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COMMISSION STAFF WORKING DOCUMENT

Accompanying the document

REPORT FROM THE COMMISSION TO THE COUNCIL AND THE EUROPEAN PARLIAMENT

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

{COM(2021) 1000 final}

Pressure from Agriculture

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)

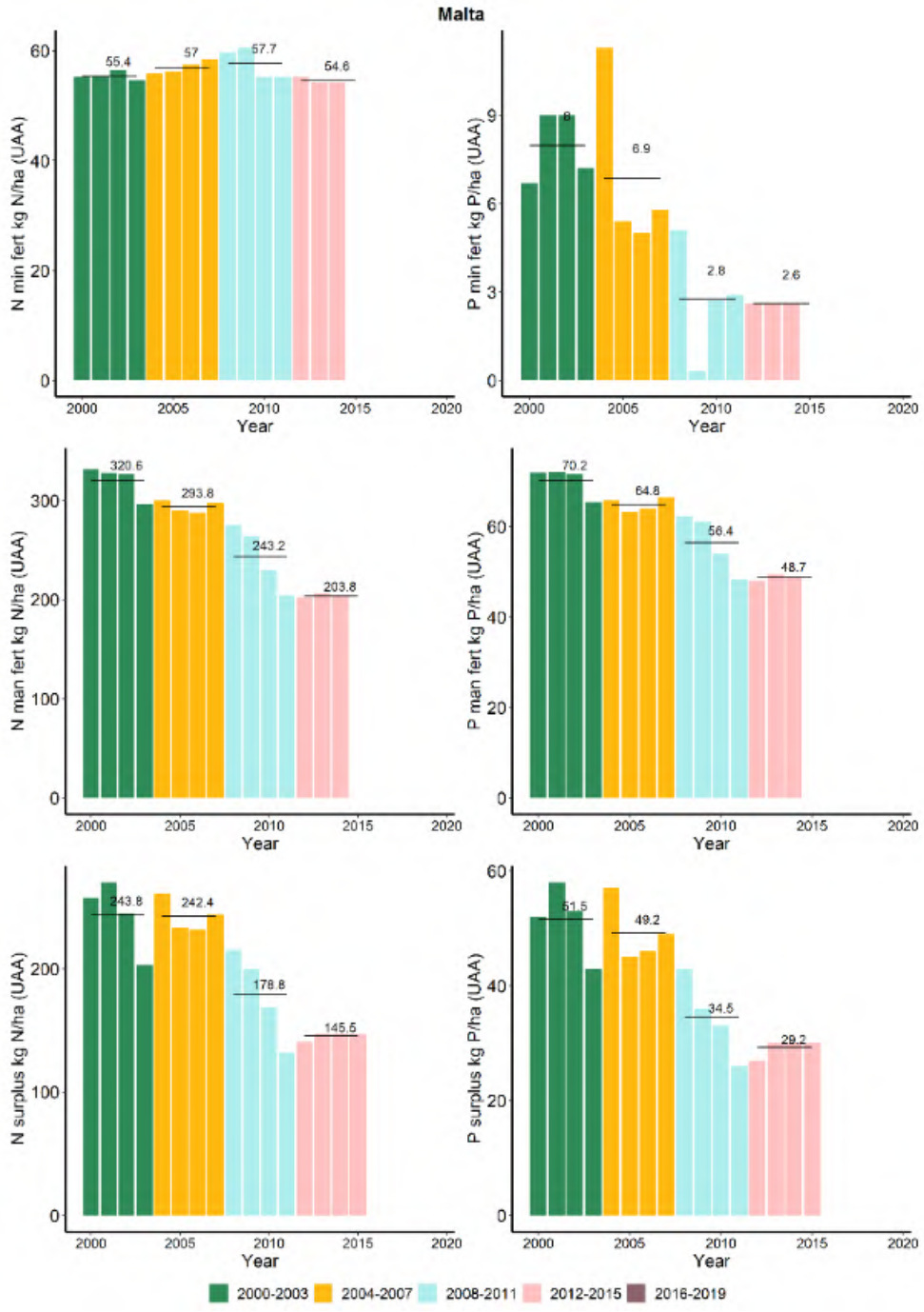


Figure 1. N and P fertilizers and gross surplus (kg/ha)

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

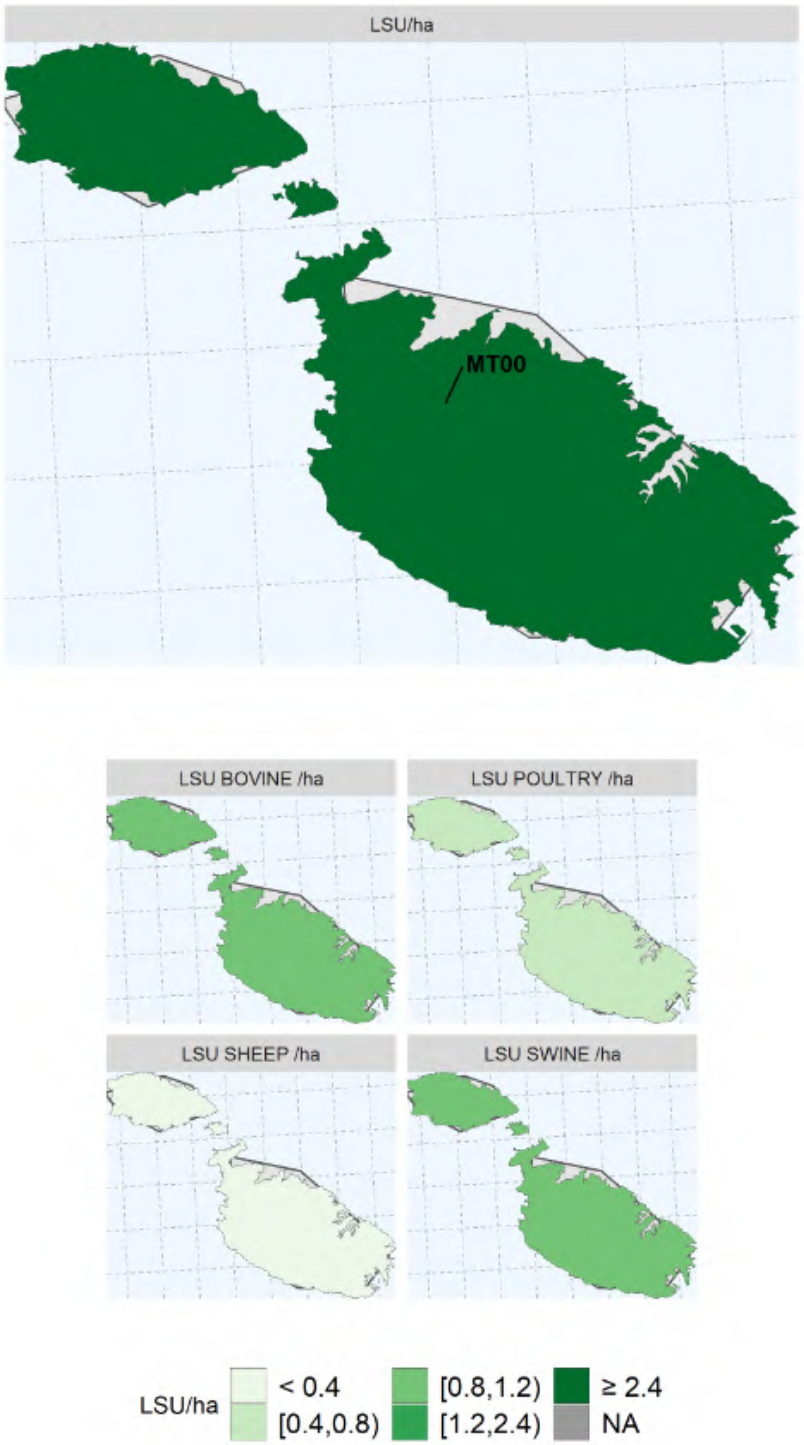


Figure 2. Map of livestock unit distribution, year 2016 (Source: Eurostat, February 2021)

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

		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	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

		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	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

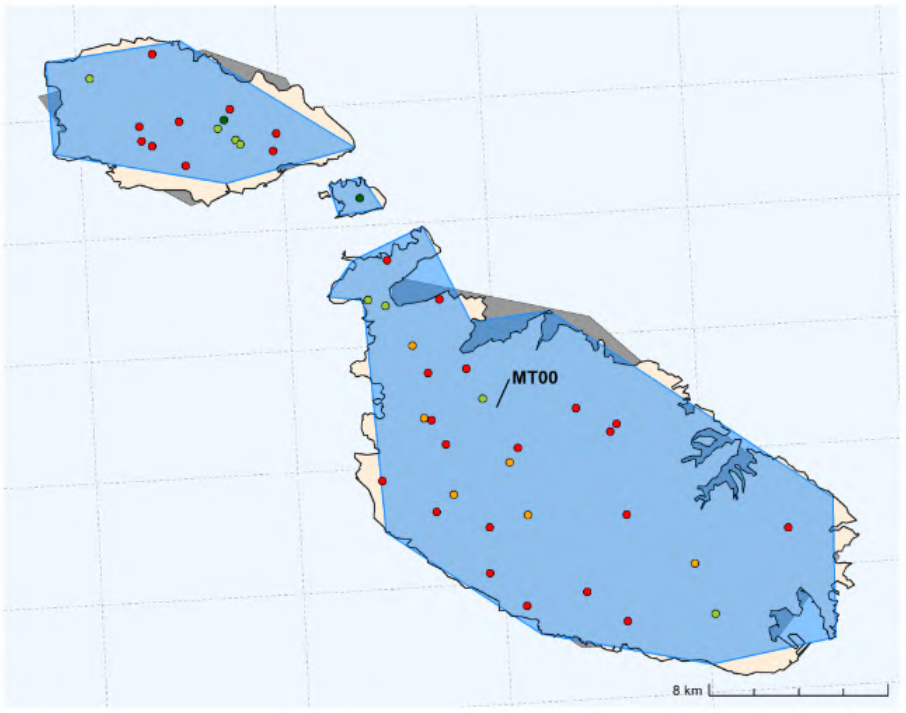


Figure 3. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information.

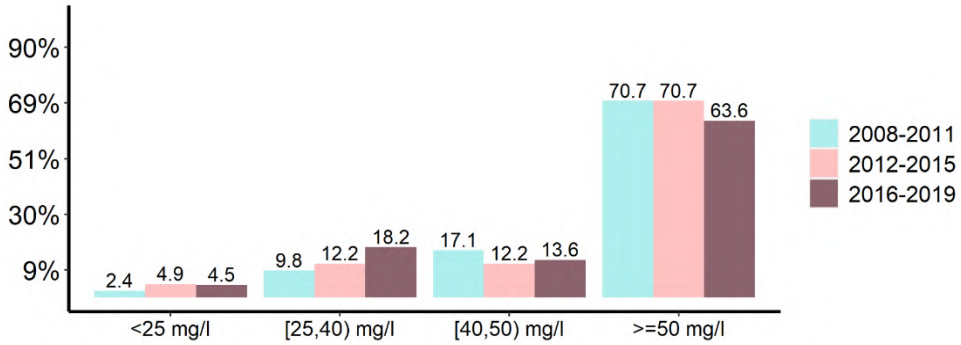


Figure 4. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis)

Groundwater average annual nitrate concentration trend

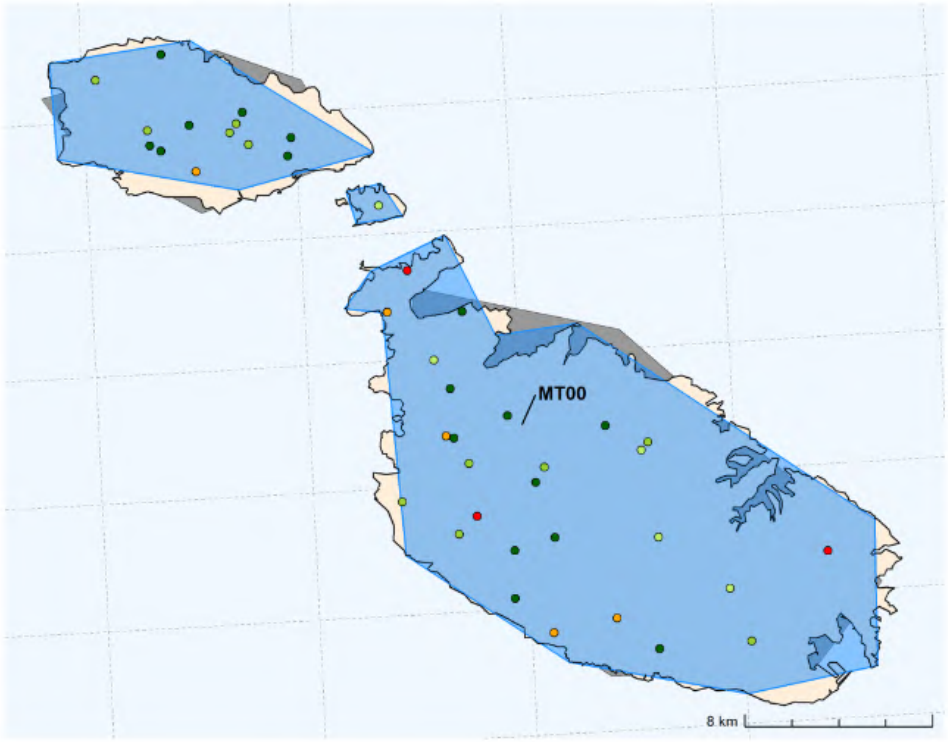


Figure 5. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis).

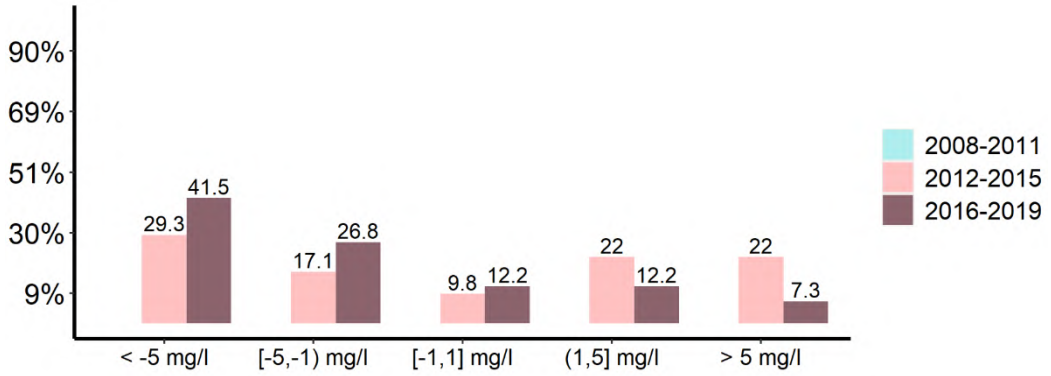
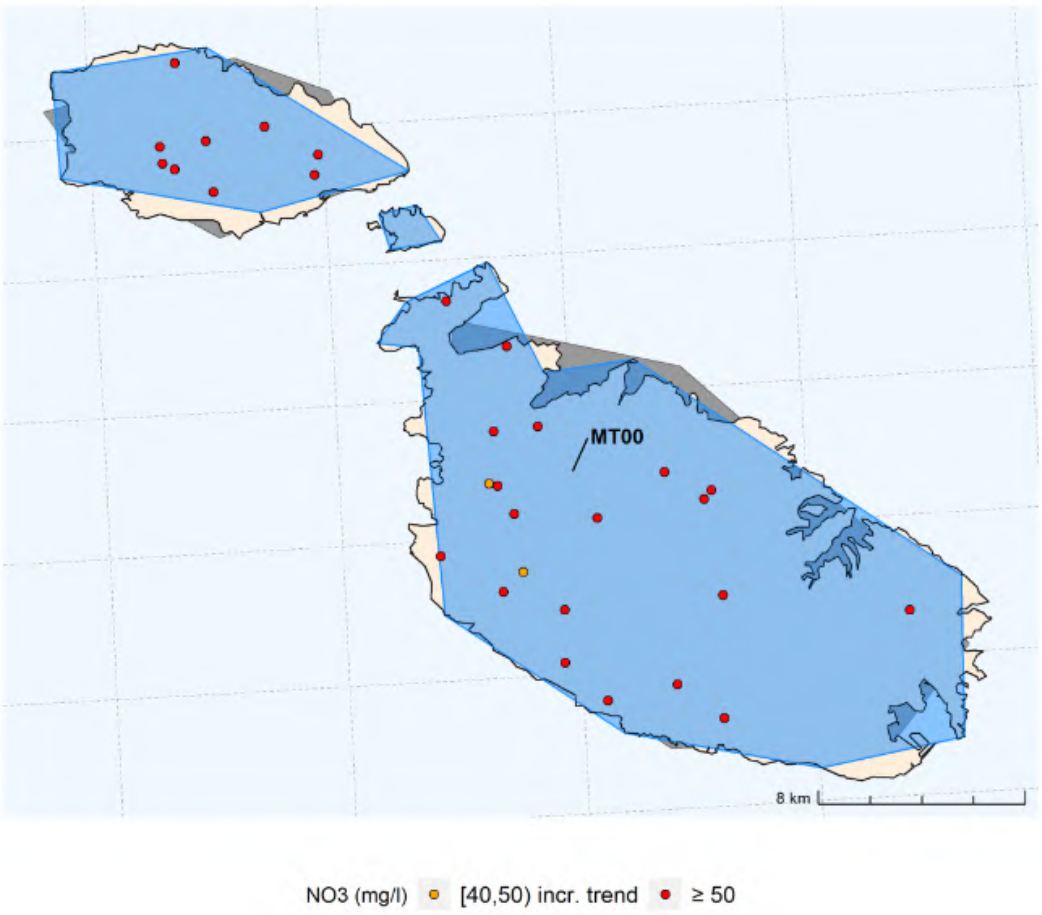


Figure 6. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis).

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

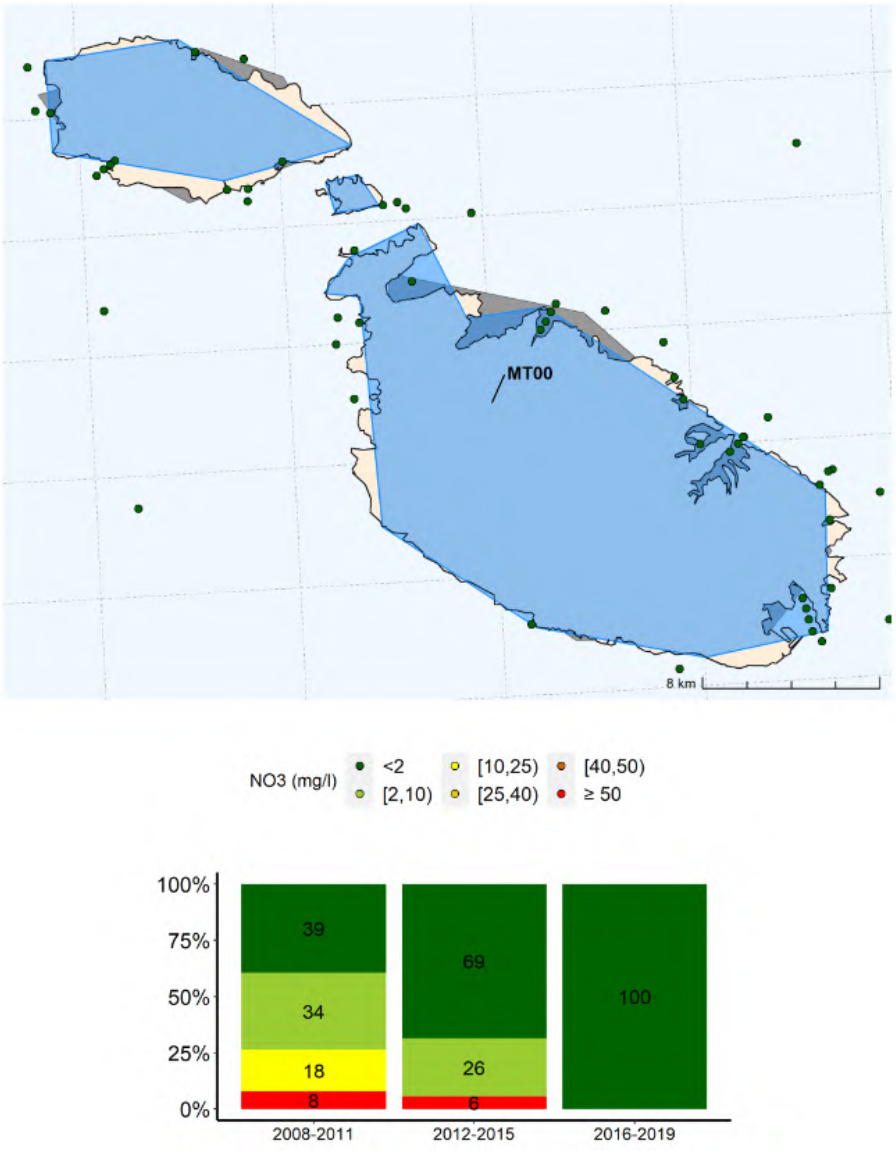


Figure 8. Spatial distribution of average NO3 annual concentration (map) and corresponding percentage of monitoring points per classes of concentration by reporting period (x axis).
In the period 2016-2019, only coastal and marine water stations were submitted.

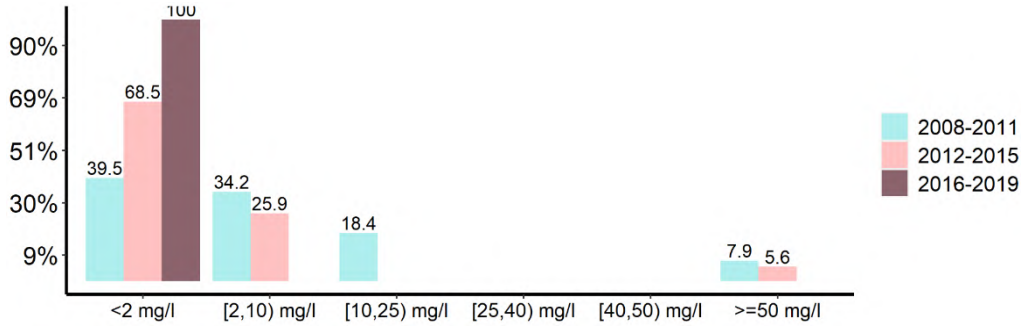


Figure 9. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual concentration (x axis)

Surface water average annual nitrate concentration trend

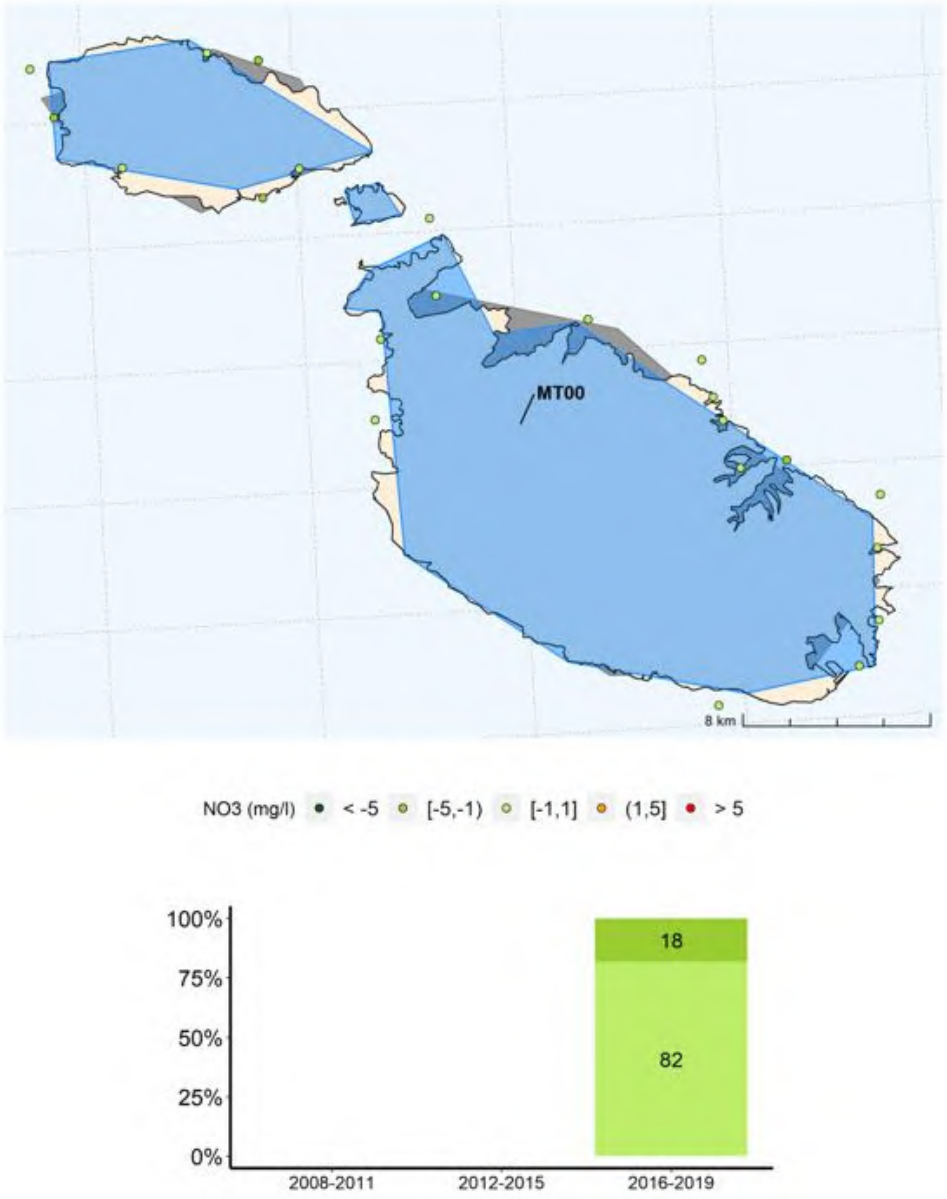


Figure 10. Spatial distribution of average NO3 annual trends (map) and corresponding percentage of monitoring points per classes of trends by reporting period (x axis)

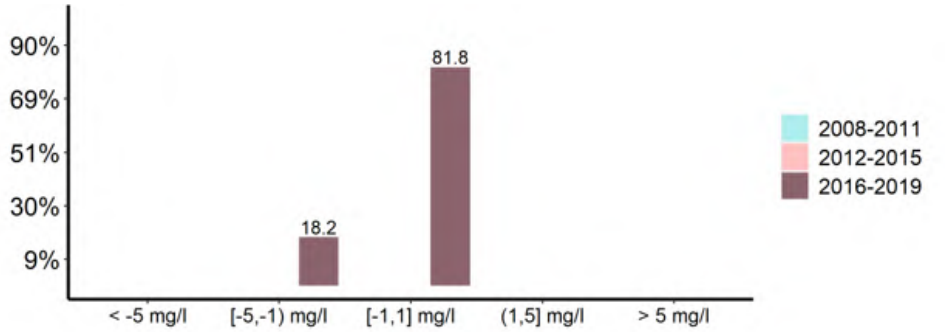


Figure 11. Comparison of percentage of monitoring points in the three reporting periods by classes of average NO3 annual trends (x axis)

Surface Water Eutrophication

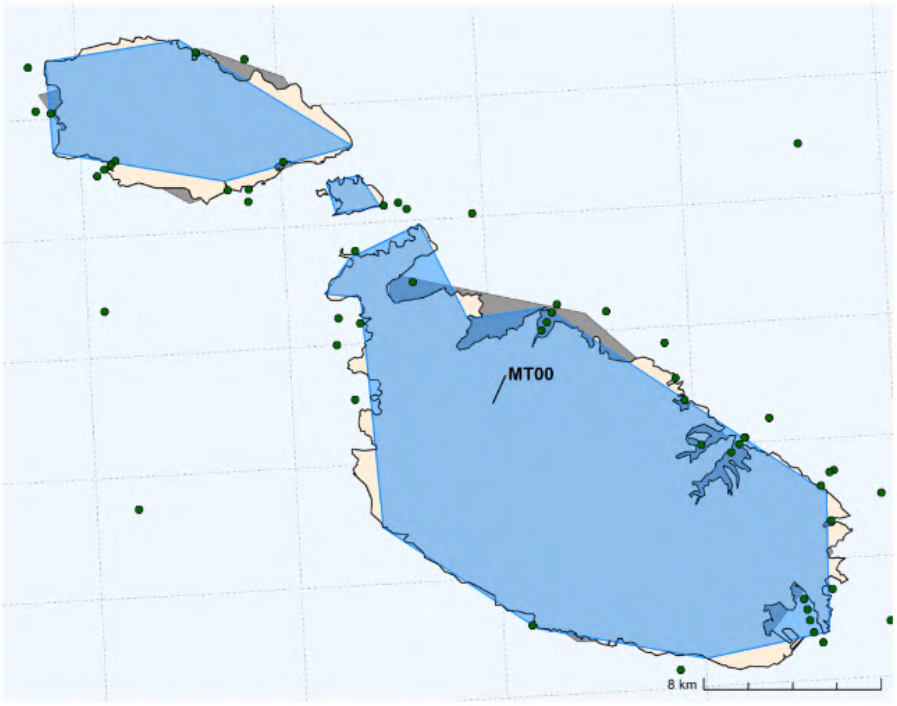


Figure 12. Spatial distribution of eutrophic status (map) and corresponding percentage of monitoring points per classes of status by reporting period (x axis). The percentages below 5% are not labelled, see the next plot for more information. In the map in blue the NVZ
Note that a different methodology 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.

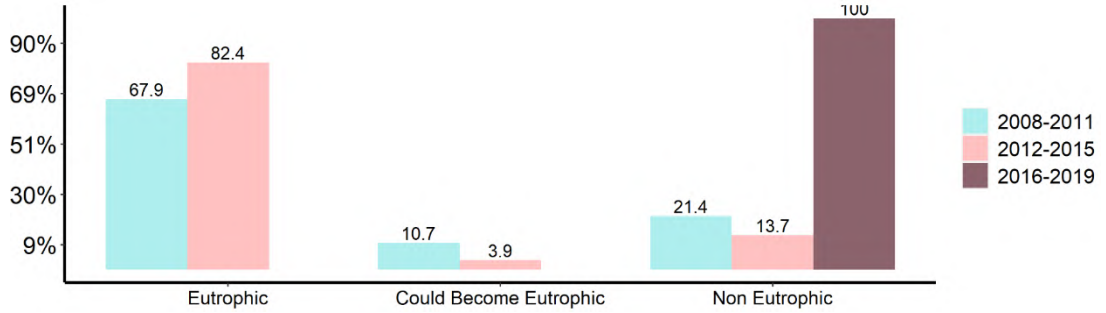


Figure 13. Comparison of percentage of monitoring points in the three reporting periods by classes of status (x axis)

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.

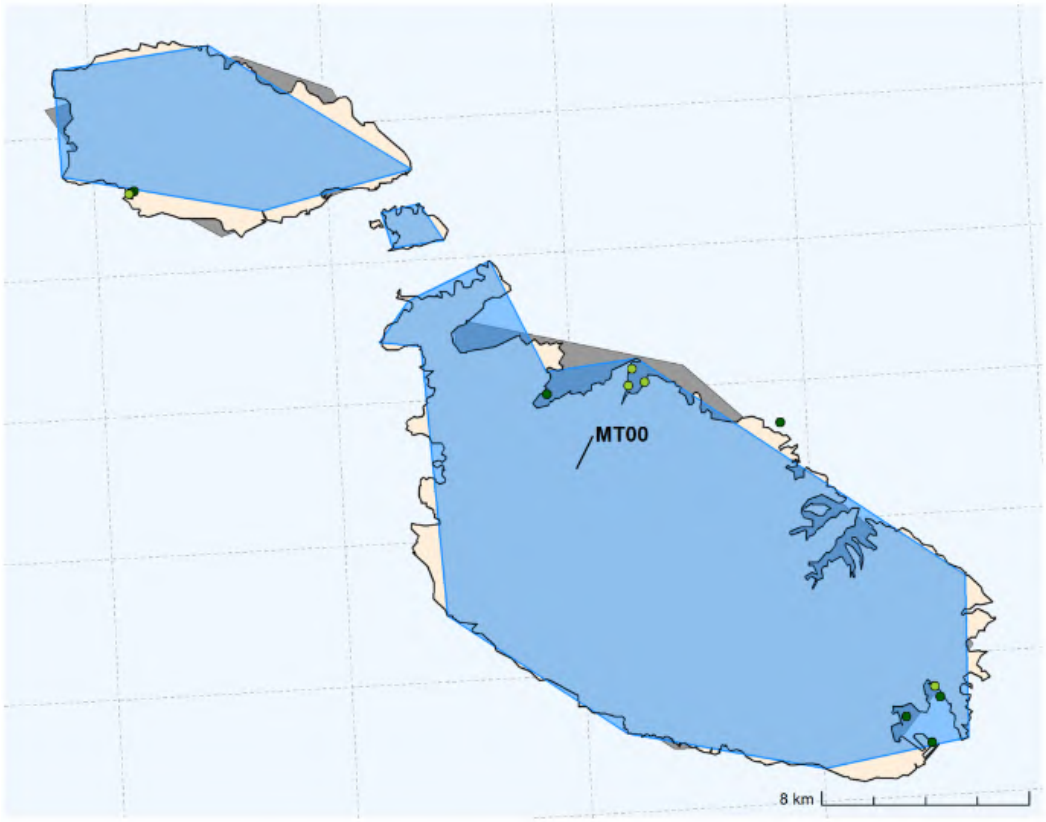
In addition, the trophic index method (TRIX) for Mediterranean coastal waters as described in Giovanardi, F. and Vollenweider, A. [1] is applied to ensure consistency with the Malta's 2016 report. The TRIX index is a linear combination of four variables (chlorophyll a, dissolved inorganic nitrogen, total 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

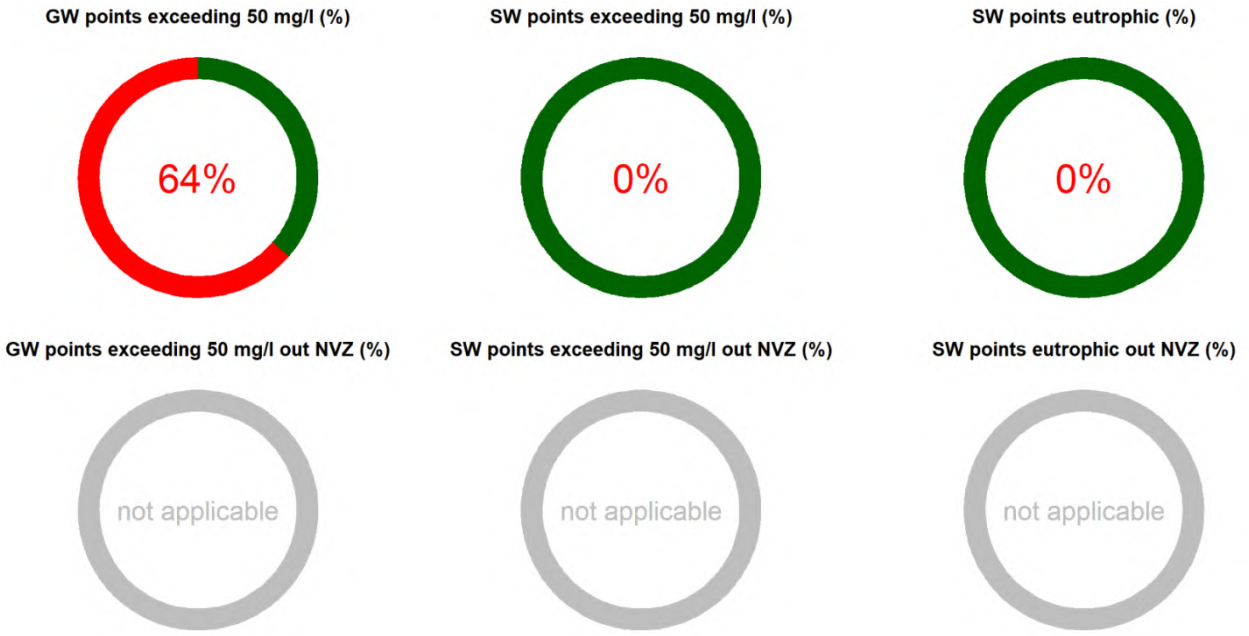


Figure 15. The summary plot for the period 2016-2019

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

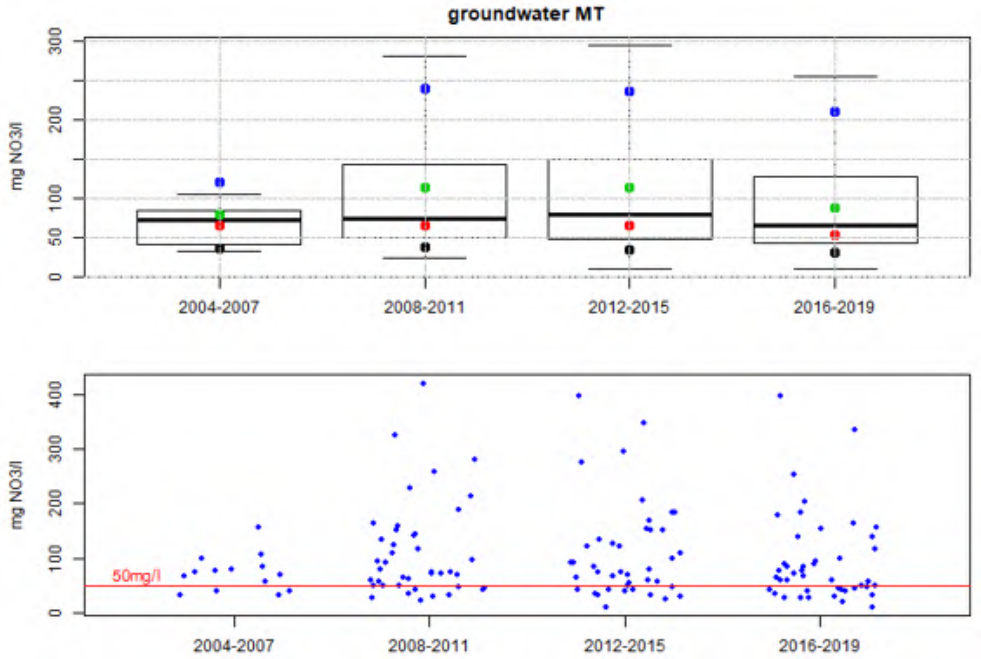


Figure 16. Time series of box whisker plots along with the distribution of the average NO3 annual concentrations for each reporting period for groundwater stations. RPs represent the reporting periods, RP7 being the last period (2016-2019). The blue, red, green and black dots represent the mean of the fourth third, second and first quartiles, respectively.

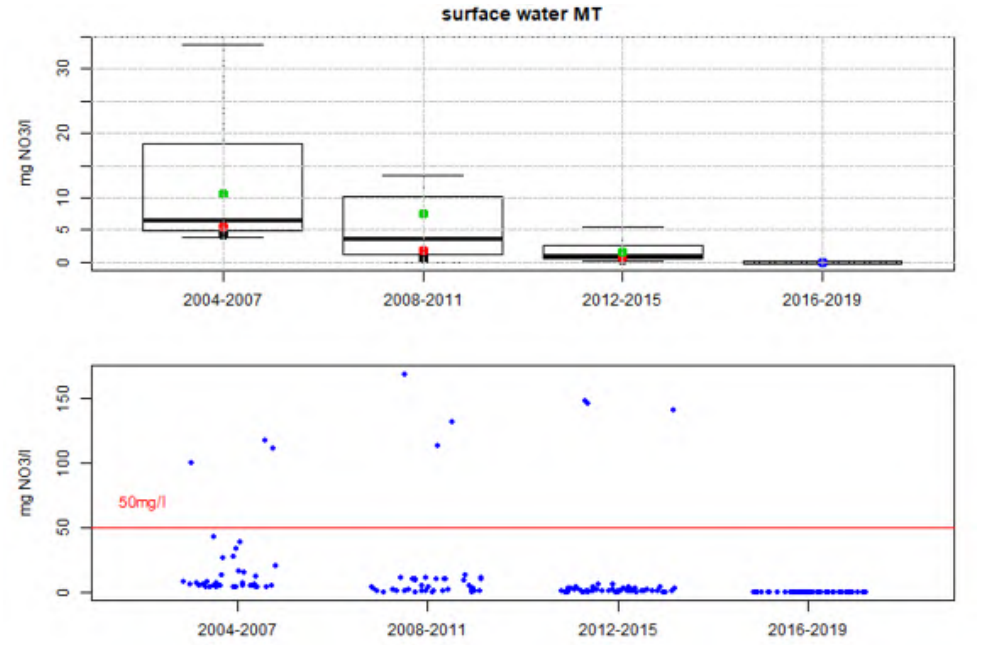


Figure 17. Time series of box whisker plots along with the distribution of the average NO3 annual concentrations for each reporting period for surface water stations. RPs represent the reporting periods, RP7 being the last period (2016-2019). The blue, red, green and black dots represent the mean of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