Assessment of spawning conditions of endemic fish species in major tributaries of Lake Sevan (Armenia) with a purpose to restore them

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INTRODUCTION

Lake Sevan (surface 12,650 km², volume 305 km³) is the largest freshwater lake in Armenia, in the Caucasus and in the Middle East. It is one of the largest freshwater high-altitude lakes in the world, which has an important role in the water balance of the whole South Caucasian as well as the northern regions of Iran and Turkey. Lake Sevan is a hydromorphous lake, located at the altitude of 1,900 m above sea level. The basin of the lake is located on the junctions of Transcaucasian and Middle East Ridges and has an elements of different nature zones: semidesert, alpine meadows, broad-leaved forests. The total surface area of the lake is 4,960 km² (including the lake the lake is fed by 28 rivers and streams.

On July 1933, Lake Sevan with its basin was included in the List of Wetlands of International Importance of the Convention on Wetlands (Parnar, Iran, 1971). In January 1978 Sevan National Park was established, the first national park in Armenia. The biological diversity of plants is extremely high. Approximately 1,600 species of vascular plants have been recorded in the basin of Lake Sevan. 6 of them are endemic. The faunas of vertebrates consists of 28 species of mammals, 210 species of birds, 16 species of reptiles, 4 species of amphibians, 10 species of fish, 1 species of cetaceans. Small mountain river Gavaraget - nicknamed (Sahak Swartzhenkend) of Sevan Barb (Barbaro Joanguer Sahak), Sevan Barb (Barbaro Joanguer Sahak), and Seven Rhyacophila (Trichoptera). Sevan Barb (Barbaro Joanguer Sahak), and Seven Rhyacophila (Trichoptera).

Among the tadpoles only in the upper reaches of the rivers were remarked by embryonic stage of the most species of Rhyacophila, and 8 species of Sceletomera. In the middle and lower reaches of the rivers the most common tadpoles are Heterobranchus and Potamophylax sp. Apatia aurita, Hydroptila pelidobius H. acrise, Rhyacophila amenea, Ph. phthirioides, Psychomyia sp. On slow flowing rivers sections, where is rich of macrophytes are formed 2 species amphibians: Gemmea leukota and G. pules occur in large quantities.

The problem of water overusing for small hydropower plants is particularly acute. In summer and autumn months downstream become dry, which affect to the fish reproduction. In general, the severity of the water balance in rivers, comes from the construction and exploitation of small hydropower plants in rivers Vardenik, Makenis, and Argichi are in regard to the disturbance of fish species spawning, their death in drought and decrease in irrigation water supply to rural communities whose land areas are located on the spot of water collection for HPP. Small hydropower plants situated in rivers Vardenik, Mshart, Makenis and Argichi. Only on the small river Makise (Makise) 24 km have 2 small hydropower plants without special channel for the passage of fish, which is making it impossible for fish to spawning in the upper reaches of the river. The same situation in Vardenik river.

In 2010 the Ministry of Nature Protection recognized illegal construction of small hydropower plants on the river Argichi. However the HPP was not dismantled, and now started the construction of a new hydropower plant in the upstream of the river. Both the public and the institute Hydroecology and Ichthyology are doing every effort to stop the construction. On the stage of completion is hydroelectric power station on the river Vardenik. Here are present special waterways for fish (fish ladders), but they are too narrow and small. Given the these threats and prospects of the future, National Academy of Science and environmental NGOs, in 2012 the GovernmentDecided on not permission of small hydropower plant construction in the rivers of Lake Sevan basin was adopted.

As seen in Table 1, the level of snapping exceeds along a watercourse, especially where villages and municipal solid waste from localities falls into the river. The process of eutrophication is enhanced under conditions of low water level due to water withdrawal in the upper reaches for irrigation and hydropower plants purposes.

A major step to solving the problem of water pollution and eutrophication was the commissioning of sewage treatment plants for the three major cities of Sevan basin. Today, according to BOD data and physical parameters of studied rivers (the form and shape of river bed, the degree of development of coastal vegetation, temperature, flow velocity, micro habitat coverage, the degree of development of the periphyton and macrophytes, as well as the physical characteristics of the spawning fish. Benthic samples were collected with a special quantitative frame (a “kurt” of paper) and were stained and microscopically examined. The level of snapping exceeds along a watercourse, especially where villages and municipal solid waste from localities falls into the river. The process of eutrophication is enhanced under conditions of low water level due to water withdrawal in the upper reaches for irrigation and hydropower plants purposes.

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