



Runoff pollution characterization and first flush effect of urban roof catchment

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ABSTRACT

Roof runoff pollution has been given considerable attention to ensure the safety of roof rainwater utilization. A residential roof catchment located in Handan, China, was selected as a study site. The water quality of roof runoff was analyzed at 15 storm events during 2014–2016. The median concentrations of chemical oxygen demand (COD), ammonia nitrogen, total nitrogen, total phosphorus and sulphane are 104, 8.53, 10.60, 0.21 and 14.31 mg/L, respectively; these values all exceed the class V of environmental quality standards for surface water in China. A strong linear correlation is established between COD and other pollutants. All the Pearson's coefficients (r) are more than 0.8. COD could be considered surrogates for other pollutants. During storm events, the concentration change of runoff pollutants could be fitted well by the exponential function. The selected storm events present the first flush effect in varying degrees. Approximately 80% of the pollutant load is transported in the first 36%, 53%, 57%, 26% and 38% of the volume for five storm events. The first flush effect is evidently related with rainfall depth and antecedent dry days. Furthermore, water quality depth (WQD) can be used as a definitive parameter for runoff pollution control. WQD presents different values to reach diverse stormwater management targets.

Keywords: Runoff pollution characterization; Correlation analysis; First flush effect; Cumulative load ratio; Cumulative runoff ratio; Water quality depth

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