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Biomass and density fluctuations of the macrozoobenthos of the intertidal flats in the Oosterschelde, the Netherlands

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As part of the BALANS-project the benthic fauna of the Oosterschelde was studied at 8 intertidal stations situated at 3 of the major tidal flats of the area: 3 at the Roggenplaat (in the western part of the Oosterschelde), 1 at the Hooge Kraayer and 4 at the mudflats of the Verdronken Land van Zuid-Beveland (eastern part of the Oosterschelde). At each station 15 core samples of 0.0083 m^2 were taken to a depth of 30 cm and washed in the field through a 1 mm sieve. To establish the density and biomass of the larger sparsely distributed animals the top layer (10 cm) of a two square meters sampling area was collected and washed through a 3 mm sieve. The sampling area was further dug out to a depth of 50 cm and the organisms were sorted by hand. The formalin preserved residues were sorted in the laboratory under a stereo-microscope and all animals were identified to species level, except for the oligochaetes. Ash-Free Dry Weights were determined by standard methods.

Samples were taken from spring 1983 until winter 1984 at three month intervals. Biomass and density-figures for the dominant species are analysed. These species are, in sequence of decreasing biomass: *Cerastoderma edule, Arenicola marina, Lanice conchilega, Hydrobia ulvae, Littorina littorea, Macoma balthica, Nereis diversicolor, Scrobicularia plana, Mya arenaria, Nephtys hombergii, Heteromastus filiformis* and *Scoloplos armiger.* They contribute more than 96% of the total biomass, *Mytilus edulis* excluded. Mussels are grown on culture plots with high biomass per m^2, in the shallow parts of the Oosterschelde, on the slopes of some of the gullies and on some intertidal flats. These were not sampled.

In general biomass values are lowest in February for all stations (10–40 g AFDW/m^2). Highest biomass values vary considerably from station to station but are generally reached in August-September (25–88 g AFDW/m^2). In several stations biomass tends to be higher in 1983 than in 1984. As far as data are available a comparison will be made with stations sampled in 1979 till 1981 in the Oosterschelde. Suspension feeders (*Cerastoderma edule, Mya arenaria*) contribute most to the biomass in about half of the samples, especially from the stations near the mouth of the Oosterschelde. Deposit feeders (*Arenicola marina, Macoma balthica* and *Scrobicularia plana*) contribute most in 3 stations, 2 located in the innermost part of the Oosterschelde. Some stations low in the intertidal zone have a high share of filter feeders and some stations high in the intertidal zone have a high share of deposit feeders, but this is no general rule.

Densities vary likewise from station to station and from season to season. Species like *Cerastoderma edule* have low densities in February/May (50–500 ind./m^2) and reach their maximum in August/September (500–2000 ind./m^2). *Arenicola marina* shows little variance over the year except for juveniles in spring on stations high in the intertidal zone, where *Heteromastus filiformis* and *Macoma balthica* juveniles also have their highest densities. Other species that will be discussed are: *Scoloplos armiger, Nephtys hombergii* and *Nereis diversicolor.*

Finally, distribution, biomass and density of these species is correlated with some abiotic factors like position in the intertidal zone (emersion time), sediment type and organic fraction in the sediment.

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Dynamics of the dominating macrozoobenthos in the Danish Wadden Sea 1980–1985

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Sampling of macrozoobenthos was carried out by use of a core sampler and a 1 mm sieve at 6 localities in the Danish Wadden Sea 2–4 times per year (1980–1985). Each locality was sampled as a transect from MHWL to MLWL.

The mean abundance (N/m^2) and biomass (g ADW/m^2) of the 10 dominating species (excl. *Mytilus edulis* and *Hydrobia* sp.) were calculated for each transect, as was a mean for all 6 transects.

From the beginning of 1980 both abundance and biomass were more than halved during the first 2/3 of the year. In 1981 and 1982 both increased slowly to the early 1980 level (late in 1982), and later increased to more than 2.5 times this value from 1983 to 1985. In all these years abundance and biomass was higher and more unstable in the eutrophicated Ho Bay than around the island of Rømø where the water was more clean.

In 1985 sampling was only carried out once – in the autumn. This sampling showed a rather different species composition compared to the previous years. 5 of the normally dominating species as well as 6 of the normally rare species increased greatly in abundance.

Most of these species are often declared as indicator species of eutrophication.

The winter 1984–1985 was extremely severe with thick ice cover for more than 2 months.

The most probable explanation of these changings in 1985 seems to be a recolonisation after the severe winter, but an increased eutrophication cannot be ignored either.

Conclusion

All these results indicate that a better knowledge of the natural fluctuations of both the dominating and the non-dominating species is necessary for a better understanding of the results of short term pollution monitoring. The long term project COST-647 can provide this knowledge.