A Quantitative Study of the Sources of Nitrate of TypicalUnderground River in Southwest China Based on SIAR model

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Introduction

In recent years, with the extensive use of chemical fertilizers and pesticides, nitrate contamination in groundwater has become more and more serious with each passing day [1,2]. Especially in the karst areas of southwest China, the underground river system is more vulnerable to pollution, which threatens the water security of local people. The purpose of this study is to provide a new method for the quantitative study of nitrate sources in karst groundwater. The research area of this paper is Zhaidi underground river,which is located in Guilin city in Southwest China.

Methods

On the basis of field investigation, the nitrogen and oxygen isotopes and hydrochemical data of karst groundwater were analyzed. This study can provide a new method for quantitative study of groundwater sources of nitrate in the karst area. SIAR model was used to calculate the sources of nitrate quantitatively.

Discussion of Results

The results show that the nitrate is dominated by NO_3^-, the NO_3^- concentrations are in the range of 2.67~17.99 mg/L, 6.3 mg/L on average. The sources of nitrate in the study area are animal waste and sewage, fertilizer, and soil organic nitrogen, with fertilizer, animal waste and sewage, and soil organic matter possessing 23%~78%, 6%~58%, and 6%~38% respectively. In the direction of groundwater flow, the proportions of fertilizer and animal waste and sewage vary significantly, closely related to the distance from the residential area. The longer the distance, the larger the proportion of the fertilizer, and the smaller the proportion of the animal waste and sewage.

[1] Chen J *et al*. (2016) *Exposure and Health* **349**, 349-359.
[2] Liu C-W *et al*. (2013) *Environmental Monitoring and Assessment* **185**, 10147–10156.