

Dynamic Change of Groundwater Level in the Changwu Tableland Region on the Loess Plateau of China

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The loess tablelands traverse Gansu, Shaanxi and Shanxi provinces of China, and are mostly located between 104°E and 112°E along 36°N, of which Changwu tableland in Shaanxi province is in the middle. As the groundwater is an important water resources for agriculture, industry and people's life in this region, this paper analyzed the dynamic change of groundwater table in Changwu County, discussed the reason and countermeasures to promote the sustainable use of groundwater. The data of water table monitoring in 4 representative wells and 2 assistant wells distributing on loess tablelands with the longest period of 30 years were used. Well No.552 is in the middle part of Changwu tableland and to the west of Changwu county town, its groundwater level was comparatively stable, and kept a depth of 26 m before 1990, and then dropped down remarkably at a speed of 0.41m per year. Compared with well No.552, two assistant wells in the county town showed a bigger dropping speed of groundwater table in the same period, i.e., 0.56-0.84 m per year. Well No.551 lies in the western part of Changwu tableland. The level of groundwater in well No.551 was approximately stable before 1981, went up to a depth of 37 m in 1981, dropped down at a speed of 0.21m after 1981, and fell below the bottom of the well in 1993. Well No.555 is in the eastern part of Changwu tableland, its groundwater level went up ladderlike at a speed of 0.14 m per year to a depth of 49.4 m in 1992, and then dropped down slowly to a depth of 50.6 m in 2005. Well No.554 is located in Julu tableland, which is dissected severely by gullies and faces Changwu tableland across the Heihe River. The groundwater level in well No.554 was very deep, dropped down at a speed of 0.18 m per year until reaching to a depth of 92.3 m in 1992 and then kept steady. The river stage around the tablelands was lower than the groundwater level in the tablelands, so the rain infiltration, including through ponds, dams and reservoirs, was the only supply for the groundwater in the tablelands. The excessive extraction of groundwater and increase of evapotranspiration was the major reason for groundwater level falling in the tablelands. The rising of groundwater level in a part of tableland and in a certain period should be related to rainwater supply and distribution of groundwater flow field. Controlling the amount of pumped wells and keeping the extraction of groundwater within the limits of supply is a basic principle for sustainable use of groundwater resources.

Key words: groundwater, water table, the loess plateau, Jinghe river, Changwu tableland

Fig.1 Locations of the monitoring wells, Changwu, Shaanxi

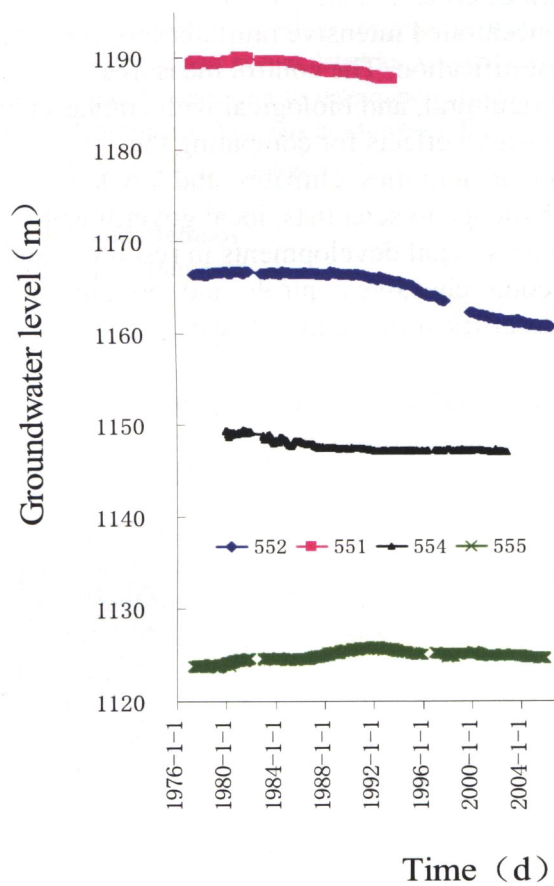
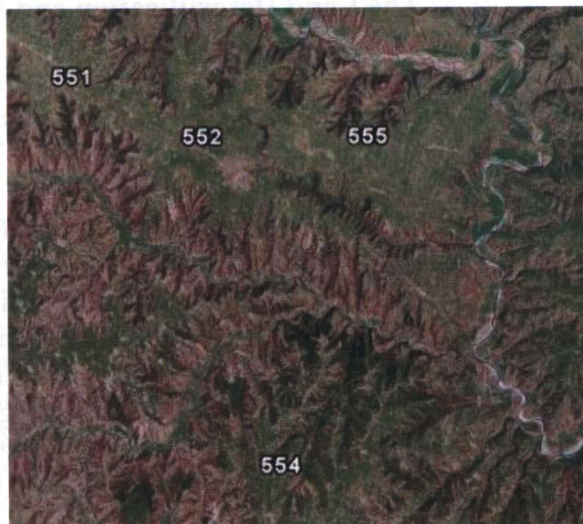


Fig.2 Groundwater level change in the monitoring wells, Changwu, Shaanxi