

Interactive comment on “Restoration of the Baltic Proper by decadal oxygenation of the deepwater” by Anders Stigebrandt

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Received and published: 25 May 2016

Thank you for an interesting paper, Prof. Stigebrandt!

I agree that artificial oxygenation of the Baltic Sea may be beneficial to cod, although the effects of reduced or removed stratification and a substantially altered vertical salinity gradient may have to be investigated further in relation to cod.

My main objection to the manuscript is that the general lack of long-term effects on P leakage of artificial oxygenation in lakes has not been addressed in the paper. P load, hypoxia/anoxia and P leakage are correlated, but the causal connections are being debated. Even if sediments are oxygenated, there may be a certain sediment depth where there is anoxia and where P can be transformed from particulate forms to dissolved forms and subsequently leak out into the water column. Thus, there may be

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beneficial short-term effects from oxygenation that may be counteracted and vanish at a later point.

See, e. g.,

Conley, D. J., Bonsdorff, E., Carstensen, J., Destouni, G., Gustafsson, B. G., et al., 2009. Tackling Hypoxia in the Baltic Sea: Is Engineering a Solution? *Environ. Sci. Technol.*, 2009, 43 (10), pp 3407–3411.

Hupfer, M., Lewandowski, J., 2008. Oxygen controls the phosphorus release from lake sediments – a long-lasting paradigm in Limnology. *International Review of Hydrobiology*, 93: 415–432.

Instead of oxygenation, nutrients may be abated further, and the most effective and cost effective options should in that case be applied first. For instance, it has been estimated that improved sewage treatment may reach 80% of the P target in the Baltic Sea Action Plan (and 70% of the N target).

See Hautakangas et al. (2014): <http://link.springer.com/article/10.1007/s13280-013-0435-1#/page-1>

Nevertheless, once the findings and conclusions in Hupfer & Lewandowski (2008) have been addressed, I support acceptance and publication of the manuscript.

Best regards, Dr Andreas Bryhn

Interactive comment on *Ocean Sci. Discuss.*, doi:10.5194/os-2016-17, 2016.

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