

## **What Explains Positive Social Outcomes of Community-Based Rangeland Management in Mongolia?**

**Tungalag Ulambayar<sup>1,2</sup>, Maria Fernandez-Gimenez<sup>1,3</sup>, Batbuyan Batjav<sup>4,5</sup>, Batkhishig Baival<sup>6,7</sup>**

<sup>1</sup>Dept. of Forest & Rangeland Stewardship, Colorado State University, Fort Collins, CO 80523-1472, USA

<sup>2</sup><tungaa@rams.colostate.edu>

<sup>3</sup><Maria.Fernandez-gimenez@colostate.edu>

<sup>4</sup>Center for Nomadic Pastoralism Studies, Ulaanbaatar, Mongolia

<sup>5</sup><b\_batbuyan@yahoo.com>

<sup>6</sup>Nutag Action Research Institute, Ulaanbaatar, Mongolia

<sup>7</sup><batkhishig.baival@yahoo.com>

### **ABSTRACT**

Community-based rangeland management (CBRM) has been proposed as a promising option to reduce rural poverty and resource degradation in Mongolia. However, results have been mixed. Studies about the factors influencing CBRM success have been limited. We explored the mechanisms underlying social outcomes of Mongolian CBRM. The study revealed that access to diverse information, leadership, knowledge exchange and rules facilitated the effect of formal organization on pastoralists' traditional and innovative rangeland practices, proactive behavior, and social networking. Importantly, information diversity had a triggering effect on the other three facilitating variables. This chain of four mediators collectively increased the effect of the formal organization on the above social outcomes. We also found that ecological zone had a moderating effect on the relationship between formal organization and members' proactive behavior and social networking.

Keywords: community-based management, pastoralism, Mongolia, social outcomes

### **INTRODUCTION**

Several studies of Mongolian CBRM have revealed improved livelihoods, better resource condition and increased adaptive capacity (Usukh et al., 2010; Fernández-Giménez et al., 2012; Leisher et al., 2012). In contrast, others showed CBRM to be ineffective and potentially exclusionary (Upton, 2008; Murphy, 2011; Addison et al., 2013). Research on the relationships between factors that may explain mixed outcomes of CBRM has been limited, however. To address this gap, we examined how and why CBRM increases social outcomes and if the group's ecological zone influences this relationship. We advanced three hypotheses:

(1) The effect of formal organization on social outcomes is mediated by intermediate variables including access to diverse information sources, leadership, knowledge exchange, and the presence of rules.

(2) These four mediators are causally interrelated.

(3) The ecological zone moderates the mediated effect of formal organization on social outcomes.

In this study, pastoral groups sharing resources in the same area and organized into groups under external donor support are defined as formal CBRM groups. They had agreed-upon rules to manage rangeland resources, in contrast to informal non-CBRM groups practicing customary norms for resource use.

## STUDY SITE

We sampled 142 pastoral groups and 706 member households in four ecological zones including desert steppe, steppe, eastern steppe and mountain and forest steppe. Adjacent *soums* (counties) (N=36) were paired with (N=77) and without (N=65) CBRM groups in 10 *aimags* (provinces) of Mongolia.

## METHODS

### Survey

We collected data using household interviews and organization profile questionnaires. Household interviews measured household demographics, livelihoods, rangeland management practices, norms, behaviors, and social networks. The organization profiles represented an initial synthesis of the field data about each group's characteristics, organizational management, social capital, and leadership.

### Variables

The independent variables were organization status and ecological zone. The organization status was coded as either "no formal organization or non-CBRM" or "formal organization or CBRM." Ecological zone included four categories mentioned earlier.

Ultimate social outcomes were our dependent variables. Six ultimate social outcomes measured essential household assets, cognitive social capital (trust and norms of reciprocity), structural social capital (social ties for mutual assistance), rangeland practices, and proactive behavior. Traditional practices were a sum of 16 customary practices such as seasonal moves and setting aside reserve pastures. Innovative practices included 19 different activities recently introduced by donors. Proactive behavior measured members' reports of constructive actions to solve rangeland issues. Intermediate outcome variables were dependent on organization status and ecological zone but functioned as independent for ultimate social outcomes. Intermediate outcomes included information diversity, perceptions about local leadership, reported knowledge exchange within and outside of the group, and the presence of rules for rangeland management.

### Analysis

We used a regression-based conditional process analysis (Hayes, 2013) to test a moderated mediation effect of organization status on ultimate social outcomes. This is a causal model where a mediator links a cause and an effect, and explains "why" and "how" this causal process occurs (Wu and Zumbo, 2008). A moderator modifies this causal effect and clarifies "when" or "for whom" independent variable most strongly causes dependent variable (ibid). We used a serial-multiple mediator model of the path analysis using bias-corrected bootstrap confidence intervals (5,000 bootstrap samples) introduced by Hayes (2013). His PROCESS software provided estimates for the total effects (c), direct effects (c'), and total indirect effects (c-c') as well as specific indirect effects (the total indirect effect is a sum of these specific effects). For the moderation test, we used a model that treated four mediators as parallel controlling combined indirect effects on social outcomes. To define causal relationships between the four intermediate

variables, we conducted multiple regressions controlling organization status and ecological zone.

## RESULTS

We found a significant interdependence of four mediators except the relationship between leadership and the presence of rules. Information diversity significantly affected the other three mediators at  $p < .05$ :  $\beta = .38$  on leadership,  $.39$  on rules and  $.29$  on knowledge exchange. Leadership had a significant effect on information diversity and knowledge exchange (both  $\beta = .35$ ,  $p < .01$ ). Knowledge exchange had a significant positive effect on information diversity and leadership ( $\beta = .25$  and  $.34$ ,  $p < .01$  respectively) and a negative effect on rules ( $\beta = -.19$ ,  $p < .05$ ). Rules significantly influenced information diversity ( $\beta = .31$ ,  $p < .01$ ) but had a significant negative effect on knowledge exchange ( $\beta = -.17$ ,  $p < .05$ ). We placed the mediators in a causal sequence based on the strength and magnitude of the association as well as on the basis of reported order by donors.

A total effect of organization status on ultimate social outcomes is a sum of its direct effect on outcomes and the indirect effects through mediators. We found a significant total indirect effect of organization status on four ultimate social outcomes: traditional ( $c-c' = .72$ ) and innovative (.76) rangeland practices, proactive behavior (.44), and structural social capital (.37) at 95% bias-corrected confidence intervals (CI). Accordingly, the total effect was significant ( $c = 1.05$ ,  $1.21$ ,  $.74$  and  $.31$  for traditional and innovative practices, proactive behavior, and structural social capital respectively at  $p < .01$ ). We note that only proactive behavior had a partial mediation or a significant direct effect of organization status ( $c' = .30$  at  $p < .05$ ) while the other three outcomes were fully mediated (i.e. no significant direct effect) by the serial-mediators.

We also examined which mediators were more influential for transferring the effect of formal organization onto social outcomes. These indirect effects were channeled through information diversity path alone onto traditional practices ( $B = .52$ ), innovative practices (.62), proactive behavior (.20) and assets (.45). Information diversity and leadership together transferred the organization effect onto traditional practices ( $B = .16$ ), proactiveness and structural social capital (.11 each) and cognitive social capital (.05) with 95% of bias-corrected CI. Other paths had small indirect effects. Figure 1 shows these two influential paths. A contrast test indicated a significantly greater specific indirect effect on traditional practices through information diversity compared to the path through information diversity and leadership.

Ecological zone significantly moderated two ultimate social outcomes with the significant mediation effect at  $p < .05$  (Figure 2). Desert steppe ecological zone had a significant positive moderation of the indirect organization effect on proactive behavior through agreed rules ( $B = 1.19$ ). However, the steppe zone had a significant negative moderation of the same path ( $B = -.60$ ). Eastern steppe also had a significant negative moderation on structural social capital through leadership ( $B = -1.82$ ).

## DISCUSSION

The results partially supported our hypothesis about the mediation effect of intermediate variables. The effect was found on four of six ultimate social outcomes including traditional and innovative rangeland practices, proactive behavior, and structural social capital. The most influential mediators that explain the effect of organization status on the four ultimate social outcomes were information diversity and information diversity together with leadership. The second hypothesis was supported with significant relationships among the four mediators. The results revealed a sequential order of these factors, where better access to information triggered an increase in subsequent variables including leadership, knowledge exchange and the presence of rules. However, rules were negatively associated with leadership and knowledge

exchange. Lastly, the significant moderation of ecological zone partially supported our third hypothesis affecting only two social outcomes. The desert ecological zone has a positive moderation effect on the effect path to proactive behavior through agreed rules. The same path was negatively moderated by the steppe zone. We also found that the path to structural social capital through leadership was less effective for eastern steppe CBRMs.

The results were consistent with our prior findings that formal organization had a stronger effect on proactive behaviors and rangeland management practices than on other social outcomes. We note that rules had a negative effect on several outcomes although the effect was not significant. Many studies highlight the importance of resource users' participation in designing rules for their successful enforcement. Further study is necessary to examine the reasons behind the negative influence of rules on social outcomes found in this study.

The fact that the mediation of information diversity alone was powerful in increasing traditional and innovative practices is worth noting. It may imply that adequate education and training is the key for herders to revive proven traditional practices and introduce new adaptive methods for rangeland management.

## **IMPLICATIONS**

The study has theoretical, practical and methodological implications. The results partially confirm that the formal organization of resource users increases their social outcomes. These outcomes are theorized to be essential to long-enduring successful commons institutions (Ostrom, 1990; Agrawal, 2002). In the Mongolian context, such outcomes included herders' traditional rangeland management practices, recently introduced management innovations, and herders' pro-activeness in bringing rangeland-related issues to local authorities for solutions. The study contributes to commons theory by examining underlying mechanisms through which formal organizations affect social outcomes. It showed that formal organization of herders could achieve social outcomes given their access to information, increased leadership, knowledge exchange and resource rules.

Commons theory also predicts better outcomes of commons institutions in resource-rich areas such as steppe and eastern steppe with relatively stable and predictable production. In contrast, successful collective action and resulting outcomes are anticipated to be more challenging in areas with unpredictable patchy production such as the desert steppe (Schlager et al., 1994). Our findings showed differences among ecological zones, potentially associated with their resource characteristics. However, contrary to predictions, we observed more proactive behavior and social networking among desert steppe CBRM members. Further, these results were in line with our prior findings of higher levels of reciprocal norms and mutual assistance in the desert steppe groups (Ulambayar, 2015). Overall, our findings suggest that the mixed conclusions about CBRM reported by past studies may be explained in part by failure to consider mediating and moderating factors and the sequential order of intermediate variables during the CBRM implementation.

We propose that social outcomes such as CBRM members' proactive behavior about rangeland matters and their rangeland management practices are building blocks for successful collaboration among resource users. These household-level outcomes are important first accomplishments of the emerging commons institutions that help to overcome inherent social dilemmas for resource use. For the goal of large-scale resource management, these achievements should gradually expand to interactions and cooperation beyond household groupings. Hence, in the pastoral context, the pace of progress seems important. The study groups had an average of five years' experience of collective action and in this timeframe were able to increase outcomes primarily in

rangeland practices and behaviors. It may require more time and experience to revitalize trust and strengthen reciprocal relationships among resource users.

Two major policy implications emerge from this study. First, policy for CBRM development should prioritize information and training to herders. Educating herders and local leaders first is a necessary step for CBRM facilitation. Second, policy should aim to provide organized groups with mediating factors including information access, knowledge exchange, leadership and rules for resource use to support proactive behaviors and management practices thought to benefit resource conditions. Methodologically, the conditional process analysis provided a powerful tool to test underlying mechanisms for achieving CBRM social outcomes. Finally, our study highlights the need for further research to elucidate why rules have a negative effect on social outcomes, how rules were negotiated, and the specific content of resource use rules.

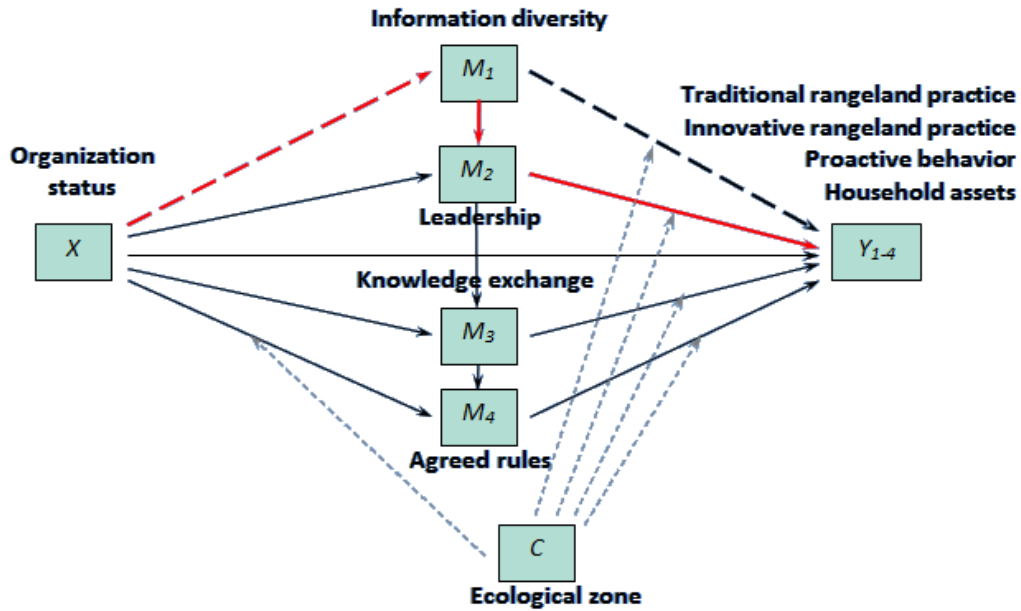
## ACKNOWLEDGEMENTS

This research was sponsored by the National Science Foundation award No. BCS-1011801, “Does community-based rangeland management increase coupled systems’ resilience to climate change in Mongolia?”

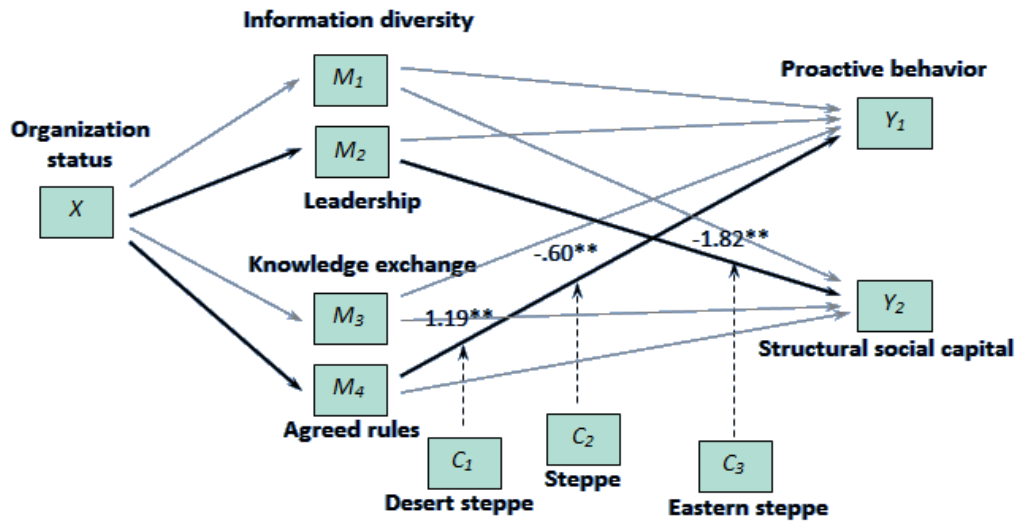
## REFERENCES

- Addison J, Davies J, Friedel M, Brown C. (2013). Do pasture user groups lead to improved rangeland condition in the Mongolian Gobi desert? *Journal of Arid Environments*, 94(0), 37-46.
- Agrawal A. (2002). Common resources and institutional sustainability. In (Ostrom E, ed.), *Drama of the Commons*, National Academy Press, Washington DC, p41-85.
- Fernández-Giménez ME, Batkhishig B, Batbuyan B. (2012). Cross-boundary and cross-level dynamics increase vulnerability to severe winter disasters (*dzud*) in Mongolia. *Global Environmental Change*, 22(4), 836-851.
- Hayes AF. (2013). *Introduction to mediation, moderation, and conditional process analysis a regression-based approach*. The Guilford Press, New York.
- Leisher C, Hess S, Boucher TM, van Beukering P, Sanjayan M. (2012). Measuring the impacts of community-based grasslands management in Mongolia's Gobi. *PLoS ONE*, 7(2), e30991, [doi: 10.1371/journal.pone.0030991].
- Murphy DJ. (2011). *Going on otor: Disaster, mobility, and the political ecology of vulnerability in Uguumur, Mongolia*. PhD dissertation, University of Kentucky.
- Ostrom E. (1990). *Governing the commons: The evolution of institutions for collective action*. Cambridge University Press, Cambridge.
- Schlager E, Blomquist W, Tang, SY. (1994). Mobile flows, storage, and self-organized institutions for governing common-pool resources. *Land Economics*, 70(3), 294-317, [doi: 10.2307/3146531].
- Ulambayar T. (2015). *Social outcomes of community-based rangeland management in post-socialist Mongolia: Influential factors and favorable institutional designs*. Unpublished PhD dissertation, Department of Forest and Rangeland Stewardship, Colorado State University.
- Upton C. (2008). Social capital, collective action and group formation: Developmental trajectories in post-socialist Mongolia. *Human Ecology*, 36(2), 175-188, [doi: 10.1007/s10745-007-9158-x].
- Usukh B, Binswanger-Mkhize HP, Himmelsbach R, Schuler K. (2010). *Fostering the sustainable livelihoods of herders in Mongolia via collective action*. Swiss Agency for Development and Cooperation (SDC), Mongolian Society for Rangeland Management, Ulaanbaatar, Mongolia.

Wu A, Zumbo B. (2008). Understanding and using mediators and moderators. *Social Indicators Research*, 87(3), 367-392, [doi: 10.1007/s11205-007-9143-1].



**Figure 1.** Schematic of the mediated effect of organization status on four ultimate social outcomes through serial-mediators: bold lines represent a variable's effect on other variables and arrows show the direction of the effect. Ecological zone moderates the combined effect of mediators ( $M_{1-4}$ ) and organization status ( $X$ ) on ultimate social outcomes ( $Y_{1-4}$ ) shown by pecked grey lines. Information diversity alone (bold pecked lines) was the most influential path, and the second influential was the path through information diversity and leadership (red line)



**Figure 2.** Significant conditional indirect effect of the organization status on two ultimate social outcomes through four mediators is shown by bold lines. Desert steppe had a significantly positive moderation (pecked line) of the indirect effect of the organization status on proactive behavior of members through rules. Eastern steppe and steppe zones had a negative conditional indirect effect (pecked line) on proactive behavior and structural social capital through leadership and rules respectively. Unstandardized coefficients are shown at  $p < .05$  shown by two asterisk.