

Indicative indicators of eutrophication as an element of monitoring of aquatic ecosystems

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Abstract

The choice of criteria for assessing the state of aquatic ecosystems has long been an important aspect of environmental and hydrobiological research. Changes in the mean multiyear values of the indices of chemical and biological oxygen consumption, characterizing the conditions of the degree of eutrophication, been shown. Using the ratio of MPC for COD and BOD5 defined "normative" ratio – 13.33%. It was shown that this ratio in control areas was 7.94-7.89%, in the zone of wastewater mixing with the water of the reservoir the ratio was 14.97, in the area of wastewater discharge from the primary settler this ratio was the maximum – 58.48%.

Since the level of phytoplankton development reflects the level of natural eutrophication of aquatic ecosystems, a comparative analysis of water quality indicators for the development of phytoplankton was conducted. It is shown that the calculated indices do not reflect the real ecological specifics of the sites.

Based on the study of the components of the hydrobiocenosis of the section of the Volga Reach in the area of wastewater discharges of the Mari Pulp and Paper Mill, it was shown that under the conditions of anthropogenic eutrophication, there is a significant variability in the characteristics of the hydrobiocenosis including species diversity. The coefficient of variation of the indices of species diversity better reflects the level of eutrophication.

A developed Index Y is proposed that reflects the ratio of the main complex of zoobenthos species with different types of respiration: in areas of the greatest anthropogenic eutrophication, it is represented mainly by insect species capable of atmospheric respiration; when the state in the ecotope is improved, the diversity and representation of the secondary-water insects increases, and the groups consuming oxygen dissolved in water replace forms that consume atmospheric air; primary-water animals predominate in the control areas and in the restoration zones. The values of the indicator can vary from 100 if there are no insects in the zoobenthos to 0 in the absence of zoobenthos or if it is represented exclusively by hydrobionts, which are adapted to breathing atmospheric air. The main criterion for the state of the system is the ratio of zoobenthos to oxygen in water, therefore this index can be considered as an indicator of eutrophication of the ecosystem. The lower the index, the more critical the state of the aquatic ecosystem. The index, unlike the others, is not an indicator of the ongoing process of eutrophication, but reflects the already negative impact on the aquatic ecosystem and assesses its ability to restore.

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