

论文

三峡水库蓄水对消落带土壤理化性质的影响

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摘要:

土壤养分是三峡库区消落带生态系统的重要组成部分。通过对石宝寨消落带12个水位96个样点的土壤分析,研究了消落带不同水位土壤容重、酸碱度、有机质、全氮、全磷、全钾、速效氮、速效磷、速效钾的含量变化。结果表明:①淹水后消落带土壤由微碱性(pH值=7.91)变为碱性(pH值=8.14),养分平均含量普遍下降,速效钾含量下降最多(46.7%),淹水易造成养分流失;②消落带土壤淹水前各测定指标在不同高程之间差异均不显著($P>0.05$);③不同淹水强度的土壤容重、有机质、全氮、速效钾含量差异极显著($P<0.01$),氨态氮含量差异显著($P<0.05$),淹水土壤pH值高于未淹水土壤,有机质、全氮及速效钾含量低于未淹水土壤;④长期淹水后(146 m)的土壤出现有机质及全量养分累积现象。

关键词: 全量养分 氨态氮 淹水 水位

The Effect of Flooding on Soil Physical and Chemical Properties of Riparian Zone in the Three Gorges Reservoir

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Abstract:

The soil physical and chemical properties play a key role in ecological environment of the riparian zone in the Three Gorges Reservoir. This research was done to analyze the variation of soil nutrients after flooding which would contribute to the study of the flooding effect on water-soil in the reservoir riparian zone. We measured the content of soil bulk density, pH, organic matter, total N, total P, total K, $\text{NO}_3\text{-N}$, $\text{NH}_4\text{-N}$, available P and available K in different water levels of the riparian zone in the Three Gorges Reservoir. Different water levels did not exhibit significant divergence of nutrients content before flooding. Compared to the criterion of the second national soil survey, soil pH was alkaline and the soil nutrients were limited in the reservoir riparian zone after flooding. Different water levels exhibited significant divergence in bulk density, organic matter, total N and available K ($P<0.01$). pH value was significantly higher after flooding and the soil nutrients were much lower than soil without flooding. Soil organic matter, total N, total P and total K accumulated in 146 m which was always in submergence state.

Keywords: total nutrients ammonia flooding water level

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参考文献:

- [1] Graf W L. Down stream hydrologic and geomorphic effect of large dams on American rivers [J]. *Geomorphology*,2006,79: 336-360. [2] 冯孝杰,魏朝富,谢德体.周期性淹水对消落区水土环境的影响及控制对策[J]. *中国农学报*,2005,21(10): 356-359. [3] 谢德体,范小华,魏朝富.三峡水库消落区对库区水土环境的影响研究[J]. *西南大学学报:自然科学版*,2007,29(1): 39-47. [4] Chao D H. The Three Gorges Project and eco-environmental monitoring system [J]. *Environmental Informatics Archives*,2006,4: 419-426. [5] Baldwin

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