Country fiche: Denmark

Content

1. Introduction

The European Environment Agency (EEA) manages water data and information reported either voluntarily by EEA member countries (water quality in groundwater, rivers, lakes; emissions of pollutants and water quantity); and data reported via REPORTNET under EU water directives: Water Framework Directive (WFD); Bathing Water Directives (BWD) and Urban Waste Water Treatment Directive (UWWTD), Nitrate Directive (NiD) and Drinking water Directive (DWD). Reported data are processed at EEA and stored in water data center. They can be also accessible on EEA home page. Data reported under Nitrate Directive (NiD) and Drinking water Directive (DWD) are not yet available at EEA water data center home page.

The aim of the country fiches is both to clean-up and correcting errors in the data member countries now have reported for 15-20 years. Some errors have been introduced by the EEA and its Topic Centres handling of the reported data; others is due to errors introduced in member countries reporting.

Another aspect is to improve the spatial and temporal coverage and to ensure that the relevant determinands are reported.

- In some cases member countries will be asked for more stations to increase the spatial coverage or density of stations; or questions on why data have not been reported from some of the RBDs.

- EEA water quality indicators are for trend assessments based on consistent time series with some gap filling. For a single country consistent time series are established for the defined period (e.g. 1992-2012; or 2000-2012) with some gap filling(e.g. up to 3 years) and only stations with values for all years in the defined period are used. This ensure that any trend is because of change in the observations and not in the stations included.

- In the current data set the reporting of some high priority determinands has stopped or there has been change in the determinands in the database e.g. cadmium changed to dissolved cadmium. EEA wants to clarify if these changes are real changes or it has been errors/misinterpretations introduced in compiling the databases. In addition, the aim is to ensure that the high priority determinands (e.g. nitrate or orthophosphate) have as complete coverage as possible.

The last part is on ensuring linkage between the different Waterbases by having a common coding system (Water Body ID) and linked to different reference layers such as the RBDcodes.

2. Reporting obligations from European Water Directives

Denmarks reporting of data in relation to EU water directives have in the last years been uploaded to the Reportnet Central Data Repository (CDR Denmark) and below is listed an overview of Denmarks reporting in relation to water directives (Remark this is an overview of what is available in CDR and Denmark may have reported by other format directly to the European Commission).

- Bathing Water Directive (2006/7/EC) Link – Denmarks reporting under the Bathing Water Directive is further described in the annual national report published by EEA available at Link and the data is available here Link
- Drinking Water Directive Report (98/83/EC) - Link. Data related to two "3 yearly report on quality of water for human consumption" are available for the period 2005-2007 and 2008-2010.
- Floods Directive Preliminary flood risk assessment
  - Floods Directive Unit of Management and Competent Authorities. Link, Danish Competent

Authority and Units of Management,
  - Preliminary flood risk assessment Link.
- Nitrates Directive (91/676/EEC) - Link. Report/data related to the Nitrate Directive reporting period 2004-2007 and 2008-2011.
- Urban Waste Water Treatment Directive
  - Monitoring (91/271/EEC) [Art 15] - Link. 2011 UWWT data plus archive over previous reporting.
  - Article 16 - Situation report – Link. *No data in CDR yet*.
  - Article 17 - National Implementation Programme – Link. *No data in CDR yet*.
- Water Framework Directive
  - Art. 3 reporting (River Basin Districts and Competent Authorities) – Link.
  - Art. 5 reporting – Link.
  - Art. 8 (Monitoring programmes) – Link.
  - Art. 13 (River Basin Management Plans) – Link.
  - Art. 15.3 Progress on implementation of programmes of measures – Link.

3. Overview on WFD reporting in Denmark

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)*

Source: Denmark`s WFD implementation report
http://ec.europa.eu/environment/water/water-framework/pdf/CWD-2012-379_EN-Vol3_DK.pdf

RBD	Name	Size[3] (km²) (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*

The WISE-WFD database contains data from River Basin Management Plans reported by EU Members States according to article 13 of the Water Framework Directive. A number of aggregation queries provide an overview on number and statistics of water bodies, on status assessments and pressures and impacts for both surface water bodies and groundwater bodies.

The following queries are available:

- Numbers and statistics of surface water bodies
- Ecological and chemical status of surface water bodies
- Significant pressures affecting surface water bodies
- Impacts on surface water bodies
- Numbers and statistics of groundwater bodies
- Chemical and quantitative status of groundwater bodies

The information is aggregated at country, river basin district (RBD) or in some cases even RBD-subunit level and can be downloaded here.

4. Eionet priority data flows – SoE data (Waterbase)

Denmark has in the period 2007-2011 reported river, lake (reservoir) and groundwater water quality data, while there have been limited reporting of data on emissions and water quantity (river flow).

Denmark – performance of EEA priority inland data flows

Data flow name	Progress 2000	Progress 2001	Progress 2002	Progress 2003	Progress 2004	Progress 2005	Progress 2006	Progress 2007	Progress 2008	Progress 2009	Progress 2010	Progress 2011	Progress 2012
EWN1: River quality													
EWN2: Lake quality													
EWN3: Groundwater quality													
EWN4: Water quantity	N/A	N/A	N/A	N/A	N/A			N/A	N/A	N/A			
WISE1: Water emission quality	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A				

Data flow name	Status	Progress 2012-2013	Progress 2013-2014	Remark
EWN1: River quality	2014-05-26			Data delivered on time and in the requested format. Feedback to reported issues provided. Monitoring stations with coordinates provided. Data on 5 preferred SoE nutrient delivered. Hazardous substances data delivered. Proxy pressures data not provided for all stations. Some long time series on preferred SoE nutrients available. Biology data delivered.
EWN2: Lake quality	2014-06-10			Data delivered on time and in the requested format. No reply to critical QA issues on previously reported data. Monitoring stations with coordinates provided. Data on 4 preferred SoE nutrient delivered. Hazardous substances data delivered. Proxy pressures data not provided for all stations. Long time series on preferred SoE nutrients available. Biology data delivered.
EWN3: Groundwater quality	2014-02-04			Data delivered on time and in the requested format but with many formal errors. Data for all 5 requested chemical substances provided, all in disaggregated form. Monitoring sites with coordinates and links to GW bodies provided. GIS data for GW bodies and list of GW bodies with most important attributes and pressure data provided.
EWN4: Water quantity (1)	2014-02-07			Late delivery (5 Feb 2014) of groundwater data not in the requested format. Reported data relevant to Water Quantity in EUROSTAT/OECD JQ 2012.
WISE1: Emissions to water (1)	2014-02-03			No data delivery under WISE-SoE data collection 2013, data from E-PRTR inserted.

Note: Further information and scoring criteria is available here:
http://www.eionet.europa.eu/dataflows/pdf2013/country_summary?country=DK
http://www.eionet.europa.eu/dataflows/pdf2013/history?country=DK

4.1 Rivers and Lakes

Note: all queries (which are still under development) and outcomes on rivers and lakes can be found here: http://www.tcvode.si/wise_soe_country_fiche/#

In Chapters 2.1.1 and 2.1.4 reporting on nutrients, organic matter and general physico-chemical determindands is illustrated. For simplification only the term nutrients is used in the descriptions.

Rivers – Nutrients, Organic Matter and General Physico-Chemical Determinands

Issues to be clarified:

- Have data for all SoE nutrients of highest priority[1] been reported consistent over the years?
- Are stations with monitoring of highest priority nutrients covering all RBDs?
- Are longer time series (since 1992) for preferred nutrients available?
- Member State specific issues, if such occur

Denmark has been reporting data on nutrients in rivers since 1971. The table below provides an overview by determinands of the number of river stations per year for the period 1992 to 2012. In 2011 the reporting on total oxidised nitrogen and BOD5 stopped or only few stations were submitted. Reporting on total ammonium stopped in 2005, on CODCr is weak in general.

Table 1: Number of river stations per determinand/year (nutrients of highest EEA priority)

Determinand_Nutrients	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Total oxidised nitrogen	37	39	39	39	40	40	39	39	40	40	40	40	41	41	41	42	41	40	41	40	40
Total nitrogen	38	41	41	41	40	40	41	41	42	42	42	42	42	42	42	42	41	41	41	40	40
Orthophosphates	36	41	41	41	40	40	41	41	42	41	42	42	42	42	42	42	41	41	41	40	40
Total phosphorus	38	41	41	41	41	41	41	41	42	42	42	42	42	42	42	42	41	41	41	40	40
BOD5	14	34	33	33	36	36	38	38	39	39	39	39	42	42	42	42	41	41	41	2	4
CODCr	25	13	2	2	0	2	1	2	2	0	0	0	0	0	0	0	0	0	0	0	0
Total ammonium	37	32	34	30	32	33	37	37	38	38	38	38	42	0	0	0	0	0	0	0	0

Note: In the current data set the reporting of some high priority determinands has stopped or there has been a change in the determinands in the database. EEA wants to clarify if these changes are real changes or it has been errors/misinterpretations introduced in compiling the databases. In addition, the aim is to ensure that the high priority determinands (e.g. nitrate or orthophosphate) have as complete coverage as possible.

Table 2 shows the number of river stations by River Basin Districts which reported on nutrients for the period from 1992 – 2012. Denmark reported data from 42 river stations for nutrients in this period. The number of river stations reporting on nutrients is stable in Denmark.

Table 2: Number of river stations for stations for nutrients by River Basin Districts for the period 1992 - 2012

RBDcode	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
DK1	27	30	30	30	30	30	30	30	31	31	31	31	31	31	31	31	30	30	30	30	30
DK2	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	8	8
DK3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
DK4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Total	38	41	41	41	41	41	41	41	42	42	42	42	42	42	42	42	41	41	41	40	40

[1] Determinands of highest priority in terms of EEA`s needs are determinands which are or will be used in EEA assessments (e.g. CSI).

The figure below illustrates the river stations with nutrient reporting in 2013 (covering the year 2012) in Denmark. From this it can be seen that all RBDs in Denmark are reporting on nutrients, but the density of stations is low.

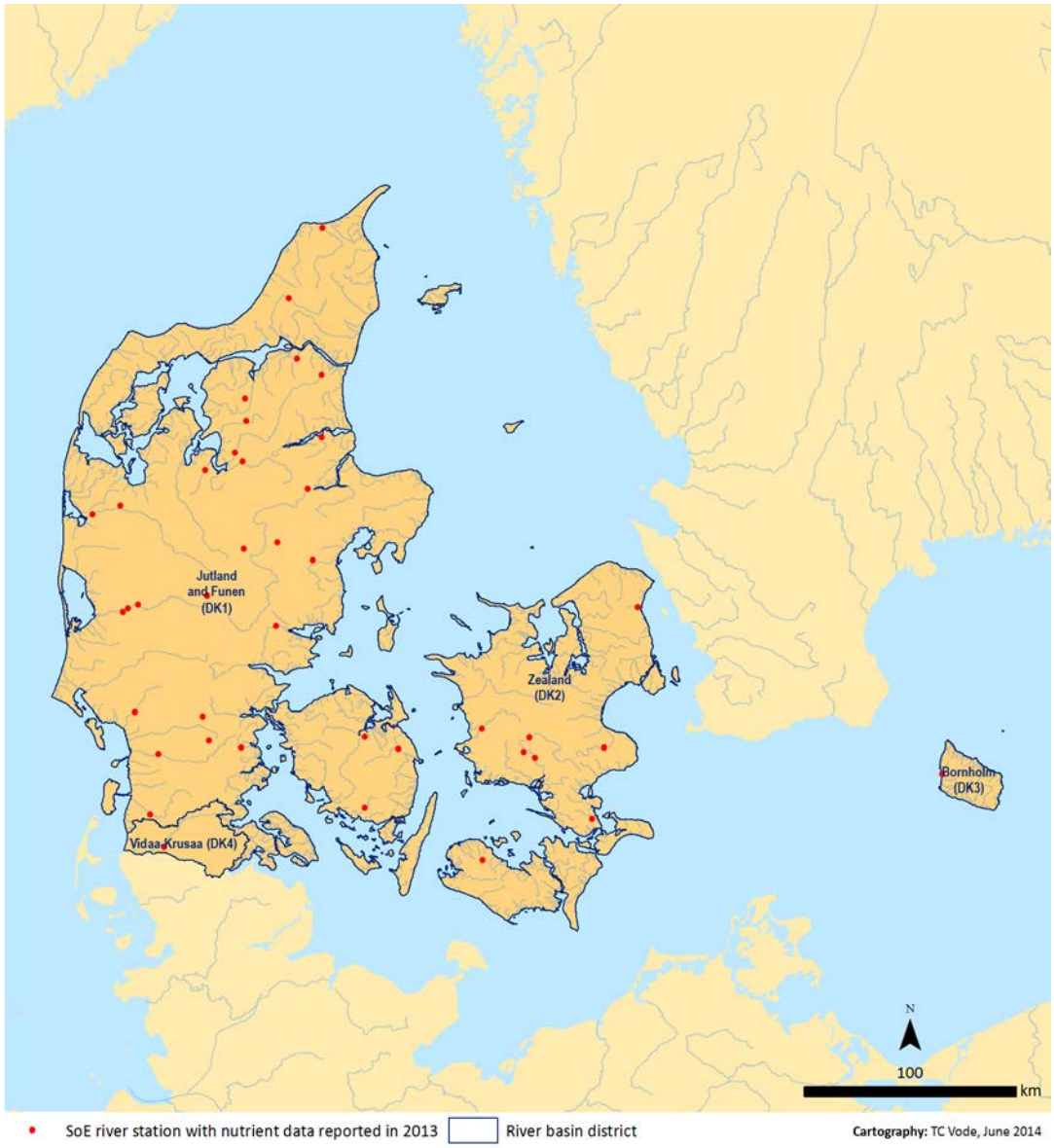

Figure 1: SoE river stations with nutrient data reported in 2013 in Denmark`s RBDs

For the period 1992 to 2012 Denmark has reported 42 river stations with monitoring of total ammonium. Because the reporting stopped in 2005, there is an interruption of the 27 time series with 13 years observation (Table 3).

Table 3: Length of total ammonium time series in Denmark for period 1992 – 2012 (value in the table fields is number of stations with x years' time series)

RBDcode	1 yr	2 yr	3 yr	4 yr	5 yr	6 yr	7 yr	8 yr	9 yr	10 yr	11 yr	12 yr	13 yr	14 yr	15 yr	16 yr	17 yr	18 yr	19 yr	20 yr	21 yr
Total	4	0	0	0	1	0	4	1	2	0	0	3	27	0	0	0	0	0	0	0	0

Note: EEA water quality indicators are used for trend assessments based on consistent time series with some gap filling. For a single country consistent time series are established for the defined period (e.g. 1992-2012; or 2000-2012) with some gap filling (e.g. up to 3 years) and only stations with values for all years in the defined period are used. This ensures that any trend is because of change in the observations and not in the stations included.

Questions to Denmark regarding the reporting on nutrients in rivers:

- Does data exist for determinands to fill the gaps in reporting? BOD5 in 2011 and 2012, total ammonium in 2006? CODCr from 1994 – 2012?
- Can the data be resubmitted for stations / years / which have not been reported so far?
- Are there more stations with time series for the listed determinands (in particular the priority ones) available that have so far not been reported?
- Can more stations be reported to increase spatial coverage?

Rivers – hazardous substances

No data on hazardous substances in rivers have been reported from Denmark.

Questions to Denmark regarding the reporting on hazardous substances in rivers:

- Why is no information on hazardous substances in rivers reported to SoE? Can this information be submitted in the future?

Rivers – Biology

Issues to be clarified:

- Are status classes reported? If not, why not?
- Are EQR values reported? If not, why not?
- Can reported EQR values be normalised? If not, why not?

In general care should be taken to ensure that the stations reported are geographically representative, as well as representative in terms of the whole range of ecological status classes, and that all major river types are included.

Denmark reported river biology data (only invertebrates) for 2010-2011, but not for 2012 (Table 4 and Table 5). The number of stations (42) was stable for the two years reported. 68% of the stations were reported for two or more years.

Table 4: Number of river biology records per determinand, aggregation period and year.

BQE	DeterminandBiology	ImpactType	AggregationPeriod	2010	2011	2012
MI	InvertebrateEQR_G	G	Annual	20	22	

Table 5: Number of river biology records per BQE, RBD and year.

BQE	RBDcode	RBDname	2010	2011	2012
MI	DK1	JUTLAND AND FUNEN	14	15	
MI	DK2	ZEALAND	4	6	
MI	DK3	BORNHOLM	1	1	

Questions to Denmark regarding the reporting on biology in rivers:

- Status classes and EQR values are reported, but not classification system. Therefore, EQR values cannot be normalised. Denmark is encouraged to report the classification system, or to report the normalised EQR values (in which case the classification system does not have to be reported).
- Are data for 2012 available and can they be redelivered?

Lakes – Nutrients, Organic Matter and General Physico-Chemical Determinands

Issues to be clarified:

- Have data for all SoE nutrients of highest priority[2] been reported consistent over the years?
- Are stations with monitoring of highest priority nutrients covering all RBDs of the Member States?
- Are longer time series (since 1992) for preferred nutrients available?
- Member State specific issues, if such occur

Denmark has been reporting data from nutrients in lakes from 1989 on. The table below provides an overview by determinands of the number of lake stations per year for the period 1992 to 2012. There was a change in reporting Total ammonium or Ammonium in 2009. Few data have been reported for total oxidised nitrogen, reporting on nitrate stopped in 2007.

Table 6: Number of lake stations per determinand/year (nutrients of highest priority)

Determinand_Nutrients	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Nitrate	20	19	20	20	20	20	20	20	20	20	20	20	20	20	20	0	0	0	0	0	0
Total oxidised nitrogen	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18	0
Total nitrogen	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	19	19	15	18	18
Orthophosphates	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	19	19	15	18	18
Total phosphorus	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	19	19	15	18	18
Ammonium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19	0	0	0
Total ammonium	20	20	20	20	20	20	20	20	20	20	20	20	20	19	19	20	19	0	15	18	18

Note: In the current data set the reporting of some high priority determinands has stopped or there has been a change in the determinands in the database. EEA wants to clarify if these changes are real changes or it has been errors/misinterpretations introduced in compiling the databases. In addition, the aim is to ensure that the high priority determinands (e.g. nitrate or orthophosphate) have as complete coverage as possible.

[2] Determinands of highest priority in terms of EEA`s needs are determinands which are or will be used in EEA assessments (e.g. CSI).

Table 7 shows the number of lake stations by River Basin Districts which reported on nitrate for the period from 1992 – 2012. Data are reported from 20 stations in this period. The reporting on nitrate stopped in all Danish RBDs in 2007. No data on lakes were reported from DK3 (only one natural lake in DK3).

Table 7: Number of lake stations for nitrate by River Basin Districts

RBDcode	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
DK1	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	0	0	0	0	0	0
DK2	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	0	0	0	0	0	0
DK4	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
Total	20	19	20	20	20	20	20	20	20	20	20	20	20	20	20	0	0	0	0	0	0

Questions to Denmark regarding the reporting on nutrients in lakes

- Does data exist for determinands to fill the gaps in reporting? Nitrate after 2006, orthophosphates?
- Ammonium/total ammonium - why was there a change 2009, is ammonium/total ammonium the same parameter?
- Can the data be resubmitted for stations / years / which have not been reported so far?
- Are there more stations with time series for the listed determinands (in particular the priority ones) available that have so far not been reported?
- Can more stations be reported to increase spatial coverage?

Lakes – Hazardous Substances

No data on hazardous substances in lakes have been reported from Denmark.

Questions to Denmark regarding the reporting on hazardous substances in rivers:

- Why is no information on hazardous substances in lakes reported to SoE? Can this information be submitted in the future?

Lakes – Biology

Issues to be clarified:

- Are status classes reported? If not, why not?
- Are EQR values reported? If not, why not?
- Can reported EQR values be normalised? If not, why not?
- Are stations with monitoring covering all RBDs of the Member States?

Care should be taken to ensure that the stations reported are geographically representative, as well as representative in terms of the whole range of ecological status classes, and that all major lake types are included.

Denmark reported no status class data for lakes biology, but additional metrics data (phytoplankton and macrophytes) for 2012, as well as historical data 1989-2009.

Phytoplankton: All additional metrics were reported in 2012, but not in 2010-2011. Additional metrics were reported for 15 stations in years 1989-2007, but the number of stations dropped to 6 in 2009. 90% of the stations were reported for two or more years. Macrophytes: Additional metrics were reported in 2010-2011, but not in 2012. All stations were different in the two years.

Table 8: Number of lake biology records per determinand, aggregation period and year: Additional metrics in original scale.

BQE	PP	PP	PP	PP	PP	PP	MP
Determinand Biology	Cyanobacteria Biomass	Cyanobacteria Biomass	Cyanobacteria Proportion	Cyanobacteria Proportion	Total Phytoplankton Biomass	Total Phytoplankton Biomass	Macrophyte Depth Limit
Aggregation Period	Annual	GrowingSeason	Annual	Growing Season	Annual	Growing Season	Annual
1989	15	15	15	15	15	15	
1990	15	15	15	15	15	15	
1991	15	15	15	15	15	15	
1992	15	15	15	15	15	15	
1993	15	15	15	15	15	15	
1994	15	15	15	15	15	15	
1995	15	15	15	15	15	15	
1996	15	15	15	15	15	15	
1997	15	15	15	15	15	15	
1998	16	16	16	16	16	16	
1999	16	16	16	16	16	16	
2000	16	16	16	16	16	16	
2001	16	16	16	16	16	16	
2002	16	16	16	16	16	16	
2003	16	16	16	16	16	16	
2004	15	15	15	15	15	15	
2005	15	15	15	15	15	15	
2006	15	15	15	15	15	15	
2007	15	15	15	15	15	15	
2008	10	10	10	10	10	10	
2009	6	6	6	6	6	6	
2010							4
2011							4
2012	7	7	7	7	7	7	

Table 9: Number of lake biology records per BQE, RBD and year: Additional metrics in original scale.

BQE	PP	PP	PP	MP	MP	MP
CountryCode	DK	DK	DK	DK	DK	DK
RBDcode	DK1	DK2	DK4	DK1	DK2	DK4
1989	60	24	6			
1990	60	24	6			
1991	60	24	6			
1992	60	24	6			
1993	60	24	6			

1994	60	24	6			
1995	60	24	6			
1996	60	24	6			
1997	60	24	6			
1998	66	24	6			
1999	66	24	6			
2000	66	24	6			
2001	66	24	6			
2002	66	24	6			
2003	66	24	6			
2004	60	24	6			
2005	60	24	6			
2006	60	18	6			
2007	54	24	6			
2008	30	24				
2009	12	24				
2010				3	1	
2011				2	1	1
2012	30	12				

Questions to Denmark regarding the reporting on biology in lakes:

- Denmark has not reported status classes nor EQR values.
- Denmark is encouraged to increase the number of stations reported.
- Denmark is encouraged to continue the reporting of additional metrics for phytoplankton (as well as for macrophytes). The data can be used to link with the nutrients data, which would improve European assessments of pressures and impacts/status.
- Denmark is encouraged to report EQR values and status class for the lake BQEs, or to explain why this is not done.

4.2 Groundwater quality

Issues to be clarified:

- Have data for all SoE nutrients of highest priority (in terms of EEA`s needs) in groundwater been reported consistent over the years?
- Have disaggregated data for all highest priority SoE nutrients in groundwater been reported consistent over the years?
- Are all RBDs in the MS covered with reporting on highest priority SoE nutrients in groundwater?
- Have data on preferred hazardous substances, if monitored by Member State, in groundwater been reported for all years in which they are available?
- Are all RBDs in the MS covered with reporting on preferred SoE hazardous substances in groundwater?

Groundwater - Nutrients, Organic Matter and General Physico-Chemical Determinands

Denmark reports disaggregated[3] data on groundwater nutrients. In 2005 and 2006 the highest number of values and stations (see also Table 11) was reported. This number declined steadily until 2011 and 2012. Since 2006 no data for dissolved oxygen have been delivered. Data for all Danish RBDs have been reported.

Table 10: (Highest priority) nutrients in groundwater disaggregated (value = number of stations per country in which given determinand was reported)

DeterminandName	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Nitrate	802	817	780	837	777	1009	979	897	826	741	617	476	537
Ammonium	580	486	465	637	656	986	949	842	750	693	574	474	537
Nitrite	805	764	733	788	724	1002	975	898	822	737	616	476	537
Dissolved Oxygen	44	45	118	98	97	68	0	0	0	0	0	0	0

Note: In the current data set the reporting of high priority determinands has stopped or nutrients have been reported as aggregated data only. The aim is to ensure that the high priority determinands (preferably disaggregated data) have as complete coverage as possible.

Table 11: Number of groundwater stations for highest priority nutrients (disaggregated) by River Basin Districts

RBDcode	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
DK1	536	552	541	564	541	666	657	627	563	497	420	326	362
DK2	221	213	198	218	185	276	279	235	229	217	168	136	152
DK3	10	16	6	17	17	20	12	16	16	9	4	11	11
DK4	26	26	26	26	23	31	31	20	18	18	25	3	12

Note: One aspect of the country fiches is to improve the spatial coverage and ensure that stations are reported for all RBDs.

Groundwater - Hazardous substances

In Table 12 there is an overview on the reporting of the preferred hazardous substances (metals and some more preferred hazardous substances as example) in groundwater in Denmark. Information is

3 For Eionet-Water data are reported at different levels of aggregation:

- Disaggregated: concentrations in each sample and date of sample taken at each monitoring site in the groundwater body;
- Aggregated: annual average concentrations for the groundwater body.

not available for all preferred hazardous substances. Sometimes metals have been reported as dissolved also (Copper, Nickel). In some years there was less reporting in general (2004, 2006) or for some substances only (2007). In some cases reporting stopped in 2004, 2007 or after (Chromium, Mercury in 2004, Diuron, Isoproturon, …).

Table 12: Number of groundwater stations per determinand (examples for preferred hazardous substances)/year

DeterminandName	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Arsenic	537	564	586	556	7	696	38	726	367	672	428	421	97
Copper	537	563	566	555	0	597	26	726	367	672	205	420	97
Copper dissolved	448	475	480	466	0	507	11	629	309	548	175	0	0
Cadmium	537	563	565	554	0	597	26	726	367	672	205	420	97
Chromium	357	224	199	234	0	695	27	0	0	0	0	0	0
Nickel	537	564	585	556	21	708	38	726	367	672	428	421	97
Nickel dissolved	448	476	499	467	7	583	23	629	309	548	353	0	0
Lead	536	563	564	555	0	597	26	726	367	672	205	420	97
Mercury	231	57	59	98	0	0	0	0	0	0	0	1	0
Zinc	533	563	564	555	0	696	27	726	367	672	206	417	97
Zinc dissolved	445	475	478	466	0	576	12	629	309	548	176	0	0
Atrazine	546	560	570	559	482	636	641	648	593	519	443	430	451
Diuron	546	560	565	556	481	635	641	45	0	0	0	0	0
Isoproturon	547	559	570	558	482	636	641	45	0	0	0	0	0
Simazine	547	560	570	558	482	636	641	621	559	511	443	430	451
Pentachlorophenol	463	561	563	603	19	67	376	262	335	251	201	420	48
Bentazone	547	560	570	558	482	636	641	648	593	519	443	430	451
Desethylatrazine	547	560	570	558	482	636	641	648	593	519	443	419	451
Desisopropylatrazine	547	560	570	558	482	636	641	648	593	519	443	430	451
Terbuthylazine	547	560	570	558	482	636	641	119	0	0	0	0	0
2,4-D	547	560	570	558	471	623	641	119	0	0	0	0	0
MCPA	547	553	570	558	482	636	641	45	0	0	0	0	0
Mecoprop	547	560	570	558	482	636	641	648	593	519	443	430	451
Benzene	200	199	214	295	20	17	383	261	335	252	201	420	48

Note: In the current data set the reporting of preferred substances has stopped or data have not been reported. The aim is to ensure that the high priority determinands (e.g. priority substances) have as complete coverage as possible.

All Danish RBDs provide information on preferred hazardous substances in groundwater (see **Table 13**). The total number of stations reported was around 780 in 2006 and 455 in 2012.

Table 13: Number of groundwater stations for preferred hazardous substances by River Basin Districts

RBDcode	2000	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
DK1	352	379	364	306	428	394	497	449	433	316	301	303

DK2	191	188	209	145	260	211	228	188	229	118	120	131
DK3	10	16	17	17	20	12	19	16	12	5	11	10
DK4	25	22	25	22	33	30	33	27	31	22	3	11

Note: One aspect of the country fiches is to improve the spatial coverage and ensure that stations are reported for all RBDs.

Questions to Denmark regarding the reporting on groundwater

- Why is the number of groundwater stations decreasing from 2006 to 2012?
- Why does reporting of some substances stop (e.g. Mercury) in the last years? Can data be resubmitted?

4.3 Emissions

Issues to be clarified:

- Does Member State report data on emissions or are the tables prefilled from E-PRTR reporting?
- What type of source apportionment has been reported?
- Which determinands have been reported for the different emissions categories (nutrients from point and diffuse sources, hazardous substances from point and diffuse sources)
- Have data been reported from all RBDs (if relevant)?

For Denmark records from E-PRTR as well as country-reported records are present. In the following tables there is an overview on reporting nutrients and hazardous substances from point and diffuse sources and the groups of emission sources which have been used. The value in the table fields is the number of RBDs in which the determinands were reported.

It can be seen from the tables that Denmark reported data for nutrients point as well as diffuse sources and information on different sources of emissions covering the whole country. In the contrary all records for hazardous substances and total organic carbon were inserted from E-PRTR.

Table 14: Nutrients emissions from point sources (value means the number of spatial units in which the determinand was reported for that year)

Determinand_Nutrients	2006	2007	2008	2009	2010	2011	2012
Total Nitrogen			4		4	4	4
Total Organic Carbon (TOC)					2	2	
Total Phosphorus			4		4	4	4

Sources of emissions reported:

I	Industrial Waste Water Discharges total
I3	Industrial Waste Water Treated Discharges
O	Other Waste Water Discharges total

O5	Other Waste Water Treated Discharges
U	Urban Waste Water Discharges total
U2	Urban Waste Water Treated Discharges total

Table 15: Hazardous substances emissions from point sources (value means the number of spatial units in which the determinand was reported for that year)

Determinand_HazSubs	CASNumber	2007	2008	2009	2010	2011	2012
Arsenic	7440-38-2				2	2	
Copper	7440-50-8				1	1	
Chromium	7440-47-3				1	1	
Lead	7439-92-1				1	1	
Mercury	7439-97-6				1	1	
Nickel	7440-02-0				2	2	
Zinc	7440-66-6				1	1	

Sources of emissions reported:

I	Industrial Waste Water Discharges total
U2	Urban Waste Water Treated Discharges total

Table 16: Nutrients emissions from diffuse sources (value means the number of spatial units in which the determinand was reported for that year)

Determinand_Nutrients	2006	2007	2008	2009	2010	2011	2012
Total Nitrogen					4	4	4
Total Phosphorus					4	4	4

Sources of emissions reported:

NP Total Diffuse Emissions to Inland Waters

Questions to Denmark regarding the reporting on emissions:

- Are other data than E-PRTR available for hazardous substances?

4.4 Water Quantity

As shown in Table 17 the water quantity related data reported by Denmark include both, point (stations for stream flow measurement in daily scale and groundwater level in annual scale) and areal data (water balance, water abstraction, water use). For many of the reported parameters the time series cover the time period 2000-2012. The preferred time scale of the reported time series was annual (807 TS). Denmark has several monitoring wells with more than one screen each of them being a monitoring station. For the WISE SoE Water Quantity dataflow only the upper most water body is relevant and therefore the data provider is kindly asked not to report more than one value of water level per well and date. The reported 200 daily stream flow time series refer to the year 2010. Continuous reporting of stream flow data as well as providing data on reservoir inflow/outflow would be welcomed. The spatial distribution of the selected stations is adequate. Reporting of areal data in a smaller time scale (monthly instead of annual) would be very useful for further analysis on European level (e.g. production of Water Accounts).

Table 17: Number of reported time series (of any time scale) per parameter (see http://etcdd.eionet.europa.eu/dataelements/7433 for the description of parameters)

Parameter	Number of time series
Groundwater level	759
Stream flow	200
wa_total_abstraction	1
wa_total_abstraction_sw	1
wa_total_abstraction_gw	1
wa_for_public_wss	1
wa_for_public_wss_sw	1
wa_for_public_wss_gw	1
wa_abstraction_for_self_suply_total	1
wa_abstraction_for_self_suply_total_sw-total	1
wa_abstraction_for_self_suply_total_sw-nace_a	1
wa_abstraction_for_self_suply_total_sw-nace_a_irrgation	1
wa_abstraction_for_self_suply_total_sw-nace_c	1
wa_abstraction_for_self_suply_total_sw-nace_d	1
wa_abstraction_for_self_suply_total_sw-nace_i	1
wa_abstraction_for_self_suply_total_gw-total	1
wa_abstraction_for_self_suply_total_gw-nace_a	1
wa_abstraction_for_self_suply_total_gw-nace_a_irrgation	1
wa_abstraction_for_self_suply_total_gw-nace_c	1
wa_abstraction_for_self_suply_total_gw-nace_d	1
wa_abstraction_for_self_suply_total_gw-nace_i	1
wb_areal_precipitation	2
wb_act_evapotranspiration	1
wb_internal_flow	1
wb_total_act_ext_inflow	2
wb_total_actual_outflow	1
wb_total_actual_outflow_sea	1

wb_total_actual_outflow_neighbour	1
wb_changes_in_groundwater_storage	1
wu_total_freshwater_used-total	1
wu_total_freshwater_used-domestic	1
wu_total_freshwater_used-nace_a	1
wu_total_freshwater_used-nace_a_irrgation	1
wu_total_freshwater_used-nace_c	1
wu_total_freshwater_used-nace_d	1
wu_total_freshwater_used-nace_i	1
wu_public_water_supply-total	1
wu_public_water_supply-domestic	1
wu_public_water_supply-nace_a	1
wu_public_water_supply-nace_d	1
wu_public_water_supply-nace_i	1
wu_self_supply-total	1
wu_self_supply-domestic	1
wu_self_supply-nace_a	1
wu_self_supply-nace_a_irrgation	1
wu_self_supply-nace_c	1
wu_self_supply-nace_d	1
wu_self_supply-nace_i	1

The location of the reported stations projected on the map is shown on Figure 2, where

- Station measuring groundwater level (well)
- Stream flow station

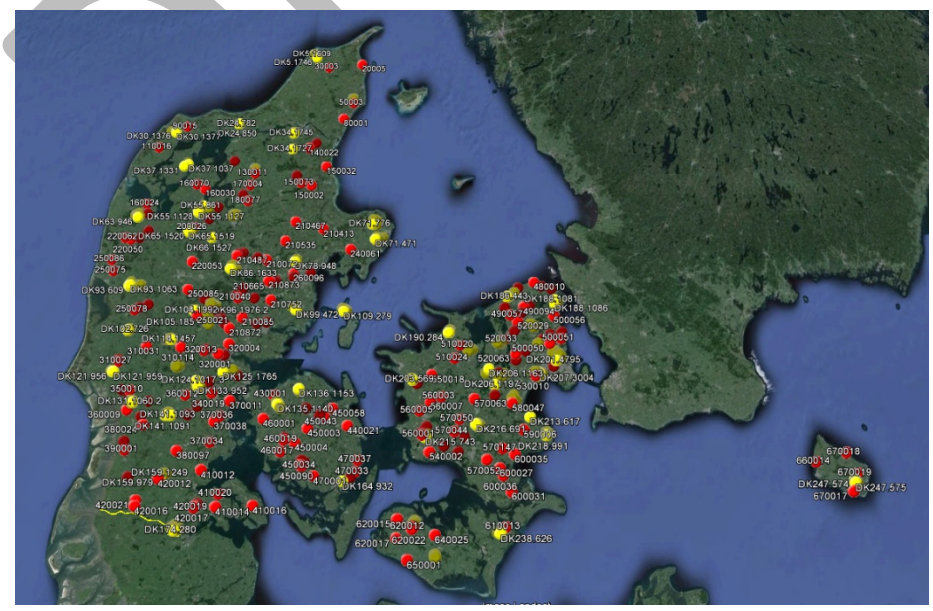

Figure 2: Location of stations

Some inconsistencies have been detected through TS analysis of water abstraction data reported in 2009 and 2010. Table 18 shows these issues.

Table 18: QA/QC issues

Region	Rule code	Rule definition	Time step	Ref. Year	Equation	Equation analysis
Country	WA002-EQ	wa_for_public_wss_gw + wa_abstraction_for_self_suply_total_gw-total = wa_total_abstraction_gw	annual	2000	976.910000 = 709.130000	419.910000 + 557.000000 = 709.130000
Country	WA002-EQ	wa_for_public_wss_gw + wa_abstraction_for_self_suply_total_gw-total = wa_total_abstraction_gw	annual	2001	864.780000 = 692.920000	410.750000 + 454.030000 = 692.920000
Country	WA002-EQ	wa_for_public_wss_gw + wa_abstraction_for_self_suply_total_gw-total = wa_total_abstraction_gw	annual	2002	864.460000 = 649.520000	423.100000 + 441.360000 = 649.520000
Country	WA002-EQ	wa_for_public_wss_gw + wa_abstraction_for_self_suply_total_gw-total = wa_total_abstraction_gw	annual	2003	800.410000 = 632.530000	417.510000 + 382.900000 = 632.530000
Country	WA002-EQ	wa_for_public_wss_gw + wa_abstraction_for_self_suply_total_gw-total = wa_total_abstraction_gw	annual	2004	793.360000 = 659.260000	416.420000 + 376.940000 = 659.260000
Country	WA004-EQ	wa_for_public_wss_sw + wa_for_public_wss_gw = wa_for_public_wss	annual	2002	427.590000 = 667.870000	4.490000 + 423.100000 = 667.870000
Country	WA004-EQ	wa_for_public_wss_sw + wa_for_public_wss_gw = wa_for_public_wss	annual	2003	422.330000 = 651.160000	4.820000 + 417.510000 = 651.160000

By comparing identical parameters reported through the WISE SoE dataflow and through the OECD/EUROSTAT Joint Questionnaire 2012 some inconsistencies have been detected, as shown in Table 19.

Table 19: Comparison of annual values at country level of parameters reported through the OECD/EUROSTAT Joint Questionnaire 2012 and the WISE SoE water quantity dataflow

Ref. year	Parameter	Value (JQ)	Value (SoE)
2004	Total gross abstraction from surface water	17.44	20.85
2004	Fresh surface water abstraction for agriculture, forestry, fishing	3.48	4.28
2004	Fresh surface water abstraction for the manufacturing industry	5.63	9.58
2004	Fresh surface water abstraction used for other services	0.01	0.05
2004	Fresh groundwater abstraction for irrigation	146.73	188.5
2004	Fresh groundwater abstraction used for other services	0.74	1.7

5 Matching of stations/water bodies

For the integrated assessment with the Water Framework Directive as well as other Water Directives it is a prerequisite that SoE stations can be linked to stations or water bodies from the other reporting streams. That was often not possible in former assessments and should be improved in the future, especially with regards to the next assessment of WFD reporting.

All the datasets reported to WISE have different fields to identify the stations or water bodies. The WISE-WFD database with data reported for the first RBMPs has the **water body code** (Surface or Groundwater) as one of the main codes. The WISE-SoE Groundwater, Rivers and Lake databases have a field with the **water body codes** (WaterBodyID/ GWBcode_WFD).

Database	Water Body Code
WISE-WFD database	*Surface water bodies* EUSurfaceWaterBodyCode SWB_MS_Code SWB_NAME
WISE_SoE rivers	WaterBodyID WaterBodyName
WISE_SoE lakes	WaterBodyID WaterBodyName
WISE-WFD database	*Groundwater bodies* EUGroundWaterBodyCode SWB_MS_Code SWB_NAME
WISE_SoE groundwater bodies Groundwater stations	GWBcode_WFD GWBcode_WFD

The following overview shows some statistics of the availability of WaterBodyID for SoE surface water stations or WaterBodyCode for SoE groundwater stations and groundwaterbodies and their matching with WFD EUSurfaceWaterBodyCode and WFD SWB_MS_CD.

WISE-SoE rivers

Denmark has not reported WaterBodyID for its 42 WISE-SOE river stations; therefore it is not possible to match Water body ID with WFD water bodies (see Table 20).

Table 20 WISE SoE rivers water quality dataset - statistics of the availability of rivers monitoring stations and their attributes (waterbody ID) and the results of the matching of the SoE rivers waterbody ID with WFD EUSURFACEWATERBODYCODE and SWB_MS_CD

SOE_STATIONS_TOTAL	SOE_WATERBODYID_EXISTS	MATCH_EUSURFACEWATERBODYCODE	MATCH_SWB_MS_CD
42	0	0	0

WISE-SoE lakes

Denmark has reported WaterBodyID for 26 of 29 lakes; however, there are no match between lake stations and the WFD water bodies (Table 21).

Table 21: WISE SoE lakes water quality dataset - statistics of the availability of lakes monitoring stations and their attributes (water body ID) and the results of the matching of the SoE lakes waterbodyID with WFD EUSURFACEWATERBODYCODE and SWB_MS_CD

SOE_STATIONS_TOTAL	SOE_WATERBODYID_EXISTS	MATCH_EUSURFACEWATERBODYCODE	MATCH_SWB_MS_CD
29	26	0	0

WISE-SoE groundwater

The majority of Denmarks WISE-SoE groundwater bodies (393 of 396) and WISE-SoE groundwater stations (1128 of 1165) have GWB codes. There are high match of 382 groundwater bodies with WFD water bodies, if EUGroundWaterBodyCode is used for matching (Table 22), but only of 128 groundwater stations with WFD water bodies (Table 23).

Table 22: WISE SoE groundwater quality dataset - statistics of the availability of groundwaterbodies and their SOE_GWBCODE_WFD and the results of the matching of the SoE groundwater SOE_GWBCODE_WFD with WFD EUGROUNDWATERBODYCODE and GWB_MS_CD

SOE_GWB_TOTAL	SOE_GWBCODE_WFD_EXISTS	MATCH_EUGROUNDWATERBODYCODE	MATCH_GWB_MS_CD
396	393	382	0

Table 23: WISE SoE groundwater quality dataset - statistics of the availability of groundwater monitoring stations and their attributes (SOE_GWBCODE_WFD) and the results of the matching of the SoE groundwater SOE_GWBCODE_WFD with WFD EUGROUNDWATERBODYCODE and GWB_MS_CD

SOE_GW_STATIONS_TOTAL	SOE_GWBCODE_WFD_EXISTS	MATCH_EUGROUNDWATERBODYCODE	MATCH_GWB_MS_CD
1165	1128	128	0

Questions to Denmark:

- Can the waterbody code as defined in the WFD guidance (EUSurfaceWaterBodyCode) be reported for all stations and water bodies?

- Other statistics on matching (see example Spain) will be included in the country fiche in a next version -