AN OPERATIONAL MODEL FOR NUTRIENT DYNAMICS DURING FLOOD EVENTS UNDER ANTHROPOGENIC IMPACTS IN A SMALL MOUNTAINOUS CATCHMENT

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In Vietnam where point source controlling is already very difficult, non-point sources are not addressed in water quality management.

Watershed water quality modelling is required in order to account for these sources. However, simulation of nutrient dynamics during flood events induced by point and diffuse sources is rather limited in literature, especially under tropical conditions and in developing countries like Vietnam. Furthermore, data limitations bring certain constraints for the implementation of available packages.

In this paper, a robust modelling system is presented with the aim to fulfil this gap i.e. capturing the dominant processes within a catchment while requiring low input data. This system includes four coupled components that run simultaneously within a Microsoft Excel spreadsheet. The components are: (1) the Geomorphologic Instantaneous Unit Hydrograph (GIUH) for runoff generation, (2) a simplified erosion dynamic model, (3) loading functions for nutrient generation, and (4) a simple river routing to include point source disposals. The model operates in a semi-distributed fashion where each land cover type represents a modelling unit. Fluxes are calculated and accummulated at sub-catchment outlet and finally routed through river networks. Model parameters are mostly extracted by processing Digital Elevation Model (DEM) and overlaying/aggregating maps within a Geographic Information System (GIS). Other paramters can be obtained from literature and/or directly measured from the field. The integrated model has been successfully tested for different flood magnitudes in 2008 at the Tra Phi catchment (21 km^2) in Southern Vietnam. In addition, analysis of uncertainty propagation caused by highly uncertain input data and model parameters was carried out using Monte-Carlo simulations. Results showed good aggreements between simulated and observed nutrient concentrations. Therefore, the model can be considered as an operational tool for water management in small mountainous catchments in this region, especially for wastewater allocation.