ADB

Japan Fund for Poverty Reduction

From the People of Japan

SUSTAINABLE TOURISM DEVELOPMENT PROJECT

Building the Climate Change Resilience of Mongolia's Blue Pearl

Khuvsgul Lake National Park

SDCC Resilience Learning Month
18 November 2021

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ADB

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1. BACKGROUND

- **Protected areas**: cornerstone of conservation
- Conservation of biodiversity, cultural heritage
- Multiple benefits for society – ecosystem services, health, spiritual, tourism
- Essential for One Health
- Protected areas help protect "natural infrastructure" and nature-based solutions
- Increasing importance with rising populations

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- **Climate change** is threatening much of life
- All species live within climate parameters
- Climate changing faster than species can adapt
- Ecological impacts: species are moving to higher elevations / latitudes; changes in communities and distributions; extinctions
- Climate change compounds existing threats
- Protected areas build climate resilience
- **Management** critical to achieve resilience

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Mongolia

- National PA network >31.1 m ha (~19.8%)
- Global biodiversity, heritage values
- Many PAs support vulnerable communities
- Threats – overgrazing, mining, logging, fire, unregulated tourism, pollution, hunting
- Among highest global rates of climate change
- National targets: PA network 30% by 2030; scale up ecotourism; benefits for rural communities

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How will climate change affect the many benefits of protected areas?

What can be done to address these risks?

- Large global literature for protected areas
- Broad approaches well established, but –
  - ➢ Few site-specific studies in Asia
  - ➢ No quantitative studies for Mongolia
- PAs will be key for development planning; yet little guidance for policy makers, managers, CSOs

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Study Objectives

1. Assess the extent of potential climate change at Khuvsgul Lake National Park
2. Assess potential impacts of climate change to three dimensions: biodiversity, livelihoods, tourism
3. Identify adaptation measures to help build resilience to climate change

First such quantitative study for Mongolia

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2. STUDY AREA – KHUVSGUL LAKE NP

- 1.18 million ha, global biodiversity values
- Mountains, plains around Khuvsgul Lake
- Only lake surrounded by permafrost
- Clear, cold waters – very sensitive to pollution
- Cold, dry winters, mild summers
- Multiple-use: conservation, livelihoods, tourism
- Small human populations; herding livelihoods
- National priority for tourism (>74,000 in 2019)

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Existing threats

- Livestock overgrazing
- Unmanaged tourism – sewage, solid waste; lake water quality; damage to shoreline
- Overfishing – of endemic/rare species
- Hunting – of large, rare grazing mammals
- Timber extraction
- Fire
- Climate change

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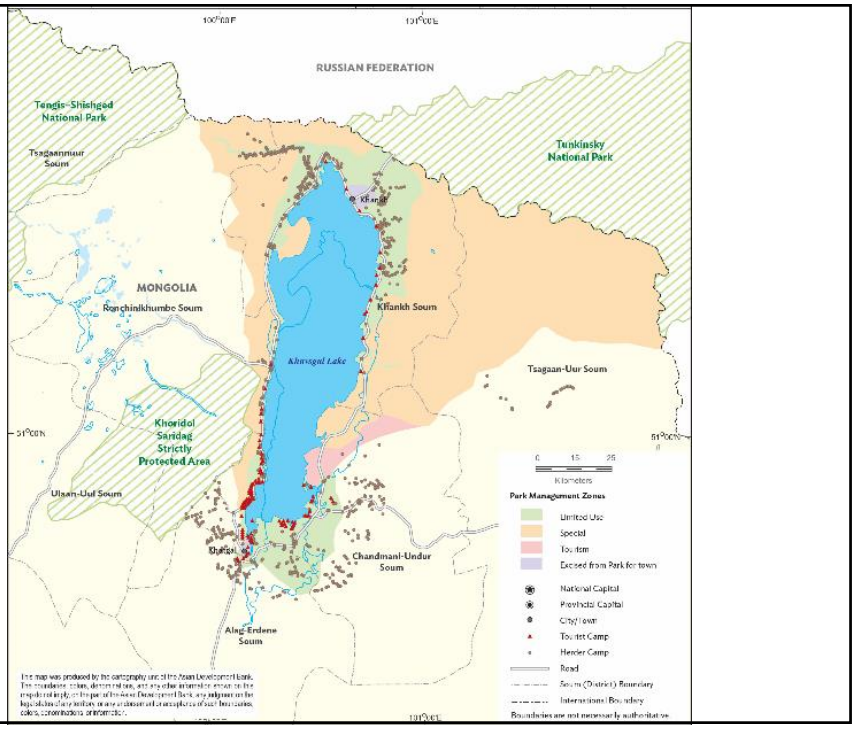

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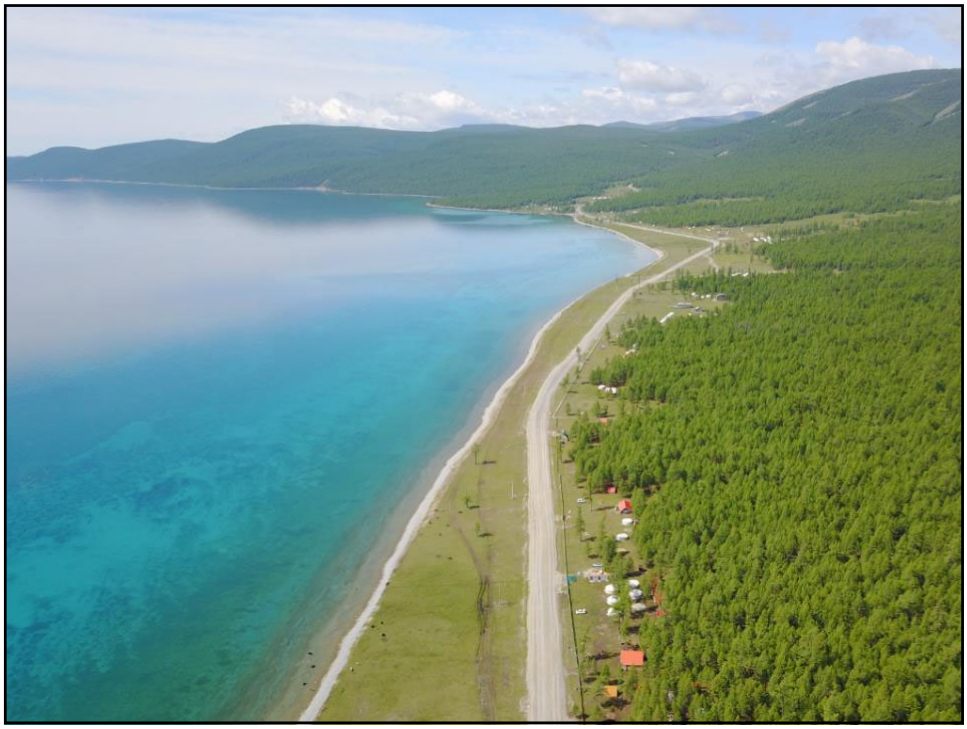

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Why select KLNP for this study?

- Among the largest National Parks in MON
- Key tourism site
- Multiple use – require holistic management
- Existing data incl. 2 ADB projects, 2016–2024:

  Grant 9183 ($3 m JFPR, 2016–2020)
  L3787/3788 ($1.1 m JFPR; $38 m loans, 2019–2024)

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3. METHODS

1. Compile meteorological data and analyze trends
2. Extract open source data from WorldClim

   → *Open Source and Global Coverage*
3. Establish "baseline climate" **1960–1990**
4. Establish "projected climate" to **2050** using an ensemble of 10 GCMs

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5. Extract ecosystem classification for KLNP from The Nature Conservancy ecosystem mapping

   → *Surrogate indicator for biodiversity*
6. Derive climate parameters from the WorldClim data

   Potential Evapotranspiration, Aridity-Wetness Index, Growing Degree Days, and Monthly Mean Temperature Seasonality
7. Establish baseline "bioclimate" map

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8. Overlay bioclimate map with ecosystems
9. Determine correspondence between ecosystems and bioclimate strata
10. Establish future 2050 “bioclimate” map using projected climate parameters.
11. Calculate changes in area, elevation
12. Use the correspondence between ecosystems and bioclimates to make predictions of future changes in ecosystems

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13. Compare bioclimate, ecosystems and projected changes with nearby areas
14. Stakeholder consultations
15. Assess impacts
16. Identify adaptation measures
17. Limitations of study
18. Peer review by experts

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4. KEY FINDINGS

Baseline and Projected Climate Change

- Significant change over past 50–60 years
- Air temperatures increased by 0.3°C/decade
- Max. lake temperatures increased by 4°C
- Rainfall–little change, but #storms doubled

By 2050, the climate will be warmer and drier

- Mean air temperatures to continue rising
- Small increases in summer and winter precipitation

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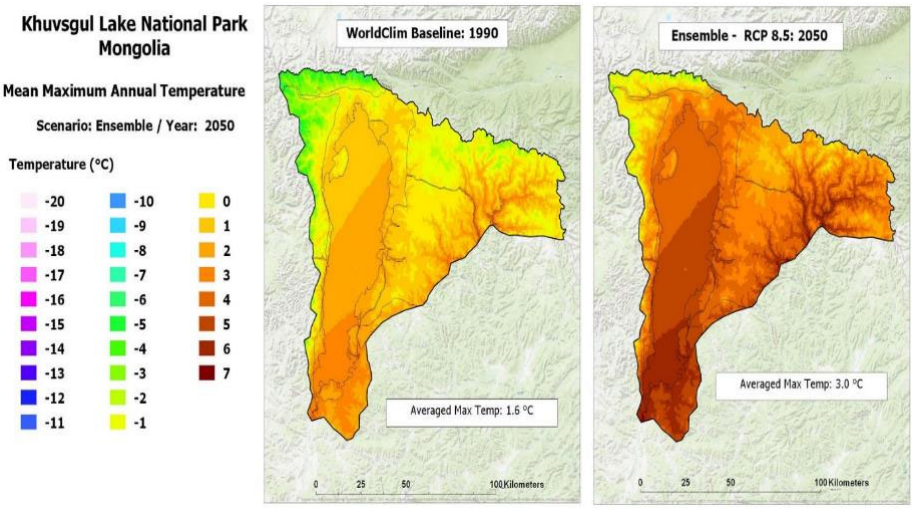

Projected Mean Maximum Annual Temperatures (°C) at Khuvsgul Lake National Par
by 2050 Compared with Baseline (1960–1990) (RCP 8.5)

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Bioclimate and Ecoregions – Baseline

1960–1990

- **Bioclimate:** 3 Zones (9 strata); over 90% of park in 2 zones. 1 zone occupied 5 km^2 (high elevations only)
- **Ecosystems – 15:** land-based–14; lake–1
- Together these classifications provide a baseline that reflect different climatic and environmental conditions, with associated vegetation communities
- Correspondence between bioclimatic zones and ecosystems

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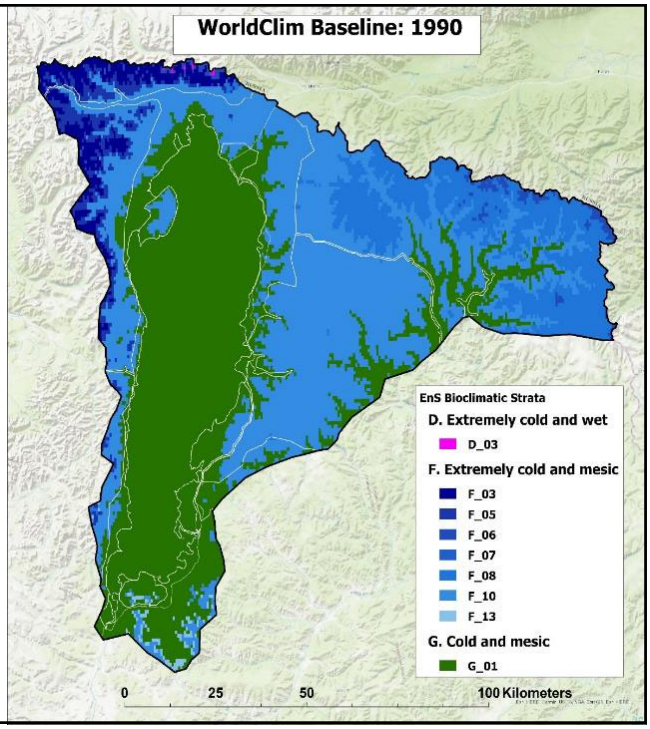
Bioclimate – baseline

Climate variables that most influence plant growing conditions



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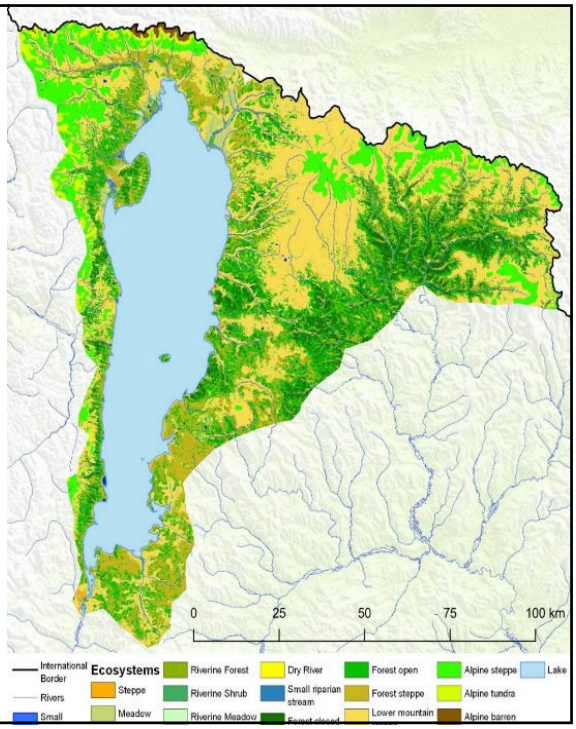
Ecosystems – baseline

Ecosystems represent distinct groups of plants, animals and their non-living environments



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High Mountain Alpine Ecosystems

Forest Steppe Ecosystem

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Khuvsgul Lake Ecosystem

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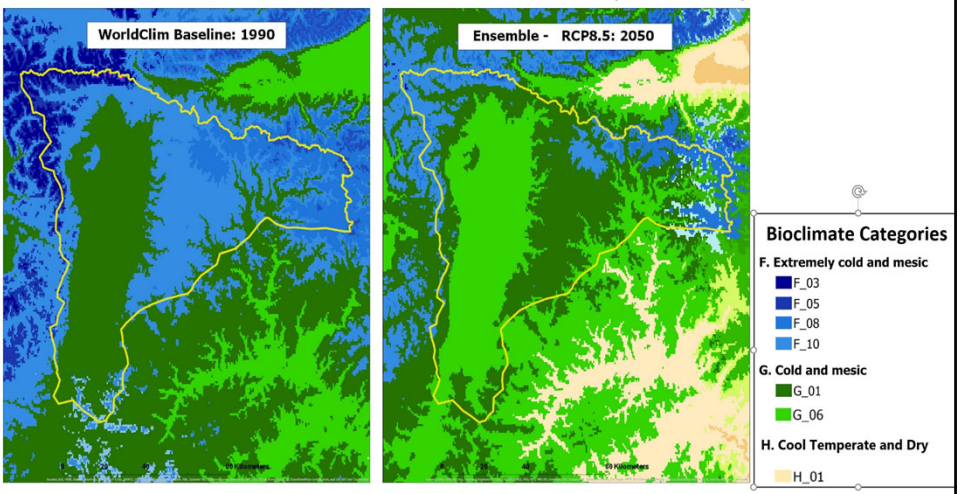
Bioclimate – Projected Changes by 2050

- 93% (10,983 km^2) of KLNP will shift to new bioclimate
- Coldest bioclimatic zone may disappear
- Mean elevations of all zones will shift upwards by 200–400 m



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PROJECTED IMPACTS – to biodiversity

- 3 Alpine Ecosystems – will decline by 87–92% and be displaced by lower elevation ecosystems
- Meadow, Closed Forest – decline by 76% and 45%
- Ecosystems with dense, wet vegetation will be replaced by drier, open forest and steppe
- Thick cover and rich feeding resources for large grazing mammals will decline
- These impacts will compound existing threats
- Large changes in communities; local extinctions

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PROJECTED IMPACTS – to Khuvsgul Lake

- Lake will occur within a warmer, drier bioclimate
- Water quality: warming waters + more nutrients → algal blooms, fish die-off → declining quality
- Hydrology: glacial melt, then reduced inflow → longer dry season conditions
- Thermal stratification: turnover earlier in summer → impacts to nutrient circulation
- Physical damage: from increased storm events
- Biodiversity: loss of unique aquatic communities

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PROJECTED IMPACTS – to herding livelihoods

- Most camps occur within 10 km of Khuvsgul Lake
- All ecosystems grazed will become drier
- Less winter fodder; higher livestock mortality
- 90% HHs reported CC impacts to pasture, livestock
- Cycle of increasing impact: over-grazing + CC → poor livestock health → more livestock → more damage
- Impacts will be most severe for poor households
- Likely to impact biodiversity – more hunting, fishing

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PROJECTED IMPACTS – to tourism

- Increasing damage to infrastructure – roads, jetties, tour camps
- Increasing O&M costs
- Hazards to visitors, residents: safety risks (temp, fire, flood, wave), diseases linked with poor sanitation
- Declining tourism – reduced visitor experience
- Ice Festival – altered times or safety
- Reduced income opportunities for residents
- Will compound existing impacts of tourism

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PROJECTED IMPACTS – to Management

- Area of ecosystems in each Zone will change
- Existing Zoning will become less effective
- Tourism Zone includes all of Khuvsgul Lake: this weakens resilience to climate change
- Existing conservation targets in management plan do not include the most urgent priorities
- Higher O&M costs and more complex management
- **OVERALL:** KLNP values will decline and management effectiveness will decline

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STAKEHOLDER CONSULTATIONS

- 700 households, 700 tourists, 51 tour camp owners, >10 government agencies and CSOs
- High stakeholder awareness of climate change
- For herding livelihoods, gov. agencies and CSOs emphasized the need to reduce herd sizes, improve herd health, and provide technical support
- For tourism, tour camp owners reported damage from climate change: flooding at 17 camps and melting permafrost at 11 camps

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5. ADAPTATION MEASURES

Three key approaches are needed:

1. Address existing threats to biodiversity and natural resources
2. Improve habitat connectivity
3. Strengthen park management

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(i) Address existing threats to biodiversity

Highest priority:

- Address livestock overgrazing and unregulated tourism – the greatest threats to KLNP values

Moderate priority:

- Conduct updated threat assessment; revise and update conservation management priorities

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Adaptation actions for herding:

- Over-grazing is causing lake pollution, permafrost exposure, fire, damage to streams
- Addressing herder needs will benefit livelihoods, reduce biodiversity impacts, build resilience

Highest-priority actions:

1. Establish herding groups, pasture plans
2. Fewer, healthier livestock
3. Support pasture, livestock management
4. Exclude grazing from ≥5 ecosystems

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Adaptation actions for tourism:

- Tourism is causing lake pollution, shore damage

Highest-priority actions:

1. Tour camps: control sewage; apply sanitation standards; prohibit phosphate-based detergents; relocate camps <200 m to lake
2. Dedicated tourism management agency
3. Climate-resilient infrastructure
4. Strengthen community-based tourism
5. Improve visitor medical facilities

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(ii) Improve Habitat Connectivity

- Nearby soums contain important areas of ecosystems; and 4 large PAs occur near KLNP
- Maximizing large landscape corridors will enable terrestrial ecosystems to shift and adapt

Highest-priority actions:

1. Extend KLNP boundary west and east in Renchinlkhumbe and Tsagaan-Uur Soums
2. Scale up landscape conservation planning between 5 protected areas including KLNP

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National protected area network in northern Khuvsgul *Aimag* and adjacent region of the Russian Federation

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(iii) Strengthen park management

Highest-priority actions:

1. Prepare KLNP Management Plan, 2020–2024
2. Expand Special Use Zone for 6 ecosystems and include most of Khuvsgul Lake
3. Establish long-term Master Plan (2020–2050)
4. Establish committee for northern Khuvsgul
5. Align development plans with KLNP plans
6. Continue capacity building, technical support

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6. KEY MESSAGES (i)

How did the study benefit the ADB projects?

- New conservation, management priorities
- Highlighted and reconfirmed the urgency to address 2 key issues (herding, tourism)
- Applied guidance for park zoning; park management plan; 1 district dev plan
- Stand-alone knowledge contribution

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6. KEY MESSAGES (ii)

- Building climate resilience for multiple-use PAs is complex. Beyond scope of one agency or project
- Holistic, multi-sector approach required
- Multiple skill-sets required – capacity building
- Improving habitat connectivity is not possible for isolated wetland and lake systems
- **Addressing existing threats** to ecosystems is usually the highest priority to build resilience for biodiversity and livelihoods

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7. APPLICATION FOR ADB PROJECTS

- DMCs increasing their PA networks; ADB scaling up biodiversity, CC resilience, multi-sector designs
- Demo of a detailed study beyond CC due diligence, using open-source models, “bioclimate”
- Consider in longer-term, landscape-level projects
- View protected areas as a form of NBS
- Assess PAs, CC in this broader landscape context
- Integrate PA management in project design

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Acknowledgments

- **Government of Mongolia**
- **The Nature Conservancy**
- **Japan Fund for Poverty Reduction of the Government of Japan**
- **ADB Climate Change Fund**
- **Project Implementation Units – G9183, L3787/3788**
- **Peer Reviewers**
- **Co-authored study (4 authors)**

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Thank you

Knowledge product is here:

[Building the Climate Change Resilience of Mongolia's Blue Pearl: The Case Study of Khuvsgul Lake National Park | Asian Development Bank (adb.org)]

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