

IMPACT OF HYDROTECHNICAL STRUCTURES ON THE DYNAMICS OF SANDY SHORE ACCORDING TO THE EXAMPLES OF THE MAINLAND PART OF THE LITHUANIAN BALTIC SEASHORE

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The south and eastern coastline parts of the Baltic seashore are prominent for sandy coast prevailing there. Thus the problem of unstable matter seashore erosion is under considerable attention in the countries adjacent to the Baltic Sea. The major part of south-eastern Baltic sandy seashore has been influenced by erosion and recession of varying intensity. Though Lithuanian coastline length doesn't exceed 100 kilometres, the area is attractive for its fine sand beaches and costal protective dunes. The discussed area stretches more than 40 kilometres from the Port of Klaipėda to the state border with Latvia.

In 1960-1964 on the basis of the data of long-term research near the Klaipėda dumping place and in some other areas, Rudolfs Knaps, a Latvian hydrotechnician, found out that the near shore streams carrying sand had the northward direction, and that a yearly amount of it was 250-500 thousand cubic meters (Knaps 1966). It was detected by using marked sand and automatic current recorders. Later prof. V. Gudelis stated that a yearly amount of transported sand was 300.000 cubic meters (Gudelis 1998). It is important to mention that the hydrotechnical structures mentioned above stabilize the shore well only in calm periods. During strong gales and hurricanes (the definitions are given after the Beaufort scale) a very high sea water level causes precarious situations. Strong waves, currents and wind result in the deflation processes on the shore (Gudelis 1998). The recent investigations of the Lithuanian mainland coastal area show the decreased volume of the sediment transport. The studies of Žilinskas et al. (2003) showed that the budget of continental coastal surface sediments (in a time frame 1993-2003) was negative. The annual loss of sediments from the Lithuanian mainland coast is about 48,000 cubic meters of sand on the average. According to Kriauciūnienė et al. (2006), during the average year the Lithuanian mainland beaches could accumulate 100,000 cubic meters of sediments.

The aim of the study was to survey new tendencies in coastal erosion using some examples observed on the Lithuanian mainland coastal area. Hydrotechnical intervention into the natural processes always causes some upcoming changes. The most dynamical situation appears to be at resort town of Palanga. Due to the groyne that was put into action there in the period 1888-1910, the shoreline moved seawards by 500 steps (each 0.7 meters long) (Karwowski, 1913), and by 1947 it had additionally moved 100 meters (Knaps, 1966; Gudelis, 1998). A promontory near the Palanga coast has consequently formed due to the implementation of the hydrotechnical means. In 1997-1998, after the removal of the under-pier groyne in Palanga, aggressive coastal erosion occurred there. An exclusion of any segment out of the system, being characterized as of stable dynamic equilibrium, results in sequential regressive changes in the system. When forcing the coastal and near the coast area with the invasive hydrotechnical means exerting influence on the dynamic equilibrium, it is necessary to implement auxiliary means enabling to keep looking after the construction. Due to regular extreme impact of hydrometeorological factors the groyne constructed at the Lithuanian marine coast in Palanga will undergo more or less significant damages. Prevailing stormy winds of southwest direction cause the cyclonic character of currents and sediment transport in the south eastern and eastern coastal area of the Baltic Sea. In 1997-1998, after the exclusion of the hydrotechnical construction from the balanced sea-and-coast system the aggressive erosion processes occurred on the coastal part of the newly created cape shaped promontory in Palanga. First removed, later the groyne was brought back into the

system. The reconstructed groyne is smaller in its parameters than the previous one. Still, its influence on the coastal zone is evident. Approximately an average beach area in the dynamically most active zone of the Lithuanian seacoast in Palanga has widened by 40 percent. The final dynamical equilibrium of the seacoast line in the investigated zone has not formed yet and the character of this changing situation will be defined by the scale of extreme cyclonic atmospheric structures and their recurrence in this region.

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