

Thematic report on evaluation of effectiveness of measures

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1. Nutrient inputs from direct point sources from 2000 to 2018



- Based on the PLC data:
 - - NTOT load has decreased by 12,600 t and PTOT load by 1,540 t

Direct industrial nutrient inputs from 2000 to 2018

Country	Parameter																				Change	Change
		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	(2000-2018)	(2000-2017)
		t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	%
DE	NTOT	22						25	24	22	11	26	7	36	36	31	38	30	35	31	9	42
DK	NTOT	439	412	358	266	194	144	148	152	178	113	123	150	121	134	127	109	94	104	95	-344	-78
EE	NTOT	626				33	85	61	69	88	41				51	8	8	19	24	19	-607	-97
FI	NTOT	1844	1662	1559	1563	1431	1410	1070	1138	1224	1120	1255	1302	1352	1601	1607	1316	1039	1474	1319	-526	-28
LT	NTOT	8	13	13	9	3	8	4					6	9	7	9	7	11	14	12	3	36
LV	NTOT		21	18	12	10	6	14	21	10	7	8	11	11	11	10	8	4	5	2	2	
PL	NTOT	15	0	0	0	0	0					3					6		23	19	4	28
RU	NTOT	33	29	22	2	1	13	60	16	7	5				9	39	39	36	71	8	-25	-76
SE	NTOT	2672	2274	2559	2592	2517	2585	2622	2209	2198	2007	1895	1864	2006	2100	1987	1971	1833	1751	1653	-1020	-38
Total	NTOT	5661	4412	4530	4444	4189	4251	4004	3628	3730	3305	3307	3339	3534	3950	3819	3502	3067	3501	3158	-2503	-44

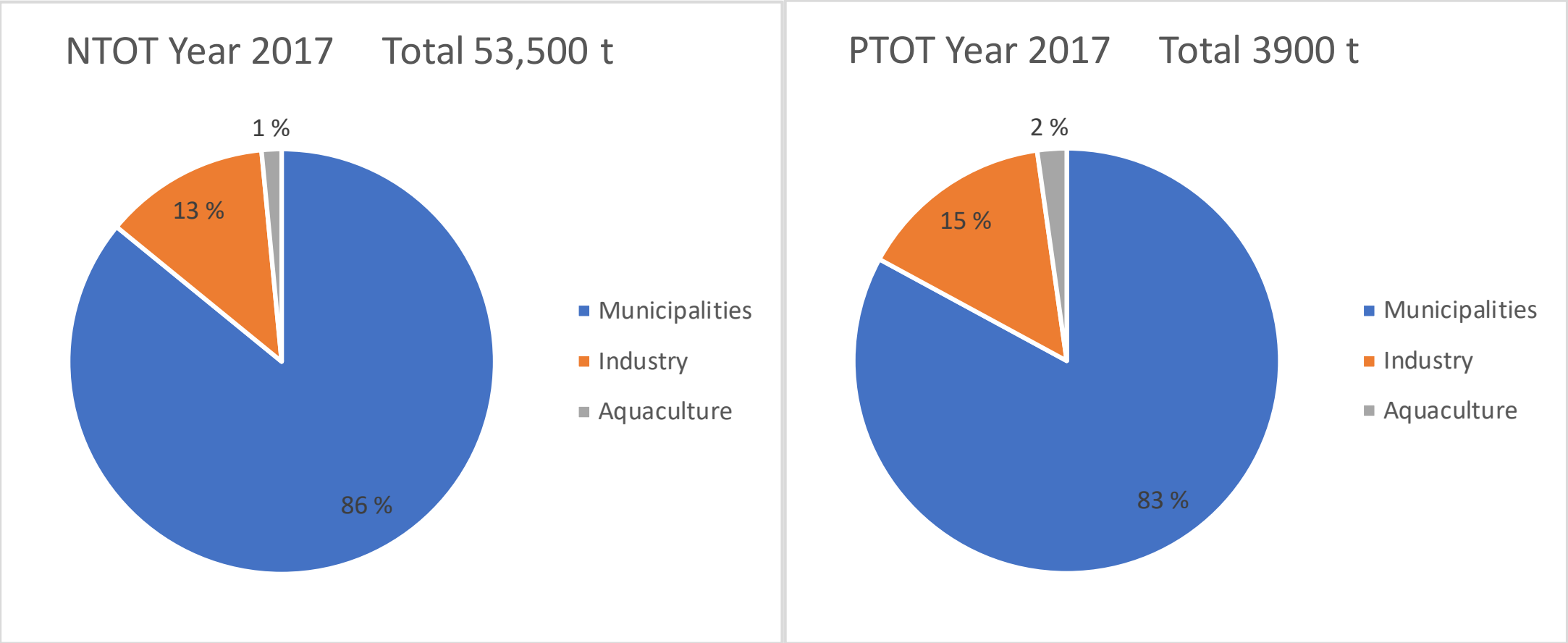
Country	Parameter																				Change	Change
		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	(2000-2017)	(2000-2017)
		t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	%
DE	PTOT	1						1	1	1	0	1	0	1	2	1	1	1	1	1	0	-3
DK	PTOT	25	24	22	14	12	11	10	10	12	5	9	9	10	10	9	8	7	8	8	-18	-70
EE	PTOT	1				2	8	12	4	9	3				2	1	1	1	1	2	1	39
FI	PTOT	93	100	94	94	95	95	88	100	95	75	83	79	91	89	76	75	50	65	61	-32	-35
LT	PTOT	1	1	1	1	0	1	0					0	0	0	0	0	1	1	1	0	-24
LV	PTOT		4	4	3	4	2	4	5	3	2	3	3	4	3	3	2	0	1	0	0	
PL	PTOT	4	0	0	0	0	0										1		2	1	-3	-73
RU	PTOT	10	8	18	1	2	2	10	11	10	6					10	11	9	9			
SE	PTOT	280	250	266	262	280	275	279	254	238	217	219	203	221	227	226	208	218	187	173	-107	-38
Total	PTOT	415	387	406	375	395	394	405	384	368	308	314	295	326	333	326	307	287	276	246	-159	-38

Marine aquaculture: nutrient inputs from 2000 to 2018

Country	Parameter																				Change	Change
		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	(2000-2018)	(2000-2017)
		t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	%
DK	NTOT	262	248	263	270	240	255	270	285	299	255	266	322	324	338	337	335	322	333	352	90	34
EE	NTOT							15														
FI	NTOT	769	724	517	481	538	507	530	521	500	489	432	442	479	464	469	463	399	494	391	-378	-49
LT	NTOT							0					0									
SE	NTOT							139	139	139	139	139	93		112	90	114	119	99	104		
Total	NTOT	1031	972	781	751	779	762	953	944	938	883	836	857	803	914	896	912	840	926	847	-288	-28

Country	Parameter																				Change	Change
		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	(2000-2017)	(2000-2017)
		t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	%
DK	PTOT	29	25	28	29	26	27	29	31	32	28	28	34	35	35	36	35	34	34	38	9	32
EE	PTOT							2														
FI	PTOT	95	91	64	60	66	63	65	63	62	61	54	55	58	54	50	47	39	55	39	-56	-59
LT	PTOT							0					0									
SE	PTOT							18	18	18	18	18	12		14	10	12	13	11	11		
Total	PTOT	124	116	92	89	92	91	114	112	112	106	100	100	93	103	96	94	86	99	87	-47	-38

Nutrient inputs from indirect point sources from 2000 to 2018



No comparison of the development of inputs

Indirect municipal nutrient inputs from PLC-4 to PLC-7

Country	Parameter					Change	Change
		PLC-4	PLC-5	PLC-6	PLC-7	(2000-2017)	(2000-2017)
		t	t	t	t	%	
DK	NTOT	1860	1470	1269	1162	-698	-38
EE	NTOT	124	460	210	264	141	114
FI	NTOT	6491	6890	7748	5909	-582	-9
LT	NTOT	996	1909	1332	1781	784	79
LV	NTOT	396	527	515	886	490	124
PL	NTOT	15591	31788	25148	19343	3752	24
RU	NTOT	4910		3546	7840	2930	60
SE	NTOT	7503	10450	8823	8834	1331	18
Total	NTOT	37870	53494	48590	46019	8149	22

Country	Parameter					Change	Change
		PLC-4	PLC-5	PLC-6	PLC-7	(2000-2017)	(2000-2017)
		t	t	t	t	%	
DK	PTOT	184	124	113	99	-84	-46
EE	PTOT	26	24	7	9	-17	-64
FI	PTOT	114	103	74	66	-48	-42
LT	PTOT	76	228	112	138	62	82
LV	PTOT	65	110	68	115	50	76
PL	PTOT	2096	3183	2793	2148	52	2
RU	PTOT	785		728	560	-225	-29
SE	PTOT	122	161	127	111	-12	-10
Total	NTOT	3468	3932	4023	3247	-221	-6

Indirect industrial nutrient inputs from PLC-4 to PLC-7

Country	Parameter	PLC-4	PLC-5	PLC-6	PLC-7	Change (2000-2017)	Change (2000-2017)
		t	t	t	t	t	%
DK	NTOT	231	183	101	11	-219	-95
EE	NTOT	23	341	168	22	0	0
FI	NTOT	2177	2749	2463	2261	83	4
LT	NTOT	57	132	134	219	163	286
LV	NTOT	66	135	40	186	119	179
PL	NTOT	1316	5069	4173	230	-1087	-83
RU	NTOT	2282	1366	1761	1634		
SE	NTOT	2150	2601	2334	2162	12	1
Total	NTOT	8302	12575	11172	6725	-929	-11

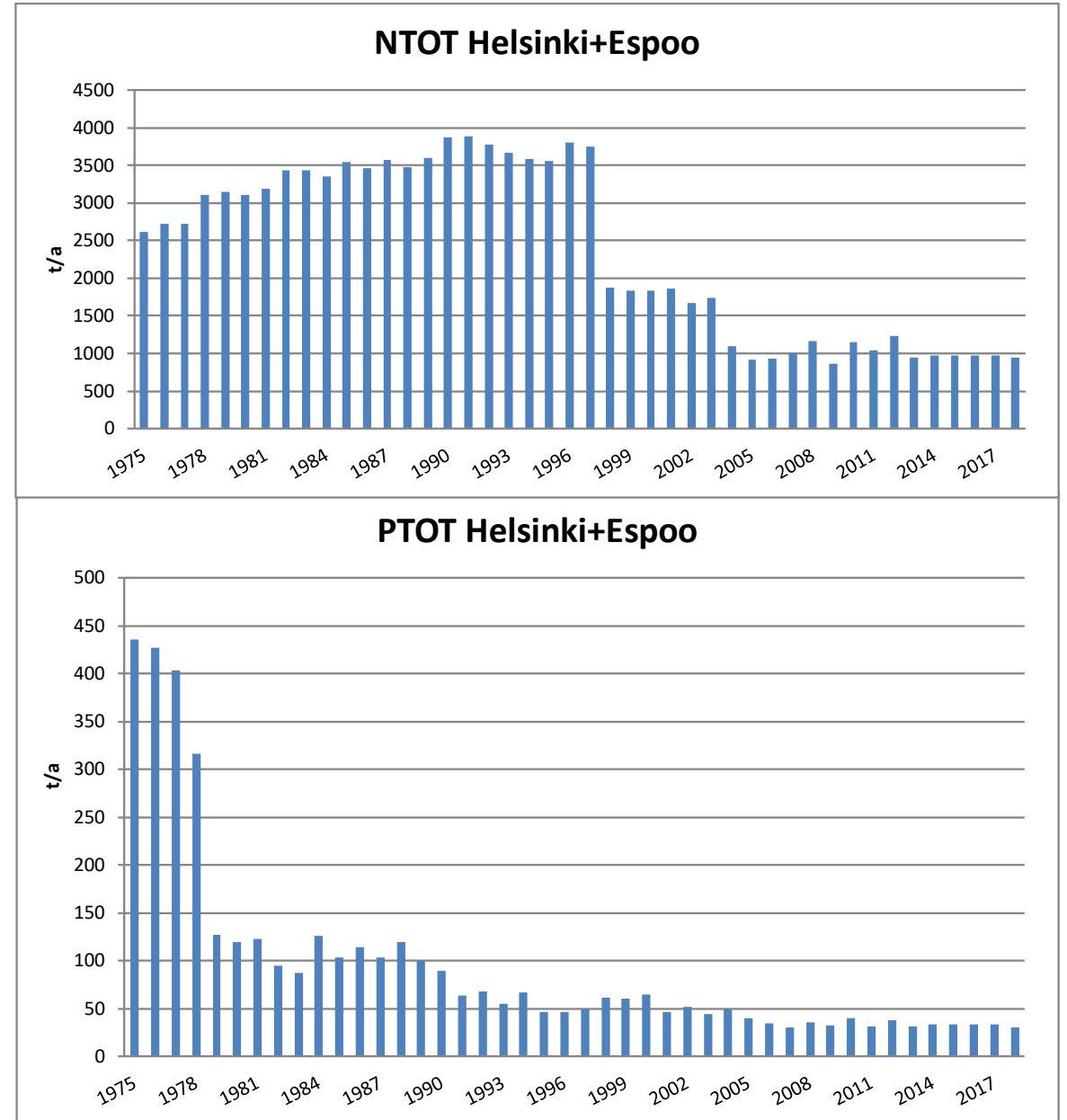
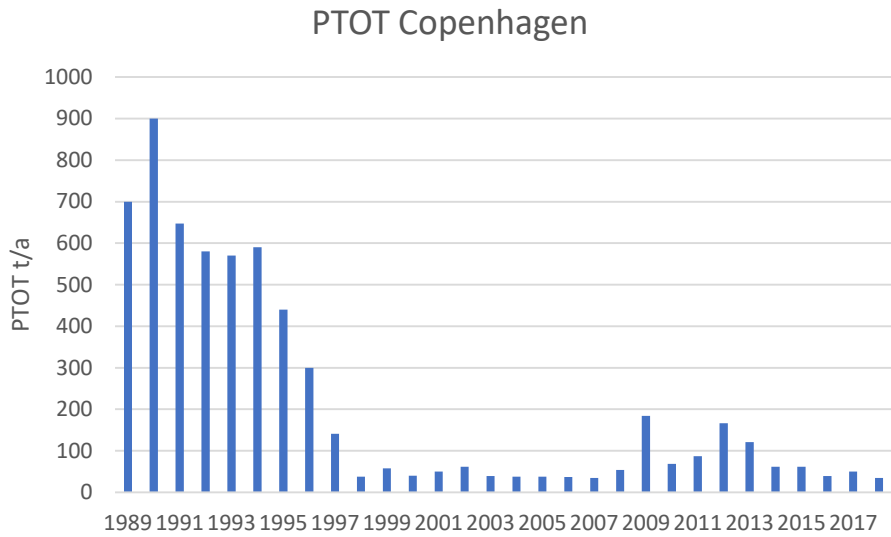
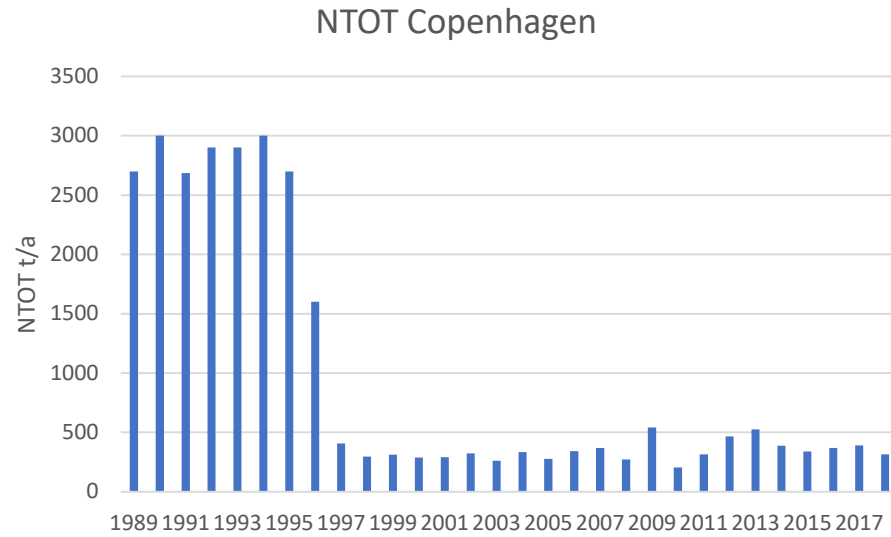
Country	Parameter	PLC-4	PLC-5	PLC-6	PLC-7	Change (2000-2017)	Change (2000-2017)
		t	t	t	t	t	%
DK	PTOT	13	5	3	1	-12	-90
EE	PTOT	2	9	4	2	0	1
FI	PTOT	137	130	113	85	-53	-38
LT	PTOT	10	9	7	9	-1	-9
LV	PTOT	4	21	4	20	16	375
PL	PTOT	80	148	75	12	-68	-85
RU	PTOT	390	328	767	399	9	2
SE	PTOT	93	75	60	53	-39	-43
Total	PTOT	730	725	1033	581	-149	113

Indirect aquaculture: inputs from PLC-4 to PLC-7

Country	Parameter	PLC-4	PLC-5	PLC-6	PLC-7	Change (2000-2017)	Change (2000-2017)
		t	t	t	t	t	%
DK	NTOT	437	326	221	227	-210	-48
FI	NTOT	235	170	135	173	-62	-26
LT	NTOT	29	69	7	5	-24	-83
LV	NTOT		62	0	1		
PL	NTOT	141	17	250			
SE	NTOT			363	403		
Total	NTOT	843	644	976	809	-296	-35

Country	Parameter	PLC-4	PLC-5	PLC-6	PLC-7	Change (2000-2017)	Change (2000-2017)
		t	t	t	t	t	%
DK	PTOT	34	27	22	21	-13	-39
FI	PTOT	29	22	13	18	-11	-37
LT	PTOT	2	3	1	1	-1	-70
LV	PTOT		8	0	0		
PL	PTOT	19	2	30			
SE	PTOT			60	46		
Total	PTOT	84	62	127	86	-25	-30

2. Time series of nutrient inputs from the large cities



2. Time series of nutrient inputs from large cities

Helsinki

The Viikinmäki wastewater treatment plant in Helsinki is the largest treatment plant in. It processes the wastewaters of around 800,000 residents as well as the wastewaters of the region's industry. The plant was taken into use in 1994 and it replaced several small-scale water treatment plants. The total flow rate of the treatment plant is around 270,000 cubic meters in a day, and an average of 100 million cubic meters of wastewater is treated at the plant every year. The treated wastewater is discharged through a rock tunnel into the sea eight kilometers away from Helsinki shoreline into a depth of 20 meters. Nowadays over 95 percent phosphorus is removed from the wastewater and 90 percent of nitrogen respectively.

- Could countries contribute with a short description of their WWTPs?

3. Evaluation of potential reduction on loads from point sources

COUNTRY	BAP	WEB	KAT	SOU	GUF	GUR	ARC	BOB	BOS	Sum	
	t	t	t	t	t	t	t	t	t		%
DE ¹⁾	26	78								103	1.0
DK		3	2	0						6	0.1
EE					2					2	0.0
FI					908		89	1526	811	3334	31.8
LT	84					0				84	0.8
LV	7				4	148				158	1.5
PL	951									951	9.1
RU ¹⁾					3575					3575	34.1
SE	83		49	104				653	1387	2277	21.7
Sum	1150	81	51	105	4489	148	89	2179	2199	10490	100

- How much inputs from MWWTs would reduce if countries would follow the HELCOM recommendation 28E/5

COUNTRY	BAP	WEB	KAT	SOU	GUF	GUR	ARC	BOB	BOS	Sum	
	t	t	t	t	t	t	t	t	t		%
DE ¹⁾	11	2.6								14	1.1
DK	1.0	21	13	29						63	5.2
EE					0.0	0.0				0	0.0
FI					2.1		0.2	2.2	2.3	7	0.6
LT	26					2.1				28	2.4
LV	4.1				1.2	50				55	4.5
PL	550									550	45.4
RU ¹⁾	0.6				494					495	40.8
SE	0.1								0	0	0.0
Sum	593	23	13	29	497	52	0	2	2	1212	100

- Product of the HELCOM ACTION project

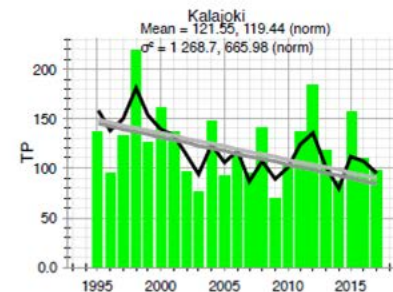
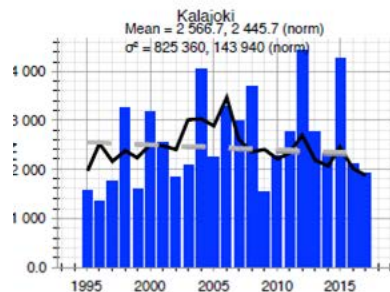
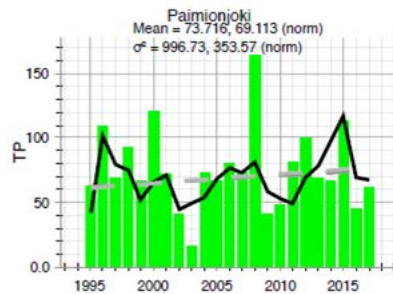
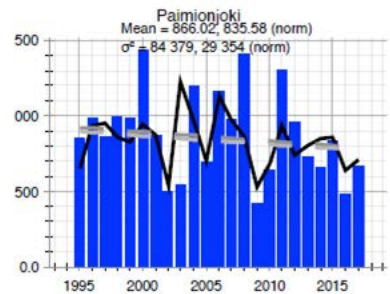
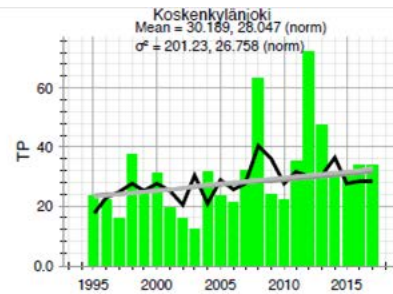
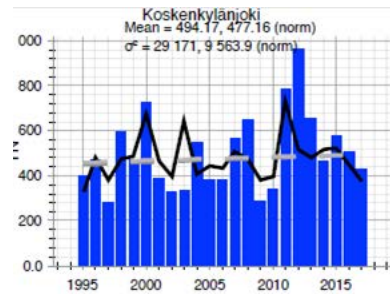
4. Scattered dwellings

Connectivity in 2017									
	DE	DK	EE	FI	LV	LT	PL	RU	SE
Per country	93		82	83	75	82	71	89	87
Bothnian Bay				75					81
Bothnian Sea				79					80
Archipelago Sea				83					
Gulf of Finland			85	87	38			88	
Gulf of Riga			65		76				
Baltic Proper	89		58		71		71	96	88
Western Balitc	96								
The Sound									97
The Kattegat									84

- Information about connectivity

Scattered Dwellings not connected to waste water treatment plant in 2017										
	DE	DK	EE	FI	LV	LT	PL	RU	SE	BAS
Bothnian Bay				91022					36580	127602
Bothnian Sea				78504					122420	200924
Archipelago Sea				27169						27169
Gulf of Finland			59745	150296				1084640		1294681
Gulf of Riga			31852							31852
Baltic Proper	15000	9830	2495				4194213	38968	273646	4534152
Western Balitc	350	85750								86100
The Sound		10288							12482	22770
The Kattegat		108505							189840	298345
Per country	15350	214373	94092	346991	0	0	4194213	1123608	634968	6623595

5. Examples of nutrient load reduction from rivers basins



- Examples how rivers showing increases or decreases in loads
- No information of mitigation measures in the PLC database
- Three Finnish rivers as an example

5. Examples of nutrient load reduction from rivers basins

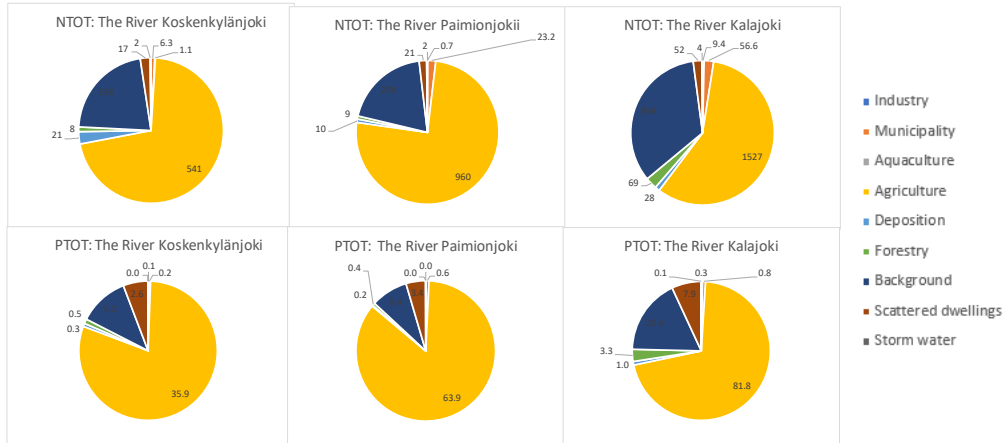


Table 9a. NTOT Point source loads in 2000, 2006, 2014 and 2017 and the difference between point source loads in 2000 and 2017.

Type	Subbasin	River	Parameter	2000	2006	2014	2017	2017-2000
Aquaculture	GUF	KOSKENKYLÄNJOKI	NTOT	0.0	0.0	1.0	1.1	1.1
Municipality	GUF	KOSKENKYLÄNJOKI	NTOT	5.1	6.3	5.3	6.3	1.2
Sum				5.1	6.3	6.3	7.4	2.3
Industry	ARC	PAIMIONJOKI	NTOT	0.0	0.0	0.4	0.7	0.7
Municipality	ARC	PAIMIONJOKI	NTOT	56.5	50.7	21.0	23.2	-33.3
Sum				56.5	50.7	21.4	23.9	-32.6
Industry	BOB	KALAJOKI	NTOT	0.1	10.0	11.1	9.4	9.3
Municipality	BOB	KALAJOKI	NTOT	81.3	92.8	90.0	56.6	-24.8
Sum				81	103	101	66	-15.5

Table 11a. NTOT source apportionment in 2000, 2006, 2014 and 2017.

River	Sub-regio	Year	AGL	ATL	MFL	NBL	SCL	SWL	FIL	INL	MWL	AQL	Sum
KALAJOKI	BOB	2000	1810	59.0	109.4	1090	108.0	6.9	0.1	81.3			3265
KALAJOKI	BOB	2006	1727	73.8	109.4	1122	118.1	6.9	10.7	92.8			3260
KALAJOKI	BOB	2014	1313	24.2	58.9	763	44.7	3.1	7.7	79.4			2294
KALAJOKI	BOB	2017	1085	20.0	48.7	631	36.9	2.6	6.4	65.6			1896
2017-2000			-724.6	-39.0	-60.7	-459.5	-71.1	-4.3	6.3	-15.7			-1369
KOSKENKYLÄNJOKI	GUF	2000	447	38.6	5.3	209	18.9	1.1	0.4	0.0	4.2		725
KOSKENKYLÄNJOKI	GUF	2006	235	16.2	5.3	104	11.3	1.1	0.6		5.0		378
KOSKENKYLÄNJOKI	GUF	2014	329	12.6	4.9	101	10.1	1.0		0.0	3.2	0.6	462
KOSKENKYLÄNJOKI	GUF	2017	302	11.6	4.5	93	9.3	0.9		0.0	3.0	0.6	424
2017-2000			-145.0	-27.0	-0.9	-116.3	-9.6	-0.2	-0.4	0.0	-1.2	0.6	-300
PAIMIONJOKI	ARC	2000	967	38.3	14.0	373	30.5	3.3		0.0	11.3		1437
PAIMIONJOKI	ARC	2006	793	17.6	14.0	269	23.5	3.3			29.5		1150
PAIMIONJOKI	ARC	2014	487	5.2	4.5	124	10.7	1.1		0.2	11.4		644
PAIMIONJOKI	ARC	2017	493	5.3	4.5	126	10.8	1.1		0.2	11.5		652
2017-2000			-474.0	-33.0	-9.5	-247.3	-19.7	-2.2		0.2	0.2		-785

- All information from the database:
 - Riverine export
 - Point source loads
 - Diffuse loads into freshwaters
 - Source apportionment
- Estimates how loads have developed, but no flow-normalization
- Indicates what is available in the database