

Sensitivity of Water/Sediment Discharge to Climate Variation Under Changing Land Use — An Example of the Longchuan Catchment, Upper Yangtze River

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Dry-hot valley is a special environmental type in southwest China, which is characterized by a hotter and dryer climate compared with their neighboring areas. However, the dry-hot valleys are usually highly populated because of the relatively flat landform, and the abundant solar radiation and heat for agriculture. Consequently, most of the dry-hot valleys in southwest China have the problem of water loss and soil erosion. Longchuanjiang Basin is a typical dry-hot valley in the Upper Yangtze River, southwest China, which is suffering from serious water loss and soil erosion. To investigate the sensitivity of river discharge and sediment flux to climate change under the situation of changing land uses, climate data at 6 weather stations in the catchment, hydrological data (water and sediment discharge) at Huangguayuan gauging station from 1960 to 2001, and five satellite images (including 1 LANDSAT MSS image in 1974, 2 TM images in 1989 and 1993 respectively and 2 ETM+ images in 1999 and 2001 respectively) were collected. Artificial neural networks (ANNs) were explored as the modelling tools to investigate the changing sensitivity. Analysis of land use, water and sediment data in the basin over the past few decades indicated that the river basin had experienced a wide range of land use changes and the significant increase in water and sediment discharge, notably in the lower part of the basin, was closely related to the land use change. River discharge and sediment flux are more sensitive to climate variation as a result of human disturbances, such as deforestation, intensification of agriculture activity, expansion of urban area and so on. The result may help to assess the human impact and provide information for catchment management. Keyword: water and sediment discharge; sensitivity; climate; land use change; Upper Yangtze River.