Comments on the COWI report "Second opinion on the need for reduction of Nitrogen in the third RBMP for 2021 – 2027, Phase 1"

Written by

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on March 2, 2023

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A different legal interpretation of The Water Framework Directiv, subsection 1.1 (COWI 2023). Should The River Basin Management Plan be based on total quantities or concentrations?

This paper focus on how to intepret The Water Framework Directiv in such way, that water born nitrogen and phosphorus best support the ecological state of the fresh or salted surface water. Here we talk about nutrient conditions supporting the biological elements, subsection 3.2.1 (COWI 2023).

The nutrient ratio together with 4 other chemical and physical-chemical elements support the biological conditions:

(1) Thermal conditions
(2) Oxygen conditions
(3) Salinity
(4) Acidification state
(5) Nutrient ratio

How should this elements be perceived?

Ad 1) Thermal conditions, temperature, is something you measure at a given location and is somewhat atypical compared to the other four elements.

Ad 2) Oxygen conditions, O2, are difficult to calculate in total quantities and make only sense if measured as concentrations.

Ad 3) Salinity, salt content. It does not make sense to measure it in total quantities, it must be measured in concentrations.

Ad 4) Acidification state, pH value only make sense as concentrations.

Therefore

Ad 5) Nutrient ratio (or Nutrient conditions) only make sense when measured as concentrations.

In particular, it will be problematic to calculate nitrogen in total quantities, as it constantly interacts with the atmosphere, often depending on a given amount of phosphorus. The way in which Danish authorities have measured and calculated land-based water born nitrogen in the periode from 1990 to 2021 is closely described in the paper from Bjarne Brønserud below.

Calculation of nitrogen target as an amount in waterbodies gives no sense and is a misinterpretation of EUs Water Framework Directive. Achiefment a good conditions in the coastal waters depends on the concentrations and not the amounts of nitrogen, which are the correct legal interpretation. In the report this fundamental distinction are absent, subsection 3.2.2 (COWI 2023).

In the costal waters nutrient from the Danish diffuse sources have only a small share compared with nutrient comming from the Baltic Sea, Skagerrak and Nord Sea. In just the opposite way serious discharges from points can destroy the good water conditions for a shorter or longer period. This aspect are missing in the report (COWI 2023).

We will not fail to draw attention to additional advantages of leaving total quantities.

In EUs Water Framework Directivs there are described the principle of "environmental damage should, as a priority, be rectified at source and that the polluter should pay". It will be shown in the

paper below from Bjarne Brønserud, that the limit of nitrat concentrations from the open land has been low in the periode starting in 1990 and till now. There is no evidence for talking of pollution or to talk about paying for any pollution from the open land in general terms. The error seems to depend on whether you make calculations based on flow measurements or use models. Talks based on models give a bad dialog or no dialog at all. And measurements are what EUs Nitrat Directiv demands.

In Fair wastewater, we believe that with much greater focus on measurements of concentrations on all parameters from the real world, the focus will be directed towards our wastewater management, which in our world is the biggest obstacle to achieve a good ecological condition in our surface water.

To elaborate on the above the articles give more information:

1. The 30-year war against the ecosystem. https://ing.dk/blog/30-ars-krigen-mod-okosystemet-116913
2. Nitrogen more friend than enemy. https://www.fairspildevand.dk/wp-content/uploads/Det-glade-budskab-til-second-opinion-3.pdf
3. Lack of authority behind water environment plans. http://uretten.dk/wp-content/uploads/2022/10/Manglende -hjemmel-bag-vandomraadeplaner.jpg

Author: consultant Bjarne Brønserud, cand. oecon.

This paper focus on the uncertainties in the data concerning nitrogen (N) and phosphorus (P). In this connection all sources of loss for the Danish waterborne supply to the coastal waters are relevant to assess in more detail.

The scattered buildings in the open land constitute a smaller part of the diffuse loss of nitrogen and phosphorus. Consequently, the measured concentrations of nitrogen and phosphorus in the stream water constitute the sum from agricultured land, forests and pasture, roads, and scattered buildings. Since 2011 the DCE at Aarhus University is responsible for the statements and measurements (Novana Vandløb 2023). Before 2011 it was The Ministry of the Environment through The National Environmental Research Institute (DMU), who was responsible from the beginning of the measurements in 1990.

For the big towns especially those placed near the fjords and coasts, the losses of nitrogen and phosphorus are calculated directly by the waste water companies owned by the municipalities. These statements are gathered in the annual Punktkilderapport issued by The Ministry of the Environment (Punktkilder 2021).

The calculation of the total loading of nitrogen and phosphorus from point sources are mostly based on models and only a small part is based on flow measurements on a daily basis. Therefore, the wastewater from industry and the towns is only based on sporadic measurements of concentrations. Both from the single-line and the two-line sewerages unintended overflow is substantial, which also happens through bypass discharges directly from the wastewater plants (Punktkilder 2021).

In the period since 1990 there has not been a demand for flow measurements on the wastewater plants' direct discharge to the fjord and coastal waters and the streams. Therefore, there is a high probability that the losses of N, P, BI5 and COD are underestimated in the calculations made by The Ministry of the Environment. For the same reason subsection 3.3.2 (COWI 2023) should contain an investigation into the mentioned deficiencies, omissions and errors in the calculations, of which there are many examples (Knud Jeppesen 2023). it should also be stated that, for the same reason,

the losses of nitrogen and phosphorus from the open land are overestimated in the case where the loading points of wastewater are placed before the permanent measuring stations in the streams. In the 1990s there were no registrations from the overflow caused by rainfalls and therefore these losses were automatically calculated as coming from the open land (DCE 2013).

When the permanent measuring stations in the largest streams were established in 1989, only about half of the Danish area was covered by these measurements (Novana Vandløb 2008). In the period of 1990 to 2018, the remaining half of the land near the coastal areas were therefore calculated based only on assumptions of the concentrations and runoff water. The Ministry of the Environment supposed the calculation of the diffuse runoff was the same as the average per hectare in the measured areas. This prejudice has been heavily revised later – the first time in 2009 and the second time in 2020. Consequently, a reduction of the amounts of nitrogen and phosphorus coming from the intensive agricultural areas and the scattered residencies has been made for all the years between 1990 and 2018. For the specific year 1990, the loss of nitrogen from the unmeasured areas has been reduced by 45%, or what corresponds to approximately 11 kilogram N per hectare (Novana 2019 and Novana 2009). Also, the phosphorus runoff was severely cut down in the unmeasured areas (Novana 2019 and Novana 2009). The revisions have therefore shown an extremely high uncertainty in the scientifically based calculations of the diffuse loss of nitrogen and phosphorus from the unmeasured open land areas. This fact does not appear from the report (COWI 2023).

In part 1.2 of the report (COWI 2023) the background material from the international evaluation in October 2017 has been specifically included (Panel 2017). As previously mentioned, the data from the Danish loss of nitrogen and phosphorus were severely overestimated for the open land in 2017. In addition, the information given by Aarhus University and DHI to the panel was not accurate (AU og DHI 2017). In figure 2.2 (AU and DHI 2017) the land-based runoff of nitrogen and phosphorus is shown for the period of 1990 to 2011. This graphic illustration cannot be found in the specified source and afterwards The Ministry of the Environment has not been able to define the catchment areas for this figure. Furthermore, the figure 2.1 (AU og DHI 2017) ought to be used with great caution, because there are no measurements showing the connection between the theoretical surplus of nitrogen from the agricultural areas and runoff to streams for the specified period of 1900 to 2005. Based on these shortcomings as well as the drastic revision in the report "Novana Vandløb 2018" (Novana 2019), the conclusions from the evaluation should be disqualified (Panel 2017).

A thorough review of the permanent measurement stations has shown that only 91 stations out of 179 have a complete series of data for total nitrogen and total phosphorus for the period of 1990 to 2021 (DCE 2023). These 91 stations cover approximately 41% of the Danish land area. The calculation in this new report shows an average content of total nitrogen for 2021 of 3.2 milligram per liter, whereas the diffuse part can be calculated to 3.0 milligram per liter. The corresponding measurement for the period of 1990 to 1994 showed a content of approximately 5.1 milligram per liter for the diffuse runoff water.

Of the 91 permanent stations only 75 stations have a complete series of measured concentration of nitrate-nitrogen for the period of 1990 to 2021 (DCE 2023). These stations cover approximately 38% of the Danish land area, and they are representative with respect to the agricultural part of the area. Measurements for the period of 2010 to 2021 show a stable level of approximately 3.0 milligram nitrate-nitrogen per liter in the streams. This low level was the same in the beginning of the 1990s where the average was 5.0 milligram per liter nitrate-nitrogen. Compared with the maximum limit of 11.3 milligram nitrate-nitrogen in the EU's Directive for regulating nitrate used in agricultural areas, the measured Danish level which is relevant for the open land shows very low levels on a constant basis. Consequently, in that respect there has never been justification for speaking about a pollution as defined in the EU's Directive regulating the agricultural use of nitrate in Denmark.

In the reports subsection 2.4.1 (COWI 2023) must be corrected to include the mentioned results of the measurements in the Danish streams.

Based on the above-mentioned uncertainties in the calculations of the Danish nitrogen runoff to the coastal waters, and the gross model based overestimation, it is clear in the subsection 2.4.1 (COWI 2023) from the EU Commission's comments that the Commission has been misinformed for many years. in The Water Framework Directive as well as The Nitrate Directive only measurements of the concentration of nitrogen and phosphorus in the streams are mentioned. This must be thoroughly explained in the report (COWI 2023). Furthermore, it must be stated that there is no over fertilization in the fields in agriculture in Denmark compared with the principle of balanced fertilization mentioned in The Nitrate Directive. And that we cannot talk about nitrate pollution from Danish agriculture in terms of article 2 in The Nitrate Directive. This information does not appear from subsection 2.3.1 of the report (COWI 2023).

The low level of nitrogen in the surface and underground water from the open land is also confirmed by measurements in the Danish groundwater statistics. In the EU's Water Framework Directive, the groundwater is defined singularly, and it is where the Danish drinking water can be extracted in a stable quality and without any direct influence from the surface water through the superposed layers of earth. For the period of 2016 to 2020, publicly controlled measurements from approximately 6,000 drinking water drillings distributed all over the Danish open land show that 99.6% have a lower content of nitrate than was the maximum limit in the EU's Directive for Drinking Water, which is also mentioned identically in the EU's Water Framework Directive (Geus 2021). This low level of nitrate concentration in the groundwater was also true already in the beginning of the 1990s where the measurements contained an average of 6.22 milligram nitrate per liter in approximately 7,000 drillings supplying water of drinking quality. The requirement in the EU's Drinking Water Directive is therefore abundantly fulfilled as the stipulated limit is 50 milligram nitrate per liter. The corresponding requirement is also mentioned in the EU's Water Framework Directive with 11.3 milligram nitrate-nitrogen per liter instead measured in the surface waters. In the report a clear and adequate statement of the mentioned Danish measuring results is missing (COWI 2023).

It does not appear from the report how it is possible to make environmental damage with these low concentrations in the Danish coastal waters due, in particular, to nitrogen coming through fresh surface waters or from seeping groundwaters (COWI 2023). Through the chapters of the report, it is obvious that there is no focus on concentrations at all, but alone on the total amount of plant nutrients per year. Nowhere in the text of the EU's Directives it is mentioned, that there is an obligation to calculate an amount of nutrient per year. Therefore, the Danish implementation of The Water framework Directive appears to have no connection to the quality requirements in the EU's Directives for fresh surface waters and drinking groundwaters.

References:

(DCE 2023) Look here https://dce.au.dk/fileadmin/dce.au.dk/Udgivelser/Foreloebige_udgaver_novana_2021/Vandloeb.pdf

(Miljøministeriet 2021) Look here 978-87-7038-368-4.pdf (mst.dk)

(COWI 2023) Second opinion on the need for reduction of Nitrogen in the third RBMP for 2021 – 2027, Phase 1, COWI 2023.

(Knud Jeppesen 2023) Access to documents about registrations of overflow and bypass discharges in Middelfart, Kalundborg og Varde municipalities.

(Novana 2019) Novana Vandløb 2018, DCE at Aarhus University, revised in February 2020.

(Novana 2009) Novana Vandløb 2005, DCE at Aarhus University, 2009.

(Panel 2017) Look here (Microsoft Word - Evalueringsrapport om de danske kv\346lstofmodeller_endelig_inkl rigtige bullets OG fuld proces) (mst.dk)

(AU og DHI 2017) Look here https://dce.au.dk/fileadmin/dce.au.dk/Udgivelser/Oevrige_udgivelser/RBMP_models_sd_2017__002_.pdf

(Geus 2021) Look here file:///C:/Backup%20fra%20TJ%20DATA/OEM/Dokumenter/geus%20Grundvand%201989-2020_a.pdf

(DCE 2013) Look here https://dce2.au.dk/pub/TR31.pdf

(Novana Vandløb 2008) Look here https://dce.au.dk/udgivelser/tidligere-udgivelser/udgivelser-fra-dmu/faglige-rapporter/nr.750-799/abstracts/fr764