RIVER BASINS

INTERNATIONAL CONFERENCE
ON MONITORING, MODELLING AND MANAGEMENT
OF RIVER BASINS

ABSTRACTS

Edited by
Máté Krisztián Kardos, Orsolya Szomolányi, Adrienne Clement,
Steffen Kittlaus, Karoline Morling and Stephan Fuchs

Budapest, Hungary
4-5 June 2024

RIVER BASINS 2024

INTERNATIONAL CONFERENCE
ON MONITORING, MODELLING AND MANAGEMENT
OF RIVER BASINS

Jointly organized by:

Budapest University of Technology and Economics
Department of Sanitary and Environmental Engineering

Technical University Vienna
Institute of Water Quality and Resource Management

Karlsruhe Institute of Technology
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Environment Agency Austria

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German Federal Institute of Hydrology

Deltares

International Committee for Protection of the Danube River

Abstracts of the Conference

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Calculating emissions to water – a simplified method implemented as a spatially and temporally distributed model

Joost van de Roovaart[1], Sibren Loos[1], Ádám Kovács[2], Matthias Zessner[3], Ottavia Zoboli[3], Steffen Kittlaus[3], Jos van Gils[1]

[1]*Deltares, Delft, The Netherlands*
[2]*International Commission for the Protection of the Danube River, Vienna, Austria*
[3]*Institute for Water Quality and Resource Management, Faculty of Civil and Environmental Engineering, TU Wien, Vienna, Austria*

jos.vangils@deltares.nl

The European Green Deal formulated the Zero Pollution Ambition. In a river basin management context, this ambition relies on baseline information on the quantities of pollutants released to surface waters ("emissions"). Despite decades of efforts within countries, good information on the total emissions of pollutants released to surface waters across Europe is still lacking.

The Water Framework Directive (WFD) requires Member States to report an inventory of emissions, discharges and losses of priority substances. Technical guidance on preparing the emissions inventory was published in 2012. A 2022 report by the European Topic Center for Inland, Coastal and Marine waters (ETC-ICM) provided a simplified method for calculating the emissions to water, describing quantification methods for the pathways for emissions to surface waters referred to in the guidance. The method focuses on priority pollutants and offers baseline information for calculating emissions. It uses emission explaining variables statistics at country scale and emission factors that are often averages based on data from different countries.

The Danube Hazard m3c Project aimed to achieve a durable and effective transnational control and reduction of hazardous substances (HS) water pollution. Supported by the collection of existing data and complementary monitoring, Danube Hazard m3c performed emission modelling at different spatial scales. A basin-scale (800,000 km^2) emission inventory was compiled for 17 HS using the ETC-ICM method, implemented however, in small spatial units (225 km^2). An underlying hydrology model was used to perform time dependent calculations following the hydrological signals of runoff and subsurface flow. The emission inventory was intended to support the development of the 2027 4th Danube River Basin Management Plan.

Detailed spatial socio-economic information (population, land use, wastewater management, etc.) was used to quantify sources and pathways and to characterize the river network and the hydrology. Thus, a better resolution of regional and local differences was expected. Time dependent emissions were quantified for 10 different hydrological years, to resolve the inter-annual variability of the emissions as affected by climate variability. In-stream concentrations were calculated and compared to field data.

For the larger rivers, the simulated concentrations showed a satisfactory agreement with measured concentrations. The uncertainty of the emission estimates increased with decreasing spatial scale however. Many spatially variable input quantities and emission factors could only be quantified country-by-country or even Europe-wide.

The method proved to provide useful results for management. Next to the overall emissions inventory, the method provided a subdivision over the pathways distinguished in the guidance, as well as maps and country inventories to elucidate spatial gradients. Exploratory scenarios were simulated to investigate the potential effect of pollution control measures, like additional treatment of wastewater, improved urban stormwater management and erosion control. The successful application to the Danube River Basin provides confidence that the method would also be applicable at the pan-European scale.