

8.2 Biological studies within the "ESTABLISH" project.

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Introduction

One of the main objectives within ESTABLISH project is to examine the uptake of contaminants (mainly of selected metals and radionuclides) to biota in order to assess, at a basic level, the impact of contamination levels on the environmental and man. As reliable indices of environmental impacts of human activities for marine and estuarine ecosystems, changes of benthic community composition, abundance and structure might be taken. The first priority given to bottom dwellers results from the fact that unlike plankton, fishes, sea birds and mammals, the benthos:

- * is the most stable in time
- * characterises the local situation in space, and
- * can represent retrospective changes in the ecosystem (Pogrebov, 1994)

The aim of the studies in the year 2001 was to characterise the structure, species composition, abundance and biomass of benthic fauna within the Yenisei and Ob estuaries and the adjacent areas of the Kara Sea. An additional aim was species sampling (basically bottom fauna and fish) for subsequent analysis for heavy metals and radionuclides in the onshore laboratory.

Methods and Materials

Macrofauna sampling was conducted by an ocean-grab with a sampling area of 0.25 m². At each station 1-3 replicates were taken. The samples then washed over a sieve with a mesh size of 1 mm. The samples were fixed in 4 % borax buffered formalin. Meiofauna were taken from the grab or the box corer of the upper 4 cm layer of sediments by a tube sampler (20 cm² in area). Only one replicate was taken at each station. Each sample were labelled and fixed separately by a 40% neutralised formaline (up to 3-4% concentration of formalin in water). For the analysis of heavy metals and radionuclides in animals' tissues the bottom dwellers were collected from dredge samples and fish were bought in local settlements. All materials for the contaminant analysis were frozen and stored in a refrigerator until further investigations.

Collected materials

During the cruise the bottom fauna of 34 stations was investigated. 13 stations were located in the Yenisei estuary, 16 stations in the Kara Sea and 5 stations in the Ob estuary. A total of 70 quantitative macrobenthos samples and 17 meiobenthos samples were collected (Tab. 5.5). For the contaminants analysis following species of animals were chosen: the fish *Coregonus muksun*, the isopoda *Saduria entomon* and *Saduria sabini*, the bivalves' *Tridonta borealis* and *Portlandia arctica*.

Preliminary results

The macrobenthos samples were presorted aboard. The following groups of organisms dominate in the macrobenthos communities of the study area: polychaetes, crustaceans, bivalves, echinoderms and sipunculids.

In the Ob and Yenisei estuaries compositions of the bottom fauna were similar. Euryhaline forms as *Saduria entomon*, *Pontoporeia affinis* and *Portlandia aestuariorum* were most abundant in the estuarine zones of both rivers. At the southern station of the Yenisei (BP01-08) macrobenthos was absent in our samples. At the stations BP01-04-06, BP01-17 (Yenisei) the various species of chironomides, typical for fresh water, were observed. At the fresh water stations in the Ob (BP01-73, BP01-77) chironomides and fresh water bivalves compose the benthic community. Seaward, with increasing salinity of the bottom water amount of polychaetes increase and species *Saduria entomon* was exchanged by *Saduria sibirica* and *Saduria sabini*. In the estuarine areas species diversity, abundance and biomass increase with increasing of salinity of the bottom water.

At the majority of stations located in the open Kara Sea with a salinity of 33-34 the bivalves' *Tridonta borealis*, *Macoma calcarea* and *Portlandia arctica*, the polychaetes *Pectinaria hyperborea* and *Spiochaetopterus typicus* and the sipunculid *Phascolion strombi* were most abundant. The amount of brittle stars and holoturians increase with increasing depth of the stations.

The macrobenthos communities of the study area can be divided into three groups: (1) communities with dominating of the freshwater species, (2) communities of estuaries with dominating of the euryhaline organisms and (3) communities with marine fauna. Salinity of bottom waters governs the distribution of the benthos communities within the study area. The lowest biodiversity and abundance values are characteristic for the oligohaline parts of estuaries, whereas the highest ones for full-salinity marine biotopes. For understanding the influence on benthos of other environmental factors further investigations is needed.