

Pollution and anthropogenic-induced processes impact on lakes quality of Russian Arctic region

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European Russia is located from the Kola Peninsula in the north to the Caspian depression (East European Plain), with an average elevation of 170 m a.s.l., with some hills rising to 300–400 m a.s.l. or higher. In the northern part of the plain (in the Kola Peninsula and Karelia tundra and taiga zones) the crystalline Archean and Lower-Proterozoic outcrops form the Baltic Shield, whereas the southern part of the plain (arid zone) is covered by thick Upper-Proterozoic and Phanerozoic sedimentary rock.

The Euro-Arctic region (Barents Sea drainage basin) is a part of the Planet where the territory is covered by a very great number of lakes. The high provision of the Arctic regions with water till recently has not caused a trouble about the state of the latter. At the same time, intensive development of the rich deposits of mineral recourses and trans-boundary transmissions of pollutants lead to a rapid disturbance in the fragile environmental equilibrium already in many urbanized and industrial Arctic regions, which leads to qualitative depletion of the water resources.

The selected lakes ranged from 0.4 km² to 20 km² in surface area with no direct sources of wastewater in their catchments. Water samples were collected in plastic bottles without sorbing properties. In the field, the bottles were rinsed twice with lake water, then and placed into dark containers and cooled to 4 °C. Water samples were transported to the laboratory as soon as possible (within 5-15 days). The sampling was carried out during autumn turnover (from late September for tundra lakes to late November for lakes on the steppe) to minimize the effect of interannual and seasonal variations.

During the flood period in Arctic region the pulse of metals in combination with low pH values can have a dominant negative effect on the fauna after the long Polar night. The danger is also in rapidly washing out of heavy metals from catchments and release of their ionic forms by acid snow-melt water. Water acidification results in higher mobility of many trace elements, primary of which is Al. In cold regions the pollutants have much more expressed negative effects. At the same time, lakes here get a special value due to high-quality water resources and good fish production. The basic principle of Arctic lake preservation should be given up as follows: priority of the clean water and fish production; refusal from non-limited Arctic water resources due to their high vulnerability to anthropogenic loadings; differential approaches to protection of lakes depending on natural conditions and on lake purpose; preventive maintenance of pollution sources instead of struggle with consequences: withdrawal of toxic substances from industrial discharges; prevention of emergencies connected with burial places of industrial and radioactive wastes, transport of petroleum, localization of non-point contaminated flows from mining activity

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