

## Preface

Clean fresh water is the most valuable natural resource besides air. The generous nature has granted a relatively large amount of fresh water to small Estonia. The bulk of it, more than 90%, is concentrated into two large lakes – Peipsi and Võrtsjärv. Also more than 90% of freshwater fish is caught in these lakes. Protection of lakes is our duty before the future generations. A prerequisite for the preservation and protection of lakes is a good knowledge of them. The present special issue of the journal represents a small part of the extensive work done in Estonia to expand our knowledge about lakes. This issue is dedicated to the research into the ecosystems of two large lakes – Lake Peipsi and Lake Võrtsjärv – and one small lake – Lake Verevi.

According to the Water Framework Directive 2000/60/EC, the state of Lake Peipsi is moderate. Rivers carry polluted water continuously into the lake. Most (80%) of the nitrogen and phosphorus present in the lake's water is introduced by the Velikaya and Emajõgi rivers. In the early 1990s, in the changed social and political conditions, the whole economy, particularly agriculture, fell into a rapid decline, which was clearly reflected in the reduction of the lake's pollution load. Compared with the 1980s, the amount of nitrogen and phosphorus fertilizers used in Estonia in the 1990s was 10–20 times smaller. Nitrogen is carried into rivers largely as a result of agricultural activity (use of fertilizers), while phosphorus originates from human settlements (use of phosphate-containing detergents). Evidently, changes in the people's living standards were not so profound as changes in agriculture as the decrease in the nitrogen load was larger than the decrease in the phosphorus load. As a consequence, the balance of nitrogen and phosphorus (i.e. the N/P ratio) in the inflows decreased. In comparison with the period 1980–1991, in 1992–2004 the nitrogen load entering Lake Peipsi from the territory of Estonia was by 39% smaller and the phosphorus load was by 13% smaller. The low N/P ratio favours mass development of blue-green algae. Water blooms due to bluegreens intensified during the last decade, which has spoilt the balance of the lake's whole ecosystem. The particularly strong water bloom in August 2002 led also to a fish kill. The amount of algal toxins found lately in the lake's water is already dangerous. To improve the state of Lake Peipsi, the phosphorus load should be reduced by all possible means. It is clear that this goal cannot be achieved without a thorough knowledge of the lake's state.

The fish fauna of Lake Võrtsjärv is in a good state today. This has been achieved largely thanks to the activities of the ichthyologists of the Võrtsjärv

Limnological Centre. In the 1950s and 1960s Võrtsjärv was classified as a ruffe lake, fine-meshed trawls killed the juveniles of valuable fishes, first of all pikeperch. In 1958–1961 only 0.45 tonnes of pikeperch was caught from the lake. In order to increase the stocks of valuable commercial fishes, a number of measures have been taken. Trawling (fine-meshed trawls) was stopped, glass eels have been regularly introduced into the lake since 1956, and the protection of commercial fishes has been improved. These measures have resulted in a rapid growth of the stocks and catches of commercial fishes, mainly pikeperch and eel. The most important fishes in Lake Võrtsjärv are the valuable eel (*Anguilla anguilla*) and pikeperch (*Sander lucioperca*), which serve as the main articles of export. A total of 39 tonnes of eel and 30–40 tonnes of pikeperch is caught annually in Lake Võrtsjärv. In order to preserve the present composition of fishes in L. Võrtsjärv, it is necessary to continuously study the lake's ecosystem and to maintain the achieved balance in it.

Lake Verevi is situated in the small resort town of Elva and its recreational value is very high. This lake too is endangered by anthropogenic eutrophication. In the first half of the 20th century Professor H. Riikoja, the founder of Estonian limnology, performed a survey of Estonian lakes, including a study of Lake Verevi in 1929. This time the lake was in its natural state and had a good ecological quality. Alarming signs of deterioration of the lake have been noticed since the 1970s. All phenomena connected with rapid eutrophication have been revealed, among these one of the highest values of phytoplankton biomass ever recorded in Estonia –  $724 \text{ g m}^{-3}$  wet weight. This led to an idea to study the functioning of the ecosystem of this lake in greater detail. The most profound seasonal studies took place in 2000 and 2001, with 25 researchers participating. Some results of this study are summarized in this special issue.

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