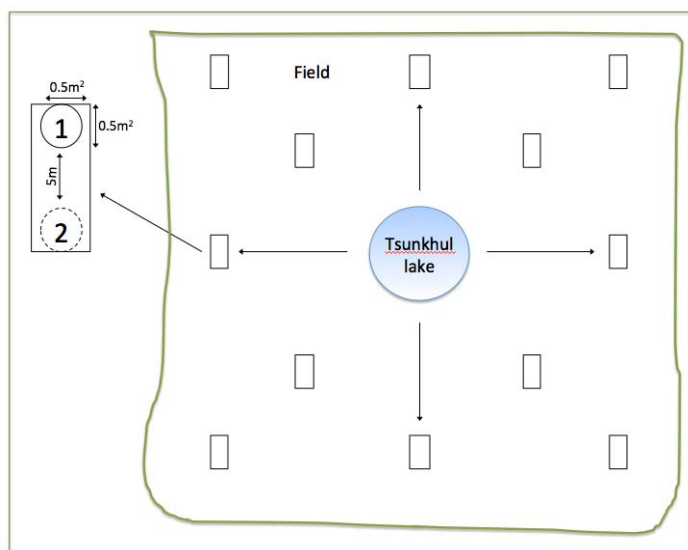


Pasture monitoring (Biomass sampling) – Summer pasture in Western Mongolia

Pasture monitoring is a standardised method for land managers to assess and to measure changes to various attributes of pastures quality. Sites for monitoring must be carefully selected to be representative of a given pasture. The more variable the vegetation is across the area, the more plots should be caged and clipped. The key attribute is standing biomass, typically clipped with scissors, dried, and expressed in kg dry weight/ha area. If samples are sequentially taken from adjacent plots at different points in time, any increase in biomass between the current and the previous harvest can be seen as the additional increase in biomass yield. Our resources are limited, harvesting once at peak standing crop (end of July) is an alternative. Given that most Mongolian pastures are grazed, assessments of productivity require that small plots are protected from grazing by small fences / grazing cages. Ungrazed biomass in the enclosure, then allows to estimate growth.

Photo 1: General overview of fences in summer pasture in mountain meadow, mountain steppe vegetation.



Establishment activities

1. Building fences/grazing cages

Maintenance

In year 1 (to be repeated annually):

1. Placing fences being 50cm x 50cm in size in the field wherever vegetation type and cover changes.
2. Mark control side 5m south of the fence but in the same vegetation.
3. Take biomass samples from control side and fenced side. Use squares of 40 cm x 40 cm (skip edges) and clip 1 cm above ground (every months or alternatively at end of July during maximum development). 1cm above the ground shortly before animals graze and repeat after grazing period ends. In permanently grazed places, take biomass samples monthly.
4. Allow to air-dry for four to five days.
5. Weigh dry forage.
6. Report the size of the square, the number of samples taken, and the dry forage weight.

Input and cost for 30 fences (US\$)

Equipment	20
Material for fence	175
Labour: establishment	45
Labour: maintenance (in 1 year)	60
Total	300

Labour requirements

For establishment: medium

For maintenance: low

Knowledge requirements

For advisors: moderate

For herders: basic

Technical drawing: From each sampling point takes 2-biomass samples.

Photo 2. Biomass sampling points in case study area, Tsunkhul lake, Bulgan soum Bayan-Ulgii province



During our vegetation survey study we found 2 types of pasture in Tsunkhul lake area.

1. Mountain meadow – dominated by indicator species for of pasture degradation *Carex duriuscula*.
2. Mountain steppe

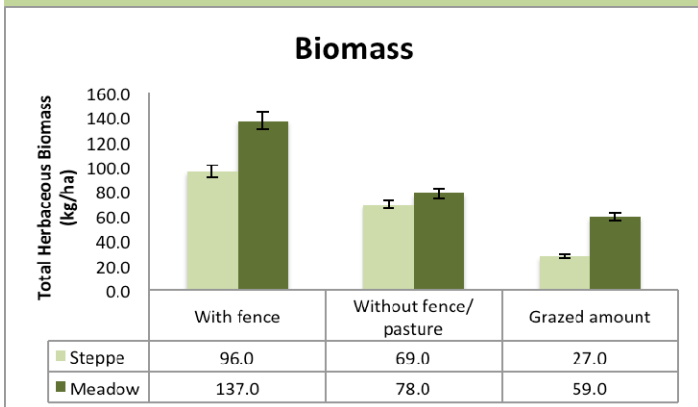
Example ecological conditions Tsunkhul lake

- Altitude: 2430 m a.s.l
- Mean annual precipitation: 300 mm
- Mean annual temperature: -4.5
- Growing Degree Days >8⁰ C: 107
- Soils: dark Kastanozem and Chernozem soils, average pH – 7.3

Socio-economic conditions

- Type of land users: herders
- Total numbers of animals during grazing period (Mongolian Sheep Units): 13921
- Grazing area (ha): 15874 (Mountain steppe 14424, mountain meadow 1450)
- Herders are ethnically and politically diverse (Kazakh, Torguud and Uriankhai)

Figure 1. Biomass sampling points



When pasture area and livestock numbers are known, monitoring pasture carrying capacity and stocking rate is simple: One sheep unit consumes 1.5kg forage per day (constant number in Mongolia). Based on biomass estimates from fences, we calculated Tsunkhul lakes carrying capacity during summer as follows:

Example forage uptake in mountain steppe with 13921 livestock units (totals MSU as above) x 1.5kg = 20881.5 kg/day. Available biomass: 14424 ha (mountain steppe) x 69kg (measured mean biomass productivity) = 995256 kg; Maximum grazing duration 995256 / 20881.5 = 47.6 days. Of these, 20-30% should remain to avoid overgrazing, so ideal grazing duration is ca. 38 days only.

Tsunkhul lake's maximum number of days current herds can graze

Mountain steppe	47.6
Mountain meadow	5.4

Tsunkhul summer pasture is usually grazed for 75 days (~05 June–20 August), oand thus 2 times overgrazed. Controlling herd size thus is strongly recommended.

Main contributors: ^{1,2}Oyundari Chuluunkhuyag, ¹Oyuntsetseg Batlai, ²Karsten Wesche.

¹Department of Biology, Division of Natural Sciences, School of Arts and Sciences, National University of Mongolia, Ulaanbaatar 210646, Mongolia;

²Senckenberg Museum of Natural History, Görlitz, PO Box 300 154, D-02806 Görlitz, Germany

Key references:

1. Pegler, L. *Pasture monitoring*: a tool to help graziers learn about ecological sustainability; *Conservation outside nature reserves*. 279–281 (1997).
2. Kent, M. & Coker, P. *Vegetation Description and Data Analysis; A practical approach*. (Wiley Blackwell, 2012).