The Baltic Sea ecosystem on a slow path to recovery? – the rumours of the patient's death are exagerrated!

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The Baltic Sea

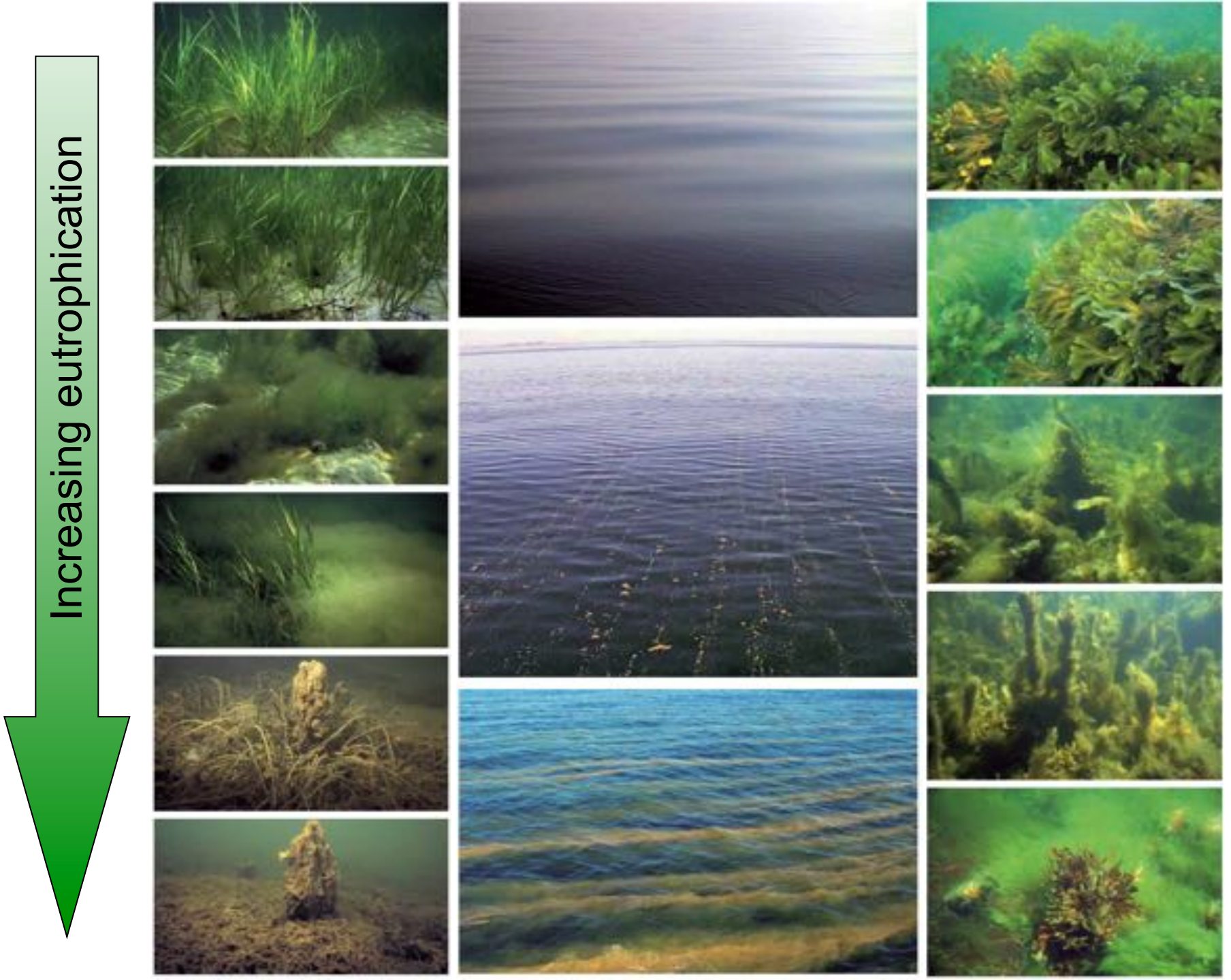
- One of the worlds largest brackish-water bodies
- Resembles a stratified fjord with shallow and narrow straits (mean depth 60 m)
- Long water residence time and pulses of saltwater intrusions
- Large catchment with nutrient run-off $\Rightarrow$ problem with eutrophication and hypoxia
- Strong physical, chemical and biological gradients (salinity, O_2, temp.)

Strong gradients in salinity set the natural limits for species diversity in the Baltic Sea

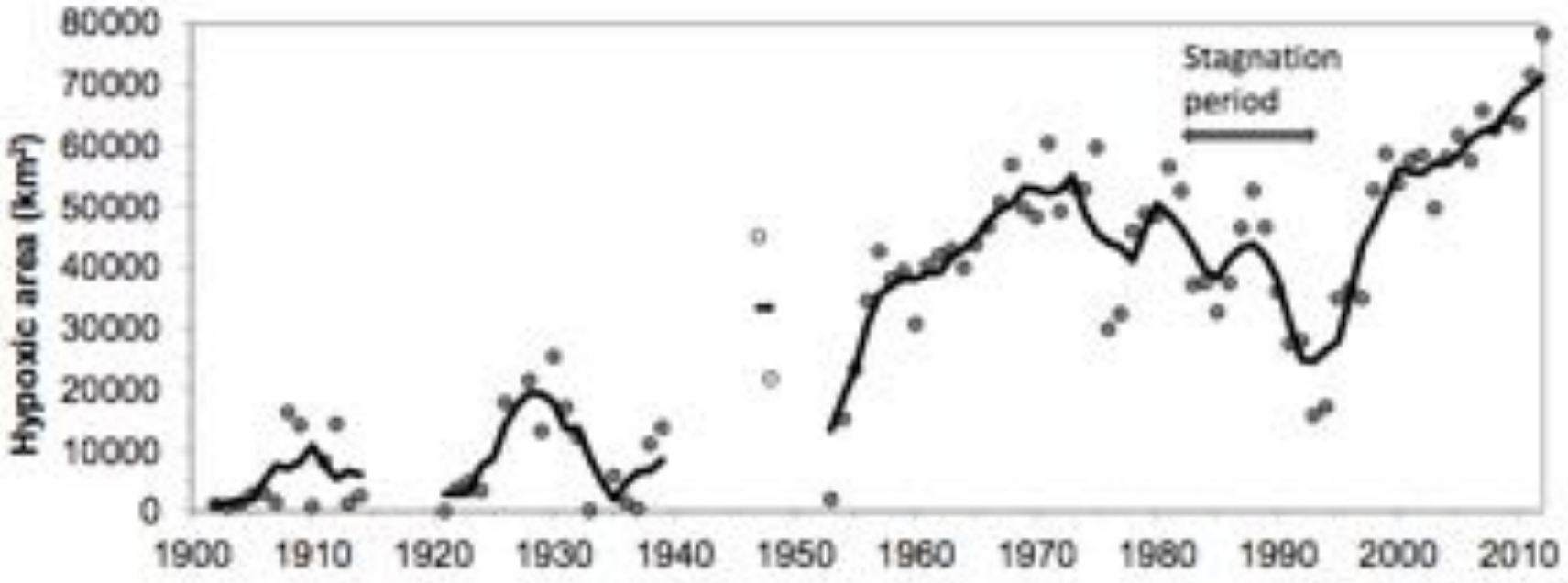
Photo: Ilkka Lastumäki

The coastal nutrient filter

Eutrophication - the major threat to biodiversity and ecosystem functioning in the Baltic Sea

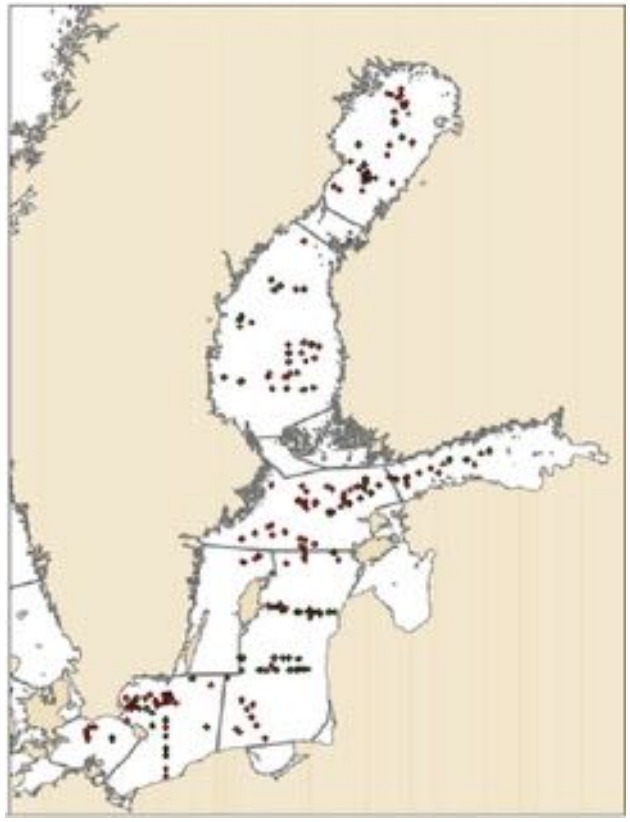

Increasing eutrophication

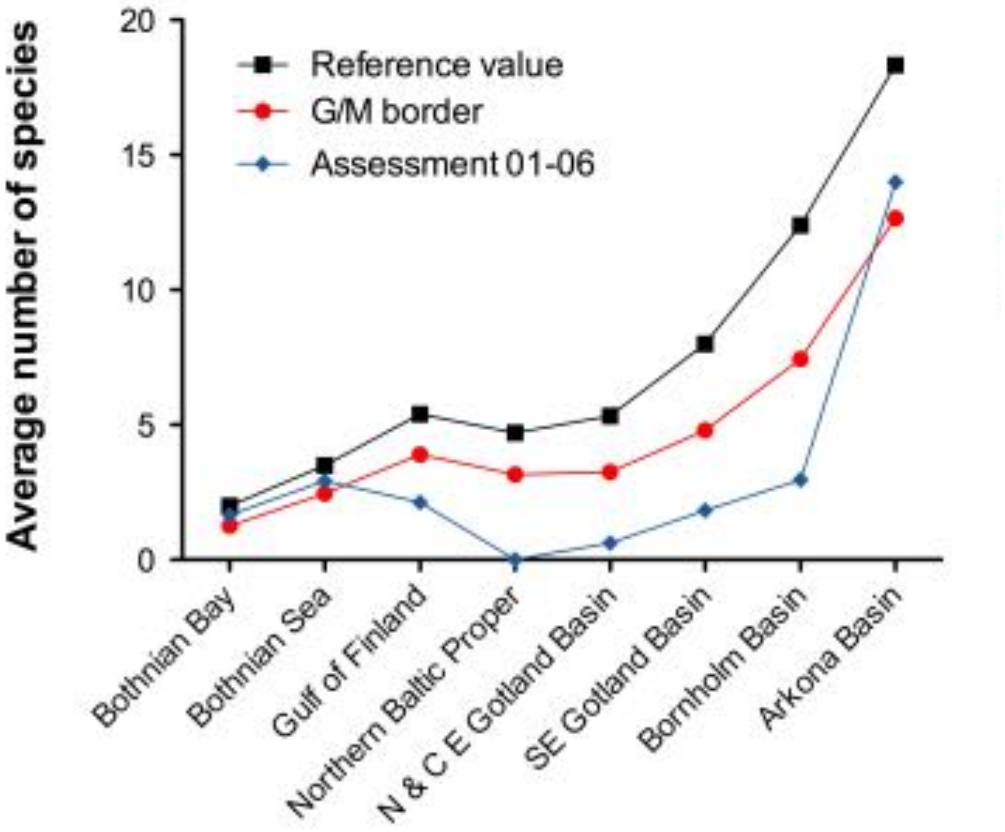
Increasing spatial extent of hypoxic waters in the Baltic Sea



Carstensen et al. 2014, AMBIO

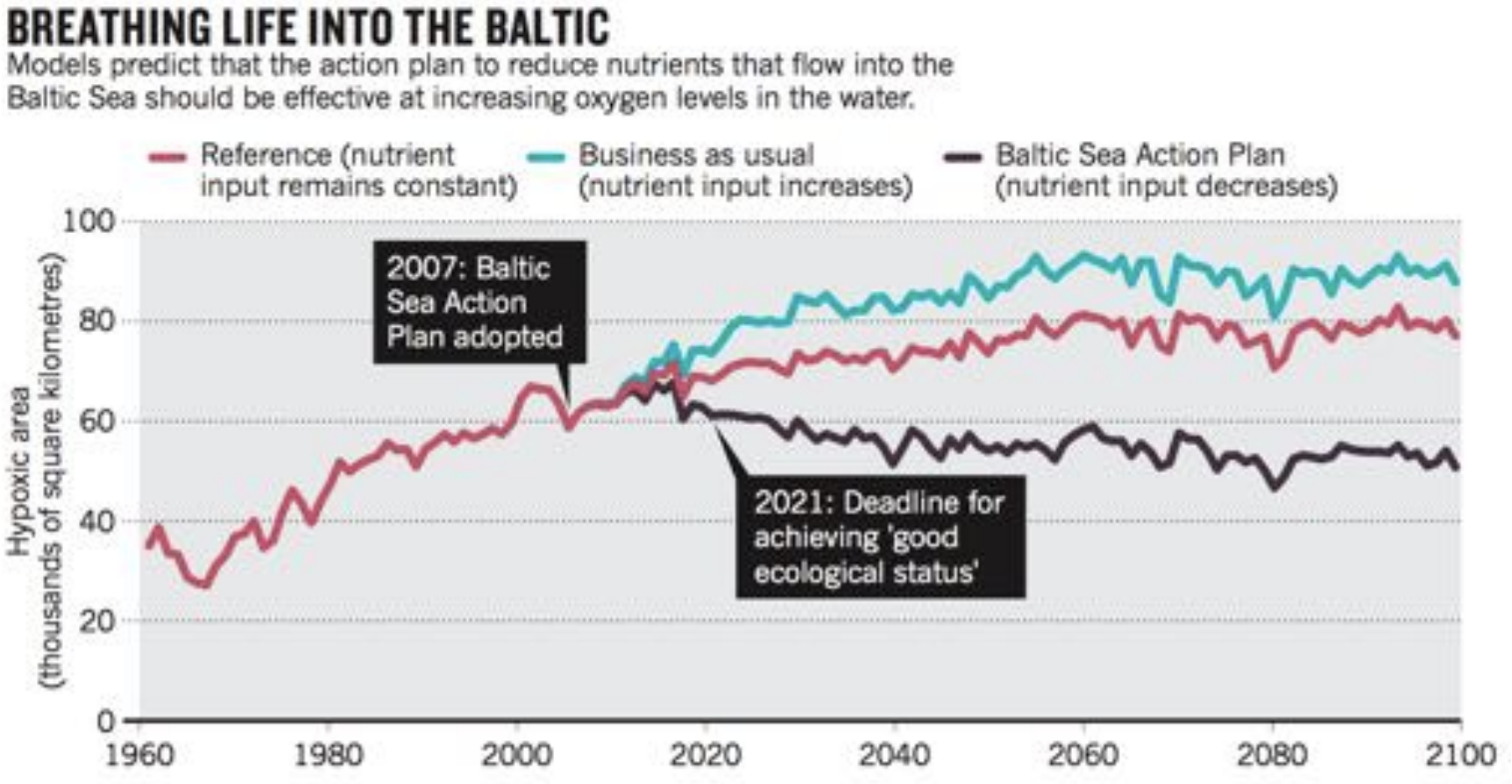
Seafloor biodiversity: gradients in diversity – and losses due to hypoxia





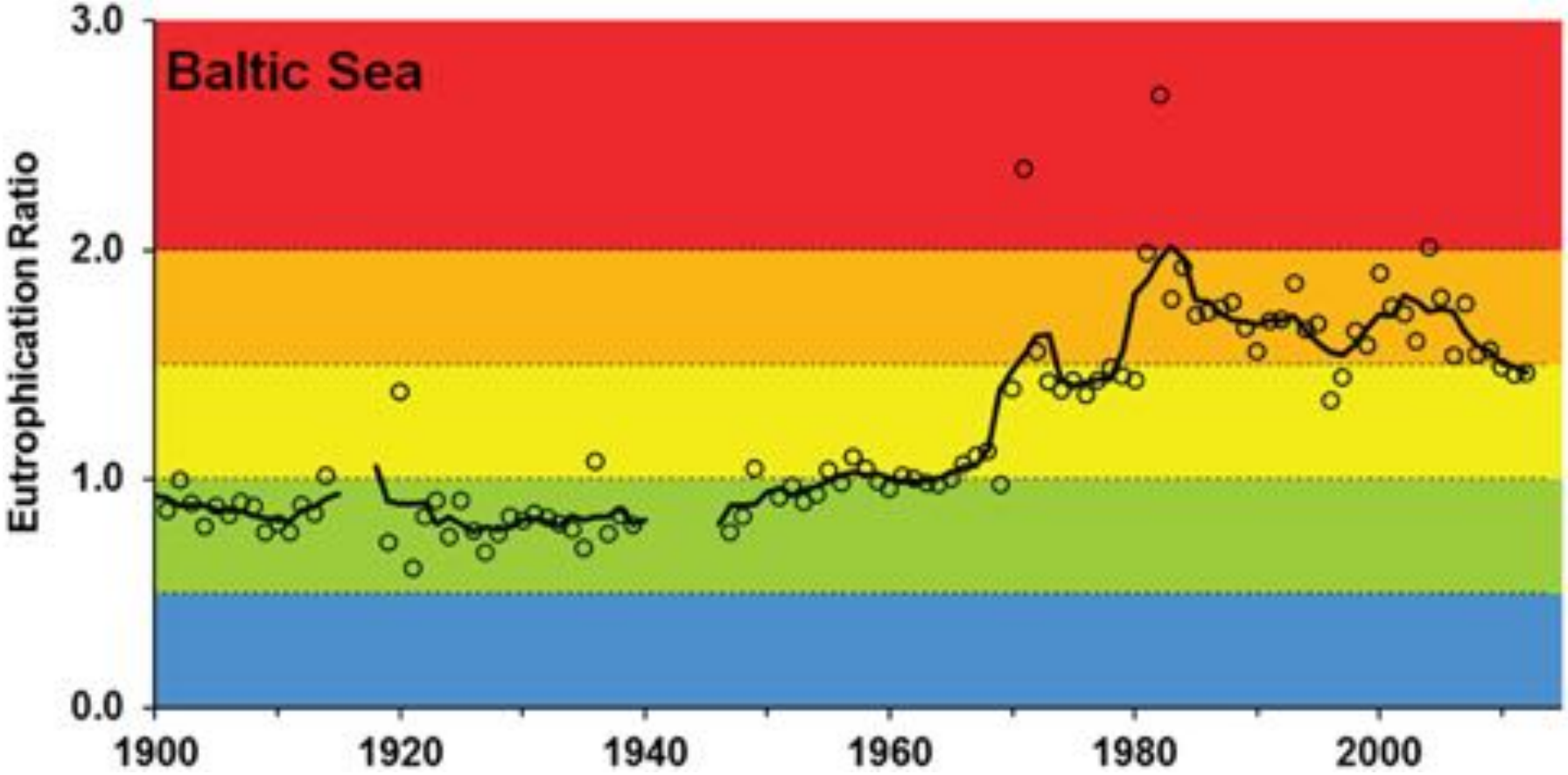
Villnäs A, Norkko A (2011) Benthic diversity gradients and shifting baselines: implications for assessing environmental status. *Ecological Applications*, 21: 2172-2186

Model predictions suggest that the BSAP will be efficient in combatting hypoxia – if we commit and stick to it!



Conley DJ (2012) Save the Baltic Sea. *Nature* 486, 463–464; Meier et al. 2011

Positive news regarding the eutrophication status of the Baltic Sea – largest improvement in areas where mitigation efforts started first



Andersen *et al* (2016) Long-term temporal and spatial trends in eutrophication status of the Baltic Sea. *Biological Reviews*, in press

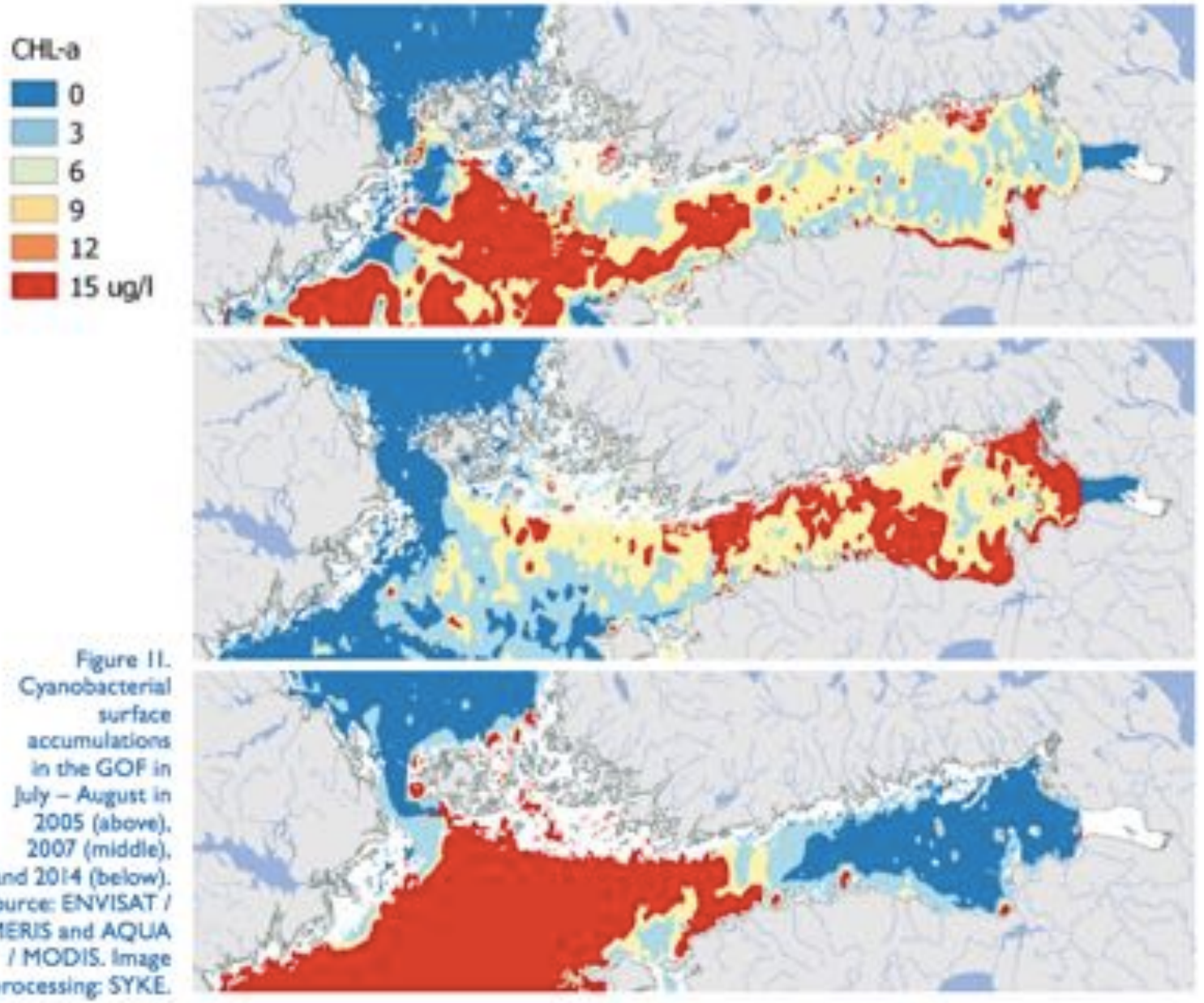


Figure 11. Cyanobacterial surface accumulations in the GOF in July – August in 2005 (above), 2007 (middle), and 2014 (below). Source: ENVISAT / MERIS and AQUA / MODIS. Image processing: SYKE.

Kauppila et al (2016) Chlorophyll a and phytoplankton blooms. In: *Raateoja & Setälä (eds) The Gulf of Finland Assessment*

Photo: Camilla Gustafsson

Photo: Ilkka Lastumäki

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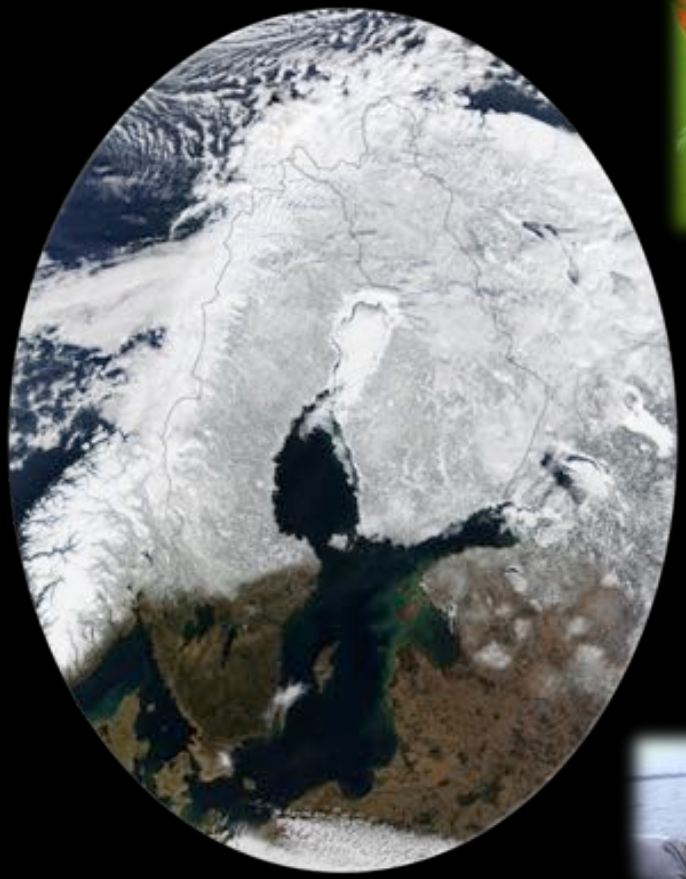
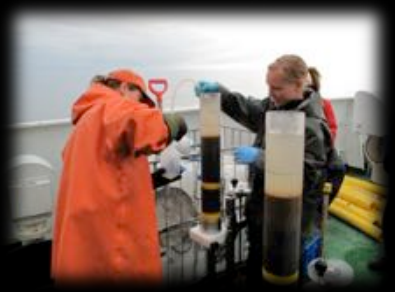
Successful mitigation requires profound understanding of the problem and the system





Thank you!