研究报告

北京市北环水系富营养化因子分析

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摘要

以北京市北环水系水体为例，利用聚类分析将研究区分为河流子系统和湖泊子系统.因子分析表明，河流子系统第一主成分富营养元素为总磷（TP）、总氮（TN）和氨氮（NH_4-N），第二主成分为温度（T）和溶解氧（DO）；湖泊子系统第一主成分为总氮和氨氮，第二主成分为总磷、酸碱度（pH）、透明度（SD）和温度，第三主成分为溶解氧和叶绿素a（Chla），表明研究区的水体富营养化主要由富营养盐负荷引起.结合逐步回归分析方法，建立富营养水平预测回归模型，根据模型自变量选择证明河流子系统富营养化特征为磷限制型，湖泊子系统为氮限制型.从水量和水质上对营养盐浓度负荷变化分析表明，研究区年最小生态环境用水为4 872×104 m3，1990～1998年，除1998年外，现实的生态环境需水均不能满足需求.随着流域人口的不断增长，生活污水、城市径流和固体废弃物淋溶液中营养物质进入水体，研究区营养盐浓度负荷有随时间不断增长的趋势，针对这种趋势提出了应对措施.

关键词　　城市水系,富营养化,特征,因子分析,逐步回归

分类号

Factor analysis of Beijing north ring water system eutrophication

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Abstract

Eutrophication is caused by hydrological,physical or chemical factors such as temperature,illumination,or shapes of waters.It is very important to identify the main factors to understand and control the process of eutrophication.In this paper,Beijing north circle water system was divided into river subsystem and lake subsystem by cluster analysis.Factor analysis indicated that the main factors of river subsystem eutrophication were TP,TN and NH_4-N, while those for lake subsystem were TN and NH_4-N,which meant that in the study area,the main cause for eutrophication was the overload of nutrients. Stepwise regression was introduced to build forecasting model,and the choice results of independent variables in the regression model inferred that the type of eutrophication in river subsystem was P limited,while that of lake was N limited.Two main causes for nutrient load were found from water quantity and quality analysis of the study area,one was the ecological water demands be not able to satisfy from 1990 to 1998 except 1998,and the other was the increase of nutrient load coming from domestic waste and non point pollutant,resulting from the rapid population increase and city expansion.The measures to control the eutrophication process were put forward.

Key words

Urban water system　Eutrophication　Characteristics　Factor analysis　Stepwise regression

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