Community-based Rangeland Management and Social-Ecological Resilience in Mongolia: An Interdisciplinary Collaborative Research Planning Meeting

International cooperative project between China and Mongolia

Comparative studies on reasons and restoration of desertification on typical steppe in Mongolia plateau

The relationship between the developing trend of Mongolia nomadic community and the social-ecological resilience

7/29/08
International cooperative project between China and Mongolia

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typical steppe in Mongolia plateau

2008.6.16

2007
2006
2004
2003
2002
2001
2000

Comparative studies on degradation degree of different grassland vegetation in Mongolia Plateau

Yi Jin, BAO Xiu-Xia, GAO Wang, LIU Shu-Run
BU Debate: S.Jigjidsuren, WU Lantuoya, JI Mu-Se, WANG Puchang, Wurenqimuge, Subudan

Fig.1 Location of study sites of Comparative studies of different grassland vegetation in Mongolia Plateau in 2007

2006-9-7, in Ulanbaatar

签定了中蒙国际合作协议

2. Basic instance of investigating country and address

Case Study Sites _______

MONGOLIA 蒙古

- TAIHALAG basin

- 3 Shili gai aimag, Zuwui sumchik khoshuu, Babshangai sum, EREDEE aimag

Fig.1 Location of study sites of Comparative studies of different grassland vegetation in Mongolia Plateau in 2007
3.1 Investigating item and method

3.1.1 Principles, content and method of vegetation and community degradation

(1) Principle: Division principle of vegetation degradation grade is not according to division principle of animal husbandry economic value, but according to comparing vegetation composition and productivity with climax community. Standard of degradation is different in different grassland types, but degradation grade can be compared in different grassland types. The standard reflects ecological condition.

(2) Content: More than 10 index were chosen, mainly including plant and soil nutrition index, and then computed comprehensive evaluation coefficient.

(3) Standard: Community types can be divided into 4 grades, including primary community, mild-deteriorated community, mid-deteriorated community and heavily deteriorated community. Each grade can be divided into 1-3 grades according to degradation degree.

According to division principle of vegetation degradation grade, desert steppe was divided into 3 grades (A, B, C). Typic steppe was divided into 4 grades (A, B, C, D). Division principle of vegetation degradation grade is as follows in detail.

### 3.1.3 Computing content and methods

- (1) Volume ratio = individual volume/total volume
- (2) Weight ratio = individual fresh weight/total weight
- (3) Important value = (Volume ratio + Weight ratio)/2
- (4) Express ratio = Important value × length of sample line
- (5) Express ratio = express value of individual express value of sample line
- (6) Ratio of Amount of vegetation composition in A%
- (7) Ratio of density of constructive species in A%
- (8) Ratio of density of dominant species in A%
- (9) Ratio of vegetation coverage in A%
- (10) Ratio of species of fine palatability in A%
- (11) Ratio of invasive species in A%
- (12) Proportion of toxic and harmful plant in A%
- (13) Ratio of important value in A%

### 3.1.4 Comprehensive evaluation

- (1) Comprehensive evaluation coefficient of plant degradation = Sum of relative value of selected and measured N relative index/N
- (2) Comprehensive evaluation coefficient of plant community degradation: Sum of relative value of selected and measured M relative index/N
- (3) Comprehensive evaluation coefficient of vegetation degradation: evaluated plant M/primary vegetation (A) M *100
- (4) Comprehensive evaluation coefficient of vegetation community degradation: evaluated plant MT/primary vegetation (A) M *100
- (5) Comprehensive evaluation coefficient of vegetation degradation: Sum of relative value of selected and measured N relative index/N
- (6) Comprehensive evaluation coefficient of vegetation community degradation: evaluated plant MT/primary vegetation (A) M *100

### Tab 2 Ecology division principle of vegetation and community degradation

<table>
<thead>
<tr>
<th>Item</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ratio of vegetation composition in A%</td>
<td>100</td>
<td>20</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>Ratio of density of constructive species in A%</td>
<td>100</td>
<td>20</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>Ratio of density of dominant species in A%</td>
<td>100</td>
<td>20</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>Ratio of vegetation coverage in A%</td>
<td>100</td>
<td>20</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>Ratio of species of fine palatability in A%</td>
<td>100</td>
<td>20</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>Ratio of invasive species in A%</td>
<td>100</td>
<td>20</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>Ratio of important value in A%</td>
<td>100</td>
<td>20</td>
<td>10</td>
<td>0</td>
</tr>
</tbody>
</table>
5 Discussion

5.1 Determination of steppe degradation grade

Plant community important value is a comprehensive evaluation coefficient that evaluates role of community and is used commonly in degradation grassland and vegetation restoration. Now, important value is not used commonly and indexes of important value is also rather less. In fact how to set a perfect grassland healthy evaluation system is still further research. Research background must be uniform due to important value is relative value.

5.2 Analysis of semi-desert grassland vegetation stability between Inner Mongolia and Mongolia

In the plant life form of view, express ratio of perennial herb, shrub and sub-shrub in Mongolia semi-desert steppe were higher than that of Inner Mongolia. But express ratio of annual herb in plots of Inner Mongolia was higher than that of Mongolia. It showed stability of eco-system in Mongolia was higher than that of Inner Mongolia.

In the water ecological types of view, vegetation of Erdenenchagan county, Suhebate village, Donggebi village, Mongolia had more drought resistance than Erdeniwnula village, Wuliya county, Dongwudumuqin banner, China.

In the floristic geographical element of view, express ratio of other species in Taalbaligole village, Erdenenchagan county, Suhebate village, Mongolia was higher than that of Inner Mongolia. It showed that vegetation degradation level in plot of Mongolia was higher than that of Inner Mongolia.

In the floristic geographical element of view, express ratio of other species in Taalbaligole village, Erdenenchagan county, Suhebate village, Mongolia was higher than that of Inner Mongolia. It showed that vegetation degradation level in plot of Mongolia was higher than that of Inner Mongolia.

The result of project is only data of 4 plots, it is not last conclusion. And we will do a lot of further research to illustrate vegetation change law.
6 Conclusion

6. 1 Difference of semi-desert grassland vegetation degradation level

In degradation community, plant of serious degradation account for 50% of total species in 07-MG-B-02 of Mongolia, and important value was lower than 07-MG-B-02 of Mongolia. Amount of plant species and express ratio of 07-MG-B-02 of Mongolia were higher than that of 07-MG-A-02 of Mongolia in degradation community.

6. 2 Difference of typical grassland vegetation degradation level in typical steppe

In 4 investigating plots, degradation level of Inner Mongolia was higher than that of Mongolia. And degradation level of typical grassland was lower than that of Mongolia.

6. 3 Total difference of vegetation stability between Inner Mongolia and Mongolia

In the 4 investigating plots, degradation level of Inner Mongolia was higher than that of Mongolia. And degradation level of typical grassland was lower than that of Inner Mongolia.

6. 4 Total difference of vegetation stability between Inner Mongolia and Mongolia

In the 4 investigating plots, degradation level of Inner Mongolia was higher than that of Mongolia. And degradation level of typical grassland was lower than that of Inner Mongolia.

Comparison Study on the Soils and Vegetation Property in Typical Steppe between Inner Mongolia of China and Mongolia

- Yi Jin1, S.JIGJIDSUREN2, Bao Xiu Xia1, Hou Xia Dong1, Wuren Qi Mu1

1. (College of Agronomy, Inner Mongolia Agriculture University, Hohhot 010019, China)
2. The Agriculture University of Mongolia, Research Institute of Animal Husbandry Ulaanbaatar 210153, Mongolia

2. Experimental content and method

2. 1 Soil test content and method

- On the typical place of different plant quadrates, using the falchion sampling about 10cm to the test of soil physical character and each quadrates repeat three times. In using falchion sampling after the place 5-15cm soil blend uniformly and soil of different quadrates of same site blend again and then add to half the content of soil 1kg cased in other fast envelope to test nutrition factor and weave identical the soil sample number with plant sample number.

2. 1.1 The method of soil sampling

(1) The method of soil sampling (drying method)

(2) The method of soil sampling (electricity method)

(3) Soil nutrition method of research (alkaline hydrolysis diffusion method)

(4) Soil total nitrogen method of research (potassium dichromate method)

(5) Soil quick result phosphorus method (sodium bicarbonate method)

(6) Soil total potassium method (hydrofluoric acid heating digestion method)

(7) Soil quick result phosphorus method (acetic acid-blaze luminosity method)
2.2. Plant study sites investigation content

- Investigation content in every sample site (m2): vegetable types, plant species, total coverage, every plant species coverage, reproductive branch height, nutritional branch height, total plant number, tassel number and soil character such as agro type, using mode. According the expressions account the tassel ratio, relative volume, important value of plant material.
- Tassel ratio of plant (%) = tassel number of plant / total plant number of plant x 100
- Relative volume of plant = coverage of plant x height of plant
- Important value of plant = coverage of plant x height of plant
- Important value of plant = coverage of plant + height of plant

Table 2 The comparative result of soil physical character among four soil texture on typical steppe of China and Mongolia

<table>
<thead>
<tr>
<th>Soil character</th>
<th>NMD (mg/mg)</th>
<th>MGD (mg/mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water content (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plant weight (g/mg)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soil density (g/mg)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small opening degree</td>
<td></td>
<td></td>
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<tr>
<td>pH Value</td>
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</tbody>
</table>

Note: NMD means typical steppe of Inner Mongolia; MGD means typical steppe of Mongolia.

3 Results and analysis

- 3.1. The testing results and analysis of physical characters of soil in different sample plots
- Eighteen sample sites and fifty quadrates have been selected at different places on typical grassland in Mongolia; twelve sample sites and forty quadrates have been selected on typical grassland in Inner Mongolia; and seven sample sites and seventy quadrates have been selected on Meadow grassland in Inner Mongolia. The testing results and analysis of physical characters of soil in different sample plots are on table 2, chart 1 and chart 2.

Fig. 2 The proportion of four soil texture in different sampling plot

Fig. 3 The relative compare of soil physical character in differ sampling plot

Fig. 4 The growth development of rhizomatous in differ vegetation types on typical steppe

Note: 1: plant species; 2: total coverage; 3: plant species coverage; 4: reproductive branch height; 5: nutritional branch height; 6: tassel number; 7: total branch number; 8: the tassel ratio; 9: relative volume; 10: important value of plant material.
3.4 The correlation analysis between soil nutrition and rhizomatous growth development on typical steppe

They wear positively correlated between the soil organic matter, nitrogen alkali soil, soil total phosphorus, potassium of soil samples with the vegetation total coverage, plant species coverage, branch number.

The comparative and reason analysis of soil nutrition differences in Mongolian Plateau

Generally, in our study in 2005-2006, the soil nutritional traits in addition to soil pH, C/N, total K in Mongolian steppe less than Inner Mongolia, the other indicators are better than Inner Mongolia, especially between typical steppes. After comparison study show that soil pH of Mongolian steppe lower than Inner Mongolia, and the remaining nutrition indicators were higher than Inner Mongolia.

6 Conclusion

Inner Mongolia of China and Mongolia both hold the main body of Mongolia plateau. The configuration, the species of plant and the mode of utilization of grassland in the two countries are quite similar. So, it’s very important to comparison study on the growth development of plant, the vegetation of grassland in Mongolia plateau.

(1) Study showed that organic matter, total nitrogen, total phosphorus, alkali-hydrolyzed N of soil are higher in the model steppe of Mongolia than in Inner Mongolia.

(2) After correlative analysis between the soil factor and the growth development of rhizomatous, we found that the correlation in soil factor and the growth development of rhizomatous is different in different grassland and different soil character.