

模糊因子分析在地下水污染评估中的应用——以河南省洛阳市为例

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中文摘要:传统的多元统计法难以量化表征不同污染源对单个样本点的影响,本文引入了一种新的方法——模糊因子分析法。将该方法应用于洛阳市地下水污染来源解析研究,通过模糊聚类和因子分析对研究区样品进行分类,探明主要的污染源类型及其对整个研究区和单个样品点的污染贡献率。计算结果表明:洛阳市浅层地下水主要有以下四个污染源:基岩风化、加工制造业、人类活动、能源企业/古遗迹,其对整个研究区的污染贡献率分别为基岩风化5.831%、加工制造业14.324%、人类活动20.291%、能源企业/古遗迹4.392%。通过模糊聚类中的隶属度函数的概念,亦可求得上述四个污染源对于区内各采样点的污染贡献率。故对整个洛阳市而言,减少生活污水的排放和化肥的使用,对加工制造业中的三废污染物进行无害处理,是治理其地下水污染的主要途径;对于每个单独的样本点,则要根据其主要的污染来源,提供不同的污染防治措施。模糊因子分析法可以为地下水污染评估与防治提供更加科学、合理的决策依据。

中文关键词:[隶属度](#) [因子分析](#) [地下水](#) [污染](#) [洛阳](#)

Assessing Groundwater Pollution Using Fuzzy Factor Analysis Method: A Case Study of Luoyang City in Henan Province

Abstract:It is difficult for traditional methods to characterize quantitatively pollution contribution rate of different pollution sources to single sample point. Fuzzy factor analysis methods, fuzzy ISODATA cluster analysis (FICA) and factor analysis (FA) were utilized to assess the factors responsible for the hydrochemical composition of the groundwater. The new methods were employed in Luoyang City, where twenty-eight hydrochemical variables were considered in 241 samples collected. Four pollution sources were identified, i.e., anthropogenic activities, processing manufacturing industries, bedrock weathering, and energy enterprise/ancient vestige. The relative pollution contribution rates of the four pollution sources are 20.291% for anthropogenic activities emission, 14.324% for processing manufacturing industry emission, 5.831% for bedrock weathering source, and 4.392% for energy enterprise/ancient vestige source. Meanwhile, the pollution contribution rates of pollution sources to each sample point were also calculated. In regard to the groundwater pollution prevention of Luoyang City, the reduction of the domestic sewage emission and chemical fertilizer consumption and the relocation of industries with heavy pollution seem to be effective ways to control groundwater pollution; as for the sample point, concrete pollution prevention measures should be provided for different sample points according to their primary pollution sources. The fuzzy factor analysis method is proved to be a practical, simple and useful tool to assess and prevent groundwater pollution.


keywords:[membership](#) [factor analysis](#) [groundwater](#) [pollution](#) [Luoyang](#)

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