

Preface

The present issue of the *Proceedings of the Estonian Academy of Sciences* is dedicated to the research into the ecosystems of Lake Peipsi and Lake Võrtsjärv. When assessing the importance of these two large lakes for small Estonia, we think first of all of clean fresh water, a valuable natural resource without which no living being can exist. The volume of fresh water in L. Peipsi is about 25 km³. In comparison with L. Peipsi, the amount of water in L. Võrtsjärv is far smaller – 0.75 km³. However, considering that all Estonian small lakes taken together contain roughly the same amount of water, the volume of L. Võrtsjärv is appreciable. Of the fresh water in Estonia lakes Peipsi and Võrtsjärv contain more than 90%, and more than 90% of the freshwater fish in Estonia is caught in these two lakes as well.

Lake Peipsi (L. Peipus, Pskovsko-Chudskoe ozero in Russian) is located on the Russian–Estonian border. By its surface area (3555 km²) L. Peipsi occupies the fourth place among the lakes of Europe. The lake consists of three parts: the largest and deepest northern part L. Peipsi *s.s.* (area 2611 km², mean and maximum depth 8.3 and 12.9 m, respectively), the middle strait-like part L. Lämmijärv (Warm Lake; 236 km², 2.5 and 15.3 m), and the southern part L. Pihkva (L. Pskov; 708 km², 3.8 and 5.3 m). Of the total area of L. Peipsi 1570 km² belongs to Estonia: 55% of L. Peipsi *s.s.*, 50% of L. Lämmijärv, and 1.3% of L. Pihkva. The catchment area (47 800 km²; including the lake) lies in the territories of Estonia (1/3) and Russia (2/3). There are about 240 inlets into L. Peipsi. The largest rivers are the Velikaya, the Emajõgi, the Võhandu, and the Zhelcha. The only outflow, the Narva River, runs its waters into the Gulf of Finland.

The water of the lake is relatively rich in biogenic substances: the mean concentrations of total phosphorus and nitrogen are 46 mg m⁻³ and 876 mg m⁻³, respectively. The northern part, L. Peipsi *s.s.*, is significantly poorer in P and N compounds than L. Pihkva, which is affected by pollution originating from the Velikaya River. Lake Peipsi *s.s.* belongs to unstratified eutrophic lakes with mesotrophic features, L. Lämmijärv has some dyseutrophic features, and L. Pihkva is strongly eutrophic.

Lake Võrtsjärv is located in central Estonia. It is a large (270 km²) shallow (mean depth 2.8 m, maximum depth 6.0 m) strongly eutrophic (total N 1600 mg m⁻³, and total P 54 mg m⁻³, chlorophyll *a* 22 mg m⁻³) waterbody. Eighteen rivers and streams falling into the lake collect their water mainly from the cultivated catchment area (3374 km²). The outflow into L. Peipsi occurs via the Emajõgi

River. The water of the lake is alkaline (pH ~8) with a high buffering capacity. The shallowness of the lake and the resuspension of bottom sediments by waves contribute to the formation of a high seston concentration and high turbidity of the water during summer. The mean transparency does not exceed 1 m in the ice-free period. The gas regime of the lake is good owing to continuous mixing. Still, oxygen deficit sometimes occurs under the ice cover. Algal blooms are a common phenomenon in the lake. Exposure to winds, shallowness, and large fluctuations of water level (annual average 1.4 m) are the main factors determining the character of the lake's ecosystem.

Protection of lakes is our task before the future generations. A prerequisite for the preservation and protection of lakes is a good knowledge of them. Large lakes with their biodiversity and constantly changing biotopes are inexhaustible objects of research for scientists. The present special issue of the journal represents a small part of this extensive work. I am thankful to all authors for their valuable contribution.

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