Investigation of the Heavy Metal Pollution of the River Ecosystems in the Lake Sevan Basin, Armenia

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Abstract : The Lake Sevan basin is situated in the eastern part of the Republic of Armenia (Gegharquniq marz/district). The heavy metal pollution of the some tributaries of Lake Sevan was investigated. Water sampling was performed in August and December, 2014 from the 4 observation sites: 1) Sotq river upstream (about 600 meters upstream from the Sotq gold mine); 2) Sotq river mouth; 3) Masrik river mouth; 4) Dzknaget river mouth. Heavy metal (V, Fe, Ni, Cu, As, Mo, Pb) concentrations in the water samples were determined by the standard methods using an atomic absorption spectrophotometer. The results of the study showed that heavy metal content mainly increased from the upstream of the Sotq river to the mouth of the Masrik river which may have been conditioned by the influence of gold mining activity as the Masrik and its tributary-Sotq rivers passing through the gold mining area were exposed to heavy metal pollution. The observation sites can be ranked by pollution degree as follows: №3> №2> №1> №4. The highest heavy metal pollution degree was observed in the Masrik river mouth which may have been conditioned by the direct impact of gold mining activity and the pressure of its tributary–the Sotq river which flows through the gold mining area. The lowest heavy metal pollution degree was registered in the Dzknaget river mouth which flowing through rural areas wasn't subject to significant heavy metal pollution. According to the observation sites of the Sotq and Masrik rivers, high positive correlation was mainly observed between the concentrations of the investigated heavy metals (except nickel) which indicated that all the heavy metals except the nickel had the same anthropogenic pollution source which was the activity of the Sotq gold mine. In general, it is possible to state that the activity of the Sotq gold mine in the Lake Sevan basin caused the heavy metal pollution of the Sotq and Masrik rivers which may have posed environmental hazards. Heavy metals are nondegradable substances, and heavy metal pollution of freshwater systems may pose risks to the environment and human health through accumulation in the tissues of aquatic organisms, water-food chain as well as oral ingestion and dermal contact.

Keywords : Armenia, Lake Sevan basin, gold mining activity, river ecosystems, heavy metal pollution
Conference Title : ICFAS 2015 : International Conference on Fisheries and Aquatic Sciences
Conference Location : New York, United States
Conference Dates : June 04-05, 2015