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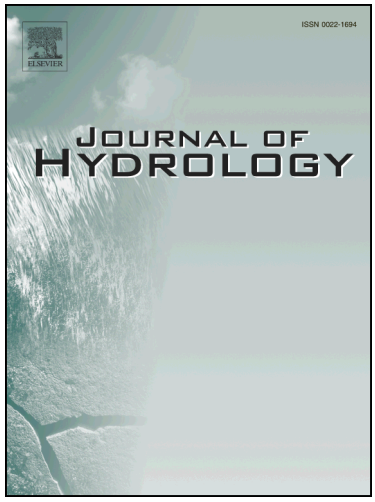

Research papers

Development of a Landscape Indicator to Evaluate the Effect of Landscape Pattern on Surface Runoff in the Haihe River Basin

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PII: S0022-1694(18)30739-X
DOI: https://doi.org/10.1016/j.jhydrol.2018.09.045
Reference: HYDROL 23142

To appear in: *Journal of Hydrology*

Received Date: 12 May 2018
Revised Date: 25 August 2018
Accepted Date: 18 September 2018

Please cite this article as: Bin, L., Xu, K., Xu, X., Lian, J., Ma, C., Development of a Landscape Indicator to Evaluate the Effect of Landscape Pattern on Surface Runoff in the Haihe River Basin, *Journal of Hydrology* (2018), doi: https://doi.org/10.1016/j.jhydrol.2018.09.045

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ACCEPTED MANUSCRIPT

Development of a Landscape Indicator to Evaluate the Effect of Landscape Pattern on Surface Runoff in the Haihe River Basin

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Abstract: The Haihe River Basin has become a watershed that suffers from intensive interference from human activities, as landscape patterns and runoff processes have significantly changed in recent decades. Investigating the effect of landscape patterns on surface runoff is helpful for establishing the synergistic evolution relationship between the landscape and the hydrological cycle, providing a theoretical basis and effective way for the future management of water resources. In this study, a landscape metrics approach is used to describe the spatial patterns of landscapes, measure changes in landscape patterns, and relate spatial patterns to surface runoff processes of water resources at a watershed scale. Given that commonly used landscape metrics not considering undulating terrain characteristics, soil properties and landcover conditions, which have significant effects on the surface runoff, a Runoff Landscape Index (RLI) is developed to evaluate the effect of watershed landscape factors on surface runoff. Factors relating to landcover, soil and topography are analyzed, weighed, and integrated during the indicator development. Then, correlation between landscape indicators (RLI and commonly used indicators) and surface runoff is examined. The results show a significant positive correlation between RLI and surface runoff, and the average correlation coefficient is 0.831, much greater than the correlation coefficients for commonly used

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