

Har östersjöns tillstånd förbättrats?

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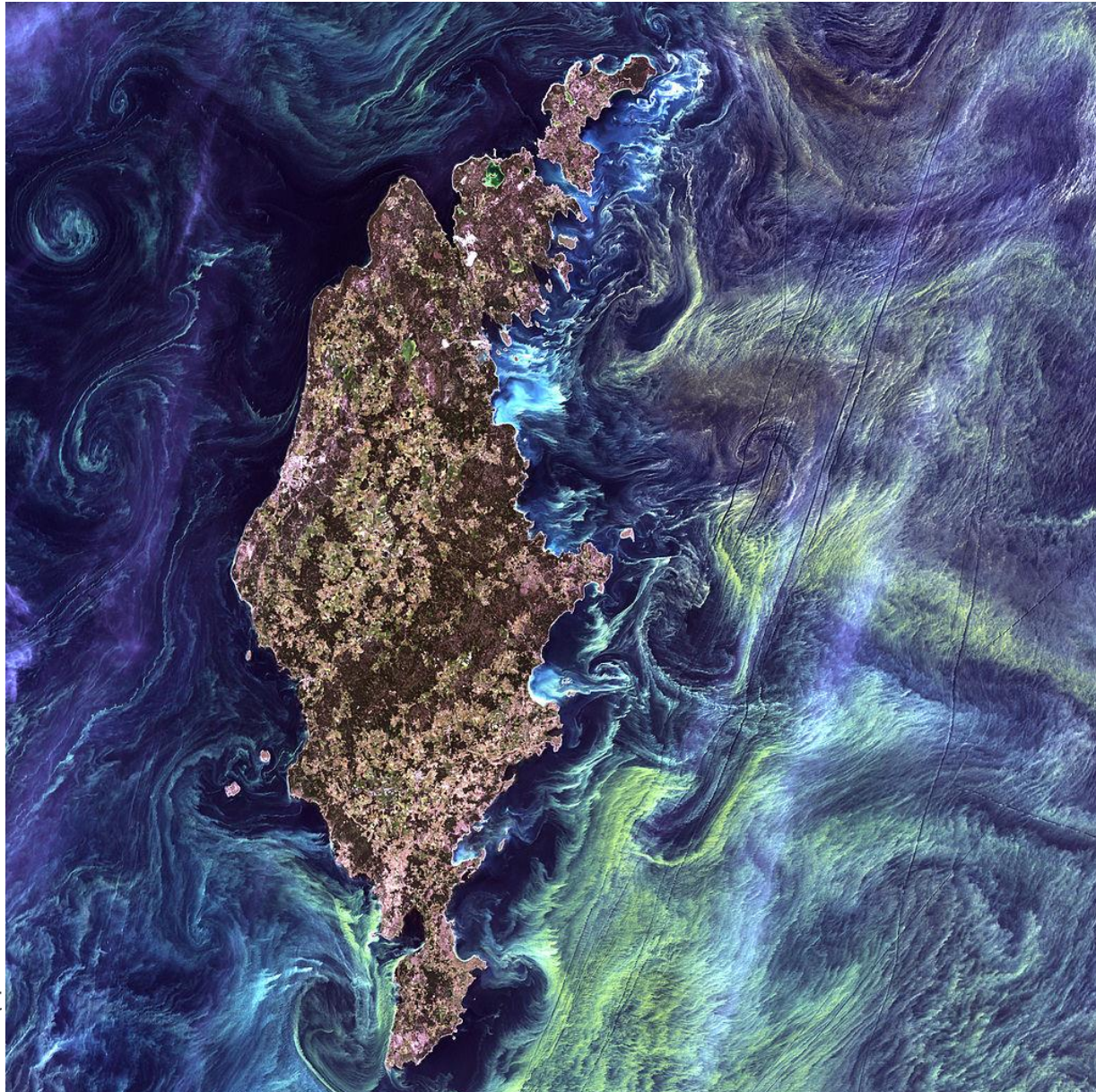
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www.balticnest.org

Cyanobakterier är vanligt förekommande



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Inte bara vackert!



Östersjön

9 kustländer, 85 miljoner
människor

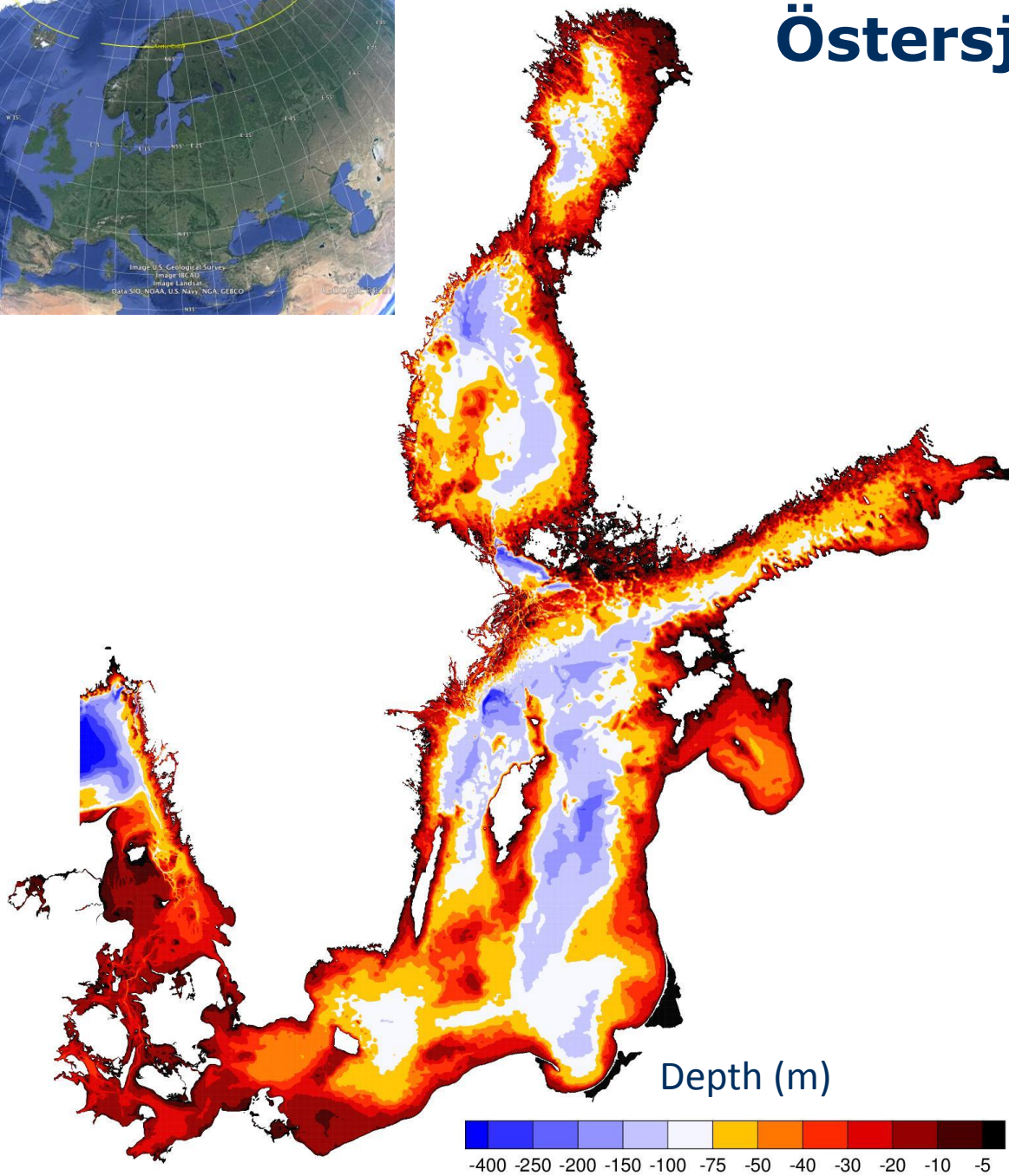
Area = 420 000 km²
Medeldjup = 50 m
Maxdjup = 459 m

Relativt stort mynningsområde
med två grunda trösklar (15 och
8 m)

Flodtillrinning = 500 km³/år
Uppehållstid = 33 år

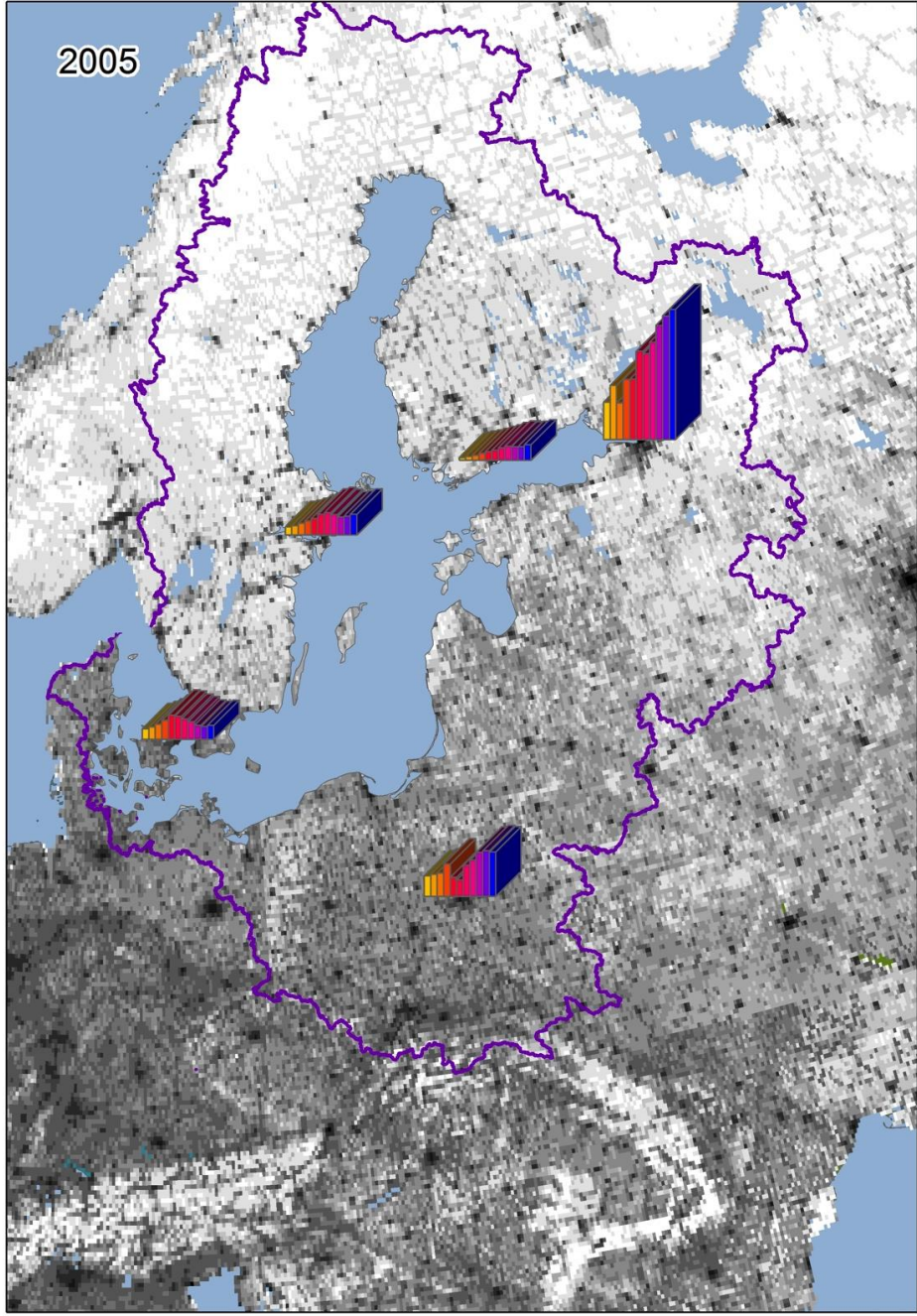
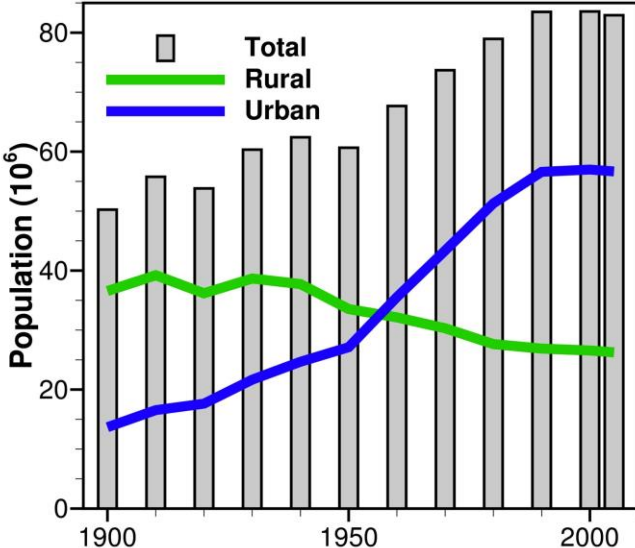
Inget tidvatten!

Stora säsongsvariationer: is på
vintern – uppåt 20 grader på
sommaren

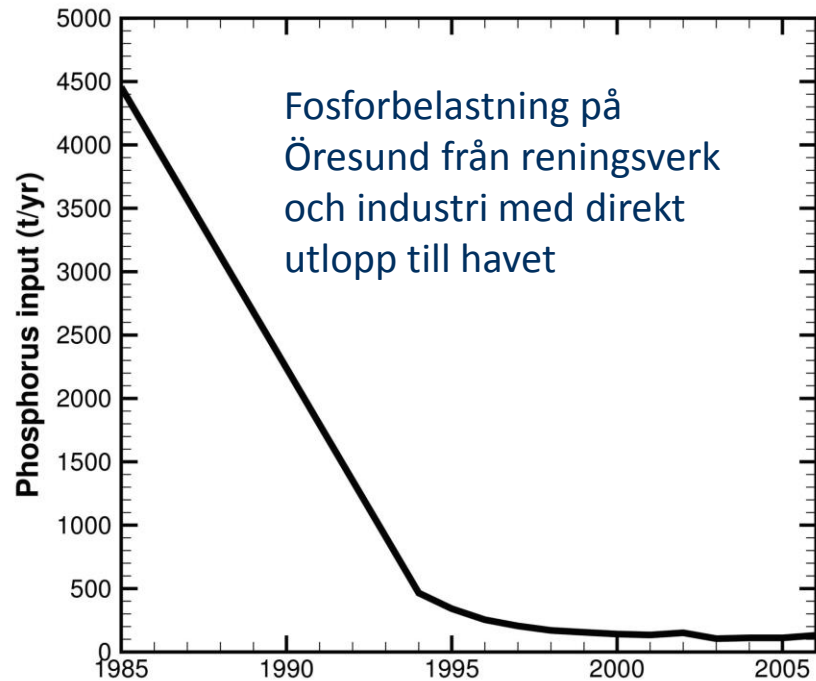


Förändringar i området

**Befolkningsökning,
urbanisering,
industrialisering och
införande av kloaksystem**



Motverkas av utbyggnad av reningsverk och renare teknologi i industrin



Nytt reningsverk för 2 miljoner människor i Warszawa öppnat 2013

Much less diffusive P sources (i.e., more P point sources) compared to HELCOM PLC 4

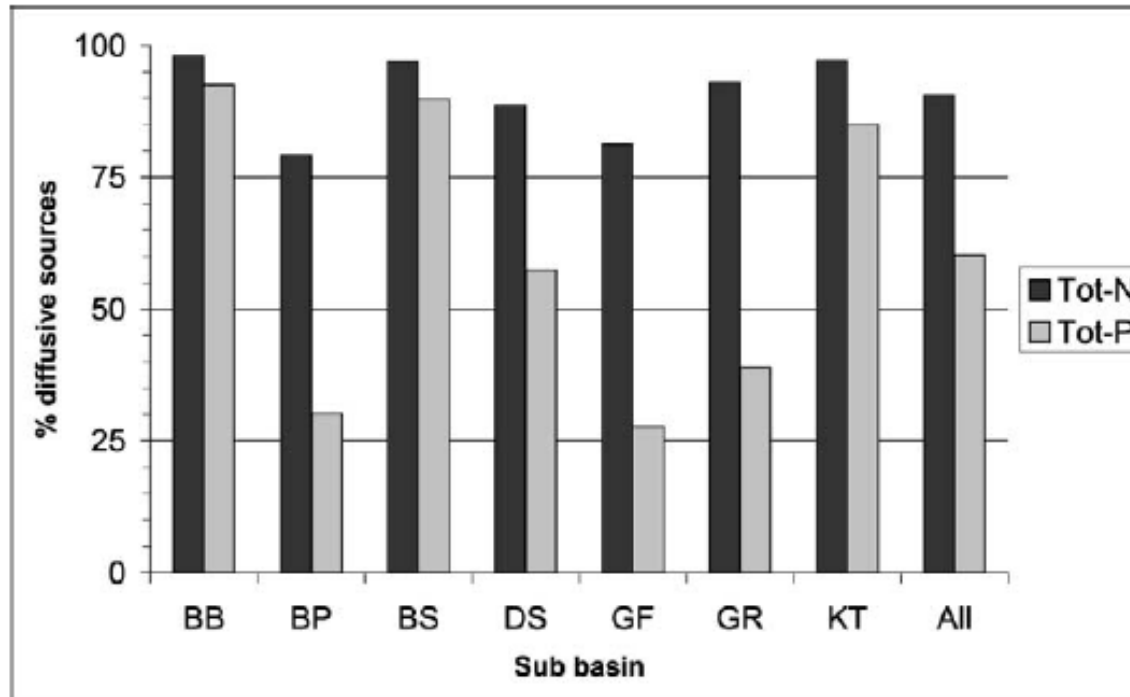
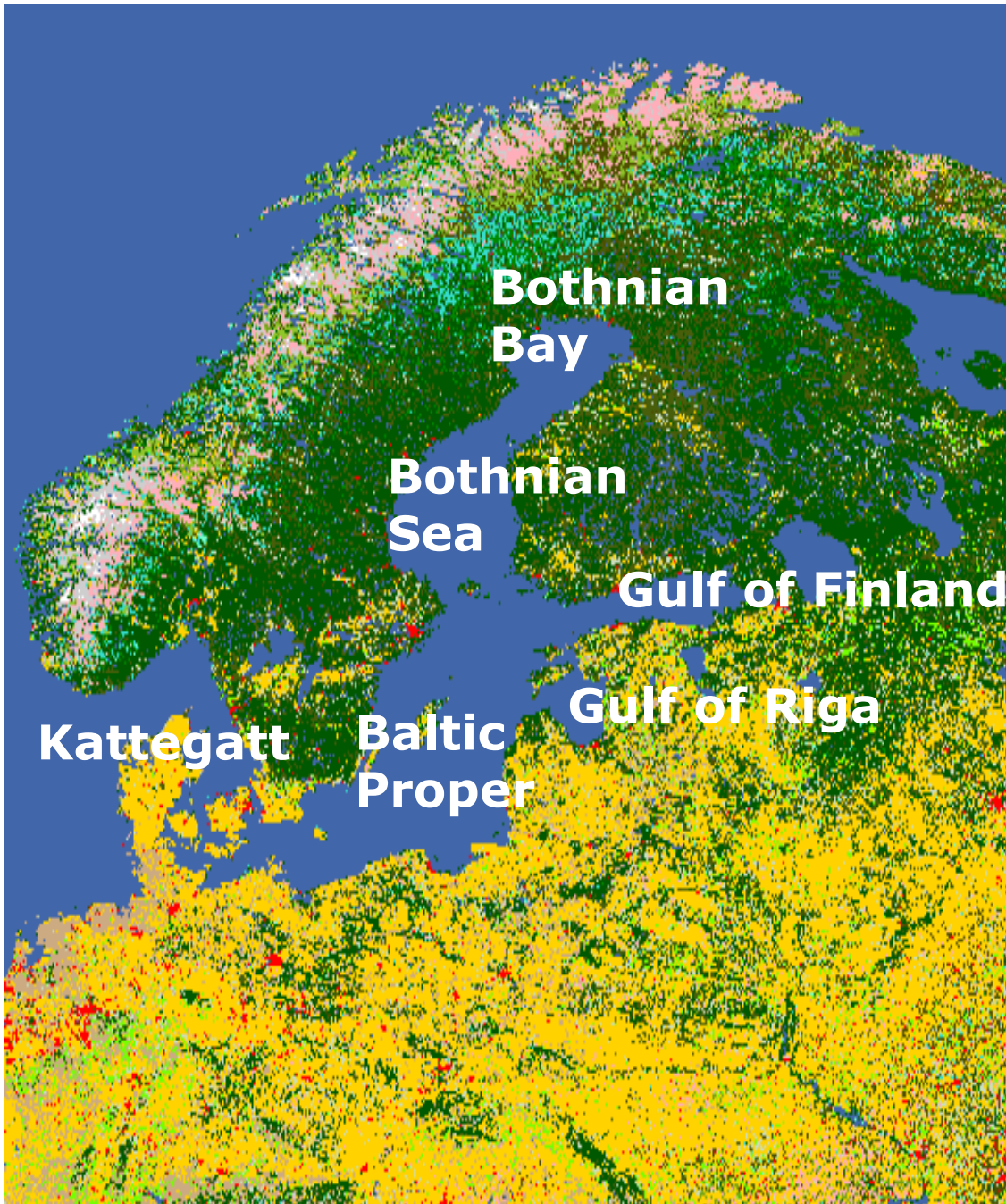


Figure 4. Diffusive sources for Tot-N and Tot-P (%) in the various subcatchments of the Baltic Sea as simulated by CSIM (same abbreviations used for subbasins as in Table 4).

Förutsättningar



Legend

glc250m

Class_Names

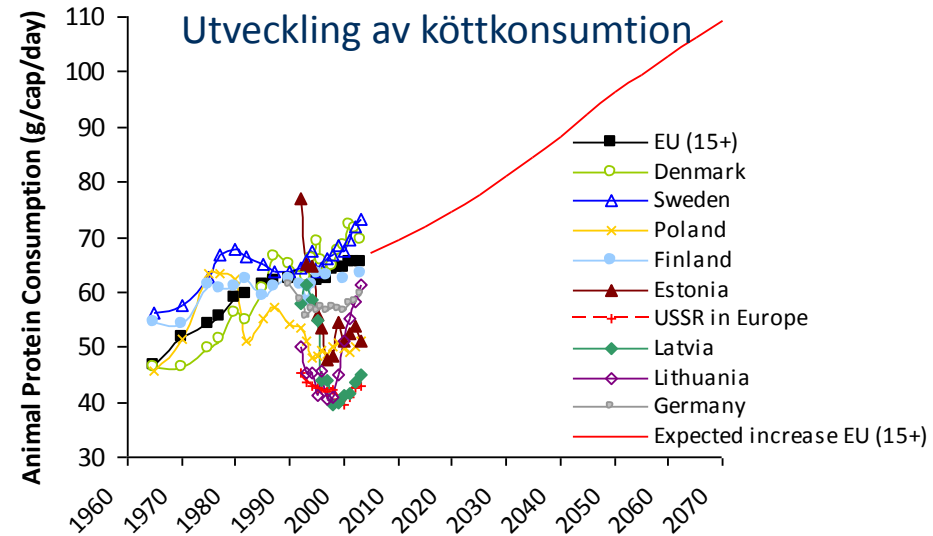
- 
-  Artificial surfaces and associated areas
-  Bare areas
-  Cultivated and managed terrestrial areas
-  Herbaceous, closed - pastures, natural grassl
-  Herbaceous, open with shrubs
-  Lichens and mosses
-  Mosaic: crop/ tree cover
-  Regularly flooded shrub and/or herbaceous
-  Snow and ice
-  Sparse herbaceous or sparse shrubs
-  Tree cover, broadleaved, deciduous, closed
-  Tree cover, broadleaved, deciduous, open
-  Tree cover, mixed phrenology, closed
-  Tree cover, mixed phrenology, open
-  Tree cover, needleleaved, evergreen, closed
-  Tree cover, needleleaved, evergreen, open
-  Water



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Framtiden avgörs mycket av jordbrukets utveckling

Industriell djurproduktion



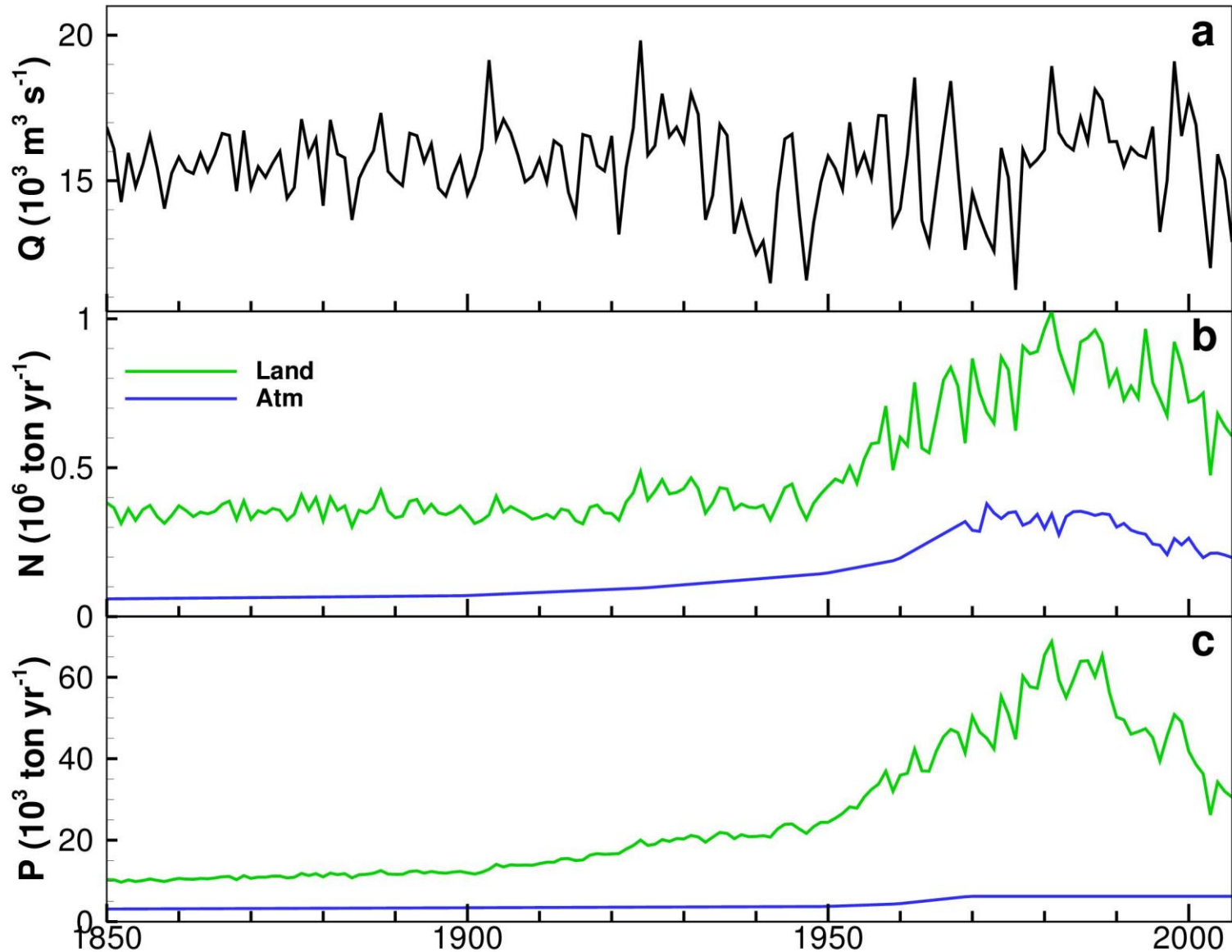
Fosforrikt slaggberg från gödselframställning



Resulting in massive increase in loads

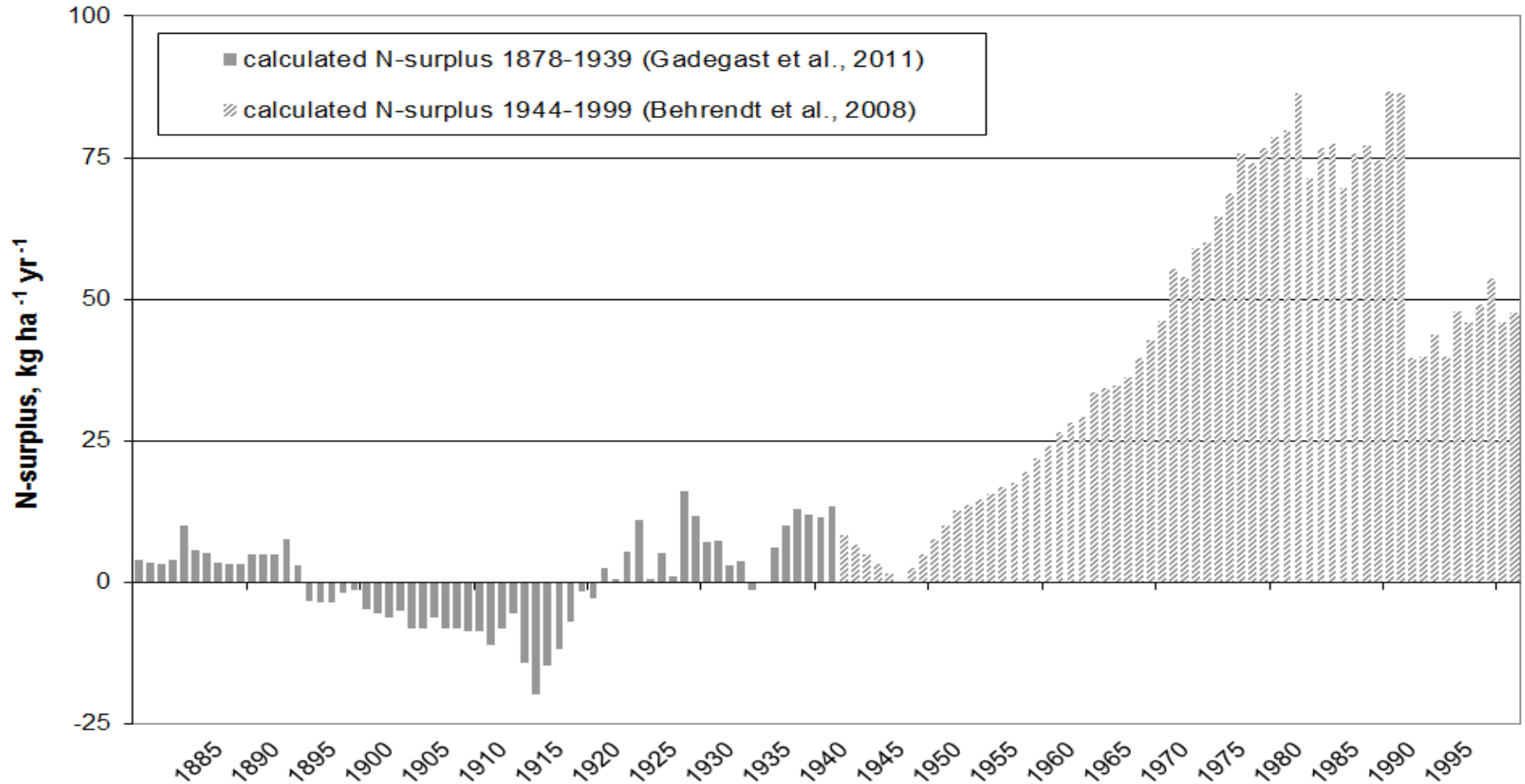


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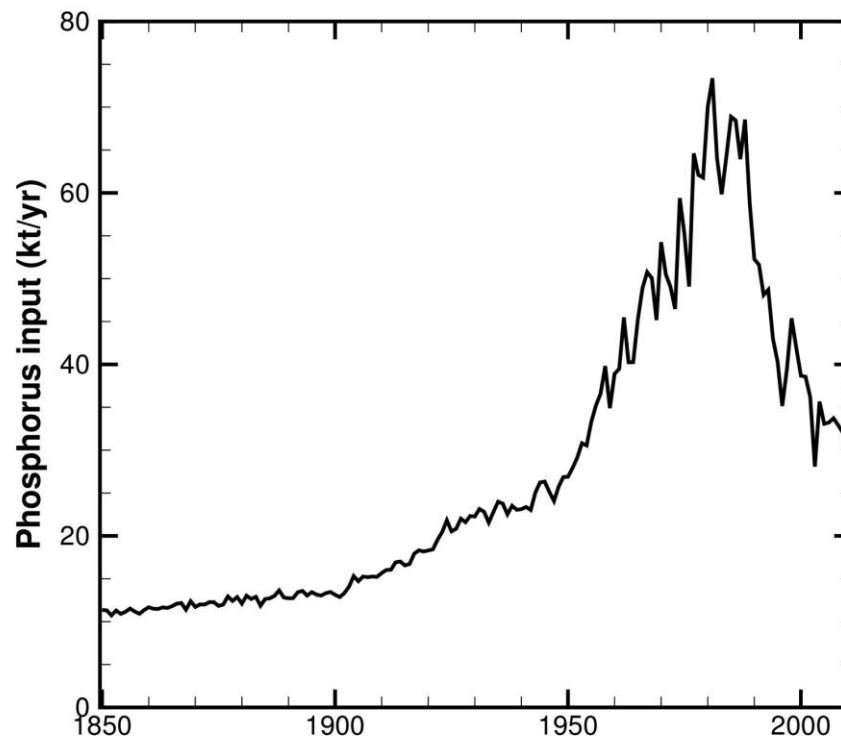
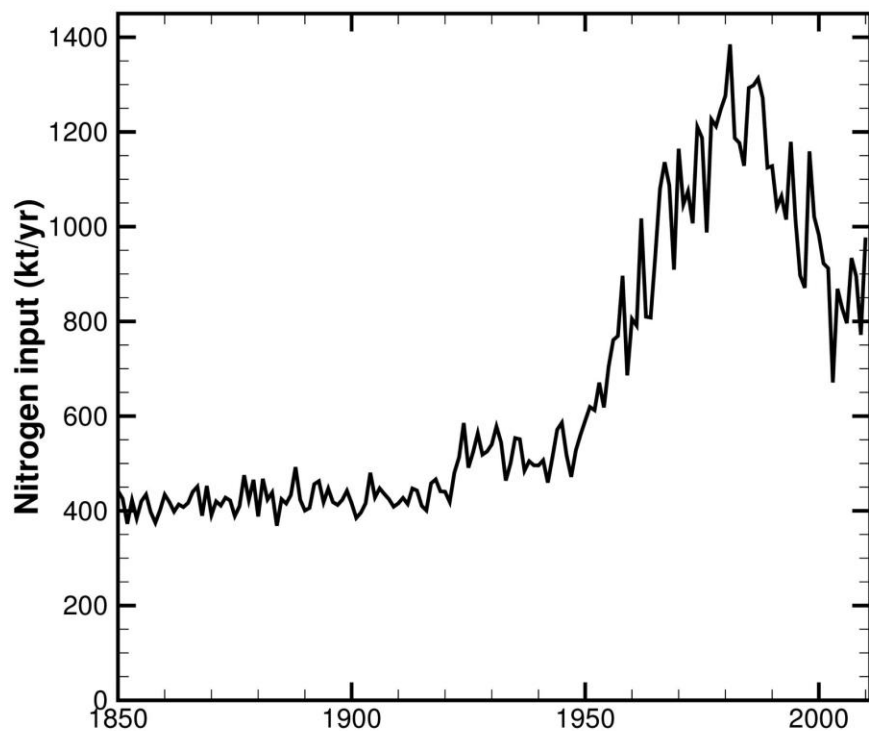


Swedish
Institute

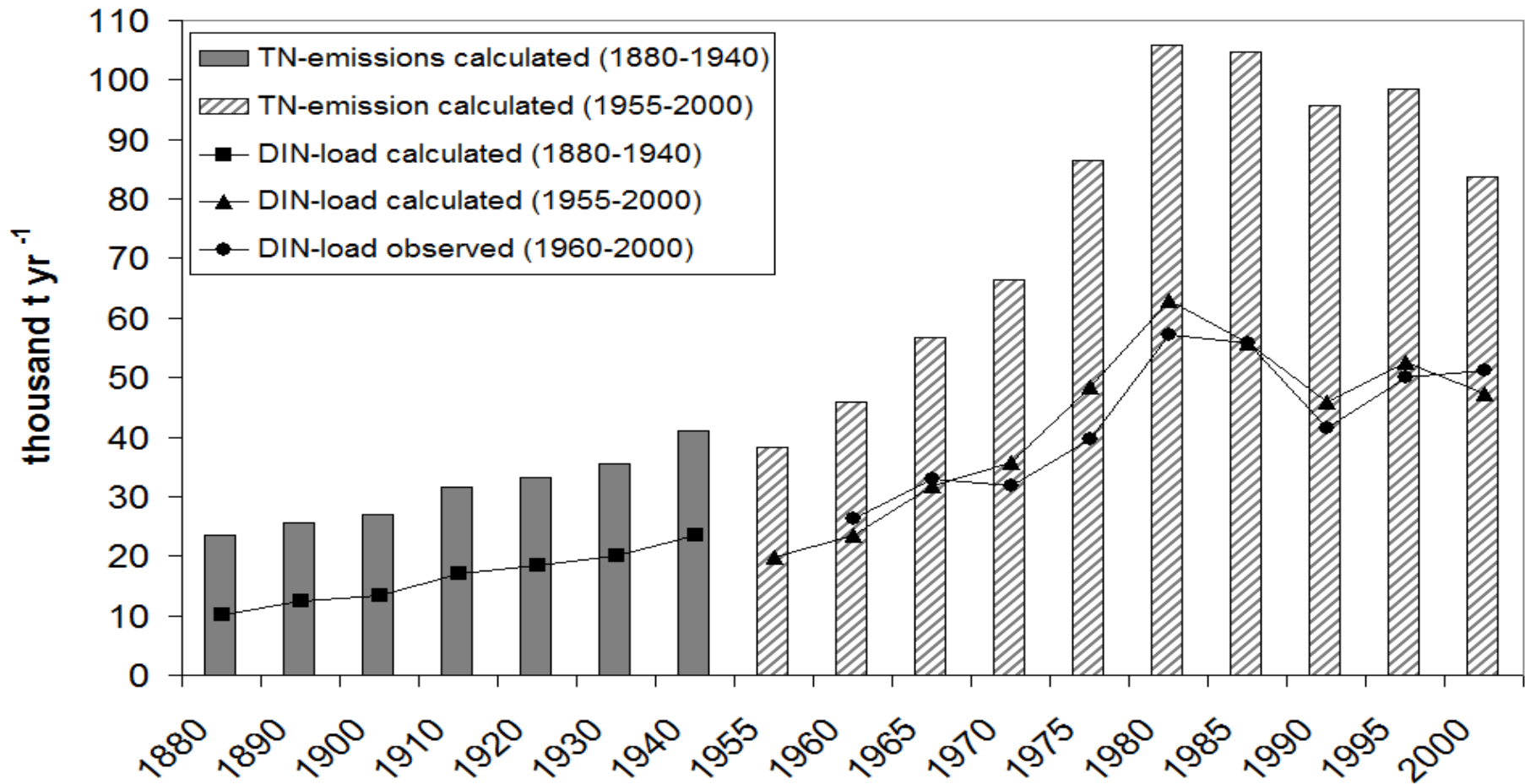
The nitrogen surplus in agriculture



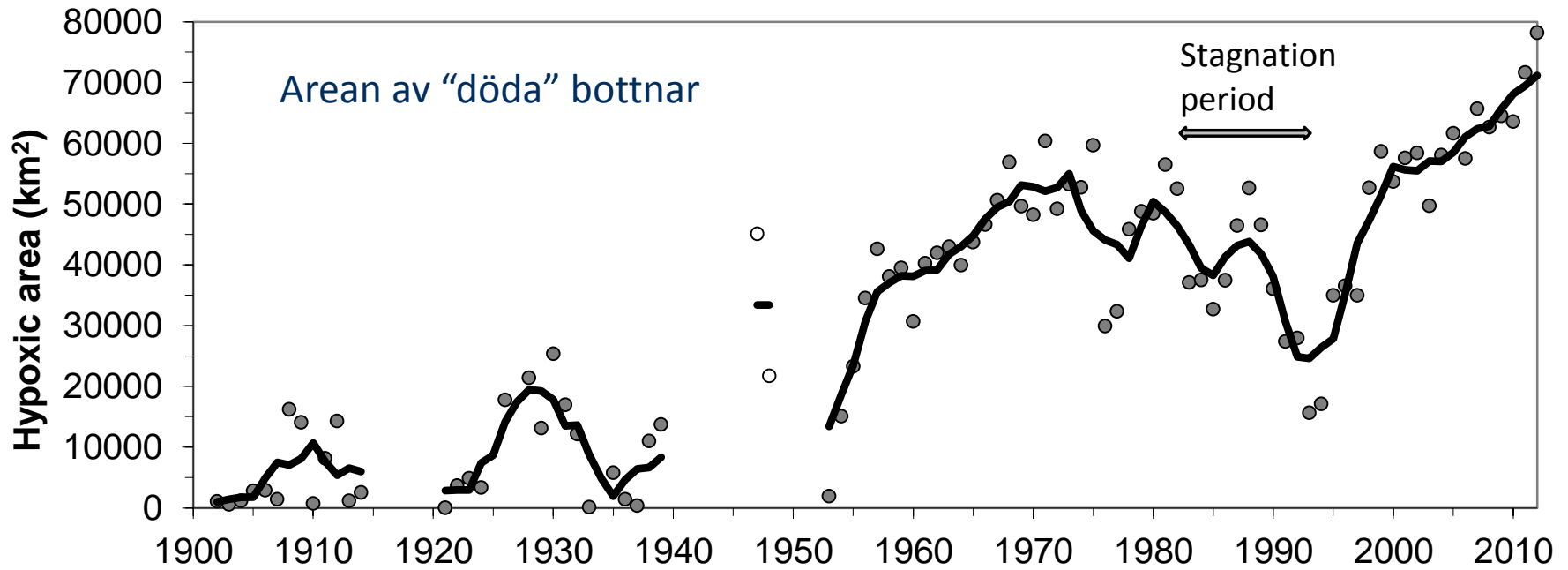
Belastningen av näringsämnen har minskat de senaste 30-40 åren



Historical changes in river load?



Ändå ökar de storskaliga problemen

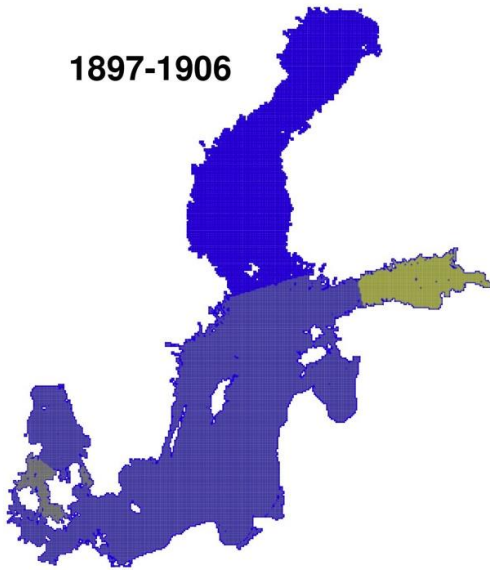




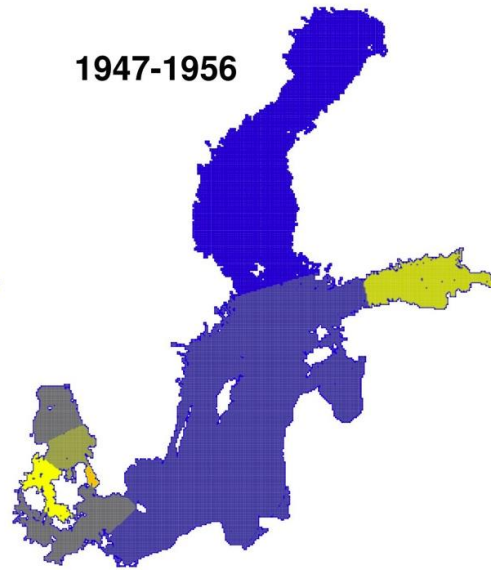
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Summer phytoplankton biomass

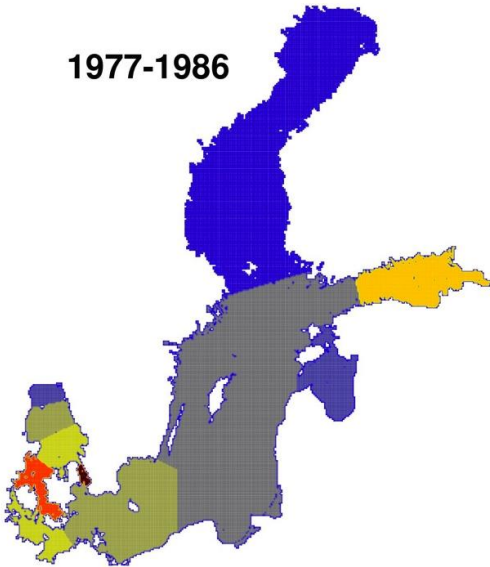
1897-1906



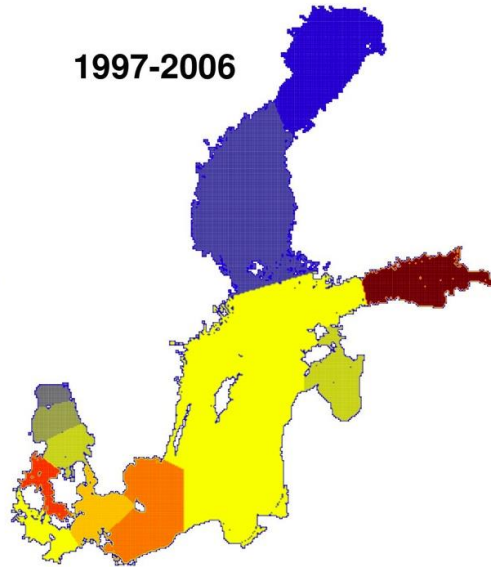
1947-1956



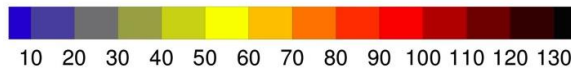
1977-1986



1997-2006



Biomass
(mgC m⁻³)



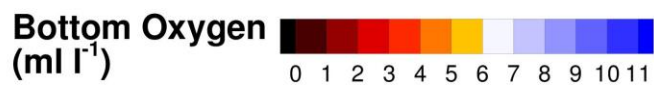
1897-1906

1947-1956

1977-1986

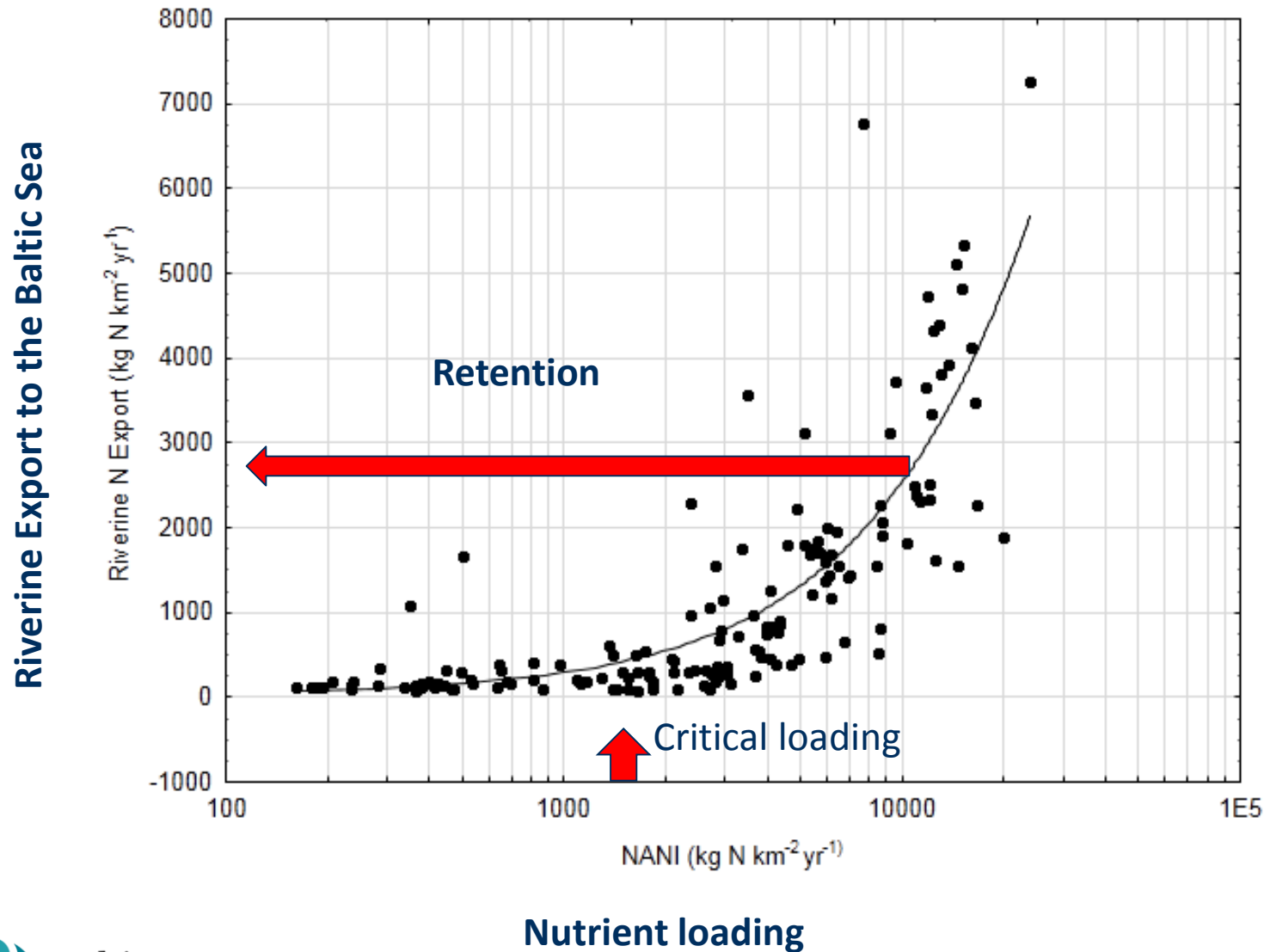
1997-2006

Bottom oxygen concentration



Vad göra?

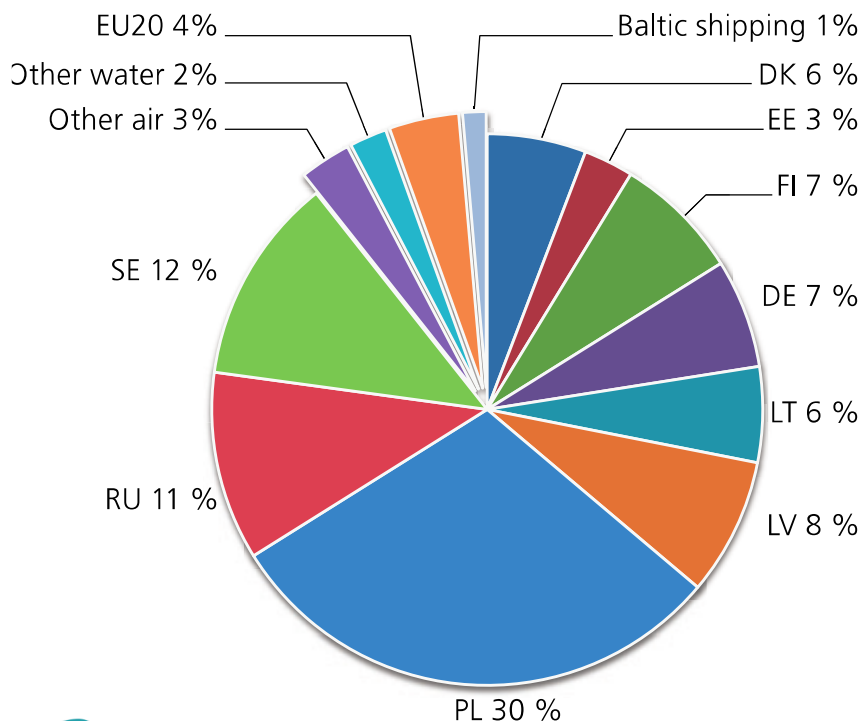
Some 25% nitrogen reaches the Baltic Sea



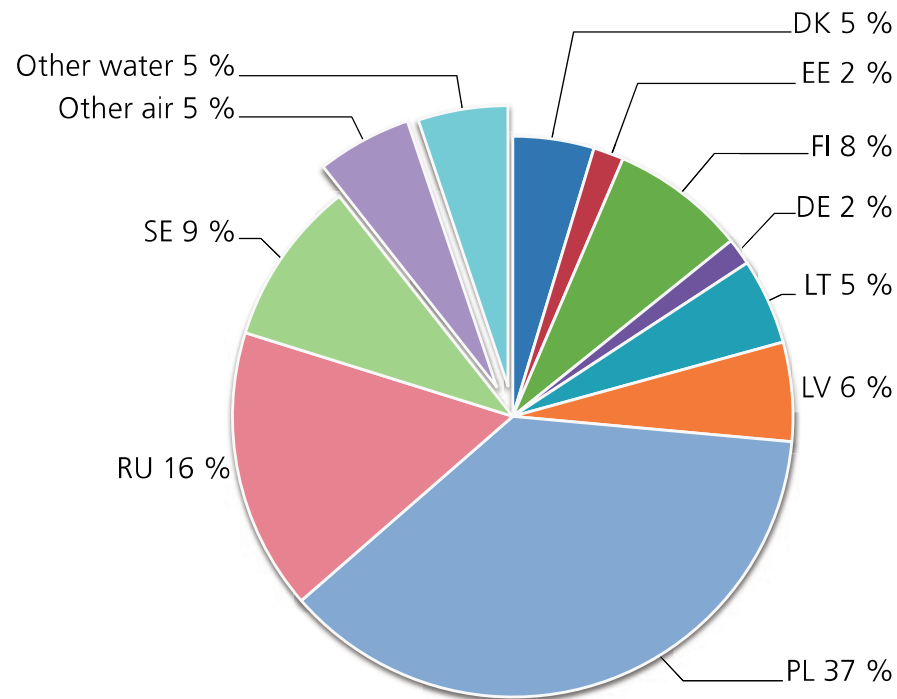
Närsalterna kommer från alla länder runt Östersjön

-> Internationella överenskommelser är nödvändiga

Nitrogen (977,000 tonnes)



Phosphorus (38,300 tonnes)

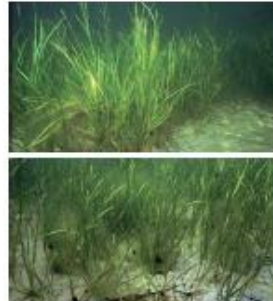


Målnivåer och indikatorer

Att översätta miljömålen till faktiska nivåer på mätbara variabler (indikatorer)



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Icke övergött vatten



Övergött vatten

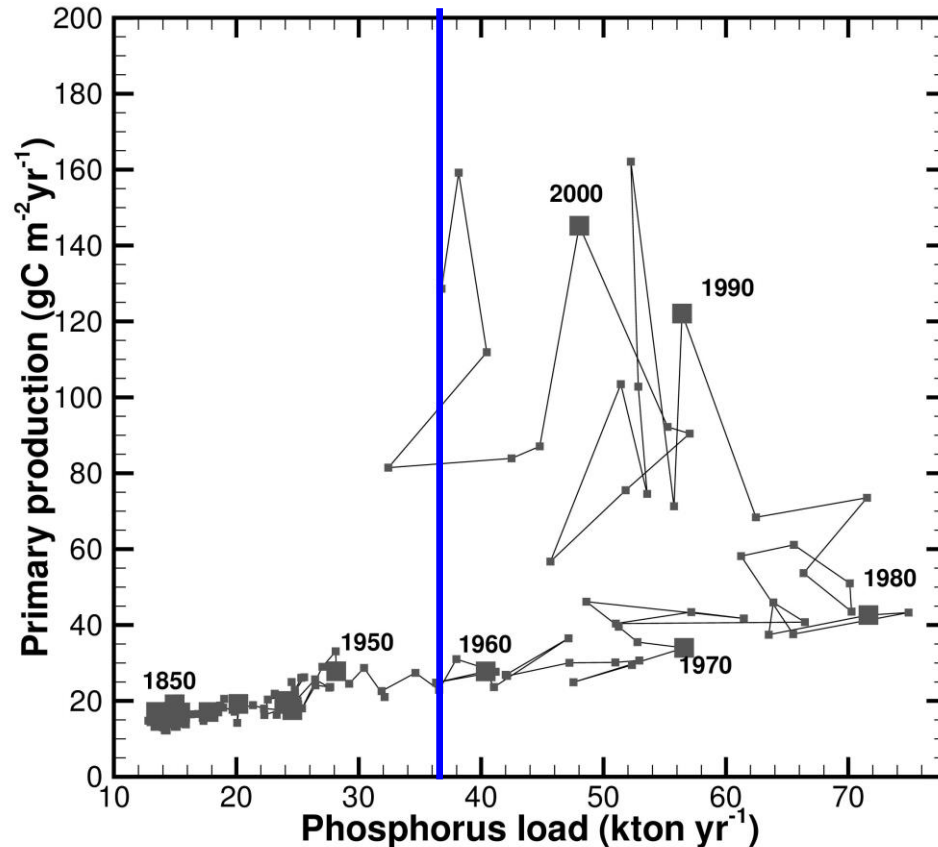


Highly non-linear response to loads

Baltic proper primary production against total loads

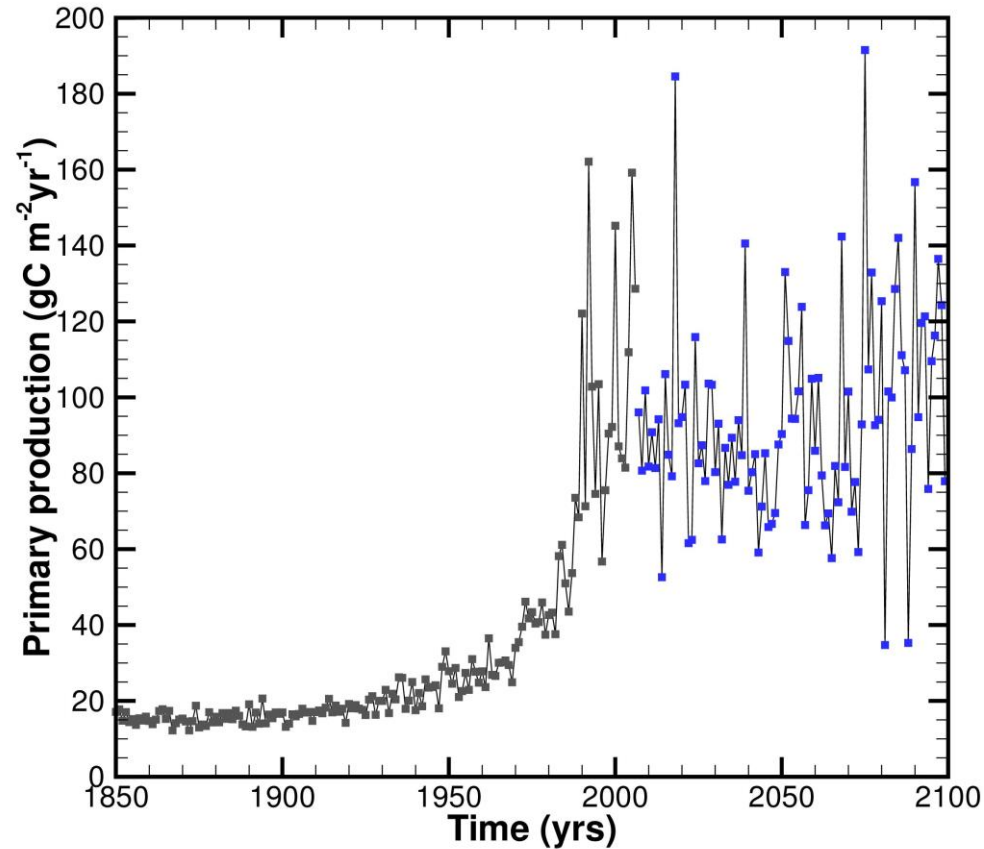


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But loads 2006 = loads 1956: will not things become better with time?

Continue simulation to 2100 with loads 2006



Not much change!

Environmental targets


An ambitious scientific foundation from the HELCOM TARGREV project
 New targets on winter nutrient concentrations, summer Secchi depth and Chl-a concentration; plus targets on oxygen levels

Basin	Winter		Summer	
	DIN	DIP	Chl <i>a</i>	Secchi
KT	5.0	0.49	1.5	7.6
DS	5.0	0.56	1.8	7.8
BP	2.6	0.30	1.7	7.4
BS	2.6	0.18	1.4	6.4
BB	4.7	0.07	1.9	5.4
GR	5.2	0.41	2.7	5.0
GF	3.8	0.59	2.0	5.5

+ targets on oxygen

Baltic Sea Environment Proceedings No. 133

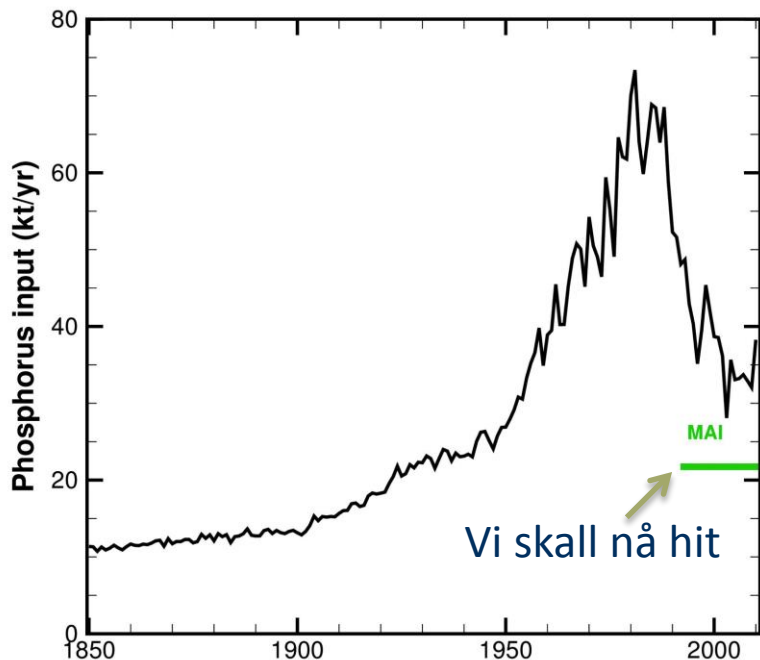
Approaches and methods for eutrophication target setting in the Baltic Sea region



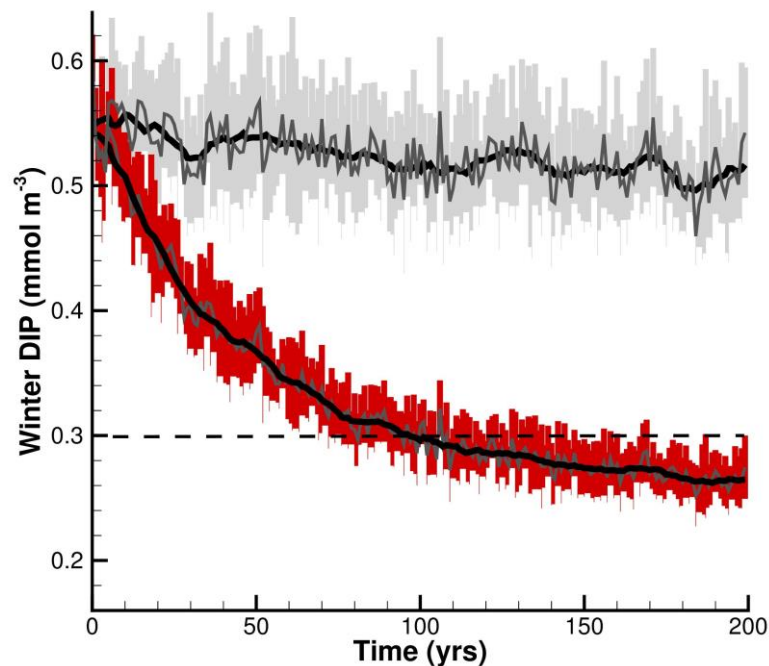
Helsinki Commission
 Baltic Marine Environment Protection Commission

Maximal belastning: hur mycket näringsämnen kan tillåtas släppas ut till Östersjön om övergödningen skall stoppas?

Vi beräknar alltså hur mycket minskningar i
utsläppen som behövs för att uppnå målnivåerna



Exempel på framtida fosfatnivåer



Maximum allowable inputs and needed reductions

WE RECOGNIZE that the revised Maximum Allowable Inputs represent best available scientific knowledge base and data, and characterize the HELCOM long-term vision of the Baltic Sea unaffected by eutrophication that we aspire;

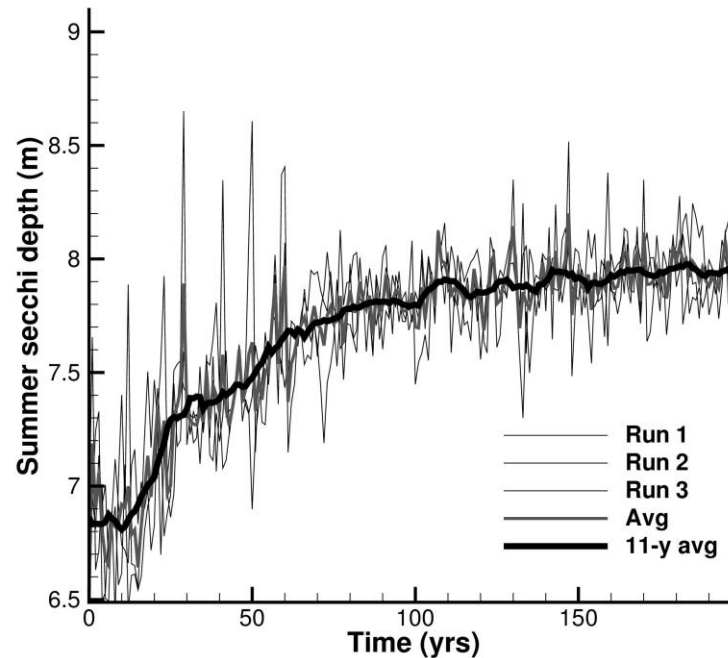
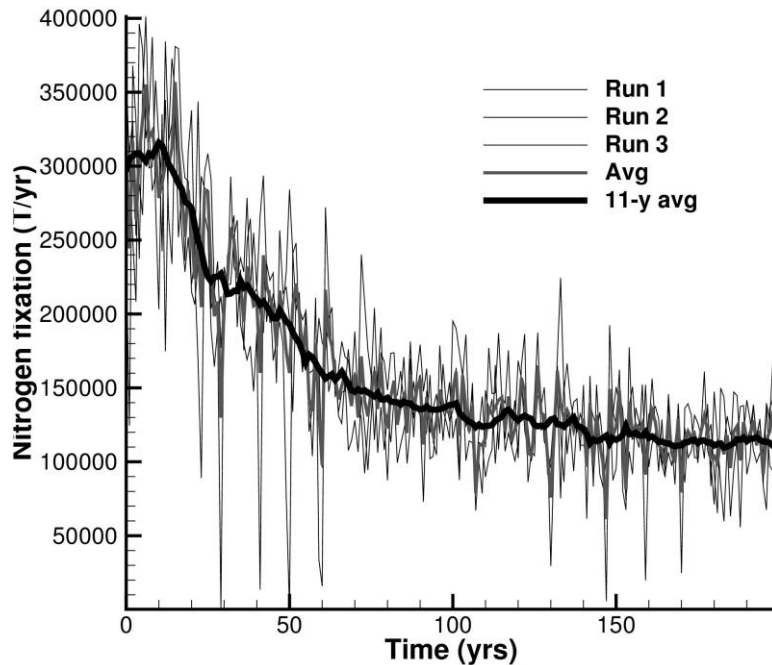
Baltic Sea Sub-basin	Maximum Allowable Inputs		Reference inputs		Needed reductions	
	TN tons	TP tons	TN tons	TP tons	TN tons	TP tons
Kattegat	74,000	1,687	78,761	1,687	4,761	0
Danish Straits	65,998	1,601	65,998	1,601	0	0
Baltic Proper	325,000	7,360	423,921	18,320	98,921	10,960
Bothnian Sea	79,372	2,773	79,372	2,773	0	0
Bothnian Bay	57,622	2,675	57,622	2,675	0	0
Gulf of Riga	88,417	2,020	88,417	2,328	0	308
Gulf of Finland	101,800	3,600	116,252	7,509	14,452	3,909
Baltic Sea	792,209	21,716	910,343	36,893	118,134	15,177

It takes 10-60 years to reach BSAP environmental targets

Reductions as prescribed by BSAP 2007 implemented year 0

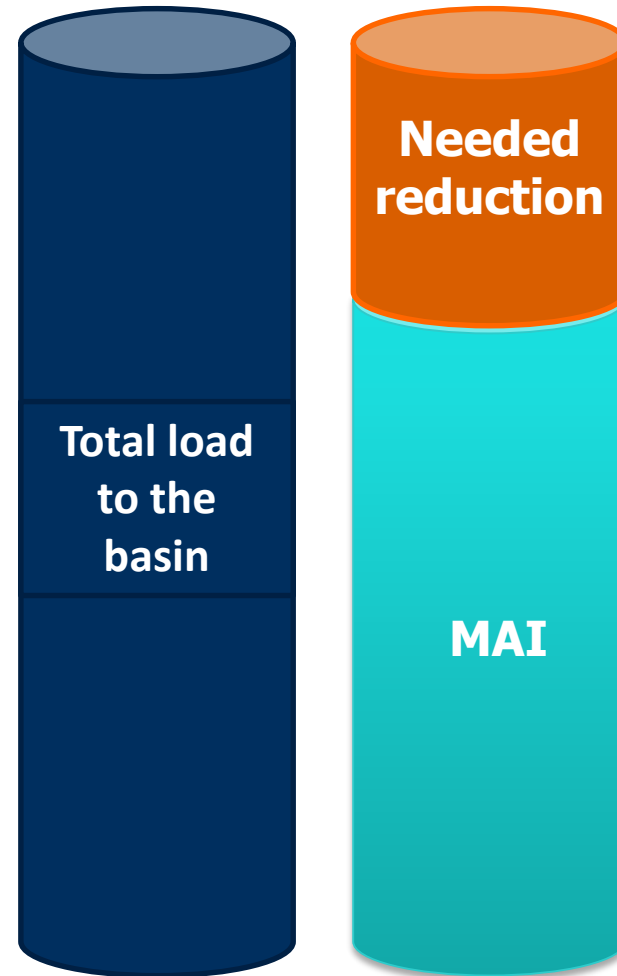
Two indicators: nitrogen fixation and Secchi depth

3 runs with different weather indicates natural variability

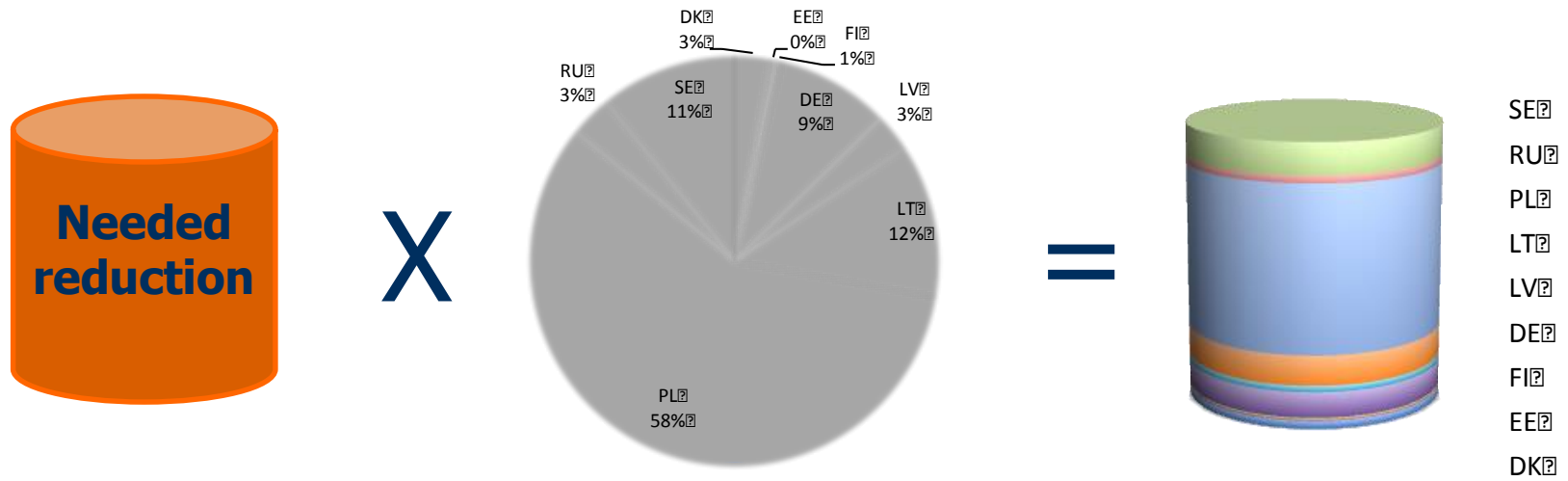


Defining total reduction target

Needed reduction given by the difference between the **total loads** to the basin and the **Maximum Allowable Inputs**



Calculation of the Country-allocated load reduction target



The needed reduction is multiplied with the share of loads

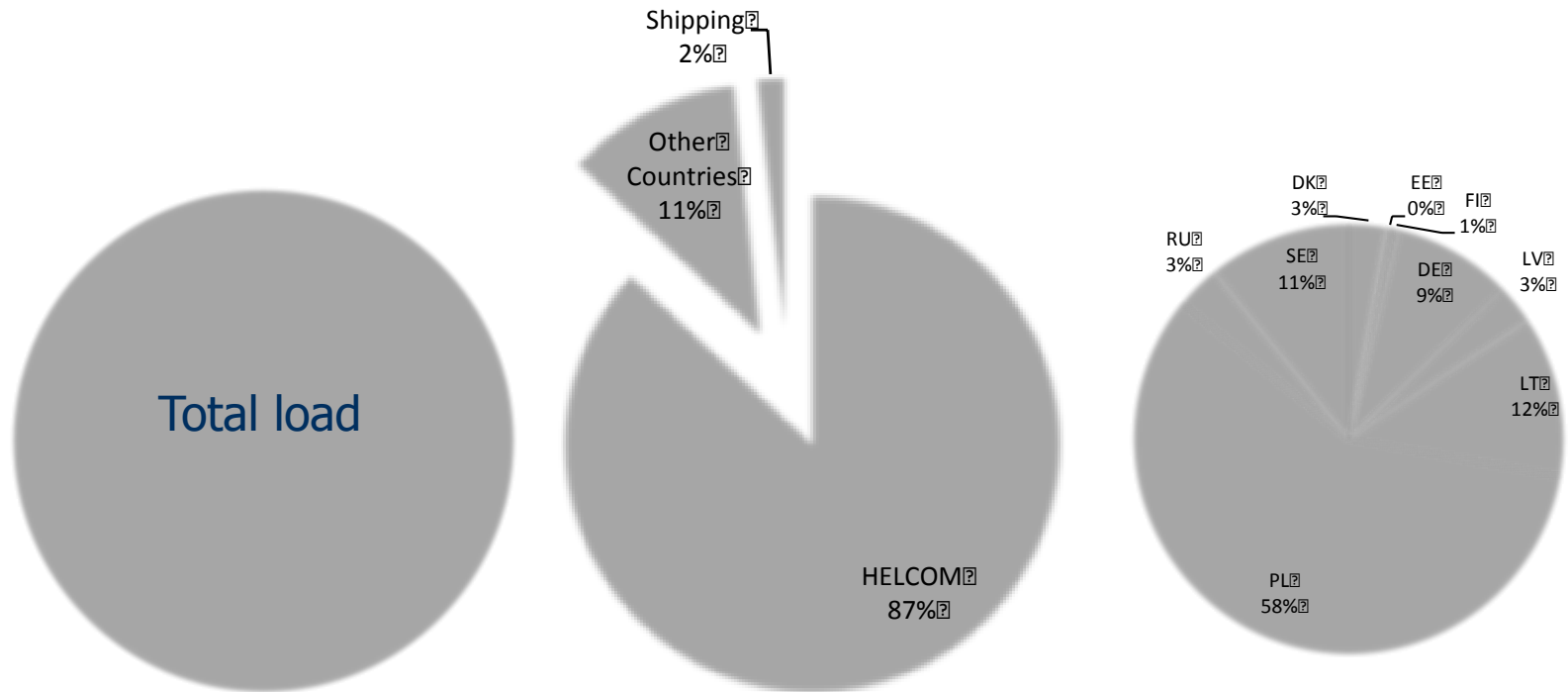
Calculating the country wise share



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Transboundary loads are subtracted from the total

The share is computed from the part of the load emitted from HELCOM countries

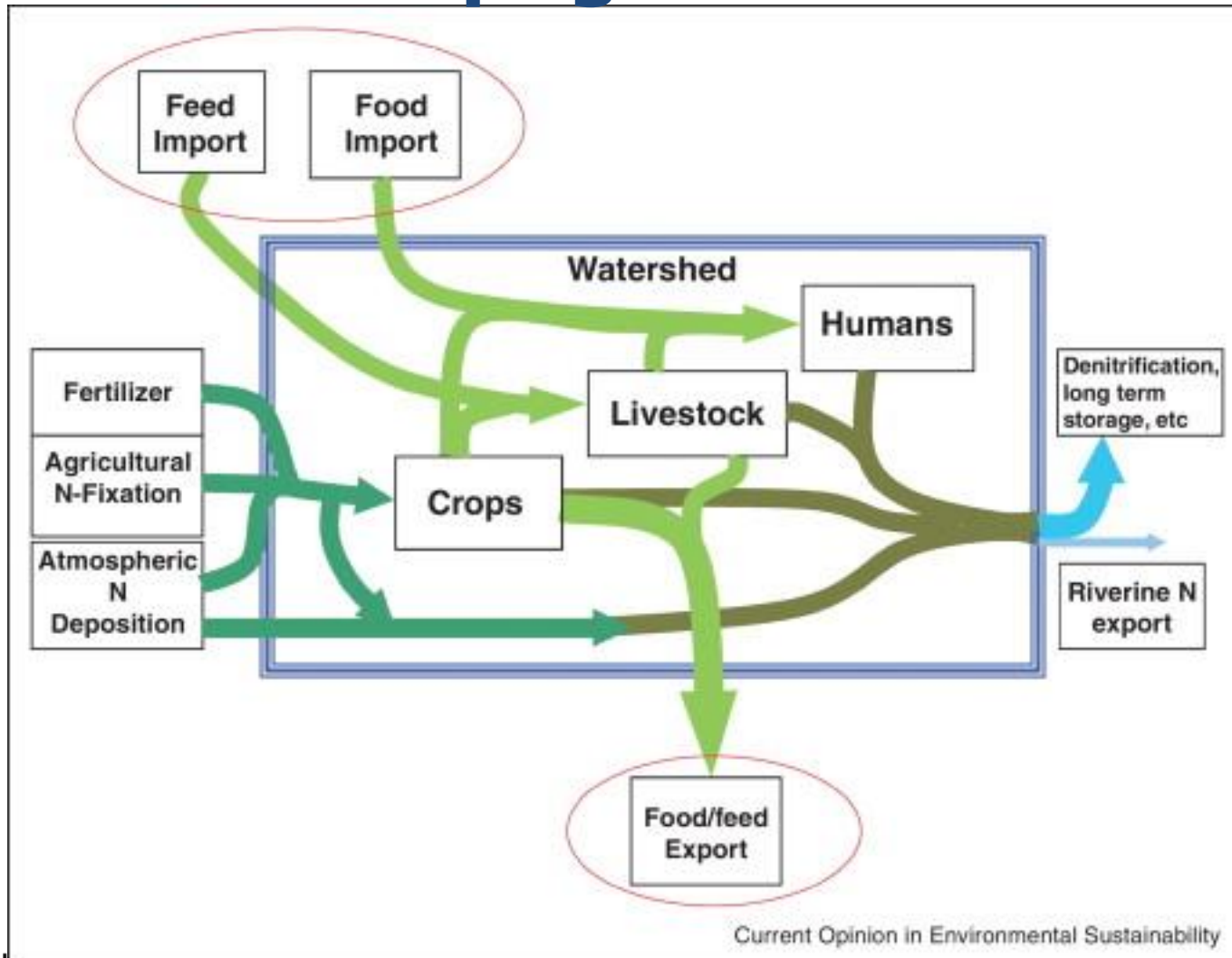


Hur blir framtiden?

Nutrient accounting tool: Net Anthropogenic Nutrient Inputs



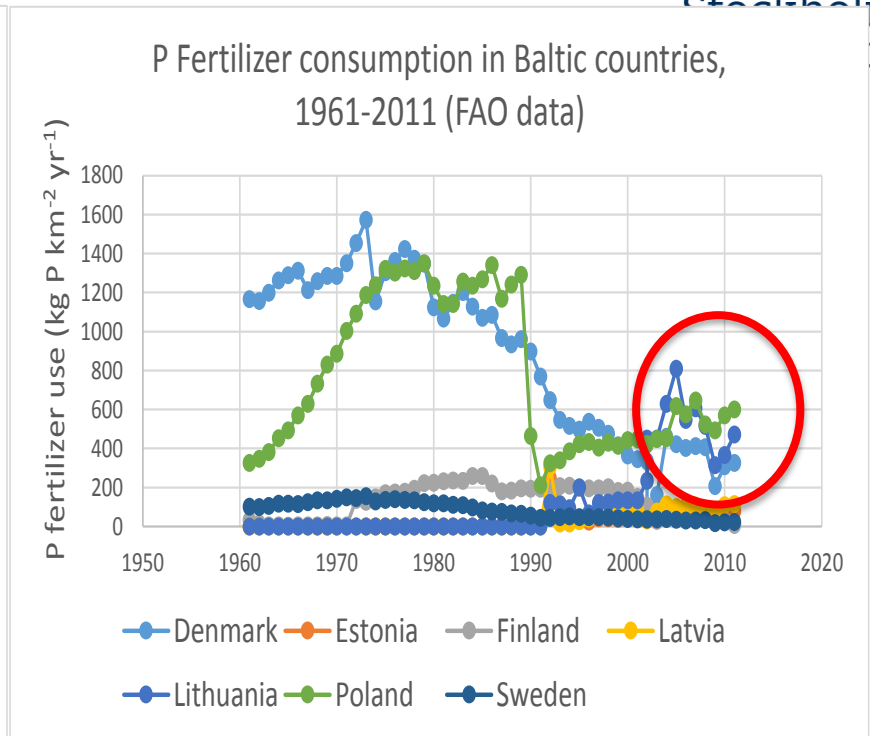
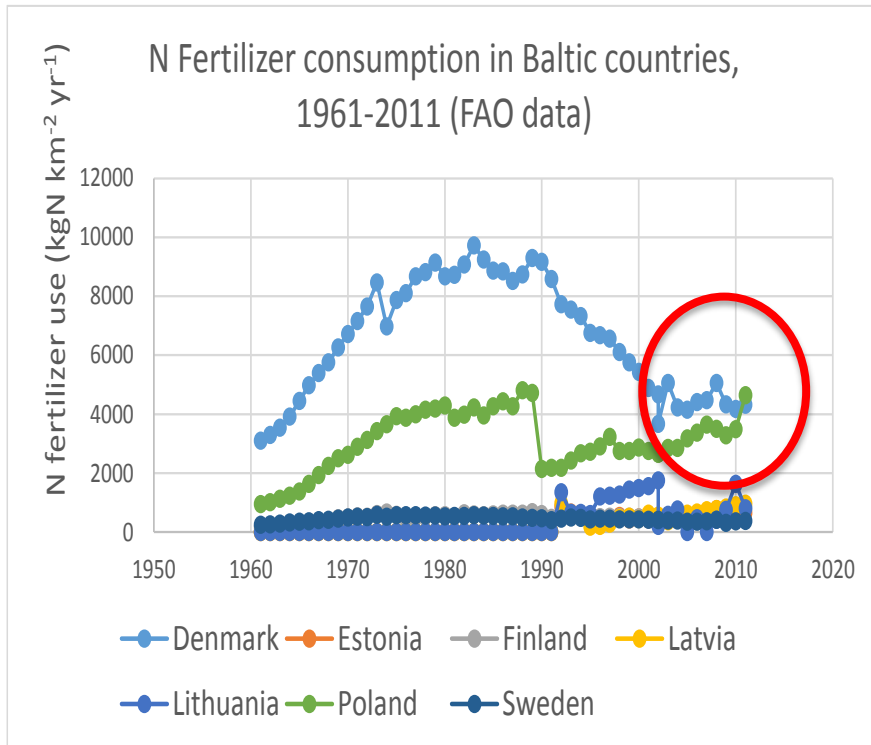
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Long-term N and P fertilizer consumption in Baltic countries (consumption per area)



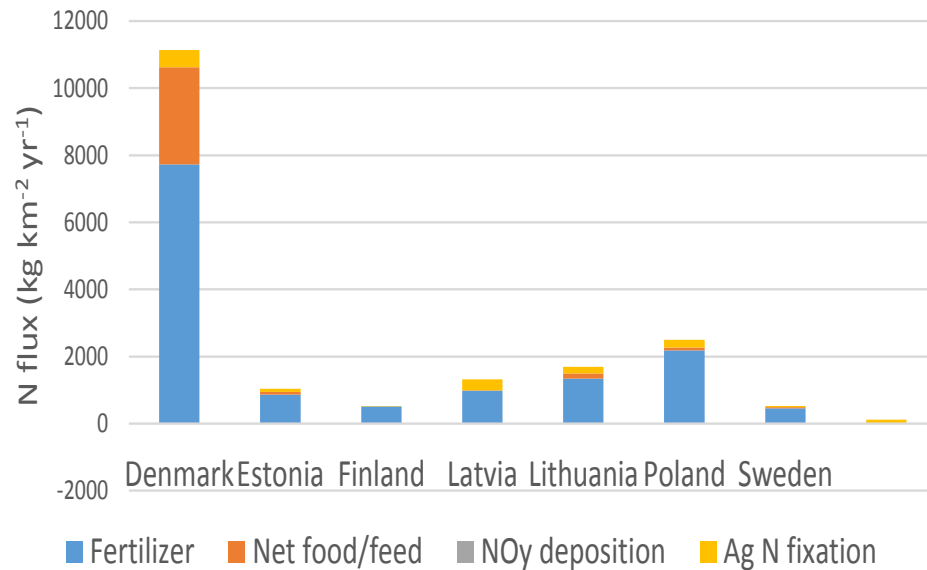
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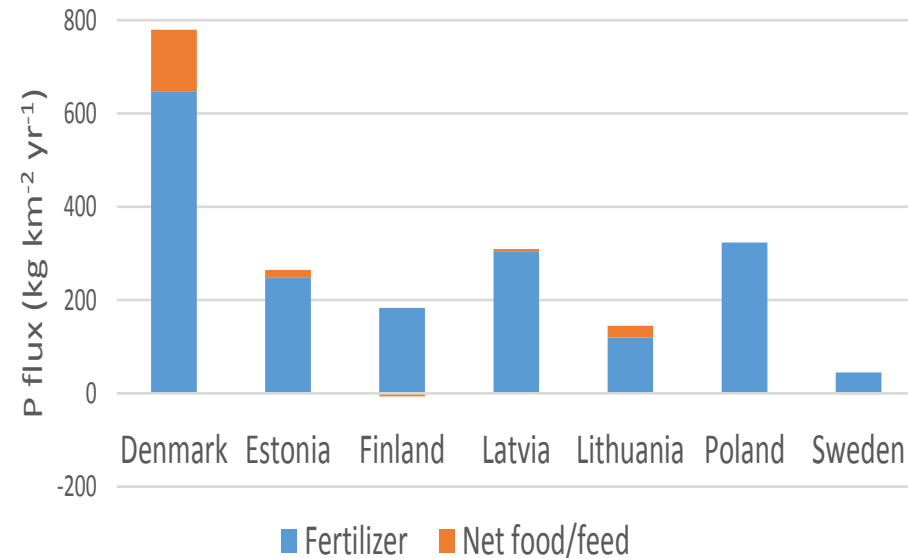
Source: <http://faostat3.fao.org/faostat-gateway/go/to/home/E>

Components of NANI and NAPI on a mass/area basis, 1992

Components of NANI in seven Baltic countries, 1992



Components of NAPI in seven Baltic countries, 1992

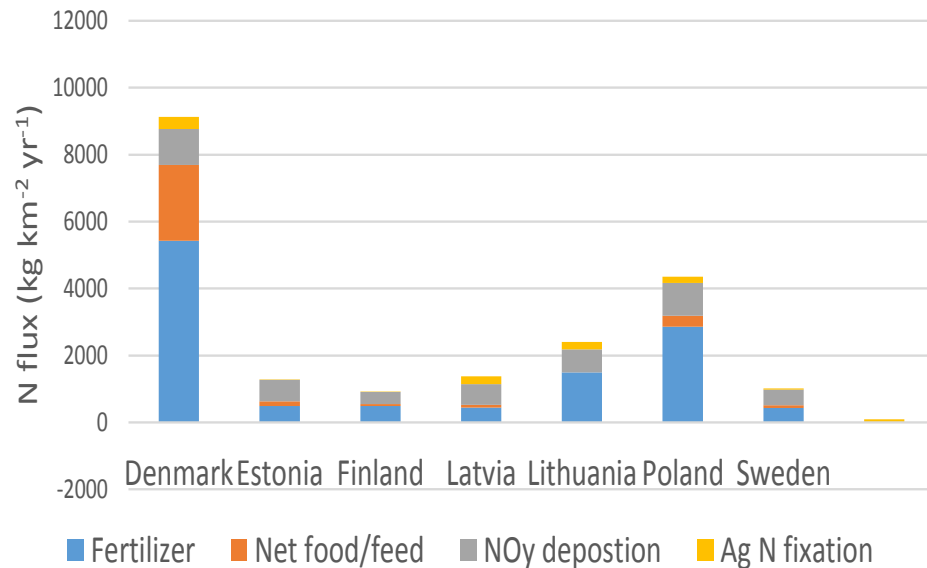


Source: <http://faostat3.fao.org/faostat-gateway/go/to/home/E> ; N & P contents for food/feed commodities

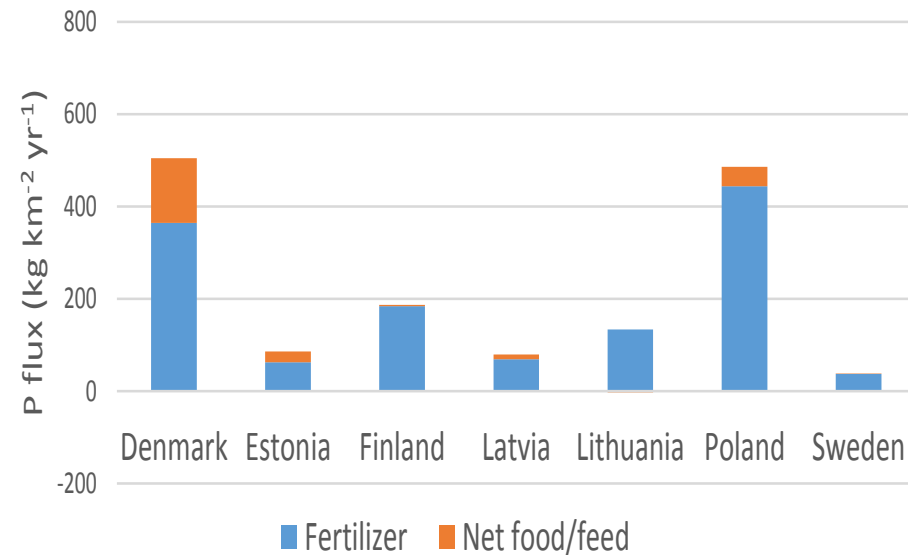
From Lassalletta et al. 2013 suppl. matl. and other sources

Components of NANI and NAPI on a mass/area basis, 2000

Components of NANI in seven Baltic countries, 2000



Components of NAPI in seven Baltic countries, 2000

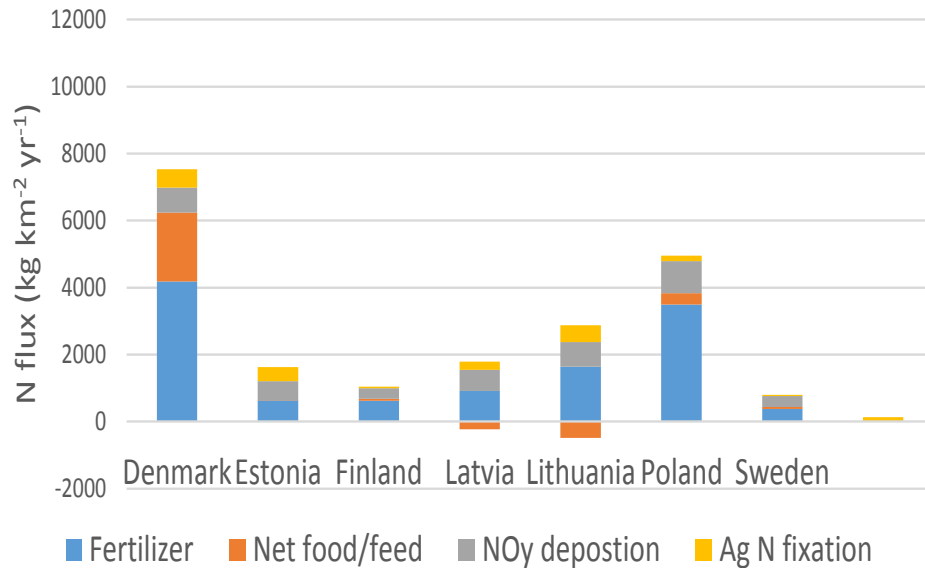


Source: <http://faostat3.fao.org/faostat-gateway/go/to/home/E> ; N & P contents for food/f

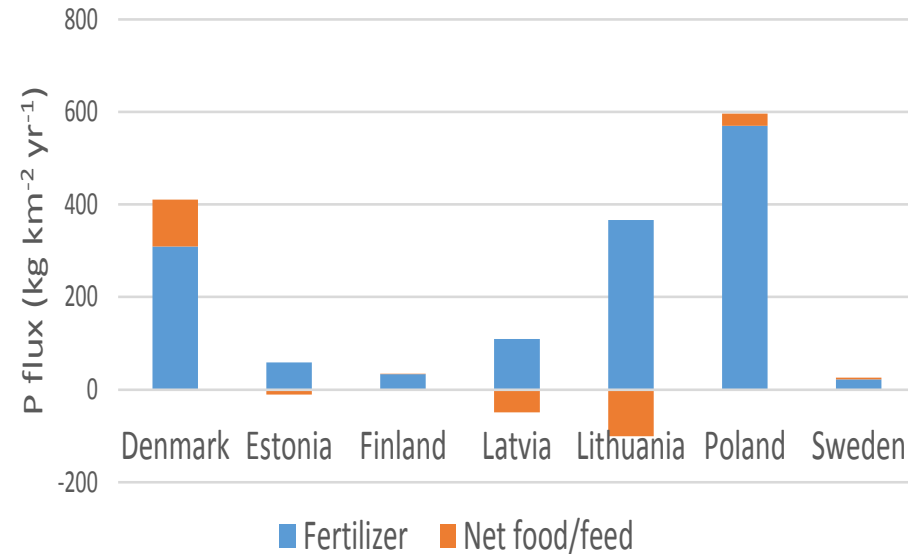
From Lassalletta et al. 2013 suppl. matl. and other sources

Components of NANI and NAPI on a mass/area basis, 2010 (Fertilizer is the dominant input in all countries)

Components of NANI in seven Baltic countries, 2010

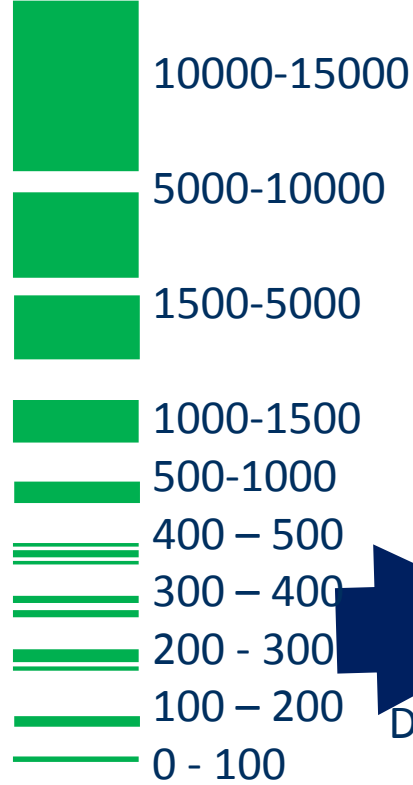


Components of NAPI in seven Baltic countries, 2010

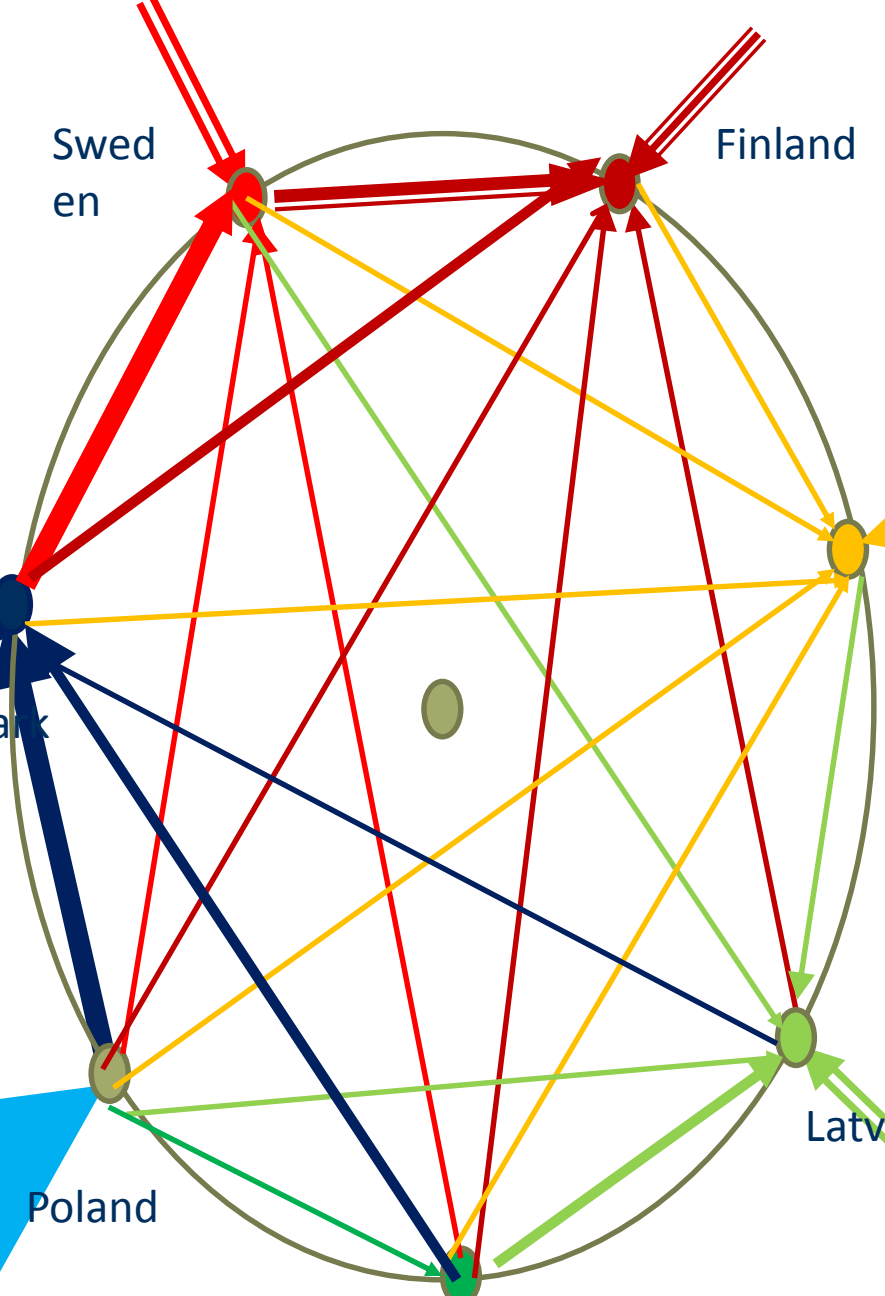


Source: <http://faostat3.fao.org/faostat-gateway/go/to/home/E> ; N & P contents for food/f

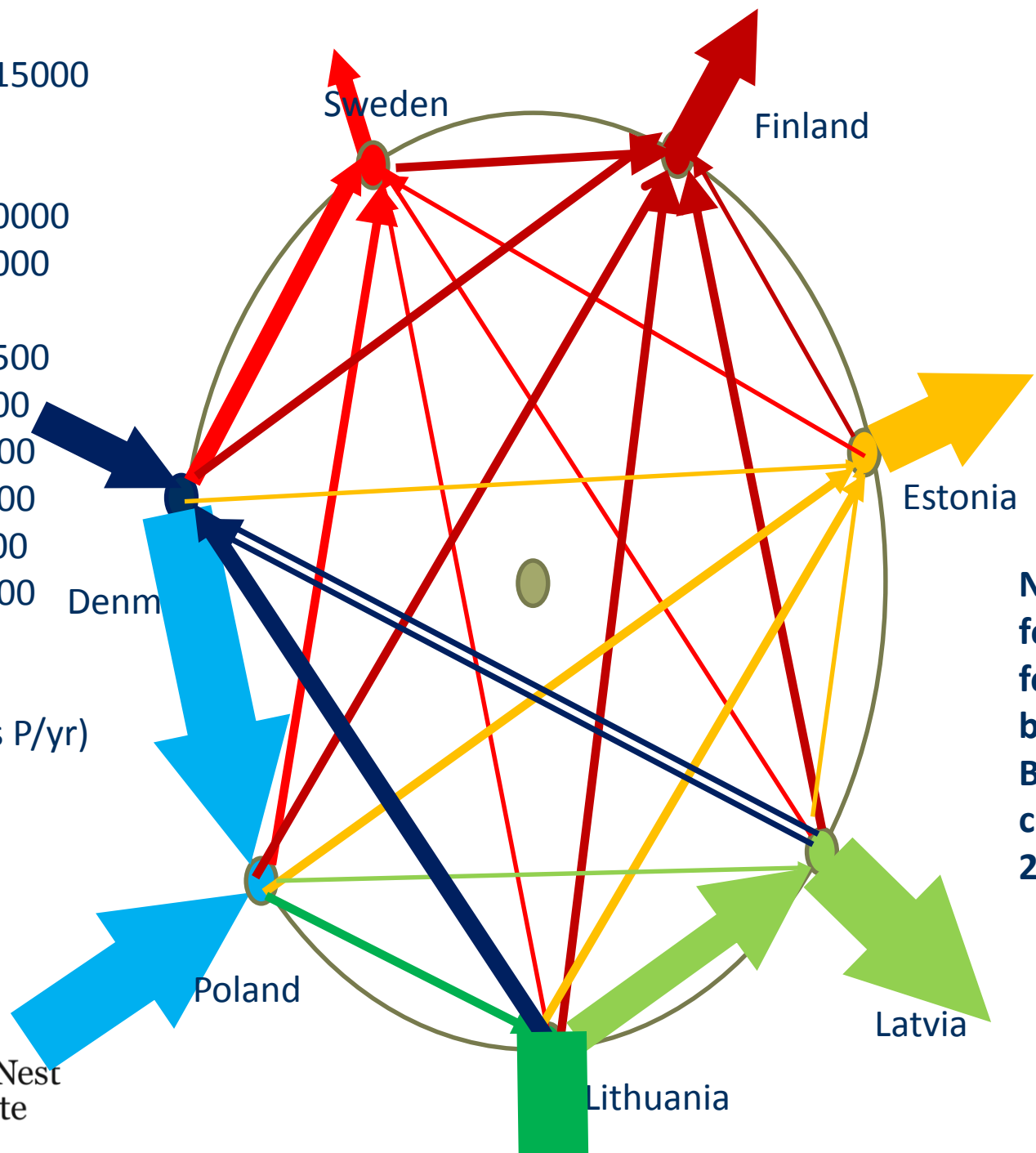
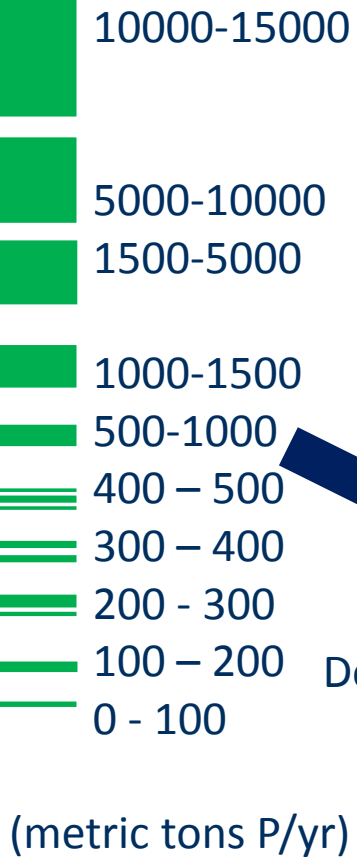
From Lassalletta et al. 2013 suppl. matl. and other sources



(metric tons P/yr)



Net P in food and feed trade between Baltic countries, 2001



Net P in food and feed trade between Baltic countries, 2010

Har östersjöns tillstånd förbättrats?

Svaret på den frågan:

NEJ, utan snarare har det blivit en försämring