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## A one-dimensional hydrodynamic and water quality model for rivers in semi-arid areas

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Water quality in rivers is undergoing continuous degradation caused by natural factors like drought and anthropogenic activities such as industry and agriculture waste water and domestic sewage. Proper assessment of water pollution is critical for agencies and local governments to take effective measures to protect water environment. Here a general one-dimensional hydrodynamic and water quality model is proposed, which explicitly incorporates the effects of pollutant attenuation and dispersion. The governing equations are solved by the finite volume Slope Limiter Centred (SLIC) scheme and the friction source term is treated implicitly to maintain numerical stability and accuracy in the occurrence of very small water depth. As applied to the Wei Canal in the Haihe River basin of China, the effects of evaporation and infiltration on the flow are considerable, especially in the summer, and thus have to be properly accounted for. Sensitivity analysis of the parameters in the water quality equation is also conducted. It is found that the present model can successfully reproduce the hydrodynamic and pollutant transport processes, thereby facilitating a promising modeling tool able to underpin water quality management.