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Assessment of Water Resources Vulnerability under Changing Environment in Hexi Corridor

By

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Abstract

Global climate change has become an indisputable fact and human ŝ activities have increased notably, which both have made great influence on water resources. With scarce precipitation and high evaporation, the arid and semi-arid regions are experiencing water shortage under changing environment. Therefore, the vulnerability assessment of water resources under changing environment in arid and semi-arid regions is of great significance to understand the influence mechanism of climate change, human ŝ activities and the water system. It also has practical significance and application value for adaptive management, water resources protection and configuration in arid and semi-arid regions.

This research chooses the Hexi Corridor in Gansu province for the typical study area researched for a long term. It is explained that the major drivers of runoff change is climate and human ŝ activities. In this thesis, based on the time series of 5 hydrographical stations and 12 meteorological stations for more than 50 years, the variation features of temperature, precipitation and runoff and their response relationship are analyzed with the methods of nonparametric test and mathematical statistics methods. This research reveals the change characters of climate and runoff for more than 50 years, which can provide some reference for the future hydrological simulation study.

In this paper, a framework of water resources assessment was outlined and applied to the Hexi Corridor. A list of 10 indicators for vulnerability assessment were identified and categorized including the climate changes, human factors and comprehensive factors. The weight of each indictor was calculated using the Analytic Hierarchy Process, the Principal Component Analysis and the Entropy Weight Method, and the standard value for each indicator was obtained from the water resources bulletin and related planning. The result showed that the water resources vulnerability value of each basin is moderate and severe vulnerable. The future water resources vulnerability value is decided by the indicators including drought index, per capita water resources, population density and water deficient ratio. Based on the assessment result and the indeterminacy of the climate changes and human ŝ activities, the possibility of further reduce of the vulnerability value was calculated when the adaptive management measures carried out on both supply and requisitioning parties.

With the future climate changes and human regulation and control of water resources in the Hexi Corridor, the predicted water resources vulnerability value would be in low value, which implied that the regulation and control measures and improve the water resources conditions of the Hexi Corridor. This result is beneficial for adaptive management of water in arid and semi-arid under predicted situation.

Key words: Hexi Corridor, Changing environment, Water resources vulnerability, Index system, Adaptive countermeasures

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IPCC 1995

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IGBP-BAHC International Geosphere-Biosphere Programme-Biospheric Aspects of the Hydrological Cycle IAHS International Association of Hydrological Sciences

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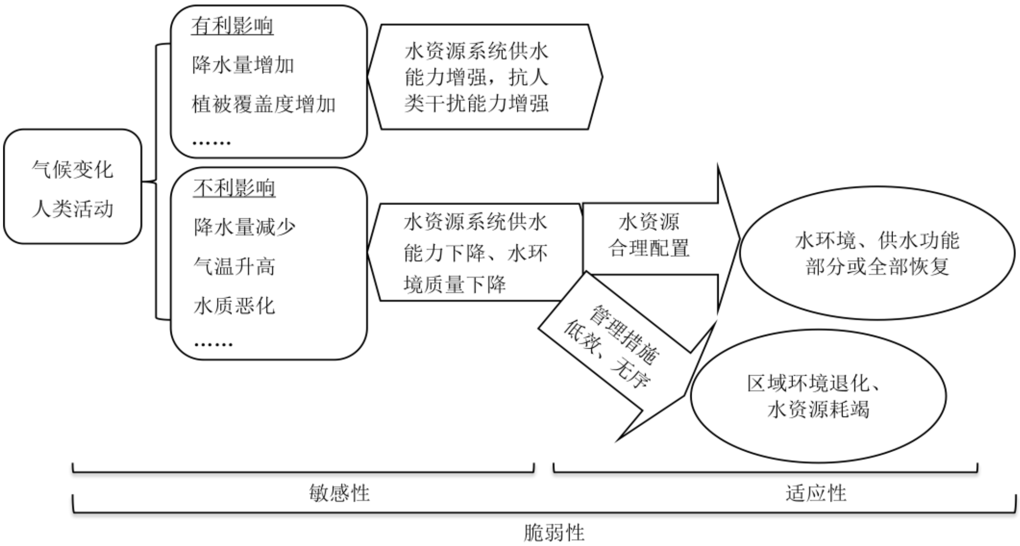

气候变化
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植被覆盖度增加
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不利影响
降水量减少
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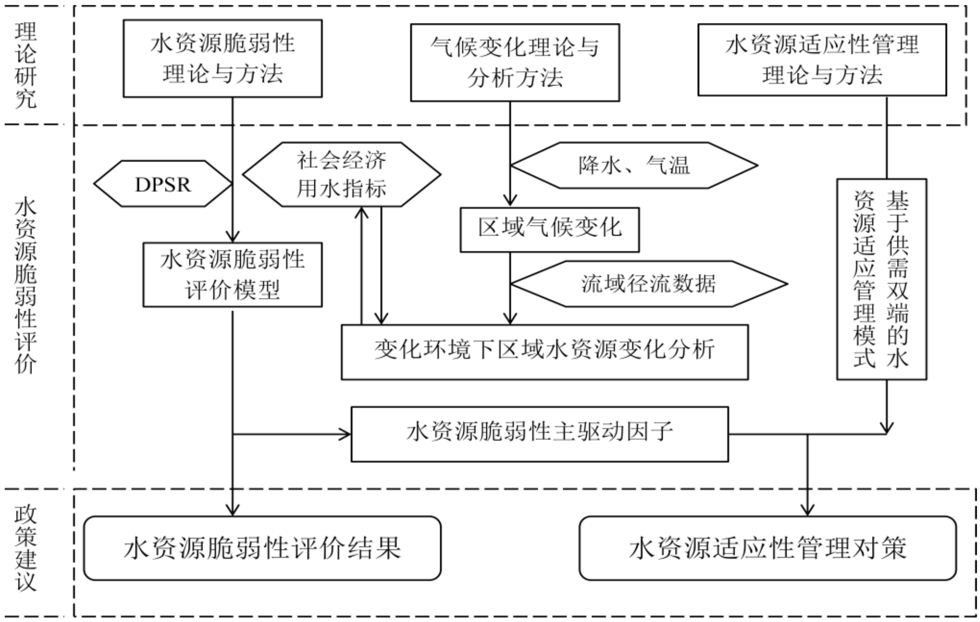

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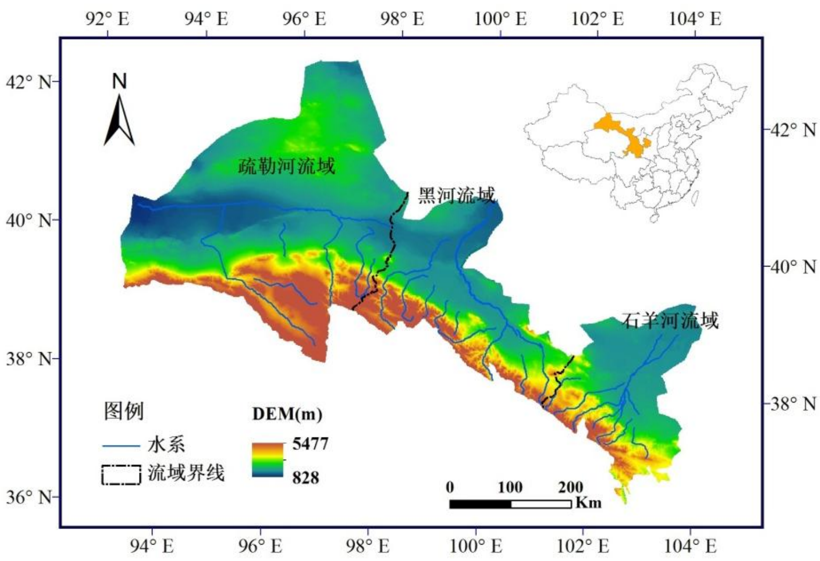

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	174.0	103.3	500-50	1474.1	800-2538
	96.6	164.2	400-50	1668.9	900-3522

2006

76.72×10⁸m³a⁻¹ 1.3 92.9% 7.1% 51.4% 28.0% 20.6%

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	36.7356	2.7328	39.4684
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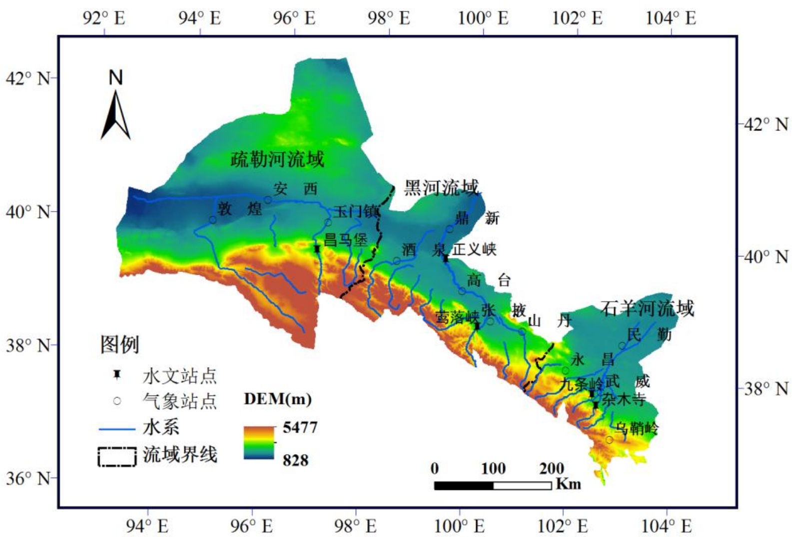

2. 1

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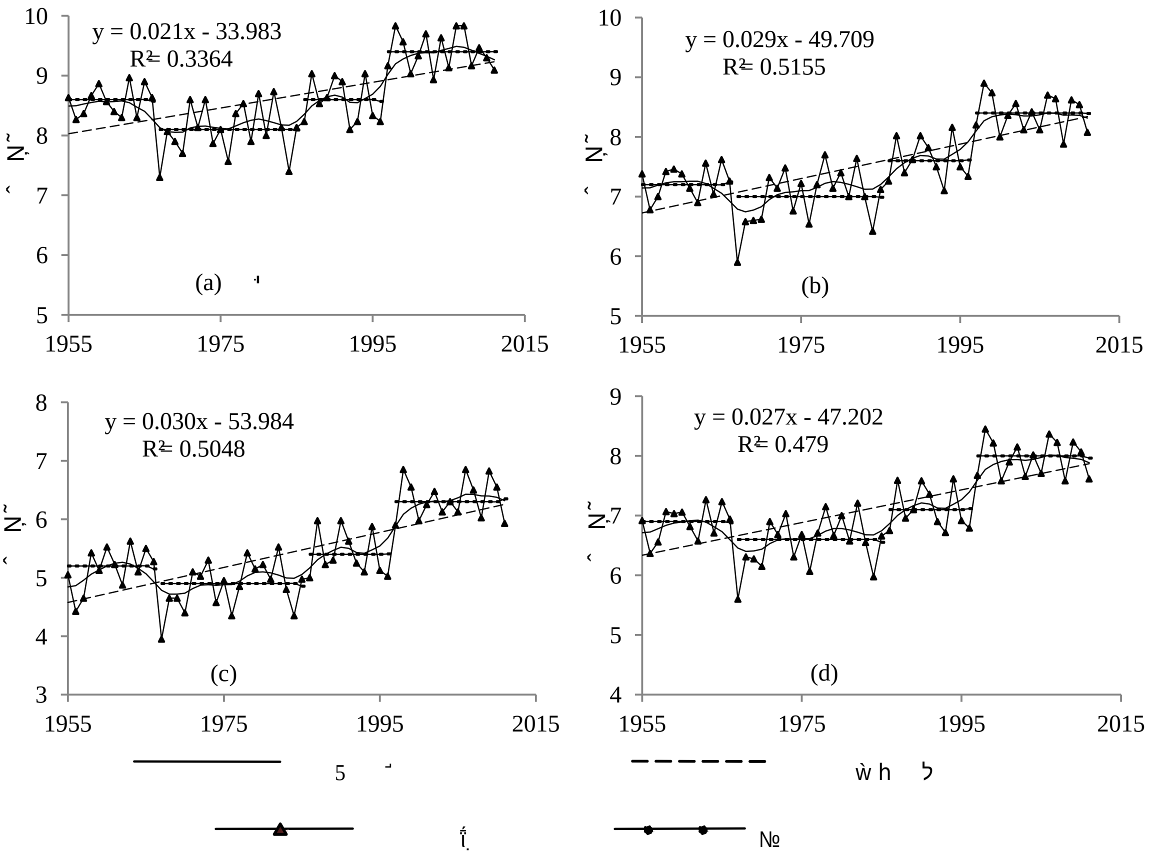

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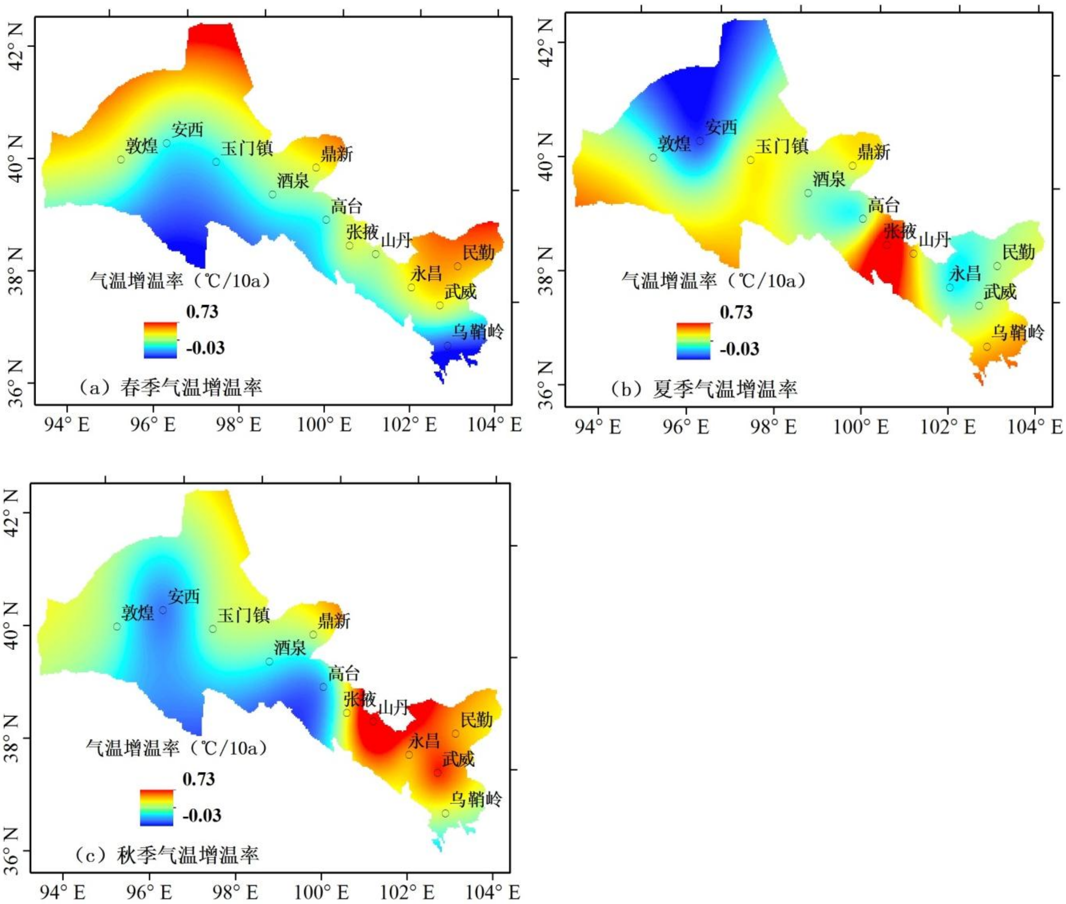

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