

Net anthropogenic nitrogen inputs and their impacts on stream water quality in the upper Yangtze River

*Dawen Yang¹

1. Tsinghua University

Various human activities influence not only the hydrological cycle but also the nitrogen cycle in a river basin. Nitrogen inputs to the river basin are increasing due to the increasing human activities, and the nitrogen input increasing have caused many water environmental problems. Understanding the interactions between human activities and hydrological processes is important for predicting the changes of water quantity and quality. This research selected the upper Yangtze River basin as the study area, and analyzed spatio-temporal variation of the net anthropogenic nitrogen inputs (NANI). To predict nitrogen inputs into the river and their impacts on river water quality, a distributed hydrological model coupled with the non-point source pollution was developed considering the interactions between human activities and hydrological processes. Based on the simulation results, it analyzed the characteristics of hillslope nitrogen loading and the impact on river water quality. The results obtained in the upper Yangtze River basin demonstrated that the major nitrogen sources were the agricultural fertilizer application, atmospheric nitrogen deposition and food/feed nitrogen input. The high values of NANI were concentrated in Chengdu Plain. Increasing urban area has changed the ways of farming and cultivation in cities and surrounding cities, which resulted in the increasing NANI. The simulated results also showed that annual total nitrogen loading was 1.50 ton/km² in the upper Yangtze River basin. The amount of nitrogen loading in July and August took more than 65% of the annual total nitrogen and the export coefficient of nitrogen was 0.26 at Yichang station, which was influenced by both artificial nitrogen inputs and the natural hydrological processes. The nitrogen concentrations in the stream waters are high in the rainy season because of strong interaction of hydrological processes with the human activities.

Keywords: net anthropogenic nitrogen inputs, hydrological processes, human activities, stream water quality, interaction between hydrological processes and human activities