## Abstract

Coastal areas provide a high variety of benthic habitats that influence the structure and functioning of macrofaunal communities even on small geographical scales. Closely located benthic habitats often vary in geochemical variables such as sediment structure, water dynamics, chemical parameters and benthic vegetation which all can induce patchy distribution of the macrobenthic fauna. Understanding the functioning of benthic communities in different habitats is of great interest in food web ecology since different composition and availability of carbon sources in the system directly affect trophic structure and energy pathways in the resident assemblages.

In this thesis, taxonomic and trophic structure of macrobenthic communities were investigated across closely located benthic habitats in a low diversity system of the semi-enclosed Puck Lagoon (Gulf of Gdańsk, southern Baltic Sea) over four seasons. Traditional community indices (species richness, abundance, biomass and diversity) and food web attributes (estimated based on stable isotope ratios of carbon and nitrogen, $\delta^{13}C$ and $\delta^{15}N$) were integrated to assess spatial and temporal variation of taxonomic and functional diversity. Combining environmental characteristics with species diversity, feeding interactions and food web indicators provided thus an opportunity to bridge the gap between community ecology and ecosystem ecology to highlight small-scale variations related to benthic habitats.

In the first part of the thesis habitat related abiotic and biological variables were shown to exert a clear effect on macrofaunal benthic communities allowing identification of two discrete regions: a region of large biomass of macrophytes and a region of little macrophytes. The quality of the surface sediment organic matter (measured as $C/N_{sed}$ ratio), water depth and composition of benthic macrophytes accounted primarily for within-region variation leading to the identification of four habitats (1) sand with little mixed vegetation (habitat A), (2) *Stuckenia*-dominated sediment (habitat B), (3) *Chara*/*Cladophora* sediment (habitat C) and (4) sand with little *Pylaiella* (habitat D). The next part of the thesis examined which basal resources fueled the food webs of four different macrobenthic communities and how different food sources affect the food web structure and trophic pathways within each community. It was demonstrated that benthic consumers had species-specific carbon and nitrogen isotope composition indicating that they feed mostly on food sources available in their habitats. The third part of thesis addressed trophic niche indices and trophic diversity as well as redundancy of the studied communities as a proxy for assessing the amount of energy and elemental space occupied by species in a given food web. The macrofaunal communities from sandy bottom

with low biomass vegetation showed lower trophic diversity and more compact food webs. Reliance on one dominant resource (suspended particular organic matter and phytoplankton) resulted here in simplification of food web structure with a large proportion of species with one feeding mode. In habitats with dense vegetation, benthic plants appeared to facilitate directly and indirectly development of different trophic niches for consumers by diversification of basic carbon resources. The increased availability and diversification of basal food resources support higher trophic diversity and resilience to disturbance such as species loss or episodic environmental event.