

# Vulnerability and Resilience of Mongolian Rangeland and Pastoral Systems: Key Findings of the Mongolian Rangelands and Resilience Project (MOR2)

María E. Fernández-Giménez<sup>1</sup>, Chantsallkham Jamsranjav<sup>1</sup>, Khishigbayar Jamiyansharav<sup>1</sup>, Tunglag Ulambayar<sup>2</sup>, Robin Reid<sup>1</sup>, Niah Venable<sup>1</sup>, Arren Allegretti<sup>1</sup>, Jay Angerer<sup>3</sup>, Batkhishig Baival<sup>4</sup>, Batbuyan Batjav<sup>5</sup>, Steven Fassnacht<sup>1</sup>, Melinda Laituri<sup>1</sup>, Jessica Thompson<sup>6</sup>  
<sup>1</sup>Colorado State University, <sup>2</sup>Saruul Khuduu Environmental Research&Training, <sup>3</sup>Texas A&M University, <sup>4</sup>Nutag Action Research Institute, <sup>5</sup>Center for Nomadic Pastoralism Studies, <sup>6</sup>Northern Michigan University, \*maria.fernandez-gimenez@colostate.edu

## Introduction

The MOR2 (2011-2015) had two central questions:

- 1) How are climate and socio-economic changes affecting pastoral social-ecological systems in rural Mongolia?
- 2) Does formal community-based rangeland management (CBRM) lead to increased social and ecological outcomes compared to traditional non-CBRM groups?

The study covered 142 communities: 77 CBRM and 65 non-CBRMs in 36 soums in 10 aimags across four ecological zones (Fig. 1). We surveyed 706 herder households, conducted focus groups and interviewed group leaders. We sampled 3 plots in winter pastures of each group (n=428 plots).

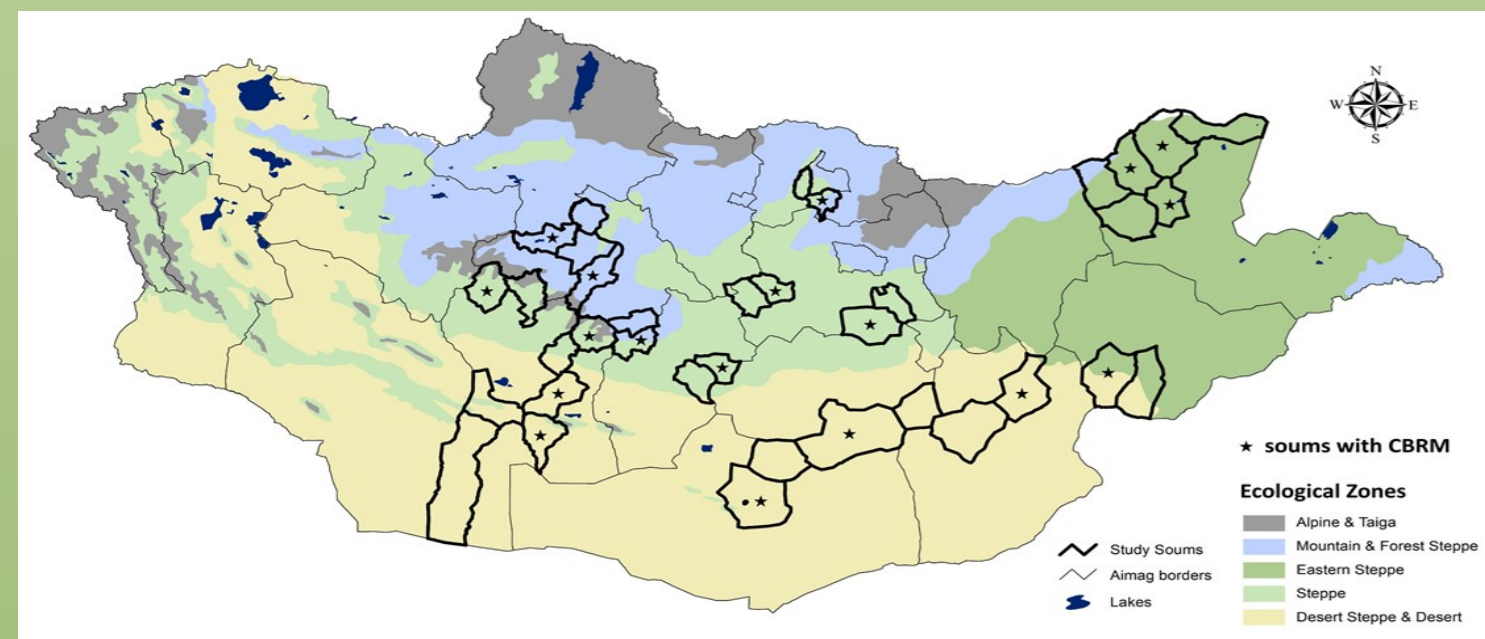


Figure 1. Study sites--18 paired soums with and without formal CBRM

## Results of Ecological Study

- Across all ecological zones 80% of winter pasture plots experienced no, slight or moderate degradation: 18% - severely degraded, and 1% - very severely degraded. Livestock effects were greatest in the steppe, moderate in the mountain & forest and desert steppes (Fig. 2a & b).
- Excessive forage use was pervasive on 37% of rangelands with 11% experiencing consistent overgrazing. Overuse is more widespread in mountain & forest steppe and steppe than in desert steppe and desert, and has increased over time (Fig. 2c & d).
- These results suggest that Mongolia's rangelands are resilient but at risk, with areas in the mountain steppe and steppe most vulnerable to the combined impacts of climate change and heavy grazing.

This material is based upon work supported by the National Science Foundation under CNH Program Grant No. BCS-1011 *Does Community-based Rangeland Ecosystem Management Increase the Resilience of Coupled Systems to Climate Change in Mongolia?* Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

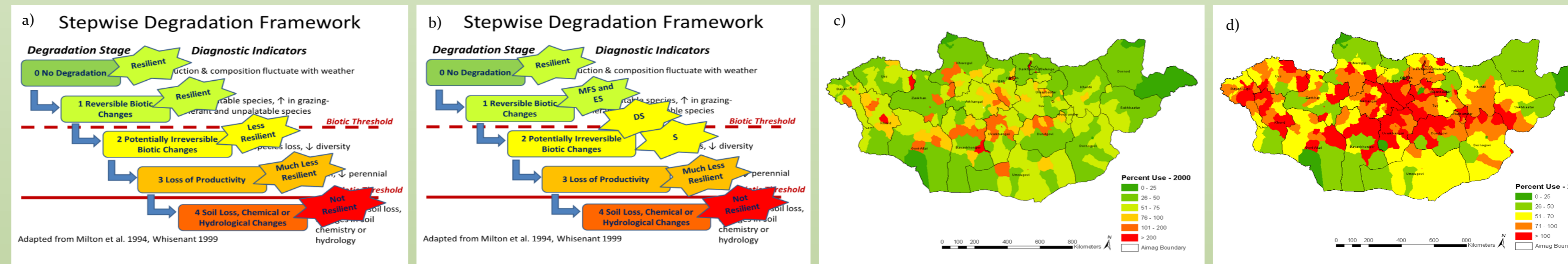


Figure 2. Pasture degradation and overgrazing a) degradation framework b) study sites on the degradation framework and c) Forage percent use, 2014

- In the long-term study in Bayankhongor aimag, total herbaceous biomass in 2013 was similar to (desert-steppe and steppe) or greater than (mountain-steppe) in 1995 (Fig. 3a), and total foliar and herbaceous cover were unchanged since 1995 in all zones (Fig. 3b). In the mountain-steppe, functional type and species cover shifts were consistent with warming temperatures and increasing grazing pressure. All species richness (Fig. 3c) and diversity (Fig. 3d) indicators declined significantly in the mountain-steppe since 1995, as did richness in the steppe.
- The plant community composition changes (1994-2013) was strongly driven by climate change in the mountain steppe, by grazing in the steppe zone. Desert-steppe plots showed no change over time.

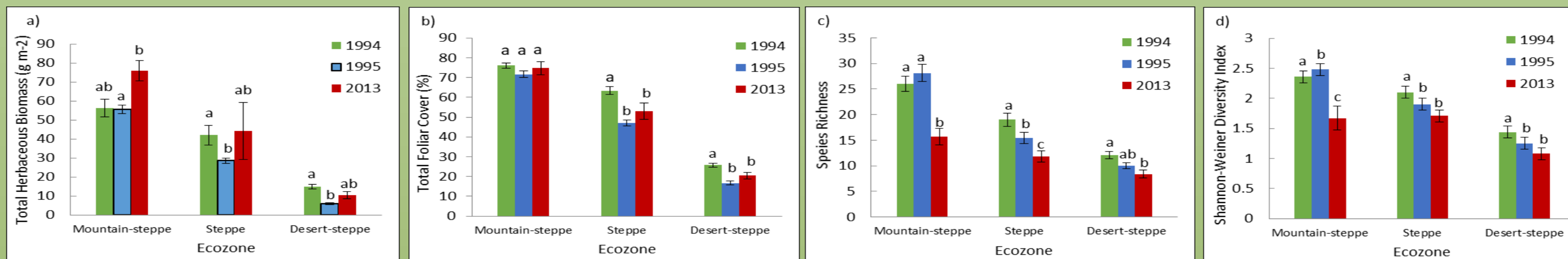


Figure 3. Long-term vegetation study conducted in Bayankhongor a) biomass b) cover c) species richness and d) species diversity

## Results of Social Study

- Social outcomes of formal CBRM were significantly greater compared to non-CBRM including more diverse information sources, opportunities for knowledge exchange, and stronger leadership contributing to higher levels of pro-active actions in addressing rangeland problems.
- CBRM households used significantly more traditional and innovative management practices associated with improved environmental conditions and reduced vulnerability to winter disasters (dzud).
- CBRM households were better prepared for dzud having less livestock mortality. Some CBRM herders learned from 1999-2003 dzud so that they were well prepared for 2009-2010 dzud indicating that CBRM can help reduce vulnerability and increase adaptive capacity of pastoralists.
- The evidence for livelihood benefits was mixed. CBRM and non-CBRM households did not differ in their livestock holdings, but CBRM households had more productive assets and diverse income sources.



Focus group meeting  
Photo by M. Fernandez-Gimenez



Community cooperation—felt-making  
Photo by B. Batkhishig



Hay harvest, Jinst Soum  
Photo by Mr. Monkjhjargal



Winter preparation, Jinst Soum  
Photo by Mr. Banzragch

## Capacity Building and Policy Outreach

A major goal of MOR2 was to build capacity for interdisciplinary applied natural resource science in Mongolia. Over 5 years, MOR2 organized 10 training workshops on ecological and social field methods, data analysis and scientific writing; 3 regional stakeholder workshops; a national policy workshop and an international conference attended by 175 people from 11 countries. The project trained 2 Mongolian PhD students, 2 post-doctoral fellows, and some 8 interns. Outreach to the wider public included radio and television programs.

Impacts from these outreach efforts include influence on:

- National-level policy discussions on rangeland management and policy
- Donor programs: Mercy Corps Resilient Communities Program
- NGO Programs: The Nature Conservancy Mongolia's Conservation of Mongolian Grasslands program
- Stewardship standards for the Sustainable Fiber Alliance

<https://warnercnr.colostate.edu/hdnr/research-and-outreach/mongolian-rangelands-resilience-mor2/training-and-outreach/>

## Policy Recommendations Towards SDG15

- Improve and coordinate soum-, aimag-, and national-level rangeland assessment and monitoring using consistent methods across soums
- Improve and expand professional training for rangeland management specialists, outreach for herders, and opportunities for peer-to-peer knowledge exchange and learning
- Immediate focus of improved management and monitoring should be on summer- and fall-grazed pastures, as winter-grazed pastures appear relatively healthy, and grazing during the growing season has the greatest impact on future rangeland productivity
- Special attention is needed in steppe winter pastures
- Strengthen local institutional capacity to implement rangeland management changes in response to monitoring results (adaptive rangeland management)
- On-going technical support for CBRMs is needed, with a focus on promoting practices that have clear conservation as well as livelihood benefits
- CBRM outcomes may take time to achieve, especially when they depend on a series of linked feedback, each of which is also affected by exogenous factors such as climate, weather and markets