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Classification management for grassland in Gansu Province, China

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Abstract Grassland is multi-functional. On the basis of the different functions performed by different grassland types, and regional development demands for grassland functions, the classification management concept of grassland was designed to ensure the sustainability of grassland ecosystems. Principles, financial mechanisms, and properties of classification management are introduced in this paper. To aid management of grassland, Gansu grassland is classified into two main management sectors. One is conservation grassland, mainly devoted to ecological and social values; the other is productive grassland, where attention is focused on economic benefits through moderate or intensive production, and contributing to social value by income generated. Conservation grassland makes up 6.05×10^6 ha, or 38% of Gansu Province. Productive grassland is 10.02×10^6 ha, 62% of Gansu Province, in which 8.93×10^6 ha is moderately grazed grassland and 1.09×10^6 ha is intensively grazed grassland. Management strategies are proposed for conservation and productive grassland respectively. Absence of grazing and cropping is predominant in the management of conservation grassland, to restore degenerated areas and protect grassland with important ecological value from destruction, and further to improve the environment. Agricultural measures, such as fertiliser and irrigation, are used to enhance the productivity of intensively grazed grassland, and rotational grazing is used on moderately grazed grassland. The management of productive grassland is contracted to the managers who are given sole responsibility for its profitability. The Government finances the conservation grassland in the China West Development.

Keywords multi-functionality of grassland; classification management; conservation grassland; productive grassland

INTRODUCTION

Plant and animal products are harvested from the nutrients cycling and the energy flowing in the grassland ecosystem (Williams 1964; Ren 1995). Animal husbandry is significant in managing grasslands (Holecheck 1989; Hodgson 1990). Because of the need to maximise the economic benefits to meet increasing demands for meat (Xu 1988), grasslands are usually stocked beyond their theoretical carrying capacity; such overgrazing leads to grassland degeneration, and further desertification (Zhu & Liu 1989). Up to 34.5% of the world's degraded land results from overgrazing (Oldeman 1981). There are 1.3×10^6 ha of degraded land in China, over 33% resulting from overgrazing (Li 1997). Introducing animals into the grassland ecosystem accelerates nutrient cycling and energy

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flows, sometimes with negative consequences. The degeneration of grassland and desertification threaten the subsistence and development of people. Mismanagement is a main factor in grassland degeneration (Zhang 2000).

Based on vegetation features and climatic characteristics, Gansu grasslands were divided into 14 types according to the China Grassland Classification System (Jia 1980). This system, however, focuses mainly on productive properties of grassland and neglects its ecological and social values (Hu 1996). Consequently, it presents an inadequate management system for Gansu grassland resources. Degraded grassland in Gansu Province made up about 40% of the total area in 1989 (Kong 1989), and had increased to 51% by 1998 (Zhang 2000) because of mismanagement, especially overgrazing. Desertification of land from grassland degradation was 2.2×10^4 ha in the early 1980s, but was 9.5×10^4 ha in the mid 1990s, a more than 4-fold increase (Fang 1999). Mainly through destabilising the catchments of rivers, decline and degradation of grassland reduces the ability of grassland to protect conservation of water resources (Wang et al. 2001). But water resources are a key factor in the semi-arid and arid ecosystem, and their decline affects regional development and security (Wang et al. 2002). Inappropriate grassland management has created severe problems for the development of water sources (Ren et al. 1997). To resolve some of these problems facing herders and regional planners, a research effort by Gansu Grassland General Station (GGGS) was initiated in 1980 and lasted 8 years. The project aimed to survey the status of Gansu grassland resource base and the degree of degradation of grassland. The Gansu grassland resource base was published by GGGS (GGGS 1999). The research showed that existing grassland management was undesirable due to the stress on excessive animal production in recent decades, and the neglect of the ecological and social values of grassland. Grassland above 3000 m elevation is fragile and its resilience is weak. Previous attempts to change the utilisation pattern to reflect ecological values were unsuccessful (Li 2002). Even grazing land below 3000 m elevation can be used sustainably only within its carrying capacity. Rational management of the grassland ecosystem relies on comprehensive understanding of grassland functions. The ecological value of grassland ecosystems was pointed out by Ren (1989, 1995) and the concept received attention in China (Ren 2001).

Ecological problems partially caused by grassland gradation have encouraged the Gansu provincial government to pay more attention to grassland use than previously, and to recognise the social and ecological values of grassland. Environmental reconstruction dominated by vegetation restoration is a key component of China West Development for the next 50 years. According to the Gansu Action Plan on China's 21st Century Agenda (Gansu People's Government 1995), reforming traditional ideas of grassland management includes: (1) intensive forage and seed production bases by converting cropland to sown grassland; (2) intensive livestock fattening bases on the superior grassland; (3) moderate grazing of land; (4) nature reserve of grassland in the catchments of rivers and prohibiting the use of seriously degraded grassland. The role of grassland in 50 years will be mainly to balance the ecological environment, although it will also have an economic component. To achieve this, classification of grassland management has been designed to restore degraded grassland and to use grassland rationally.

The objective of this research is to present a new approach to grassland management by classifying grassland into a conservation sector and a productive sector, and further to establish a strong case for attributing value to conservation grassland. The approach of investigating grassland resources adopted was a traditional field survey.

MATERIALS AND METHODS

Study area

A long narrow province, Gansu Province, in the north-west of China, lies between 32°31′and 42°57′N and between 92°13′ and 108°46′E. It is the only province in China which contains a transition zone between the south-east monsoon region, the north-western arid region, and the Tibet plateau region. Dry, continental climatic features are typical in the province. However, the types of climate vary from the eastern regions with a subtropical humid climate to the central regions with a warm temperate climate, and then to the western regions which are dry. A cold, humid montane climate is characteristic of the Qianlian Mountains and southern highlands.

The province covers 4.54×10^4 km^2. Of this 35.4%, 17.90×10^6 ha, is grassland, and the available area of grassland, 90% of the total, is three times as large as the cropland and four times as large

as the forestland. Although forestland and cropland account for only 8.72 and 12.9% respectively, more attention has been given to them than to grassland. Forestland had already been divided into conservation and productive sectors according to forest classification management, recognising its ecological values (Guo et al. 2000; Zhao et al. 2000); the conservation sector is funded by the state. The ecosystem service values of grassland are greater than those of forest (Zhu et al. 2002) because it is mainly distributed in the southern highland area and Qianlian Mountains, around the upper reaches of Yellow-Yangzi River and the river catchment regions of the Hexi corridor.

Introduction to classification management for grassland

Concept

Classification management is a new kind of administrative and management method for grassland ecosystems. According to the main function of grassland type in the regional development, it uses the appropriate management to make best use of advantageous natural conditions, intensively and scientifically manage grassland, promote grassland economic productivity, restore degenerated grassland, and further ensure the health of grassland ecosystems by harmonising ecological, social, and economic effects. The grassland is divided into two kinds of management types called "conservation grassland" and "productive grassland".

Foundation

The foundation of classification management includes the theoretical basis, the main grassland function, and current condition of grassland management.

The elements of the theoretical basis are "one property", "two ideas", and "rationalisation". "One property" means the integration of the dual natural and resource properties of grassland. The "two ideas" are first that grassland is managed to meet a specific need, second, the idea that the importance of productive value, ecological value, and social value of each grassland type is different. "Rationalisation" is ensuring that the ratio of productive grassland area to conservation grassland area is rational.

Grassland functions vary with management aims. Before the agricultural revolution, grassland was a virtually inexhaustible resource that supported our forebears. In an agricultural economy, grassland resources are thought of as the production bases of animal husbandry. After industrialisation, especially since the 1980s, ecological crises have obliged us to use grassland resources rationally for sustainable development. The main grassland functions of the future will be the combination of social, ecological, and economic values.

Current management of grassland aims to maximise the economic benefits of animal husbandry, which usually causes some grassland degradation because it is stocked beyond its carrying capacity. This applies particularly to desert grassland, where very fragile habitats are easily destroyed, and this in turn causes dust storms. Conservation or restoration of the productive capacity of degraded grassland is urgently needed.

Properties and mechanism

Conservation grassland management focuses mainly on common-good effects, and a larger area is required to exert its ecological and social value. Productive grassland is the production base for animal husbandry and producing grass products: grazing, haymaking, and silage. Its aim is to maximise economic benefits. This type of grassland needs to be centralised and aggregated to reduce transportation costs, and it is managed for intensive and semi-intensive use.

The financial mechanism for productive grassland is market-oriented management. The manager assumes sole responsibility for its profits or losses, and aims to maximise profit. Conservation grassland is managed by the state and belongs to the common-good business. It is possible to obtain government funding to cover the costs of managing conservation grassland because the Chinese Government has begun to establish nature reserves and to convert cropland to grassland or forest in western regions to improve the environment.

Evaluation of quality of grassland

A field survey was conducted across each grassland type in Gansu Province. In warm sparse shrub communities and warm thick shrub communities, 822 quadrats of 100 m^2 were sampled in the 3.0×10^5 ha of the available grassland. Quadrats placed in other grassland communities were 1 m^2, and 4321 quadrats were sampled in the 1.57×10^7 ha. Grasslands were classified into classes based on their dry matter productivity, and grades based on the nutrient value of the forage they produced.

Evaluation of class of grassland

In the field, fresh grass in the quadrats was harvested to 2 cm above ground level and samples were taken to the laboratory. The number of species in each sample was determined before oven drying at 105°C for 24 h and weighing to the nearest 0.01 g. All sampling was performed at the end of the growing season to ensure that biomass was maximal. Mean yields were calculated for each grassland.

According to herbage yield, grassland was divided into eight classes:

1. yield >12 000kg/ha
2. yield 12 000–9000 kg/ha
3. yield 9000–6000 kg/ha
4. yield 6000–4500 kg/ha
5. yield 4500–3000 kg/ha
6. yield 3000–1500 kg/ha
7. yield 1500–750 kg/ha
8. yield <750 kg/ha

Evaluation of grade of grassland

Grade of grassland was determined by plant nutritive value and species composition of grassland plant communities. The species composition of 14 grassland plant communities was sampled by estimating percentage abundance of all angiosperm plant species in each randomly placed quadrat. The dominant forage plants in the usable pastures belonged to the grass family (Gramineae) and the sedge family (Cyperaceae), with the composite family (Compositeae), the legume family (Leguminoseae), and the rose family (Rosaceae) plants occurring as subdominants.

Plant nutrient value (PNV) was determined by crude protein content (CPC), dry organic matter digestibility (DOMD), and plant palatability (PP) by:

$$PNV = CPC*W_1 + DOMD*W_2 + PP*W_3.$$

The weighting values, W_1, W_2, and W_3 were 0.32, 0.25, and 0.43, respectively, which were determined by an analytic hierarchy process with 28 expert suggestions.

On the basis of their PNV, plants were classified into "very good plants", "good plants", "mediocre plants", "poor plants", and "bad plants" (Wang & Zhu 1993).

CPC and crude fibre content of plants, important components of nutritive value of plants growing in grassland plant communities (Ren 1998), were measured by Cheng (1994) in the summer and the fall seasons.

DOMD is determined by $y = 128.68 - 2.18x$ where y is DOMD and x is crude fibre content of plants from flowering to seeding (Zhu 1983; Wang & Zhu 1993).

PP is the degree to which the herbage within easy reach of stock is grazed when grassland is properly utilised under the best practicable grassland management (USDAFS 1988). PP can be used to evaluate grassland quality. Grassland with more palatable plants is beneficial to grazing animals, and this grassland is considered as lightly degraded. All 1162 plant species growing in grassland plant communities were classified by GGGS (GGGS 1999). The most palatable plants are coded as 2.5 and less palatable coded as 0.5. On this scale 2.5 indicates livestock ingest the plant preferentially; 2 indicates livestock ingest it without preference; 1.5 indicates livestock ingest it usually, but less than 2; 1 indicates plants that livestock will ingest if they are hungry; and 0.5 indicates that livestock usually dislike the plant, but will sporadically eat it (Ren 1998).

According to PNV and the abundance of plants, five grades of grassland were defined:

I Very good plants make up over 60% of a community;
II Very good plants and mediocre plants make up 40%, and good plants 60%;
III Mediocre plants make up 60% and good plants and poor plants 40%;
IV Poor plants make up 60% and middle and bad plants 40%; and
V Bad plants make up over 60%.

RESULTS AND DISCUSSION

Function of grassland types

Following climatic zones, 14 major native grassland types were identified from the south-east to the north-west: warm sparse shrub-grass, warm dense shrub-grass, warm dense grass, temperate meadow grassland, temperate grassland, temperate desertified grassland, temperate grassland desert, cold desert, cold grassland, cold meadow, flat meadow, and swamp.

Every grassland type usually has many functions (Table 1). Some functions contribute to conservation benefits, and others contribute to productive benefits. In the conservation function, ecological and social values are provided by grassland ecosystems. In the productive functions, productive value is provided by grassland

ecosystems. Thus, the grassland ecosystem not only produces plant and animal products and energy products but also offers nature reserves, genetic pools, water sources, and soil conservation as ecological values, and recreation, scientific research, cultural value, and aesthetics as social values (Ren 2000).

For each kind of grassland, the importance of each function is different. For example, the main functions of cold deserts are ecological, including nature reserves, a genetic pool, and soil conservation, but the productive and social values are insignificant. The social value of a swamp is more significant than its ecological value, which in turn is greater than its productive value. The productive value of the warm thick grassland, the temperate grassland, and temperate meadow are greater than the ecological and social values. Flat meadows and cold meadows have recreation functions. Generally, the ecological value of grassland is the inverse of its productive value in Gansu Province, which is a core problem of managing natural resources (Ayling & Kelly 1997).

The ecological values of swamp, cold grassland, cold desert and temperate grassland are more significant than other values. The productive value of warm thick grass, flat meadow, temperate grassland, and temperate meadow are more important than that of other vegetation types. In the social value, scientific research is very prominent. The difference of functional importance is important in managing grassland (Ren 2000). The current role of grassland is to balance ecological problems in the regional development plan because of the strong environmental pressure (Xu & Li 2002). Ecological and social values of grassland have been given priority in grassland management, especially in the western regions of China, and different management measures are important for different combinations of grassland functions and grassland types.

Quality of grassland

Productive capacity

Grass yield and area of the 14 grassland types vary (Table 2). The available area of cold shrub meadow is 4.13×10^6 ha, accounting for 25.71% of the area of the province, and the mean herbage yield is 4380 kg/ha. This type of grassland is found mainly in the Qianlian Mountains and southern highlands with elevations of 3200–4000 m, on the edge of forest. It plays an important role in protecting water sources. Most of this grassland is in a state of degradation because of overgrazing (Ji 1996), which reduces water flow of rivers and aggravates problems of water use.

Next in size to the cold shrub meadow, the available area of temperate desert and temperate grassland is 3.85×10^6 and 2.40×10^6 ha, accounting for 23.97 and 14.96% of the province, respectively. Their mean herbage yields are 915 and 1935 kg/ha, respectively. Temperate desert occurs in the Hexi corridor with rainfall below 100 mm, on the edge of the desert. It has less than 10 plant

Table 1 Grassland multi-functionality, importance of grassland function by grassland type (1, unimportant; 5, very important).

Grassland type:	Ecological value				Social value				Productive value		
Grassland function: / Grassland type	Nature reserve	Genetic pool	Soil conservation	Water resources	Recreation	Pleasant	Scientific research	Cultural value	Grazing, animal production	Forage products	Energy products
Warm sparse shrub	2	1	2	1			3		4	3	3
Warm thick shrub	2	2	2	1			3		4	2	5
Warm thick grass	2	2	2	1			3		5	4	3
Temperate meadow	2	3	2	1		1	3		5	3	3
Temperate grassland	1	1	2			1	3		5	3	3
Temperate desertification	3	5	4	1			4	1	3	2	2
Temperate grassland desert	5	5	4	1			2		2	1	1
Temperate desert	5	5	5				1		1	1	1
Cold desert	5	5	5	4			1	1	1	1	1
Cold grassland	5	3	5	4			2		2	1	1
Cold meadow	4	3	5	3	4		2		2	2	1
Cold shrub meadow	5	5	5	5			2		2	2	3
Flat meadow	1	2	2		5		3		5	5	1
Swamp	3	4	1	5			5		1	1	1

species, and its habitats are easy to destroy and difficult to restore (Xu 1988), so its ecological value is greater than its productive value. Temperate grassland occurs in the central loess plateau of Gansu Province, where soil erosion is severe (Guo & Zhang 2001), because the cropland has gradually encroached on grassland and land use has shifted (the grassland with better ecological conditions being used for farming) under the strong population pressure and for historic reasons (Ren et al. 1997). The grassland area has decreased greatly and is down 20% (Guo et al. 2001). Existing grassland is very important in improving the regional environment with proper management.

Although warm sparse shrub, warm dense shrub, and warm dense grass are important grassland types, the total available area is only 7.9×10^5 ha, only 4.93% of the province. Cold desert, cold grassland, and cold meadow are 0.1×10^5, 1.4×10^6, and 6.4×10^5 ha, taking up 0.09, 8.72, and 3.98%, respectively, and these three grasslands are primary moderate grazing land. Temperate desert and temperate grassland desert comprising 9.37% of the province are also primary moderate grazing land. Temperate meadow covers only 6.8×10^5 ha, about 4.24%, but it is intensive grazing land.

Flat meadow and swamp cover 6.4×10^5 and 0.3×10^5 ha, about 3.78 and 0.16%, respectively. Herbage yields are 4470 and 6330kg/ha. They play key roles in scientific research and water sources, and should be protected (Wang et al. 2001).

Mean herbage yield of all types is 2616 kg/ha. Yields of warm sparse and dense shrub, warm dense grass, temperate meadow, cold grassland, cold meadow, cold shrub meadow, flat meadow, and swamp are above this mean, but the yields of other grassland types are below it.

Horizontal change in herbage yield depends on rainfall. Yield decreases from warm shrub in the south-east region to temperate grassland in the central region, and to temperate desertification or desert in the north-west region. Vertical change of herbage yield depends on heat, and yield increases from cold desertification or desert to cold meadow or grassland to cold shrub with decrease in elevation.

Class of grassland

According to herbage yield, grassland is divided into eight classes (Table 3). The results show that yield of all available grassland is below 12 000 kg/ha. There is no Class 1 grassland (producing over 12 000 kg/ha) in the province. The area of Class 2 and Class 3 grasslands, whose yields are above 6000 kg/ha, is 1.10×10^6 ha, 6.87% of the available grassland. Grasslands in Class 2 and Class 3 have higher yields and superior conditions for intensive grazing. Grasslands in Class 4, Class 5, and Class 6, with medium yields, account for 48.05% of the available area. These are unfavourable for intensive grazing because of partial degeneration and climatic limitations, but they play a very important role in the regional environment as a typical and natural ecosystem (Zhu & Liu 1989). Class 7 and Class 8 are about 32.11% of the area of the province, and consist of seriously degenerated grassland with

Table 2 Productive capacity of grassland types in Gansu Province.

Grassland type	Area (ha)	Available area (ha)	Available area (%)	Grass yield (kg/ha)
Warm sparse shrub	262 869	219 793	1.37	6870
Warm thick shrub	173 933	152 230	0.95	3555
Warm thick grass	487 096	419 083	2.61	3705
Temperate meadow	773 069	681 120	4.24	3705
Temperate grassland	2 595 786	2 404 925	14.96	1935
Temperate desertification	1 049 798	919 002	5.72	1500
Temperate grassland desert	703 710	587 189	3.65	915
Temperate desert	4 705 994	3 852 731	23.97	915
Cold desert	18 927	14 559	0.09	300
Cold grassland	1 479 716	1 401 508	8.72	1545
Cold meadow	664 648	640 840	3.98	4185
Cold shrub meadow	4 317 111	4 131 786	25.71	4380
Flat meadow	643 899	621 313	3.87	4470
Swamp	27 650	25 529	0.16	6330
Total	17 904 206	16 071 608	100.00	

weeds and poisonous herbs, and grassland with no productive potential (Ji 1996). Seriously degenerated grassland must be protected from further degeneration (Xu & Li 2002) because serious grassland degeneration contributes to soil erosion and the decline of carrying capacity. Grassland with no productive potential is found in regions above 3500 m elevation, where habitats are fragile, and these grasslands are suitable for only moderate, controlled grazing.

Grades of grassland

Grades of grassland are defined by the nutritive value of plants and their abundance in communities. The results indicate that Gansu Province is dominated by Grade III grassland (56.54% of the area of the province) because the dominant plants in grassland plant communities are gramineous plants with low crude protein content and high crude fibre content, and legume plants with high crude protein account for only 2.0% of communities (Cheng 1994). Grassland types mainly belonging to Grade III are temperate grassland, temperate meadow, and cold shrub meadow (GGGS 1999). Following Grade III, Grade V covers about 18.37% of the province, and is seriously degenerated grassland, because toxic weeds dominate in the plant communities (Zhang 2000). Grassland types classified into Grade V are temperate desertified grassland, and other degenerated grassland. Grade IV grassland is mainly distributed in the desert, covering 13.76% of the province. Plants growing in this grade of grassland are desert plants with corneous leaves and stems, and have lower palatability. Grade II grassland takes up 11.33% of the available grassland.

Comprehensive estimation of grassland quality

Combination of classes and grades creates 28 types of grassland (GGGS 1999), and the results are shown in Table 3. The area of III-6 combination type is 4.34×10^6 ha, or 27.01%. Following the III-6 combination type, the III-5 combination type is 2.01×10^6 ha, (12.82%). The 28 combinations are divided into a conservation group, an intensive grazing group, and a moderate grazing group.

Classification management of grassland

According to comprehensive estimation of grassland and functions of grassland in the regional development plan, grassland is divided into conservation grassland and productive grassland (Table 4). Grassland in the conservation group has a low productive capacity or is severely degenerated grassland and is unfavourable for plant and animal production in its current condition. The area is 6.05×10^6 ha, which is 37.66% of the province's area. The main grassland types are cold desert, cold meadow, temperate desertification grassland, temperate grassland desert, and temperate desert.

Productive grassland consists of a moderate grazing group and an intensive grazing group. Moderate grazing grassland is 8.93×10^6 ha (about 55.57%). Residents in these grazing areas depend

Table 3 Classes and grades of the available grassland in Gansu Province (ha).

	Class								
Grade	2	3	4	5	6	7	8	Total	Percentage
I								0	0.00
II	80 423	145 069	863 161	268 500	408 249	5 308	49 858	1 820 568	11.33
III	71 874	647 367	1 076 034	2 060 216	4 343 377	857 479	30 383	9 086 730	56.54
IV				26 556	392 534	954 069	838 457	2 211 616	13.76
V		158 897	140 364	39 426	187 777	1 432 942	993 288	2 952 694	18.37
Total	152 297	951 332	2 079 560	2 394 699	5 331 936	3 249 798	1 911 986	16 071 608	
Percentage	0.95	5.92	12.94	14.90	33.18	20.21	11.90		100.00

Table 4 Classification management types of the available grassland in Gansu Province.

		Productive grassland	
Management types	Conservation grassland	Intensive grazing	Moderate grazing
Combination type	III-7, III-8, IV-5 to IV-8, V-3 to V-8	II-2, II-3, II-4	II-5 to II-8, III-2 to III-6
Area (10^6 ha)	6.05	1.09	8.93
Percent (%)	37.66	6.77	55.57

on animal husbandry for their livelihood, and the lower density of population and limited stocking rates make possible continued grazing, including on lightly degenerated grassland. The main grassland types are warm sparse shrub, warm thick shrub, warm thick grass, temperate meadow, temperate grassland, cold grassland, and flat meadow. Intensive grazing grassland has a high productive capacity and occurs on superior sites where climatic conditions are favourable to forage production and intensive grazing. The area is 1.09×10^6 ha (6.77% of the province).

The area ratio of conservation grassland to productive grassland is about 2:3, and this ratio is in accordance to regional plan in Gansu.

The management of conservation grassland includes limiting grazing and cropping to restore degenerated grassland, and to improve the ecological environment. Agricultural measures, like fertiliser and irrigation, are used to increase the productivity of intensively grazed grassland and the harvest of animal and plant products. Changing from continuous grazing to rotational grazing is used on moderately grazed grassland to rationalise utilisation of grassland. The productive grassland is contracted out to managers, who take sole responsibility for its profits or losses. The government finances the conservation grassland.

CONCLUSION

The history of agricultural development indicates that people have different desires for grassland resources in the different stages of development. From unexploited resources to conversion into cropland, the management of grassland in China since the 1960s has changed with people's needs.

Flooding of the Yangtze River, soil erosion of Yellow River basin and dust storms caused by destruction of vegetation threaten the ecological safety of China. In response, China's Government has initiated a programme of ecological environment reconstruction of west China, in which rational use grassland is to be an important component. This paper proposes a new way to manage grassland according to its role in the regional development plan and importance of grassland function by grassland type. Like forest classification for management, grassland needs to be classified into conservation grassland and productive grassland to meet the needs of animal husbandry production and to improve the ecological environment.

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