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The dynamic changes of biodiversity in Hongsongwa Nature Reserve

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Key words : grassland , richness index , Shannon-Wiener index , Simpson index , Hongsongwa National Nature Reserve

Introduction Measuring species diversity is critical for ecological research and biodiversity conservation . Using fencing management in natural grassland ecosystems to regulate the grazing intensity of herbivores , plant biodiversity could be maintained (Herrero M et al .,1998) . Hongsongwa Nature Reserve is marked off three functional areas with fences in which different measures of management are carried out . After enclosed management taken for a long time , monitoring the trend of changes in biodiversity in Grassland Nature Reserve is of great significance .

Materials and methods Hongsongwa National Nature Reserve lies in Weichang County , Hebei Province (N 42°10' ~ 42 °20' , E117°18' ~ 117°35') in China , which is the overlapping zone of the North China , Mongolia and northeast flora (Lianfang li , 1999) . The vegetation types belong to mountain meadow , and the soil is mainly mountain meadow soil and mountain black soil . Experiments were done in core area , buffer area and experimental area in early June , July , August and September from 1999 to 2004 . Five samples were selected in each of the three functional areas in which their natural conditions were consistent with each other . The average value of the five investigated samples was the data that was used to evaluate each area's characteristic .

Results From 1999 to 2004 , Species richness & Shannon-Wiener(H') indices in buffer area were the highest between core area , buffer area and experimental area every year , followed by core area , the two indices in experimental area were minimum (Figure 1 , Figure 2) . Simpson index (C) in core and experimental area was higher than the index in buffer area in the same year (Figure 2) . Mountain meadow , as a nutrient-rich grassland ecosystem has high productivity and is richness in plant diversity . Contrasting the value of the three areas , if it was lacking grazing or mowing its biodiversity would decrease (Figure 1 & Figure 2) . The dynamics of biodiversity consisted with the viewpoint that plant species richness increased with high grazing in nutrient-rich ecosystems (M . Proulx & A . Mazumder , 1998) . The results also support the popular viewpoint at present that H' and C are useful to reflect changes of biodiversity .

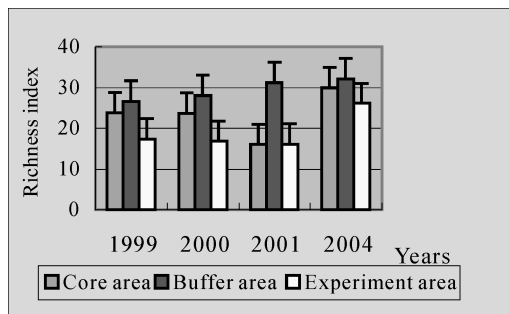


Figure 1 The species richness index of Hongsongwa Nature Reserve .

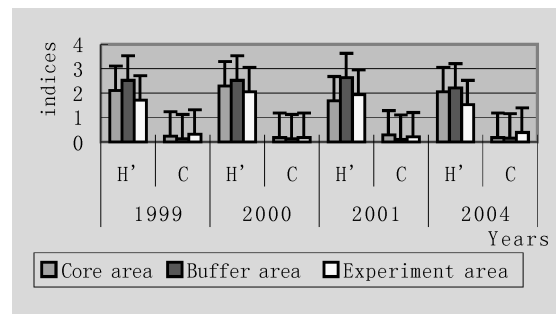


Figure 2 The species Shannon-Wiener index & Simpson index in Hongsongwa Nature Reserve .

With the enclosed management carried on , Richness index in core area decreased in 2001 because the average rainfall in summer of 2001 was more than in 1998 & 1999 and interference was lacking . Besides H' achieved its peak in 2001 , not in 2004 because that species distribution in 2004 was less evenness than that in 2001 .

Conclusions Appropriate interference of mowing in buffer area could maintain species diversity successfully . The policy of absolute protection for the core area only applied to the initial stages of degraded grasslands . After the restoration of vegetation , appropriate interference should be taken . Otherwise , biodiversity in the core area would decline along with enclosure for a long time , and the natural landscape of grassland would be changed .

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