Mongolian Rangelands and Resilience (MOR2) Kick-off Meeting

June 13-14, 2011
The Kempinski Hotel Khan Palace
Ulaanbataar, Mongolia

- Summary Report -

This report is a brief synopsis of the insights shared during the Mongolian Rangelands and Resilience kick-off meeting hosted at the Kempinski Khan Palace Hotel in Ulaanbaatar on June 13 and 14, 2011. This event was the first of three gatherings to be hosted with partners in Mongolia. For more information about the project, please visit our website: http://warnercnr.colostate.edu/mongolian-rangelands-home/

1. Introduction

This report is organized into seven main sections:

1. Introduction and description of the meeting
2. Participants & Partners
3. Synthesis of Presentations
4. World Café Conversations
5. Synthesis of Participant Evaluations
6. Suggested Next Steps
7. Appendices:
   A. List of Meeting Participants
   B. Meeting Agenda
   C. Presentations
   D. World Café Overview
   E. Scientific Findings

The information in this report was collected from (1) presentations, (2) participant evaluations, and (3) insights shared in full group discussions. If you are interested in further details of the meeting, please contact Arren Mendezona Allegretti at amendezona@gmail.com

The goal of the meeting was to share knowledge and excitement about Mongolian Rangeland and Resilience (MOR2) research effort and collaborative project. This meeting was for the multi-institutional, multi-disciplinary National Science Foundation project, with implications for natural resource management policy in Mongolia. Meeting objectives are outlined below.

Meeting Objectives:

1. Clarify and re-affirm roles of organization and individual team members for build interdisciplinary, interagency and international relationships.
2. Engage in team-building activities.
3. Develop a protocol for team membership, data ownership and sharing.
4. Develop a plan for outreach

The first day, June 13, 2011 focused on getting the internal team and partners acquainted with one another as well as project goals. This day consisted of presentations on project goals, objectives, conceptual framework, hypotheses, and research design presented by MOR2's principal investigator (PI) Dr. Maria Fernandez-Gimenez. The project history and roles were presented and discussed among team members, including Dr. Robin Reid, Dr. Steven Fassnacht, and Dr. Jessica Thompson. Presentation summaries are summarized in section three of this report.

After a morning of presentations, team members engaged in conversations about MOR2 in a World Café setting. During the World Café, facilitator Dr. Jessica Thompson asked participants questions concerning team members' roles and their potential contributions to the project. Results from the world café conversations are further outlined in section four of this report.

The second day, June 14, 2011 focused on sharing project goals with Mongolian policy makers and collaborators. Batkhishig Baival, the MOR2 Mongolian coordinator facilitated the day's events and introduced Mrs. Saule, the Deputy officer of the Mongolian Food and Light Industry and Dr. Susan Russell, the United States embassy representative on behalf of the Ambassador. Both speakers gave supportive wishes for MOR2 team members in joining the efforts for understanding Mongolian pastoral systems.

Two panels consisting of policy makers, practitioners, and herder representatives in Mongolia facilitated the discussion of MOR2 policy implications, stakeholder engagement and current pastoral issues in Mongolia. Local knowledge and experience were shared among MOR2 team members and collaborators.

2. Participants & Partners

Nearly 60 representatives from national and local government institutions, NGOs, universities, and non-profit partners were invited to this Meeting. Participants represented the following institutions:

- Center for Ecosystem Studies (CES)
- Center for Nomadic Pastoralism Studies (CNPS)
- Colorado State University (CSU)
- Government Agriculture office of Ultzit Soum, Dundgovi Aimag
- Government Agriculture office of Uvurkhangai Aimag
- Institute of Botany
- Institute of Geo-ecology (IGE)
- Institute of Geography
- Institute of Meteorology and Hydrology (IMH)
- Millennium Challenge Account, Peri-Urban Rangelands Project
- Ministry of Food, Agriculture and Light Industry
- Mongolian Ministry of Food, Agriculture, and Light Industry (MoFALI)
- Mongolian National University (MNU)
- Mongolian Society for Rangeland Management (MSRM)
- Mongolian State Agricultural University (MSAU)
- New Zealand Nature Institute
- Research Institute of Animal Husbandry (RIAH)
- Swiss Agency for Development and Cooperation, Green Gold Ecosystem Management Program
- United States Embassy
- University of Arizona
- University of Bergen, Norway

3. Synthesis of Presentations and Panel Discussions

Throughout the Meeting, several presentations and panel discussions were shared among participants. The following is an abbreviated description of presentations, hands-on activities and panel discussions. For further details, presentations can be downloaded at http://warnercnr.colostate.edu/mongolian-rangelands-presentations/

Project Goals, Objectives, Conceptual framework, hypotheses, and research design.
Dr. Maria Fernandez- Gimenez, the Principal Investigator of MOR2, provided an overview of the project's conceptual framework, research questions, and methods. Project donors, including the National Science Foundation, the World Bank, and CRSP were acknowledged.

Individual Roles and Responsibilities
Dr. Fernandez-Gimenez presented roles and responsibilities of partner institutions, including CSU, TAMU, UMICH, IGE, CES, MSRM, RIAH, IMH, and CNPS listed in section two of this report. Team communication channels among team members and collaborators were discussed.

History of the MOR2 Project Timeline
This section was a hands-on activity that involved all project team members and collaborators. Participants were asked to write down significant events influencing MOR2, pastoral systems, and community-based natural resource management (CBNRM) in Mongolia. These events were summarized in a timeline ranging from 1945-2011. Significant events included privatization and policies in the 1990s, collaborations with herder communities, severe storms events such as the *dzud*, project funding, and the creation of CBNRM institutions across Mongolia.

Preview of Scenario Planning and Collaborative Modeling Processes
Dr. Jessica Thompson presented scenario planning as a collaborative and dynamic process to integrate science and decision-making in policy and community-based rangeland management. Dr. Thompson mentioned that MOR2 will integrate participatory processes in building a shared understanding of the scenarios and stories concerning CBNRM and climate change in Mongolia.

Planning for Effective Outreach
Dr. Robin Reid presented preliminary ideas on linking multiple scales of MOR2 project engagement. Dr. Reid presented an outreach map of engagement activities integrating the scales of the community, policy, and education and training. Emphasis was given on the co-creation of research, where communities and policy makers provide valuable information in co-creating new knowledge. Finally, Dr. Reid presented an example of connecting herders, policy makers, and scientists in East Africa.

Hydro-climatic Analysis and Hydrological Modeling

Dr. Steven Fassnacht presented the ongoing and proposed MOR2 Hydrologic and climatic data analysis and hydrological modeling. N. Venable, S. Tumenjagal, G. Adayabadam, M. Fernandez-Gimenez, and B. Batbuyan played significant roles in the analysis and data collection. For the hydro-climatic change assessment, trends in climate will be analyzed using meteorological data (average temperature and precipitation values and indices derived from daily data). Trends in water resources will be analyzed from daily streamflow data. Trends are then compared with those observed by herders .The herder observations were obtained by surveys and conversations. Proposed hydrological modeling tasks were also presented. These included data requirements, expected outcomes, and scenarios to be considered.

Integrated Database, GIS, and Integrated Database

Dr. Steven Fassnacht presented on behalf of Dr. Melinda Laituri, who currently plays a key role in managing and analyzing MOR2's GIS data. Dr. Fassnacht introduced data management plans necessary for the creation of an integrated database containing MOR2's primary and secondary data. Data units, sampling analysis, ecological and social elements of the database were discussed. Dr. Fassnacht explained that GIS will be used to integrate different elements of the database, including units of analysis and cross-boundary migration. Mongolian hydrological, political, and ecological boundaries influencing MOR2 were discussed.

Outreach Panel

This panel consisted of pasture user group leader Mr. Buyankhishig, head of the herder association, Ms. Jargalsaikhan, and herder group leader Mr. Altankhuyag. Panelists represented the provinces of Ikh Tamir, Arkhangai, Omngobi, Dundgobi, and Tuv. The panelists were requested to share their thoughts on the following questions:

1. From your perspective, what key information do you need from scientists that will be helpful for your work?
2. In the past, how have you received this information?
3. What other ways would work best for you to access or retrieve this information?

Panel representatives emphasized the importance of translating technical knowledge on pasture management for herders and managers. Policy makers also mentioned the significance and necessity of traditional knowledge in forming policy and CBNRM programs. Panelists stressed that research and theory must be compared for the successful implementation of policy and CBNRM programs. Previous media for receiving information included textbooks, booklets, television and the 7 AM radio show that broadcasts the weather forecast. Ways to access or retrieve information would include further engagement meetings with local people from different soums.

Policy Panel

Panelists consisted of Mongolian national government representatives including Mr. Ganhuyag, director of the livestock policy implementation in the Department of the Ministry of Food, Agricultural, and Light Industry, Mr. Chinbat, head of the Agriculture office in Uvurkhangai, Mr. Enhkbold, head of the Bayantsagaan livestock sector, and Mr.

Buyankhishig, head of the herder association. Panelists were requested to share their thoughts on the following questions:
1. What are the issues and challenges concerning climate change and rangeland management?
2. How have do you adapt to these issues discussed in question 1?
3. In your opinion, what will be the most important outcome of this study?

Conversation highlights from this panel include the following:

- Adopted a new law for genetic fund for livestock and disaster management
- There were major *dzud* Issues in the 1990s. The government adopted a national program for overcoming the risk of *dzud* and other extreme events
- Need to improve the productivity of farming. To respond to this need, the Mongolian government made a policy supporting herders.
- The division of pasture land under the Ministry of Agriculture will play an important role in mobilizing rangeland management.
- UNDP has been helpful in providing policy recommendations
- The Mongolian government has disaster management agency that has branches in *aimags* and *soums*. This new government structure has made significant changes in improving government capacity in addressing disaster issues in Mongolia. This current government structure was a recommendation of NGOs and donors.
- Current challenges include assigning or forming institutions for rangeland management. A decision needs to be made on these institutional structures.
- An important outcome of this study could be recommendations for forming appropriate government and management institutions addressing rangeland issues
- Between 2000 and 2011, 8,700 herding households lost livestock from *dzud* and other disasters. Currently, the government is only using one method that includes restocking of livestock. This method is not sufficient.
- There is the need to find policy that aims to improve herder's animal husbandry skills. What government incentives and support are needed for herders to be resilient to *dzud* and other disasters attributed to climate change?
- Need policies for vulnerable herder groups. An option could be the shifting of livelihoods for vulnerable herder groups. Training for new livelihoods must be implemented
- Need to have a law on pasture land. Difficult to have regulation over the pasture land.
- The Mongolian government developed a mid-term policy and temporary solutions to rangeland management issues. Some of these included putting some fences around pasture land. This would require a substantial amount of resources and would be difficult in rural areas. Other solutions would include the pasture rotation method. We have a *bagh* level citizens meeting where pasture rotation is discussed. Despite the consensus on this method, herders don't apply this method.
- Strengthen cooperation with donors on pasture land management.
- Herders lack responsibility and accountability. Cooperatives may increase their accountability and responsibility of pasture lands.

- Issues from the perspective of herder community leader:
- Ikh Tamir communities of herders currently protect reserve pasture land and water resources. After 2010 dzud, there were an additional 13,000 animals from other herders that did not participate in the community-based efforts. As a result, the pasture land was severely degraded. During extreme weather conditions, it is difficult to appropriately manage pastures. Herders do understand these problems
- Mr. Buyankhishig agrees with Mr. Chinbat about the necessity to put fences around the hay-making field that will be important in springtime.
- Herders are supportive of hay-making groups.
- There is no law on pasture land. MOR2 team members can pay attention to one issue. This issue is the need to think about whether the numbers of herders will be reduced or the number of herds will be reduced. Children are becoming more educated and will probably not become herders.
- Economic activities for herders, like planting trees, berries, and vegetables must be implemented. Important questions that need to be addressed include understanding what soil will be useful for certain types of plants.

4. World Café Conversations

Dr. Jessica Thompson and Arren Mendezona Allegretti facilitated the world café process among team members and collaborators. During the world café, facilitators asked participants three questions concerning MOR2. These questions were the catalyst for conversation during the meeting. These questions included the following:

1. Why is this project important to you?
2. How will you contribute to the overall project?
3. When it comes to sharing data, what are you most concerned about?
4. *How can we best engage partners and participants in the research process?*

Participant responses were shared in cafe-like conversation and then each table shared their main ideas with all participants. Below is a summary of participant responses.

1. *Why is this project important to you?*

- In Mongolia, many research institutions use different methods. This study combines different methodologies and is relevant for many organizations. This project enables us to learn methodologies from other disciplines and established scientists. It is important that we agree on various methodologies
- Personally, this will give us the opportunity to travel and learn different cultures from each other. Foreigners have the opportunity to learn from Mongolian culture, which is important for collaboration. There are opportunities to learn from the experiences of scientists from other countries.
- The project allows us to learn how to adapt to unique Mongolian contexts. The project also integrates different societal contexts.
- Learn how the rangeland systems function and help find threshold for grassland degradation and resilience
- Professionally and personally, we are interested in how things can be mitigated.

2. *How will you contribute to the overall project?*

- The social team will contribute to the development of specific information and the survey process. The social team is also engaged in the process of data collection and analysis
- The ecological team can help in collecting and processing data. There are outreach opportunities for the ecological teams.
- Everybody can contribute individually in ecology and socio-economic data collection. The team is ready to contribute.
- Researchers are trained to help people from different sectors, including ecological, economic, and social. Herders can be involved in data collection. They also

can give information and share stories on precipitation, biomass, information on history of local areas. Focusing on community herder groups is an ecological and economic unit. We can look into the community groups from different angles. Community groups need to protect nature that is part of society and collaboration with other stakeholders is crucial. In the future, community groups can be an important element in collaboration.

- Established scientists can provide advice to emerging researchers and students.
- The mixture of Mongolian and US researchers provide opportunities for collaborating and sharing lessons learned in understanding CBNRM in Mongolia.

3. *When it comes to sharing data, what are you most concerned about?*

- It is unclear on many organizations are involved.
- There is the need to focus on one person responsible for logistics in information exchange
- The social team will do analysis and the ecological team will be receiving information. Permission should be specified for teams that do the analysis. What will be the penalty for violating data sharing protocols ?
- The search for data and information exchange will be difficult among disciplines. There is the need for a mutual understanding among constituents. For the use of information, there should be integrated database. Researchers from both sides need equal right and ethical principles. The database should be utilized properly
- Meteorology institute has difficulty in accessing documents for analysis. Ordinary researchers have to pay for access to information
- My collaborative research opinion is to develop a template for opinion writing
- We need training on data entry: e.g., format for meteorological information
- We need to have a discussion on states on hydro-climactic data that already exists

4. *How can we best engage partners and participants in the research process?*

- Boundaries between organizations need to be eliminated, providing an open no-boundary relationship. Disciplines and sectors need to know and understand each other
- Roles need to be clear and distinct in terms of reference for researchers. Team work management needs to be strengthened. Who will be responsible for team work management?
- Social team should understand the ecological team process
- Encourage researchers to do more good work
- Communication among senior and younger scientists needs to be strengthened
  - Senior researchers need to be generous with their expertise
  - Young researcher’s skills in data processing need to be improved
  - Workshops for students and young scientists are essential

- Individuals need to assess their potential and objectives.
- World café needs to be organized once in a quarter
- Local authorities in rural areas do not have a better understanding of study, so we need to work more on dissemination
- Need materials provided for partners (e.g., Rural areas may have community based institutions. There needs to be herder engagement. The use of media can be used for engagement)

Participants converse about the MOR2 project though the World Café process.

5. Synthesis of Participant Evaluations

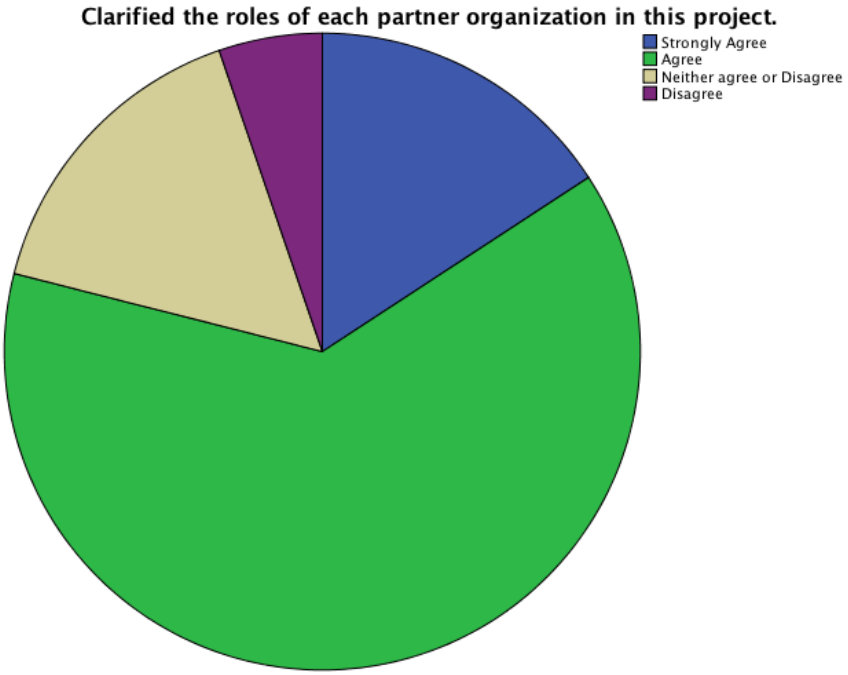
Gathering feedback and improving the meeting is very important for MOR2. Participants suggested a variety of improvements for future meetings, the top two suggestions included:

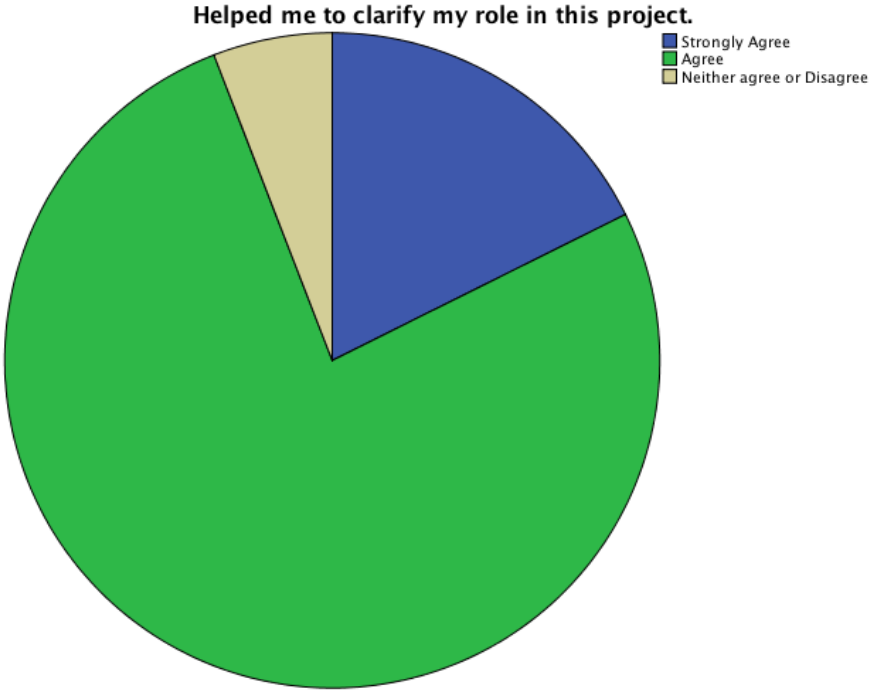
- Provide more information before the meeting
- Clarify the objectives of the meeting

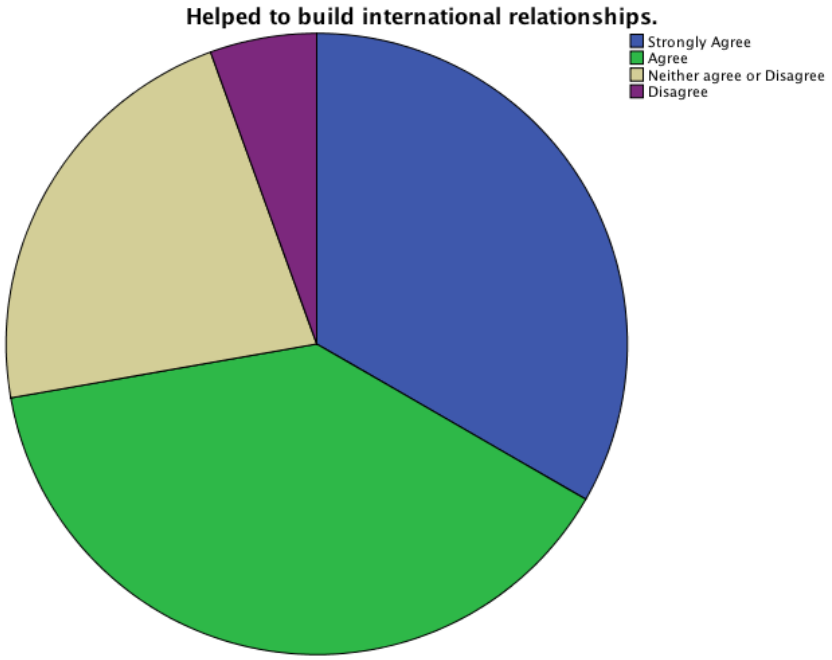
According to participants the most valuable parts of the meeting included:

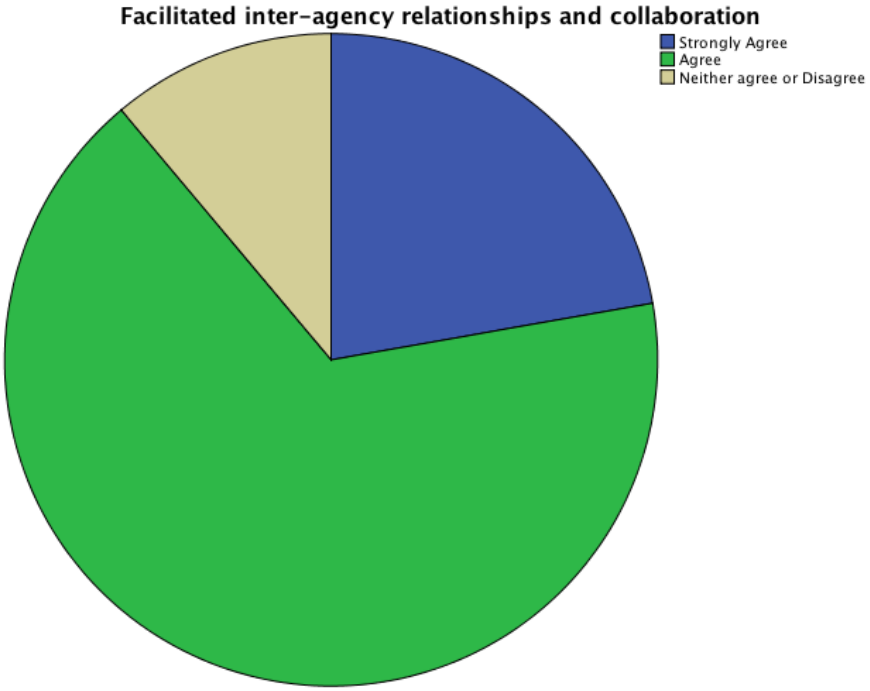
- The organization of the meeting
- World café conversations
- Outreach and policy panel discussions
- Participants represented a variety of research fields (interdisciplinary)
- Opportunity to ask questions from experts and representatives from different sectors
- Opportunity to share research information with different partner organizations
- Presentations about designing different options for collaboration
- Organizers paid attention to bring management actions and solutions at the policy level
- Presentation on GIS mapping and database
- Opportunity to exchange opinions and views

Analysis of participant evaluations revealed that the meeting accomplished the following:

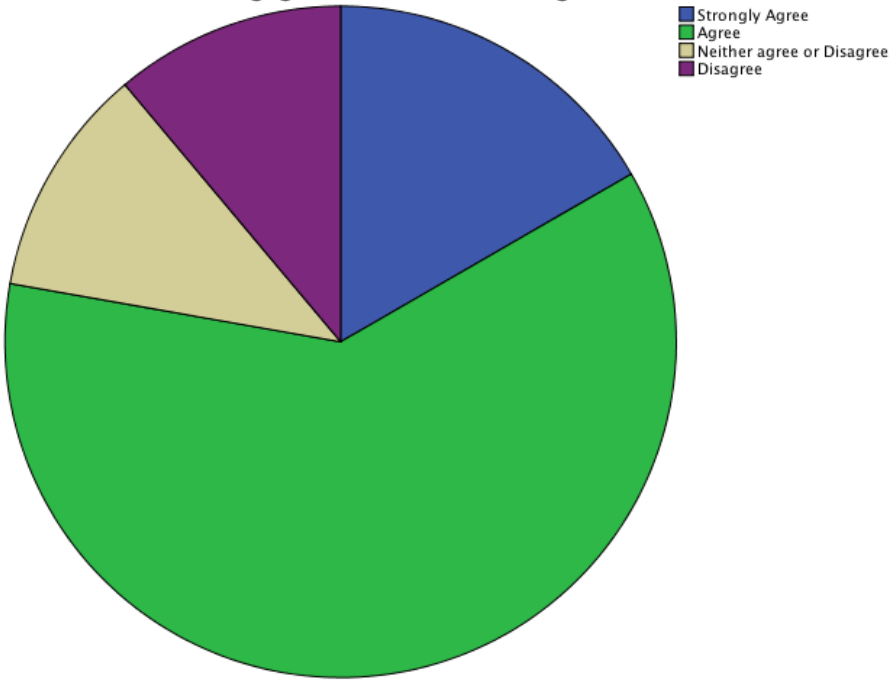

Clarified the roles of each partner organization in this project.
Strongly Agree
Agree
Neither agree or Disagree
Disagree


Helped me to clarify my role in this project.
Strongly Agree
Agree
Neither agree or Disagree

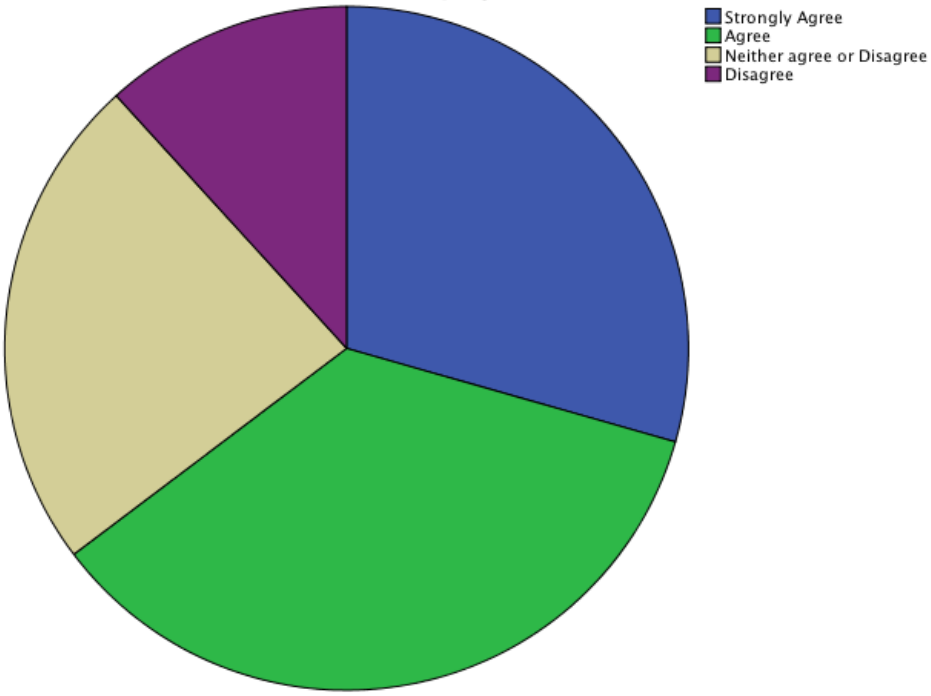

Helped to build international relationships.
Strongly Agree
Agree
Neither agree or Disagree
Disagree


Facilitated inter-agency relationships and collaboration
Strongly Agree
Agree
Neither agree or Disagree

Engaged me in team building activities.



The panelists of policy makers provided a very important perspective on our project.



6. Suggested Next Steps for the Project

Dr. Fernandez-Gimenez suggested a variety of next steps for the project including:

1. Continue social data collection for summer 2011
2. Conduct Ecological Training and Data Collection. Discuss who will be on each ecological team and manage itinerary
3. Finalize hydrological and meteorological data collection and analysis
4. Feedback on data sharing protocol due by August 2011
5. Database- ecological portion is done; data entry for social and hydrological is still in development. We will have a draft by the end of July
6. Discuss ideas for outreach and engagement. Form an outreach committee
7. Ways to facilitate communication (e.g., quarterly team meeting and get comments to keep in close touch). We will have an annual meeting
8. Data entry and analysis: ongoing discussion. Have training on data entry that includes responsibilities. Anticipate training on data analysis. Everyone participates on learning data analysis that is part of a collaborative effort in analyzing, discussing, and communicating.

Between July 2011 and 2012, we will have done some analysis and can share preliminary analysis.

Participants also suggested a variety of next steps for MOR2:

1. In-depth case studies may provide opportunities for participant observation
2. We should have draft plan stating team member responsibilities, like a rolling agenda with a written update that shows progress and current stages.
3. The team will want to know what data people will use. Make sure that metadata available
4. We need to clarify meaning of raw data
5. Broaden monthly meetings where each person from each institute can participate
6. Start with monthly or quarterly meeting with Mongolian researchers to discuss issues and participate online. It will be difficult if we all participate, perhaps just Mongolian representatives could attend online meetings
7. Revise data sharing protocol at the end of August and have notes in English and Mongolian. Include discussion forum and create a summary report to document forum
8. Consider sub-teams (e.g., social, ecological) that could meet with US team members.

9. Each Institute could have one outreach representative. Batkhishig can help facilitate having representatives for outreach
10. Encourage the presentation on preliminary data on quarterly meetings. This will allow us to see the cross-disciplinary connections and allow us to get a sense of what constituents are doing.

APPENDICES

Appendix A: List of Meeting Participants

No	Name	Organization
1	Dr.Maria Fernandez-Gimenez	Colorado State University
2	Dr.Robin Reid	Colorado State University
3	Dr.Steven Fassnacht	Colorado State University
4	Dr.Jes Thompson	Colorado State University
5	Batkhishig Baival	Colorado State University
6	Niah Venable	Colorado State University
7	Arren Alegretti	Colorado State University
8	Chantsallkham Jamsranjav	Colorado State University
9	Tungalag Ulambayr	Colorado State University
10	Retta Brueger	University of Arizona
11	Dr.Tserendash Sainkhuu	Research Institute of Animal Husbandry
12	Lkhagvasuren	Research Institute of Animal Husbandry
13	Ganhuyag Luvsan	Research Institute of Animal Husbandry
14	Dr. Altanzul	Mong. State. Ag. Univ. Center for Ecosystem Studies
15	Dejidmaa Tsedensodnom	Center for Ecosystem Studies
16	Dr.Batbuyan Batjav	Center for Nomadic Pastoralism Studies
17	Dr. Bazargur	Inst. of Geography
18	Enkhmunkh Baasanjav	Center for Nomadic Pastoralism Studies
19	Unurzul Altanhuyag	Mongolian Society for Range Management
20	Dr.Adiyabadam	Institute of Meteorology & Hydrology
21	Turbat	Institute of Meteorology & Hydrology
22	Dr.Baasandorj Yadamsuren	Institute of Geo-Ecology
23	Itgelt Naavan	Institute of Geo-Ecology
24	Solongo	Institute of Geo-Ecology
25	Khishigjargal Budjav	Institute of Geo-Ecology
26	Dr.Bulgamaa Densambuu	Mongolian Society for Range Management

27	Sergelen Munkhuu	Mongolian Society for Range Management
28	Turbagana	Mongolian Society for Range Management
29	Bayarmaa Battogtoh	Mongolian Society for Range Management
30	Sunjidmaa	Mongolian Society for Range Management
31	Vandandorj Sumiya	MOR2
32	Odgarav	MOR2
33	Azjargal Jargalsaikhan	MOR2
34	Tamiraa Lkhagvasuren	MOR2
35	Dr.Sarantuya Ganjuur	Institute of Meteorology & Hydrology
36	Dr.Tsogtbaatar Jamsran	Institute of Geo-Ecology
37	Dr.Dorligsuren Dulamsuren	Mongolian Society for Range Management
38	Dr.Enkh-Amgalan Tseelei	Swiss Agency for Development and Cooperation, Green Gold Ecosystem Mgt. Program
39	Dr.Undarmaa Jamsran	Mong. State. Ag. Univ. Center for Ecosystem Studies
40	Ganhuyag Puntsagdorj	Ministry of Food, Agriculture and Light Industry
41	Binie	Ministry of Food, Agriculture and Light Industry
42	Chinbat Chimedtseren	Uvurkhangai Aimag, Agricultural Officer
43	Enkhbold Narantsetseg	Soum Livestock Officer
44	Jargalsaikhan	Ulziit Soum, APUG leader
45	Buyankhishig	Herder, PUG leader
46	Altantsetseg Bazarragchaa	Millenium Challenge Account Peri-Urban Range-lands Project
47	Zoyo Damdinjav	Institute of Botany
48	Dr.Susan Russell	US Embassy
49	Tsengelmaa Lkhagvasuren	Participant
50	Bolor Erdenebaatar	Participant
51	Dolgormaa Shovoohoi	Participant

52	Brooke Smith	Millenium Challenge Account
53	Tsolmon Namkhainyam	Millenium Challenge Account
54	Nyamdorj Altankhuyag	Bayan Unjuul, Herder group leader
55	Sabine Schimdt	New Zealand Nature Institute
56	Dr. Samya	Deputy Minister, Ministry of Food, Agriculture and Light Industry
57	Dr. Andrei Marin	University of Bergen, Norway

Appendix B. Meeting Agenda

MOR^2 TEAM & PARTNERSHIP KICK-OFF MEETING

JUNE 13 & 14 2011
Kempinski Hotel Khan Palace
Ulaanbaatar, Mongolia

The goal of this workshop is to share knowledge and excitement about this research effort and collaborative project. This workshop is the kick-off meeting for the multi-institutional, multi-disciplinary National Science Foundation project, with implications for natural resource management policy in Mongolia.

Workshop Objectives:

1. Clarify/re-affirm roles of organization and individual team members and build interdisciplinary, interagency and international relationships.
2. Engage in team-building activities.
3. Develop a protocol for team membership, data ownership and sharing.
4. Develop a plan for partner and participant engagement

Monday, June 13 – *MOR^2 Team & Partners*

9:00 – 9:30 **Welcome & Outline of the Workshop Agenda & Process**
Led by: Maria Fernandez-Gimenez

9:30 – 10:30 **Workshop Participants & Team: Welcome & Introductions**
Led by: Maria Fernandez- Gimenez

Presentation on Project Goals, Objectives, Conceptual framework, hypotheses, and research design.
Presenters: Maria Fernandez- Gimenez & Robin Reid

Facilitated Q & A

10: 30 – 10:50 Coffee & Tea Break

10:50 – 12:00 **History of Project Timeline Activity**
Presenters: Maria Fernandez- Gimenez, Batkhishig Baival, & Jes Thompson

12:00 – 12:30	**Introductions and Roles on Project** Facilitators: Maria Fernandez-Gimenez & Jes Thompson
12:30 – 1:00	**Interdisciplinary Nature of Project** Presenter: Melinda Laituri
1:00 – 2: 00	Lunch Break
2:00 – 3:15	**Expectations & Contributions: World Café Discussion Forum I** Facilitators: Jes Thompson & Arren Mendezona Allegretti Question 1: Why is this project important to you? Question 2: How will you contribute to the overall project?
3:15 – 3:30	Coffee & Tea Break
3:30 – 5:20	**Data Sharing & Engagement: World Café Discussion Forum II**. Question 1: When it comes to sharing data, what are you most concerned about? Question 2: How can we best engage partners and participants in the research process?
5:20	**Adjourn**

Tuesday, June 14 – *MOR^2 Team, Partners & Policy-makers*

9:00 – 9:45	**Formal Welcome Address**
9:45 – 10:00	**Overview of the Project** Presenter: Maria Fernandez- Gimenez
10:00 – 10:45	**Policy Implications Round Table Discussion** Facilitators: Batkhishig Baival & Maria Fernandez-Gimenez
10:45 – 11:00	Coffee & Tea Break
11:00 – 11:30	**Preview of Scenario Planning and Collaborative Modeling Processes** Presenter: Jes Thompson
11:30 – 12:30	**Planning Effective Engagement Activities** Presenters: R. Reid, B. Baival, J. Thompson, M. Laituri, B. Batbuyan, T. Ulambayer, A. Allegretti
12:30-1:30	Lunch Break

1:30 – 2:30	**Mapping & Database Component of Project: Physical, Social & Institutional Boundaries** Presenters: Melinda Laituri & Steven Fassnacht
2:30 – 3:00	Coffee & Tea Break
3:00 – 4:30	**Wrap-up & Next Steps** Led by: Maria Fernandez- Gimenez and Robin Reid
4:30	**Adjourn**

Appendix C. Presentations

MOR2 Kick-off presentation hand-outs are appended to this document. To view full presentations, please go to http://warnercnr.colostate.edu/mongolian-rangelands-presentations/

MOR² Team & Partnership Kick-off Meeting

June 13 & 14, 2011
Kempinski Hotel Khan Palace
Ulaanbaatar, Mongolia

Workshop Process

Day 1 - Monday

- Team and Partners
- Getting acquainted & discussing the details of the project
- Presentations about the project
- Small group conversation-style sessions

Day 2 - Tuesday

- Team and Partners + Policy, Practitioner & Herder Representatives
- Formal opening of project
- Policy Roundtable
- Presentations & discussion about future directions for collaboration & outreach

The goal:

To share knowledge and excitement about this research effort and collaborative project.

Today's Agenda

- Welcome & Introductions
- Project Goals, Objectives, Conceptual Framework, Hypotheses & Research Design
- History of the Project
- Roles on the Project
- Interdisciplinary Nature of the Project
- World Café Discussion Forum

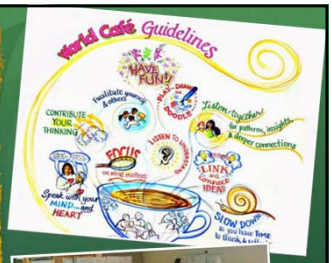
Workshop Objectives:

- Clarify & confirm the roles of the organizations and individual team members
- Build interdisciplinary, interagency & international relationships
- Engage in team-building activities
- Develop a protocol for team membership, data ownership and data sharing
- Develop a plan for outreach

World Café Discussion

Small group conversations, focused on addressing four main questions:

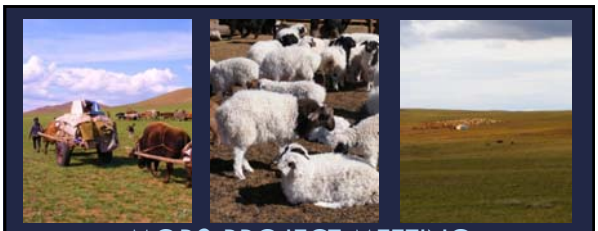
1. Why is this project important to you?
2. How will you contribute to the overall project?
3. When it comes to data sharing, what are you most concerned about?
4. What ideas do you have for project outreach?



Tomorrow's Agenda

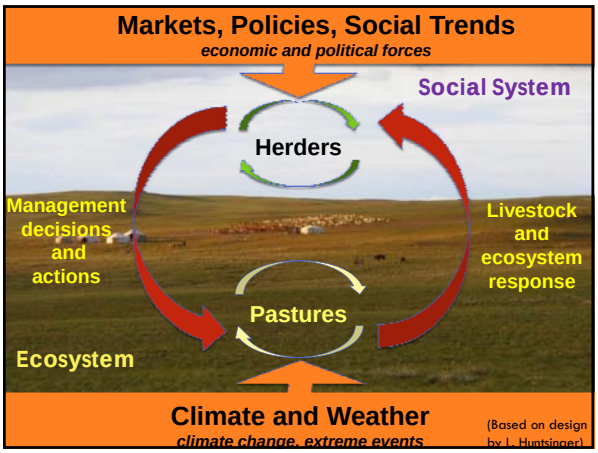
- Formal Opening for the Project
- Brief Overview of the Project
- Policy Implications – Roundtable
- Scenario Planning
- Outreach Discussion
- GIS Mapping & Database Component of Project

Let's Get Started!



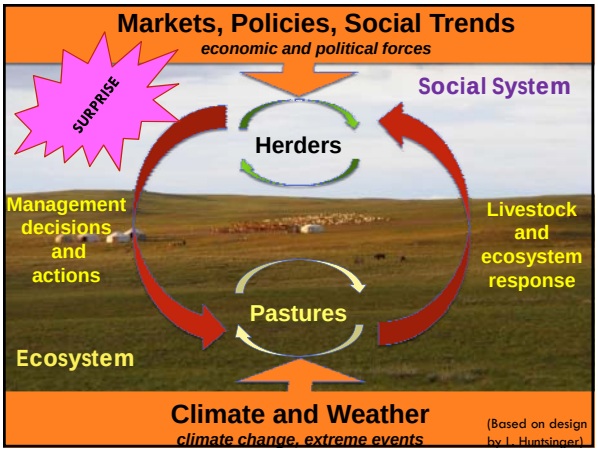
MOR2 PROJECT MEETING:
GOALS & OBJECTIVES
CONCEPTUAL FRAMEWORK
HYPOTHESES & RESEARCH DESIGN

June 13, 2011, Ulaanbaatar



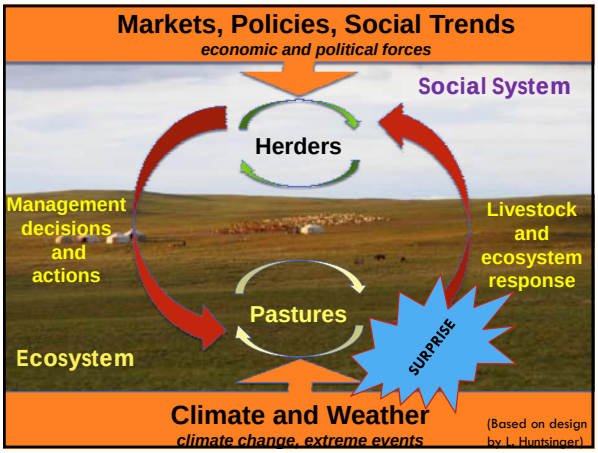
Outline

- Goals & Objectives
- Conceptual Framework
- Research Questions
- Overall Research Design
- Hypotheses and Specific Methods
- Expected Outcomes

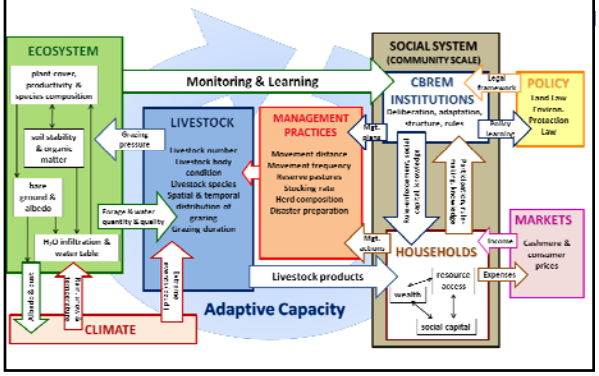


Project Objectives

1. Assess the vulnerability of Mongolian pastoral social-ecological systems to climate change
2. Evaluate the effects of community-based rangeland management (CBRM) on the resilience of Mongolian pastoral systems.
3. Strengthen linkages between natural resource science and policy-making in Mongolia.
4. Build the capacity of participating Mongolian and US researchers and students to analyze the dynamics of complex coupled natural-human systems.



Conceptual Model



Research Design

- Nation-wide comparative study
  - 3 ecological zones (mountain/forest steppe, steppe, desert steppe)
  - In each zone, paired soum with and without formal CBRM
- Multiple, nested scales
  - 36 soum (18 with CBRM and 18 without formal CBRM)
  - ~162 CBRM groups/traditional herder community (~5 in CBRM soum, 4 in non-CBRM soum)
  - ~810 herder households (5 per group)
  - ~486 ecological plots (3 per group)
- Over time
  - Remote sensing & modeling
  - Soum statistics

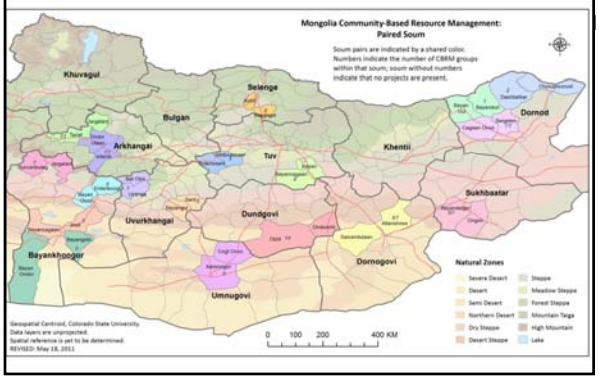
Research Questions

1. How resilient or vulnerable are Mongolian pastoral SESs to climate change?
2. Does community-based rangeland management (CBRM) increase coupled systems' resilience to climate change?
3. What are the implications of temporal and spatial scales and differing physical, ecological and social boundaries for understanding and managing resilience?
4. Can participatory modeling and scenario planning improve within- and cross-scale learning, knowledge integration and adaptation?

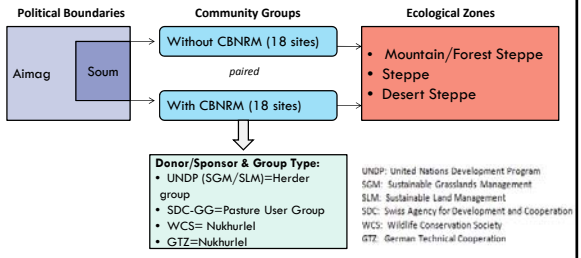
Sampling

- Stratification
  - by ecological zone
  - by presence/absence of organized CBRM
  - by CBRM group type (PUG, herder group, nokhorlel)
- Purposive selection of replicated paired soum within each ecological zone to control for ecological variability
- Within selected soum, randomly select 5 CBRM groups or traditional herder neighborhoods
- Within groups/neighborhoods select
  - 1 winter pasture area for ecological sampling (3 plots/pasture)
  - 5 herder households for socio-economic and livestock productivity sampling

Research Design

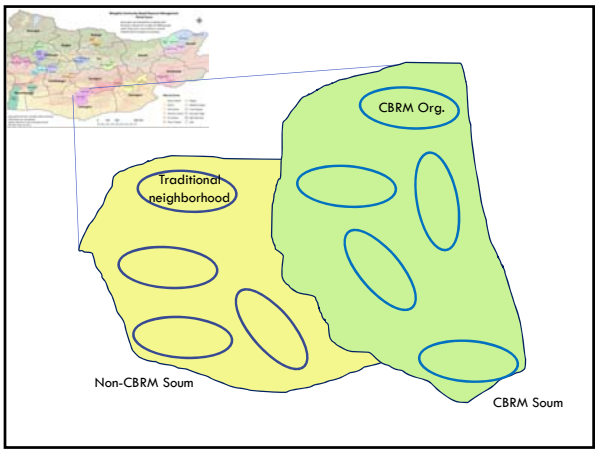


Site Selection: PRIMARY FACTORS



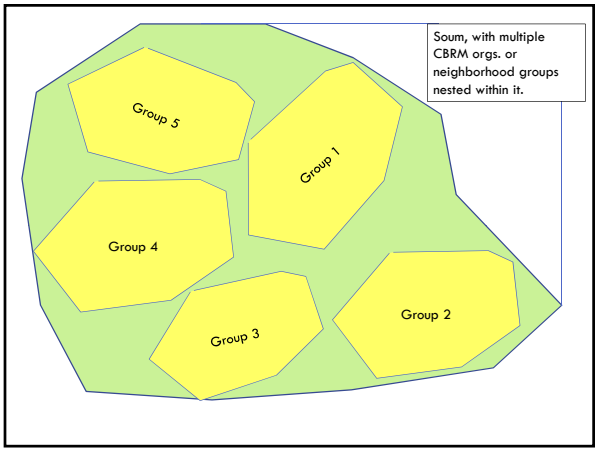
SECONDARY FACTORS

Age of project:	Geographic distribution:	Other factors:	Future Considerations:
> 5 yrs < 5 yrs	Central, Eastern	• Past research contacts • Existing data • Other studies in region	• Dzud • Watershed boundaries



Units of Analysis & Sampling Units

Units of Analysis or Sampling Units	People	Animals	Pasture
Soum	Soum	Soum herd	Soum territory
CBRM Organization or Neighborhood Group	CBRM Organization or Traditional Neighborhood Group	Aggregate herd	Winter pasture area
Household	Household	Household Herd	Winter pasture area
Sampling Unit	Person (questionnaire respondent)	Animal (sampled)	Ecological plot (sampled)



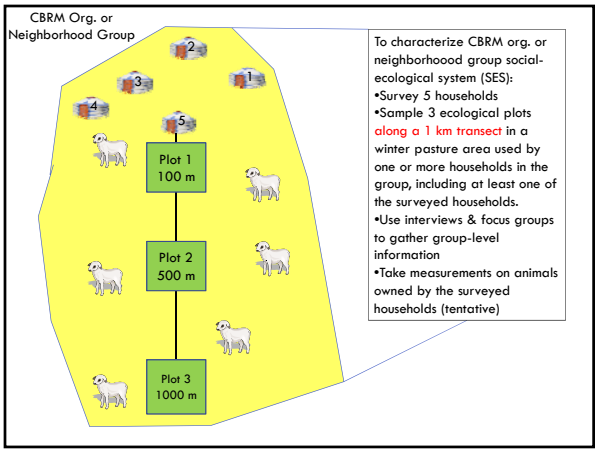
Q1. How vulnerable are Mongolian pastoral systems to climate change?

Overarching hypothesis we will test:

- Climate change is making Mongolian rangelands more vulnerable

How will we measure rangeland ecosystem vulnerability?

- Water, snow cover
- Vegetation
- Extent of equilibrium / non-equilibrium rangelands
- Soils



Q1. How vulnerable are Mongolian pastoral systems to climate change?

Sub-hypothesis 1A: Climate change & rangeland dynamics
Climate change is increasing the spatial extent of non-equilibrium rangeland dynamics as the area of dry steppe expands and variability in production increases.

Test of sub-hypothesis 1A:

1. Remote sensing analysis of temporal and spatial variability of NDVI over time from desert to mountain steppe
2. Comparison of the change in vegetation and soil characteristics in plots measured over time in the same way (Jinst, Ikh Tamir)
3. Comparison of vegetation composition along grazing pressure transects from winter camps or water sources
4. Herder interviews along these same gradients about change in vegetation and soils over time

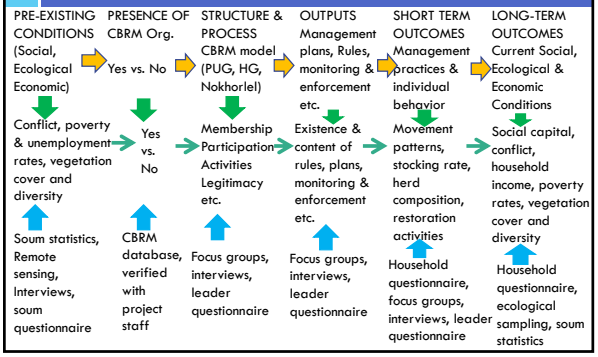
Q1. How vulnerable are Mongolian pastoral systems to climate change?

Sub-hypothesis 1B: Climate change, snow cover and surface water
Climate change is causing changes in snow cover and surface water.

Test of sub-hypothesis 1B:

1. Assess hydrological and climatic changes using established statistical techniques: daily streamflow, temperature and precipitation, with the analysis focusing on annual (seasonal and monthly) averages, extremes (for streamflow peak and likely persistent minimums - these are new) and extreme indices.
2. Measure small scale hydro-meteorological to assist with modeling and feedback to herders.
3. Hydrological modeling of various watersheds.
4. Assess changes in snow cover, drought, and dzud.

Q2. Logic Model for CBRM Resilience and CBRM Performance Hypotheses—Specifics



Q2. Does community-based rangeland management (CBRM) increase SES resilience to climate change?

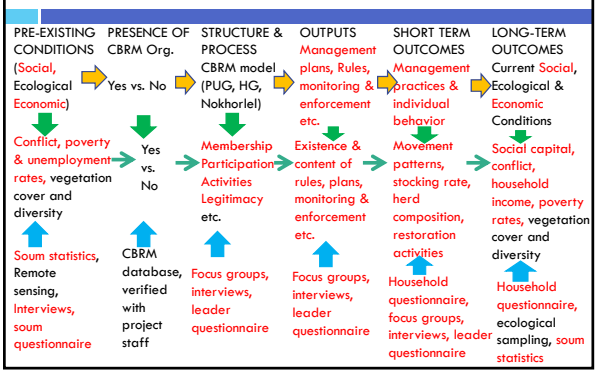
2A. CBRM Resilience Hypothesis:

- CBRM increases the adaptive capacity of coupled systems by strengthening self-regulating feedbacks between social and ecological systems.

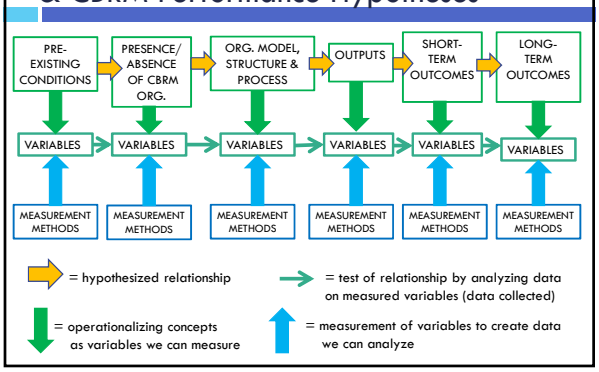
2B. CBRM Performance Hypothesis:

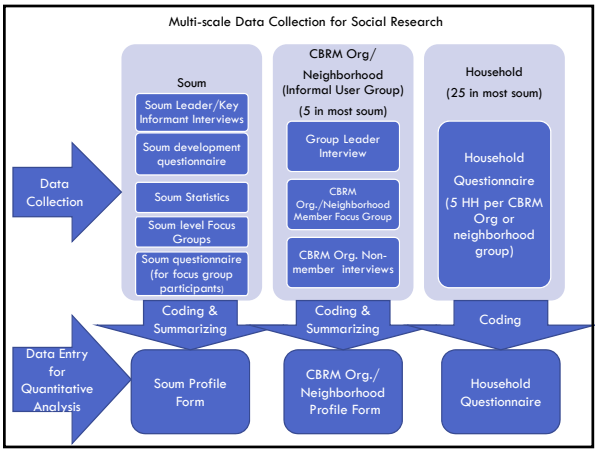
- Performance and outcomes of CBRM will vary with key institutional design elements, including territory & group size, monitoring & enforcement mechanisms, and others.

Q2. Logic Model—Social Measures

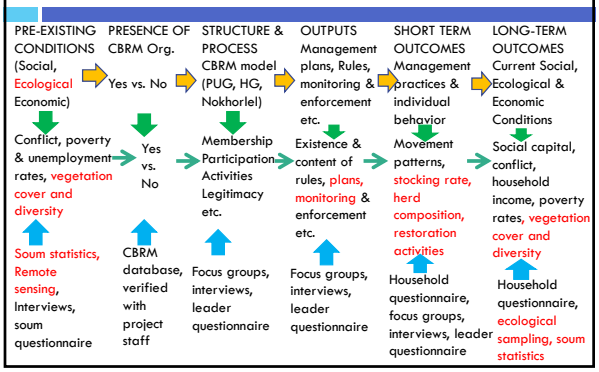


Q2. Logic Model for CBRM Resilience & CBRM Performance Hypotheses





Q2. Logic Model—Ecological Measures



Research Question 2

How will we measure vegetation? (50 x 50 m plots)

- Standing crop vegetation biomass (clipped)
- Vegetation cover by species and bare ground cover (5, 50-m line point-intercept transects with 50 points in each plot)
- Additional search in plot for species missed on transects
- Basal gaps for perennial plants
- Utilization by grazers
- Species-specific dung counts

How will we measure soils?

- Bulk density
- Texture
- Total carbon (C)
- Total nitrogen (N)
- Available phosphorus (P) and potassium (K)

Research Question 2

<u>Overarching hypothesis 2:</u> CBRM institutions create feedbacks between social and ecological systems

- CBREM institutions increase the adaptive capacity of coupled systems by strengthening the self-regulating feedbacks between social and ecological systems

How will we measure these feedbacks?

- Focus groups and household questionnaires about herders' practices in soums with and without CBRM institutions
- Ecological measurements of rangeland conditions in soums with and without CBRM institutions

Q3. What are the implications of temporal and spatial scales and differing physical, ecological and social boundaries for understanding and managing resilience?

3A. Boundary Analysis Hypothesis:

- Analysis of the relationships among physical, ecological and political boundaries and pastoral migratory territories and social networks will reveal the most useful units and scales of analysis.

Test of 3A:

- Overlay-patchwork analysis of physical, ecological, social, and political boundaries using geographic information system

Research Question 2

Sub-hypothesis 2A: CBRM institutions and rangeland ecosystems

Soums with CBRM institutions will have more surface water, better vegetation cover, more native species and less bare ground than soums without CBRM institutions

Test of hypothesis 2A:

1. Comparison of vegetation, soils (and surface water?) in soums with and without CBRM institutions.
2. We will control for local grazing effects by sampling along a transect at 100, 500, and 1000 m from the nearest winter camp or water point in each soum.

Q3. What are the implications of temporal and spatial scales and differing physical, ecological and social boundaries for understanding and managing resilience?

3B. Multi-scale Governance Hypothesis:

- CBRM organizations alone are insufficient to ensure sustainable management practices and ecological conditions. Multi-level governance is needed to ensure sustainability.

3B. Test of 3B

- Edge effects of boundaries
- Ecological and social gradients
- Cross-scale temporal and spatial linkages

- **3D Visualization**

Research Questions & Hypotheses

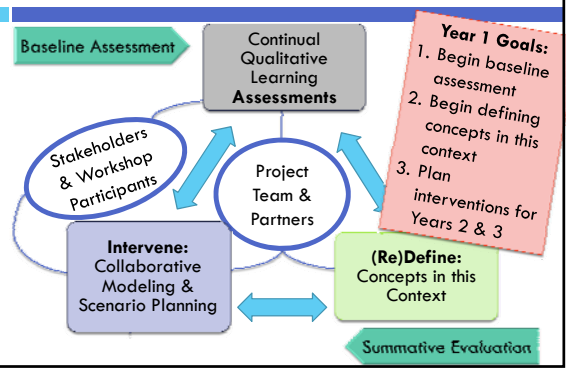
Research Question 4:

Can participatory modeling and scenario planning improve within- and cross-scale learning, knowledge integration and adaptation?

Scenario Planning and Social Learning Hypothesis:

- Participatory systems modeling and scenario planning will deepen participants' understanding of system dynamics and cross-scale relationships, integrate multiple knowledge sources, and enhance adaptive capacity, leading to increased capacity for cross-scale governance and learning.

Research Question 4: The Big Picture



Research Questions & Hypotheses

Research Question 4:

Can participatory modeling and scenario planning improve within- and cross-scale learning, knowledge integration and adaptation?

Scenario Planning and Social Learning Hypothesis:

- Participatory systems modeling and scenario planning will deepen participants' understanding of system dynamics and cross-scale relationships, integrate multiple knowledge sources, and enhance adaptive capacity, leading to increased capacity for cross-scale governance and learning.

Research Question 4: The Big Picture

Baseline Assessment: What do we know now?

1. (Re)Define:

- Cross-scale learning, Knowledge integration, Adaptation readiness & capacity

2. Assess team members & partners' learning & capacity:

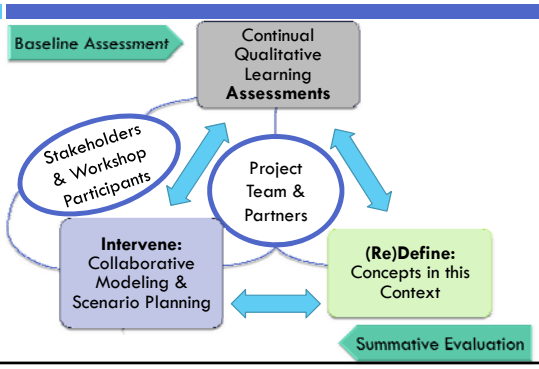
- Pre- & post- workshop interviews & questionnaires
- Qualitative observations throughout the project
- Evaluations of trainings and workshops

3. Intervene:

- Scenario Planning workshop series (with stakeholders)
- Collaborative Modeling process (within team)
- Trainings and other facilitated workshops/meetings

Summative Evaluation: What did we learn / accomplish?

Research Question 4: The Big Picture



Research Question 4: Data & Analysis

- **What Data We Will Collect?**
  - Observations, interviews & questionnaires for team members, partners and stakeholders
- **How We Will Analyze It?**
  - ***Open coding*** through an Interpretive Paradigm, using Grounded Theory – the goal is to learn from and understand ourselves better.
  - ***Regular member checks***: we'll regularly report codes and themes to the group for their review & confirmation
  - ***Continual revising of codes*** and themes throughout the project

Expected Outcomes

- Increase scientific understanding of community-based institutions and coupled systems' resilience to climate change
- Develop methods for integrated data collection and analysis
- Impact policy through participatory modeling and scenario planning
  - Recommendations to government, NGOs and donors on community-based rangeland management in Mongolia
- Train Mongolian & US researchers and graduate students
- Train secondary school teachers

Field Sites for 2012

Aimag	CBREM soum	No of Groups to sample	Non-CBREM Match	No of Groups to sample
Steppe 2012				
Tuv	Ondorshireet	10	Erdenesant	4
	Bayantsagaan	5	Bayan	4
Mountain/Forest Steppe 2012				
Uvurkhangai	Sant	5	Bayangol	4
	Uranga	5	Bat-Ulziit	4
Arkhangai	Ikhtamir	5	Ondor Ulaan	4
	Tariat	5	Jargalant	4
Bayankhongor	Erdenetsogt	5	Bayan Ovoo	4
	Gurvanbulag	5	Jargalant	4
Selenge	Bayangol	5	Khotol	4
	TOTAL	50		36

2011 Fieldwork Schedule & Teams

2011 Fieldwork Timeline

- April 3-April 11: Social Survey Training, Field Testing, Revision of Instruments
- April 18-June 30: Social Survey fieldwork (2 teams, 3 field trips each)
- June 13-14: Project Team Meeting in UB
- June 15-18: Ecological field training (location TBD)
- Field Schedule for Ecological Teams:
  - Field Trip #1: June 21-mid-July(2 teams)
  - Field Trip #2: Mid-July-July 30 (2 teams)
  - Field Trip#3: late July-August (1 MSRM team)

Field Sites for 2011

Aimag	CBREM soum	No of Groups to sample	Non-CBREM Match	No of Groups to sample
Desert-Steppe 2011				
Dundgovi	Ulziit	10	Undurshil	4
Bayankhongor	Jinst	5	Bayantsagaan	4
	Bayangobi	5	Bayan Undur	4
Omnogovi	Khankhongor	5	Tsogt Ovoo	4
Dornogovi	Altanshiree	5	Saikhandulan	4
Steppe 2011 (To be sampled by MSRM Team)				
Dornod	Dashbaldar	2	Chuluunkhorot	2
	Bayan Dun	1	Bayan Uul	2
	Sergelen	?	Tsagaan Ovoo	2
Sukhbaatar	Bayandelger	5	Ongon	4
	TOTAL	~40		30

2011 Social Fieldwork Teams

- **Social Team Roles:**
- Team leader (1):
  - Coordinate field activities
  - Supervise sampling, household selection etc.
  - Participate in data collection activities
  - Responsible for soum and CBRM/neighborhood profiles
- Researchers (3)
  - Assist with interviews, collecting secondary data, recording for focus groups
  - Conduct household surveys
- Local consultant (1)
  - Assist in locating groups, households and potential ecological sampling sites

2011 Ecological Fieldwork Teams

- Ecological Team roles:
  - 2 Soils experts
    - Dig small profile
    - Describe soils
    - Take soil samples
  - 2 plant identification experts
    - Line-point intercept sampling
    - Species richness survey (entire plot)
  - 2 Plot set-up and description, biomass sampling, gap intercept
    - Photographs, GPS points, landscape position, slope & aspect, etc.
    - Sample biomass by functional group
    - Gap intercept measurements
  - 1 Local consultant
    - Assist with locating ecological plots

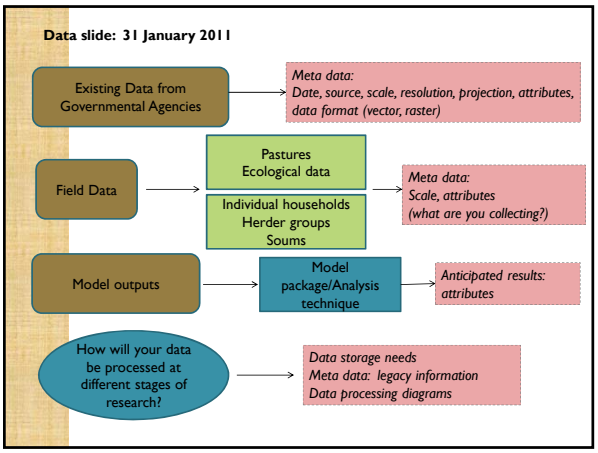
Institution	Participant	Roles	Team?	Field Trip 1	Field Trip 2
CSU	Maria F-G	Team leader		X	X
	Robin Reid	Team leader		X	X
	Retta Brueger	Vegetation?		X	X
	Chantsaljam	Vegetation?		X	X
MSRM	1 team	All		FT 3	FT 3
	Sergelen	Soils		X	X
	Tirbagana	Soils		X	X
	Bayarmaa	Vegetation		X	X
	Sunjidmaa	Vegetation		X	X
IGE	Baasandorj	Soils		X	X
	Itgelt	Vegetation		X	X
CES	Altanzul	Vegetation			
	student	Vegetation			
	student	Vegetation			
RIAH	Tserendash	Vegetation			
	Gerelmaa	Vegetation			
	Lhagvasuren	Vegetation			
WCS	Vandandorj	Vegetation		X	X
	Otgarav	Vegetation		X	X

Potential Team make-up

	Team 1	Team 2
Leader	Maria Fernandez-G.	Robin Reid
Soils	Baasandorj? (IGE)	Delgertsetseg (IGE)
Soils	Turgbana (MSRM)	Sergelen (MSRM)
Veg	Retta?	Chantsaa?
Veg	Itgel (IGE)	Vandanjorj (WCS)
Veg	Lhagvsuren (RIAH)	Gerelmaa (RIAH) +
Veg	Bayarmaa (MSRM)	Sunjidmaa (MSRM)
Veg	Odgarav (WCS)	Turbat (IHM)
Veg	Altanzul (CES)	Tserendash (RIAH)
Veg	CES student	CES student
Veg		

1. Integrated Database
2. Boundary Analysis

Melinda Laituri
Colorado State University
June 2011



Data Requirements – NSF

- Investigators will share with other researchers the primary data created or gathered in the course of work under National Science Foundation grants
- Data Management Plans

Establishing a Database

- What are our scales?
- What are our units of analysis?
- What commonality do we have?
- What is the nature of our data?
- What are the limitations?

Database development

- Data protocols
- Field data
  - Social, ecological, physical data collection
  - Data collection forms
  - Quality assessment/Quality control (QA/QC)
- Data transference and pre-processing
- Database organization
  - Database schema/relationships
- Data access

Units of Analysis & Sampling Units

Units of Analysis or Sampling Units	People	Animals	Pasture
Soum	Soum	Soum herd	Soum territory
CBRM Organization or Neighborhood Group	CBRM Organization or Traditional Neighborhood Group	Aggregate herd	Winter pasture area
Household	Household	Household Herd	Winter pasture area
Sampling Unit	Person (questionnaire respondent)	Animal (sampled)	Ecological plot (sampled)

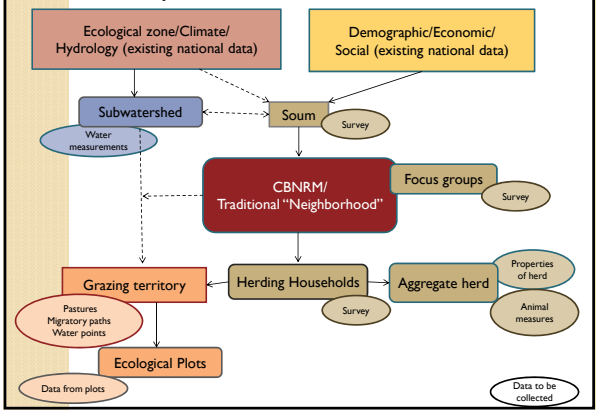
Other elements will be added to the database:

- Other boundaries of the system
- Ecological elements of the system
  - biological and physical components
- System processes and modifiers
- Key aspects of the system that change in response to these processes
- Key processes that act as "drivers" of the system
- Key ecosystem services and resources used by and of concern to people in the area

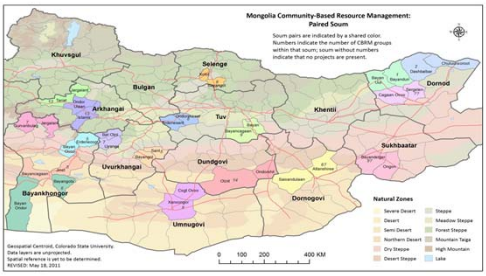
Boundary Hypothesis

- Hypothesis 1: Units of analysis
  - Overlay-patchwork analysis of physical, ecological, social, and political boundaries using geographic information system
- Hypothesis 2: Cross boundary migration
  - Edge effects of boundaries
  - Ecological and social gradients
  - Cross-scale temporal and spatial linkages
- 3-D Visualization

Preliminary Data Schema

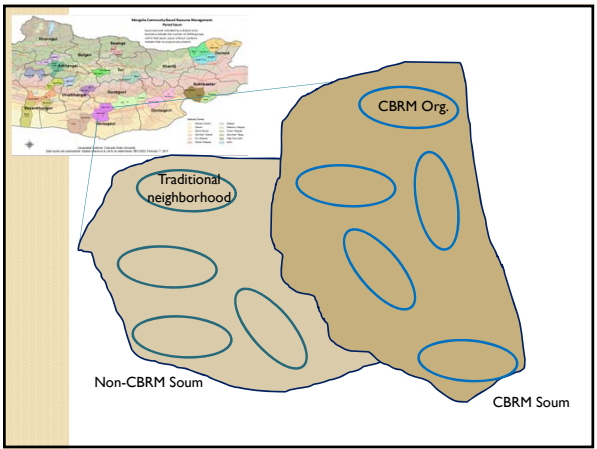


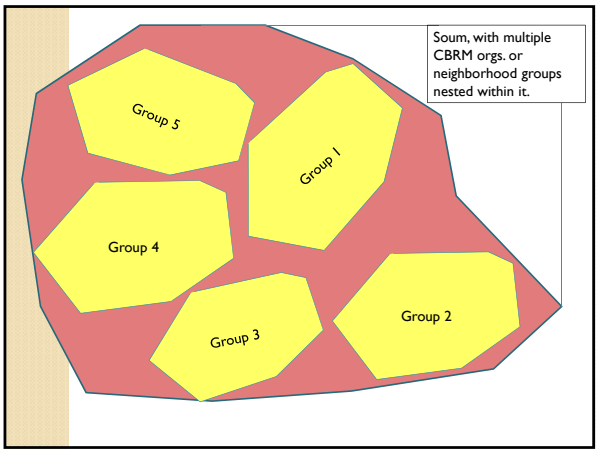
Study Sites



GIS as an Integrative Tool

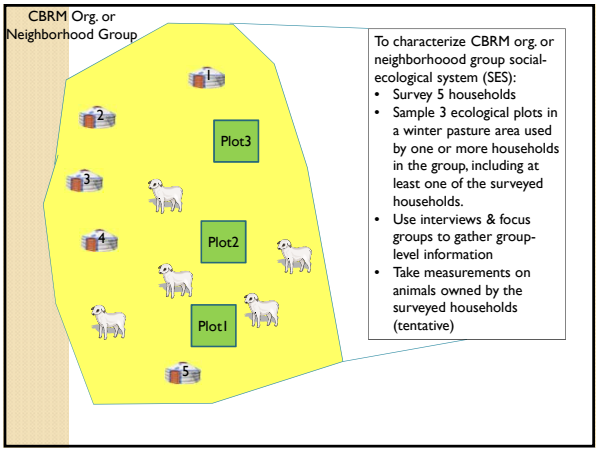
- Establish common/similar sites
  - Data collection for comparison and identifying interaction
  - Expectation of shared/common database
  - Build relational database
- Multiple scales
  - Time and space
- Multiple boundaries
  - Inter-relationships
- GIS models
  - Integrated database/Overlay analysis
- Geovisualization
  - Interactive maps





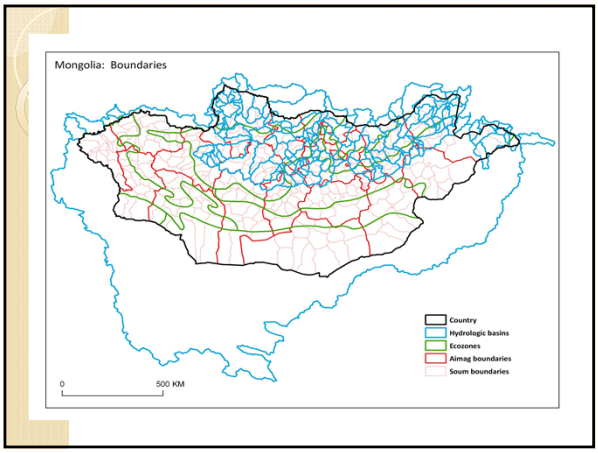
Gradients

- Ecological gradients
  - Vegetative patterns across elevational boundaries
- Water points
- Social gradients
  - Seasonal migration patterns as linked to institutional arrangements
- Edge effects of boundaries



Geospatial Analysis

- Typology of boundaries
  - Social, ecological, physical
- Intersect physical and social environment
  - Landscape, ecosystem, watershed
- Overlay patchwork analysis
  - Identify areas of overlap, coincidence, gaps
- Identify boundary relationships
  - Vertical linkages via institutional agreements
- Areas of Cooperation/Conflict
- Visualization and mapping



Hydro-climatic Analysis and Hydrological Modeling for MOR2

Ус ,цаг уурын шинжилгээ
MOR2 төслийн Гидрологийн загвар

Steven Fassnacht, Niah Venable,
Tumenjargal Sukh, G. Adyabadam,
Maria Fernandez-Gimenez, B. Batbuyan

Hydro-Climatic Change Assessment
Ус цаг уурын өөрчлөлтийн үнэлгээ

- Data
  - Meteorology (daily climate data)
    - Temperature – maximum, average, minimum
    - Precipitation
  - Hydrology
    - Streamflow урсац
    - Springs and wells?
  - Herder Surveys Малчдын төсөөлөл
    - Quantitative and Interviews

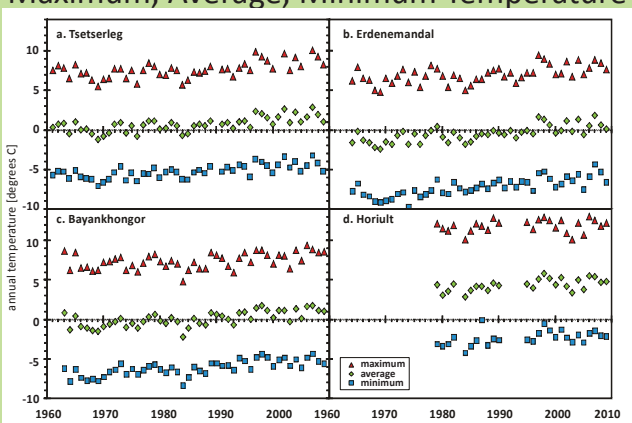
Hydro-Climatic Change Assessment

- Variables Хэмжигдэхүүн
  - Meteorology
    - Temperature – maximum, average, minimum Температур
    - Precipitation amount, days with (intensity)
    - Precipitation as snow/rain
  - Streamflow Урсац
    - Annual average Жилийн дундаж
    - Peak flow amount, time of peak flow - Урсацын хамгийн их утга
    - Low flow, no flow – Урсацын хамгийн бага утга

Hydro-Climatic Change Assessment

- Trends - Хандлага
  - Averages - дундаж
  - Extremes -
  - Variability - хэлбэлзэл
- Time Periods – Цаг хугацааны өөрчлөлт
  - Annual, seasonal, monthly
- Statistical Techniques – Статистик боловсруулалт
  - Significance (Mann-Kendall test)
  - Rate of Change (Sen's Slope)
  - Comparison of datasets (Mann-Whitney test)

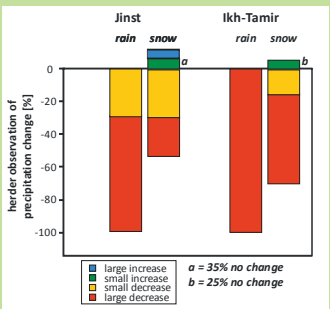
Maximum, Average, Minimum Temperature



Precipitation Change Тунадасны өөрчлөлт

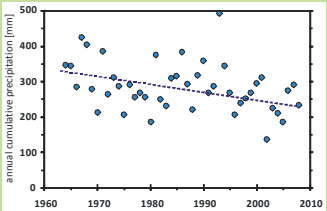
Herder Observations – Малчдын ажиглалт

- Quantitative survey data



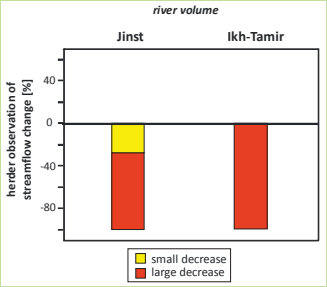
Station Data – Цаг уурын станци

- Jinst - Жинст
  - More days with precipitation
- Ikh-Tamir
  - Less days with precipitation
  - Less annual precipitation



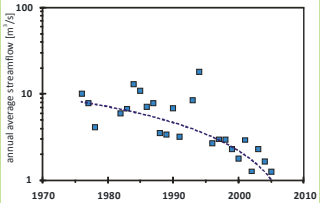
Streamflow Change - Урсацын өөрчлөлт

Herder Observations



Station Data

- Jinst
  - Decrease in average flow
- Ikh-Tamir
  - Decrease in average and peak



Hydrological Modelling: Data
Гидрологийн модель

- Time Series – Хугацааны үечлэл
  - Meteorology: Precipitation, Temperature, other
  - Hydrology: Streamflow
- Spatial – Орон зайн үечлэл
  - Topography (DEM-derived variables) - топограф
  - Land Cover/Use and Canopy Density – газар ашиглалтын өөрчлөлт
  - Soils – хөрсний мэдээлэл

Hydrological Modelling: Outcomes
Гарах үр дүн

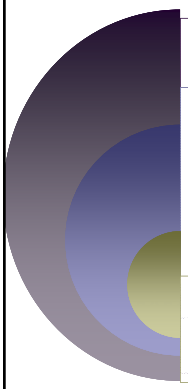
- Scaling
  - Model larger basins with streamflow data загвараар тухайн голын сав дахь урсацын мэдээлэлийг авах
  - Simulate streamflow at the study site/soum scale
- Model Other Hydrological Variables
  - Soil Moisture
  - Snowpack

Hydrological Modelling: Scenarios

- Historical/period of instrument record
- Future climate scenarios
- Extremes using Paleo-data
- Land cover/use changes
  - Provide feedback of climate-cover change

MOR2 Knowledge Exchange and Engagement Map

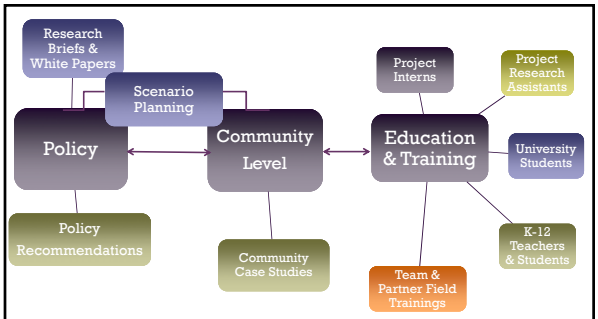
Preliminary ideas on linking multiple scales of project engagement



Community
- Community Case Studies/Reports
- Scenario Planning & Resiliency "Stories"
- Education efforts

Education & Training
- University Students
  - Project Research Assistants
  - Undergraduate Seminars
  - Graduate Seminars
  - Service Learning & Interns
  - Graduate student Projects
- Team & Partner Trainings
  - Social Methods Training
  - Ecological Methods Training
- Public Schools
  - Teacher Training Workshop
  - Climate Change Curriculum / Module

Policy
- Scenario Planning
- White Papers
- Research Briefs
- Policy Recommendations



A 'map' of our planned engagement activities

An example of connecting herders, policy makers and scientists in east Africa

Co-creation of Research

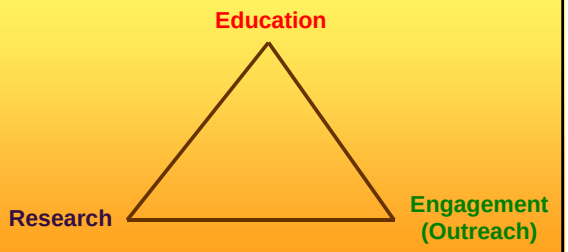
Communities and Policy makers may "reach in" to the project, providing valuable information and co-creating new knowledge

The center of our team: 6 community and policy facilitators, whose entire function was to link herder communities, policy makers and scientists in 4 ecosystems, 30 communities, 2 countries

Policy maker photos: Daily Nation, Martin Rowe

Other photos: Ole Kamuaro, R. Reid, B. Graham, C. Wilson

A second example:
Land-grant universities in the US



Preview of Scenario Planning & Collaborative Modeling Processes

Jessica Thompson
Human Dimensions of Natural Resources

What are Models?

- Stories about the current situation that help us make decisions
- They offer a range of possibilities – not predictions
- Provide a framework for thinking about change over time

What is Scenario Planning & Collaborative Modeling?

- Collaborative & dynamic process to integrate science and decision/policy making.
- Used in multiple contexts.
- Blends qualitative and quantitative data and information.
- Both are communication tools

Models help us to understand; scenarios help us to plan.

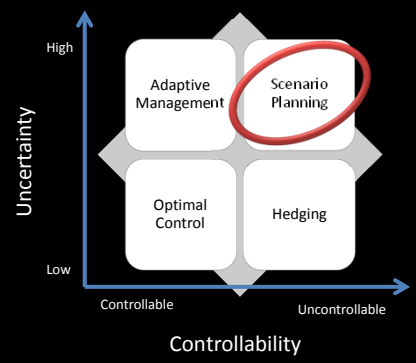
What are Scenarios?

- Stories about the future that help us make decisions today
- They offer a range of possibilities – not predictions
- Scenarios provide a framework for adapting to change over time & ahead of time

Most models include scenarios; and most scenarios are based on models.

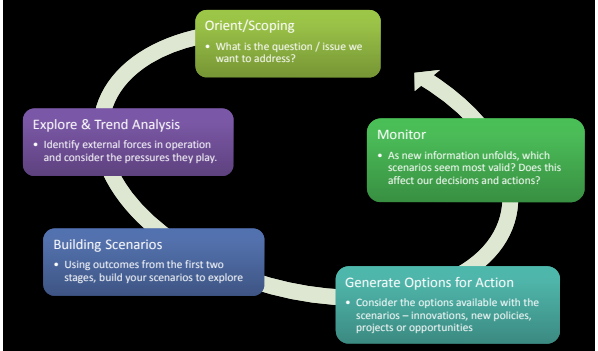
In this project, we will use both participatory processes to build shared understanding.

When it comes to climate change, we don't have time to be reactive!



Peterson et al., 2003. Conservation Biology

What Does the Process Look Like?



"Doing this exercise proactively - *essentially, rehearsing for multiple futures* - strengthens an organization's ability to recognize, adapt to, and take advantage of, changes over time."

- Global Business Network

Orient/Scoping

What is the question / issue you want to address?

The first step is to orient participants to the strategic challenge and focal question for the process

How can we best manage our resources and livelihoods in the face of climate change?

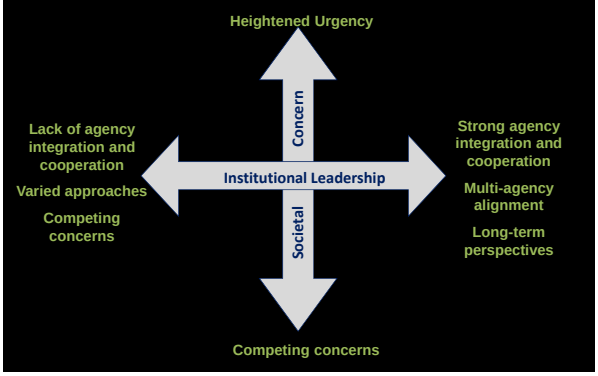
How will climate change effects impact the landscapes we rely upon over the next 50 - 100 years?

Explore & Trend Analysis

Identify external forces in operation and consider the pressures they play.

Climate Variable	General Change Expected	Confidence Level
Temperature	Ecologically significant increase consistently forecasted	High
Precipitation	Moderate increase in winter; summer forecasts most frequently predict decrease	Moderate for winter effects; low for summer
Evaporation	Increase (linked to temperature)	Moderate
Drought	Severity, frequency and duration all increase	High for severity / frequency; moderate for duration
Snow cover	Increase in snow-free days; decreased accumulations	Moderate
Length of growing season	Increase	High
Extreme Events: Temperature	Warm Events Increase / Cold Events Decrease	High
Extreme Events: Precipitation	Decreased frequency, increased intensity	Low to moderate
Extreme Events: Storms	Increased intensity, possible decrease in frequency	Low to moderate

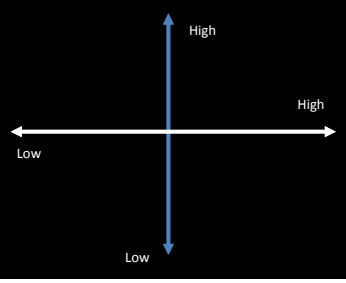
"What will be the social and political attitudes around climate change over the next 25-50 years?"



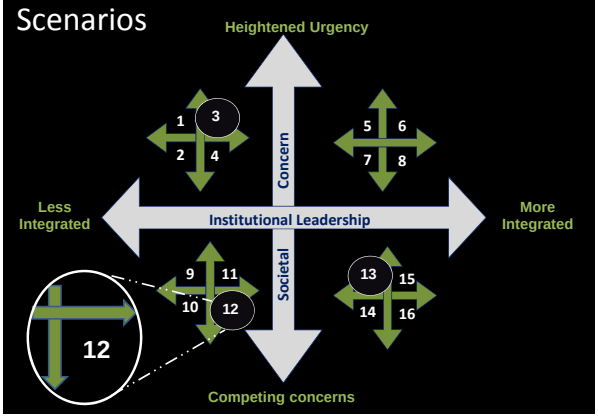
Building Scenarios

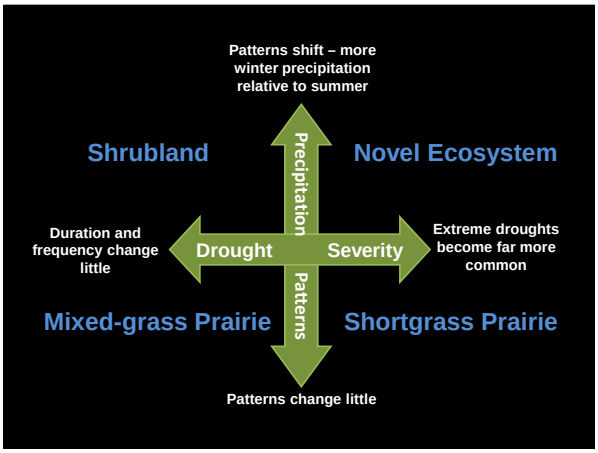
Using outcomes from the first two stages, build scenarios to explore

Ask participants: How do we combine and synthesize these forces to create a small number of plausible futures?



Nested Scenarios





What Makes a Story?

Once upon a time, there was a little girl named Goldilocks. She went for a walk in the forest. Pretty soon, she came upon a house. She knocked and, when no one answered, she walked right in. At the table in the kitchen, there were three bowls of porridge. Goldilocks was hungry. She tasted the porridge from the first bowl.

"This porridge is too hot!" she exclaimed…

What Makes a Story?

Name	Species	Hair/Fur	Age	Appetite Level	Size	Preliminary Porridge Assessment	Preliminary Mattress Assessment
Goldilocks	Human	Blonde	8	Moderate	Petite	N/A	N/A
Papa	Bear	Brown	12	High	Big	Too Hot	Too Hard
Mama	Bear	Tawny	11	Moderate	Medium	Too Cold	Too Soft
Baby	Bear	Red-Brown	3	Low	Small	Just Right	Just Right

Example Implications and Actions

Resiliency

- Forest thinning
- Herd reduction/ mgmt
- Drought tolerant grass seeding
- Reduce stressors (exotic plants, etc.)
- Actions to enhance streams (vegetation buffers, etc.) to reduce erosion etc.

Capacity Building

- Monitoring – staff, program focus, rangeland management
- Local partnership to secure money to drill water in alternative locations
- Partnerships with other communities, etc. to enable responses
- More generalized training

Research and Study

- Photo documentation of changes
- Collection of seeds and specimens
- Data entry for historical records.
- Contingency planning for water supply and management
- Effects of temperature increase and climate change on resources
- Stream assessments

Indicators to Monitor

- Invasives detection
- Pre/post disturbance monitoring
- Maintain/ enhance water monitoring
- Herd health monitoring

Monitor

Evaluate scenarios and continue to validate with more information

Ask Participants: As new information unfolds, which scenarios seem most valid? Does this affect our decisions and actions?

Generate Options for Action

Consider the options available with the scenarios – innovations, new policies, projects or opportunities

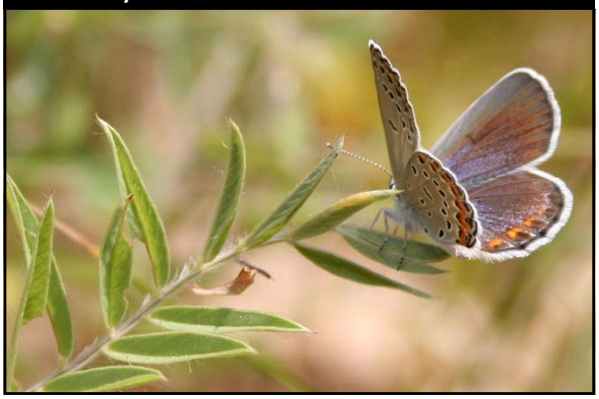
Ask participants: What are the implications of these scenarios for our future, and what actions should we take in light of them?

- Resiliency
- Research and Study
- Capacity Building
- Indicators to Monitor

The Benefits of these Processes

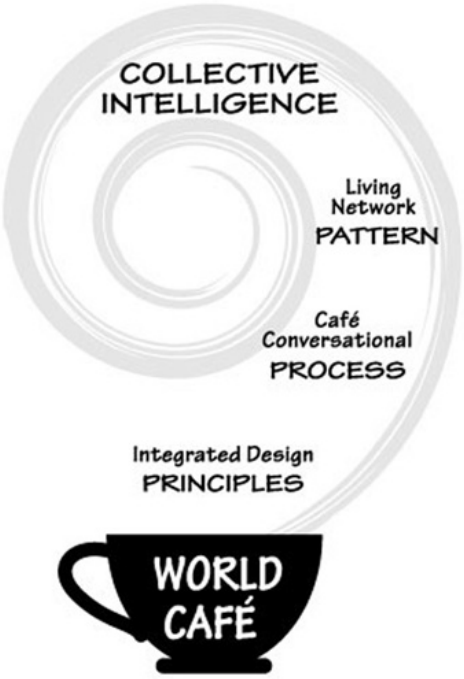
- Provide techniques for acknowledging and exploring uncertainty
- Recognize that we do know some things
- Build common ground
- Communication tools

Thank you. Questions?



Appendix D: World Café Overview

MOR2 Team & Partner Kick-Off Meeting
OVERVIEW of the WORLD CAFÉ DISCUSSION PROCESS



What is the World Café Discussion Process?
The World Café Process is a method to enable full group discussion in a small group format. The focus is on conversation and creativity. There are simultaneous small conversations at each table. Periodically the participants reshuffle, and the conversations become part of a network, allowing us to share our collective knowledge.

The World Café evolved out of a two-day dialogue in 1995 among a global, interdisciplinary group known as the Intellectual Capital Pioneers. As they reflected on the success of their dialogue they examined what contributed to its quality and designed the elements of the World Café process. This technique is not about making decisions but fostering conversation, discovering multiple perspectives, surfacing commonalities and building respect for everyone in the group.

How does the World Café Discussion Process Work?
Four-five people sit at each café-style table. One person will become the "table host" and stay at the table (to explain the doodling to the next group) during both rounds of questions; everyone else will join a new table. After a quick round of introductions, everyone will focus on answering the question for that round (we'll try to go through four rounds of questions this afternoon), during which, they can doodle and draw on the paper "tablecloths." After each question, we will briefly "harvest" the answers from each table. During the harvest we will post key ideas on the walls and summarize the insights shared during the small group discussion for the larger group. During the break everyone can review the ideas and insights shared through a "gallery walk" (walking by and reading the post-it notes on the wall).

What are the Expectations for Discussion Participants?
There is a standard set of expectations called, **Café Etiquette:**

Focus on what matters.

Contribute your thinking.

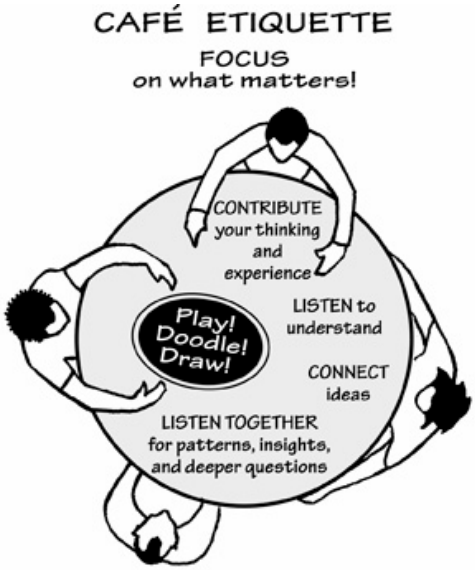
Listen to understand.

Link and connect ideas.

Listen together for deeper insights and deeper questions.

Play, doodle, draw! Writing on the table paper is encouraged!

Have fun!



What Questions will we discuss in our World Café?

1. Why is this project important to you?
2. How will you contribute to the overall project?
3. When it comes to sharing data, what are you most concerned about?

Appendix E: Summary of Key Research Findings

Summary of Key Research Findings Leading up to MOR2 Project

Ecological Findings from 1994-1995 Fieldwork in Bayankhongor Aimag

- Mongolian desert-steppe systems display non-equilibrium dynamics. Inter-annual variation in precipitation explains more of the variation in vegetation cover, species composition and biomass than grazing intensity.
- Mountain/forest steppe systems are equilibrium systems in which grazing intensity significantly influences plant cover, biomass and species composition.
- Steppe systems have characteristics of both equilibrium and non-equilibrium systems.
- It is important to measure multiple vegetation attributes (e.g. cover, biomass, species richness) in order to understand system dynamics.
- In the mountain/forest steppe and steppe, increasing distance from water points is associated with an increase in palatable grasses and a decrease in weedy forbs associated with disturbance.
- In all ecological zones, soil nutrient concentrations (nitrogen, phosphorus and potassium) were strongly associated with differences in species composition. Soil texture was also important in the desert-steppe.
- In the mountain/forest steppe and steppe P (phosphorus) and K (potassium) concentrations were negatively associated with distance from water, suggesting that livestock may harvest nutrients from the broader landscape and concentrate them near water sources. Thus livestock may affect plant species composition both through direct effects of grazing and trampling and indirect effects of nutrient redistribution (of P and K).

Herders' Ecological Knowledge and Environmental Observations
1993 & 2000

- Herders possess rich knowledge of their environment and ecological relationships, which is expressed in their management practices and institutions.
- Much of herders' knowledge coincides with scientific understanding of ecological relationships.
- Herders perceive declines in pasture productivity and species diversity, but attributed these to changes in climate or see them as temporary and reversible responses to overgrazing or other disturbances.
- Herders' knowledge can serve as the basis for future management institutions and provide potential monitoring indicators, and suggests that herders should be involved in designing rangeland tenure policies and monitoring approaches.

- However, herders' lack of experience with severe and irreversible rangeland degradation could prevent them from foreseeing the potentially negative consequences of their own actions.

2010

- Herders' perceptions of changes in temperature, rainfall and streamflow largely correspond to changes measured over time at meteorological stations and streamflow gauges, although in some instances they perceive declines in streamflow where the measured changes were not statistically significant.
- Most herders also perceived a decline in the amount of snow, but were divided in their perceptions of the timing of snowmelt. Slightly more herders in both the desert steppe and forest steppe perceived that snowmelt was coming later now.

Climate Change, Dzud and Their Impacts and Policy Implications

2010

- In 2010 we conducted case studies in 4 soum affected by the 2009-2010 dzud. Two soums were in the forest steppe and two in the desert steppe. In each zone, one of the soum had active CBRM groups and the other case study site did not.
- Households that did fall otor (in the forest steppe), stored more hay (desert steppe) and reserved spring pastures (desert steppe) had fewer livestock losses than those in the same region who did not do these practices. In soums where surface water has declined herders were unable to use pastures, and their animals did not gain enough weight to withstand the dzud conditions.
- CBRM organizations were effective in organizing herders to prepare well for winter by managing their pastures and storing hay, helped them to respond during the dzud (desert-steppe), and brought herders together after the dzud to learn from their experienced.
- In two of the soums incoming otor herders during the dzud created a "hoofed dzud" that led to greater losses for local herders.
- Key regional and national-level policy lessons from this study included:

1. Dzud preparation and response at all levels depends critically on clear policies to guide and capacity to implement pastureland governance across multiple scales. As national policies for pastureland tenure and management are revised and strengthened it is especially important to consider provisions for designation of dzud (otor) reserves at the local, aimag and national levels, and mechanisms to coordinate and regulate otor movements between different soum and aimag.
2. In order to improve coordination and communication among multiple agencies (National Emergency Management Agency (NEMA) and others) and relief organizations and different levels of government, it is important to identify the distinct roles of local, regional and national government, donor and aid organizations and community or-

ganizations and develop effective communication and coordination mechanisms between them.

3. Due to the different ecological and management characteristics of different geographical regions in Mongolia, regionally-specific recommendations for dzud preparation and response may be required.

- In another study completed in 2010, we analyzed changes in climate at two meteorological stations in Arkhangai and two in Bayankhongor Aimags, and changes in streamflow for the Khoit Tamir, Hanui and Tuin Rivers.
- Annual average temperature, and annual minimum temperature increased significantly at all sites, and annual maximum temperature increased significantly at all sites but Horiult in Bayankhongor.
- The number of rainy days increased significantly in Horiult, and average annual precipitation decreased significantly in both Arkhangai stations (Erndenemandal and Tsetserleg).
- Annual average stream discharge decreased significantly in both the Khoit Tamir and Hanui Rivers in Ikhtamir, Arkhangai, as did the annual maximum discharge. The annual average discharge of the Tuin River also decreased significantly, but the decline was much smaller than for the rivers in Arkhangai.
- These findings support other national-scale assessments of increasing temperatures, and also confirm herders' observations of warming. This research also documents the significant decline in streamflow in the rivers we evaluated. This observation also coincides with herders' perceptions.

Pastureland Tenure and Policy

1999

- A historical analysis of changing tenures and land-use patterns in Mongolia suggests that in prerevolutionary Mongolia wealth and poverty determined herders' mobility and access to pasture resources, a pattern that continues to the present time.
- Historical data also reveal dual formal (e.g. monasteries) informal (herder communities) regulatory institutions in the past that coordinated patterns of seasonal movement. This amounted to an unofficial tenure system and has contributed to Mongolia's legacy of ecologically and socially sustainable pastoralism.

2002 (based on fieldwork in 1994-1995)

- Mobile pastoralists have potentially conflicting needs for secure rights (tenure) in pasture and socially and spatially flexible patterns of resource use. For example, Mongolian herders need to be sure their reserved winter and spring pastures will not be grazed by others, so they are available during the harsh seasons. However, they also need the flexibility to move to different areas when weather or pasture condi-

tions are poor, and to camp with different households in different seasons or years. This paradox of pastoral land tenure poses problems for the management of pastoral commons.

- The vagueness, permeability, and overlap of boundaries around pastoral resources and user groups make it challenging to implement formal tenure regimes that aim to allocate rights to specific areas of land to well-defined groups of users.
- Three solutions to the paradox are evaluated: formal tenure (e.g. pasture leases), rangeland co-management, and regulation of herders' seasonal movements.
- An approach that develops and tests institutions to coordinate pastoral movements is recommended over formal tenure for pasturelands, which should be approached with caution in Mongolia.

2004 (based on fieldwork in 1999)

- In 1994, Mongolia's parliament passed the Land Law, which authorized land possession contracts (leases) over pastoral resources such as campsites. Implementation of leasing provisions began in 1998.
- This study examined the status of implementation in 1999, resurveying households in Bayankhongor that were studied in 1994-1995.
- Poorer herders were largely overlooked in the allocation of campsite leases, meaning they lacked secure rights to campsites.
- The wealthy had become more sedentary and the poor more mobile, perhaps because the latter lacked strong rights.
- There was a sharp decline in trespassing following lease implementation, but that many herders and officials expected pasture leasing to lead to increased conflict over pastures.
- The Land Law provides broad regulatory latitude and flexibility to local authorities, but the Law's lack of clarity and poor understanding of its provisions by herders and local officials limit its utility.
- In general, the implied goal of land registration and titling is an all-embracing land market and the advancement of private property rights. This goal is in conflict with Mongolia’s existing legal framework for pastureland tenure as well as local attitudes, which strongly oppose privatization of pasture.

2007

- 3rd re-survey, in 2006, of communities in Bayankhongor studied in 1994-1995 and 1999.
- Climate remains a driver of herders’ land use patterns and mobility is still a key strategy for dealing with climate variability. Many measures of mobility, such as the average distance moved, had increased since 1999.

- Global markets play an increasing role in land use through their effects on cashmere prices and resulting increase in goats, on one hand, and unregulated mining, on the other.
- Herder opposition to pastureland privatization continues but there is growing evidence of the need to regulate inter-soum and inter-aimag movements and provide more secure rights to pasture.

2008

- In a study to assess the implementation of the pastureland provisions of the Land Law, in 2007 we conducted key informant interviews and household surveys in 5 soum in 4 aimags (Selenge, Uvurkhangai, Tuv and Arkhangai) and compared the behavior of herders that were members of organized herders groups or pasture user groups to those that were not.
- We found members of organized herder groups (CBRM organizations) were more mobile than non-members, moving farther, more often, and using more different campsites. CBRM group herders also were more likely to make otor moves.
- CBRM group herders also had greater structural social capital as measured by their participation in national and local organizations, interactions with government officials, and support received from local organizations.
- CBRM group herders also scored higher than non-group herders on a scale that measured trust and reciprocity (cognitive social capital) among community members.
- Case studies of formally organized herder groups revealed that some groups were successful in organizing members to coordinate movements and reserve seasonal pastures but cross-boundary movements of herders from other soums often undermined these efforts.

Selected Bibliography of Past Research Results by CSU MOR2 Team Members

Books and Book Chapters:

Fernandez-Gimenez, M.E., X. Wang, B. Baival, J. Klein and R. Reid, eds. Forthcoming. Reconnecting Communities with the Land : Community-based Rangeland Management in China and Mongolia. Wallingford, UK: CABI.

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