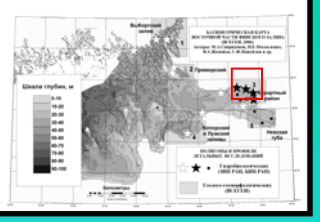

SEDENTARY ALIEN INVERTEBRATES IN BENTHIC BIOTOPES OF THE EASTERN GULF OF FINLAND

ПРИКРЕПЛЕННЫЕ ЧУЖЕРОДНЫЕ БЕСПОЗВОНОЧНЫЕ В ДОННЫХ БИОТОПАХ ВОСТОЧНОЙ ЧАСТИ ФИНСКОГО ЗАЛИВА

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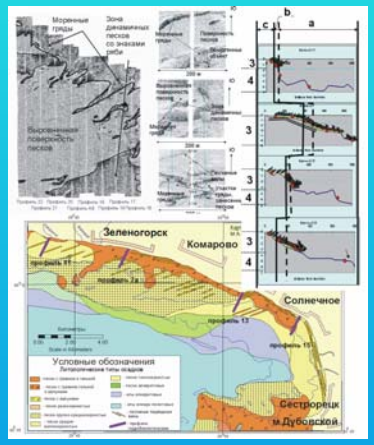

Figure 1. Resort district (typical for freshwater-oligohaline zone of EGOF). *Upper left panel*– fragment of sonar view of the bottom and coloured underwater topography elements and *upper central three images* - its detalization; *upper right panel* – scuba diving profiles with reconstructed distribution of settlements of sessile organisms along (*Cladophora glomerata*, , *Dreissena polymorpha*, *Cordylophora caspia*) and found types of coastal biotopes (denoted with numbers and letters, see also Figure 2); *color map on the bottom* – reconstructed distribution of types of sediments and geologic structure, herein: *violet lines* off the shoreline are hydrobiological profiles; *the first three boxes in Legend (sands with grave and pebble, sands with boulders, moraines, sands with boulders, pebbles and gravel)* are types of sediments that are occupied with sessile organisms.

Coastal zone forms sufficient part of the whole area in the eastern Gulf of Finland (EGOF). So far benthic compartment of the ecosystem herein plays prominent role in transformation of matter and energy coming in different proportions from Land and marine sources, riverine runoff, live organisms, benthic sediments, etc. By now available original data (geomorphological (sedimentological and acoustic), hydrophysical (currents, wave, wind action), other environmental characteristics, satellite images and results from investigation of structure and functioning of bottom communities) are collected along typical areas of EGOF during 2000-2007 and used for restoration of spatial variation of benthic habitats and communities (Figure 1). Relief and geological structure of bottoms, salinity, transparency (depends on variety of factors and determines extension of photic zone deep ward) are the most important driving forces for distribution and dynamics of coastal zone biotopes. Among inner driving factors the populations of habitat creating species are expected to play important role in productivity and elemental cycling therein, as well as in creating microhabitats. Of these species, the alien seston feeding sessile ponto-caspian bivalve *Dreissena polymoprha* and north American barnacle *Balanus improvisus* form dense population at salinities 0.2 -5.5 and upper 2 PSU respectively along both shores (Figure 2). Herein they reach the biomass up to 1.5 kg/m2, and contribute up to 99% of total biomass of invertebrates.

Seston-feeding zebra mussel is considered as powerful habitat creating factor through it's water clearance capacity and solid and liquid biodeposition (Orlova et al., 2004, Figure 3).

However, there are no statistically significant revealed direct effects of zebra mussels on water transparency, concentration of chlorophyll and seston, concentration of dissolved nutrients *in situ* with exception of very few surveys done in periods of calm weather. This may be explained by short water retention time at localities of surveys as well as by strong wave and wind action. On the other hand in experimental conditions zebra mussels significantly impact all these characteristics as well as demonstrate high rate of biodeposition of both liquid (Pmin) and solid excreta (faeces and pseudofaeces) (Orlova et al., 2004) and they do this in another way than native unionid bivalves (Orlova, Gorokhova, 2007). Also the presence of zebra mussel at hard substrates positively and significantly impacts biomass of deposit feeding invertebrates (Орлова и др., 2008 (in press), Figure 4) .

As follows from SCUBA diving, geological acoustic surveys and benthic landscapes mapping, the zebra mussel forms specific, high productive and relatively stable ***BB**** at area that constitutes 9% of the EGOF's part adjacent to St-Petersburg (the panel at the bottom of Figure 1). Herein a total macrozoobenthos stock varies from 917 to 19628 tons, and it is completely dependent on the zebra mussels biomass. Zebra mussel biomass also constitutes 79 - 93 % of the whole macrozoobenthos stock at the area. Such contribution of zebra mussel settlement to the benthic life should induce pronounced impacts on water column and sediments and nutrients' recycling along the area.

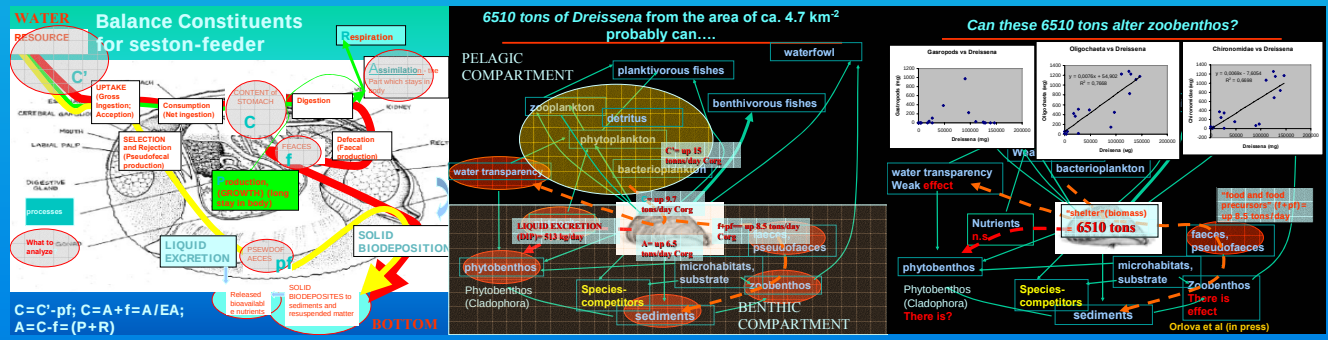

Figure 3 On the left: Balance constituents for seston-feeder, In the center: calculation of balance for population of zebra mussel inhabiting Resoet District of the eastern Gulf of Finlang (the red-framed area on the map preceding the title of the poster, On the right: Estimation of suggested effects

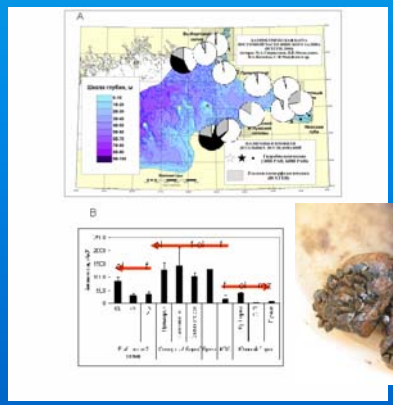

Figure 2. 2004 – 2006 by summer average data. A – Pie diagrams that demonstrate contribution of sessile invertebrate species (black - Balanus improvisus, white – Dreissena polymorpha) and other species of invertebrates (grey) to total biomass of macrozoobenthos; Б – Total biomass of macrozoobenthos at 3x biotopes, situated at different ecoregions and salinity conditions. f-freshwater conditions, fol – freshwater to oligohaline, ol - oligohaline, mz – mezohaline conditions. Photo – typical settlement of zebra mussel

How can we use fouling organisms of the eastern Gulf of Finland in theoretical and practical sense?

(1) Understanding the processes underlying formation and functioning of benthic landscapes driven by fouling species (

(2) In technologies to combat eutrophication, reduce cost of sewage purification, boom and barrier technologies and getting additional benefits, (on one more possibility to use benthic-pelagic capacities of fouling species, see poster by Orlova, Zyukov)

(3)Sanitary use and assessment of water quality

(4)Creation of artificial reefs as a remedy against coastline and underwater terrace deterioration

Possible programs for co-operation: INTERREG-IV (Second Call), OTHER?

***BB= Benthic Biotope=** functional unit of marine landscape and core geoecological division, consisting of habitat (=geological and physical environment) and living community (itself + results of its presence in habitat) being in interaction with each other and depending on available matter/energy sources and external abiotic and biotic impacts and human pressures.)* as well as their inner and outer driving forces BB. In 2002-2007 there were identified 8 major types of benthic biotopes in EGOF. ,