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Modelling cost-effective strategies for managing trade-offs between water and climate regulation in the Baltic Sea Region

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Abstract:

This paper aims to investigate the scope for jointly delivering cost-effective nutrient abatement and reductions in greenhouse gas emissions through the implementation of measures in agriculture and waste water treatment. It also aims to analyse the potential conflicts between these two environmental policy domains in the Baltic Sea Region level. The analysis is undertaken using a cost-minimisation model for the entire Baltic Sea region, the BALTCOST model. The BALTCOST model is an economic/hydrological model applied with high spatial resolution data for the entire Baltic Sea catchment, and the model has been further developed to include greenhouse gas emissions at the same level of spatial resolution. Bio-physical data at spatial resolutions down to 10 x 10 km grid cell scale (18377 grid cells across the complete Baltic drainage basin) are used to localise abatement cost and abatement effect functions. The same dataset provides a basis for estimating nutrient retentions and for deriving abatement capacity constraints for 6 different abatement measures in each of 22 main Baltic drainage basins, including emissions of nitrogen, phosphorus and green- house gases; the latter is estimated as CO₂ equivalents. By implying policy relevant reduction targets for both nutrient reductions and GHG emissions, the paper effectively elucidates the trade-offs, synergies and conflicts between the policy implementation of water quality and climate policies.

JEL classification: Q52, Q53, Q54, Q24, Q25, Q18