

Migration of some metals in the ecosystem of the Caspian sea

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The content of heavy metals in aquatic organisms of the Caspian sea is connected with the increase of anthropogenic load on aqueous ecosystems, what leads to the disruption of the natural cycle of chemical elements. Heavy metals in small concentrations are included in an organism and are involved in various metabolic processes. One of the reasons for the high content of metals in the body of hydrobionts is the accumulation of the last in the food web and functional disturbance in all parts of the ecosystem. The aim of this work was to trace the migration of some metals in trophic chains in the ecosystem of the Caspian sea. The objects of the study were: various types of soils of the Caspian sea molluscs of the genus *Didacna*, fish - gobies *Gobiidae* and liver of Russian sturgeon *Acipenser gueldenstaedtii*, mammal - the liver of the Caspian seal *Phoca caspica*. The main burden of the accumulation of trace elements takes on the liver, which is a functional depot of many metals and is characterized by high metabolic activity in which there is a filtering and transformation of substances. The content of heavy metals in the objects of study were determined by atomic absorption method. The results are presented in mg/kg dry matter.

The results showed that the level of accumulation of heavy metals in different types of soils of the Caspian sea was within the limits of environmental standards for bottom sediments taken in the Netherlands (2009) and heavy metal concentrations in silt and sand soil were below background values (according Verkhnevolzhskaya exploration of the enterprise and the Institute of water problems Russian Academy of Sciences, Russia). It should be noted that silty and sandy soils have a similar distribution pattern of heavy metals. A number of decrease the content of heavy metals in different soils of the Caspian sea were as follows: Silty and sandy soils: Zn>Ni>Pb>Co>Cd>Hg. The metals content in mollusks decreases in the series: Zn>Ni>Cd>Pb>Co>Hg. Decreasing the number of heavy metals content in steers as follows: Zn>Ni>Pb>Co>Cd>Hg, in the liver of Russian sturgeon: Zn>Ni>Pb>Cd>Co>Hg. It should be noted that in living objects Zn and Ni is accumulated to a greater extent in comparison with the other investigated metals. Apparently, this is due to their close contact with sediments, which have previously drawn attention N.V. Kuznetsova (2015) and N. Yu. Yevtushenko (1996). And mollusks, have the most intimate contact with the soil, have accumulated zinc and Nickel at higher concentrations (79.73 ± 2.18 mg/kg and 59.97 ± 9.29 mg/kg, respectively), compared with fishes. In living organisms revealed the migration of mercury through trophic levels. If the concentration of mercury in sandy soil to make per unit, it is possible to obtain the following ratios: sand soil $\times 1 <$ mollusks $\times 5 <$ gobies $\times 10 <$ hepar Russian sturgeon $\times 70 <$ Caspian seal $\times 2000$. Mercury forms a very stable mercury-organic complexes, displacing biological molecules, almost all other metals. This property of mercury causes an irreversible increase in its concentration in the transition to the trophic chain of organisms from lower links (mollusks) to high (Caspian seal). Shellfish have a high ability to remove heavy metals from soil, especially from sandy. Therefore, they have a high bioaccumulation factors (Zn – 7, Ni – 7, Cd – 4, Hg – 5) while the fish significant coefficients of bioaccumulation was noted in only a handful of metals: gobies (Hg – 2), Russian sturgeon (Cd – 2.5 and Hg - 7). Thus, the bioaccumulation potential of metals depends on species physiological characteristics of the organisms and environmental factors.