

Role of the sediments in eutrophication of the Baltic Sea

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Multiple drivers for Earth system changes in the Baltic Sea region

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Baltic Earth

Earth System Science for the Baltic Sea Region

The Baltic Sea is under **high environmental stress** due to semi-enclosed shelf structure of the basin, large catchment area and **nutrients overload**, especially from anthropogenic sources. Even though total loads of nitrogen and phosphorus have been reduced by around 22 and 25%, respectively, from 1995 to 2014, eutrophication and its consequences, are still major concerns within the Baltic Sea ecosystem. This status can be sustained by the **release of large amounts of N and P stored in the sediments**, even though, a decrease of N and P inputs from terrestrial sources has been noted over past years. While they come back from the sediments in the process called **return flux**, they contribute to the **increase of primary production**. This leads to creating a **'vicious cycle'**, which increases the response time of the basin to the ongoing reduction of nutrient loads.

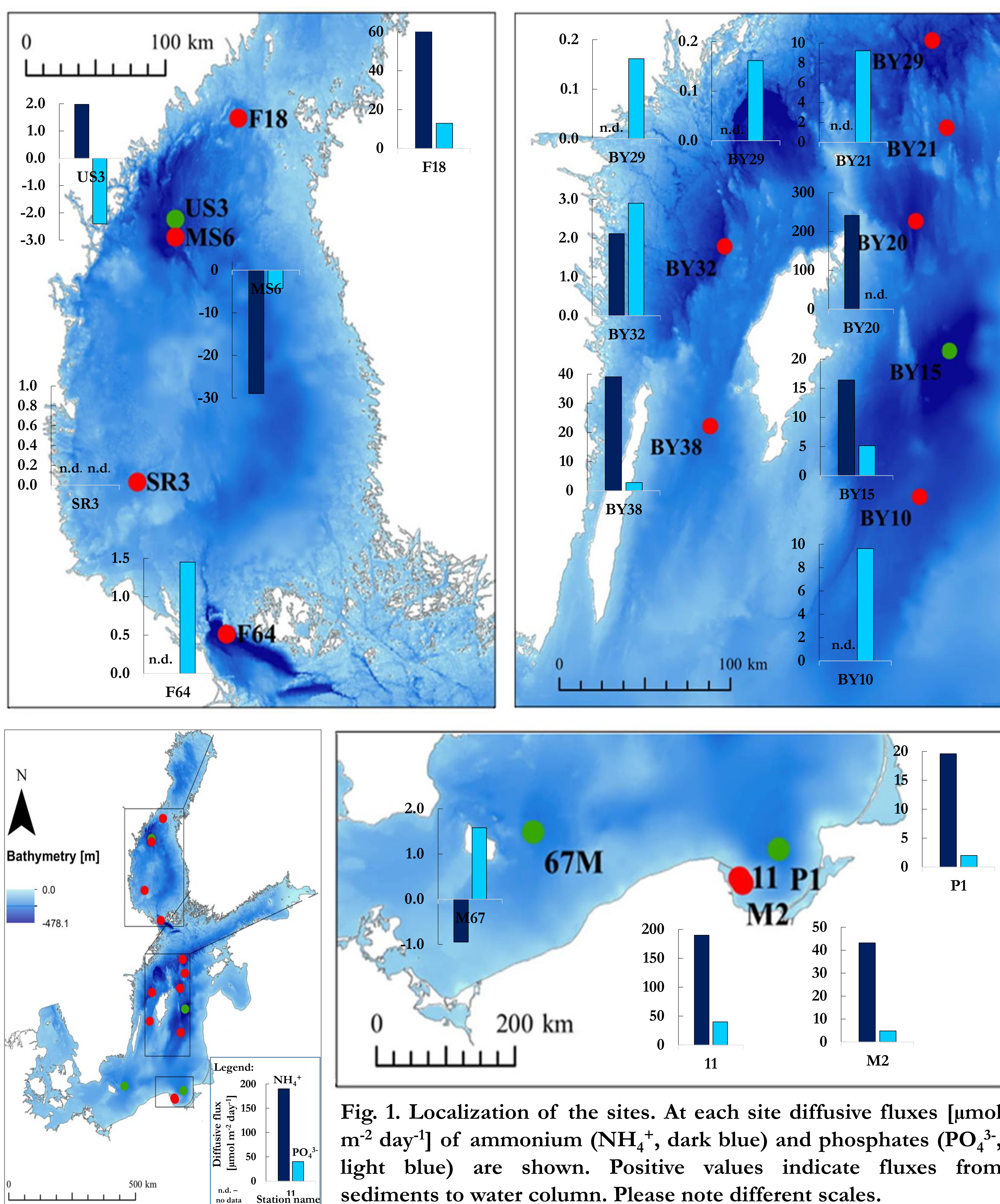


Fig. 1. Localization of the sites. At each site diffusive fluxes [$\mu\text{mol m}^{-2} \text{day}^{-1}$] of ammonium (NH_4^+ , dark blue) and phosphates (PO_4^{3-} , light blue) are shown. Positive values indicate fluxes from sediments to water column. Please note different scales.

Sediments as a driver for eutrophication

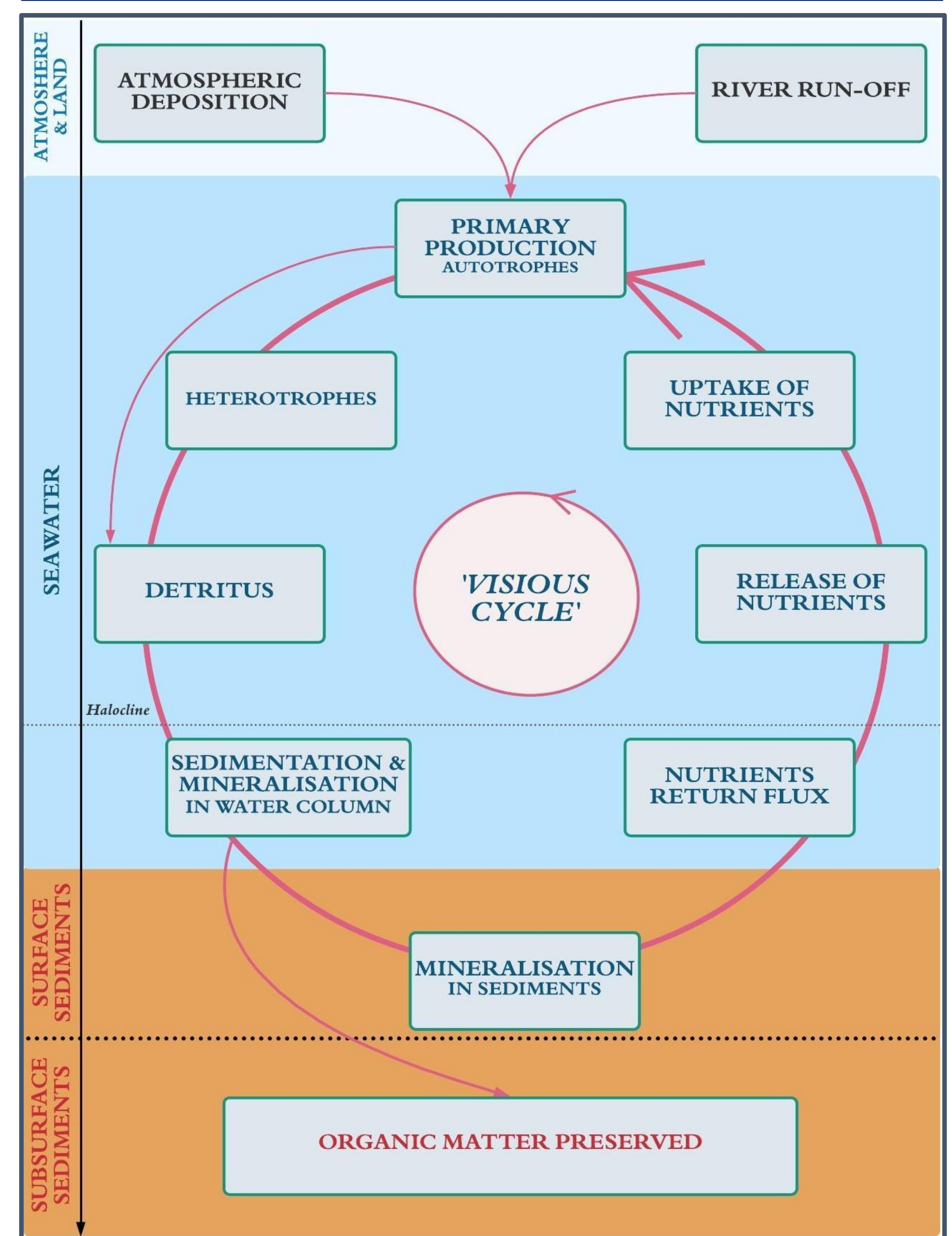


Fig. 2. Schematic representation of sediments' role in eutrophication of a basin (example for Baltic Sea depositional area)

TAKE-HOME MESSAGES

1. Sediments should be considered as one of the drivers for eutrophication in the Baltic Sea.
2. Even though N and P terrestrial loads have been reduced, great amounts of organic matter deposited in the sediments due to mineralisation processes are a constant source of nutrients.
3. According to this study, sediments can be a source of 2 – 240 $\mu\text{mol m}^{-2}$ of ammonia and 0.2 – 50 $\mu\text{mol m}^{-2}$ of phosphates per one day.