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Rainwater harvesting using check dams in gully of Ili Valley, China

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XVIII WORLD WATER CONGRESS Water for All Harmony between Humans and Nature

第18届 世界水资源大会 水与万物: 人与自然和谐共生

Ili Valley: wet island of Central Asia

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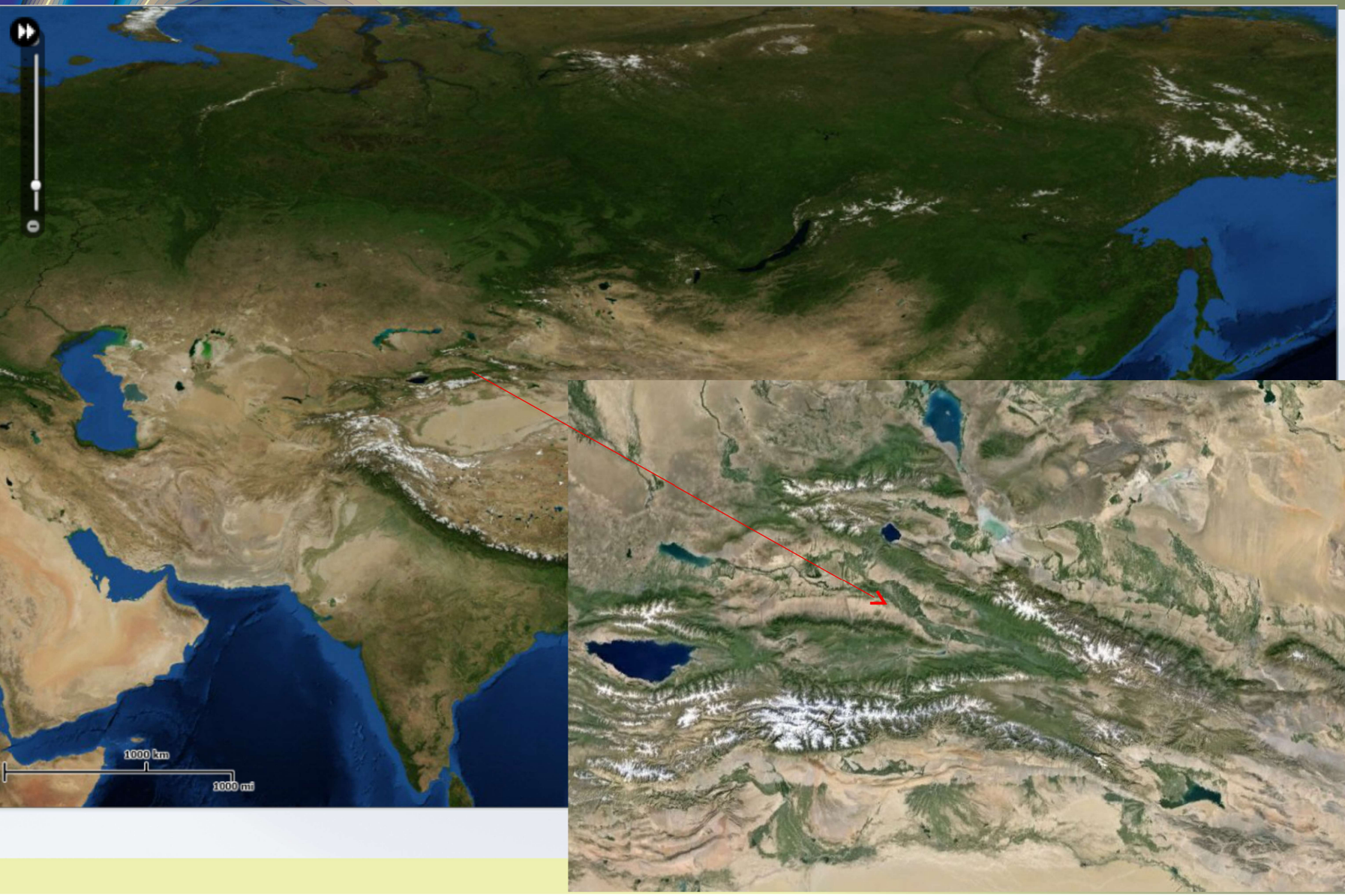

Xinjiang 165 mm

Ili Valley 200-800 mm, >840 mm where altitude >1500 m

Occasional rainstorms cause serious water loss

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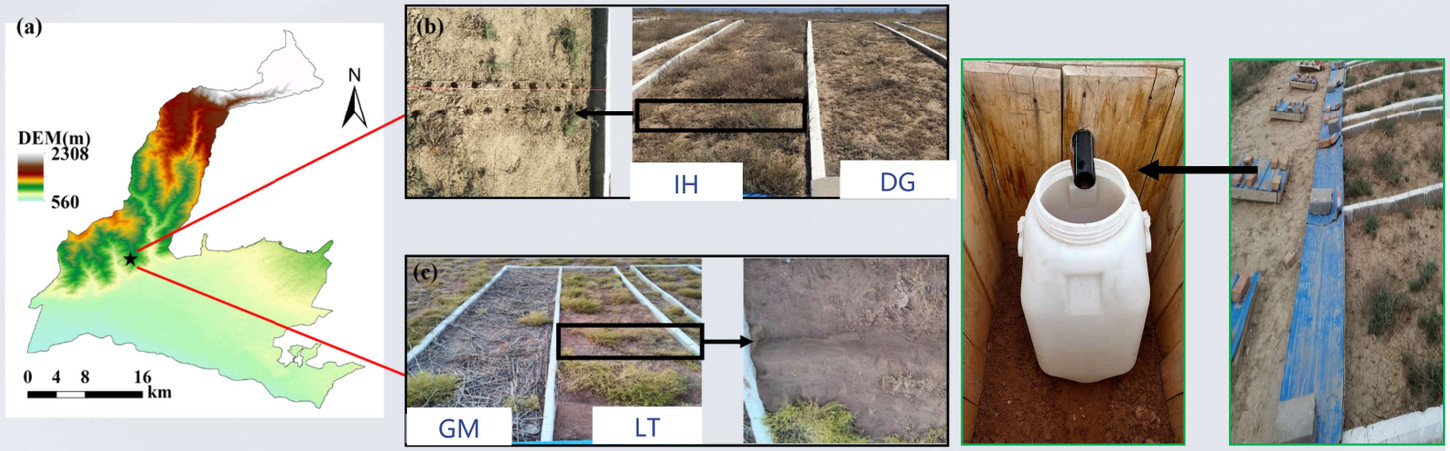
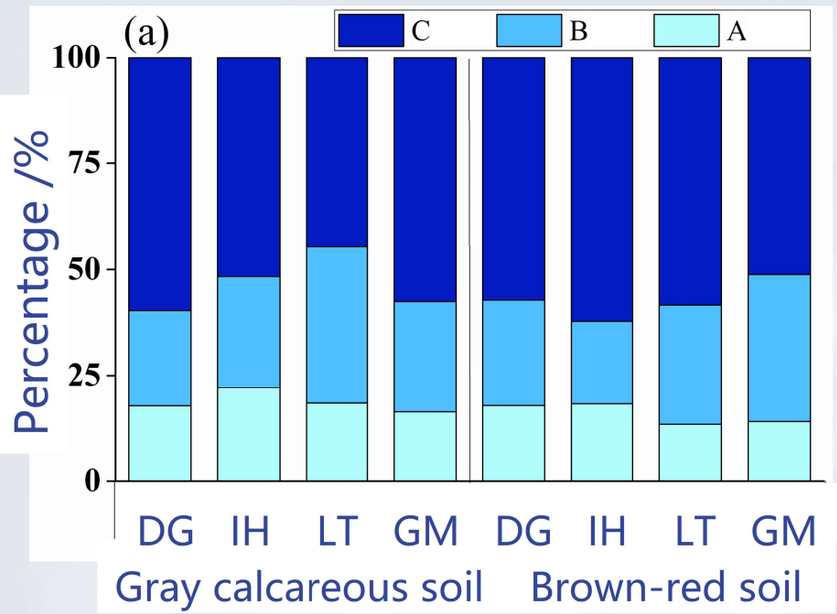




Rainfall	Mean rainfall/mm	Mean duration/h	Mean intensity/(mm·h^{-1})	Times
A type	4.62±0.87c	6.00±1.70b	0.82±0.29b	6
B type	9.76±2.83b	9.83±3.27a	1.14±0.66b	9
C type	15.20a	2.80b	5.47a	2

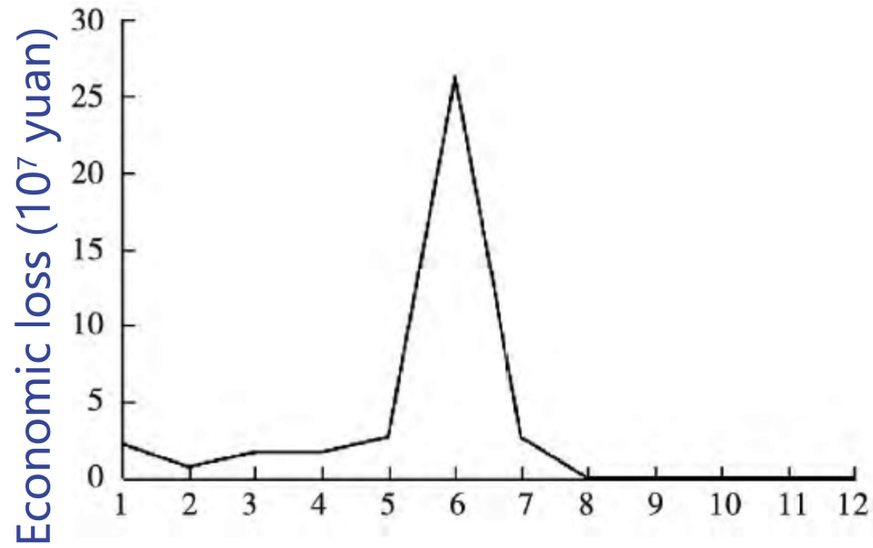
DG: degraded grassland

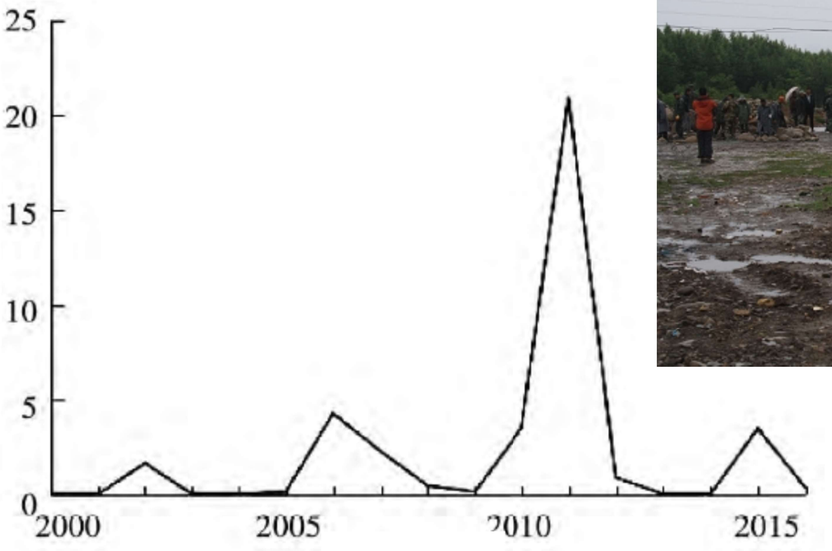
IH: infiltration hole

LT: level trench

GM: grass mulching

Economic loss of flood disasters in Ili Valley





2015-06-29, Tekes County

For Qapqal Xibe Autonomous County of Ili Valley, Direct economic loss was the highest in June.

It is estimated that averagely 364 million yuan economic loss per year from 2000 to 2016 in Ili Valley.

Key issues should be addressed of this study

(1) to evaluate the suitability of gully for rainwater harvesting at watershed scale, and

(2) to test the effect of check dams on reducing runoff and promoting vegetation rehabilitation.

Study area: Kulusitai river watershed of Yining County

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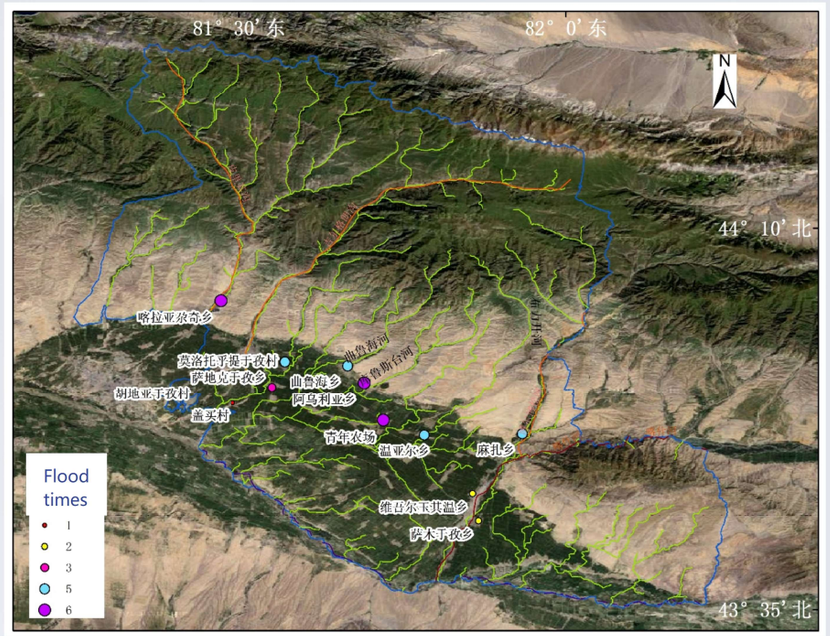
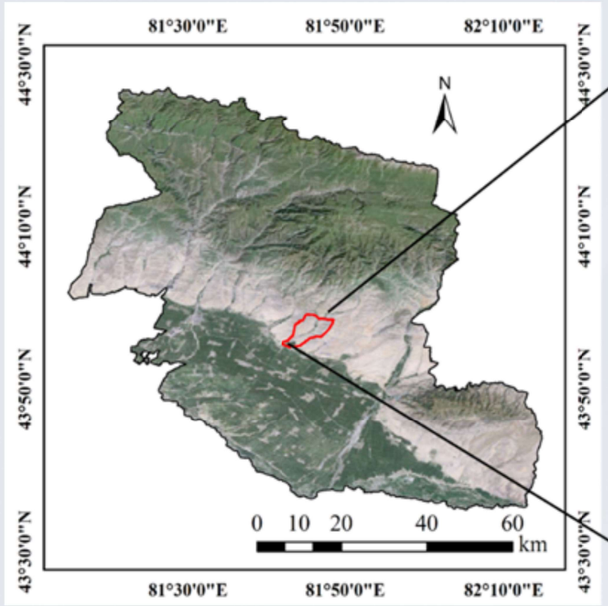
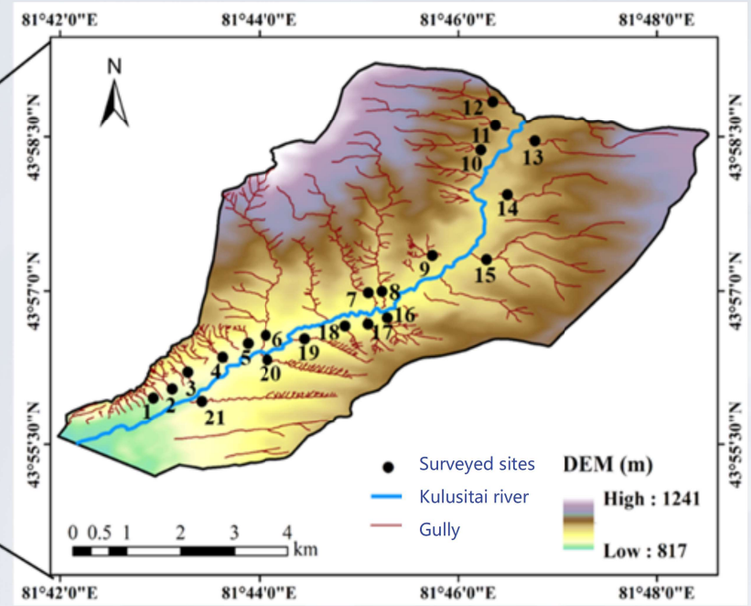
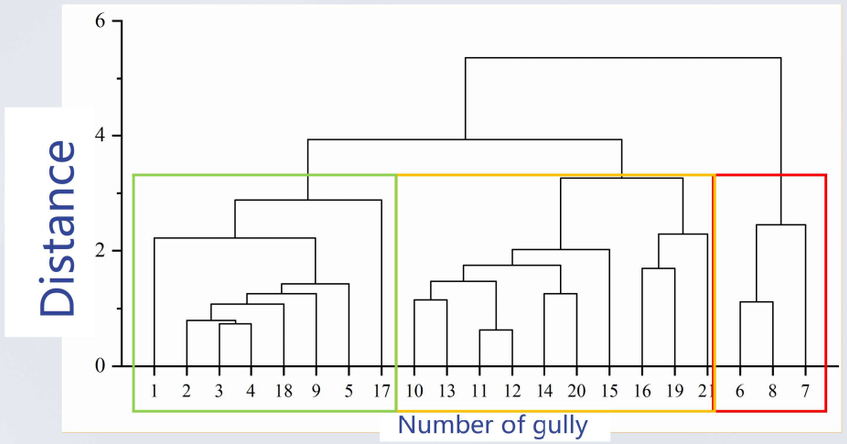
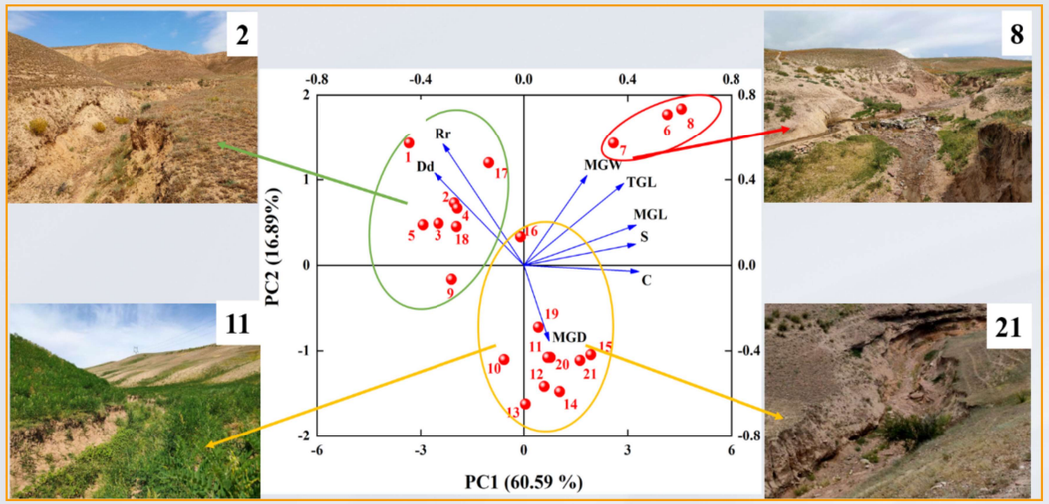






Characteristics of gully development

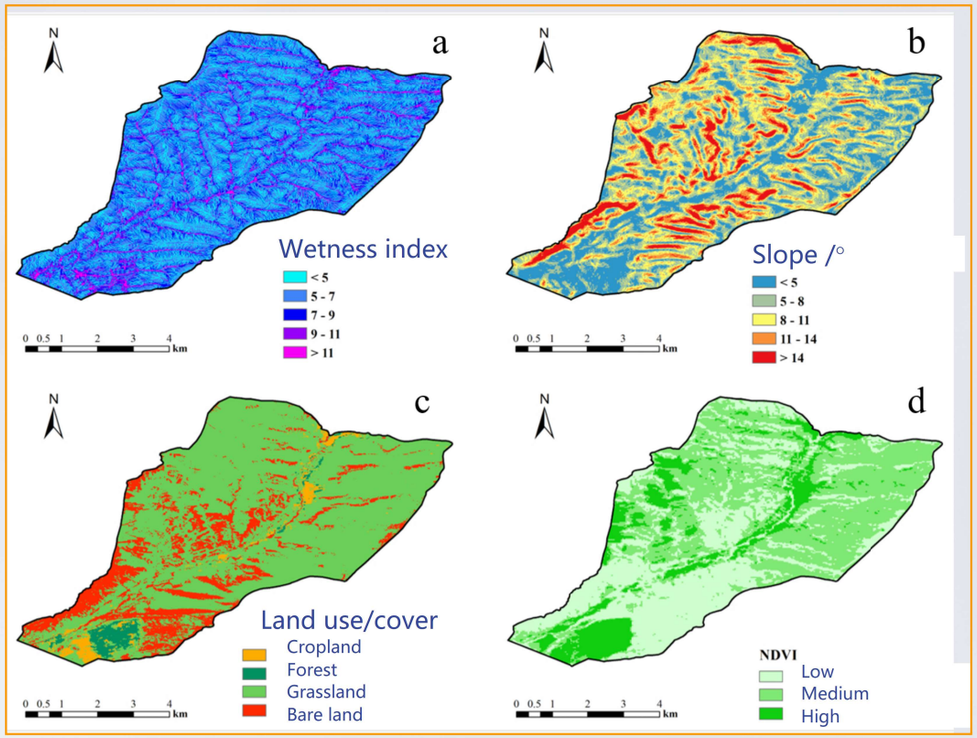


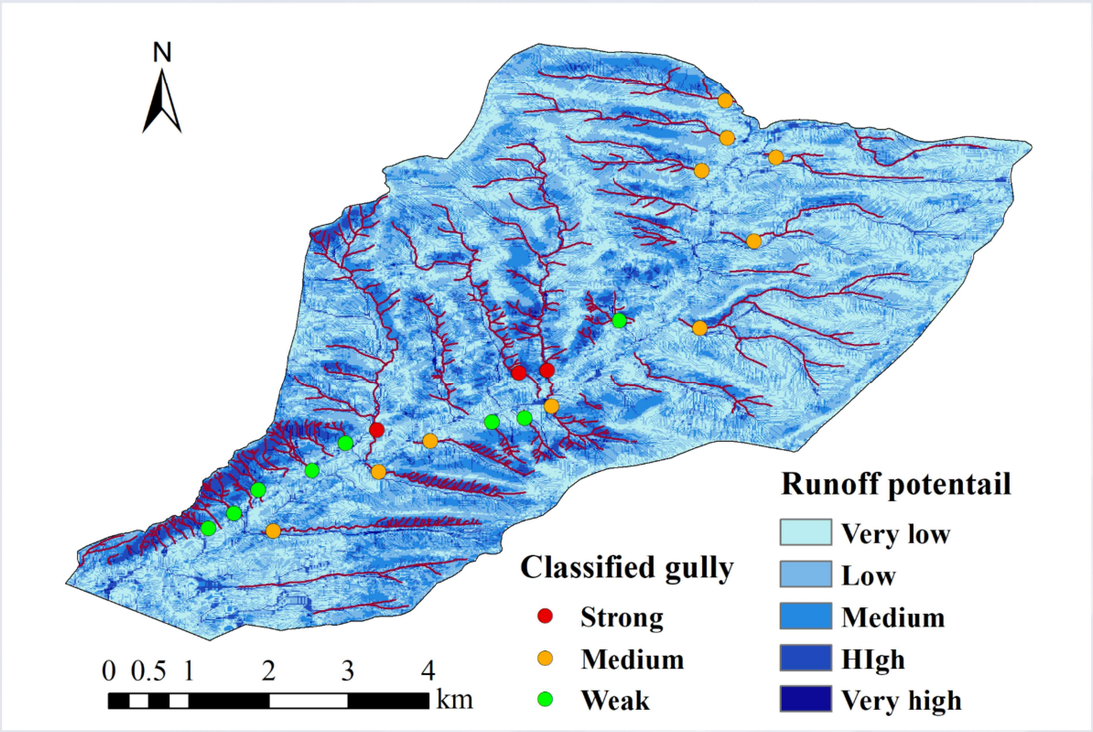


Gully types	MGL (km)	TGL (km)	MGW (m)	MGD (m)	C (km)	Area (km^2)	Drainage density (km/km^2)	Rr
Weak	0.65±0.05c	1.46±0.29b	4.62±1.04b	1.63±0.12b	1.64±0.15c	0.13±0.02c	12.4±1.75a	0.13±0.005a
Medium	1.48±0.13b	2.29±0.26b	5.41±0.84b	3.52±0.55a	4.60±0.34b	0.96±0.14b	3.05±0.79a	0.07±0.006b
Strong	3.30±0.27a	6.37a±1.13a	9.97±0.70a	1.71±0.22b	7.96±0.71a	2.43±0.31a	2.57±0.17b	0.09±0.005b

MGL=main gully length， TGL=total gully length， MGW=main gully width， MGD=main gully depth， C=circumference， Rr=relief ratio

Evaluating runoff potential using Analytic Hierarchy Process





Planting trees near the check dams in gully

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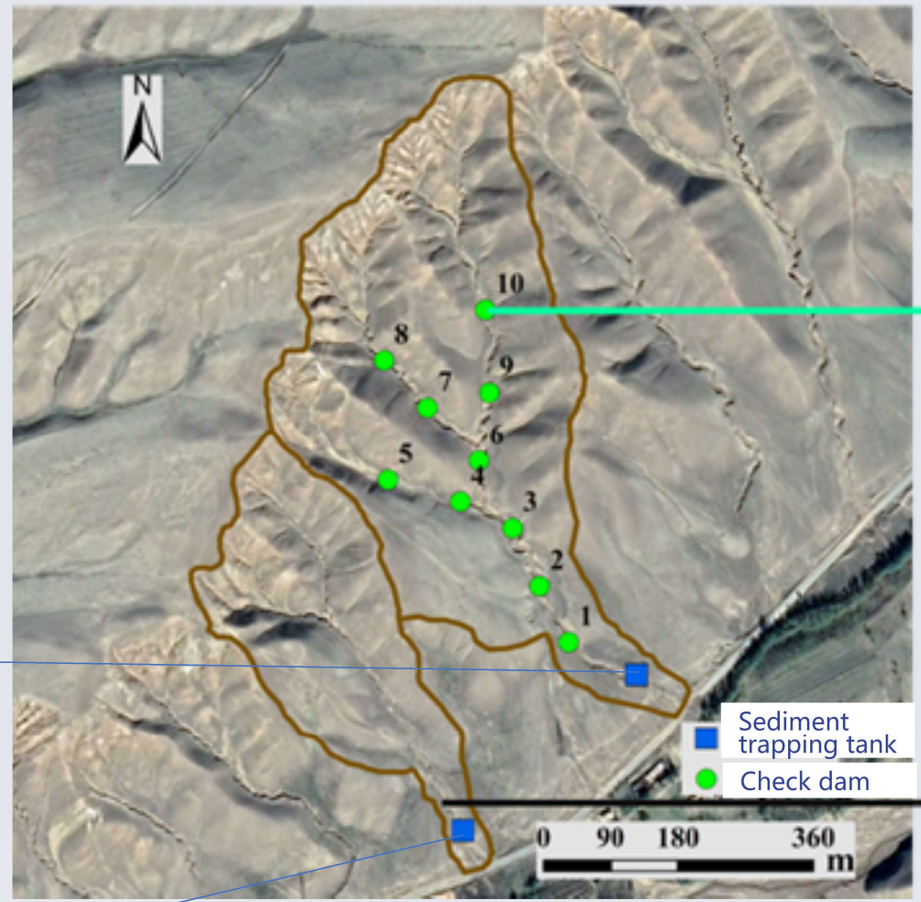


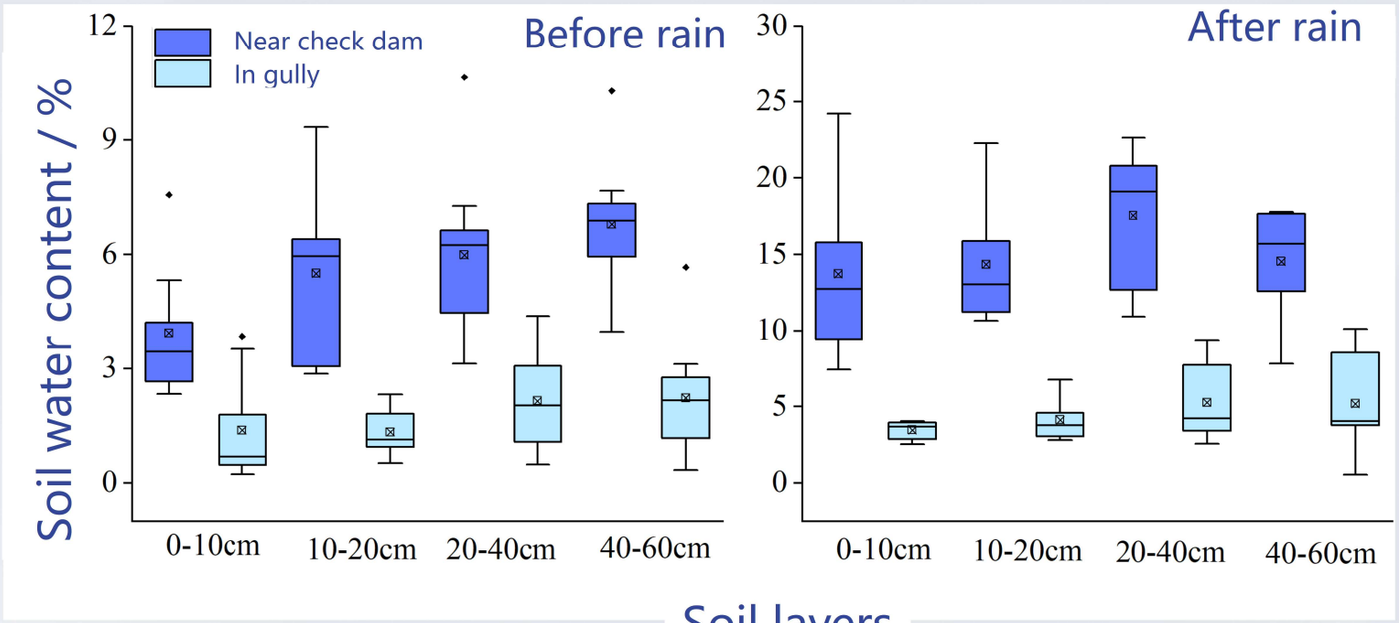
Treated

Control

Treated

Control

Impact of check dam on storing water



Gully as the water flow channel became the ideal site for storing harvested rainwater

Check dams and the harvested rainwater sustained about 80 m^2 vegetation patches in the gully

Gully rainwater harvesting in future

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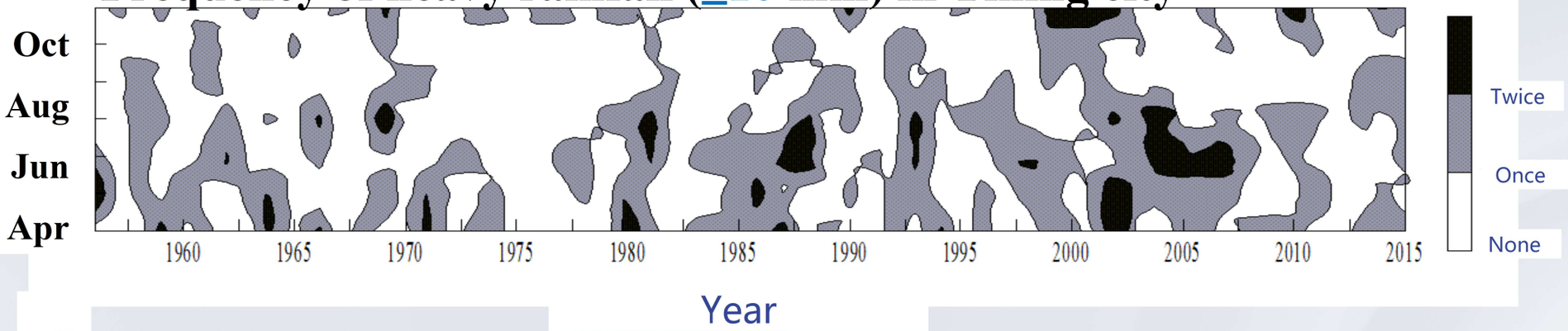
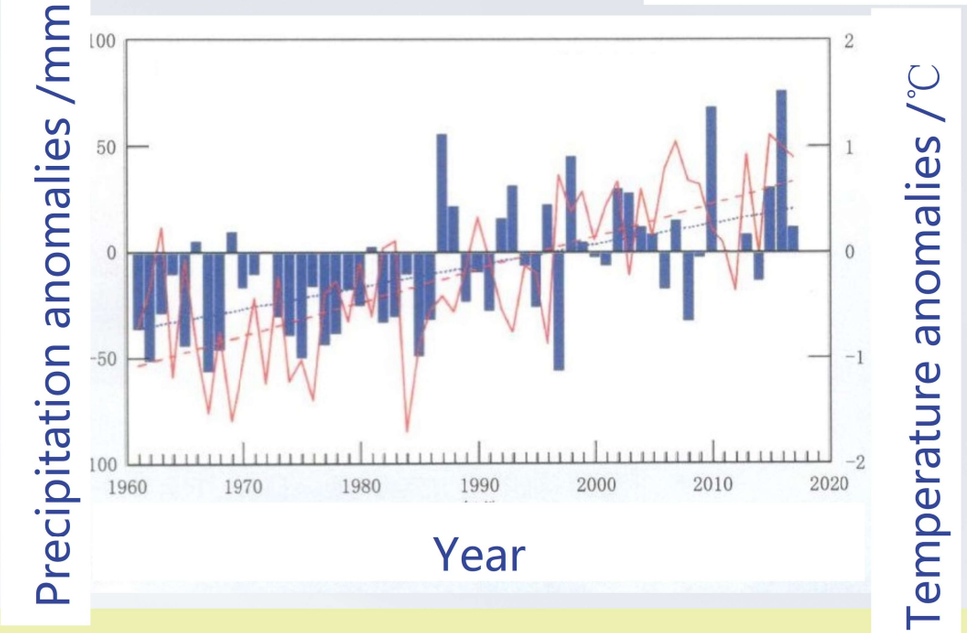
Frequency of heavy rainfall (≥10 mm) in Yining city





Under the background of increasing precipitation and temperature in Ili Valley, this study emphasizes the importance of gully rainwater harvesting on reducing flood disaster risk

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Thanks for Attention!

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