



# МОНГОЛЬСКОЕ ПЛАТЮ

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### Some soums' pasture land use in Kharaa river basin area

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### Использование пастбищ в сомонах бассейна реки Хараа

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**Abstract:** Pasture land is the main support base for the livestock production. The unified land fund report of 2015 indicates 1025.05 thousand ha area used for agriculture from the total of 1771.98 thousand ha area included in study area. Total of agriculture land comprise pasture 79.2%, crop 15.5%, hay 4.75 and other types 0.6% area respectively. Pasture land percentage in total area of soum differs even though the pasture land area rates the high number in agriculture land. Pasture land area decreased constantly for the past 10 years since 2005. Pasture land area of 812.15 thousand ha registered in 2015 where the number is decreased by 33.28 thousand ha comparing to the year of 2005. Pasture area decreases every year whereas livestock numbers increase every year. Total number of 468206 head animals grazed in 2005 along the study area's soum and the number increased by 1.9 times in 2010 and 2.1 times in 2015.

**Key words:** land use, pasture land, agriculture land, livestock.

#### Introduction

Kharaa river basin area comprises economically important Central region's 18 soums of Selenge, Tuv and Darkhan Uul province and covers Ulaanbaatar city's Songinokhairkhan district's 21<sup>st</sup> microdistrict area. Industry, livestock and agriculture plays significant role for the province and soums' economic structure in this river basin area. Moreover, the area has relatively decent development of transportation, telecommunication, energy power and business sectors. Dense population settlement due to the industry and infrastructure development forms the different types of land use condition. Therefore, it's important for the future sustainable use, protection and planning to understand the local area's land use and change. This article presents the some soums' pasture land use and change in Kharaa river basin based on unified land database and other statistic materials.

**Method:** Study area: Total of 11 soums of Tuv, Selenge and Darkhan Uul province included in the study area. Herein: Batsumber, Bayanchandmani, Bornuur, Jargalant, Sumber soum, Tuv province; Bayangol, Mandal soum, Selenge province; Orkhon, Khongor and Darkhan soum, Darkhan Uul province respectively.

**Materials:** Unified land fund report materials of Tuv, Selenge, Darkhan Uul province (2005, 2010, 2015), statistical year book of Tuv, Selenge, Darkhan Uul province, topographic map with 1:100000 scales, field study material and other related materials used.

Collected materials during the research study processed using the MS.Excel program and the land use map developed by using the ArcGIS software.

Preliminary data materials for the research study use collected and processed on province-soum administration units. The current condition of the study area's soum's pasture utilization and its change determined and estimated based on present soum's unified land fund report. For this, pasture utilization change estimated by present year's data compared with basic year's database. Pasture utilization change in certain period estimated by the following formula;

$$P = \frac{P_i * 100}{B} - 100$$

$P$  – pasture change percentage (increase/decrease);  $P_i$  – present years pasture area /ha/;  $B$  – pasture area comparing year /ha/; 100 – coefficient

Each animal types converted into sheep head unit coefficient when estimating the animal in per ha pasture area. Herein, 1 camel – 5 sheep, 1 horse – 7 sheep, 1 cow – 6 sheep, 1 sheep – 1 sheep, 1 goat – 0,9 sheep.

Livestock estimation formula;

$$L_{dens} = \frac{L}{A}$$

$L_{dens}$  – livestock density,  $L$  – livestock number,  $A$  – total area

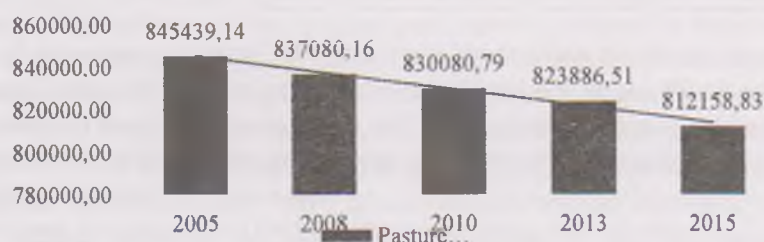
## Results

The main economic sector of Mongolia is the livestock production. Kharaa river basin area's natural condition is favorably suitable for the agriculture and became the core region for the agriculture production coordinating with the country policy and has the character of managing livestock production besides agriculture. Pasture land is the main support base for the livestock production. The unified land fund report of 2015 indicates 1025.05 thousand ha area used for agriculture from the total of 1771.98 thousand ha area included in study area. Total of agriculture land comprise pasture 79.2%, crop 15.5%, hay 4.75 and other types 0.6% area respectively. Basically, agriculture land is utilized for the pasture land use type based on above numbers in the research area. Pasture land percentage in total area of soum differs even though the pasture land area rates the high number in agriculture land /table 1/. This relates with several conditions such as present soum's natural and geographical peculiarity, agriculture development policy, land area and the lack of land reserve for different types of land use development.

**Table 1.** Soum pasture land size in total soum area, 2015

Soums	Total area, ha	Pasture area, ha	Pasture land percentage in total area
Darkhan	9813	1431.56	14.59
Khongor	263957	137928.58	52.25
Orkhon	44177	34252.08	77.53
Bayangol	197628	135424.54	68.52
Mandal	484373	106299.12	21.95
Saikhan	131187	88471.8	67.44
Batsumber	243116	82472.46	33.92
Bayanchandmani	61315	40974.2	66.83
Bornuur	114687	62901.24	54.85
Jargalant	186803	99452.57	53.24
Sumber	34930	22550.67	64.56

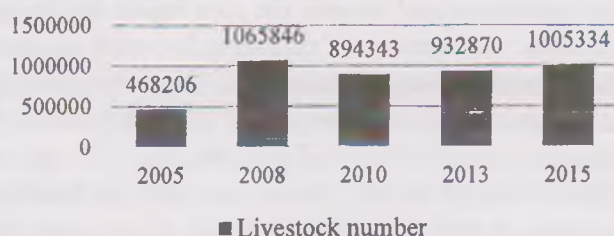
Land use purpose and types varies in certain ways following the social need, economic development trend and region's planning. Pasture land area decreased constantly for the past 10 years based on the research study area's pasture land change data of 2005, 2010, 2015 /graph-1/. Pasture land area of 812.15 thousand ha registered in 2015 where the number is decreased by 33.28 thousand ha comparing to the year of 2005.



**Graph 1.** Pasture land change

For the past years, land law allows the citizens of Mongolia to possess the land nearby the national main roads and great number of area expanding in settlement and ger district area as well as agriculture activity is intensified. These factors shrink the pasture land area and form the change in unified land fund classification. Generally, it's required to define the seasonal pasture grazing area to prevent the degradation and promote the vegetation growth. However, Kharaa river basin area lacks the grazing reserve area for the seasonal rotation thus, particular one season's pasture used for other seasons repeatedly. The comparison of 2015 and 2005 data indicates the summer-fall pasture decreased by 43 thousand ha where winter-spring pasture area decreased by 30 thousand ha. Ideally, summer-fall and reserve pasture area's utilized commonly among the herders but inter soum reserve pasture area does not exist in above study area soums. Mostly, winter-spring and summer-fall pasture camps located in the same area and herders' move directly from the winter camp to the summer camp. In some soum area seasonal pastures summer-fall and winter-spring camp distance is no more than 2-3km. Herders' mainly camp in an area abundant with water resource thus, animals graze for a long period near the

water points such as river, lake and spring area. This grazing practice initiates the pasture degradation. Pasture area decreases every year /Graph 1/ whereas livestock numbers increase /Graph 2/ every year. Total of 468206 head animals grazed in 2005 in study area soums and the numbers increased by 1.9 times in 2010 and 2.1 times in 2015. In 2015, 68096 head horse, 167441 head cow, 462837 head sheep, 306754 head goat and 206 head camel grazed in study area's soums.



Graph 2. Livestock number

Total number of 468206 head animals grazed in 2005 along the study area's soums and the number increased by 1.9 times in 2010 and 2.1 times in 2015. Grazing animals in soums pasture area in 2015 comprised 68096 head horse, 167441 head cow, 462837 head sheep, 306754 head goat and 206 head camel. The number of animals in per ha pasture area increased accordingly with the increasing number of animals. The number of animals /converted into sheep head unit/ per pasture ha noted 1.15 in 2005, 2.25 in 2008, 2.12 in 2010, 2.39 in 2013 and 2.74 in 2015 respectively. Livestock density varies in each soums /Table 2/.

Table 2. Livestock density

Soums	2005	2008	2010	2013	2015
Mandal	1.48	2.67	2.38	2.69	3.19
Bayangol	0.81	1.67	1.70	1.77	1.97
Saikhan	0.74	1.43	1.46	1.64	1.87
Batsumber	1.33	2.18	1.99	2.04	2.57
Bornuur	1.44	2.68	2.73	3.11	3.79
Jargalant	0.89	2.02	2.26	2.59	2.84
Bayanchandmani	1.52	2.68	1.95	2.64	2.89
Sumber	1.44	3.02	2.88	3.04	3.25
Darkhan	28.16	68.58	86.40	100.54	104.90
Khongor	0.67	1.41	1.26	1.63	2.03
Orkhon	1.24	2.68	2.12	2.55	2.77

The average livestock density in study soums /excluding the Darkhan soums/ area is 2.99. Pasture area in Darkhan soums comprises 14.5% out of the local total area and the number of animals per ha in pasture land is 104.9 which is 63.3 times more than the average of Tuv, Selenge and Darkhan Uul province. For the past 10 years livestock density increased by 3.72 (2005-28.16, 2010-86.40, 2013-100.54, 2015-104.9) times in Darkhan soums. This issue relates with soums pasture area decrease in every year and herders began to move, settle in specially developed area with sufficient infrastructure. In one side, the increasing number of animals in Khovd river basin area and in other hand, pasture land decrease intensifies the pasture capacity and gradually approaches the degradation level.

### Conclusion

In 2015, 812.15 thousand ha pasture land registered in study area of Tuv, Darkhan Uul and Selenge province's 11 soums. Out of this pasture area agriculture land comprise 79.2 percent and total area's 45.8 percent. Pasture land area decreased by 33.28 thousand ha for the past 10 years. The great number of pasture land decrease noted in Darkhan and Batsumber soums. Darkhan soums's pasture land decreased by 48.7% where Batsumber soums's by 13.2% respectively between from 2005-2015. Land possession, many crossroads, expansion of settlement and ger district area and intensified agriculture activities has the impact on narrowing the pasture area. The number of animals increased by 114.7% comparing to 2005 counting 1005334 head unit in 2015. Livestock density in per ha pasture increased constantly for the past ten years. Therefore, increased number of animals and narrowness of pasture land leads to the rangeland degradation.

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## Understanding land system change in the Mongolian Plateau through scenario-based simulations: A case study from the Hohhot

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### Изменения системы землепользования на Монгольском плато на примере Хух-Хото

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**Abstract.** The Mongolian Plateau is expected to face dramatic land system change in the context of socioeconomic development and environmental conservation (Wu et al., 2015). Recent studies have addressed changes of land cover with socioeconomic development in the Mongolian Plateau (Chen et al. 2008; Huang et al. 2014; Xu et al. 2009). However, the changes in land use intensity and the potential role of environmental conservation measures have yet to be adequately examined. Given the importance of land management intensity to the ecological conditions and regional sustainability, our study projected land system change in Hohhot city in the Mongolian Plateau from 2013 to 2030. Here, land systems are defined as combinations of land cover and land use intensity. Using the CLUMondo model (van Asselen and Verburg 2013; Ornetsmüller et al. 2016), we simulated land system change in Hohhot under three scenarios: a scenario following historical trends (TREND), a scenario with strong socioeconomic and land use planning (PLANNED), and a scenario focused on achieving environmental conservation targets (CONSERVATION). Our results showed that Hohhot is likely to experience agricultural intensification and urban growth under all three scenarios (Figure 1). The agricultural intensity and the urban growth rate were much higher under the historical trend scenario compared to those with more planning interventions. The dynamics of grasslands depend strongly on projections of livestock and other claims on land resources. In the historical trend scenario, intensively grazed grasslands increase whereas a large amount of the current area of grasslands with livestock converts to forest under the scenario with strong planning. Strong conversion from grasslands with livestock and extensive cropland to semi-natural grasslands was estimated under the conservation scenario. The findings provide an input into discussions about environmental management, planning and sustainable land system design for Hohhot.

**Key words:** historical land use change; land use planning; conservation; land use intensity; Hohhot; land use model

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