Update of trends in nitrate concentrations on derogation farms in the Netherlands

Version 4 October 2019

Disclaimer: The figures are based on the data of the National Manure Policy Monitoring Program. The figures are produced with available scripts and data without the regular additional checks due to time constraints. An internal review could also not be carried out. The data presented here are displayed unweighted; the data in these graphs are not stratified. The preparation of the Derogation Report (and Nitrate Directive Report) is always a very careful process with accurate data control and selection. This care could not be sufficiently taken into account for the most recent figures, which is why these figures are not suitable for reference. The final results will be presented in the derogation report prepared by the RIVM, which will be sent to the European Commission in June 2020.

1 Nitrate leaching from the root zone

In the Derogation Monitoring Network 300 farms registered for derogation are sampled. These are mainly dairy farms and some other grassland farms. Farms registered for derogation are permitted to apply grazing livestock manure up to 250 kg of nitrogen per hectare. Except for derogation farms on loessial soils (Loess region) and sandy soils in the central and southern part of the Sand region (Sand region 230); they may apply up to 230 kg of nitrogen from grazing livestock manure per hectare.

Since the start of the monitoring in 2007, the nitrate concentrations in the water that leaches from the root zone have decreased (Figure 1 and Figure 2). The average nitrate concentrations on derogation farms are below the 50 mg/l nitrate limit in the Clay, Peat and Sand Region 250. Since 2014, the average nitrate concentrations in the Loess and Sand Region 230 have also fallen below this limit. However, the results from 2018 show an increase in nitrate concentrations in the Derogation Monitoring network, comparable to the results from the Evaluation Monitoring Network (which includes all farm types). This is particularly visible in the Loess region and less in the Sand region 230. In these regions there was a local drought in 2017 (Appendix 1, figure A1). The agricultural practice in 2017 is related to the water quality in 2018 in the Sand Region and the Loess Region. The increase in nitrate concentration in both regions is predominantly caused by the drought in 2017. In the Loess region a small group of farms influences the average value with their higher nitrate concentrations; as is indicated by the large difference between the median value of 47 mg/l nitrate (meaning that 50% of the farms have a nitrate concentration below 47 mg/l nitrate) and the average value of 65 mg/l nitrate. In the summer of 2018, the drought affected the whole of the Netherlands (Appendix 1, Figure A2). This drought was worse than ever before experienced in the Netherlands. This is reflected in the water quality of the water leaching out of the root zone in the clay and peat regions in winter 2018/2019 (provisional figures, marker at year 2019). The agricultural practice of summer 2018 is related to the water quality in winter 2018/2019 in the lower lying parts of the Netherlands. It is related to the water quality of summer 2019 and autumn 2019/winter 2020 in the higher parts of the Netherlands (respectively Sand and Loess region). The data for the Sand and Loess regions of summer 2019 and autumn 2019/winter 2020 respectively are not yet available.

The drought has an effect on the nitrate concentrations in the groundwater in various ways: 1) because the groundwater levels are lower, the soil is more oxygen-rich, and there is less nitrate is denitrified, as a result of which more nitrate leaches into the groundwater. 2) Less nutrients are used by the poorly growing crop, so more nutrients remain in the root zone, which increases the risk of leaching. 3) Due to the strong

evaporation there is less groundwater replenishment and the nitrate concentration is higher in the water that does leach into the groundwater. And 4) for low-lying areas, water is admitted into the polders from surrounding surface waters to keep the groundwater level high, so that water with potential higher nutrient concentrations enters the area.

The derogation farms, also in Zand-230 and Loess, follow the manure regulations well. The fraud pressure is low on these farms, because these farms are often less intensive (intensive farms often grow a lot of maize and therefore do not meet the grassland criteria), are allowed to spread extra manure compared to other dairy farms without derogation (less manure pressure) and have a major interest in derogation. If a company is caught for fraud, the derogation for this company expires and is excluded from participation in the following year. That risk is real and lowers the fraud burden.

The drought is thus the most important cause of the increase in nitrate concentrations in 2018 and 2019.

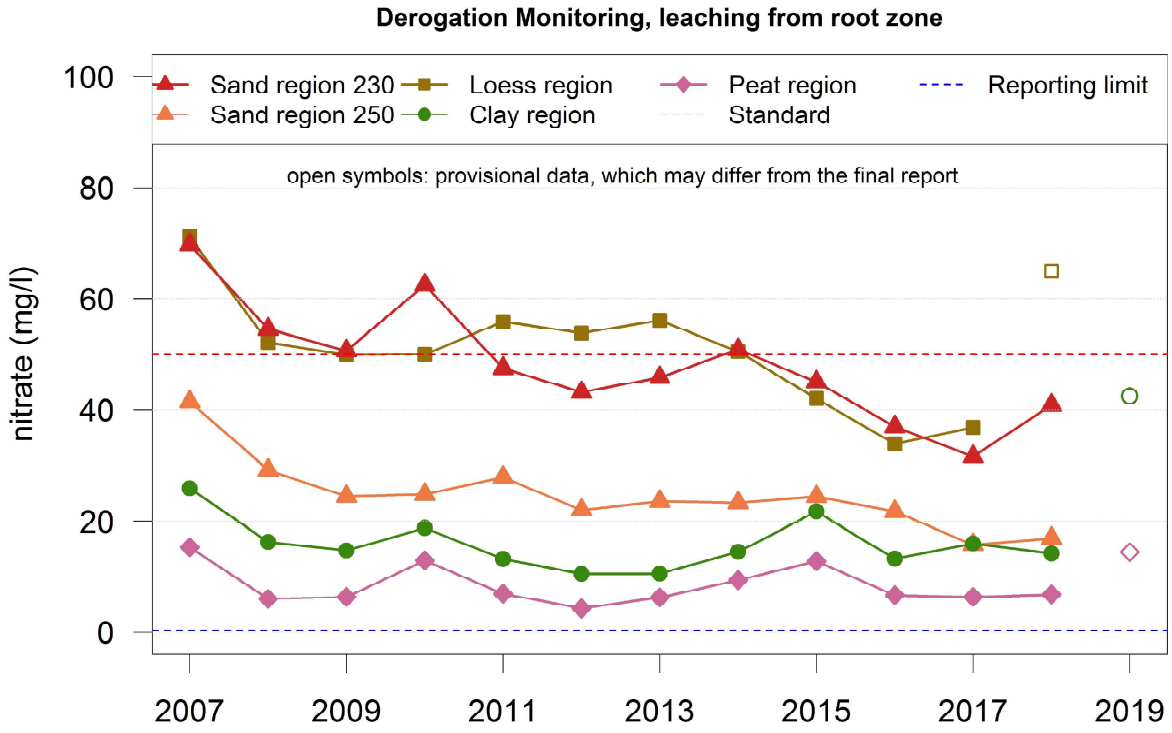

Figure 1 Average nitrate concentration in water leaching from the root zone at derogation farms for each of the four regions in the 2007-2018 period (source: RIVM-rapport 2019-0026, provisional data for recent year are added).

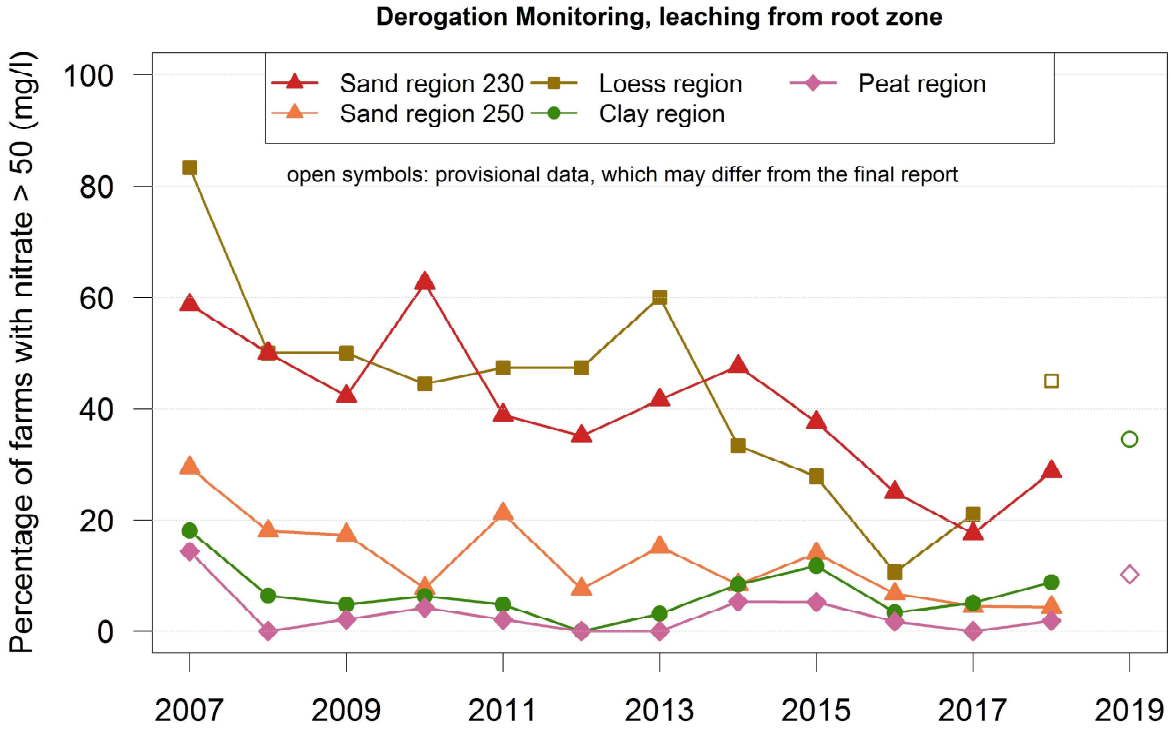

Figure 2 Percentage of derogation farms with an average nitrate concentration in water leaching from the root zone higher than 50 mg/l in the 2007-2018 period (source: RIVM-rapport 2019-0026, provisional data for recent year are added).

2. Nitrate in ditch water

Nitrate concentrations in ditch water in winter at derogation farms are on average below the standard of 50 mg/l in all regions (Figure 3 and Figure 4). Trends are decreasing, although higher concentrations occurred in recent years in the sand region, due to effect of drought (Appendix 1). Ditches in the winter period respond quickly to the effects of droughts in the previous growing season, which is reflected in the nitrate concentration in the surface water. In 2019 the preliminary results of ditch water show an increase in concentrations. In the Sand region a small group of farms influences the average value with their higher nitrate concentrations; as is indicated by the large difference between the median value of 36 mg/l (meaning that 50% of the farms have a nitrate concentration below 36 mg/l) and the average value of 52 mg/l of the whole Sand region together.

Fluctuations over the years in the Sand region 250 are likely to be caused by the limited number of farms with ditches (approximately 11-12) in the monitoring network in that region – because of this a change in a few farms can have a large effect on the average water quality.

As for the water leaching out of the root zone, also for ditch water the drought is the most important cause of the increase in nitrate concentrations in 2019.

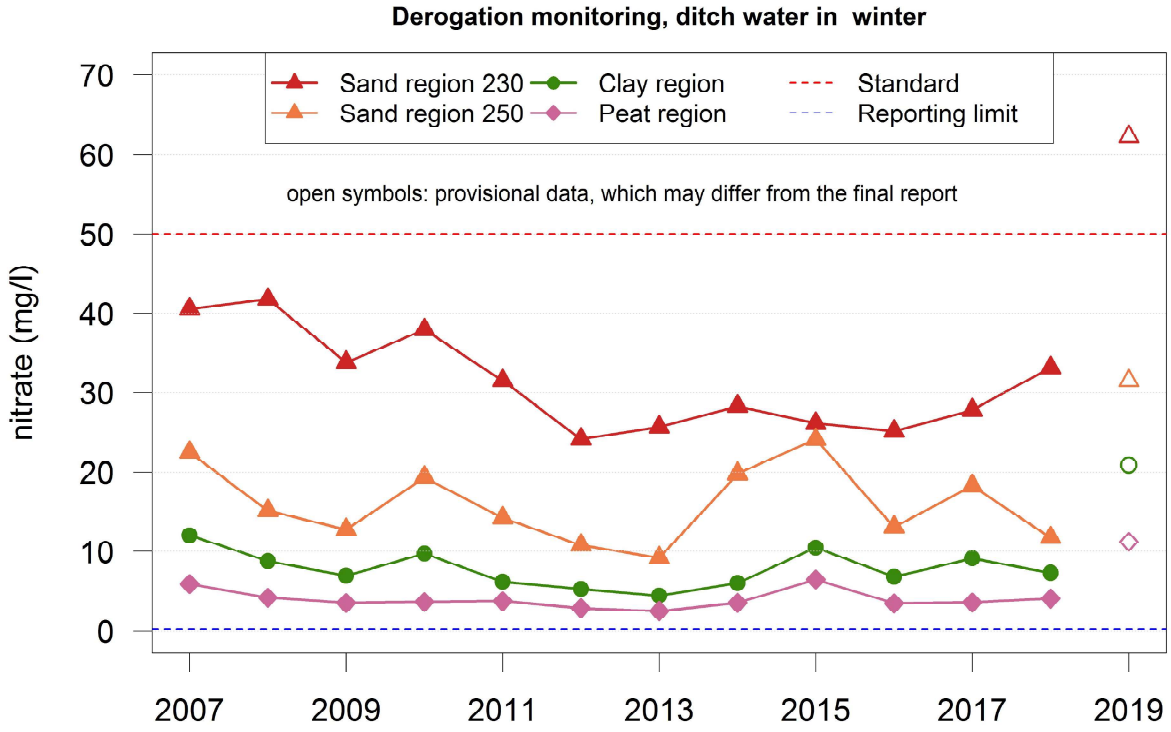

Figure 3: Average nitrate concentration in ditch at derogation farms for each of the four regions in the 2007-2018 period (source: RIVM-rapport 2019-0026, provisional data for recent year are added).

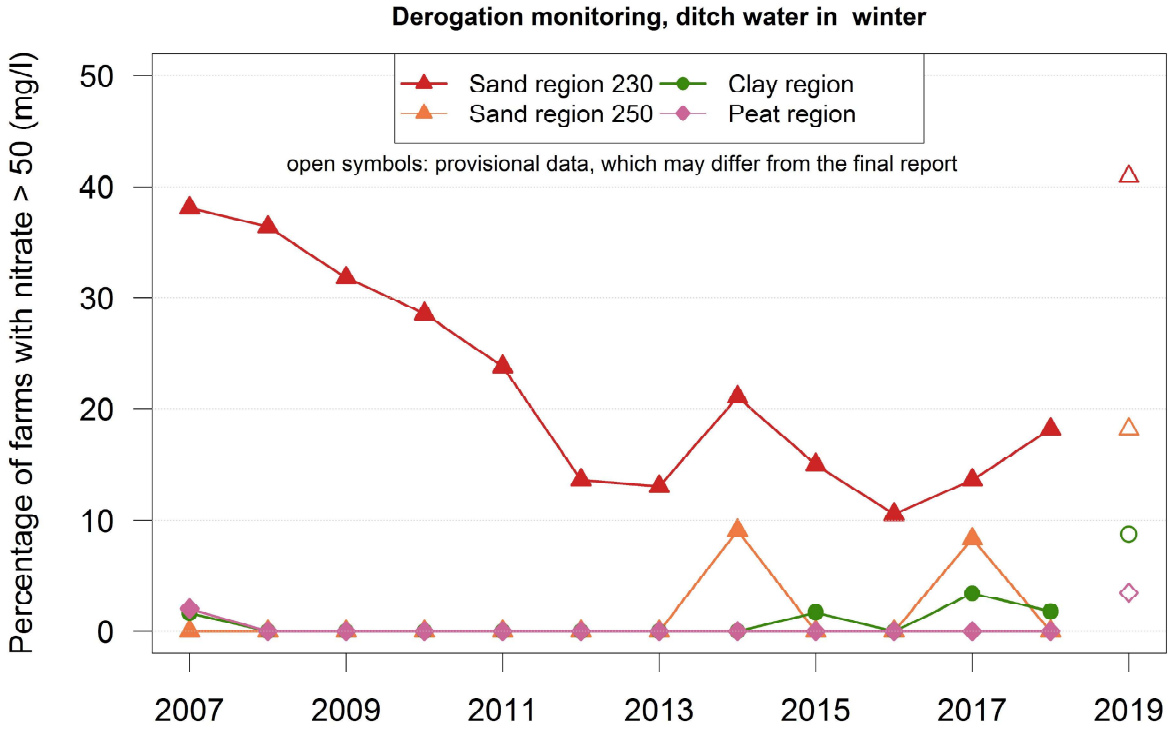

Figure 4: Percentage of derogation farms with an average nitrate concentration in ditch water higher than 50 mg/l in the 2007-2018 period per region (source: RIVM. This picture is not included in the derogation report (RIVM-rapport 2019-0026), provisional data for recent year are added).

Appendix 1

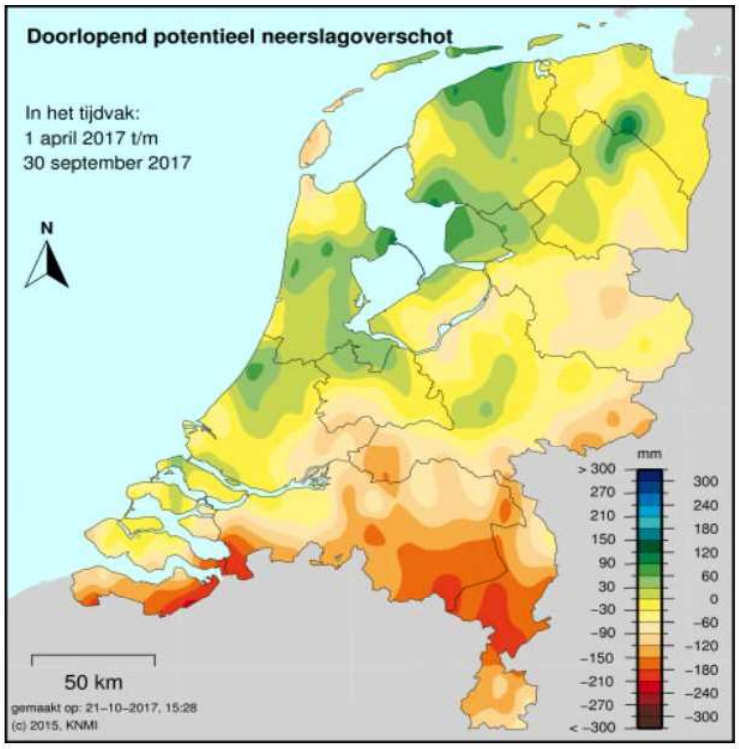

Figure A1: continuous potential precipitation surplus of 2017

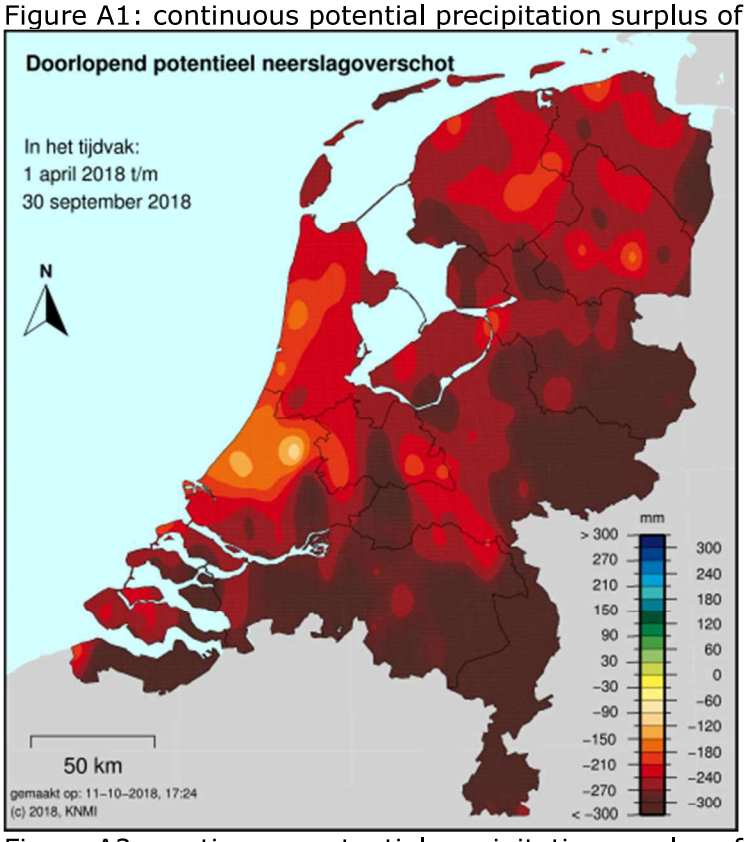

Figure A2: continuous potential precipitation surplus of 2018