

Denmark The danish RBM3 for lakes and coastal water with focus on main pressures and measures.

Nordic WFD, WG2 3. oktober 2024

Danish River Basin Management Plans 2021-2027: Status for marine water bodies

- 109 coastal water bodies (1 nautical mile)
- 5 out of 109 coastal water bodies reach the target 'good ecological conditions'





Danish River Basin Management Plans 2021-2027: main pressures for marine water bodies

Nutrients (mainly N but also P) are the main cause of eutrophication



Danish River Basin Management Plans 2021-2027: Maximum allowable inputs of nitrogen (N-MAIS)

N-MAIs are determined by a modelling approach

- a complex of mechanistic and statistic models cover all coastal water bodies

- models are used to calculate the water body specific sensitivity towards nutrients from different sources (Danish N, Danish P, foreign N, foreign P, atmosphere)

- Danish N-MAIs are calculated based on a set of assumptions regarding the future development of other nutrient sources than Danish N



Danish River Basin Management Plans 2021-2027: N-MAIs

Target N-MAIs was calculated for each of the 108 water bodies with a catchment

The total Danish N-MAI was calculated to be 38.300 tonnes N/år



Bilag 1.1: Beregning af fordelt indsatsbehov 2027 på deloplande med udgangspunkt i målbelastninger for heloplande						Kvælstof - helopland				
Hov	edfarvands- åde	Kystvand- gruppe	Kystvand		Nedstrøms kystvand	Areal, helopland	Status- belastning	Baseline- belastning	Mål- belastning	
ID	Navn	ID	ID	Navn	ID	km2	Tons N/år	Tons N/år	Tons N/år	
	1 Nordsøen	119	111	Lister Dyb	119	1877,9	1865,9	1801,6	1739,6	
- 1	1 Nordsøen	119	107	Juvre Dyb	119	284,4	321,4	299,0	192,0	
	1 Nordsøen	119	120	Knudedyb	119	1453,4	3014,4	2869,9	1144,7	
	1 Nordsøen	119	121	Grådyb	119	1820,4	2694,7	2556,4	1863,8	
1.3	1 Nordsøen	119	119	Vesterhavet, syd		5776,4	7967,9	7587,1		
	1 Nordsøen	133	132	Ringkøbing Fjord	133	3476,5	4517,5	4278,4	2631,8	
	1 Nordsøen	133	131	Nissum Fjord, Felsted Kog	130	1202,5	1822,3	1696,8		
	1 Nordsøen	133	130	Nissum Fjord, mellem	129	1311,9	1954,6	1816,8	(



Danish River Basin Management Plans 2021-2027: Nmitigation demand

N-status load 2018:	56.100 ton/yr
N-Baseline load 2027:	51.300 ton/yr
Danish N-MAI:	38.300 ton/yr
Need for reduction:	13.000 ton/yr

Planned measures, RBMP3: 10.400 ton/yr

- 23% CAP-effects
- 15% Voluntary measures (wetlands, mini- wetlands, afforrestation)
- 62% Catch-crops



Danish River Basin Management Plans 2021-2027: Status for lake water bodies

- 986 lake water bodies (5 ha and above + lakes larger than 1ha in habitat areas with certain lake habitat types)



Danish River Basin Management Plans 2021-2027: Maximum allowable inputs of phosphorus (P-MAIS) and reduction need

P-MAIs are determined by a modelling approach
The target concentrations are calculated based on statistical linear relationships of nutrient versus biological indicators.

-Target concentrations are transformed into target loads by models for the relation between residence time and loads and a measured/modelled water balance for the specific lake.

-Based on a baseline load and the P-MAI the reduction need is calculated for each lake

Hovedvandopland	ID	Navn	Note	Søareal	Oplandsareal	Belastning 2016-2018	Baselinebelastning 2027	Målbelastning	Indsatsbehov
				ha	ha	kg P/år	kg P/år	kg P/år	kg P/år
1.2	248	Arup Vejle		388	1.207	305	296	314	-
1.2	252	Bjørnkær		8	147	41	37	50	-
1.2	255	Borbjerg Møllesø	4	13	285	164	160	99	61
1.2	256	Bredmose Fjends	4	4	117	52	51	19	32
1.2	258	Brokholm Sø		82	2.958	1.493	1.453	678	775
1.2	260	Bølling Sø	4	311	2.958	379	366	805	-
1.2	265	Ferring Sø		314	2.051	1.430	1.410	530	880
1.2	268	Flade Sø		486	1.186	570	568	339	229

TABEL 1: Søernes belastning og indsatsbehov

Measures according to the current river bassin management plan

RBM3

- Net reduction need: 110 tons P
- Unknown for approx. 50% of the lakes

Measures:

- bying freshwater aquaculture facilities (fish ponds)
- phosphorus wetlands
- reduction of rain water overflow
- \rightarrow ca. 7,5 tons P

Remaining gap: approx. 100 tons

Main problem: run-off from diffuse sources

Increased knowledge on phosphorus and mitigation measures is under development



>0.5

10 / Miljøstyrelsen / Titel på præsentation

Bidrag	Metode		Interval	
		tons P år-1	tons P år-1	
Vand-erosion	Model	56	53-58	
Vind-erosion	Poulsen & Rubæk, 2005	10	5-15	
Overfladisk afstrømning	Poulsen & Rubæk, 2005	10	5-15	
Matrix-udvaskning	Model	59	23-94	
Makropore-tab	Model + skøn	162	138-191	
Dyrket lavbundsjord	Poulsen & Rubæk, 2005. Her anvendt: rate = 1,9 kg P/ha; areal = 1716 km ²	326	69-515	
Grundvand fra ikke-drænede marker	Poulsen & Rubæk, 2005	60		
Landbrugsbidrag		683	293-888	
Brinkerosion	Model	644	422-1373	
Grundvand fra udyrkede arealer		?	?	
Diffust bidrag (landbrug-baggrund)		1327	715-2261	

Tabel 4.8.1 Samlet kildeopsplitning af landbrugsbidraget og af det samlede diffuse tab på landsplan, tons fosfor per år.

https://dce2.au.dk/pub/SR397.pdf



Potential for placement of specific measure

Green: potential Yellow: maybe potential Red: no potential

Economical model Target_ECON_P





Main measures: Forest Phosphorus wetlands Mini wetlands Stabilization of brinks by trees Extensivation

Knowledge gaps

Synergy planning (climate measures, nitrogen measures, phosphorus measures etc.)

Generel regulation versus targeted measures

Experiences with voluntary measures

Reduction needs for lakes without specified inlet/outlets