Isotopic signatures of eelgrass (*Zostera marina* L.) as bioindicator of anthropogenic nutrient input

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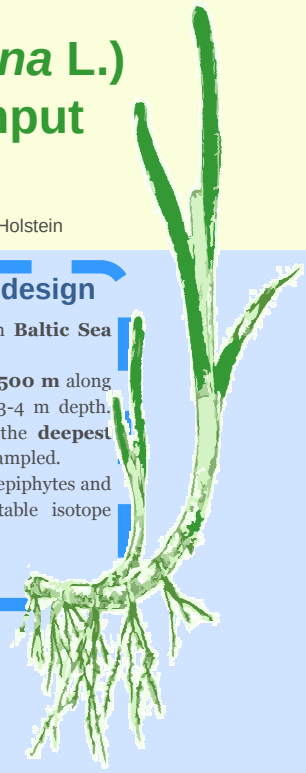


Can we use the $\delta^{15}N$ ratio of eelgrass leaves to assess sewage input in coastal ecosystems of the Baltic Sea?

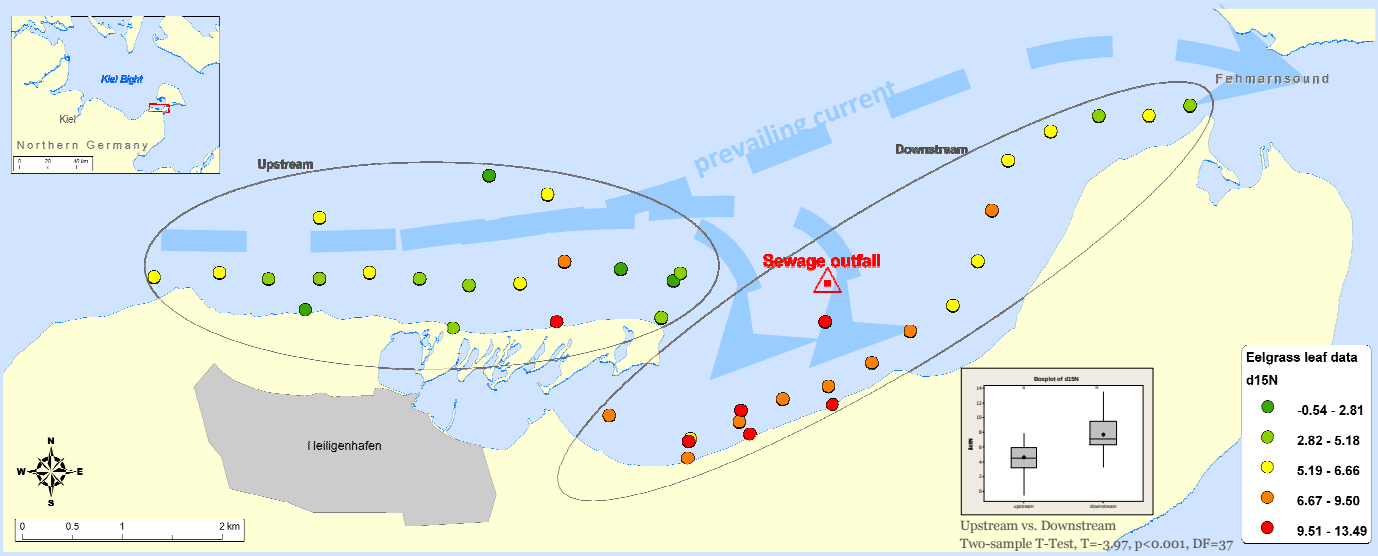
Recent use of stable isotope content of macroalgae as a proxy for human nutrient input suggests that eelgrass ***Zostera marina*** could be used as **biomarker** for sewage derived nutrients.
Eelgrass is continuously distributed along the German coast of the Baltic Sea. The leaves function as a **temporal integrator** of nutrient input with a leaf turnover time of about 50-60 days.
Sewage derived nitrogen often has a **distinctive isotopic signature** due to the high prevalence of the heavier ^{15}N isotope caused by nitrification and denitrification processes in wastewater treatment plants. This results in high $\delta^{15}N$ values (>12‰) of the outflowing water.
Our **goal** here was to map eelgrass $\delta^{15}N$ ratios around a major sewage outfall and then compare the findings with our expectations of nutrient distribution.

Sampling location and design

Heiligenhafen Bay lies in the western **Baltic Sea** and holds an important sewage outfall.
Eelgrass shoots were collected **every 500 m** along a transect **parallel** to the shore in 3-4 m depth.
Additionally, at 7 vertical transects the **deepest and shallowest** eelgrass found was sampled.
Back in the lab plants were cleaned of epiphytes and **eelgrass leaves** were used for stable isotope analysis.

Results

1. $\delta^{15}N$ values of eelgrass growing **downstream** of the outfall were significantly **higher** than upstream
2. Nitrogen isotope ratios were **back to normal** about 4 km downstream of the outfall
3. No differences in stable isotope signature between deep and shallow eelgrass



Conclusion

Spatial patterns of **stable isotope distribution** matched our expectations. Hence, stable isotope $\delta^{15}N$ ratios of eelgrass leaves seem to be suited as **biomarker** for anthropogenic nutrient input from wastewater. The next step will be a **coastwide screen** of ^{15}N from eelgrass to assess the influence of sewage derived nitrogen on coastal ecosystems of the western Baltic Sea.

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