DEVELOPMENT AND CONSERVATION OF GRASSLANDS

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Contents

Summary

In China grasslands occupy approximately 4.0×10^8 ha, accounting for 40% of the total national land area. Natural steppe in the north forms the major part of the area, about 3.13×10^8 ha. Chinese grasslands include five categories, namely temperate meadow steppe, temperate typical steppe, temperate desert steppe, alpine grassland, and tropical-subtropical grassland. Grasslands, as the primary base for livestock husbandry and components of environmental conservation, are irreplaceable for the economy, ecology, and social development of the country. There are, however, many problems concerning grasslands, including excessive utilization, extensive management, and degradation of the grassland ecosystem. Due to these facts and the trend of deterioration, grassland improvement has been the subject of much attention by the government. Legislation and legally backed grassland management are being promoted.

1. Introduction

Grassland, which is considered to be a soil type in China, is defined as "a multi-functional natural complex composed of herbaceous and woody forage plants together with the soil supporting them". Grasslands are classified into several types, including natural grasslands with total coverage over 5%, campos cerrados whose crown density are under 0.3 and primarily used for grazing, shrub communities with crown density under 0.4, secondary grasslands after five years of fallow, artificial ranges, and various greenbelts dominated by perennial herbaceous plants. In general, grasslands are divided into two categories—natural grasslands and artificial grasslands. The former, which is also called steppe, refers to plant communities composed primarily of microthermic and xerophilous perennial herbage sometimes with small xeric dwarf-shrubs. Steppe comprises the great majority of the natural grassland in China. The information discussed in this paper is largely confined to steppes.

In Eurasia, the steppe stretches about 110 degrees of longitude from the lower reaches of the Danube eastward to the Northeast of China, crossing Romania, Ukraine, Russia, and Mongolia. It is the largest and most intact area of grassland in the world, and is generally called the Eurasian Steppe Belt. It extends from west to east between 45 and 55 ^{O}N, then turns southwestward in Northeast China, ending to about 28 ^{O}N. This distributive pattern closely correlates with the configuration of land mass and oceans, as well as the effects of atmospheric circulation over this region. As the effect of the monsoon from seas in the southeast of China weakens, and that from Siberia and Mongolia gradually strengthens, along a southeast to northwest direction, the farther away from the southeast coast, the less the precipitation and the drier the climate. Therefore, vegetation types along this direction show distinct zonal characteristics.

In China steppe extends about 4500 km east from the Northeast Plain, across the Great Hinggan Mountains, the vast Mongolia Plateau, Erdus Plateau, and Loess Plateau, to the south edge of the Tibetan Plateau. It occurs between 51 and 28 ^{O}N, about 23 degrees of latitude.

Grasslands of various types cover approximately 4.00×10^8 ha, about 40% of the total land area of China. Steppe comprises the majority of northern China. It occupies some 3.13×10^8 ha, accounting for 78% of the total grassland area.

2. Main Grassland Types and Their Features

The immense territory of China covers 31 degrees of latitude and quite different climate zones. It spans five thermal climate zones, namely tropical, subtropical, warm-temperate, temperate, and cold temperate zones. Annual precipitation varies dramatically. It is over 2000 mm on the southeast coast and less than 50 mm in the northwest interior region. Altitude changes from sea level to above 8000 m. Furthermore, there is an enormous range of soil types in China. Hence, it is not surprising to see diverse grassland forms in China. There are five dominant types: temperate meadow steppe, temperate typical steppe, temperate desert steppe, alpine grassland, and tropical-subtropical grassland.

2.1. Temperate Meadow Steppe

Temperate meadow steppe is zonal vegetation in temperate semi-humid regions. It

mainly consists of perennial meso-xerophilous cespitose and rhizomatous grasses as well as meso-xerophilous and mesophilous herbs with more or less meso-xerophilous small shrubs. This type develops in the most humid steppe climate and is concentrated in the transitional zone between forest and steppe. In China temperate meadow steppe is mostly distributed at the eastern end of the steppe belt, such as in the hill regions under the foot of the Great Hinggan Mountains, and the upper parts of some alpine grassland zones. The famous Hulunbuir Grassland, Xilingol Grassland, and Horqin Grassland in Inner Mongolia, and the Altay Grassland and Yining Grassland in Xinjiang contain extensive meadow steppes with a total area of 1.45×10^7 ha, 3.7% of the total grassland area in China.

Temperate meadow steppes are developed in a temperate semi-humid climate. The annual precipitation varies between 350 ~550 mm. Cumulative temperature above 10 ^{O}C is 1800~2200 ^{O}C. The main soil types are chernozem, dark chestnut soil, and meadow soil. These soils are fertile, with organic matter content normally over 3%.

Meadow steppes are rich in plant species. There are 15 to 25 species per $1m^2$. Owing to the favorable natural conditions, plants grow well and have high productivity. The average height of plant community is as high as 50cm, coverage between 70 to 90%, and annual forage output 1500 kg ha^{-1}.

The meadow steppes have long been the primary pastoral regions and traditional stock raising base for China because of the favorable natural conditions, high productivity, and fine forage quality. They are also good places for developing cattle, fine and half-fine wool sheep, and wool-and-meat sheep production.

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Biographical Sketch

Chen Zuozhong, Professor of the Institute of Botany of the Chinese Academy of Sciences was born in Siyang, Jiangsu province in 1937. Many of his long-term study fields are related to the ecology of temperate steppe, including the relationship of vegetation and soil, material cycle and grassland fertilizing, steppe ecosystem degradation and its control, grassland resource utilization and sustainable development, and global change and its influence etc. He has recently also been paying attention to research for turfgrass science.