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# The Water Volume Changes of Lake Manas and Its Response to Climate Change and Human Activities

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The water volume changes of the lake basin in China's arid northwest region can sensitively reflect the impact of climate change and human activities in upper stream area. Lake Manas is a terminal lake of Manas Valley, a typical Valley in Northern Xinjiang. Just like other lakes, tectonic activities, such as water conservancy projects and agriculture irrigation projects, have great impacts on its evolution and change. We have a research on the response to climate change and human activities since 1950s, taking the Lake Manas for example. Collect aerial photographs and satellite imagery in year of 1958,1964,1979,1989,1999,2001,2003, with 1:50,000 topographic maps, 1:10000 DEM and other types of Figure and data of Lake Manas, we calculate the changes of the water volume of the Lake in 7different time period. According to the analysis of weather and hydrology records in the past 50 years, this author construct the correlation curves among the flow rate of Manas River, the temperature and precipitation in its upper steam area. This study shows that the development of contemporary Lake Manas could be divided to three stages: high-water period (in late the 1950s), extinct period (between 1970s and 1990s), and recovering season (in the early 21st century). The high-water period in late 1950s and the recovering season in early 21st century are mostly the results of excessive wet climate in the drainage basin, while the extinct period between the 1970s and the 1990s is mostly the result of man-made water projects in its upper stream area.The impact of climate change mainly in: the impact of climate change on runoff upstream determine the inflows of Lake Manas; the impact of downstream climate on the combination of water and heat determine the evaporation. The impact of human activities mainly in: the water conservancy projects upstream and agriculture irrigation projects since 1954 result in the extinct period between 1970s and 1990s in Lake Manas.
Key Words: Lake Manas; water volume changes; climate change; human activities