

## **Modeling nutrient retention in the coastal zone of an eutrophic sea - a model study in the Stockholm Archipelago, Sweden**

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This study shows that the Stockholm archipelago works as a filter for nutrients that enters the coastal zone from land. The filter capacity is high, but not effective enough to take care of all the nutrients that the system receives. At least 65 % and 72 % of the phosphorus (P) and nitrogen (N), respectively, is retained. The multi-basin one dimensional Swedish Coastal zone Model (SCM) that was used is based on the Swedish Coastal and Ocean Biogeochemical model (SCOBI) coupled to the equation solver PROgram for Boundary layers in the Environment (PROBE). An evaluation of model results showed that the nutrient, salinity and temperature dynamics in the SCM model are of good quality. To analyse the results the Stockholm archipelago was divided into three sub-areas: the inner, the intermediate and the outer archipelago. The analysis showed that the highest total amounts of P and N are retained in the outer archipelago where the surface area is largest. The area weighted retention of P and N, however, is highest in the smaller inner archipelago and decreases towards the open sea. A major part of the retention is permanent. For P sediment burial is the only permanent retention mechanism, but for N almost 92 % of the permanent retention is caused by benthic denitrification, less than 8 % by burial, while pelagic denitrification is below 1%. A reduction of the land load of nutrients (P reduced with 13 % and N with 20%) resulted in increased retention capacity of N and P and lowered the transport of N out from the archipelago. About 15 years after the reduction P is imported into the archipelago instead of being exported.