The HELCOM common regional approach for eutrophication target setting in the Baltic Sea

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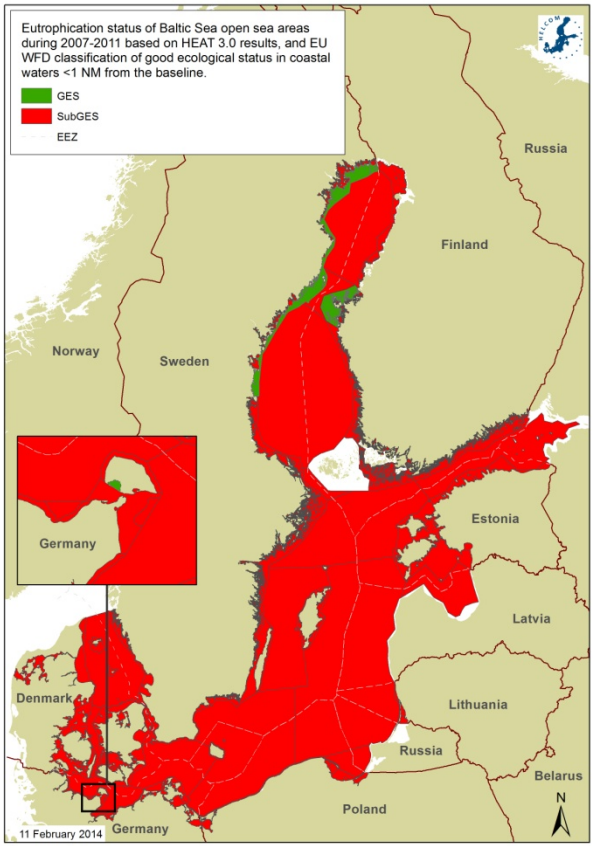


Starting point

- HELCOM has started a scientific project for the revision of eutrophication targets (= G/M boundaries) in 2010
- Work was carried out by BNI, NERI, SYKE, IOW, DHI
- BSAP nutrient reduction targets of 2007 were only based on secchi depth
- Aim was to arrive at harmonised targets for eutrophication parameters (nutrients, Chla, secchi, oxygen, benthic fauna) as a basis for a revision of the BSAP nutrient reduction targets
- Approach chosen: establishment of long-term historical data series of eutrophication parameters and supported by ensemble modelling using BALTSEM, ERGOM and MIKE-ECOLAB (modelling of different load scenarios – 1900, present, BSAP reductions)

Analysing historic time-series

- Historic time series were analysed with the intention to define “change points”
- Most eutrophication parameters including nutrients showed a gradual degradation and no change points relevant for target setting were identified
- For oxygen debt a relevant „change point“ was identified around 1940

Time series of TN concentrations for Baltic Proper

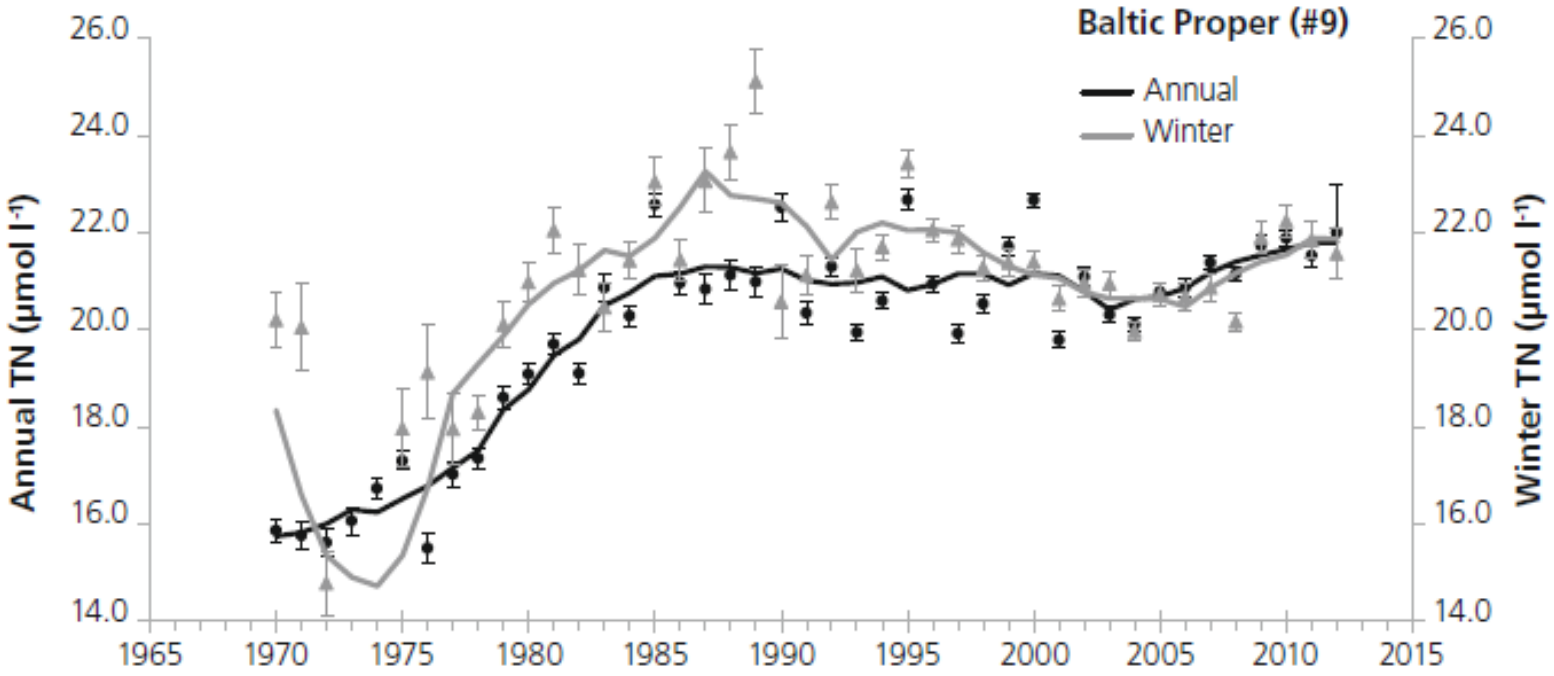


Figure 2.3 *Long-term trend in annual (black) and winter (grey) surface TN concentrations in the Baltic Proper (0-20 m). Lines indicate the five-year moving average (starting from 1970); error bars represent 95% confidence limits of the means. Other basins are shown in Annex B (Fig. B.1)*

Time series of TP concentrations for Baltic Proper

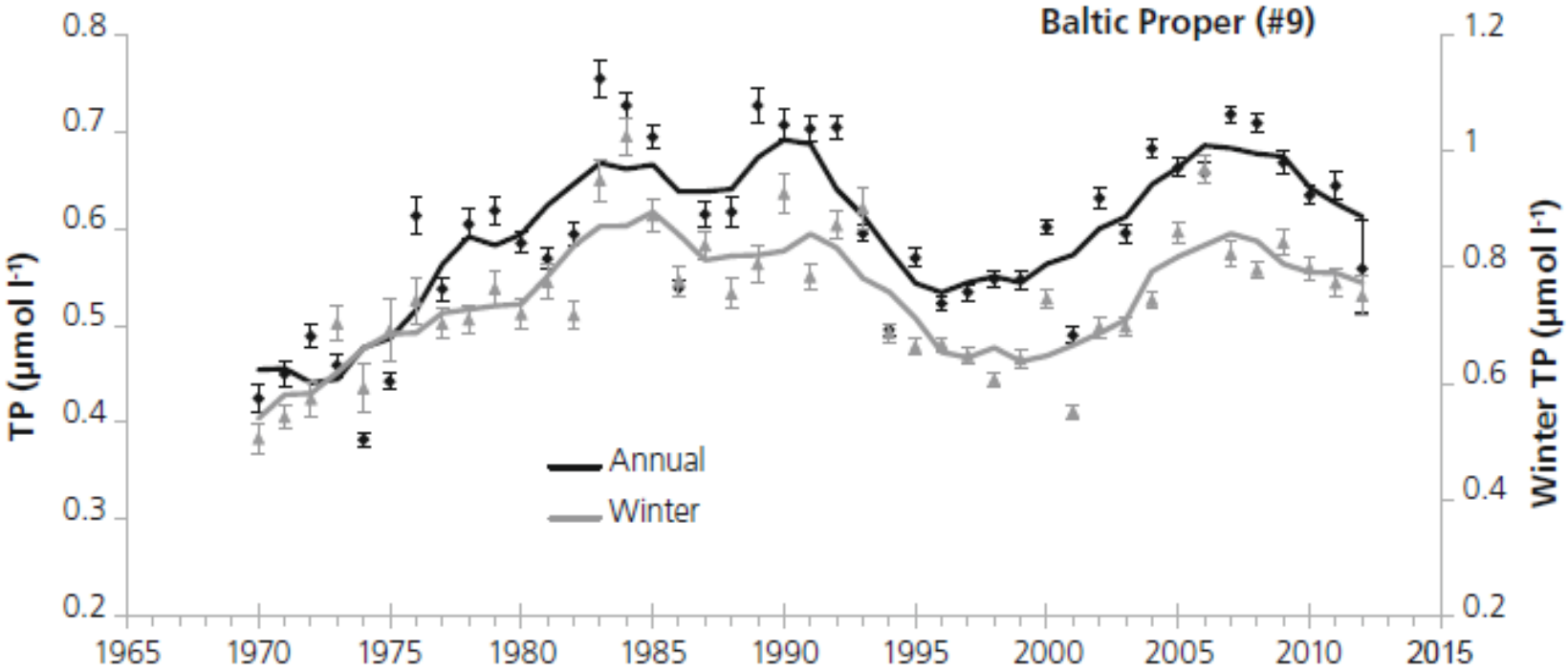
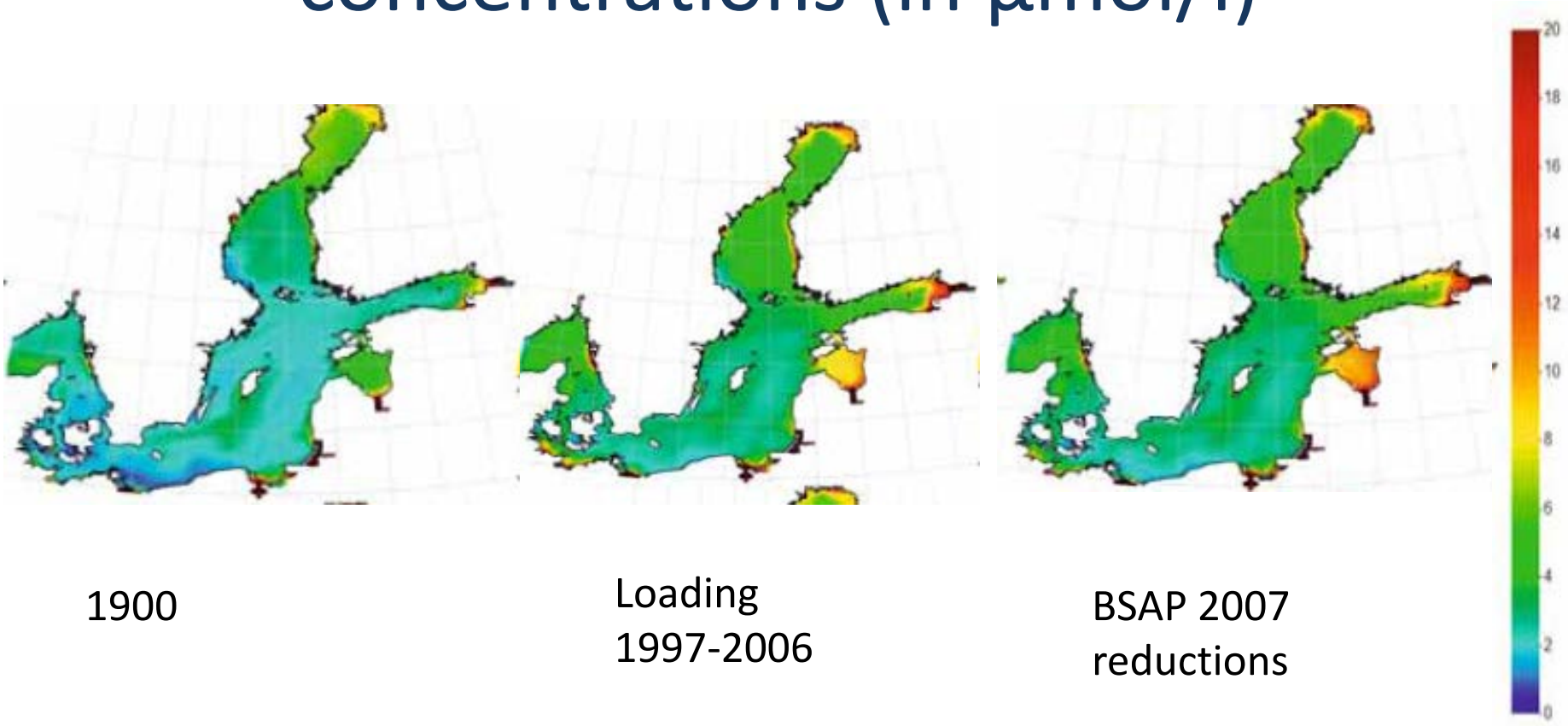


Figure 2.9 *Long-term trend in annual (black) and winter (grey) surface TP concentrations in the Baltic Proper (0-20 m). Lines indicate the five-year moving average (starting from 1970) and error bars represent 95% confidence limits of the means. Other basins are shown in Annex B (Fig. B.5)*

ERGOM model results for winter DIN concentrations (in µmol/l)

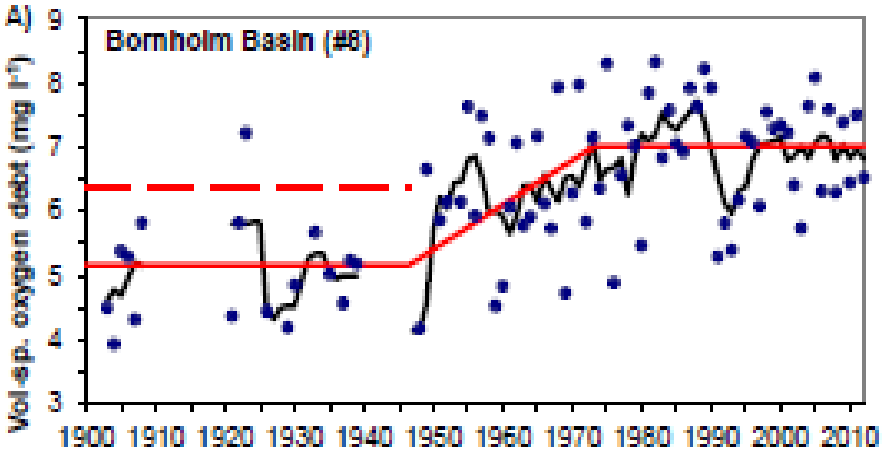


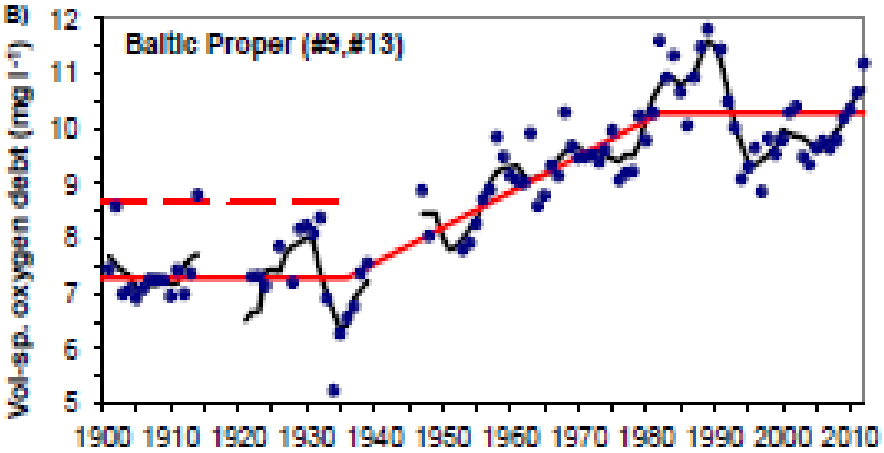
1900

Loading
1997-2006

BSAP 2007
reductions

Identification of a „change point“ for oxygen debt





- Oxygen debt = „missing“ oxygen relative to a full saturated water column
- Break point was identified around 1940s

Target setting for nutrients

- Nutrient levels from the earliest period (1970-1975) were assessed and compared with the estimates from the model simulation of the 1900 scenario
- Compared with the oxygen debt indicator (1940s) it was clear that target nutrient concentrations must lie between 1900 and 1970-1975
- Therefore concentrations from these two periods were averaged to obtain nutrient G/M boundaries
- Reference concentrations were not derived

References

- HELCOM (2013): Approaches and methods for eutrophication target setting in the Baltic Sea region. Baltic Sea Environment Proceedings No.133