
Functioning of FOOD WEbs across ecosystems of different BIOdiversity level (RMP 4.5)

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Processes ongoing in the ecosystem and mediated by organisms are determined by interactions among organisms and between organisms and the ambient environment, thus by biodiversity. Diversity of habitats and species vary geographically across environmental and ecological gradients, structuring ecosystems and their functioning at local and global scales. Ecosystem metabolism is intimately linked to carbon and nitrogen fluxes from primary producers to consumers of higher trophic levels. This trophic transfer determines the productivity of ecosystems depending on the efficiency of the food webs. Systems with high diversity and complex trophic interrelations such as the Mediterranean Sea or Atlantic are considered to be stable and productive, while in systems such as the Baltic Sea average diversity is low and food web structure relatively simple. Despite such striking differences in their structures, the productivity of the food web in the Baltic is reported to be similar to that of the Atlantic. This would indicate that biodiversity might not be an essential prerequisite for ecosystem (food web) functioning. However, the number of interactions between species increases with their number and even so does the number of material cycles and pathways within a food web. Therefore the question arises, to what extent food web efficiency of an ecosystem is related to the entire diversity as well as to the species pool of the higher-ranking systems.

To address this question, the *FOODWEBIO* project investigates the relations between diversity of habitats and species, and the functioning food webs in European coastal waters that differ in biodiversity. The objectives of the project are:

- 1) to define the structure and functioning of the food webs and inter-relations between various trophic levels in ecosystems of different biodiversity level based on key taxa
- 2) to compare the structure of the food webs among systems based on the selected BIOMARE flagship sites across a range of geographical and environmental gradients
- 3) to assess the effect of changes in biodiversity on the efficiency of food web at a pan-European scale.

Two methodological approaches are integrated: (1) $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ ratios to identify the origin of organic matter in various components of the systems studied and define trophic relations and (2) Network Analysis to unravel the interactions between the living and non-living components of ecosystems and energy flow within them.

The project was commenced in November 2005 through a kick-off meeting in Hel, Poland for a period of nearly four years (until 2008) within the activity of EU Network of Excellence Marine Biodiversity and Ecosystem Functioning (*MarBEF*). The project gathers nine partners representing six European countries bordering the Baltic Sea, North Sea, Bay of Biscay and Mediterranean Sea.