Participatory Mapping and Herders' Local Knowledge on Mongolia's Landscapes and Socio-ecological Boundaries

Arren Mendezona Allegretti[1,2], Melinda Laituri[1,3], Batbuyan Batjav[3], Batkhishig Baival[4]

[1]Ecosystem Science and Sustainability, Colorado State University, Fort Collins, CO, USA 80523-1476 [2]<amendezona@gmail.com>
[3]<Melinda.Laituri@colostate.edu>
[4]Center for Nomadic Pastoralism Studies, Ulaanbaatar-210646 Mongolia <b_batbuyan@yahoo.com>
[5]Nutag Partners, Ulaanbaatar-210646 Mongolia <batkhishig.baival@yahoo.com>

ABSTRACT

Socio-ecological boundaries delineate landscapes containing natural resources that are differentially accessed and managed by stakeholders. These boundaries may be human-demarcated and biophysical serving as tangible and intangible features delineating landscapes. Our purpose is to explore Mongolian herders' perceptions of their pasture and boundaries through participatory mapping processes. Our research questions include: 1) what boundaries are depicted on herders' participatory maps? and 2) how are boundaries discussed through herders' participatory mapping narratives? We conducted participatory mapping and informal interviews (n= 35) with herder groups and district officials in Arkhangai, Tuv, Dornod, and Dornogovi. We qualitatively coded participatory mapping narratives and applied visual grounded theory. Tangible features on participatory maps included economic, hydroclimatic, geomorphological, and ecological boundaries portrayed as springs, landforms, vegetation types, seasonal camps, wells, and roads. Non-physical intangible boundaries such as governance arrangements were evident in participatory mapping narratives and served as human demarcated boundaries for accessing seasonal camps, markets, government assistance, and resources for herder migration. The relationships among herder mobility, governance boundaries, and biophysical pasture boundaries are coupled and dynamic, resulting in multi-dimensional outcomes of herder livelihoods.

Keywords: socio-ecological boundaries, local knowledge, participatory mapping

INTRODUCTION

Livelihoods and adaptive practices are shaped by the intersection of boundaries, institutions, and access to natural resources (Ostrom, 2009). Socio-ecological boundaries delineate landscapes containing natural resources that are differentially accessed and managed by diverse stakeholders. Examining socio-ecological boundaries integrates local ecological knowledge, acquires a systems view for investigating complex socio-ecological research questions, and develops practical frameworks useful for effective decision-making and policy (Barham, 2001). Investigating how socio-ecological boundaries are perceived, managed, and transformed by stakeholders and boundary

spanning institutions are crucial facets to achieving sustainability goals (Buzinde and Manuel-Navarrete, 2013). This paper aims to explore herders' perceptions of their pastures and pasture boundaries in Mongolia. We apply participatory mapping to examine 1) what boundaries are depicted on herders' participatory maps? and 2) how are boundaries discussed through herders' participatory mapping narratives? We focus this paper on Mongolian traditional and community-based rangeland management (CBRM) herder groups examined by the Mongolian Rangelands and Resilience (MOR2) project.

Socio-ecological Boundaries

Socio-ecological boundaries may be comprised of human-demarcated and biophysical boundaries. Human-demarcated boundaries involve patterns of human behavior that characterize socio-ecological systems and establish the separation among ecological, socio-economic, and political spaces (Newman, 2003). For example, human-demarcated boundaries may demarcate areas with ecological and socio-economic resources managed by distinct individuals and/or institutions. Socio-ecological boundaries may be both intangible and tangible. Tangible boundaries visibly or materially delineate landscapes, such as fences signifying administrative boundaries or visible vegetation communities influencing wildlife species habitat and livestock grazing areas. Intangible boundaries include invisible social and biophysical processes delimiting landscapes. Examples include soil types influencing vegetation communities and cultural norms driving human behavior for managing landscapes.

CBRM context

CBRM institutions include herder groups engaging in formal activities facilitated and funded by donors. Activities involve collectively sharing pasture resources through formal agreed-upon rules and informal rules for grazing. An approach to CBRM is facilitating pasture-user group (PUGs) that includes herders grazing within a territory. The preparation of pasture management plans (PMP) is required from the PUG. PMPs guide land use contracts among herder groups and regulate pasture resting, well management, seasonal rotations and the fencing of haymaking areas. The creation of new territorial boundaries based on PMPs inevitably influences the existing human relationships, norms, and boundaries on pastures (Fernandez-Gimenez, 2002). PUGs, PMPs, and land use contracts formalize rules and demarcate territories, thus serving as human-demarcated boundaries. The formalization practice involves processes and structures by which stakeholders make decisions and share power (Ostrom, 2009).

Participatory Mapping Processes and Nutag Framework

Participatory (PAR) mapping is a form of counter-mapping, a technique used to challenge power relations in cartographic processes and products (Gilmore and Young, 2012). PAR mapping involves multiple participants drawing and negotiating diverse representation of their landscapes and sense of places. PAR mapping is also a process and technique to involve diverse world views about their landscapes, including the socio-ecological boundaries represented in practices, norms, and landscape outcomes. In Mongolia, PAR mapping is certainly not a new process and has been applied by many donors to map herder's territories and PMPs, particularly with using Geographic Information Systems (GIS). Our motives differ from the latter in that we are interested in applying the process of participatory mapping to explore how herder's discuss their world views about pastures and boundaries. Thus, we focus on herder's narratives about their PAR maps rather than a final GIS map of their pastures.

We combine PAR mapping processes with the *Nutag* approach and framework to explore herder's view of their pastures (Baival, 2012). *Nutag* is a term depicting indigenous worldviews about hometown, territory, pasture resources, common knowledge and ties to nature (Baival, 2012). *Nutag* is also a conceptual space signified by a physical central point, such as a campsite, dictating practices, norms, and mobility

(Murphy, 2011). Baival (2012) recommends a *nutag* framework to donors and NGOs, where local ecological knowledge and adaptive practices are incorporated in pasture management plans and land use contracts. The nutag framework may also guide participatory research tools for examining the role of socio-ecological boundaries in herders' adaptive practices and livelihoods.

STUDY SITE

Study sites were selected within MOR2 research locations and represented diverse ecological zones (Figure 1). Participatory mapping sessions occurred during the summers of 2013 and 2014 in six counties (*soums*): Ikh Tamir in Arkhangai province (*aimag*), Undurshireet in Tuv *aimag*, Tsagaan Ovoo and Sergelen in Dornod *aimag*, and Saikhandulan and Altanshiree in Dornogovi *aimag* (Figure 1).

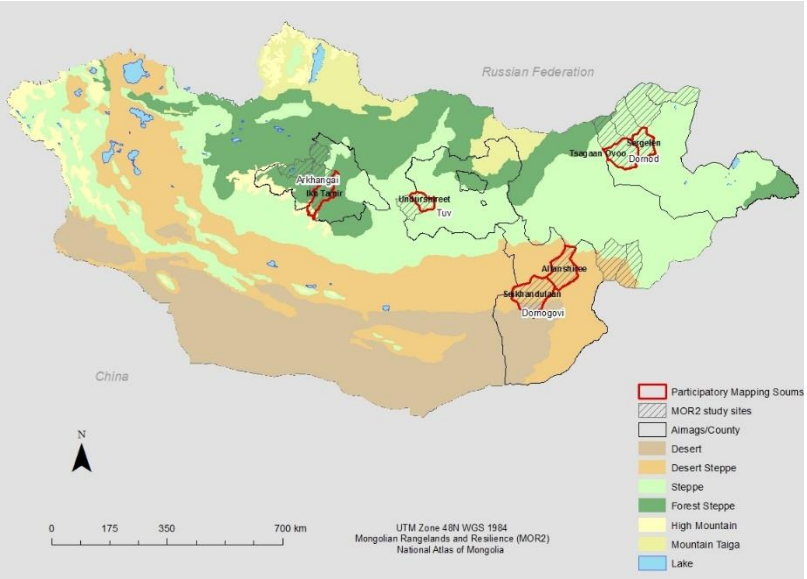

Figure 1. Participatory mapping study sites.

METHODS

We requested the herders to draw places of significance as well as natural and human made features on their *nutag* after herder leaders granted us permission. We purposely gave very little instruction to avoid our western conceptions of boundaries and integrate participant's own ways of thinking. We handed them a blank paper and markers, where families drew their pastures and determined the legend, extent and scale of their map. The participatory mapping processes took 1-2 days for each herder group, particularly as herders negotiated the representation of their pastures. Herders and researchers engaged in conversations about their pastures, especially as we asked questions of why certain places were important to them. As participant observers, we considered these conversations important for developing relationships and learning about herder views of their pastures.

Data sources included the participatory maps, narratives, and informal interviews with herder leaders and APUG representatives (n= 35). Herders' narratives during participatory mapping allowed researchers to move beyond map content for revealing emic perspectives. Field notes documented translated narratives, informal interviews, and personal observations of the participatory mapping process.

Participatory maps and herder narratives were qualitatively coded using grounded theory and visual grounded theory respectively (Konecki, 2011; Strauss and Corbin, 2007). Grounded theory includes the process of generating codes from qualitative data where recurring patterns, themes, codes, and a general theory emerge. Visual grounded theory concentrates on slices of visual data (i.e., maps) and involves constructing categories, memo writing, selective coding, theoretical memo writing, and comparative analyses of images for validating relationships among codes for examining research questions. These analyses allowed for a greater examination of the context and content behind the participatory mapping process.

RESULTS AND DISCUSSION

Participatory Maps and Views of Boundaries

Boundaries in herders' maps included biophysical and human demarcated boundaries of their pastures. We consider these as tangible boundaries since these materially delineate territories belonging to their kin and/or PUG. These boundaries can be categorized into economic, ecological, hydroclimatic, geomorphological, and political. Economic boundaries included seasonal camps, pasture reserves, wells, and roads. These boundaries may be tangible to herders since these delineate visible assets or resources on landscapes. Roads and wells delineate pastures and resources significant for herders. Winter shelters are visible on a landscape and symbolize ownership and exclusion of resources in the surrounding winter camp. Tightly coupled with economic boundaries include vegetation serving as ecological boundaries in delineating suitable pastures for certain types of livestock. Vegetation such as palatable grass for sheep distinguishes pastures and influences forage quality significant for livestock types and livelihoods. Herders' local knowledge on locations of palatable grass was consistently conveyed in herder's maps and noteworthy in determining pastures deemed suitable to herders with a certain livestock composition.

Geomorphological, hydroclimatic, political, and economic boundaries are interlinked, mainly since these influence placement and access of seasonal camps and shelters crucial for herder movement. For instance, the placement of winter camps is partially influenced by geomorphological and hydroclimatic boundaries in rangelands. Geomorphological boundaries such as leeward areas of valleys are ideal sites for winter camps because they shelter livestock serving as economic assets for herding families. Natural springs serve as hydroclimatic boundaries because they delineate water access points for livestock and serve as drivers for seasonal movement and placement of winter camps and shelters. Acquiring winter shelters is mainly driven by inheritance, usually by the senior herder (Fernandez-Gimenez, 2002).Winter shelters serve as economic boundaries and assets that can be owned, bought, and sold by families. Access to winter shelters and reserve pastures especially in times of natural disasters such as *dzuds* involve herders from other *soums* and PUGs crossing political and geomorphological boundaries to access resources.

Narratives of Non-Material Human Demarcated Boundaries and Governance

Herders referred to human demarcated boundaries when they discussed arrangements and contracts for mobility and grazing. These included processes and contracts that influence how pasture resources or assets are accessed, allocated, and utilized (Murphy, 2014), hence serving as *governance boundaries*. These boundaries separate grazing territories, and guide movement for accessing pasture resources and markets.

Narratives of governance boundaries included accessing winter camps, markets, government assistance, and inter and within *soum* migration. The process of accessing winter camps involves traditional arrangements among kin and bureaucratic arrangements among PUGs, Associations of PUGs, soum land officers responsible for

developing their pasture management plans and land use certificates. Winter shelters are accessed and secured through long-term leases registered with the soum government. Herding families may have exclusive ownership and secure access to their winter shelters, but do not have legal ownership over the pasture surrounding their winter shelters. Despite the lack of legal ownership of winter camps, it is customary for herders to respect winter camp boundaries. These intangible human-demarcated boundaries are determined by norms, local knowledge, and herder conceptions of their pastures.

Differing views of pastures included the need of flexibility and security to pasture resources, markets, and government assistance especially times of *dzud* (Fernandez-Gimenez et al., 2012). The capacity for accessing goods and government services may create governance boundaries between donor- funded and traditional herder groups (Baival, 2012; Upton, 2008). Significant goods and services evident in herder's narratives included acquiring government loans and donor aid for cashmere processing, haymaking capacity, well maintenance, and transportation services. Accessing markets and government assistance are significant for PUGs who have formal agreements among local soum government.

IMPLICATIONS

Examining socio-ecological boundaries respected by herder groups may be helpful for local and national policy-decision making. The Mongolian parliament has introduced pastureland legislation to provide clear guidelines for legal decision-making in accessing and sustaining pasture resources (Fernandez-Gimenez et al., 2008). Similar to past land laws, gaps exist in allocating access to pasture resources and winter shelters. Integrating herders' perspectives of their pasture boundaries into land laws may address some policy gaps in facilitating herder mobility, promoting stewardship and securing access to pasture resources crossing boundaries. For example, addressing the existence of these pasture boundaries may reveal specific compliance challenges with pasture reserves targeted by multiple aimag and soum officials. Soum officials currently may consult with herder groups across administrative boundaries for improving pasture management plans and securing access to pasture reserves.

Donors and local governments providing assistance to herder groups may focus on human-demarcated boundaries tied to accessing markets and pasture resources. Donors and local governments emphases on biophysical boundaries coupled with livelihood concerns are common approaches for managing sustaining rangelands. The integration of intangible human-demarcated boundaries allows donors to integrate herders' norms into policy for accessing pasture assets, markets, and facilitating herders' mobility.

Participatory mapping is a common donor strategy for integrating herders' local knowledge and perceptions of territories. However, the focus on the sole content of participatory maps may only highlight the tangible physical boundaries and neglect the intangible human-demarcated boundaries influential in herders' livelihoods. The work presented in this paper highlights the significance of participatory mapping narratives in revealing intangible human-demarcated boundaries vital to herders' livelihoods and pastures. Participatory mapping processes may incorporate the nutag approach/framework crucial for co-learning about socio-ecological boundaries in Mongolian rangeland management. Participatory mapping is a recommended process for local governments to use as a meaningful tool for linking herder's knowledge and perceptions with governments and expert knowledge for adaptive capacity building (Baival and Fernández-Giménez, 2012).

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