

## COMBINED ECOLOGICAL RISK ASSESSMENT OF SEDIMENT AND WATER COLUMN CONTAMINATED BY DIFFUSE POLLUTION

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Ecological risk assessment provides an advantage over traditional approach using single criteria for water quality evaluation. The risk assessment process quantifies the probability that due to emission of a contaminant or contaminants target species indigenous to the receiving body will be adversely affected. The effects of contaminants on living organisms are generally evaluated using the basic concepts of acute and chronic toxicity. Acute toxicity is related to water column concentration, while chronic toxicity is related to the water column and the sediment concentration. Present methodology using water column concentration neglects the chronic effect of contaminated sediments on biota. The methodology has been adapted and modified by the authors to assess the risk to aquatic biota from contamination both in the sediment and the water column. The chemical integrity of receiving waters is defined by the chronic and acute effects and is reflected in IBI scores representing the total biotic integrity of the stream. The proposed methodology has been applied to the Oak Creek and Menomonee River, both located in southeastern Wisconsin. Oak Creek watershed (70 km<sup>2</sup>) is rural but rapidly developing, while the Menomonee River watershed (350 km<sup>2</sup>) has been already developed with the exception of upstream areas. Non-point sources such as agriculture, urban runoff, and a metropolitan airport, are prevalent in both watersheds with heavy metals and PAHs being of primary concern. The chemical integrity will be evaluated in its three components, ambient acute toxicity, ambient chronic toxicity, and sediment chronic toxicity. The paper (1) investigates the relationship between the chronic toxicity of the sediment and chronic toxicity of the water column, (2) estimates the total risk from chemical contamination (3) compares chemical integrity to biotic integrity.