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Monitoring, chemical fate modelling and uncertainty assessment in combination: a tool for evaluating emission control scenarios for micropollutants in stormwater systems

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Extended Abstract

Stormwater discharges can represent significant sources of micropollutants (MP), including heavy metals and xenobiotic organic compounds that may pose a toxicity risk to aquatic ecosystems. Control of stormwater quality and reduction of MP loads is therefore necessary for a sustainable stormwater management in urban areas, but it is strongly hampered by the general lack of field data on these substances. A framework for combining field monitoring campaigns with dynamic MP modelling tools and statistical methods for uncertainty analysis was hence developed to estimate MP fluxes and fate in stormwater runoff and treatment systems under sparse data conditions (Figure 1).

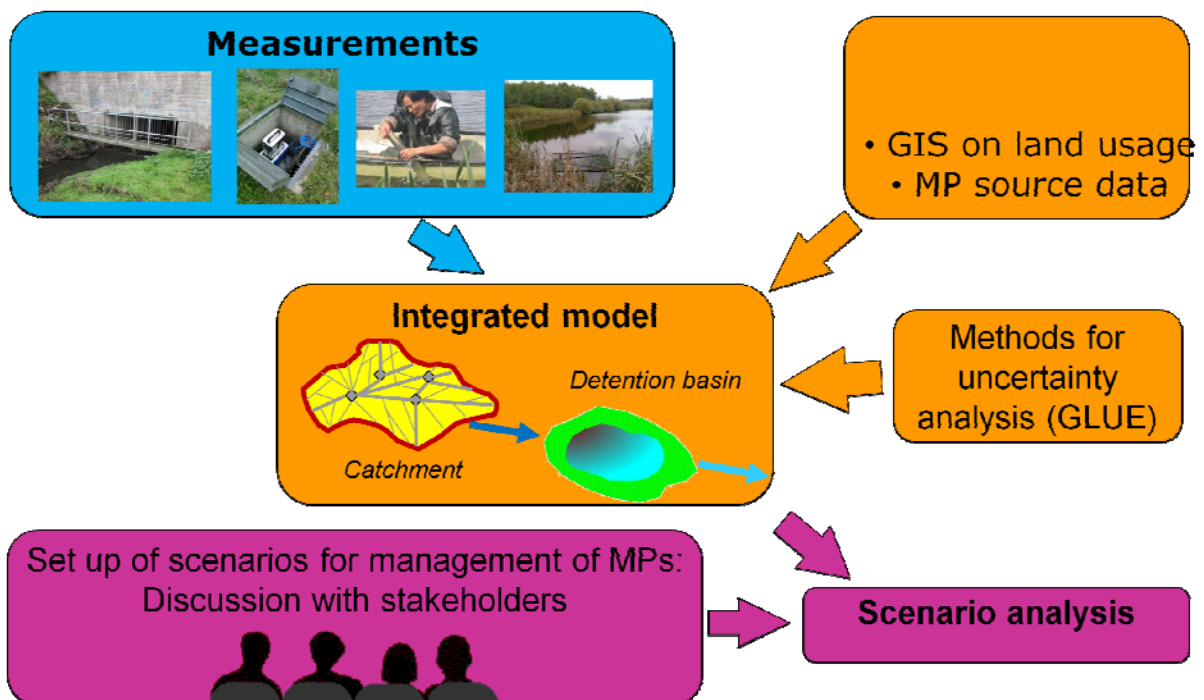


Figure 1. Framework for combining field monitoring campaigns with dynamic micropollutant modeling tools and statistical methods for uncertainty analysis.

The framework was applied to an industrial/residential area in the outskirts of Copenhagen (Denmark), where stormwater is discharged in a separate channel system discharging to a wet detention pond. Analysis of economic activities and GIS data on land usage allowed characterizing the catchment and identifying the major potential sources of stormwater MP.

Monitoring of the pond inlet and outlet using both automatic and passive sampling techniques, as well as sediment analyses, allowed assessing the current situation and highlighted potential risks for the downstream surface water environment. The collected data was used in combination with an integrated dynamic MP fate model to estimate the MP fluxes in the catchment and the MP fate in the pond over a 10-year period. The model was also used to evaluate the potential effects of anticipated future climate changes as well as different scenarios for reduction of MP emissions while considering the uncertainty of the model predictions. The conference contribution will present an overview of tool and methods involved and the results achieved so far and give recommendations about the practical applicability.

References

- Birch, H., Mikkelsen, P.S., Jensen, J.K. & Holten Lützhøft, H.C. (2011). Micropollutants in stormwater run-off and combined sewer overflow in the Copenhagen area, Denmark, *Water Science and Technology*, 64 (2), 485-493.
- Vezzaro, L., Ledin, A., Mikkelsen, P.S. (in press). Integrated modelling of priority pollutants in stormwater systems. *Physics and Chemistry of the Earth*. DOI: 10.1016/j.pce.2011.07.002.
- Birch, H., Sharma A.K., Vezzaro, L., Mikkelsen P.S. Lützhøft, H.-C.H. (2011): Passive sampling and modeling of PAHs and heavy metals in stormwater runoff. In Proceedings of the 12th International Conference on Urban Drainage, Porto Alegre, Rio Grande do Sul, Brazil, 11th-16th September 2011.
- Lützhøft, H.-C.H, Birch, H., Eriksson, E., Mikkelsen P.S. (2011): Comparing chemical analysis with literature studies to identify micropollutants in a catchment of Copenhagen (DK). In Proceedings of the 12th International Conference on Urban Drainage, Porto Alegre, Rio Grande do Sul, Brazil, 11th-16th September 2011.
- Sharma A.K., Vezzaro, L., Birch, H., Arnbjerg-Nielsen, K. and Mikkelsen P.S. (2011) : Effect of climate change on stormwater characteristics and treatment efficiencies of stormwater retention ponds. In Proceedings of the 12th International Conference on Urban Drainage, Porto Alegre, Rio Grande do Sul, Brazil, 11th-16th September 2011.
- Vezzaro L. and Mikkelsen P.S. (2011): Investigating the appropriate level of complexity for stormwater micropollutants modeling . In Proceedings of the 12th International Conference on Urban Drainage, Porto Alegre, Rio Grande do Sul, Brazil, 11th-16th September 2011.
- Vezzaro, L., Sharma A.K., Ledin, A., Mikkelsen P.S. (2011) : Evaluating stormwater pollution control strategies by the application of an integrated model. In Proceedings of the 12th International Conference on Urban Drainage, Porto Alegre, Rio Grande do Sul, Brazil, 11th-16th September 2011.