



Vistula Lagoon

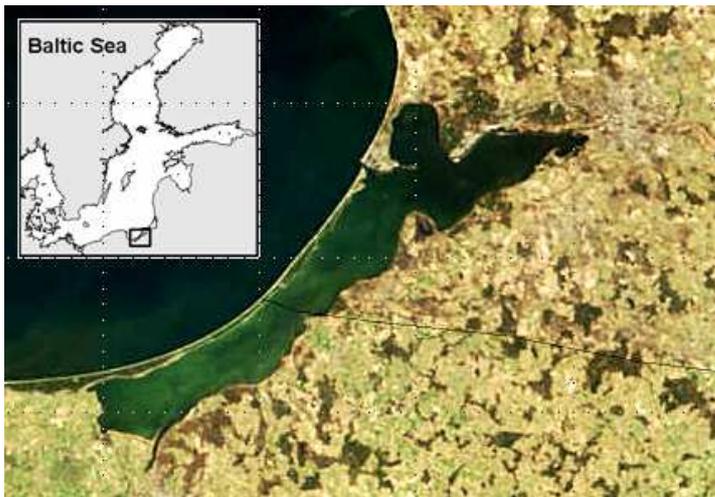
Piotr Margoński¹ and Boris Chubarenko²

¹ Sea Fisheries Institute, Gdynia, Poland, e-mail: pmargon@mir.gdynia.pl

² P. P. Shirshov Institute of Oceanology of Russian Academy of Sciences, Kaliningrad, Russia, e-mail: chuboris@mail.ru

Location and characteristics: The Vistula Lagoon is located at the southern coast of the Baltic Sea. It stretches out along the shore at ca. 90 km. It is separated from the sea by a stable sandy barrier. Its water volume and surface area are 2.3 km³ and 838 km². Average lagoon depth equals 2.7 m and maximum depth excluding the artificially dredged navigable channel is 5.2 m. The state border between Kaliningrad region (Russia) and Poland divides the lagoon into two parts which occupy 56.2% and 43.8% of the lagoon area. Drainage area equals 23,871 km² of which 61% belongs to Poland and 39% to Russia.

Width and depth of a single lagoon inlet (Baltiysk Strait, Kaliningrad region) are 400 m and 10-12 m. Navigable channel, created in 1901 by traders, connects the Baltiysk Strait and Pregolia River mouth and passes 43 km along the northern lagoon coast. It is separated from the proper lagoon by a set of artificial islands and needs a permanent maintenance dredging.

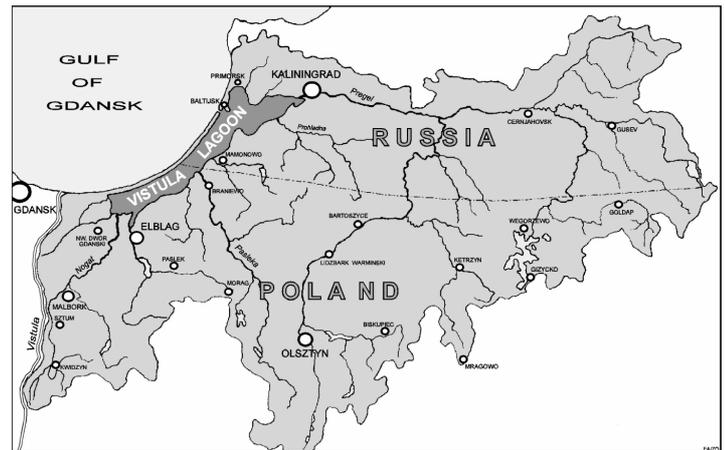


The Vistula Lagoon historically formed an estuary of the Vistula River. In the past a total river runoff toward the lagoon was 11-12 km³ a⁻¹ and the Vistula River discharged to the lagoon 8-9 km³ a⁻¹ of water through the Nogat branch. In 1916 after regulation, when the Vistula River runoff was mostly directed to the Baltic Sea, the Nogat River discharge dropped down to 0.7 km³ a⁻¹ in average. Since that, hydrological and sedimentation regimes of the lagoon changed dramatically - the lagoon evolved from freshwater estuary toward estuarine lagoon with significant influence of the Baltic Sea.

The Pregolia River is nowadays the largest river in the catchment area. It opens in the north-eastern corner of the lagoon, just after crossing the biggest city in the drainage basin, the City of Kaliningrad (former Königsberg).

Eutrophication: The horizontal distribution of water quality parameters in the Vistula Lagoon is strongly influenced by hydrological and meteorological factors, one of the most important of which is the exchange of water masses between the Gulf of Gdańsk and the lagoon. As a consequence, the area close to the Baltiysk Strait is "washed-out" and the concentrations of nutrients in this area are lower in comparison with those in remote parts of the lagoon.

The high internal potential for eutrophication is caused by significant sources of nitrogen and phosphorus that have accumulated in the sediments and are released from them.



Biota: The present trophic state has been evaluated as polytrophic/eutrophic.

Light and nutrient availability are the most important parameters controlling primary production. The average annual production in the Polish and the Russian parts of the lagoon was estimated at 300 and 180 gC m⁻² year⁻¹, respectively. Phytoplankton growth is limited mainly by nitrogen. Phosphorus limitation is only observed during early spring.

Three phytoplankton groups dominate in terms of abundance - cyanobacteria, green algae, and diatoms. Blooms of the *Anabaena* genus and *Aphanizomenon flos-aquae* have been observed from June to September in the central part of the lagoon. Cyanobacteria blooms have also been observed regularly in the Russian part.

Differences in zooplankton abundance, biomass, and species composition between the Russian and the Polish parts were mostly influenced by the different salinity regimes. Rotifers play a much more important role in the Polish part as compared to the Russian part where copepods dominate.

There are pronounced differences in macrozoobenthos communities: in the Russian part the majority of species observed are of marine origin, whereas the western part is dominated by freshwater taxa. However, the reduction of taxonomic composition as well as the increasing role of invasive species is characteristic for both parts. The Polychaeta *Marenzelleria neglecta* became a dominant species in nearly the entire area.

Due to its productivity, the Vistula Lagoon provides favorable conditions for many fish species. The dominant freshwater species are accompanied by fewer brackish water species. Variation in herring catches (2,000 – 13,000 tons annually) has had an impact on total catches (3,000 – 15,000 tons) over the last thirty years. In addition to herring, the most important fish species are eel, pikeperch, and bream.

For details and further references see Chubarenko & Margoński. The Vistula Lagoon. In: Schiewer (ed.): Ecology of Baltic Coastal waters; Ecological Studies, Springer.