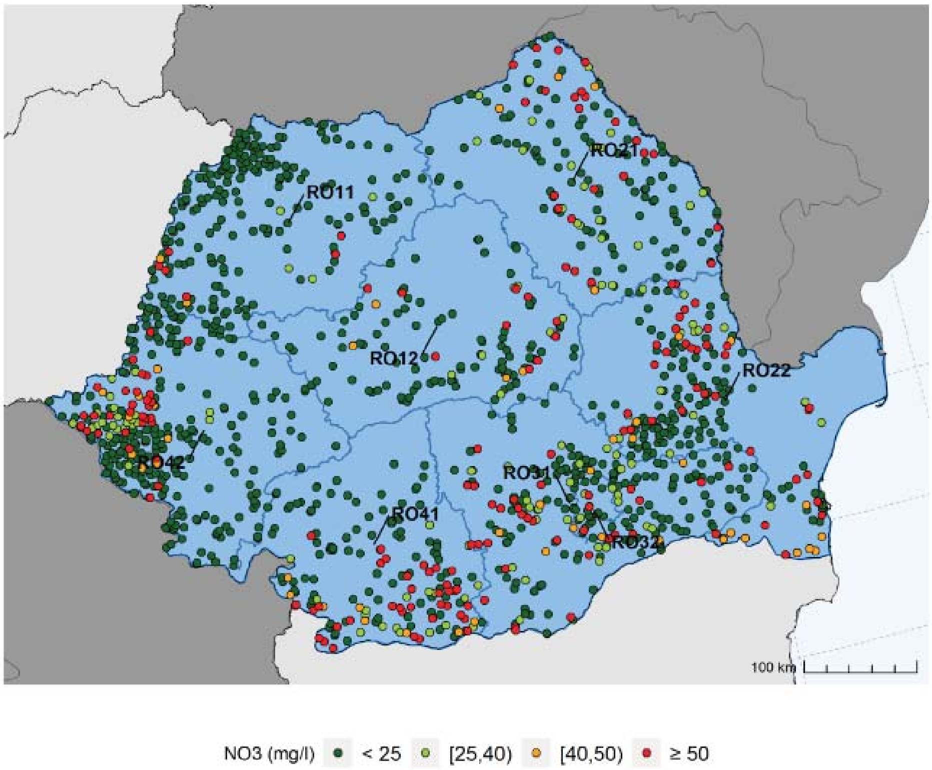
Surface water quality monitoring network

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	768	905	871	612	671	723	0	905	871
5	Lake/reservoir water	345	319	252	277	260	241	219	319	270
6	Transitional water	7	5	5	6	4	5	0	5	5
7	Coastal water	35	25	23	31	23	23	0	25	23
8	Marine water	12	5	4	4	4	4	0	5	4
9	Not specified	0	0	0	0	0	0	0	0	0
	Total	**1167**	**1259**	**1155**	**930**	**962**	**996**	**219**	**1259**	**1173**

Groundwater Quality

Groundwater average annual nitrate concentration



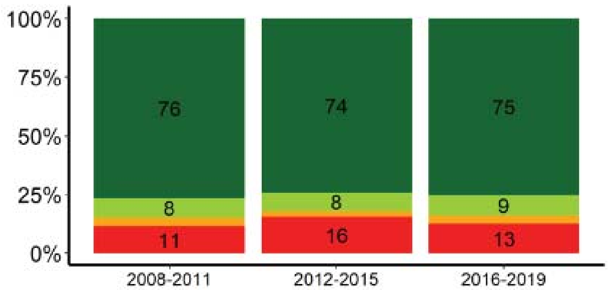


Figure 3. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information.

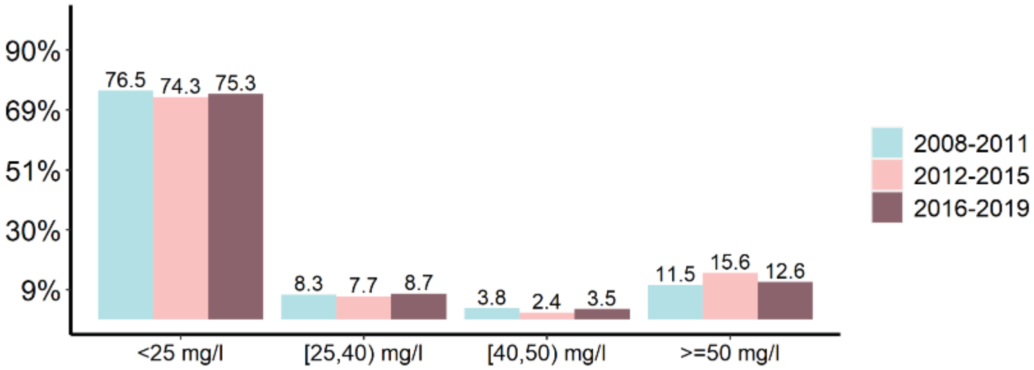


Figure 4. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis)

Groundwater average annual nitrate concentration trend

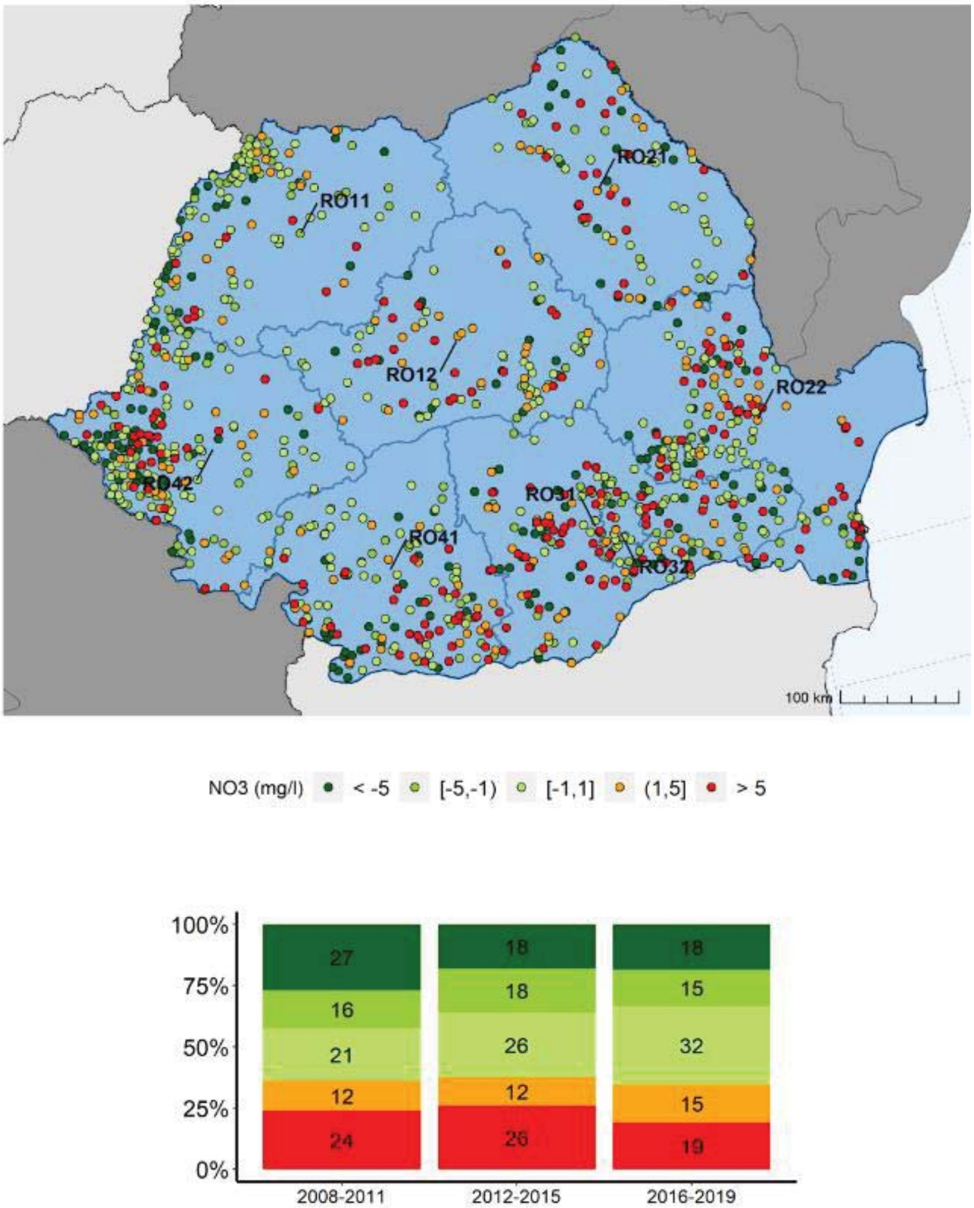


Figure 5. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis).

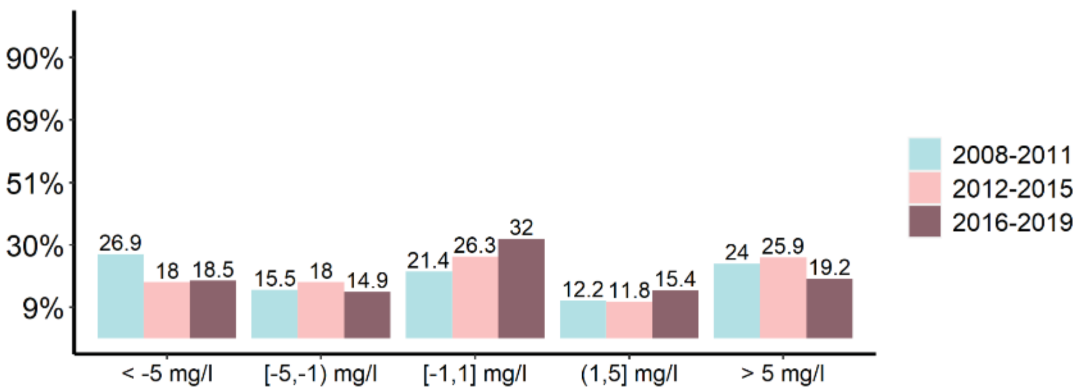
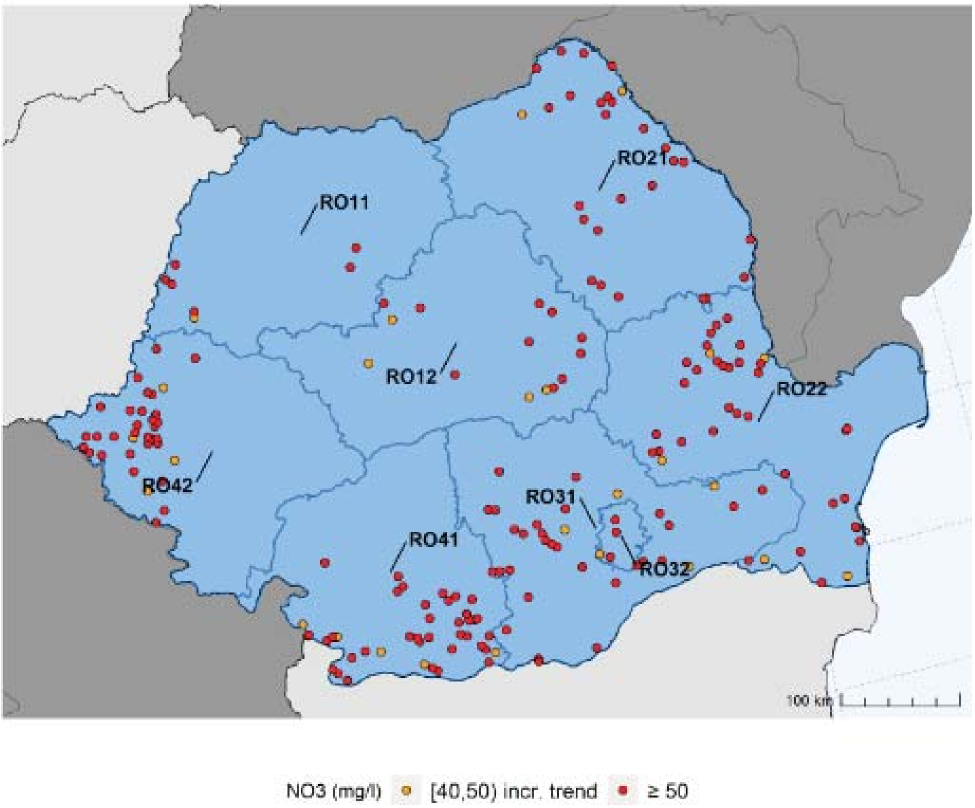


Figure 6. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis)

Groundwater hotspot

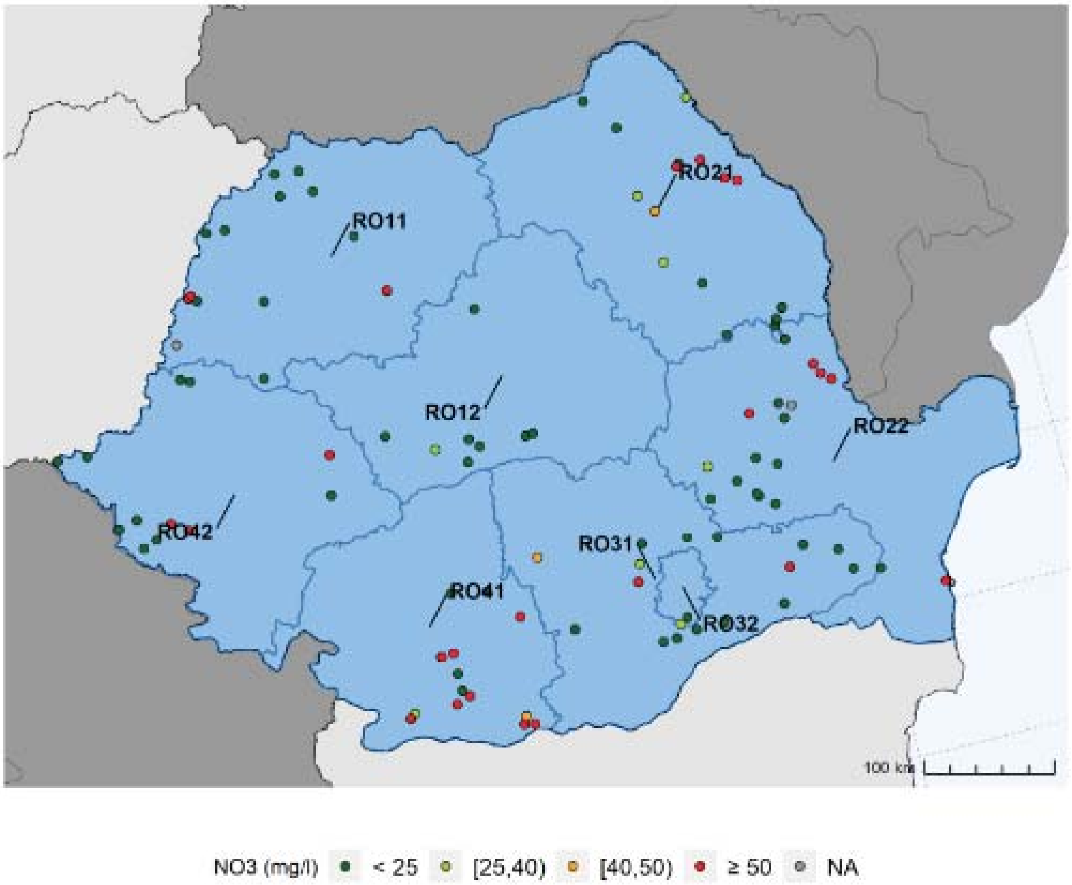


NUTS ID	NUTS NAME	>=40 and < 50 mg/l incr.trend	>=50 mg/l
RO11	Nord-Vest	1	6
RO12	Centru	4	10
RO21	Nord-Est	2	26
RO22	Sud-Est	5	32
RO31	Sud - Muntenia	4	28
RO32	Bucuresti - Ilfov	1	3
RO41	Sud-Vest Oltenia	5	38
RO42	Vest	4	30
0	NA	0	1
	Total	**26**	**174**

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

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

Groundwater stations removed



Station Type	Description	Number of removed stations		
		total removed	with measurements	with trends
0	Phreatic groundwater (shallow): 0-5 m	10	10	6
1a	Phreatic groundwater (deep) 5-15 m	45	44	21
1b	Phreatic groundwater (deep) 15-30 m	22	22	11
1c	Phreatic groundwater (deep) >30 m	7	7	4
2	Captive groundwater	21	20	12
3	Karstic groundwater	2	2	1
9	Not specified	0	0	0
	Total	**107**	**105**	**55**

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

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

Surface Water Quality

Surface water average annual nitrate concentration

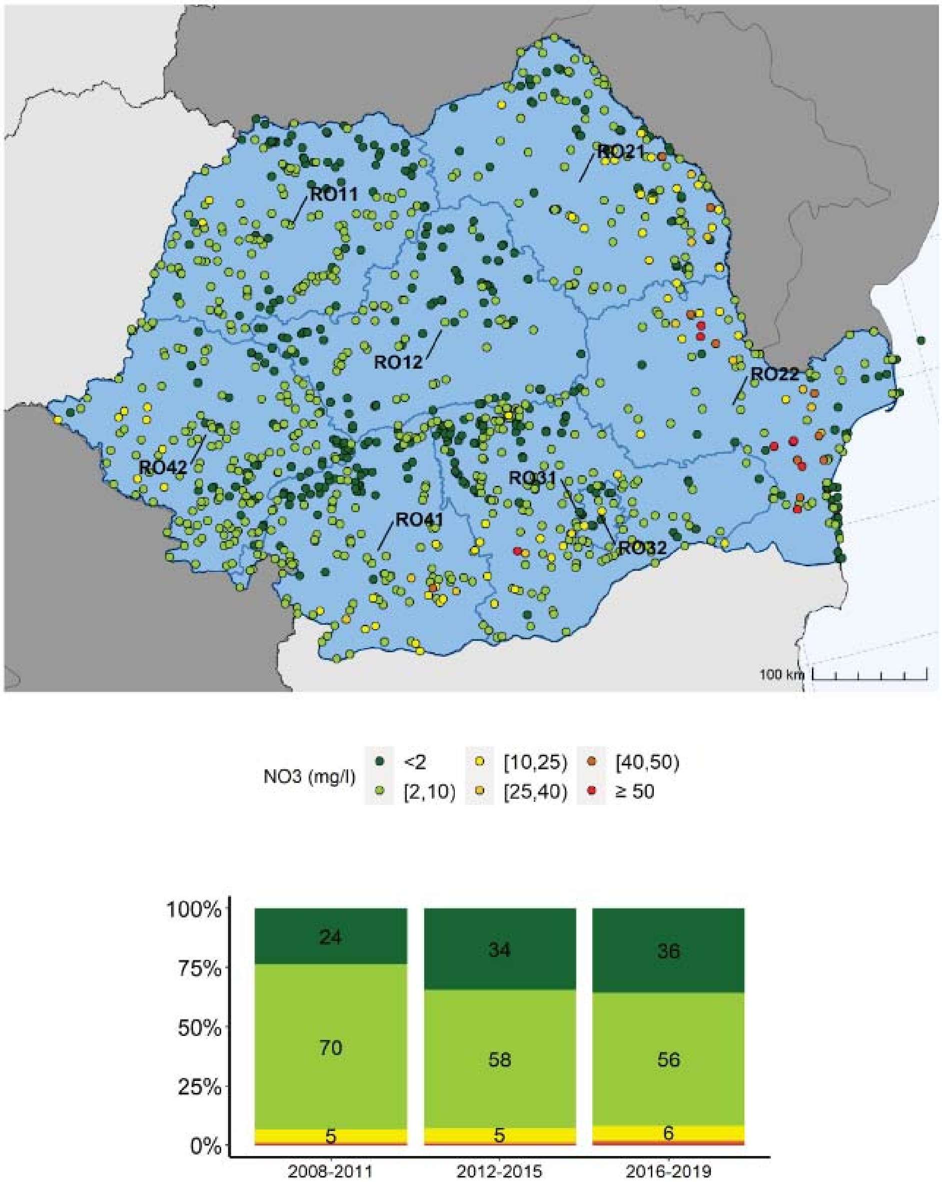


Figure 9. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information.

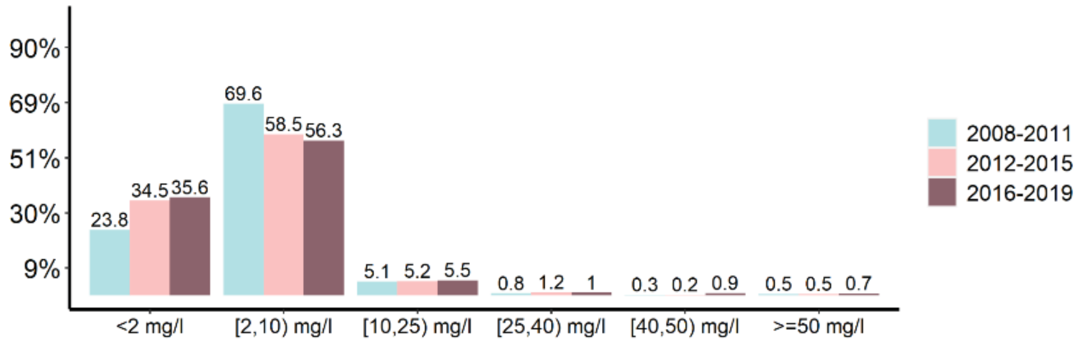
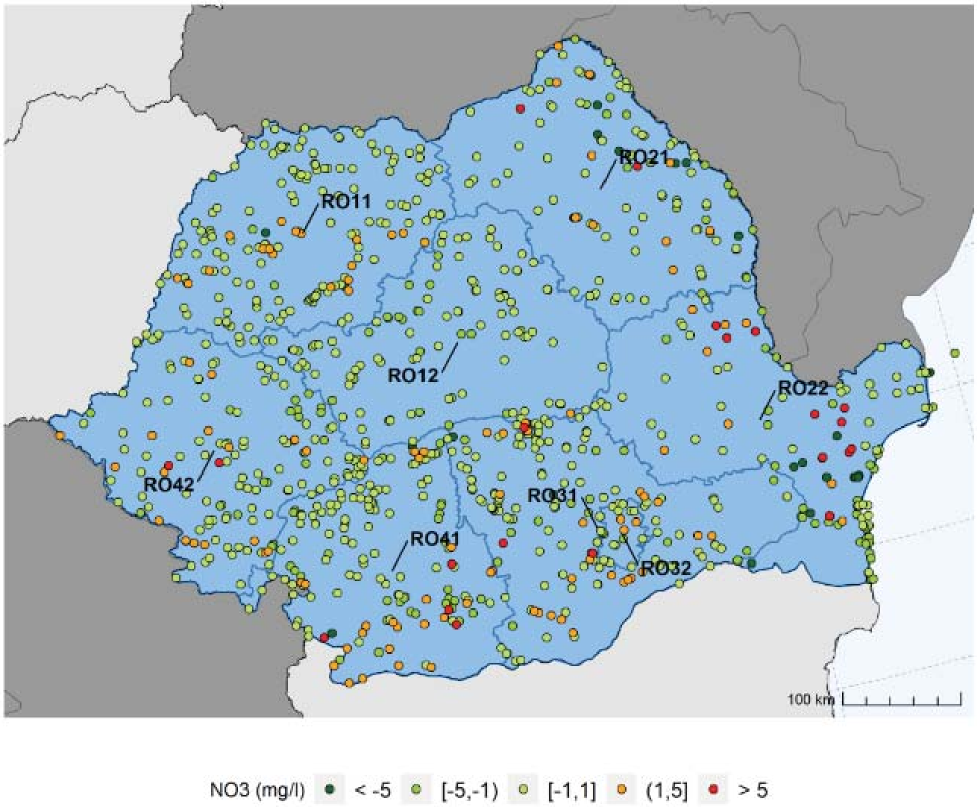


Figure 10. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis)

Surface water average annual nitrate concentration trend



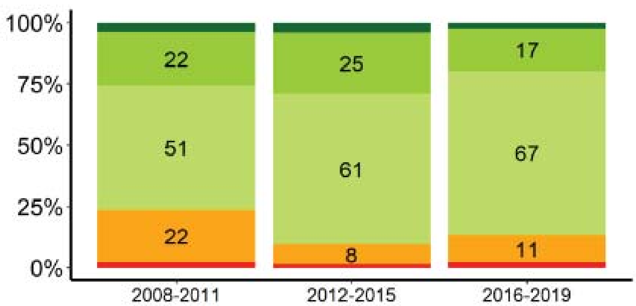


Figure 11. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information.

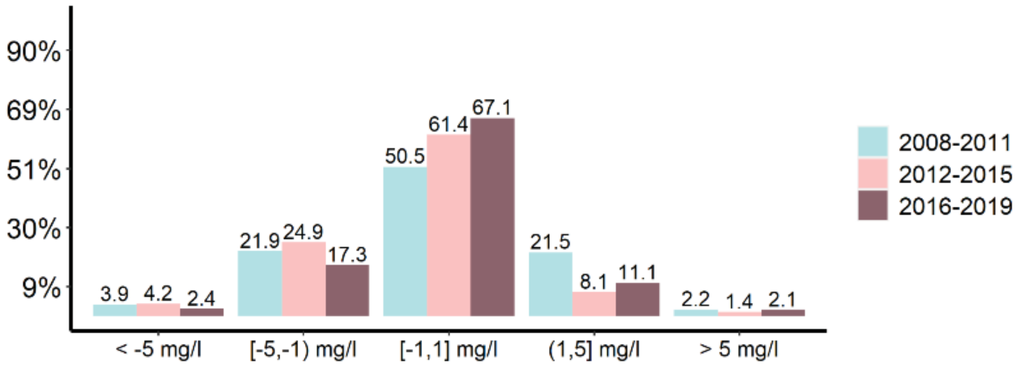
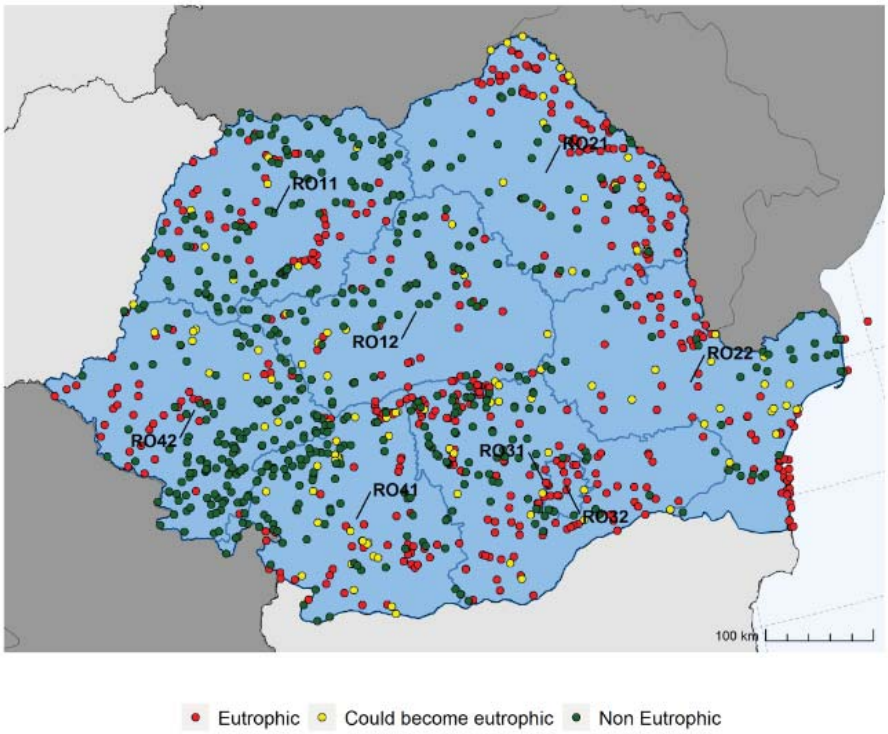


Figure 12. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis)

Surface Water Eutrophication



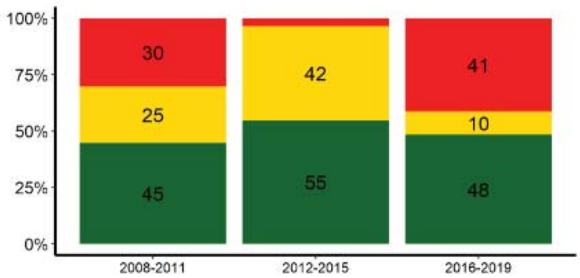


Figure 13. Spatial distribution of eutrophic status (map) and corresponding percentage of monitoring points per classes of status by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information.

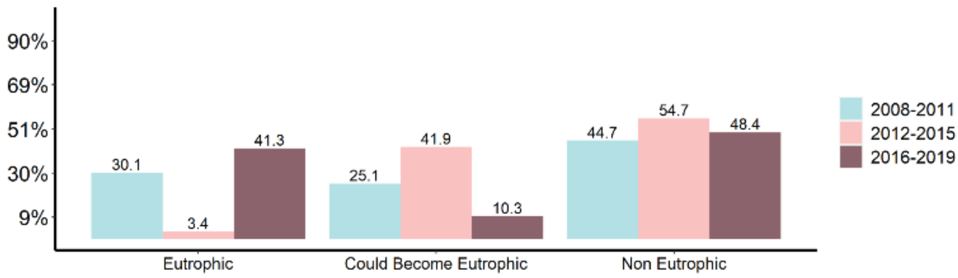
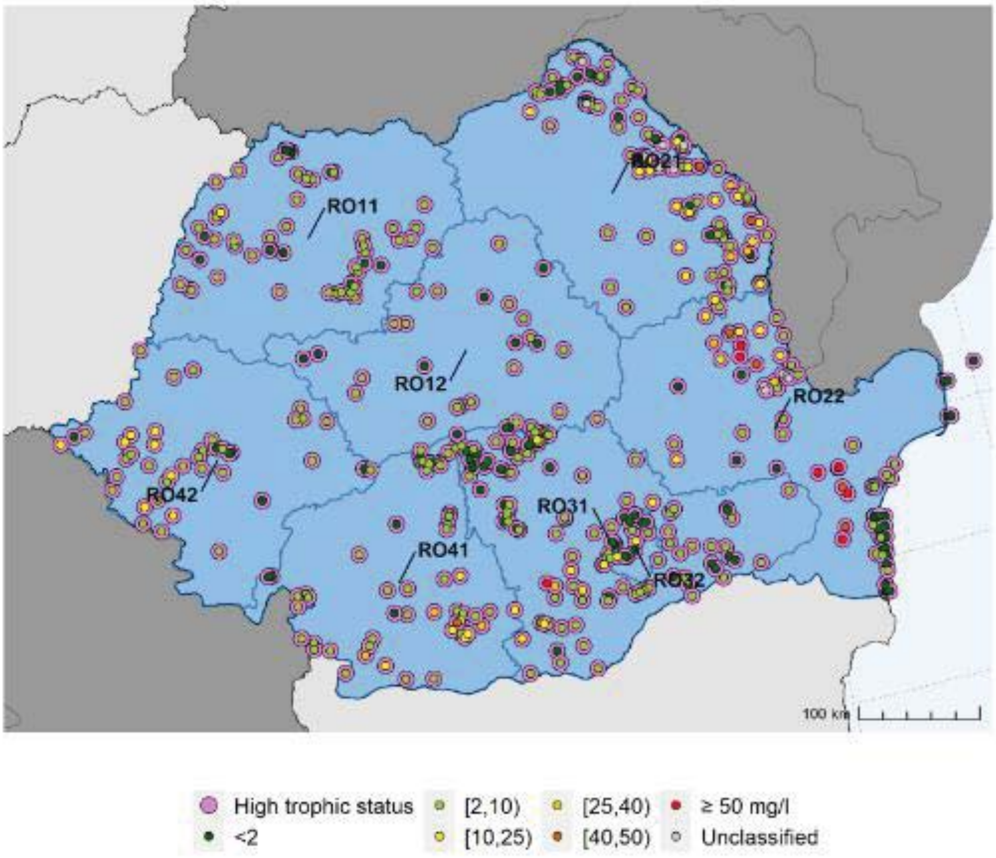


Figure 14. Comparison of percentage of monitoring points in the three reporting periods by classes of status (x axis)

In the current reporting period, the assessment of the trophic status was carried out using a different methodological approach respect to the previous reporting periods, 2008-2011 and 2012-2015. The new method is in line with the reporting guidelines and takes into account the correlation with the Water Framework Directive requirements, including the “one out, all out” principle.

The Eutrophic status vs average NO3 annual concentration



NUTS ID	NUTS NAME	High trophic status	Number of stations by classes of concentration						
			<2 mg/l	[2,10) mg/l	[10,25) mg/l	[25,40) mg/l	[40,50) mg/l	>=50 mg/l	Unclassified
NO_NUTS	SALINE	32	28	4	0	0	0	0	0
RO11	Nord-Vest	55	14	40	1	0	0	0	0
RO12	Centru	40	8	31	1	0	0	0	0
RO21	Nord-Est	103	23	47	17	3	2	0	11
RO22	Sud-Est	46	4	17	7	2	4	7	5
RO31	Sud - Muntenia	97	30	59	6	1	0	1	0
RO32	Bucuresti - Ilfov	16	11	3	2	0	0	0	0
RO41	Sud-Vest Oltenia	51	4	36	7	3	1	0	0
RO42	Vest	44	8	28	8	0	0	0	0
	Total	**484**	**130**	**265**	**49**	**9**	**7**	**8**	**16**

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

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

The classification and assessment system for the status of water bodies has been developed in line with the requirements of the Water Framework Directive. The indicator parameters of the eutrophication process include nutrients (nitrate, nitrite, total nitrogen, phosphate, and total phosphorus), dissolved oxygen and organic substances (measured by BOD5), transparency (Secchi disk), as well as chlorophyll-a. The trophic status of surface waters was assessed using the ecological status/potential classes in the monitoring section.

For rivers the classification is based on the concentrations of total phosphorus, phosphate, nitrate, nitrite, dissolved oxygen and chlorophyll-a where the limit of the trophic status depends on the water types. For rivers the limit values between very good/good status and maximum/good ecological potential and good/moderate are [0.110 mg/l P to 0.32 mg/l P] and [0.22 to 0.66 mg/l P] for total phosphorus, [0.035 to 0.13 mg/l P-PO4] and [0.075 to 0.67 mg/l P-PO4] for phosphate, [0.7 to 2.6 mg/l N-NO3] and [1.4 to 5.5 mg/l N-NO3] for nitrate, [10 to 8 mg/l] and [8 to 6 mg/l] for dissolved oxygen.

For lakes the limit values between very good/good status and maximum/good ecological potential and good/moderate are [0.02 mg/l P to 0.18 mg/l P] and [0.04 to 0.38 mg/l P] for total phosphorus, [0.015 to 0.12 mg/l P-PO4] and [0.03 to 0.25 mg/l P-PO4] for phosphate, [0.4 to 1.6 mg/l N-NO3] and [0.8 to 3.3 mg/l N-NO3] for nitrate, [10 to 8 mg/l] and [8 to 6 mg/l] for dissolved oxygen.

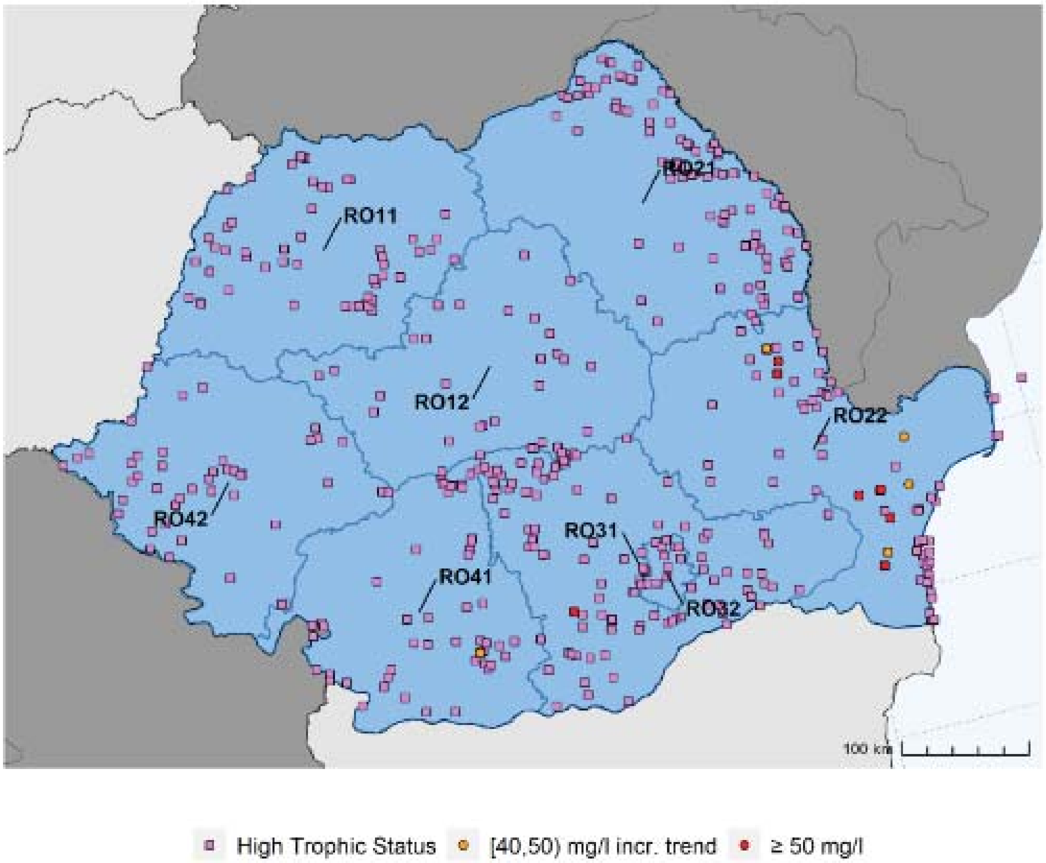
For transitional water the limit values between very good/good status and maximum/good ecological potential and good/moderate are [0.012 to 0.03 mg/l P-PO4] and [0.3 mg/l P-PO4] for phosphate, [<1 mg/l N-NO3] and [1 to 1.53 mg/l N-NO3] for nitrate, [9 to 13 mg/l] and [6.2 to 9 mg/l] for dissolved oxygen, and [2.6 µg/l] and [3.9 µg/l] for chlorophyll-a.

Considering this classification scheme, all coastal waters and transitional waters are eutrophic. For surface waters the number of eutrophic water bodies is slightly higher than that of the non-eutrophic water bodies.

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	348	99	424
5	Lake/reservoir water	104	22	144
6	Transitional water	5	0	0
7	Coastal water	23	0	0
8	Marine water	4	0	0
9	Not specified	0	0	0
	Total	**484**	**121**	**568**

Surface Water quality hotspot



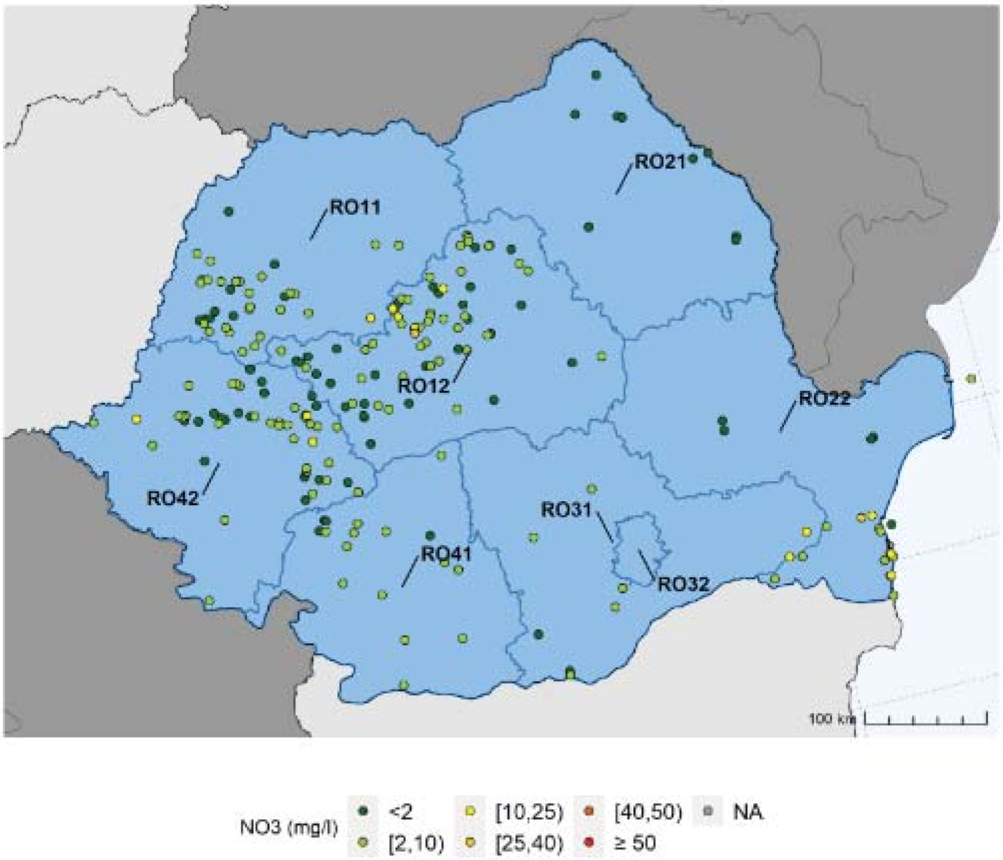
NUTS ID	NUTS NAME	High trophic status	>=40 and < 50 mg/l incr.trend	>=50 mg/l
NO_NUTS	SALINE	32	0	0
RO11	Nord-Vest	55	0	0
RO12	Centru	40	0	0
RO21	Nord-Est	103	0	0
RO22	Sud-Est	46	4	7
RO31	Sud - Muntenia	97	0	1
RO32	Bucuresti - Ilfov	16	0	0
RO41	Sud-Vest Oltenia	51	1	0
RO42	Vest	44	0	0
	Total	**484**	**5**	**8**

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

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

Only the NUTS of interest are reported.

Surface Water Stations Removed



Station Type	Description	Number of removed stations: total removed	with measurements	with trends	with trophic status
4	River water	171	171	59	171
5	Lake/reservoir water	42	42	31	42
6	Transitional water	0	0	0	0
7	Coastal water	2	2	2	2
8	Marine water	1	1	1	1
9	Not specified	0	0	0	0
	Total	**216**	**216**	**93**	**216**

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

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

Measures in the Action Programme

The first Code of Good Agricultural Practice was drawn up in 2003 and was revised in 2005 and recently on 31/07/2015. The Action Programme (AP) was published for the first time in 2007 and was revised in 2010 and 2013. Currently no amendments were made to the Programme as compared to the previous report. Cost effectiveness was not reported.

Table 6. Details of the Action Programme

Measure	General details in Action Programme (*)
Period of prohibition of fertiliser application	The prohibition periods for field application of fertilizers are defined by the time interval in which the average air temperature drops below 5°C. This interval corresponds to the period when the requirements of the crop for nutrients are reduced or when the risk of percolation / surface runoff is high.
	• For solid organic fertiliser on arable land and grassland: 1 November to 15 March
	• For liquid organic fertilizers and mineral fertilizers on arable land for autumn crop: 1 November to 1 March
	• For liquid organic fertilizers and mineral fertilizers on arable land for other cultures and on grassland: 1 October to 15 March
Restrictions for application on sloped soils	• On arable land with a slope of up to 12%, it is recommended to maintain the percentage of autumn crops and / or cover crops at least 20% of the arable area of the farm
	• On arable land with a slope of more than 12%, it is mandatory to maintain the share of autumn crops and / or cover crops at least 30% of the arable area of the farm
Restrictions for application on soaked, frozen, or snow-covered soils	• On soils saturated with water, flooded, frozen or covered with snow, the application of organic fertilizers of animal nature is prohibited
Restrictions for application near watercourses (buffer strips)	• Protection zones and buffer strips are established in accordance with art. 40 and annex 2 of the Water Law no. 107/1996, with the subsequent modifications and completions, along the watercourses. The width of the protection zones is established according to the width of the watercourse, the type and destination of the water resource or the hydrotechnical arrangement
Effluent storage works	• Within the Code of Good Agricultural Practice, 2015, were introduced the criteria for selecting the methods of storage and construction of municipal platforms, individual warehouses and temporary warehouses in the field
Capacity of manure storage	• Within the Code of Good Agricultural Practice, 2015, were introduced the estimation of the necessary storage capacity according to the category of animals and the maintenance system
Rational fertilisation (e.g., splitting fertilisation, limitations)	• Maximum quantities of fertilizers (mineral + organic) that can be applied on agricultural land.
	• For organic fertilizers of animal origin maximum N-total applied must not exceed 170 kg N/ha/year.
	• For mineral fertilizers the maximum N-total that can be applied is given by the difference between the value imposed by the maximum standard and the amount of mineralized nitrogen from organic fertilizers of animal nature applied in the field
	• The technical means for the application of fertilizers depends on the type and condition of the fertilizers, the method for dosing and application, the type of operation and the capacity.
Crop rotation, permanent crop enhancement	• It is recommended to rotate a fast-growing crop with the main crop
Vegetation cover in rainy periods, winter	• Not specified
Fertilisation plans, spreading records	• The fertilization plan must be drawn up on the basis of an agrochemical study carried out by specialized bodies of the Ministry of Agriculture and Rural Development (County Pedological and Agrochemical Studies Office-OSPA) in accordance with the requirements of the Environmental Agreement (Integrated Environmental Agreement) necessary for the operation of the farm.
Other measures	• Not specified
Date for application limit of 170 kg N/ha/year:	• Not specified

Controls

Administrative controls took place on around 10% of the farms each year. The most significant non-compliance concerned mostly manure storage and storage capacity (8.3% of the farms controlled). The main problems with complying with the manure storage is that most farms are subsistence and semi-subsistence farms with little economic capacity not allowing them to have their own storage capacities. In addition, the farmers have difficulties to understand the proposed measures and are poorly equipped. Finally, due to strict ban periods for manure spreading, in recent years, when above 5-degree temperatures occurred early, the manure could not be spread efficiently.

Designation of NVZ

Romania has adopted a whole territory approach.

Forecast of Water Quality

It is anticipated that if additional pollution reduction measures are not taken, nitrate concentrations in surface water bodies are not expected to diminish. Romania estimates future water quality developments based on the MONERIS model that is applied across the Danube region. There are currently no results of forecast for the coming years.

Summary

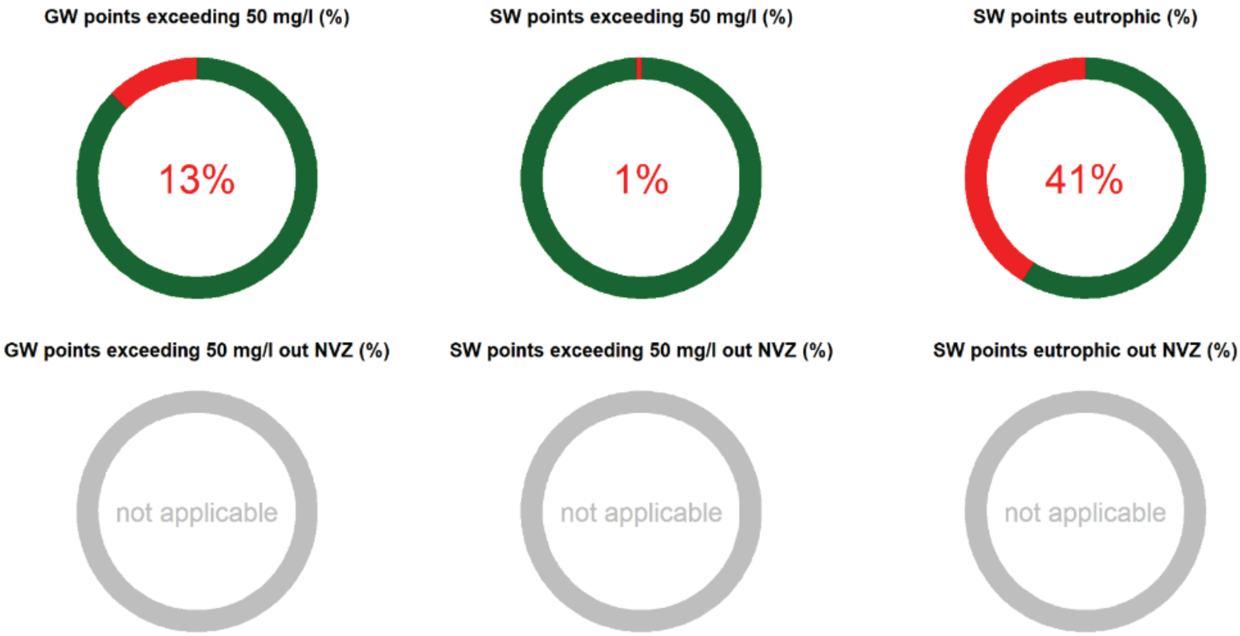


Figure 18. The summary plot for the period 2016-2019

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

In the current reporting period, the assessment of the trophic status was carried out using a different methodological approach respect to the previous reporting periods, 2008-2011 and 2012-2015. The new method is in line with the reporting guidelines and takes into account the correlation with the Water Framework Directive requirements, including the “one out, all out” principle.

Long term analysis

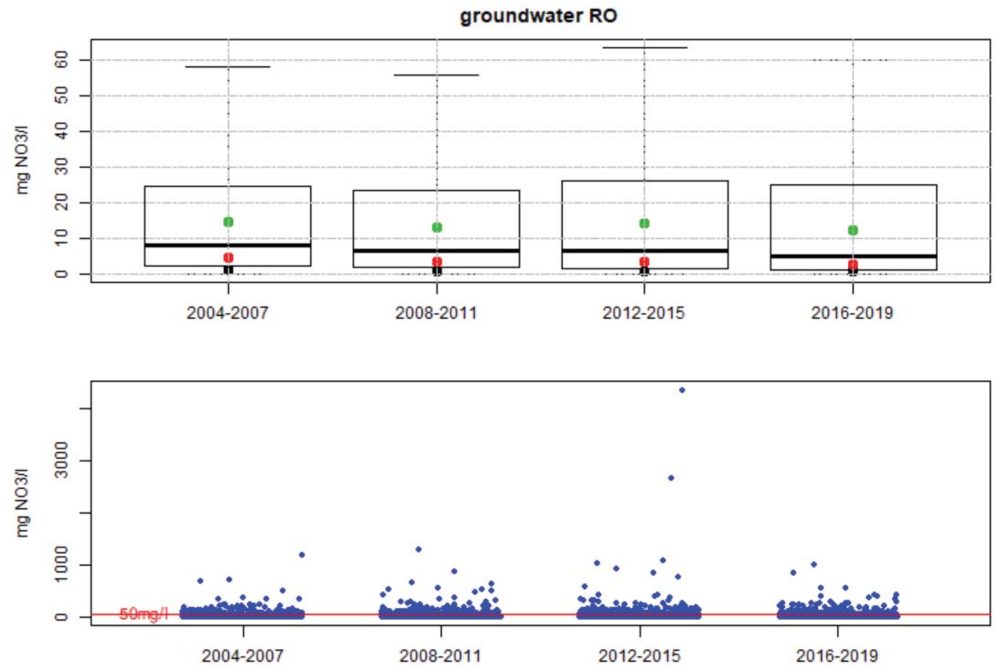


Figure 19. Time series of box whisker plots along with the distribution of the average NO3 annual concentrations for each reporting period, for groundwater stations. RPs represent the reporting periods, RP7 being the last period (2016-2019). The blue, red, green and black dots represent the mean of the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

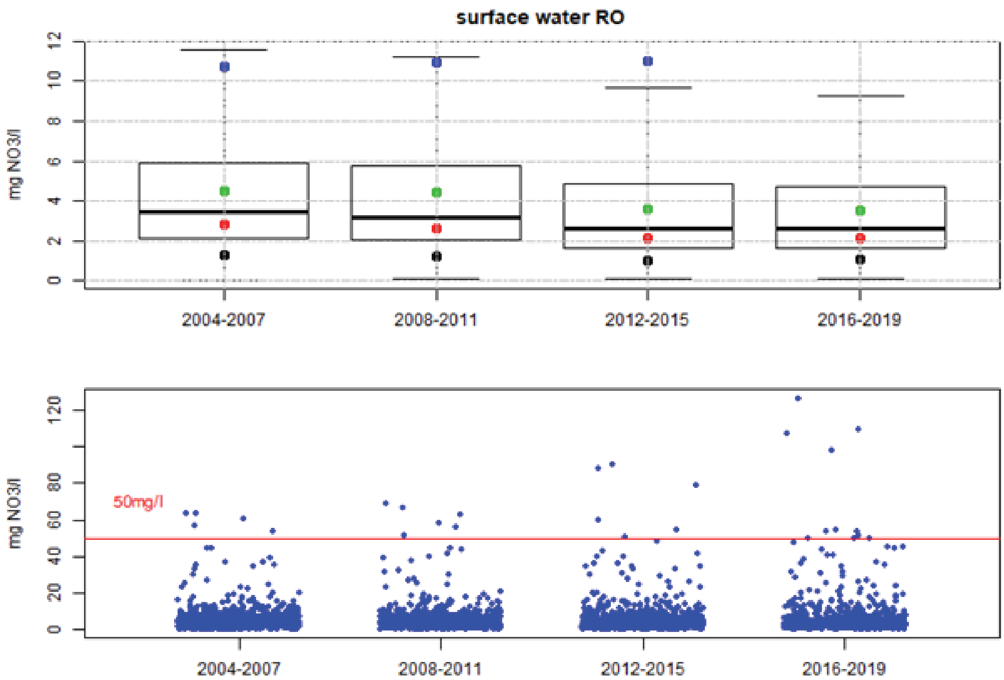


Figure 20. Time series of box whisker plots along with the distribution of the average NO3 annual concentrations for each reporting period, for surface water stations. RPs represent the reporting periods, RP7 being the last period (2016-2019). The blue, red, green and black dots represent the mean of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

Conclusions and recommendations

Romania has a low livestock density and has a negative balance for nitrogen as well as phosphorus.

There is a well elaborated network of monitoring stations. There is a number of groundwater hotspots showing nitrates concentration above 50 mg/l in NVZ, also a high number of stations show an increasing trend. A high number of surface waters are affected by eutrophication.

The action programmes was revised in 2012.

The Commission recommends Romania to address the groundwater hotspots with high nitrate pollution and increasing trend.

EUROPEAN
COMMISSION

Brussels, 11.10.2021
SWD(2021) 1001 final

PART 32/38

COMMISSION STAFF WORKING DOCUMENT

Accompanying the document

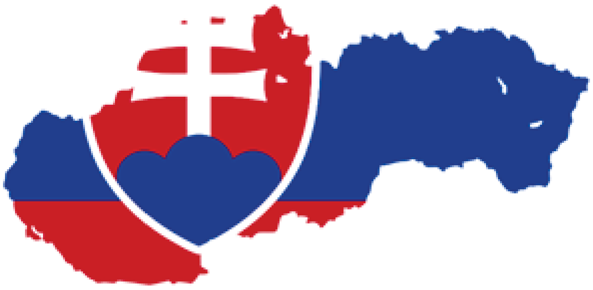
REPORT FROM THE COMMISSION TO THE COUNCIL AND THE EUROPEAN PARLIAMENT

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}

EN EN

Pressure from Agriculture



Slovakia's utilized agricultural area amounts to 1.9 Mha, representing 39.9% of the total land area and has remained stable since 2007. The major outputs of the agricultural industry excluding services and secondary activities include in a decreasing order cereals (24.8%), industrial crops (13.5%) and milk (12%).
Eurostat

Major land use statistics for Slovakia

Table 1.Utilized agricultural area (abbreviated as UAA)

Slovakia	2005	2007	2010	2013	2016
Utilised agricultural area UAA (1000 ha)	NA	1931	1922	1929	1919
arable land (1000 ha)	NA	1343	1354	1363	1347
permanent grass (1000 ha)	NA	528	513	514	521
permanent crops (1000 ha)	NA	25	23	20	18
kitchen gardens (1000 ha)	NA	34	31	32	32

Note:
Eurostat (FSS)

Slovakia's arable land as well as grassland have remained stable since 2007. The permanent crops area has decreased by 28% since 2007.

Animal distribution in Slovakia

Slovakia's live poultry have increased while live bovines and pigs have decreased since 2013. The livestock density index has remained stable and is lower than the EU average of 0.8

Table 2. Livestock statistics

Slovakia	2005	2007	2010	2013	2016
Livestock index	0.42	0.39	0.35	0.34	0.33
dairy cows (10^6 heads)	0.20	0.18	0.16	0.14	0.13
live bovines (10^6 heads)	0.53	0.50	0.47	0.47	0.45
live pigs (10^6 heads)	1.11	0.95	0.69	0.64	0.59
live poultry (10^6 heads)	NA	NA	12.66	11.36	12.06

Note:
Eurostat (FSS)

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

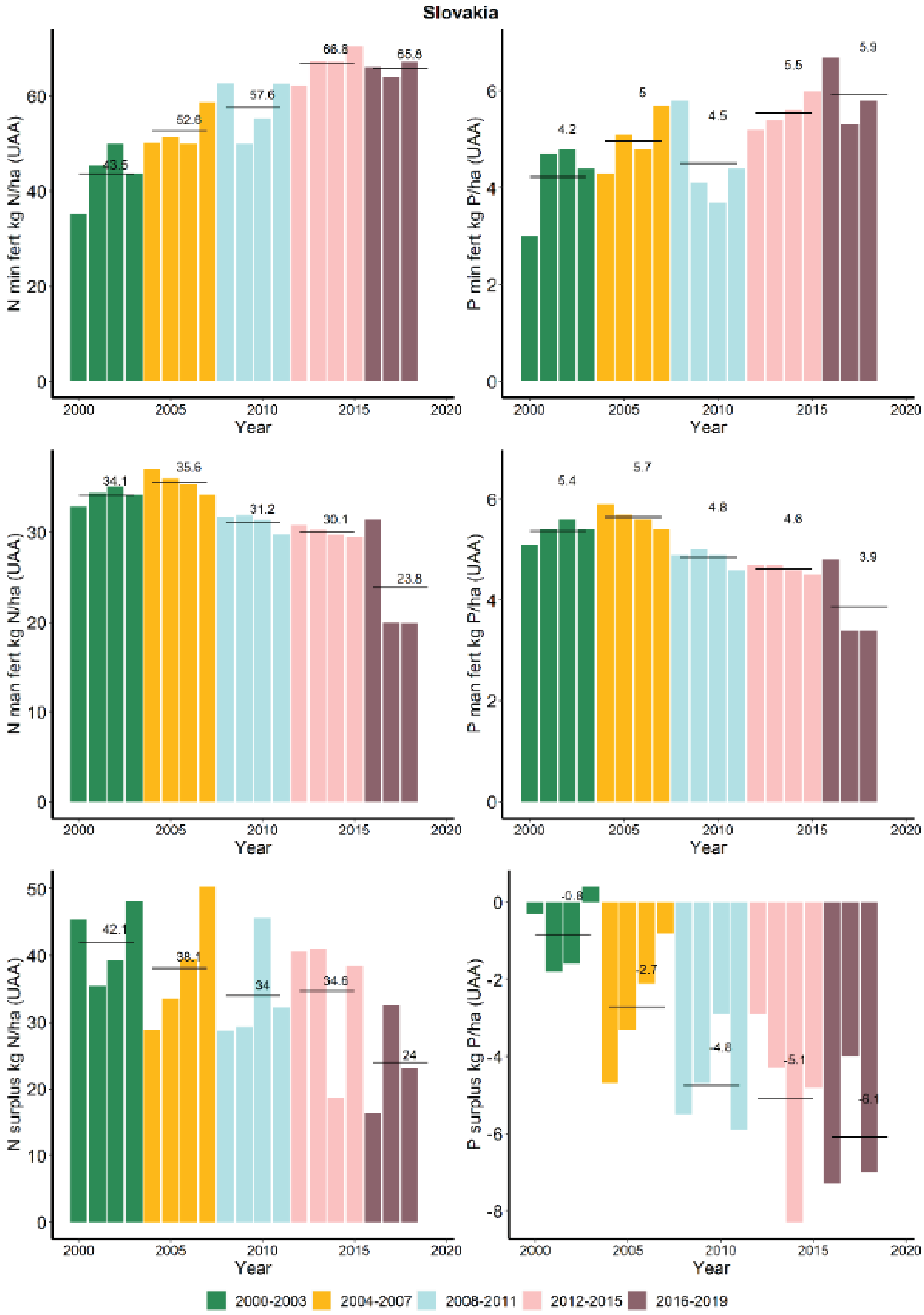
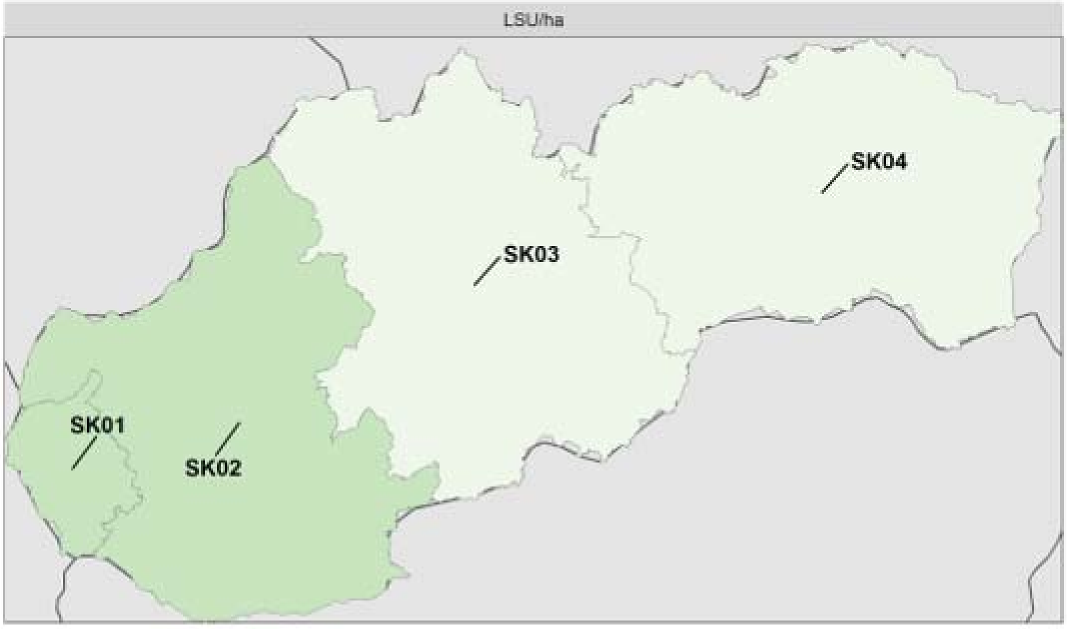


Figure 1. N and P fertilizers and gross ì surplus (kg/ha)

The gross nitrogen and phosphorus surpluses originate from EUROSTAT data for the years 2000-2018. N and P mineral fertilizers remained stable with respect to the previous reporting period, while N and P manure decreased. Both the nitrogen and phosphorus surpluses decreased from the last reporting period. 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



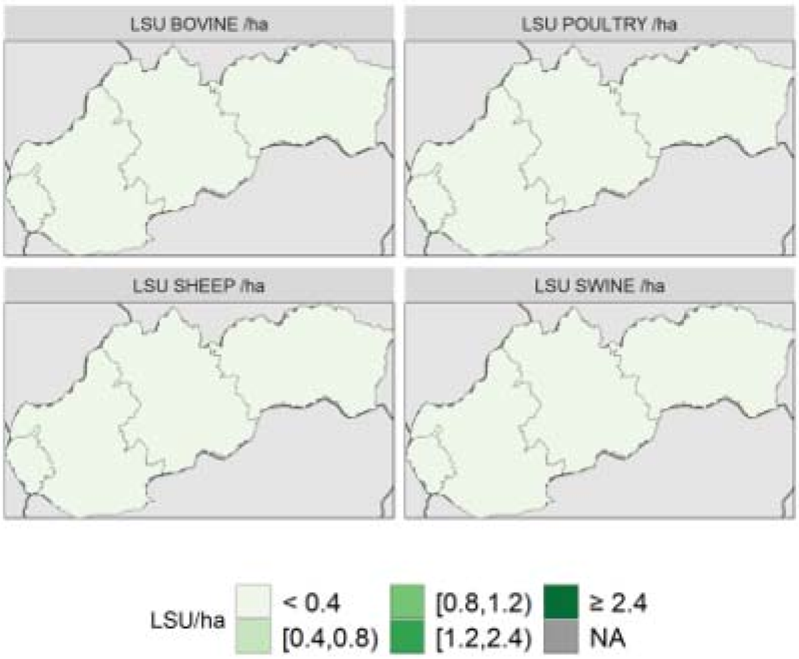


Figure 2. Map of livestock unit distribution, year 2016 (Source: Eurostat, February 2021)

Animal production is concentrated in the south western part of the Slovakia (total LSU and LSU by animal type were retrieved individually from EUROSTAT).
In this document, the NUTS-2013 version is used.
(https://ec.europa.eu/eurostat/web/gisco/geodata/reference-data/administrative-units-statistical-units/nuts)

Water Quality Monitoring

The groundwater monitoring network relies on the existing monitoring networks managed by the Slovak Hydro-meteorological Institute (SHMI), the Water Research Institute (WRI) and monitoring stations of Water companies. Evaluation of groundwater was carried out for the entire 2016-2019 reporting period. The revision of the Nitrate Vulnerable Zones that took place in 2016 led to a decrease of the number of the monitoring stations in the NVZ areas, and conversely to the increase in the number of monitoring facilities in the rest of the Slovak territory.

The surface water monitoring relies on Slovak water monitoring program designed to comply with the WFD requirements. Due to the different reporting cycles of the WFD and the Nitrates Directive, it was not possible to ensure monitoring of all points for the purposes of the Nitrates Directive at the same points within the 4-year cycle. Consequently, the number of points for trend evaluation is lower than the total number of monitoring points. Processing of all 2019 data needed for the evaluation of surface water quality and agricultural activities was not completed by the time of preparation of the report. Therefore, evaluation of surface water quality in this report was carried out for the 2016-2018 period.

For groundwater measurements, some stations have same coordinates due to different depths or uncertainty in the spatial location. For surface measurements, some stations have same coordinates because they are representative of different banks of a river or different horizons in water reservoir. 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	26	268	257	8	249	203
1a	Phreatic groundwater (deep) 5-15 m	1078	1064	1107	152	969	825
1b	Phreatic groundwater (deep) 15-30 m	117	110	130	108	91	69
1c	Phreatic groundwater (deep) >30 m	187	84	67	161	76	53
2	Captive groundwater	0	76	118	0	51	56
3	Karstic groundwater	0	115	109	0	108	92
9	Not specified	309	0	0	252	0	0
	Total	**1717**	**1717**	**1788**	**681**	**1544**	**1298**

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	784	466	765	236	332	308	356	249	753
5	Lake/reservoir water	68	46	77	0	46	35	42	0	22
6	Transitional water	NA	NA	NA	NA	NA	NA	NA	NA	NA
7	Coastal water	NA	NA	NA	NA	NA	NA	NA	NA	NA
8	Marine water	NA	NA	NA	NA	NA	NA	NA	NA	NA
9	Not specified	0	0	0	0	0	0	0	0	0
	Total	**852**	**512**	**842**	**236**	**378**	**343**	**398**	**249**	**775**

Groundwater Quality

Groundwater average annual nitrate concentration

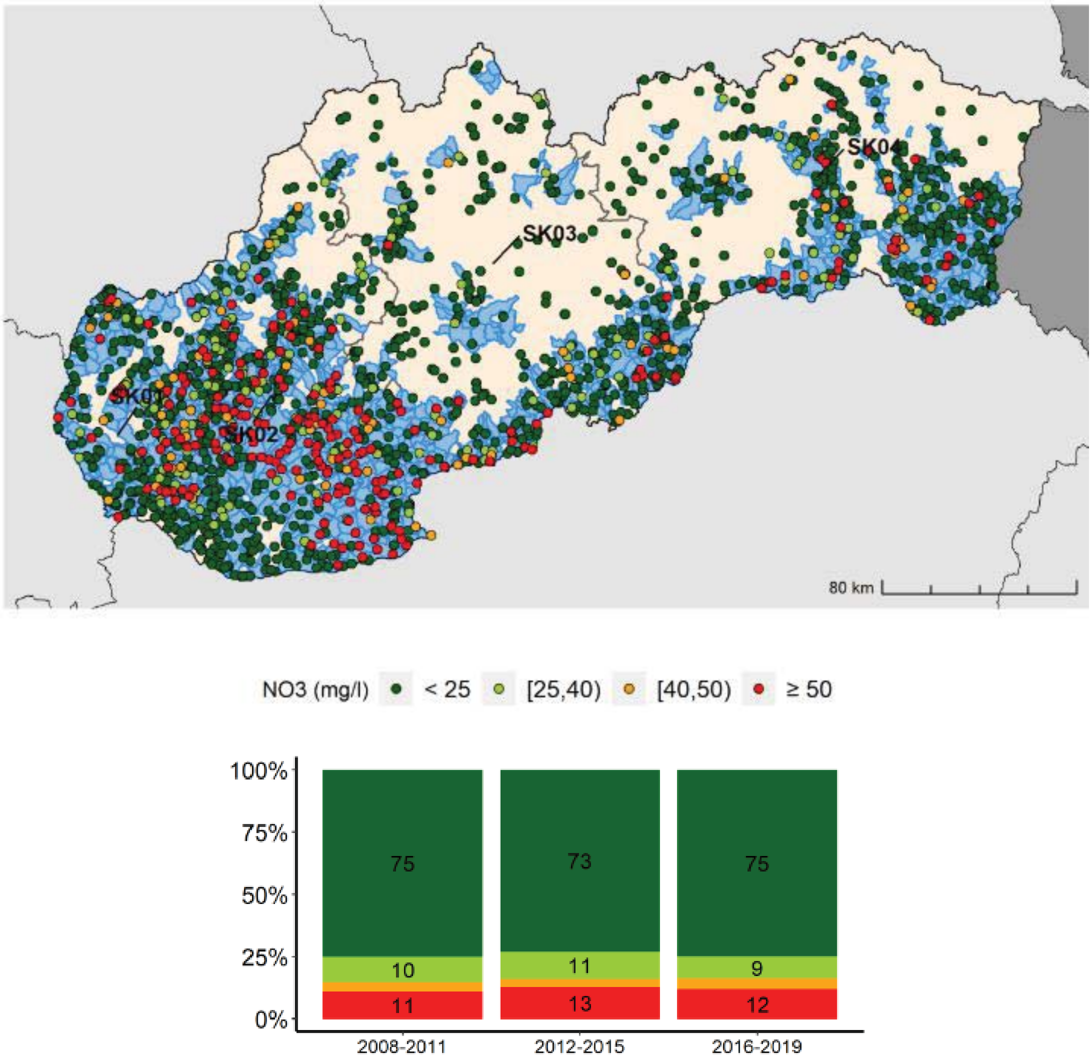


Figure 3. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information. In the map in blue the NVZ.

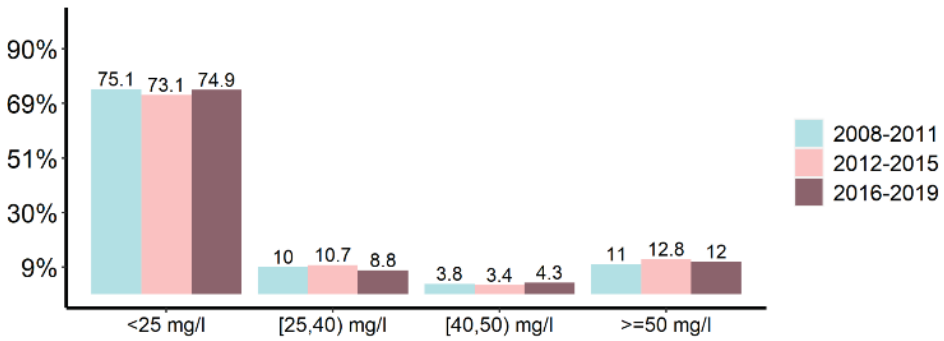


Figure 4. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis)

Groundwater average annual nitrate concentration trend

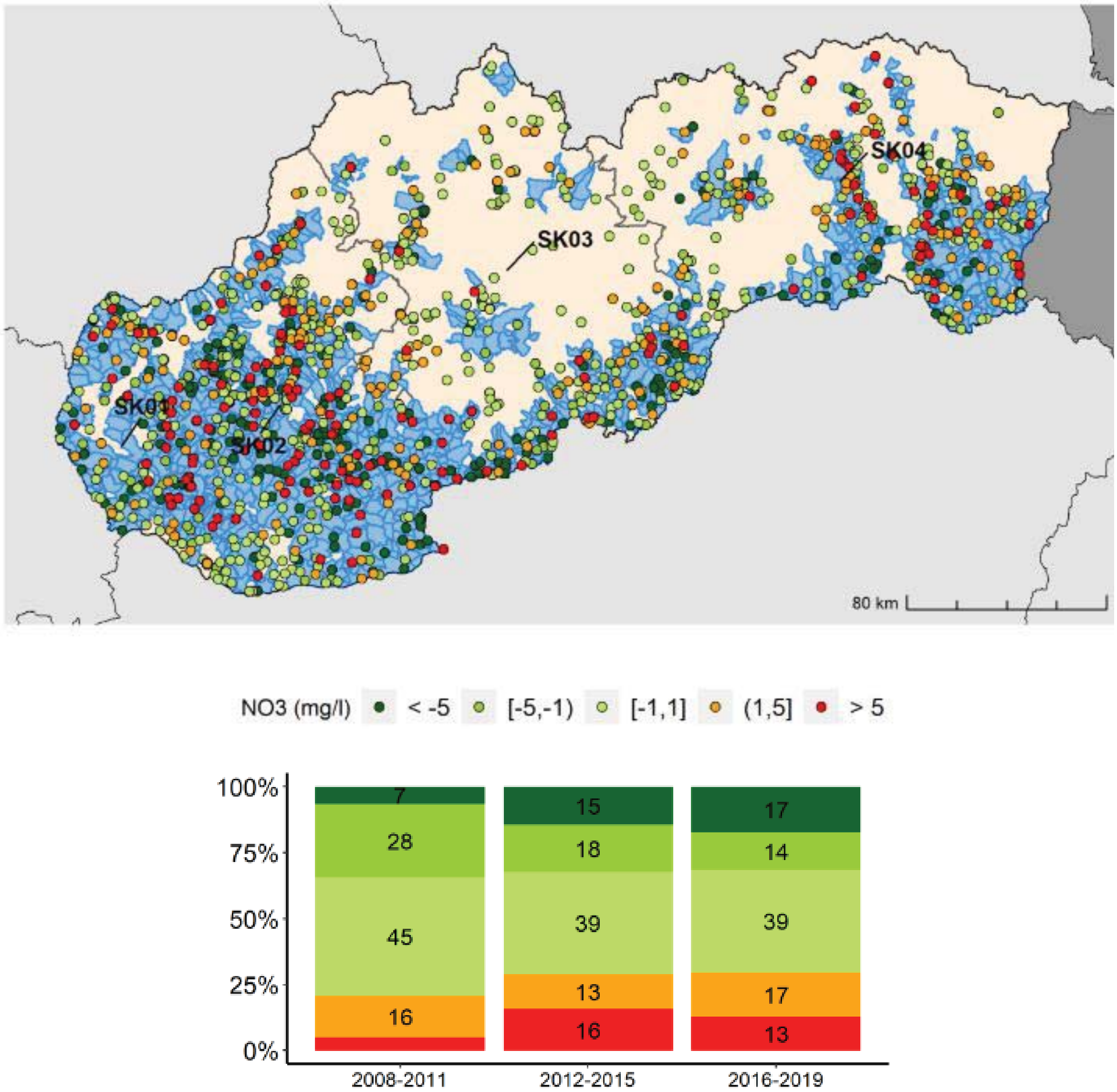


Figure 5. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information. In the map in blue the NVZ.

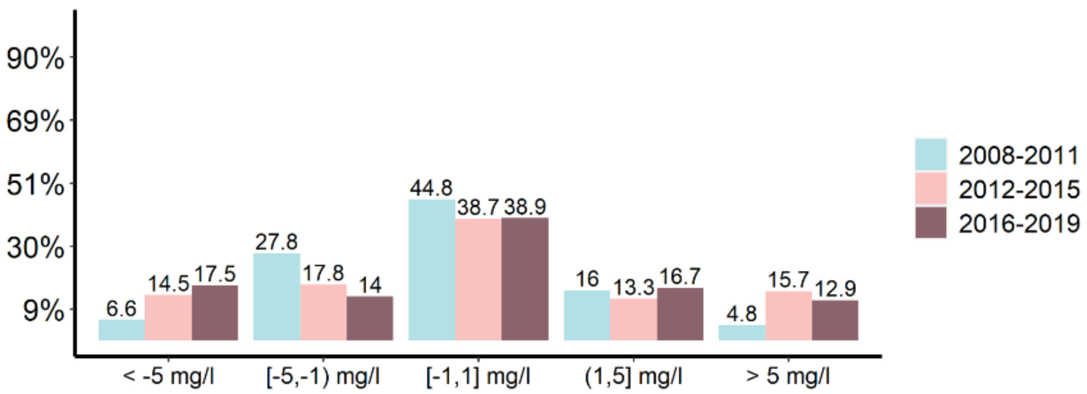
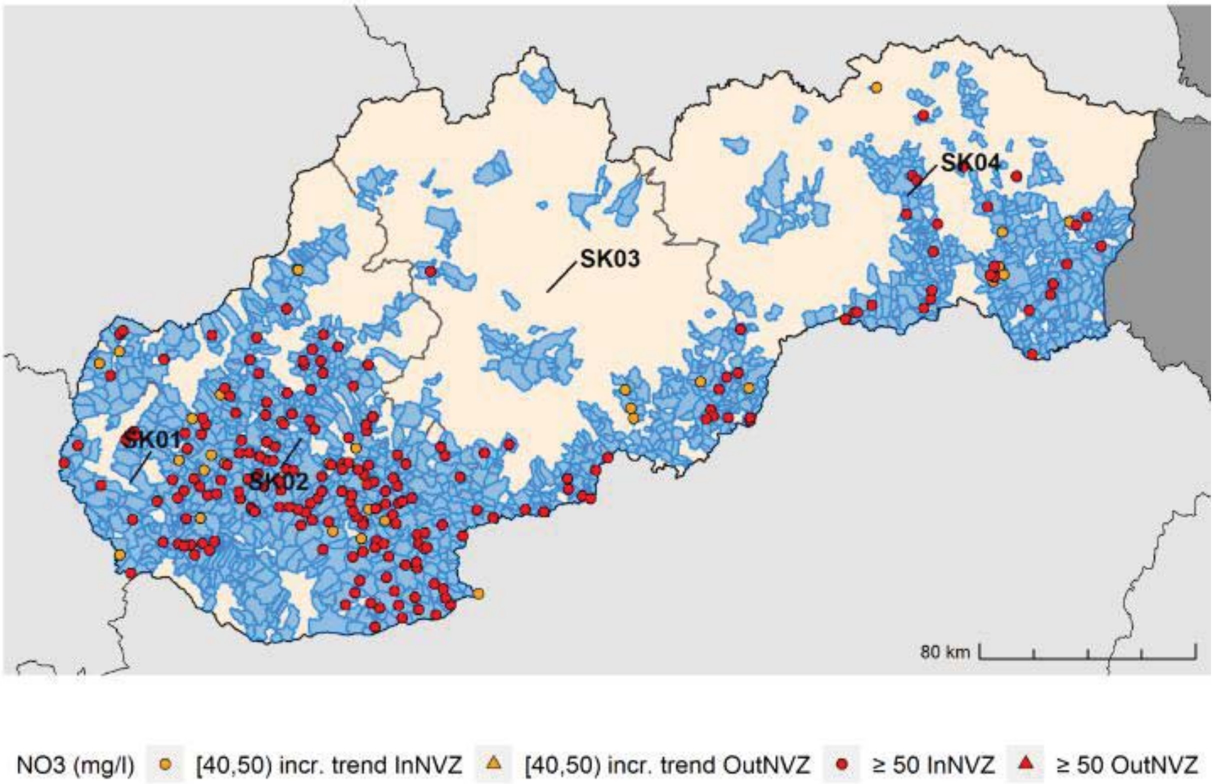


Figure 6. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis)

Groundwater hotspot

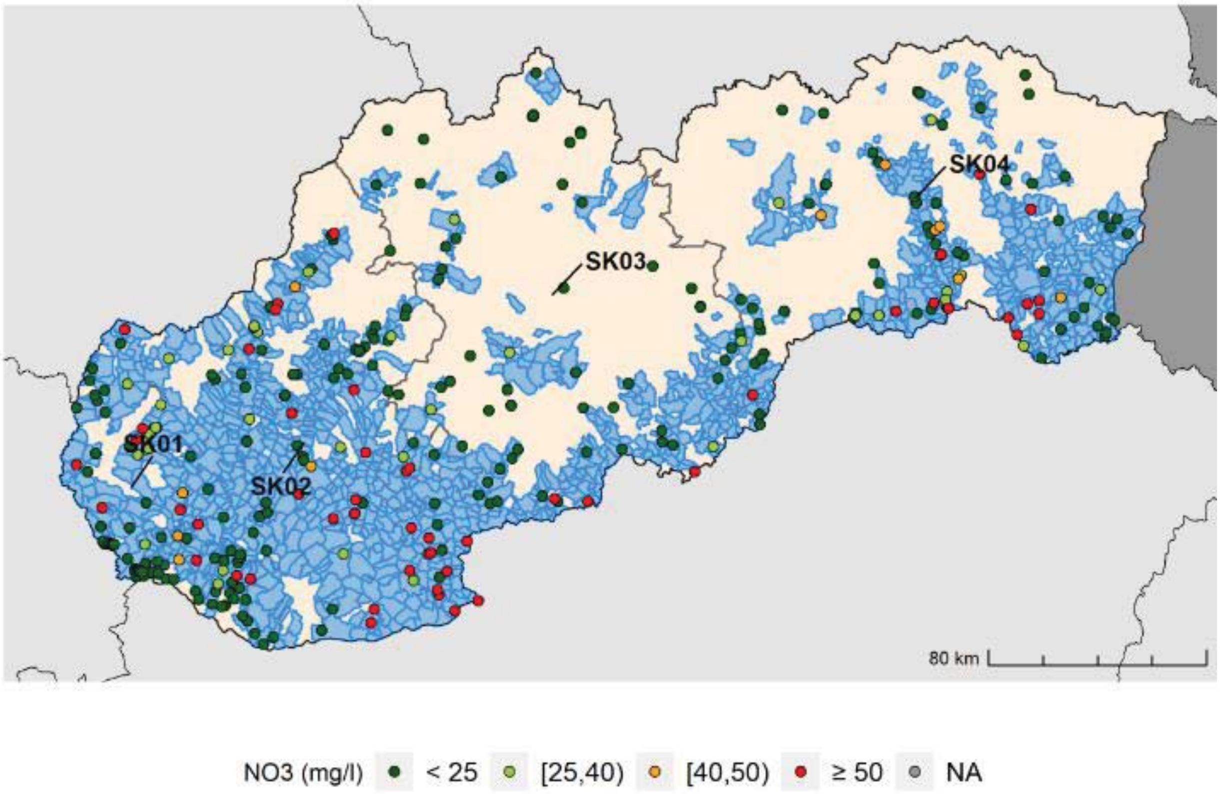


NUTS ID	NUTS NAME	>=40 and < 50 mg/l incr.trend		>=50 mg/l	
		InNVZ	OutNVZ	InNVZ	OutNVZ
SK01	Bratislavský kraj	2	0	14	0
SK02	Západné Slovensko	21	0	151	0
SK03	Stredné Slovensko	5	0	22	0
SK04	Východné Slovensko	6	0	27	0
	Total	**34**	**0**	**214**	**0**

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 or are above 50 mg/l. The map shows the spatial distribution of these points, and the table reports the number of stations by NUTS inside and outside NVZ. Only the NUTS of interest are reported and NVZ with Validity=1.

Groundwater stations removed



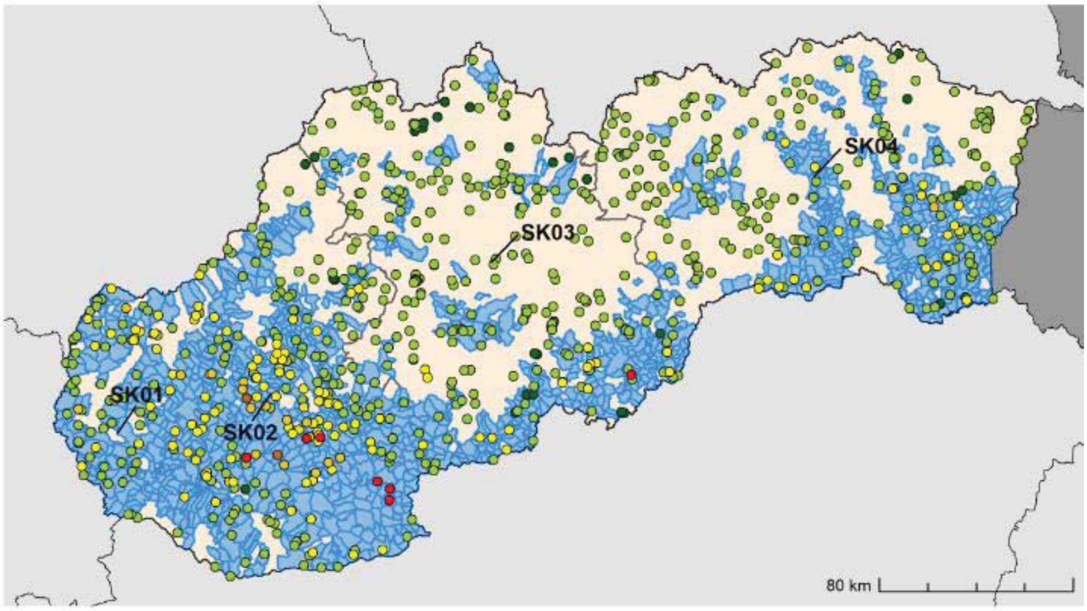
Station Type	Description	Number of removed stations		
		total removed	with measurements	with trends
0	Phreatic groundwater (shallow): 0-5 m	63	63	61
1a	Phreatic groundwater (deep) 5-15 m	240	240	199
1b	Phreatic groundwater (deep) 15-30 m	41	41	36
1c	Phreatic groundwater (deep) >30 m	32	32	31
2	Captive groundwater	20	20	16
3	Karstic groundwater	23	23	22
9	Not specified	0	0	0
	Total	**419**	**419**	**365**

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



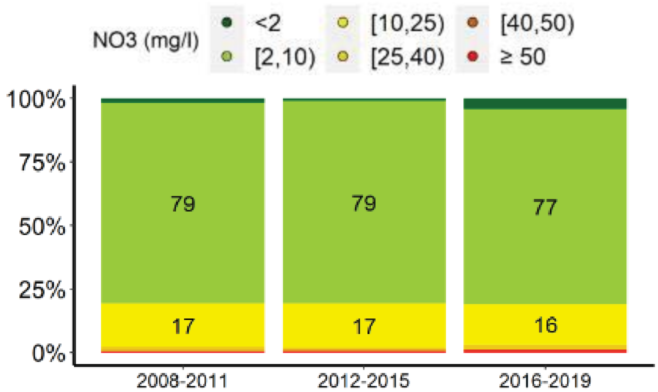


Figure 9. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information. In the map in blue the NVZ.

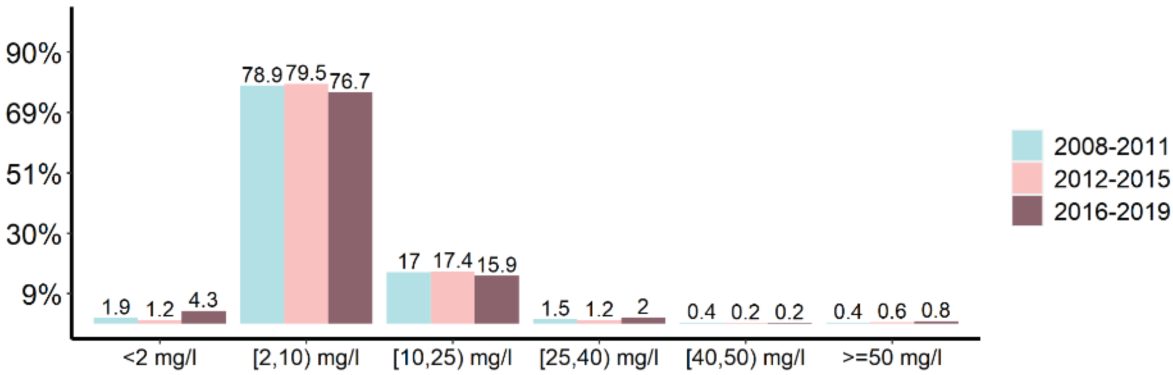


Figure 10. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis)

Surface water average annual nitrate concentration trend

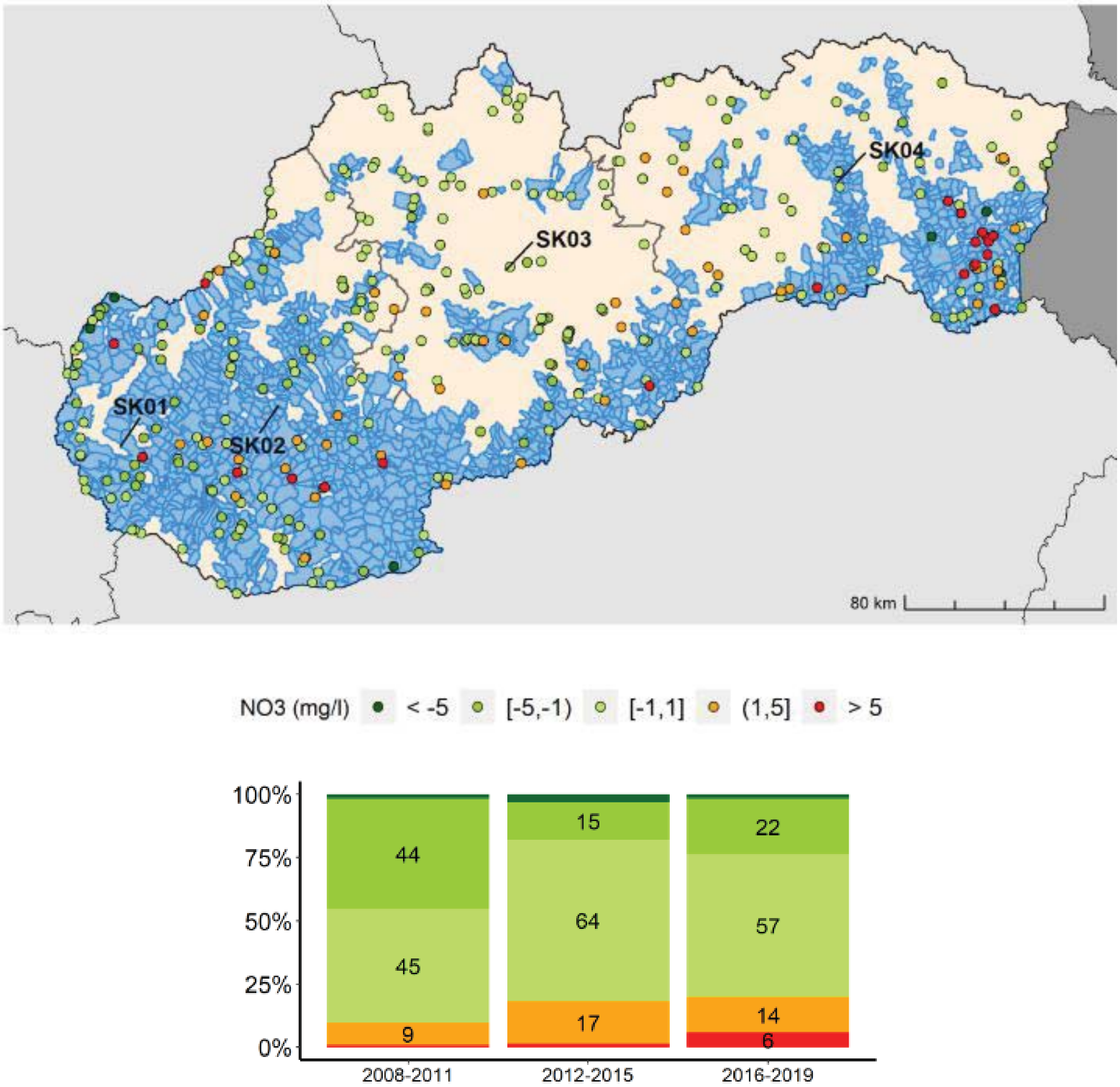


Figure 11. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information. In the map in blue the NVZ.

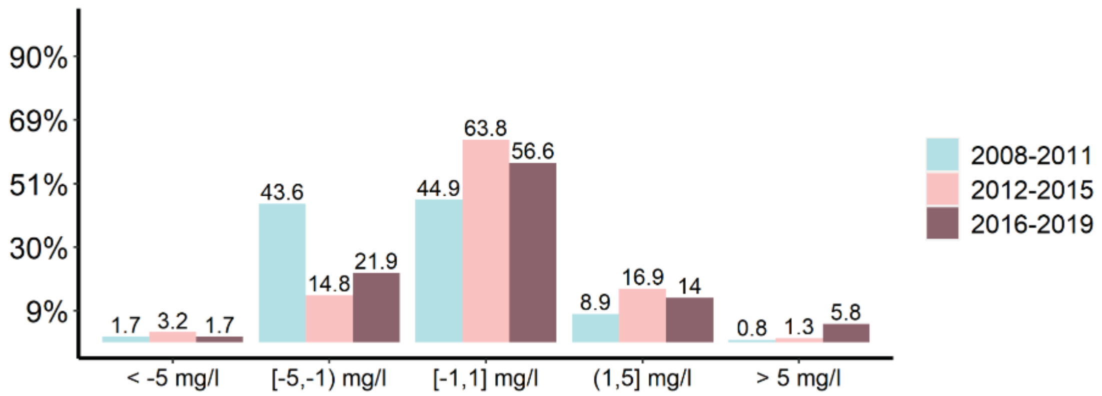
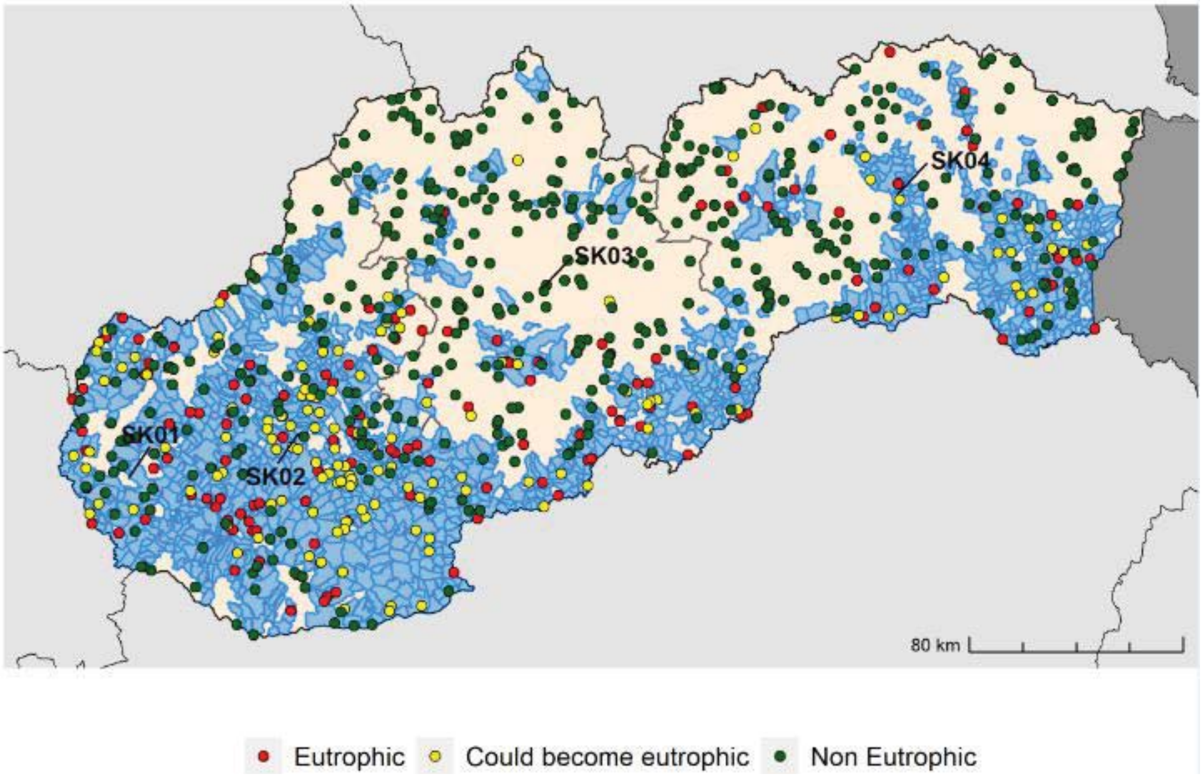


Figure 12. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis)

Surface Water Eutrophication



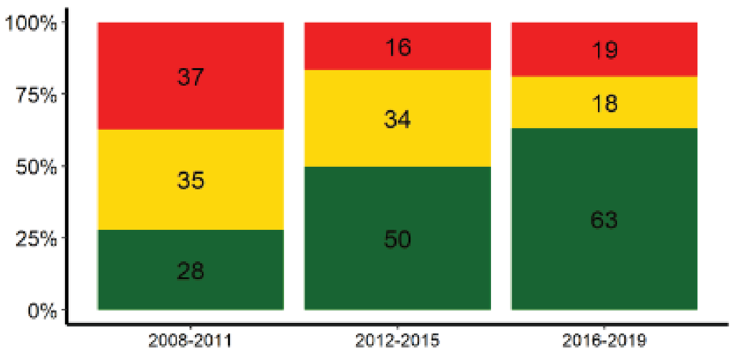


Figure 13. Spatial distribution of eutrophic status (map) and corresponding percentage of monitoring points per classes of status by reporting period (x axis). In the map in blue the NVZ.

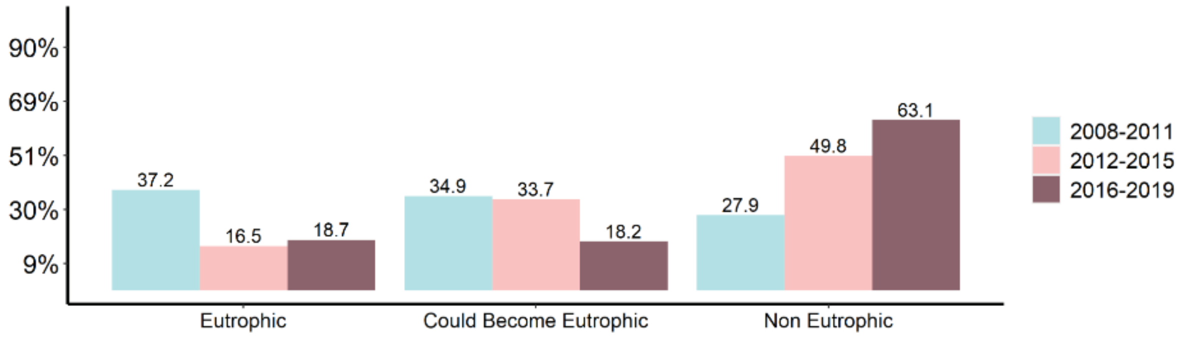
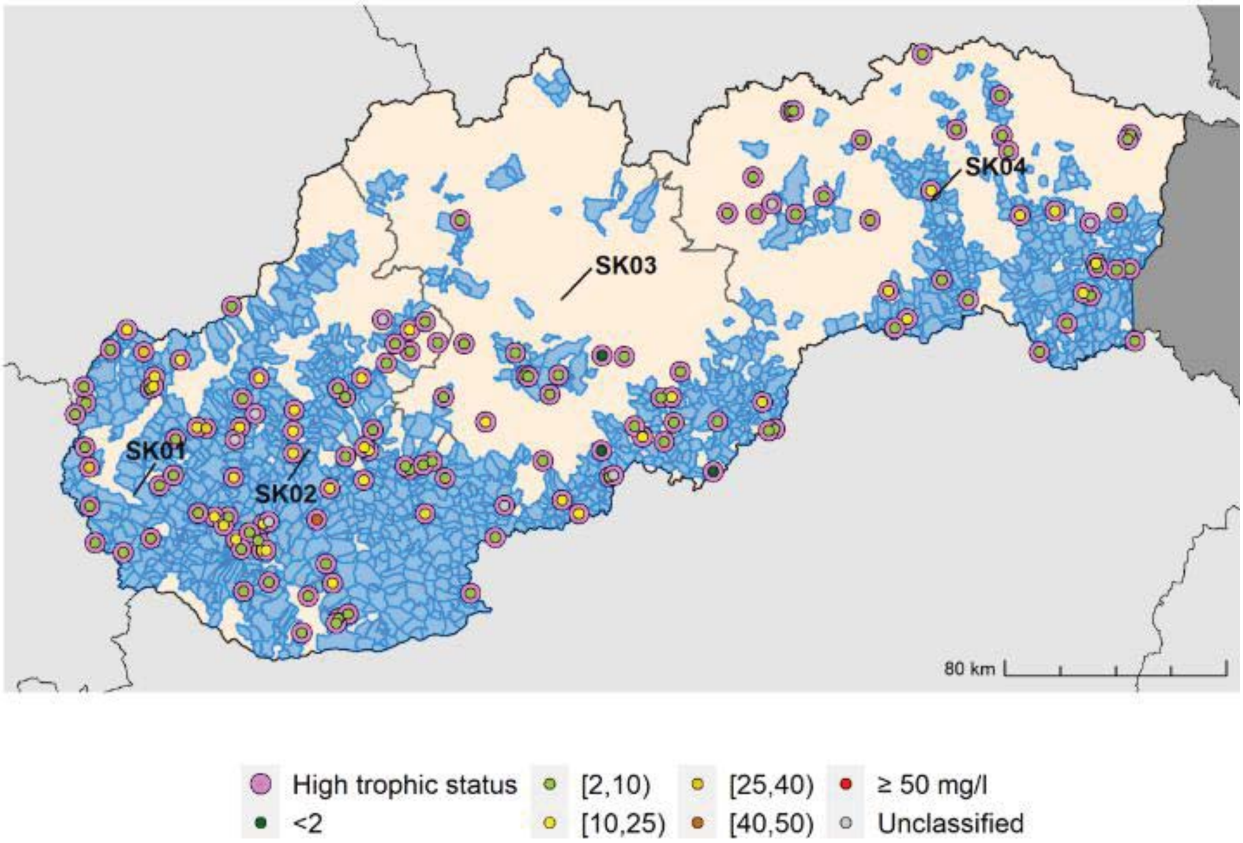


Figure 14. Comparison of percentage of monitoring points in the three reporting periods by classes of status (x axis)

Surface water eutrophication in Slovakia has been evaluated using two different methodologies. In the current reporting period, 2016-2019, the Slovak methodology based on the CIS WFD Guidance document No 23 was used. For the previous reporting periods, 2012-2015 and 2008-2011, the French methodology was applied
The eutrophication assessment was based on "the French methodology" until 2012 – 2015 reporting period ("Report on the state of Nitrate directive implementation in the Slovak Republic in 2016"). "The Slovak methodology" was used since 2012 – 2015 reporting period and it has been described in detail in the "Report on the state of Nitrate directive implementation in the Slovak Republic in 2016".

The Eutrophic status vs average NO3 annual concentration



NUTS ID	NUTS NAME	High trophic status	Number of stations by classes of concentration						
			<2 mg/l	[2,10) mg/l	[10,25) mg/l	[25,40) mg/l	[40,50) mg/l	>=50 mg/l	Unclassified
SK01	Bratislavský kraj	8	0	7	0	1	0	0	0
SK02	Západné Slovensko	71	0	38	25	2	1	0	5
SK03	Stredné Slovensko	30	3	20	6	0	0	0	1
SK04	Východné Slovensko	36	0	26	7	0	0	0	3
	Total	**145**	**3**	**91**	**38**	**3**	**1**	**0**	**9**

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 the higher trophic status and the corresponding value of average NO3 annual 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.

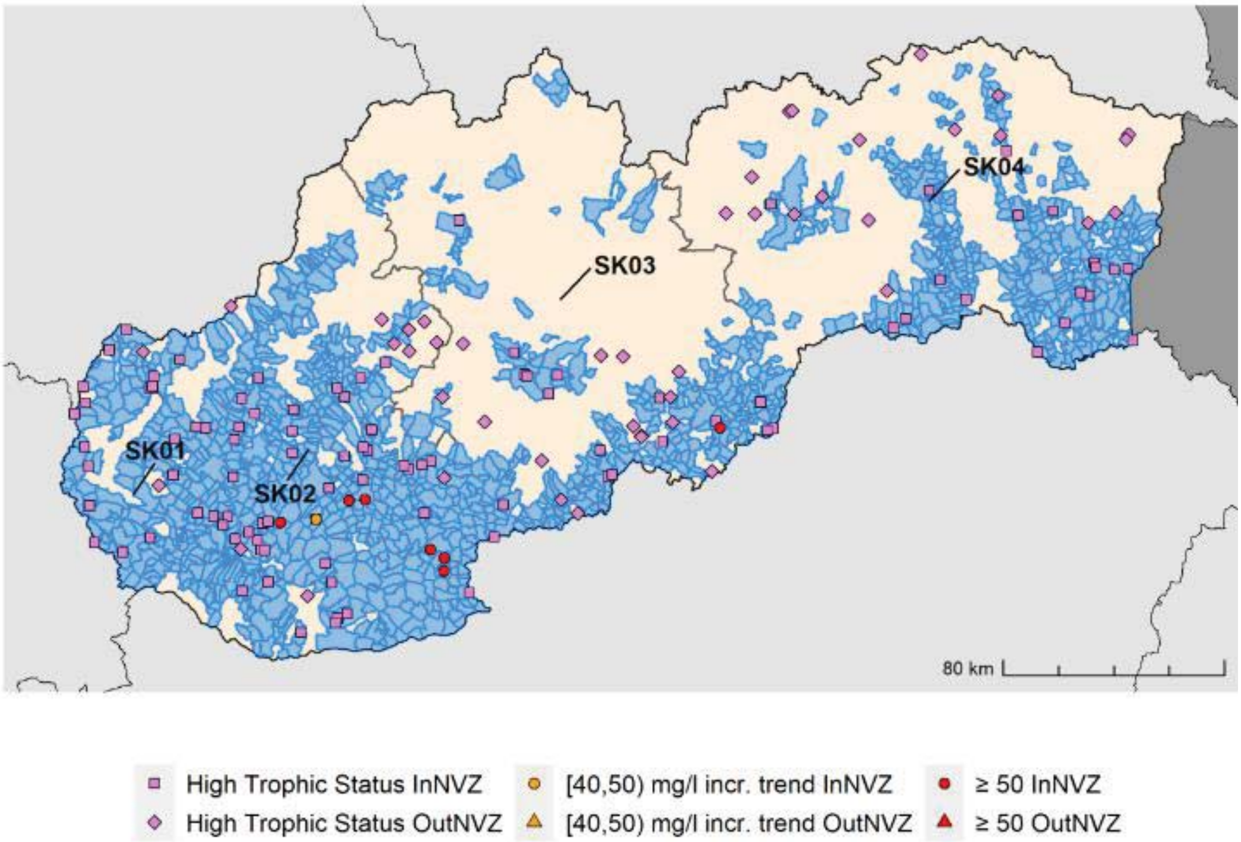
It is noteworthy that P-PO4 has also an important role in determining the trophic status since is a limiting factor for eutrophication in rivers.

The evaluation of eutrophication was conducted in accordance with the requirements laid down in the Development guide for Member States' reports and the Slovak Methodology. Data from the period 2016-2018 were reviewed to derive the appropriate indicators. The assessment of eutrophication of surface water relies on nutrients including NO3, NH4, PO4 and total P which are classified in three categories by type specific classification. The biological elements used to derive the trophic status include phytoplankton, phytobenthos, macrophytes, classified in 5 quality classes according to type-specific classification schemes based on indices calculated and the EQR.
The large majority of flowing rivers fall in the non-eutrophic classes. Eutrophic or could become eutrophic represent about 37% of all rivers. Concerning the reservoirs analyzed, they fall almost equally in the eutrophic and non-eutrophic classes.

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	135	141	477
5	Lake/reservoir water	10	0	12
6	Transitional water	NA	NA	NA
7	Coastal water	NA	NA	NA
8	Marine water	NA	NA	NA
9	Not specified	0	0	0
	Total	**145**	**141**	**489**

Surface Water quality hotspot



NUTS ID	NUTS NAME	High trophic status InNVZ	High trophic status OutNVZ	>=40 and < 50 mg/l incr.trend InNVZ	>=40 and < 50 mg/l incr.trend OutNVZ	>=50 mg/l InNVZ	>=50 mg/l OutNVZ
SK01	Bratislavský kraj	7	1	0	0	0	0
SK02	Západné Slovensko	60	11	1	0	6	0
SK03	Stredné Slovensko	15	15	0	0	1	0
SK04	Východné Slovensko	18	18	0	0	0	0
	Total	**100**	**45**	**1**	**0**	**7**	**0**

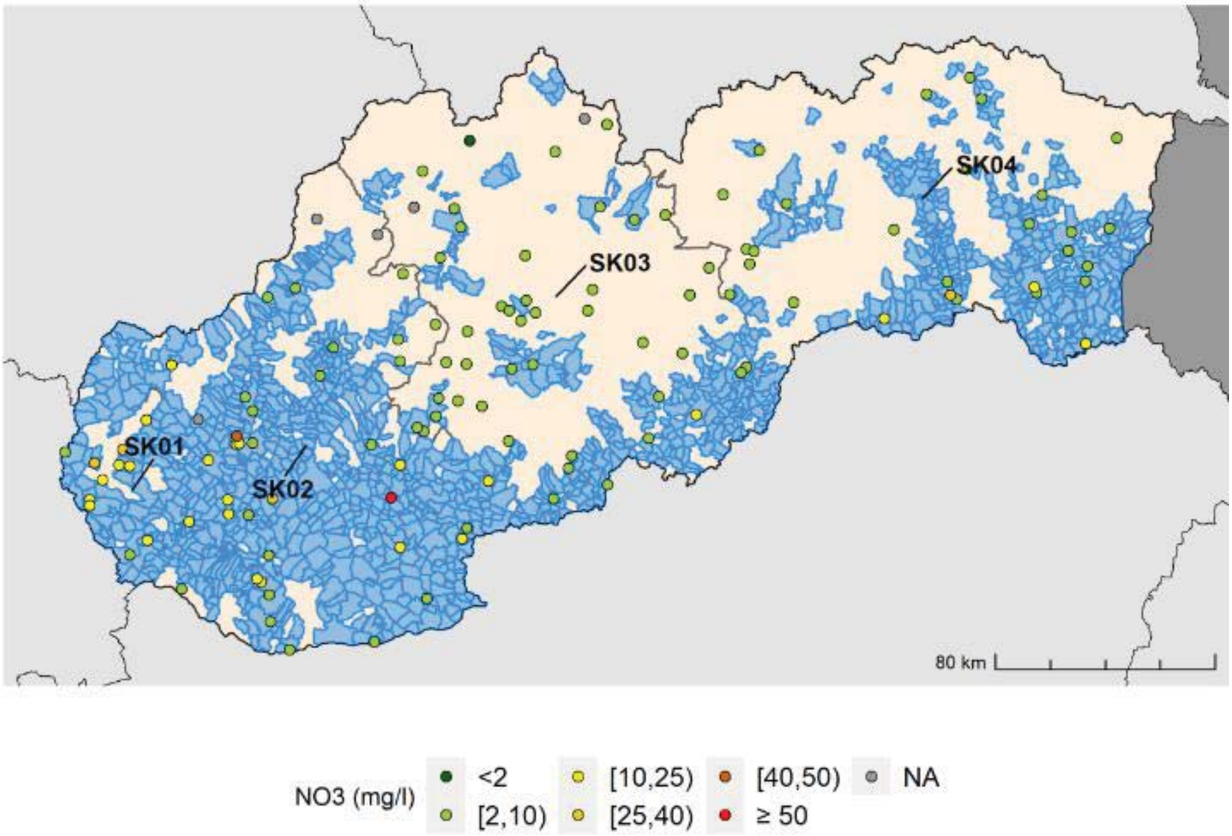
Figure 16. SW hotspot analysis map (top graph) and distribution by NUTS2 (lower graph) of average NO3 annual concentration greater than 40 mg/l and trophic status. In the map in blue the NVZ.

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 or are above 50 mg/l. The map shows the spatial distribution of these points, and the table reports the number of stations by NUTS inside and outside NVZ.

Only the NUTS of interest are reported. We considered NVZ with Validity=1.

It is noteworthy that all monitoring stations with high trophic status outside NVZ were analysed as part of work on revision of NVZ in 2020. It is expected that there will be new NVZ designation in 2021.

Surface Water Stations Removed



Station Type	Description	Number of removed stations			
		total removed	with measurements	with trends	with trophic status
4	River water	120	115	71	50
5	Lake/reservoir water	4	4	4	0
6	Transitional water	0	0	0	0
7	Coastal water	0	0	0	0
8	Marine water	0	0	0	0
9	Not specified	0	0	0	0
	Total	**124**	**119**	**75**	**50**

Figure 17. SW removed stations amp (top graph) and distribution by surface water type (lower graph). In the map in blue the NVZ.

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

Measures in the Action Programme

The first Code of Good Agricultural Practice was drawn up in 2001. Approximately 30% of farmers farming outside vulnerable zones began voluntarily working according to the principles of the Code of Good Agricultural Practice for Water Protection in 2016-2019.

The Action Programme (AP), called “Farming Programme”, was published for the first time in 2004 and was revised on 01/01/2019. The revised Farming Programme introduces and governs, among other things, the main measures for the elements of agricultural activities described in the subsequent table. Some measures were differentiated in three categories of farming restrictions that range from low level (A) to high level (C). The categories were defined based on a set of soil, hydrology, geography, and environmental parameters. The new measures are summarized in the following table.

Table 6. Details of the Action Programme

Measure	General details in Action Programme (*)
Period of prohibition of fertiliser application	• Different dates depending on type of fertiliser, type of land and level of restrinction (Section 10c(1), Annex 2 of the Act)
Restrictions for application on sloped soils	• Different limitations depending on type of fertiliser, type of land and level of restrinction (Sections 10c(8), 10c(9), 10c(10) of the Act)
Restrictions for application on soaked, frozen, or snow-covered soils	• Not allow in these situations (Section 10c(7) of the Act)
Restrictions for application near watercourses (buffer strips)	• Different restrictions depending on type of fertiliser, type of land and level of restrinction (Section 10c(11) of the Act)
Effluent storage works	• Details reported in section 5.3 -point 5 (CGAP measures):
	• Slurry can be stored using reliable homogeniser in underground tanks, sumps, above-ground tanks and isolated depressions
	• Recommended widths when manure are placed on a slope
Capacity of manure storage	• 6 months for liquid agricultural fertilisers and for storing livestock manure (Section 10b(1) of the Act)
	• 3 months otherwise
Rational fertilisation (e.g., splitting fertilisation, limitations)	• Maximum N-total use (Section 10c(6) of the Act)
	• Maximun single dose on nitrogen in spring (Section 10c(6))
Crop rotation, permanent crop enhancement	• Use suitable equipment for evenly application of fertilisers in agricultural land (Section 10c(7) of the Act)
	• Ensure without delay the sowing of a succeeding crop in the recovery of permanent grassland and after ploughing in clover (Section 10c(7) of the Act)
	• In dry weather conditions use irrigation water (Section 10c(7) of the Act)
Vegetation cover in rainy periods, winter	• 47.5% of arable land left bare in winter (average 2016-2019)
Fertilisation plans, spreading records	• Not specified
Other measures	• Plan on the use of nitrogen fertilising substances (Section 10c(5) of the Act)
	• Inventory on storage capacity, livestock number and technique of housing and fertiliser consumption (Section 9(1)(f) of the Act)
	• Harmful substances must not be dissipated or leak into the surrounding area (Section 9(3) of the Act)
Date for application limit of 170 kg N/ha/year:	• 2010 (dates of last revision CGAP)

(*) Act No 394/2015 amending Act No 136/2000 on fertilisers, as amended

CGAP- Code of Good Agricultural Practice – Protection of Water Resources. Bratislava: Ministry of Agriculture, September 2001

The economic efficiency of the new measures was expressed as the costs spent on measures scaled to a kilogram of retained (non-leached) nitrogen and the environmental effects of the measures were based on an expert estimate. The costs of implementation of the individual measures are specified in the sense of the Rural Development Programme of the Slovak Republic 2014-2020. The implemented measures contribute not only to lower nitrogen losses from soil but are accompanied also by other positive effects on the environment (protection of agricultural land from erosion, reduction in the amount of agrochemicals applied, greater biodiversity and others). These effects are not included in the costs and economic efficiency of the measures.

Controls

Checks of the compliance with the conditions of the Farming Programme are conducted by the Central Control and Testing Institute in Agriculture (CCTIA). An average of 79% of the farmers located in vulnerable zones were subject to a yearly administrative check concerning the use of fertilizers. About 8% of the farmers located in vulnerable zones were subject to a physical check. The level of compliance is high. The highest non-compliance occurred in less than 1% of the farmers concerning the measure “Land use and agricultural practices, including crop rotation systems (records, fertilization plans)”.

Designation of NVZ

Slovakia has revised the nitrate vulnerable zones in 2016 using a new methodology. The extent of NVZs went from 22328 km^2 to 20938 km^2. The proportion of utilized agricultural areas in vulnerable zones went from 61.3% to 62.0%.

Forecast of Water Quality

This is the second time the Slovak Republic conducts a forecast of water quality. The forecast for groundwater is based on a linear trend analysis of the average annual concentration at monitoring stations with long-term time series (at least 8 years). Based on this linear regression, a time by which a station will fall under the 50 mg/ is calculated l. About 70.1% of the stations evaluated (568 stations) were classified as posing no problem as they already dropped below 50 mg/l and are stabilized or the concentration is even on a decline. About 21% of the stations are expected not to reach the desired threshold by 2034 and are all located in NVZ areas.

Analyzing time series of surface water nitrate concentration for the period 2007-2018 led to the conclusion that the short-term development of nitrate nitrogen concentration for outlet monitoring sites of the Slovak Danube river basin district would remain at the actual levels unless shifts linked to anthropogenic activities occur.

Summary

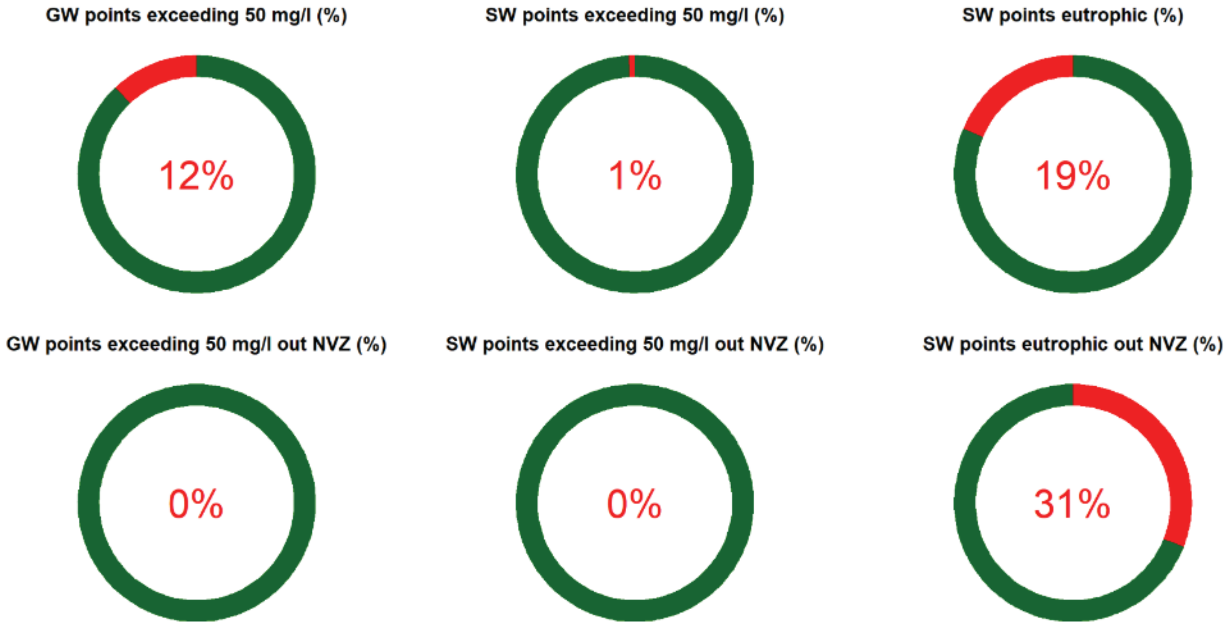


Figure 18. The summary plot for the period 2016-2019

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

Long term analysis

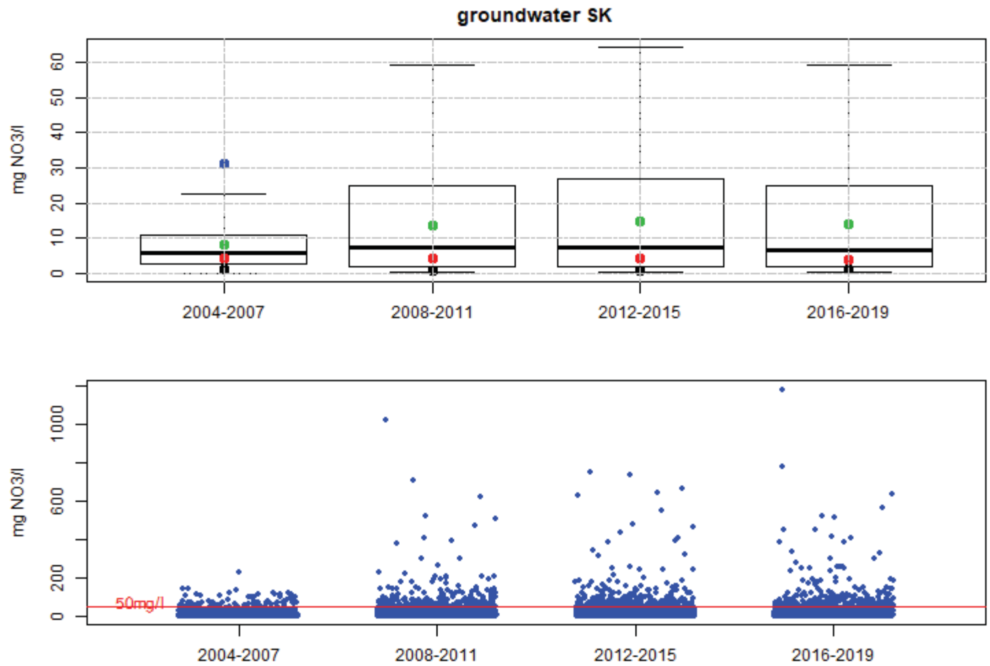


Figure 19. Time series of box whisker plots along with the distribution of the average NO3 annual concentrations for each reporting period, for groundwater stations. The blue, red, green and black dots represent the mean of the fourth third, second and first quartiles, respectively.

The highest GW concentrations above 250 mg/L are under control and will be part of a task to be taken by Water Research Institute under Ministry of Environment

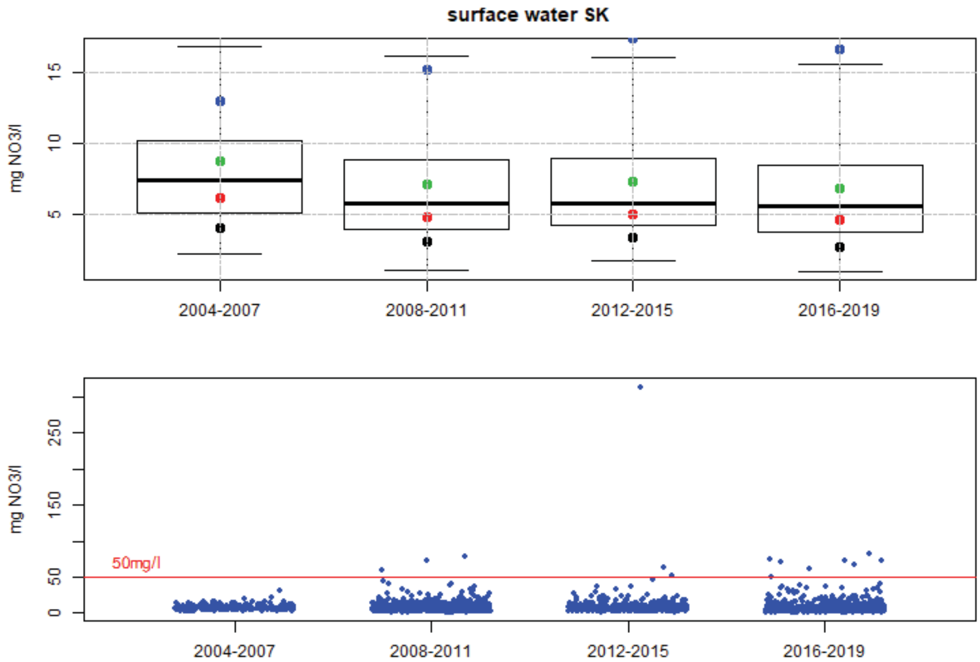


Figure 20. Time series of box whisker plots along with the distribution of the average NO3 annual concentrations for each reporting period, for surface water stations. The blue, red, green and black dots represent the mean of the fourth third, second and first quartiles, respectively.

Conclusions and recommendations

Slovakia has a low livestock density, a low surplus of nitrogen and a high deficit for phosphorus.

There is a well-elaborated network of monitoring stations. The groundwater quality is generally good. However, there are a number of hotspots, with a nitrate concentration above 50 mg/l and/or increasing trend. A number of surface waters are eutrophic or are at risk to become eutrophic.

A number surface waters found to be eutrophic are located outside the NVZ.

The action programme was revised in 2019.

The Commission recommends Slovakia to verify the designation of NVZ considering that not all the surface waters found to be eutrophic are included in the NVZ.

EUROPEAN
COMMISSION

Brussels, 11.10.2021
SWD(2021) 1001 final

PART 33/38

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}

EN EN

Pressure from Agriculture

Slovenia's utilized agricultural area amounts to 0.48 Mha, representing 24% of the total land area and has remained stable since 2007. The major outputs of the agricultural industry excluding services and secondary activities include in a decreasing order forage (14.7%), milk (13.1%) and wine (13.1%).

Eurostat

Major land use statistics for Slovenia

Table 1.Utilized agricultural area (abbreviated as UAA)

Slovenia	2005	2007	2010	2013	2016
Utilised agricultural area UAA (1000 ha)	NA	498	483	479	478
arable land (1000 ha)	NA	175	170	174	174
permanent grass (1000 ha)	NA	297	286	277	276
permanent crops (1000 ha)	NA	26	27	27	28
kitchen gardens (1000 ha)	NA	NA	NA	NA	NA

Note:
Eurostat (FSS)

From 2007 the structure of agricultural land use in Slovenia is quite stable. Permanent grass (grassland) covers 58% of utilized agricultural area.

Animal distribution in Slovenia

The livestock density index (livestock unit per hectare of Utilized Agricultural Area) has remained stable and is higher than the EU average of 0.8. Poultry production increased by 28 %

Table 2. Livestock statistics

Slovenia	2005	2007	2010	2013	2016
Livestock index	1.08	1.13	1.07	1.00	1.05
dairy cows (10^6 heads)	0.12	0.12	0.11	0.11	0.11
live bovines (10^6 heads)	0.45	0.48	0.47	0.46	0.49
live pigs (10^6 heads)	0.55	0.54	0.40	0.29	0.27
live poultry (10^6 heads)	NA	NA	4.90	4.86	6.22

Note:
Eurostat (FSS)

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

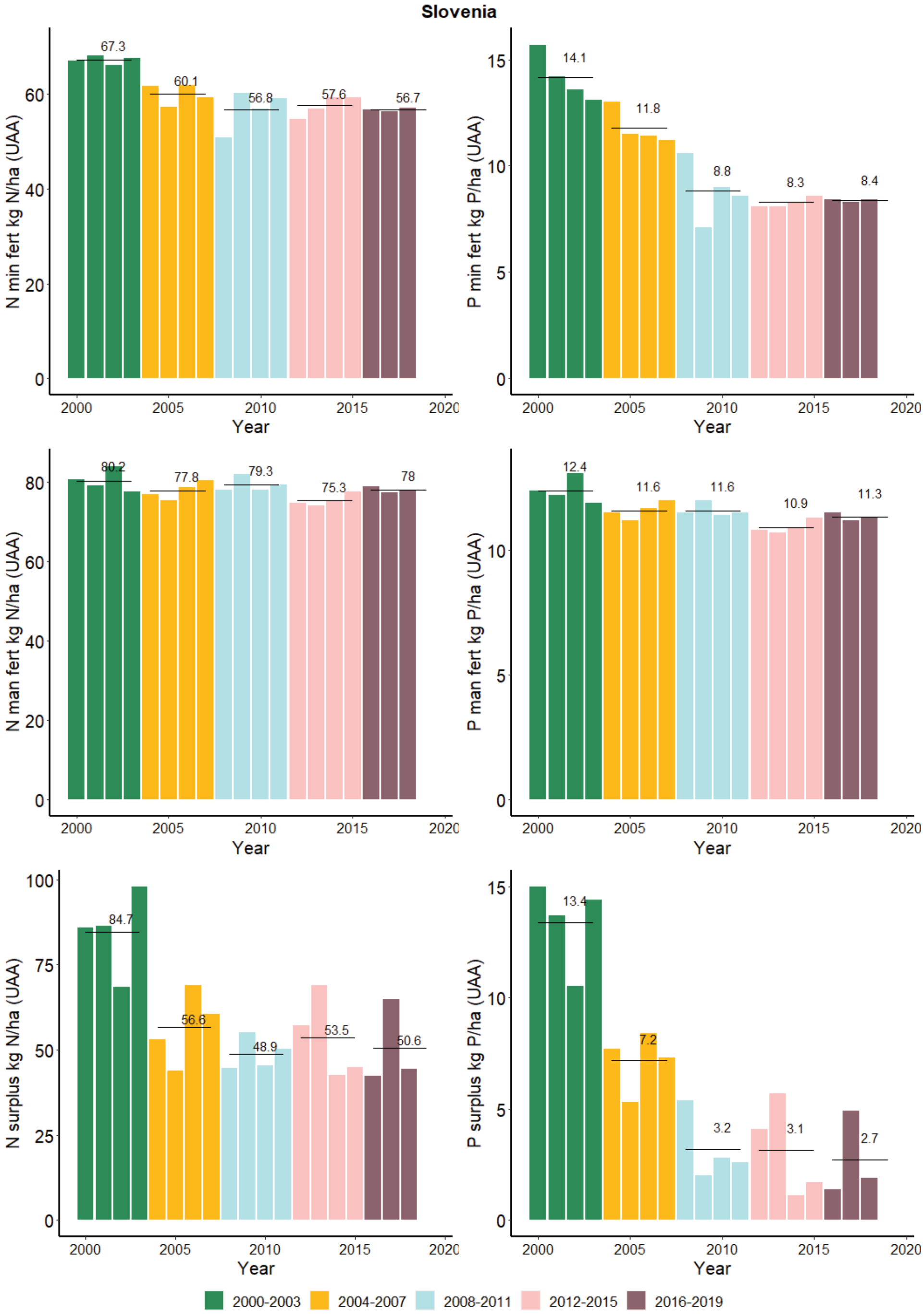


Figure 1. N and P fertilizers and gross surplus (kg/ha)

The N and P fertilizers and gross surplus are originated from EUROSTAT data for the years 2000-2017 while data for year 2018 have been retrieved from the Statistical Office of the Republic of Slovenia because of correspondence, for the previous years, with Eurostat statistics. Manure and inorganic fertilisers use remained stable for the last reporting period. The gross surplus decreased by 6% and 13% for N and P, respectively.

Livestock unit - LSU /ha

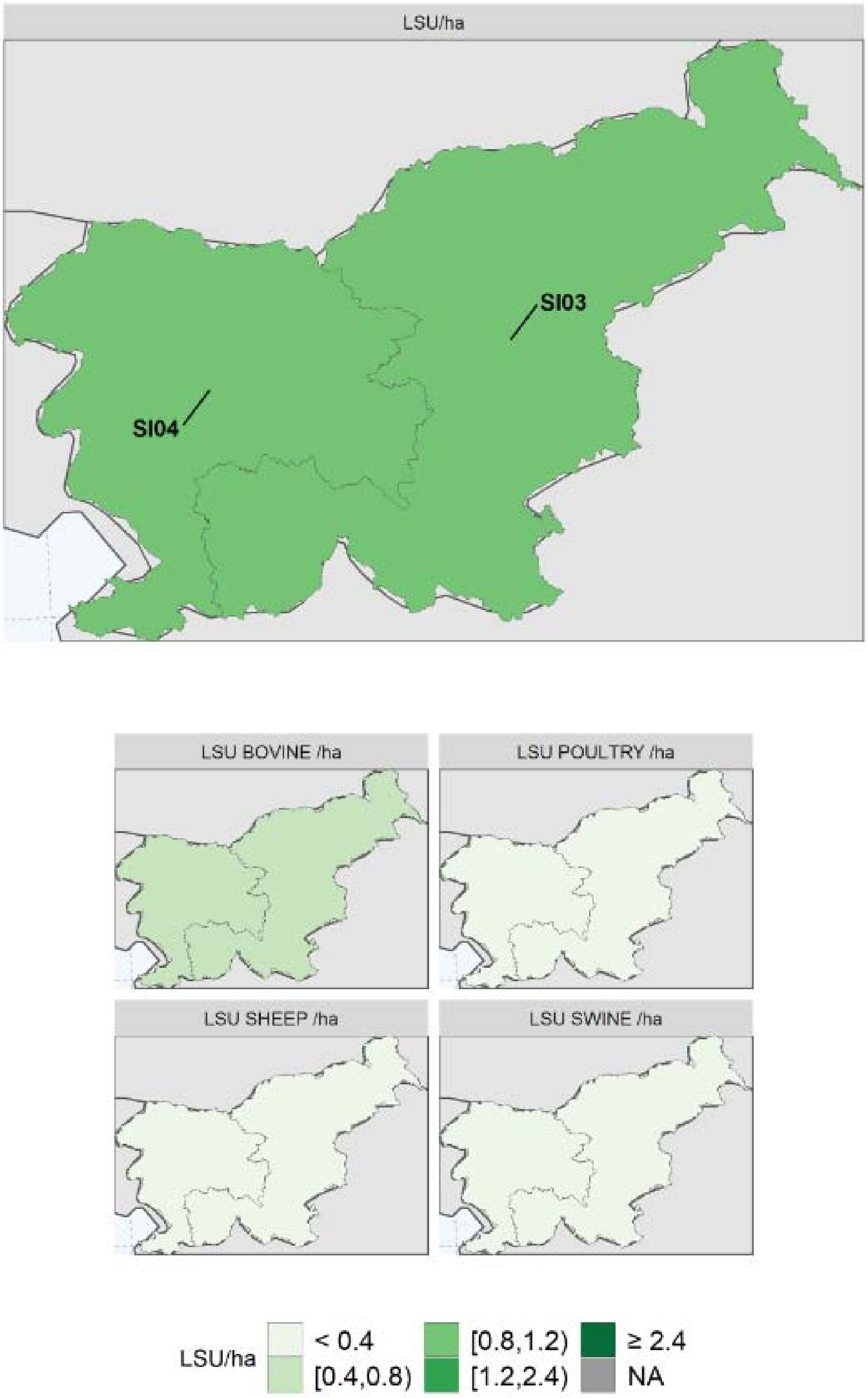


Figure 2. Map of livestock unit distribution, year 2016 (Source: Eurostat, February 2021)

Animal production from bovine is dominant respect to other animals total LSU and LSU by animal type were retrieved individually from EUROSTAT).
In this document, the NUTS-2013 version is used.
(https://ec.europa.eu/eurostat/web/gisco/geodata/reference-data/administrative-units-statistical-units/nuts)

Water Quality Monitoring

Water quality assessments are made on the basis of regulations aligned with the requirements of the Water Framework Directive and the Groundwater Directive. The monitoring programme has been drawn by the Slovenian Environment Agency (ARSO). Water quality monitoring programmes, which Slovenia has had in place for decades, were aligned with the requirements of the Water Framework Directive in 2006. Measurements for groundwater stations take place once to twice per year. For surface water measurement frequency usually ranges between 2 to 12 times per year for rivers and 4 to 12 for lakes. Marine and coastal waters are sampled 12 times per year.

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	22	19	18	22	16	18
1a	Phreatic groundwater (deep) 5-15 m	20	44	45	20	21	43
1b	Phreatic groundwater (deep) 15-30 m	14	31	33	14	13	28
1c	Phreatic groundwater (deep) >30 m	1	22	23	1	1	22
2	Captive groundwater	3	7	13	3	3	7
3	Karstic groundwater	44	75	79	44	44	74
9	Not specified	0	0	0	0	0	0
	Total	**104**	**198**	**211**	**104**	**98**	**192**

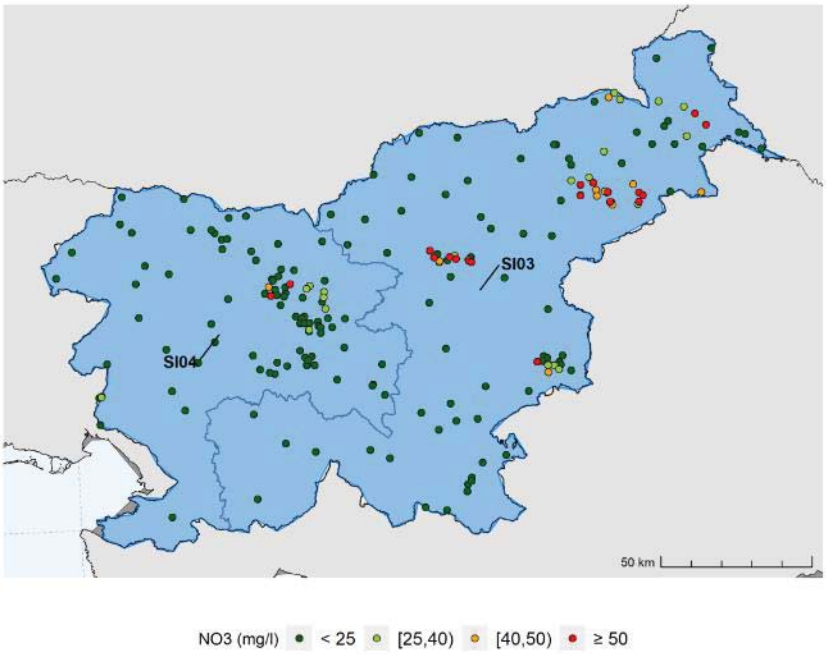
Surface water quality monitoring network

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	128	125	143	98	105	124	120	81	110
5	Lake/reservoir water	11	11	11	11	11	11	11	11	11
6	Transitional water	0	0	0	0	0	0	0	0	0
7	Coastal water	4	4	4	4	4	4	3	3	3
8	Marine water	1	1	1	1	1	1	0	0	0
9	Not specified	0	0	0	0	0	0	0	0	0
	Total	**144**	**141**	**159**	**114**	**121**	**140**	**134**	**95**	**124**

Groundwater Quality

Groundwater average annual nitrate concentration



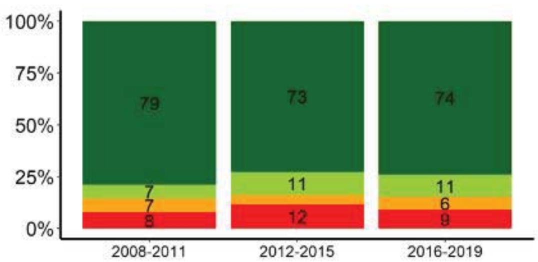


Figure 3. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis).

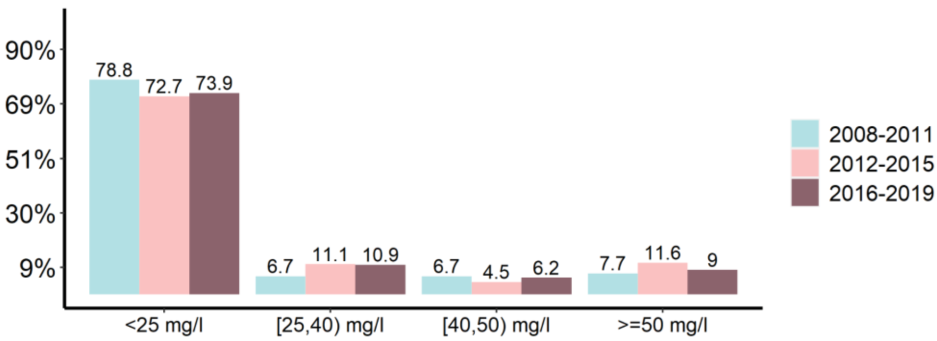
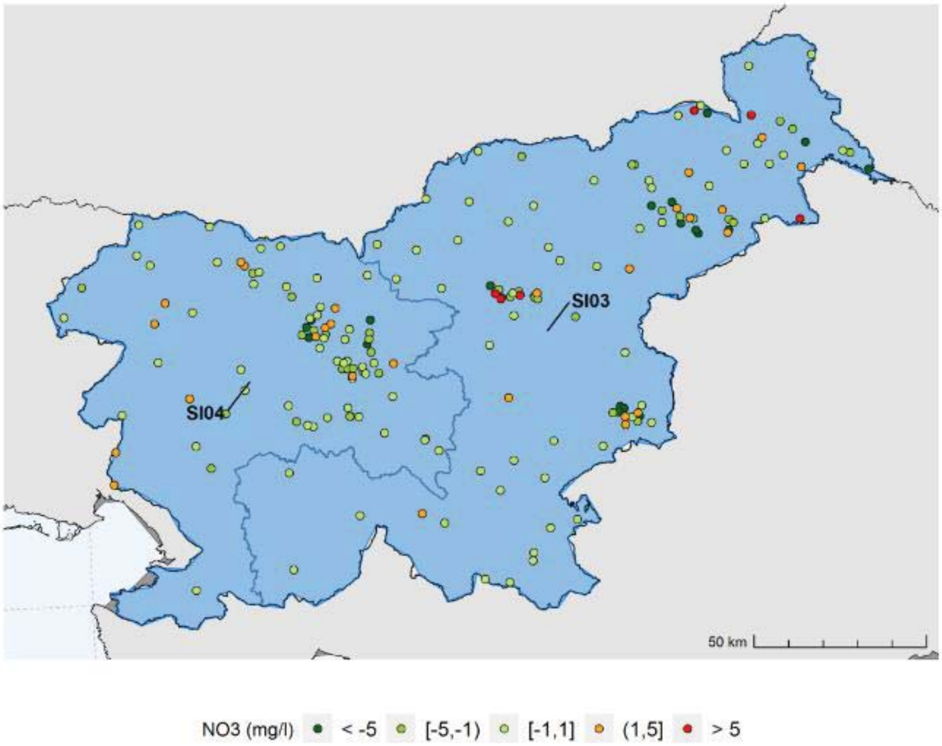


Figure 4. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis)

Groundwater average annual nitrate concentration trend



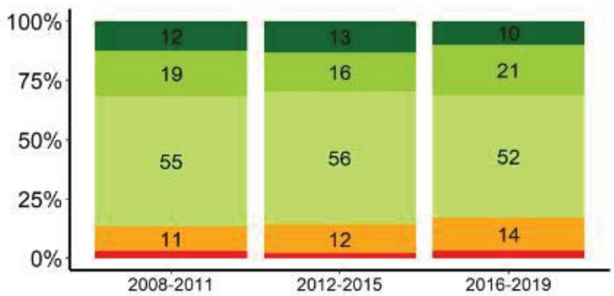


Figure 5. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information.

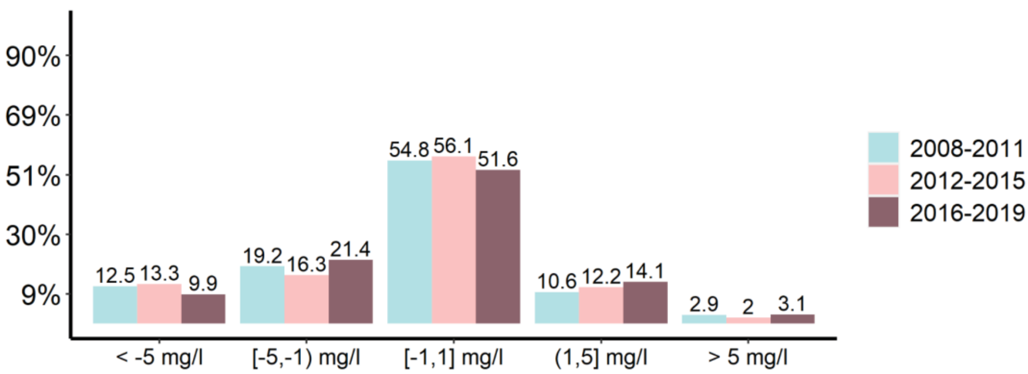
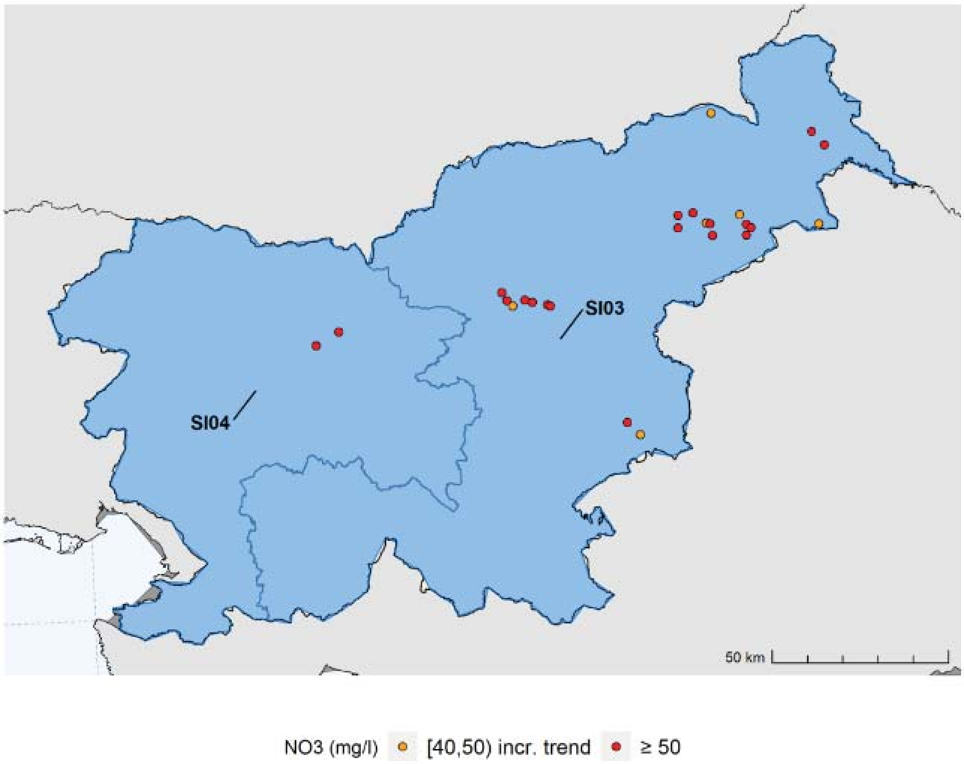


Figure 6. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis)

Groundwater hotspot

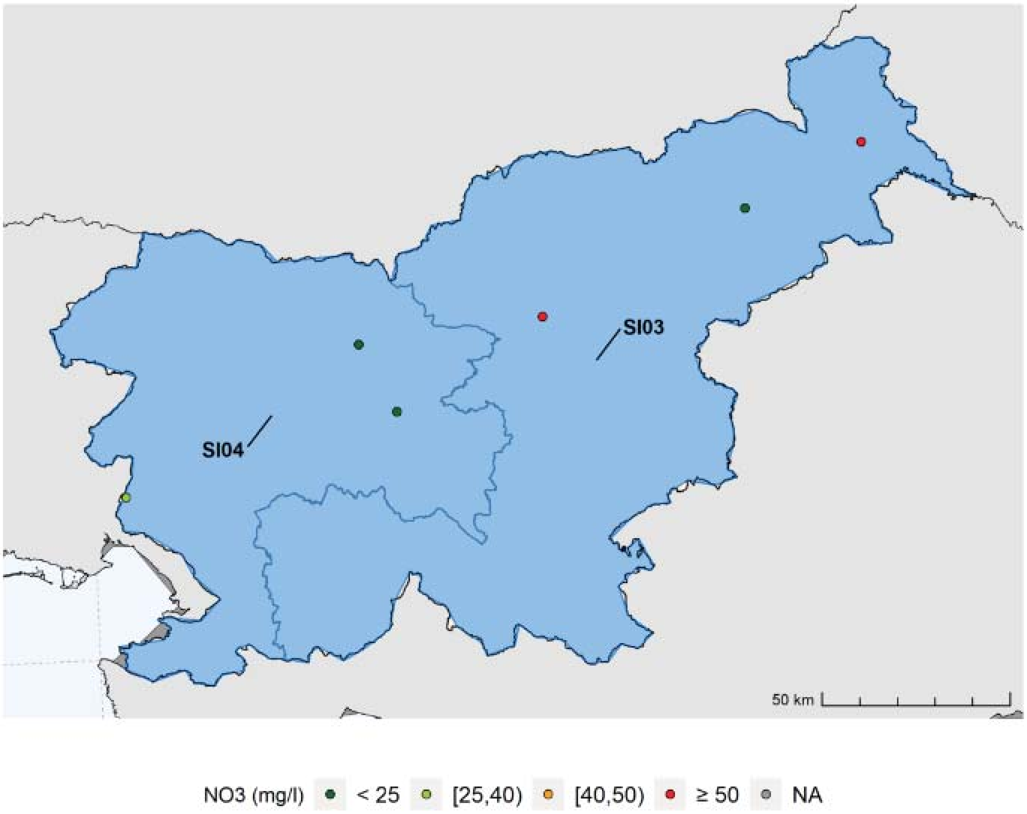


NUTS ID	NUTS NAME	>=40 and < 50 mg/l incr.trend	>=50 mg/l
SI03	Vzhodna Slovenija	6	17
SI04	Zahodna Slovenija	0	2
	Total	**6**	**19**

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

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

Groundwater stations removed



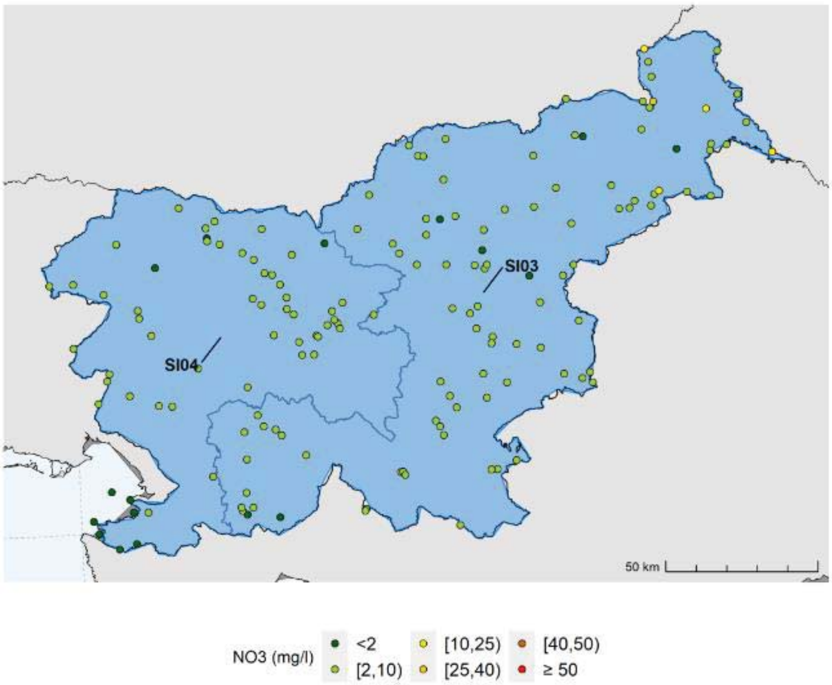
Station Type	Description	Number of removed stations		
		total removed	with measurements	with trends
0	Phreatic groundwater (shallow): 0-5 m	1	1	1
1a	Phreatic groundwater (deep) 5-15 m	1	1	0
1b	Phreatic groundwater (deep) 15-30 m	3	3	2
1c	Phreatic groundwater (deep) >30 m	0	0	0
2	Captive groundwater	0	0	0
3	Karstic groundwater	1	1	1
9	Not specified	0	0	0
	Total	**6**	**6**	**4**

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

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

Surface Water Quality

Surface water average annual nitrate concentration



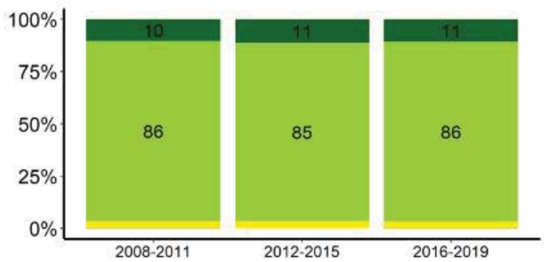


Figure 9. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information.

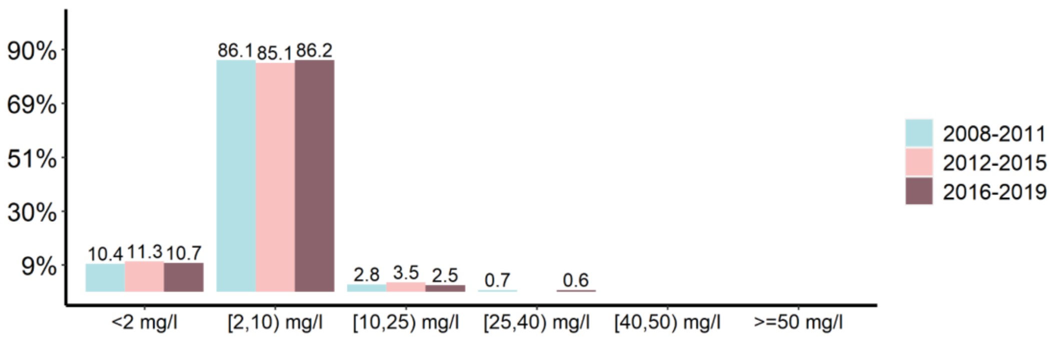
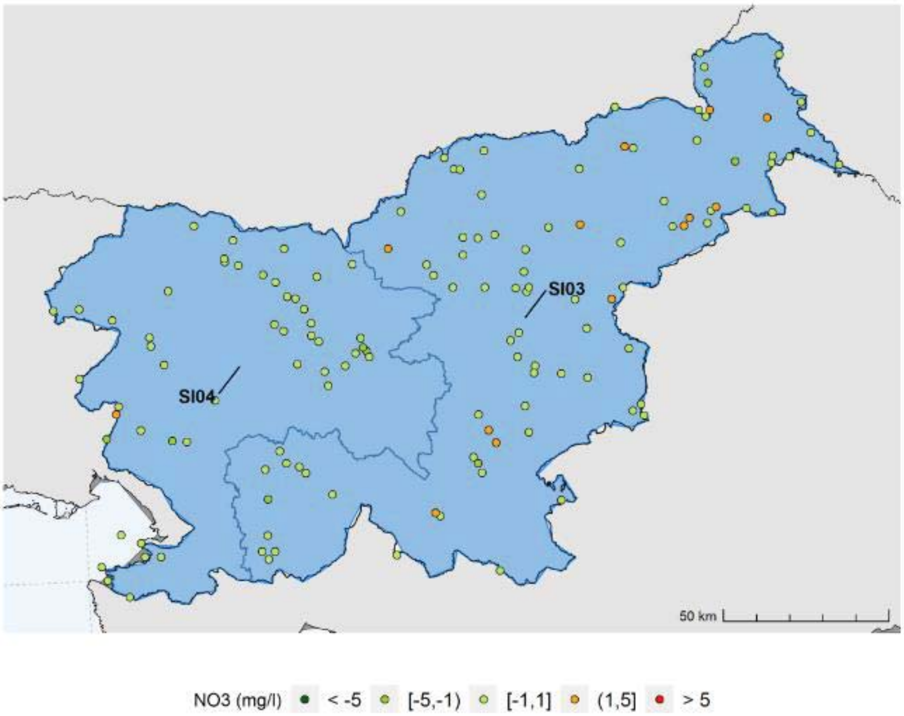


Figure 10. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis)

Surface water average annual nitrate concentration trend



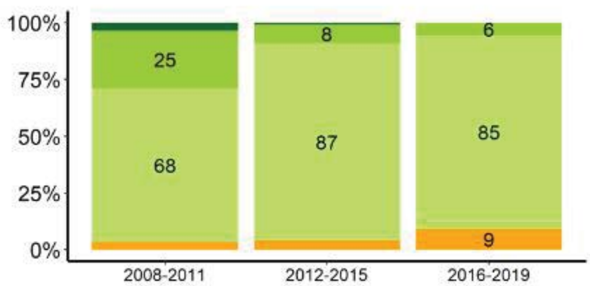


Figure 11. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information.

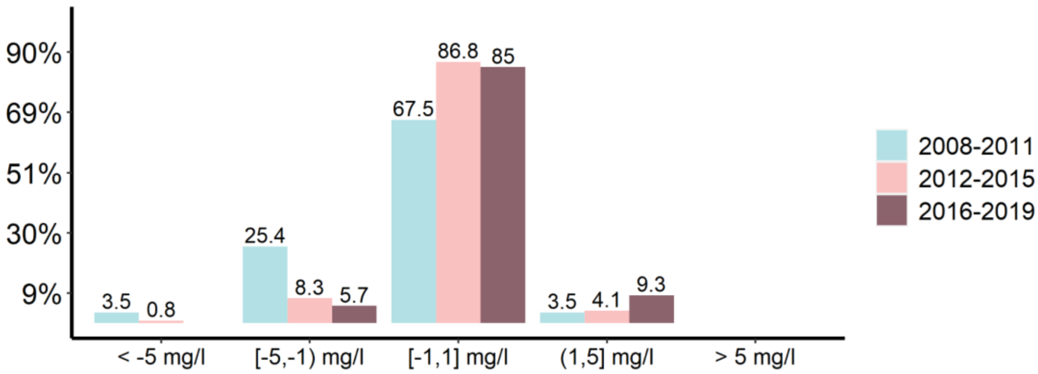


Figure 12. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis)

Surface Water Eutrophication

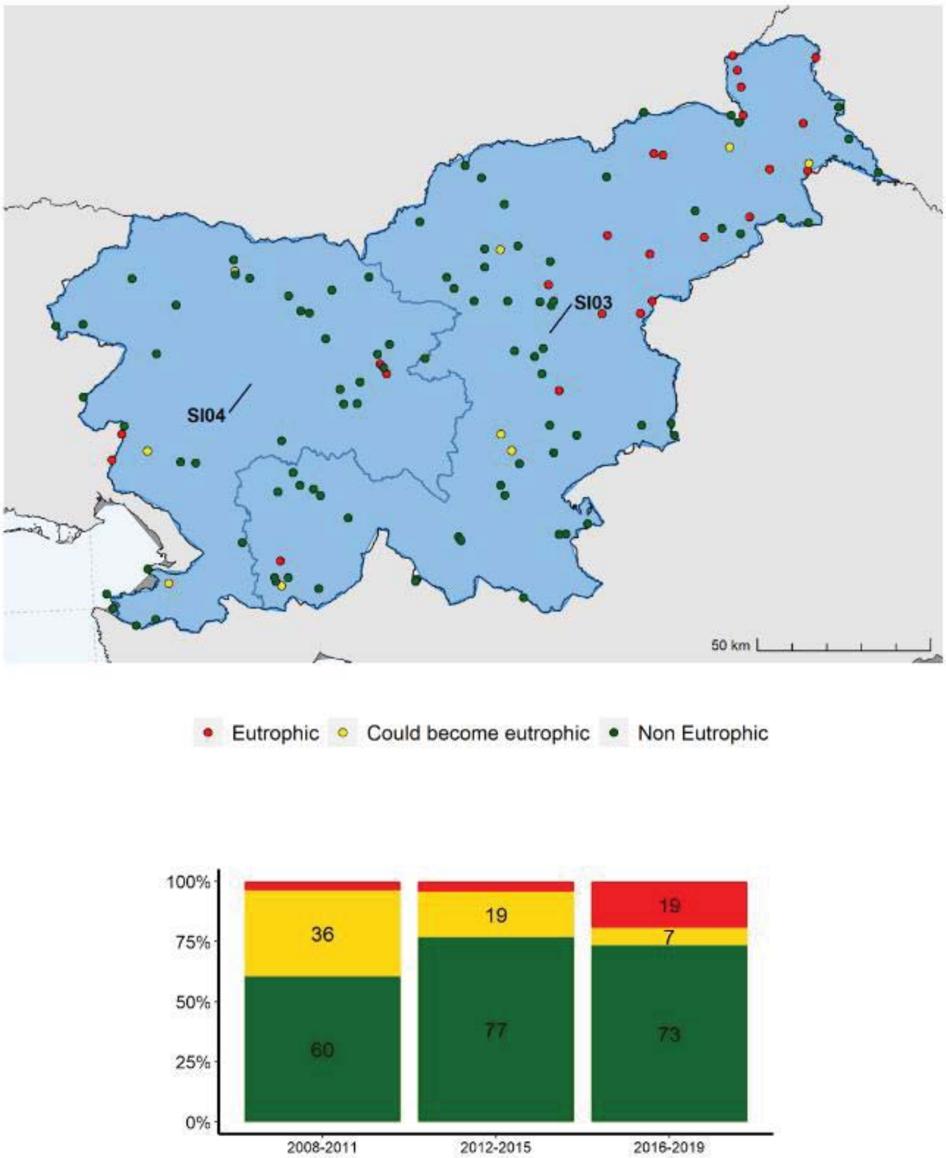


Figure 13. Spatial distribution of eutrophic status (map) and corresponding percentage of monitoring points per classes of status by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information.

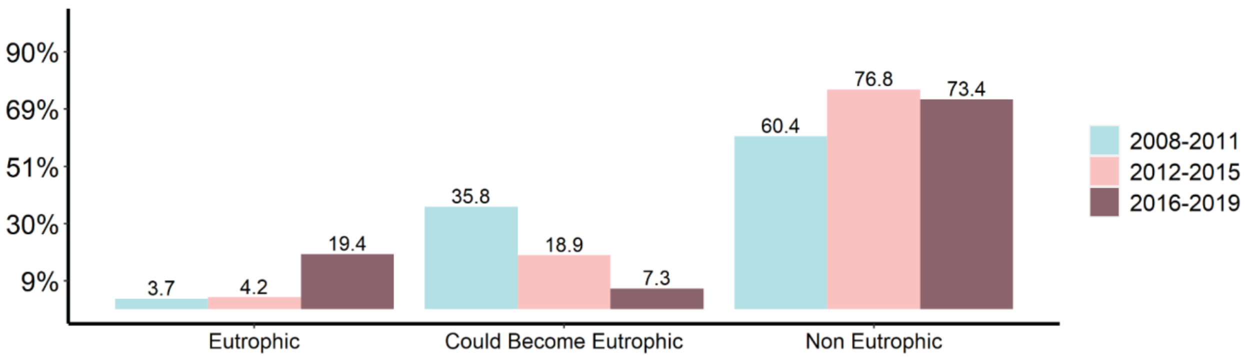
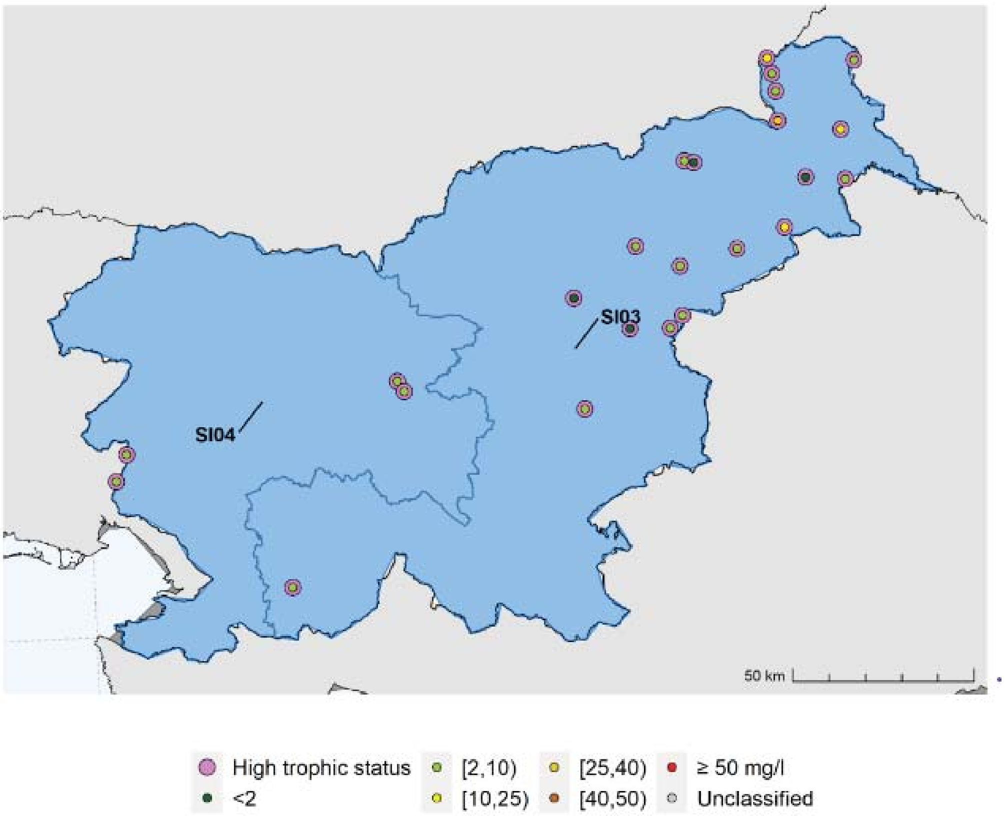


Figure 14. Comparison of percentage of monitoring points in the three reporting periods by classes of status (x axis)

The Eutrophic status vs average NO3 annual concentration



NUTS ID	NUTS NAME	High trophic status	Number of stations by classes of concentration						
			<2 mg/l	[2,10) mg/l	[10,25) mg/l	[25,40) mg/l	[40,50) mg/l	>=50 mg/l	Unclassified
SI03	Vzhodna Slovenija	20	4	12	3	1	0	0	0
SI04	Zahodna Slovenija	4	0	4	0	0	0	0	0
	Total	**24**	**4**	**16**	**3**	**1**	**0**	**0**	**0**

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

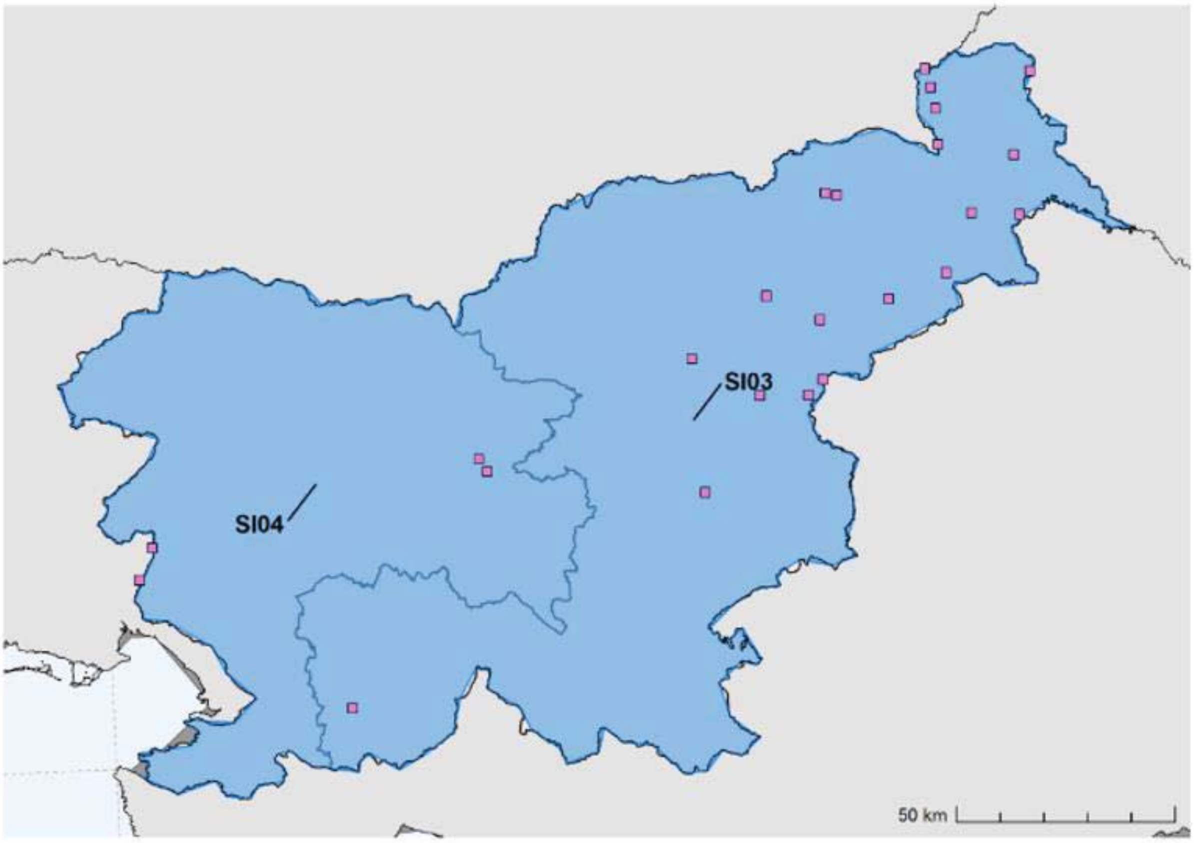
The analysis shows all the SW monitoring stations with the higher trophic status and the corresponding value of NO3 concentration. The map shows the spatial distribution of these points, and the table reports the number of stations with measurements with highest trophic status and the corresponding stations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

The assessment of the eutrophication of rivers derives from the evaluation of the ecological status, on the basis of the biological quality element of phytobenthos and macrophytes, and the concentrations of nitrate and total phosphorus. This assessment is performed as part of Slovenia's obligations under the Water Framework Directive. Each parameter is given a score based on a type specific reference condition. The final assessment of eutrophication in rivers is based on the worst scoring element.
The trophic status of lakes is in line with the requirements of the Water Framework Directive. The trophic status of lakes is based on the biological element phytoplankton and the concentration of total phosphorus.
The evaluation of trophic status of coastal waters is based on the phytoplankton biomass and on the concentration of nutrients including nitrate, total phosphorus and orthophosphate. The final assessment of eutrophication in coastal waters is based on the worst scoring element.
Most of rivers in Slovenia are non-eutrophic, while the majority of lakes are eutrophic or could become eutrophic. All monitored coastal waters are non-eutrophic.

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	19	5	86
5	Lake/reservoir water	5	4	2
6	Transitional water	0	0	0
7	Coastal water	0	0	3
8	Marine water	0	0	0
9	Not specified	0	0	0
	Total	**24**	**9**	**91**

Surface Water quality hotspot



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

NUTS ID	NUTS NAME	High trophic status	>=40 and < 50 mg/l incr.trend	>=50 mg/l
SI03	Vzhodna Slovenija	20	0	0
SI04	Zahodna Slovenija	4	0	0
	Total	**24**	**0**	**0**

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

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

Measures in the Action Programme

The Action Programme (AP) was published for the first time on 15/04/2008 and was revised in 2009, 2013, 2015 and recently in 2017. The deadline for imposing a limit of 170 kg/ha of nitrogen from livestock manure was 01/01/2003. The AP remains valid and unchanged from the previous report for 2012–2015, except for these amendments: i) definition of winter crops, ii) the preparation of land for sowing of spring cereals, grasses and grass-clover mixtures, or spring fertilisation of winter crops and sowed grassland, iii) a prohibition was imposed on fertiliser application using compost or digestate on agricultural land from 1 December to 15 February if such fertiliser comprises more than 20 per cent dry matter, iv) the prohibitions and requirements do not apply in cases involving research commissioned for the implementation of the Decree by the ministry responsible for the environment or the ministry responsible for agriculture, v) the form for providing and receiving livestock manure, digestate or compost.

Additional measures are taken under the Rural Development Programme of the Republic of Slovenia 2014–2020 and include 19 operations that involve obligatory and optional requirements. In the 2016–2019 period no new study of cost-effectiveness was conducted.

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Table 6. Details of the Action Programme

Measure	General details in Action Programme (*)
Period of prohibition of fertiliser application	• Fertilization of agricultural land using liquid organic fertilisers is prohibited between 15 November and 1 March. Exception exceptions concerning the fertilisation of agricultural land with liquid organic fertilisers are listed in paragraphs of Article 8 of the Decree.
	• The fertilisation of agricultural land with solid manure, compost or digestate, where the latter contains more than 20% of dry matter is prohibited from 1 December to 15 February.
	• The fertilisation with mineral fertilisers containing nitrogen is prohibited from 15 October to 1 March. The fertilisation of winter cereals with mineral fertilisers containing nitrogen is prohibited from 1 December to 15 February.
Restrictions for application on sloped soils	• On steeply sloping land that incline towards surface waters, the doses of organic and mineral fertilisers that contain nitrogen shall be divided into several parts so that one-time dose of applied nitrogen does not exceed 80 kg/ha. In In addition, one of the following measures must be ensured: the field must be bounded by transverse green zones, or there must be a belt of land at least 15 m wide, with green cover or containing other agricultural crops, or the field must be worked transversely to the slope, or the field must have green cover throughout the winter (Article 10 of the Decree).
Restrictions for application on soaked, frozen, or snow-covered soils	• Fertilisation using slurry, organic manure and mineral fertilisers shall be prohibited on flooded soil, water-saturated soil, snow-covered soil and frozen soil (Article 10 of the Decree).
Restrictions for application near watercourses (buffer strips)	• Application of fertilisers is prohibited near watercourses at a distance 15 meters from the boundary of the bank of the watercourse of the 1st order and 5 meters from the boundary of the bank of the watercourse of the 2nd order.
	• If no water protection regime is stipulated for the area surrounding a facility for the capture of drinking water that is part of the public drinking water supply system, the application of liquid organic fertilisers into/onto the soil and the ploughing of permanent grassland is prohibited within 100 m of the facility until water protection regimes are adopted (Article 11 of the Decree).
Effluent storage works	• Livestock manure and biogas slurry (even if such slurry does not contain livestock manure) is stored in reservoirs for liquid manure, in cesspits or in other storage facilities for livestock manure.
	• Storage facilities for livestock manure shall be located, constructed and managed so that no uncontrolled discharge and pollution of water or land occurs. They shall be watertight, stable and resistant to mechanical, heat or chemical damage.
	• Storage facilities for livestock manure shall be regularly maintained. In the event of damage, the livestock manure or biogas slurry shall be quickly and safely used or stored elsewhere in a manner that prevents the pollution of water or land.
	• Conduits and pipelines connecting stalls with storage facilities for livestock manure or connecting storage facilities for livestock manure shall be watertight, stable and resistant to mechanical, heat or chemical damage. The conduits and pipelines shall be regularly maintained. The use of a conduit or pipeline to remove liquid organic fertilisers is not permitted if the conduit or pipeline is damaged (Article 12 of the Decree).
Capacity of manure storage	• The capacity of storage facilities for livestock manure shall be adjusted to the number and species of animals on an agricultural holding and shall provide sufficient capacity for at least six months' storage.
	• The minimum necessary capacity levels for livestock manure storage facilities are set out in Table 3 of Annex 1 of the Decree.
	• A storage facility for liquid manure or slurry shall not be required if, due to special methods of rearing and of storing manure with litter, slurry or liquid manure are not produced (Article 12 of the Decree).
Rational fertilisation (e.g., splitting fertilisation, limitations)	• Fertiliser must be used in accordance with the plants' nutrient requirements. These requirements shall be determined on the basis of the expected crops, soil types, ground conditions, climatic conditions, use of land and other conditions of cultivation.
	• Limit value for the input of nitrogen into the soil per single unit of agricultural land use in the course of the fertilisation of individual species of agricultural plants may not exceed the limit values given in Table 4 of Annex 1 of the Decree.
	• The annual application of nitrogen from organic fertilisers per single unit of agricultural land use may not exceed 250 kg N/ha (Article 13 of the Decree)
Crop rotation, permanent crop enhancement	• The provisions are part of chapter 5.1.3.1 related to Measures agri-environment-climate payments from the Rural Development Program of the Republic of Slovenia for the period 2014- 2020 and its implementation in the period 2016-2019.
Vegetation cover in rainy periods, winter	• Vegetation cover in rainy periods and in winter is part of additional measures within the Rural Development Program of the Republic of Slovenia for the period 2014-2020, namely in agri-environment measures, which includes 19 operations with mandatory and optional requirements.
Fertilisation plans, spreading records	• An agricultural holding on which the annual application of nitrogen from livestock manure exceeds 350 kg N/year and which at the same time exceeds the annual load of 140 kg N/ha of agricultural land in use from livestock manure must keep data on the use of livestock manure in written form. This data must contain a list of the units of agricultural land use that are fertilized using livestock manure, and the quantity, time and type of manure used.
Other measures	• Not specified
Date for application limit of 170 kg N/ha/year:	• 1 January 2003

Controls

Annual administrative controls on the implementation of the Action Programme measures carried by the Inspectorate of the Republic of Slovenia for Agriculture, Forestry, Hunting and Fisheries concerned about 11.4% of the farmers. Additional controls are also performed under the frame of Cross-Compliance. Several problems were detected in implementing the Action Programme including the non-sufficient supervision in extensive protected zones in which the application of fertilisers is not permitted, the incomplete fertilisation plans with regard to the needs of specific cultures, as well as the time prohibitions on the use of liquid organic fertiliser in the event of adverse weather condition.

Designation of NVZ

Slovenia has adopted a whole territory approach.

Forecast of Water Quality

Slovenia bases its forecast of water quality changes on modelling. By 2050 the basic assumptions include the increase of crop nutrient uptakes, and a decrease of the nitrogen surplus. It is estimated considering climate change, that nitrate leaching will be reduced by 2050.

Summary

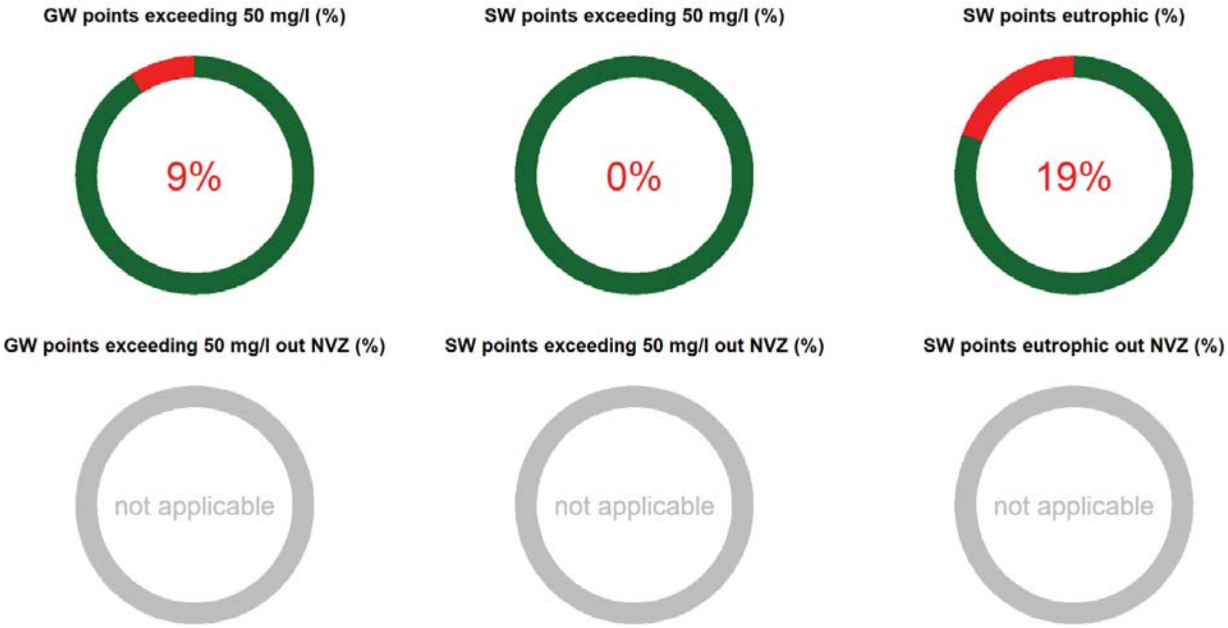


Figure 17. The summary plot for the period 2016-2019

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

Long term analysis

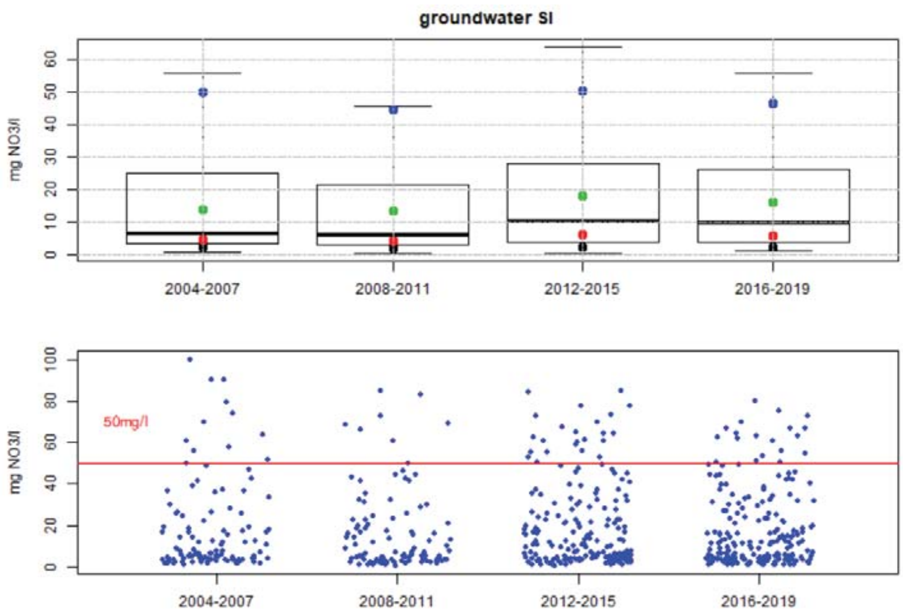


Figure 18. Time series of box whisker plots along with the distribution of the average NO3 annual concentrations for each reporting period, for groundwater stations. The blue, red, green and black dots represent the mean of the fourth third, second and first quartiles, respectively.

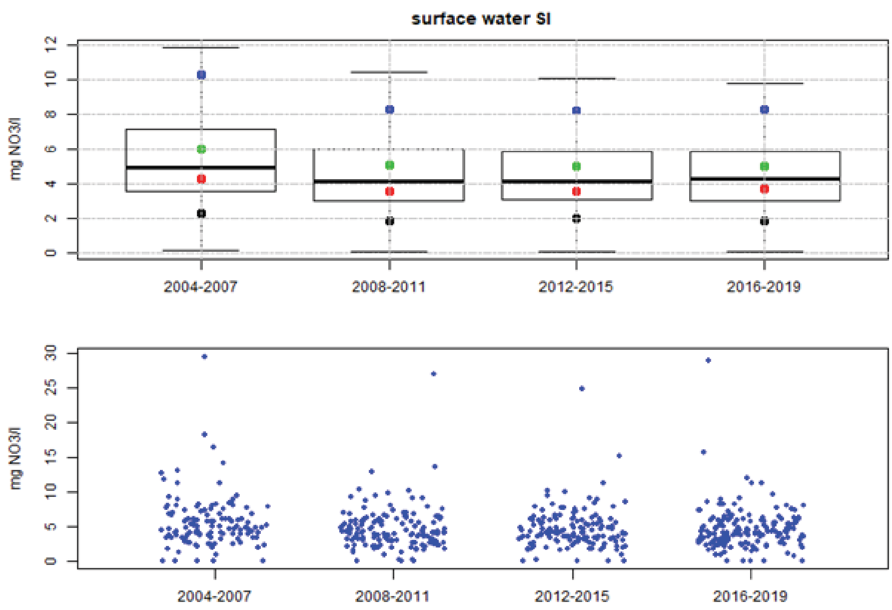


Figure 19. Time series of box whisker plots along with the distribution of the average NO3 annual concentrations for each reporting period, for surface water stations. The blue, red, green and black dots represent the mean of the fourth third, second and first quartiles, respectively.

Conclusions and recommendations

Slovenia has an average livestock density and a surplus of nitrogen and phosphorus slightly below the average.

There is a well-elaborated network of monitoring stations. There are a number of hotspots, with a nitrate concentration above 50 mg/l. and a number of surface waters are eutrophic.

A revised action programme was published in 2017.

The Commission recommends Slovenia to continue to follow-up these hotspots and to take appropriate actions if it appears necessary.

EUROPEAN
COMMISSION

Brussels, 11.10.2021
SWD(2021) 1001 final

PART 34/38

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}

EN EN

Pressure from Agriculture

Spain's utilized agricultural area amounts to 23.8 Mha, representing 47.7% of the total land area and has remained stable since 2010. The major outputs of the agricultural industry include in a decreasing order fruits (19.4%), vegetables and horticultural plants (18%), other crops/crop products (18.6%).
Eurostat

Major land use statistics for Spain

Table 1.Utilized agricultural area (abbreviated as UAA)

Spain	2005	2007	2010	2013	2016
Utilised agricultural area UAA (1000 ha)	NA	25003	23719	23495	23816
arable land (1000 ha)	NA	13197	12690	12311	12475
permanent grass (1000 ha)	NA	6820	6331	6390	6471
permanent crops (1000 ha)	NA	4810	4658	4682	4757
kitchen gardens (1000 ha)	NA	109	NA	111	114

Note:
Eurostat (FSS)

Spain's arable land has remained stable since 2010. Both the permanent grassland and crops have remained stable since 2010.

Animal distribution in Spain

Spain's live bovines and pigs have increased since 2013, while live poultry has remained stable. The livestock density index has remained stable since 2010 and is lower than the EU average of 0.8.

Table 2. Livestock statistics

Spain	2005	2007	2010	2013	2016
Livestock index	0.58	0.58	0.62	0.62	0.62
dairy cows (10^6 heads)	1.02	0.90	0.84	0.84	0.83
live bovines (10^6 heads)	6.46	6.58	6.08	5.80	6.32
live pigs (10^6 heads)	24.89	26.06	25.70	25.50	29.23
live poultry (10^6 heads)	NA	NA	200.91	205.82	203.11

Note:
Eurostat (FSS)

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

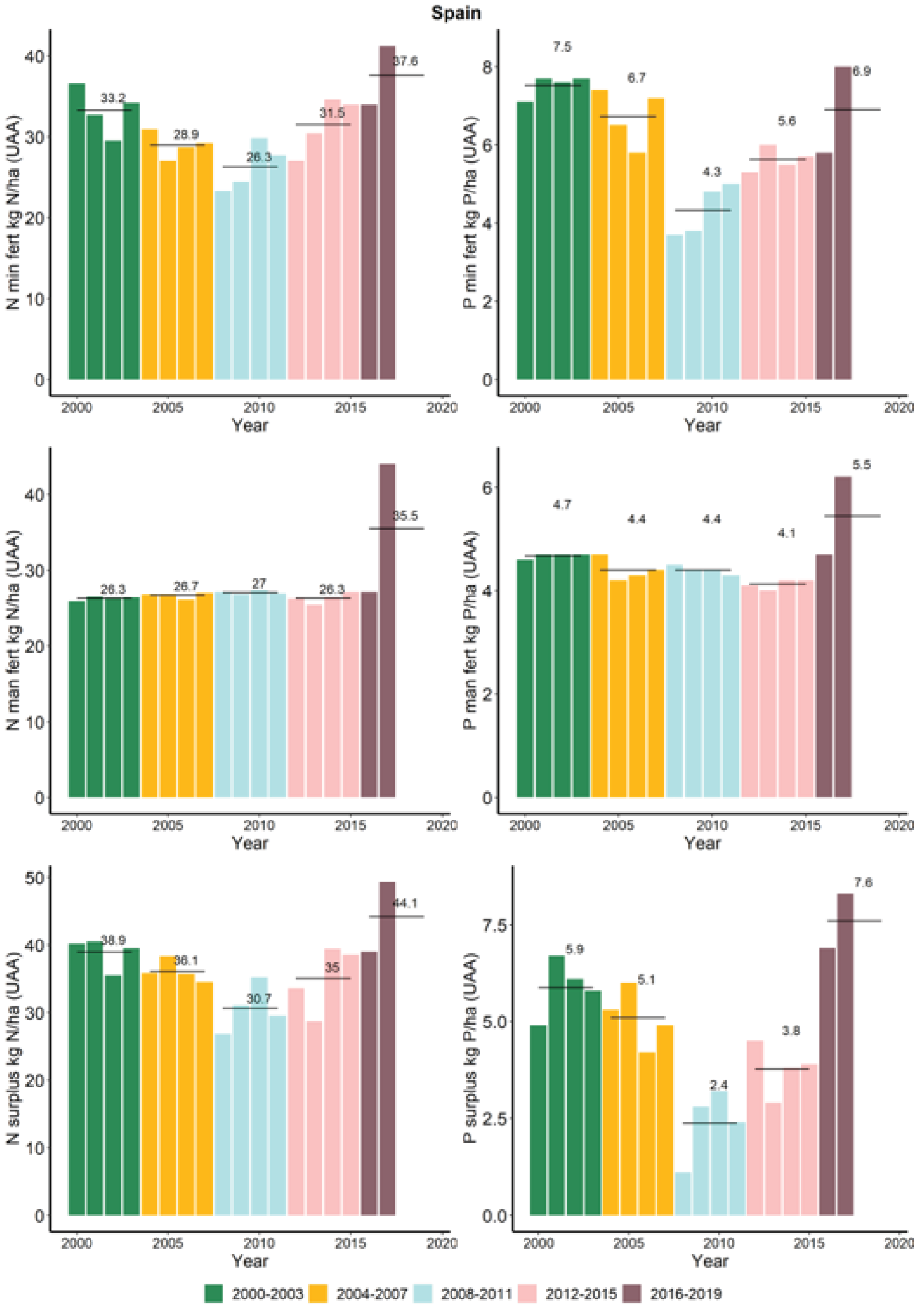


Figure 1. N and P fertilizers and gross surplus (kg/ha)

The gross nitrogen and phosphorus surpluses originate from EUROSTAT data for the years 2000-2017. N and P mineral fertilizers increased from the last reporting periods. N and P manure also increased from the last reporting period. The nitrogen and phosphorus surplus increased in average significantly from the last reporting period. 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

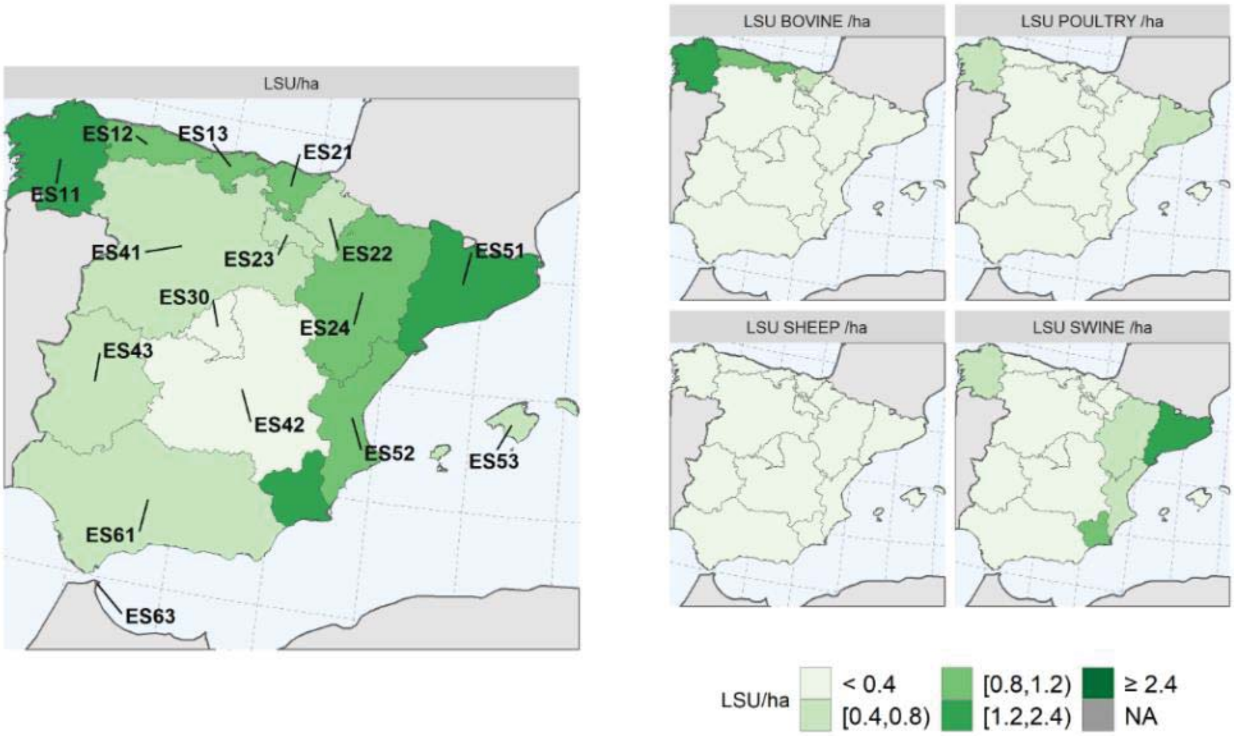


Figure 2. Map of livestock unit distribution, year 2016 (Source: Eurostat, February 2021)

Animal production is concentrated in the northern and eastern parts of the Spain (total LSU and LSU by animal type were retrieved individually from EUROSTAT).
In this document, the NUTS-2013 version is used.
(https://ec.europa.eu/eurostat/web/gisco/geodata/reference-data/administrative-units-statistical-units/nuts)”

Water Quality Monitoring

The monitoring networks are managed in accordance with the complex Spanish framework of competences, by both the State administration, via the River Basin Confederations, and the various Autonomous Communities.

The water quality evaluation required by the Nitrates Directive has been carried using information collected from 9085 monitoring points that were active during the period 2016-2019. During the four-year period 2016-2019, data are available on the nitrate concentration of groundwaters for the 94.6 % of the stations.

The surface water monitoring data are available for 89.8 % of the stations of the network. For these stations it has been possible to calculate the trends for all of them. In addition, data available on trophic status represents 22.3 % of the stations. In Spain, the trophic state of water bodies in the river category is not assessed since, due to the characteristics of their regime and flow, with a high renewal rate that does not favour the growth of a representative potamoplankton community, it has not been considered adequate and, therefore, their assessment has been excluded from the WFD intercalibration exercise.

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	2669	1325	2096	1042	1278	1997
1a	Phreatic groundwater (deep) 5-15 m	475	345	409	268	316	354
1b	Phreatic groundwater (deep) 15-30 m	236	172	247	125	168	230
1c	Phreatic groundwater (deep) >30 m	1274	2109	1215	756	1133	1125
2	Captive groundwater	12	56	51	12	46	51
3	Karstic groundwater	112	125	139	112	94	136
9	Not specified	0	0	0	0	0	0
	Total	**4778**	**4132**	**4157**	**2315**	**3035**	**3893**

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	3065	3305	2922	1712	2489	2919	3035	13	0
5	Lake/reservoir water	665	598	603	360	427	598	475	429	465
6	Transitional water	212	136	238	94	153	106	246	209	204
7	Coastal water	419	114	356	177	220	174	407	264	351
8	Marine water	0	0	0	0	0	0	0	0	0
9	Not specified	0	0	0	0	0	0	0	0	0
	Total	**4361**	**4153**	**4119**	**2343**	**3289**	**3797**	**4163**	**915**	**1020**

Groundwater Quality

Groundwater average annual nitrate concentration

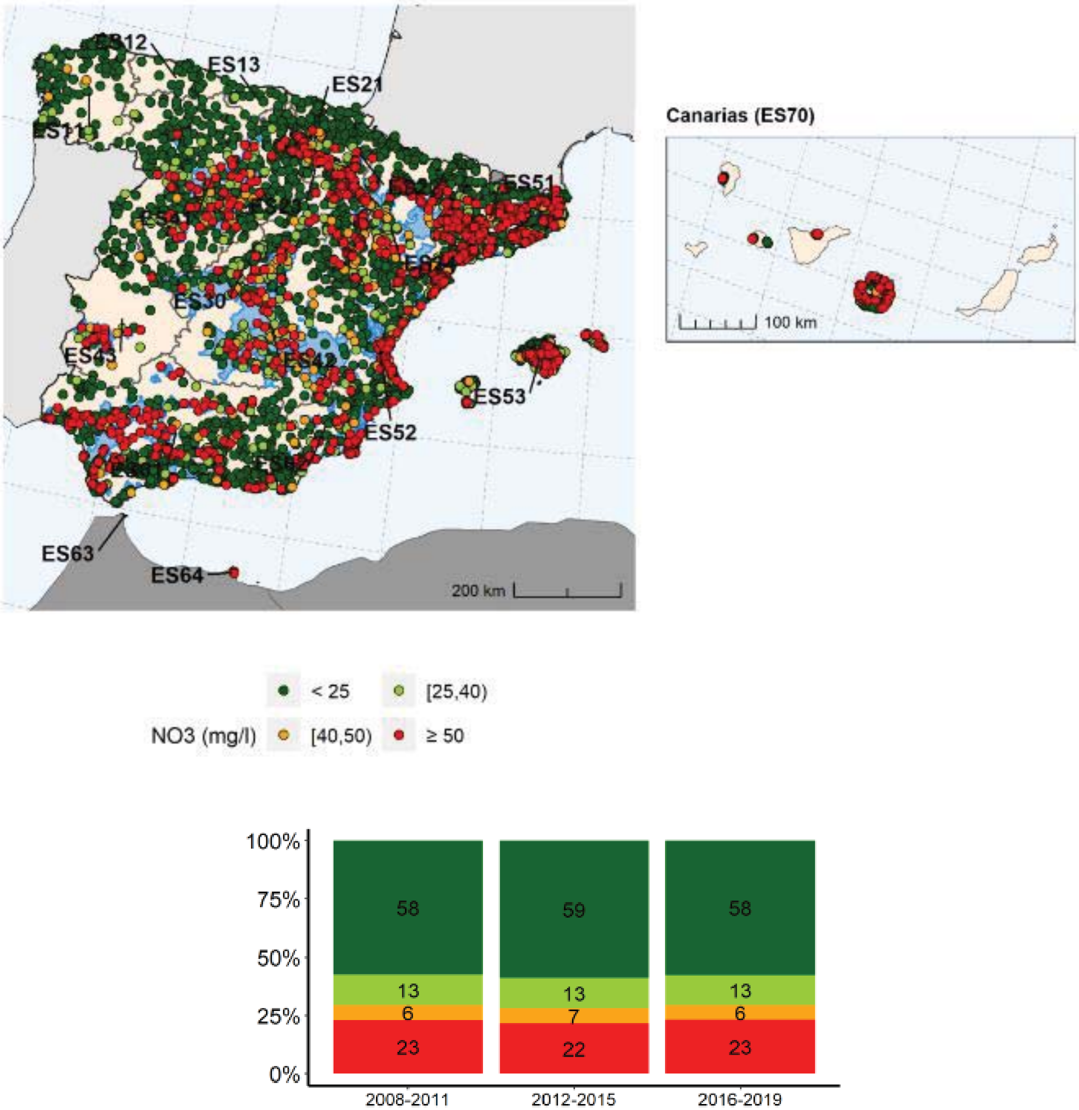


Figure 3. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). In the map in blue the NVZ.

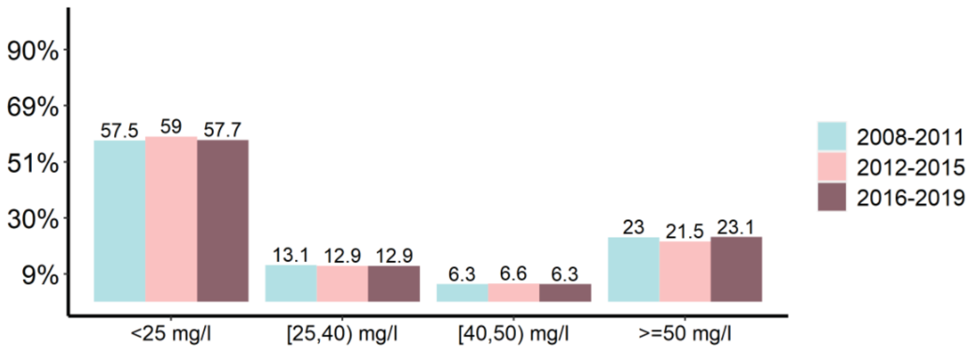


Figure 4. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis).

Groundwater average annual nitrate concentration trend

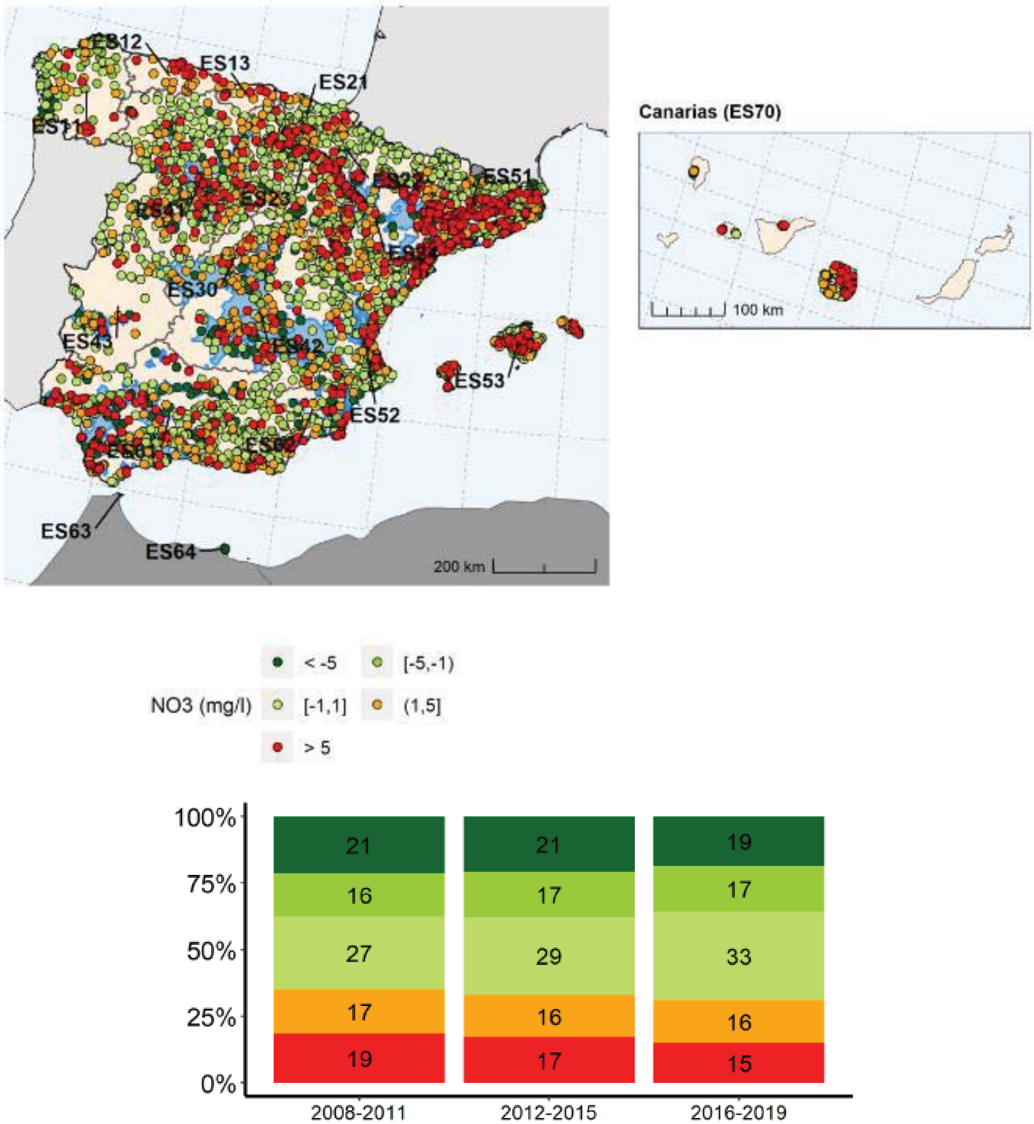


Figure 5. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis). In the map in blue the NVZ.

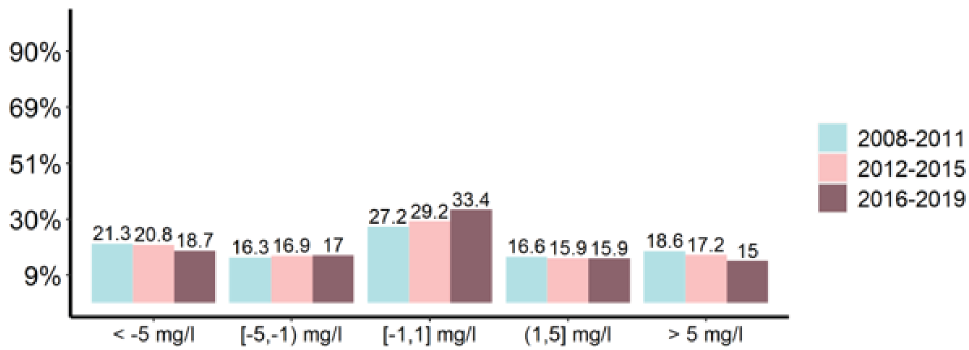
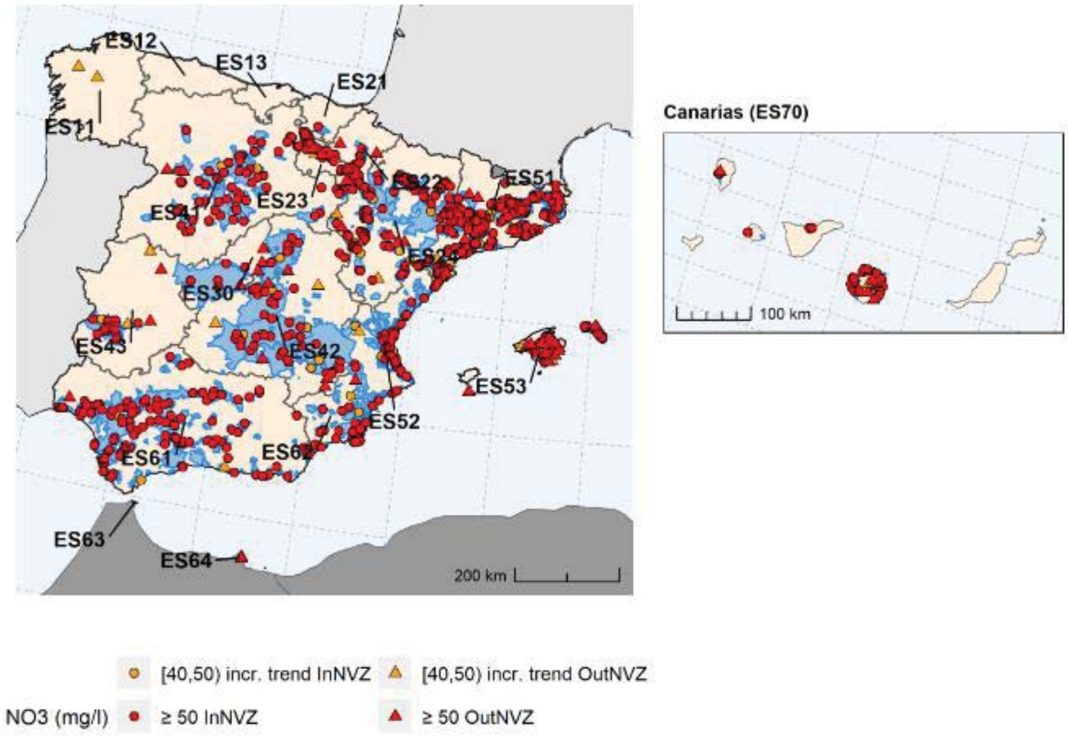


Figure 6. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis).

Groundwater hotspot



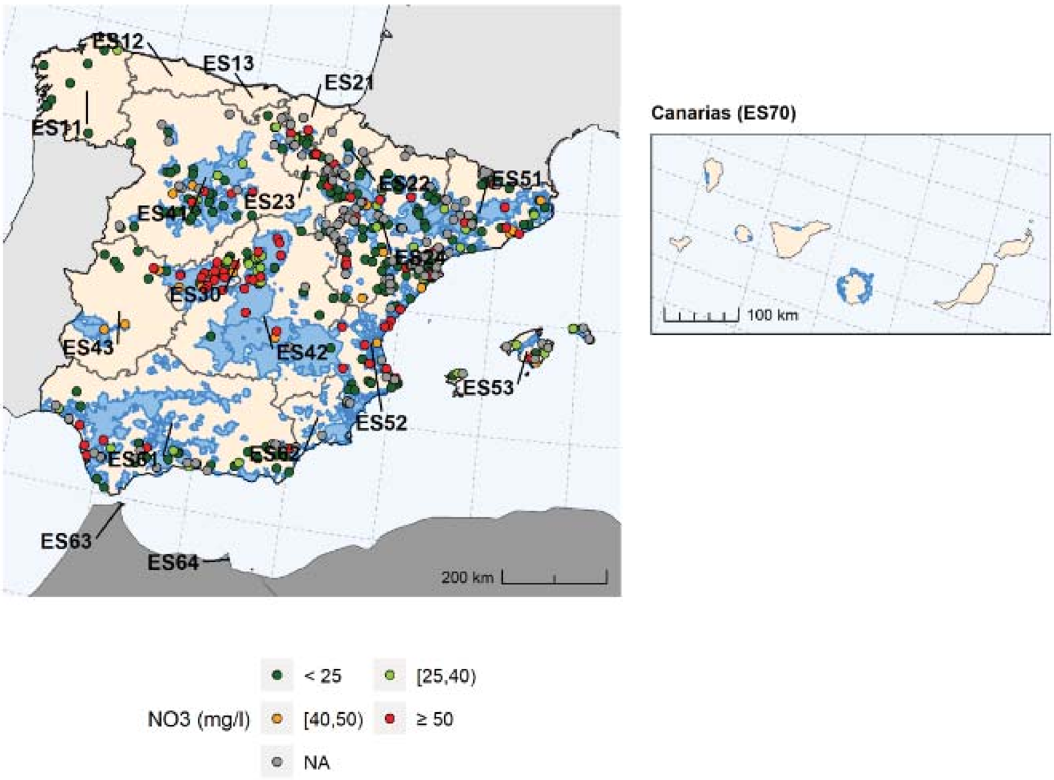
NUTS ID	NUTS NAME	>=40 and < 50 mg/l incr.trend		>=50 mg/l	
		InNVZ	OutNVZ	InNVZ	OutNVZ
ES11	Galicia	0	2	0	0
ES21	País Vasco	0	0	17	2
ES22	Comunidad Foral de Navarra	2	0	25	3
ES23	La Rioja	2	1	28	6
ES24	Aragón	17	1	91	4
ES30	Comunidad de Madrid	0	1	3	4
ES41	Castilla y León	3	2	74	2
ES42	Castilla-La Mancha	9	2	52	5
ES43	Extremadura	1	2	14	2
ES51	Cataluña	20	4	274	7
ES52	Comunidad Valenciana	7	1	48	0
ES53	Illes Balears	7	5	66	19
ES61	Andalucia	7	2	116	1
ES62	Región de Murcia	2	0	27	1
ES64	Ciudad Autónoma de Melilla	0	0	0	2
ES70	Canarias	1	3	62	6
	Total	**78**	**26**	**897**	**64**

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 validity 1). Only the NUTS of interest are reported.

European Commission

Groundwater stations removed



Station Type	Description	Number of removed stations total removed	with measurements	with trends
0	Phreatic groundwater (shallow): 0-5 m	276	144	144
1a	Phreatic groundwater (deep) 5-15 m	50	47	42
1b	Phreatic groundwater (deep) 15-30 m	21	15	15
1c	Phreatic groundwater (deep) >30 m	140	137	118
2	Captive groundwater	3	3	2
3	Karstic groundwater	1	1	1
9	Not specified	0	0	0
	Total	**491**	**347**	**322**

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. For many removed stations there is not the correct corresponding station code in the previous reporting period.

Surface Water Quality

Surface water average annual nitrate concentration

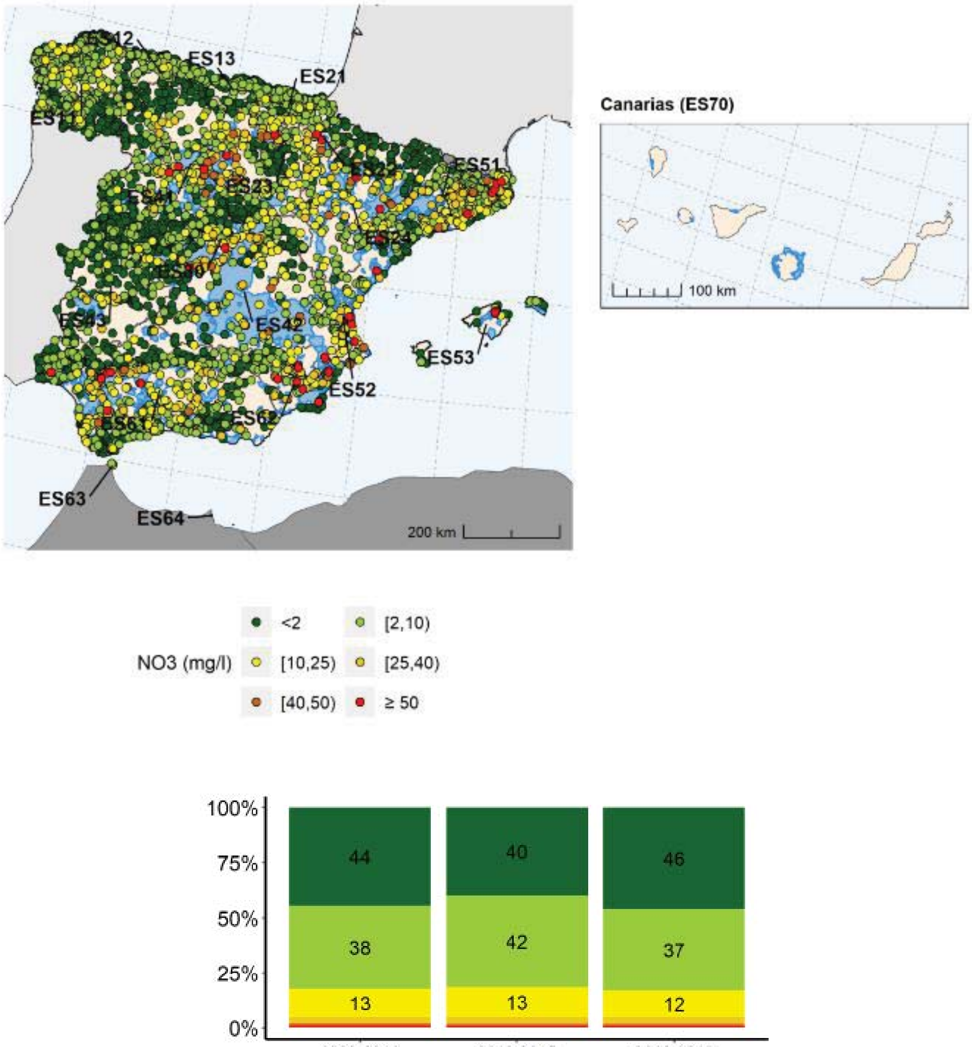


Figure 9. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information. In the map in blue the NVZ

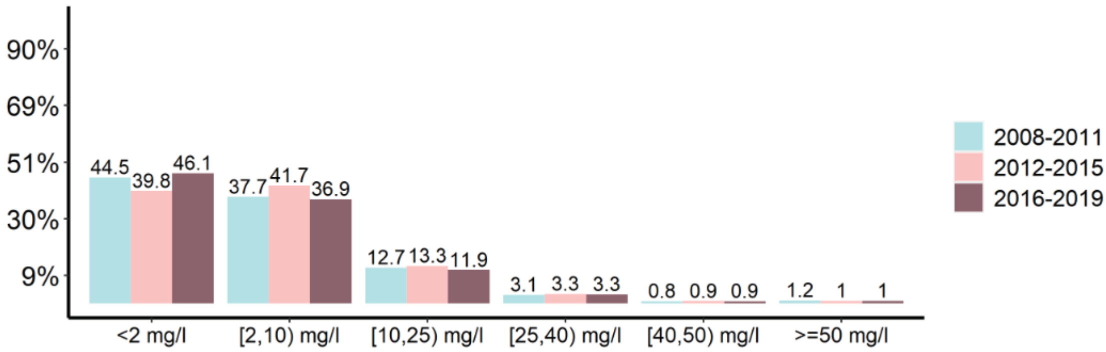


Figure 10. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis)

Surface water average annual nitrate concentration trend

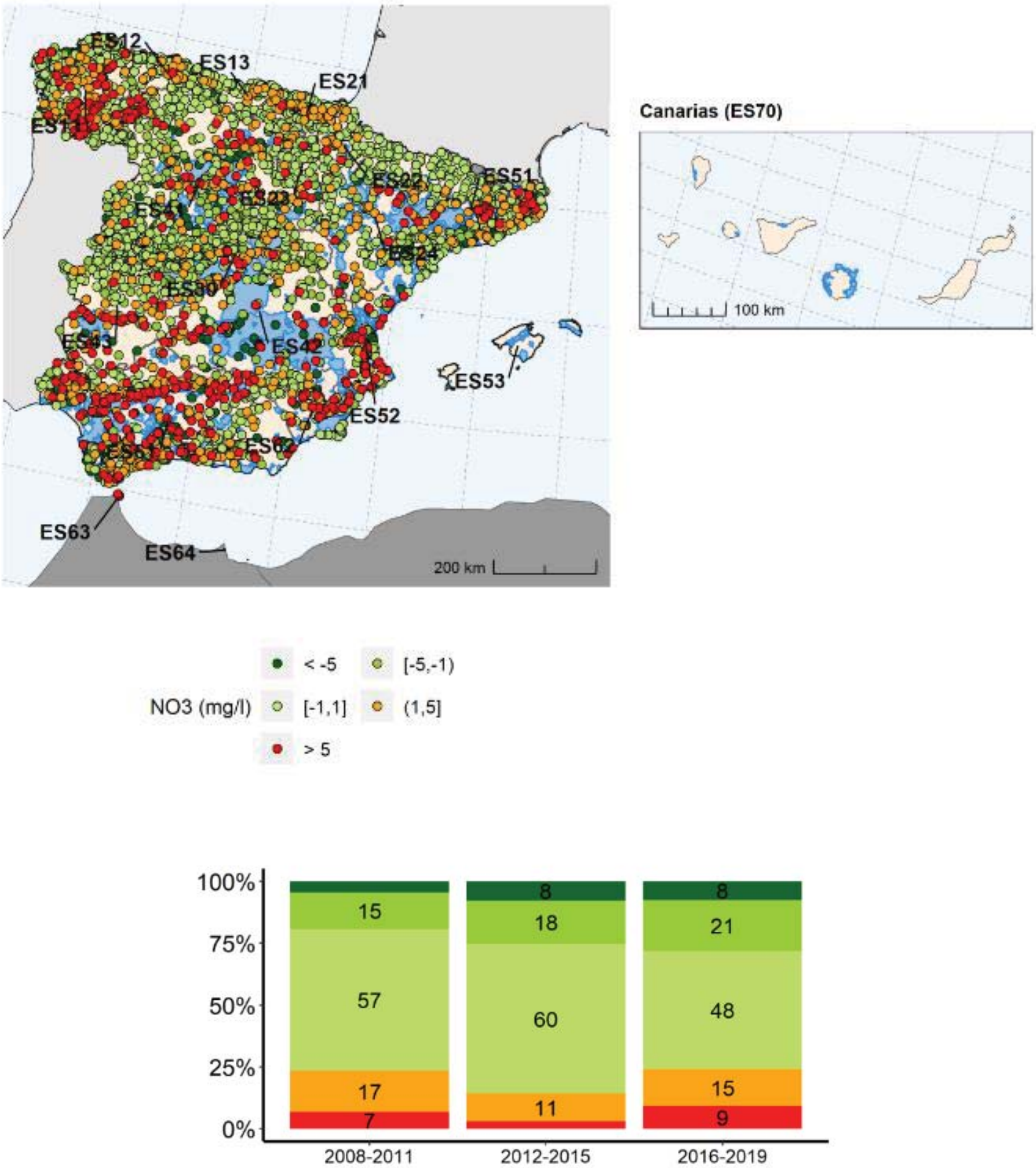


Figure 11. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information. In the map in blue the NVZ

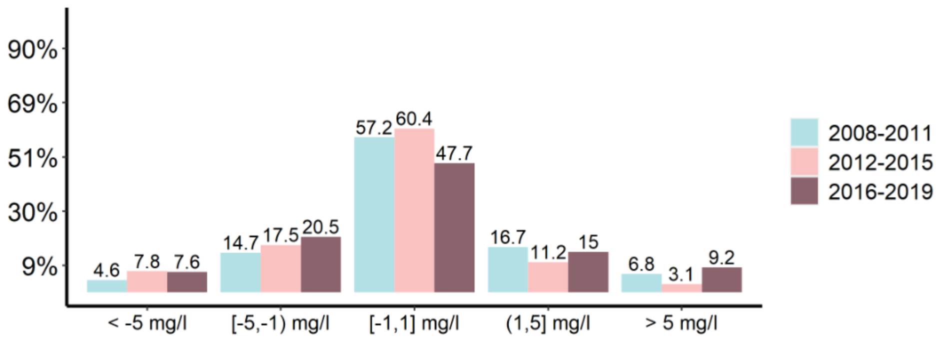
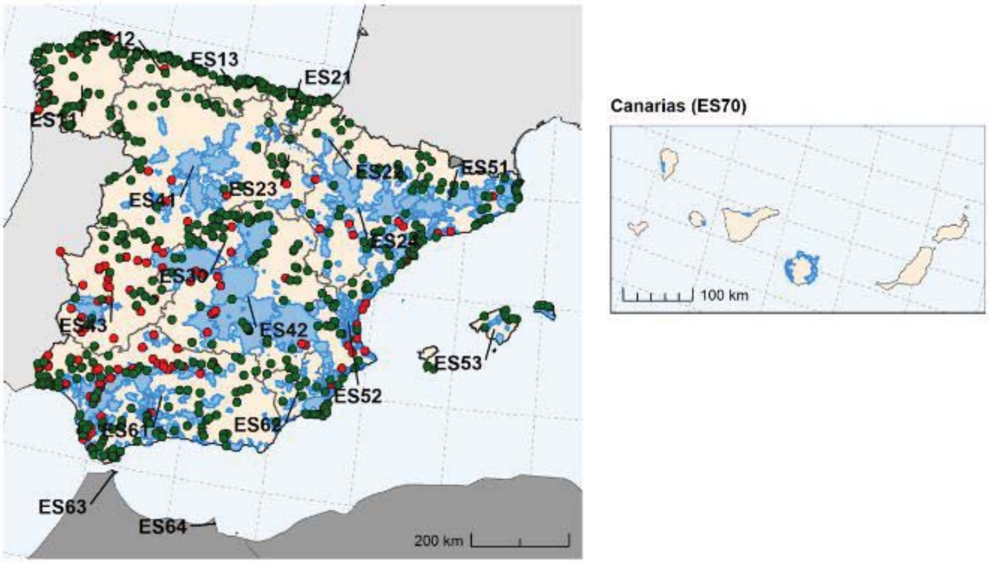


Figure 12. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis).

Surface Water Eutrophication



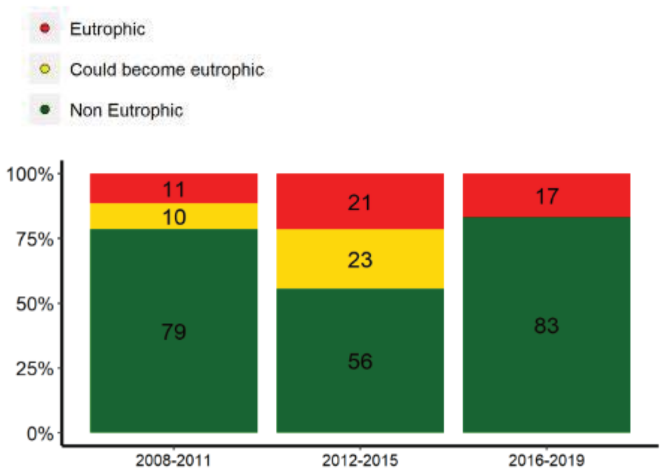


Figure 13. Spatial distribution of eutrophic status (map) and corresponding percentage of monitoring points per classes of status by reporting period (x axis). In the map in blue the NVZ.

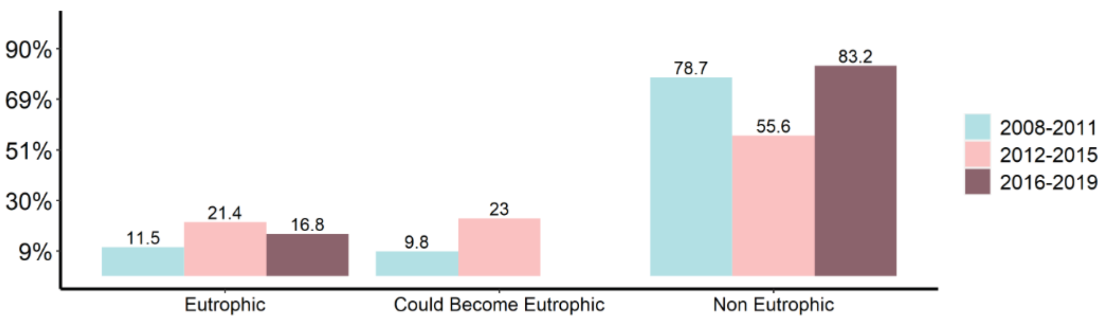
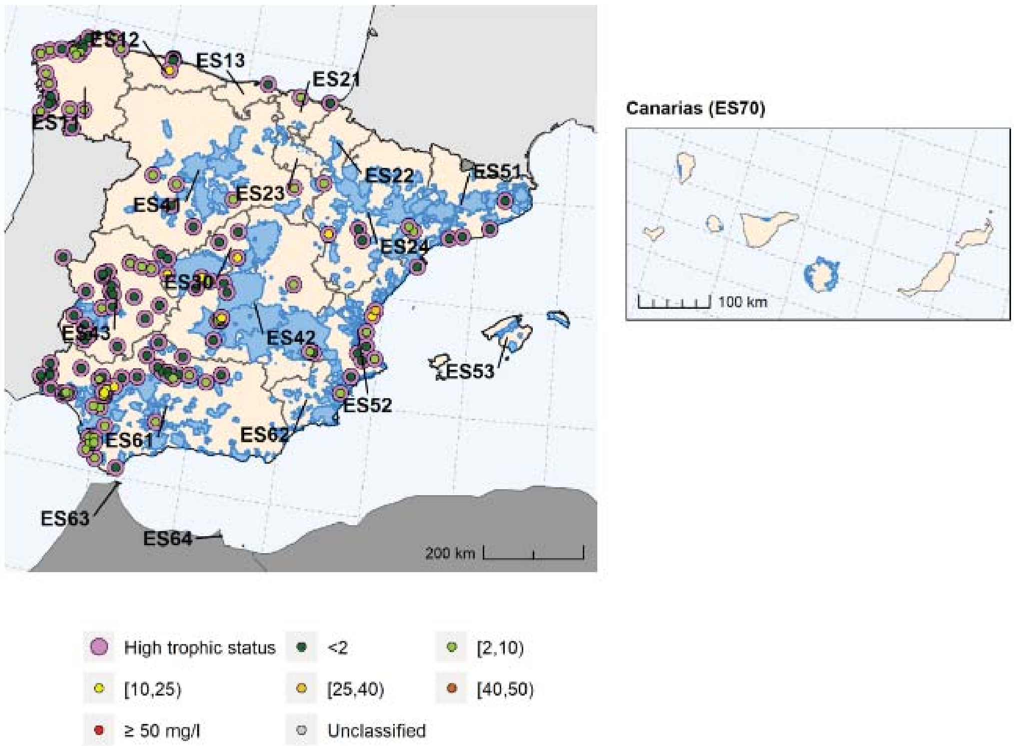


Figure 14. Comparison of percentage of monitoring points in the three reporting periods by classes of status (x axis).

The Eutrophic status vs average NO3 annual concentration



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
ES11	Galicia	5	2	3	0	0	0	0	0
ES12	Principado de Asturias	1	0	0	1	0	0	0	0
ES24	Aragón	5	2	2	1	0	0	0	0
ES30	Comunidad de Madrid	3	2	0	1	0	0	0	0
ES41	Castilla y León	6	2	4	0	0	0	0	0
ES42	Castilla-La Mancha	18	7	8	3	0	0	0	0
ES43	Extremadura	23	19	4	0	0	0	0	0
ES51	Cataluña	4	3	1	0	0	0	0	0
ES52	Comunidad Valenciana	11	4	4	2	1	0	0	0
ES61	Andalucía	32	18	11	3	0	0	0	0
NO_NUTS	SALINE	63	32	27	4	0	0	0	0
	Total	**171**	**91**	**64**	**15**	**1**	**0**	**0**	**0**

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

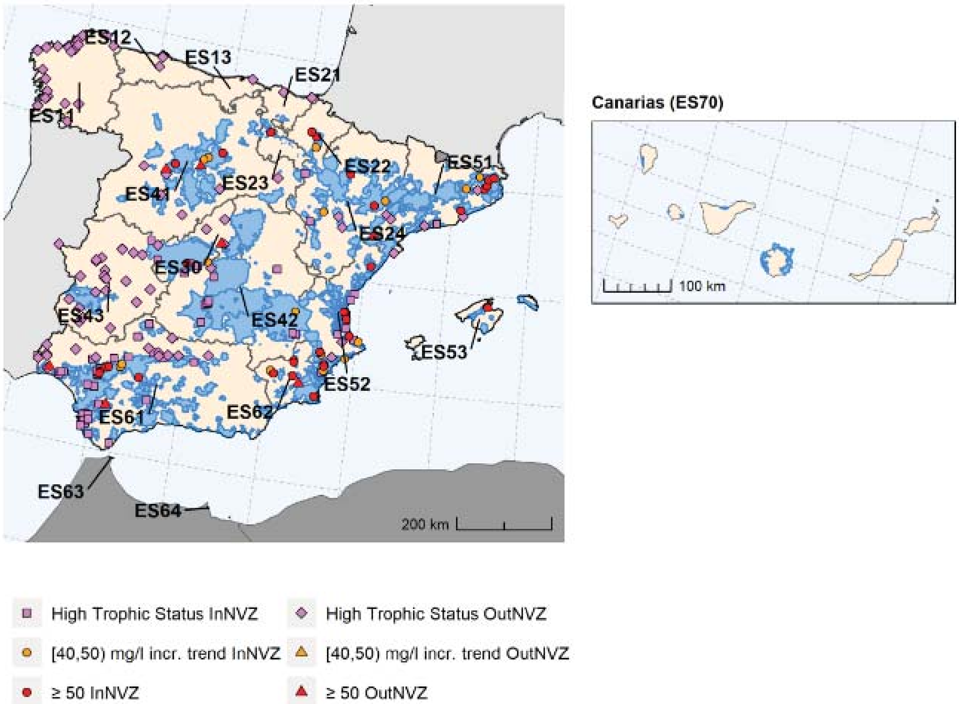
The analysis shows all the SW monitoring stations with the highest trophic status and the corresponding value of NO3 concentration. The map shows the spatial distribution of these points, and the table reports the number of stations with measurements with highest trophic status and the corresponding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

As a general rule, the ecological status of WFD water bodies has been consulted, in relation to water bodies with nutrient-related pressures, as well as the key indicators in the process and how closely they are linked with eutrophication.
The OECD criteria for the assessment of trophic status have then been applied. An attempt has been made to apply as many variables as possible, and not only chlorophyll a (taking the summer chlorophyll a value as the maximum value), i.e. assessing the rest of the parameters indicated by the method (essentially turbidity and phosphorus concentration). In some cases, only chlorophyll a was taken into account because the other parameters were considered supportive and raised doubts about their specific interpretation in each case.
To provide support, in case of doubt, other methodologies have also been applied, such as the Carlson Trophic Status Index (TSI), in accordance with the amendments made by Aizaki (1981), which uses as variables the annual average Secchi disk depth values (Sec, m) and the surface concentrations of Total Phosphorus (PT, mg/m3) and chlorophyll a (Chla, mg/m3).
Based on these values, a final assessment of the results obtained has been carried out, by expert judgement, reviewing and updating the value assigned in the eutrophication diagnosis reporting database at all points in the district.
In the case of the coastal and transitional waters of the Autonomous Community of Galicia, the water bodies with a poor or bad status, in accordance with the WFD, or with problem areas, in accordance with the OSPAR Convention, have been classified as eutrophic.
It should be noted that the methodology for assessing eutrophication has changed in this four-year period compared to previous four-year periods. Therefore, comparison of eutrophication data from the previous four-year periods with the current one should be made with caution.

		Number of stations with Trophic status		
Station Type	Description	Eutrophic	Could become eutrophic	Non Eutrophic
4	River water	0	0	0
5	Lake/reservoir water	108	0	357
6	Transitional water	55	0	149
7	Coastal water	8	0	343
8	Marine water	0	0	0
9	Not specified	0	0	0
	Total	**171**	**0**	**849**

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

Surface Water quality hotspot

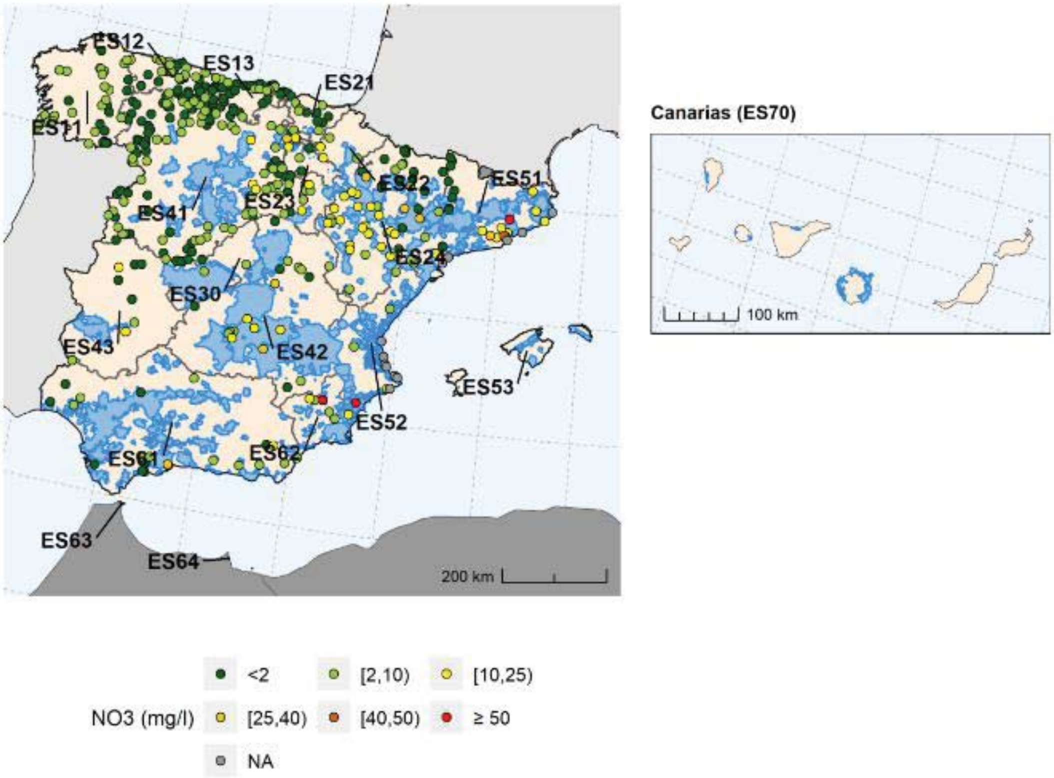


NUTS ID	NUTS NAME	High trophic status		>=40 and < 50 mg/l incr.trend		>=50 mg/l	
		InNVZ	OutNVZ	InNVZ	OutNVZ	InNVZ	OutNVZ
ES11	Galicia	0	5	0	0	0	0
ES12	Principado de Asturias	0	1	0	0	0	0
ES22	Comunidad Foral de Navarra	0	0	1	0	2	0
ES23	La Rioja	0	0	0	0	1	0
ES24	Aragón	2	3	2	0	3	0
ES30	Comunidad de Madrid	0	3	1	0	0	1
ES41	Castilla y León	0	6	2	0	2	2
ES42	Castilla-La Mancha	16	2	1	0	1	0
ES43	Extremadura	0	23	0	0	0	0
ES51	Cataluña	1	3	2	0	5	0
ES52	Comunidad Valenciana	9	2	4	0	10	0
ES61	Andalucia	19	13	2	0	5	2
ES62	Región de Murcia	0	0	1	0	5	1
NO_NUTS	SALINE	23	40	0	0	2	0
	Total	**70**	**101**	**16**	**0**	**36**	**6**

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

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 validity 1). Only the NUTS of interest are reported.

Surface Water Stations Removed



Station Type	Description	Number of removed stations: total removed	with measurements	with trends	with trophic status
4	River water	361	361	199	0
5	Lake/reservoir water	36	36	15	27
6	Transitional water	6	5	6	6
7	Coastal water	53	20	53	53
8	Marine water	0	0	0	0
9	Not specified	0	0	0	0
	Total	**456**	**422**	**273**	**86**

Figure 17. SW removed stations map (top graph) and distribution by surface water type (lower graph). In the map in blue the NVZ.

The removed stations analysis identifies all the SW monitoring stations that were removed in the current reporting period. The map shows the spatial distribution of these points with the concentrations of the previous reporting period, and the table reports the number of stations with measurements and trends per type. For many removed stations there is not the correct corresponding station code in the previous reporting period.

Measures in the Action Programme

The 17 Autonomous Communities covering the whole territory of Spain established the CGAPs required by Article 4 of the Directive. In some cases, the first version of these CGAPs has been updated by the relevant legal instruments. The first CGAPs established by the Autonomous Communities were approved in the late 1990s and, since then, these instruments have been reviewed in Aragon, Asturias, Castile and Leon, Murcia, the Basque Country and Valencia. In the most recent four-year period 2016-2019, the CGAPs of Murcia and Valencia were updated. In Murcia, by means of Annex V to Law 1/2018, of 7 February 2018, on urgent measures to ensure environmental sustainability in the Mar Menor area. In Valencia, by means of Order 10/2018, of 27 February 2018, on the use of nitrogen fertilisers on farms in Valencia. In 2020, the Autonomous Community of Castile and Leon also approved Decree 5/2020, of 25 June 2020, designating the zones vulnerable to water pollution caused by nitrates from agricultural and livestock sources, and the CGAP was approved. Although this is an update after the four-year period, it is recorded to allow for a better assessment of the situation.

The degree of voluntary implementation of the CGAPs outside vulnerable zones is linked to a growing number of organic farms, conversion to that has been encouraged in recent years by the payment of aid that promotes better agri-environmental practices. In addition, the ecological conditions associated with the allocation of aid from the Common Agricultural Policy, together with the requirements of the Rural Development Programmes (EAFRD) to finance the start-up of new agricultural installations, are also examples that contribute to the implementation of good agricultural practices on a voluntary basis.

The Spanish Autonomous Communities have established and updated the corresponding APs. There are several draft publications in the process of adoption. The first official publications began in 2000 and a greater number of regulatory revisions were carried out in 2009. During the period 2016-2019, there have been amendments made in the Autonomous Communities of the Balearic Islands, Castile-La Mancha, Catalonia, Rioja, Murcia, Navarre and Valencia. In addition, adjustments to the action programmes of Aragon, the Canary Islands, Extremadura, Madrid, the Basque Country and, once again, Murcia are expected to be published shortly.

In all the Autonomous Communities, there is a lack of cost-effectiveness studies in relation to the implementation of the APs in the NVZ.

Controls

In the Autonomous Communities, except Galicia, Asturias and Cantabria, which have not designated any NVZ, nitrate pollution is monitored via the annual farm inspection. Inspections are carried out by the administrations of the Autonomous Communities, as part of the evaluation of the fulfilment of cross-compliance obligations set out under the European Common Agricultural Policy, with the average number of farms inspected nationally slightly over 4%.

Designation of NVZ

An update of the designation of vulnerable zones in Spain is ongoing. A draft version of the legislation in the process of being. The area covered by the vulnerable zones in Spain stands at 121 563.3 km2, which represents 24.0% of the national territory and which will rise to 122 965.67 km2 once the different designation rules that are currently being processed, increasing the percentage to 24.3%, are published.

Forecast of Water Quality

In Spain, forecast for the monitoring stations situated in groundwater bodies have been drawn up using to the PATRICAL (Precipitation-Contribution in Water Quality Integrated Network Sections) module developed by Pérez-Martín et al. (2014 and 2016). The model simulates the hydrological cycle and quality of the waters for medium-sized and large river basins (between 1 000 km2 and 500 000 km^2), and is integrated into a geographic information system (GIS).

The forecast for the evolution of water quality has been calculated for the monitoring station situated in groundwater bodies that exhibit the following features:

- Average or maximum nitrate concentration above 50 mg/l.
- Average or maximum nitrate concentration of between 40 and 50 mg/l and upward trend between the previous four-year period and the current period.

The results show that 1235 stations in groundwater bodies are polluted or at risk of pollution by nitrates, which represents 27.6% of the stations. 612 of them are expected to recover in 2021, with a further 82 stations expected to recover at the end of the cycle closing in 2027, which constitutes the limit set in the WFD for achieving the environmental targets. The remaining stations are expected to recover in future periods.

In the case of the stations outside of vulnerable zones that are not expected to recover by 2039, work will be carried out to include them in vulnerable zones so that they can benefit from the measures applied under the associated Action Programmes.

In the case of the 451 stations that, despite being in published or draft vulnerable zones, are not estimated to recover by 2039, additional measures will be examined to promote their recovery and will be included in the river basin management plans.

Summary

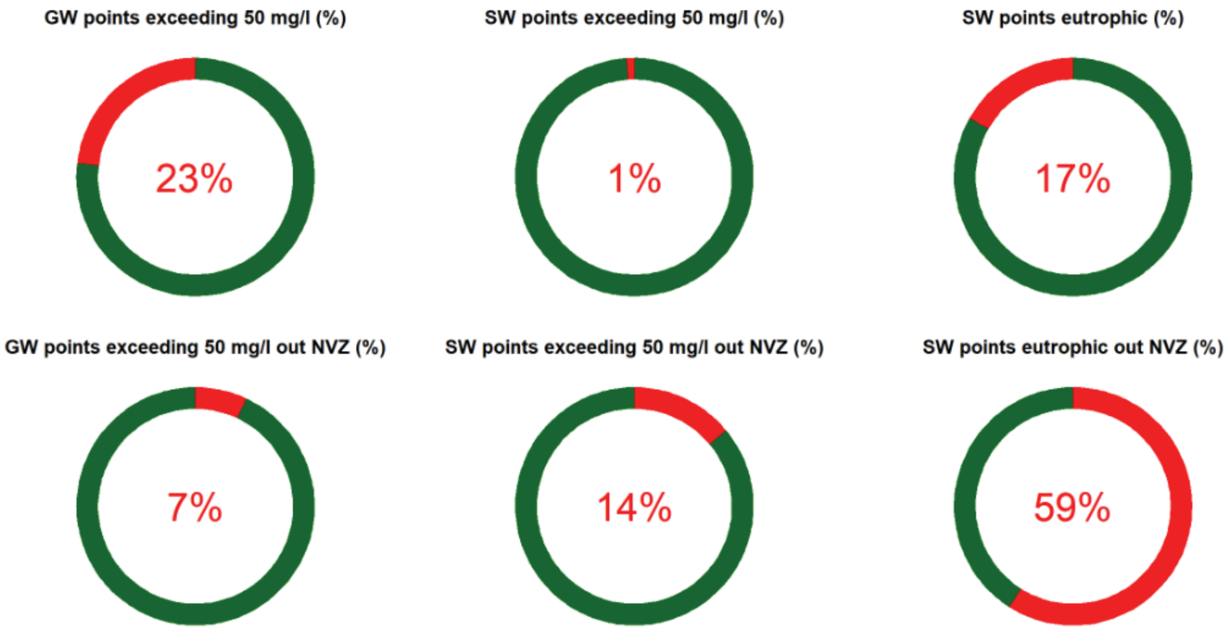


Figure 18. The summary plot for the period 2016-2019

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

Long term analysis

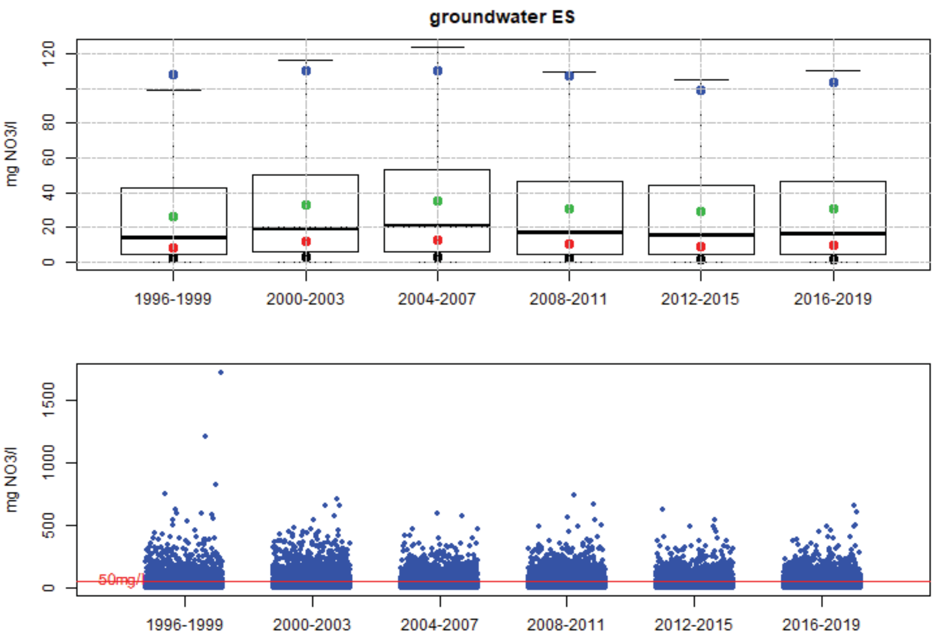


Figure 19. Time series of box whisker plots along with the distribution of the average NO3 annual concentrations for each reporting period for groundwater stations. RPs represent the reporting periods, RP7 being the last period (2016-2019). The blue, red, green and black dots represent the mean of the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

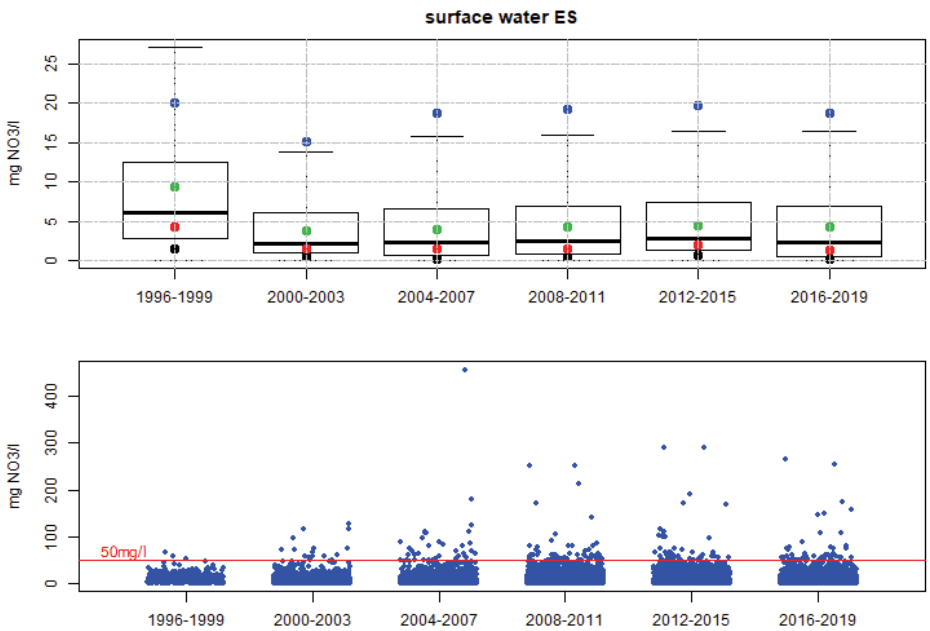


Figure 20. Time series of box whisker plots along with the distribution of the average NO3 annual concentrations for each reporting period for surface water stations. RPs represent the reporting periods, RP7 being the last period (2016-2019). The blue, red, green and black dots represent the mean of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

Conclusions and recommendations

Livestock density is lower than the EU average but some regions show high livestock densities. While the nitrogen surplus is below the EU average, there is a quite high phosphorus surplus.

There is a well-elaborated network of monitoring stations. A high number of groundwater monitoring stations shows nitrates concentrations above 50 mg/l. A high number of stations also shows an increasing trend. A high number of waters that are eutrophic are outside NVZ.

Most regions have updated their action programme during this reporting period.

The Commission recommends that Spain revises and reinforces its action programme to tackle the groundwater pollution in hot spots and revises NVZ designation to address eutrophication of surface waters where agriculture pressure is significant.

EUROPEAN
COMMISSION

Brussels, 11.10.2021
SWD(2021) 1001 final

PART 35/38

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}

EN EN

Pressure from Agriculture

Sweden's utilized agricultural area amounts to 3 Mha, representing 7% of the total land area. The major outputs of the agricultural industry excluding services include in a decreasing order forage (17.9%), milk (17.3%) and cattle (10.5%). Eurostat

Major land use statistics for Sweden

Table 1.Utilized agricultural area (abbreviated as UAA)

Sweden	2005	2007	2010	2013	2016
Utilised agricultural area UAA (1000 ha)	NA	3121	3074	3036	3021
arable land (1000 ha)	NA	2631	2619	2589	2566
permanent grass (1000 ha)	NA	486	452	443	452
permanent crops (1000 ha)	NA	3	3	5	3
kitchen gardens (1000 ha)	NA	NA	0	NA	0

Note:
Eurostat (FSS)

Sweden's arable land has decreased by 2.5% since 2007. Permanent grassland increased by 2% from 2013.

Animal distribution in Sweden

Sweden has seen a decrease in the number of pigs and a significant increase of poultry. The livestock density index (livestock unit per hectare of Utilized Agricultural Area) has remained stable and is below the EU average of 0.8.

Table 2. Livestock statistics

Sweden	2005	2007	2010	2013	2016
Livestock index	0.57	0.57	0.57	0.56	0.57
dairy cows (10^6 heads)	0.39	0.37	0.35	0.35	0.33
live bovines (10^6 heads)	1.53	1.52	1.47	1.44	1.44
live pigs (10^6 heads)	1.80	1.73	1.61	1.48	1.44
live poultry (10^6 heads)	NA	NA	14.29	16.59	18.78

Note:
Eurostat (FSS)

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

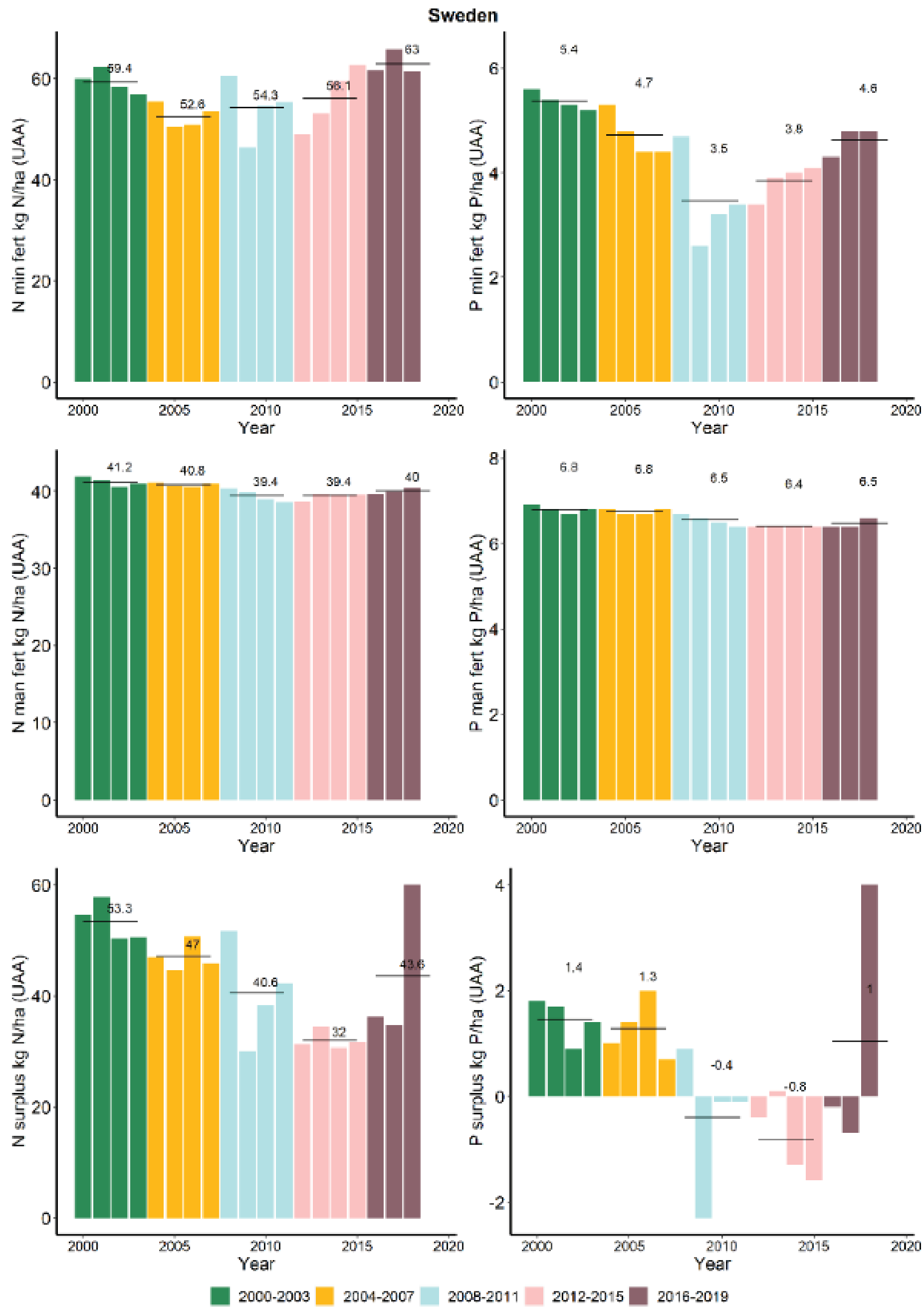


Figure 1. N and P fertilizers and gross surplus (kg/ha)

The gross nitrogen (N) and phosphorus (P) surpluses originate from EUROSTAT data for the years 2000-2018. The consumption of inorganic fertilizers during the last reporting period is higher than that of the previous reporting period. The usage of manure is similar to that of the previous reporting period. The N surplus is significantly higher than that of the previous reporting period with a value around 44 kg/ha UUA probably due to the predicted high surplus in 2018 because of a particularly dry year that resulted in low yields. The gross P surplus is also higher to that of the previous reporting period due to the large surplus in 2018.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

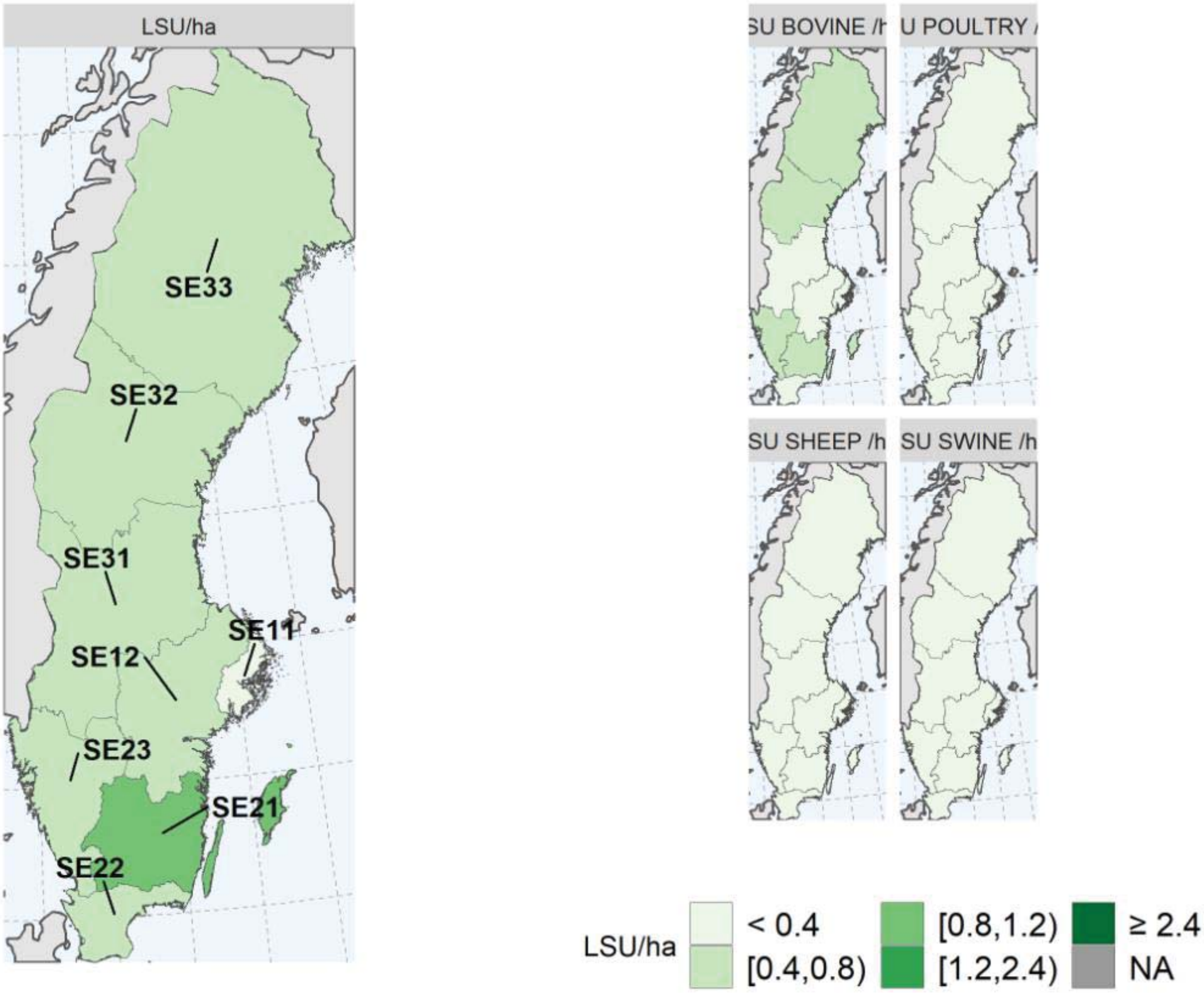


Figure 2. Map of livestock unit distribution, year 2016 (Source: Eurostat, February 2021)

Animal production is concentrated in the south western part of the Sweden (total LSU and LSU by animal type were retrieved individually from EUROSTAT).
In this document, the NUTS-2013 version is used.
(https://ec.europa.eu/eurostat/web/gisco/geodata/reference-data/administrative-units-statistical-units/nuts)

Water Quality Monitoring

Swedish water quality is monitored by means of national environmental monitoring programmes coordinated by the Swedish Agency for Marine and Water Management and the Swedish Environmental Protection Agency. Sweden does not have a specific environmental monitoring programme for the Nitrates Directive. Data is stored by various data hosts and is available to the general public. The Swedish University of Agricultural Sciences is the data host for fresh water (lakes and watercourses), the Geological Survey of Sweden is the data host for groundwater, while SMHI (Swedish Meteorological and Hydrological Institute) is the data host for coastal and marine waters. The period of the current assessment covers the years 2016-2018.

Investigations of lake water quality in Sweden have been carried out every autumn as part of the national environmental monitoring programme involving cyclical sampling of lakes, where sixth of them are sampled every year. The watercourses have been sampled at least 12 times a year, while groundwaters are sampled several times per year.

For groundwater measurements, some stations have same coordinates because their location is classified/secret. 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	301	298	316	0	70	80
1a	Phreatic groundwater (deep) 5-15 m	8	11	41	0	7	6
1b	Phreatic groundwater (deep) 15-30 m	8	8	15	0	8	7
1c	Phreatic groundwater (deep) >30 m	7	6	5	0	6	4
2	Captive groundwater	2	2	17	0	2	7
3	Karstic groundwater	0	0	0	0	0	0
9	Not specified	0	111	139	0	6	5
	Total	**326**	**436**	**533**	**0**	**99**	**109**

Surface water quality monitoring network

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

Station Type	Description	Number of stations with measurements			Number of stations with Trends			Number of stations with Trophic status		
		2008-2011	2012-2015	2016-2019	2008-2011	2012-2015	2016-2019	2008-2011	2012-2015	2016-2019
4	River water	187	222	197	0	45	33	186	221	197
5	Lake/reservoir water	0	2570	2085	0	0	0	2269	2570	2085
6	Transitional water	2	12	0	0	0	0	0	0	0
7	Coastal water	134	97	120	0	0	0	0	0	120
8	Marine water	97	75	70	0	0	0	0	0	70
9	Not specified	0	0	0	0	0	0	0	0	0
	Total	**420**	**2976**	**2472**	**0**	**45**	**33**	**2455**	**2791**	**2472**

Groundwater Quality

Groundwater average annual nitrate concentration

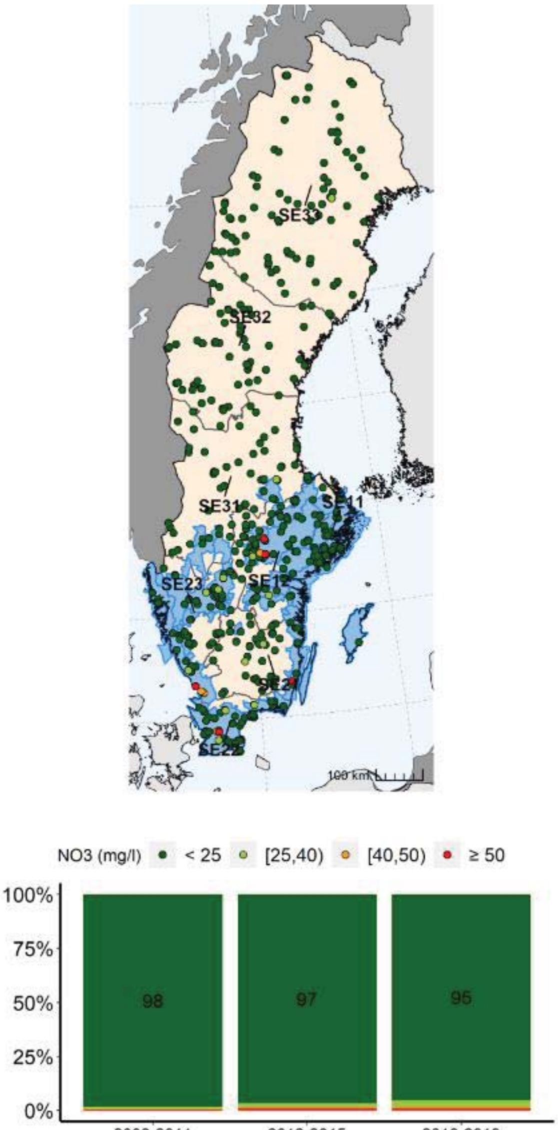


Figure 3. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information. In the map in blue the NVZ.

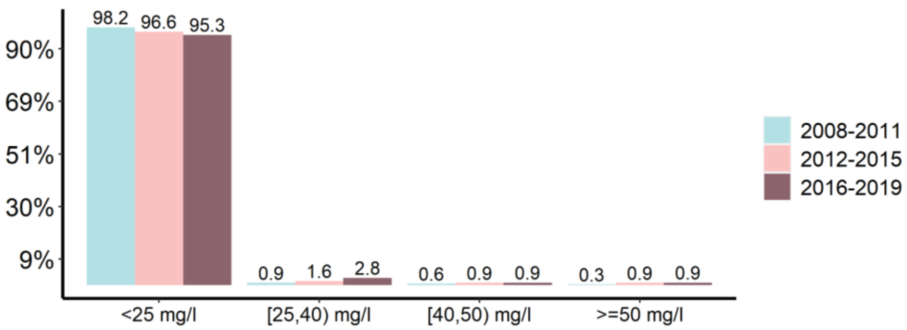


Figure 4. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis).

Groundwater average annual nitrate concentration trend

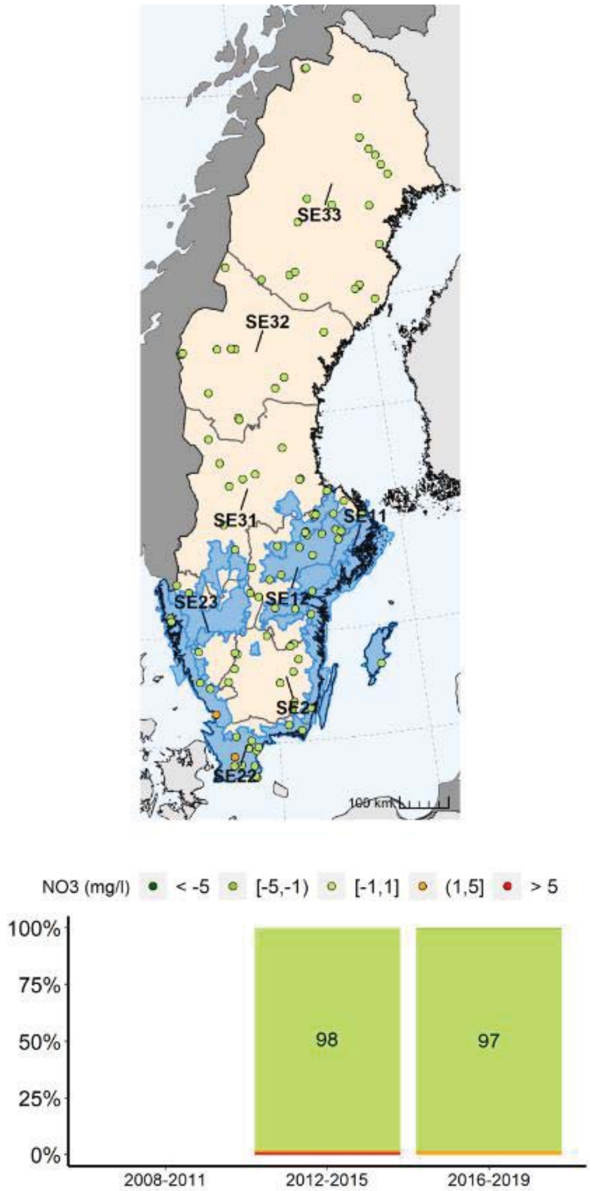


Figure 5. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information. In the map in blue the NVZ.

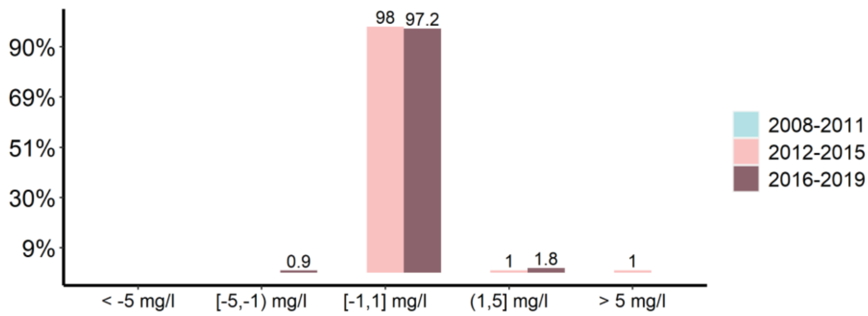


Figure 6. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis).

Groundwater hotspot

		>=40 and < 50 mg/l incr.trend		>=50 mg/l	
NUTS ID	NUTS NAME	InNVZ	OutNVZ	InNVZ	OutNVZ
SE12	Östra Mellansverige	0	0	2	0
SE21	Småland med öarna	0	0	1	0
SE22	Sydsverige	0	0	1	0
SE23	Västsverige	1	0	1	0
	Total	**1**	**0**	**5**	**0**

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.

Surface Water Quality

Surface water average annual nitrate concentration

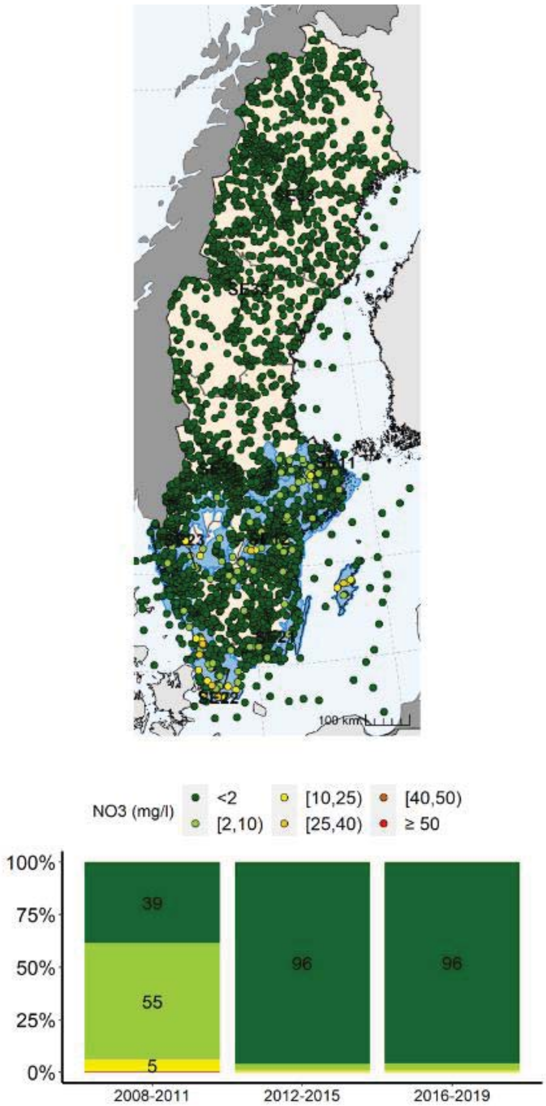


Figure 8. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information. In the map in blue the NVZ.

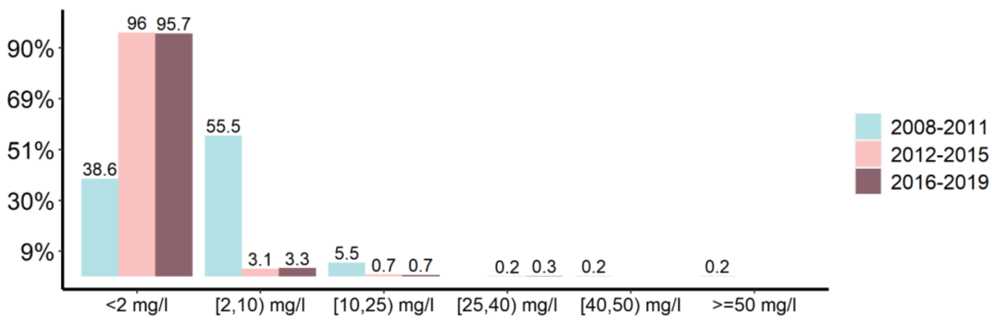


Figure 9. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis) .

Surface water average annual nitrate concentration trend

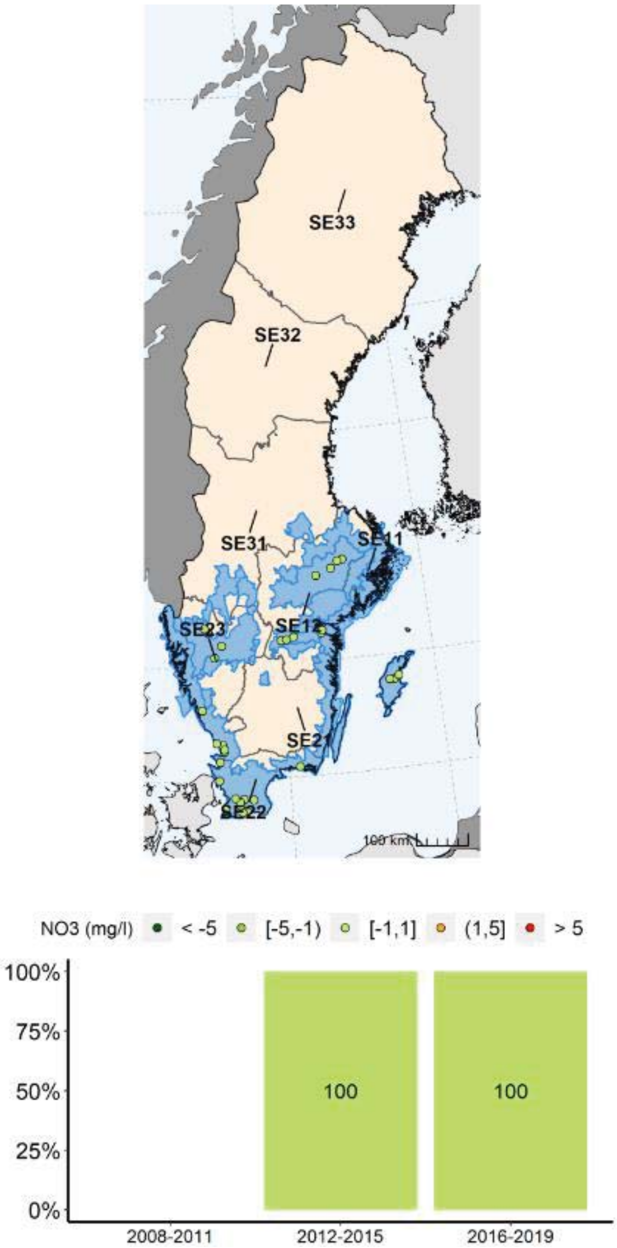


Figure 10. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis). In the map in blue the NVZ.

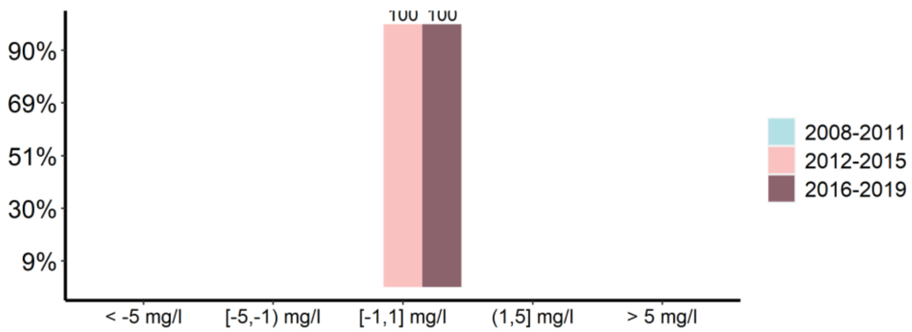


Figure 11. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis).

Surface Water Eutrophication

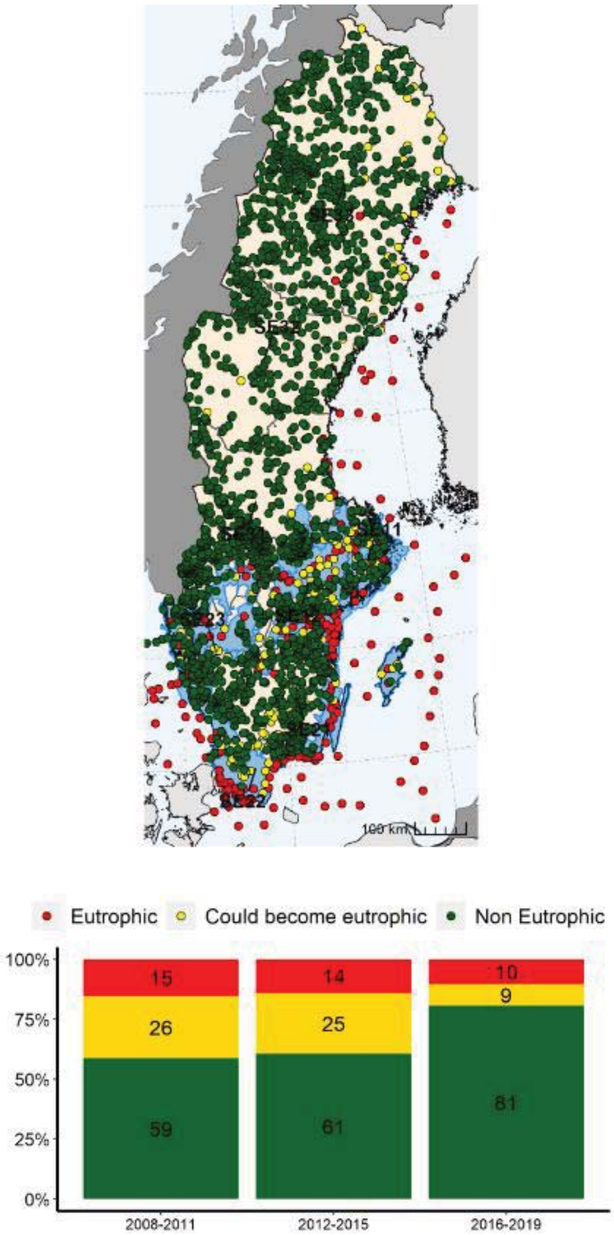


Figure 12. Spatial distribution of eutrophic status (map) and corresponding percentage of monitoring points per classes of status by reporting period (x axis). In the map in blue the NVZ.

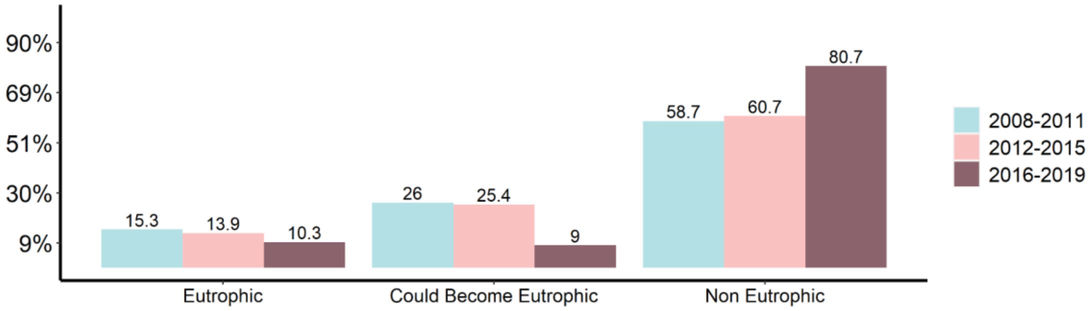
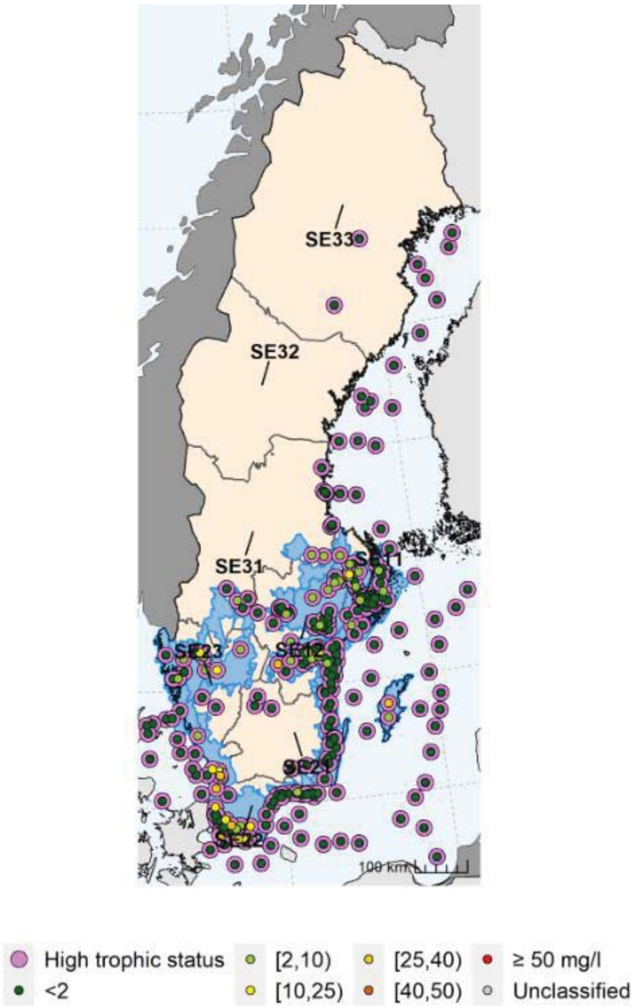


Figure 13. Comparison of percentage of monitoring points in the three reporting periods by classes of status (x axis).

In the context the Marine strategy framework directive, Swedish authorities use the evaluation by HELCOM in their assessment of status for the Baltic Sea. HELCOM integrated eutrophication assessment (published in 2018) assesses the status of eutrophication in the Baltic Sea during the years 2011-2016.

Some of the marine stations located west of Sweden are part of the OSPAR network and were evaluated to be part of a “non-problem area”.

The Eutrophic status vs average NO3 annual concentration



NUTS ID	NUTS NAME	High trophic status	Number of stations by classes of concentration						
			<2 mg/l	[2,10) mg/l	[10,25) mg/l	[25,40) mg/l	[40,50) mg/l	>=50 mg/l	Unclassified
NO_NUTS	SALINE	147	147	0	0	0	0	0	0
SE11	Stockholm	13	8	5	0	0	0	0	0
SE12	Östra Mellansverige	45	24	18	2	1	0	0	0
SE21	Småland med öarna	7	5	1	0	1	0	0	0
SE22	Sydsverige	18	3	7	4	4	0	0	0
SE23	Västsverige	18	6	6	5	1	0	0	0
SE31	Norra Mellansverige	5	3	2	0	0	0	0	0
SE33	Övre Norrland	2	2	0	0	0	0	0	0
	Total	**255**	**198**	**39**	**11**	**7**	**0**	**0**	**0**

Figure 14. 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 the higher trophic status and the corresponding value of NO3 concentration. The map shows the spatial distribution of these points, and the table reports the number of stations with measurements with highest trophic status and the corresponding stations by classes of NO3 concentration. Only the NUTS of interest are reported.

The assessment of trophic state of lakes is based on phosphorus criteria established by the Environmental Protection Agency. Lakes and water courses with a concentration of total phosphorus between 0.025 and 005 mg/l TotP are considered slightly eutrophic, and lakes and water courses with concentration between 0.05 and 0.1 mg/l Tot P strongly eutrophic, and those with concentrations above 0.1 are hypertrophic. About 22% of water courses are classified as eutrophic while only 3% of the lakes fall in that category.

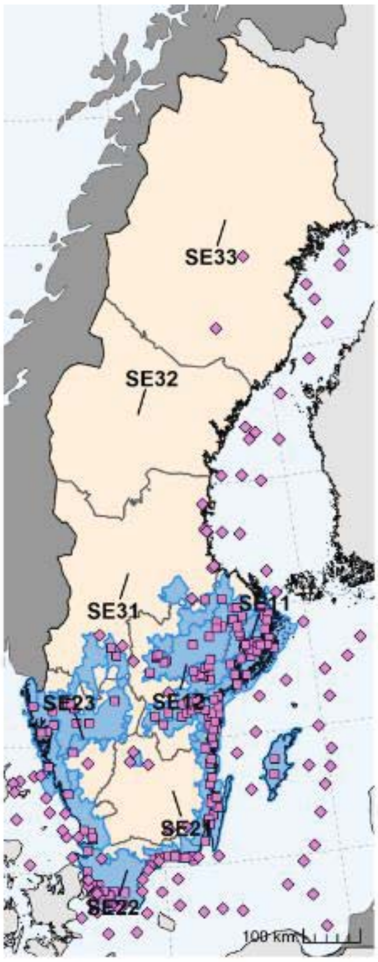
Assessments of the trophic status of the seas are carried out both nationally and internationally. Nationally, the water authorities carry out status classifications of coastal waters according to the Water Framework Directive. In the Swedish report, the classification of status is assessed on the basis of nutrients, where the classification is based on winter values for dissolved organic phosphorus, dissolved inorganic nitrogen, total phosphorus and total nitrogen, as well as summer concentrations of total phosphorus and total nitrogen.

In the overall assessment of eutrophication, in Skagerrak/Kattegat, only Skagerrak's deep-sea waters, and in the Baltic Sea, only the coastal waters in the northern part of the Bothnian Sea and the northern part of the Gulf of Bothnia were not considered to be eutrophic. However, in Skagerrak/Kattegat, the assessment results for other areas are often close to the limit for good status, while in coastal waters, it is usually bottom fauna and harmful algal blooms which lower the status. All deep-sea areas in the Baltic Sea are considered to be eutrophic. The situation in the Bothnian Sea appears to have worsened slightly, partly as a result of the input of nutrients from the Baltic Proper, but also because of climate impacts. Based on the reported data all marine stations are eutrophic and the large majority of coastal waters are eutrophic

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	44	40	113
5	Lake/reservoir water	64	172	1849
6	Transitional water	0	0	0
7	Coastal water	81	11	28
8	Marine water	66	0	4
9	Not specified	0	0	0
	Total	**255**	**223**	**1994**

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
NO_NUTS	SALINE	62	85	0	0	0	0
SE11	Stockholm	13	0	0	0	0	0
SE12	Östra Mellansverige	43	2	0	0	0	0
SE21	Småland med öarna	2	5	0	0	0	0
SE22	Sydsverige	17	1	0	0	0	0
SE23	Västsverige	17	1	0	0	0	0
SE31	Norra Mellansverige	2	3	0	0	0	0
SE33	Övre Norrland	0	2	0	0	0	0
	Total	**156**	**99**	**0**	**0**	**0**	**0**

Figure 15. SW hotspot analysis map (top graph) and distribution by NUTS2 (lower graph of average NO3 annual concentration greater than 40 mg/l and trophic status. In the map in blue the NVZ.

The hotspot analysis identifies all the SW monitoring stations that have high eutrophic 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.

Measures in the Action Programme

In Sweden the Code of Good Agricultural practices (CGAP) is primarily represented by regulations and is not voluntary but includes general advices for areas outside the NVZ.

The Swedish Action Programme (AP) has been collated in a document governed by the Swedish Board of Agriculture's regulations and general advice (SJVFS 2004:62) on environmental concerns in agriculture which entered into force in 1999. Last amendments to the regulation were carried out in the period 2012-2015, mainly related to adjustments in order to clarify the text and changes to the areas to be included in the nitrate vulnerable zones. No changes were made to the regulations during the period 2016-2019.

The AP regulates not only agricultural activities in the nitrate vulnerable zones, but also the rest of the country in certain respects. The details of AP are reported in the following table. No cost effectiveness was reported.

Table 6. Details of the Action Programme

Measure	General details in Action Programme (*)
Period of prohibition of fertiliser application	Inside NVZ:
	• The restrictions on the application of fertilisers vary by region, type of crop and type of fertiliser used. Details are listed in Sections 23a, 25, 26-26a, 28a-28b of SJVFS 2004:62
	Outside NVZ:
	• 1 December to 28 February: livestock manure or other organic fertiliser that is applied must be ploughed in within twelve hours
Restrictions for application on sloped soils	• Never when slope >10%, within NVZ
Restrictions for application on soaked, frozen, or snow-covered soils	• Not on water-saturated, snow-covered and frozen soils, within NVZ
Restrictions for application near watercourses (buffer strips)	• 2 m within NVZ
Effluent storage works	• The rules vary by the units and types of livestock. Storage capacity requirements also apply to holdings outside nitrate vulnerable zones. The rules are described in Sections 6–7 of Ordinance 1998:915 and 4–4b, 5a–5d, 6–7 SJVFS 2004:62
Capacity of manure storage	• The rules vary by the units and types of livestock. The rules are described in Sections 6–7 of Ordinance 1998:915 and 4–4b, 5a–5d, 6–7 SJVFS 2004:62
Rational fertilisation (e.g., splitting fertilisation, limitations)	• Within NVZ, maximum N-total applied on different crops (Section 20 SJVFS 2004:62)
	• Maximum application of 170 kg of nitrogen from livestock manure per hectare in the NVZ
	• Restrictions with regard to the provision relating to phosphorus (Sections 8, 10, 13-14, 17-19 b (section 12 repealed in 2012) SJVFS 2004:62)
	• Restriction on the quantity of readily available nitrogen applied prior to autumn sowing in the NVZ (Sections 8, 10, 13-14, 17-19 b (section 12 repealed in 2012) SJVFS 2004:62)
	• Rules relating to the procedure for land application of mineral fertilisers and livestock manure in the NVZ subject to certain restrictions (Sections 1, 23–23 c, 26 c, 27 (replaced by 23 b 2012), 28 (replaced by 23 c 2012), 28 d SJVFS 2004:62)
Crop rotation, permanent crop enhancement	• Not specified
Vegetation cover in rainy periods, winter	• In some parts of Sweden including the NVZ, certain proportion of arable land must be planted with an autumn or winter cover crop (Sections 29–34 SJVFS 2004:62 and section 11 of Ordinance 1998:915)
Fertilisation plans, spreading records	• Not specified
Other measures	• A Rural Development Programme covers the period 2014-2020 and includes environmental investments, environmental payments and enterprise aid
Date for application limit of 170 kg N/ha/year:	• Not specified

(*) Decree on environmental considerations in agriculture (SFS 1998:915)

Regulations on Environmental Concerns in Agriculture with Regard to Plant Nutrients (SJVFS 2004:62)

Controls

The correct implementation of the Action Programme is indirectly controlled through cross-compliances checks, even though the results do not, however, provide a comprehensive picture of the situation in the country because they are not sufficiently representative. The number of annual controls was around 403. The highest numbers of non-conformity concerned the application of manure (9% of non-compliance). Manure storage non-conformity concerned about 2.4% of the controls.

Designation of NVZ

Sweden has made no adjustment to the nitrate vulnerable zones designated in the previous report. As a consequence, Sweden designated 94,742 km^2 as NVZ, which represents 23% of the national territory. NVZs were first designated in 1995, and the last revision took place on 1 April 2016 (2,484 km^2).

Forecast of Water Quality

According to the national report of Sweden, if additional pollution reduction measures are not taken, nitrate concentrations in surface water bodies are not expected to diminish.

Summary

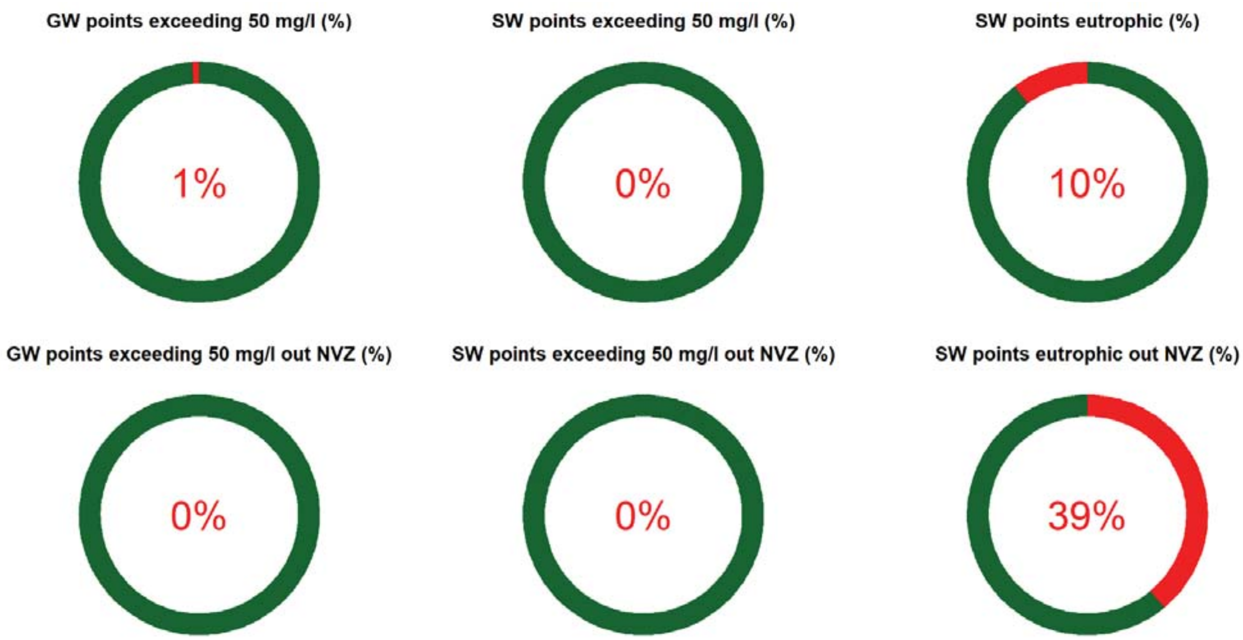


Figure 16. The summary plot for the period 2016-2019

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

Long term analysis

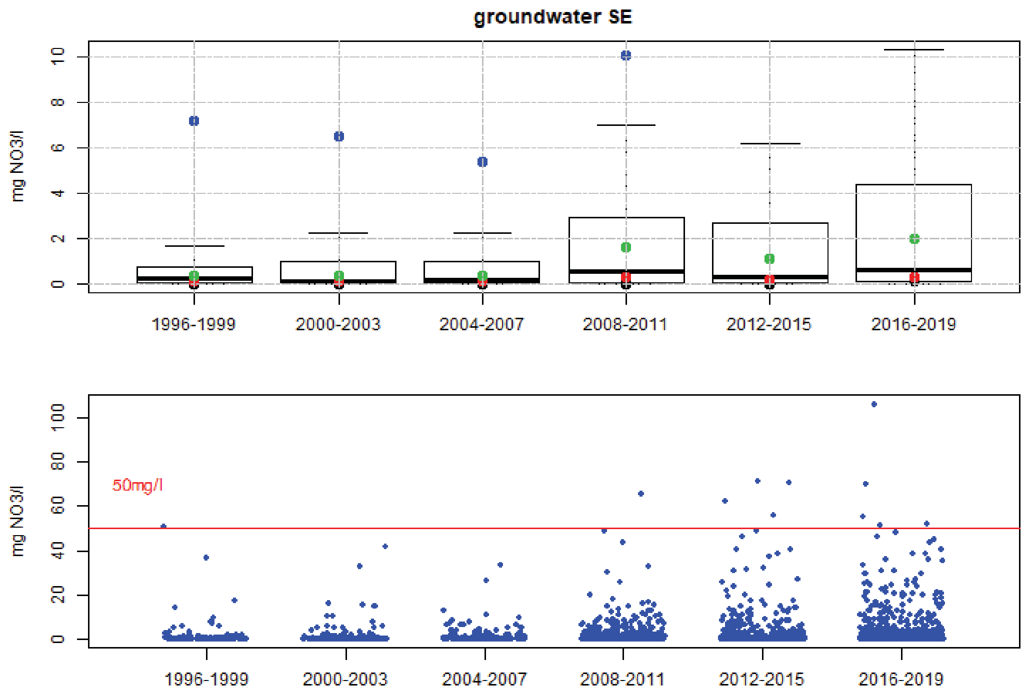


Figure 17. Time series of box whisker plots along with the distribution of the average NO3 annual concentrations for each reporting period for groundwater stations. The blue, red, green and black dots represent the mean of the fourth third, second and first quartiles, respectively.

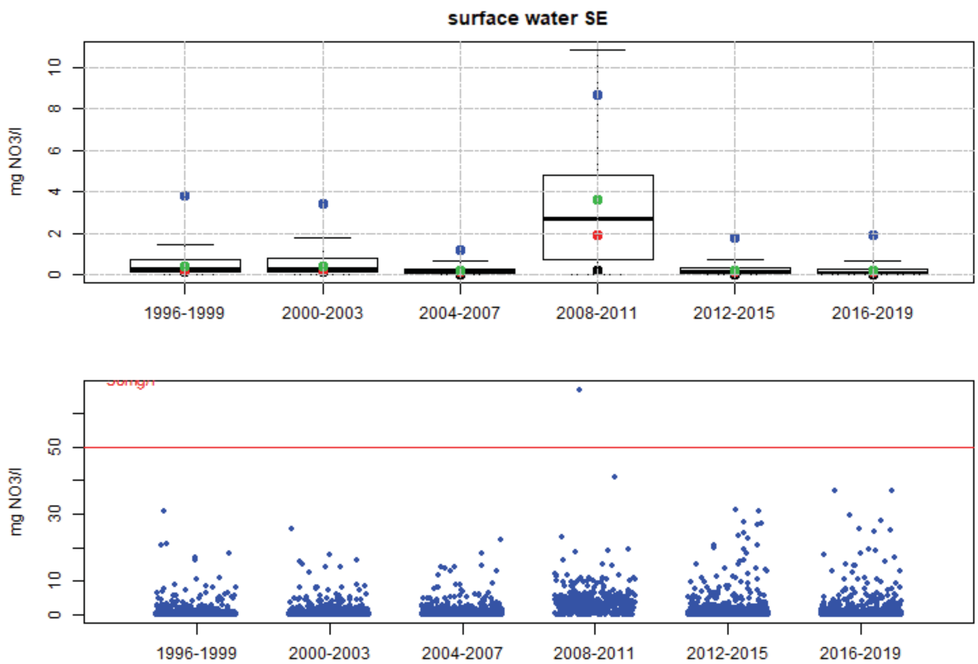


Figure 18. Time series of box whisker plots along with the distribution of the average NO3 annual concentrations for each reporting period for surface water stations. The blue, red, green and black dots represent the mean of the fourth third, second and first quartiles, respectively.

Conclusions and recommendations

Sweden has a low livestock density, a low surplus of nitrogen and phosphorus.

There is a well-elaborated network of monitoring stations. The groundwater quality is generally very good, but there a number of monitoring stations showing eutrophication. Eutrophication affects inland waters inside NVZ and coastal waters.

The action programme was revised in 2015.

The Commission recommends Sweden to reinforce its action programme to better address eutrophication issues for inland waters and marine waters.

EUROPEAN
COMMISSION

Brussels, 11.10.2021
SWD(2021) 1001 final

PART 36/38

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}

EN EN

Pressure from Agriculture

United Kingdom's utilized agricultural area amounts 17 Mha, representing 70% of the total land area and has remained stable since 2010. The major outputs of the agricultural industry include in a decreasing order milk (16.9%), cattle (14%) and cereals (12%).

Eurostat

Major land use statistics for United Kingdom

Table 1.Utilized agricultural area (abbreviated as UAA)

United_Kingdom	2005	2007	2010	2013	2016
Utilised agricultural area UAA (1000 ha)	NA	17737	17231	17259	17357
arable land (1000 ha)	NA	6177	5976	6272	6031
permanent grass (1000 ha)	NA	11522	11219	10940	11288
permanent crops (1000 ha)	NA	35	36	36	38
kitchen gardens (1000 ha)	NA	0	0	NA	0

Note:
Eurostat (FSS)

United Kingdom's arable land has decreased since 2013, while permanent grass increased.

Animal distribution in United Kingdom

United Kingdom's poultry have increased since 2013. The livestock density index (livestock unit per hectare of Utilized Agricultural Area) has remained stable since 2010 and it is close to the EU average of 0.8.

Table 2. Livestock statistics

United_Kingdom	2005	2007	2010	2013	2016
Livestock index	0.90	0.86	0.79	0.76	0.79
dairy cows (10^6 heads)	NA	NA	NA	NA	NA
live bovines (10^6 heads)	NA	NA	NA	NA	NA
live pigs (10^6 heads)	4.73	4.67	4.38	4.38	4.54
live poultry (10^6 heads)	NA	NA	162.56	137.19	164.38

Note:
Eurostat (FSS)

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

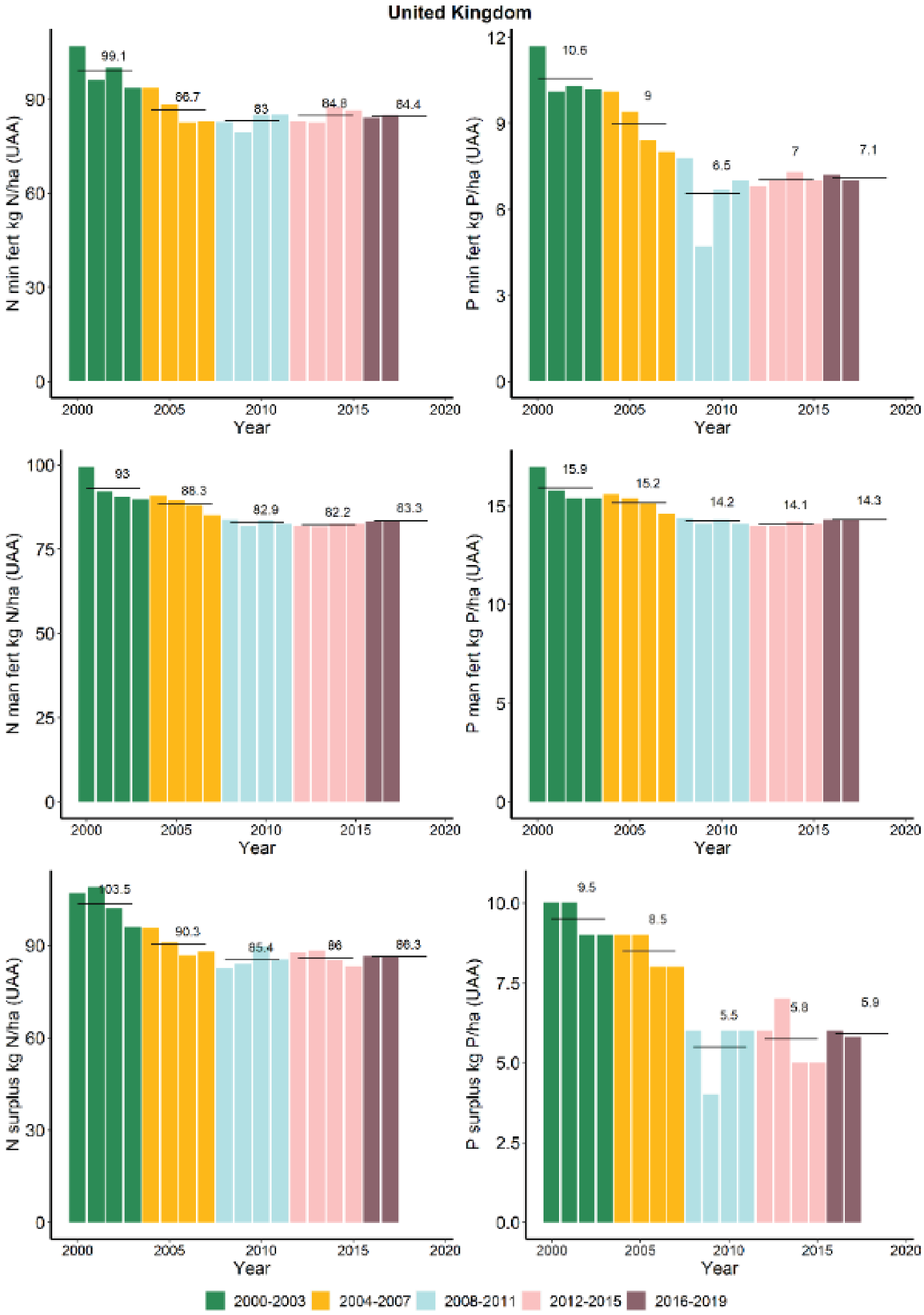


Figure 1. N and P fertilizers and gross surplus (kg/ha)

The N and P mineral fertilizer, manure and gross nitrogen (N) and phosphorus (P) surpluses originate from EUROSTAT data for the years 2000-2017. The consumption of inorganic N and P during the last reporting period remained stable. Both N and P from manure have slightly increased since the last reporting period. The N and P surpluses remained stable. 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 -England

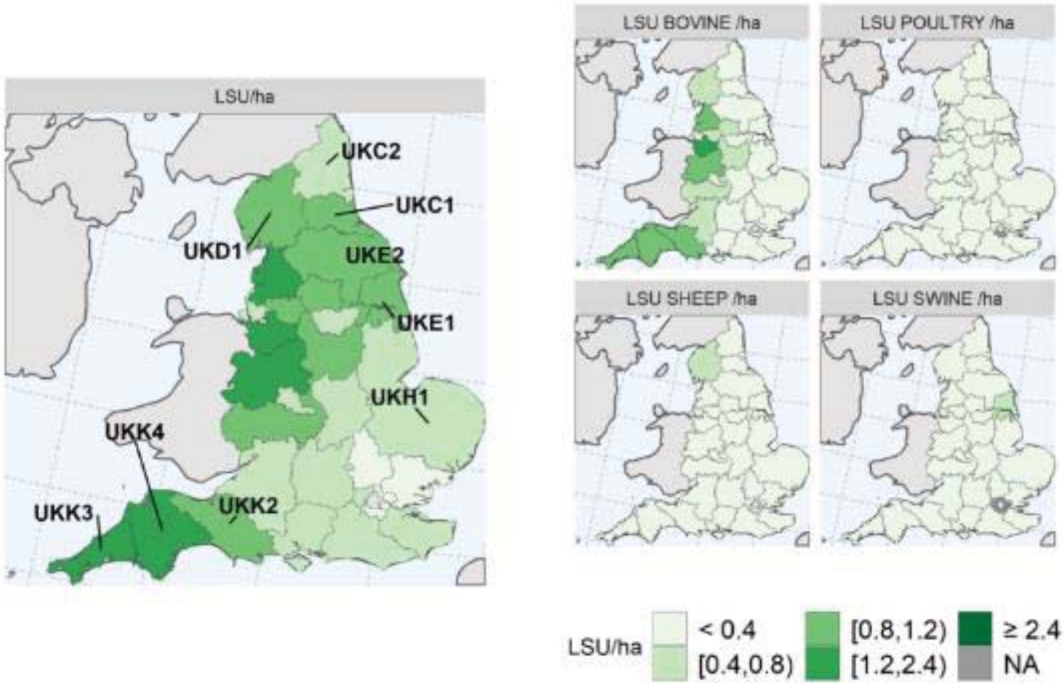


Figure 2. Map of livestock unit distribution, year 2016 (Source: Eurostat, February 2021)

Animal production is concentrated in the eastern part of England and the bovine have the highest LSU/ha (total LSU and LSU by animal type were retrieved individually from EUROSTAT).

Livestock unit - LSU /ha -North Ireland

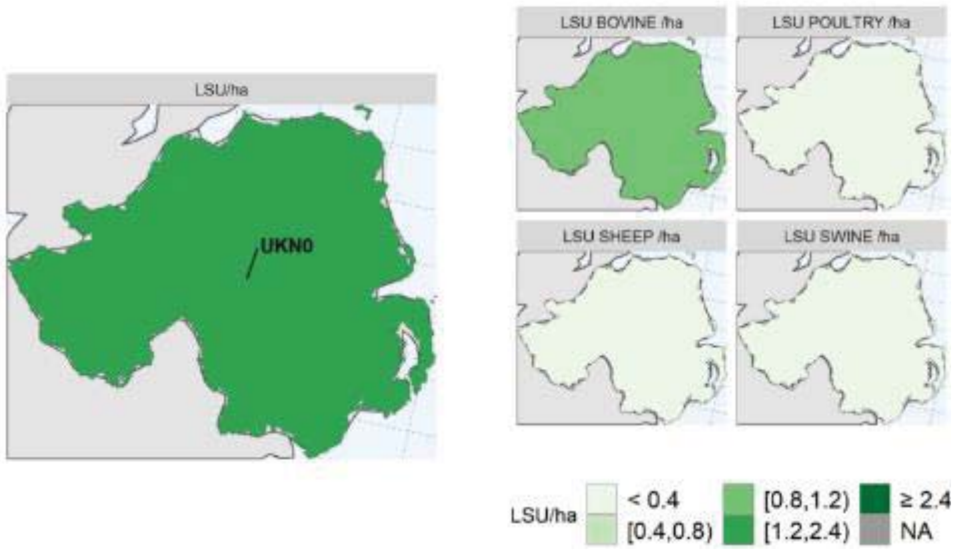


Figure 3. Map of livestock unit distribution, year 2016 (Source: Eurostat, February 2021)

The bovine LSU/ha is dominant in North Ireland (total LSU and LSU by animal type were retrieved individually from EUROSTAT).

Livestock unit - LSU /ha -Scotland

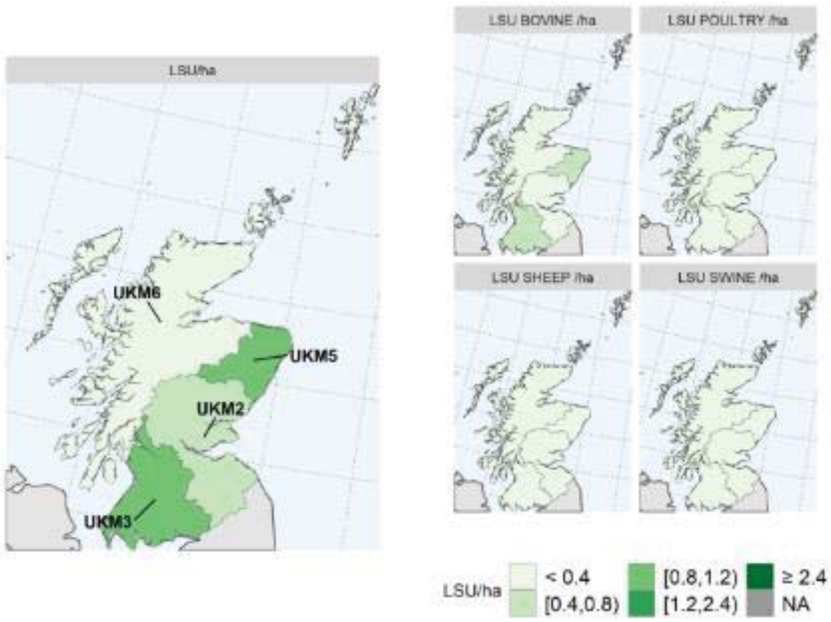


Figure 4. Map of livestock unit distribution, year 2016 (Source: Eurostat, February 2021)

Animal production is concentrated in the south eastern part of the Scotland (total LSU and LSU by animal type were retrieved individually from EUROSTAT).

Livestock unit - LSU /ha -Wales

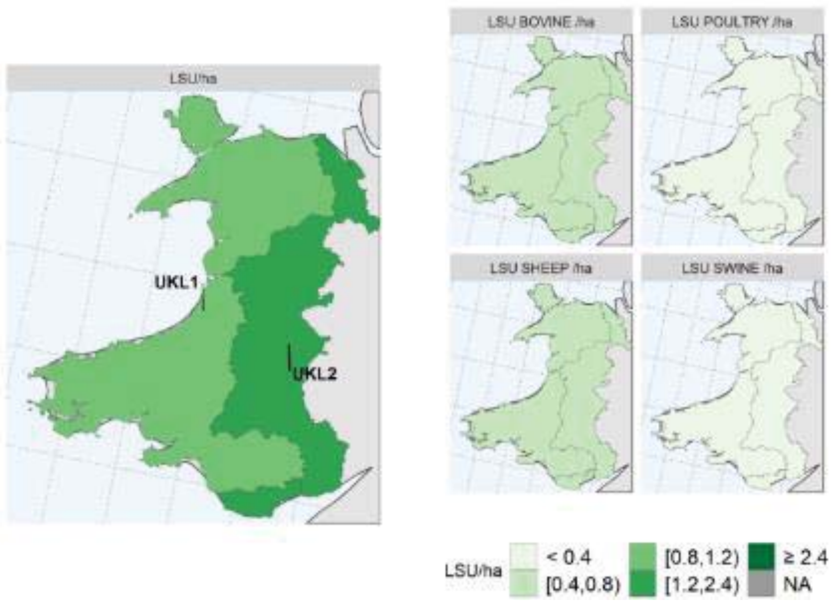


Figure 5. Map of livestock unit distribution, year 2016 (Source: Eurostat, February 2021)

Bovine and Sheep production is dominant in Wales (total LSU and LSU by animal type were retrieved individually from EUROSTAT).

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

Water Quality Monitoring- England

Since the country report of England report was not available no descriptions are reported in the following sections. England, as in previous reporting periods, did not provide the trophic status for the current reporting period.
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	0	63	70	0	57	68
1a	Phreatic groundwater (deep) 5-15 m	991	119	134	752	106	103
1b	Phreatic groundwater (deep) 15-30 m	0	804	724	0	662	714
1c	Phreatic groundwater (deep) >30 m	1119	1076	1041	904	940	942
2	Captive groundwater	478	460	433	397	398	404
3	Karstic groundwater	0	0	0	0	0	0
9	Not specified	0	0	0	0	0	0
	Total	**2588**	**2522**	**2402**	**2053**	**2163**	**2231**

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	5276	6462	6086	4522	4228	5667	0	0	0
5	Lake/reservoir water	0	0	46	0	0	13	0	0	0
6	Transitional water	0	0	212	0	0	183	0	0	0
7	Coastal water	641	426	139	388	391	110	0	0	0
8	Marine water	0	0	0	0	0	0	0	0	0
9	Not specified	0	0	0	0	0	0	0	0	0
	Total	**5917**	**6888**	**6483**	**4910**	**4619**	**5973**	**0**	**0**	**0**

Groundwater Quality - England

Groundwater average annual nitrate concentration

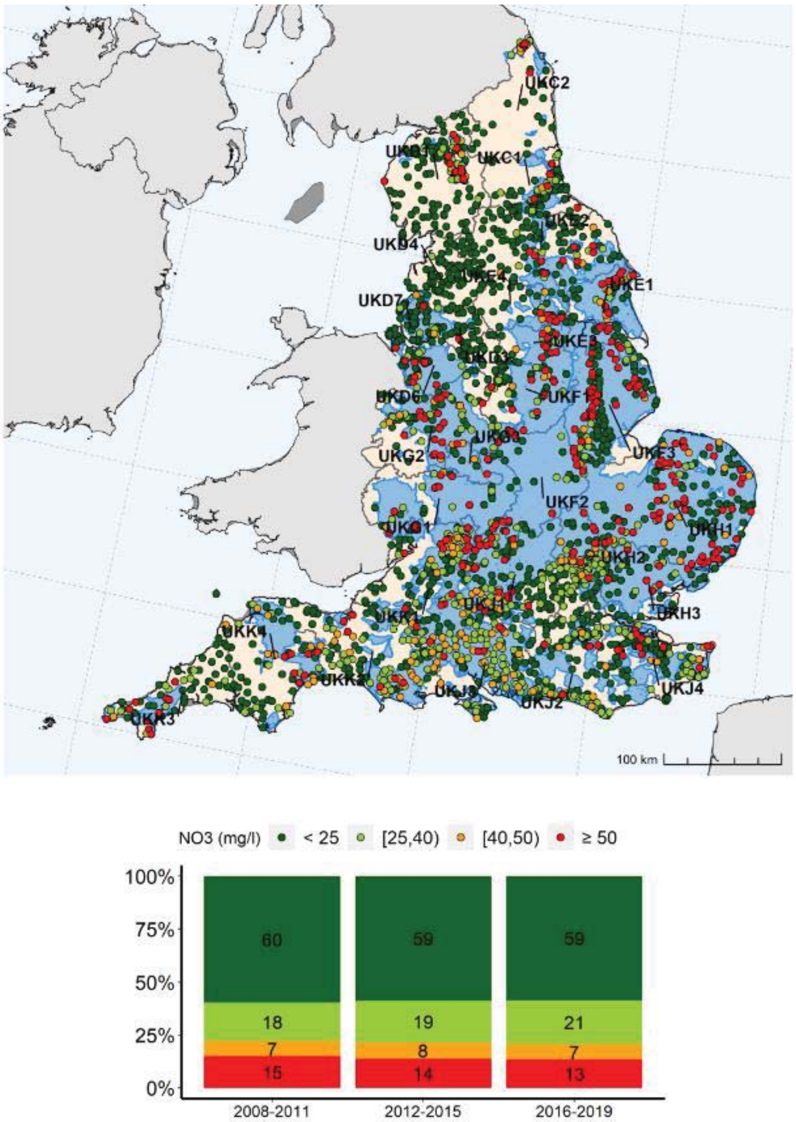


Figure 6. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). In the map in blue the NVZ.

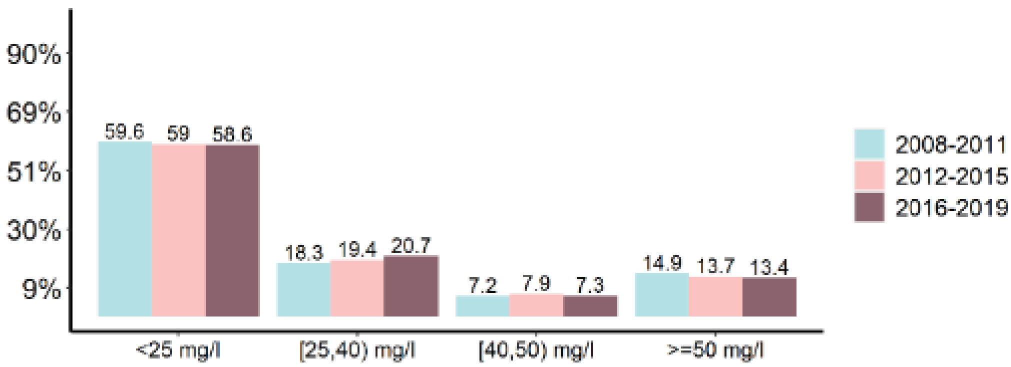


Figure 7. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis).

Groundwater average annual nitrate concentration trend

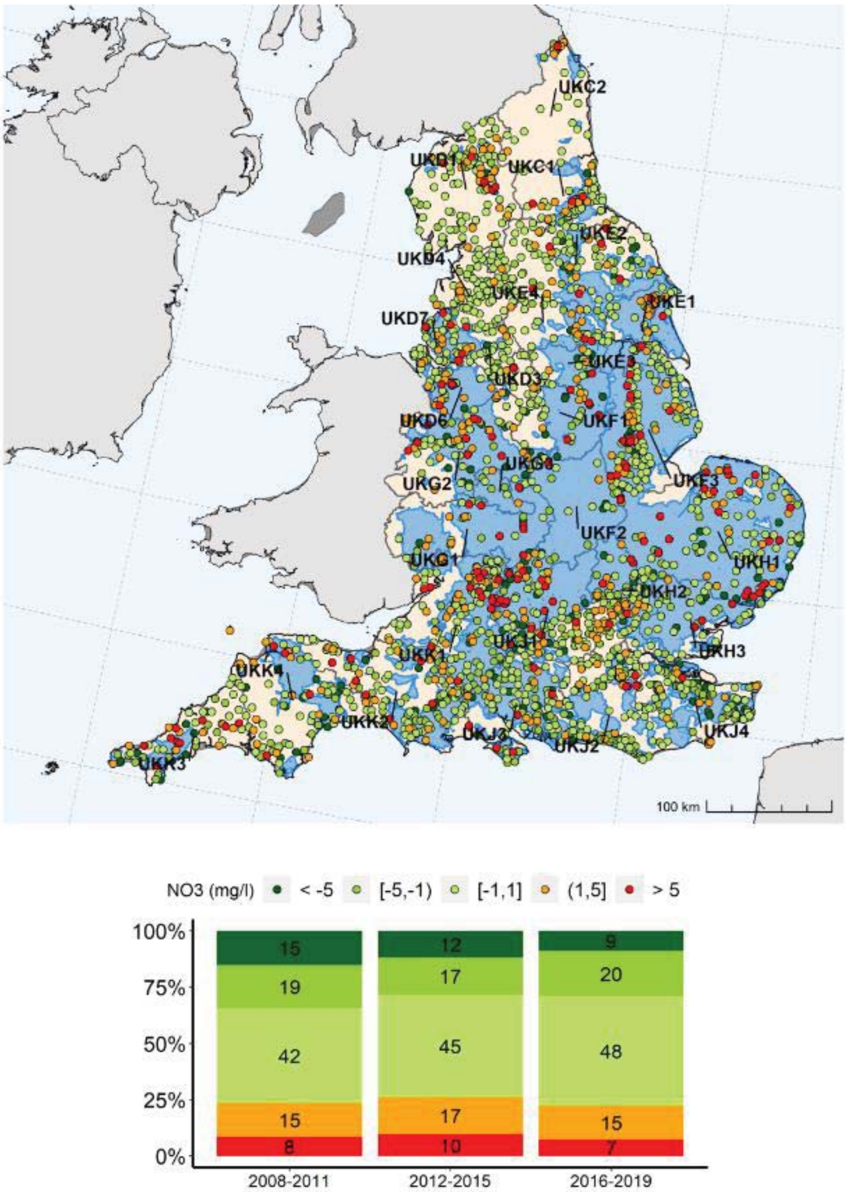


Figure 8. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis). In the map in blue the NVZ.

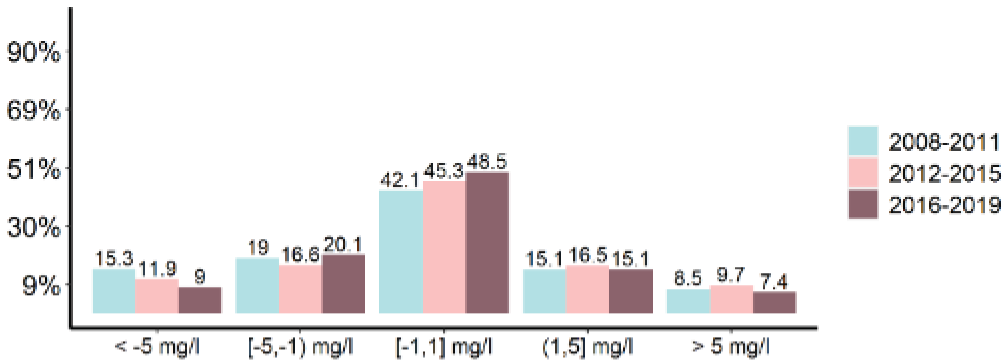
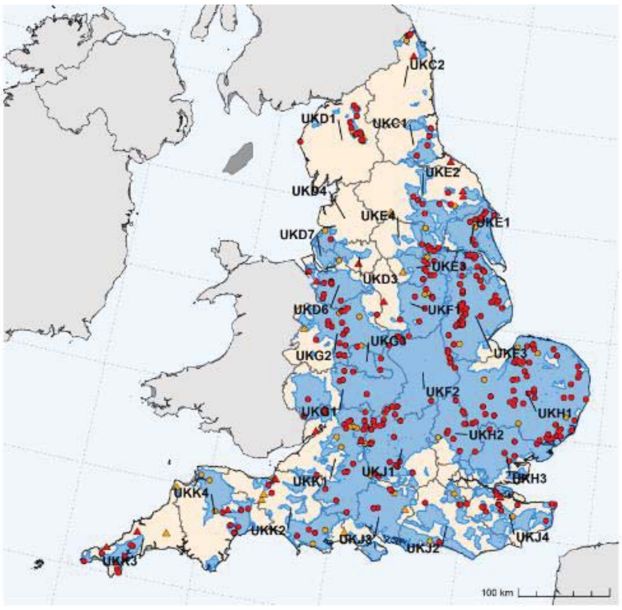


Figure 9. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis).

Groundwater hotspot



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

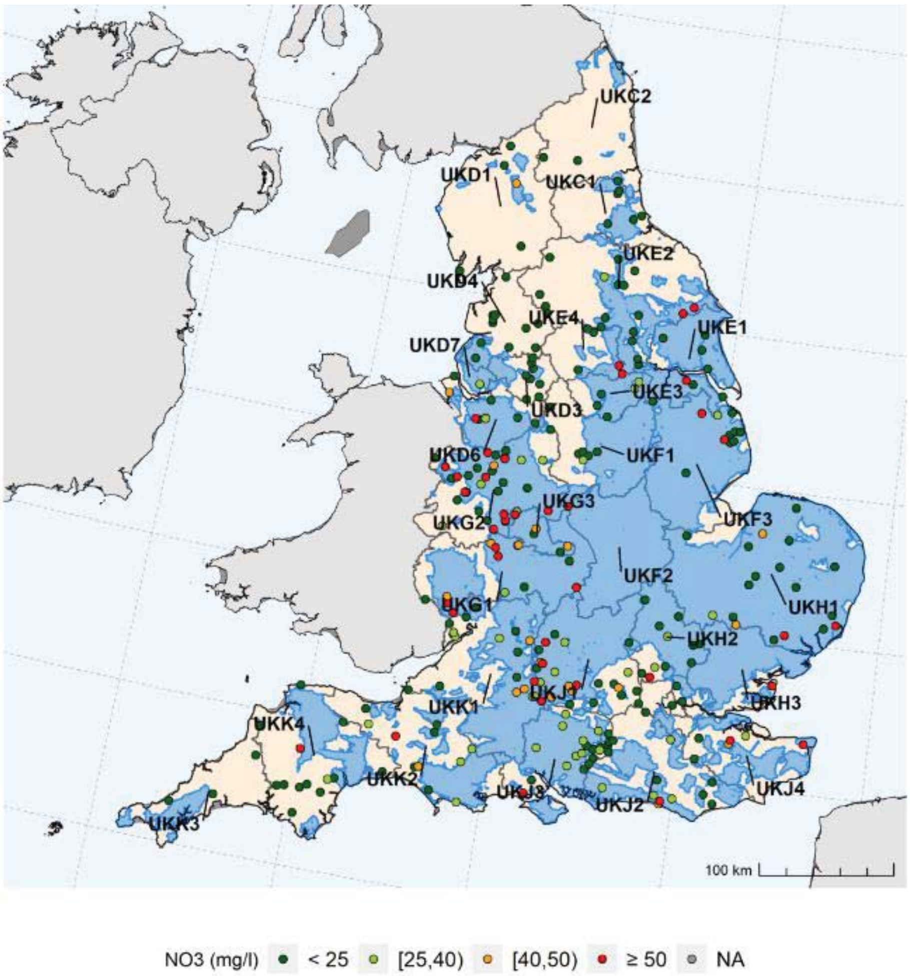
NUTS ID	NUTS NAME	>=40 and < 50 mg/l incr.trend		>=50 mg/l	
		InNVZ	OutNVZ	InNVZ	OutNVZ
UKC1	Tees Valley and Durham	0	0	3	1
UKC2	Northumberland and Tyne and Wear	1	0	4	1
UKD1	Cumbria	2	1	13	0
UKD3	Greater Manchester	0	0	0	1
UKD4	Lancashire	1	0	1	0
UKD6	Cheshire	2	0	11	1
UKE1	East Yorkshire and Northern Lincolnshire	1	0	19	2
UKE2	North Yorkshire	2	1	11	2
UKE3	South Yorkshire	1	1	8	0
UKE4	West Yorkshire	0	0	1	0
UKF1	Derbyshire and Nottinghamshire	2	0	9	1
UKF2	Leicestershire, Rutland and Northamptonshire	0	0	12	0
UKF3	Lincolnshire	1	0	33	0
UKG1	Herefordshire, Worcestershire and Warwickshire	0	0	8	0
UKG2	Shropshire and Staffordshire	3	1	20	0
UKG3	West Midlands	0	0	1	0
UKH1	East Anglia	8	0	55	0
UKH2	Bedfordshire and Hertfordshire	1	0	8	0
UKH3	Essex	0	0	6	0
UKI6	Outer London - South	1	0	0	0
UKJ1	Berkshire, Buckinghamshire and Oxfordshire	3	0	22	0
UKJ2	Surrey, East and West Sussex	2	0	6	0
UKJ3	Hampshire and Isle of Wight	1	2	4	0
UKJ4	Kent	1	0	12	1
UKK1	Gloucestershire, Wiltshire and Bristol/Bath area	6	1	19	2
UKK2	Dorset and Somerset	2	2	5	1
UKK3	Cornwall and Isles of Scilly	0	1	8	2
UKK4	Devon	3	1	6	1
	Total	**44**	**11**	**305**	**16**

Figure 10. 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



Station Type	Description	Number of removed stations		
		total removed	with measurements	with trends
0	Phreatic groundwater (shallow): 0-5 m	6	6	5
1a	Phreatic groundwater (deep) 5-15 m	15	15	15
1b	Phreatic groundwater (deep) 15-30 m	75	75	65
1c	Phreatic groundwater (deep) >30 m	140	140	120
2	Captive groundwater	55	55	48
3	Karstic groundwater	0	0	0
9	Not specified	0	0	0
	Total	**291**	**291**	**253**

Figure 11. 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.

European Commission

Surface Water Quality-England

Surface water average annual nitrate concentration

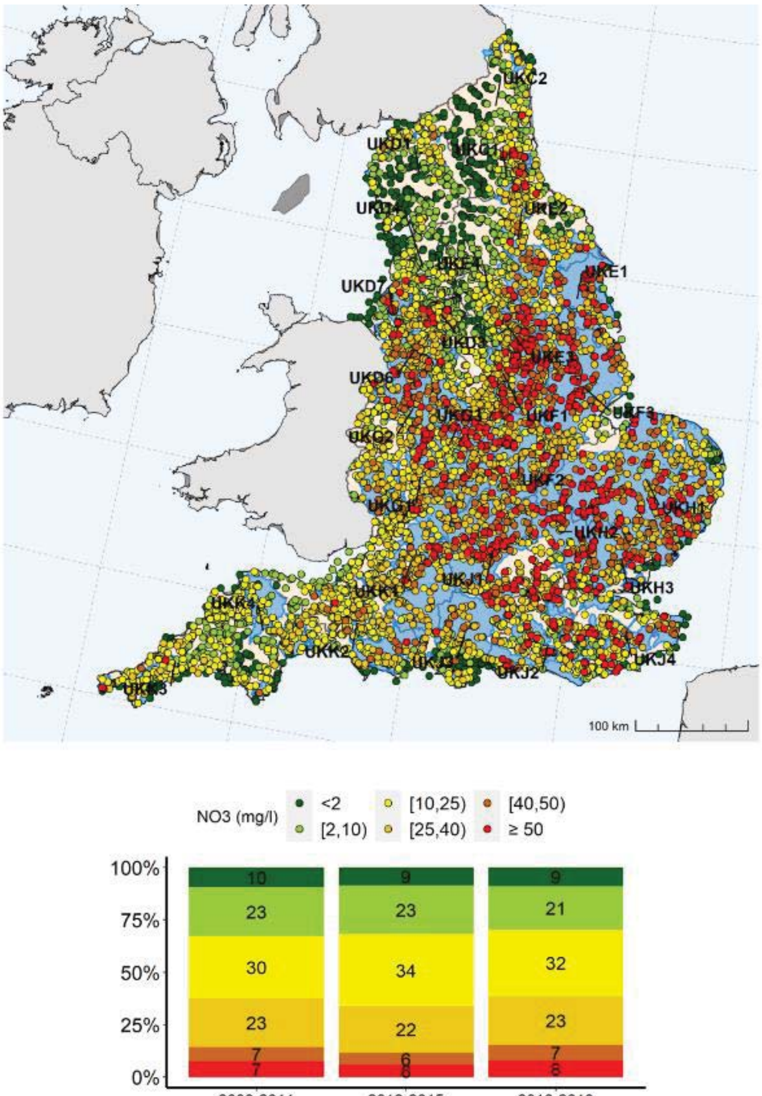


Figure 12. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). In the map in blue the NVZ.

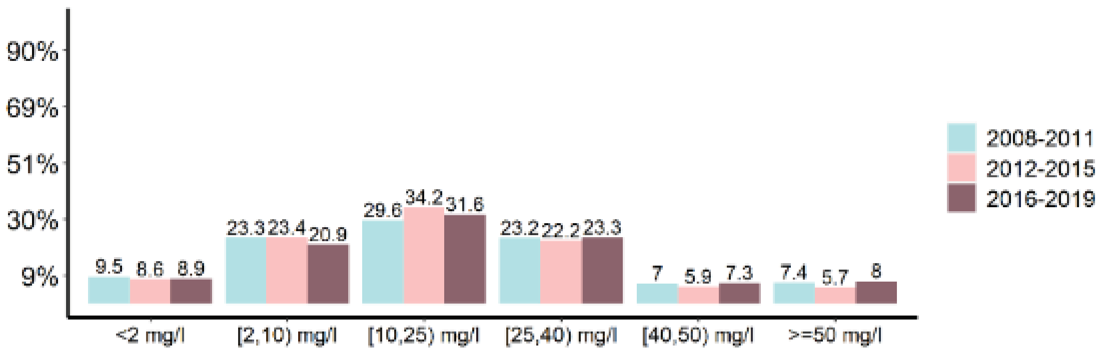
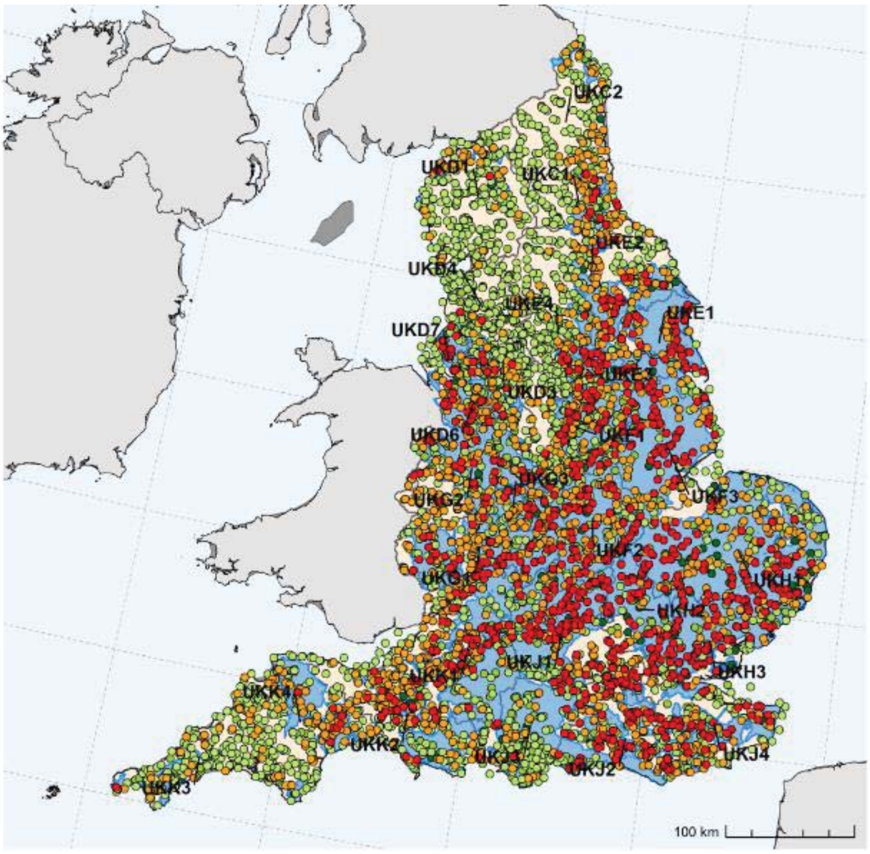


Figure 13. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis)

Surface water average annual nitrate concentration trend



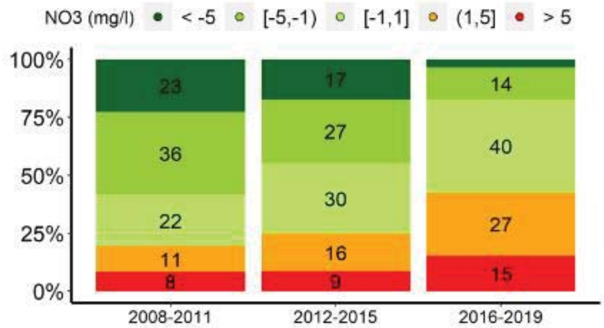


Figure 14. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information. In the map in blue the NVZ.

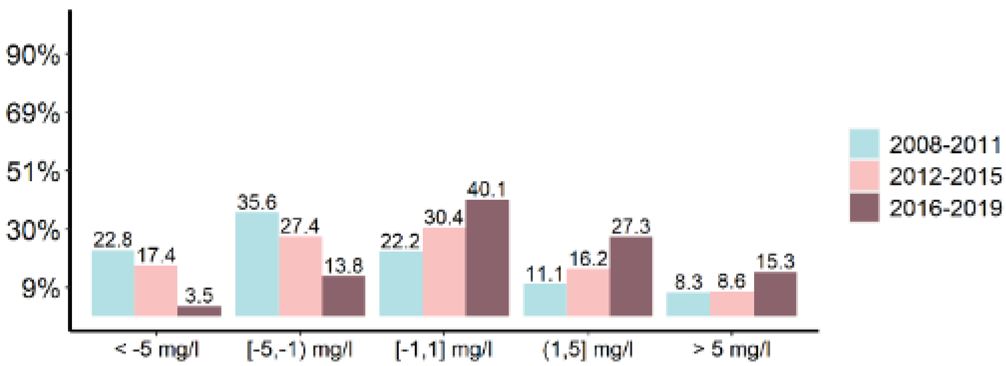
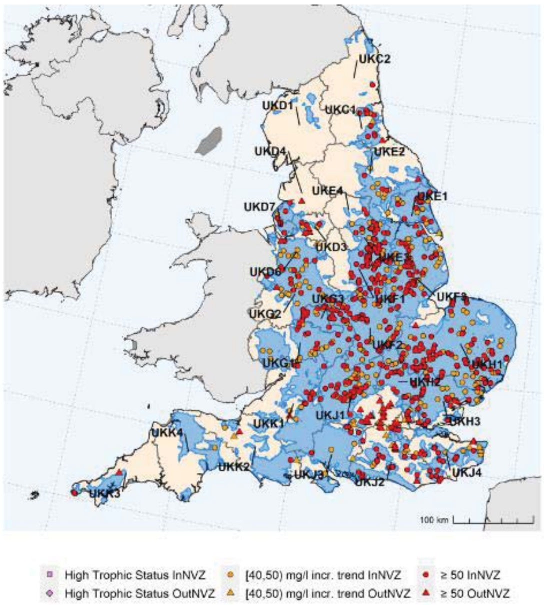


Figure 15. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis).

Surface Water quality hotspot



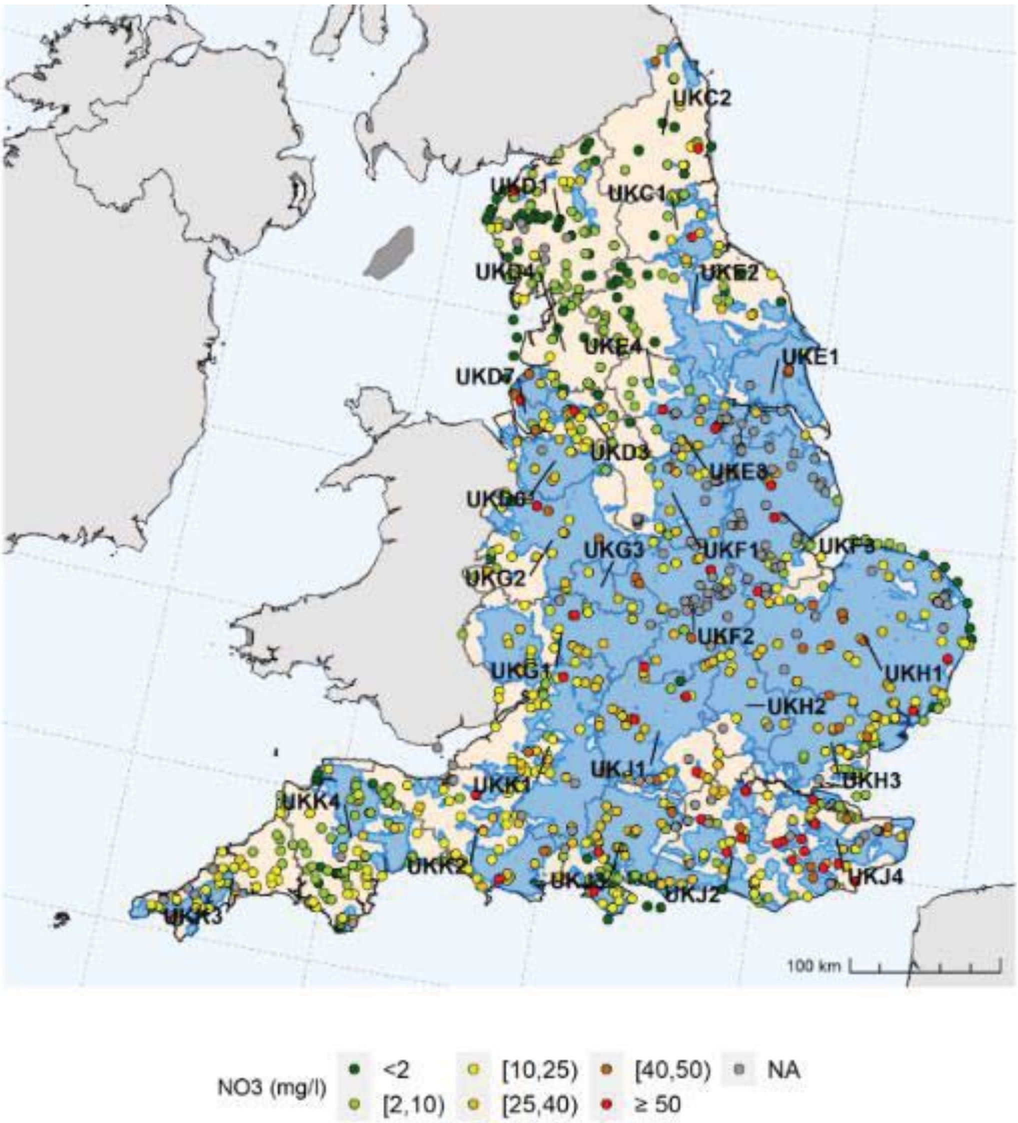
		High trophic status		>=40 and < 50 mg/l incr.trend		>=50 mg/l	
NUTS ID	NUTS NAME	InNVZ	OutNVZ	InNVZ	OutNVZ	InNVZ	OutNVZ
NO_NUTS	SALINE	0	0	0	4	0	0
UKC1	Tees Valley and Durham	0	0	3	1	8	1
UKC2	Northumberland and Tyne and Wear	0	0	0	0	2	0
UKD1	Cumbria	0	0	1	0	0	0
UKD3	Greater Manchester	0	0	2	0	3	3
UKD4	Lancashire	0	0	1	0	3	1
UKD6	Cheshire	0	0	8	1	4	1
UKD7	Merseyside	0	0	0	0	5	0
UKE1	East Yorkshire and Northern Lincolnshire	0	0	17	1	18	2
UKE2	North Yorkshire	0	0	8	0	6	1
UKE3	South Yorkshire	0	0	4	0	19	0
UKE4	West Yorkshire	0	0	2	0	2	0
UKF1	Derbyshire and Nottinghamshire	0	0	12	0	51	0
UKF2	Leicestershire, Rutland and Northamptonshire	0	0	24	0	41	0
UKF3	Lincolnshire	0	0	33	1	45	0
UKG1	Herefordshire, Worcestershire and Warwickshire	0	0	17	0	19	0
UKG2	Shropshire and Staffordshire	0	0	21	1	24	1
UKG3	West Midlands	0	0	2	0	3	0
UKH1	East Anglia	0	0	46	0	70	1
UKH2	Bedfordshire and Hertfordshire	0	0	8	0	22	2
UKH3	Essex	0	0	17	0	24	0
UKI3	Inner London - West	0	0	0	0	1	1
UKI4	Inner London - East	0	0	0	0	3	1
UKI5	Outer London - East and North East	0	0	2	0	4	1
UKI6	Outer London - South	0	0	0	0	4	0
UKI7	Outer London - West and North West	0	0	0	0	0	5
UKJ1	Berkshire, Buckinghamshire and Oxfordshire	0	0	24	4	36	8
UKJ2	Surrey, East and West Sussex	0	0	3	4	25	9
UKJ3	Hampshire and Isle of Wight	0	0	4	1	4	0
UKJ4	Kent	0	0	5	1	14	2
UKK1	Gloucestershire, Wiltshire and Bristol/Bath area	0	0	7	1	12	1
UKK2	Dorset and Somerset	0	0	1	2	1	1
UKK3	Cornwall and Isles of Scilly	0	0	2	0	1	1
UKK4	Devon	0	0	1	0	0	0
	Total	**0**	**0**	**275**	**22**	**474**	**43**

Figure 16. SW 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 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



Station Type	Description	Number of removed stations: total removed	with measurements	with trends	with trophic status
4	River water	932	767	538	0
5	Lake/reservoir water	0	0	0	0
6	Transitional water	0	0	0	0
7	Coastal water	122	121	103	0
8	Marine water	0	0	0	0
9	Not specified	0	0	0	0
	Total	**1054**	**888**	**641**	**0**

Figure 17. SW removed stations map (top graph) and distribution by surface water type (lower graph). In the map NVZ areas in blue.

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

Measures in the Action Program- England

The Measures in the Action Program are not available since the country report of England was not submitted.

Controls - England

The information about the controls are not available since the country report of England was not submitted.

Designation of NVZ - England

England decreased the NVZ areas since the last reporting period. The total area is 72441 km^2, about 3% lower with respect to the previous reporting period (74697 km^2).

Forecast of Water Quality - England

Forecast analysis are not available since the country report of England was not submitted.

Summary -England

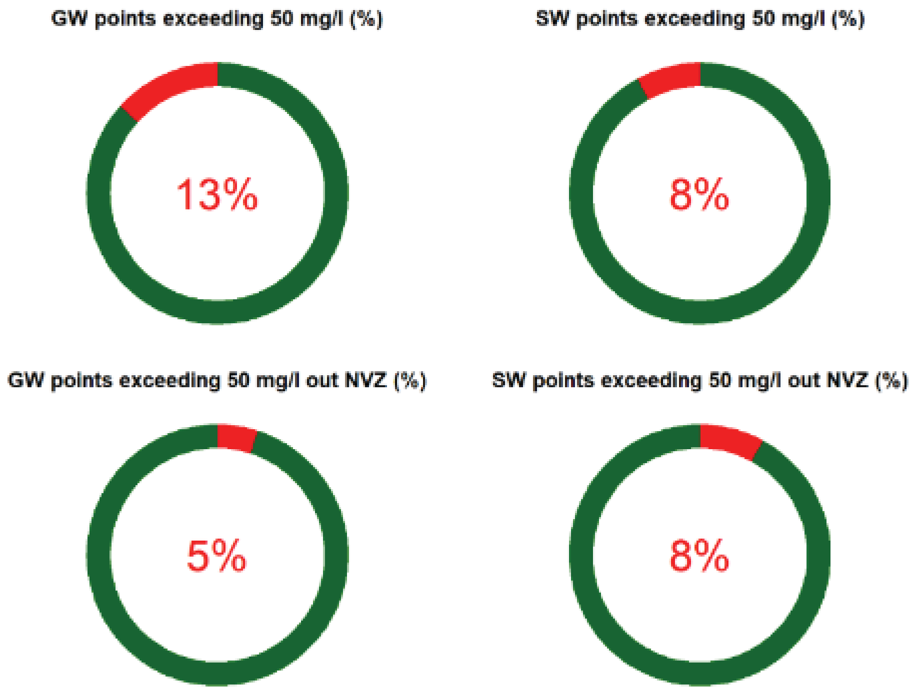


Figure 18. The summary plot for the period 2016-2019

This plot provides in the first row the percentage of stations exceeding 50 mg/l with respect to the total stations with measures. 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/.

Long term analysis -England

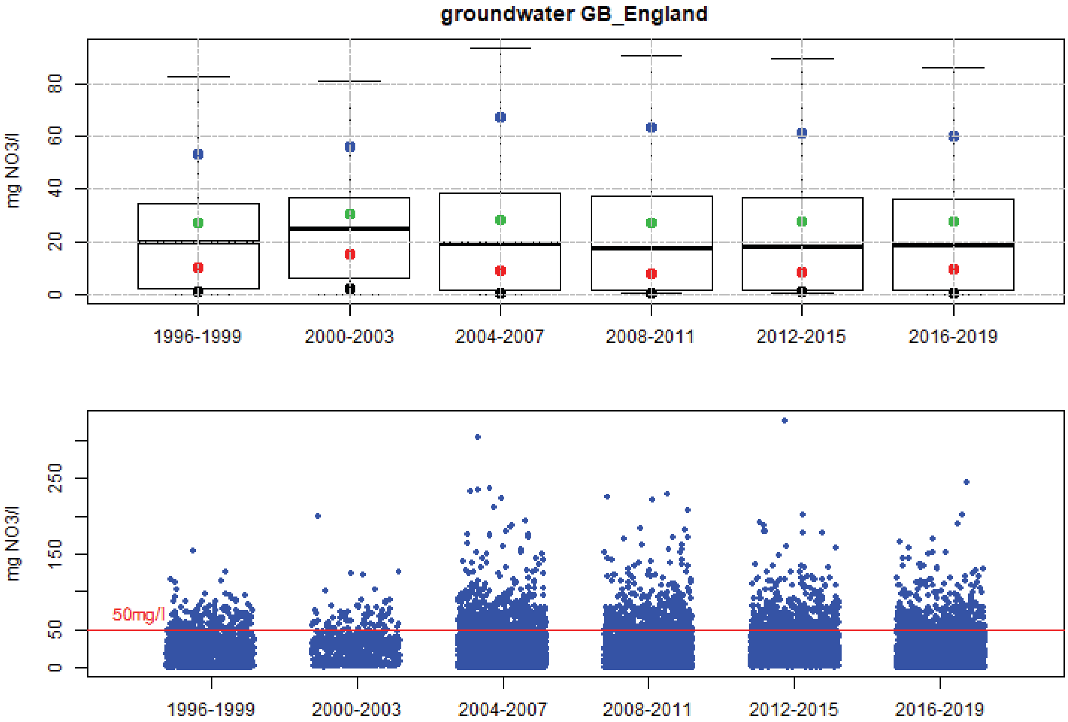


Figure 19. Time series of box whisker plots along with the distribution of the values average NO3 annual concentrations for each reporting period for groundwater stations. RPs represent the reporting periods, RP7 being the last period (2016-2019). The blue, red, green and black dots represent the mean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

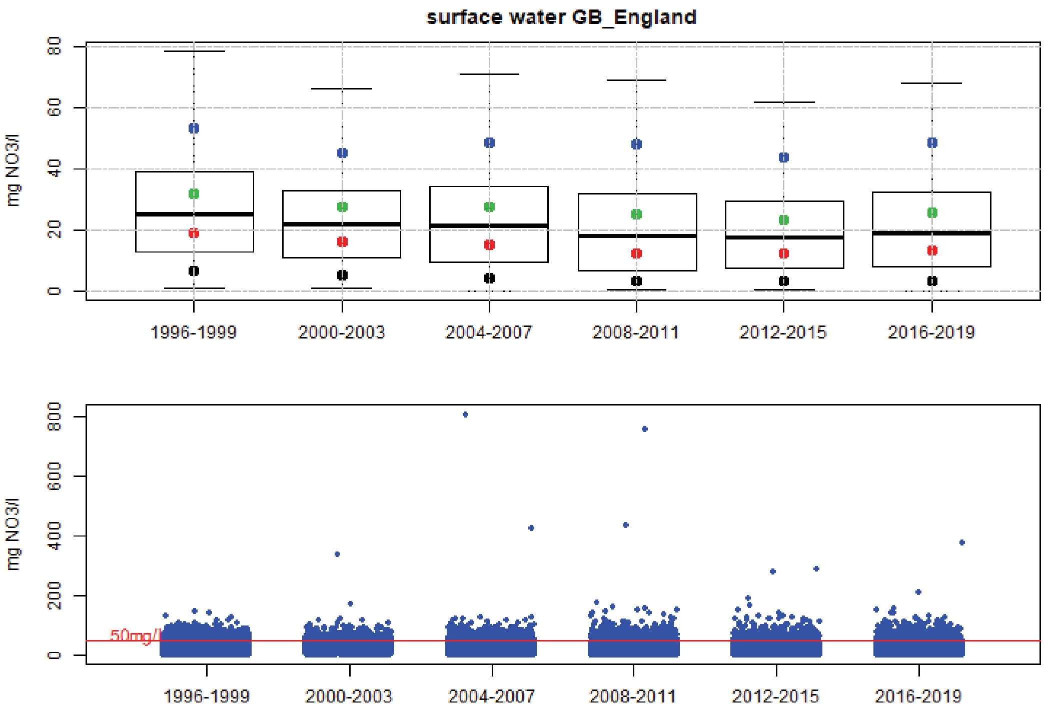


Figure 20. Time series of box whisker plots along with the distribution of the values average NO3 annual concentrations for each reporting period for surface water stations. RPs represent the reporting periods, RP7 being the last period (2016-2019). The blue, red, green and black dots represent the mean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

EUROPEAN
COMMISSION

Brussels, 11.10.2021
SWD(2021) 1001 final

PART 37/38

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}

EN EN

Water Quality Monitoring - Northern Ireland

The Department of Agriculture, Environment and Rural Affairs (DAERA) has the responsibility of monitoring water quality of surface waters (rivers, lakes, transitional waters) and groundwater across Northern Ireland. Groundwater quality in Northern Ireland is assessed in accordance with the Northern Ireland Environmental Agency (NIEA) groundwater monitoring programme through the collection of groundwater water samples from boreholes, wells and springs that are mostly owned and operated by third parties. This implies that the network can undergo changes due businesses closing or changing their groundwater usage. The surface freshwater monitoring network coverage in Northern Ireland aims to fulfil all monitoring obligations under multiple directives including the Nitrates Directive and the Water Framework Directive. A review of the surface freshwater monitoring programme undertaken for the second cycle of the River Basin Management Plans (RBMP), led to a modification of the network through a better targeting and adopting a risk based approach. However, the modification of the network also included the requirement to maintain long term data for nitrogen and phosphorus concentrations.

For surface measurements, two stations have same coordinates due to different station type (one for river and one for lake). In these cases, the average values cover different measurements in time, but also location. In the maps since it is not possible to distinguish stations with the same coordinated: 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 5. 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	2	2	2	2	2	2
1a	Phreatic groundwater (deep) 5-15 m	3	36	37	3	21	35
1b	Phreatic groundwater (deep) 15-30 m	0	0	0	0	0	0
1c	Phreatic groundwater (deep) >30 m	8	7	8	8	7	7
2	Captive groundwater	0	5	4	0	0	4
3	Karstic groundwater	0	6	5	0	5	5
9	Not specified	45	0	0	0	0	0
	Total	**58**	**56**	**56**	**13**	**35**	**53**

Surface water quality monitoring network

Table 6. 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	566	317	473	500	302	305	567	391	430
5	Lake/reservoir water	56	21	21	55	20	21	0	21	20
6	Transitional water	33	5	5	0	5	5	12	5	5
7	Coastal water	93	19	19	0	19	19	60	19	19
8	Marine water	0	0	0	0	0	0	0	0	0
9	Not specified	0	0	0	0	0	0	0	0	0
	Total	**748**	**362**	**518**	**555**	**346**	**350**	**639**	**436**	**474**

Groundwater Quality - Northern Ireland

Groundwater average annual nitrate concentration

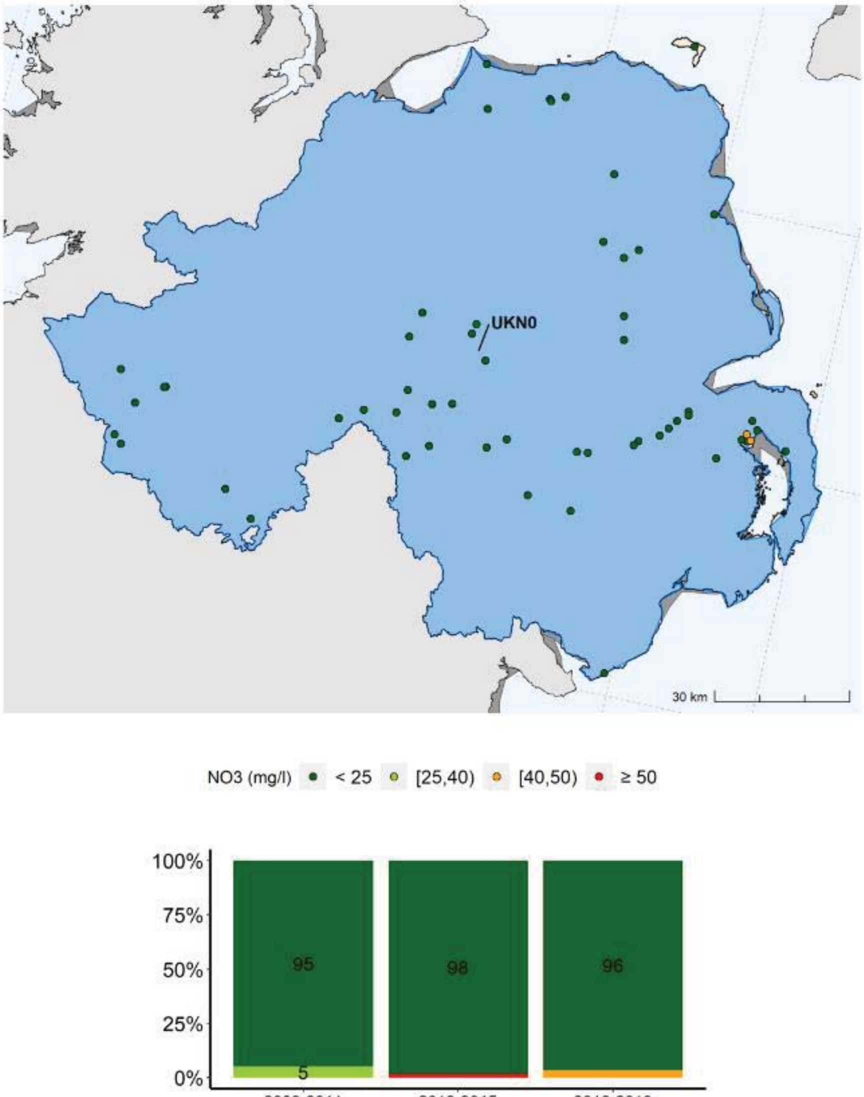


Figure 21. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information.

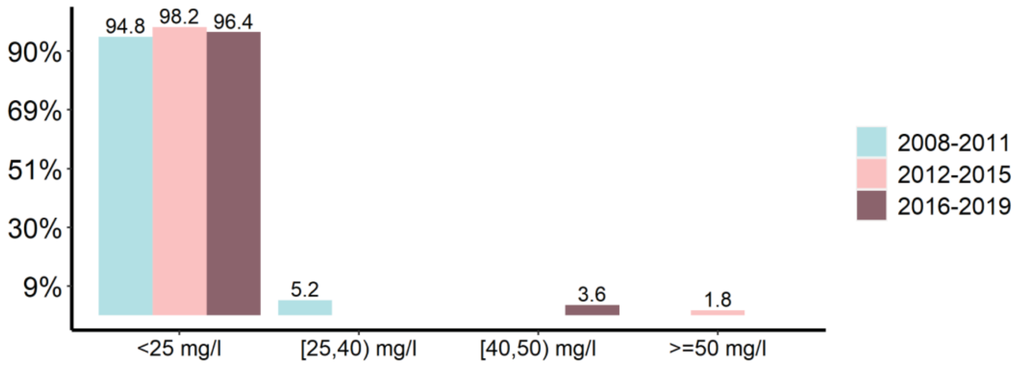
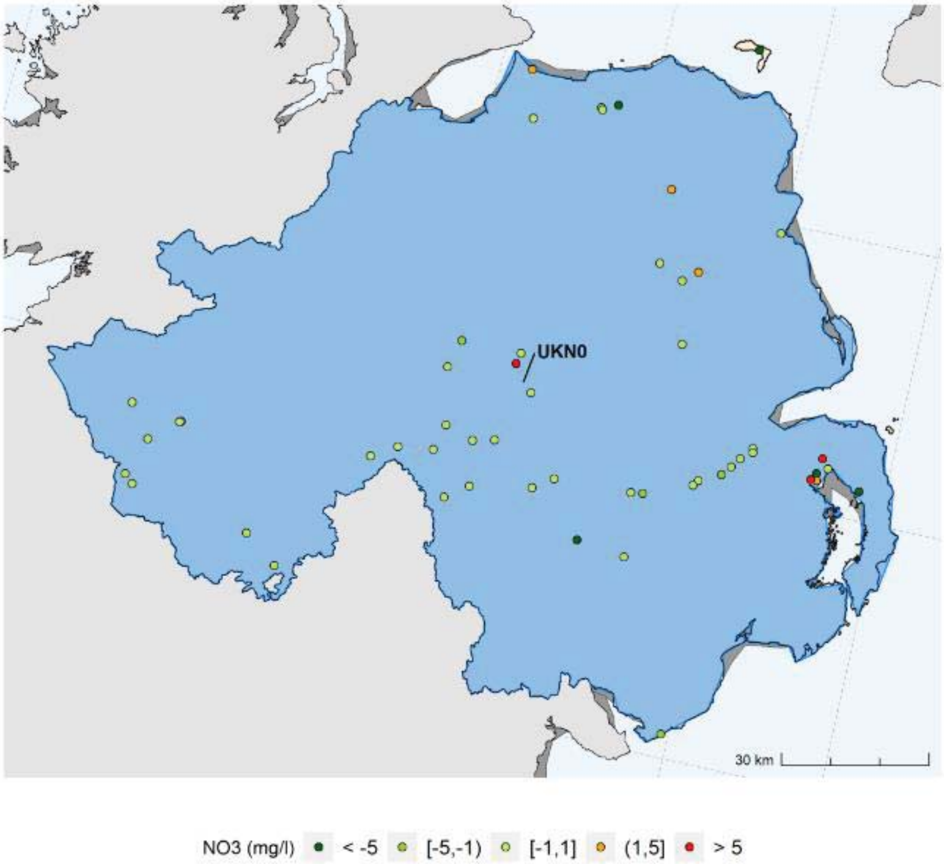


Figure 22. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis).

Groundwater average annual nitrate concentration trend



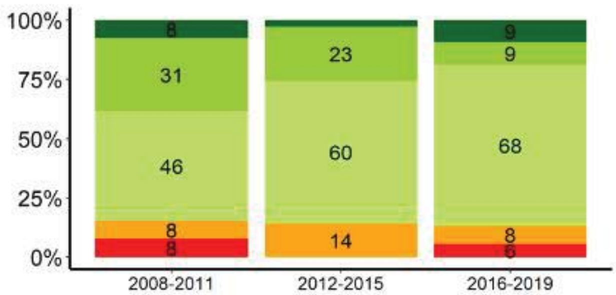


Figure 23. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information.

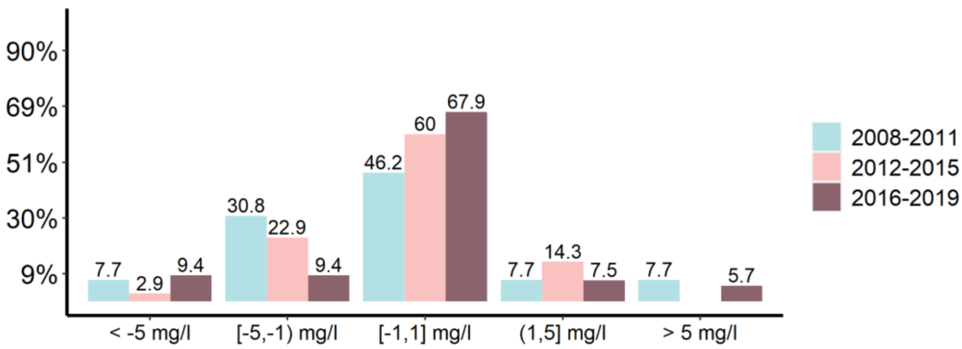
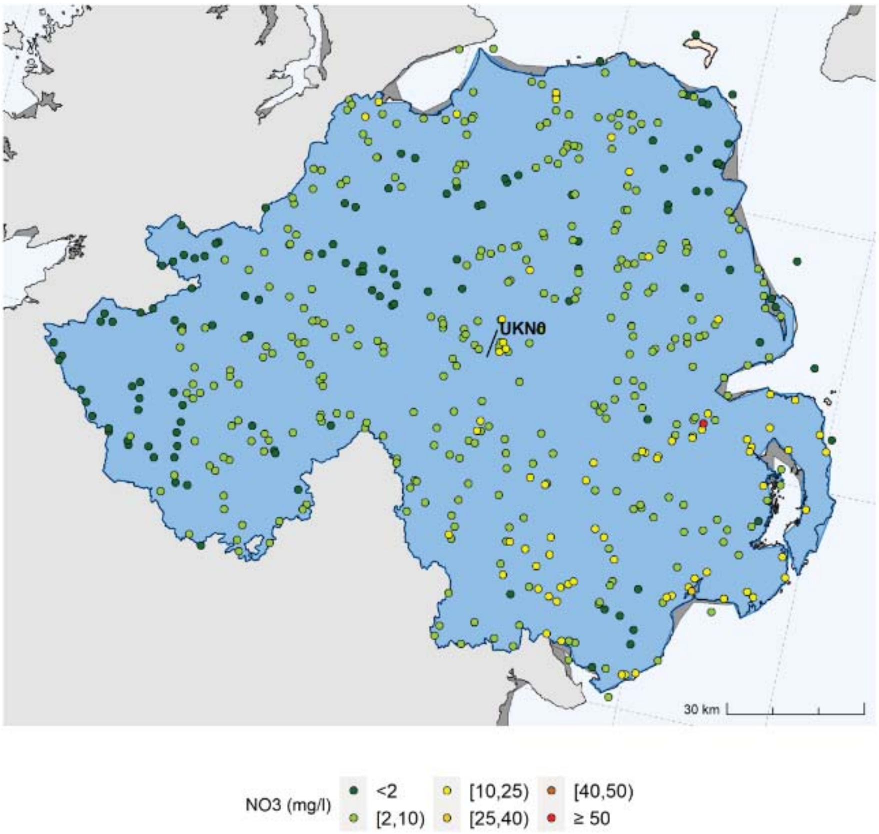


Figure 24. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis)

Surface Water Quality - Northern Ireland

Surface water average annual nitrate concentration



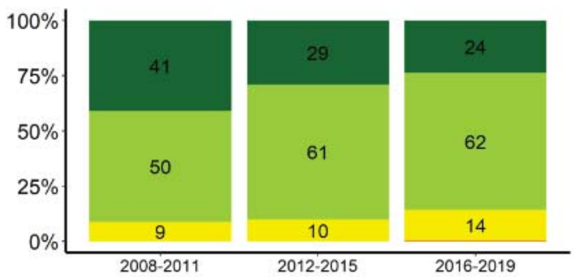


Figure 25. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information.

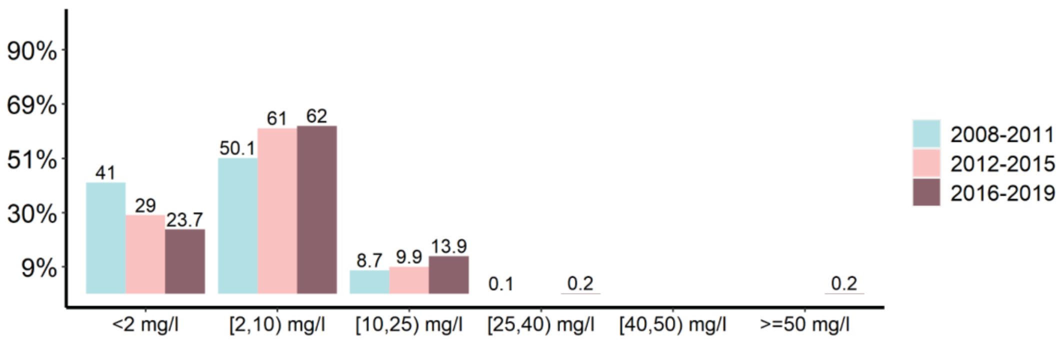


Figure 26. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis).

Surface water average annual nitrate concentration trend

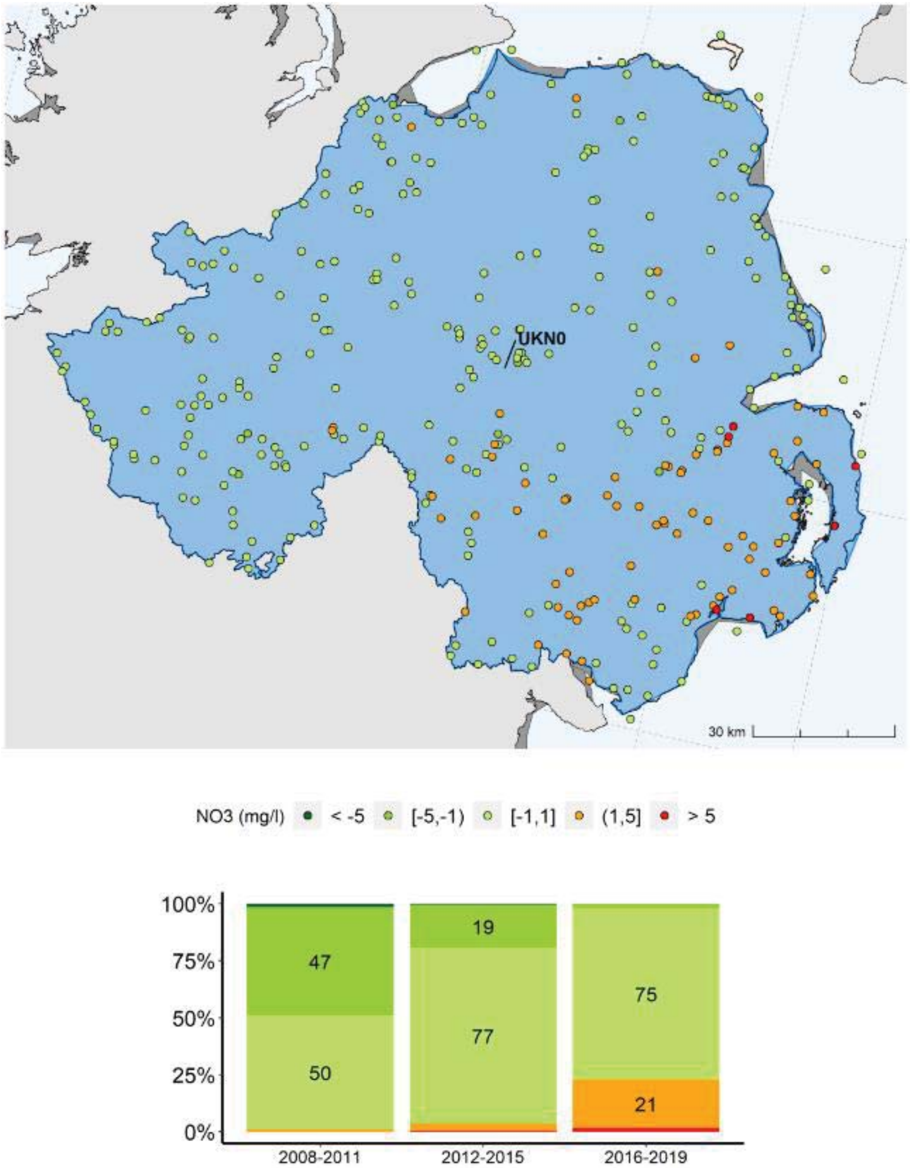


Figure 27. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information.

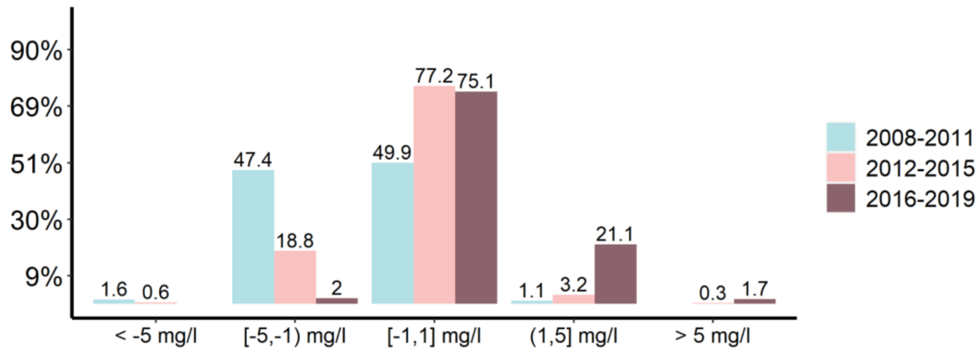
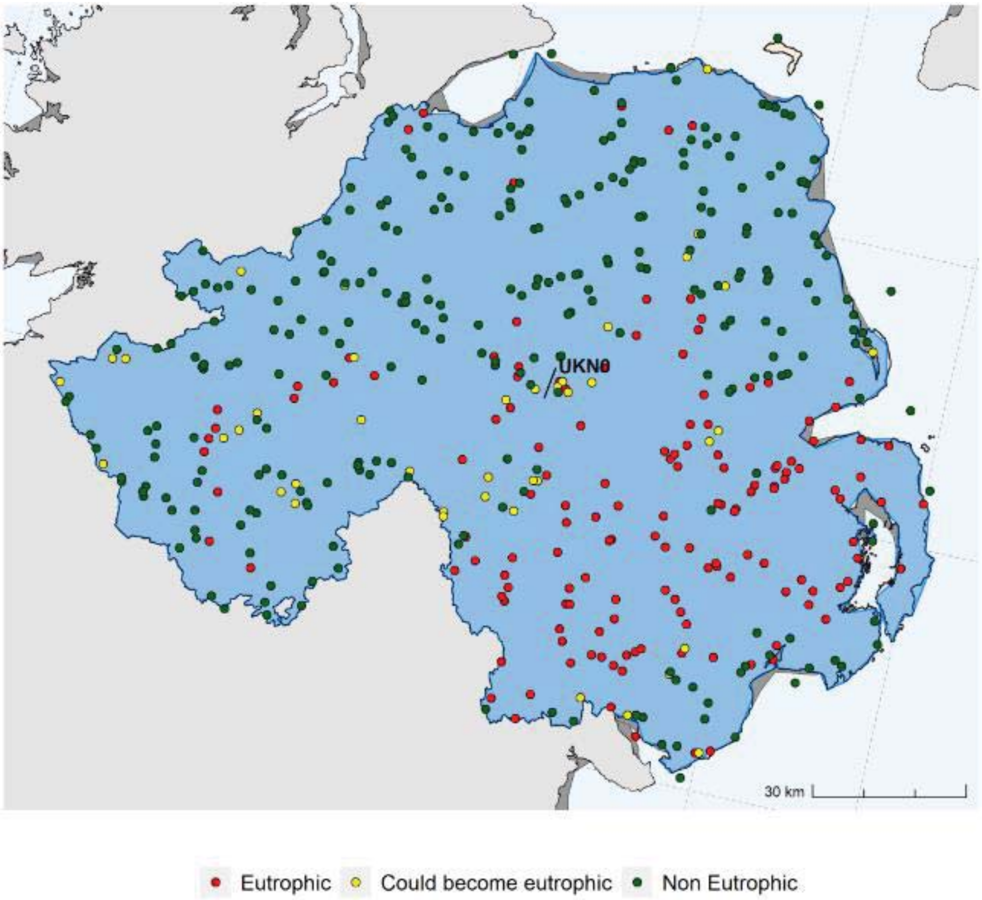


Figure 28. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis).

Surface Water Eutrophication



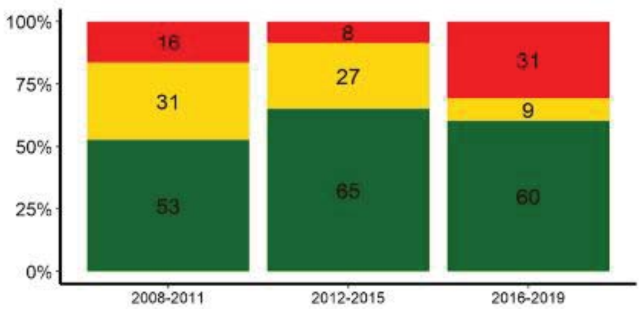


Figure 29. Spatial distribution of eutrophic status (map) and corresponding percentage of monitoring points per classes of status by reporting period (x axis).

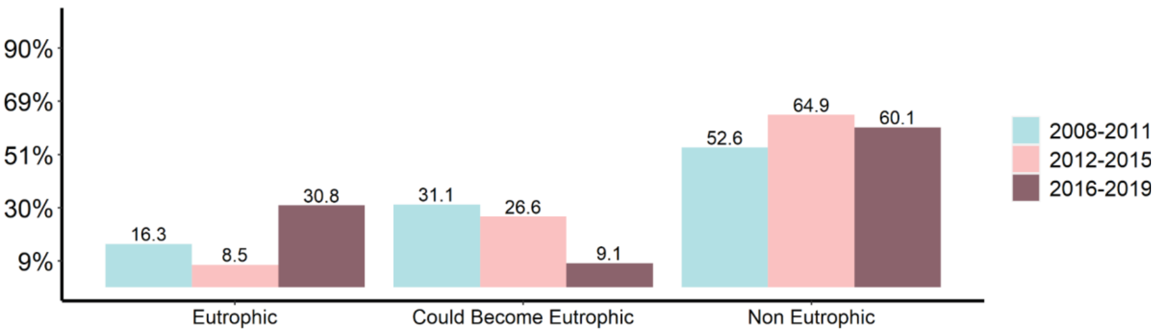
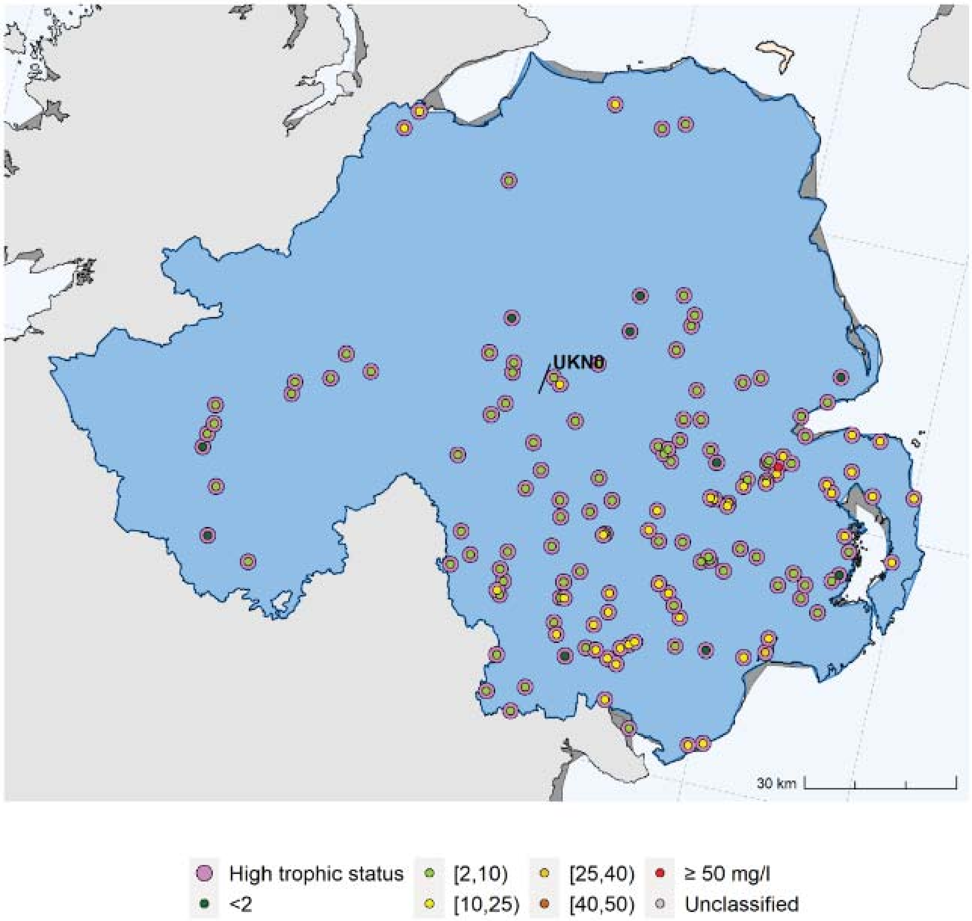


Figure 30. Comparison of percentage of monitoring points in the three reporting periods by classes of status (x axis).

The Eutrophic status vs average NO3 annual concentration



NUTS ID	NUTS NAME	High trophic status	Number of stations by classes of concentration						
			<2 mg/l	[2,10) mg/l	[10,25) mg/l	[25,40) mg/l	[40,50) mg/l	>=50 mg/l	Unclassified
NO_NUTS	SALINE	9	0	2	5	1	0	1	0
UKN0	Northern Ireland	137	10	87	40	0	0	0	0
	Total	**146**	**10**	**89**	**45**	**1**	**0**	**1**	**0**

Figure 31. The SW monitoring stations with eutrophic status versus the average NO3 annual concentration.

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.

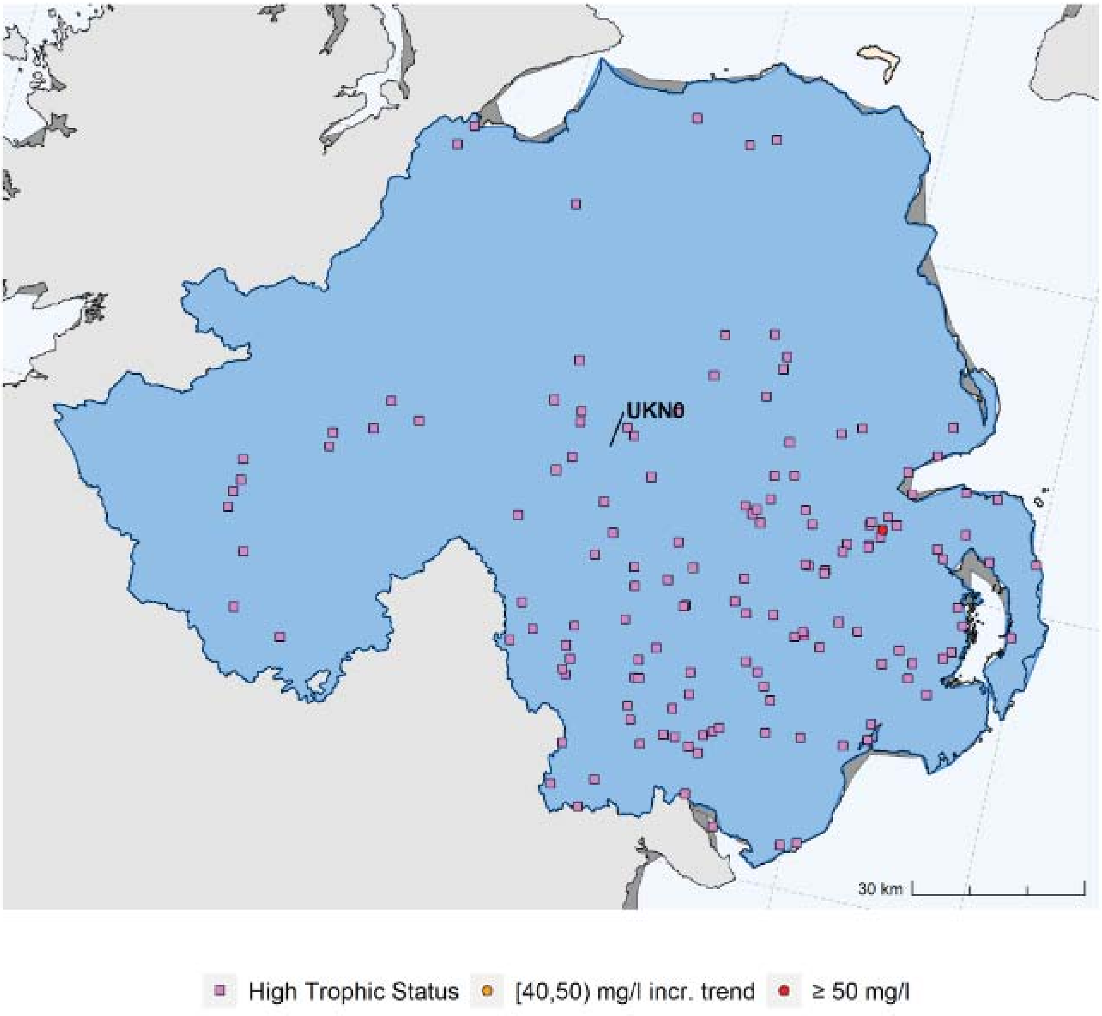
Eutrophication is assessed using WFD nutrient standards and Biological Quality Element (BQE) classification tools which are known to be sensitive to nutrient enrichment. The Water Framework Directive 2018 interim classification data was also be used to assess eutrophication in both rivers and lakes, and transitional and coastal marine waters. For rivers the assessment relies on the soluble reactive phosphorus, diatoms, and macrophytes. Freshwater lakes assessment is based on total phosphorus, chlorophyll-a, cyanobacteria phytoplankton and diatoms, and macrophytes. Both transitional and coastal water trophic status are evaluated based on dissolved inorganic nitrogen, dissolved oxygen, chlorophyll-a, and macroalgae.

All transitional waters were classified as eutrophic. Most of coastal waters were non-eutrophic. The large majority of lakes/reservoirs were eutrophic or could become eutrophic. Rivers were mostly non eutrophic (62%). Eutrophic rivers represent 29% of the total rivers.

Table 7. 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	124	38	268
5	Lake/reservoir water	13	4	3
6	Transitional water	5	0	0
7	Coastal water	4	1	14
8	Marine water	0	0	0
9	Not specified	0	0	0
	Total	**146**	**43**	**285**

Surface Water quality hotspot

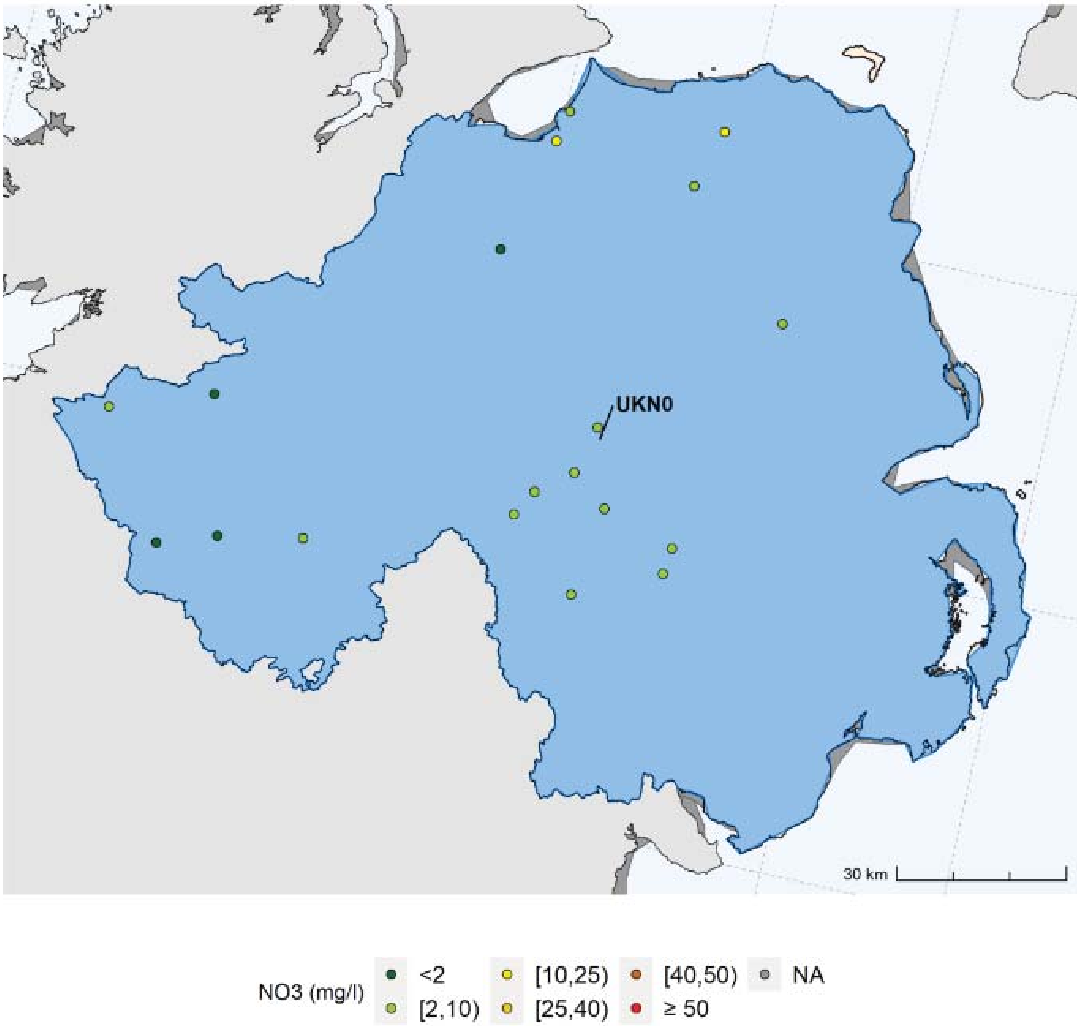


NUTS ID	NUTS NAME	High trophic status	>=40 and < 50 mg/l incr.trend	>=50 mg/l
NO_NUTS	SALINE	9	0	1
UKN0	Northern Ireland	137	0	0
	Total	**146**	**0**	**1**

Figure 32. SW hotspot analysis map (top graph) and distribution by NUTS2 (lower graph) of average NO3 annual concentration greater than 40 mg/l and trophic status.

The hotspot analysis identifies all the SW monitoring stations that have high eutrophic status (eutrophic and hypertrophic), 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



Station Type	Description	Number of removed stations			
		total removed	with measurements	with trends	with trophic status
4	River water	17	17	15	17
5	Lake/reservoir water	1	1	1	1
6	Transitional water	1	1	1	1
7	Coastal water	0	0	0	0
8	Marine water	0	0	0	0
9	Not specified	0	0	0	0
	Total	**19**	**19**	**17**	**19**

Figure 33. 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 Program - Northern Ireland

The Nitrates Action Programme (NAP) is required to be reviewed and, where necessary, revised, at least every four years. There have been three NAPs implemented in Northern Ireland since 2006. Following a scientific review, public consultation and discussion with the Commission, a fourth NAP for the period 2019-2022 came into effect on 11 April 2019 through the Nutrient Action Programme Regulations (Northern Ireland) 2019 (the 2019 NAP Regulations). The Phosphorus Regulations 2015 – 2018 are now incorporated as part of the overall Action Programme. A Nitrates Derogation for Northern Ireland for the period 2019-2022 was also approved in Commission Decision EU 2019/1325 following a positive Member State vote at the Nitrates Regulatory Committee meeting in March 2019. This is the fourth derogation decision approved for Northern Ireland. Therefore the 2019 NAP Regulations were amended to include measures to allow derogation from the 170 kg/ha/year N limit up to a limit of 250 kg/ha/year N for intensive grassland farms which meet certain criteria. In the following table the details of AP.

Table 8. Details of Action Programme

Measure	General details in Action Programme (*)
Period of prohibition of fertiliser application	• Chemical N and P fertiliser must not be applied to grassland from midnight 15 September to midnight 31 January (Part 3, section 7 of the NAP)
	• All types of chemical fertiliser must not be applied to arable land from midnight 15 September to midnight 31 January unless there is a demonstrable crop requirement (Part 3, section 7 of the NAP)
	• Organic manures must not be applied from midnight 15 October to midnight 31 January (Part 3, section 7 of the NAP)
	• Farmyard manure must not be applied from midnight 31 October to midnight 31 January (Part 3, section 7 of the NAP)
Restrictions for application on sloped soils	• On steep slopes (with an average incline of 20% or more on grassland or 15% or more on all other land) where other significant risks of water pollution exist (Part 3, section 8 of the NAP)
	• On other land (with an incline of less than 20% for grassland or less than 15% for all other land) where significant risks of water pollution exist.
	• The risk factors to be considered include the proximity to waterways/lakes, amount to be applied, soil conditions, weather forecast and time to incorporation if applied to arable land (Schedule 4 of the NAP)
Restrictions for application on soaked, frozen, or snow-covered soils	• Not on waterlogged soils, flooded land or land liable to flood, frozen ground or snow covered ground (Part 3, section 8 of the NAP)
Restrictions for application near watercourses (buffer strips)	•All types of chemical fertiliser must not be applied within 2m of any waterway (Part 3, section 8 of the NAP)
	• Several distances are applied for organic manures, including dirty water, depending on time period and type of waterbody (Part 3, section 8 of the NAP)
Effluent storage works	• Provide storage for dirty water during periods when conditions for land application are unsuitable (Part 4 of the NAP)
Capacity of manure storage	• Manure storage for pig and poultry enterprises minimum of 26 weeks (Part 4 of the NAP)
	• Storage for other enterprises minimum of 22 weeks (Part 4 of the NAP)
Rational fertilisation (e.g., splitting fertilisation, limitations)	• Nitrogen and phosphate fertiliser application limits are defined in sections Part 3, sections 10, 13 and 14 of the NAP
Crop rotation, permanent crop enhancement	• Derogated farms only - Crop rotation must not include leguminous or other plants fixing N except for grassland with less than 50 % clover and to areas with cereals and peas undersown with grass
Vegetation cover in rainy periods, winter	• From harvest of certain crops until 15 January of the following year, the controller must manage the land to ensure minimum soil cover and to minimise soil erosion and nutrient run off (Part 4, section 25 of the NAP)
NA	• Residues of crops harvested late must be left undisturbed until just before sowing the following spring (Part 4, section 25 of the NAP)
Fertilisation plans, spreading records	• Records relating to export of organic manure to be submitted annually by 31 January of the following year and by 1 March for derogated holdings (Part 6, section 27 of the NAP)
	• From 1 January 2020 farms importing anaerobic digestate will require a nutrient content analysis (Part 6, section 27 of the NAP)
	• From 1 January 2020 a fertilisation plan must be prepared and kept up to date by all grassland farms using chemical phosphorus fertiliser, and all farms using phosphorus rich manure e.g. some poultry manures, pig FYM manures and anaerobic digestate. A soil analysis is required (Part 3, section 16)
	• From 1 January 2017, evidence of crop P requirement from soil analysis if organic manure with over 0.25 kg TP per 1 kg total nitrogen is applied (Part 3, section 14)
Other measures	• Limits for the application of chemical P fertiliser to crop requirement, based upon a soil analysis; and set values for P recommendations for extensively managed grassland (schedule 5 of the NAP)
Date for application limit of 170 kg N/ha/year:	• 2019

(*) NAP - The Nutrient Action Programme Regulations (Northern Ireland) 2019

Controls - Northern Ireland

The total number of inspections peaked in 2014 with 679 farms and was lowest in 2018 with 330 inspections being carried out as reflected respectively in the 2.1% and 1.4% inspection rates. In the current reporting period 2016-2019 the total number of inspections leveled out with an annual average of 346 equating to 1.4%. The annual number of referral inspections conducted in this reporting period was 72, ranging from 91 in 2016 to 59 in 2018. The most frequent areas of non-compliance related to water pollution, often associated with poorly managed or inadequate manure storage facilities, and exceeding livestock manure limits. Nitrogen fertiliser entering a waterway or water contained in underground strata, resulting in pollution is the most common non-compliance issue found in referral inspections.

Designation of NVZ - Northern Ireland

Northern Ireland applies a whole territory approach (13,500 km^2).

Forecast of Water Quality - Northern Ireland

Geo-statistical modelling techniques have been developed extensively in the last 10 years by Northern Ireland and analysis has been undertaken to explore changes in Nutrient Export Coefficients in recent years.

Forecasting of response in groundwater nitrate concentrations to changes in land use is particularly difficult in Northern Ireland given the dominance of locally discharging, shallow flow groundwater systems with relatively limited groundwater residence times. The extensive and variable cover of glacially-derived deposits, which strongly influences the vertical migration of nitrates from near surface to the underlying groundwater body, also complicates predictions.

Groundwater monitoring and results analysis to date have indicated that measured groundwater concentrations are, for the most part, below concentrations of significance (for 2014-2019 period 98 % of monitored boreholes with annual average < 25 mg/l NO3).

Summary - Northern Ireland

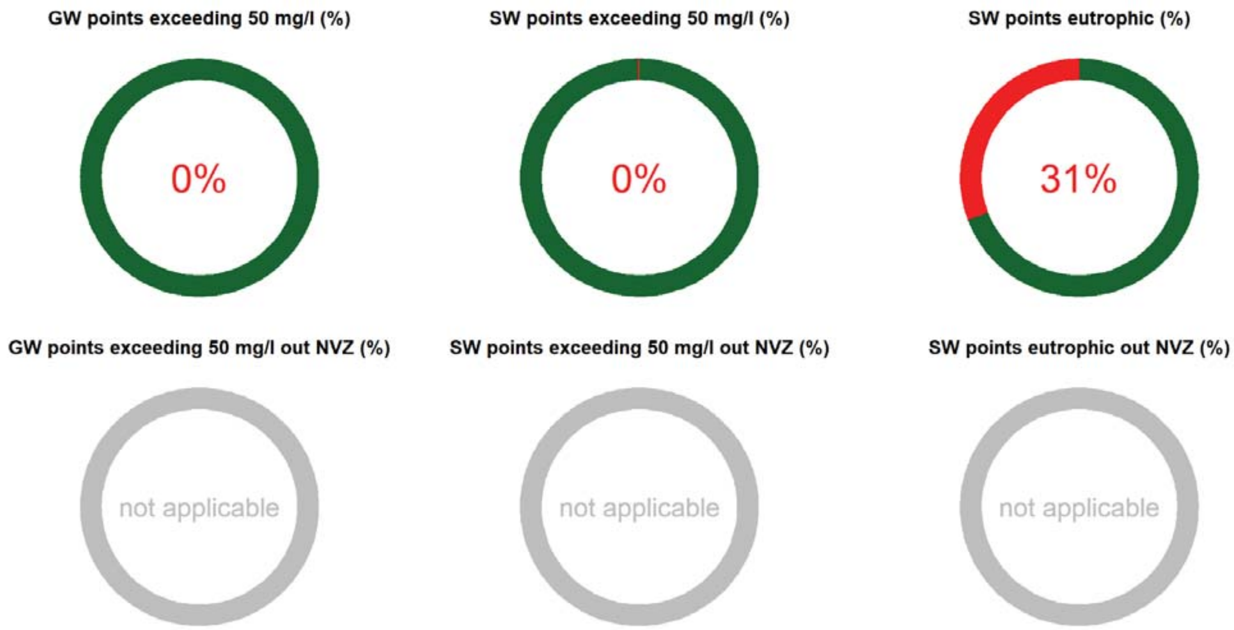


Figure 34. The summary plot for the period 2016-2019

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 - Northern Ireland

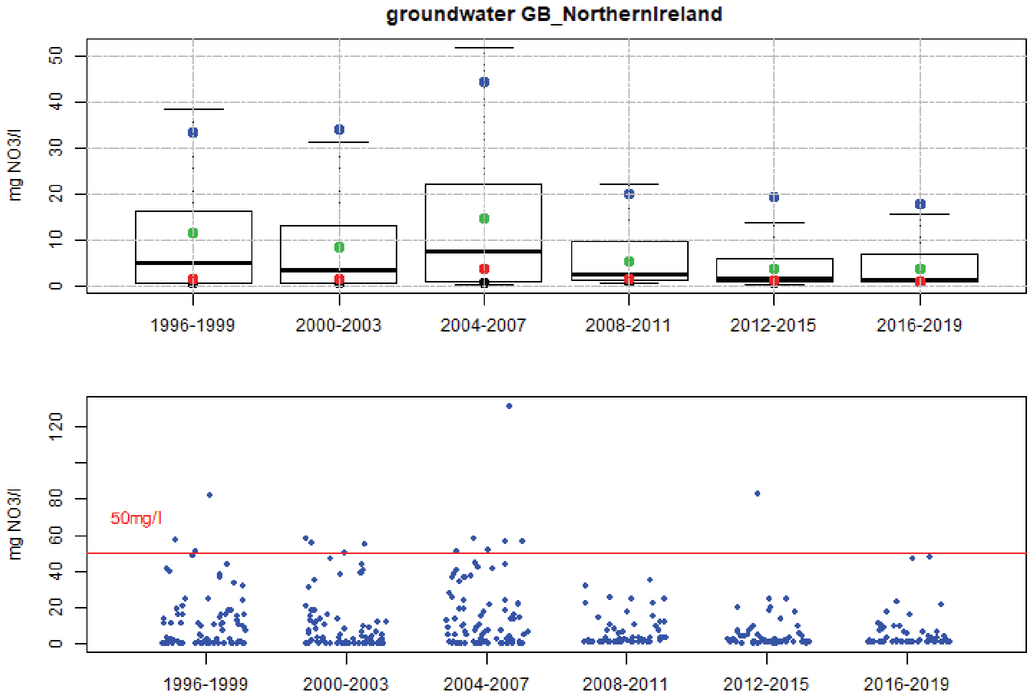


Figure 35. Time series of box whisker plots along with the distribution of the values average NO3 annual concentrations for each reporting period for groundwater stations. RPs represent the reporting periods, RP7 being the last period (2016-2019). The blue, red, green and black dots represent the mean of the fourth third, second and first quartiles, respectively.

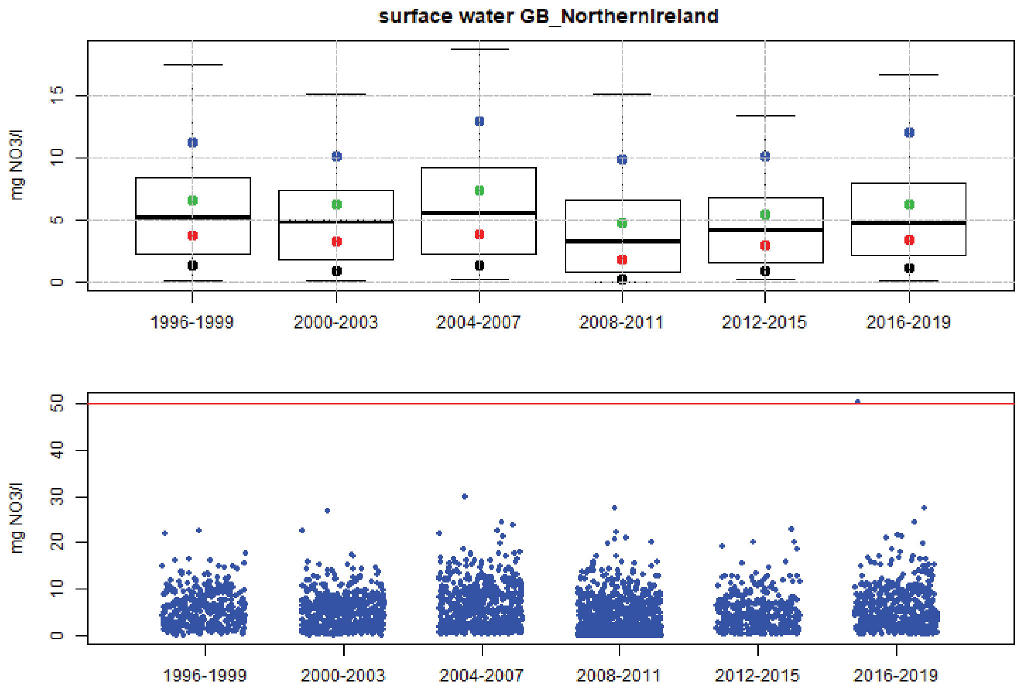


Figure 36. Time series of box whisker plots along with the distribution of the values average NO3 annual concentrations for each reporting period for surface water stations. RPs represent the reporting periods, RP7 being the last period (2016-2019). The blue, red, green and black dots represent the mean of the fourth third, second and first quartiles, respectively.

EUROPEAN
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SWD(2021) 1001 final

PART 38/38

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}

Water Quality Monitoring - Scotland

Since the country report of Scotland is not available no descriptions are reported in the following sections. 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 9. Number of GW stations with measurements and trends per type

Station Type	Description	Number of stations with measurements			Number of stations with Trends		
		2008-2011	2012-2015	2016-2019	2008-2011	2012-2015	2016-2019
0	Phreatic groundwater (shallow): 0-5 m	77	99	99	25	88	93
1a	Phreatic groundwater (deep) 5-15 m	59	41	40	25	39	39
1b	Phreatic groundwater (deep) 15-30 m	86	61	61	40	58	60
1c	Phreatic groundwater (deep) >30 m	47	80	78	22	71	74
2	Captive groundwater	48	33	28	20	33	28
3	Karstic groundwater	0	0	0	0	0	0
9	Not specified	0	0	0	0	0	0
	Total	**317**	**314**	**306**	**132**	**289**	**294**

Surface water quality monitoring network

Table 10. Number of SW stations with measurements, trends and trophic status per type

Station Type	Description	Number of stations with measurements			Number of stations with Trends			Number of stations with Trophic status		
		2008-2011	2012-2015	2016-2019	2008-2011	2012-2015	2016-2019	2008-2011	2012-2015	2016-2019
4	River water	223	388	555	223	179	422	0	0	554
5	Lake/reservoir water	86	42	95	2	29	80	0	0	96
6	Transitional water	69	27	27	28	27	27	0	0	27
7	Coastal water	101	12	3	25	12	3	0	0	3
8	Marine water	0	0	0	0	0	0	0	0	0
9	Not specified	0	0	0	0	0	0	0	0	0
	Total	**479**	**469**	**680**	**278**	**247**	**532**	**0**	**0**	**680**

Groundwater Quality - Scotland

Groundwater average annual nitrate concentration

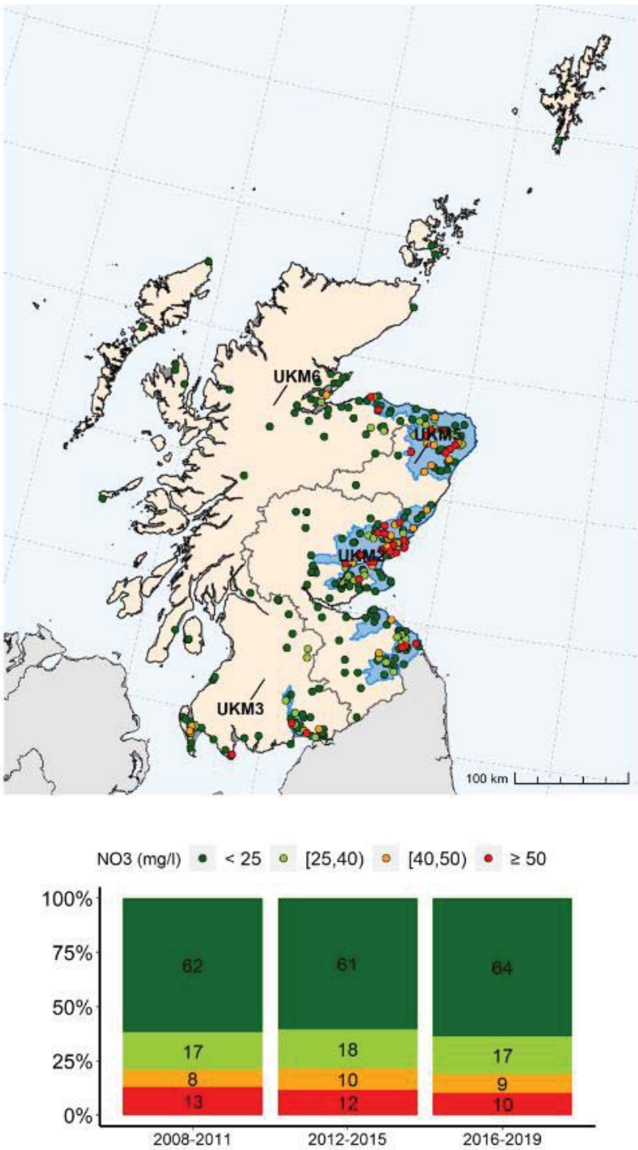


Figure 37. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). In the map in blue the NVZ.

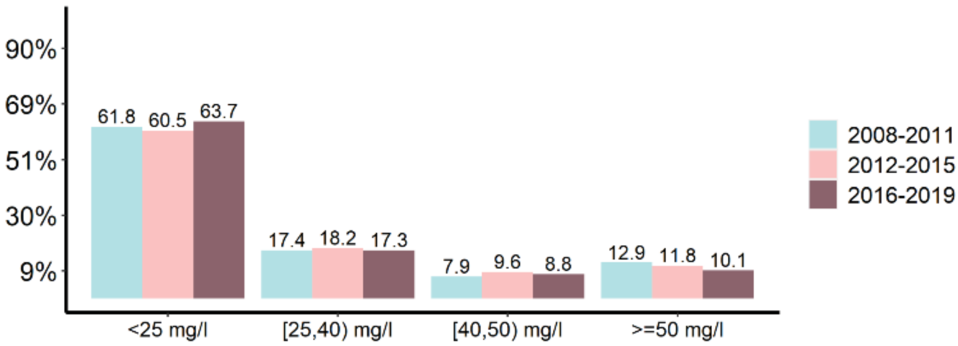
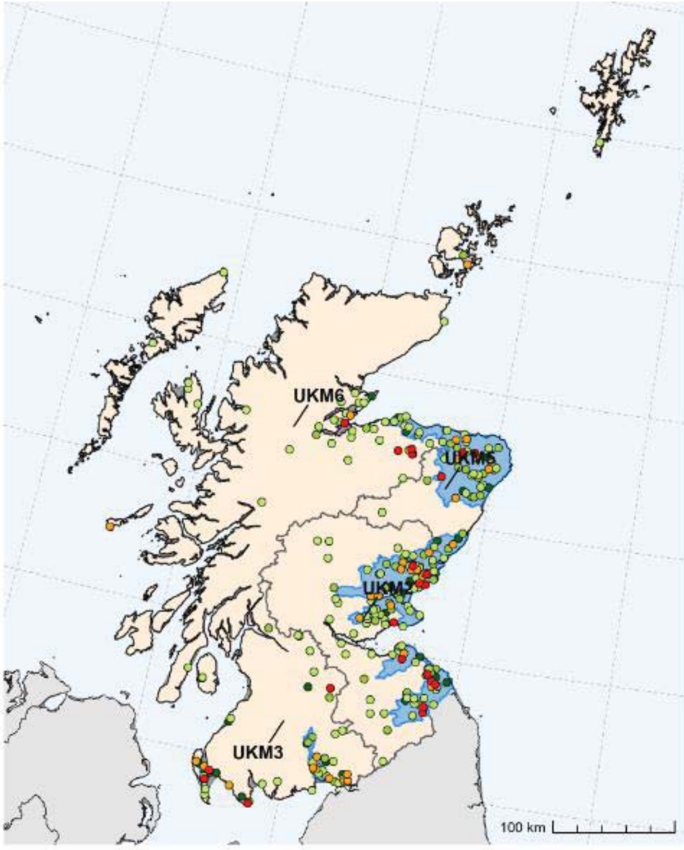


Figure 38. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis).

Groundwater average annual nitrate concentration trend



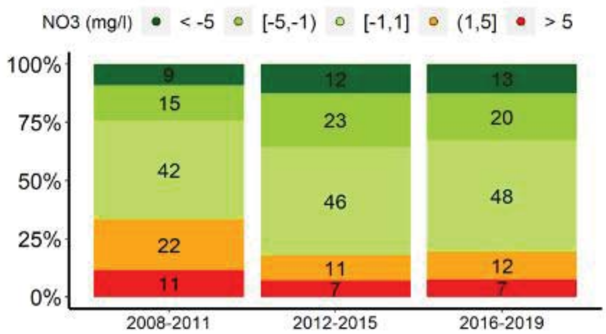


Figure 39. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis). In the map in blue the NVZ.

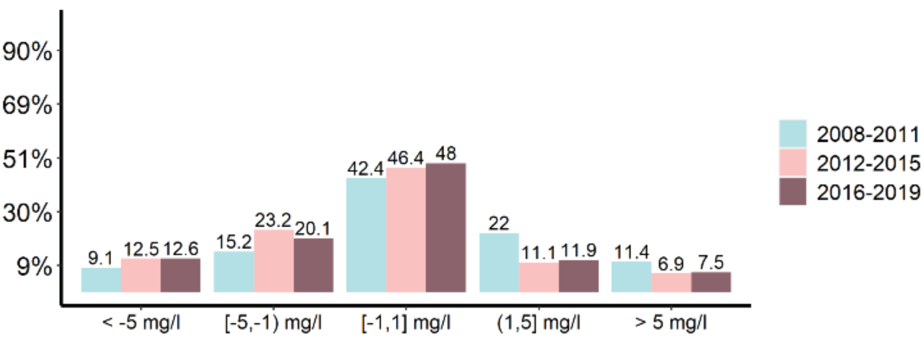
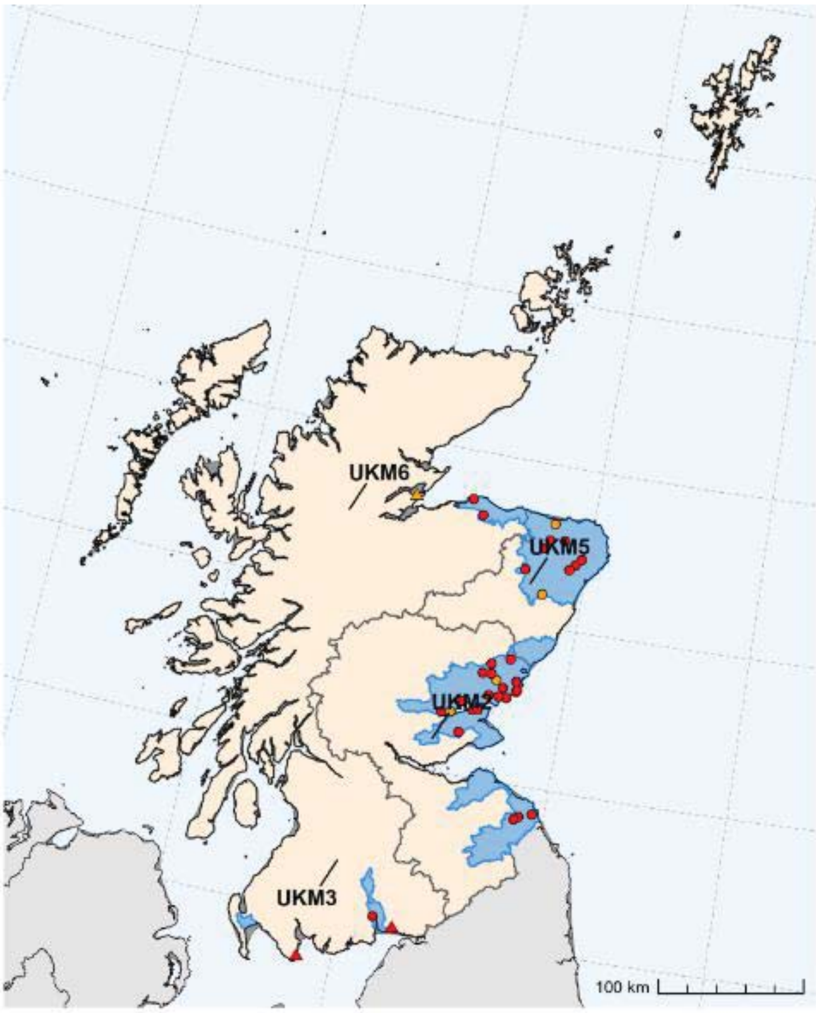


Figure 40. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis).

Groundwater hotspot



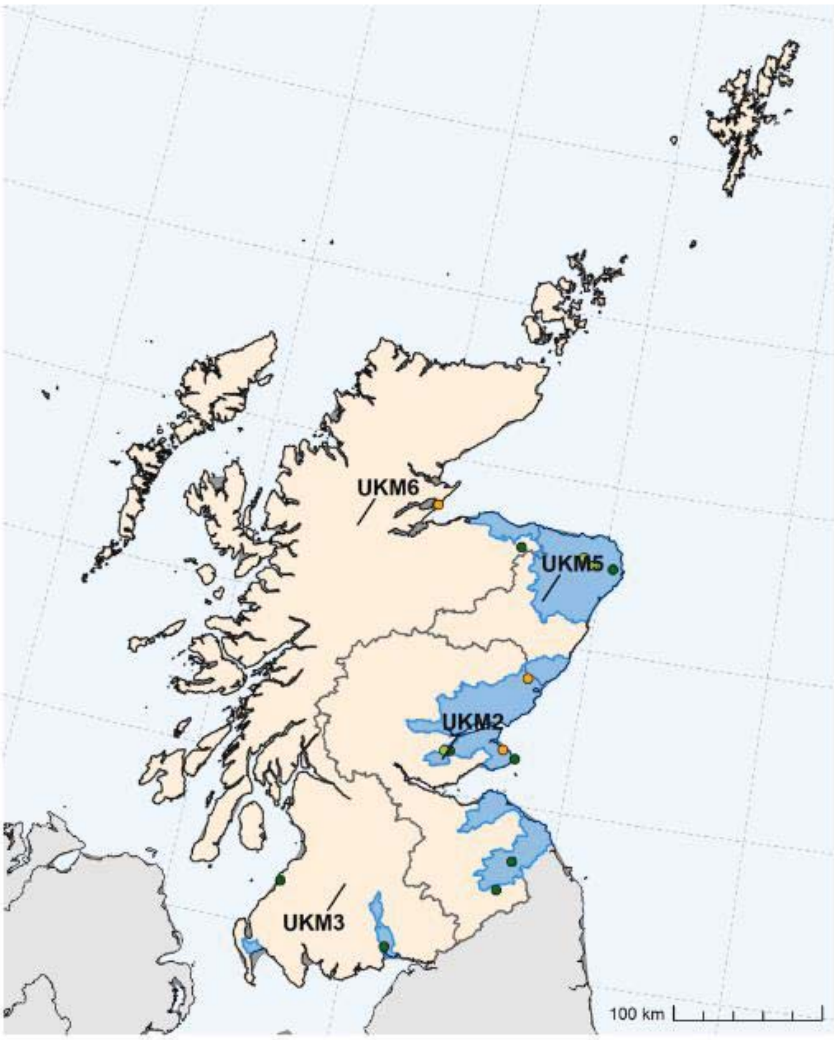
NO3 (mg/l) ● [40,50) incr. trend InNVZ ▲ [40,50) incr. trend OutNVZ ● ≥ 50 InNVZ ▲ ≥ 50 OutNVZ

		>=40 and < 50 mg/l incr.trend		>=50 mg/l	
NUTS ID	NUTS NAME	InNVZ	OutNVZ	InNVZ	OutNVZ
UKM2	Eastern Scotland	2	0	19	0
UKM3	South Western Scotland	0	0	1	2
UKM5	North Eastern Scotland	2	0	7	0
UKM6	Highlands and Islands	0	1	2	0
	Total	**4**	**1**	**29**	**2**

Figure 41. 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



NO_3 (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	6	6	5
1a	Phreatic groundwater (deep) 5-15 m	0	0	0
1b	Phreatic groundwater (deep) 15-30 m	0	0	0
1c	Phreatic groundwater (deep) >30 m	5	5	5
2	Captive groundwater	3	3	3
3	Karstic groundwater	0	0	0
9	Not specified	0	0	0
	Total	**14**	**14**	**13**

Figure 42. 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 - Scotland

Surface water average annual nitrate concentration

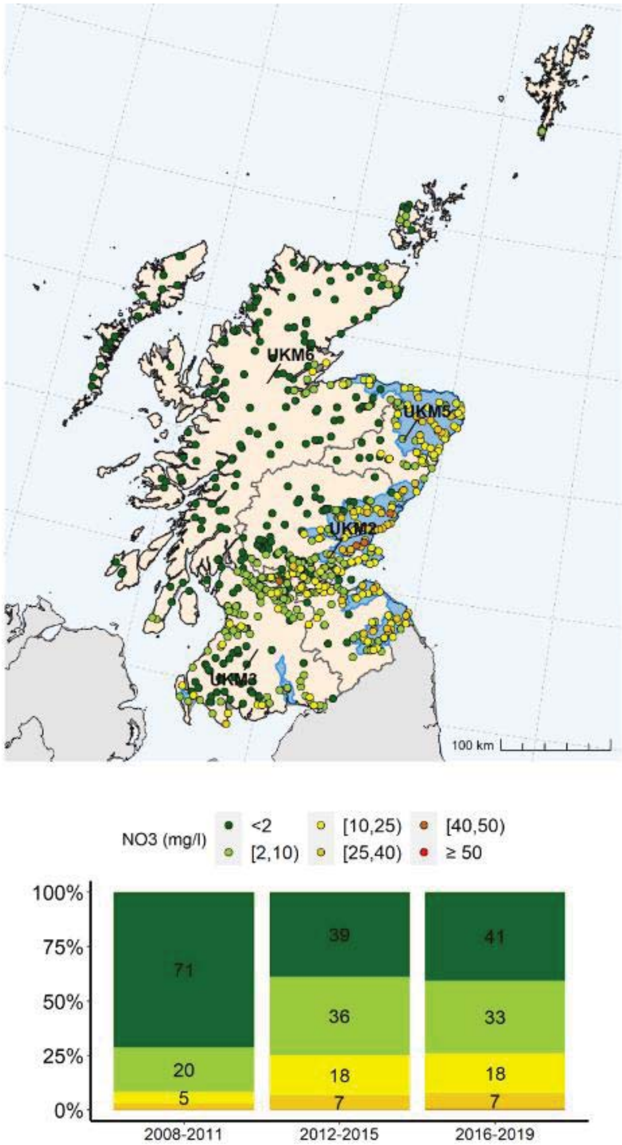


Figure 43. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information. In the map in blue the NVZ.

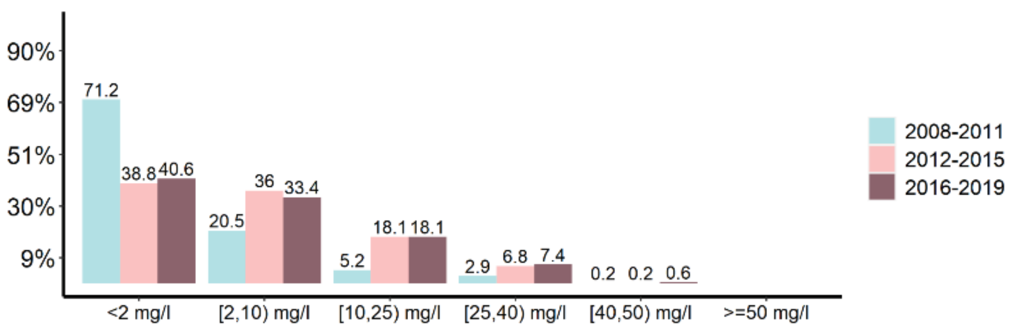


Figure 44. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis).

Surface water average annual nitrate concentration trend

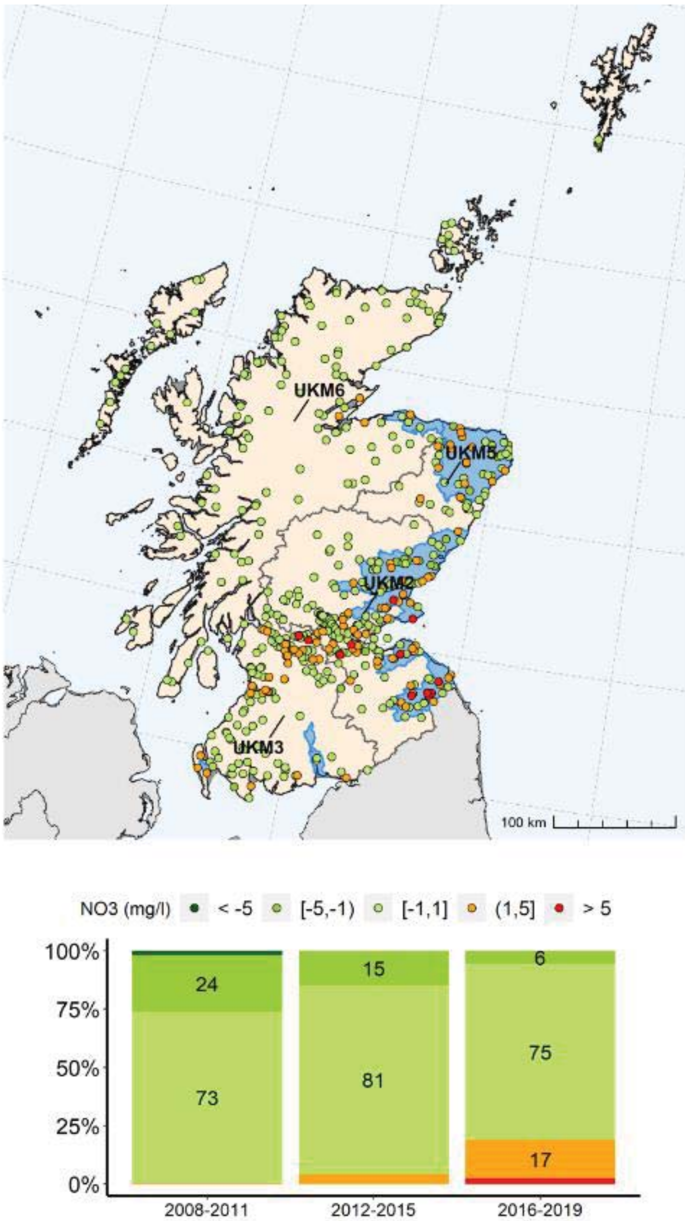


Figure 45. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information. In the map in blue the NVZ.

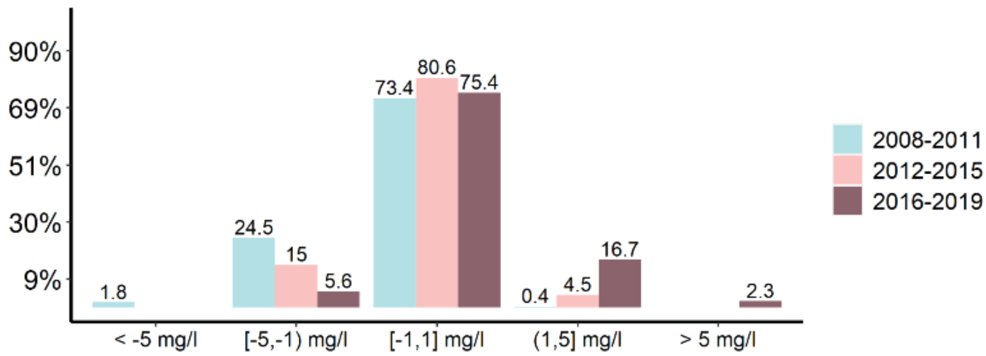


Figure 46. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis).

Surface Water Eutrophication

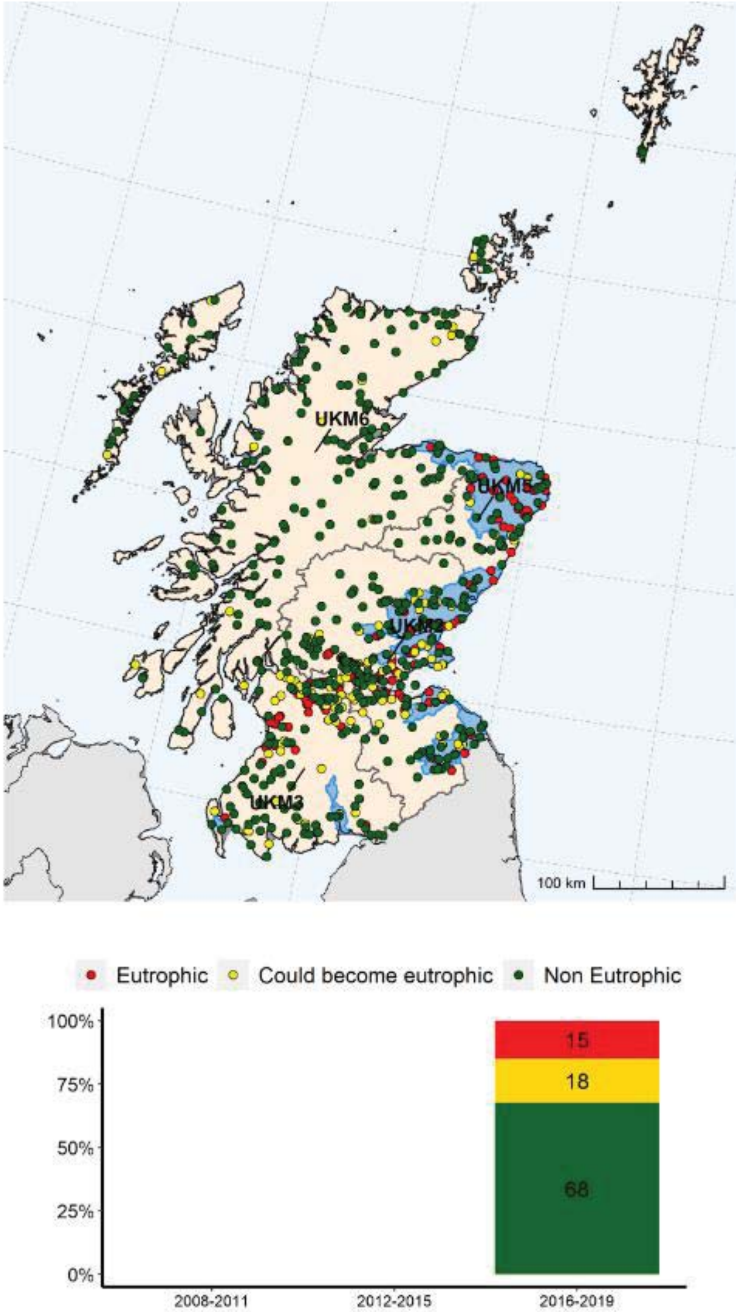


Figure 47. Spatial distribution of eutrophic status (map) and corresponding percentage of monitoring points per classes of status by reporting period (x axis). In the map in blue the NVZ.

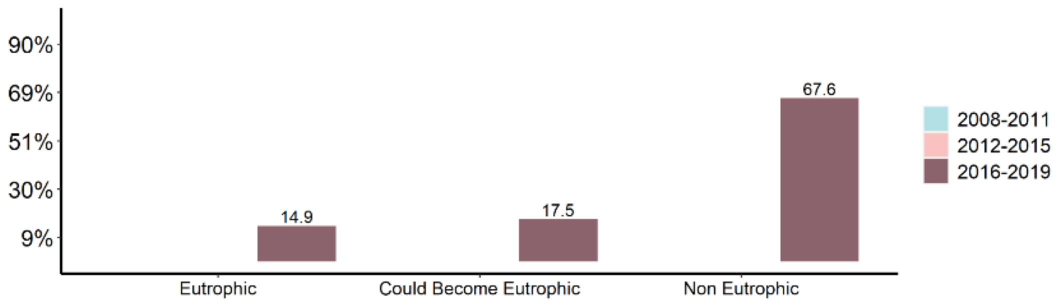
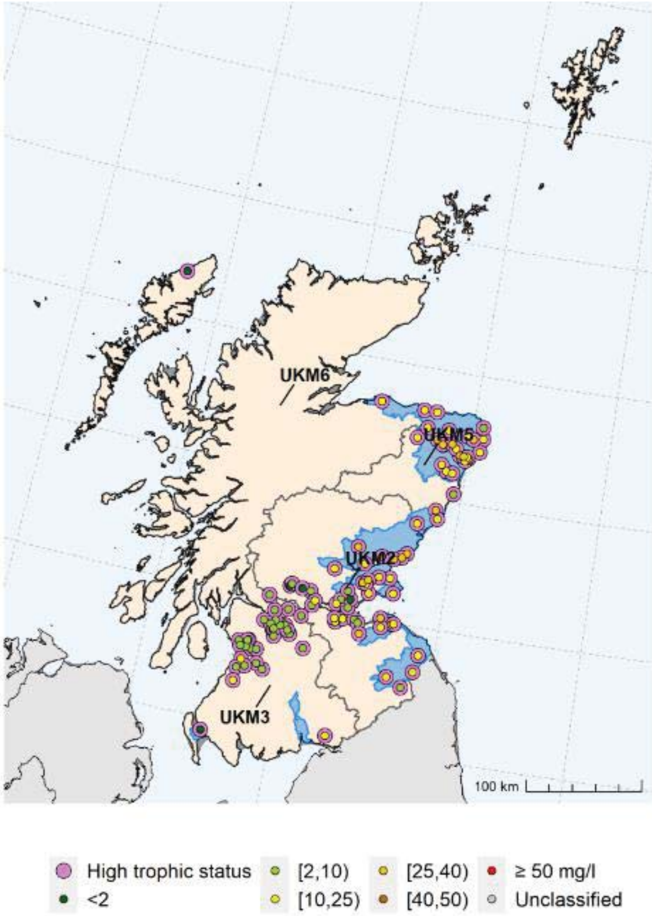


Figure 48. Comparison of percentage of monitoring points in the three reporting periods by classes of status (x axis)

The Eutrophic status vs average NO3 annual concentration



NUTS ID	NUTS NAME	High trophic status	Number of stations by classes of concentration							
			<2 mg/l	[2,10) mg/l	[10,25) mg/l	[25,40) mg/l	[40,50) mg/l	>=50 mg/l	Unclassified
UKM2	Eastern Scotland	40	3	10	18	9	0	0	0
UKM3	South Western Scotland	32	1	28	3	0	0	0	0
UKM5	North Eastern Scotland	27	0	2	17	8	0	0	0
UKM6	Highlands and Islands	2	1	0	1	0	0	0	0
	Total	**101**	**5**	**40**	**39**	**17**	**0**	**0**	**0**

Figure 49. The SW monitoring stations with eutrophic status versus the average NO3 annual concentration. In the map in blue the NVZ.

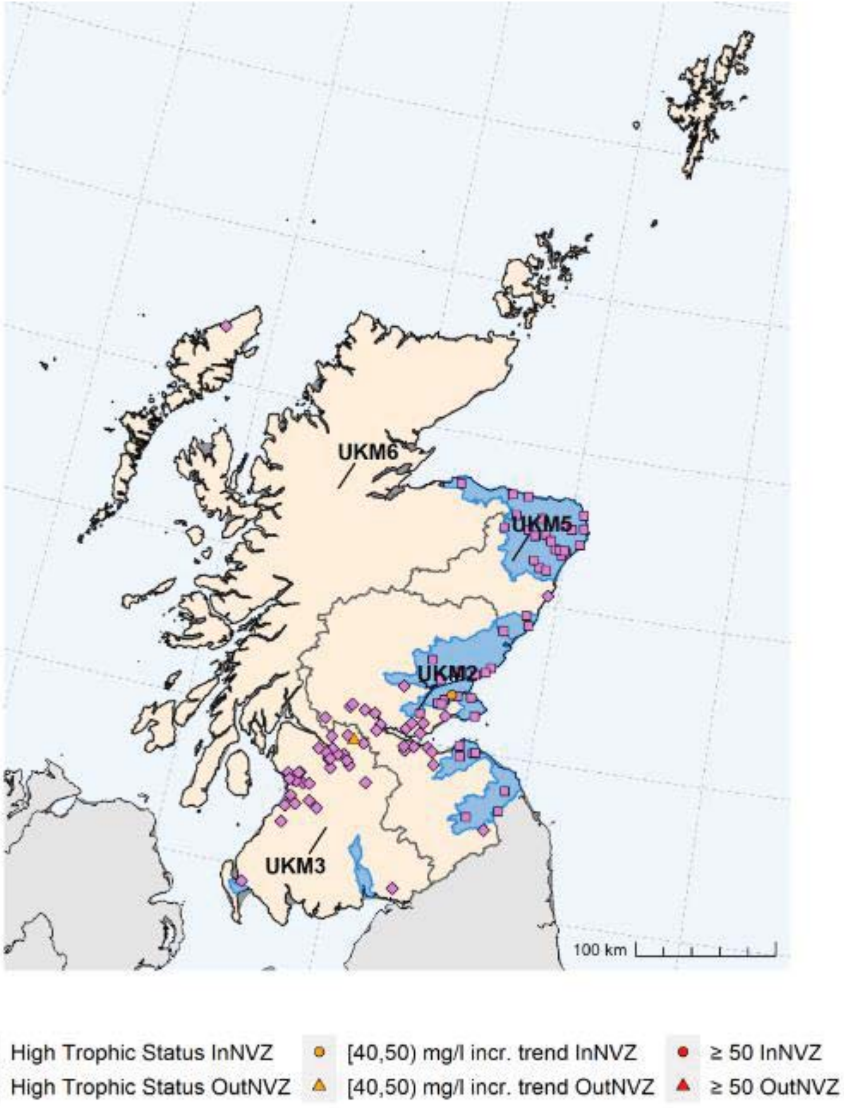
The analysis shows all the SW monitoring stations with high trophic status and the corresponding value of NO3 concentration. The map shows the spatial distribution of these points, and the table reports the number of stations with measurements with highest trophic status and the corresponding stations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

In the following table the count of stations by classes of trophic status and type is reported.

Table 11. Summary of SW stations by classes of trophic status and type.

Station Type	Description	Number of stations with Trophic status		
		Eutrophic	Could become eutrophic	Non Eutrophic
4	River water	96	72	386
5	Lake/reservoir water	5	36	55
6	Transitional water	0	11	16
7	Coastal water	0	0	3
8	Marine water	0	0	0
9	Not specified	0	0	0
	Total	**101**	**119**	**460**

Surface Water quality hotspot

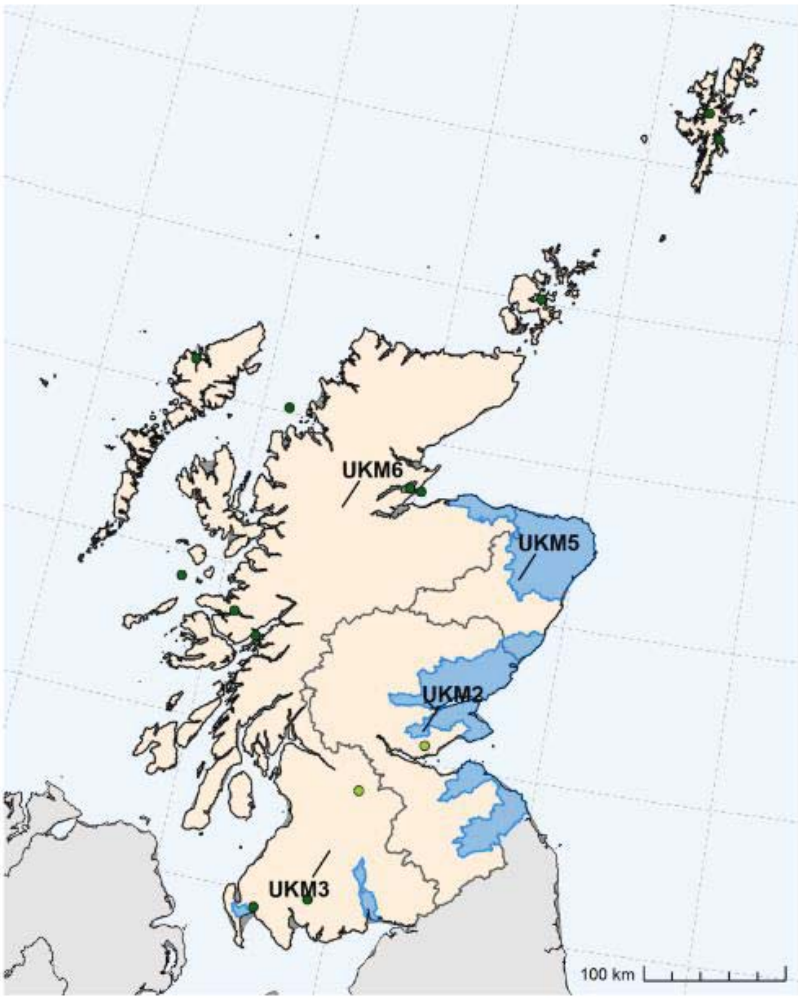


		High trophic status		>=40 and < 50 mg/l incr.trend		>=50 mg/l	
NUTS ID	NUTS NAME	InNVZ	OutNVZ	InNVZ	OutNVZ	InNVZ	OutNVZ
UKM2	Eastern Scotland	20	20	1	0	0	0
UKM3	South Western Scotland	0	32	0	1	0	0
UKM5	North Eastern Scotland	26	1	0	0	0	0
UKM6	Highlands and Islands	1	1	0	0	0	0
	Total	**47**	**54**	**1**	**1**	**0**	**0**

Figure 50. SW 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 SW monitoring stations that have high trophic status (eutrophic and hypertrophic), 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



Station Type	Description	Number of removed stations total removed	with measurements	with trends	with trophic status
4	River water	3	3	1	0
5	Lake/reservoir water	1	1	0	0
6	Transitional water	1	1	1	0
7	Coastal water	9	9	9	0
8	Marine water	0	0	0	0
9	Not specified	0	0	0	0
	Total	**14**	**14**	**11**	**0**

Figure 51. SW removed stations map (top graph) and distribution by surface water type (lower graph). In the map in blue the NVZ.

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 Program - Scotland

The Measures in the Action Program are not available since the country report of Scotland was not submitted.

Controls - Scotland

The information about the controls are not available since the country report of Scotland was not submitted.

Designation of NVZ - Scotland

Scotland decreased the NVZ areas since the last reporting period. The total area is 8409 km^2, 25% lower with respect to the previous reporting period (11263 km^2).

Forecast of Water Quality - Scotland

Forecast analysis are not available since the country report of Scotland was not submitted.

Summary – Scotland

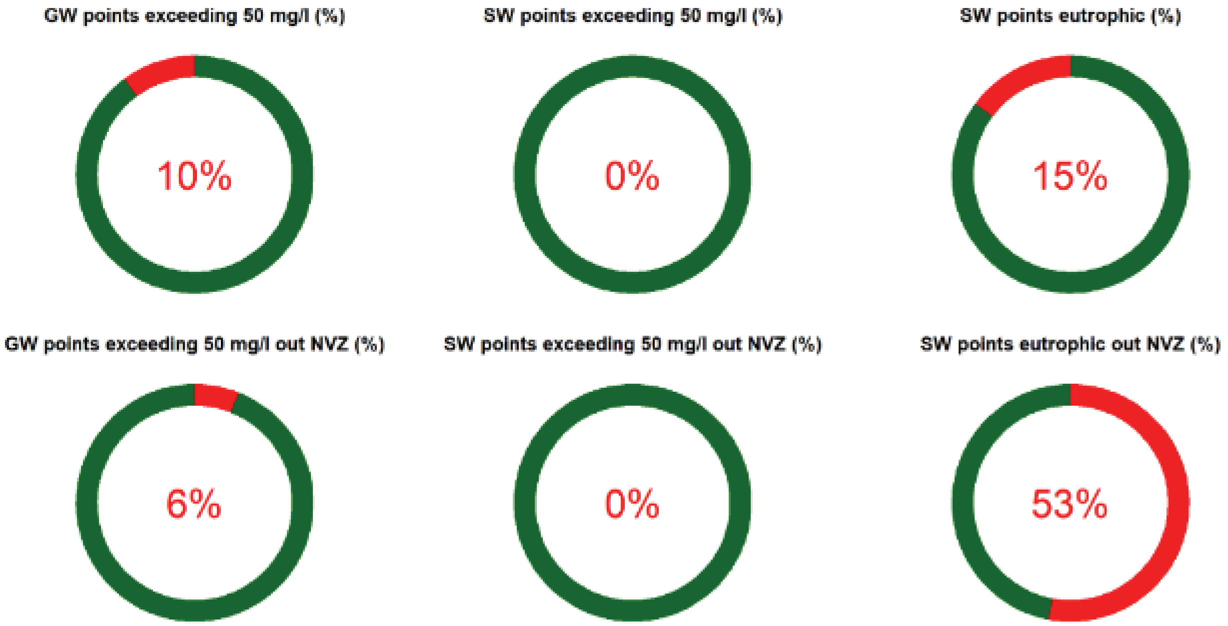


Figure 52. The summary plot for the period 2016-2019

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 - Scotland

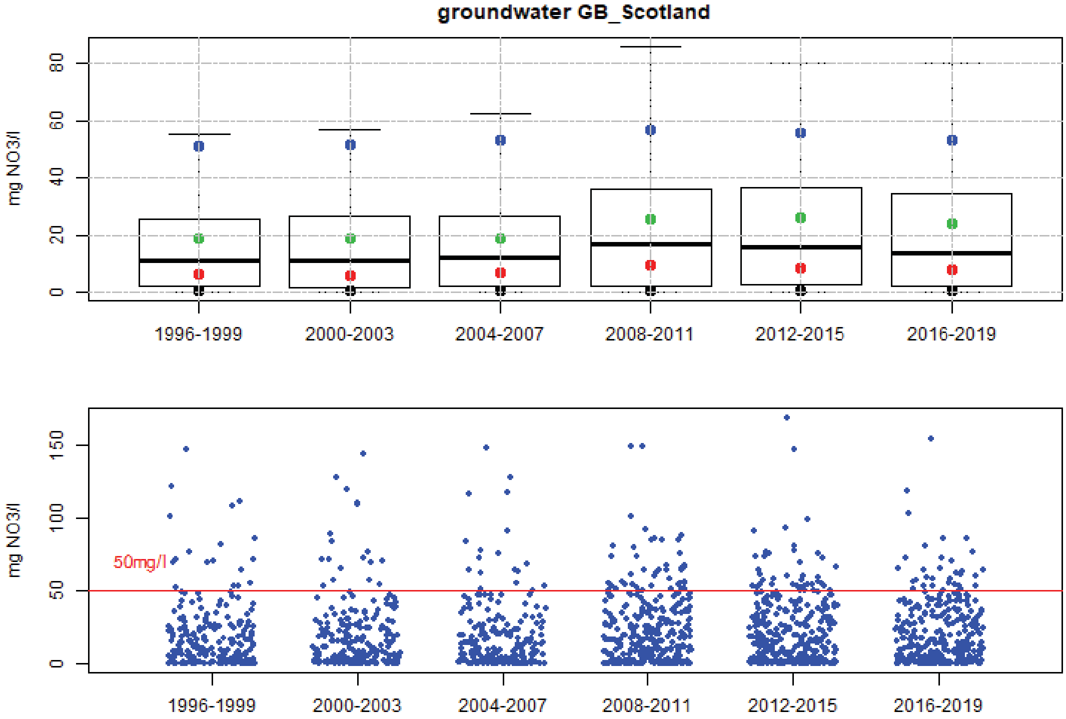


Figure 53. Time series of box whisker plots along with the distribution of the values average NO3 annual concentrations for each reporting period for groundwater stations. RPs represent the reporting periods, RP7 being the last period (2016-2019). The blue, red, green and black dots represent the mean of the fourth third, second and first quartiles, respectively.

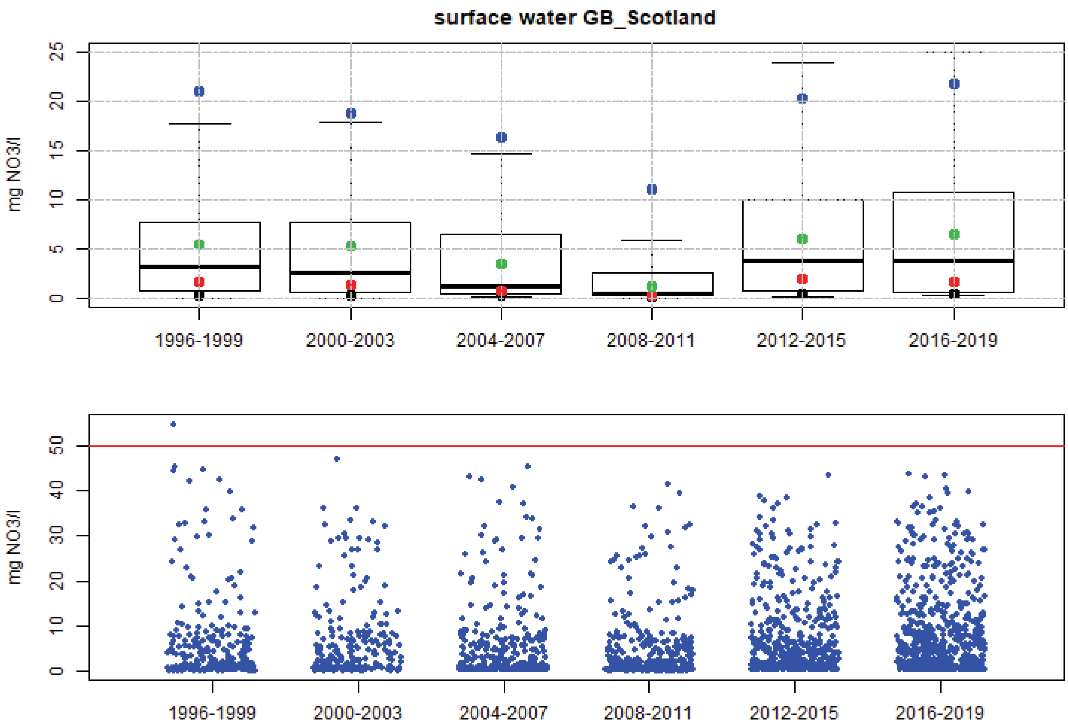


Figure 54. Time series of box whisker plots along with the distribution of the values average NO3 annual concentrations for each reporting period for surface water stations. RPs represent the reporting periods, RP7 being the last period (2016-2019). The blue, red, green and black dots represent the mean of the fourth third, second and first quartiles, respectively.

Water Quality Monitoring - Wales

Since the country report Wales report was not available no descriptions are reported in the following sections. Wales, as in previous reporting periods, did not provide the trophic status for the current reporting period.

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 12. 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	0	103	74	0	43	62
1a	Phreatic groundwater (deep) 5-15 m	87	60	61	87	54	53
1b	Phreatic groundwater (deep) 15-30 m	0	7	7	0	7	7
1c	Phreatic groundwater (deep) >30 m	31	54	34	31	45	34
2	Captive groundwater	7	18	11	7	13	11
3	Karstic groundwater	0	5	4	0	5	4
9	Not specified	0	0	0	0	0	0
	Total	**125**	**247**	**191**	**125**	**167**	**171**

Surface water quality monitoring network

Table 13. 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	1171	1174	671	845	790	608	0	0	0
5	Lake/reservoir water	0	0	0	0	0	0	0	0	0
6	Transitional water	0	0	0	0	0	0	0	0	0
7	Coastal water	127	185	181	72	97	142	0	0	0
8	Marine water	0	0	0	0	0	0	0	0	0
9	Not specified	0	0	0	0	0	0	0	0	0
	Total	**1298**	**1359**	**852**	**917**	**887**	**750**	**0**	**0**	**0**

Groundwater Quality- Wales

Groundwater average annual nitrate concentration

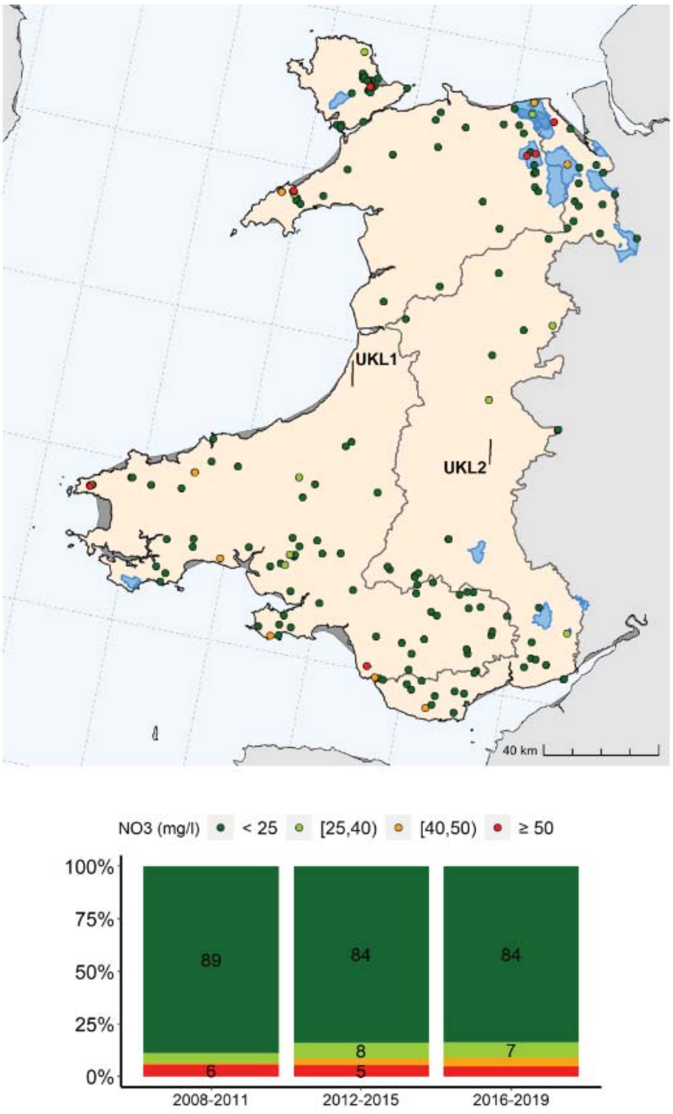


Figure 55. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information. In the map in blue the NVZ.

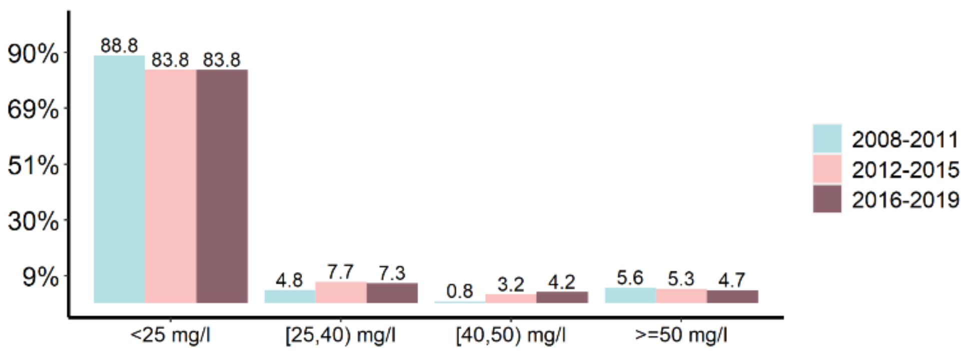
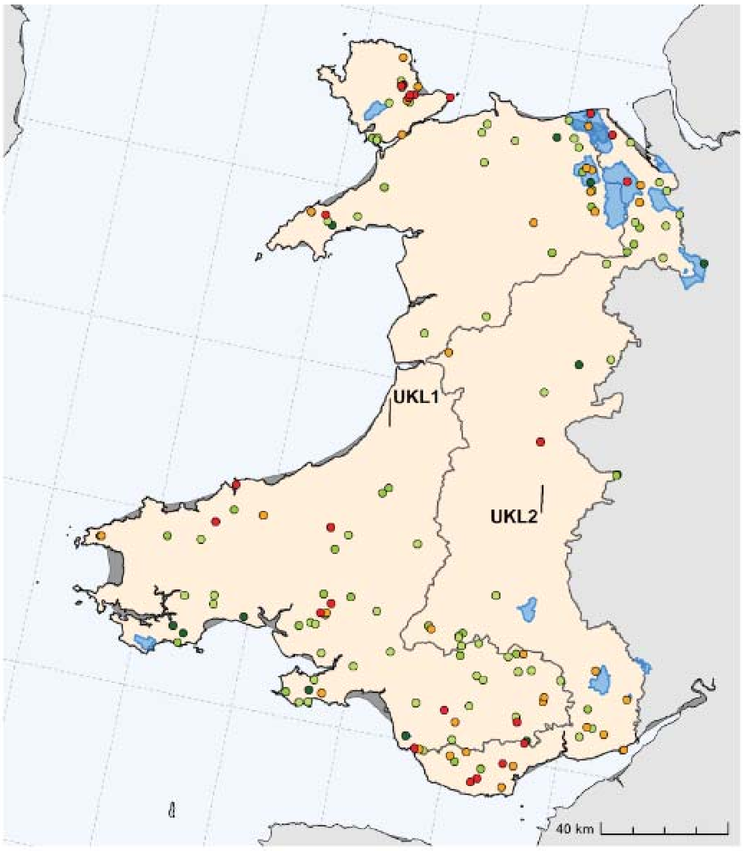


Figure 56. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis).

Groundwater average annual nitrate concentration trend



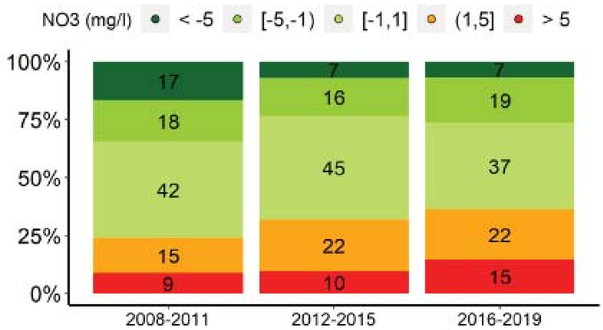


Figure 57. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis). In the map in blue the NVZ.

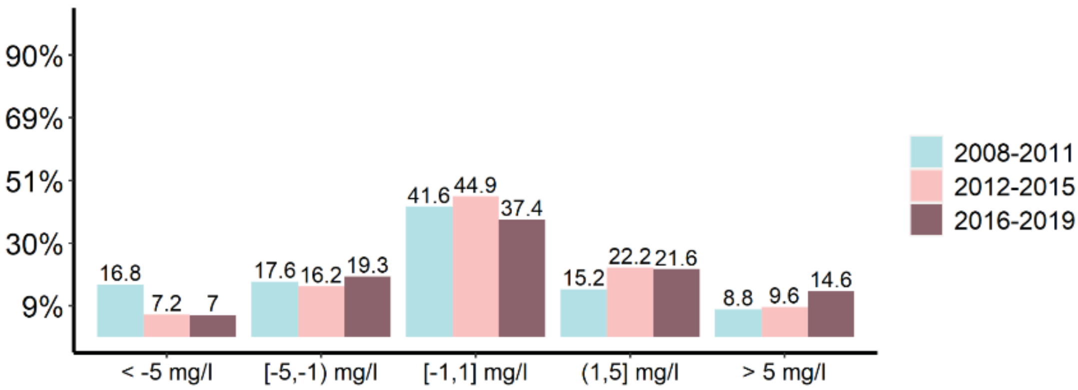
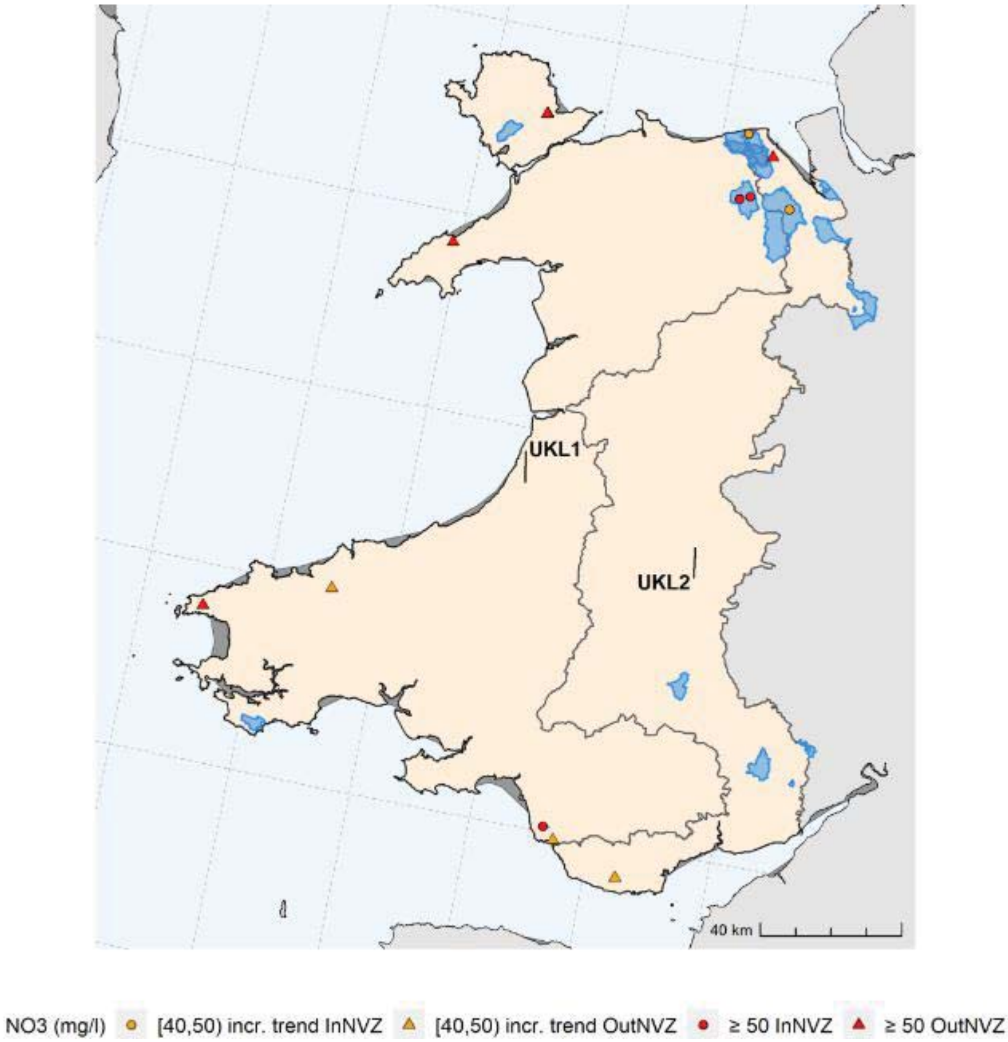


Figure 58. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis).

Groundwater hotspot



		>=40 and < 50 mg/l incr.trend		>=50 mg/l	
NUTS ID	NUTS NAME	InNVZ	OutNVZ	InNVZ	OutNVZ
UKL1	West Wales and The Valleys	1	2	3	5
UKL2	East Wales	1	1	0	1
	Total	**2**	**3**	**3**	**6**

Figure 59. 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.

Surface Water Quality- Wales

Surface water average annual nitrate concentration

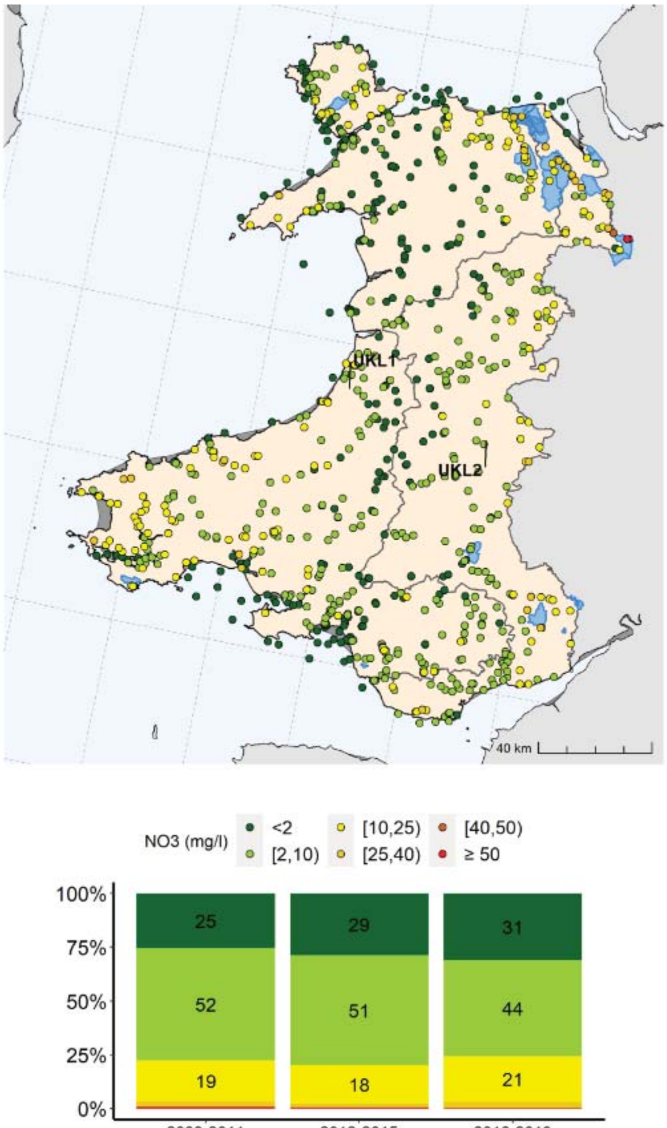


Figure 60. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information. In the map in blue the NVZ.

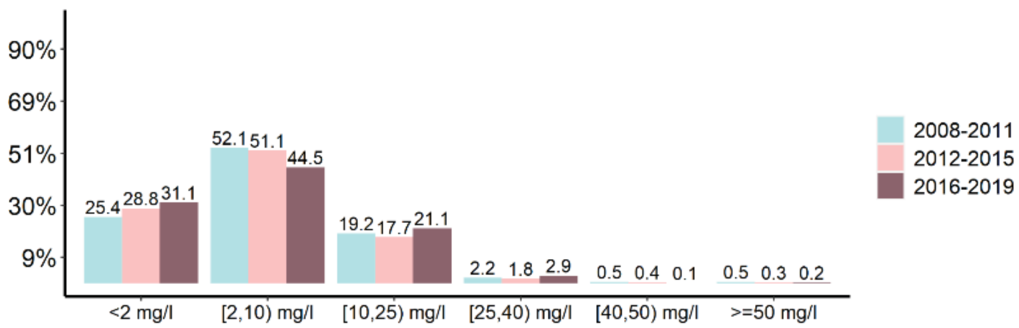
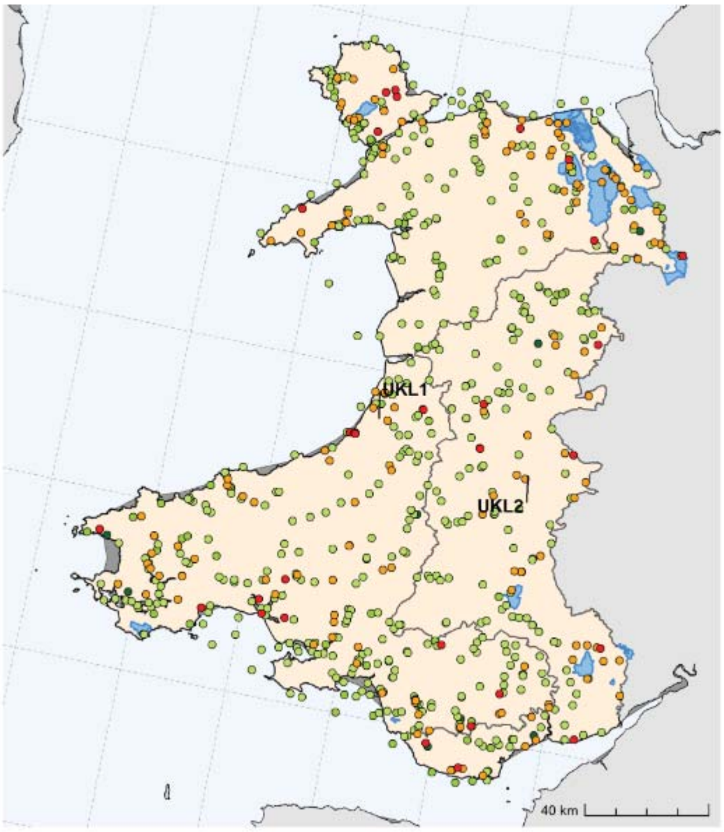


Figure 61. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis).

Surface water average annual nitrate concentration trend



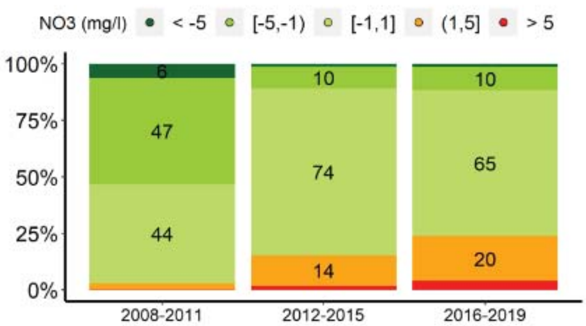


Figure 62. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information. In the map in blue the NVZ.

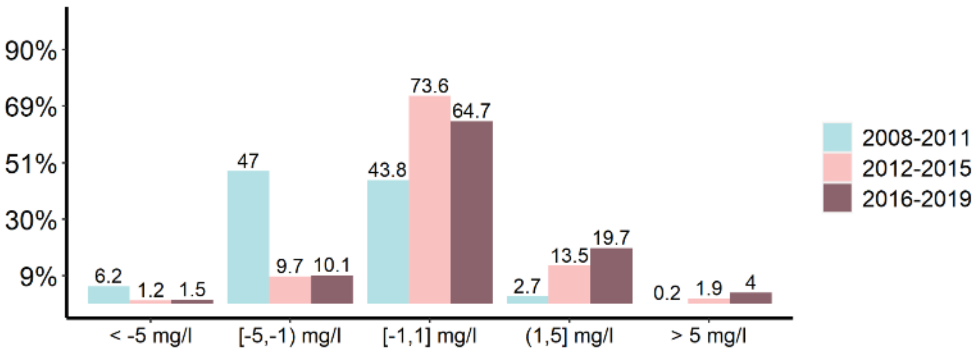
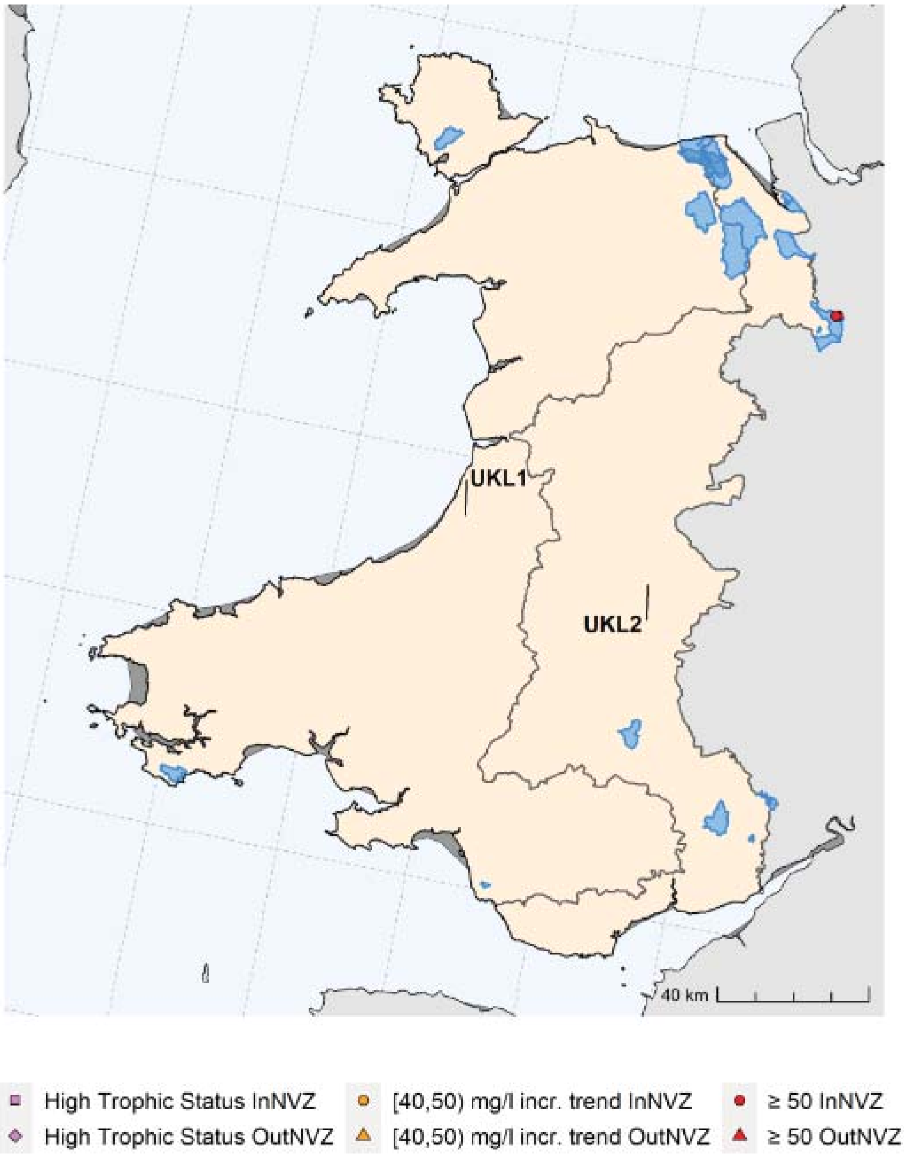


Figure 63. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis).

Surface Water quality hotspot



		High trophic status		>=40 and < 50 mg/l incr.trend		>=50 mg/l	
NUTS ID	NUTS NAME	InNVZ	OutNVZ	InNVZ	OutNVZ	InNVZ	OutNVZ
UKL2	East Wales	0	0	0	0	2	0
	Total	**0**	**0**	**0**	**0**	**2**	**0**

Figure 64. SW hotspot analysis map (top graph) and distribution by NUTS2 (lower graph) of average NO3 annual concentration greater than 40 mg/l and trophic status. In the map in blue the NVZ.

The hotspot analysis identifies all the SW monitoring stations that have high trophic status (eutrophic and hypertrophic), 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.

Measures in the Action Program- Wales

The Measures in the Action Program are not available since the country report of Wales was not submitted.

Controls - Wales

The information about the controls are not available since the country report of Wales was not submitted.

Designation of NVZ - Wales

Wales NVZ areas did not change and is equal to 479 km^2.

Forecast of Water Quality - Wales

Forecast analysis are not available are not available since the country report of Wales was not submitted.

Summary- Wales

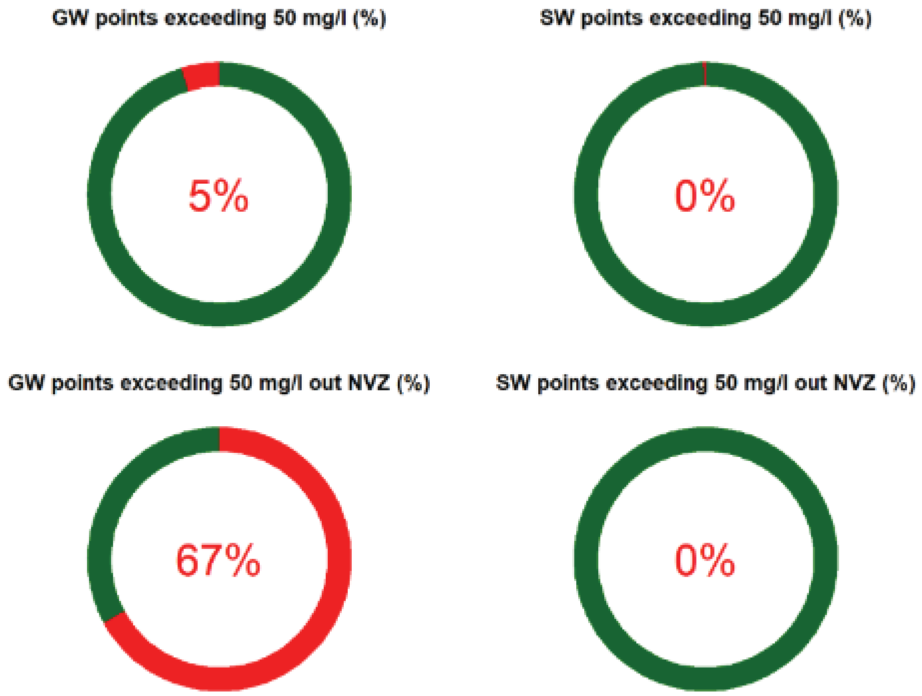


Figure 65. The summary plot for the period 2016-2019

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 – Wales

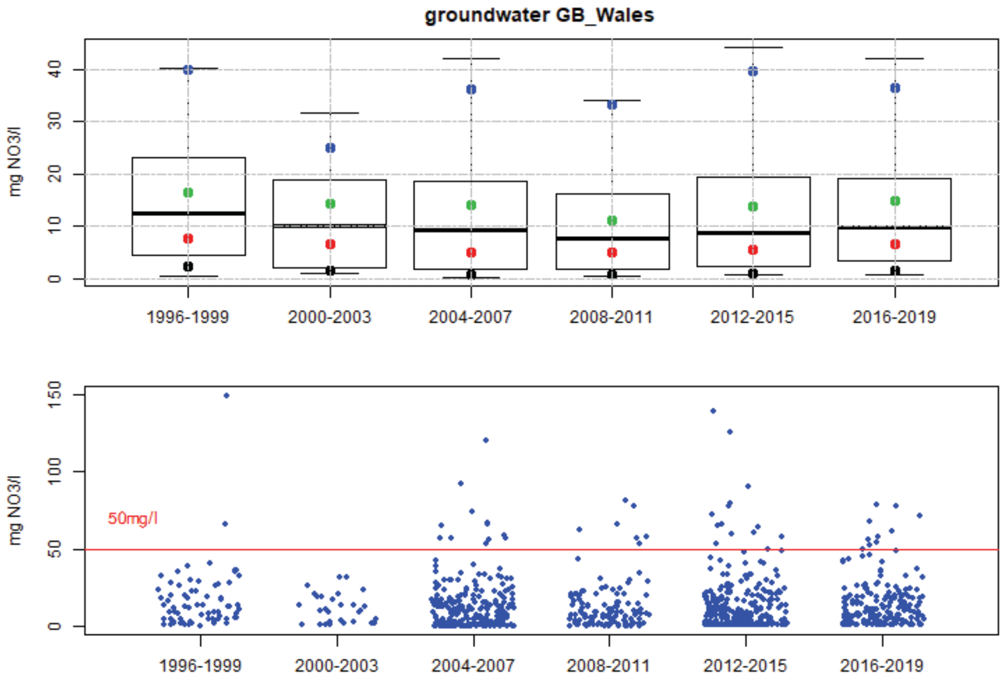


Figure 66. Time series of box whisker plots along with the distribution of the values average NO3 annual concentrations for each reporting period for groundwater stations. RPs represent the reporting periods, RP7 being the last period (2016-2019). The blue, red, green and black dots represent the mean of the fourth third, second and first quartiles, respectively.

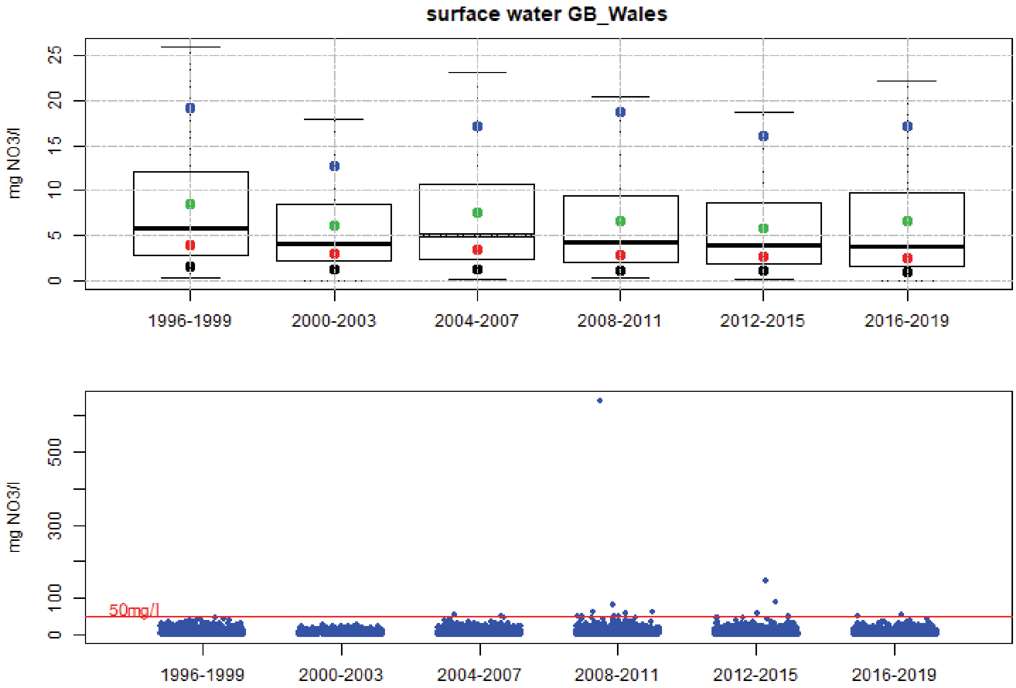


Figure 67. Time series of box whisker plots along with the distribution of the values average NO3 annual concentrations for each reporting period for surface water stations. RPs represent the reporting periods, RP7 being the last period (2016-2019). The blue, red, green and black dots represent the mean of the fourth third, second and first quartiles, respectively.

Conclusions

The United Kingdom has a Livestock pressure that is close to the EU average. The nitrogen and phosphor surplus is above average for the EU.

There is a well-elaborated network of monitoring stations.

In Northern Ireland, nitrate content of ground- and surface water is low. However, there is an increasing trend of nitrate in surface water and of waters that are eutrophic.

In Scotland and Whales there are a number of groundwater hotspots with nitrate levels above 50 mg/l. Nitrate content of surface waters is low, however there is an increasing trend.

In England there is a higher number of groundwater hotspots with nitrate levels above 50 mg/l. The Nitrate content of surface waters is high and is increasing. 8 % of the surface water monitoring stations have nitrate concentrations above 50 mg/l. Compared to the European Member States, this is the highest percentage.