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Adaptive Public Open Space Planning in A Cold-climate Ger District: A GIS and Participatory Study of Bilgekh Valley, Ulaanbaatar, Mongolia

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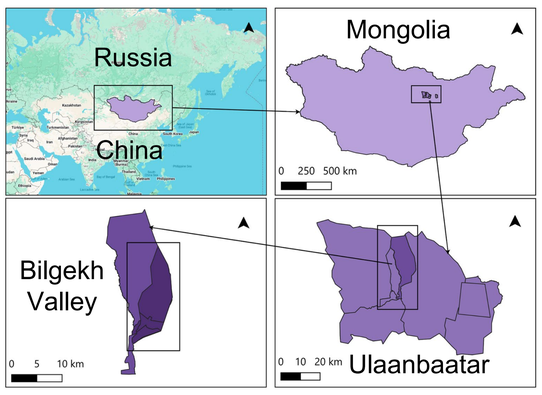
STUDY AREA MAP

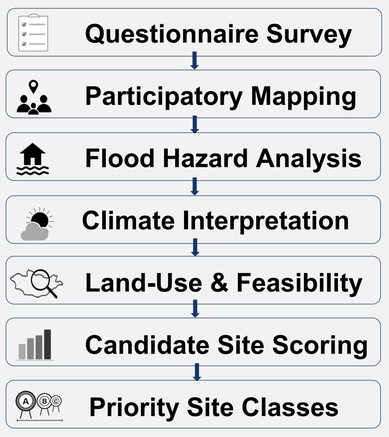


Bilgekh Valley is a cold-climate ger area landscape with limited climate-resilient public open space and multiple hazards.

BACKGROUND

- Aim: Identify and prioritise adaptive public-open-space sites by integrating participatory mapping, survey evidence, flood hazard analysis, climate interpretation, and land-use/feasibility screening.
- Research question:
  Which locations is Bilgekh Valley should be prioritised for adaptive public open space when social demand, hazard conditions and implementation feasibility are assessed together?
- Hypothesis
  Candidate public-open-space sites in Bilgekh Valley can be prioritised more accurately when resident demand, participatory spatial knowledge, climatic exposure, and terrain-based environmental suitability are integrated rather than treated separately.

METHODOLOGY



A transparent four-criteria matrix: Demand, Access, Hazard, Feasibility

KEY FINDINGS

Social Demand

Playground (4.53) — Green walk/run (4.46)
Youth sport (4.44) — Quiet areas (4.37)

Key Deficits

Public-space quality — Disaster protection
Pedestrian path quality — Recreation accessibility

Climate Note

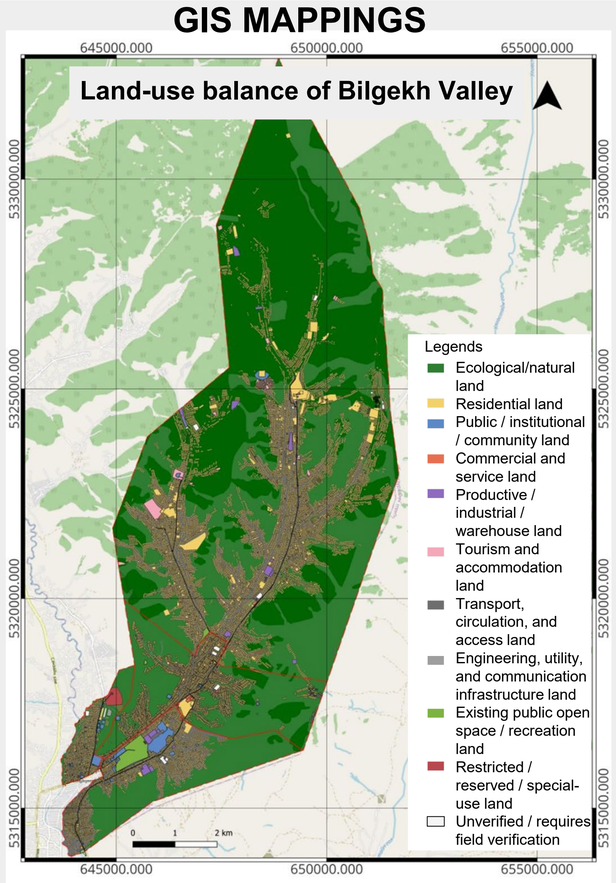
Only 36% thermally comfortable; 64% discomfort.
Winter solar access and wind shelter are crucial.

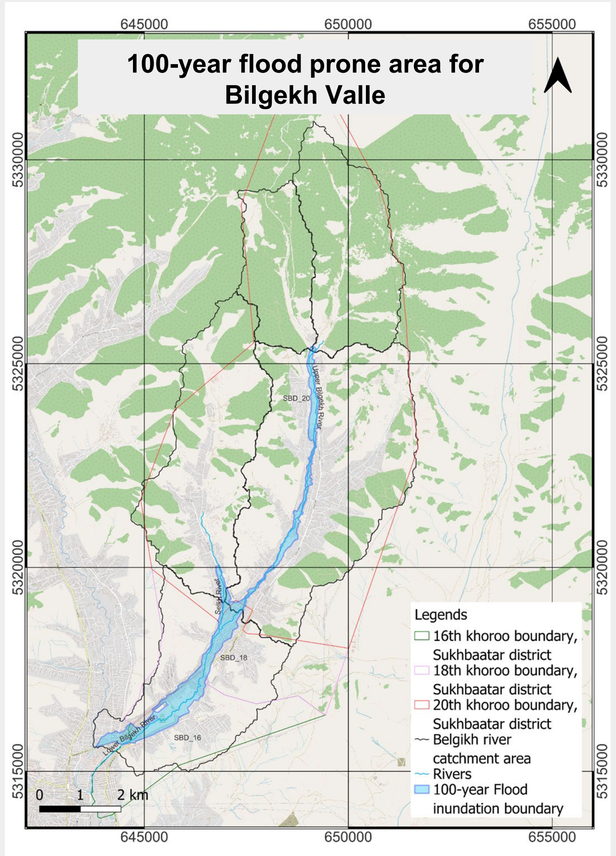
Flood note

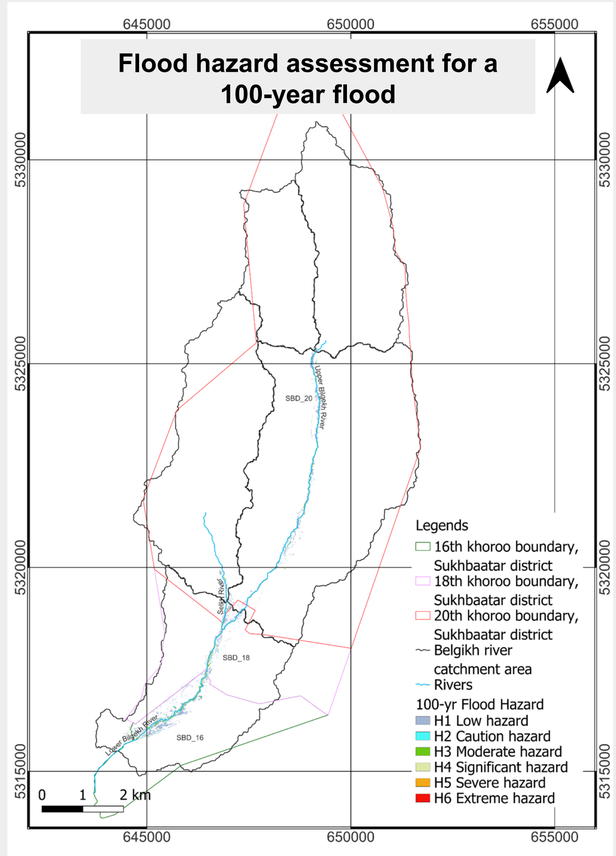
River-edge zones show significant to severe hazard

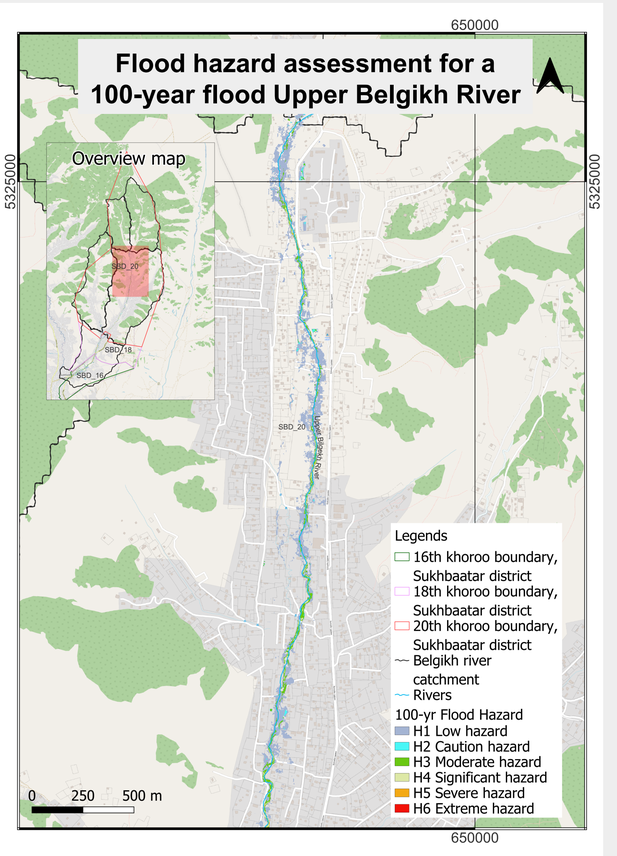
n=190 survey responses — Participatory maps — Climate data — 100-year flood hazard

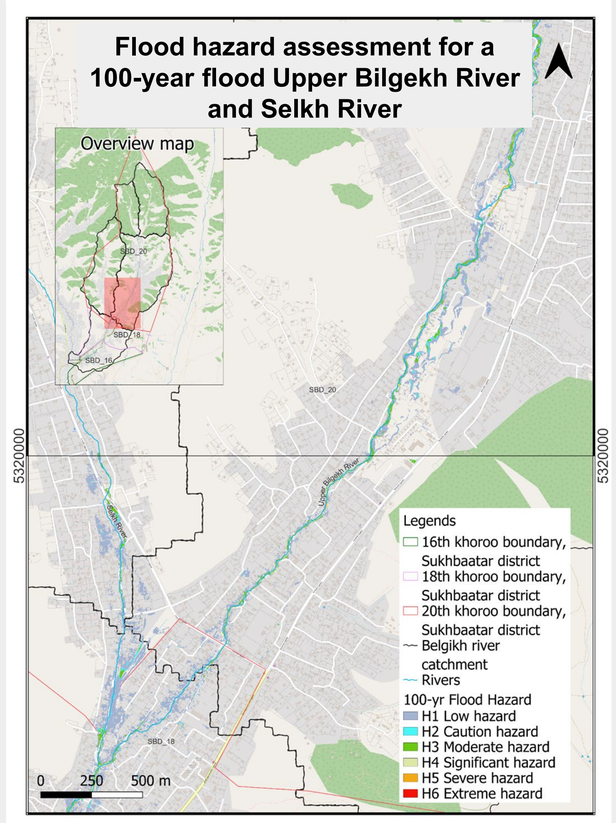
GIS MAPPINGS

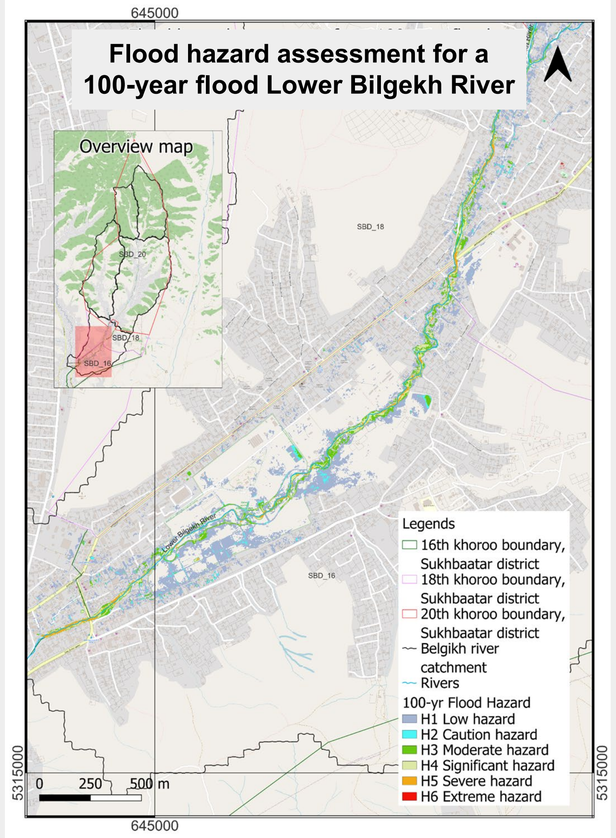


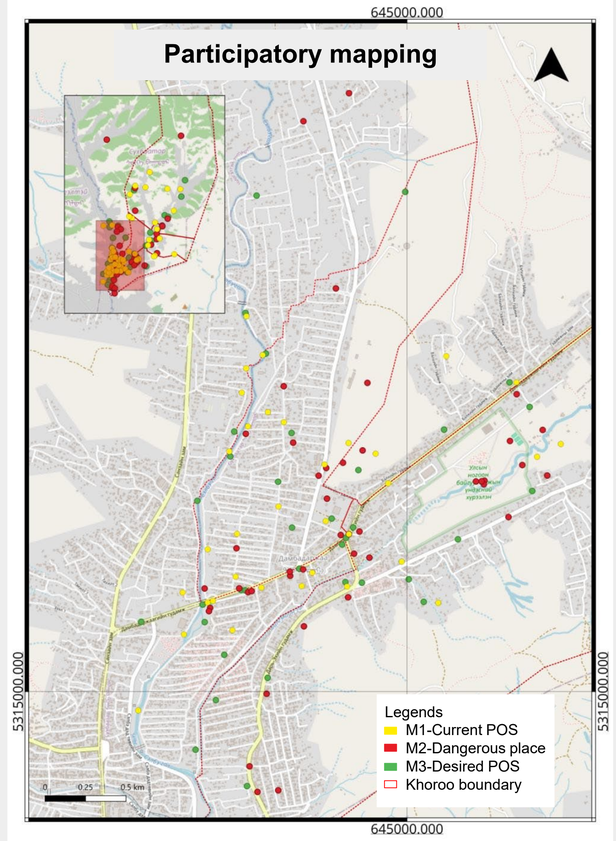


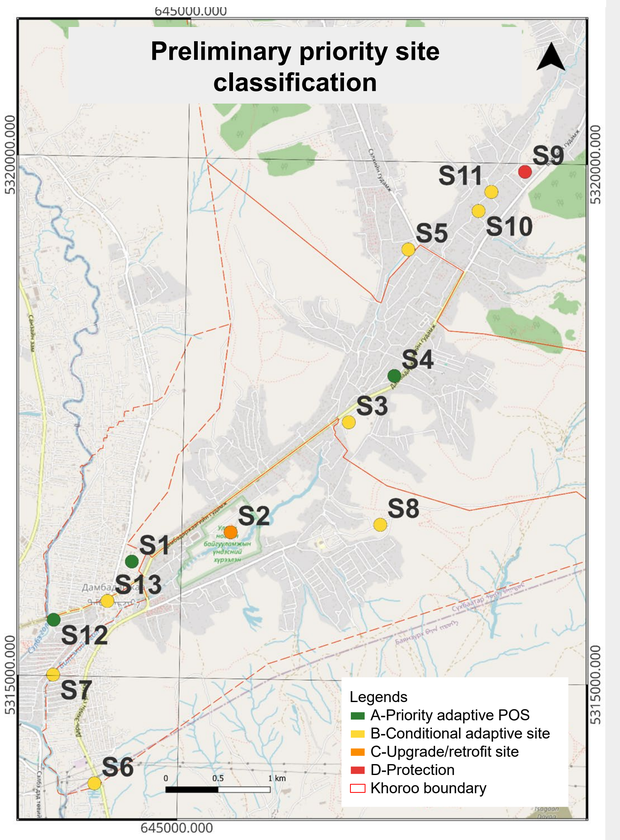












SITE PRIORITISATION MATRIX *(preliminary)*

Site ID	Site type	Location	Demand	Access	Hazard	Feasibility	Total	Class
S1	New POS candidate	Damdarjgaa Monestary	3	3	3	2	**11**	**A**
S2	Existing POS upgrade	KT-G Park	0	0	2	3	**5**	**C**
S3	Collective service node	Belkh market	1	3	3	1	**8**	**B**
S4	Collective service node	School zone	2	3	3	2	**10**	**A**
S5	Existing POS upgrade	Gunjiin bulag/Spring	1	2	2	3	**8**	**B**
S6	Existing POS upgrade	Dari-Ekh bulag/Spring	1	3	2	3	**9**	**B**
S7	River-edge corridor	Lower section in Bilgekh river	3	1	1	3	**8**	**B**
S8	Existing POS upgrade	Forest of Imagination /KT-G	1	1	3	3	**8**	**B**
S9	Existing POS upgrade	Vacant lot/suggested by authority	0	0	1	2	**3**	**D**
S10	Existing POS upgrade	Public space along side Bilgekh river	2	2	2	3	**9**	**B**

DENSITY, AREA

Zone	Population	Area (ha)	Density (person/ha)
16	**10,771**	759	**14.19**
17	**4,923**	215	**22.82**
18	**8,333**	911	**9.15**
20	**4,520**	5,815	**0.78**
Total	28,547	**7,701**	3.71

LIMITATIONS

- Feasibility is preliminary:official land-right data were unavailable.
- Survey participation was constrained by low response willingness and limited municipal support for gathering residents.

CONCLUSION

In this study, adaptability is evaluated as the capacity of a candidate site to accommodate socially valued and inclusive public use under environmental stress while remaining accessible, climatically supportable, and institutionally feasible. Accordingly, adaptation is treated not only as climatic response, but as the negotiated fit between hazard conditions, human perception, everyday use, and implementation realism.

CONFLICT OF INTEREST

The authors declare no conflicts of interest.

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