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COVER NOTE

from:	Secretary-General of the European Commission, signed by Mr Jordi AYET PUIGARNAU, Director
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Subject:	Commission staff working document Member State: Denmark Accompanying the document Report from the Commission to the European Parliament and the Council on the Implementation of the Water Framework Directive (2000/60/EC) River Basin Management Plans

Delegations will find attached Commission document SWD(2012) 379 final.

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COMMISSION STAFF WORKING DOCUMENT

Member State : Denmark

Accompanying the document

REPORT FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT AND THE COUNCIL

on the Implementation of the Water Framework Directive (2000/60/EC)

River Basin Management Plans

{COM(2012) 670 final}

1. GENERAL INFORMATION

Figure 1.1: *Map of River Basin Districts*

International River Basin Districts (within EU)

International River Basin Districts (outside EU)

National River Basin Districts (within EU)

Countries (outside EU)

Coastal Waters

Source: *WISE, Eurostat (country borders)*

The Danish population is 5.6 million (the exact number on 1st January 2012 is 5 560 628[1]). Denmark has a total area of 43 321 km^2 [2] (2).

RBD	Name	Size[3] (km^2) (Area including coastal waters shown in brackets)	Countries sharing RBD
DK1	Jutland and Funen	31999	-
DK2	Zealand	9318	-
DK3	Bornholm	588	-
DK4	International (Vidå-Kruså)	1100 (DK) + 250 (DE)	DE

Table 1.1: *Overview of Denmark's River Basin Districts*
Source: *River Basin Management Plans reported to WISE[4]: http://cdr.eionet.europa.eu/dk/eu/wfdart13*

Denmark has one international RBD (Vidå-Kruså, DK4) shared with Germany. The international river basin districts shared with Germany is not jointly designated. There are more than one trans-boundary river basin in the RBDs.

Name international river basin	National RBD	Countries sharing borders	Co-ordination category	
			3	
			km²	%
Krusaa/Krusau	DK4	DE	15	71.4
Vidaa/Wiedau (Rudboel Soe/Ruttebüller See)	DK4	DE	1081	80.5

Table 1.2: *Transboundary river basins by category (see CSWD section 8.1) and % share in Denmark[5]*
Category 1: Co-operation agreement, co-operation body, RBMP in place.
Category 2: Co-operation agreement, co-operation body in place.
Category 3: Co-operation agreement in place.
Category 4: No co-operation formalised.
Source: *EC Comparative study of pressures and measures in the major river basin management plans in the EU.*

2. STATUS OF RIVER BASIN MANAGEMENT PLAN REPORTING AND COMPLIANCE

All RBMPs were adopted on 21.12.2011, and reported to the Commission on 22.12.2012. Electronic reporting to WISE was submitted in the Spring of 2012. The infringement case against Denmark for not adopting and reporting RBMP was closed early 2012.

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1 Eurostat: http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&language=en&pcode=tps00001&tableSelection=1&footnotes=yes&labeling=labels&plugin=1)

2 (Commission report of 2009, Annex on MS methods (http://ec.europa.eu/environment/water/water-framework/implrep2007/pdf/sec_2009_415_2_en.pdf).

3 Source: http://www.naturstyrelsen.dk/Vandet/Vandplaner/.

4 This MS Annex reflects the information reported by the MS to WISE which may have been updated since the adoption of the RBMPs. For this reason there may be some discrepancies between the information reported in the RBMPs and WISE.

5 EC Comparative study of pressures and measures in the major river basin management plans in the EU.

Reported plans and data are available on EIONET: http://cdr.eionet.europa.eu/dk/eu/wfdart13.

There are no main RBMPs for DK1 and DK2, but within DK1 there are 15 sub-river basin districts, each with their own RBMP. Within DK2 there are 6 sub-river basin districts each with their own RBMP. Each sub district plan is reported as a separate pdf-file within a zipped folder for the main RBD in EIONET.

2.1 Main strengths[6]

Fairly good common structure of the sub-RBMPs linked closely to the WFD requirements.

A national approach on governance has been followed in the WFD implementation. The main competent authority is the Danish Nature Agency. A comprehensive and transparent consultation process has been carried out. More than 4,200 consultation responses were received. The comments received and the replies given to the comments are given in the plans.

There is a relatively high density of monitoring stations reported for inland waters, and this is mainly due to the number of operational monitoring sites in rivers.

Of the few BQEs that are developed for the classification system, EQR class boundaries that are consistent with the inter-calibrated boundaries in the IC phase 1 Official Decision have been developed.

EQSs are applied for all chemical pollutants monitored in water, and annual average(AA) and maximum allowable concentration (MAC) values have been considered. Selection of relevant pollutants for monitoring is based on a screening survey from 2008. There are also results from national monitoring programs on contaminants in sediments.

Nutrient loads are quantified and a source apportionment has been carried out.

There is a comprehensive economic analysis of the water use in Denmark attached in annex 8 in the RBMPs.

In each RBMP all planned mitigation measures, including agricultural measures, have been listed, and the approximate area has been described together with the costs and the effect of these measures. The measures have also been described in a catalogue of measures, containing information on effect and costs. Several measures to reduce the hydromorphological impact have been implemented.

Implementation of the WFD and the Habitats Directive are integrated. Links with the other directives are also described.

[6] Due to the late reporting Denmark did not, unlike other MS, receive a letter with preliminary findings upon which they could react in writing. Instead an email was sent in July 2012, and a meeting was held in August. The information has been taken into account in the annex as appropriate.

2.2 Main shortcomings

The ecological status classification system is weakly developed, and a large proportion of the BQEs is missing. The Danish classification methods are only developed for benthic fauna in rivers, chlorophyll in lakes, and angiosperm depth limit and benthic fauna (fjords) or chlorophyll (open coast). HyMo QEs are missing in the classification system for lakes and coastal waters, and for rivers, there are no class boundaries given for continuity, flow and morphological variation of river banks.

There are no criteria or thresholds given on how to define significant pressures from point and diffuse sources. There is no information on tools to assess significant hydromorphological pressures.

The reported monitoring system is a new one (NOVANA) and not the one used for developing the first RBMPs. Although it is new, it appears to not yet be WFD compliant. There is no operational monitoring of drinking water protected areas (groundwaters). For the first RBMPs several quality elements were not monitored, and the new programme is still missing several quality elements, e.g. phytobenthos in rivers. No surveillance monitoring stations for lakes have been reported.

The ecological status is assessed with only one BQE for rivers (benthic fauna) and only chlorophyll a for lakes. The assessments are reported with "no info on confidence" for 95% of all water bodies. It also seems like fewer methods are available now compared to what was reported in 2007. This needs to be clarified.

The basis for assessing quantitative status in groundwater bodies is weak. Groundwater monitoring is only done by the water supply works, and any GWBs exceeding drinking water standards (e.g. nitrates or pesticides) is abandoned, and monitoring is stopped. Thus trends are difficult to analyse. Water abstraction for irrigation is a major source of this pressure.

Denmark takes a narrow approach to water services. The polluter pays principle is applied for wastewater treatment and water supply with 100 % of the funding of the service provided by users, but there is no information about cost recovery for other water services (e.g. for water used for irrigation and directly abstracted from the source by farmers).

3. GOVERNANCE

3.1 Timeline of implementation

Denmark has taken a national approach for the different consultations as required by Article 14 of the WFD, so the dates for the consultations were the same for all RBDs.

Consultations on draft RBMPs took place in two phases, starting with consultations of local authorities in the spring of 2010 before a public hearing.

RBD	Timetable	Work programme	Statement on consultation	Significant water management issues	Draft RBMP	Final RBMP

Due dates	22/06/2006	22/06/2006	22/06/2006	22/12/2007	22/12/2008	22/12/2009
All DK RBDs	Started 20/12/2006	Started 20/12/2006	07/12/2010	22/06/2007	Started 14/10/2010	22/12/2011

Table 3.1.1: *Timeline of the different steps of the implementation process*
Source: *WISE*

3.2 Administrative arrangements - river basin districts and competent authorities

The **main competent authority** for the development of the RBMPs is the Danish Nature Agency, under the Ministry of Environment. The Danish Nature Agency is in charge of the work of implementing the WFD and preparing the RBMPs.

The competent authority **develops RBMP and accompanying programs of measures**. The RBMPs set targets for all waters covered by the water planning, and the programs describe how environmental objectives are going to be achieved. The Minister for the Environment is the water district authority. That implies that the Minister has the overall responsibility for ensuring that the RBMPs are established, and that environmental objectives are met. The Danish Nature Agency undertakes the practical task of preparing water management plans and programs. Based on the RBMPs, municipalities shall develop local action plans for how water management plans and programs should be implemented locally. The local action plan shall describe the local initiatives necessary to implement the RBMP, and the RBMP shall be taken into account when providing new environmental permits and environmental approvals.

A **national approach** has been followed in the WFD implementation. This argument is supported by the substantial number of national documents available for the Water Authorities containing for example regulation, guidelines for the programmes of measures, catalogue of instruments to use in the programmes of measures, etc.

The 15 sub-district areas in DK1, and the 6 sub-district areas in DK 2 are divided as follows and are said to respect the hydrological boundaries.

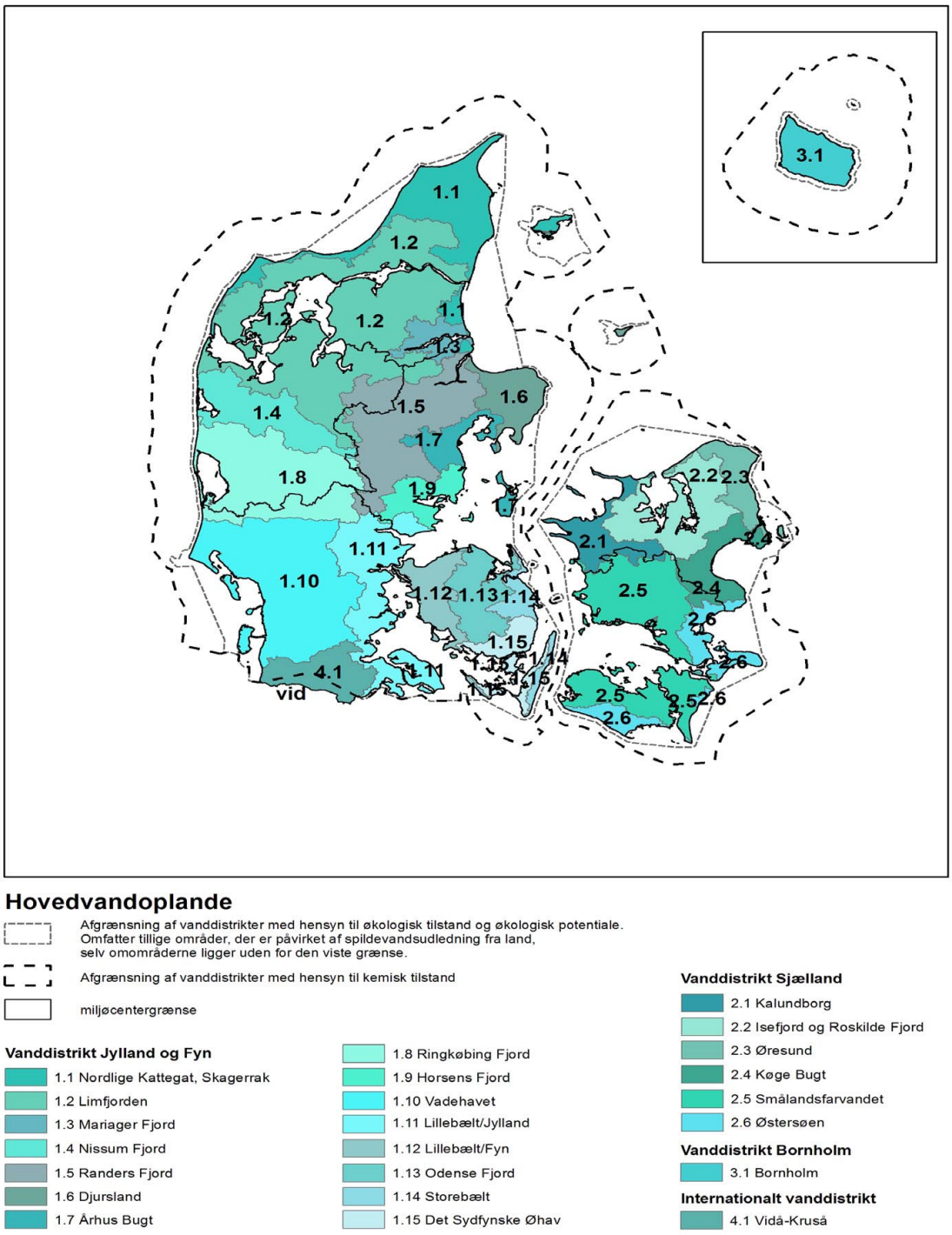

Figure 3.2.1: *Map of the division of Denmark into 4 RBD, and 23 main river basins/water catchment areas*
Source: *RBMP Vadehavet, Hovedvandopland 1.10, RBD Jylland og Fyn, p. 13*

3.3 RBMPs - Structure, completeness, legal status

In general the RBMPs are well structured and easy to overview (they seem to be written in a national framework) and contain the main categories of necessary information according to the WFD annex VI.

There are 4 river basin districts in Denmark. Each water district includes land and sea areas, consisting of one or more river basins and associated groundwater and coastal water. The water districts are subdivided into 23 main water catchments areas, for which sub-district RBMPs have been produced and reported. There are no 'top level' single RBMPs covering DK1 and DK2.

As regards the **legal status** of the RBMPs, the RBMPs are instruments to achieve the objectives outlined in the EU Water Framework Directive: that all water - groundwater, streams, lakes and coastal area of the sea - must have "good status" by 2015. The Water Framework Directive is implemented in Danish legislation in 2004 in the Law of Environmental Objectives. The act prescribes the State to develop water plans and programs, which outlines how Denmark will reach the EU objective of "good status" for the Danish waters.

The Minister of the Environment is the **approving authority**, and the RBMPs are adopted by Ministerial Orders. The RBMP is a planning document of a status similar to Ministerial Orders, i.e. in the hierarchy of legal acts it falls below laws and cannot contradict them. On the other hand, it stands above administrative decisions. [7]

As regards the **legal effect of the plans**, there is the general obligation for individual decisions to take the RBMPs into account. The river basin management plans are binding for national, regional and local authorities. Authorities need to take into account and ensure compliance with the RBMP objectives/provisions in carrying out their duties. The RBMP is not binding to individual persons i.e. operators, water users. The obligation of compatibility of the RBMP with other decisions and plans applies to the RBMP in its entirety.[8]

3.4 Consultation of the public, engagement of interested parties

Consultations on draft RBMPs started late, due to the need to reach a political agreement in the Danish Parliament. This agreement called "Green Growth" was reached in April 2010, after which the draft plans were developed. A special website, *www.vandognatur.dk,* was set up with information for the public about the water plans. The **consultation phase** of the draft water plans was divided into two parts. The first part was the implementation of a consultation of water plans in municipalities, regions and governmental institutions. The second part was the public hearing. Written contributions came from individuals, business organisations, environmental organisations, agricultural counselling centres and public authorities. Meetings with municipalities, regions and governmental institutions were also organised. During the public consultation of the water and nature plans, more than 4200 consultation responses were received. In the supplementary consultation process, 1700 responses were received. In addition, there were 1700 responses received in the idea phase. The numbers of meetings and participants etc. are not stated.

There is a general description of the **impacts of the public consultation on the final plans** and how the comments received were considered is set out in the RBMP. It is stated that the contributions are summarised and presented on the Nature Agency's website (www.naturstyrelsen.dk). The contributions are described to be of importance to ensure that

[7] EC Comparative study of pressures and measures in the major river basin management plans in the EU.

[8] Ibid.

the RBMPs are developed based on accurate data. The contributions have in several cases led to the reassessment around discharges, of water body conditions, of proposed actions etc., which further led to adjustments in the final plans. All consultation responses received were examined, and water plans were amended further. It is however not clear from the RBMPs which specific changes the consultations led to, but such information is available on the website of the Nature Agency.

There is no information about whether **continuous involvement of stakeholders** and general public will exist for the future, but in the consultation phase, a water and nature board was established, consisting of political representatives from municipalities, representatives from nature protection NGO`s and representatives from the regional authorities.

3.5 International co-operation and co-ordination

The **cross-border international river district** includes the main water district Vidå - Kruså, formed by the Danish section of river basins which spans the Danish-German border. The international character of this RBD is briefly handled in the Vidå-Kruså RBMP. There is also a summary of action to deal with transboundary pollution. There is no single shared international RBMP for these transboundary waters.

Denmark and Germany expressed their commitment to co-ordinate the management of catchments to transboundary watercourses in 2005 in a joint statement and the RBMP for the Danish part of the international Water District has been prepared accordingly. With the common statement describing the general framework for co-operation between the Danish and German water authorities, the relevant authorities considered it unnecessary to establish an international water plan or an international water board or co-operation body. Instead, the existing structures of co-operation across the border are used. These catchments are therefore so called Category 3 catchments (see CSWD).

4. CHARACTERISATION OF RIVER BASIN DISTRICTS

4.1 Water categories in the RBD

All water categories are relevant to Denmark. However, the category for transitional waters is not used, and no justification is given as to why this water category has not been used. Danish Authorities have defined two separate types of coastal waters: “open coastal waters” and “fjords”. Some of these fjords are even called 'inner fjords' such as Limfjorden, where turbidity, water depths, freshwater exchange and salinity seem more similar to transitional waters. In practice this designation means among other things that fish is not used for classification of this water type.

4.2 Typology of surface waters

A **surface water typology** has been developed for all water categories used, e.g. rivers, lakes and coastal waters (incl. fjords).

The Danish typology has been developed to provide a physical typology which is as simple as possible. There is no information on whether this typology has **been tested with biological data,** although Danish Authorities state the typology is ecologically relevant. They admit that there is a need to supplement the typology with more precise descriptions of complex reference conditions within the variation existing within a type. This statement is general and applies to all water categories used in Denmark (for transitional waters, see above).

RBD	Rivers	Lakes	Transitional	Coastal
DK1	6	17	0	15
DK2	6	17	0	8
DK3	6	17	0	1
DK4	6	17	0	1
Total	*6*	*17*	-	*15*

Table 4.2.1: *Surface water body types at RBD level*
Source: *WISE*

Reference conditions have been provided for all river types, but only partly for lakes and coastal waters. The actual reference conditions provided are type-specific for rivers.

For lakes reference conditions are set according to intercalibration results and are type-specific for the three lake types that have been intercalibrated (covering 7% of Danish lakes). Reference conditions are to be developed for the remaining lakes.

Reference conditions for coastal waters are given for chlorophyll a for different coastal areas, but the links to the coastal types are unclear.

There is no information on the methodology used to set the reference conditions for rivers. The general reference value of 7 for the Danish rivers invertebrate fauna index is not explained in the RBMP but is in national guidance and relates to the benthic invertebrates. No other BQEs are used for setting the reference values in rivers. For lakes, there is no information on how the reference values for chlorophyll a were derived. Danish authorities have clarified that reference conditions for chlorophyll a in lakes have been developed based on expert judgement.

For coastal waters the reference conditions are based on **historical data**. For the depth limit of eel grass there is a large historical material on the depth distribution of seagrasses in Danish coastal waters from the year 1900 and the following few decades until 1930 that can be used to define reference conditions. For certain types of coastal waters there are no historical data available on depth limit of seagrasses, and for those types the reference value for seagrass depth limit is based on **modelling**, using nitrogen as a proxy together with the regression between depth limit and total nitrogen. The method used to set reference values for phytoplankton chlorophyll a in coastal waters is explained in national guidelines on the elaboration of PoMs. Benthic fauna was not used in the first cycle for the assessment of ecological status.

The following background reports have been reported by the Danish authorities:

- National guidelines on the elaboration of programmes of measures, notably Annex 5. (in Danish: Retningslinjer for udarbejdelse av indsatsprogrammer), version 5.0, from the Ministry of Environment, December 2010[9].

- National guidance on characterisation (in Danish): Basisanalysen del 1. Karakterisering af vandforekomster og opgørelse av påvirkninger, Guidance no. 2, 2004[10].

- Rivers: Annex 9 to the National guidance on Classification[11].

- Coastal waters: Annex 5 to the National guidance on Classification, page 3[12].

- Lakes: Annex 13 to the national guidelines on the elaboration of programmes of measures.

4.3 Delineation of surface water bodies

Rivers with a catchment area smaller than 10 km^2 can be separate water bodies if needed according to specific laws (such as for nature protection law, river law, environmental protection law). For lakes, all lakes larger than 5 ha are delineated as water bodies. Also smaller lakes can be separate water bodies if delineated by the regional plans or based on guidelines given by other sector authorities according to sector laws. Natura 2000 lakes are also separate water bodies.

RBD	Surface Water								Groundwater	
	Rivers		Lakes		Transitional		Coastal			
	Number	*Average Length (km)*	*Number*	*Average Area (sq km)*	*Number*	*Average Area (sq km)*	*Number*	*Average Area (sq km)*	*Number*	*Average Area (sq km)*
DK1	12640		619	7	0		104	242		
DK2	3601		269	107	0		55	212		
DK3	340		19	1	0		3	1357		
DK4	300		33	*15*	0		0	0		
Total	*16881*		*940*		*0*		*162*	*252*		

Table 4.3.1: *Surface water bodies, groundwater bodies and their dimensions*
Source: *WISE*

[9] http://www.naturstyrelsen.dk/NR/rdonlyres/C88AD233-0775-45B5-8C50-0A93B11F133D/120333/-Retningslinjer.pdf

[10] http://www.naturstyrelsen.dk/NR/rdonlyres/87C17030-22C0-4E59-8283-751EAA1E1F16/0/Vejledningomkarakteriseringafvandforekomsterogopg%C3%B8relseafp%C3%A5virkninger.pdf

[11] http://www.naturstyrelsen.dk/NR/rdonlyres/C88AD233-0775-45B5-8C50-0A93B11F133D/120350/Bilag9.pdf

[12] http://www.naturstyrelsen.dk/NR/rdonlyres/C88AD233-0775-45B5-8C50-0A93B11F133D/120342/Bilag5.pdf

4.4 Identification of significant pressures and impacts

Denmark has not reported pressures and impacts to WISE[13]. Quantitative data on the number of water bodies subject to specific pressures are therefore not presented below. The major pressures and impacts listed in the RBMP sub-plans are:

[13] Because of this lack of data, any data presented on the basis of WISE shows all water bodies as being without pressures, and therefore the relevant tables are not included in this report.

Pressures	Impacts
Pollution from agriculture	Nutrient enrichment Organic enrichment Contamination (pesticides)
Urban waste water from households and industry	Nutrient enrichment Organic enrichment Contamination (heavy metals, POPs)
Pollution from aquaculture	Nutrient enrichment Organic enrichment Contamination (heavy metals, POPs)
Hydromorphological pressures, e.g. barriers, channelization, impoundments, piped streams, drainage	Altered habitats
Water abstraction for irrigation and public water supply	Water scarcity (local only)

Table 4.4.1: *Types of impacts per pressure*
Source: *Summarised and translated from Danish based on information given in Table 2.2.1 in the sub-plan for DK1.2 Limfjorden (similar tables for the other sub-plans)*

There are no criteria or thresholds given on how to **define significant pressures from point and diffuse sources**. The RBMP sub-plans provide tables with numerical accounts of emissions of N and P (and organic carbon given as BOD_5 in some of them) from **point sources** like urban waste water treatment plants, storm overflows, industry, fish farms and households not connected, and also source apportionment. The accounts were based on national and regional and municipal statistics and web-GIS based information, as explained in national guidelines, but this information is not clear from the sub-district RBMPs. The sub-district plans also provide tables with numerical accounts of **diffuse loads** of N and P from agriculture and long-range transboundary air pollution. Source apportionment with diffuse loads in absolute and relative terms shows the contribution to total loads relative to loads from point sources. There is no information in the sub-plans on how the calculations were carried out, but a reference is made to a report from DMU 2010 (but the full citation of the referenced report is not given in the plans).

For **water abstraction** there is a pie chart in the sub-plans showing water abstraction permitted from public and private water supply, agriculture and other sectors. Most of the water abstraction is from groundwater, although some irrigation is from rivers. There is also a table showing actual water abstraction from groundwater bodies, giving information on number of m^3 abstracted and percentage used relative to permitted. There is a rule that maximum abstraction of groundwater should not exceed 35% of the natural recharge of groundwater. The tables in the sub-plans show that very few groundwater bodies are overabstracted, but irrigation was not assessed for the first RBMPs. The method for calculating the water abstraction is not reported anywhere in the plans or in the national guidelines. The only information in the national guidelines for pressures on surface waters is that the public water works provide data on water abstraction. The methodology described in this guidance is basically to check all national, regional and municipal statistics as well as web-GIS based information.

There is no information in the RBMPs on the tools used to assess **significant hydromorphological** (HyMo) pressures. The only information found is in the sub-plans chapter 2.2.6 on "Other pressures", where different HyMo pressures and other pressures are described. A physical index was used to assess morphological pressures (physical variation)

for rivers, but not for lakes or coastal waters. All pressures are assessed using official statistics and web-GIS, according to the national guidance on characterisation.

The information on **chemical pollution and the main sources** is very limited and general. Urban waste water, agriculture, aquaculture, navigation and historical contaminated sites are generally mentioned as sources, but not quantified in any way.

Background documentation: WISE chapter 2.2.4.2 is referring to The Danish Act on Methodology, annexes 2 and 3, there are guidelines given on where information on significant pressures can be found referring to official statistics and web-GIS[14].

4.5 Protected areas

Denmark is exempt from designating specific sensitive areas for the Nitrates Directive and the Urban Waste Water Treatment Directive, since it considers the whole territory sensitive or vulnerable. Denmark is not using surface waters for drinking water abstraction purposes.

RBD	Number of PAs										
	Article 7 Abstraction for drinking water	Bathing	Birds	European Other	Fish	Habitats	Local	National	Nitrates[15]	Shellfish	UWWT[16]
DK1	256		76			169				23	
DK2	99		31			71				13	
DK3	6		2			12					
DK4	7		4			5					
Total	*368*		*113*			*257*				*36*	

Table 4.5.1: *Number of protected areas of all types in each RBD and for the whole country, for surface and groundwater[17].*
Source: *WISE*

[14] Danish Act (bekendtgørelse) nr. 1355 of 11 December 2006. (https://www.retsinformation.dk/Forms/R0710.aspx?id=13004&exp=1).

[15] Denmark has established and applies action programmes in the whole of its territory and therefore, in accordance with article 3.5 of the Nitrates Directive (1991/676/EEC), it is exempted from designation of specific vulnerable zones.

[16] Denmark applies more stringent waste water treatment in the whole of its territory and therefore, in accordance with article 5.8 of the Urban Waste Water Directive (1991/271/EEC), it is exempted from designation of specific vulnerable zones.

[17] This information corresponds to the reporting of protected areas under the WFD. More/other information may have been reported under the obligations of other Directives.

5. MONITORING

5.1 General description of the monitoring network

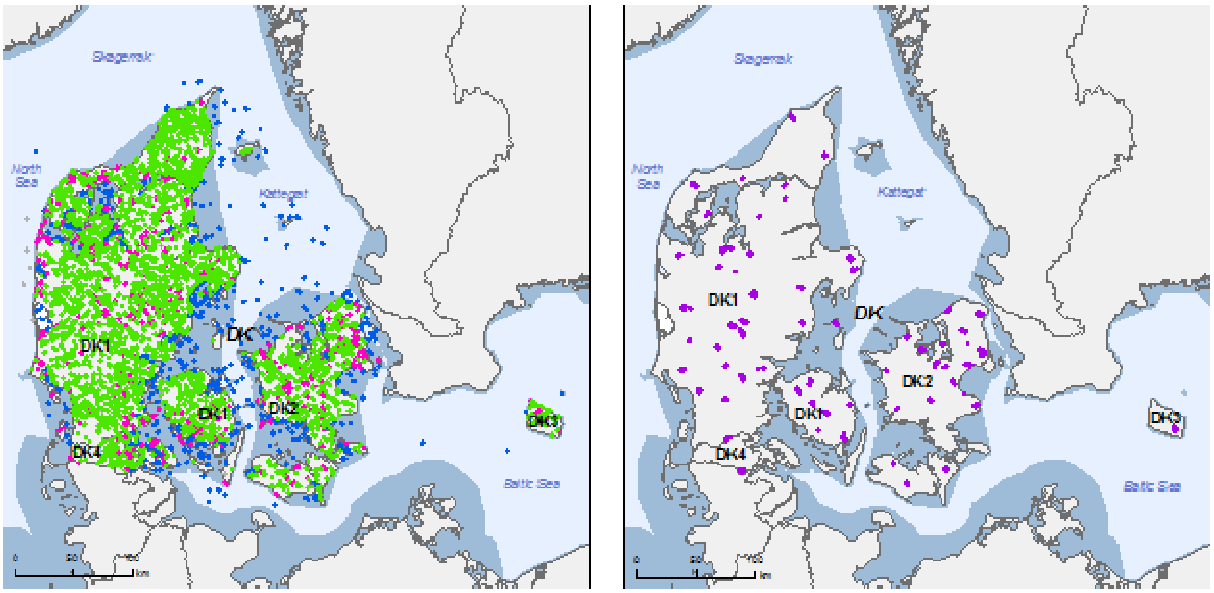

Figure 5.1.1: *Maps of surface water (left) and groundwater (right) monitoring stations*

- *River monitoring stations*
- *Lake monitoring stations*
- *Transitional water monitoring stations*
- *Coastal water monitoring stations*
- *Unclassified surface water monitoring stations*
- *Groundwater monitoring stations*
- *River Basin Districts*
- *Countries outside EU*

Source: *WISE, Eurostat (country borders)*

There has been a substantial change of monitoring stations between article 8 (as given in the 2009 WFD implementation report) and article 13 reporting. Denmark has a relatively high number of monitoring sites, although not all types of monitoring seem to take place and not all quality elements are monitored at the reported sites.

The monitoring network used for the preparation of the current River Basin Management Plans was not reported in the RBMPs, instead a new monitoring programme was reported, the new national guidance on monitoring, NOVANA[18]. This new programme, to run from 2011 to 2015, is said to be more WFD compliant, whilst the previous programme was built on existing pre-WFD monitoring. The RBMPs include a very brief description of the new programme, and reference is made to the webportal WebGis[19] for more information.

[18] (Nasjonal overvågning av vand og natur), part 2. Ministry of Environment, "Naturstyrelsen". www.naturstyrelsen.dk .ISBN: 978-87-7279-013-8, sections 6.3 for rivers, 7.3 for lakes and 8.3 for coastal waters.

[19] http://miljoegis.mim.dk/cbkort?profile=miljoegis_vandrammedirektiv2011

Information was partly reported to WISE, and there are some inconsistencies. This assessment tries to distinguish between the two generations of monitoring as far as possible, and it is assumed that the monitoring network described in the 2009 implementation report was used for the first RBMPs. Denmark did not report which (types of) quality elements are monitored at the specific reported sites. Quality elements monitored have however been reported for the different monitoring programmes.

Denmark did not report which specific quality elements were monitored to WISE. Because of this lack of data, any data presented on the basis of WISE shows no quality elements are, and therefore the relevant tables are not included in this Member State Annex

RBD	Rivers		Lakes		Transitional		Coastal		Groundwater		
	Surv	Op	Surv	Op	Surv	Op	Surv	Op	Surv	Op	Quant
DK1	607	1971	0	250	0	0	162	312	419	419	419
DK2	140	393	0	89	0	0	77	119	185	185	185
DK3	15	27	0	3	0	0	4	3	13	13	13
DK4	14	84	0	9	0	0	0	0	19	19	19
Total by type of site	*776*	*2475*	*0*	*351*	*0*	*0*	*243*	*434*	*636*	*636*	*636*
Total number of monitoring sites[20]	*3251*		*351*		-	*677*	*636*		*5391*		

Table 5.1.1: *Number of monitoring sites by water category*
Surv = Surveillance
Op = Operational
Quant = Quantitative
Source: *WISE*

For **rivers,** there has been a large increase in the number of operational monitoring stations (from 748 to 2477), and a smaller increase in the number of surveillance monitoring stations (from 728 to 776) reported to WISE. In the new national guidance there are 800 river stations for surveillance monitoring (table 6.3, p. 90) and 5700 stations for operational monitoring (table 6.5, p. 93). However the information is not clear (as explained above).

For **lakes,** the WISE data indicate that there are 190 stations for surveillance monitoring and 351 stations for operational monitoring, while the 2009 report shows 263 stations for surveillance monitoring and 265 stations for operational monitoring. The new national guidance shows 150 stations for surveillance monitoring (table 7.1, p. 110) and 310 stations for operational monitoring (table 7.7, p. 118).

For **coastal** waters there has also been an increase in the number of stations**,** the WISE data shows 243 stations for surveillance monitoring and 434 stations for operational monitoring, whereas the 2009 report shows only 34 stations for surveillance monitoring and 51 stations for operational monitoring. In the new national guidance the number of stations varies with quality elements, from 13 stations for phytoplankton to 65 stations for angiosperms (table 8.1, p. 132).

[20] Number of sites calculated from data reported at site level. If no data reported at site level, then table supplemented with data reported at programme level.

For **groundwate**r there has been a decrease in the number of stations, 636 stations for both quantitative monitoring and chemical surveillance and operational monitoring were reported to WISE, compared to 858 stations in the previous report. The monitoring programme for drinking water protected areas (only groundwater) is not included in the NOVANA programme.

5.2 Monitoring of surface waters

The information below is based on the new Danish national guidance on monitoring (NOVANA 2011-2015), which has been reported with the RBMPs (see above).

For rivers, the phytobenthos (benthic algae) is not monitored. There is no justification given why this parameter has been excluded. Also phytoplankton in rivers is excluded, but this is justified by saying that this BQE is not scientifically relevant to Danish rivers (p.88 in NOVANA). According to this programme, the connection to groundwater is not to be monitored, and it is unclear whether the other HyMo QEs are monitored, or only some of them. For the physico-chemical QEs, conductivity (salinity), chloride and sulphate are parameters missing from the monitoring programme. There is no justification given why these supporting QEs are missing from the monitoring programme.

For lakes, phytobenthos is missing, as well as the supporting QEs chloride and sulphate, morphological conditions and connection to groundwater. No justification is given why these are missing. For coastal waters, all the HyMo QEs are missing. No justification given.

Denmark has established an **operational monitoring programme** for all water categories used in Denmark (rivers, lakes and coastal waters). For rivers only benthic fauna is used. Danish authorities have clarified that only BQEs that have been intercalibrated in the 1st decision and for which a Danish method is available have been monitored and used in the first RBMP phase, more BQEs are foreseen to be used for the second RBMP. For lakes, chlorophyll α and macrophytes are the only BQEs used. For coastal waters the QEs are the same as for surveillance monitoring (all BQEs and physico-chemical QEs).

Screening has been used to identify **relevant pollutants (both priority substances and national specific pollutants).** The new national guidance document (NOVANA) provides long lists of potentially relevant substances and EQS values for water and for some substances also sediments. Mercury is also monitored in fish in lakes. Only substances found in concentrations considered to be significant for the water environment in the screening survey are monitored, and only in water bodies exposed to emissions of these substances.

Denmark has ca. 17000 river water bodies, 940 lake water bodies and 162 coastal water bodies (see preceding table). In WISE table 5.1.2.b, the total number of water bodies monitored is not given, only the total number classified. For rivers, benthic invertebrates are reported to be classified in over 10000 water bodies (ca. 60%) of all water bodies, while the monitoring guidance says that benthic invertebrates are monitored in 5700 stations. For lakes, 78% of the water bodies are classified (using only chlorophyll α), and for coastal waters 66 of 104 (or 162 according to the table above) water bodies are classified (using angiosperms and/or chlorophyll α). Although these numbers indicate that **grouping of water bodies** must have been applied, there is no information found on grouping in the RBMP subplans, nor in the national guidance documents on monitoring and on classification. Information about grouping is available in the national guidelines for the programme of measures.

There is no common **transboundary monitoring programme** in place. Monitoring of the transboundary water bodies (two lakes, one major border river and several smaller transboundary rivers) is carried out according to the NOVANA guidelines for Denmark and according to the German guidelines for the German water bodies. The designation of water bodies was done in a co-ordinated way between DK and DE according to an international agreement from 2005.

Background document/national guidance: The RBMP sub-plans refer to the new National guidance on monitoring, NOVANA (Nasjonal overvågning av vand og natur), 2011-2015, part 2. Ministry of Environment, "Naturstyrelsen". ISBN: 978-87-7279-013-8. http://www.naturstyrelsen.dk/Naturbeskyttelse/National_naturbeskyttelse/-Overvaagning_af_vand_og_natur/NOVANA/novana.htm.

5.3 Monitoring of groundwater

The number of monitoring stations are different in the WISE aggregation report on GWST_sites compared to the report submitted in 2007 (see above), but the number of monitoring stations in the WISE aggregation report is inconsistent with (much higher than) the information given in the new NOVANA national monitoring guidance, as detailed in the following paragraph.

A **quantitative groundwater monitoring programme** has been established. The number of sites is unclear, as the information in the WISE aggregation report (638 stations) is not consistent with the information given in the National Monitoring guidance (NOVANA 2011-2015) (116 stations). Water quantity parameters are included where the quantitative status is at risk from over-abstraction: groundwater level, water abstraction relative to size and age of the groundwater resource. The water balance and groundwater recharge are modelled on national scale based on a Danish method.

It is unclear whether there is a **separate surveillance and operational monitoring programme for groundwater** in Denmark. There is a monitoring programme for the current network of 116 stations according to NOVANA (p. 68). The selection of parameters is different for water bodies that are at risk and not based on exceedance of the nitrate value in the Nitrates Directive (50 mg/l NO_3 corresponding to 15 mg/l N-NO_3). For water bodies at risk the selection of parameters are based on exceedance of drinking water standards for other major components (major ions, including sodium and chloride (salt)), using screening data for specific and priority pollutants from 1993 to 2008. The following major groups of parameters are used: nitrate and other major components (ions, and CO_2), metals, POPs including pesticides. A full list of parameters that can be included in the monitoring programme depending on the screening results are given in the national monitoring guidance. There is no particular explanation of the relationship between parameter selection and specific pressures or impacts.

Trend analyses for **groundwater chemical status** are so far said to be at a preliminary level, but for water bodies exceeding the Nitrates Directive standard and/or standards for pesticides and other pollutants, a programme is planned for monitoring trends for nitrate and selected major components based on samples taken annually or every three years. It is not clear if this trend programme will include other pollutants, as nothing is said about this in the national guidance.

There are many groundwater bodies for which an **Article 6 exemption** is applied. However, the only monitoring programme described is not specific to these water bodies, but rather general regardless of whether exemptions have been applied or not. The programme established for trend monitoring is specifically used for water bodies at risk, but nothing is said about exemptions under that section in the monitoring guidance. As most of the groundwater bodies seem to be on the list of exemptions, the national programme of monitoring seems to be applicable also for those.

No **international monitoring programme of groundwater** is in place. Monitoring of the transboundary water bodies (no information on transboundary GWBs) is carried out according to the NOVANA guidelines for Denmark and according to the German guidelines for the German water bodies. The designation of water bodies was done in a co-ordinated way between DK and DE according to an international agreement from 2005.

5.4 Monitoring of protected areas

There is a specific **monitoring programme in place for groundwater protected areas used for drinking water.** This monitoring programme is not included in the national programme (NOVANA), but done by the water works operators. The monitoring is not carried out in the raw water resource, but only in the drinking water after simple purification. Any groundwater body exceeding drinking water standards are abandoned and no longer monitored by the water works operators. There are 421 monitoring sites included in this programme. Surface waters are not used for drinking water in Denmark. No monitoring stations for groundwater drinking water abstraction protected areas are reported to WISE. In 2007, 70 such monitoring stations were reported (DK1 : 35, DK2 : 32, DK3: 1, DK4 : 3).

There is also a **surface waters monitoring programme** for the Natura 2000 sites under the Habitats Directive. No specific sensitive areas or specific vulnerable zones were designated under the Nitrates and UWWT Directives (see above).

In addition to drinking water protected areas as mentioned above, more monitoring stations have been reported for other **protected areas** compared to the 2007 report, in which no other monitoring stations than for groundwater for drinking water were reported.

RBD	Surface waters									Ground-water drinking water
	Surface drinking water abstraction	Quality of drinking water	Bathing water	Birds sites	Fish	Habitats sites	Nitrates	Shellfish	UWWT	
DK1	0	0	49	369	0	554	554	177	0	309*
DK2	0	0	11	153	0	0	183	82	0	164*
DK3	0	0	0	5	0	0	5	0	0	13*
DK4	0	0	0	16	0	0	8	0	0	10*
Total	*0*	*0*	*60*	*543*	*0*	*554*	*750*	*259*	*0*	*496*

Table 5.3.1: *Number of monitoring sites in protected areas*[21]
*Note: *Number of monitoring sites reported at programme level.*
Source: *WISE*

6. OVERVIEW OF STATUS (ECOLOGICAL, CHEMICAL, GROUNDWATER)

RBD	Total	High		Good		Moderate		Poor		Bad		Unknown	
		No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)
DK1	2234	182	8.1	597	26.7	611	27.4	226	10.1	191	8.5	427	19.1
DK2	3237	69	2.1	646	20.0	1259	38.9	463	14.3	187	5.8	613	18.9
DK3	351	55	15.7	167	47.6	60	17.1	3	0.9	1	0.3	65	18.5
DK4	31	13	41.9	3	9.7	4	12.9	3	9.7	3	9.7	5	16.1
Total	*5853*	*319*	*5.5*	*1413*	*24.1*	*1934*	*33.0*	*695*	*11.9*	*382*	*6.5*	*1110*	*19.0*

Table 6.1: *Ecological status of natural surface water bodies*
Source: *WISE*

RBD	Total	High		Good		Moderate		Poor		Bad		Unknown	
		No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)
DK1	1359	11	0.8	244	18.0	149	11.0	82	6.0	28	2.1	845	62.2
DK2	680	0	0	72	10.6	110	16.2	46	6.8	23	3.4	429	63.1
DK3	11	0	0	0	0	0	0	0	0	0	0	11	100
DK4	68	1	1.5	23	33.8	5	7.4	15	22.1	11	16.2	13	19.1
Total	*2118*	*12*	*0.6*	*339*	*16.0*	*264*	*12.5*	*143*	*6.8*	*62*	*2.9*	*1298*	*61.3*

Table 6.2: *Ecological potential of artificial and heavily modified water bodies*
Source: *WISE*

RBD	Total	Good		Poor		Unknown	
		No.	%	No.	%	No.	%
DK1	2234	29	1.3	3	0.1	2202	98.6
DK2	3237	0	0	0	0	3237	100
DK3	351	0	0	0	0	351	100
DK4	31	0	0	0	0	31	100
Total	*5853*	*29*	*0.5*	*3*	*0.05*	*5821*	*99.5*

Table 6.3: *Chemical status of natural surface water bodies*
Source: *WISE*

RBD	Total	Good		Poor		Unknown	
		No.	%	No.	%	No.	%

[21] Number of sites calculated from data reported at site level. If no data reported at site level, then table supplemented with data reported at programme level.

RBD	Total	Good		Poor		Unknown	
		No.	%	No.	%	No.	%
DK1	1359	3	0.2	6	0.4	1350	99.3
DK2	680	0	0	0	0	680	100
DK3	11	0	0	0	0	11	100
DK4	68	0	0	0	0	68	100
Total	*2118*	*3*	*0.1*	*6*	*0.3*	*2109*	*99.6*

Table 6.4: *Chemical status of artificial and heavily modified water bodies*
Source: *WISE*

RBD	Total	Good		Poor		Unknown	
		No.	%	No.	%	No.	%
DK1	271	138	50.9	133	49.1	0	0
DK2	101	72	71.3	29	28.7	0	0
DK3	6	6	100	0	0	0	0
DK4	7	5	71.4	2	28.6	0	0
Total	*385*	*221*	*57.4*	*164*	*42.6*	*0*	*0*

Table 6.5: *Chemical status of groundwater bodies*
Source: *WISE*

RBD	Total	Good		Poor		Unknown	
		No.	%	No.	%	No.	%
DK1	271	190	70.1	81	29.9	0	0
DK2	101	49	48.5	52	51.5	0	0
DK3	6	6	100	0	0	0	0
DK4	7	4	57.1	3	42.9	0	0
Total	*385*	*249*	*64.7*	*136*	*35.3*	*0*	*0*

Table 6.6: *Quantitative status of groundwater bodies*
Source: *WISE*

RBD	Total	Global status (ecological and chemical)					Good ecological status 2021		Good chemical status 2021		Good ecological status 2027		Good chemical status 2027		Global exemptions 2009 (% of all SWBs)			
		Good or better 2009		Good or better 2015		Increase 2009 - 2015									Art 4.4	Art 4.5	Art 4.6	Art 4.7
		No.	%	No.	%	%	No.	%	No.	%	No.	%	No.	%	%	%	%	%
DK1	13364	15	0.1	67	0.5	0.4									24	0	0	0
DK2	3925	0	0.0	0	0.0	0.0									26	0	0	0
DK3	362	0	0.0	0	0.0	0.0									6	0	0	0
DK4	333	0	0.0	0	0.0	0.0									40	0	0	0
Total	*17984*	*15*	*0.1*	*67*	*0.4*	*0.3*									*24*	*0*	*0*	*0*

Table 6.7: *Surface water bodies: overview of status in 2009 and expected status in 2015, 2021 and 2027*[22]
Waterbodies with good status in 2009 fall into the following category:
1. Ecological status is high or good and the chemical status is good, exemptions are not considered
Waterbodies expected to achieve good status in 2015 fall into the following categories:
1. Ecological status is high or good and the chemical status is good, exemptions are not considered
2. Chemical status is good, and the ecological status is moderate or below but no ecological exemptions
3. Ecological status is high or good, and the chemical status is failing to achieve good but there are no chemical exemptions
4. Ecological status is moderate or below, and chemical status is failing to achieve good but there are no ecological nor chemical exemptions
Note: Waterbodies with unknown/unclassified/Not applicable in either ecological or chemical status are not considered
Source: *WISE (for data on status in 2009, 2015 and exemptions) and RBMPs (for data on status in 2021 and 2027)*

[22] Data for 2009 and 2015 extracted from WISE. Data for 2021 and 2027 established during the compliance assessment of the RBMPs.

RBD	Total	Ecological status					Good ecological status 2021		Good ecological status 2027		Ecological exemptions (% of all SWBs)			
		Good or better 2009		Good or better 2015		Increase 2009 -2015					Art 4.4	Art 4.5	Art 4.6	Art 4.7
		No.	%	No.	%	%	No.	%	No.	%	%	%	%	%
DK1	2234	779	34.9	1361	60.9	26.1					22.4	0	0	0
DK2	3237	715	22.1	1803	55.7	33.6					27.2	0	0	0
DK3	351	222	63.2	269	76.6	13.4					5.7	0	0	0
DK4	31	16	51.6	17	54.8	3.2					29.0	0	0	0
Total	*5853*	*7047*	*29.6*	*3450*	*58.9*	*29.3*					*24.1*	*0*	*0*	*0*

Table 6.8: *Natural surface water bodies: ecological status in 2009 and expected status in 2015, 2021 and 2027*[23]
Source: *WISE (for data on status in 2009, 2015 and exemptions) and RBMPs (for data on status in 2021 and 2027)*

RBD	Total	Chemical status					Good chemical status 2021		Good chemical status 2027		Chemical exemptions (% of all SWBs)			
		Good or better 2009		Good or better 2015		Increase 2009 -2015					Art 4.4	Art 4.5	Art 4.6	Art 4.7
		No.	%	No.	%	%	No.	%	No.	%	%	%	%	%
DK1	2234	29	1.3	32	1.4	0.1					0	0	0	0
DK2	3237	0	0.0	0	0.0	0					0	0	0	0
DK3	351	0	0.0	0	0.0	0					0	0	0	0
DK4	31	0	0.0	0	0.0	0					0	0	0	0
Total	*5853*	*29*	*0.5*	*32*	*0.5*	*0*					*0*	*0*	*0*	*0*

Table 6.9: *Natural surface water bodies: chemical status in 2009 and expected status in 2015, 2021 and 2027*[24]
Source: *WISE (for data on status in 2009, 2015 and exemptions) and RBMPs (for data on status in 2021 and 2027)*

[23] Data for 2009 and 2015 extracted from WISE. Data for 2021 and 2027 established during the compliance assessment of the RBMPs.
[24] Data for 2009 and 2015 extracted from WISE. Data for 2021 and 2027 established during the compliance assessment of the RBMPs.

RBD	Total	GW chemical status					Good chemical status 2021		Good chemical status 2027		GW chemical exemptions (% of all GWBs)			
		Good or better 2009		Good or better 2015		Increase 2009 -2015					Art 4.4	Art 4.5	Art 4.6	Art 4.7
		No.	%	No.	%	%	No.	%	No.	%	%	%	%	%
DK1	271	138	50.9	138	50.9	*0.0*					49	0	0	0
DK2	101	72	71.3	72	71.3	*0.0*					29	0	0	0
DK3	6	6	100.0	6	100.0	*0.0*					0	0	0	0
DK4	7	5	71.4	5	71.4	*0.0*					29	0	0	0
Total	*385*	*221*	*57.4*	*221*	*57.4*	*0.0*					*43*	*0*	*0*	*0*

Table 6.10: *Groundwater bodies: chemical status in 2009 and expected status in 2015, 2021 and 2027*[25]
Source: *WISE (for data on status in 2009, 2015 and exemptions) and RBMPs (for data on status in 2021 and 2027)*

RBD	Total	Groundwater quantitative status					Good quantitative status 2021		Good quantitative status 2027		GW quantitative exemptions (% of all GWBs)			
		Good or better 2009		Good or better 2015		Increase 2009 -2015					Art 4.4	Art 4.5	Art 4.6	Art 4.7
		No.	%	No.	%	%	No.	%	No.	%	%	%	%	%
DK1	271	190	70.1	190	70.1	0.0					30	0	0	0
DK2	101	49	48.5	49	48.5	0.0					51	0	0	0
DK3	6	6	100.0	6	100.0	0.0					0	0	0	0
DK4	7	4	57.1	4	57.1	0.0					43	0	0	0
Total	*385*	*249*	*64.7*	*249*	*64.7*	*0.0*					*35*	*0*	*0*	*0*

Table 6.11: *Groundwater bodies: quantitative status in 2009 and expected status in 2015, 2021 and 2027*[26]
Source: *WISE (for data on status in 2009, 2015 and exemptions) and RBMPs (for data on status in 2021 and 2027)*

RBD	Total HMWB	Ecological potential	Good ecological	Good ecological	Ecological exemptions (% of all HMWB/AWB)

[25] Data for 2009 and 2015 extracted from WISE. Data for 2021 and 2027 established during the compliance assessment of the RBMPs.
[26] Data for 2009 and 2015 extracted from WISE. Data for 2021 and 2027 established during the compliance assessment of the RBMPs.

		Good or better 2009		Good or better 2015		Increase 2009 -2015					Art 4.4	Art 4.5	Art 4.6	Art 4.7
		No.	%	No.	%	%	No.	%	No.	%	%	%	%	%
DK1	1359	255	18.8	291	21.4	2.6					18.5	0	0	0
DK2	680	72	10.6	137	20.1	9.6					16.9	0	0	0
DK3	11	0	0.0	0	0.0	0.0					0	0	0	0
DK4	68	24	35.3	27	39.7	4.4					41.2	0	0	0
Total	*2118*	*351*	*16.6*	*455*	*21.5*	*4.9*					*18.6*	*0*	*0*	*0*

Table 6.12: *Heavily modified and artificial water bodies: ecological potential in 2009 and expected ecological potential in 2015, 2021 and 2027*[27]
Source: *WISE (for data on status in 2009, 2015 and exemptions) and RBMPs (for data on status in 2021 and 2027)*

RBD	Total HMWB and AWB	Chemical status					Good chemical status 2021		Good chemical status 2027		Chemical exemptions (% of all HMWB/AWB)			
		Good or better 2009		Good or better 2015		Increase 2009 -2015					Art 4.4	Art 4.5	Art 4.6	Art 4.7
		No.	%	No.	%	%	No.	%	No.	%	%	%	%	%
DK1	1359	3	0.2	9	0.7	0.4					0	0	0	0
DK2	680	0	0	0	0	0					0	0	0	0
DK3	11	0	0	0	0	0					0	0	0	0
DK4	68	0	0	0	0	0					0	0	0	0
Total	*2118*	*3*	*0.1*	*9*	*0.4*	*0.3*					*0*	*0*	*0*	*0*

Table 6.13: *Heavily modified and artificial water bodies: chemical status in 2009 and expected status in 2015, 2021 and 2027*[28]
Source: *WISE (for data on status in 2009, 2015 and exemptions) and RBMPs (for data on status in 2021 and 2027)*

[27] Data for 2009 and 2015 extracted from WISE. Data for 2021 and 2027 established during the compliance assessment of the RBMPs.
[28] Data for 2009 and 2015 extracted from WISE. Data for 2021 and 2027 established during the compliance assessment of the RBMPs.

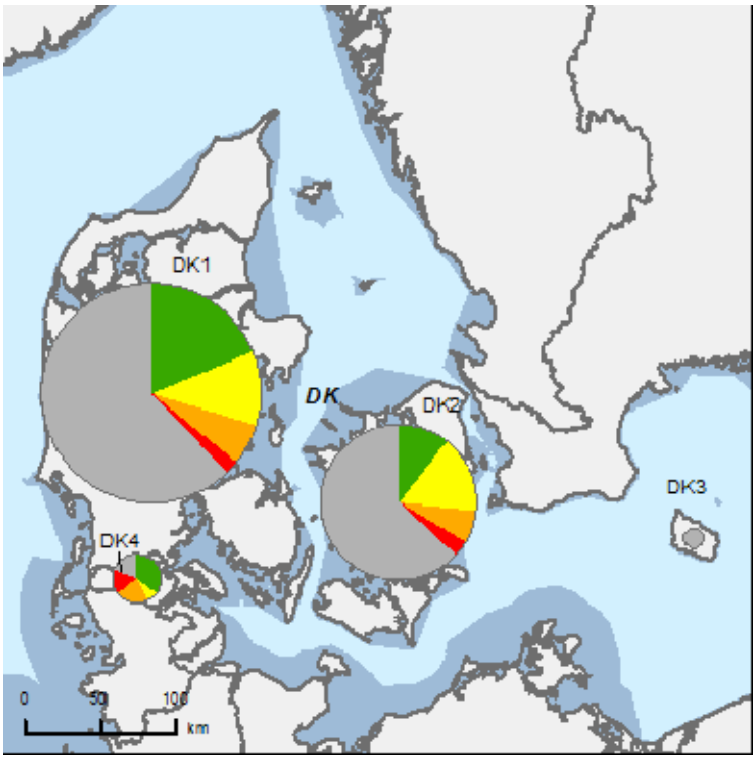

Figure 6.1: *Map of ecological status of natural surface water bodies 2009*

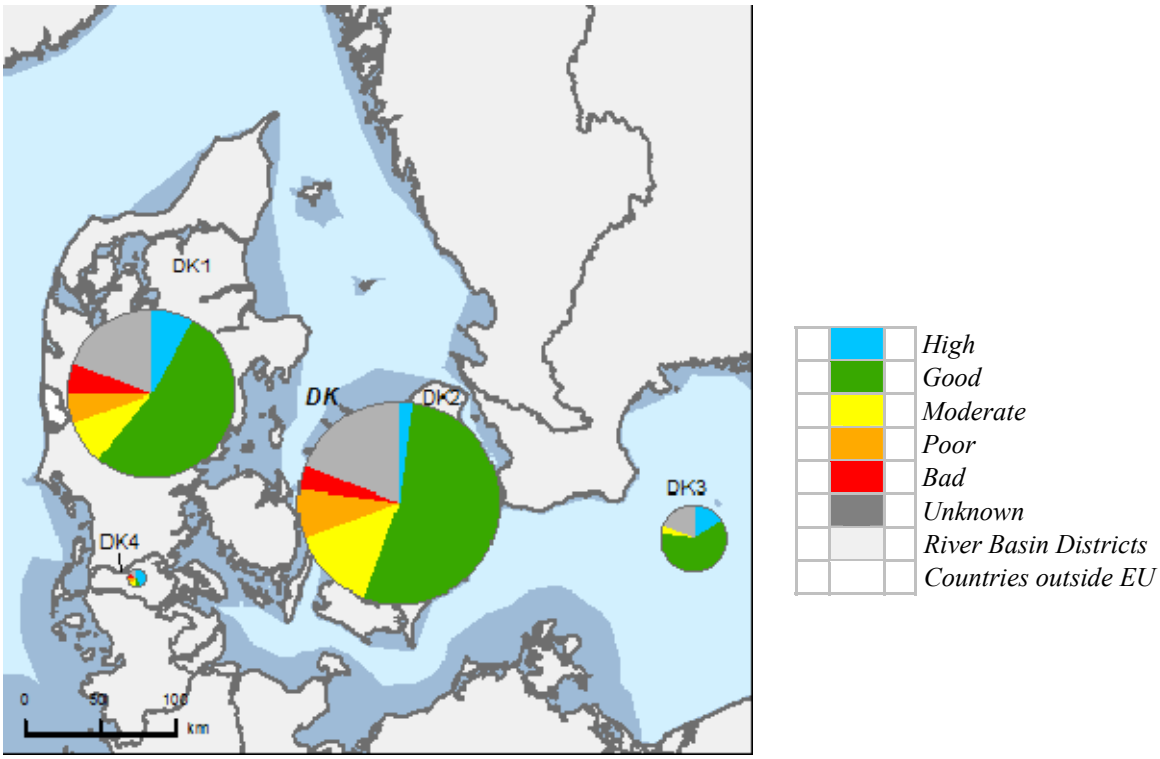

Figure 6.2: *Map of ecological status of natural surface water bodies 2015*
Note: Standard colours based on WFD Annex V, Article 1.4.2(i).
Source: *WISE, Eurostat (country borders)*

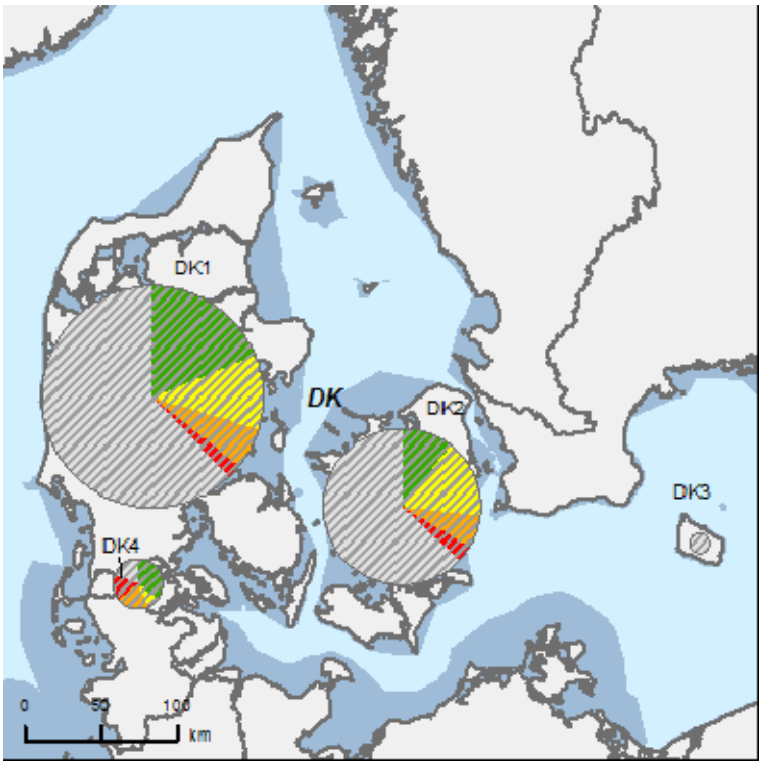

Figure 6.3: *Map of ecological potential of artificial and heavily modified water bodies 2009*

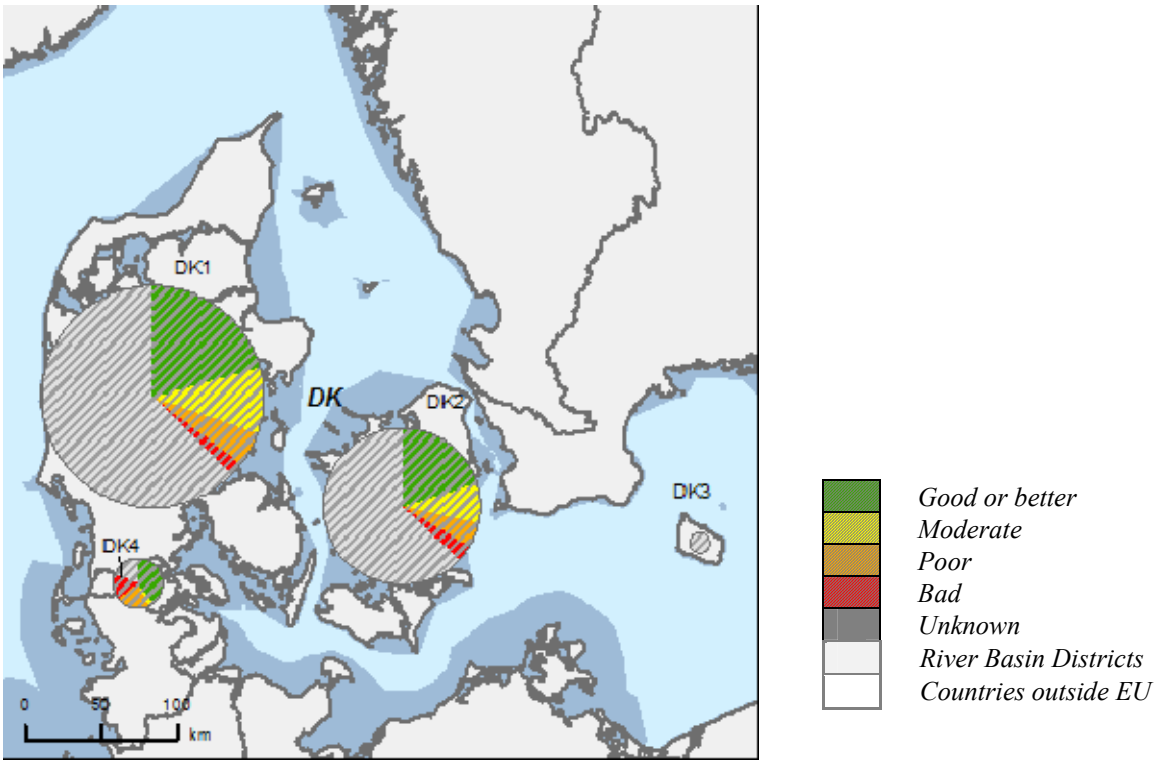

Figure 6.4: *Map of ecological potential of artificial and heavily modified water bodies 2015*
Note: Standard colours based on WFD Annex V, Article 1.4.2(ii).
Source: *WISE, Eurostat (country borders)*

Figure 6.5: *Map of chemical status of natural surface water bodies 2009*

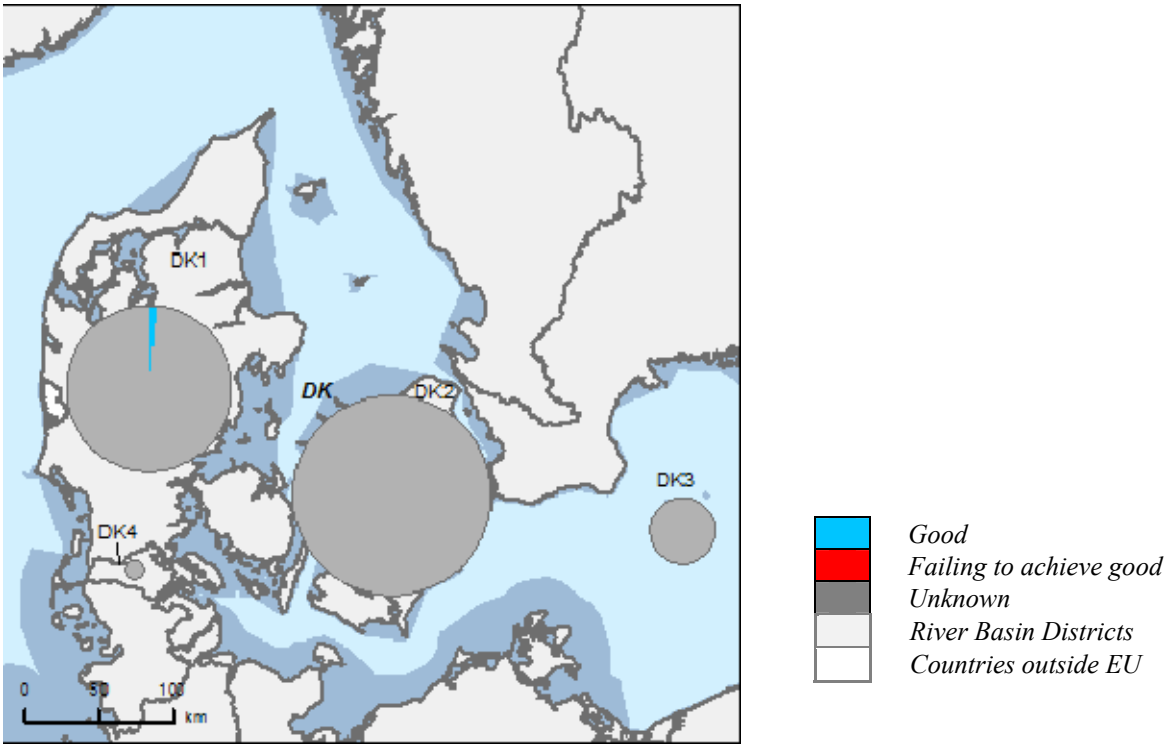

Figure 6.6: *Map of chemical status of natural surface water bodies 2015*
Note: Standard colours based on WFD Annex V, Article 1.4.3.
Source: *WISE, Eurostat (country borders)*

Figure 6.7: *Map of chemical status of artificial and heavily modified water bodies 2009*

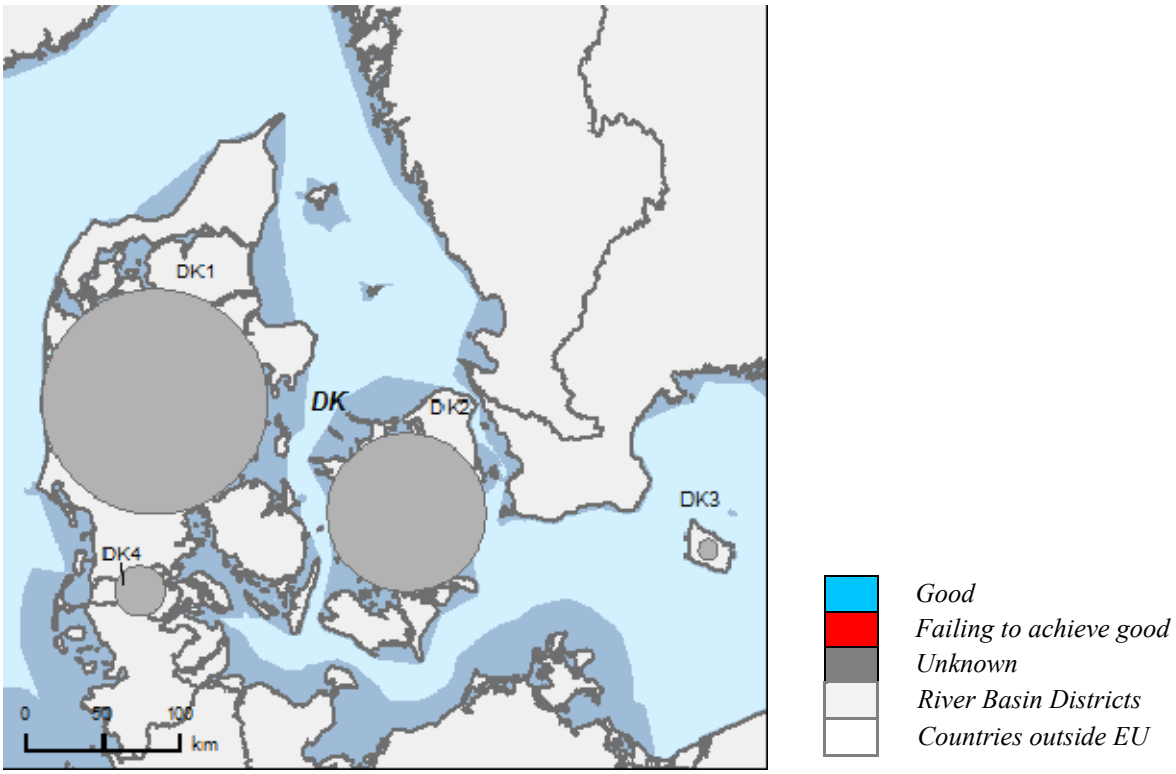

Figure 6.8: *Map of chemical status of artificial and heavily modified water bodies 2015*

Note: *Standard colours based on WFD Annex V, Article 1.4.3.*
Source: *WISE, Eurostat (country borders)*

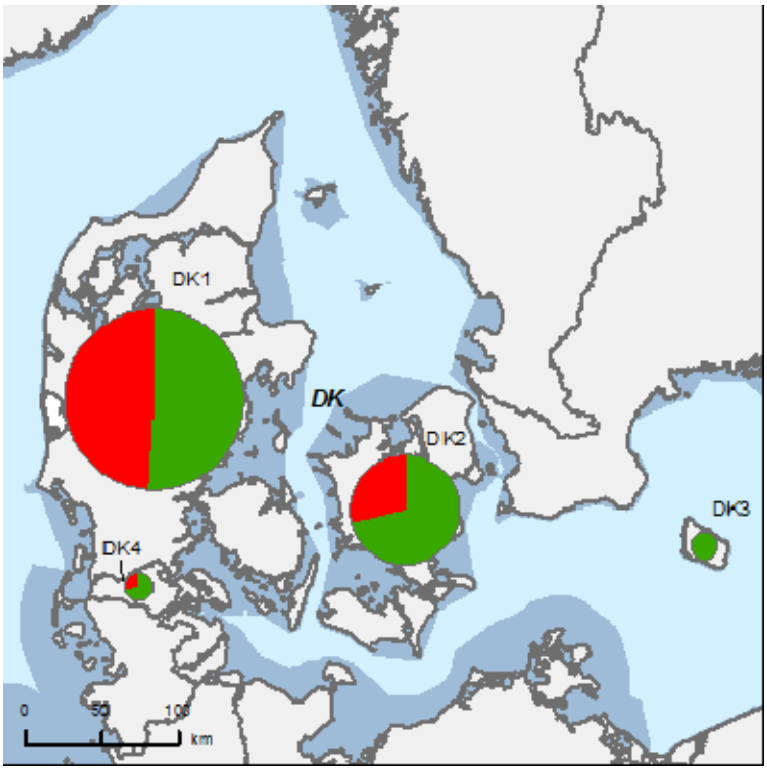

Figure 6.9: *Map of chemical status of groundwater bodies 2009*

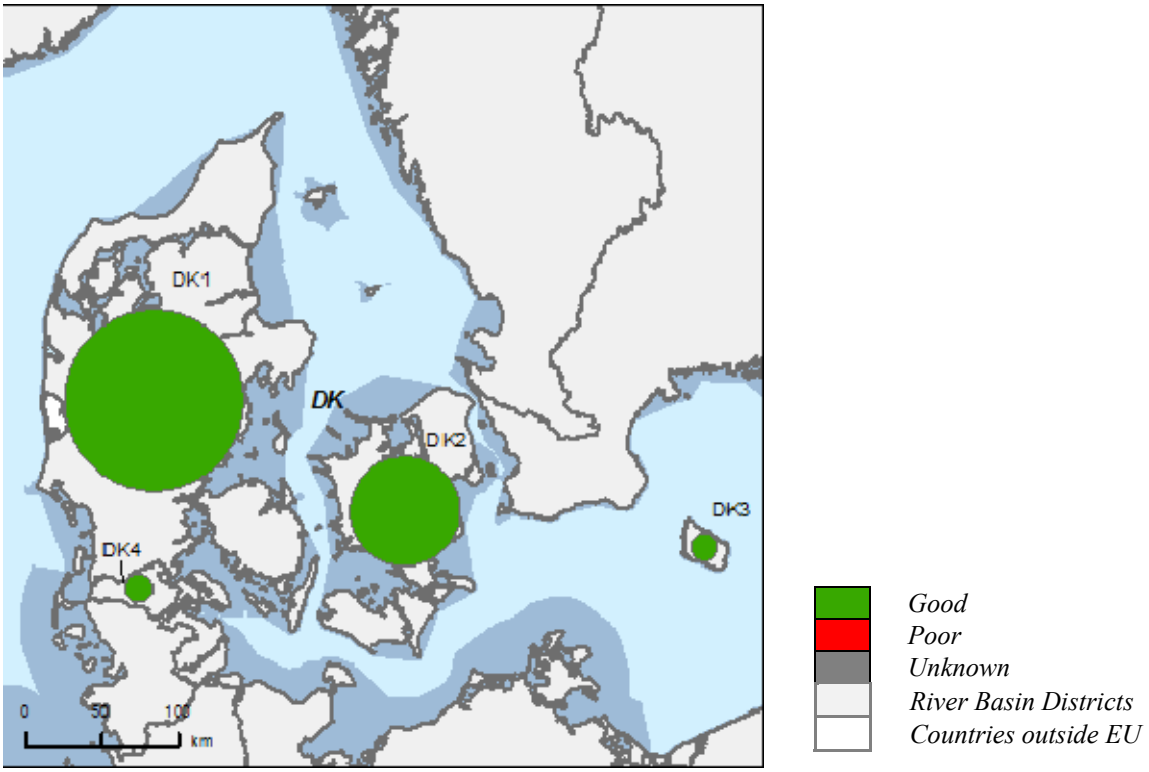

Figure 6.10: *Map of chemical status of groundwater bodies 2015*

Note: *Standard colours based on WFD Annex V, Article 2.4.5.*
Source: *WISE, Eurostat (country borders)*

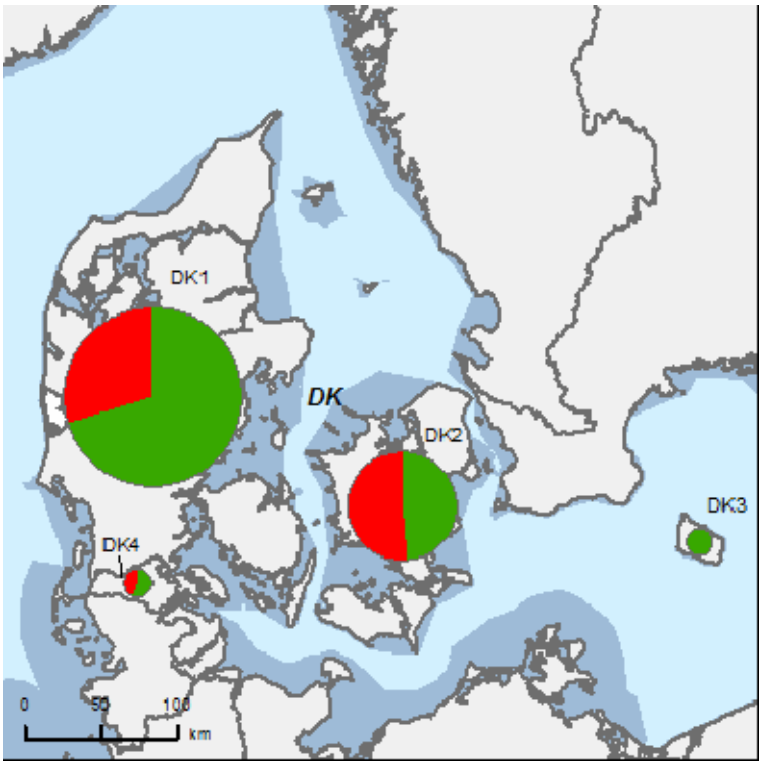

Figure 6.11: *Map of quantitative status of groundwater bodies 2009*

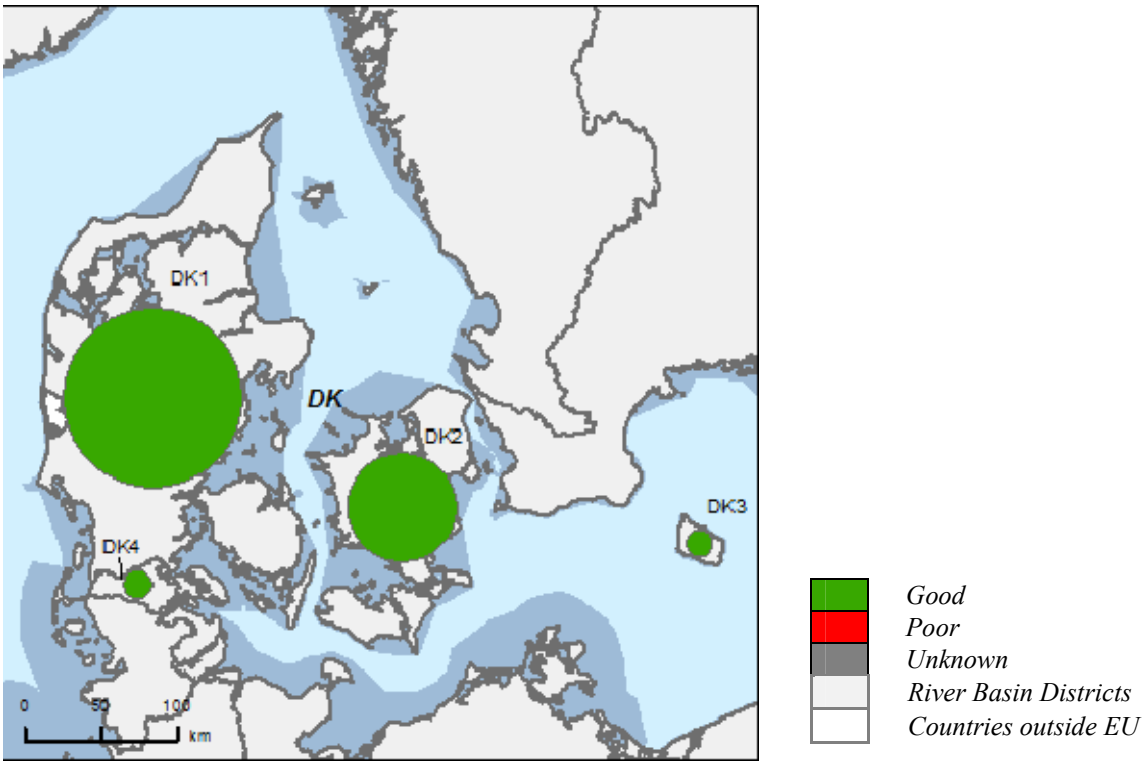

Figure 6.12: *Map of quantitative status of groundwater bodies 2015*
Note: Standard colours based on WFD Annex V, Article 2.2.4.

Source: *WISE, Eurostat (country borders)*

7. ASSESSMENT OF ECOLOGICAL STATUS OF SURFACE WATERS

Denmark has a national approach to the assessment of ecological status.

There have been many changes between the 2009 WFD implementation report and the reporting of the first RBMPs in 2011. The assessment of the current situation is based on new guidelines from 2010, describing details of the different BQE methods and gaps.

Comparison between the RBMPs and the 2009 WFD implementation report for Danish methods shows that fewer methods are available now, however Danish authorities have clarified that new assessment methods are in development.

RBD	Rivers							Lakes							Transitional							Coastal					
	Phytoplankton	Macrophytes	Phytobenthos	Benthic invertebrates	Fish	Physico-Chemical	Hydromorphological	Phytoplankton	Macrophytes	Phytobenthos	Benthic invertebrates	Fish	Physico-Chemical	Hydromorphological	Phytoplankton	Macroalgae	Angiosperms	Benthic invertebrates	Fish	Physico-Chemical	Hydromorphological	Phytoplankton	Macroalgae	Angiosperms	Benthic invertebrates	Physico-Chemical	Hydromorphological
DK1																											
DK2															-	-	-	-	-	-	-						
DK3															-	-	-	-	-	-	-						
DK4																											

Table 7.1: *Availability of biological assessment methods*

Assessment methods fully developed for all BQEs

Assessment methods partially developed or under development for all or some BQEs

Assessment methods not developed for BQEs, no information provided on the assessment methods, unclear information provided

\- *Water category not relevant*

Source: *RBMPs*

7.1 Ecological status assessment methods

Denmark has still not developed **ecological status assessment methods** for all BQEs. Danish authorities state that only BQEs for which methods are fully developed and intercalibrated have been used for classification. For rivers, the only BQE method developed is benthic invertebrates. For lakes, the only phytoplankton (chlorophyll a) was used, and for coastal waters, chlorophyll a and angiosperms were used. Methods for phytobenthos and benthic invertebrates are not developed for rivers and no justification is given. For coastal waters, the method for phytoplankton is only partly developed (only chlorophyll a) and there is no method yet available for macroalgae.

The biological methods are developed to **detect all major pressures**, which according to the Danish authorities are morphological changes in rivers and nutrient enrichments in rivers and coastal waters. For rivers, the pressures detected with the benthic invertebrates are primarily organic enrichment and morphological changes, whereas nutrient enrichment may not be well detected, as the most sensitive BQE is missing (phytobenthos). For lakes and coastal waters, the BQE methods developed primarily detect nutrient enrichment, while HyMo pressures may not be well detected. Other potential pressures seem not to be detected by the biological methods chosen.

Standards have been set for most **physico-chemical** QEs in lakes, but not in the other water categories. For **hydromorphological** QEs, the only standard set is for the Danish physical index for rivers (which describes physical variation). Danish Authorities have clarified that in their view, hydromorphological quality elements are not relevant to lakes and coastal waters in Denmark.

EQS values have been set in a national Decision[29] for most **specific pollutants** identified in a screening survey, but it is unclear from the RBMPs whether these have been set according to WFD Annex V, 1.2.6. These EQS are listed in annex 6 to the sub-district plans, which also include what seem to be "guidance values" that are the 75th and 90th percentile of the concentrations of relevant pollutants found in sediment, used as a basis for a preliminary basis for the assessment of status (and for screening).

The **one-out-all-out principle** has been applied to derive the overall ecological status. In practice however only one BQE has been used for each water category in the first plans (benthic fauna for rivers, chlorophyll a for lakes and angiosperms depth limit for coastal waters), but the physico-chemical QEs or the specific pollutants are used to downgrade from good to moderate if the supporting QEs are worse than the BQE used for each water body.

As regards **uncertainty,** there is no information on confidence or precision of the biological assessment, except for chlorophyll a in lakes, where precision is shown to increase with increasing sampling frequency. There is no information on whether grouping has been used. The uncertainty issue is planned to be addressed in the next RBMPs.

Ecological status assessment methods have been developed for the surface water body types as follows:

[29] BEK nr 1022 af 25/08/2010. https://www.retsinformation.dk/Forms/R0710.aspx?id=132956

- Rivers: The only biological method for rivers is the benthic fauna index that is applied to all river types. For the supporting QEs, it is not clear whether the assessment methods apply to all types or not.

- Lakes: The classification system is only developed for three types for chlorophyll a (lake types 2, 9, 10), and two types for all other QEs (lake types 9 and 10). There are 16 national lake types altogether, but most Danish lakes are said to belong to the types 9 (very shallow, clear, high alkalinity) and 10 (deep, clear, high alkalinity).

- Coastal waters: Classification systems for chlorophyll a are developed for some coastal water types, but not for all. There are 15 types of coastal waters altogether; two types are included in the chlorophyll a system. For the other BQEs (depth limit of angiosperms and benthic fauna on soft-bottoms) the system is applied to all national types. Classification systems are not developed for the supporting QEs.

All **intercalibrated metrics** were checked and found to be consistent with the values given in the IC official decision for all three water categories. The following metrics were intercalibrated for Denmark:

- Rivers: Danish benthic fauna index for rivers.

- Lakes: Phytoplankton, Chlorophyll a.

- Coastal waters: Phytoplankton, Chlorophyll a, Angiosperms, growth limit, and Benthic fauna on soft-bottoms.

For rivers, the classification methods apply to all types. The lake types not corresponding to the IC types are consistent with the IC results in terms of absolute values for chlorophyll α. For coastal waters, there is only a guideline saying that the boundary setting for other national types than those corresponding to the IC types should use the same EQRs, and that any deviation from these values has to be justified and documented properly. Danish authorities have clarified that development of a monitoring method and assessment method for phytobenthos is underway.

A **background document or national/regional guidance document** has been reported: National guidance on classification, included in the guidelines on elaboration of RBMPs (in Danish: Retningslinjer for udarbejdelse av indsatsprogrammer), version 5.0, from the Ministry of Environment, December 2010, also referred to in the RBMPs[30].

7.2 Application of methods and ecological status results

Due to the lack of several assessment methods in Denmark (see above), there are **no water bodies assessed using all relevant quality elements.** The BQEs used for assessment are those that have been intercalibrated in phase 1, as well as supporting physico-chemical QEs. This means that for rivers, benthic fauna is the only BQE used, for lakes only chlorophyll α is used, while for coastal waters the assessment is primarily based on angiosperm depth limit

[30] This document is available at the url: http://www.naturstyrelsen.dk/NR/rdonlyres/C88AD233-0775-45B5-8C50-0A93B11F133D/120333/Retningslinjer.pdf

(as this is the only BQE with good relationship to pressures), although also the other two intercalibrated BQEs (or part of BQEs), chlorophyll α and benthic fauna, are recommended to be used as soon as dose-response relationships are established.

RBD	CAS Number	Substance	Percentage Water Bodies Failing Status (%)
DK1	7440-38-2	As	
DK1	7440-47-3	Cr	
DK1	7440-50-8	Cu	
DK1		Li	
DK1		PCB7	
DK2	7440-50-8	Copper	
DK3		Fe-oxides	
DK4		Fe-oxides	

Table 7.2.1: *River basin specific pollutants causing failure of status*
Source: *RBMPs*

The sections of the sub-district plans on surface water status also indicate which pollutants exceed these "guidance values" in sediment. Some water body specific information is available, for instance exceedances of these "guidance values" in sediment and biota (mussels) in selected water bodies. No overview has been found concerning **exceedances of water EQS specific river basin specific pollutants in specific water bodies,** and no information was reported to WISE. There is some scattered information in the RBMP sub-plans that small rivers may have exceedances of certain pesticides, and that several surface water bodies might fail to achieve good ecological status due to elevated concentrations of As, Cr, Cu, Li, and PCB7. High concentrations of several specific pollutants are also found in sediments in some lakes and in harbour areas, but EQS values are not yet available, so exceedances cannot be assessed. From the RBMPs it appears EQS exceedances of RBD specific substances were not used to assess ecological status, and the sediment analysis was not used to assess ecological (or chemical) status since no guidelines for sediment EQS exists. Danish authorities have clarified that specific pollutants are used for the classification of ecological status.

As regards selection of the **most sensitive biological quality elements,** operational monitoring in rivers is based only on benthic invertebrates, which are primarily sensitive to organic enrichment and to a certain extent to hydromorphological changes. Other pressures in rivers, e.g. diffuse source pollution causing nutrient enrichment may not be sufficiently well detected, as phytobenthos is ignored. In lakes, phytoplankton chlorophyll α and macrophytes are used. Both are sensitive to nutrient enrichment caused by diffuse and point source pollution, which is the dominant pressure on Danish lakes. In coastal waters, mainly angiosperms depth limit is used, which is well related to nutrient enrichment, while other pressures may not be well detected.

As regards confidence and precision or **uncertainty, *c***onfidence class is given for each classified water body. More than 90% of rivers and lakes are classified with no information on confidence, while for transitional and coastal waters all water bodies are classified with high confidence (ref. EEA/ETC Thematic assessment of ecological status and pressures, figure 3.4). It is not clear why the confidence is reported so differently for rivers and lakes, versus coastal waters. There is no information on the criteria used for choosing the different levels of confidence.

8. DESIGNATION OF HEAVILY MODIFIED WATER BODIES (HMWB) AND ASSESSMENT OF GOOD ECOLOGICAL POTENTIAL

Figure 8.1: *Map of percentage Heavily Modified and Artificial waterbodies by River Basin District*

0 – 5 %
5 – 20 %
20 – 40 %
40 – 60%
60 – 100 %
No data reported
River Basin Districts
Countries outside EU

Source: *WISE, Eurostat (country borders)*

The provisional identification of Heavily Modified Water Bodies (HMWBs) and Artificial Water Bodies (AWBs) for DK in the Article 5 report[31] was estimated to approximately 9% of the total number of WB, with about 2% being AWBs and 7% HMWBs . In the RBMPs, 1546 HMWBs and 570 AWB have been designated in the 4 main RBDs representing 12% of totally 17983 WBs in Denmark[32]. This is a slight increase relative to the provisional designation reported in Article 5.

8.1 Designation of HMWBs

The **water uses** for which the water bodies have been designated as HMWBs or AWBs are clearly stated in the national guidelines from 2008: navigation including port facilities, recreation, storage for irrigation, flood protection, land drainage, urban or agricultural development requiring piped streams and culturally or historically valuable remnants (dams).

[31] http://ec.europa.eu/environment/water/water-framework/implrep2007/pdf/sec_2007_0362_en.pdf

[32] Ref. SWB_STATUS_NATURAL_6May.xls-extract from WISE done by WRc.

The physical modifications related to these uses are locks, weirs/dams/reservoirs, channelization, straightening, bank reinforcement, land reclamation and ports. These modifications are listed as examples of water bodies that can be designated as HMWBs or AWBs. In cases where these modifications only affect a minor part of a water body, not affecting the status of the whole water body, there should be no designation of those water bodies as HMWBs or AWBs. Rivers channelized to achieve land drainage should not be designated as HMWBs if they can be restored to good status with minor changes in maintenance (e.g. less cutting of weeds) or with minor restoration measures. There is a recommendation that piped streams in urban areas should be reconsidered to be re-opened.

The **methodology used for designation of HMWBs** partly follows the CIS Guidance document Nº4[33]. Steps 1 to 6 have been partly followed, but slightly modified with somewhat different wording. Steps 7 to 9 are followed.

No information is given on **uncertainty** in the designation process and Danish authorities state that there is no uncertainty in the process.

Background/guidelines: Chapter 4 in the National guidelines on the designation of HMWBs and AWBs including methodology for assessing ecological potential, called: "Bilag 12 Retningslinjer for definition og udpegning af stærkt modificerede vandområder", v. 5, March 2008 and published by Naturstyrelsen[34]. This document is an Annex to the main Danish national guidance on elaboration of RBMPs from 2010.

8.2 Methodology for setting good ecological potential (GEP)

GEP has been defined for rivers, coastal waters (ports), and lakes.

The **mitigating measures approach** (Prague approach) has been used to define GEP. All mitigation measures without significant adverse effects on the use or the wider environment have not been identified, and Maximum Ecological Potential (MEP) has not been defined by estimating the biological values expected if all mitigation measures were taken. The information in the RBMP sub-plans do not provide any information on the first two steps. It is also unclear if Step 3 has been used.

The RBMP sub-plans state that for rivers GEP is defined for benthic fauna by comparison with the natural water bodies that most closely resemble the HMWBs, but where it is accepted that the existing HyMo status will not be changed.

The following types of mitigation measures are foreseen and are expected to restore the benthic fauna to achieve GEP: sediment/debris management; removal of structures: weirs, barriers; bank reinforcement; reconnection of meander bends or side arms; restoration of bank structure; minimum ecological flow and reopening piped river reaches.

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[33] http://ec.europa.eu/environment/water/water-framework/implrep2007/pdf/sec_2007_0362_en.pdf

[34] (Danish EPA), available at http://www.naturstyrelsen.dk/NR/rdonlyres/C88AD233-0775-45B5-8C50-0A93B11F133D/120353/Bilag12.pdf

For coastal waters, GEP is defined as having the same values for the supporting QEs (nutrients) as the equivalent natural types of coastal water bodies. GEP is not defined for **biological** QEs for coastal waters. So it is unclear whether these definitions of GEP have been related to the measures, as specified in step 3.

The term "minor modifications not affecting the status of the main water body" is used as a reason not to designate a water body as heavily modified or artificial, but no information is given in quantitative terms concerning what is meant by "minor modifications". The RBMP describes an approach on how the significant adverse effects of restoration measures on the use and the wider environment (Article 4.3.a) have been defined, although no criteria or specific thresholds have been developed to identify these adverse effects (e.g. unacceptable social and economic costs, or historical/cultural value). Numerous examples of significant adverse effects of restoration measures on the use and the wider environment are given for each water category. Examples given for rivers are: a) if the removal of an impoundment will cause draining of specially valuable nature sites or if the impoundment has special historical value or social preservation value; b) if the restoration of natural flow in a drained river reach would be technically difficult or cause large economic costs; c) if the reopening of piped rivers in urban areas to provide natural physical conditions allowing good ecological status is not possible due to technical, cultural or economic causes; d) if restoration of rivers that are channelised for flood protection in urban areas cannot be done due to technical difficulties or large economic costs. Examples for lakes are: a) if the removal of an impoundment will cause draining of specially valuable nature sites or if the impoundment has special historical value or social preservation value; b) impounded artificial lake with large mercury concentrations in the sediment, where restoration would cause spreading of mercury to downstream water bodies; c) impoundments done for hydropower production or drinking water supply or freshwater aquaculture that cannot be removed due to large economic costs. Examples for coastal waters are: dredging carried out to maintain navigation cannot be stopped due to socially or economically unacceptable costs.

Background document/guidance document: Chapter 4 in the National guidelines on the designation of HM and AWBs including methodology for assessing ecological potential, called: "Bilag 12 Retningslinjer for definition og udpegning af stærkt modificerede vandområder", v. 5, March 2008 and published by Naturstyrelsen (Danish EPA)[35]. This document is an Annex to the main Danish national guidance on elaboration of RBMPs from 2010.

[35]), available at http://www.naturstyrelsen.dk/NR/rdonlyres/C88AD233-0775-45B5-8C50-0A93B11F133D/120353/Bilag12.pdf

8.3 Results of ecological potential assessment in HMWB and AWB

Table showing the percentage of water bodies in less than good ecological status or potential of the total number of classified water bodies in Denmark.

Water category	Modification category	Number of water bodies classified	% less than good
All	HMWB	410	64.1
	AWB	410	50.2
	DK total	14508	51.4
Rivers	HMWB	388	63.1
	AWB	408	50
	DK total	13642	50.4
Lakes	HMWB	20	80
	AWB	2	100
	DK total	783	64.6
Coastal waters	HMWB	2	100
	AWB	0	0
	DK total	83	100

Table 8.3.1: *Percentage of water bodies in less than good ecological status or potential*
Source: *WISE*

The assessment results given in the table above show that the proportion of water bodies that are reported as being less than good is higher for the heavily modified rivers and lakes (64%) than for the total number of classified water bodies (51%). Artificial water bodies have almost the same proportion of less than good water bodies (50%) as the total number of classified water bodies.

Only 27% of the HMWBs have been classified, while more than 80% of all water bodies have been classified. Thus the results shown above may not be representative of the majority of the HMWBs. Moreover, the ecological potential assessment in the heavily modified and artificial rivers is only based on benthic fauna, and the assumed impacts of hydromorphological changes. Thus the **reliability** of the assessment is doubtful. The Danish authorities have clarified that more monitoring is needed to increase the certainty of the classification and to identify mitigation measures.

9. ASSESSMENT OF CHEMICAL STATUS OF SURFACE WATERS

9.1 Methodological approach to the assessment

The basis for the assessment are the environmental quality standards (EQS) of Annex I of the EQSD (Directive 2008/105/EC).

- Few of the EQSD substances have been monitored, and the number of samples analysed (water and biota) is low, this is also mentioned in the RBMP sub-plans. The substances monitored have been selected based on a screening survey. Substances that have been used in Denmark or that can be long-range transported and that have been found to occur in water bodies in Denmark are included.

- EQS according to the EQSD for biota are applied. Some results are shown for mercury and hexachlorobenzene in biota, no results for hexachlorobutadiene were found. Denmark has conducted a lot of work on sediments on many of the EQSD substances.

Background concentrations are not considered in the assessment of the compliance with the EQS. **Bioavailability** (e.g. pH, filtered/not filtered, water hardness, DOC content) is not taken into account in the assessment of compliance with the EQS for metals.

9.2 Substances causing exceedances

There is a large proportion of water bodies for which the classification is unknown or no information has been provided in Demarks RBDs.

The substances exceeding EQS are reported in the WISE summary, and in the RBMPs, but it is not completely straightforward to find the information in the RBMPs (see comment chapter Ecological status).

RBD	Priority substance or certain other pollutant Aggregated into type or named individual substances	Number of water bodies where EQSs are exceeded and chemical status is less than good
DK1.2	1.3 Mercury	1
DK1.5	1 Heavy Metals - aggregated	37
	1.3 Mercury	2
DK1.7	1 Heavy Metals - aggregated	14
	1.3 Mercury	2
DK1.8	1.3 Mercury	1
	4.17 Tributyltin compounds	1
DK1.9	1.3 Mercury	1
DK1.13	1.3 Mercury	3
	3 Industrial Pollutants - aggregated	1
DK1.14	1.3 Mercury	1
DK1.15	1.3 Mercury	1
	2.7 Isoproturon	2

Table 9.2.1: *Priority Substances and other pollutants causing exceedances by sub-RBMP for DK1. DK 1.2 indicates the number of the sub-district plans.*
Source: *WISE*

9.3 Other issues

To a certain extent, mixing zones have been used according to Article 4 of the EQSD.

10. ASSESSMENT OF GROUNDWATER STATUS

The main pressures on groundwater are point and diffuse source pollutions, and in some areas also water over-abstraction. The status information reported (see tables in chapter 6 above) shows that 35% of all GWBs are in poor quantitative status and 42% in poor chemical status.

10.1 Groundwater quantitative status

The **basis for assessment** of quantitative status are GIS map layers e.g. water abstraction, recharge and infiltration, numeric models (DK NOVANA model) or water balance equations. Regarding **groundwater dependent terrestrial ecosystems,** the RBMP's states that the assessment (both regarding quantity and quality) is based on insufficient data and that new information/data, methods etc. will be collected/developed during the first implementation cycle.

As regards the methodology for the balance between re-charge and abstraction, a Danish model is said to be used, but needs improvements due to weaknesses. According to the sub-plan for DK 2.3, the DK model has high uncertainty, as it has not been updated according to recent hydrogeological knowledge in water exchange with nearby aquifers. In some areas, this uncertainty causes a mismatch between estimated large remaining water availability in a GWB and observed water scarcity in the rivers connected to that GWB.

10.2 Groundwater chemical status

The basis for assessment of chemical status is monitoring data and threshold values for As, Cd, Pb, Hg, NH4, Cl, SO4, trichloroethylene and tetrachloroethylene, conductivity. The substances **considered for threshold values (TV)** are laid down in a national regulation. Some RBMPs use nitrate, pesticides and chloride, others add for example sodium, potassium, fluoride, sulphate, ammonium, phosphorous and trichloroethylene. The TVs for most of the substances are identical with the drinking water TVs.

Background concentrations have been considered for ions (ammonia, phosphorous, potassium, fluoride, chloride).

A **methodology for TV exceedances** is established in figure 3.9 of the National guidance on classification, included in the guidelines on elaboration of RBMPs, also referred to in the RBMPs[36]. This method is based on two steps, where the first step is to assess whether there is any exceedance of threshold values, and the second step consists of several tests (or control questions) to decide if the exceedance is significant. These tests include questions on

[36] This document is available online at: http://www.naturstyrelsen.dk/NR/rdonlyres/C88AD233-0775-45B5-8C50-0A93B11F133D/120333/Retningslinjer.pdf

whether there is salt water intrusion, whether surface waters or connected terrestrial ecosystems are affected and whether the groundwater is a protected area for drinking water. The status is poor if the exceedance is found for at least one substance and the water body fails one or more of these tests.

Trends have not been found due to a lack of data for assessing pollution trends, i.e. long enough time series.

10.3 Protected areas

RBD	Good	Failing to achieve good	Unknown
DK1	97	159	
DK2	40	59	
DK3	6		
DK4	2	4	
Total	*146*	*222*	*0*

Table 10.3.1: *Number and status of groundwater drinking water protected areas.*
Source: *WISE*

The table above shows the status of the GWB associated to drinking water protected areas. The main reasons for failing to achieve good are over-abstraction and/or nitrate pollution.

11. ENVIRONMENTAL OBJECTIVES AND EXEMPTIONS

A risk assessment of the water bodies sort the water bodies in two main categories, the ones that are likely to meet the environmental objectives by 2015 and the ones that will fail to meet the targets by 2015 with a certain probability. For the latter category, impacts causing the problems of achieving good ecological/chemical status are assessed.

The RBMP describes environmental objectives for some sub-basins for 2015. Current environmental quality is described for all water bodies and summarised in the WISE summary report. It is however stated that all water bodies (except the ones where exemptions are applied) are going to reach good ecological status/potential by 2015. Environmental objectives for 2021 and 2027 are not described.

Many water bodies are still unclassified. In the RBMPs, an overview of the number of natural water bodies and groundwater bodies in 2015 at good ecological status or better is presented on the basis of already taken or planned environmental improvements.

There is some inconsistency between the summary statistics in chapter 5 of the WISE summary report and the reporting in the rest of chapter 5 describing ecological/chemical status of rivers, lakes and coastal waters for the different kinds of water bodies. WEBGIS provides more detailed information.

11.1 Additional objectives in protected areas

It is possible to introduce stricter requirements in Natura 2000 areas and water quality in 5 lake habitats to ensure their favorable conservation status. A condition assessment system has not currently been developed to enable assessment of need for any additional efforts to achieve favorable conservation status. With regard to groundwater, there will not be a knowledge base to set stricter requirements for associated terrestrial habitats in the first plan period (2009 -2015).

For protected areas related to shellfish and bathing water areas, it is not clear from the RBMPs and WISE summary report whether additional objectives (i.e. additional to good status) have been set.

11.2 Exemptions according to Article 4(4) and 4(5)

The Danish Nature Agency has used the WFD exemptions options in a number of areas to postpone efforts to later plan periods. The Danish Nature Agency has thoroughly considered the scope of individual exemptions, and their use stated in the individual water plans. The use of exceptions is divided into the following causal categories: 1) Technical reasons: there is no or insufficient information about the problem, and therefore a solution cannot be identified. 2) Natural reasons: natural conditions make it impossible to achieve goals within time and 3) Disproportionate costs: There will be excessive costs associated with completion on schedule.

The RBMPs state that disproportionate costs, technical feasibility and natural condition arguments justify exemptions. Danish authorities have clarified that disproportionate costs are used to distribute measures over time, notably for measures to ensure wastewater treatment for scattered settlements. There are some discrepancies between WISE and RBMP reporting.

Numbers are given in the RBMP for rivers, lakes, coastal waters and groundwater bodies in each of the 23 sub-districts in Denmark, but these are not summarised in the WISE summary report. An example of how this is presented is given below (RBMP Nordlige Kattegat and Skagerrak, page 48):

Water body ID number	Problem to be addressed	Exemption	Justification of exception
DK1.1.1.2	Quantitative and chemical influences from saltwater intrusion	Postponement of deadline for the achievement good chemical status	Natural conditions make it impossible to achieve goals within time.

Table 11.2.1: *Example of exemption reported in sub-district plan*
Source: *RBMP Nordlige Kattegat and Skagerrak*

Tables presented in the RBMP provide an overview identifying water bodies for which exceptions are applied in addition to a general description of any problem, type of exemption (postponed deadline), and reason for exemption (disproportionate costs, natural conditions and technical feasibility.) Numbers are given in the RBMP for rivers, lakes, coastal waters

and ground water bodies in each of the 23 sub-districts in Denmark and are not summarised in the WISE summary report. An example of how this is presented is given below (RBMP Nordlige Kattegat and Skagerrak, page 45):

Lake	Problem to be addressed	Exemption	Justification of exception
Gersholt Sø, Dybvad Sø, Guldager Sø, Lillesø, Råbjermile Sø, øst; Råbjerg Sø, Nørlev Sø, Vandplasken Vandet Sø	Lack of knowledge about the effort required. The lake does not meet the environmental target in the baseline but the evidence is insufficient to estimate the necessary effort to reach fulfillment.	Postponement of deadline for the achievement good chemical status	There is no or insufficient information about the problem, and therefore a solution cannot be identified

Table 11.2.2: *Example of water bodies identified for exemption reported in sub-district plan*
Source: *RBMP Nordlige Kattegat and Skagerrak*

The economic consequences of alternatives will be assessed and compared with the consequences of making no changes. The economic impact analysis and **assessment of whether the cost is disproportionate** will be made before the next water plan. Thereafter it may be evaluated whether there is basis for reducing objectives for water bodies. No further information is provided, such as if basic measures are considered in the disproportionate costs.

It is reported in the WISE summary report that no use is made of the **technical infeasibility criterion** and the influence of natural conditions on recovery to justify exemptions. There is only a general statement that technical reasons are the basis for exemptions where there is no, or insufficient information about the cause of the problem, and therefore a solution cannot be identified. There is also a general statement that exemptions due to natural reasons can be justified when the natural conditions will not make it possible to improve the status of the water body to achieve goals within time. Technical infeasibility and the influence of natural conditions on recovery are generally stated in the RBMPs as a reason for the suggested exemptions in the first plan period.

RBD	Global[37]					
	Technical feasibility		Disproportionate costs		Natural conditions	
	Article 4(4)	Article 4(5)	Article 4(4)	Article 4(5)	Article 4(4)	Article 4(5)
DK1	1701	0	1264	0	296	-
DK2	672	0	233	0	111	-
DK3	9	0	11	0	2	-
DK4	64	0	58	0	11	-
Total	*1701*	*0*	*1264*	*0*	*296*	-

Table 11.2.3: *Numbers of Article 4(4) and 4(5) exemptions*
Source: *WISE*

[37] Exemptions are combined for ecological and chemical status.

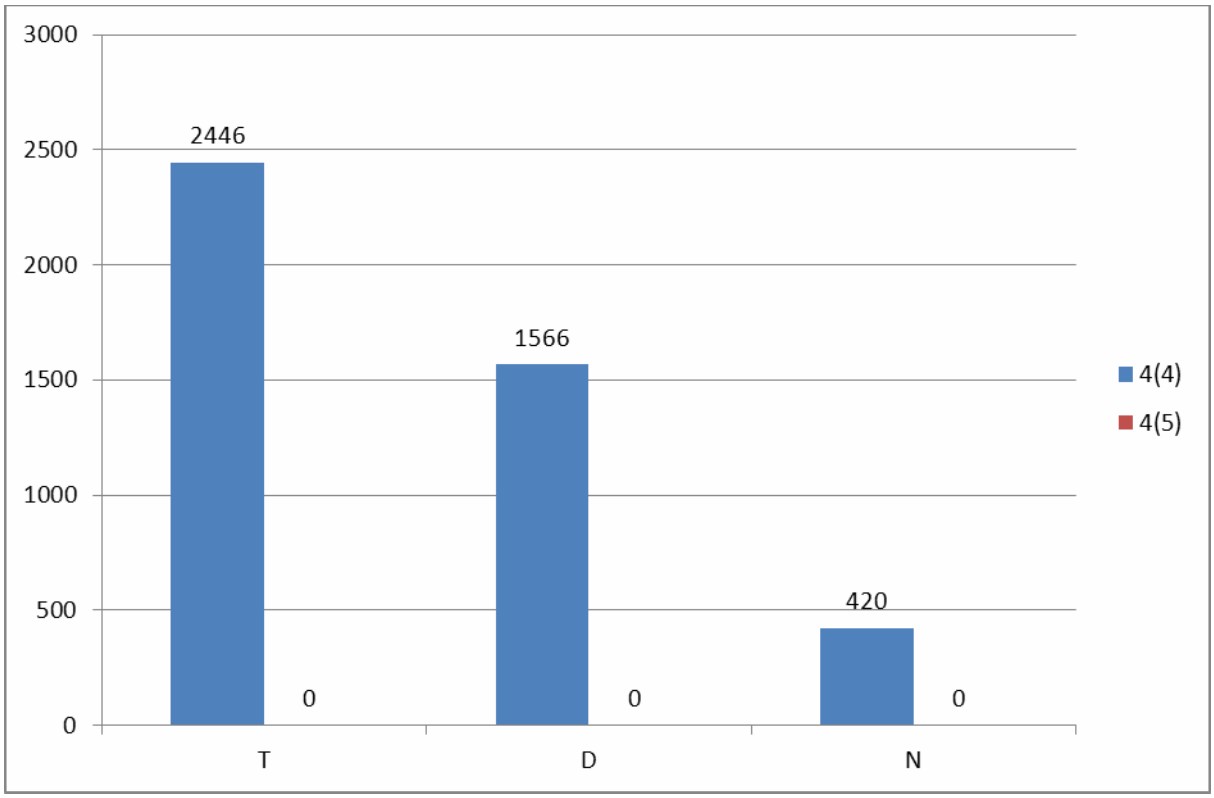

Figure 11.2.1: Numbers of Article 4(4) and 4(5) exemptions
T = Technical feasibility
D = Disproportionate costs
N = Natural conditions
Blue = Article 4(4) exemptions
Red = Article 4(5) exemptions
Source: *WISE*

11.3 Exemptions according to Article 4(6)

Exemptions according to Article 4(6) are not applied in Denmark.

11.4 Exemptions according to Article 4(7)

Exemptions according to Article 4(7) are not applied in Denmark in the first cycle, some projects may be developed in the second linked to the implementation of the Floods Directive.

11.5 Exemptions to the Groundwater Directive

Tables presented in the RBMPs provide an overview identifying water bodies for which exceptions for groundwater under the Environmental Act § 16 and 19 are applied in addition to a general description of problem, type of exemption (postponed deadline), and reason for exemption (natural conditions and technical feasibility).

No exemptions to the achievement of the objectives of groundwater Article 7 Drinking Water Protected Areas have been reported.

12. PROGRAMMES OF MEASURES

According to Annex VII of the WFD, the RBMPs should contain a summary of the programmes of measures (PoM), including the ways in which Member States expect to achieve the objectives of Article 4 WFD. The programmes should have been established by 2009, but are required to become operational only by December 2012. The assessment in this section is based on the PoM as summarised by the Member State in its RBMP, and the compliance of this with the requirements of Article 11 and Annex VII of the WFD.

It therefore does not include a comprehensive assessment of compliance with the requirements of Article 11(3)[38] on basic measures. It focuses in particular on key sets of measures. Member States will report to the Commission by December 2012 on the full implementation of their PoMs, including on the progress on the implementation of basic measures as required by Article 11(3). The Commission will assess what Member States report and will publish its assessment in accordance with Article 18 WFD.

12.1 Programme of measures (PoM) – general

According to the RBMPs, the PoM is **prepared on the basis of status assessment**. The general measures will be implemented to all WB, but the specific targeted measures will be applied in relation to the specific need to reach the goal for each WB. For some measures, notably nutrient pollution, Denmark has linked the protection of eelgrass to specific nutrient loads, and designed specific cost-effective measures on that basis, involving stakeholders in the process.

The PoM is not **co-ordinated with other the neighbouring countries**. For the international RB (Vidå-Kruså), a general co-operation exists.

The **scope of application** of the measures is specified e.g. as km of buffers, area of changed agricultural practice (Table 1.3.1. for each subunit of RBMP).

Measures have been established at national, regional, sub-basin and water body **level.** At the national level, the Danish Nature Agency (regional offices) is responsible for the agricultural measures. The municipalities are responsible for most measures on wastewater, and there are additional measures in the RBMPs to reduce point sources from scattered dwellings, stormwater overflows and discharges from smaller public wastewater treatment plants. The information on responsibility of different authorities is not easily accessible in the RBMPs. The municipalities are also responsible for measures improving river continuity and the physical condition of rivers(restoration) and for the establishment of wetlands (N and P removal). Finally the municipalities are responsible for controlling water abstraction(permit),

[38] These are the minimum requirements to be complied with and include the measures required under other Community legislation as well as measures to achieve the requirements of other WFD Articles and to ensure appropriate controls on different activities affecting water management.

taking into account the objectives for groundwaters and freshwaters. In some catchment areas abstraction should be reduced in order to maintain ecologically based flow regimes.

The **cost of measures** has been clearly identified at the RB sub-district level, but the costs are not summarized for the RBDs. It is stated in the RBMPs that the measures are mainly funded through taxes on water use (water supply and wastewater treatment), additionally from general taxes and a minor part from private business. Measures on agriculture are funded by the acgriculture sector, by EU funding(RDP) and the Government.

Plans for **measures will be operational** at the latest by December 2012. The PoM will not be sufficient to reach the goal of good ecological status for all water bodies. But for some WB the measures will be implemented to reach the target. No other information on deadlines for implementation of measures within the plan period was found in the RBMPs, however Danish authorities have clarified that that some measures are operational now and some are subject to consultation at local level, with the aim of all measures being operational at the end of 2012. A detailed assessment of which measures are needed at what locations are provided in the WebGIS portal. Some measures, such as wetland creation, improved waste-water treatment and changing of physical conditions are being negotiated at local level, with the object of making these measures operational by the end of 2012.

12.2 Measures related to agriculture

Nutrients (nitrates and phosphorus) and pesticides from diffuse sources have been identified as **significant pressures.** Also channelisation of streams for improved drainage of agricultural fields is a threat to ecological status of the water bodies. Water abstraction is a significant pressure.

In all the RBMP, there is a time schedule describing the planning process (Table 2.7.1). Between 2007 and 2011 there have been 4 hearings where **stakeholders** such as inhabitants, organisations - including farmer organisations - municipalities and regional authorities have had the opportunity to comment on the plans. Some comments have caused changes in the plans. Comments and answers have been published.

The main focus in the RBMP is on technical **measures**. Technical measures in agriculture include changes in soil tillage practices and reduced fertilizer application. Also buffer zones have been implemented as a general measure. The economic instruments were not described in detail in the RBMPs.

The **scope of measures** is specified e.g. as km of buffers, area of changed agricultural practice (Table 1.3.1. for each subunit of RBMP).

The **cost of measures** has been identified at the sub-district level, but the costs are not summarized for the RBDs. The measures are mainly funded through a tax on water use, additionally from general taxes and a minor part from private business / finance, but no information was found on the financial commitment for implementation of measures. Danish authorities have clarified that the Rural Development Programme is foreseen to be used for the financing of measures.

Plans for measures will be ready at the latest by December 2012. No detailed information on the **timeline for implementation** of agricultural measures was found, however clarification

has been provided by the Danish authorities that measures like strengthening of the norm system, buffer zones creation or ligation, limited ploughing and catch crops are currently in place and/or required.

Measures	DK1	DK2	DK3	DK4
Technical measures				
Reduction/modification of fertiliser application	✓	✓	✓	✓
Reduction/modification of pesticide application				
Change to low-input farming (e.g. organic farming practices)				
Hydromorphological measures leading to changes in farming practices	✓	✓	✓	✓
Measures against soil erosion	✓	✓	✓	✓
Multi-objective measures (e.g. crop rotation, creation of enhanced buffer zones/wetlands or floodplain management)	✓	✓	✓	✓
Technical measures for water saving				
Economic instruments				
Compensation for land cover				
Co-operative agreements	✓	✓	✓	✓
Water pricing specifications for irrigators				
Nutrient trading	✓	✓	✓	✓
Fertiliser taxation				
Non-technical measures				
Additions regarding the implementation and enforcement of existing EU legislation				
Institutional changes				
Codes of agricultural practice	✓	✓	✓	✓
Farm advice and training	✓	✓	✓	✓
Raising awareness of farmers				
Measures to increase knowledge for improved decision-making				
Certification schemes				
Zoning (e.g. designating land use based on GIS maps)	✓	✓	✓	✓
Specific action plans/programmes				
Land use planning	✓	✓	✓	✓
Technical standards	✓	✓	✓	✓
Specific projects related to agriculture				
Environmental permitting and licensing				

Table 12.2.1: *Types of WFD measures addressing agricultural pressures, as described in the PoM*
Source: *RBMPs*

12.3 Measures related to hydromorphology

Measures are **appropriate to target the pressures**. Building of fish ladders are planned to overcome problems of barriers. Stream meandering will be implemented to reduce the impact of channelisation. Re-opening of piped streams to improve the ecological status is also included in the variety of measures. Reduced maintenance of water courses, and removal of physical obstacles are the most important measures.

All measures have been evaluated regarding their **effects** on the WBs. Table 1.3.1 in each of the RBMP describes the expected effects.

Hydromorphological measures have been planned for some **HMWB**, but are less comprehensive when compared to other water bodies. For some HMWB improved knowledge is needed and will be investigated to be able to improve the status.

As regards **ecologically based flow regime,** specific limits for water abstraction are established in permit system, but not reported. Additional limits to water abstraction have been suggested in several RBMPs, but will not be implemented during the first plan period. The influence of water abstraction on flow requires further investigation.

Background document: short description of measures, the background, effects and economy are stated in the Catalogue of Measures (Virkemiddelkatalog) on www.naturstyrelsen.dk.

Measures	DK1	DK2	DK3	DK4
Fish ladders	✓	✓	✓	✓
Bypass channels				
Habitat restoration, building spawning and breeding areas	✓	✓	✓	✓
Sediment/debris management				
Removal of structures: weirs, barriers, bank reinforcement	✓	✓	✓	✓
Reconnection of meander bends or side arms	✓	✓	✓	✓
Lowering of river banks				
Restoration of bank structure	✓	✓	✓	✓
Setting minimum ecological flow requirements	✓	✓	✓	✓
Operational modifications for hydropeaking				
Inundation of flood plains	✓	✓	✓	✓
Construction of retention basins				
Reduction or modification of dredging	✓	✓	✓	✓
Restoration of degraded bed structure				
Remeandering of formerly straightened water courses	✓	✓	✓	✓

Table 12.3.1: *Types of WFD measures addressing hydromorphological pressures, as described in the PoM*
Source: *RBMPs*

12.4 Measures related to groundwater

For all water bodies failing to achieve good status according to the method described in the Chapter on groundwater status assessment, measures should be taken. The measures are based on varying degree of expert judgements, calculations or modelling.

In addition to the permit regime in place for water abstractions, the measures related to the **quantitative status** are to move the point of abstraction if an exceedance is identified, reducing the abstraction or requiring better planning. Abstraction is an issue for major cities like Copenhagen, Arhus and Odense.

No measures related to improving **chemical status** are planned, since this is assumed to be managed by the regulation of drinking water. More knowledge is needed to determine specific measures needed.

There is no information on **international co-ordination of measures**.

12.5 Measures related to chemical pollution

Priority substances and other hazardous substances are mentioned in the RBMP and WISE, but the description is mainly general and no **inventories** related to specific substances have been found. The RBMPs note that knowledge related to chemical pressures and measures are missing in the 2010-2015 plan.

Basic measures required by Article 11(3)(a), Article 11(3)(b-l), and measured listed in Annex VI Part A have been implemented in the RBMPs. **Main measures** are not indicated, but the plans note overall that measures related to chemical pollution from agriculture, fish farming, point/diffuse sources, and industry will be considered. Danish authorities have clarified that a key task for the first cycle is to increase the knowledge base regarding chemical pollution.

The only s**ubstance specific** measures that included in the first RBMP are further investigations and general permitting regime.

12.6 Measures related to Article 9 (water pricing policies)

In practice the narrow definition of water services and uses has been applied i.e. Public and private suppliers, private water supply, private sewage disposal and private abstraction for crop irrigation in accordance with water plans (no further details described).

No further information is available if at least **households**, **industry** and **agriculture** are defined as water users.

Cost recovery is calculated for all defined water services; the coverage of costs of water use is regulated through the Water Supply Act (Act No. 635 of June 7 2010), the Act on payment rules for wastewater (Act No. 633 of 07th June 2010) and water sector law (L No 469 of 12 June 2009). User charges include users' direct payment for the services water supply and wastewater treatment. A fee for mapping of groundwater and a sewage tax are also included. Private operators ' cost of water abstraction, wastewater treatment and remedial action in relation to contaminated land is categorized here as self-financing because the cost is usually paid directly by those private operators. The level of general taxation and tax financing is calculated residually; as the amount needed for the total recovery of expenses. In addition to user charges on water supply and wastewater treatment, a number of green taxes are also paid (see below). This implies that households and companies' total costs related to water is greater than the total cost of the water sector. As for most other public activities, there is nothing that indicates that an area's activities should be covered by taxes related to this area.

A principle for cost recovery was established by law in 1998. This principle implies that the revenue of water supply cannot exceed its expenses, and that it may only incur costs that are directly related to the regular water supply activities. The law specifies that the water price may include the necessary **financial costs** of extraction and distribution of water, salaries and

other operating costs, administration costs, operational costs, depreciation, interest on external finance and losses from prior periods arising from the construction, substantial expansion of supply systems and provision for new investments. In addition, the water price covers advising clients about saving water, financing water-saving measures as well as participation in water company collaborations. Cost of construction, operation and maintenance of wastewater facilities are to be covered by the affected property owners who are connected to the public sewage system or who are contractually affiliated to the public sewage system. Expenses for the fulfilment of e.g. recipient maintenance or restoration are not covered by user fees.

To some degree some **environmental and resource costs** are recovered. The cost of water supply recovers costs of mapping, monitoring and protecting water resources as water suppliers have a current or potential interest in being able to recover from water resource areas. The act on payment rules for waste water treatment plants is based on a principle that wastewater treatment is a public utility to be fully funded by users and thus the "polluters pay" in accordance with uniform guidelines.

The **polluter pays principle** functions for wastewater treatment. There is no information about other water services. The "polluter pays" principle is implemented by a 100% user funding.

The current water pricing policy provides **adequate incentives** for users to use water resources efficiently by metering water and applies volumetric charging. Water use is charged kr (danish kroner) per m^3 water used. User charges include consumers direct payment for the services water supply and wastewater treatment. In addition to user charges on water supply and wastewater treatment, a number of green taxes are also paid.. In this case, the water related green taxes, i.e. piped water tax and sewage tax, give a larger revenue than the tax-funded activities within the water sector. It is common practice in Denmark, to charge a green fee per. m^3 water from all users. This is to create incentives for reducing water consumption. Businesses can recover the tax if they are VAT registered. Other green taxes (e.g. waste tax and CO_2 tax) are included in the user charges. There is no information if the situation is also relevant for self-abstraction and other water services, which hasn't been identified.

The RBMP states the use of **provisions in article 9.4** as not relevant. No further information is given.

Denmark has a common definition of water uses and water services, common presentation of existing water prices and a common approach to cost recovery calculations. The methodological approach for this topic generally follows a national approach, the information in the RBMPs and the WISE summary report is very similar for all the river basin districts. Annex 8 in each RBMP about the economic analysis of water use is common for Denmark as a whole. **International co-operation** is not reported in the application of Article 9.

12.7 Additional measures in protected areas

In Denmark every areas is a nitrate vulnerable zone and hence only general and **no additional measures** will be implemented to reach the goal of the Nitrates Directive. Water bodies for bathing water quality have been identified and presented in the Danish webGIS

(miljoegis.mim.dk). Some additional measures are suggested for example to remove sewage from discharging into bathing water.

The measures in the RBMP are co-ordinated with measures in the Natura2000-plan (e.g. Habitat-directive). There are specific plans for measures in the Habitat- and Birds-directive. For the Shellfish, specific areas are selected for growth of shellfish (areas from which shellfish (mussels and gastropods) may be sent directly for human consumption without treatment). No specific plan for measures for shellfish was found in the RBMPs. However through the analysis of additional national sources of information[39] the Danish Department of Environment has established guidelines for the development of Programmes of Measures (PoMs) in the designated shellfish waters. Production and protection areas largely overlap and production areas are regulated through the "Order on mussels etc." , which is based on the Commission's decision 2002/226/EF. Measures to improve bathing water quality are included in the RBMP. In RBMP, freshwater fish have been mentioned as a parameter for the ecological status of water bodies. Additional measures to fulfil the Freshwater fish directive were not found.

Plans for Drinking water are implemented at the national scale and therefore no additional measures are needed. General regulations on drinking water are more strict than regulations in the WFD.

13. WATER SCARCITY AND DROUGHTS, FLOOD RISK MANAGEMENT AND CLIMATE CHANGE ADAPTATION

13.1 Water Scarcity and Droughts

Water scarcity and droughts are not considered a major problem in Denmark. However water scarcity affects a large proportion of groundwater bodies, particularly in DK2 (e.g. Zealand), where half of the GWBs are reported to be in poor quantitative status (see table in chapter 6 above). Also in DK1 (Jutland and Funen) 30% of the GWBs are reported to be in poor status. The classification of quantitative status for GWBs is uncertain due to lack of data and knowledge on abstraction for irrigation and on re-charge. Also rivers are reported to be affected by water scarcity in dry periods in summer. Droughts are not particularly mentioned in the RBMP sub-plans. The causes for water scarcity are primarily water abstraction for irrigation and for domestic water supply. The impacts mentioned are an especially enhanced risk of salt water intrusion into groundwater bodies in coastal areas, as well as low flows in rivers, with adverse effects on their ecological status. In some areas, particularly in DK2, the public water works had to abandon the groundwater body, and find new groundwater bodies.

Data on water abstraction for public water supply are collected by the water works as well as for water works for abstraction for irrigation and for industrial use. Data are not available on domestic water supply not connected to public water works. Data on annual water consumption is given for different sectors connected to public water works (not including agriculture) from 1997 to 2009, showing a slight decrease in water consumption, especially in

[39] ***'EC Comparative Study of Pressures and Measures in the major river basin management plans in the EU'***

households (12% over the last decade)[40]. The decrease is attributed to the introduction of green fees in the 1990s (see next point below). Models for recharge of groundwater bodies (the DK model) are being improved to increase the accuracy of water accounts. The **trend scenarios** provided in the sub-district RBMPs are that the water abstraction will be stable (in DK1) or slightly increasing (2% in DK2) for the years 2010-2015.

Measures: Green fees on water supply and sanitation were implemented in the mid-1990s and have reduced the consumption of water from the public water supply. Limits for water abstraction of groundwater have been set to 35% of annual re-charge. The abstraction needed to meet demand for public water supply can exceed these norms if the status of the GWB is in good quantitative status, and there is no risk of not achieving the good status objectives for that water body and related surface waters. Additional measures are now needed to prevent further over-exploitation of groundwater bodies. The main additional measures mentioned in the sub-district RBMPs are restrictions to new irrigation schemes, better management of groundwater abstraction in terms of controls and registers, improvement of the Danish model for groundwater accounts, moving the groundwater abstraction to other groundwater bodies with better water availability, based on knowledge of the water availability and re-charge in potentially new sources, and better documentation of water demand.

The reduction and management of groundwater abstraction is definitely regarded as the most important measure against water scarcity, especially focusing on irrigation. A pre-requisite to achieve this is to get more knowledge on groundwater re-charge and connectivity to surface waters, and providing guidance to local river basin managers. Most of the measures indicated above will be implemented in the next cycle of RBMPs.

No information is given on how to ensure **(international) co-ordination** in relation to water scarcity and droughts. The influence of other sector policies on water scarcity is not described, although irrigation is stated as one of the main reasons for water scarcity. There is no information provided to link the measures mentioned above to other sector policies (e.g. agriculture).

13.2 Flood Risk Management

Floods are **addressed as a significant water management pressure** related to intensive rain episodes causing flooding of riparian areas and urban areas, large run-off from paved surfaces in urban areas, sewage overflows, and deterioration of environmental status. Traditional flood protection measures have been used for many years and include land drainage, regulation and physical modifications of the rivers in the form of embankments and channelisation. Several potential new flood protection measures are listed, e.g. allow flooding of riparian areas whilst giving economic compensation to farmers, enhancing the capacity in the sewage networks, building water retention ponds along roads and other paved surfaces. There is a large concern that other measures to reduce nutrient loads and improve water quality and ecological status in the rivers, e.g. reduced drainage and reduced week cutting of river vegetation, will pose a severe risk for enhanced flooding and reduced agricultural production. An in-depth EIA is

[40] The data source is specified as DANVA Vand i tal, DANVA benchmarking og vandstatistik 2010 (http://www.danva.dk/Default.aspx?ID=219&TokenExist=no).

required in the RBMP consultation to estimate this risk before these measures are implemented on broad basis in Denmark.

Rivers channelised to obtain better land drainage should not be designated as **HMWBs** if they can be restored to good status with minor changes in maintenance or with minor restoration measures. However, if this is not the case then channelised rivers can be designated as HMWBs.

No information is provided on floods related to Article 4.6.

No information is provided on floods related to Article 4.7.

Floods were considered in the context of climate change adaptation.

No information has been found in the sub-district RBMPs on the future co-ordination of the implementation of the WFD and the Floods Directive.

13.3 Adaptation to Climate Change

Some of the measures defined in the first RBMPs will contribute to mitigate the consequences of changed precipitation, e.g. buffer zones along rivers will counteract increased precipitation, similar effects are expected for construction of water retention ponds to receive run-off from paved surfaces related to heavy rain episodes. The RBMP authorities intend to prioritise measures that can support a synergy effect related to climate change adaptation, e.g. enhancing the capacity of sanitation systems.

The climate change issues found in the plans are climate change scenarios, increased pressures from point sources, and adaptation measures. The national climate change strategy contains challenges for different sectors related to climate change, research strategy and general information on a new data-portal and on how to organise the future work on adaptation measures across all sectors, including the water sector.

No explicit **climate check** has been done for the programmes of measures, but several are mentioned to mitigate the impacts of climate change.

As regards future insights, more research is needed on climate change impacts on flow, on nutrient pressures and on status. These climate change impacts are foreseen to be considered in the next cycle.

14. RECOMMENDATIONS

Following the steps of river basin planning as set out in the WFD should ensure that water management is based on a better understanding of the main risks and pressures in a river basin and as a result, interventions are cost effective and ensure the long term sustainable supply of water for people, business and nature.

To deliver successful water management requires linking these different steps. Information on **pressures** and risks should feed into the development of **monitoring programmes**, information from the monitoring programmes and the **economic analysis** should lead to the

identification of **cost effective programmes of measures** and justifications for exemptions. **Transparency** on this whole process within a clear governance structure will encourage **public participation** in both the development and delivery of necessary measures to deliver sustainable water management.

To complete the 1st river basin management cycle, and in preparing for the second cycle of the WFD, it is recommended that:

- Given the late adoption of the sub-district RBMPs, Denmark needs to take special care to ensure that the preparation of the next cycle of RBMPs is carried out in accordance with the WFD timetable, to ensure the 2nd cycle RBMPs are adopted no later than December 2015.
- Transitional waters are not designated, and no justification is given as to why this water category has not been used. Denmark should review its designation of at least some coastal waters, notably those referred to as inner coastal fjords water, and consider transitional water designation, considering physical and chemical factors that determine the characteristics of transitional waters and hence the biological population structure and composition.
- Where there are currently high uncertainties in the characterisation of the RBDs, identification of pressures, and assessment of status, these need to be addressed in the current cycle, to ensure that adequate measures can be put in place before the next cycle.
- Denmark needs to further develop water typologies which are tested against biological data, and develop and provide further information on reference conditions for all water types. Appropriate methods for assessing all potential pressures need to be developed.
- Denmark needs to further develop the assessment methods for a large proportion of the biological QEs, since it seems that the Danish classification methods are only developed for benthic fauna in rivers, chlorophyll in lakes, and angiosperm depth limit and benthic fauna (fjords) or chlorophyll (open coast).
- Denmark needs to extend its classification system for lakes and coastal waters to address hydromorphological QEs. For rivers, class boundaries given for continuity, flow and morphological variation of river banks need to be developed.
- Denmark needs to improve the identification of significant pressures, describe the methodologies, thresholds and tools better in the plans and report more detailed data by water body. This applies also to hydromorphological pressures and chemical pollution.
- Denmark needs to further extend the monitoring programme to include all biological, physical-chemical and hydromorphological quality elements as relevant, for all water categories (rivers, lakes, coastal waters) and ensure there is adequate monitoring of ground waters to enable assessment of status, pressures and trends.
- Surveillance monitoring stations for lakes need to be established and reported, and the types of quality elements monitored per station need to be reported.
- Denmark needs to be more transparent on the use of grouping of water bodies for monitoring and classification.
- Denmark needs to improve the certainty of its ecological status assessment.

- The identification of river basin specific pollutants needs to be more transparent, with clear information on how pollutants were selected, how and where they were monitored, where there are exceedances and how such exceedances have been taken into account in the assessment of ecological status. It is important that there is an ambitious approach to combating chemical pollution from river basin specific pollutants and that adequate measures are put in place. Denmark needs to provide clearer reporting on the methodologies used to set the EQS values for national specific pollutants.

- Denmark needs to ensure that the correct procedures to establish Good Ecological Potential (GEP) are carried out, and are clearly described in the RBMP. The mitigation measures methodology has been used to define GEP, but it seems from the RBMPs that steps 1 and 2 have not been used, in spite of national guidance requiring this.

- Denmark will need to provide data on the chemical status of a much higher proportion of its water bodies, if necessary by monitoring more extensively. The apparent omission of data on hexachlorobutadiene should be addressed. Denmark needs to specify exactly which industrial pollutants are causing failure of the chemical status objective. Groundwater monitoring and methodologies should all be made WFD compliant. Measures to ensure good chemical status of groundwater should be established considering all WFD aspects, not only drinking water use. Trend assessments and reversals should be carried out in the 2nd RBMP cycle.

- A large number of exemptions have been applied in this first cycle of RBMPs. While the WFD does provide for exemptions, there are specific criteria that must be fulfilled for their use to be justified. The application of exemptions needs to be more transparent and the reasons for the exemptions should be clearly justified in the plans. Denmark should take all necessary measures to bring down the number of exemptions for the next cycle, including the needed improvements in the characterisation process, monitoring networks and status assessment methods, as well as reducing sinificantly the degree of uncertainties.

- Only little improvement in the water status is expected by 2015 and the objectives for subsequent planning deadlines are not always clear. Objectives should be clearly indicated and transparent in order to be able to reach good status of waters in a reasonable timeframe.

- Denmark has indicated there may be new physical modifications in forthcoming RBMPs, falling within the scope of Article 4(7). If this is the case, the use of exemptions under Article 4(7) should be based on a thorough assessment of all the steps as requested by the WFD, in particular an assessment of whether the project is of overriding public interest and whether the benefits to society outweigh the environmental degradation, and regarding the absence of alternatives that would be a better environmental option. Furthermore, these projects may only be carried out when all possible measures are taken to mitigate the adverse impact on the status of the water. All conditions for the application of Article 4(7) in individual projects must be included and justified in the RBMPs as early in the project planning as possible.

- Meaningful information regarding the scope, the timing and the funding of the measures should be included in the PoM so that the approach to achieve the

objectives is clear. All the relevant information on basic and supplementary measures should be included in the summary of the PoM to ensure transparency on the planned actions for the achievement of the environmental objectives set out in the WFD.

- Denmark needs to ensure that hydromorphological measures are implemented where relevant, in the first plan period.
- The cost-recovery should address a broad range of water services, including impoundments, abstraction, storage, treatment and distribution of surface waters, and collection, treatment and discharge of waste water, also when they are "self-services", for instance self-abstraction for agriculture. The cost recovery should be transparently presented for all relevant user sectors, and environment and resource costs shall be included in the costs recovered. Information should also be provided on the incentive function of water pricing for all water services, with the aim of ensuring an efficient use of water. Information on how the polluter pays principle has been taken into account should be provided in the RBMPs.