Environmental Engineering and Management Journal *January 2019, Vol.18, No. 1, 99-108*
http://www.eemj.icpm.tuiasi.ro/; http://www.eemj.eu

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HYDROLOGICAL MODELING OF ARSENIC IN THE DANUBE DELTA

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Abstract

The Danube River forms one of the largest and most complex deltas at the Black Sea, being a Biosphere Reserve, UNESCO World Heritage and Ramsar site. This study assesses the spatial variability of arsenic contamination of the water in the Danube Delta. Water samples were collected during all seasons in 2013 from the south-east of the Danube Delta and analyzed through HG-AAS method for arsenic. Data were handled using two different approaches. First, a complex hydrological model was compiled, using the USEPA WASP modeling software. Secondly, the field measurements were interpolated using GIS software's kriging method to generate prediction maps for the arsenic concentrations. The prediction maps validated the results of the hydrological model, showing that the spatial and seasonal variability of the arsenic concentrations differs depending on the source of the pollution wave, originating upstream in some cases, or being influenced by the marine system. Arsenic constantly recorded noticeable variations but at lower concentrations, within the range [0.5-5.88] µg/L.
Since arsenic is not destroyed in the environment, WASP model can be extended to the entire Delta and beyond, to study the fate and transport of pollutants on a larger scale. In other case, field observations and sampling would need much more human and financial efforts.
According to our knowledge this is the first study which assesses the spatial distribution (hydrological modeling/GIS) of arsenic concentrations in the Danube Delta.

Keywords: arsenic, Danube Delta, GIS, WASP modeling

Received: December, 2014; Revised final: April, 2015; Accepted: April, 2015; Published in final edited form: January, 2019

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