Nutrients and sediment loads in water catchments with heterogeneous land uses

(Book Chapter)

- Das, S.K.,
- Ng, A.W.M.,
- Perera, B.J.C.,
- Ahsan, A.
- View Correspondence (jump link)
- [a]College of Engineering and Science, Victoria University, Melbourne, Australia
- [b]Department of Civil Engineering, Uttara University, Dhaka, Bangladesh
- [c]Department of Civil and Construction Engineering, Swinburne University of Technology, Melbourne, Australia

Abstract

Understanding how nutrient and sediment concentrations in leachates (e.g., agricultural runoff) vary with land uses is critical to study the current and future impacts of land use changes on catchment water quality. This chapter presents a simple procedure on how to use specific flow regimes to correlate pollutant load with land use activities in heterogeneous catchments, even in shortage of specific event-based water quality grab sample data. The procedure uses a simple baseflow separation technique and a data-based model with other readily available data and tools. The specific tasks of this study were: (1) establishment of whether there is any statistically significant difference between pollutant concentrations in water quality samples representing baseflow conditions and runoff events, (2) estimation of nutrient and sediment loads, and (3) identification of significant and major sources of pollutant loads. The proposed procedure was then applied to the Yarra River catchment in Victoria, Australia, and found to be effective, particularly in circumstances where limited time (for complex analysis) and data are available. The study found that at all monitoring stations, pollutant concentrations were significantly ($p \leq 0.01$) greater in runoff events than in baseflow conditions, and the LOADEST regression models developed explained more than 85% variability in loadings. Overall, water quality and pollutant

concentrations were influenced by specific flow regimes and land uses. Major pollutant loads were generated from agricultural and urban runoff, i.e., non-point sources. About 65%, 69% and 86% of annual TN, TP and TSS total loads respectively at the outlet of the catchment were delivered by runoff events where runoff event days were on average 18% and 31% only at the main stream and tributary stations respectively during the study period.

Author keywords

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