

研究论文

黄土丘陵沟壑区典型流域土地利用/土地覆被变化水文动态响应

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摘要 以黄土高原第三副区桥子东、西沟流域为例, 分析了土地利用/土地覆被变化的水文动态响应。研究结果表明: 土地利用/土地覆被对年径流有显著影响, 治理流域较未治理流域在丰水年、平水年和枯水年的径流系数分别减少约50%、85%和90%; 流域土地利用后期(1995~2004年)较前期(1986~1994年)多年平均径流系数下降73.6%, 且随降雨增多, 土地利用与植被变化对径流的响应增强。土地利用/土地覆被变化对径流量的影响具有季节性特征, 治理与非治理流域多年平均最大月径流系数减少时期与流域最大地表覆盖期具有一致性, 即5月份径流系数减少值最大; 同一降水条件下流域两期土地利用的产流量仅在生长季具有明显的差异。流域洪水径流量与场降雨量和30 min最大雨强有较好的相关关系, 场降雨量与30min雨强对治理流域洪水流量的影响要强于非治理流域; 暴雨在达到一定强度后, 对比流域的洪峰流量差异减小, 即森林植被对洪水的影响减弱。经洪水频率分析, 认为流域前后两期土地利用若具有相同频率的降雨强度, 则一定频率范围内洪峰流量对土地利用与植被变化产生明显响应。

关键词 [土地利用/土地覆被](#); [水文动态](#); [黄土丘陵沟壑区](#)

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Response of land use/land cover change to hydrological dynamics in typical watershed in Loess gullied-hilly region of China

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Abstract Qiaozidong watershed and Qiaozixi watershed in third sub-region of Loess Plateau were selected as the case to investigate the effects of landuse/landcover change on hydrological dynamics at watershed scale. The results showed that the impact of land use/land cover on annual runoff yield was significant. The runoff coefficient of controlled watershed reduced about 50%, 85% and 90% respectively in wet, normal and dry year in comparison with the runoff coefficient of uncontrolled watershed. The average runoff coefficient reduced 73.6% during the period of 19952004 compared to that in the previous period of 19861994 for land use in controlled watershed. And the impact of land use and vegetation changes on runoff strengthened in response to the increasing rainfall. In addition, the impacts of land use/land cover on runoff yield are characterized by seasonal fluctuation. The maximum monthly runoff reduction in both controlled watershed and uncontrolled watershed occurred in May, when was consistent with the period of the maximum land coverage appeared. And only in growing season obvious runoff yield difference was observed between the two land-use periods of controlled Qiaozidong watershed. Finally, the rainfall amount and rainfall intensity in 30min had significant correlation with flood volume, and had greater impacts on flood volume in uncontrolled watershed than that in controlled watershed. When the rainfall inte

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nsity reached a certain threshold, the variance of flood peak in two paired watershed reduced, which showed that the effects of forest on flood weakened. At the same time, flood peak discharge frequencies indicated that peak discharge would respond to the land use and vegetation change obviously on condition that there were the same frequencies of rainfall intensity in the earlier and later periods.

Key words [land use](#) / [land cover](#) _ [hydrological dynamics](#) _ [Loess gullied-hilly region](#)

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