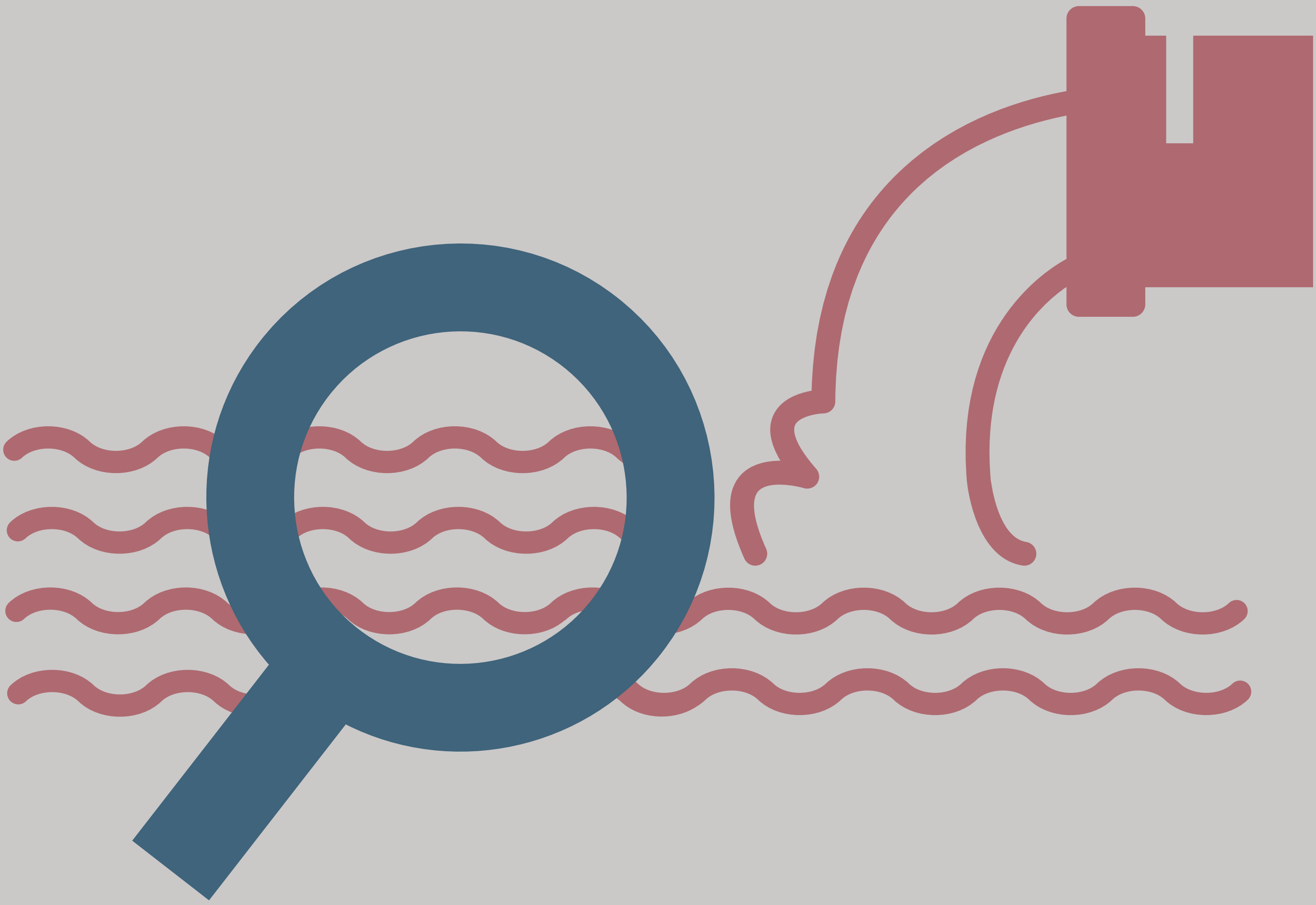
Background information on the Baltic Sea catchment area for the Seventh Baltic Sea Pollution load compilation (PLC-7)

HELCOM
Baltic Marine Environment Protection Commission

Monitoring assessment

2021



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[4]) Institute for Engineering and Environmental Problems in Agricultural Production – branch of Federal State Budgetary Scientific Institution "Federal Scientific Agroengineering Center VIM" (IEEP – branch of FSBSI FSAC VIM), Russia
[5]) HELCOM Secretariat
[6]) State Water Holdings Polish Waters, Poland
[7]) Estonian Environment Agency, Estonia
[8]) Latvian Environment, Geology and Meteorology Center, Latvia
[9]) Finnish Environment Institute (SYKE); Finland
[10]) German Environment Agency, Germany
[11]) Environmental Protection Agency, Lithuania
[12]) Institute of Soil Science and Plant Cultivation – State Research Institute, IUNG-PIB, Poland
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Layout: Laura Ramos Tirado

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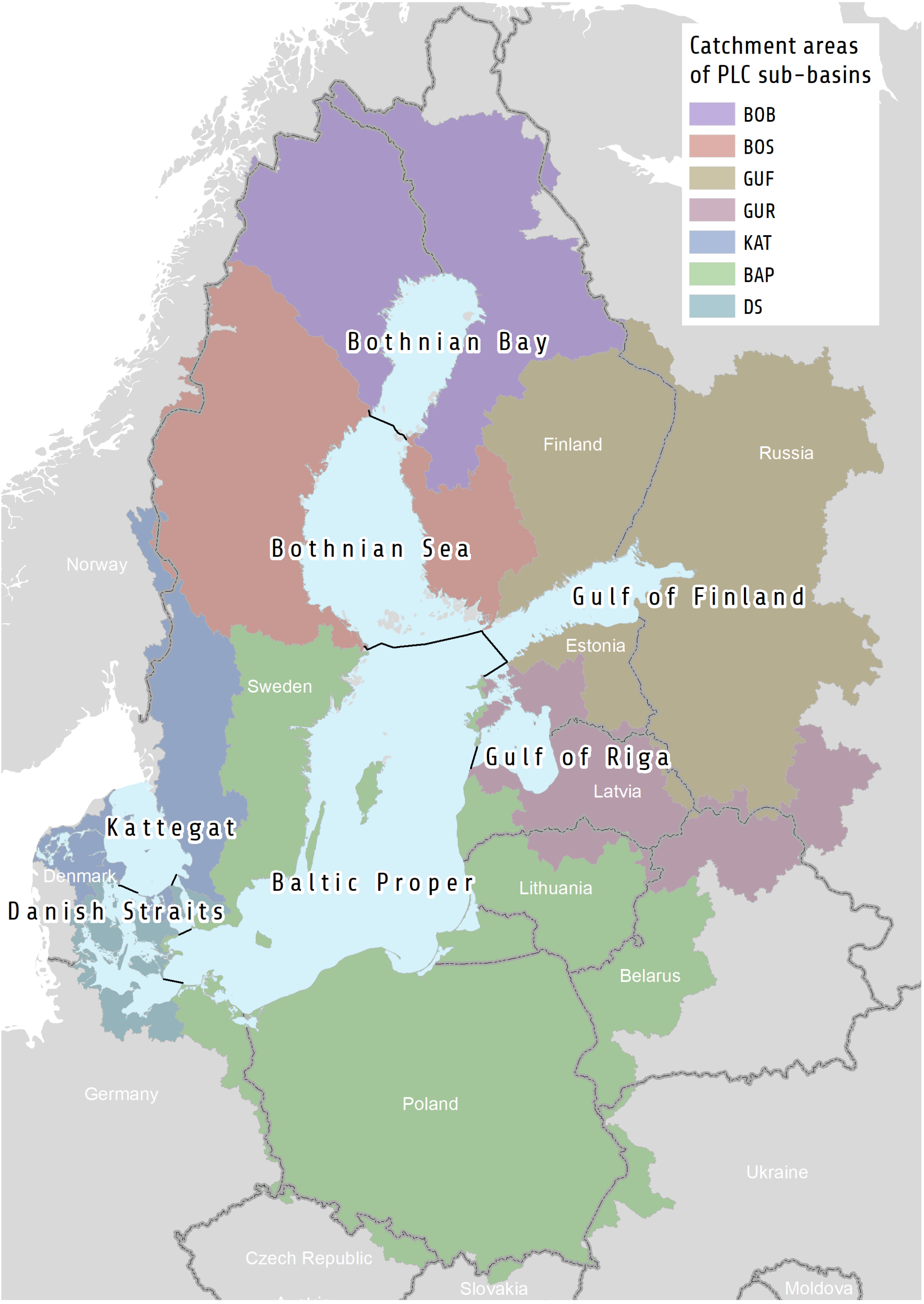
1 Division of the Baltic Sea

The total Baltic Sea catchment area comprises 1,729,500 km² being more than four times larger than the surface area of the Baltic Sea. For PLC-water the sea is divided into nine sub-regions (Figure 1). Nearly 93% of the catchment area belongs to the nine coastal HELCOM Contracting Parties and the remaining 7% lies within the territories of Non-Contracting Parties (Norway, Ukraine, Belarus, Slovakia and Czech Republic).



The Baltic Proper and the Gulf of Finland are the largest sub-basin catchment areas of the Baltic Sea, covering 576,490 km² (33%) and 422,880 km² (24%), respectively (Table 1), whereas the Archipelago Sea and the Sound have the smallest catchment areas. Sweden possesses the largest portion of the Baltic Sea catchment area, 442,700 km² (25%) and the next largest national catchment areas are those of Russia, Poland and Finland, all of which are larger than 300,000 km². Germany has the smallest proportion of the catchment area of all the HELCOM countries, at 29,090 km² (1.7%). The total catchment area outside the borders of the Contracting Parties is 127,120 km² or nearly 7% of total Baltic Sea catchment area, mostly within Belarus (>5% of total).

Table 1. Division of the Baltic Sea catchment area between Contracting Parties and non-Contracting Parties for each sub-basin (km^{-2}).

	Gulf of Bothnia						Belt Sea			Total
Sub-basin/ country	**Bothnian Bay**	**Bothnian Sea**	**Archipe-lago Sea***	**Gulf of Finland**	**Gulf of Riga**	**Baltic Proper**	**Western Baltic**	**The Sound**	**The Kattegat**	**Total catchment area**
Denmark						1,210	12,360	1,720	15,840	**31,130**
Estonia				26,730	17,210	1,460				**45,400**
Finland	146,000	39,300	8,950	107,000						**301,250**
Germany						18,630	10,460			**29,090**
Latvia				3,570	49,040	11,980				**64,590**
Lithuania					10,600	54,600				**65,200**
Poland						311,000				**311,000**
Russia				285,580	28,000	12,500				**326,080**
Sweden	116,300	175,300				84,400		2,900	63,800	**442,700**
Total Contracting Parties	**262,300**	**214,600**	**8,950**	**422,880**	**104,850**	**495,780**	**22,280**	**4,620**	**79,640**	**1,616,440**
					Non-contracting Parties					
Belarus					33,150	58,500				**91,650**
Czech Republic						7,150				**7,150**
Norway	1,060	4,860							7,430	**13,350**
Slovakia						1,960				**1,960**
Ukraine						13,100				**13,100**
Total non-contracting Parties	**1,060**	**4,860**	**0**	**0**	**33,150**	**80,710**	**0**	**0**	**7,430**	**127,210**
Total Baltic Sea catchment area	**263,360**	**219,460**	**8,950**	**422,880**	**138,000**	**576,490**	**22,800**	**4,620**	**87,070**	**1,743,650**

* Archipelago Sea is usually included in Bothnian Sea

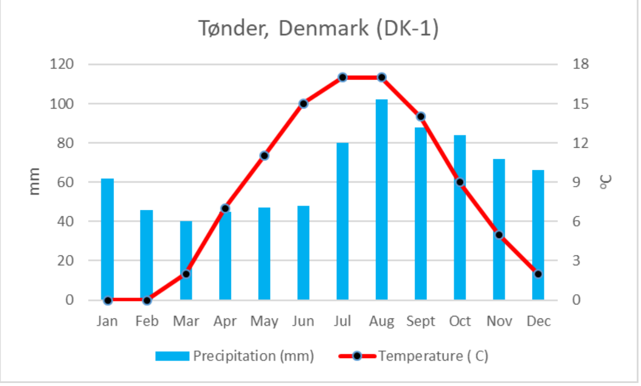
2 Climate and hydrology

2.1 Climate in the Baltic Sea catchment area

The sub-areas of the Baltic Sea vary considerably in respect of climatological conditions: The climate is Atlantic-temperate in the south-western part, more continental temperate in the eastern part, boreal in the northern parts and arctic in the very northernmost part. Long winters in the northern parts, with snow cover and soil frost, decreases nutrient leaching from soils and the major share of annual riverine material export occurs during the spring thaw. Topography also plays an important role especially for precipitation amounts, which tend to be greater at high altitudes. In addition, there are land-sea contrasts in temperature and precipitation. This aspect is illustrated in figure 2 by average monthly normal precipitation and monthly temperature from several climate monitoring stations in the Baltic Sea catchment area. The location of these climate monitoring stations is shown in figure 3 and the detailed dates in annex 1.

The input of nutrients to the marine environment is largely dependent on human activities in the catchment area, but variations in meteorological and hydrographical conditions also have a significant impact on the amount of nutrients entering the sea. Increased precipitation increases runoff from land, and wet years generally result in increased nutrient losses and inputs from diffuse sources to surface waters, including marine waters. Overall, runoff is governed by precipitation and evaporation over land and inland water bodies as well as changes in stored precipitation as snow and ice on land and in lakes and groundwater.

The total long-term mean flow rate via all rivers discharging into the Baltic Sea is about 15,200 $m^3 s^{-1}$
(480 $km^3 a^{-1}$ or 8.8 $l s^{-1} km^{-2}$), of which nearly half drains into the Baltic Sea via the seven largest rivers, namely the Neva, the Vistula, the Daugava the Nemunas, the Kemijoki, the Oder and the Göta Älv (HELCOM 2015).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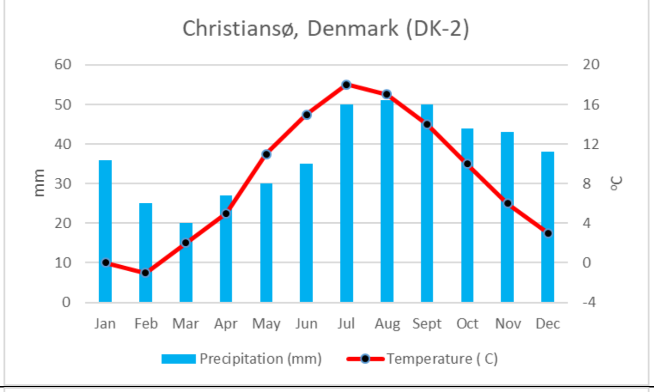
Precipitation (mm)
Temperature (C)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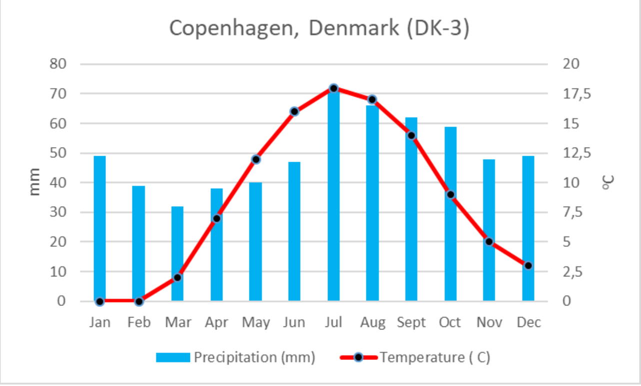
Temperature (C)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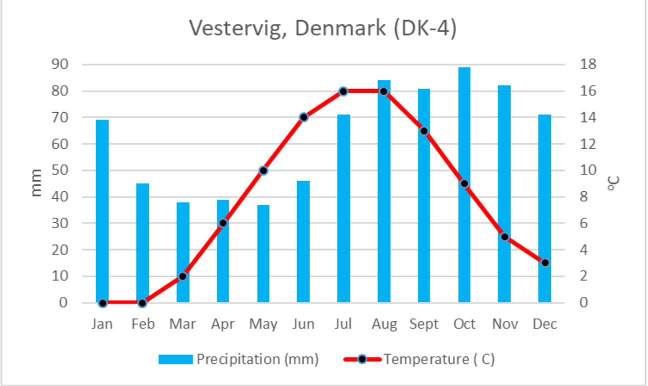
Temperature (C)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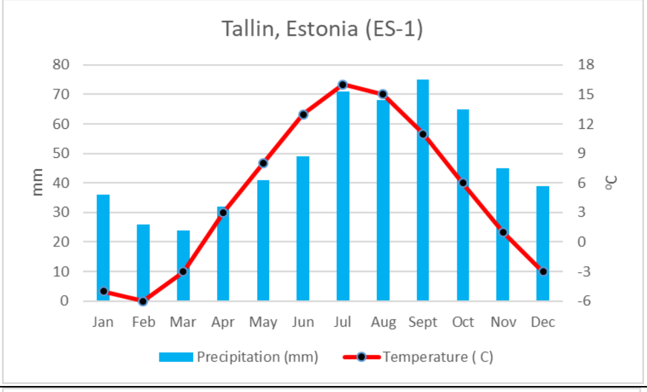
Temperature (C)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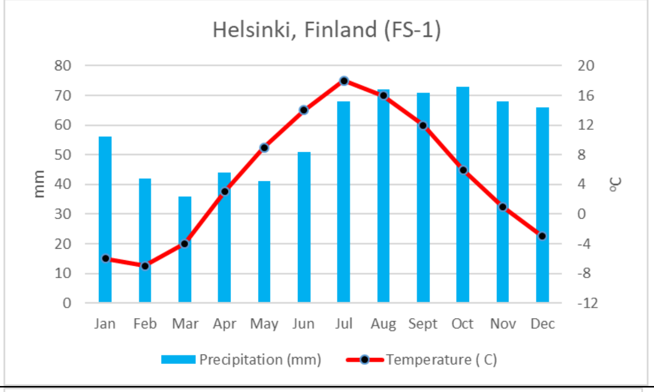
Precipitation (mm)
Temperature (C)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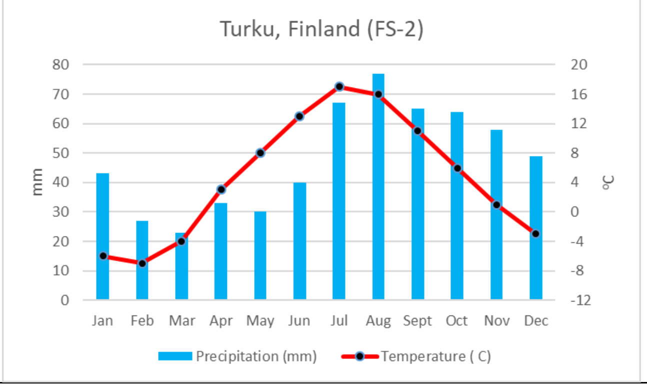
Jan Feb Mar Apr May Jun Jul Aug Sept Oct Nov Dec
Precipitation (mm)
Temperature (C)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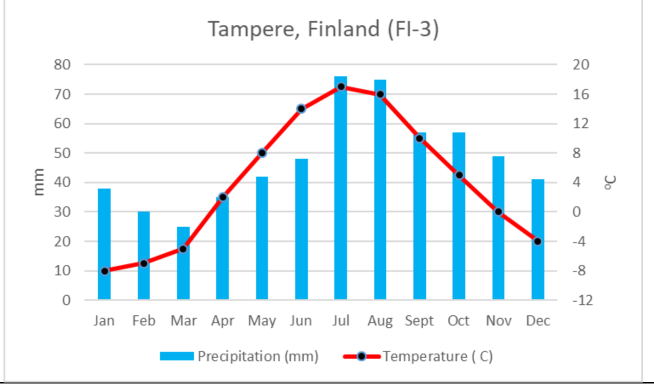
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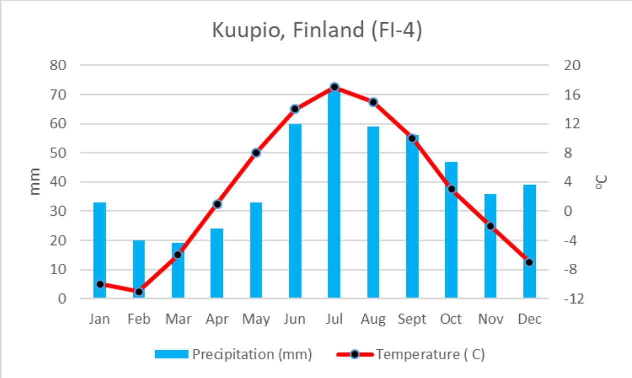
Precipitation (mm)
Temperature (C)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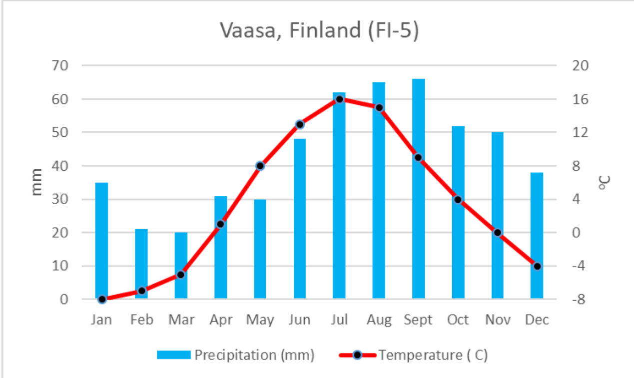
Precipitation (mm)
Temperature (C)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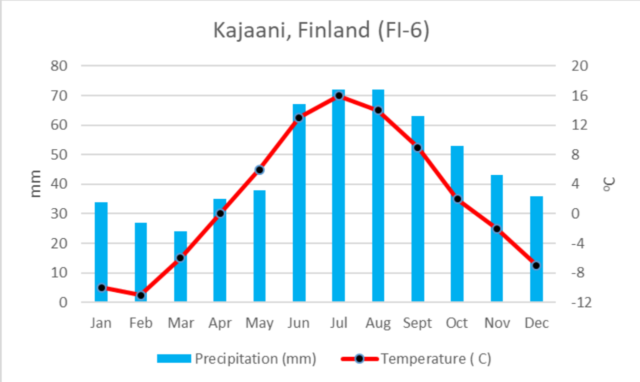
Precipitation (mm)
Temperature (C)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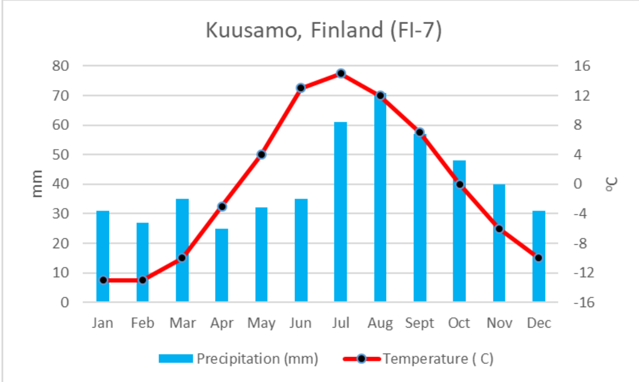
Precipitation (mm)
Temperature (C)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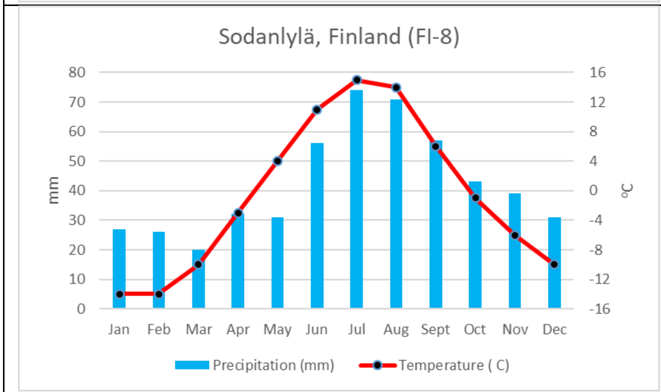
Precipitation (mm)
Temperature (C)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mm
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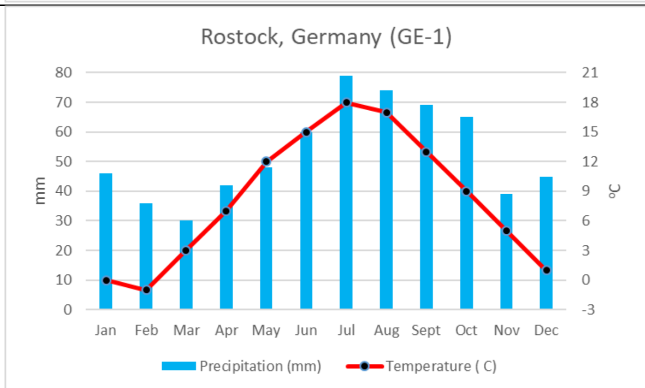
Jan Feb Mar Apr May Jun Jul Aug Sept Oct Nov Dec
Precipitation (mm)
Temperature (C)


Rostock, Germany (GE-1)
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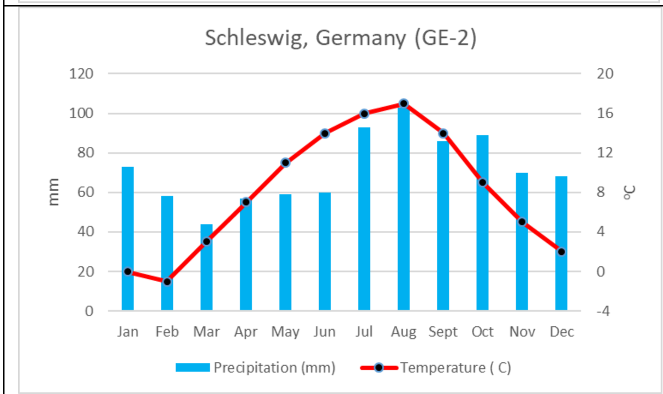
Precipitation (mm)
Temperature (C)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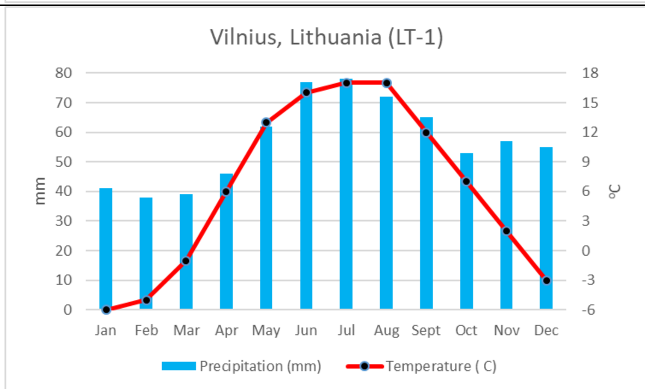
Temperature (C)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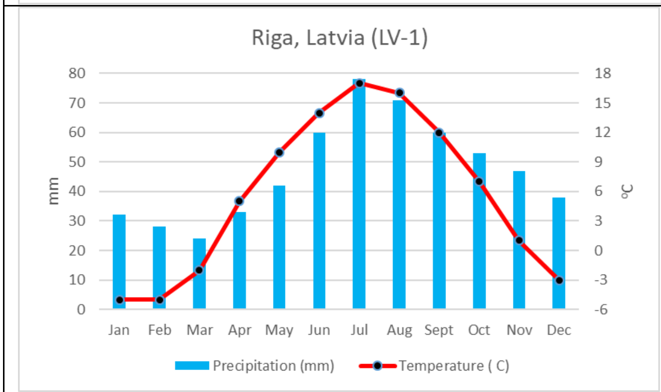
Precipitation (mm)
Temperature (C)


Riga, Latvia (LV-1)
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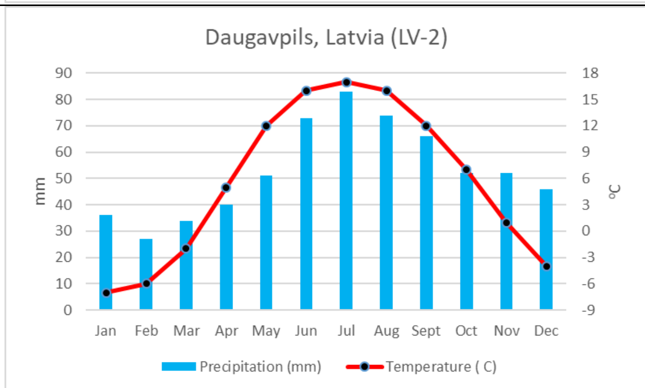
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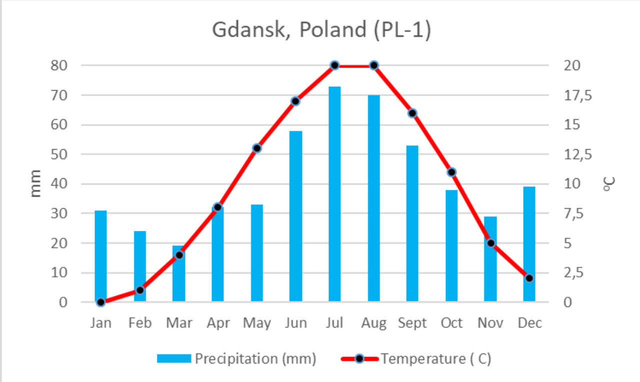
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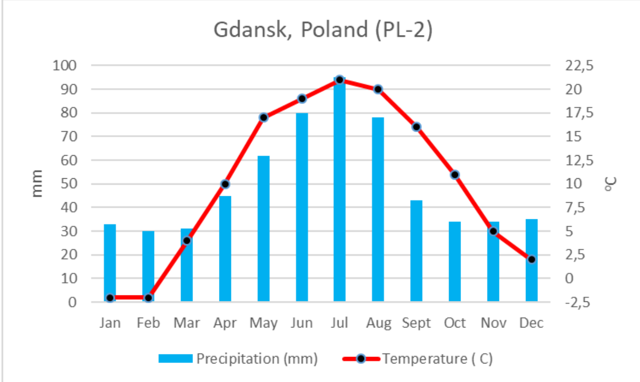
Temperature (C)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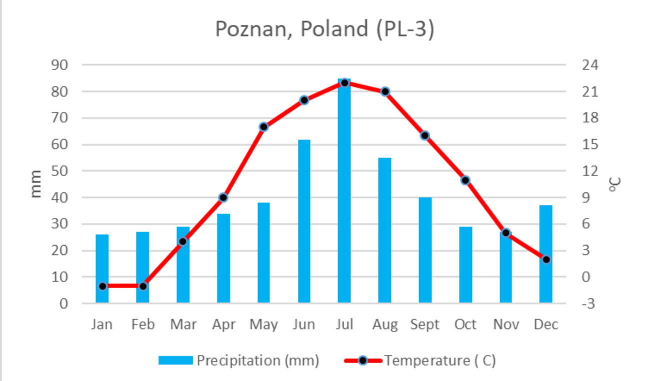
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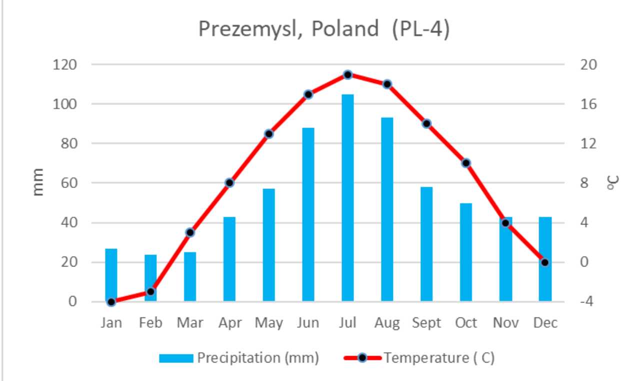
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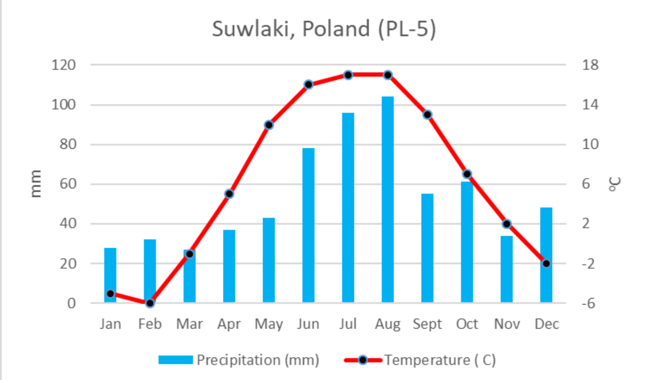
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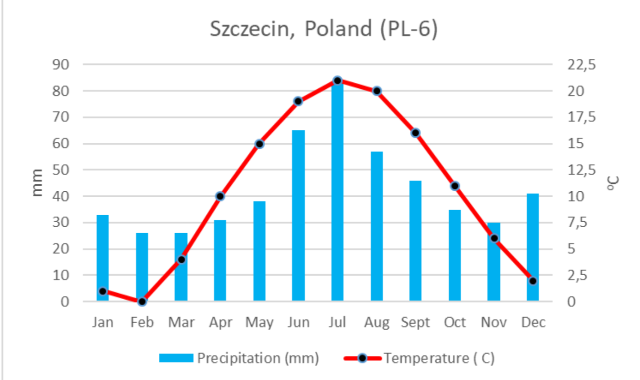
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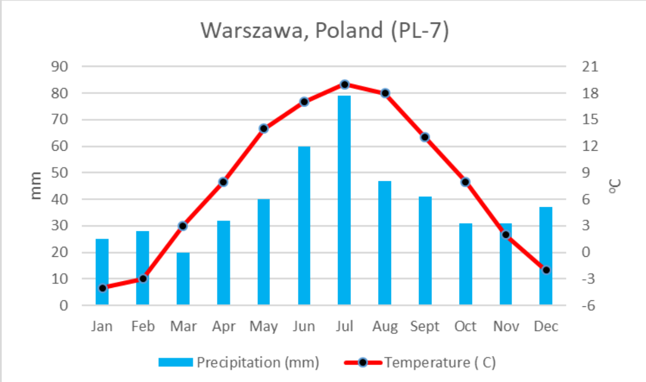
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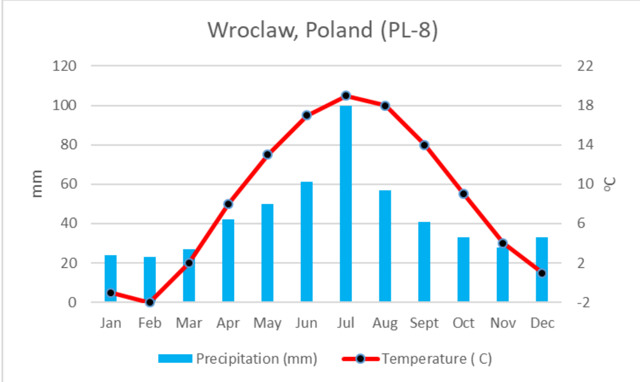
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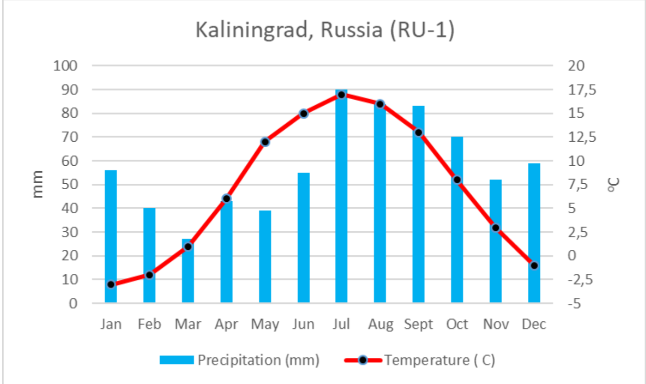
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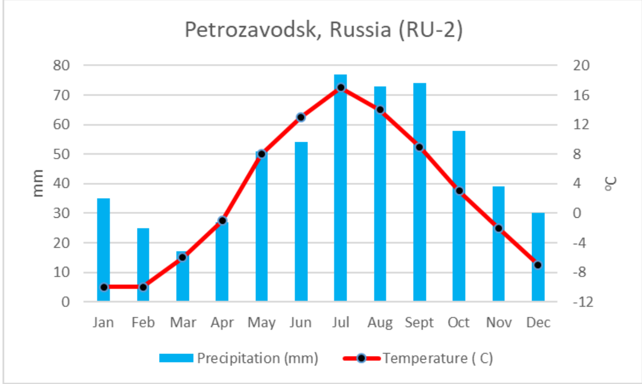
Temperature (C)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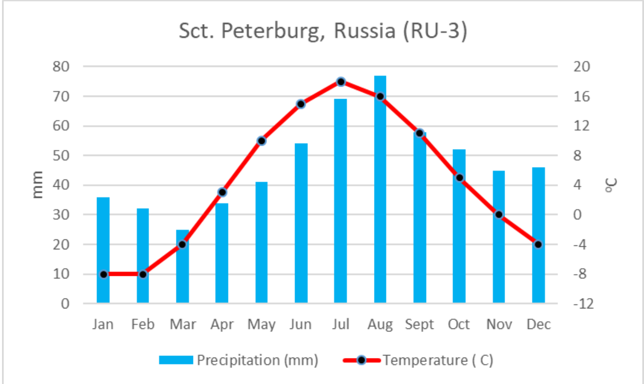
Temperature (C)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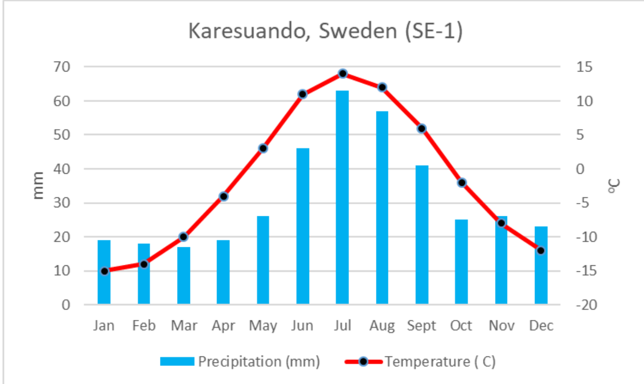
Precipitation (mm)
Temperature (C)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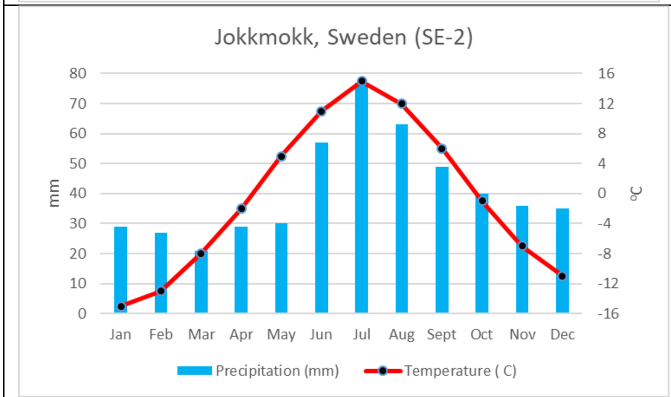
Precipitation (mm)
Temperature (C)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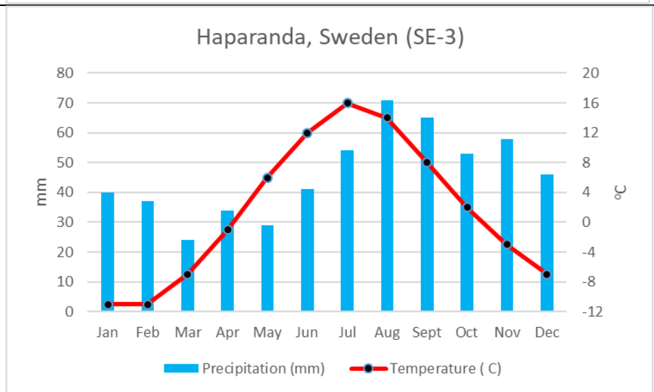
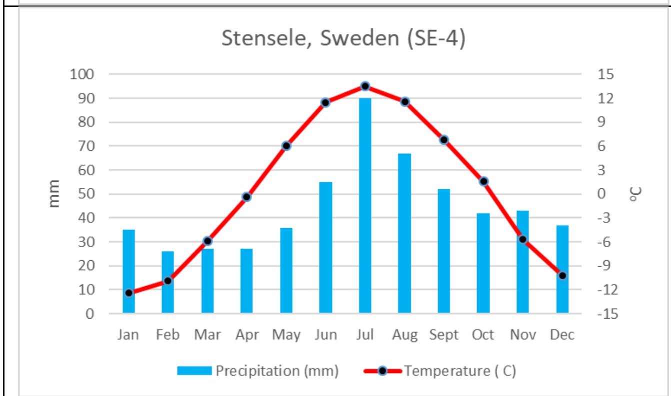
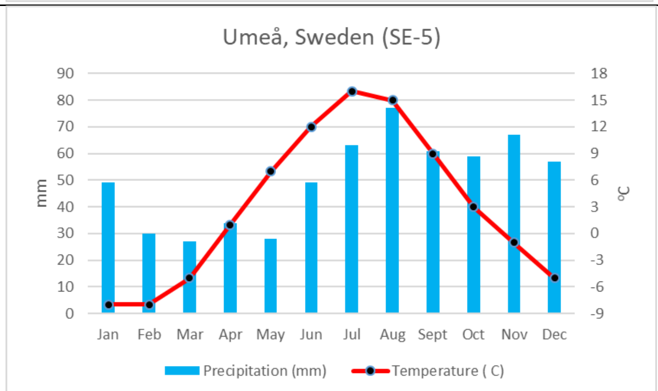
Precipitation (mm)
Temperature (C)


Haparanda, Sweden (SE-3)
mm
80 70 60 50 40 30 20 10 0
ºC
20 16 12 8 4 0 -4 -8 -12
Jan Feb Mar Apr May Jun Jul Aug Sept Oct Nov Dec
Precipitation (mm)
Temperature (C)


Stensele, Sweden (SE-4)
mm
100 90 80 70 60 50 40 30 20 10 0
ºC
15 12 9 6 3 0 -3 -6 -9 -12 -15
Jan Feb Mar Apr May Jun Jul Aug Sept Oct Nov Dec
Precipitation (mm)
Temperature (C)


Umeå, Sweden (SE-5)
mm
90 80 70 60 50 40 30 20 10 0
ºC
18 15 12 9 6 3 0 -3 -6 -9
Jan Feb Mar Apr May Jun Jul Aug Sept Oct Nov Dec
Precipitation (mm)
Temperature (C)

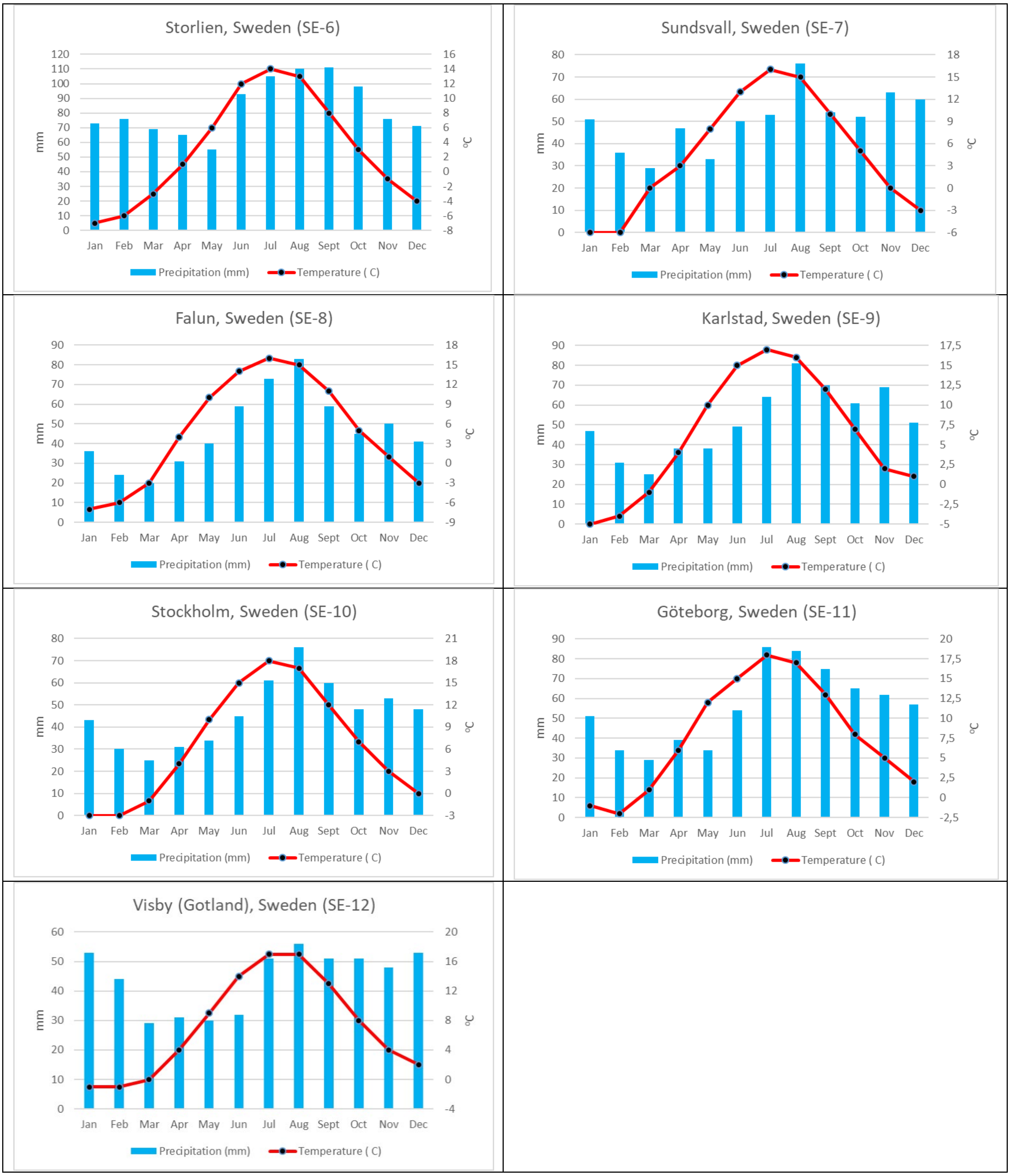


Figure 2. Monthly normal average temperature and precipitation from selected climate monitoring stations within the Baltic Sea catchment area (normal period is mainly 1961-1990). The location of these stations are shown in figure 3. The detailed data are in annex 1 together with data on monthly sunshine hours. Main source: Cappelen, J. & Jensen J.J: (2017): "Earth Climate - Guide on weather and climate in 156 countries (update). Technical Report (ONLINE) 01-17: https://www.dmi.dk/fileadmin/user_upload/Rapporter/TR/2001/tr01-17.pdf

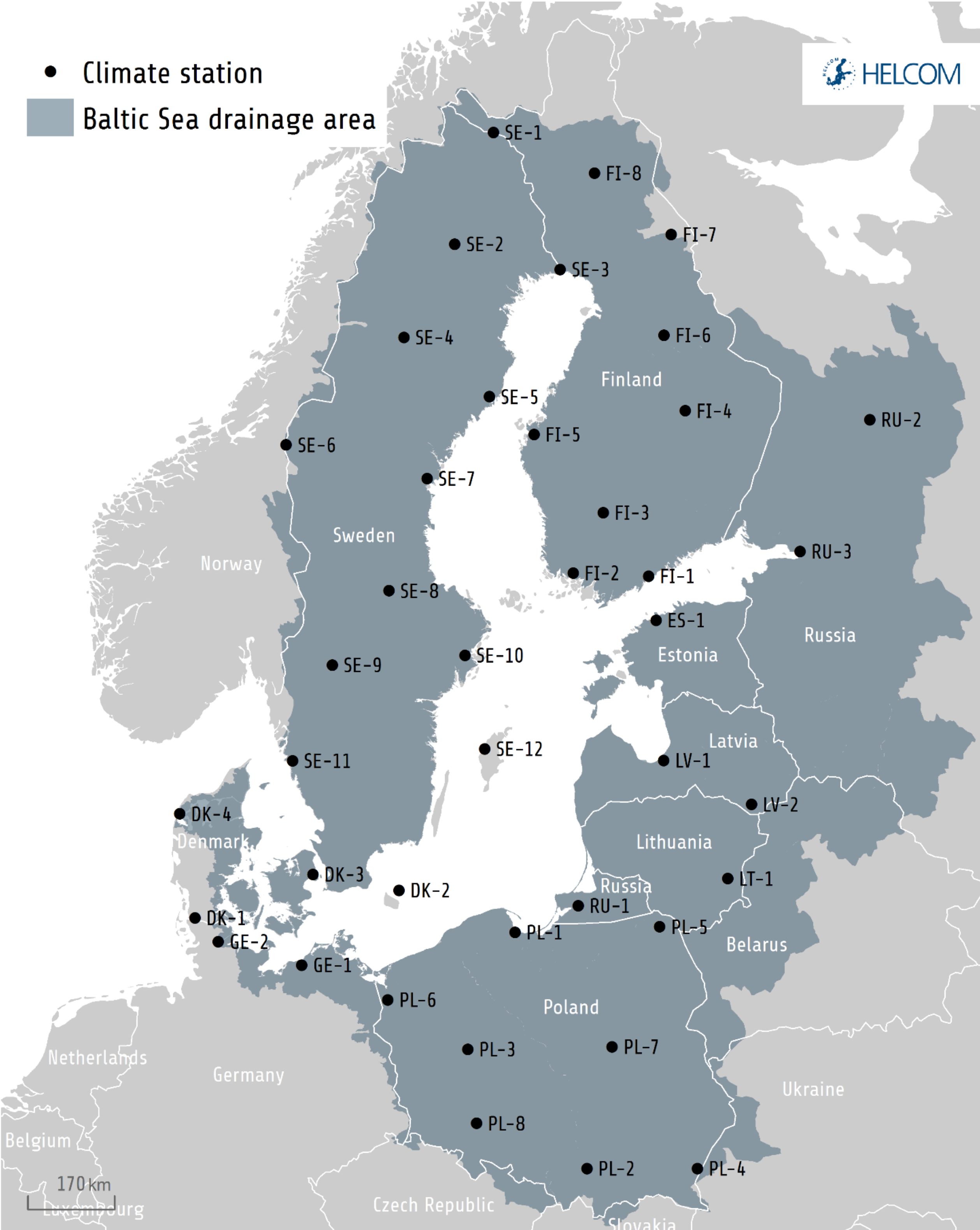


Figure 3. Location of the climate monitoring station from figure 2.

2.2 Climate change

In the Baltic Sea region climate change has been reflected in a decrease in the number of very cold days during winter as well as a decrease in the duration of the ice cover and its thickness in many rivers and lakes, particularly in the eastern and south-eastern Baltic Sea basin (HELCOM 2007). In addition, the length of the frost-free season has increased and an increasing length of the growing season in the Baltic Sea basin has been observed during this period, especially during the past 30 years. Scientists predict that in association with further warming, there would be changes in precipitation patterns, both geographically and seasonally (Figure 4). A general increase in annual precipitation is projected for the whole Baltic Sea basin, especially the northern parts. Seasonally, the increase in precipitation mainly would occur in winter. Regionally, the southern areas of the basin would be drier than northern areas, particularly during summer. These changes in precipitation will affect the runoff into the Baltic Sea, with potential increases in mean annual river flow in the northern catchments and decreases in the southernmost ones (HELCOM 2007). Furthermore, there is a risk that more extreme precipitation events will create a higher frequency of, and more extreme, flooding and more soil and riverbank erosion. Higher temperatures and longer growing seasons may further induce new or modified practices in agriculture and forestry and extend agricultural areas to the north, but the effects of such changes are generally difficult to predict.

In the northern Baltic Sea region, soil frost and snow cover help to reduce leaching of pollutants during a large part of the year, and therefore warmer winters with less snow and soil frost will likely result in greater runoff and consequently higher nutrient loads. Furthermore, with more extreme rainfall events, more erosion will take place and enhance particulate inputs to surface waters. The change in the seasonal distribution of the discharge regime of major boreal rivers has potentially large impacts on the redistribution of organically bound carbon and nutrients from land to sea. Areas with a mean annual temperature around 0 °C (i.e. around 61°N) are most sensitive to further warming (Storch et al. 2015).

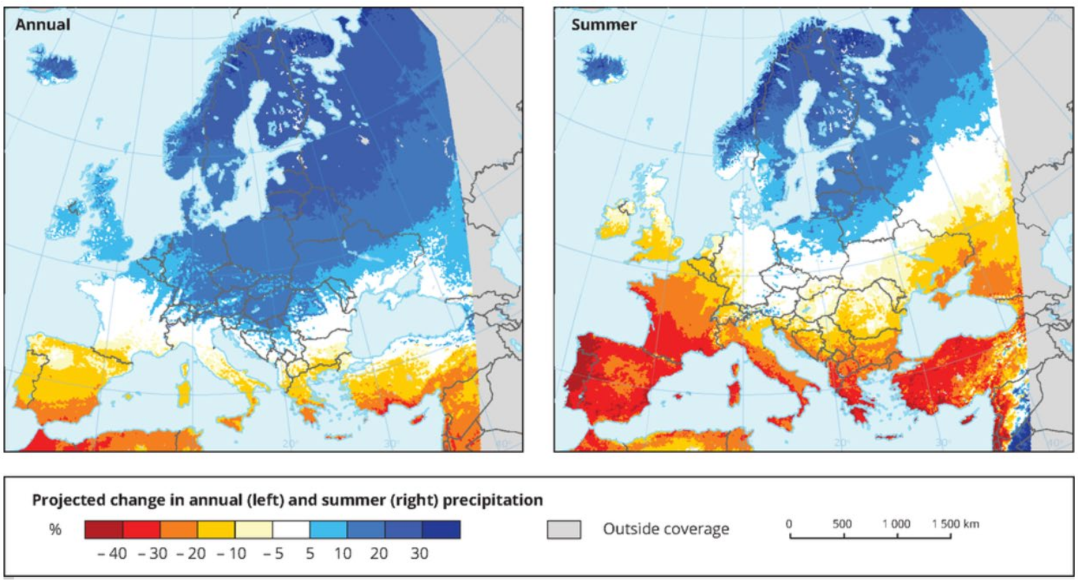


Figure 4. Projected changes in annual (left) and summer (right) precipitation (%) in the period 2071-2100 compared to the baseline period 1971-2000. Source: EEA (https://www.eea.europa.eu/data-and-maps/indicators/european-precipitation-2/assessment).

3 Catchment properties and land use

The northern parts of the Baltic Sea catchment area are dominated by forests and peatlands, whereas southern and south-western parts of the catchment are dominated by cultivated areas (Figure 5). Forests cover over half of the land area in Estonia. Finland, Russia and Sweden. Cultivated areas cover over half of the Danish, German, Latvian and Lithuanian land area (Table 2). In the Gulf of Finland catchment area, like in south-western Sweden, lakes cover large parts of the drainage basin retaining part of pollution load.

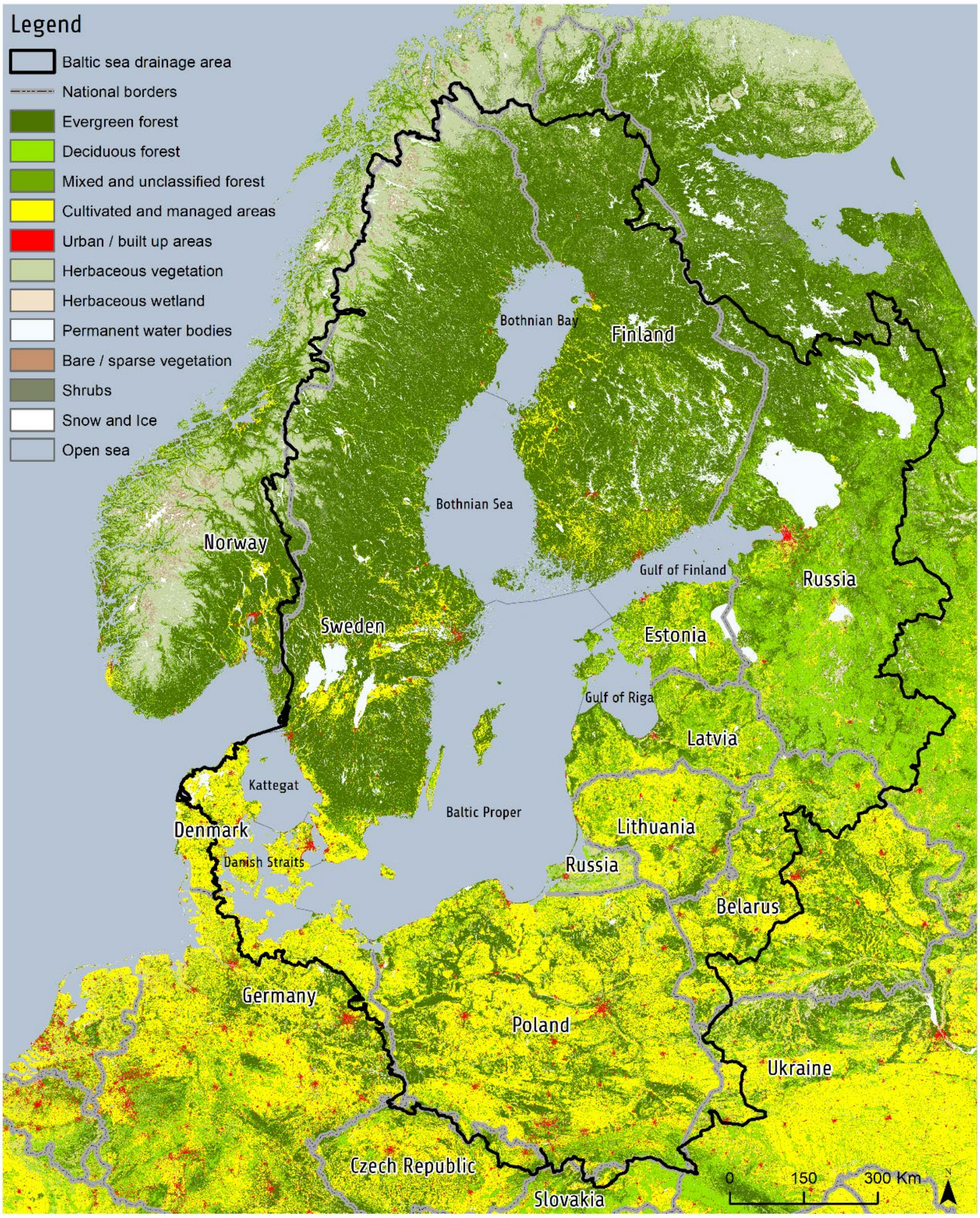


Figure 5. Land cover in the Baltic Sea catchment area. (Source: The Copernicus Land Service 2015 (https://land.copernicus.eu/global/).

Table 2. Land cover and land use of the Baltic Sea catchment by countries (%). Source Corine land Cover 2018 (https://land.copernicus.eu/pan-european/corine-land-cover/clc2018); For Belarus, Russia and Ukraine Source Copernicus Global Land Services 2015 (https://land.copernicus.eu/global/).

	Denmark	Estonia	Finland	Germany	Latvia	Lithuania	Poland	Russia	Sweden	Belarus	Czech Republic	Norway	Slovakia	Ukraine	Total
Year of data	2018	2018	2018	2018	2018	2018	2018	2015	2018	2015	2018	2018	2018	2015	2018
Cultivated and managed areas	74	32	9	70	40	59	59	4	9	39	50	1	37	45	48
Forest	9	47	64	20	38	30	31	77	59	54	34	37	45	42	28
Permanent water bodies	1	5	9	2	2	2	2	12	8	1	1	7	0	1	6
Urban / built-up areas	7	2	1	5	2	3	6	1	1	1	9	0	4	3	3
Other	8	15	16	3	19	6	3	7	23	5	7	54	15	10	15

4 Human pressures

4.1 Population

Over 82 million people live in the Baltic Sea catchment area, of which 58% are in the catchment of the Baltic Proper sub-basin. Forty-six percent of the total population living in the entire Baltic Sea catchment area live in Poland. The highest population densities are in the southern parts of the catchment area (Figure 6 and Table 3). Cities with large human populations and intense industrial activities are considered major point sources, although effective wastewater treatment can significantly reduce pollution inputs. Rural populations, with little or no treatment of sewage discharges can also have a significant impact on nutrient inputs.

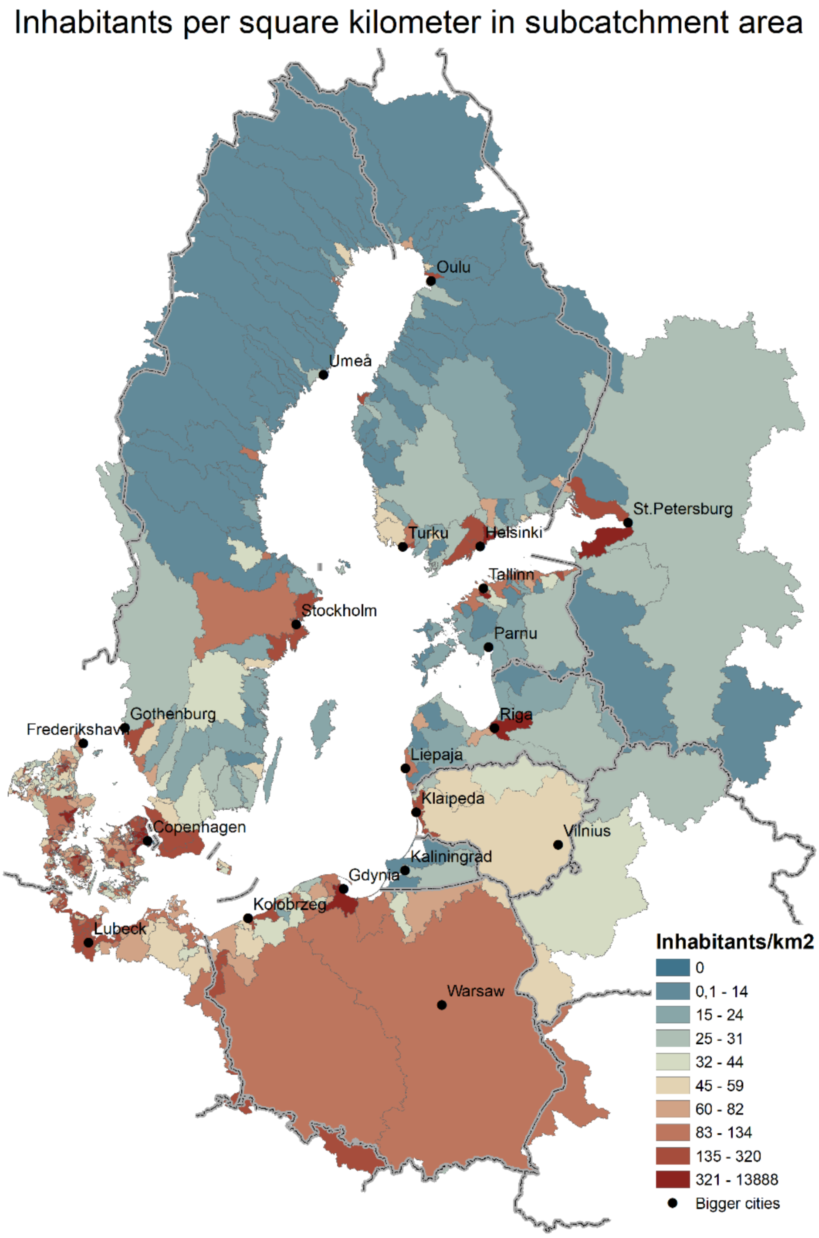


Figure 6. Population density (inhabitants km^{-2}) within the Baltic Sea catchment area. Source: Census 2001 (EUROSTAT), Russia: NASA Socioeconomic Data and Applications Center (SEDAC) Gridded Population of the World version 4.

Table 3. Population and surface areas of the Baltic Sea catchment area and sub-regions in 2017.

Sub-basin/ country	Country area (km^{-2})	Baltic Sea catchment area (km^{-2})	Total population in catcment area (in 1000)	Population density in catchment (person km^{-2})
Denmark	43,040	31,130	5,150	165
Estonia	45,400	45,400	1,315	29
Finland	338,450	301,250	5,480	18
Germany	357,600	29,100	2,735	94
Latvia	64,590	64,590	1,940	30
Lithuania	65,200	65,200	2,930	45
Poland	312,700	311,000	38,400	123
Russia	1,7075,200	326,080	10,300	32
Sweden	450,300	442,700	10,035	23
Total Contracting Parties		**1,616,450**	**78,285**	**559**
		Non-contracting Parties		
Belarus*	207,600	91,200	1,420	16
Czech Republic	78,850	7,150	1,145	160
Norway	385,200	13,350	20	1
Slovakia	49,050	1,960	180	92
Ukraine**	603,600	13,100	1,230	94
Total non-contracting Parties		**126,760**	**3,995**	**363**
Total Baltic Sea catchment area		**1,743,210**	**82,280**	**922**

* In 2015
** In 2019

4.2 Municipal wastewaters and scattered dwellings

In 2017 loads from altogether 2,147 municipal wastewater treatment plants were reported to the HELCOM PLC database (Table 4), covering many more3 wastewater treatment plants, because two countries (Poland and Sweden) reported indirect plants aggregated by river catchments. The clear majority of the plants were discharging wastewaters into inland waters (i.e. indirectly). Denmark and Lithuania reported together 60 % of the reported wastewater treatment plants.

Phosphorus removal from municipal wastewaters in the Baltic Sea catchment has improved considerably during the last decade. By contrast, efficient N removal is a more recent development, and there are several wastewater treatment plants (WWTPs) that still require upgrading. St Petersburg is a good example of improved wastewater treatment: Before 1978, almost all wastewaters from St Petersburg were discharged untreated into the GOF or the River Neva, but nowadays the capacity has increased to 98.5% (Vodokanal, 2015) and the nitrogen load has decreased by 60% and the phosphorus load by 90% (Knuuttila et al. 2017).

Table 4. Direct and indirect Municipal wastewater treatment plants in 2017 reported to the HELCOM PLC database. Poland and Sweden reported indirect municipal sources as aggregated per sub-catchment. Russia reported direct sources partly as aggregated per region and indirect sources as aggregated per river catchment.

Country	Direct	Indirect	Total
Denmark	205	442	647
Estonia	15	43	58
Finland	55	342	397
Germany	29	128	157
Latvia	5	33	38
Lithuania	11	626	637
Poland*	11	1,690	1,701
Russia	13	7	20
Sweden	106	42	148
Total	**450**	**3,353**	**3,803**

*Numbers for Poland are from 2018

There has been a steady increase in the percentage of the population connected to secondary and tertiary wastewater treatment systems (Table 5). Connectivity to wastewater treatment plants has especially increased in Lithuania, Poland and Russia, which has been reflected in a decreased P load from scattered dwellings.

Table 5. Percentage of population connected to urban wastewater collection and treatment systems. Source of the data for the year 2004: PLC-5 Report. 2014 and 2017 information collected under the PLC-6 and PLC-7 projects respectively

Country	2004	2014	2017
Denmark*	89	85	94
Estonia	72	82	83
Finland	81	82	83
Germany	94	92	93
Latvia	70	76	76
Lithuania	59	80	82
Poland	58	72	71
Russia	60	83	89
Sweden	86	87	87

*The latest values in from 2018

4.3 Industrial wastewaters

In 2017 loads from altogether 1983 industrial wastewater treatment plants were reported to the HELCOM PLC database (Table 6a). Most of them (87%) were discharging their wastewaters into inland waters. Finland had the largest share of industrial plants (78%), many of them being peat production areas, which are included in industrial point sources. Poland and Russia reported industrial plants aggregated by river catchment.

Table 6a. Direct and indirect Industrial plants in 2017 reported to the HELCOM PLC database. Poland and Sweden reported indirect industrial sources as aggregated. Russia reported direct sources as aggregated per region and indirect sources aggregated per river catchment.

Country		Direct	Indirect	Total
Denmark		**31**	**31**	**62**
Estonia		**1**	**12**	**13**
Finland		**68**	**990**	**1,058**
Germany		**3**	**7**	**10**
Latvia		**8**	**44**	**52**
Lithuania		**11**	**49**	**60**
Poland*		**1**	**51**	**52**
Russia**		**2**	**7**	**9**
Sweden		**52**	**27**	**79**
Total		**177**	**1,218**	**1,395**

*Numbers for Poland are from 2018

ʻRussia reported quantity for indirect sources as a sum by catchment. Number of indirect industrial sources 736 (in 2014). Number of direct industrial sources 37 (in 2014).

4.4 Aquaculture

In 2017 loads from altogether 360 aquaculture plants were reported to the HELCOM PLC database (Table 6b, Figure 7), but Poland and Sweden reported indirect point sources aggregated. Inland plants were more common as they comprised 58% of the plants. About half of the plants were in Finland and nearly 30% in Denmark. There was a clear difference between these two countries: Danish aquaculture plants are situated in inland waters, whereas Finnish plants are in coastal waters, especially in the Archipelago Sea region.

Table 6b. Direct and indirect aquaculture plants in 2017 reported to the HELCOM PLC database. Poland and Sweden reported indirect aquaculture sources as aggregated per sub-catchment.

Country	Direct	Indirect	Total
Denmark	21	82	103
Estonia	0	0	0
Finland	116	68	184
Germany	0	0	0
Latvia	0	5	5
Lithuania	1	29	30
Poland	0	16	16
Russia	0	0	0
Sweden	12	12	24
Total	**150**	**212**	**362**

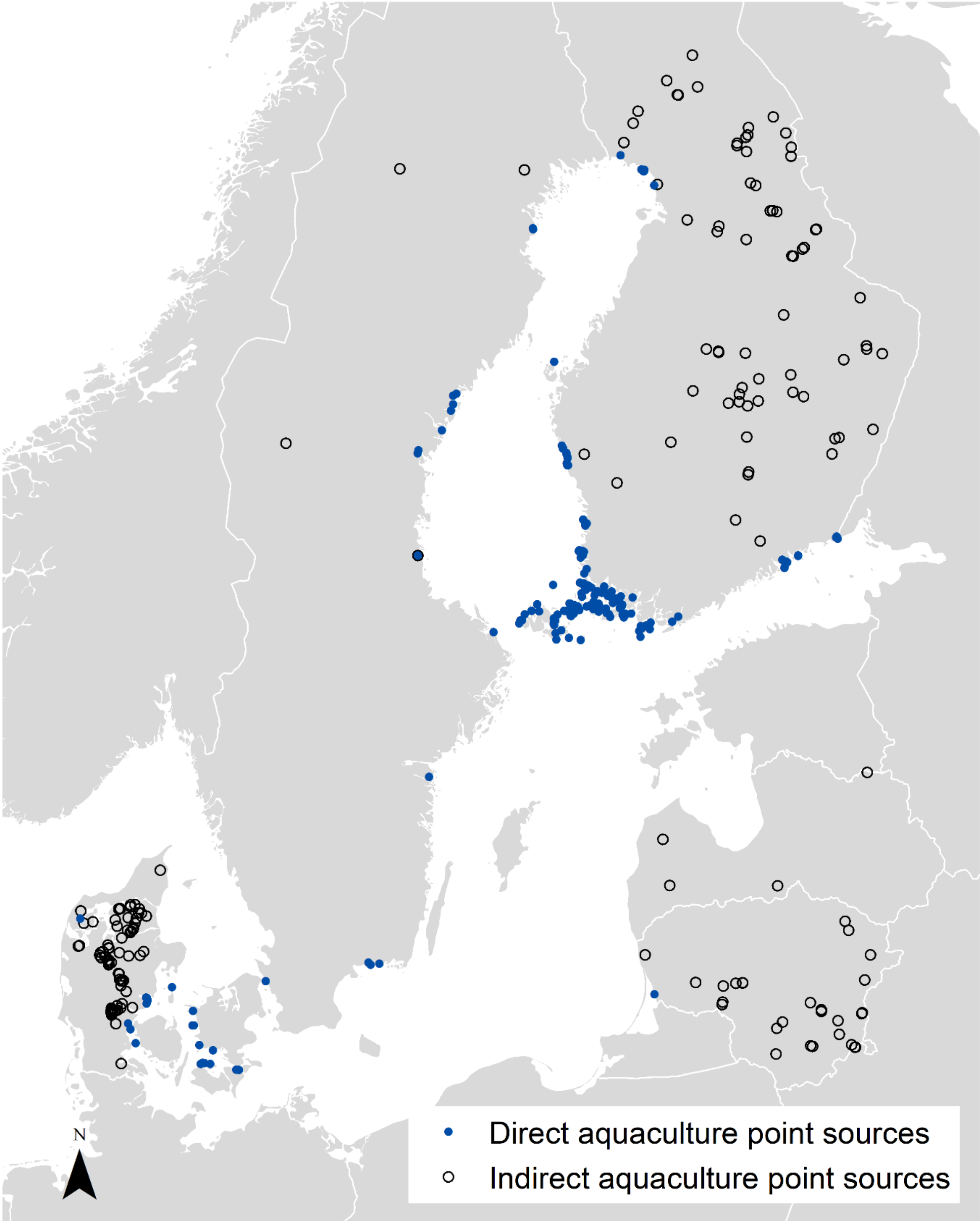


Figure 7. Aquaculture plants in 2017 reported to the HELCOM PLC database (blue spots). All Polish and most Swedish aquaculture plants are reported as aggregated and are not visible on the map. No reported Russian aquaculture plants.

4.5 Agriculture

Agriculture is a major source of nutrient inputs to the Baltic Sea. Reducing nutrient loads from agriculture is more complicated than cutting loads from point sources, because leaching of nutrients may continue to be at a high level for decades after the reduction of fertilisation usage. Although the implementation of agri-environmental measures is expected to promote reductions in nutrient loads from agriculture, there is evidently a considerable time lag between the implementation of agricultural water protection measures and visible effects in waterbodies. Denmark, Germany, Poland and Lithuania have the highest proportion of agricultural areas of the total land area (Figure 8). Poland has clearly the highest cultivated land area (188,101 km^2) followed by Sweden (30,114 km^2) and Lithuania (27,383 km^2) (Table 7).

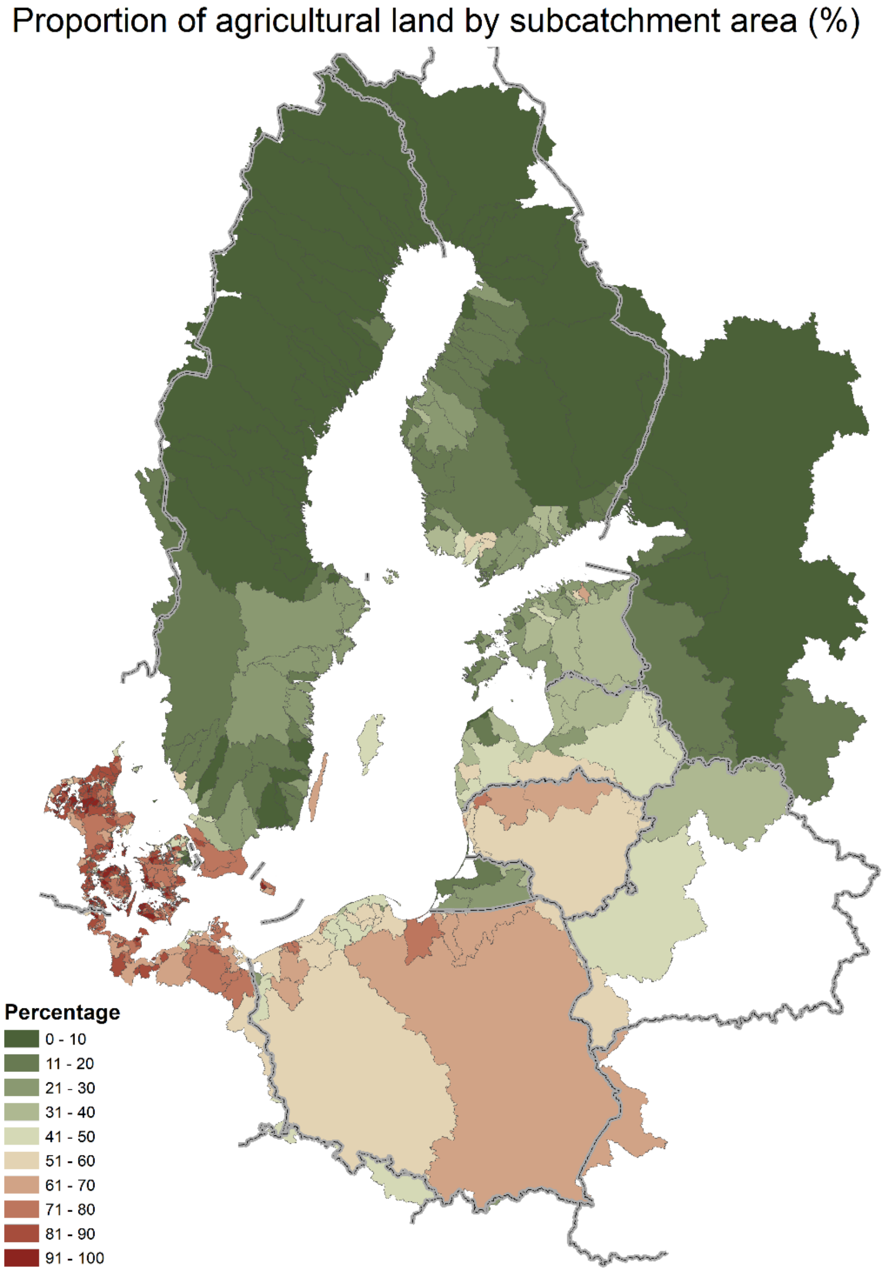


Figure 8. Proportion of agricultural land area by sub-catchments. Source: Corine 2012, Russia: NASA Global Land Cover Facility (GLCF).

4.5.1 Cultivation and fertiliser usage

Agricultural land area covered 366 000 km^2 (e.g. 23%) of the Baltic Sea catchment area (based on 2017 data). The countries with the most intensively cultivated areas were Denmark (62% of the land area under cultivation), Poland (60%) and Germany (59%), whereas Sweden (7%) and Finland (7%) had the lowest proportion of arable land. There were no extensive changes in the agricultural land area since 1995 except the increase in Lithuania. The cultivated area has slightly increased in Finland, Germany and Poland, whereas it faintly decreased in Denmark and Sweden (Figure 10).

Approximately half of the phosphorus fertilisers were in organic form and respective portion of nitrogen fertilisers was 35% in 2017. Poland had the highest amount of fertiliser usage: 258,000 t of applied phosphorus fertiliser (organic & mineral) and 1.7 Mt applied nitrogen fertiliser, but Germany and Denmark had the highest application rates per cultivated land area (Table 7). Livestock intensity, expressed in life stock units per square kilometre, was highest in Denmark and Germany and lowest in Estonia, Latvia and Lithuania (Table 7 and Figure 9).

Table 7. Agricultural area, fertiliser usage per agricultural land and livestock units per agricultural land in 2017 in the Baltic Sea catchment areas.

	DE	**DK**	**EE**	**FI**	**LT**	**LV**	**PL**	**RU**	**SE**
Agricultural area (km^2)	14,958	19,180	9,818	22,399	27,383	19,323	188,101	9,344	30,114
Nitrogen kg ha^{-1} agricultural land									
Mineral fertiliser	101	94	38	62	63	40	61	0.86	66
Organic fertiliser	61	69	22	43	11	n.a.	30	95	40
Total fertiliser	**161**	**163**	**60**	**105**	**74**		**91**	**96**	**106**
Phosphorus kg ha^{-1} agricultural land									
Mineral fertiliser	6.1	8.4	4.1	5.5	8.0	5.9	8.0	0.4	4.8
Organic fertiliser	15	13	4.3	7.6	n.a.	n.a.	5.7	19.7	6.4
Total fertiliser	**21**	**21**	**8.4**	**13**			**14**	**20**	**11**
Livestock units km^{-2} agricultural land									
Poultry	26	32	3.0	28	16	13	47	45	38
Cattle	33	38	26	27	11	29	23	33	33
Pigs	24	150	10	15	3.7	10	20	69	14
Others	5.0	2.2	1.3	1.3	0.74	2.4	1.0	1.6	4.7
Total livestock units	**88**	**222**	**40**	**72**	**31**	**55**	**91**	**148**	**90**

The usage of fertilisers has been gradually decreasing in Denmark, Finland, Sweden and Germany (only phosphorus fertilisers) since 1995 (Figures 10 and 11). The decrease has been more evident in the application of phosphorus fertilisers compared to nitrogen fertilisers. In Latvia and Lithuania, the application of mineral fertilisers has remarkably increased from 2005 to 2017.

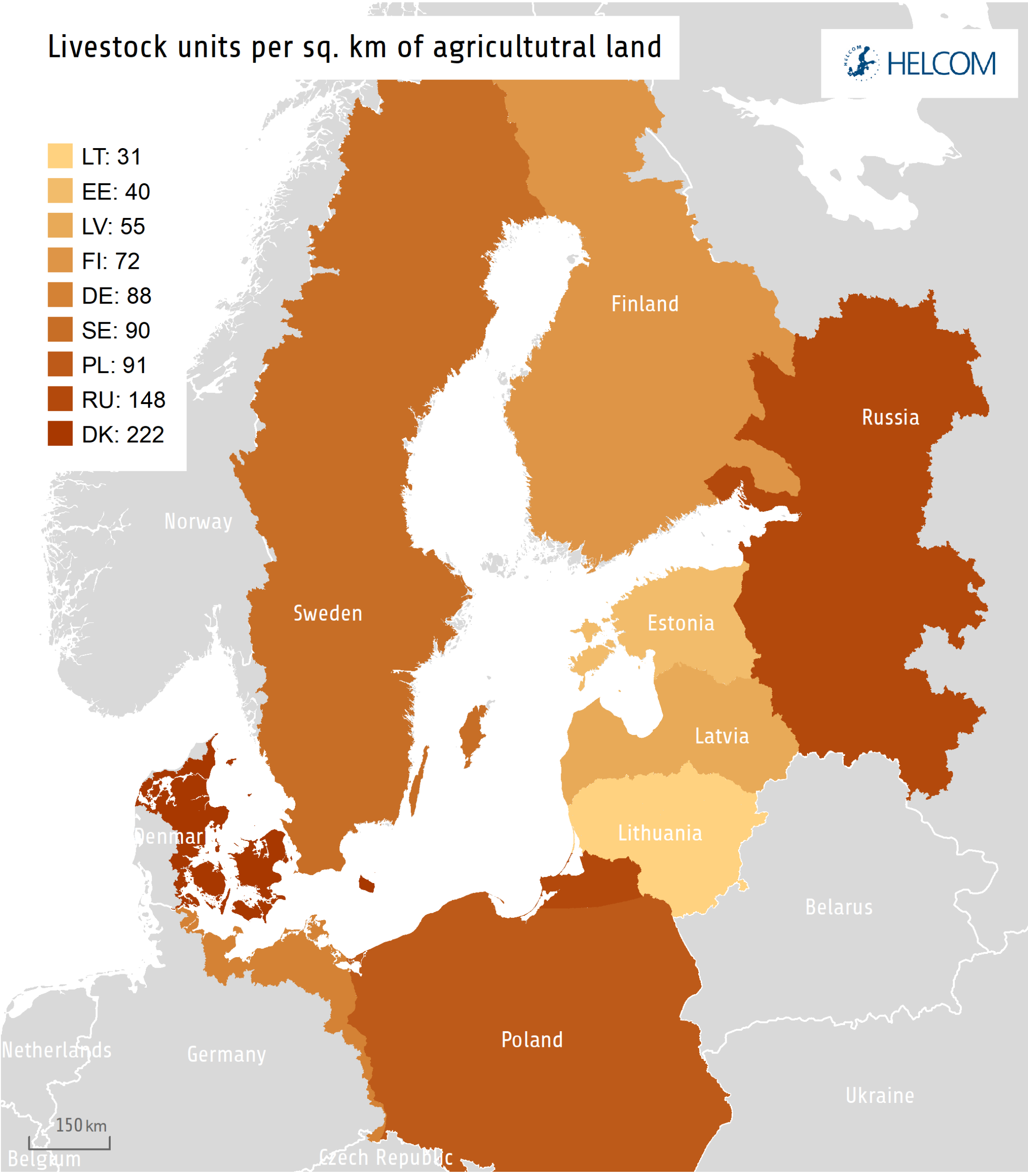
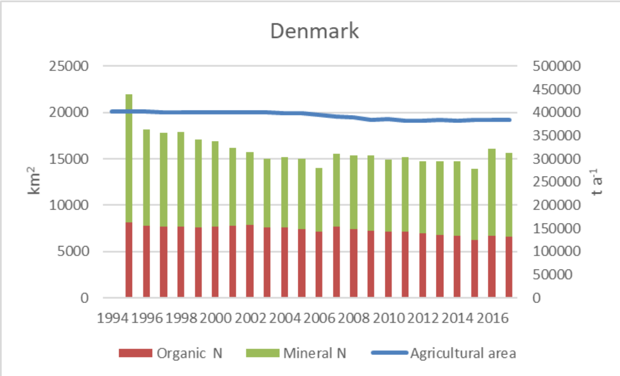
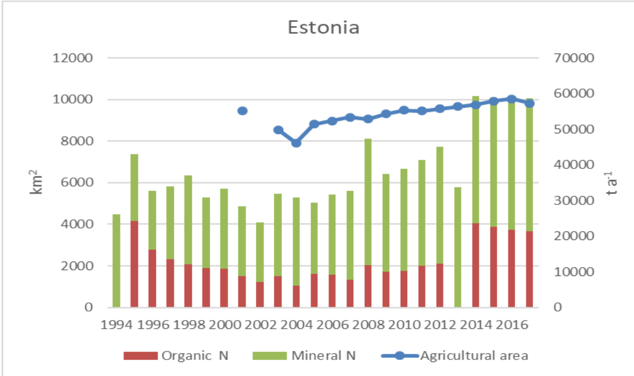
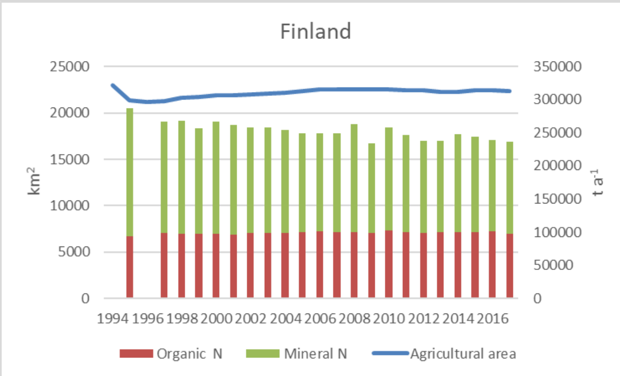
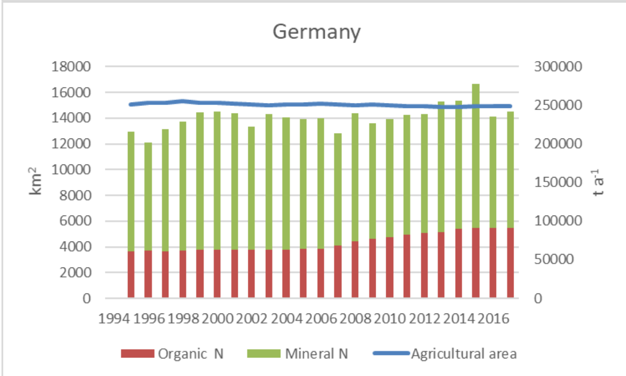


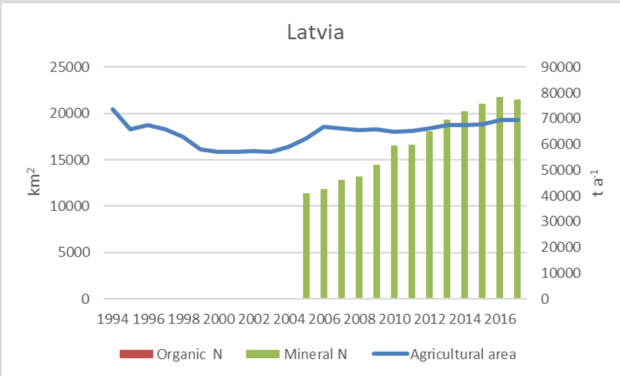
Figure 9. Livestock units per agricultural area in 2017.

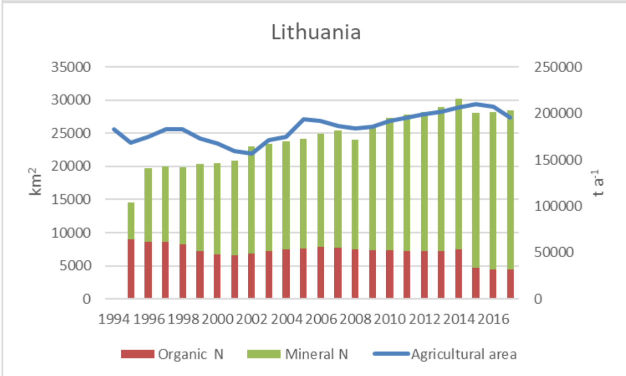

Denmark
km²
t a⁻¹
Organic N
Mineral N
Agricultural area

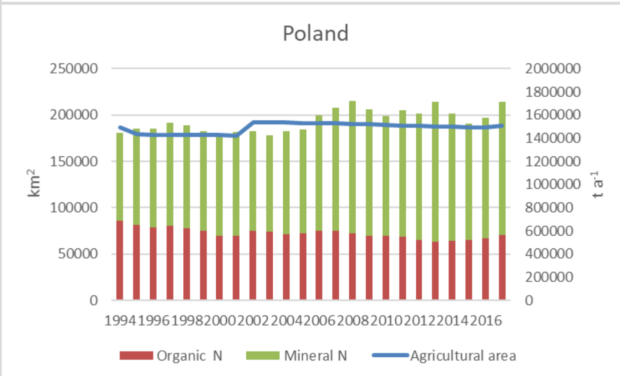

Estonia
km²
t a⁻¹
Organic N
Mineral N
Agricultural area

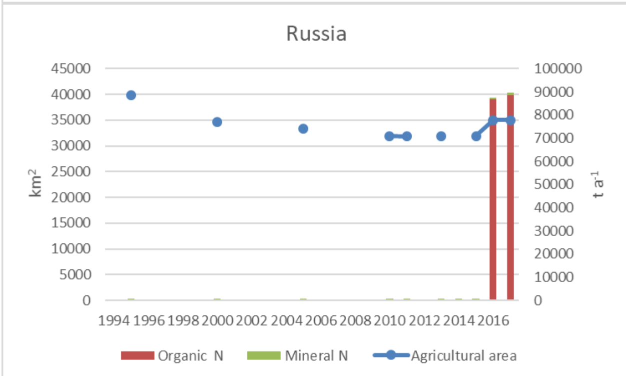

Finland
km²
t a⁻¹
Organic N
Mineral N
Agricultural area


Germany
km²
t a⁻¹
Organic N
Mineral N
Agricultural area


Latvia
km²
t a⁻¹
Organic N
Mineral N
Agricultural area


Lithuania
km²
t a⁻¹
Organic N
Mineral N
Agricultural area


Poland
km²
t a⁻¹
Organic N
Mineral N
Agricultural area


Russia
km²
t a⁻¹
Organic N
Mineral N
Agricultural area

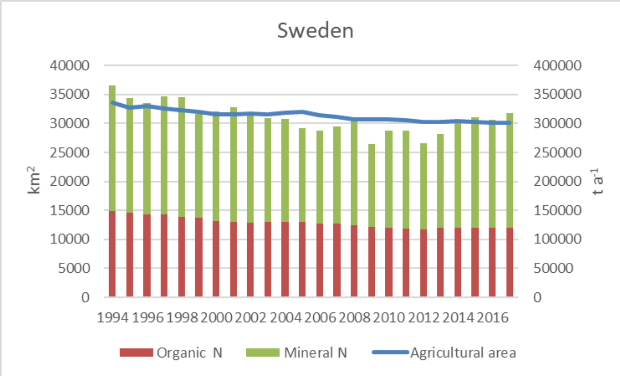


Figure 10. Agricultural land area and nitrogen in applied mineral and organic fertilisers.

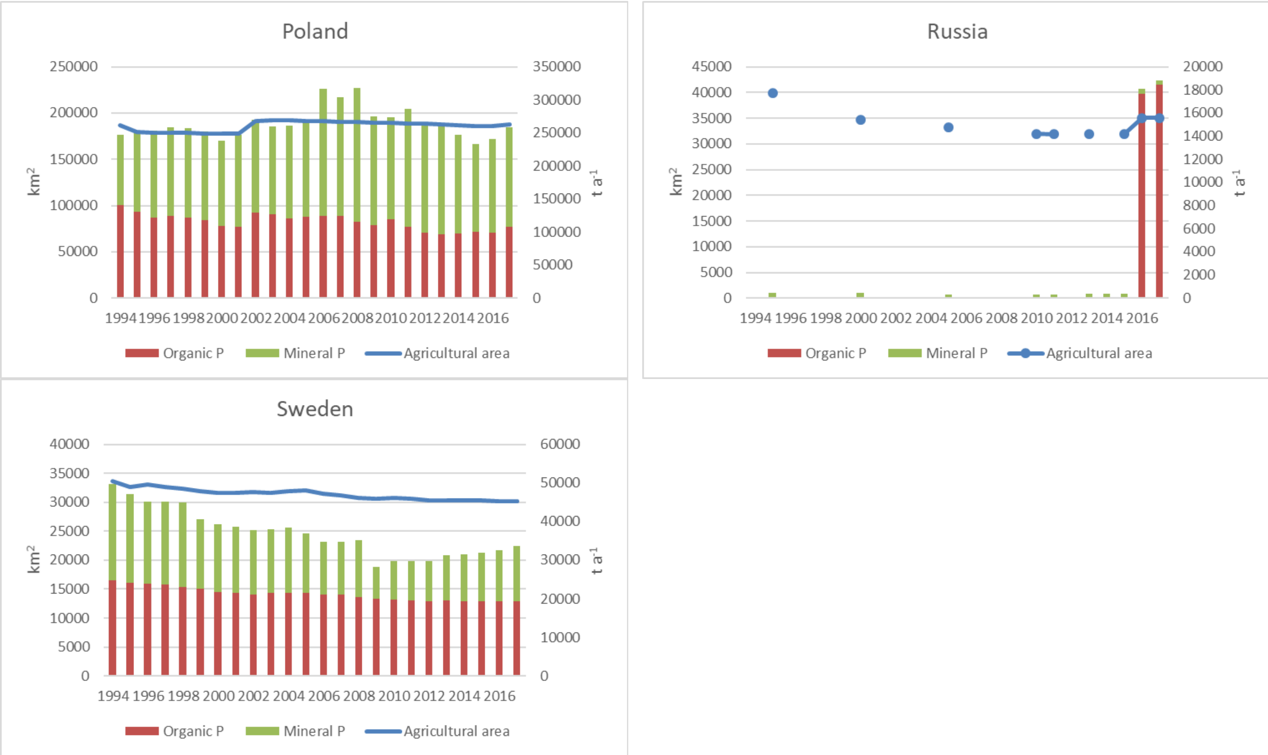


Figure 11. Agricultural land area and phosphorus in applied mineral and organic fertilisers.

4.5.2 Animal husbandry

In 2017 the total number of animals in different animal husbandry classes in the Baltic Sea area was: 285 million poultry, 26.4 million pigs, 11.9 million cattle and 1.5 million animals belonging to the class others (etc. horses, sheep, goats) (Figure 12). Even if poultry clearly dominated the total number of animals, their respective proportion of the livestock units (LSU) was only little bit higher than the respective proportions of cattle and pigs (Figure 12). The livestock unit is a reference unit, which aggregates livestock from various species via the use of specific coefficients established on the basis of the nutritional requirement of different animal species. It can also be used to compare different animal husbandry classes as a potential source of nutrient load.

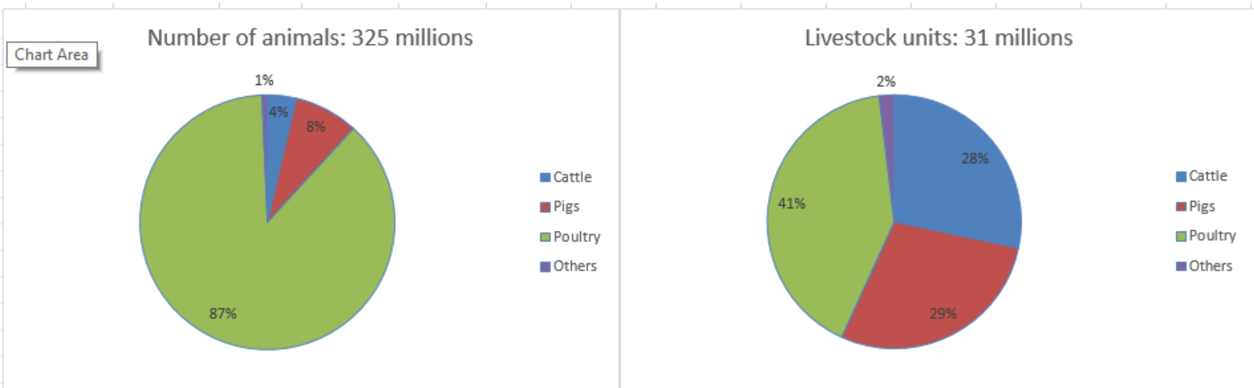


Figure 12. Number of animals in the Baltic Sea catchment and the respective livestock units in 2017.

Poland has the largest number of animals: 62% of poultry (Fig. 13), 51% of cattle (Fig. 14) and 43% of pigs (Fig. 15) in 2017. Denmark had a big share (32%) of pigs and Russia of poultry (15%). The Baltic States had the lowest number of animals. The densest husbandry number (domestic animals per catchment area) was found in Germany and Denmark.

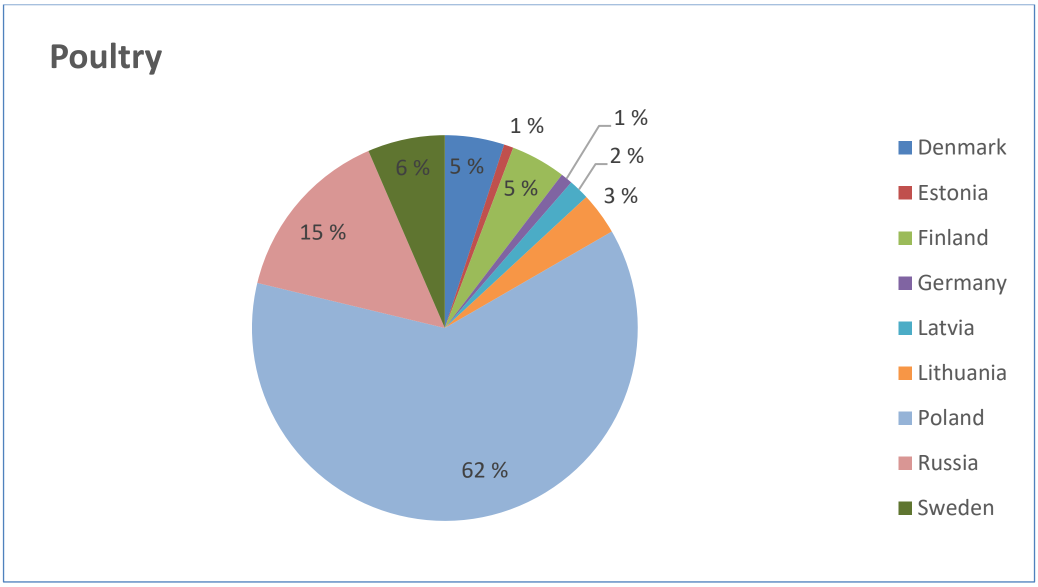


Figure 13. Proportions (%) of poultry in the Baltic Sea catchment divided by countries in 2017.

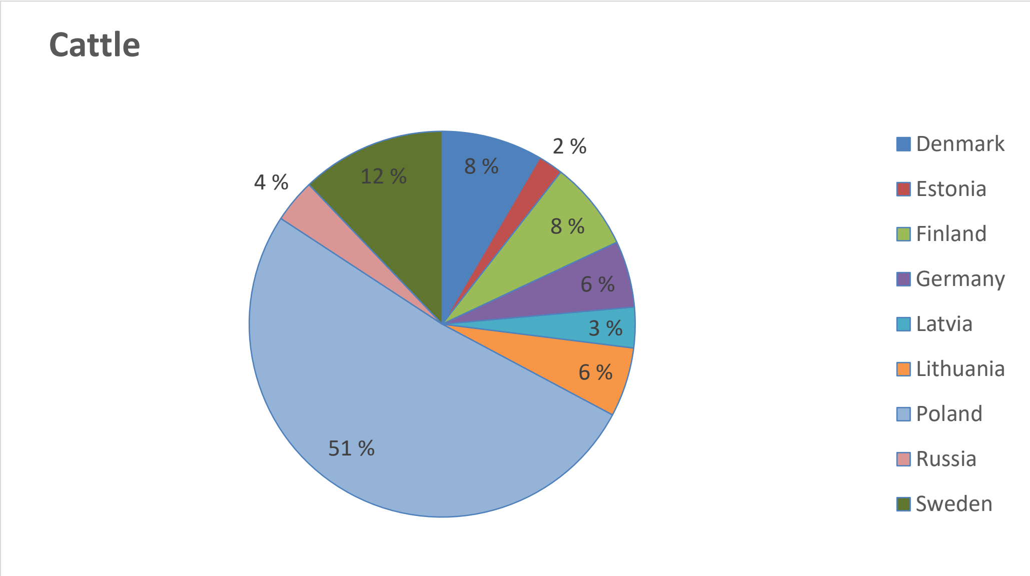


Figure 14. Proportions (%) of cattle in the Baltic Sea catchment divided by countries in 2017.

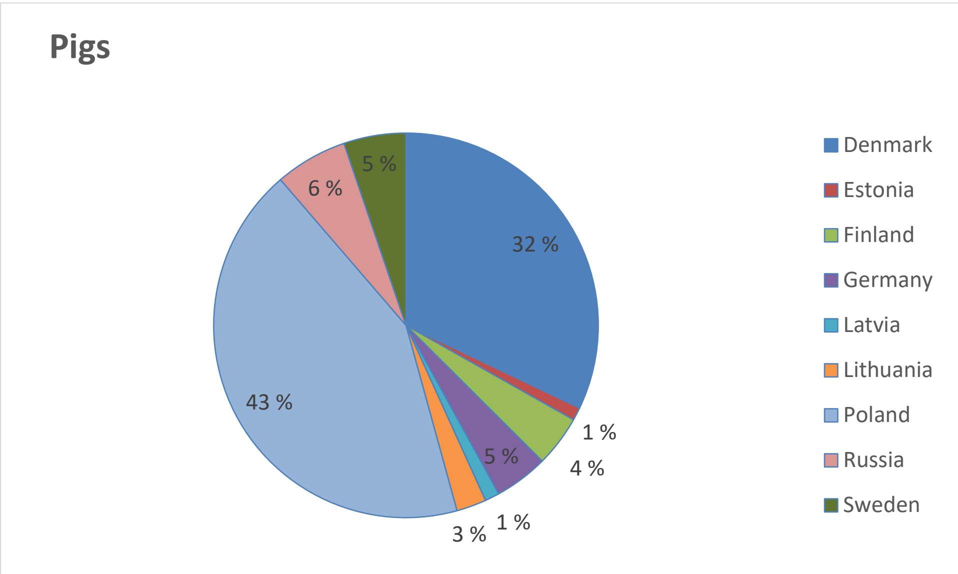


Figure 15. Number of pigs in the Baltic Sea catchment divided by countries in 2017.

There were gaps in the annual coverage of the animal number data, but for the years 1995, 2014 and 2017 the datasets were almost complete (although data for some countries are missing particularly on poultry in 1995) making it possible to estimate trends in animal numbers for the whole Baltic Sea. There is a remarkable increase in the number of poultry from 1995 to 2017, but some data was missing for 1995. Number of cattle and pigs have decreased with 15% and 22% respectively since 1195 (Figure 16). These tendencies were valid for most of the countries except for Russia and Germany where the number of pigs did increase from 1995 to 2017 (Figure 17).

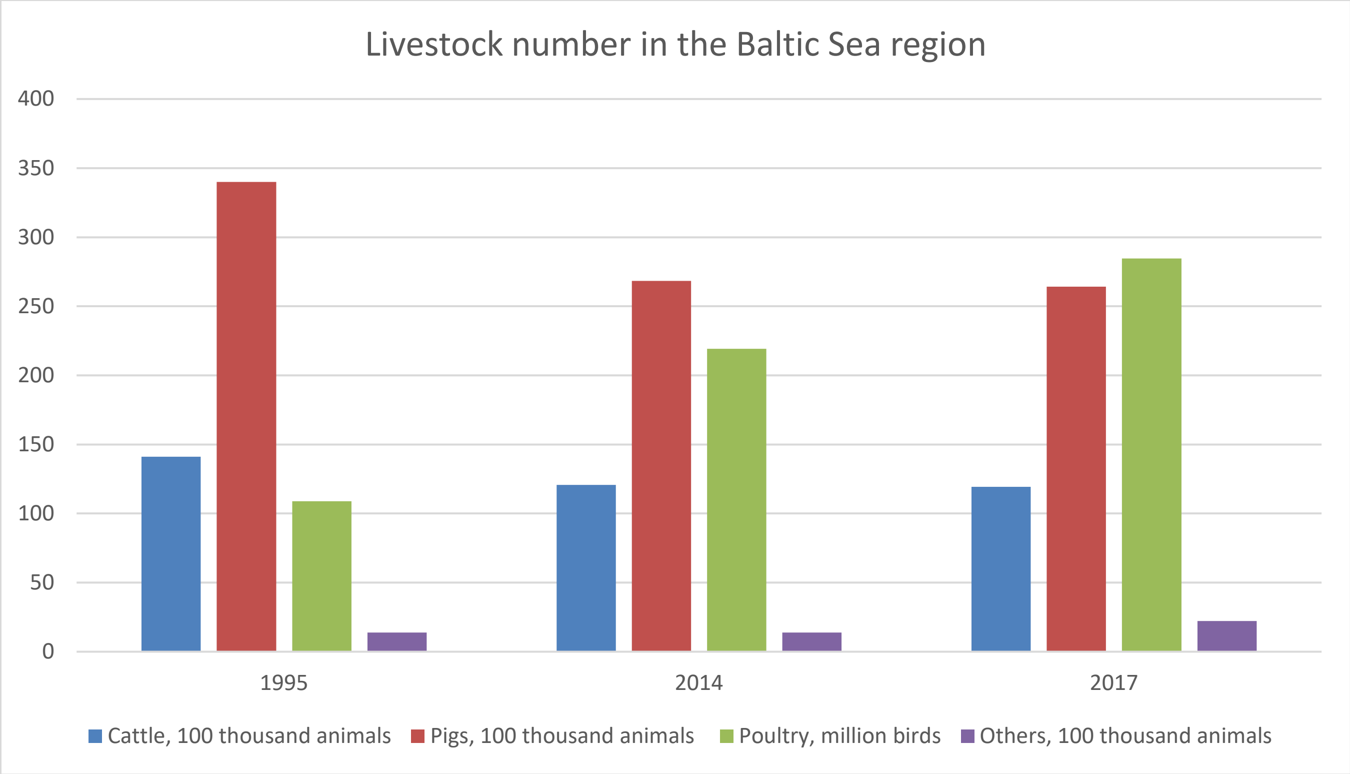
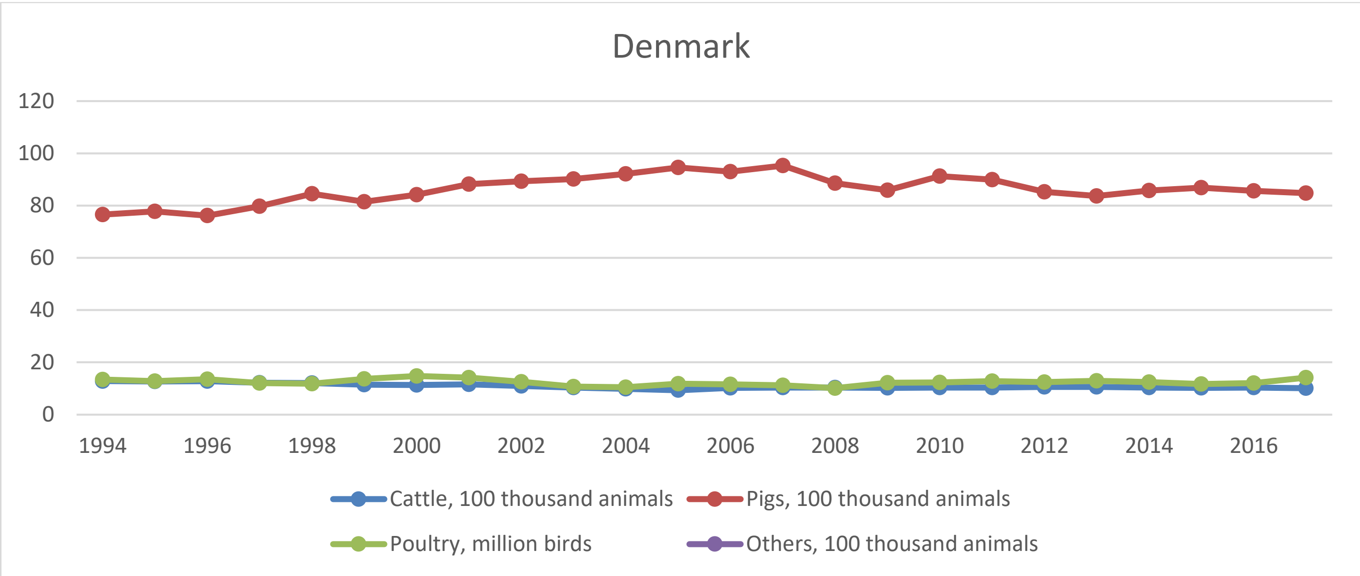
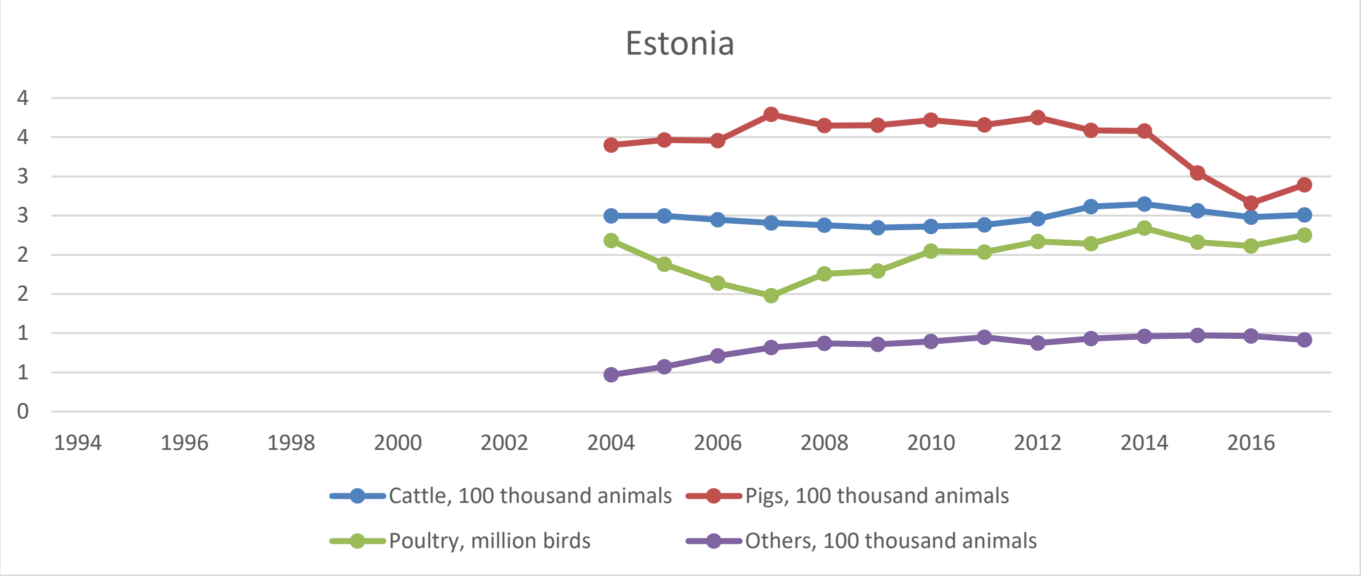
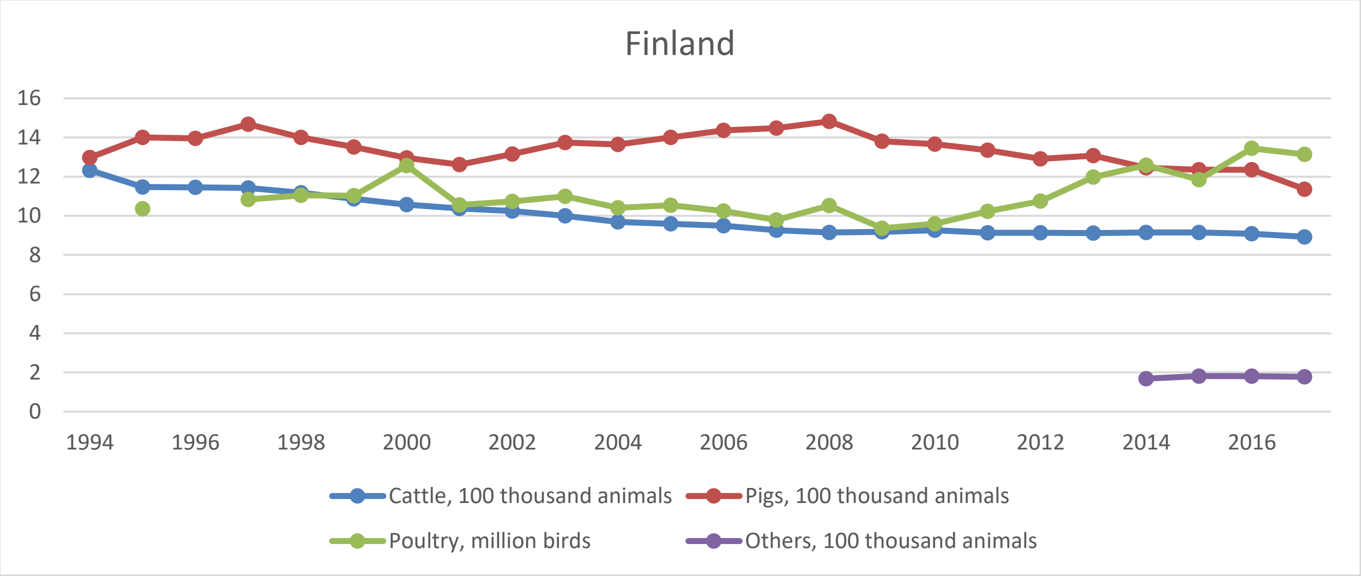
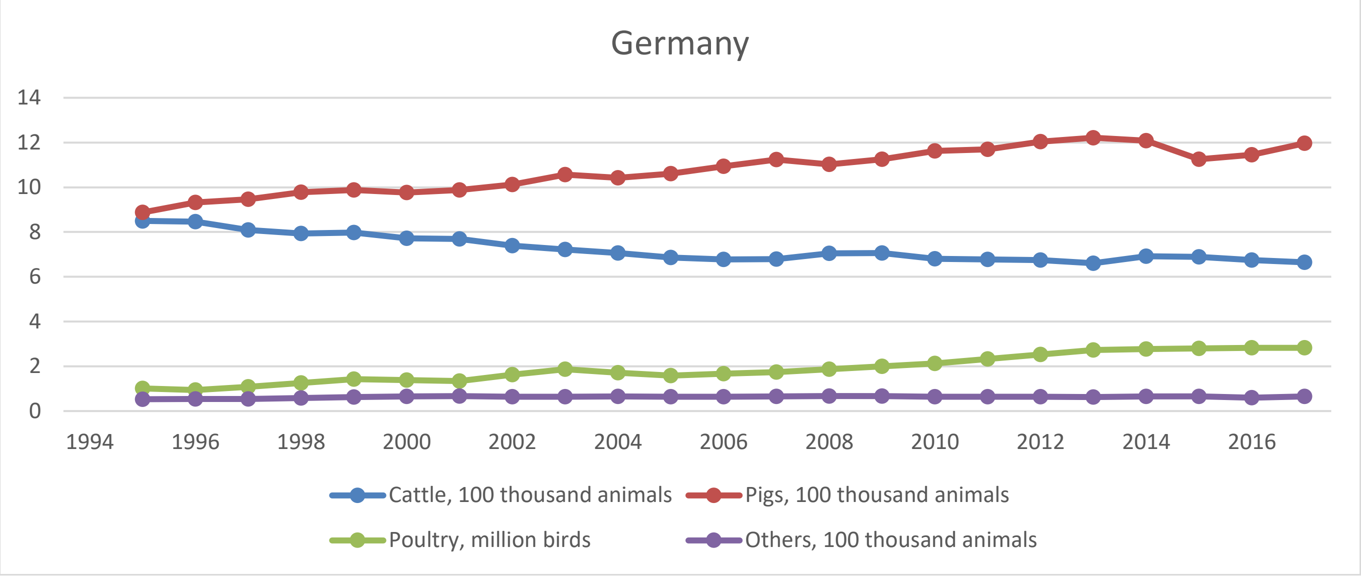


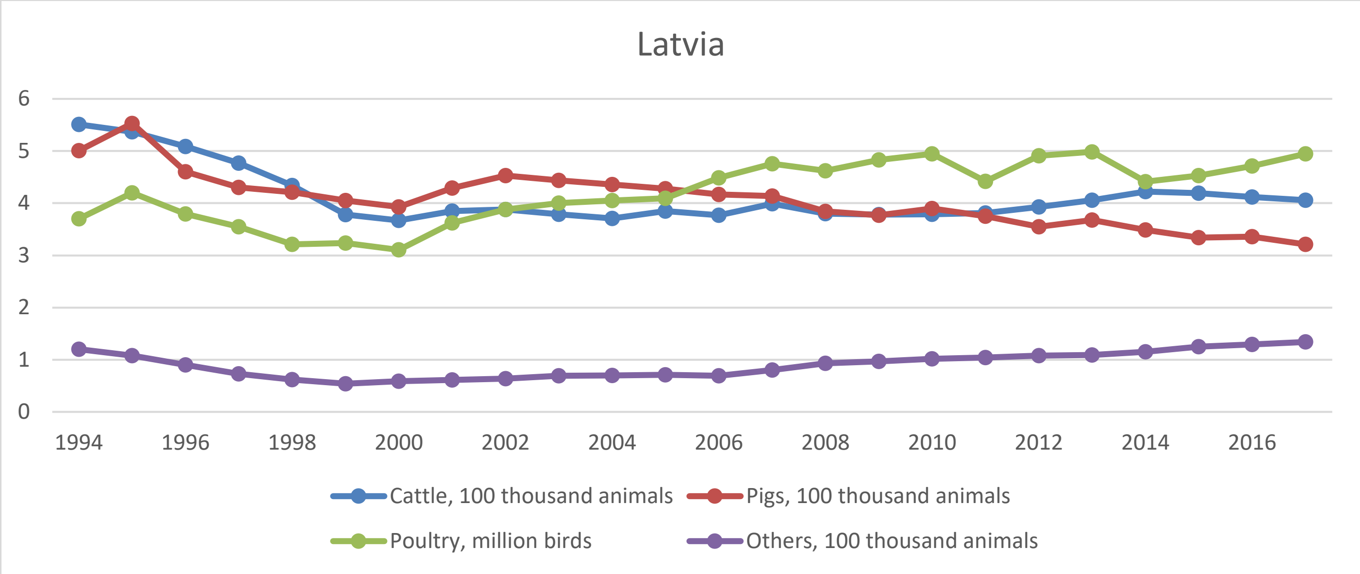
Figure 16. Total animal numbers in the Baltic Sea catchment in 1995, 2014 and 2017.

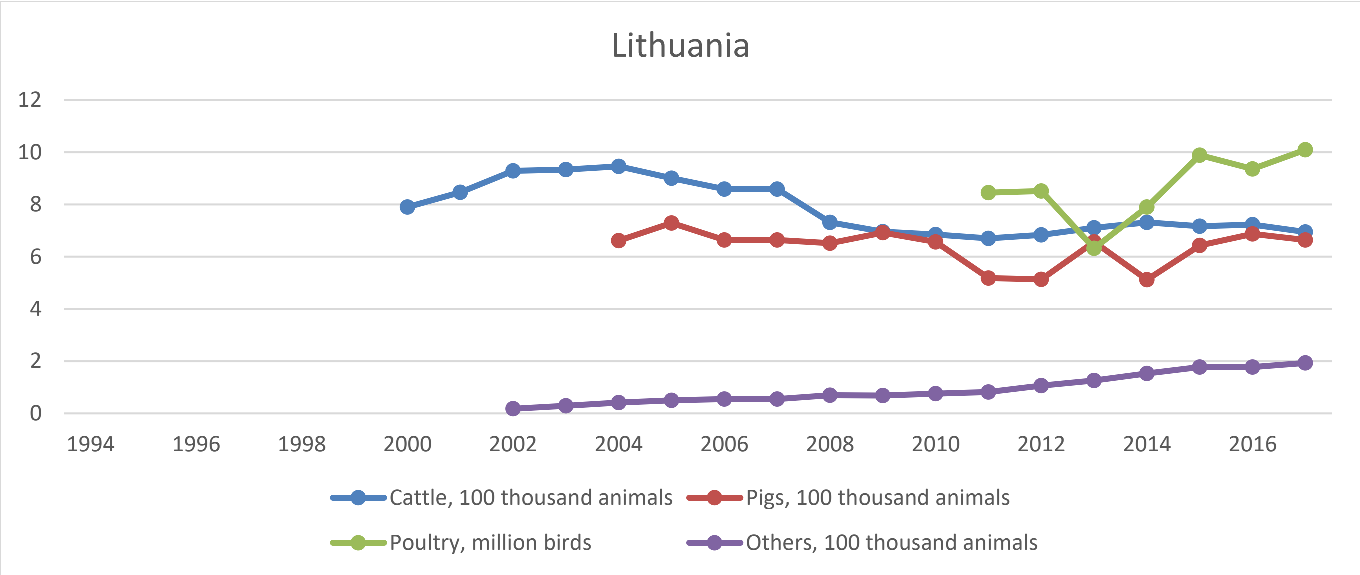


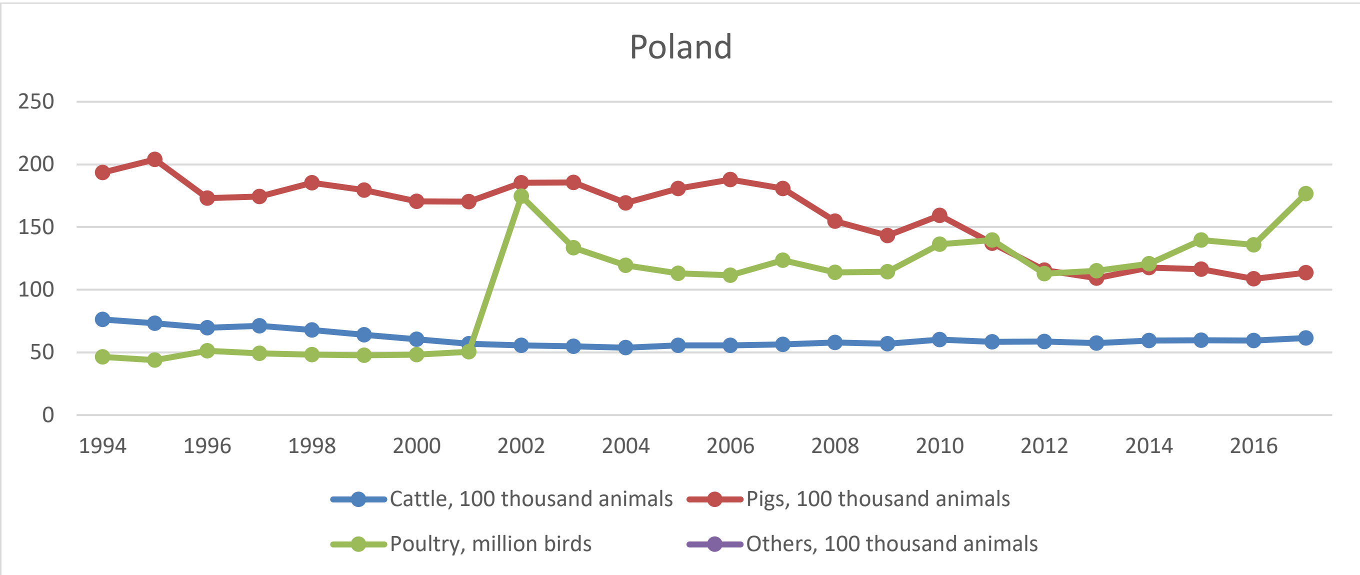

Estonia
4
4
3
3
2
2
1
1
0
1994 1996 1998 2000 2002 2004 2006 2008 2010 2012 2014 2016
Cattle, 100 thousand animals
Pigs, 100 thousand animals
Poultry, million birds
Others, 100 thousand animals


Finland
16
14
12
10
8
6
4
2
0
1994 1996 1998 2000 2002 2004 2006 2008 2010 2012 2014 2016
Cattle, 100 thousand animals
Pigs, 100 thousand animals
Poultry, million birds
Others, 100 thousand animals


Germany
14
12
10
8
6
4
2
0
1994 1996 1998 2000 2002 2004 2006 2008 2010 2012 2014 2016
Cattle, 100 thousand animals
Pigs, 100 thousand animals
Poultry, million birds
Others, 100 thousand animals


Latvia
6
5
4
3
2
1
0
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
Cattle, 100 thousand animals
Pigs, 100 thousand animals
Poultry, million birds
Others, 100 thousand animals


Lithuania
12
10
8
6
4
2
0
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
Cattle, 100 thousand animals
Pigs, 100 thousand animals
Poultry, million birds
Others, 100 thousand animals


Poland
250
200
150
100
50
0
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
Cattle, 100 thousand animals
Pigs, 100 thousand animals
Poultry, million birds
Others, 100 thousand animals

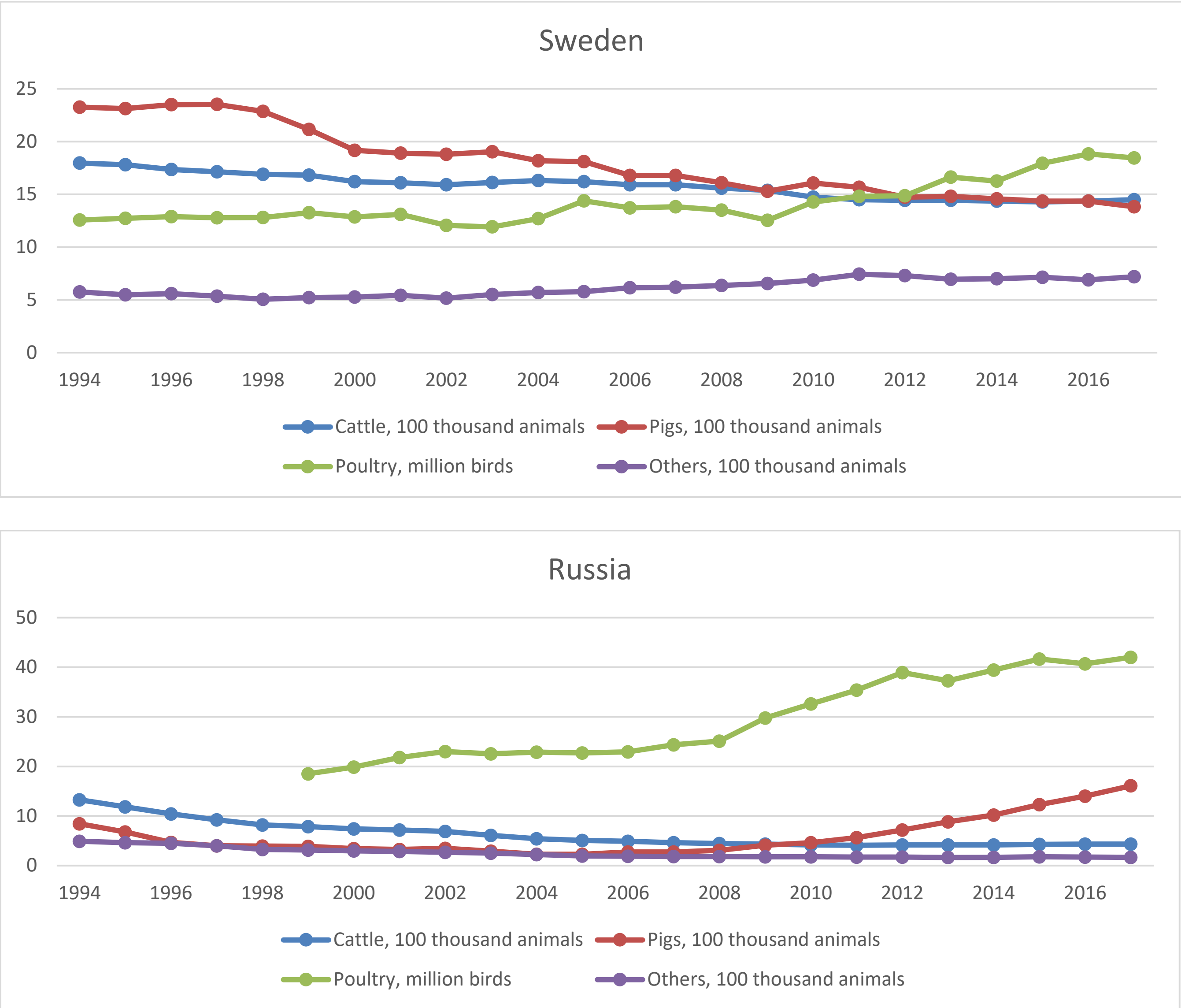


Figure 17. Total animal numbers in the Baltic Sea catchment in different countries from 1995 to 2015.

4.6 Other human pressures

No reduction potentials have been calculated for storm water constructions or managed forestry, because statistics and data on those sources are poor in many countries.

Stormwater or surface runoff of rainwater from urban areas is a major source of flooding and water pollution by nutrients and hazardous substances in urban communities. Consistent monitoring data on these diffuse nutrient loads from urban areas to the Baltic Sea is still lacking from HELCOM member states. Climate change-driven urban planning and stormwater management is becoming of particular interest today and results in increased share of impervious surfaces that demand efficient stormwater systems to prevent flooding and pollution runoff. Historically, many Baltic Sea Region cities with combined sewage and stormwater sewer systems are not capable of receiving large volumes of wastewater during severe rainfalls and allow an overflow of untreated sewage and polluted stormwaters into receiving surface waters (e.g. Coalition Clean Baltic, 2017; HELCOM, 2018)

Forest fertilisation has been reduced considerably since the 1980s. Diffuse nutrient loss from managed forest areas to water recipients deviate from large scale changes in land use, such as clear-cuttings. Nutrient loss from commercially managed forests have declined in recent decades due to a decline in forest drainage schemes and water protection measures taken in forestry, such as buffer strips along streams and lakes and modified clear-cutting methods. Statistics and data on those sources are poor in the HELCOM member states (Kiedrzynska et al., 2014)).

5 References

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Annex 1. Average normal (1961-1990) monthly temperature, precipitation and hours of sunshine for selected climate monitoring stations within the Baltic Sea Catchment area.

"Year" in the outermost right column are the annual average for temperature and annual sum for precipitation and hours of sunshine.

For each climate monitoring station is included:

Station:	"Name of the station"
Country:	"Helcom member country"
Position:	"Geographical coordinates"
Hight (m):	"Location above sea level in meter of the monitoring station"

The positions of the climate monitoring stations can be found on figure 3.

Data based (mainly) on:
Cappelen, J. & Jensen J.J: (2017): "Earth Climate - Guide on weather and climate in 156 countries (update). Technical Report (ONLINE) 01-17:
https://www.dmi.dk/fileadmin/user_upload/Rapporter/TR/2001/tr01-17.pdf

n.i. = no. information

DK-1

Station:	Tønder	
Country:	Denmark	
Position:	54 56 N	8 52 E
Hight (m):	2	

Normal	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Year
Temperature (C)	0	0	2	7	11	15	17	17	14	9	5	2	8,3
Precipitation (mm)	62	46	40	45	47	48	80	102	88	84	72	66	780
Sunshine (hours)	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.

DK-2

Station: Christiansø
Country: Denmark
Position: 55 19 N 15 11 E
Hight (m): 3

Normal	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Year
Temperature (C)	0	-1	2	5	11	15	18	17	14	10	6	3	8,3
Precipitation (mm)	36	25	20	27	30	35	50	51	50	44	43	38	449
Sunshine (hours)	44	63	134	174	270	297	267	235	204	99	38	30	1855

DK-3

Station: Copenhagen, Agricultural University
Country: Denmark
Position: 55 41 N 12 32 E
Hight (m): 9

Normal	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Year
Temperature (C)	0	0	2	7	12	16	18	17	14	9	5	3	8,6
Precipitation (mm)	49	39	32	38	40	47	71	66	62	59	48	49	600
Sunshine (hours)	35	55	118	161	245	245	239	207	157	87	34	19	1602

DK-4

Station: Vestervig
Country: Denmark
Position: 56 46N 8 19 E
Hight (m): 18

Normal	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Year
Temperature (C)	0	0	2	6	10	14	16	16	13	9	5	3	7,8
Precipitation (mm)	69	45	38	39	37	46	71	84	81	89	82	71	752
Sunshine (hours)	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.

ES-1

Station: Tallin
Country: Estonia
Position: 59 25 N 24 48 E
Hight (m): 44

Normal	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Year
Temperature (C)	-5	-6	-3	3	8	13	16	15	11	6	1	-3	4,7
Precipitation (mm)	36	26	24	32	41	49	71	68	75	65	45	39	571
Sunshine (hours)	23	51	148	192	262	287	281	234	156	75	28	16	1753

FI-1

Station: Helsinki
Country: Finland
Position: 60 10 N 24 37 E
Hight (m): 51

Normal	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Year
Temperature (C)	-6	-7	-4	3	9	14	18	16	12	6	1	-3	4,9
Precipitation (mm)	56	42	36	44	41	51	68	72	71	73	68	66	688
Sunshine (hours)	34	63	135	184	270	294	295	251	152	76	30	18	1802

FI-2

Station: Turku
Country: Finland
Position: 60 31 N 22 16 E
Hight (m): 49

Normal	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Year
Temperature (C)	-6	-7	-4	3	8	13	17	16	11	6	1	-3	4,6
Precipitation (mm)	43	27	23	33	30	40	67	77	65	64	58	49	576
Sunshine (hours)	38	76	173	187	258	290	254	208	141	85	37	23	1770

FI-3

Station: Tampere
Country: Finland
Position: 61 28 N 23 46 E
Hight (m): 84

Normal	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Year
Temperature (C)	-8	-7	-5	2	8	14	17	16	10	5	0	-4	4,0
Precipitation (mm)	38	30	25	35	42	48	76	75	57	57	49	41	573
Sunshine (hours)	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.

FI-4

Station: Kuupio
Country: Finland
Position: 62 54 N 27 41 E
Hight (m): 110

Normal	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Year
Temperature (C)	-10	-11	-6	1	8	14	17	15	10	3	-2	-7	2,7
Precipitation (mm)	33	20	19	24	33	60	72	59	56	47	36	39	498
Sunshine (hours)	22	52	155	165	225	259	253	181	113	65	20	8	1518

FI-5

Station: Vaasa
Country: Finland
Position: 63 03 N 21 46 E
Hight (m): 5

Normal	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Year
Temperature (C)	-8	-7	-5	1	8	13	16	15	9	4	0	-4	3,5
Precipitation (mm)	35	21	20	31	30	48	62	65	66	52	50	38	518

Sunshine (hours)	30	77	168	194	267	312	272	206	141	82	35	18	1802

FI-6

Station: Kajaani
Country: Finland
Position: 64 17 N 27 41 E
Hight (m): 143

Normal	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Year**
Temperature (C)	-10	-11	-6	0	6	13	16	14	9	2	-2	-7	2,0
Precipitation (mm)	34	27	24	35	38	67	72	72	63	53	43	36	564
Sunshine (hours)	18	58	157	186	237	272	269	188	112	56	17	6	1576

FI-7

Station: Kuusamo
Country: Finland
Position: 65 58 N 29 10 E
Hight (m): 260

Normal	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Year**
Temperature (C)	-13	-13	-10	-3	4	13	15	12	7	0	-6	-10	-0,3
Precipitation (mm)	31	27	35	25	32	35	61	71	57	48	40	31	493
Sunshine (hours)	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.

FI-8

Station: Sodankylä
Country: Finland
Position: 67 22 N 26 39 E
Hight (m): 180

Normal	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Year**
Temperature (C)	-14	-14	-10	-3	4	11	15	14	6	-1	-6	-10	-0,7

Precipitation (mm)	27	26	20	32	31	56	74	71	57	43	39	31	507
Sunshine (hours)	8	48	132	195	221	281	289	198	99	66	23	1	1561

GE-1

Station: Rostock
Country: Germany
Position: 54 05 N 12 06 E
Hight (m): 20

Normal	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Year
Temperature (C)	0	-1	3	7	12	15	18	17	13	9	5	1	8,3
Precipitation (mm)	46	36	30	42	48	60	79	74	69	65	39	45	633
Sunshine (hours)	43	62	127	165	227	253	231	214	171	90	47	33	1663

GE-2

Station: Schleswig
Country: Germany
Position: 54 31 N 9 35 E
Hight (m): 22

Normal	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Year
Temperature (C)	0	-1	3	7	11	14	16	17	14	9	5	2	8,1
Precipitation (mm)	73	58	44	57	59	60	93	103	86	89	70	68	860
Sunshine (hours)	49	66	128	191	249	248	238	187	175	102	46	32	1711

LT-1

Station: Vilnius
Country: Lithuania
Position: 54 42 N 25 16 E
Hight (m): 110

Normal	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Year

Temperature (C)	-6	-5	-1	6	13	16	17	17	12	7	2	-3	6,3
Precipitation (mm)	41	38	39	46	62	77	78	72	65	53	57	55	683
Sunshine (hours)	36	71	117	164	241	231	219	217	140	94	33	25	1588

LV-1

Station: Riga
Country: Latvia
Position: 56 58 N 24 04 E
Hight (m): 3

Normal	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Year
Temperature (C)	-5	-5	-2	5	10	14	17	16	12	7	1	-3	5,6
Precipitation (mm)	32	28	24	33	42	60	78	71	60	53	47	38	566
Sunshine (hours)	36	61	140	197	268	282	276	235	166	91	35	25	1812

LV-2

Station: Daugavpils
Country: Latvia
Position: 55 53 N 26 30 E
Hight (m): 93

Normal	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Year
Temperature (C)	-7	-6	-2	5	12	16	17	16	12	7	1	-4	5,6
Precipitation (mm)	36	27	34	40	51	73	83	74	66	52	52	46	634
Sunshine (hours)	34	61	123	170	250	259	255	226	151	90	33	22	1674

PL-1

Station: Gdansk
Country: Poland
Position: 54 23 N 18 36 E
Hight (m): 12

Normal	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Year
Temperature (C)	0	1	4	8	13	17	20	20	16	11	5	2	9,8
Precipitation (mm)	31	24	19	32	33	58	73	70	53	38	29	39	499
Sunshine (hours)	39	70	135	163	244	259	236	225	174	105	45	32	1727

PL-2

Station: Krakow
Country: Poland
Position: 50 05 N 19 48 E
Hight (m): 237

Normal	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Year
Temperature (C)	-2	-2	4	10	17	19	21	20	16	11	5	2	10,1
Precipitation (mm)	33	30	31	45	62	80	95	78	43	34	34	35	600
Sunshine (hours)	47	56	114	139	203	197	208	183	152	106	53	31	1489

PL-3

Station: Poznan
Country: Poland
Position: 52 25 N 16 50 E
Hight (m): 86

Normal	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Year
Temperature (C)	-1	-1	4	9	17	20	22	21	16	11	5	2	10,4
Precipitation (mm)	26	27	29	34	38	62	85	55	40	29	27	37	489
Sunshine (hours)	51	64	142	168	255	241	221	218	184	112	55	40	1751

Pl-4

Station: Przemysl
Country: Poland
Position: 49 47 N 22 48 E
Hight (m): 201

Normal	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Year
Temperature (C)	-4	-3	3	8	13	17	19	18	14	10	4	0	8,3
Precipitation (mm)	27	24	25	43	57	88	105	93	58	50	43	43	656
Sunshine (hours)	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.

PL-5

Station: Suwlaki
Country: Poland
Position: 54 06 N 22 57 E
Hight (m): 165

Normal	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Year
Temperature (C)	-5	-6	-1	5	12	16	17	17	13	7	2	-2	6,3
Precipitation (mm)	28	32	27	37	43	78	96	104	55	61	34	48	643
Sunshine (hours)	24	60	146	139	226	250	218	207	162	85	29	22	1568

PL-6

Station: Szczecin
Country: Poland
Position: 53 24 N 14 37 E
Hight (m): 7

Normal	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Year
Temperature (C)	1	0	4	10	15	19	21	20	16	11	6	2	10,4
Precipitation (mm)	33	26	26	31	38	65	83	57	46	35	30	41	511
Sunshine (hours)	45	53	119	166	229	253	243	224	175	105	43	35	1690

PL-7

Station: Warszawa
Country: Poland
Position: 52 09 N 20 59 E

Hight (m): 105

Normal	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Year
Temperature (C)	-4	-3	3	8	14	17	19	18	13	8	2	-2	7,8
Precipitation (mm)	25	28	20	32	40	60	79	47	41	31	31	37	471
Sunshine (hours)	53	55	115	158	252	244	219	215	158	119	49	39	1676

PL-8

Station: Wroclaw
Country: Poland
Position: 51 06 N 16 53 E
Hight (m): 120

Normal	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Year
Temperature (C)	-1	-2	2	8	13	17	19	18	14	9	4	1	8,5
Precipitation (mm)	24	23	27	42	50	61	100	57	41	33	28	33	519
Sunshine (hours)	45	70	122	145	227	232	221	216	179	115	54	39	1665

RU-1

Station: Kaliningrad
Country: Russia
Position: 54 42 N 20 37 E
Hight (m): 27

Normal	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Year
Temperature (C)	-3	-2	1	6	12	15	17	16	13	8	3	-1	7,1
Precipitation (mm)	56	40	27	43	39	55	90	84	83	70	52	59	698
Sunshine (hours)	42	59	130	184	256	276	252	230	180	107	39	31	1786

RU-2

Station: Petrozavodsk
Country: Russia

Position: 61 49 N 34 16 E
Hight (m): 40

Normal	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Year
Temperature (C)	-10	-10	-6	-1	8	13	17	14	9	3	-2	-7	2,3
Precipitation (mm)	35	25	17	27	51	54	77	73	74	58	39	30	560
Sunshine (hours)	19	52	162	200	249	300	294	219	128	58	26	12	1719

RU-3

Station: Sct. Peterburg
Country: Russia
Position: 59 58 N 30 18 E
Hight (m): 4

Normal	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Year
Temperature (C)	-8	-8	-4	3	10	15	18	16	11	5	0	-4	4,5
Precipitation (mm)	36	32	25	34	41	54	69	77	58	52	45	46	569
Sunshine (hours)	17	38	111	166	253	263	277	212	130	66	21	9	1563

SE-1

Station: Karesuando
Country: Sweden
Position: 68 27 N 22 30 E
Hight (m): 327

Normal	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Year
Temperature (C)	-15	-14	-10	-4	3	11	14	12	6	-2	-8	-12	-1,6
Precipitation (mm)	19	18	17	19	26	46	63	57	41	25	26	23	380
Sunshine (hours)	2	46	137	201	225	272	287	155	134	87	22	0	1568

SE-2

Station: Jokkmokk

Country: Sweden
Position: 66 36 N 19 51 E
Hight (m): 257

Normal	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Year
Temperature (C)	-15	-13	-8	-2	5	11	15	12	6	-1	-7	-11	-0,7
Precipitation (mm)	29	27	21	29	30	57	77	63	49	40	36	35	493
Sunshine (hours)	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.

SE-3

Station: Haparanda
Country: Sweden
Position: 65 50 N 24 09 E
Hight (m): 5

Normal	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Year
Temperature (C)	-11	-11	-7	-1	6	12	16	14	8	2	-3	-7	1,5
Precipitation (mm)	40	37	24	34	29	41	54	71	65	53	58	46	552
Sunshine (hours)	24	50	151	206	269	299	308	214	154	98	34	8	1815

SE-4

Station: Stensele
Country: Sweden
Position: 65 04 N 17 10 E
Hight (m): 330

Normal	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Year
Temperature (C)	-12	-11	-6	0	6	12	14	12	7	2	-6	-10	0
Precipitation (mm)	35	26	27	27	36	55	90	67	52	42	43	37	537
Sunshine (hours)	41	76	151	208	292	318	295	248	174	103	41	26	1973

SE-5

Station: Umeå
Country: Sweden
Position: 63 50 N 20 17 E
Hight (m): 11

Normal	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Year
Temperature (C)	-8	-8	-5	1	7	12	16	15	9	3	-1	-5	3,0
Precipitation (mm)	49	30	27	34	28	49	63	77	61	59	67	57	601
Sunshine (hours)	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.

SE-6

Station: Storlien
Country: Sweden
Position: 63 18 N 12 07 E
Hight (m): 642

Normal	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Year
Temperature (C)	-7	-6	-3	1	6	12	14	13	8	3	-1	-4	3,0
Precipitation (mm)	73	76	69	65	55	93	105	110	111	98	76	71	1002
Sunshine (hours)	19	54	116	129	210	177	203	182	116	67	32	19	1324

SE-7

Station: Sundsvall
Country: Sweden
Position: 62 32 N 17 27 E
Hight (m): 4

Normal	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Year
Temperature (C)	-6	-6	0	3	8	13	16	15	10	5	0	-3	4,6
Precipitation (mm)	51	36	29	47	33	50	53	76	54	52	63	60	604
Sunshine (hours)	58	70	143	204	266	261	273	239	148	102	59	27	1850

SE-8

Station: Falun
Country: Sweden
Position: 60 37 N 15 38 E
Hight (m): 122

Normal	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Year
Temperature (C)	-7	-6	-3	4	10	14	16	15	11	5	1	-3	4,8
Precipitation (mm)	36	24	20	31	40	59	73	83	59	45	50	41	561
Sunshine (hours)	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.

SE-9

Station: Karlstad
Country: Sweden
Position: 59 22 N 13 28 E
Hight (m): 46

Normal	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Year
Temperature (C)	-5	-4	-1	4	10	15	17	16	12	7	2	1	6,2
Precipitation (mm)	47	31	25	38	38	49	64	81	70	61	69	51	624
Sunshine (hours)	49	70	141	189	272	299	290	237	162	84	44	25	1862

SE-10

Station: Stockholm
Country: Sweden
Position: 59 21 N 18 04 E
Hight (m): 44

Normal	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Year
Temperature (C)	-3	-3	-1	4	10	15	18	17	12	7	3	0	6,6
Precipitation (mm)	43	30	25	31	34	45	61	76	60	48	53	48	554
Sunshine (hours)	41	76	151	208	292	318	295	248	174	103	41	26	1973

SE-11

Station: Göteborg
Country: Sweden
Position: 57 42 N 12 00 E
Hight (m): 5

Normal	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Year
Temperature (C)	-1	-2	1	6	12	15	18	17	13	8	5	2	7,8
Precipitation (mm)	51	34	29	39	34	54	86	84	75	65	62	57	670
Sunshine (hours)	48	76	151	201	274	286	285	245	178	108	47	29	1928

SE-12

Station: Visby, Gotland
Country: Sweden
Position: 57 40 N 18 21 E
Hight (m): 51

Normal	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Year
Temperature (C)	-1	-1	0	4	9	14	17	17	13	8	4	2	7,2
Precipitation (mm)	53	44	29	31	30	32	51	56	51	51	48	53	529
Sunshine (hours)	28	56	128	208	292	317	302	255	186	108	30	22	1932