

Assessment of Landfill Pollution Load on Hydroecosystem by Use of Heavy Metal Bioaccumulation Data in Fish

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Abstract : Landfill leachates contain a number of persistent pollutants, including heavy metals. They have the ability to spread in ecosystems and accumulate in fish which most of them are classified as top-consumers of trophic chains. Fish are freely swimming organisms; but perhaps, due to their species-specific ecological and behavioral properties, they often prefer the most suitable biotopes and therefore, did not avoid harmful substances or environments. That is why it is necessary to evaluate the persistent pollutant dispersion in hydroecosystem using fish tissue metal concentration. In hydroecosystems of hybrid type (e.g. river-pond-river) the distance from the pollution source could be a perfect indicator of such a kind of metal distribution. The studies were carried out in the Kairiai landfill neighboring hybrid-type ecosystem which is located 5 km east of the Šiauliai City. Fish tissue (gills, liver, and muscle) metal concentration measurements were performed on two types of ecologically-different fishes according to their feeding characteristics: benthophagous (Gibel carp, roach) and predatory (Northern pike, perch). A number of mathematical models (linear, non-linear, using log and other transformations) have been applied in order to identify the most satisfactorily description of the interdependence between fish tissue metal concentration and the distance from the pollution source. However, the only one log-multiple regression model revealed the pattern that the distance from the pollution source is closely and positively correlated with metal concentration in all predatory fish tissues studied (gills, liver, and muscle).

Keywords : bioaccumulation in fish, heavy metals, hydroecosystem, landfill leachate, mathematical model

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