



1. Introduction

The Gulf of Finland is the most pollute part of the Baltic Sea. Intense human activity (harbor engineering, shippings, dumping industrial waste etc.) are influence on ecosystem of the Gulf of Finland. For solving these issues was created different project on the Gulf of Finland protection (for example the "Helsinki Commission" is the ecological project for development of laws and monitoring methods).



Fig. 1 Geopolitics of the Baltic Sea Region

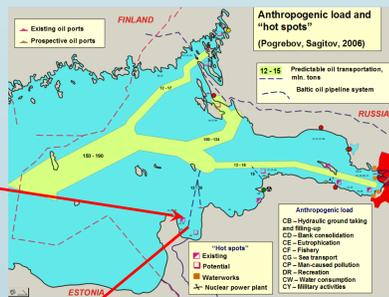


Fig. 2 Anthropogenic impact on the Gulf of Finland



Fig. 3 Location of the ust-luga port (the Luga Bay)

2. Motivation and the Main Idea

One of the hot spots of the Gulf of Finland is the Luga Bay. For example, on terminals of the Luga Bay, we can study the impact of harbor installations on the ecosystem of the Gulf of Finland. Infrastructure of the Luga Bay is composed of various harbor installations. There are multi-terminal, plants infrastructure and "New Harbour-Streams". The main idea of our project is estimation state-of-the-art of the Luga Bay ecosystem in building and service of the project "New Harbour-Streams". For our research we have the following tasks:

1. Sampling of water and bottom sediments.
2. Laboratory and analytical processing of the field studies results.
3. Selecting appropriate methods of estimation of the Luga Bay ecosystem.

3. Characteristic of the Luga Bay ecosystem

1. System of water circulation in the Luga Bay can remove pollutants. This is to maintain balance in the ecosystem.
2. The water in the Luga Bay is eutrophic. The oxygen content in the water is, however, relatively high giving good conditions for biological life.
3. Sedimentation occurs in the southern part of the bay. The bottom sediments are sands, silts mixed with pelite, loam and clay mixed with silts.
4. The production of zooplankton in the Luga Bay is one of the highest in the Gulf of Finland.
5. Macrozoobenthos quality is poor. Benthic communities are unstable and under anthropogenic impact rapidly degraded.
6. Along coast thickets of a reed are marked. In summertime green seaweed *p. Cladophora* are produced. The increase seaweed is a marker of eutrophication coasts.

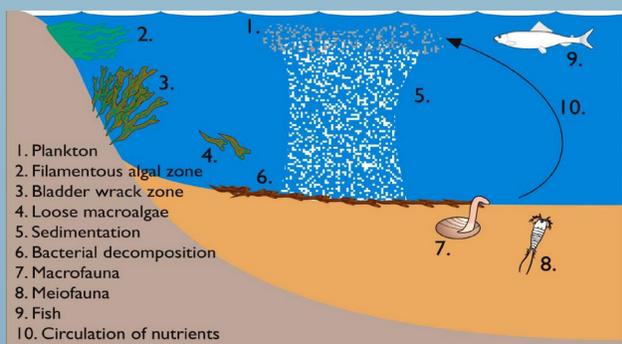


Fig. 4 Characteristic organisms and processes of the Luga Bay ecosystem

4. Methods

In the field works we studied 20 sites for water sampling and bottom deposits. Water samples were selected bathometers. Samples of sediments were selected Bottom-grab. For studying of the Luga Bay ecosystem, we used the methods of physical-chemical analysis (such as Grade Analysis, Atomic Absorption Spectrometry). In the Statistical analysis, we have computed coefficients for analyses water.



Fig. 5 Bottom-grab and Bathometer

5. Results

The relief (geomorphological traps, et al.) defines accumulation and migration of pollutants. We described depends distribution of petroleum hydrocarbons and the metals from depths (Fig. 6). Geomorphological traps promote secondary pollution of the ecosystem.

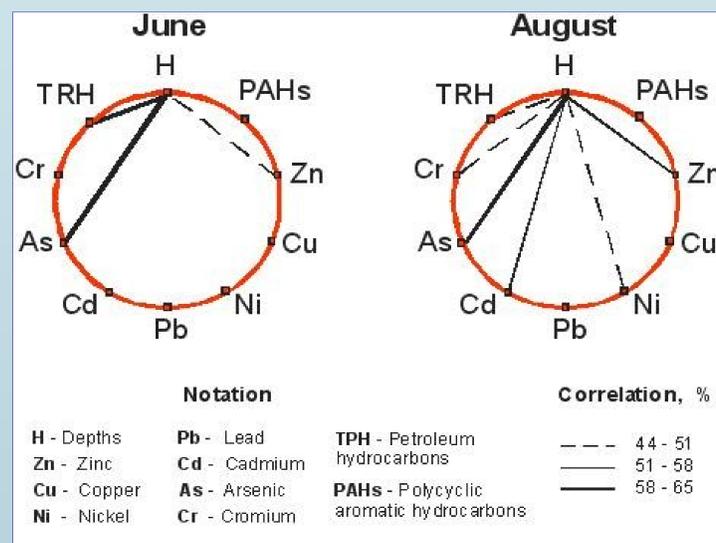
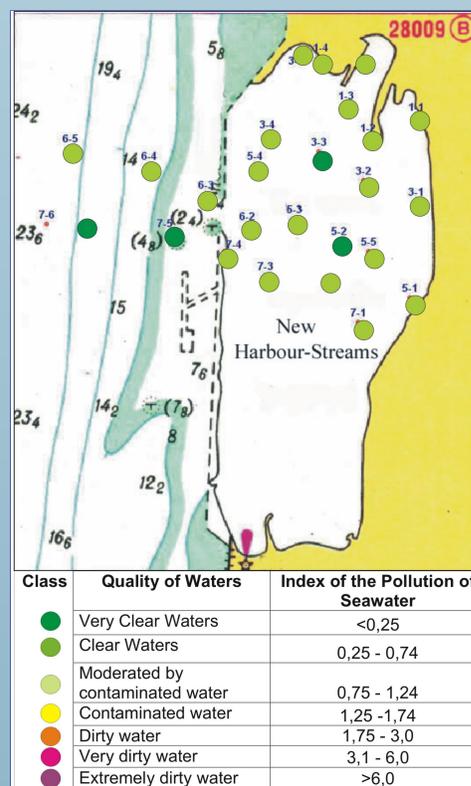


Fig. 6 Distribution of pollutants from depths

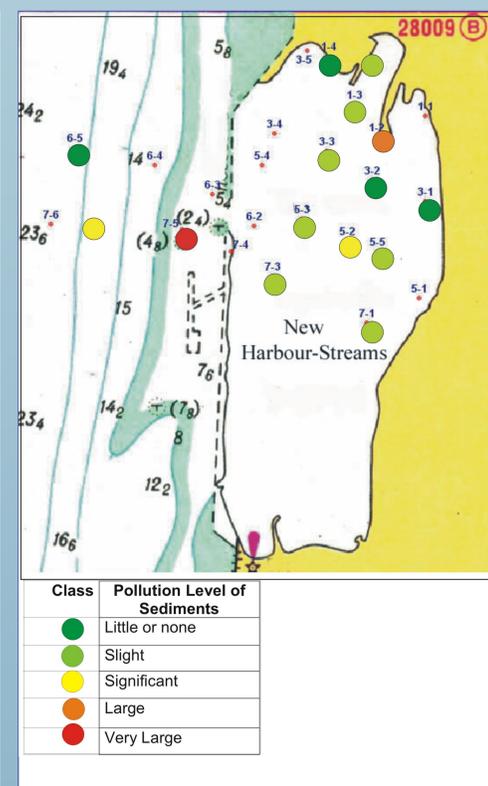
According to the research of marine water, we constructed maps of water quality (Fig. 7). On the map you can see sites with very clean waters and clean wares. Sites with very clean waters are not very much.

In addition, we studied pollution level of sediments (Fig. 8). You can see classification of pollution level of sediments. Sediment of "New Harbor Streams" is weakly pollution, but in places to the north of the bay and in places of geomorphological traps the polluted sediment was found.



Class	Quality of Waters	Index of the Pollution of Seawater
●	Very Clear Waters	<0,25
●	Clear Waters	0,25 - 0,74
●	Moderated by contaminated water	0,75 - 1,24
●	Contaminated water	1,25 - 1,74
●	Dirty water	1,75 - 3,0
●	Very dirty water	3,1 - 6,0
●	Extremely dirty water	>6,0

Fig. 7 Quality of Waters



Class	Pollution Level of Sediments
●	Little or none
●	Slight
●	Significant
●	Large
●	Very Large

Fig. 8 Pollution level of sediments

6. Conclusions

Condition of "New Harbor Streams" ecosystem is general stable. Introduced recommendations will not cause the ecosystem degradation and at the same time will contribute to economic and social development of the region. The results of ecological estimation of water area are suggested to be used for estimation of influence of building and operation of constructions on ecosystem in the future. It is hoped that with all the environmental activities, ecosystem will not come to a catastrophic condition and not lose the ability to self-recovery.

7. References

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2. Diaz, R.J., Rosenberg R. (2008). Spreading dead zones and consequences for marine ecosystems. *Science* 321:926-929.
3. Olenin, S., Daunys, D. (2004). Coastal typology based on benthic biotope and community data: The Lithuanian case study. In: Schernewski G., Wielgat M. (eds). *Baltic Sea Typology*.