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## Study of Quality Water in Bypass Channel and the Sorbulak Lake (Almaty, Kazakhstan), Used for Irrigation of Agricultural Land

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### Abstract

This study undertakes researches of sewage water quality indicators after purification: in the bypass channel and in the lake-collector Sorbulak which water is used for irrigation of field and technical cultures.

Determination of phosphate, sulphates and nitrites shows that the level of these biogenous elements in Sorbulak lake has been twofold reduced in comparison with the channel water:  $10.04 \pm 0.07 \text{ mg ml}^{-1}$  /  $22.7 \pm 0.2 \text{ mg ml}^{-1}$ ,  $405.2 \pm 0.05 \text{ mg ml}^{-1}$  /  $987.6 \pm 0.60 \text{ mg ml}^{-1}$  and  $22.5 \pm 0.08 \text{ mg ml}^{-1}$  /  $34.6 \pm 0.05 \text{ mg ml}^{-1}$ , respectively.  $\text{NO}_3^-$  - anion in channel water and in Sorbulak were lower than  $23 \text{ mg l}^{-1}$ , and the content of total nitrogen lies within  $30\text{--}39 \text{ mg l}^{-1}$ .

Sorbulak lake showed a reduced concentration of phenol  $2.02 \pm 0.08 \text{ mg l}^{-1}$ , aluminum  $0.12 \pm 0.01 \text{ mg l}^{-1}$ , and lead  $3.66 \pm 0.06 \text{ mg l}^{-1}$ , compared to the bypass channel, but phenol and lead concentration were still higher than allowed. Moreover, reduction of surfactants (cation, anion) was observed in Lake Sorbulak, but the concentration of neon was practically the same in the channel as in the collector.

The comparative analysis of algological biodiversity identified that the bypass channel water contained more generic diversity (9 genus) as presented by Chlorophyta, and opposite to the Sorbulak lake contained also Chromophyta (7 genus) and Cyanophyceae. Increase of biodiversity of this last group of microalgae can be the reason of inorganic phosphorus and nitrogen absorption and as a result of biomass collection. That is why irrigation water containing these microalgae can stimulate growth of agricultural crops.

Thus, the channel for discharge of sewage water can be considered as an independent purification ecosystem, as the water passing through it continues to purify a result of diverse form of lives in it. Finally, maximal purification is reached in the lake. However, Sorbulak lake water doesn't correspond to the quality levels for heavy metals and phenols.

**Keywords:** Algae, biogenous element, lake-collector Sorbulak, waste water