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Dynamics of pollutant indicators during flood events in a small river under strong anthropogenic pressures

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In densely populated regions, human activities profoundly modify natural water circulation as well as water quality, with increased hydrological risks (floods, droughts,. . .) and chemical hazards (untreated sewage releases, industrial pollution,. . .) as consequence. In order to assess water and pollutants dynamics and their mass-balance in strongly modified river system, it is important to take into account high flow events as a significant fraction of water and pollutants loads may occur during these short events which are generally underrepresented in classical mass balance studies. A good example of strongly modified river systems is the Zenne river in and around the city of Brussels (Belgium).The Zenne River (Belgium) is a rather small but dynamic rain fed river (about 10 m3/s in average) that is under the influence of strong contrasting anthropogenic pressures along its stretch. While the upstream part of its basin is rather characterized by agricultural land-use, urban and industrial areas dominate the downstream part. In particular, the city of Brussels (1.1M inhabitants) discharges in the Zenne River amounts of wastewater that are large compared to the natural riverine flow. In order to assess water and pollutants dynamics and their mass-balance in the Zenne hydrographic network, we followed water flows and concentrations of several water quality tracers during several flood episodes with an hourly frequency and at different locations along the stretch of the River. These parameters were chosen as indicators of a whole range of pollutions and anthropogenic activities. Knowledge of the high-frequency pollutants dynamics during floods is required for establishing accurate mass-balances of these elements. We thus report here the dynamics of selected parameters during entire flood events, from the baseline to the decreasing phase and at hourly frequency. Dynamics at contrasting locations, in agricultural or urban environments are compared. In particular, the importance of combined sewer overflows are evaluated and discussed.
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