

Changes in water resources and ecological environment in arid northwest China

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Abstract: The arid region of northwest China is one of the driest regions in the world and is characterized with severe water scarcity. Water shortage is the most critical natural factor limiting the high-quality economic and social development and ecological security in the arid region of northwest China.

Based on the long-term monitoring and field survey data from the field stations of Chinese Academy of Sciences, observation data of meteorological stations, water resources bulletin and the remote sensing data, this study systematically analyzes the basic characteristics of water resources and ecological environment in the arid region of northwest China, assesses the changing trends of hydrological elements, water resources, and ecological environment. Besides, this study analyzes the changes of water resources carrying capacity in terms of water use structure and water resources utilization efficiency, and puts forward some suggestions on sustainable water resources utilization and ecological and environmental protection. The results show that the temperature in the arid region of northwest China has increased at a rate of 0.32 °C/decade and precipitation has increased at a rate of 9.32 mm/decade. The glaciers are shrinking at accelerating rate and the runoff supplied by glacier/snow meltwater has increased. The amount of water resources has increased by about 11 billion m³ since the mid-1990s.

In the past decade, water use efficiency has been improved, water-saving irrigation area has been expanded, and agricultural water production efficiency has been improved due to water conservation and utilization measures. Water environment capacity has been increased, water carrying capacity has been enhanced, surface water area has been expanded, and the ecosystem condition has improved. However, water resources problems are still prominent in the arid region of northwest China, the intensity of extreme climate and hydrological events has increased, and the ecological environment is still fragile. In the future, it is necessary to further explore the water resources potential of this region, improve the water resources management, and enhance ecological protection and restoration efforts for better adaptation to the possible risks of climate change, so as to provide scientific and technological support for promoting the construction of the “Green Silk Road” and realizing high-quality regional economic and social development.

Keywords: *Arid areas, water resources, ecological environment, climate change, water use efficiency*