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Problem of coastal erosion in the Eastern Gulf of Finland: preconditions and risk assessment

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The world-wide problem of the coastal zones erosion is performed more acute in the conditions of the ongoing climate change, the sea level rise and the swift in the development of the society. Distinct parameters of territory such as a tectonic movement, structure and composition of sediments, hydro- and meteorological particularities and a degree of anthropogenic influence determine the rate of the abrasion.

Nowadays the considerable extension of the Eastern Gulf of Finland and especially Kurortny District coasts undergoes the dramatic erosion recession. The consequences of the erosion effect consist in losses of particularly important territories, destruction of near located buildings and involve significant costs for reconstruction and maintaining of disrupt areas. For Kurortny District the mean rate of the shore retreat is 0.5 meters per year, the maximal rate was equal 1.8 meters per year during strong storms. Complex investigations for the exploration of the Eastern Gulf of Finland were carried out, including the estimation of the geological situation via field observations, the execution of underwater profiles, using sonar data, the determination coast evolution via comparison of old and recent maps, images and the assessment the hydrometeorological conditions.

The work contains two closely connected parts – an estimation of possible long-shore transport and an assessment the risks of coastal erosion for maritime territories. The examined amount of the long-shore transported sediment detected the important cause of the erosion processes – the movement of material from the coast part to the adjacent regions induced by wave influence. The rate of long-shore material transport varies in dependence of the predominant wave characteristics, the morphology and the orientation of the coast. The prevalent winds from western (W) direction cause waves from the same direction on the territory of the Eastern Gulf of Finland and form the pattern of sediment motion mainly directed to the east. The various geological and morphological conditions promote the generation of accumulation zones and zones of strong erosion.

The next step lay in compilation of the risk maps of the coastal zone according to different scenarios of the climate change with time period of 50 and 100 years. Such maps allow determining zones with high risk of destructive coastal processes and making recommendations concerning the economic use of the coastal territories of the Eastern Gulf of Finland.

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