

WESTBANKS

WestBanks: understanding benthic, pelagic and air-borne ecosystem interactions in shallow coastal seas

DURATION OF THE PROJECT
Phase 1: 15/12/2006 – 31/01/2009
Phase 2: 01/02/2009 – 31/01/2011

BUDGET
1.149.463 €

KEYWORDS

Benthic-pelagic coupling, benthos, demersal fish, dispersal, terns, modeling

CONTEXT

WestBanks builds further on the projects ‘Structural and functional biodiversity of North Sea ecosystems: species and their habitats as indicators for a sustainable development of the Belgian Continental Shelf’ (SPSD-1) and ‘TROPHOS: higher trophic levels in the Southern North Sea’ (SPSD II). It aims for a better understanding of the links between the processes occurring in different parts (sediment, water column and air) of the marine ecosystem. This project is closely linked to European initiatives (e.g. Networks of Excellence MarBEF and Marine Genomics Europe, Save the North Sea project) in which the different WestBanks partners participate.

PROJECT DESCRIPTION

Research within WestBanks focuses on the interactions between the sea floor, the water column and the seabirds at the ecosystem, species and population level within a limited geographic area: the Western Coastal Banks area. We propose to achieve that by implementing four work packages: (1) benthic-pelagic coupling; (2) the role of dispersal for benthic organisms and demersal fish, (3) air-sea biotic coupling and (4) coordination, data management and valorization. Specific objectives of WestBanks include:

1. studying the structuring role of key benthic organisms on the functioning of the benthic system and its impact on the benthic-pelagic coupling
2. studying the structural and functional links between small-scale dispersal of key species and ecosystem units
3. studying top predators (fish and birds) feeding at interfaces (benthic-pelagic and pelagic-air)

Methodology

The structuring role of benthic key species on the functioning of the benthic ecosystem will be investigated by lab experiments in which different densities and combinations of the key species will be incubated with defaunated sediment. Bioturbation will be assessed by the redistribution of lumino-

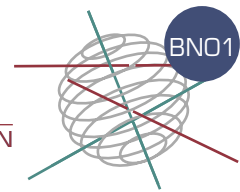
phors added at two different sediment depths. At the same time, a number of proxies for ecosystem functioning (oxygen consumption, (de)nitrification...) will be quantified as well. Based on the results of this first series of experiments, we will investigate the structuring effects of the macrobenthic activities on the benthic food web. Labeled food items (pelagic diatoms or Phaeocystis) will be added to experimental units containing different combinations of habitat engineering species.

The importance of dispersion for benthic and demersal organisms will be investigated using a number of key species. Research will be targeted towards dispersion, population dynamics and population genetics of embryos and (post)larvae of these species. Sampling will be done in the Eastern English Channel and the North Sea (regional scale) and the Belgian Continental Shelf (local scale). Genetic profiling will allow for relatedness estimation in open populations, the calculation of well-defined population characteristics (diversity, gene flow...), recognition of cryptic species and estimation of connectivity and population borders. The 3d coupled physical-biological COHERENS model will be applied reveal dispersion patterns of larval organisms.

Predator-prey links will be investigated at two interfaces in the marine ecosystem: at the sediment-water and air-sea interface. The sand mason *Lanice conchilega* reach high densities in our study area, where this organism builds reefs. This causes an increase in habitat complexity and quality which can have a positive effect on demersal fish populations. Stomach analysis of demersal fish will reveal the contribution of *Lanice conchilega* to the diet of demersal fish. Both lab and field experiments in which *Lanice* populations will be disturbed will be conducted in order to assess the resilience of *Lanice* reefs.

The role of seabirds as top predators will be investigated in the breeding colonies of terns in the harbour of Zeebrugge. The breeding success of terns, in combination with distribution patterns at sea and diet analysis will allow increasing our understanding of the link between these top predators and their pelagic prey.





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INTERACTION BETWEEN THE DIFFERENT PARTNERS

Execution of this research project will be done through an intense co-operation between researchers from different fields of expertise (molecular biology, process studies, modeling and more traditional biology) at different levels (species, populations, size classes). This will be achieved by integrating the available expertise and knowledge available at the partner institutes. A close co-operation between the Marine Biology Section and NIOO-CEME is needed for a better understanding of the benthic processes, while the molecular biology and associated modeling will be done by collaboration between the Lab for Aquatic Ecology, MUMM and the Marine Biology Section.

gy, MUMM and the Marine Biology Section. The research on terns and their pelagic prey will be done by co-operation between scientists from INBO and the Marine Biology Section.

EXPECTED RESULTS AND/OR PRODUCTS:

- papers in international scientific journals
- project website <http://www.vliz.be/projects/westbanks>
- project database and online meta database
- sound scientific evidence supporting policy makers with respect to biodiversity and ecosystem processes at the Belgian Continental

PARTNERS - ACTIVITIES

Marine Biology Section, Ghent University: general coordination, experimental work with macro- and meiobenthos, coupling Lanice-demersal fishes, molecular research on Lanice

Lab for Aquatic Ecology, Catholic University of Leuven: life history and dispersal of organisms with pelagic life stages.

INBO: breeding success of terns in relation with population characteristics of pelagic fishes, role of seabirds as marine top predators

NIOO-CEME: experimental research on benthic processes, modeling of benthic processes.

MUMM: further development of dispersion modeled for pelagic life stages

VLIZ: data management, valorisation and exploitation of results

CONTACT INFORMATION

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Follow-up Committee

For the complete and most up-to-date composition of the Follow-up Committee, please consult our Federal Research Actions Database (FEDRA) by visiting <http://www.belspo.be/fedra> or <http://www.belspo.be/ssd>

