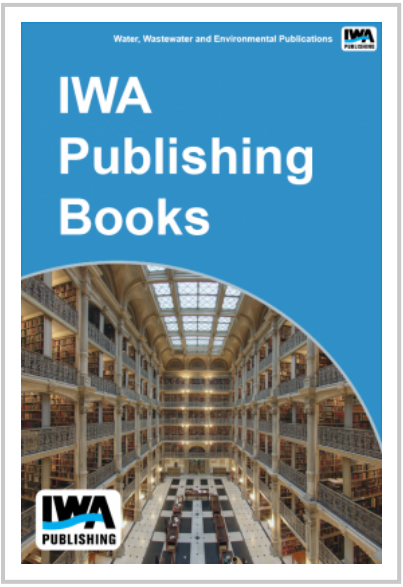
Stormwater Thermal Enrichment in Urban Watersheds



Thermal enrichment of coldwater streams by heated stormwater in summer months is often overlooked and even exacerbated by traditional management practices that typically account for flow moderation and pollutant removal only. Initiated in 1999, this study evaluated and identified innovative and traditional approaches to moderate this temperature impact by monitoring and analyzing the hydrologic and thermal regimes of an urban stormwater treatment system consisting of two traditional wet detention ponds and an enhanced natural wetland.

Data analysis clearly shows temperature increases in the open detention ponds and the ability of the wetland to mitigate this thermal enrichment. Event-based thermal loading and temperature regime analysis indicated flow reduction via infiltration and effective vegetative cover in the wetland were the primary mechanisms for mitigating stormwater thermal enrichment. Using the concept of temperature equivalent, we also established the locations and strength of thermal enrichment areas.

A heat transfer model was developed to simulate runoff temperature. Results indicated that rainfall characteristics, temperature difference between rainfall and the ground surface, and the runoff flow depth were the most important factors affecting runoff temperature.

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