

Integrated development and management of water resources: A typical area in China

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It is unfortunate that problems with water are considered to grow worse in the coming decades. Water Scarcity is one of the most pervasive problems afflicting people throughout the world. According to the World Water Council, human beings have access to less than eight-tenths of one percent of the total water on our blue planet. Although freshwater is a renewable natural resource, its circulation rate is determined by climate system, human activities, etc., and there is an upper limit to the volume of freshwater natural resource.

More intense droughts in the past decade, affecting an increasing number of people, have been linked to higher temperatures and decreased precipitation, but are also frequently a consequence of the misunderstanding of water resources. The increased exposure to potential hazards has led to more awareness of intergraded groundwater and surfacewater development and management, especially in Karst area, which have complicated hydrologic and hydrogeologic conditions.

Houzhai Catchment is a typical Karst area in Guizhou Province in the southwest of China. A conceptual Karst streamflow model is established, whose parameters are calibrated and determined by Genetic Algorithm. According to three indexes (Relative Error, Cross-correlation Coefficient and Deterministic Coefficient), the results show that the proposed model can simulate and forecast the special runoff yield and flow concentration process of this typical Karst area, which is useful to improve the evaluation method and promote growing awareness of the need for properly integrated development and management of water resources.

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Effects of soil environment on activity of rare earth elements: Implications for land utilization

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Rare earth elements (REEs), as an agent for increasing products, have been widely used in agricultural processes. However, how do the soil environments affect the activity of REEs in the soil? It is one of the hotly-discussed issues in the land utilization. This paper reports the total REE contents of 40 surface soil samples and available REE contents of 20 samples from the Yanbian region in the eastern Jilin Province, NE China analyzed using ICP-MS. The total REE contents range from 95.7 to 266 ppm, yielding a weighted mean value of 150 ppm, which is lower than the average REE content (187 ppm) of soil in China. The available REE contents for 20 samples vary from 18.5 to 118 ppm, yielding a weighted average value of 56.8 ppm. The average REE activity indexes in the soil, i.e., available REE contents/total REE contents, are between 23.2% and 46.5% (average 37.9%). Correlation analyses done by SPSS software indicate that the total and available contents of Yb and Lu exhibit evidently positive correlations while these of other REE have extremely remarkable positive correlations. The activity indexes of Y, Sm, Gd, Er, Tm, Yb, and Lu show evidently positive correlations with pH values in soil. Additionally, the difference of REE activity indexes between different types of soils also occurs. Compared with the similar studies of Hainan province, southern China where the climate, soil type and soil physical and chemical properties are different from the Yanbian area, REE activity index in the soils from NE China is evidently low, suggesting that the climate, soil type, and soil physical and chemical properties have important affects on REE activity in soil. Therefore, it is of important implications for scientifically using land, protecting soil environment, and maintaining agro-ecosystems to understand and utilize relationship between soil environment and REE activation in them.