Supplementary material

Spatially explicit assessment of water scarcity and potential mitigating solutions in a large water-limited basin: the Yellow River basin in China

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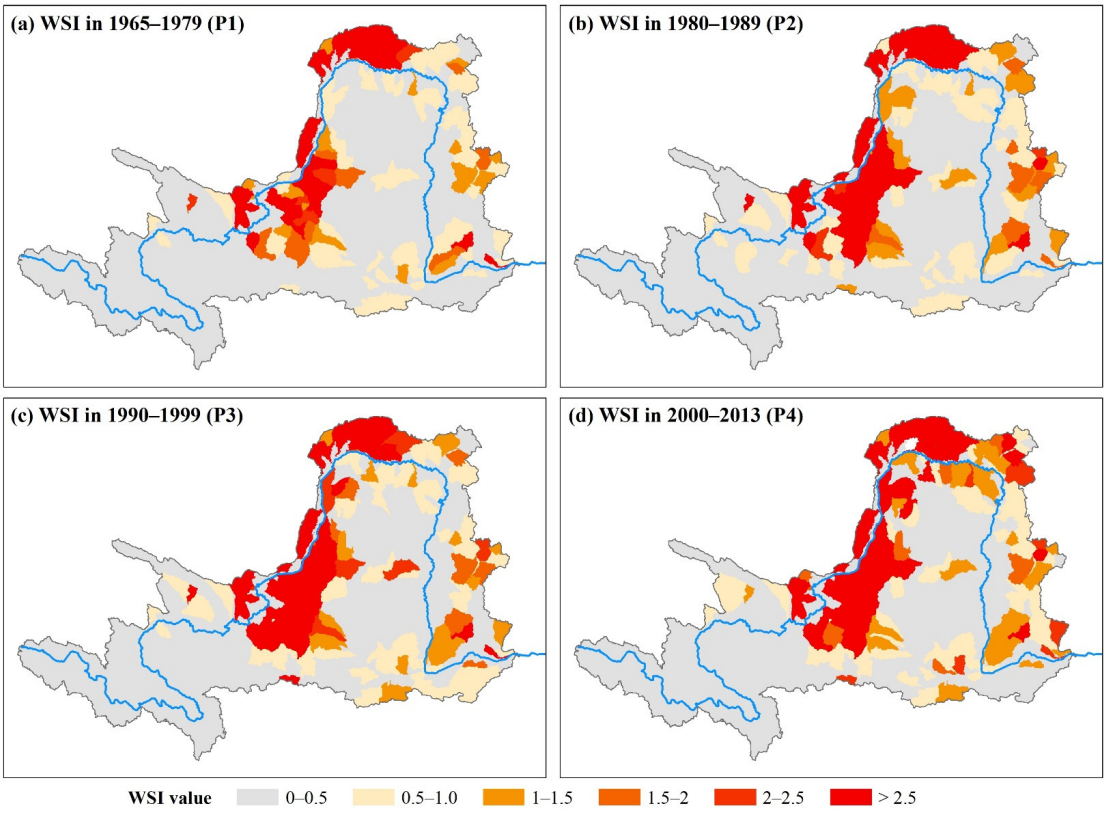

Figure S1. Spatial distribution of water scarcity index (WSI) value in different periods.

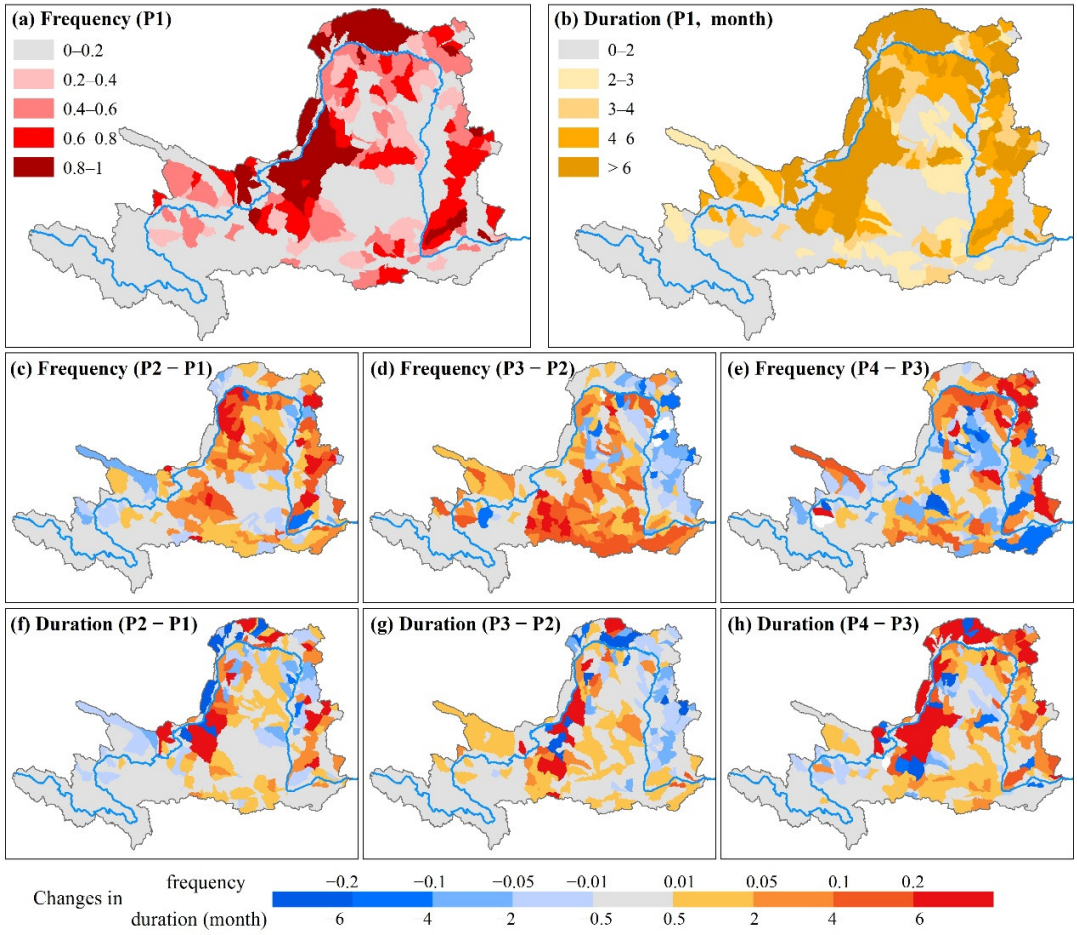

Figure S2. Spatial distribution of (a) frequency and (b) average duration (month) of water scarcity during P1. Changes in (c, d, and e) frequency and (f, g, and h) average duration of water scarcity between two consecutive decades.

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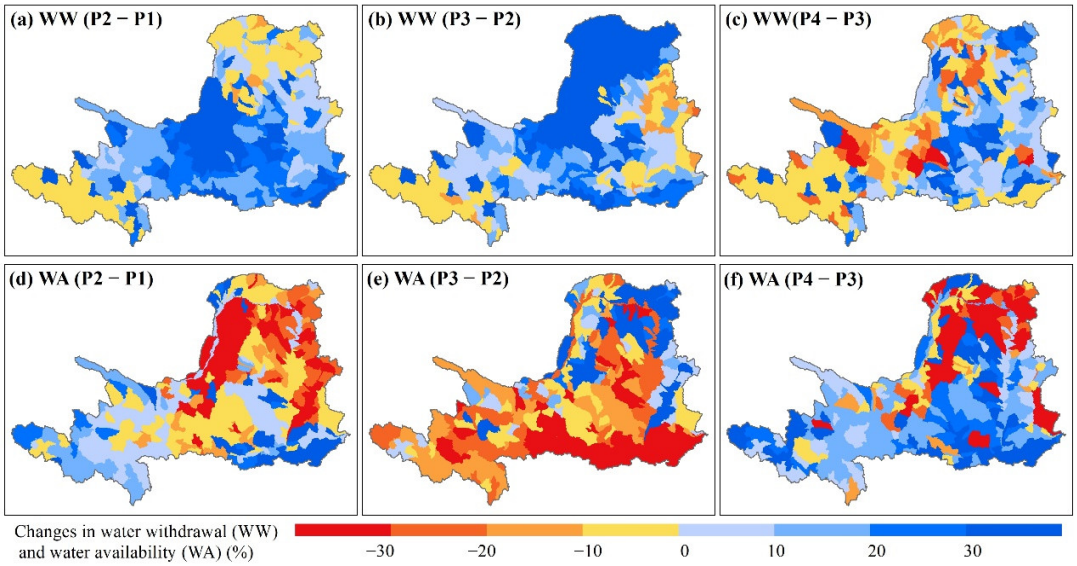

Figure S3. Relative changes (%) in water withdrawal (a, b, and c) and water availability (d, e, and f) between the consecutive periods. WW and WA denote the water withdrawal and water availability, respectively.

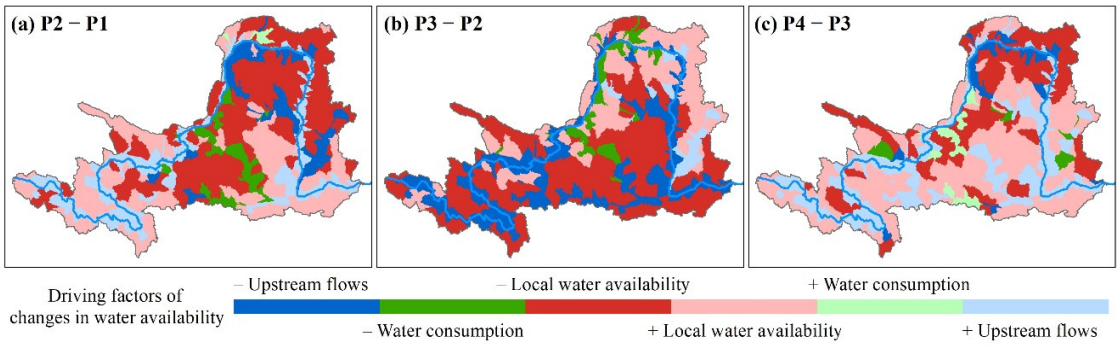

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Figure S4. Spatial pattern of driving factors of changes in water availability between two consecutive periods. A '+' prefix indicates a positive effect on water availability, whereas a '–' indicates a negative effect.

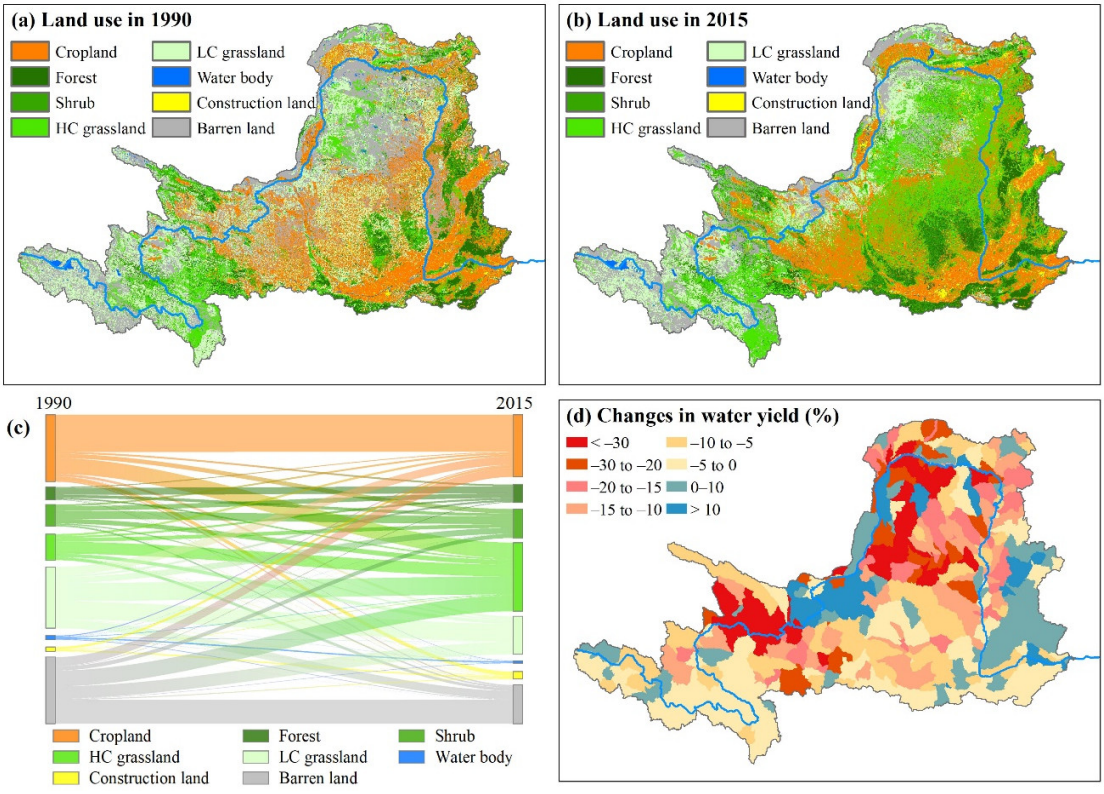

Figure S5. (a) Land use in 1990. (b) Land use in 2015. (c) Transition of land use between 1990 and 2015. (d) Changes in water yield with and without vegetation restoration (i.e., land use in 1990). HC grassland: high coverage grassland; LC: low coverage grassland.

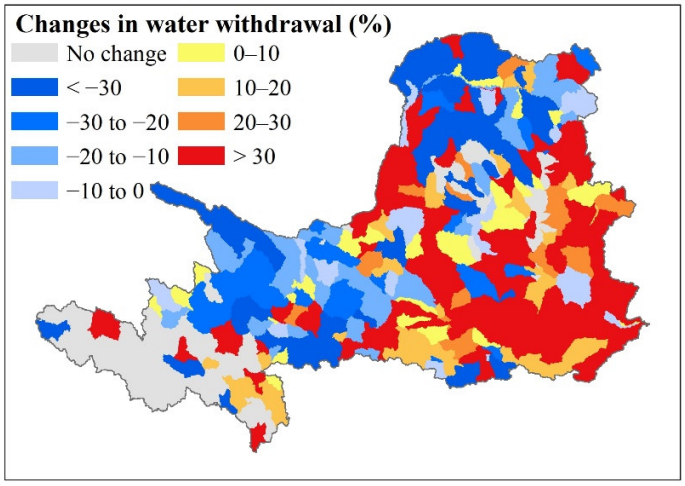

Figure S6. Spatial pattern of changes in total water withdrawal from the recent decade (2000–2013) to the 2030s, expressed as a percentage (%).

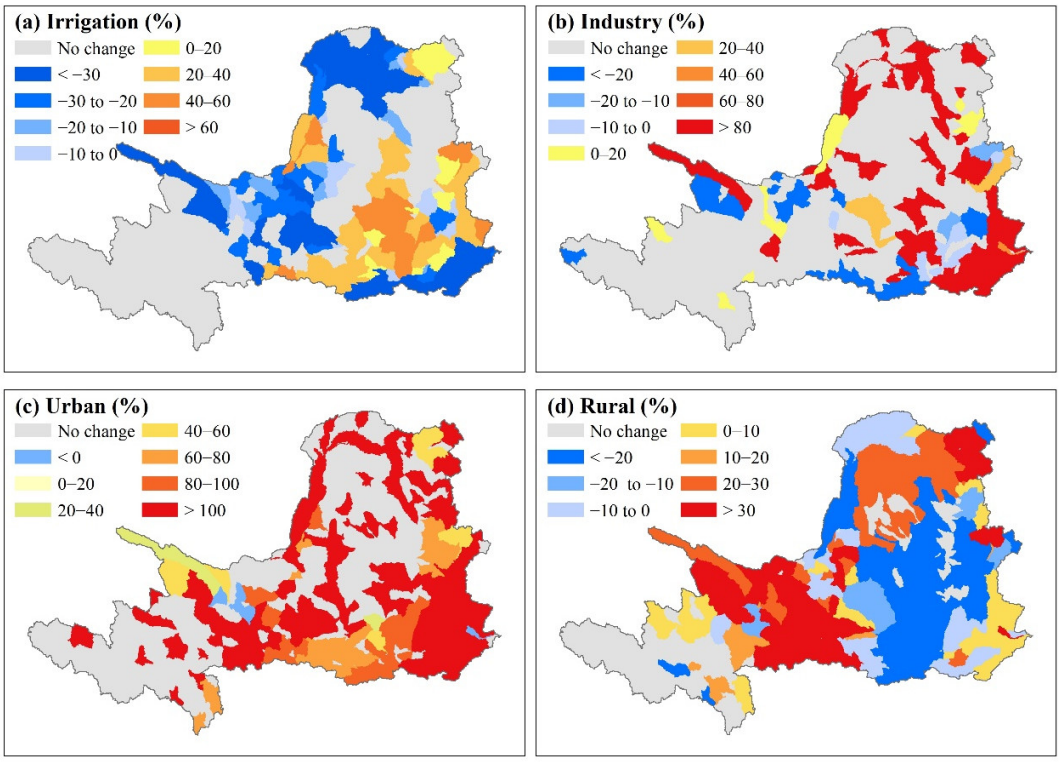

Figure S7. Same as Figure S6, but for different sectors.

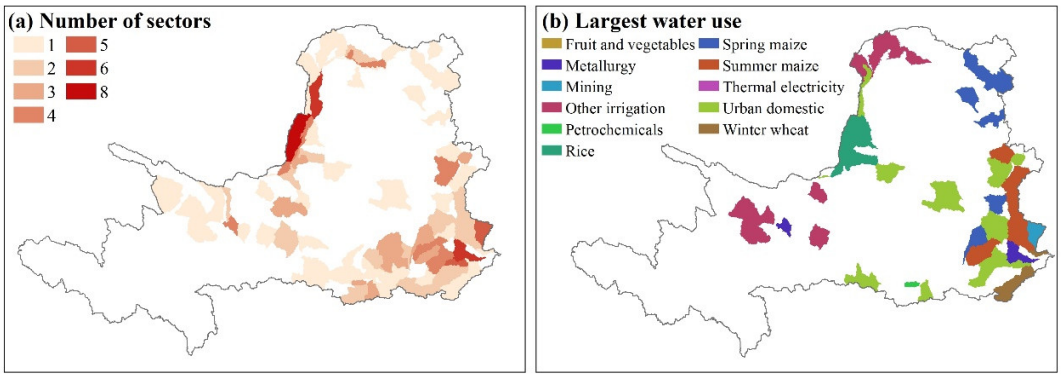

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Figure S8. Spatial distribution of (a) number of sectors for the top 5% water use sub-basin sector combinations and (b) its largest sector.

Table S1. Definitions of different types of the population exposed to water scarcity between two periods (WSIl: WSI value in the latter period, and WSIf: WSI value in the former period).

WSI condition	Classification
WSIl >1 and WSIf <1	Moving into water scarcity
WSIl <1 and WSIf >1	Moving out of water scarcity
WSIl >1, WSIf >1, and WSIl > WSIf	Aggravation of water scarcity
WSIl >1, WSIf >1, and WSIl < WSIf	Alleviation of water scarcity

Table S2. Irrigation efficiency (IE) improvement (Zhao et al., 2015).

Provinces	IE in 2007	IE in 2030	Increase rate (%)
Qinghai	0.43	0.67	53
Sichuan	0.40	0.54	37
Gansu	0.49	0.68	39
Ningxia	0.41	0.57	39
Inner Mongolia	0.44	0.70	59
Shaanxi	0.52	0.68	32
Shanxi	0.49	0.61	27
Henan	0.55	0.68	22