

Trace metals trapping dynamics in urban stormwater constructed treatment wetlands: Cases study in Strasbourg, Moulins-les-Metz and Leuville-sur-Orge

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Trace metals trapping dynamics in urban stormwater constructed treatment wetlands: Cases study in Strasbourg, Moulins-les-Metz and Leuville-sur-Orge

Dynamique du piégeage des micropolluants métalliques au sein des zones humides artificielles traitant des eaux pluviales urbaines strictes

Context and experimental sites

Trace metal behaviour is a key point to evaluate the long term efficiency of stormwater constructed wetlands (SCW). The present study aimed at exploring behaviours of Cd, Cu, Pb and Zn in three SCW at the downstream of three urban catchments located in France at Strasbourg (Alsace), Moulin-lès-Metz (Lorraine), and Leuville-sur-Orge (Ile de France).



Strasbourg

Methods

The sampling campaign took place in May 2015, about four years after SCWs setting up. The filters were split in two sampling areas according to the plant abundance (low =area 1 or high = area 2). For each sampling area, the filter media were sampled at 3 different depths (from top to bottom) and analysed by mineralization to determine metal contents and by the Tessier sequential extraction to determine their speciation in soil.

StrasbourgArea (m²)CatchmentFilterStrasbourg60,000Strasbourg60,000Moulin-lès-365,000MetzLeuville sur400,000Orge



Leuville sur Orge



Results

Metal trapping Metal concentrations decrease from the feeding point towards

to the end of the SCWs and with the depth in the SCW. Cd is not often quantify or in low concentrations. Pb content is high in Moulin-les-Metz when Zn is the mostly present metal in the other SCWs.

Metal speciation - Strasbourg example
Metal trapping in the 3 systems by sampling area
Cu and Pb
⁴ Exchangeable
Bound to carbonates
²⁵ Bound to carbonates
²⁶ Bound to carbonates
²⁷ Bound to carbonates
²⁸ Bound to carbonates
²⁹ Bound to carbonates
²⁰ Bound to carbonates

- are mainly linked to organic matter fraction in sediment layer and to residual fraction in sand layers.
- Zn



is mainly bound to residual minerals and carbonates in sediment layer, and to organic matter and oxides in sand layers.



Conclusion

Metals are mostly trapped in the first part of CW and in first [§] centimeters of filter for each experimental site.

In Strasbourg, there is a risk of Cu, Pb and Zn release in infiltrated water under oxidizing conditions and there is a risk of cedimentation of the sand layers.

Metal speciation in Strasbourg system compartments

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