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European Academic Science and Research

ACADEMIC EDITION

ISSN 2789-1968

Online ISSN 2789-195X

Proceedings
of the scholarly abstracts
**European Academic
Science and Research**

April,
2022

The material published in the journal reflects the opinions of the authors, which may not always coincide with the position of the Editorial Board.

Publisher:
“EASR”
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2022

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MORPHO-FUNCTIONAL STATE OF GRASS CARP (CTENOPHARYNGODON IDELLA) FROM KAPSHAGAY RESERVOIR

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The toxicological state of the Kapshagay reservoir is a relevant problem. Studies demonstrated the toxicological state and the level of anthropogenic pollution of the reservoir. The Kapshagay reservoir is subjected to pollution by heavy metals, both in the spatial and temporal aspects, which is associated with fluctuations in the flow of the river Ile.

The purpose is to conduct a study of the morpho-functional state of the visceral organs of grass carp from the Kapshagay reservoir. According to the results of the previous study, the MPC level was exceeded for copper - from 5.5 $\mu\text{g}/\text{dm}^3$ to 32 $\mu\text{g}/\text{dm}^3$ (32 MPC), for zinc - from 18 and 21 $\mu\text{g}/\text{dm}^3$ in 2012 and 2018. up to 69 and 75 mcg/dm^3 in 2014 and 2019 respectively.

The research material is the grass carp (*Ctenopharyngodon Idella*) and for this study, a histological research method was used. For histological analysis, immediately after the catch, the gills and liver of carp with signs of anomalies and those devoid of external manifestations of the pathological process were selected.

Studies show that in the organs of carp, heavy metals are mainly accumulated in the liver (iron (Fe), zinc (Zn), copper (Cu), and lead (Pb)) and muscles (chromium (Cr)). Exceeding the MPC for iron (Fe) was noted in carp - in the gills, heart, liver, and gonads; For zinc (Zn), MPC is exceeded in carp - in the heart and liver.

Morphological study of the gills. The lamella epithelial lining reacts to dissolved lead creating tissue osmoregulatory imbalance. The observed changes in gills such as hyperplasia, lamellar fusion, epithelial necrosis, and edema were generally attributed to the toxic effects of lead. Similar alterations in the gills have also been reported in the fish exposed to metals.

Pathological findings in the liver included cytoplasmic vacuolation, cellular degeneration, swelling of hepatocytes, and focal necrosis. Histology of the heart included chronic inflammation, leucocyte infiltration, and edema of muscle bundles. Heavy metals, especially lead induce gills, liver, and muscle damage as indicated by the elevation of histopathological alterations, the decline of the enzyme, and antioxidant activity.

In conclusion, the study revealed histopathological alterations and morphometric evidence in the visceral organs of grass carp. In addition, histological and morphological alterations were observed in all parts of the Kapshagay reservoir, even in the basins of the river Ile and lake Balkhash.