THE BALANCE OF ECONOMIC, ENVIRONMENTAL AND SOCIAL NEEDS FOR SUSTAINABLE MANAGEMENT OF LAKE ECOSYSTEM

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Abstract
The aim of this study is to develop hydrodynamic model of Tasu Lake to evaluate lake water level fluctuation impact on environment, economics and social activities. Tasu Lake is located in the South West part of Latvia. Tasu Lake is a part of Alande river basin from Alande river source to Eile stream. Tasu Lake is a eutrophic lake rich in nutrients that results in plant growth and eutrophication of the Tasu Lake. The catchment area of the Tasu Lake is 59.86 km^2. The 16.70% of the total catchment area is covered with forests and 10.97% are covered with bogs. The total surface area of water bodies in the catchment area of the lake, including Tasu Lake, is 0.94 square kilometres. Measurements of water depth and sludge layer were carried out using the hydro acoustic stream meter RiverRay. Its working principle is based on sound distribution with sound sensors at a specified frequency. The shape of a waterbed and its variability can be determined with multiple measurements in several cross-sections and by forming a cartographic representation of the waterbed terrain. Measurements are performed with geodesic engagement in absolute height scale. Measurements are carried out using the WinRiver II data-processing computer programme. From the resulting measurement data, 3D models of Tasu Lake, Tasu Lake waterbed and Tasu Lake sludge layer were made. A conceptual hydrological model METQ has also been applied. For the model, meteorological data, such as twenty-four hours air temperature, precipitation and relative humidity, were prepared and placed in the model pattern. After that calculation of the runoff of the hydrological response, the unit was done. Runoff of every hydrological response unit is described with surface runoff (O1), soil runoff (Q2), subsurface slow (Q3). The water level of Tasu Lake after optimisation of environment, economics and social activities is defined 17.6 m LAS-2000,5.

Keywords: hydrological regime, optimization model, sustainable management