

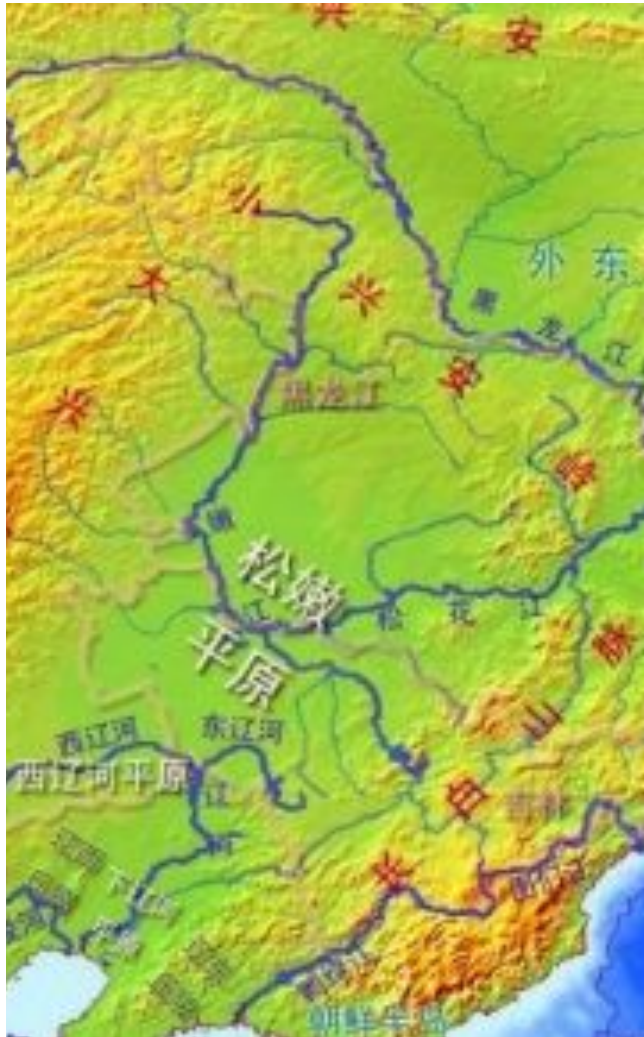
Investigation of Songnen plain: Comparison of ecological community characters at different stages of degradation

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Reference: <https://images.app.goo.gl/82RPyfbYZTvU1rEC6>

Introduction

Background of Songnen plain:

The Songnen plain is located in the southwest of Heilongjiang province and the northwest of Jilin province. The southern part of it is next to the Liaohe plain separated by the Songliao upland; the northern part of it connects to the Xiaoxing'anling mountain; the western part of it links with the Daxing'anling, and the eastern part of it can extend to the eastern mountains. It is 150-200 meters above sea level and covers an area of about 180,000 square kilometers, which is nearly half of the area of the Northeast plain. It is formed by the erosion of the Songhua river and the Nenjiang river, which also contribute to the accretion of soil for this plain (Li, 2000). Songnen Plain is known for its vast, fertile black soil, which is beneficial for the growth of a large number of crops. With 56,000 square kilometers of cultivated land, Songnen Plain is one of China's important commodity grain production lands, producing soybeans, sorghum, potatoes, wheat, corn, flax, beets, sunflowers and so on. In fact, the Songnen Plain is the only black soil belt which is suitable for cultivation in the world now. Songnen Plain has a variety of natural landscapes, such as grassland, wetlands, rivers, lakes, forests, and snowfields, and it has great biodiversity.

Objectives:

Compare the data of meadow plant among three parts of grassland at different stages of degradation. Discuss the factors that contribute to grassland degradation. Discuss the factors that contribute to grassland degradation.

Definition of meadow degradation:

Meadow degradation refers to the process that the grassland system conducts a retrograde succession with its productivity decline, under unreasonable utilization. And the main feature of meadow degradation is the decrease of density, coverage, abundance, biomass, height, and the number of species in grassland botany, soil environment deterioration, and the fall of soil manufacturability and ecological function.

Importance of the research:

As grassland degradation can not only affect land development but also cause terrible consequences to human beings, we want to do research on the grassland and try to find the reasons of meadow degradation.

Hypothesis :

The variety and density/intensity of the population is negative relevant with the degree of degradation.



Reference: <https://images.app.goo.gl/3stvHoPnUrNaNjYn9>

Methodology

A. Spatial sampling R.P.Haining(2015) declared that "Spatial sampling is undertaken to estimate an attribute of a spatially distributed population. The grasslands are assessed to be cut in three parts with different stages of degradation, samples are randomly selected in each of the three parts. The sampling of botany and insects are done separately. In total there are six 1m X 1m samples of botany and 12 insect samples.



Reference: Photoed by group 6

Insect Sampling

For the sampling of insects, we adopted sweep netting, which is a strategy of active sampling. Three samples of 20m X 20m grasslands at three stages of degradation are randomly selected, four parallel routes in each sample are set. All the routes are no closer to the edges of samples than 3m to avoid edge effect.

Sweep the net with every 3 steps through the route, in total 10 nettings a route. Poison the captured insects with ethyl acetate for identification and statistics.

Results and discussion

Type of the grassland		Average height(cm)
Not degraded grassland	Foxtail	56
Mildly degraded grassland	Foxtail	35.6
Heavily degraded grassland	Foxtail	25.6

Table 1: Foxtail average height in different types of grassland

From Table 1, for example with the increase of grassland degradation, the average height of foxtail gradually decreased. And the main feature of meadow degradation is the decrease of density, coverage, abundance, biomass, height, and the number of species in grassland botany, soil environment deterioration, and the fall of soil manufacturability and ecological function.

Number of species

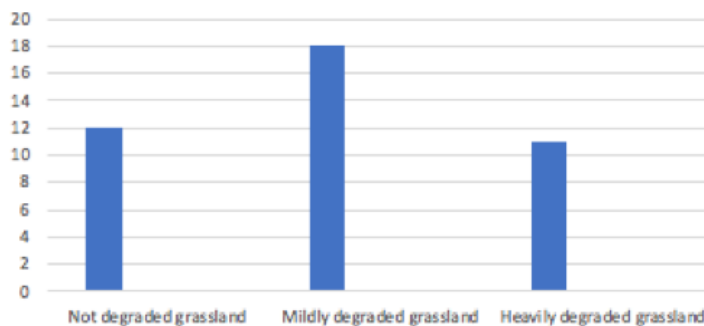


Figure1: The number of species in different types of grasslands

From the number of species in Fig.1, the number of diversity of non-degraded grassland is twelve which is six less than the number of mildly degraded grassland. Then, the quantity of the species of heavily degraded grassland is the least among these three kinds of grassland at eleven. This graph indicates that the grassland with the strongest stability is not undegraded grassland, but mildly degraded grassland. This reflects that the best state of the grass does not have any effect, what's more,

The percentage of Chinese wildrye and foxtail of three kinds of grassland

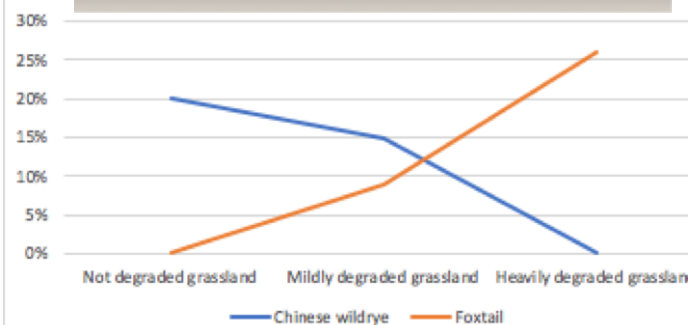


Figure2: The percentage of Chinese wildrye and foxtail of three kinds of grassland

From Fig2 which comes from the result of the table, the number and coverage of foxtail were significantly different in grassland with three different degrees of degradation. The number of severely degraded foxtail was significantly higher than that of mildly degraded grassland and undegraded grassland, which confirmed that foxtail was degraded. For the plant stand meadow, the distribution of Chinese wildrye is the most normal, and the degree of degradation gradually decreases. This indicates that the growth of the Chinese wildrye has higher environmental requirements and further illustrates the vulnerability of grassland. Fig3 demonstrates that with the increase of grassland degradation, the number of insect trees is gradually decreasing.

Number of insect species (Average)

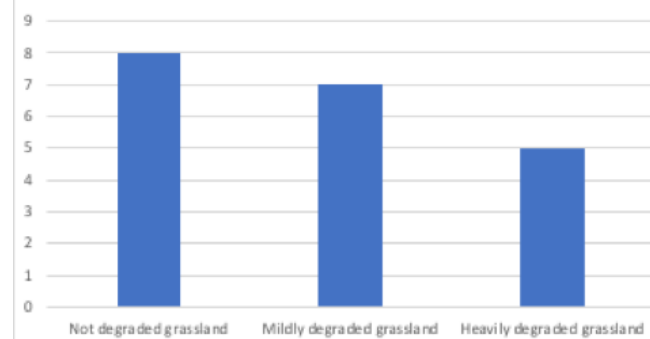


Figure3: Number of insect species (Average)

Conclusion

Biodiversity is negative relevant to the degree of degradation. Grassland with the strongest stability is mild degraded grassland. The research illustrates the relationship between biodiversity and the degree of degradation is not the same as our hypothesis, as mildly grassland has the strongest stability. However, as Gang et al.'s global estimate (2014) show that nearly half of the grassland ecosystems have degraded, and nearly 5% of them have experienced intense to extreme degradation which we should pay attention, or we will ask for it.

Reference

- Affleck, D., Gregoire, L., & Valentine, R. (2005). Edge effects in line intersect sampling with segmented transects. *Journal of Agricultural, Biological, and Environmental Statistics*, 10(4), 460-477.
- Gang, C., Zhou, W., Chen, Y., Wang, Z., Sun, Z., Li, J., Odeh, I. (2014). Quantitative assessment of the contributions of climate change and human activities on global grassland degradation. *Environmental Earth Sciences*, 72(11), 4273-4282.
- Jun, L.X. (2000). The Alkali-saline Land and Agricultural Sustainable Development of the Western Songnen Plain in China.
- Laguardia, C. (2003). International encyclopedia of the social and behavioral sciences. *Library Journal*, 128(6), 141.