Study the influence of a biological product "East of the EM-1" to improve the water quality of Lake "Mine Town"

Object of study is a lake located in the park of culture and recreation "Mine Town" in Vladivostok. Water surface area of the lake of 1500 m2, depth -1,7-1,9 m. The lake's water before the study was described as slightly turbid from the presence of floating impurities, and in some places, with the presence of rapidly blooming algae (Fig. 1). To study the effect of a biological product "East of the EM-1" on the water quality of the lake, first produced activation of the drug in the Landmine town employees LLC Primorsky EM-Center ". To do this in the park mine town was chosen a place where there are 3 tank volume of 200 liters. Water in the tanks previously advocated for a day to neutralize chlorine. Activation was carried out by the following recipe: Concentrate - 2%, cane molasses - 0,5%, beet molasses - 0,5%, sugar - 1%, wheat bran - 1%. The room maintained a constant temperature of 35-36 degrees with a radiator. The process of activating the drug "East of the EM-1, lasted 6 days. Acidity (pH) of the finished biological product was 3,3-3,4 units. That is the norm for the drug. Were also made about 300 of the EM koloboks, much less than the required number (5 pieces / 1 m2). Ready to activate the drug (volume 600 liters) was poured in 5 liter containers, tanks were transported by car to the lake to a distance of 100 m, were loaded into the catamaran and then poured the drug evenly throughout the lake (Fig. 2). EM-balls have been thrown into the water directly off the coast of the lake due to the small number of them. Activation of the drug and its pouring into the lake was performed twice in equal volumes. Before filling the EM preparation in the lake were selected control samples of water (07/07/2010 was). The first introduction of a biological product performed 15.7.2010, the second fills conducted 08.05.2010. Water samples after a 2-fills a biological product in the amount of 1200 liters were taken 8/30/2010 Also, the sludge samples were taken before and after the introduction of EM preparation (Fig. 3). Sampling of sludge was carried out by employees of laboratory gas chemical Pacific Oceanological Institute FEB RAS.

Figure 1. Exterior view of the lake "Mine town" before the introduction of EM preparation

Fig. 2. Pathways and the Gulf of activated EM preparation in the lake

Fig. 3. Sampling of silt in the lake "Mine Town"

Analyses of lake water were carried accredited central laboratory of OAO Primorgeologiya. Results of chemical analysis of lake water before and after the introduction of EM preparation are presented in Table 1.

Table 1.

Narrative	**Units of measurement.**	**Control (before the introduction of EM)**	**Experience (after a 2-fold administration of EM-drug)**
Turbidity	mg/dm3	5,24	1,71
pH	units.	9,57	10,14
Smell	point	2	0
Transparency	-	Muddy	slightly turbid
Suspended solids	mg/dm3	70,4	6,80
Floating mixture	-	in the form of debris	No
Permanganate oxidation	mg O/dm3	4,8	2,96
Ammonium	mg/dm3	0,34	0,057
Nitrates	mg/dm3	3,08	0,74
Nitrites	mg/dm3	0,005	0,005
Dissolved oxygen	mg/dm3	9,77	9,59
Hydrogen sulfide	mg/dm3	0,0043	0,002
BOD5	mg/dm3	1,54	0,91
COD	mg/dm3	60	31

Organic carbon	mg/dm3	3,69	4,02

The results showed that before the introduction of EM product in the lake recorded a high number of both mineral and organic matter (Fig. 4, 5). Were marked by high concentrations of suspended solids, a significant turbidity and odor, high amounts of hydrogen sulfide, which revealed a significant accumulation of organic matter in the lake.

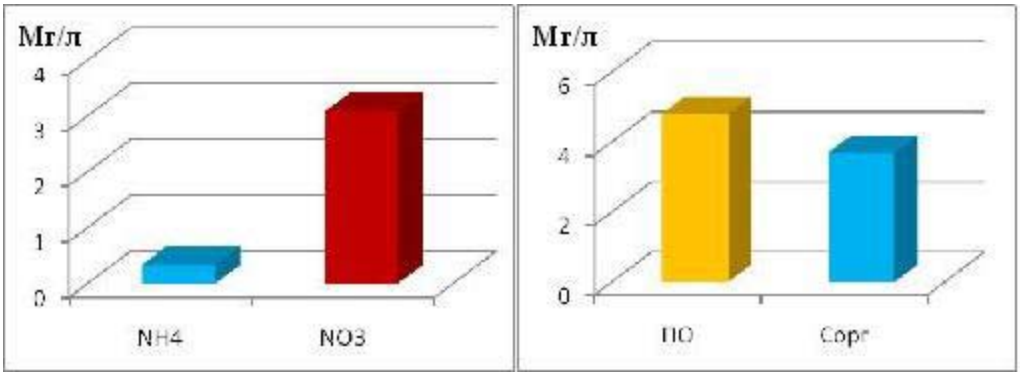

Fig. 4. The content of chemical substances in the Lake "Mine town" before the introduction of EM preparation (NH4-ammonium, NO3 - nitrates, ON - permanganate oxidizability, sorghum - organic carbon)

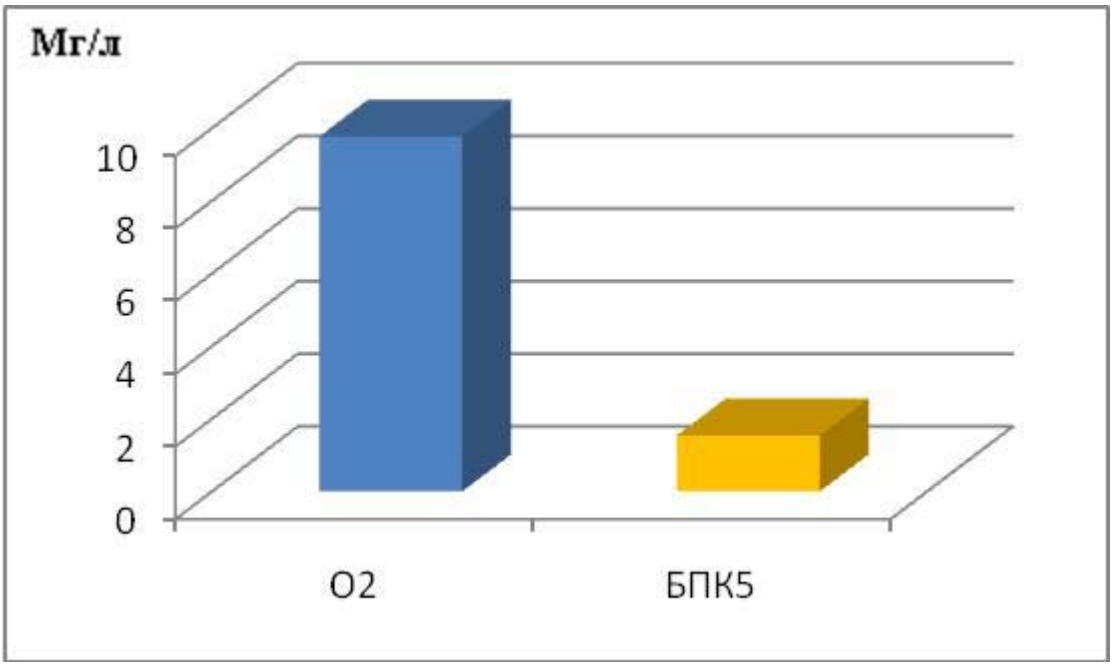

Fig. 5. Oxygen levels and BOD5 in the lake prior to the introduction of the EM preparation

After the double processing of the lake EM preparation of 600 liters of water clarity has improved significantly, reduced odor, debris in the water was no longer detected. Number of nitrites, ammonia and suspended solids in the water after the introduction of EM sharply decreased by 76%, 83% and 91% respectively (Fig. 6).

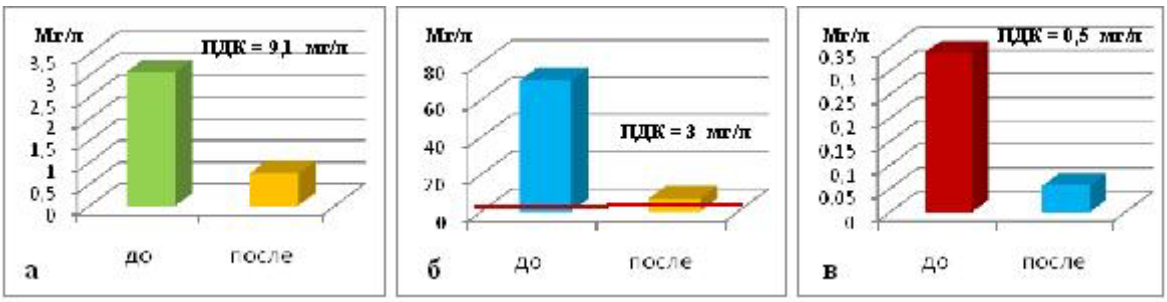

Fig. 6. Nitrite (a), suspended solids (b) and ammonia (c) in the surface waters of the Lake "Mine Town" before and after the introduction of EM preparation.

Such an indicator as COD (chemical oxygen demand) reflects the presence of total organic matter in the lake. From the data shows that before the introduction of EM, the figure was 60 mg / L, which exceeded the MCL in 4 times. After adding the EM-drug concentration of COD in the lake was reduced by 48% (Fig. 7).
In the lake water were also found high concentrations of hydrogen sulfide (0.0043 mg / l). It is known that hydrogen sulfide is a toxic gas that is formed when large amounts of unclaimed rotting organic matter. Maximum allowable concentration of this gas in water is 0. The introduction of the EM preparation in the lake has reduced the concentration of hydrogen sulfide in water at 53% (Fig. 7).

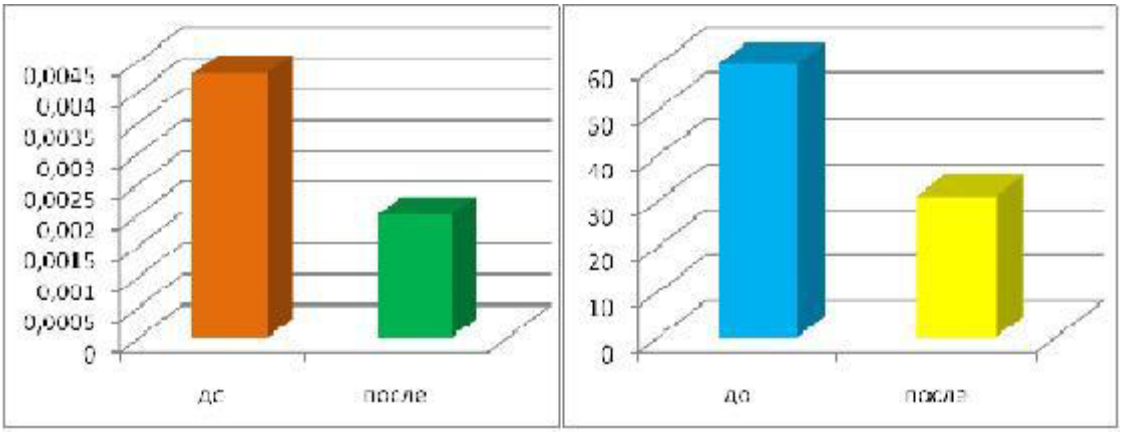

Fig. 7. Levels of hydrogen sulfide (a) and COD (b) in the Lake "Mine Town" before and after administration of EM-drug

Permanganate oxidizability (PO) is an indicator of the presence of water trudnookislyaemyh organic compounds such as phenols, petroleum products, etc. Prior to the introduction of the EM-drug concentrations are in the lake was not high and amounted to 4.8 mg / liter. After processing the EM preparation of software decreased by more than 38%.

Results of the analysis of water samples for the presence of methane showed that prior to processing the lake EM preparation water contained high amounts of methane concentration exceeding the background values of 10-20 times (Fig. 8). The processing of the EM agent the amount of methane in the water decreased by 30-35% (Fig. 8). The study of silt the lake before the introduction of EM preparation, revealed that the sediment of the lake is saturated with methane. This means that life in the sediment there. Such aeration is usually associated with oxidation of organic matter that falls to external flows. The processing of the Lake of the

EM agent the amount of methane in the silt has increased 2-3 times (Fig. 8), in addition, there were heavy hydrocarbons - ethane, propane, butane. This is possible due to the fact that the EM-bacteria siege of organics from water to sludge and methane-forming bacteria from it produced methane.

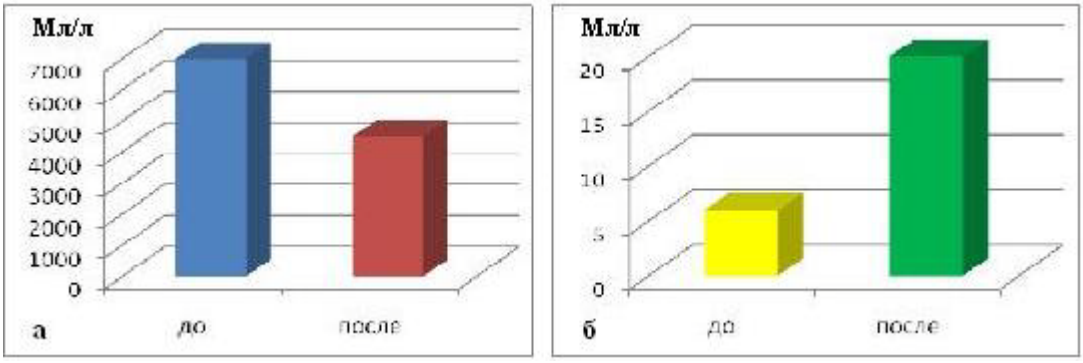

Fig. 8. The concentration of methane in water (a) and bottom sediments (b) of the lake "Mine Town" before and after administration of EM-drug

Thus, the introduction of activated biological product "East of the EM-1 in water and bottom sediments of the lake significantly accelerates the natural purification of the lake, allows much faster to reduce the concentration of pollutants and improve the hydrochemical regime of the lake. For a complete cleaning of the lake is necessary to repeat injections of a biological product