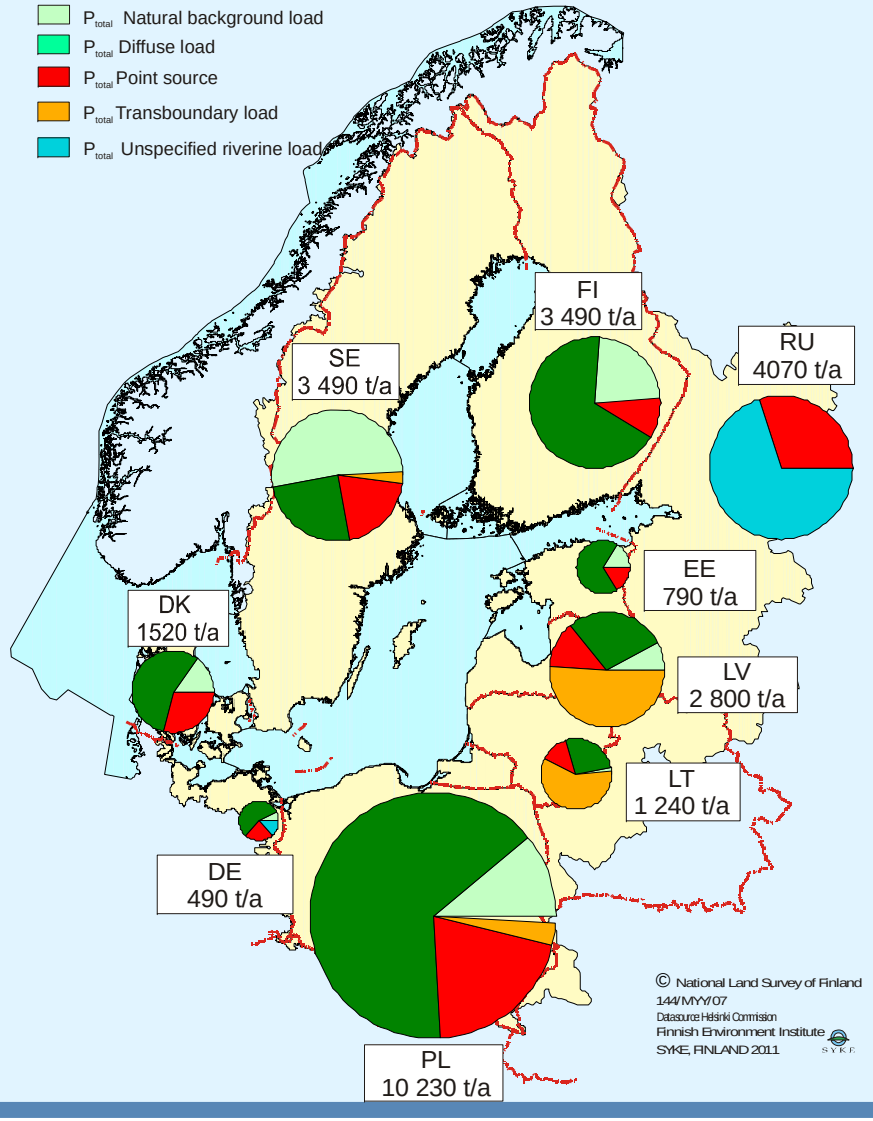
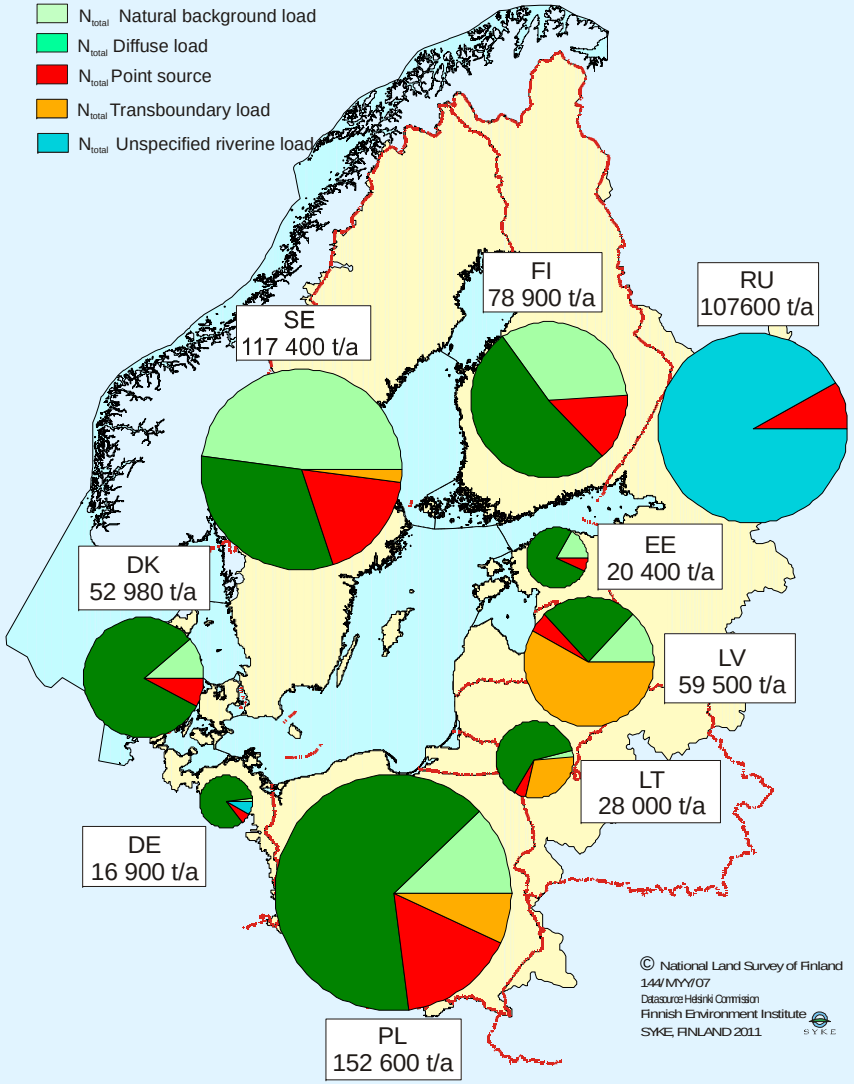
Where is the potential to reduce nutrient loading into the Baltic Sea?

Seppo Knuuttila
Marine Research Centre
SYKE

Cyanobacterial blooms in the Baltic Sea
MODIS AQUA 2005-07-11, data from NASA
processed by SMHI

Total phosphorus and nitrogen loads into the Baltic Sea in 2006





HELCOM PLC-5 Core Group,
Seppo Knuuttila 8.3.2011

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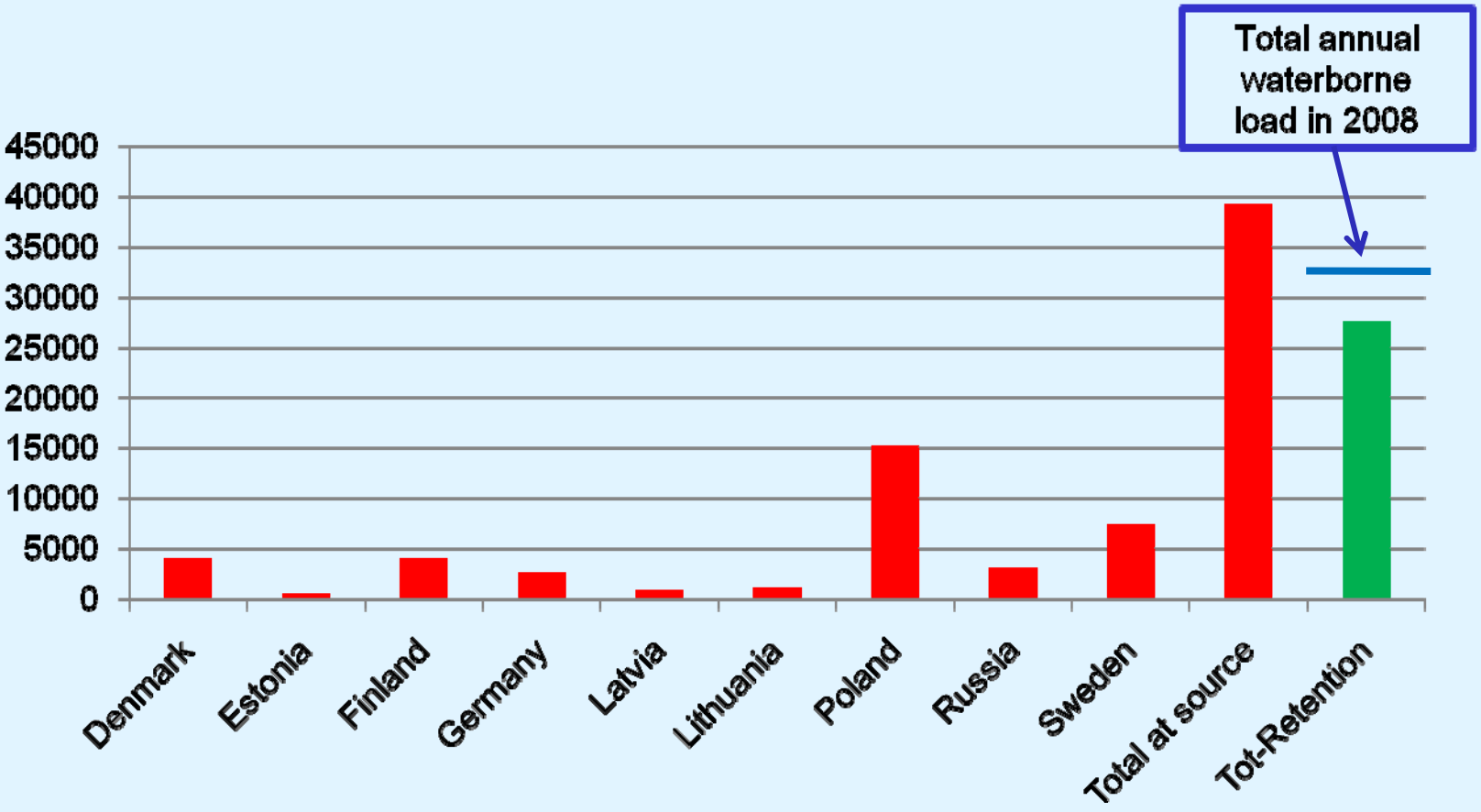
Waste water treatment

Photo: The John Nurminen Foundation

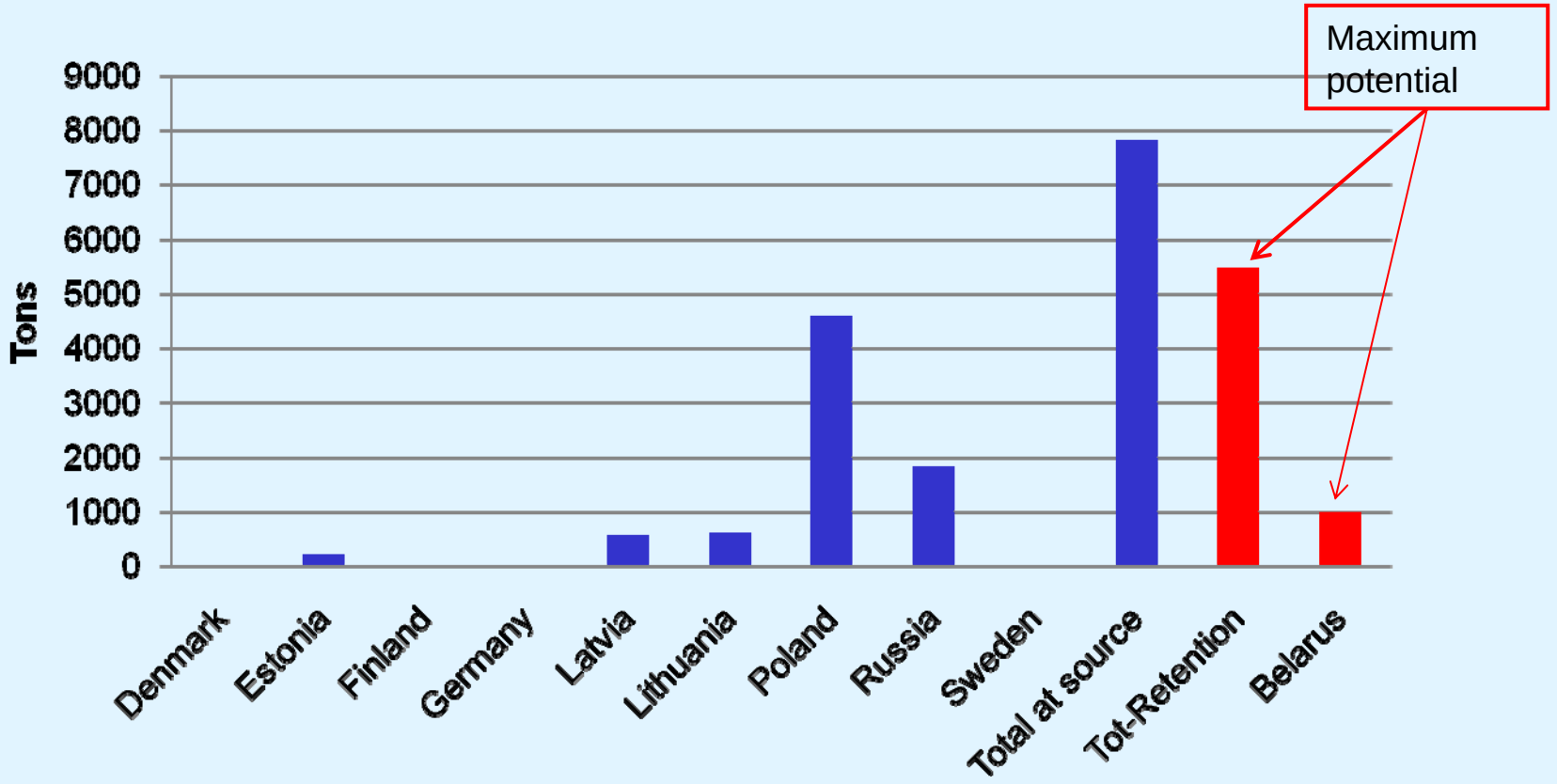
Reduction of phosphorus load (tons) from municipal waste waters into the Baltic Sea in 1970-2009



Waste water treatment plant in the catchment area of the Baltic Sea in 2011

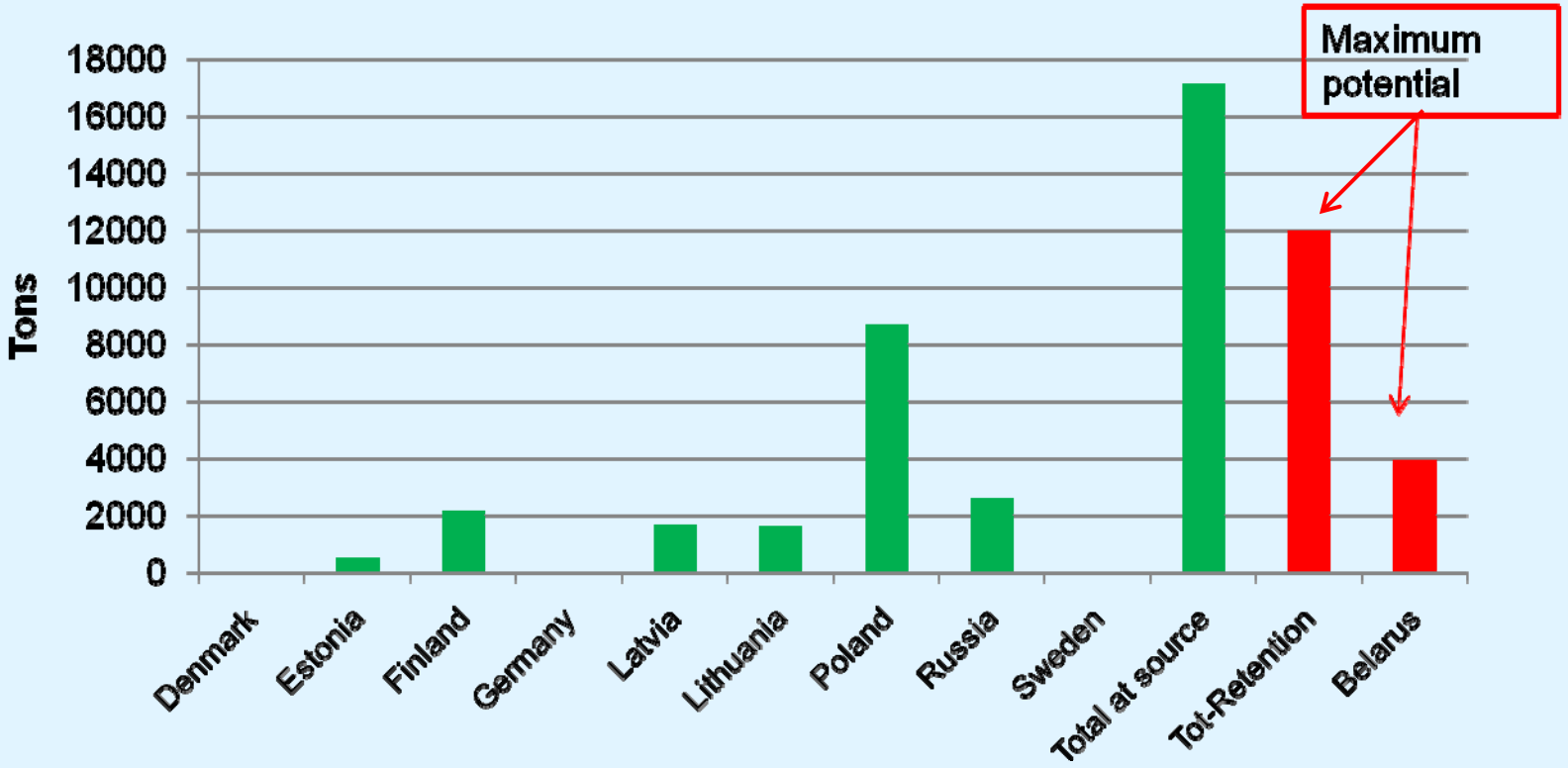
Photo: Seppo Knuuttila

Phosphorus reduction potential in the municipal waste water treatment plants



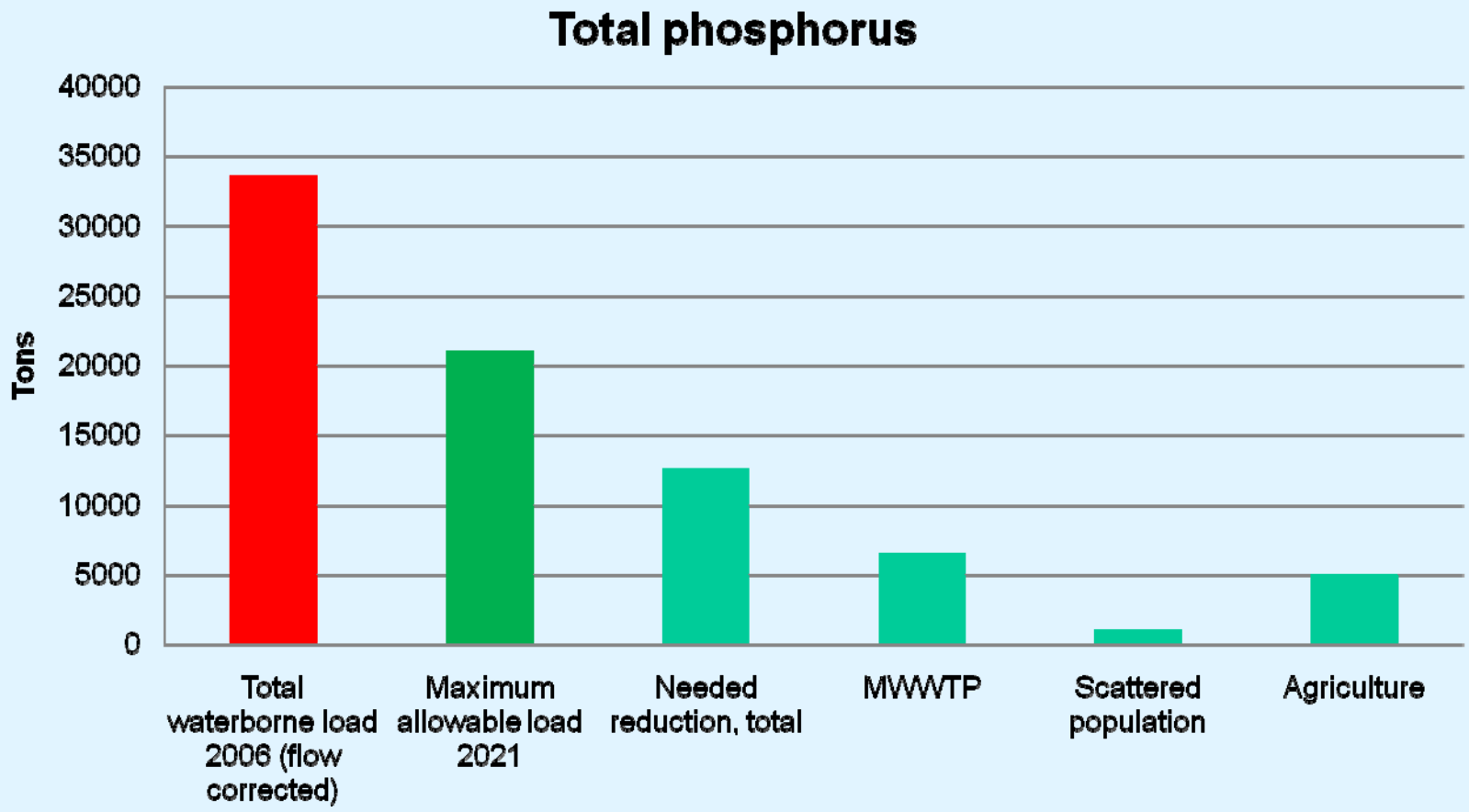
- **Improval of primary and secondary treatment to meet 90% reduction target**
- **Blue bars: reduction at the treatment plant per country and total of HELCOM countries**
- **Red bars: retention in the catchment area subtracted, total of HELCOM countries + Belarus**

Nitrogen reduction potential in the MWWTPs

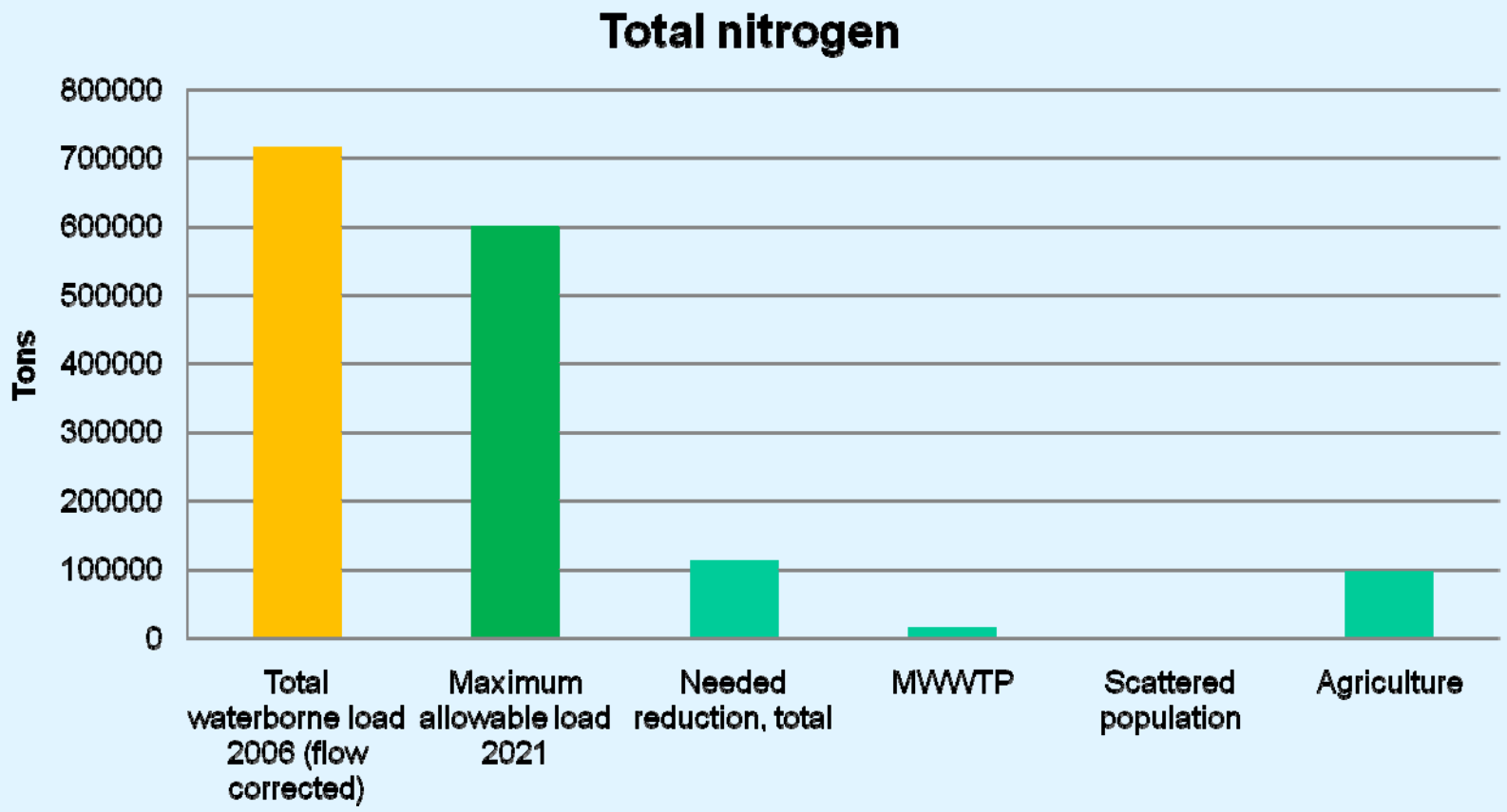


- **Improval of nitrogen reduction up to 70% (+ about 20 000 tons if 80%)**
- **Green bars: reduction at the treatment plant per country and total of HELCOM countries**
- **Red bars: retention in the catchment area subtracted, total of HELCOM countries + Belarus**

Total load into the Baltic Sea in 2006 and needed reduction by 2021



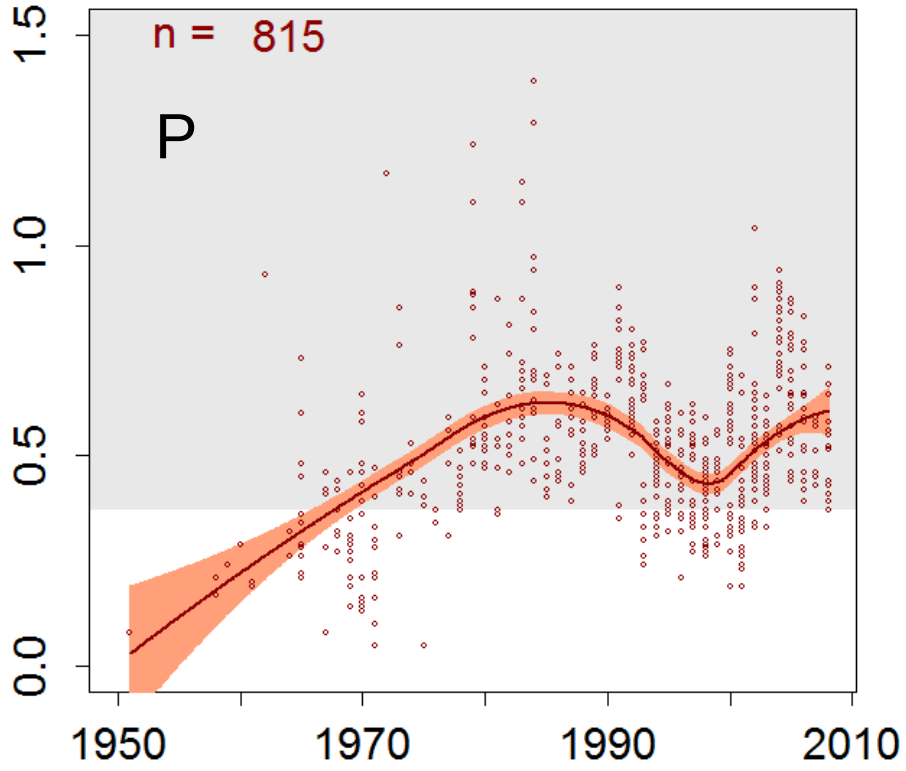
Total load into the Baltic Sea in 2006 and needed reduction by 2021

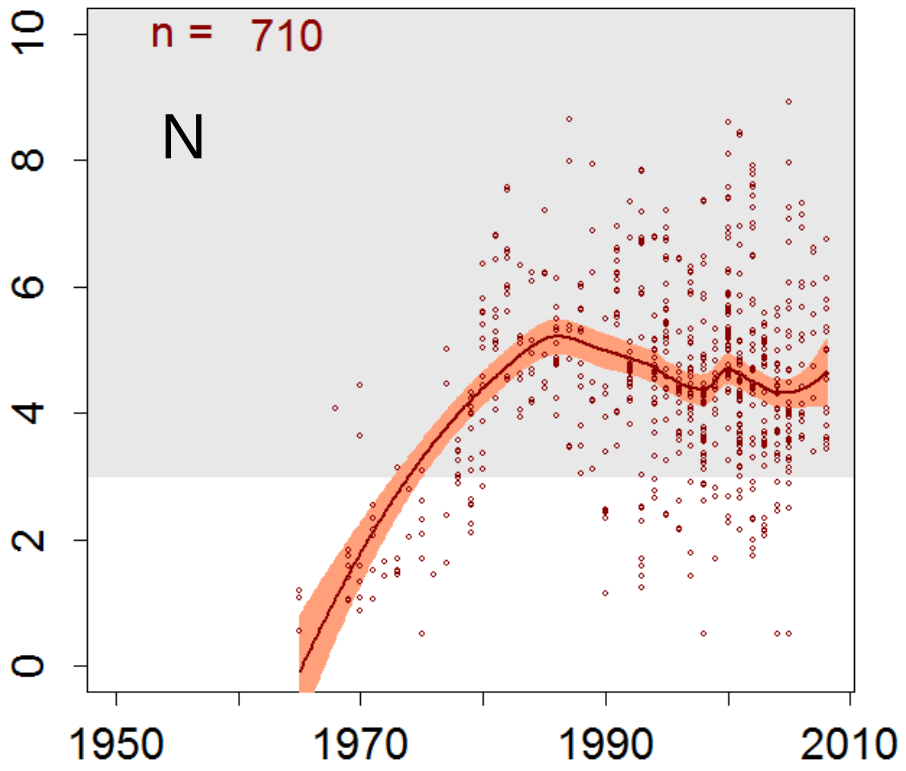


Agriculture

Photo: Seppo Knuuttila

Phosphorus and nitrogen concentrations in northern Baltic Proper





Source: Fleming-Lehtinen, SYKE

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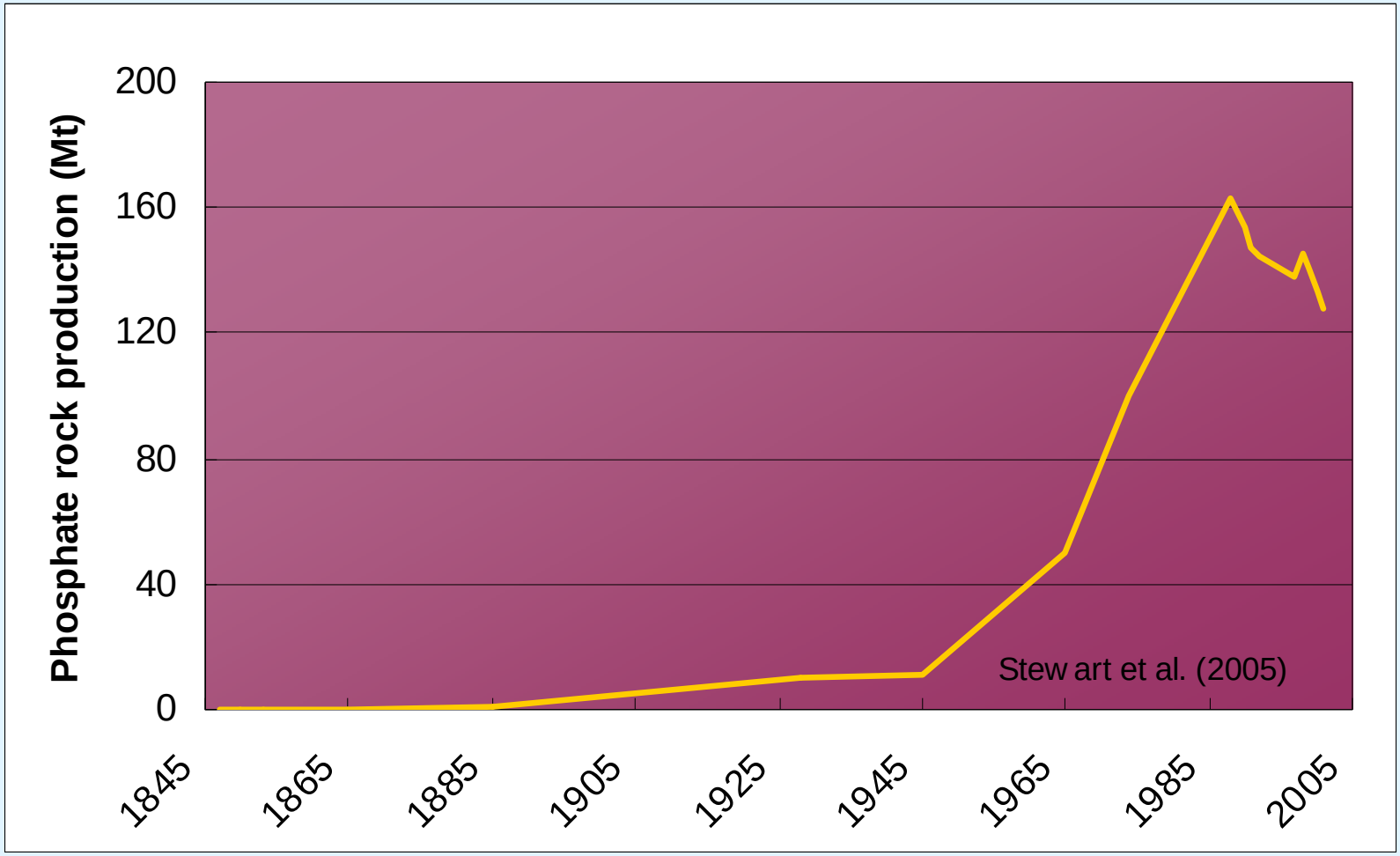
Global production of phosphorus fertilizers



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Separation of grain and livestock production

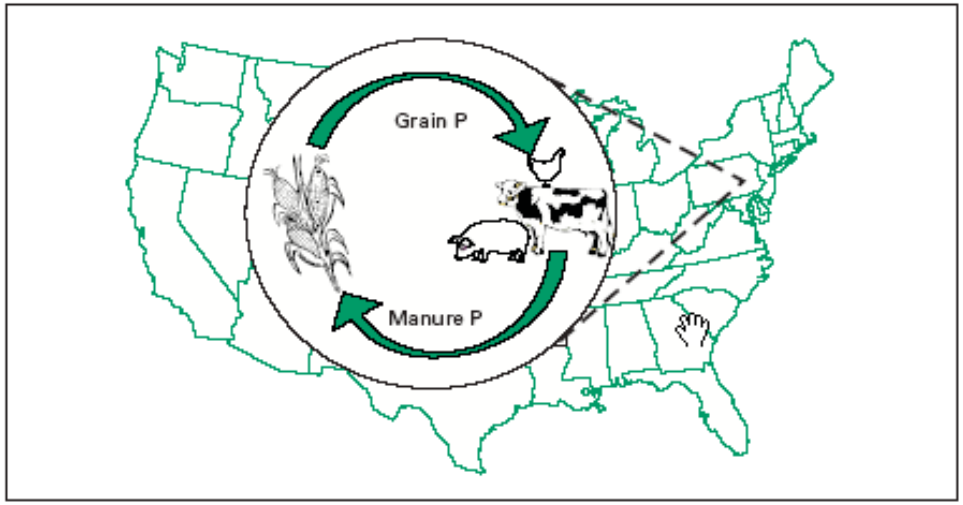

Figure 34-6. Before World War II, nutrient cycling was localized and sustainable within watersheds.

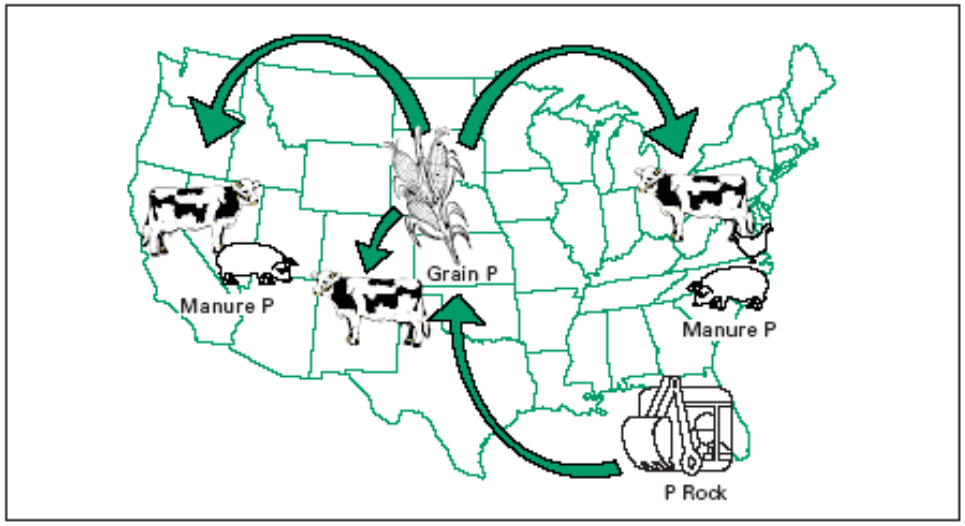

Figure 34-7. Since World War II, the nutrient cycle has been broken on a national level, with P tending to move from areas of grain production to areas of livestock production.

http://www.lpes.org/Lessons/Lesson34/34_4_Phosphorus_Increase.pdf

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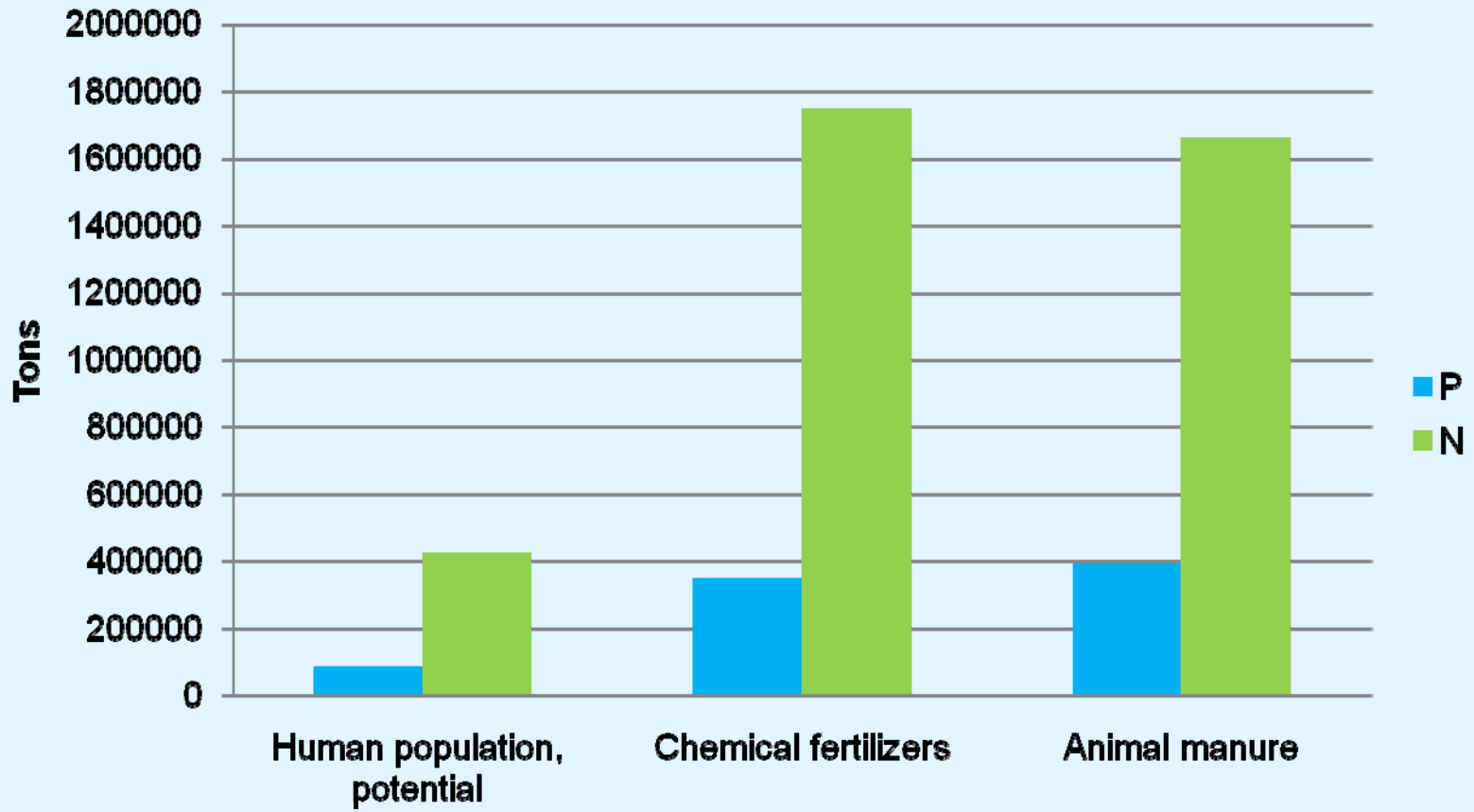
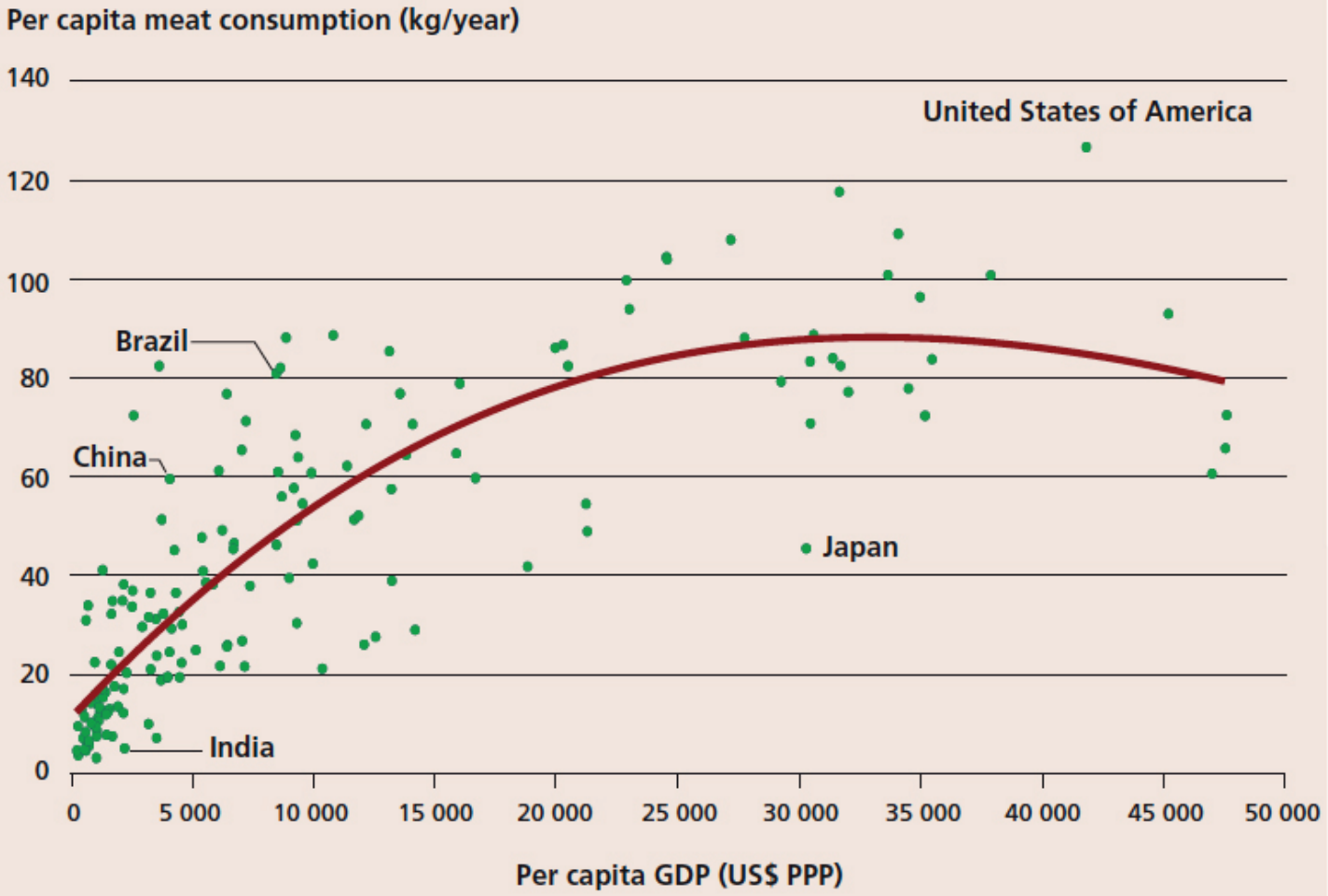
The nutrient pool produced/spread annually in the catchment area of the Baltic Sea




Manure from livestock production in the catchment area of the Baltic Sea
Photo: Seppo Knuuttila

Per capita GDP and meat consumption by country, 2005



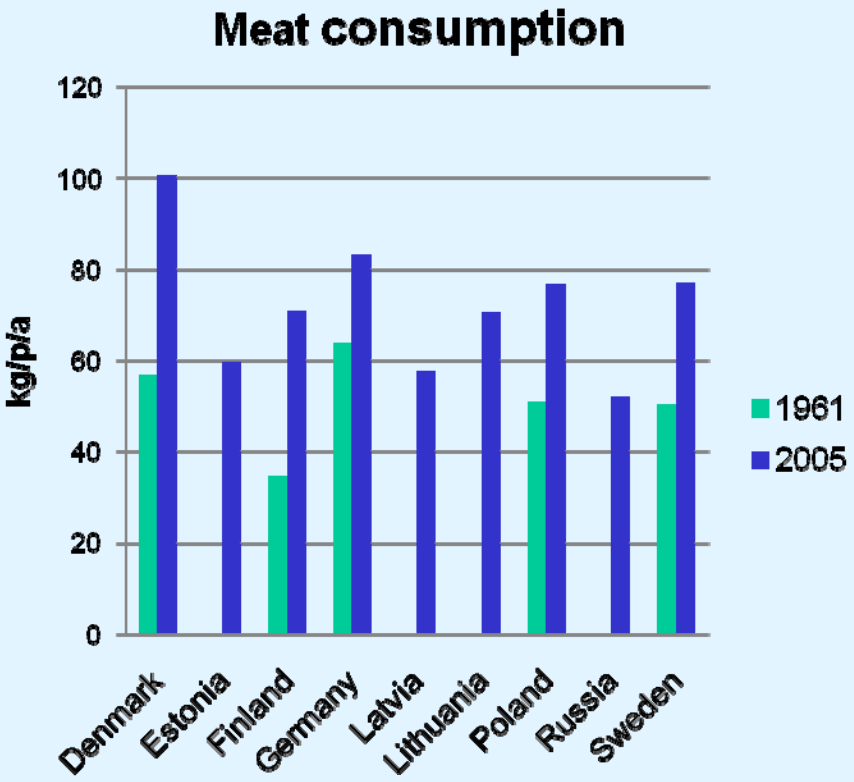
Note: GDP per capita is measured at purchasing power parity (PPP) in constant 2005 international US dollars.

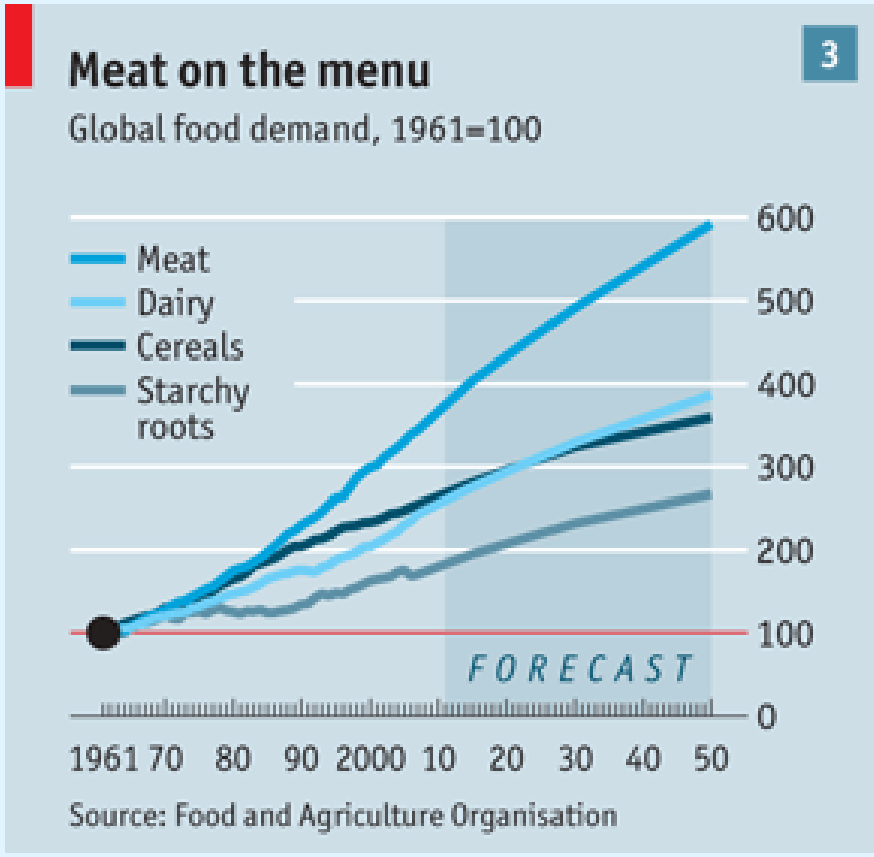
Source: Based on data from FAOSTAT (FAO, 2009b) for per capita meat consumption and the World Bank for per capita GDP.

Reduction targets set for nutrient loading from agriculture are challenging, when at the same time:

- **Global demand for food is expected to increase by the year 2050 (meat ,dairy products, cereals) by at least 50%;**
- **Climate change will be favourable for agriculture in (large parts of) the Baltic Sea catchment area;**
- **Rising temperature and increasing precipitation will accelerate leaching of nutrients;**
- **Rising food price may enhance profitability of agriculture (short term), and therefore increase production;**
- ***Ultimate challenge for agriculture, however, is decreasing phosphorus recourses => recycling of P will be unavoidable in a few decades***

Meat consumption in Baltic Sea countries and global demand





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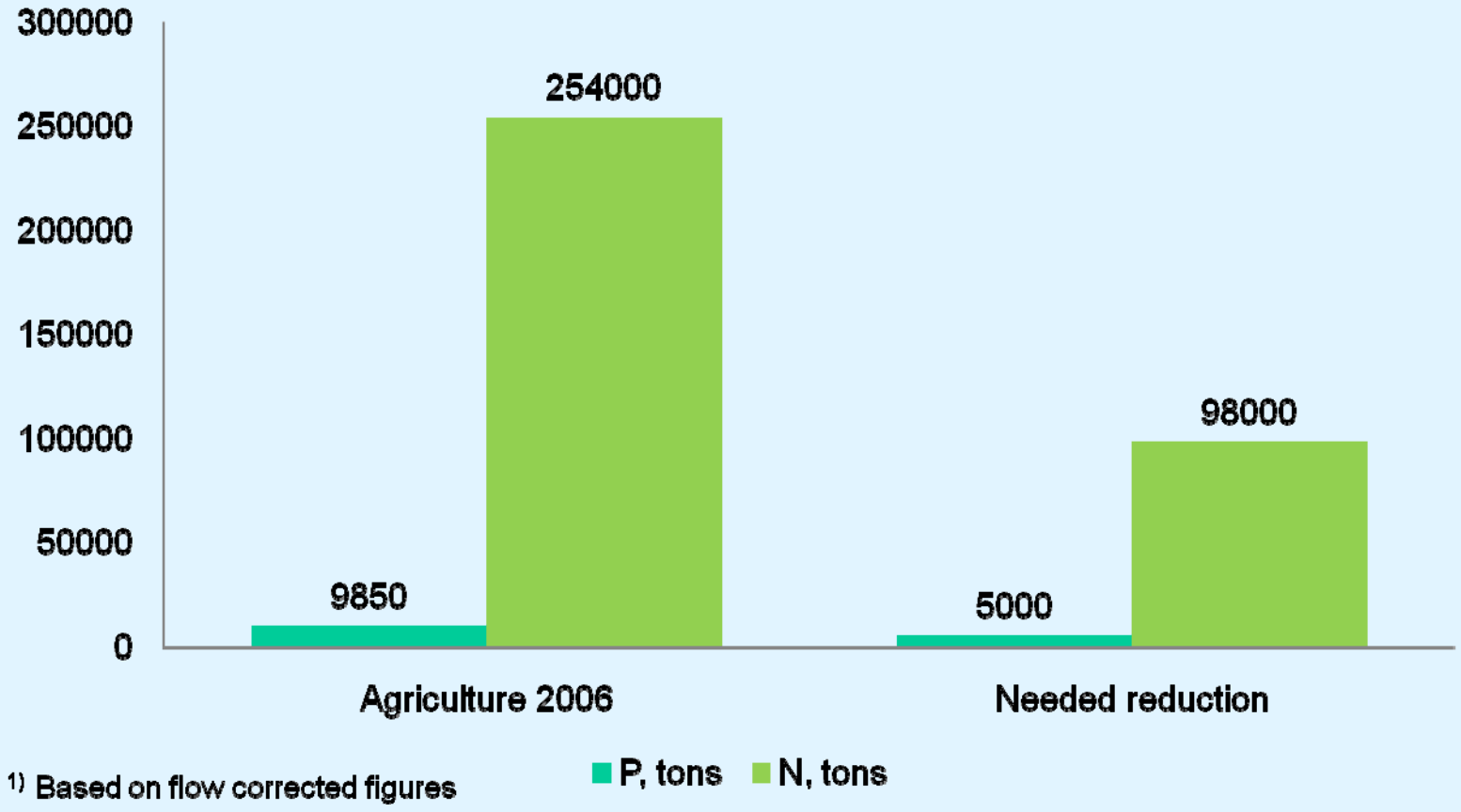
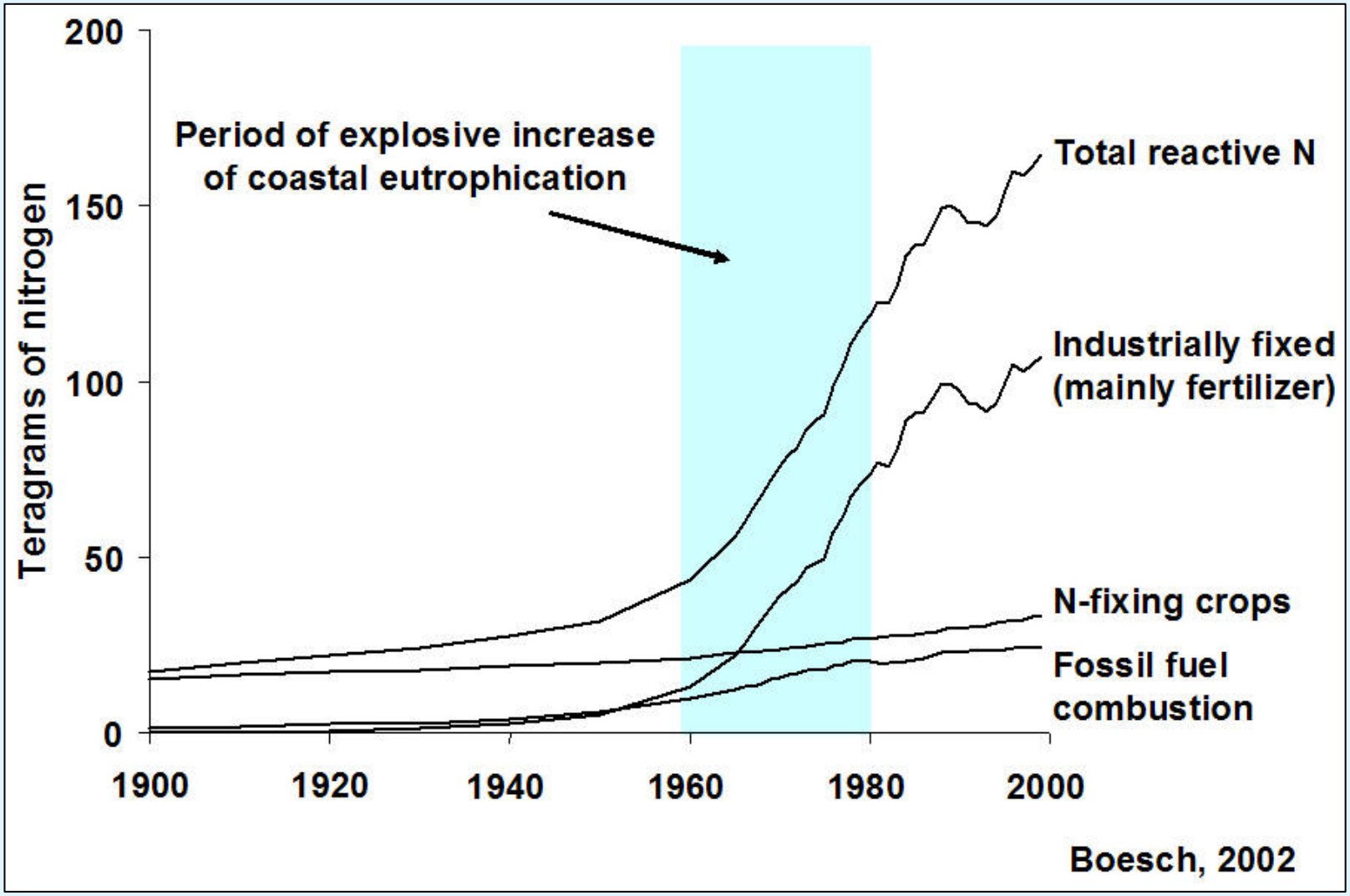
Waterborne nutrient load from agriculture (tons) into the Baltic Sea in 2006 and needed reduction(1 with reference to the BSAP



1) Based on flow corrected figures


Manure from livestock production in the catchment area of the Baltic Sea
Photo: Seppo Knuuttila

The accelerated time course of coastal eutrophication in the northern Gulf of Mexico since the 1950s



http://www.gulfhypoxia.net/overview/

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