Contemporary Chinese Political Economy and Strategic Relations: An International Journal Vol. 5, No. 1, April/May 2019, pp. 409-489

Environmental Dimension of Regional Development in China, with Special Focus on Grassland Ecological Compensation in Alxa League of Inner Mongolia

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Abstract

There are four characteristics typical of the distribution of China's population in poverty: (1) concentration in the mountainous areas; (2) concentration in the western region; (3) concentration in environmentally fragile areas; (4) concentration in ethnic minority areas. In particular, poverty in this large country is very much related to environmental factors. Out of the country's 592 poverty counties, 366 are in the western region, and most of these poverty counties are distributed over several major areas of fragile environmental habitat, including among others Inner Mongolian plateau's southeastern border area that suffers from desertification. The paper focuses on poverty in China's western region, its determining factors especially environmental

degradation that is dominated by the three main issues of soil erosion, desertification and grassland deterioration, and State policies to overcome these problems, and includes a specific case study of the grassland ecological compensation policy in the Alxa League of Inner Mongolia.

Keywords: *China, poverty, environmental degradation, grassland ecological compensation policy, grazing, herdsmen/herders, Alxa League, Alxa Left Banner, Inner Mongolia*

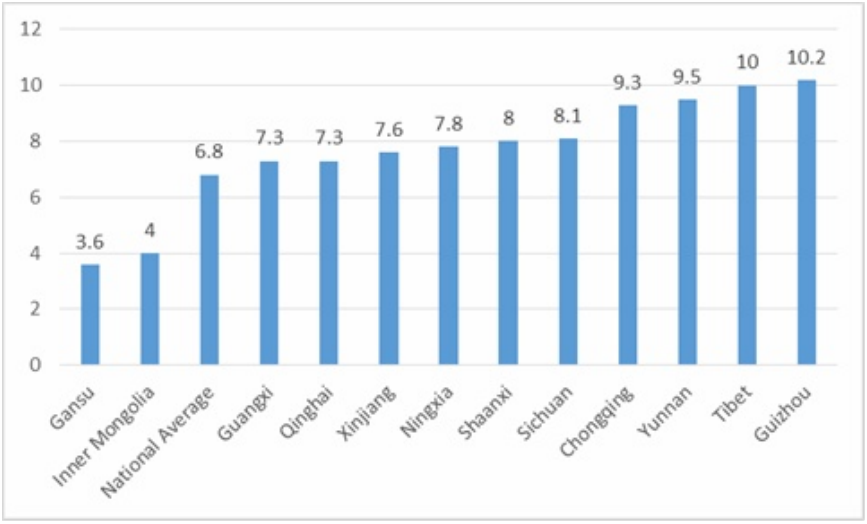
1. Introduction

Since the official beginning of the "Western Regional Development" (*xibu dakaifa* / 西部大開發) strategy in 2000, the State's investments in the western region have been greatly strengthened, already including more than 70 major projects in the launching decade of the 2000s such as the Qinghai-Tibet (Qing-Zang) Railway and the transmission of natural gas and electrical power from west to east, involving more than 980 billion yuan. Also experiencing rapid growth was western region's fix capital formation even in the beginning part of the strategy, with an annual average growth rate of 20.5 per cent during the period 2000-2004, being 1.4 percentage points higher than the national average. The rapid development of the western regional economy was reflected in the above 10 per cent economic growth rate of the region during the tenth five-year plan period (2001-2005) which was higher than the national average. In fact, Inner Mongolia, which represents a particular target of investigation (with focus on the grassland ecological compensation policy in the region's Alxa League) in this paper, topped the country for three consecutive years 2003, 2004 and 2005 with its growth rate of gross regional product of 16.8 per cent, 19.4 per cent and 16.6 per cent

for the three years respectively. (*Zhongguo fazhan shuzi ditu*, 2006, p. 225) Building on these early years' achievements, Today, under China's 13th Five-Year Plan (2016-2020) which emphasises optimising the spatial development, accelerating development of the western region, and balancing regional development, efforts have continued to go into establishing the western region's economic co-operation with the outside world under the Belt and Road Initiative (HKTDC, 2016).

The rapid growth of fixed capital formation has led to the fast expansion in the scale of industrial production of the western region and remarkable enhancement of economic benefits. Sichuan, Guangxi, Guizhou and Qinghai in particular had achieved unprecedented high level of industrial benefits and profits. Certain pillar industries and industrial clusters with regional resource advantage and territorial advantage can be seen to be in formation and rapid development in the western region and sub-regions. However, the economic foundations of the western region remain weak. The lack of capital and quality human resource and the locational disadvantage that causes its low degree of openness to the outside world have led to the region's remarkable bottleneck constraint in its basic infrastructure, low level of resource use, irrational industrial structure and low private to public ownership ratio. While experiencing rapid growth during the tenth five-year plan (2001-2005) period, total economic and industrial volumes remained small, compared to the national levels, though as China's economy has been facing a number of challenges like lacklustre export markets and rising labour and land costs in recent years, the western region's economy has notably been growing steadily by comparison in the 2010s at a rate surpassing the national average (HKTDC, 2016). However, the region's "boorish" growth pattern has also led to the increasingly obvious resource and environmental constraints. Blind imitation and disorderly competition are also serious problems for the region's specialized

Figure 1 GDP Growth Rate in China's Western Region Compared with National Average, 2017 (%)



Source: CGTN (2018); *Trading Economics* (2019).

Figure 2 Gross Domestic Product of China's Western Region (RMB billion)

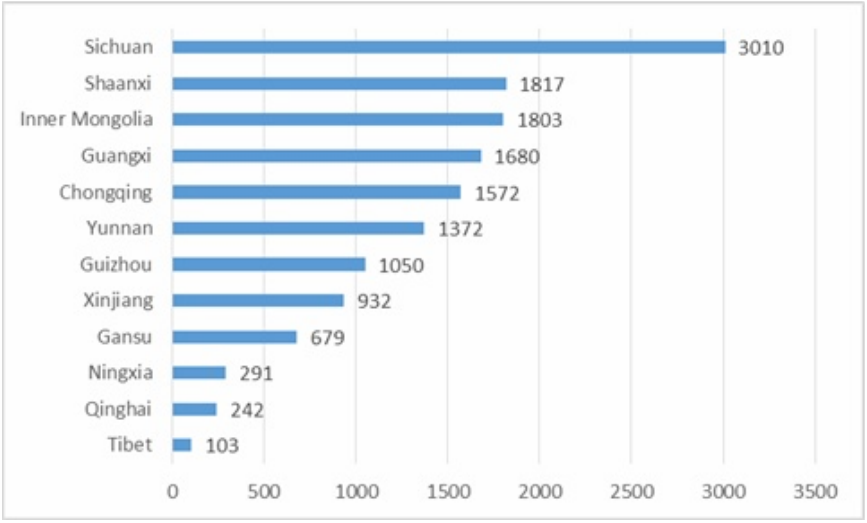
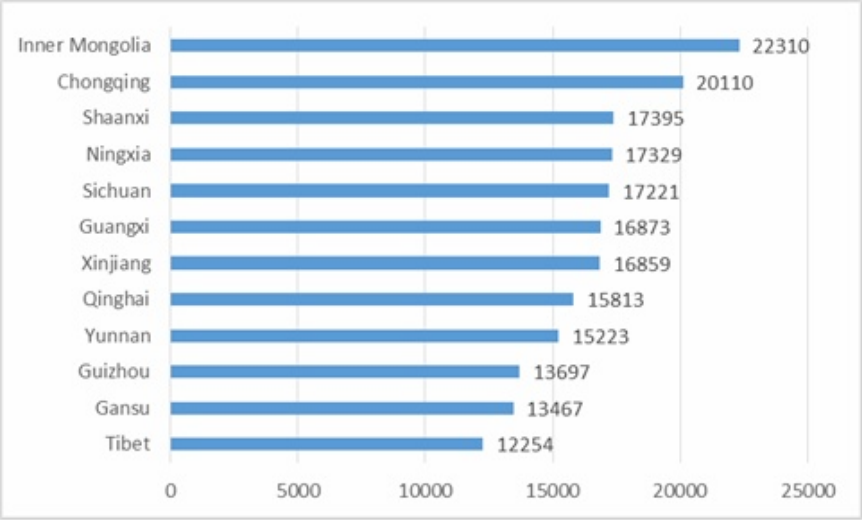


Figure 3 Disposable Income Per Capita of China's Western Region (RMB)



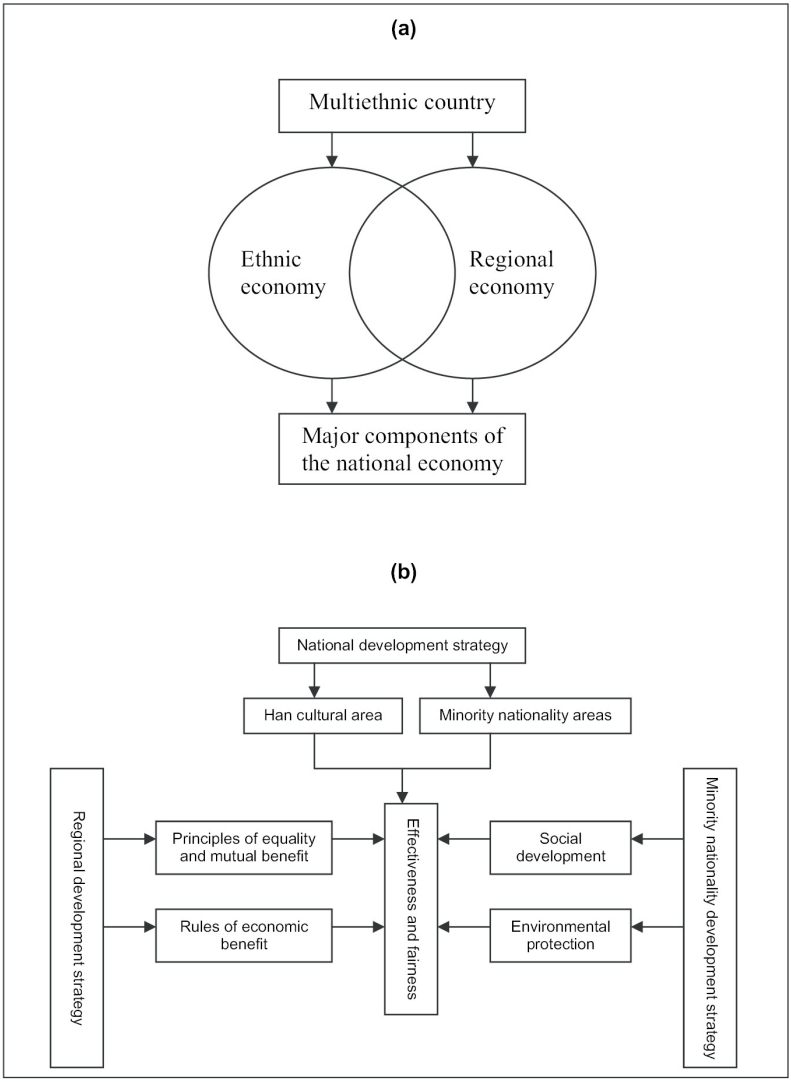
Source (Figures 2 & 3): HKTDC (2016).

advantaged industries, in addition to the lack of coordination and cohesion in resource exploitation. (*Zhongguo fazhan shuzi ditu*, 2006, p. 227)

It is in this context that the combined impact of poverty, unemployment, interethnic inequalities and ethnoregional disparities hence represents one of the major challenges facing China's ruling regime in maintaining social stability for continued rapid economic development that is now increasingly seen as the key to the survival of its unique governance model.

When the government stressed the need for "national unity" in proposing the "Western Regional Development" strategy in 1999/ 2000, the government simply conveyed its understanding of the need

Figure 4 Official View of "Western Regional Development" Strategy as Part of National Development Strategy



Source: Wu (2006: 3-5), Figures 4 and 5.

for different approaches in economic development strategy for the eastern and western regions (Figure 4) due to the contrasting ethnic compositions of the two regions – a recognition of the fact that while the eastern region is demographically dominated by the Han Chinese, the western region is home to a large number of China's ethnic minorities, and compounding the exigencies engendered by the ethnic factor is not only the socioeconomic disparity between the regions, but also the differences in environmental and ecological conditions between them that pose additional problems to State policies whether to deal with poverty or environmental issues which are inevitably interconnected, such as Inner Mongolia's grassland degradation and the herdsmen's livelihood that will form the focus of this article's later sections on the evaluation of the State's grassland ecological compensation policy in the particular case of the Alxa League where Suruna, a native of the Alxa League, has conducted her fieldwork and questionnaire survey for her MPA research paper that Emile supervised.

2. Urban-Rural Disparity in Ethnic Minority Regions

Mainly engaged in traditional farming and animal husbandry, China's ethnic minorities have always been lagging behind in level of urbanization. While the national urbanization over the past decade in terms of cities (*chengshihua* / 城市化) was around 24 per cent (more than 13 percentage points lower than the national figure of 37 per cent) and that in terms of townships (*chengzhenhua* / 城鎮化) was about 13 per cent – the former being 1.76 times the latter – ethnic minorities' urbanization in terms of cities was only 12 per cent, not much different from that of in terms of townships (Yeoh, 2013: 240, Figure 20.5). By late 2000s, in minority provinces, such as Tibet, Qinghai, Ningxia,

Xinjiang and Gansu, the population density and city size were still usually smaller, with between 60 per cent and 80 per cent of the cities being ranked within the small city category, while of all the eight extra-large and large cities, minority populations accounted for less than 30 per cent of the city populations, and of 58 minority cities, 70 per cent are found within small-sized cities (Maimaitiming *et al.*, 2013). Maimaitiming *et al.* (2013) attribute this phenomenon to minority ethnic groups' preference for small cities and suburban places rather than larger, centralized cities as the daily expenses in small cities are lower than that in large cities, and most minority groups, being generally less educated, cannot find jobs in big cities which are more competitive than smaller cities.

This lower urbanization of the ethnic minorities has directly affected the development of their occupational structure, resulting in the majority of them being engaged in the primary industry (agriculture). The proportion of ethnic minority population in the agricultural sector was 82.51 per cent, i.e. 7.24 percentage points higher than the national average (Yeoh, 2013: 542, Figure 20.10. While these provincial data include also the Han Chinese, it still shows a general increase in the agricultural population in the ethnic zizhiqu and multiethnic provinces, with the exception of Inner Mongolia and Guangxi. The highest increase was registered in Xinjiang, Tibet and Ningxia.)

Looking at urban-rural disparity in general, due to the fact that rural income growth has relatively been slower and more unstable compared to urban income growth, the urban-rural income gap has been expanding over the years.

Table 1 Ethnic Distribution# by Province/Zizhiqu/Zhixiashi[2]

	Province/zizhiqu/zhixiashi	Ethnic distribution*
1	***Qinghai****	Han (漢) 54%; Zang (藏, Tibetan) 23%; Hui (回) 16%; Tu (土) 4%; Salar (撒拉, Sala) 2%; Mongol (蒙古) 2%
2	***Xinjiang**** (Uygur Zizhiqu)	Uyghur (維吾爾, Uygur) 45%; Han 41%; Kazakh (哈薩克, Kazak) 7%; Hui 5%; Khalkh 1%; Mongol 1%
3	***Guangxi**** (Zhuang Zizhiqu)	Han 62%; Zhuang (壯) 32%; Yao (瑤) 3%; Miao (苗) 1%; Dong (侗) 1%
4	***Guizhou****	Han 63%; Miao 12%; Bouyei (Buyi) (布依) 8%; Dong 5%; Tujia (土家) 4%; Yi (彝) 2%; Gelao (仡佬, Gelo) 2%; Sui (水, Shui) 1%; Bai (白) 1%
5	***Yunnan****	Han 67%; Yi 11%; Bai 4%; Hani (哈尼) 3%; Dai (傣) 3%; Zhuang 3%; Miao 2%; Hui 2%; Lisu (傈僳) 1%; Lahu (拉祜) 1%; Wa (佤, Va) 1%; Naxi (納西) 1%
6	***Ningxia**** (Hui Zizhiqu)	Han 65%; Hui 34%
7	***Inner Mongolia**** (Mongol Zizhiqu)	Han 79%; Mongol 17%; Manchu (滿, Man) 2%; Hui 1%
8	Hainan	Han 83%; Li (黎) 16%; Miao 1%; Zhuang 1%
9	Liaoning	Han 84%; Manchu 13%; Mongol 2%; Hui 1%; Chosŏn (朝鮮, Korean) 1%
10	Hunan	Han 90%; Tujia 4%; Miao 3%; Dong 1%; Yao 1%
11	Jilin	Han 91%; Korean 4%; Manchu 4%; Mongol 1%
12	***Gansu****	Han 91%; Hui 5%; Tibetan 2%; Dongxiang (東鄉) 1%
13	***Xizang/Tibet**** (Tibetan Zizhiqu)	Tibetan 93%; Han 6%
14	***Chongqing**** (Zhixiashi)	Han 94%; Tujia 5%; Miao 2%
15	***Sichuan****	Han 95%; Yi 3%; Tibetan 2%
16	Heilongjiang	Han 95%; Manchu 3%; Korean 1%
17	Hubei	Han 96%; Tujia 4%
18	Hebei	Han 96%; Manchu 3%; Hui 1%
19	Beijing (Zhixiashi)	Han 96%; Hui 2%; Manchu 2%
20	Tianjin (Zhixiashi)	Han 97%; Hui 2%; Manchu 1%
21	Fujian	Han 98%; She (畲) 1%
22	Guangdong	Han 99%; Zhuang 1%
23	Henan	Han 99%; Hui 1%
24	Zhejiang	Han 99%
25	Shandong	Han 99%; Hui 1%
26	Anhui	Han 99%; Hui 1%
27	Shanghai (Zhixiashi)	Han 99%
28	***Shaanxi****	Han 100%
29	Jiangsu	Han 100%
30	Shanxi	Han 100%
31	Jiangxi	Han 100%

Table 1 (Continued)

Notes:
China as a whole – Han 92% + 55 other "nationalities" (*minzu* / 民族) including Zhuang 1%, Manchu 0.9%, Hui 0.8%, Miao 0.7%, Uygur 0.68%, Tujia 0.65%, Yi 0.63%, Mongol 0.47%, Tibetan 0.44%, etc.
+ Decimals are rounded to the nearest. Ethnic groups below 1 per cent are not shown.
* provinces (*sheng* / 省), "autonomous regions" (*zizhiqu* / 自治區), and provincial-level cities (*zhixiashi* / 直轄市) now classified as the "western region"

Source: Yeoh (2013: 522-523), Table 20.2.

3. Ethnoregional Dimension of Poverty

In line with the now well-known fear of instability[1] on the part of China's ruling Communist Party, the main objective of the country's poverty alleviation policy is to prevent income and wealth inequality from growing out of political control, by attempting to improve the economic position of the poorest through considerably limited administrative intervention. Furthermore, discontent brewing in the areas resided by ethnic minorities is taken seriously because these areas are also places that show a relative concentration of poor people.

Just how the western region populated by the non-Han peoples has been left behind in China's economic development is clearly indicated by the poverty problem. Any political or social instability in this ethnic minority region could have grave ramifications throughout the economy that would threaten the development efforts of the central government especially in regard to the development of the regional cores.

Over the past decade, of the around 24 million rural poor of China, the eastern region, central region and western region contributed about 3 million (13.7 per cent), 8 million (35.5 per cent) and 12 million (50.8

per cent) respectively, with incidence of absolute poverty of the central region and western region being respectively 3.1 times and 6.5 times that of the eastern region (Yeoh, 2013: 542, Figure 20.9). Compare this with the 1993 figures of 19.5 per cent, 31.1 per cent and 49.4 per cent for the eastern region, central region and western region respectively (*Zhongguo Fazhan Baogao 2007*, p. 37), it is obvious that the changes in the regional distribution of the rural population in absolute poverty were mainly reflected in the decline of its proportion in the eastern region, increase of that in the central region, while that in the western region had remained largely unchanged, with the implication that the extent of decline of the number in absolute poverty in the eastern region actually surpassed the national average, that in the central region was obviously below the national average, and that in the western region was the same as the national average (*ibid.*).

By 2010s, western China still shows a higher incidence of poverty – with 10.4% of people being MPI poor (following the Global Multidimensional Poverty Index (MPI); see Alkire and Shen, 2015) – compared to 4% or less in the eastern and central regions of China, and the average intensity of poverty in western China is also higher, where on average MPI poor people are deprived in 42.8% of the poverty indicators – equivalent to being deprived in, for example, roughly one health indicator, one education indicator, and two living standard indicators. With both higher incidence and higher intensity, poverty in the western region of China is thus, by 2010s, still significantly higher than in China's eastern or central provinces (Alkire and Shen, 2015).

In terms of interregional differentials in rural poverty incidence, those provinces/zizhiqu with incidence of poverty above 5 per cent (i.e. double the national average) over the past decade were Inner Mongolia, Guizhou, Yunnan, Tibet, Shaanxi, Gansu, Qinghai and Xinjiang which were all in the western region (Yeoh, 2013: 542, Figure 20.9). The only

province/zizhiqu/zhixiashi of the western region that had incidence of poverty below 5 per cent were Chongqing, Guangxi, Sichuan and Ningxia – the last one, Ningxia, having experienced a steep decline in rural incidence of poverty from a height of 14.5 per cent in 2000 to just 3 per cent over the past decade. Beijing, Tianjin, Shanghai, Jiangsu, Zhejiang, Fujian and Guangdong which are all provinces/zhixiashi in the eastern region have basically eliminated absolute poverty, with incidence of poverty at just 0.2 per cent and below. Shandong also had incidence of poverty below 1 per cent. Hainan, Hebei and Liaoning were the only provinces in the eastern region that still had incidence of poverty above 1 per cent. On the other hand, all provinces in the central region – Anhui, Heilongjiang, Henan, Hubei, Hunan, Jiangxi, Jilin and Shanxi – had rural absolute poverty incidence from 1.5 to 3.5 per cent.

There are four characteristics typical of the distribution of poverty population in China:

1. Concentration in the mountainous areas.
2. Concentration in the western region.
3. Concentration in environmentally fragile areas.
4. Concentration in ethnic minority areas.

For instance, at the end of China's ambitious "8-7 Plan" (National Plan for Poverty Reduction, 1994-2000), out of the 29 million people in absolute poverty (in 2003), 15.5 per cent were in the eastern region, 35.5 per cent in the central region, and 49 per cent in the western region. Areas with incidence of poverty less than 1 per cent were all located in the eastern region. Guangxi, Sichuan and Chongqing were the only places in the western region with incidence of poverty between 1 and 5 per cent. Inner Mongolia, Yunnan, Shaanxi, Gansu, Ningxia and Xinjiang were places in the western region with incidence of poverty

between 5 and 10 per cent. All areas with incidence of poverty above 10 per cent were in the western region, viz. Guizhou, Tibet and Qinghai. With rural population with income from 637 to 882 yuan per annum are officially classified as the low-income group, those in the low-income group totaled 29.46 million just within the poverty counties alone. (Chen, 2006: 175, footnote 1) Combining the rural poverty population and the low-income group, the number then totaled 85.17 million, of which 40.14 million (47.1 per cent) were in the western region, 31.2 million (36.6 per cent) in the central region and 13.83 million (16.2 per cent) in the eastern region. (*ibid.*: 176, Figure 7-2) More than a decade later today, the goal of eliminating absolute poverty has become clearer defined as to raise per capita disposable income to 4,000 yuan (US$580) or more, and guarantee compulsory education, medical treatment and housing security to impoverished households in order to reduce the rural impoverished population to less than 15 million and incidence of poverty to below 2 percent with the lifting of about 40,000 extremely impoverished villages and more than 50 percent of the impoverished counties out of poverty (Li, 2018).

Of China's 592 officially designated poverty counties[3] – including 257 ethnic minority poverty counties – 62 per cent were concentrated in the western region. Besides the 592 counties that are officially designated as poor, there are also 14 contiguous poor areas, with some overlapping between the two categories which cover a total of 832 of China's counties.[4] Of the 29 million people in poverty back then at the end of the "8-7 Plan", more than half were among the ethnic minorities (i.e. non-Han) or in the ethnic minority areas (the 12 zizhiqu and provinces of the western region), totaling 17 million people or 58.55 per cent. (*Zhongguo Minzu Fazhan Baogao, 2001-2006*, p. 235) Hence, it is discernable that there is a trend of gradual concentration of the poor towards the western region and the frontier areas, and towards the ethnic

minorities. Estimation of the extent of absolute poverty among the ethnic minorities ranges from 40 per cent of the total population as estimated by researchers in China to 60 per cent as estimated by Nicholas Stern of the World Bank. In view of the fact that ethnic minorities only constitute 8.41 per cent of China's total population, that 40 to 60 per cent of China's poor come from them is indeed alarming. (*ibid.*)

One of the most crucial aspects of China's poverty problem hence is the very fact that the dominant component of the rural poor is the ethnic minorities – as mentioned above, out of the 592 poverty counties, 257 (44 per cent) are ethnic minority counties. By the end of the "8-7 Plan", among the poor of the 592 poverty counties, 46.7 per cent were in ethnic minority areas, with incidence of poverty of 11.4 per cent that was higher than those of the mountainous areas (10.1 per cent), hilly areas (7.1 per cent), old revolutionary base areas (7.7 per cent) and the plains (7.8 per cent). Eighty per cent of the 4.59 million poor of Guizhou were ethnic minorities, and almost all of the 3.1 million hard-core poor of the province were ethnic minorities. In the mountainous areas of southern Ningxia, 60 per cent of the 520 thousand poor were Hui. Eighty-five per cent of Yunnan's 4.4 million poor and more than 90 per cent of Tibet's 250 thousand poor were also ethnic minorities. (Chen, 2006: 177) In fact, out of the country's 29 million poverty population, 45 per cent or more than 13 million were in the ethnic minority areas. Among the 630 thousand people of 22 ethnic minority groups each with population less than 100 thousand, 394 thousand were in absolute poverty or in the low-income category. (Wu, 2006: 15) Official figures then showed that ethnic minority areas' rural absolute-poverty population constituted 47.7 per cent of the national total, incidence of poverty was 5 percentage points higher than the national figure, population with low income constituted 46 per cent of the national total, proportion of low-income population in rural population was 9 percentage points higher than the national figure,

absolute-poverty population plus low-income population constituted 46.6 per cent of the national total, and the proportion of absolute-poverty plus low-income population in rural population was 14 percentage points higher than the national figure. Almost 80 per cent of China's ethnic minorities are found in the country's western region, especially the rural areas. China's northwest with about 20 different ethnic minorities and total minority population of more than 15 million and southwest with more than 30 ethnic minorities and total minority population of more than 29 million being the country's two areas with the most complex ethnic composition and the largest number of and most concentrated ethnic minorities, the geographical correlation of ethnic minority distribution (largely populating the frontier areas) and poverty population distribution is unmistakable, hence reflecting the composite phenomenon made up of rural poverty, geographical poverty, ethnic poverty and frontier poverty. (Nie and Yang, 2006: 153)

As China was experiencing a continuous expansion in urban-rural income gap, the interregional rural income disparity is also widening. The ratio of eastern to central to western rural income had been expanding then from 1:0.83:0.79 in 1980 to 1:0.75:0.63 by 1990 and further to 1:0.68:0.52 by mid-2000s (*Dangdai Zhongguo Shehui Ge Jieceng Fenxi 2007*, p. 212, Table 7-2).

According to official figures, western regional to national GDP ratio appears to be stable, with slight increases in later years, and there was steady increase in western regional GDP per capita, though it still lagged behind the national level by a very large differential (*Zhongguo xibu nongcun quanmian xiaokang zhibiao tixi yanjiu*, 2006, pp. 51-52, Tables 4-1, 4-2). Even official figures admitted that the gap between the ethnic regions and the advanced eastern region was expanding, with Shanghai's and Guangdong's respective annual average growth rates of 13.11 per cent and 13.97 per cent for the 2000-2004 period exceeding the 13.05

per cent of the ethnic regions, and the annual average growth rate of Guangdong's total import-export surpassing that of the ethnic regions by 9 percentage points for the same period (*Zhongguo Minzu Fazhan Baogao 2001-2006*, p. 64). The disadvantage of the western region is even more glaring in terms of public revenue, where the differential has been expanding over the years.

4. Environmental Dimension of Interregional Imbalance

Back at the end of the "8-7 Plan", Woo *et al.* (2004) found that China appeared to be off track to achieve the MDG Target 9 with proportion of land covered by forest amounting to 17.5 per cent in 2001, only slightly increased from 15.6 per cent in 1990.

Table 2 Natural Ecosystem Reserves in China

	Quantity		Area	
	Number	Percentage (%)	Area (10,000 ha.)	Percentage (%)
Forest ecosystem	1,397	52.34	3,062.77	20.45
Grassland and meadow ecosystem	43	1.61	215.83	1.44
Desert ecosystem	33	1.24	4,092.42	27.32
Inland wetland and water area ecosystem	335	12.55	2,926.21	19.54
Marine and coastal ecosystem	74	2.77	76.63	0.51
Total	*1,882*	*70.51*	*10,373.66*	*69.26*

Source: Ministry of Foreign Affairs of the People's Republic of China and United Nations System in China (2013). *China's progress towards the Millennium Development Goals - 2013 report*, p. 42. (Table 7-2: Different categories of nature reserves across China, 2012 (source: Ministry of Environmental Protection of PRC)).

While ecological resource protection and governance has since been intensified, with the implementation of natural resource protection of forests, expanding the restoration of farmland to forests or grasslands and returning grazing grass to grasslands, promoting the comprehensive control of desertification, soil erosion, and protected vegetation, rivers, lakes and wetlands, and by the 2010s, 2,669 nature reserves of different categories and levels were set up across China, covering a total area of 149.79 million hectares, with its land area accounts for 14.94 percent of national territory (MFA PRC & UNSC, 2013)[5], this may not auger well enough for China's continued effort to solve her poverty problem. The reality is that poverty in this large country is still very much related to environmental factors. For instance, the concentration of the poor in the western region is related to the fact that the poverty-stricken mountainous areas are concentrated in this particular region. The country's 64.8 per cent of poverty-stricken mountainous areas (*shanqu* / 山區) and 56.2 per cent of the hilly (*qiuling* / 丘陵) areas are found in 10 provinces/zizhiqu/zhixiashi of the western region, occupying 72.9 per cent of the total area of the region, with mountainous areas alone taking up 53.1 per cent. The most mountainous provinces are the three southwest provinces of Sichuan (including Chongqing), Yunnan and Guizhou, with mountainous areas taking up 72 per cent, 80.3 per cent and 80.8 per cent of the respective total areas of the said provinces. If inclusive of the hilly areas, the figure rises to 95 per cent for Yunnan and Guizhou, and 97.5 per cent for Sichuan. (Chen, 2006: 176)[6] Out of the 592 poverty counties, 366 are in the western region, and out of these 366 counties, 258 are remote mountain counties, occupying about 70 per cent of the western mountain counties. Most of these poverty counties are distributed over 6 major areas of fragile environmental habitat, viz. Inner Mongolian plateau's southeastern border area that suffers from desertification, Huangtu (黃土) plateau's gully area that suffers from

severe soil erosion, the environmentally deteriorating mountainous areas of the Qin Ba (秦巴) region, the environmentally endangered hilly areas of the karst plateau, the sealed-off mountain and valley areas of the Hengduan (横斷) range and the severely cold mountain areas of the western deserts. Being environmentally fragile and sensitive, all these are areas extremely short of resources, with extremely bad environment for human habitation. (*ibid.*: 177) Thus, coupled with structural economic disadvantages, the western region populated by many of China's ethnic minorities is trapped in the vicious cycles of developmental nightmare as depicted by Wu (2006) (see Figure 1).

There are three main issues in the western region's environmental degradation: soil erosion, desertification and grassland deterioration. Major symptoms like the increasingly serious Huanghe (黄河, Yellow River) drought since the 1990s, the severe flood of mid-Yangzi River (揚子江 / Chang Jiang / 長江) in 1998, and the almost yearly spring sandstorm since 2000 all point to the critical stage of environmental degradation of the western region. For instance, when the first sandstorm of 2008 came in March from the Gobi desert, it affected not only up to 110 million people in China's 300 cities, towns and counties in 5 provinces/zizhiqu, but also adjacent nations including Korea, Japan and Taiwan, straining bilateral relations. Such sandstorms from China are costing, besides human lives, an estimated US$5.82 billion of losses in Korea alone.[7]

China's western provinces and zizhiqu are resource-rich regions (Yeoh, 2013: 544, Figure 20.11), as Cook and Murray (2001: 126-127) succinctly summarized:

> Three of China's four largest coal fields are in this area, as well as four of the most important oil fields. Some 140 kinds of mineral ores have been detected along with large reserves of bauxite for processing

> into aluminium, and gold. The Qaidam Basin in the middle of Qinghai Province, home to a large Tibetan population, for example, is described by local officials as the province's 'treasure bowl', containing proven oil reserves of 200 million tons, as well as 4.5 billion tons of mostly high-quality coal with low ash and sulphur content. Under the Kunlun and Qilian mountains are large proven caches of iron, manganese, chromium, vanadium, copper, lead, zinc, nickel, tin, molybdenum, antimony, mercury, gold, silver, platinum, beryllium and selenium. The iron reserves are estimated at 2.2 billion tons, and the province claims the country's largest lead and zinc mines, and is a primary producer of asbestos. The Hui people in the Ningxia Hui Autonomous Region, meanwhile, are sitting on large proven reserves of oil and natural gas, along with mineral resources such as copper, iron, silver, gold, aluminium and nickel. The growing prosperity of Xinjiang is being built on the back of developments in the vast and inhospitable Tarim Basin, where experts reckon there are reserves of up to 100 billion barrels of oil and 8,300 billion cubic metres of natural gas.

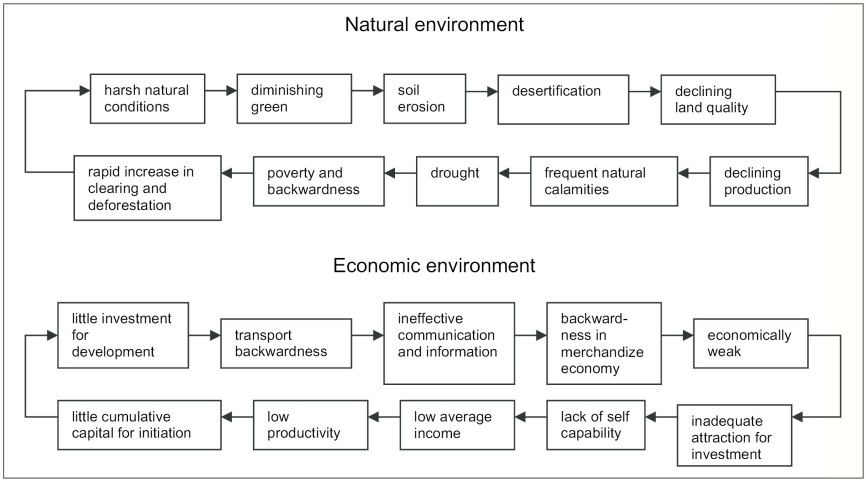
The western region's coal, petroleum, natural gas and a whole range of abundant mineral resources have been forecasted to be adequate to guarantee China's economic development or exports by 2010s and beyond, and hence the western region – being the major energy source for the whole of China, providing 34 per cent of the nation's coal, 78 per cent of hydroelectricity and 59 per cent of natural gas (*Zhongguo Xibu Jingji Fazhan Baogao 2006*, p. 268) – has long poised to become the country's important reserve base of strategic resources.

Within this context, adding to those problems of environmental degradation mentioned earlier, there is also an alarming degree of wastage and environmental damage in resource exploitation in the

western region, the former being partly due to the fact that the right for exploitation is given by the government via administrative measures, hence does not feature in the enterprises' cost structure. Furthermore, resource tax by production volume is as low as just 1.18 per cent of resource volume on average. Zero cost of access to resource and extremely low resource tax have thus led to tremendous wastage in exploitation. For instance, for some oil wells in northern Shaanxi, only around 100 kilograms could be extracted from every ton of crude oil reserve, the other more than 800 kilograms being completely wasted. (*ibid.*: 272) Such over-exploitation and wastage, coupled with neglect of environmental protection, have also led to increasingly severe environmental degradation. For instance, in Shaanxi's Shenmu (神木) county, over-exploitation by the county's 216 coal enterprises has resulted in a cavity of up to 99.12 km2 in size, leading to 19 cave-ins. Cave-ins, death of plant life due to the drying up of groundwater, and severe water and air pollution are making the mining regions increasingly uninhabitable. It was reported that while caving-ins are making land uncultivable for farmers and causing grazing problems for animal husbandry, and diminishing groundwater is drying up wells which households depend on for drinking water, the mining company is paying villagers a cave-in compensation of just RMB 20 cents for every ton of coal. (*ibid.*: 272-273)

Up to 80 per cent of the country's total area of soil erosion, 81.43 per cent of the area of desertification and 93.27 per cent of the area of grassland deterioration are in the western region. (Chen, 2006: 19), and of all the provinces/zizhiqu/zhixiashi (not including Chongqing), seven have area of soil erosion exceeding 100000 km^2. Other than Shanxi, all of these provinces/zizhiqu are in the western region: Sichuan, Inner Mongolia, Shaanxi, Xinjiang and Gansu. Soil erosion in the southwestern region is also serious.

Figure 5 Vicious Cycles of China's Ethnic Minority Areas



Source: Wu (2006: 2), Figures 2 and 3.

The desertification of farmland in the western region involves a total area of up to 1.1 million hectares. While this is only 2.24 per cent of the total area of farmland in the western region, it contributes to 43.24 per cent of the national total area of desertification of farmland – that suffering from light- and medium-degree desertification is 87.95 per cent of the national total area and that suffering from high-degree desertification is 12.05 per cent of the national total area. Provinces/zizhiqu in the western region particularly severely hit by desertification are Xinjiang, Qinghai, Gansu and Tibet. (Chen, 2006: 20) With the "Western Regional Development" strategy inevitably aiming at exploiting the rich natural resources (water, nonferrous metals, petroleum, natural gas, etc.) of the western region (Yeoh, 2008a: 15-19), both to promote the region's economic growth and enhance the living

standard and welfare of the region's inhabitants, and to meet the energy needs of the country as a whole, in time there could arise an inherent contradiction between habitat construction/environmental protection and the basic aim of *xibu dakaifa* that cannot be ignored. (*ibid.*: 33)

With 40 million hectares of grassland (41.7 per cent of the country's total land area), China is one of the few countries in the world with the largest grassland. The country's natural grassland is mainly distributed in the ethnic minority pastures in the western and northern frontiers. The area of pasture grassland totaled up to 3.6 million km^2, or 37 per cent of the country's land area.

The western region is the country's main region of grassland deterioration. The pasture grasslands of Tibet, Gansu and Sichuan have been deteriorating very rapidly over the past decades (*ibid.*: 22-23). Tibet's area of deterioration was 24.267 million hectares in 1980, with a deterioration rate of 29.6 per cent. The deterioration area rose to 29.285 million hectares by 2000, with a deterioration rate of 35.7 per cent, i.e. an increase of 6 percentage points in 20 years. Gansu's area of deterioration was 2.351 million hectares in 1980, with a deterioration rate of 26.7 per cent. The deterioration area rose to 4.405 million hectares by 2000, with a deterioration rate of 50.0 per cent, i.e. an increase of 23.3 percentage points in 20 years. Sichuan's area of deterioration was only 1.333 million hectares in 1980, with a deterioration rate of only 9.8 per cent. However, the deterioration area tripled within 20 years and rose to 4.541 million hectares by 2000, with a rapid rise in deterioration rate to 33.3 per cent. Qinghai's area of deterioration was 4.398 million hectares in 1980, with a deterioration rate of 12.1 per cent. The deterioration area rose to 20.367 million hectares by 2000, with deterioration rate increased tremendously to 56 per cent, i.e. a shocking increase of 44 percentage points in 20 years (Yeoh, 2008b: 182-183, Figures 8.25-8.26).

Over the years, efforts are being strengthened to carry out measures for grassland protection, such as restoring grazing grass to grasslands and managing grasslands to control the sources of sandstorms (Yeoh, 2008b: 179). Presently China has about 400 million hectares of grassland, or nearly 6 billion *mu*[8] accounting for about 41.7 percent of the national territory, and the yield of fresh forage on natural grasslands across the country amounts to over 1 billion tons (equivalent to around 323 million tons of hay), with livestock grazing capacity reaching around 254.57 million sheep unit (MFA PRC & UNSC, 2013)[9].

5. Grassland Degradation in Inner Mongolia

Grassland ecosystem as the largest terrestrial ecosystem of China, not only plays a vital role in maintaining the ecological balance of arid areas in western and northern China, but also represents an indispensable material basis for the survival and development of some of China's ethnic minorities (MOA PRC, 2010)[10]. Of China's nearly 6 billion *mu* of all kinds of natural grassland, Inner Mongolia Autonomous Region contributes 1 billion 320 million *mu* and occupies the first place in China's five largest pasture (Hua, 2013; Li, 2010; Ma and En, 2017). Between 1960 and 2000, with the increasing population of the world and the trend of world economic growth and climate change, human demand for ecosystem services are increasing significantly (MOA PRC, 2011a)[11]. As a result, about 60 per cent to 70 per cent of the world's ecosystem services are unsustainable, posing a serious threat to human sustainable development (Hao, 2016). Therefore, the Chinese government attaches great importance to grassland ecological protection. The 13th conference of the United Nation Convention to Combat Desertification which was held in Inner Mongolia's Ordos brought participating members to agree

on the implementation of the United Nations 2030 Sustainable Development Agenda for the development of the promotion of zero growth targets for land degradation[12]. In China, grasslands cover in total about 41.7 per cent of land area, with almost 80 per cent of them existing in arid and semiarid regions[13]. As noted earlier, during the past several decades, grassland degradation has led to desertification and sandstorms making it a noteworthy environmental problem in northern China and has already reduced its ecosystem productivity and biodiversity when compared to initial condition (Akiyama and Kawamura, 2007).

While the State has introduced grassland ecological compensation policy to restore the vitality of the grassland and grassland ecology has experienced a certain degree of recovery after the implementation of the policy, the process is still slow and some areas have witnessed the phenomenon of stagnation in recovery. It was also found that some herdsmen did not follow the grassland policy requirement after they had already received their subsidy payments (Gao, 2016). As a result, the State cannot guarantee the efficiency of grassland ecosystem restoration while herdsmen are unable to improve the current state of life in the process of policy implementation.

Unfortunately, China is severely struggling with desertification. China's pastoral areas are under typical arid and semi-arid climate in which the grassland ecosystem is extremely fragile. With the rapid economic development, the market demand for livestock products is also increasing. This phenomenon results in overgrazing in pastoral areas, and damaging the grassland ecosystem. The country's grasslands have been brutally damaged and their soil eroded by overgrazing of livestock, drought, mining and other types of development.[14] Coupled with unreasonable mining and blind land reclamation, as well as drought, rainfall reduction and other natural factors, the height and coverage of grassland in Inner Mongolia Autonomous Region has noticeably

decreased, the quantity of fine forage reduced, the productivity of grassland has become insufficient and the carrying capacity of grassland has decreased year by year.

According to existing statistics, more than 90 per cent of China's grassland is in varying degrees of degradation, and the total grassland degradation area amounts to 2 billion *mu* (Yan and Sun, 2005). The degradation of grassland ecological service function has caused the decrease of herdsmen's income that depends on grassland animal husbandry, which seriously threatened the production and life of local farmers and herdsmen and the development of the pastoral economy. The disharmonious relationship between herdsmen and grassland ecological environment will lead to a series of social, economic and ecological problems, and this will have direct impact on Inner Mongolia's pastoral social stability, economic development and ecological security. Therefore, the improvement of grassland ecological environment and the restoration of grassland productivity are very important to improve the living standard of farmers and herdsmen, the healthy and sustainable development of grassland animal husbandry and the sustainable development of society and economy.

In the context of the increasingly severe grassland degradation, the Chinese government has introduced a series of grassland ecological compensation policies and regulations, such as the "Grassland Law" which was promulgated in 2002. The grasslands of northern China's Inner Mongolia Autonomous Region are currently one of the epicenters of global desertification, even as the Chinese government is attempting to create policies to overcome degradation of its grasslands (Wei and Zong, 2014). In 2016, in the annual plenary sessions of the proposal of Inner Mongolia, the third point of the proposal shows that in the "Twelfth Five-Year plan", the grassland ecological subsidy incentive mechanism was implemented, and the system of grazing prohibition and

grassland balance was strictly enforced. In the implementation of the "Thirteen Five-Year plan" of the first year, the Inner Mongolia Autonomous Region's government would strengthen the ecological protection and construction to speed up the Beijing-Tianjin sandstorm source management, returning farmland to forests and other key projects, as well as to adhere to the implementation of a new round of grassland ecological compensation policy.

On the practical level, the policies of "converting pastures to grassland" (2003) and "grazing subsidies" (2011) constitute the strategic project of China to improve the ecological environmental balance of the grassland and to promote the sustainable development of the economy in the pastoral area (Gong and Chen, 2016). This is not only related to the country's ecological security but also has great significance in promoting national and regional economic development. Although there are certain degrees of recovery of the grassland in Alxa League, the grassland problem still exists with contradiction between herders and the government. Therefore, how to establish an effective policy which can keep balance between the grassland ecology and the interests of the herdsmen is extremely significant.

On the theoretical level, the researches in the field of grassland policy and grassland ecological compensation mechanism provide a good reference for the follow-up studies. However, most of those researches are focusing on the theory and policy on the macro level, and there are few studies which focus on the effects and evaluation on the micro level and analyse the grassland ecological compensation from the perspective of the herdsmen. The most important is the herdsmen's ecological protection consciousness and their behavioural response that is directly related to the implementation of the grassland policies and projects and could decide whether they could proceed smoothly.

6. Review of Grassland Ecological Compensation Research

Environmental degradation is the beginning of environmental concerns (Jin, 2016). Arthur C. Pigou (1920) proposed a solution to the problem of externalities and this is known as a "Pigovian tax". Taxes and subsidies are fairly common instruments to control externalities. Cupures and Piepers (1996) consider that ecological compensation is a subsidy for ecological function and quality destruction in the process of social transformation. These grants are designed to improve the environmental quality of damaged areas or create an environment with the same ecological function and quality. In the area of ecological compensation research, researchers commonly use the concept of "payment for ecological or environmental services" (PES) (Hao, 2016). That is to say, ecological services are regarded as a kind of commodity, and if one wants to use the service, one has to pay a certain fee. Landell, Mills and Porras (2002) consider that ecological benefit compensation refers to any economic stimulus that helps to improve the efficiency of natural resource management. Hardner and Rice (2002) state that the key to ecological compensation is that economic compensation should be given to the groups that have made or sacrificed their interests in the process of protecting ecological services function and cannot get income or benefit through such protection. Wunder (2005) considers that the international concept of ecological compensation is generally to assess the ecological resources to be compensated, clarify the beneficiaries and their income value, and then make compensation for those who sacrifice their interests because of the protection of ecological resources.

On the study of the ecological compensation mechanism of grassland in China, researchers have made a good discussion on the necessity, compensation principle, compensation subject, compensation source, compensation standard and compensation method of grassland ecological compensation which laid an important theoretical foundation

for the comprehensive establishment of grassland ecological compensation mechanism (Chen and Wang, 2006; Hou, 2008; Hu, 2009; Song and Tang, 2012; Zhang, 2007). Based on the theory of social welfare economy, ecological economy and herders' psychology and behaviour, Liu, Shang and Long (2010) discuss the ecological compensation mechanism and compensation scheme of grassland and suggest that the ecological compensation mechanism of grassland can make the ecological service of grassland be compensated by ecological consumers in order to eliminate the irrational exploitation and utilization of grassland resources. After comparing the Alxa Mongolian traditional ecological culture and the ecological policies of grassland in recent years, Zhang and Zhang (2010) find that the grassland policy content covers less level, poor continuity, mandatory and other shortcomings. Li and Gongbuzeren (2013) through the study of academic papers published on the "return grazing to grassland project" during 2002 and 2012 found that this project has had a positive impact on the recovery of the grassland ecosystem and a majority of the scholars considered this grassland policy generating high negative impacts on herdsmen livelihoods. There are also some scholars who have discovered that overgrazing as the main reason for grassland degradation is not possible in traditional pastoralism (Li and Huntsinger, 2011). They found that animals would be moved to new places for available forage before the vegetation of this area is notably damaged by grazing. Furthermore, the restriction of livestock number will unavoidably lead to economic loss for herdsmen and this will obstruct the implementation of the grassland ecological policies and programs (Liu, 2017). As a result, the grassland ecological policies and programs do not seem to be effective enough for recovery of grassland ecosystem, especially for those policies that focus on controlling livestock number of grazing.

The "grazing prohibition", "encirclement transfer" and "return grazing land to grassland" projects promulgated by the State are beneficial to the restoration of grassland ecology. But this will undoubtedly sacrifice the interests of some herders. Although the government has the subsidies for the herders they are not enough to make up for the losses of the herdsmen. Yu and Da (2013) based on the investigation of the livelihood of grassland subsidy policy for pastoralists in 2011 in Alxa of Inner Mongolia show that different ecological and environmental policies have different effects on the livelihood situation of herders. Besides, it has an impact on the production, life and herders' psychological factor respectively. Although the research proposes there is incompatibility between the national grassland ecological subsidies and the herders of Alxa of Inner Mongolia, the authors have ignored that the herders are rational economic men, and their attitude can also affect the results of the policy. Based on the perspective of the herdsmen, Qi *et al.* (2016) use the questionnaire and empirical analysis method to find that although some achievements have been made in the implementation of grassland ecological compensation policy, there still exists a big problem. The results of the study reveal that the development and implementation of existing standards lack regional dynamics and put forward that the policy should be in accordance with "cut the livestock number first and then subsidise" rather than "subsidise first and then cut the livestock number", in order to completely stop the phenomenon of "both overload and achieve subsidy".

In summary, there are not many researches on the grassland ecological compensation area and while scholars have concentrated on the research of grassland ecological compensation policy and compensation mechanism, few studies have been done on the ecological

compensation effect of grassland. Besides, when it comes to the research on the effect of grassland ecological compensation policy, most of the studies are mainly focusing on the effect on the ecological environment rather than the effect on the stakeholders. This cannot objectively reflect the impact of the policy on the livelihood of farmers and herdsmen.

In the context of the State's emphasis on grassland ecology and the implementation of grassland ecological compensation policy, this section of our article will focus on the Alxa League Left Banner in Inner Mongolia based on a field research. The research collected the data of the local herdsmen's income from grazing before and after the forbidden period to analyse the cost and the interests and evaluate the impact on the households, through visiting the herdsmen to understand their ecological protection consciousness and their attitude towards grassland ecological compensation policy. This should bring a comprehensive understanding of the local herdsmen's policy awareness, understanding, and herdsmen's willingness to protect the grassland ecology. Besides, the opportunity cost and direct cost of the herdsmen were taken into consideration.

Over-loading of livestock and the inappropriate structure of livestock pose a major challenge to sustainable grassland development in China. Based on game theory, Liu and Yan (2014) put forward the difference between grassland and farmland. They pose the statement that grassland not only provides the basic needs for production and life of herders, but also maintains ecological balance, water conservation, mitigation of climate warming and plays a significant role in protecting soil. On the basis of empirical analysis, Zhao, Cao and Rong (2009), through setting multivariate regression analysis on the income and attributes of livestock husbandry of herders from 2000 to 2005 in Alxa of Inner Mongolia, propose that the government's grazing project provides a greater development space and maintain a more stable growth

of the local herders' income and regional economy based on the purpose of protecting grassland and restoring vegetation productivity. Wei and Liu (2015), through establishing static game model between the local government and herders as well as dynamic game model between the central government and herders, obtain the result that the government should take the difference of different grassland regions into consideration in order to ensure the effectiveness of the grassland ecological compensation policy. The limitation is that the research did not analyse the real case of grassland and herders. Based on the grey comprehensive evaluation method and the entropy weight method, Gong and Chen (2016) conducted an empirical research through the construction of comprehensive evaluation index system to analyse the effect of grassland ecological compensation in Inner Mongolia. The analysis shows that after 2007 there exists a steady upward trend that is to say the effect of compensation is significant. However, there are also many shortcomings especially in ecological environment, with factors such as the funds problems, lack of supervision and the incomplete implementation leading to a less stable grassland ecological environment compensation.

From the perspective of economic theory, environmental problems and policies are usually discussed as a problem of allocating responsibility for externalities. According to Pigou (1920), externalities are described as costs and benefits of a good or service, or the transaction spillovers. Devlin and Grafton (1998) describe environmental problem as a combination of the misuse of a natural resource currently being in the public sphere with open access. They consider that the solution is to treat this as a problem of privatisation, and allocate private property rights to the resource so as to achieve the internalization of externalities. In the process of grazing, the herders see the grassland as representation of collective interest. And when they

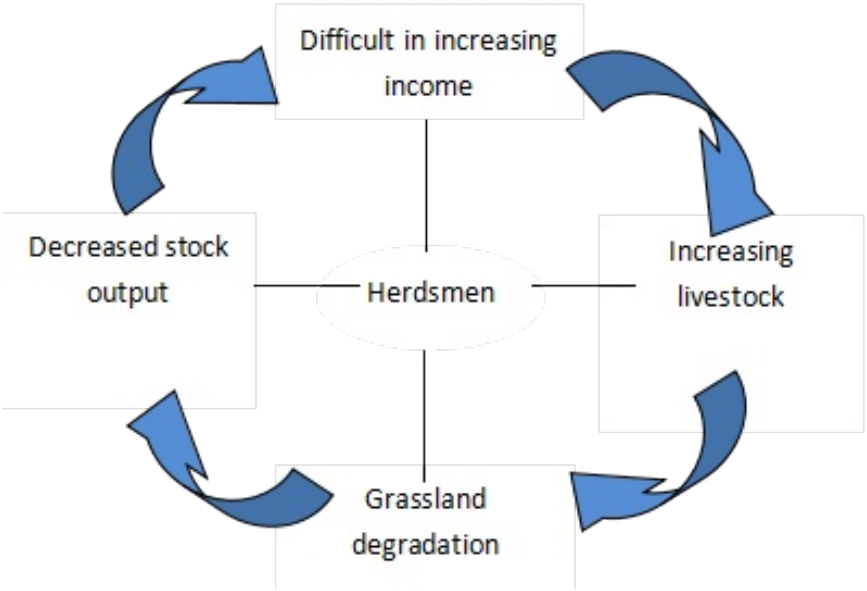
pursue personal interest, externalities thus brought about to the grassland tend to be ignored due to the self-interest.

The balance theory and non-balance theory have also been employed to study the internal pattern and development model of grassland systems in China (Li, Chen and Liu, 2004). Many case studies were carried out based on the investigation of these two competing models. In the process of the grassland ecological compensation which is implemented by the local government, the balanced relationship between the herders and the local government is dominated by the attitude and the interests of each other. The government as the regulator in the grassland ecological compensation process must thus establish the strategy and policy in diverse area which is suitable for the situation in that place.

7. Related Stakeholders

The herders act as the representation of individual interest; they do not only has relationship with the government but also have relationship between themselves. From a national development perspective, grassland sustainable development has now evolved to include ecological, economic and social dimensions (Reynolds, 2001). Li, Yang and Xu (2004) state that the root of the deterioration of grassland ecosystem of China is the unbalanced game between the pastoral government and non-pastoral government as well as the game between the herders in the pastoral area, and this happens in the background of the implementation of "return grazing land to grassland" policy. However, the research lacks the analysis of the relationship between the government and the herders, while the conflict is actually always happening between the government and the herders.

Figure 6 Vicious Circle of Grazing and Grassland Degradation



Source: Illustrated by Suruna.

There is another view that one of the fundamental factors for grassland ecological deterioration is the conflict between human basic needs and grasslands instead of the conflict between livestock and grasslands (Liu and Yan, 2014). Overload grazing is the main reason for the degradation of grassland in China (Zhang and Shen, 2008; Zhu and Jiang, 2012; Jin and Hu, 2014). That is to say, the restoration of grassland ecology is determined by the people who use the grassland and who depend on it for living, i.e. the herdsmen. Mongolian herdsmen have been observed to be overdependent on livestock raising (Gao, 2016). So far, they believe that only increasing the number of livestock

can increase their income. This means that their choice is limited when it comes to finding new and alternative sources of livelihood. Therefore, the phenomenon of grassland desertification has worsened and the herdsmen's life has also been plunged into a vicious circle as shown in Figure 6.

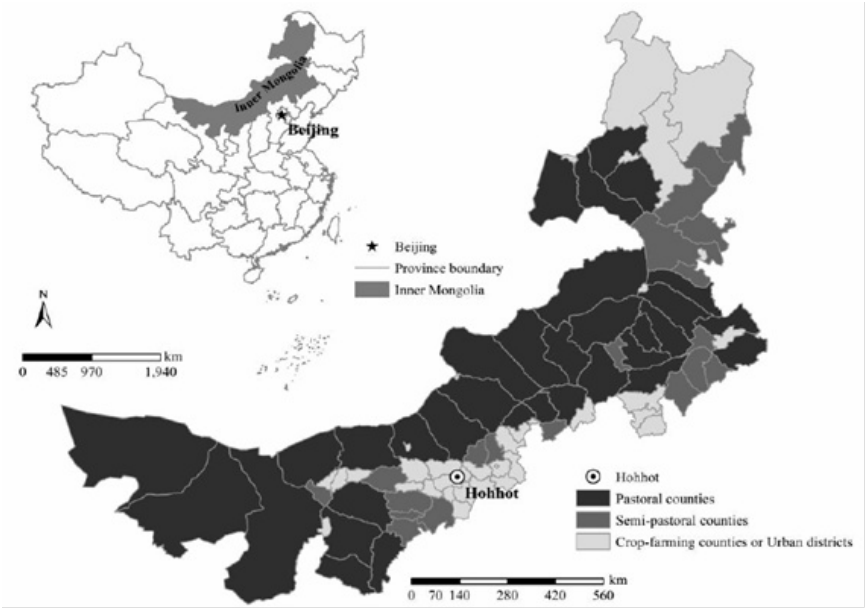
For herdsmen, it is already difficult to increase their income and they will try to do so through increasing the amount of livestock. However, overgrazing is leading to worsening condition of the grassland and therefore the stock output will decrease. At last the income of herdsmen still cannot increase. Based on the analysis of the herders' grassland ecological concepts, some scholars find that the ecological concept of Mongolian herdsmen has a direct impact on the development of grassland (Wadley, 2006; Zhao, 2007; Li, Chen and Liu, 2004). Therefore, the herdsmen should be taken into the first consideration in the ecological policy design and construction projects (Zhang, Long, Deng and Zhang, 2009).

8. Alxa Left Banner of Inner Mongolia Autonomous Region

Situated on China's northern frontier, the Inner Mongolia Autonomous Region stretches more than 2,400 km from east to west and 1,700 km from north to south. There are 102 banners and counties (cities and districts) in Inner Mongolia.[15]

Alxa League is the largest among Inner Mongolia's 12 leagues. It is located at the western end of Inner Mongolia, with the geographical coordinates of longitude 97°10′～106°52′ , latitude 37°21′～42°47′, and its border line is of 733.48 km long. The league borders the republic of Mongolia to the north, Inner Mongolia's prefecture-level city (formerly league) of Bayannur to the northeast, prefecture-level cities of Wuhai and Ordos to the east, Ningxia Hui Autonomous Region to the southeast,

Figure 7 Inner Mongolia and Its 102 Counties



Source: Liu (2017).

and Gansu province to the south and west. There are 3 banners of Alxa League, i.e. Ejin Banner, Alxa Right Banner and Alxa Left Banner. Alxa League's capital is the town of Bayanhot in the Alxa Left Banner.

Alxa Left Banner administers 9 towns, 6 *sumu*[16]. There are 14 ethnic groups in Alxa Left Banner, such as Mongol, Han, Hui, Manchu, Korean, Daur and so on. Ethnic minority population accounts for 28.3 per cent. Alxa Left Banner is a border banner with Mongol as the main body and the Han nationality as the majority component. The local terrain is the southeast high and northwest low; the average elevation of Alxa Left Banner is 800 meters to 1500 meters, while the highest elevation is 3556 meters. The whole banner is 495 kilometers long, and

Figure 8 Alxa League of Inner Mongolia

Source: Chk2011 (from Wikimedia Commons, the free media repository) <*https://commons.wikimedia.org/wiki/Commons:Reusing_content_outside_Wikimedia*>, Creative Commons Attribution-Share Alike 4.0 International <*https://commons.wikimedia.org/wiki/File:Administrative_Division_Alxa.png*>.

Table 3 Three Banners of Alxa League

Name	Population (year)	Area (km^2)	Density (/km^2)
Alxa Left Banner	143,300 (2014)	80,412	2.15
Alxa Right Banner	26,840 (2010)	72,556	0.35
Ejin Banner	26,159 (2015)	114,606	0.28

the width from east to west is 214 kilometers. The area is 80,412 square kilometers and the total population is about 150,000. Available grassland is 46,000 square kilometres. Desert covers an area of 34,000 square kilometers. The mainly desert is Tengger and Ulan Buh Desert[17].

9. Grassland Utilization Status in Alxa League

Before the 1950s and 1960s, human beings operated grassland of Alxa League in nomadic form (Nasenwuritu, 2012). The grassland ecological damage was very small and the ecological environment was sustainable through damage alleviation and recovery. Since the 1960s, in addition to natural factors, due to the irrational management of the grasslands, grassland ecological environment has deteriorated rapidly.

The first main cause is population growth. Population growth in Alxa League in the 1960s and 1970s (Ma and Zhong, 2007) had exerted a certain pressure on the grassland ecology. The second reason is the "grassland household contract system". In the 1980s, the rural "grassland household contract system" was moved to the pastoral area, and as a result an original family had turned into several families, with the grassland that had been used as common property for thousands of years being distributed to individual households (Li and Huntsinger, 2011), thus further deepening the pressure on the grasslands. The third reason is dividing pastures. Since the 1990s, the grassland has been divided into several small areas and fixed to every household, and nomadism disappeared. The last one is blind encouragement. In the mid-1980s to mid-1990s, Alxa League had implemented the policy of encouraging herdsmen to "get rich", and in order to achieve the goal of "getting rich" the herdsmen had increased the number of livestock and carried on the predatory operation to the grassland. The outcome is that grassland with low bearing capacity has been seriously overloaded.

The common effects of the above operating measures are characterized by "overloading grazing" and "overgrazing". The ultimate harm is grassland deterioration, degradation and desertification. As in the 1970s, most of the pastures in Alxa League had more than 50 per cent of pasture coverage. For example, the vegetation coverage in Jilantai[18] area in the 1970s, 1980s, 1990s, and year 2000 was 45%, 35%, 30% and 20% respectively. It can be seen that there is still a serious overloading grazing phenomenon in the Alxa League grassland, and the problem of grassland degradation still exists. Hence, the Alxa League is represents a good, typical research site to analyse the livelihood of the local herders and the restoration of the grasslands under the existing grassland policy.

10. Overview of Alxa Left Banner Grassland Policies

Based on "Alxa Left Banner grassland ecological protection subsidy incentive mechanism implementation", there are two projects in China's grassland ecological compensation – one is from 2003 to implement the "converting pastures to grassland project", and the other is from 2011 to implement the grassland ecological protection subsidy mechanism. The census of natural grassland in Inner Mongolia in 2010 found that in Alxa Left Banner the total area of grassland in accordance with the grassland compensation system is 71.1093 million *mu* in 2011, with the grazing prohibition area covering 57.6784 million *mu*, and grass and livestock balance area covering 13.4309 million *mu*. These cover the whole animal husbandry gacha and semi-agricultural and semi-animal husbandry gacha of Alxa Left Banner. The supplementary award standard is based on the net income per capita of farmers and herdsmen and this will remain unchanged for five years in principle. Herdsmen

who are included in the scope of the grassland compensation award system can enjoy ban-on-grazing subsidies or livestock balance reward, subsidies for fine varieties of pasture and comprehensive subsidies for herdsmen's means of production.

Based on fairness and rationality considerations, because of the difference between the southern and northern grassland[19] and the quality of pastures owned by herdsmen being also very different, the subsidy mechanism subsidies calculated by human units are given to households, and people who enjoy the award mechanism are reviewed once a year and according to age to enjoy different award criteria[20].

10.1. Standard of Subsidy in Prohibition Grazing Areas[21]

For people who meet the age range of the plan (male from 16 to 60 years old; female from 16 to 55 years old), each person is qualified for a subsidy of RMB 2,000, while

a) per person subsidy is RMB 12,000 per year for complete prohibition of grazing, owning grassland, and engaging in pure animal husbandry production of herdsmen;
b) per person subsidy is RMB 3,500 per year for owning grassland, and also having farmland. Grasslands outside the area of ecological non-commercial forests are all included in the scope of grazing prohibition. For herdsmen who have enjoyed the non-commercial forest policy, subsidy standards adopt the compensation system in order to achieve the standard of subsidy same as for other herdsmen who are in the grazing prohibition area.

As a result of herdsmen's strong resistance to the grassland ecological compensation policy (Zhang, 2015), since 2013 the government of Alxa Left Banner has made the following policy adjustments:

a) per person subsidy of RMB 13,000 per year for complete prohibition of grazing;
b) per person subsidy of RMB 10,000 per year for incomplete prohibition of grazing, allowing keeping one sheep per 120 mu.

From 2013, the subsidy of grassland-livestock balance has been adjusted to RMB 4,000 per year per person. In addition, in order to accommodate the eating habits and living needs of the herders who are in the grazing prohibition area, in the single-form grazing prohibition area, households are allowed to keep 1 to 30 sheep in their own pasture for their living needs.

10.2. Cost Analysis of Local Herdsman under Grassland Ecological Compensation Policy

After the implementation of the grassland ecological compensation policy, the herdsmen cannot carry out grazing in the grazing forbidden area or during the grazing forbidden period. Hence, in order to make a reasonable judgment of the herdsman's cost due to their participation in the grassland restoration project, the analysis of the herdsmen's economic loss in the process of grassland ecological compensation project must be taken into consideration. Through policy implementation and participation of herders, the cost of herdsmen in this process is generally made up of direct costs and opportunity costs (Wei and Zong, 2014).

10.2.1. The direct costs

Due to the particularity of grassland ecosystem in the pastoral area of Alxa Left Banner in Inner Mongolia, the local herdsmen are required to pay extra money to afford the cost of pasture feed in the grazing prohibition period that also includes the cost of purchasing farm

implements, fences, stabling facilities, drilling wells and so on (Fan, Xu and Duan, 2012). Besides, labor costs should also be included.

In addition to that, the implementation of the grassland ecological compensation project has led to the phenomenon of unemployment of some herders to a certain extent. With lower educational level, grazing is the only way to bring economic benefits to meet the daily expenses of herdsman families. However, after limiting the number of livestock, some of the female family members will be in the "unemployed" status during the grazing prohibition period, and this has severely reduced the direct income of grazing families. For the male, during the grazing prohibition period, they have to re-run other businesses to bring benefits to their family and this requires more new capital investment. All the above are the direct costs of herdsmen in participating in the grassland restoration project.

10.2.2. The opportunity costs

For herdsmen, before the grazing forbidden period, the grassland not only can provide grazing livestock environment but also can be used to be rented out to obtain additional revenue. When the grazing prohibition policy is implemented, the interests of the herdsmen will be damaged to a certain extent. At the same time, the households need to reduce or restrict the number of grazing livestock. Therefore, the households will lose the overload livestock income and the income which is relying on the overload livestock husbandry, such as income from the sale of livestock and livestock products (mutton, beef, sheep skin, cowhide, cow and wool products, dairy products).

However, the government has never taken into account this part of the opportunity cost of herdsmen in the process of grassland grazing subsidies. Even if households will gain relative income through other business paths, this is undoubtedly increasing the burden of herdsmen.

Then, with the shift of the country's focus of work and the imperfection of local government supervision, for those who are in the grazing proscriptive area and facing the reduction of livestock, especially for the economically disadvantaged herdsmen, in the absence of other means to generate income for the daily expenses of the family, they will continue to raise livestock over the restricted number in the grazing proscriptive area.

10.3. Alxa Left Banner Field Survey: Data Sources

The intended population of our field survey is a small population of pastoralists in northwestern Inner Mongolia's Alxa Left Banner. The data are primary, which are collected from questionnaire survey and field investigation conducted by Suruna in her native Alxa League for her MPA research paper that Emile supervised. The sample size for this study is 152 participants out of the nearly 50,000 population who are engaged in agriculture and animal husbandry activities in left banner of Alxa in Inner Mongolia, and the investigation sites are located in three gacha of Alxa Left Banner. Based on the reference of Conte's (2015) questionnaire and the survey of Hao Ting (2016), this research's variables would address herders' income and cost before the "grazing prohibition" project and their gains and losses after the grassland ecological compensation process.

The content of the questionnaire can be subdivided into four parts (Table 4). The first part is about the basic information of herders, including the respondent's age, gender, family size, labor force participation and so on. The second part is about the change of income and expenditure ratio of herders before and after the implementation of grassland ecological compensation policy, and its impact on the family loans. The third part is about the herders' perceptions about their responsibility and attitude to effectively manage grassland, and their

Table 4 Research Variables

Category	Variables
Basic information of pastoral families	Gender; Age; Ethnic group; Family size; Labor force participation; Education level
Herdsmen's expenditure and income distribution and family loan situation	*Before the grazing ban:* Source of income; Expenditure allocation (Animal husbandry production purchase, Education, Health care, Transportation, Housing, Daily expenses, Others). *After the grazing ban:* Source of income; Expenditure allocation (Animal husbandry production purchase, Education, Health care, Transportation, Housing, Daily expenses, Others). *Family loan situation:* Does the family have a loan? After grazing ban, the change of the amount of family loans? (Increased, Decreased, No change) The loan is mainly used for … (Animal husbandry needs, Housing, Transportation, Investment needs for business, Education, Others) The amount of the loan ... Do the loan meets family needs?
Herdsmen's awareness of grassland ecological compensation and their attitude toward grassland ecological protection	The awareness of grassland ecological compensation project. Did the government propagandise grassland protection policy and projects? How do you know the specific content of grassland ecological compensation? Who do you think is the main part of grassland ecosystem protection? Causes of pasture degradation? Are you willing to leave the pasture area after grazing ban? After grazing ban, the main difficulty of settling in the city is ... Do you hope your children to continue grazing? What do you think the ecological status of your pastoral area will be in the future?
Herdsmen's comprehensive evaluation of grassland ecology compensation project	What do you think of the standards of grassland ecological compensation? Are the compensation payments timely? The compensation payments are uses for ... (Buying livestock, Buying forage, Entertainment, Education, Health care, Daily expenses, Others) What is the impact of compensation on your family life? Are you satisfied with the grassland ecological compensation standard? Are you optimistic about the grassland ecological compensation project? Should the grassland ecological compensation policy continue? What is the impact of grassland policy on the ecological environment? Is the amount of grazing approved by the government reasonable? Is there any phenomenon of herdsmen not following the grassland policy requirement after they have already received their subsidy payments?

understanding of grassland ecological compensation. The fourth part is about the comprehensive evaluation of grassland ecology compensation by herdsmen, including the evaluation of the policy itself and the evaluation of the impact of policies on ecological benefits.

10.4. Sample Characteristics

As can be seen in Table 5, the gender proportion of the respondents is balanced, with 56.6 per cent male and 43.4 per cent female. The largest proportion (55.9%) of respondents are 44 years old or below while those between 45 years old and 59 years old take up the second largest proportion (42.8%).

Table 5 Background of Respondents

		Frequency	Percent
Gender	Male	86	56.6
	Female	66	43.4
Age	44 and below	85	55.9
	45-59	65	42.8
	60 and above	2	1.3
Ethnic group	Han	23	15.1
	Mongol	126	82.9
	Other ethnic groups	3	2
Education level	No education	5	3.3
	With education but did not graduate	4	2.6
	Primary school	24	15.8
	Junior high school	53	34.9
	High school	42	27.6
	University	24	15.8

Figure 9 Family Size of Respondents

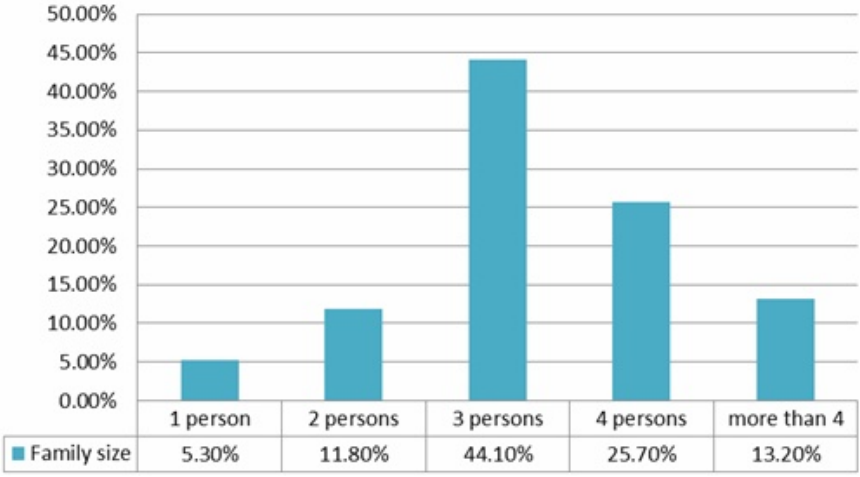
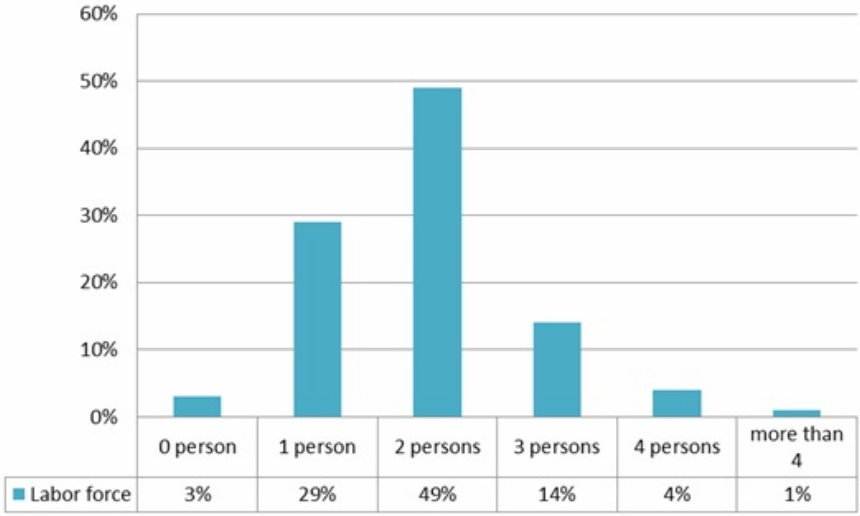


Figure 10 Labor Force Participation of Respondents



In this survey, the majority of the respondents are from Mongol ethnic group, taking up 82.9 per cent. The majority of the respondents have education at junior high school level, accounting for 34.9 per cent.

Among the respondents surveyed, most families have three family members, taking up the largest proportion (44.1%) while only a small part of the respondents are living alone. The largest proportion (49%) among the respondents have two family members in the labour force.

11. Benefit Analysis of Grassland Ecological Compensation Policy

Through comparing the data of herders' income, expenditure ratio and family loans before and after the implementation of the grassland ecological compensation policy, this research analyses if the current grassland ecological compensation policy could enhance the living standards of herdsmen and improve their quality of life.

11.1. Analysis of Changes in Income and Expenditure before and after the Implementation of Grassland Ecological Compensation Policy

Figure 11 (a) shows that before the implementation of grassland ecological compensation policy, almost all of the herders' income (91%) is from grazing. The data show that the family income of the herdsmen mainly depends on the income of grazing. Figure 11 (b) shows that after the implementation of grassland ecological compensation policy about 60 per cent of the herdsmen's income mainly comes from the grassland compensation while 40 per cent of herdsmen depend on other ways to earn money, such as doing small business and working for others. Figure 11 (c) shows that only 43 per cent of herdsmen have other ways to get income after the implementation of grassland ecological compensation

policy. This means that there is still a large proportion of herdsmen who do not have access or ability to earn money without grazing.

Figure 11 (a) Source of Income before Grassland Ecological Compensation Policy

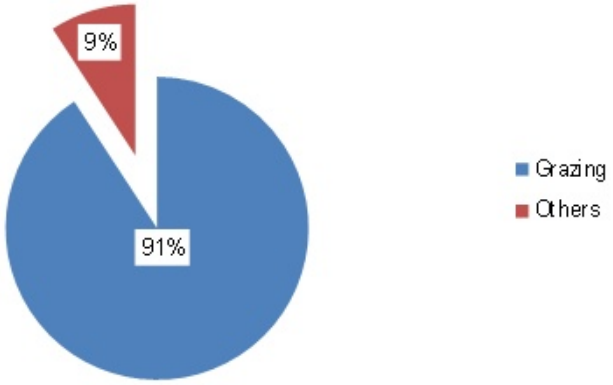


Figure 11 (b) Source of Income after under Grassland Ecological Compensation Policy

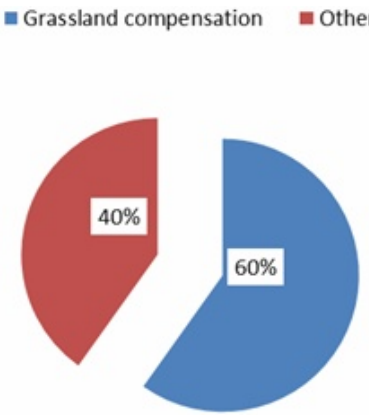


Figure 11 (c) Other Ways Are Available to Get Income after Implementation of Grassland Ecological Compensation Policy

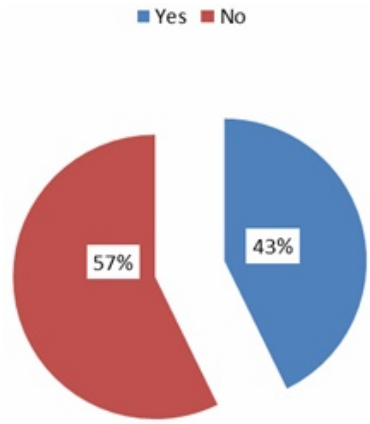
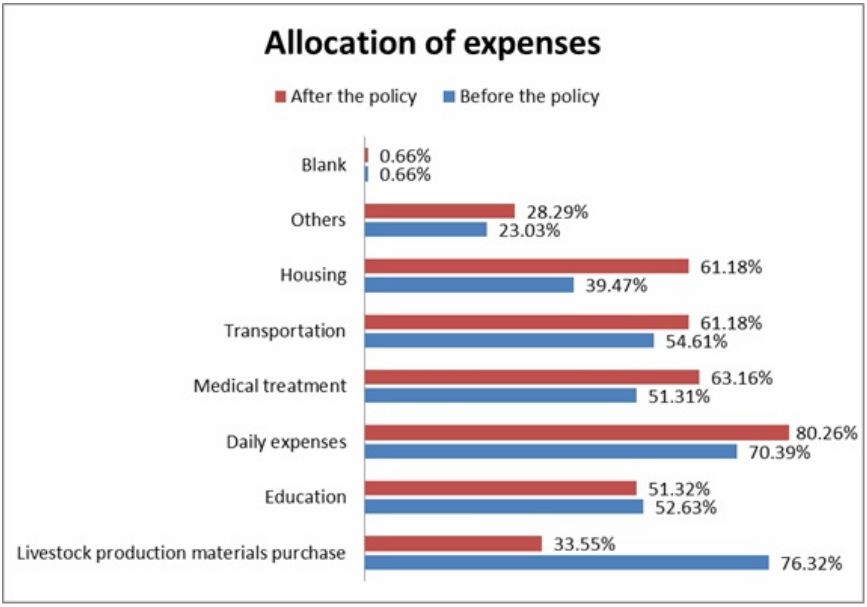


Figure 11 (d) Comparison of Herders' Allocation of Expenses



As can be seen in Figure 11 (d), before the implementation of grassland ecological compensation policy, the purchase of livestock production materials represents one of the biggest proportions of most families' allocation of expenses except the daily expenses. After the implementation of the grassland ecological compensation policy, it is obvious that the daily expenses, medical treatment, transportation and housing expenses are increased. Besides, the purchase of livestock production materials has decreased dramatically. During this period of time, the lifestyle and source of income of the local herdsmen have changed a lot, with the expenses on livestock production materials becoming less and less and the expenses on other aspects getting higher and higher. The local herdsmen have to move to the cities and find new ways to get income, and the cost of living in the cities is much higher than living in the pastoral area.

11.2. Analysis of Changes in Herdsmen's Family Loans

As we can see from Figure 12 (a) and Figure 12 (b), there are about 86 per cent of herdsmen's families having loans and after grazing was prohibited 75 per cent of the families' amount of loan is increased.

Figure 12 (c) shows that almost half of the investigated families' loans exceed RMB 100,000 and there are only 23.68 per cent of the households' loan below RMB 50,000. It can observed in Figure 12 (d) that the biggest part of the herdsmen's use of the loan is for housing. It is obvious that after the grazing ban the herdsmen generally have family loans and the amount of loans is high.

Figure 12 (a) Current Family Loans

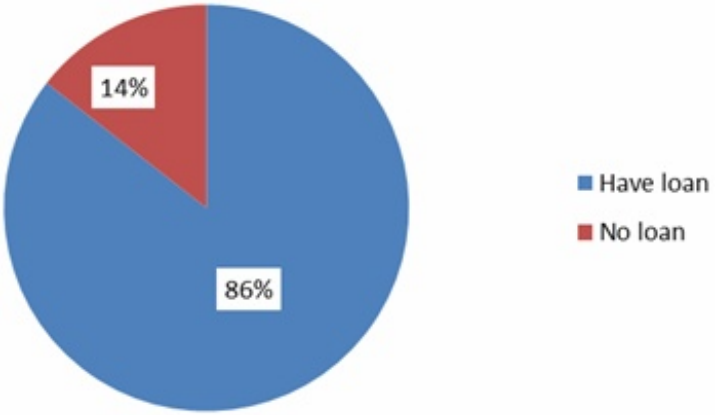


Figure 12 (b) Changes in Family Loans After Grazing Was Prohibited

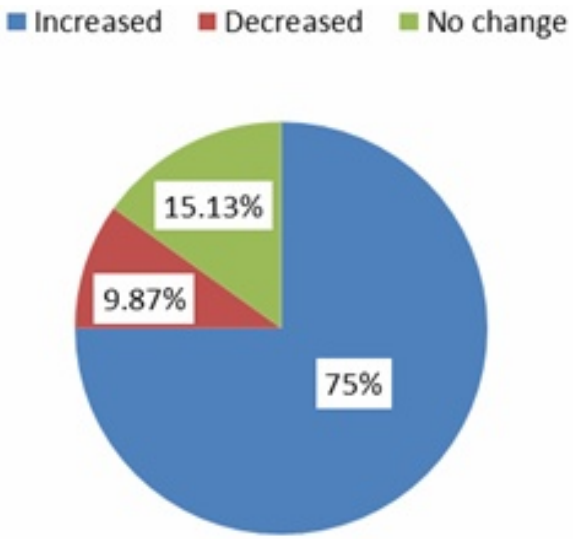
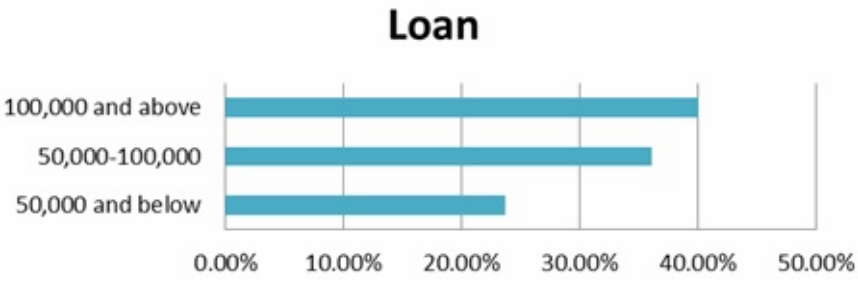
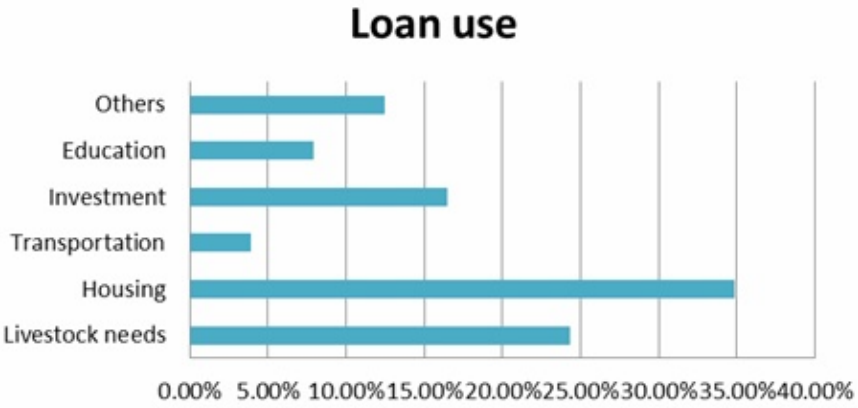


Figure 12 (c) Family Loan Amount



	50,000 and below	50,000-100,000	100,000 and above
Loan	23.68%	36.18%	40.13%

Figure 12 (d) Family Loan Use



	Livestock needs	Housing	Transportation	Investment	Education	Others
Loan use	24.34%	34.87%	3.95%	16.45%	7.89%	12.50%

11.3. Comprehensive Benefit Analysis of Grassland Ecological Compensation Policy

There are three main parts in this section on the comprehensive benefit analysis of grassland ecological compensation policy. The first part is the ecological benefit analysis, wherein we trace the herdsmen's understanding of grassland ecological compensation and their attitude towards grassland ecological protection that could reflect if the current grassland policy is beneficial for the recovery of the grassland ecosystem. The second part is an economic benefit analysis, from the perspective of changes of herdsmen's income and expenditure, to analyse if the grassland compensation standard could meet the needs of the local herdsmen as well as improve their life quality and whether the current grassland policy has reached the expected goal of balancing the grassland ecology and herdsmen's life. The third part is a social benefit analysis that through the evaluation of the herders' attitude towards and hope for the grassland ecology, their children's life and their lifestyle explores the influences of the grassland policy towards the whole society.

11.3.1. Ecological benefit analysis of grassland ecological compensation policy

Figure 13 shows that most of the respondents only know a little about the grassland ecological compensation policy and there are only 18 per cent of respondents who know well about the grassland policy and projects. Figure 14 reveals that about 56 per cent of respondents feel that the government does propagandize grassland ecological compensation policy and projects but only rarely, while about 20 per cent of respondents reflect that the government has not propagandized the

Figure 13 Awareness of Grassland Ecological Compensation Project

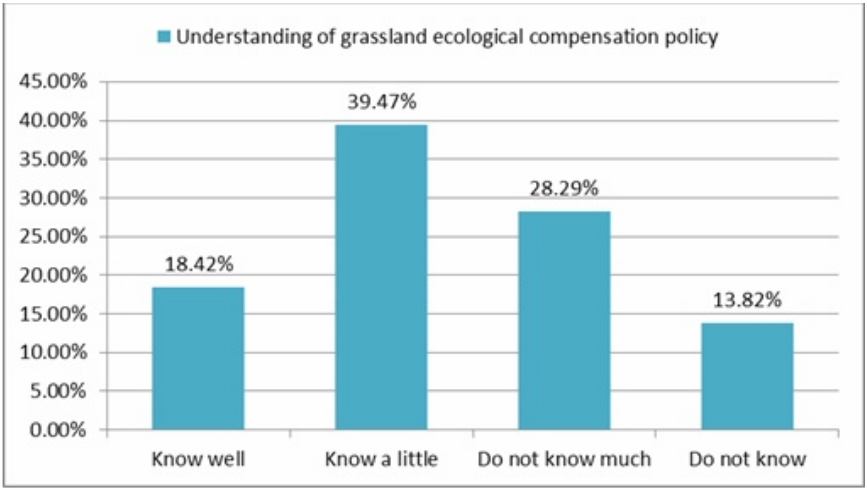


Figure 14 Does the Government Propagandize Grassland Ecological Compensation Policy?

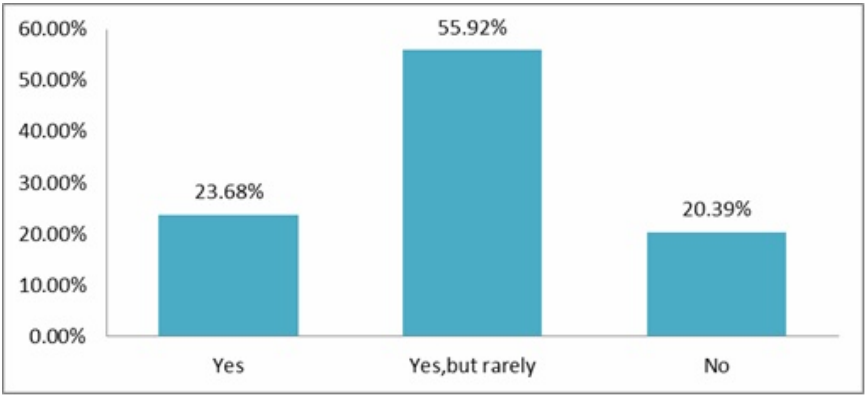


Figure 15 Way of Knowing Specific Content Of Grassland Ecological Compensation

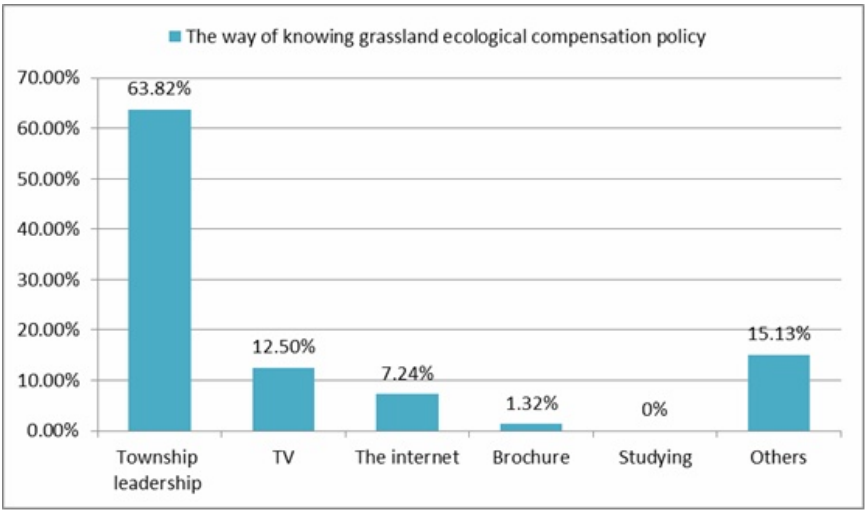
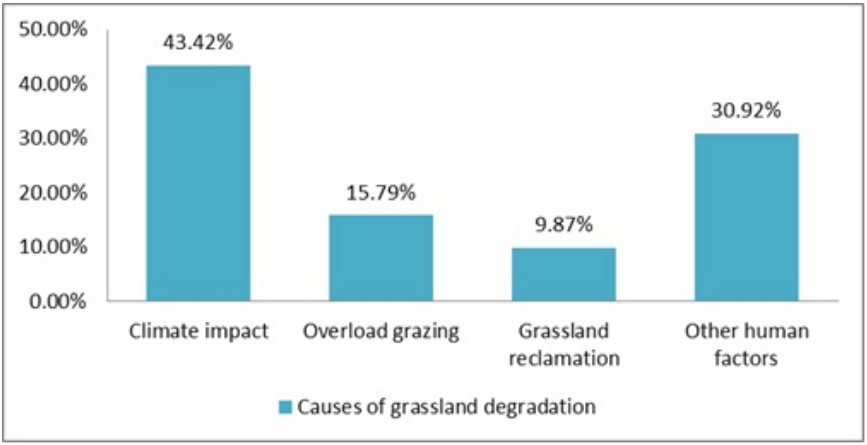


Figure 16 Causes of Pasture Degradation



related policy. On the way of the herdsmen getting to know about the grassland ecological compensation specific content Figure 15 shows that 64 per cent of the respondents know the policy through their township leadership, while there are few people who get to know the policy from TV, Internet and other media.

On causes of pasture degradation, Figure 16 shows most respondents think that that climate impact is the main reason, while there are only about 16 per cent of respondents who think grassland degradation is caused by overload grazing. This result is similar to the finding of Li and Huntsinger (2011).

Regarding who should be playing the main role in grassland ecosystem protection, results in Table 6 show that the education level significantly influences the respondents' judgment in this regard. Figure 17 shows that the respondents with low education level commonly think that the government should play the vital role in protecting the grassland ecosystem while the respondents with high education level think that the herdsmen or both the herdsmen and the government have important role to play in protecting the grassland. In particular, the respondents who have university education think that the herdsmen are much important in the process of the recovery of grassland ecosystem.

Table 6 Ecological Benefit – Chi-square Analysis (P-value)

Variables	Causes of grassland degradation	Main part of grassland ecosystem protection	Ecological status of pastoral area in the future
Gender	0.452	0.770	0.454
Age	0.266	0.388	0.156
Ethnic group	0.225	0.089	0.019
Education level	0.171	0.023	0.400

Figure 17 Main Part of Grassland Ecosystem Protection

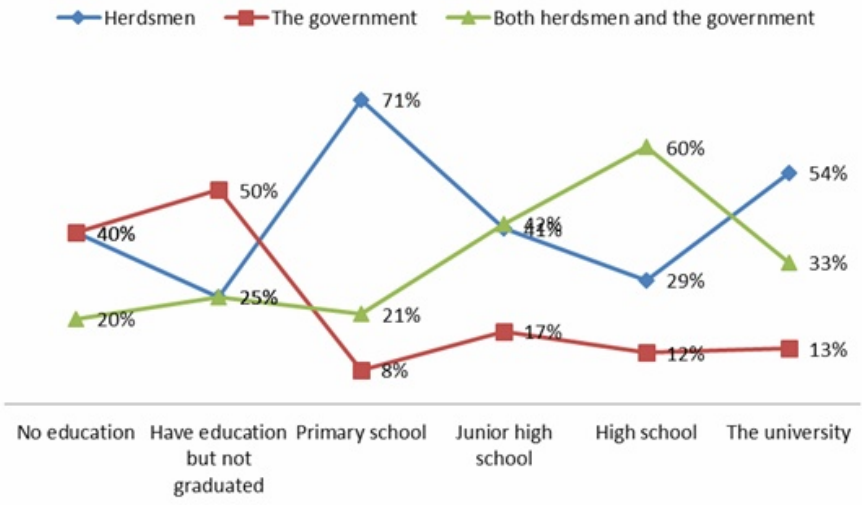
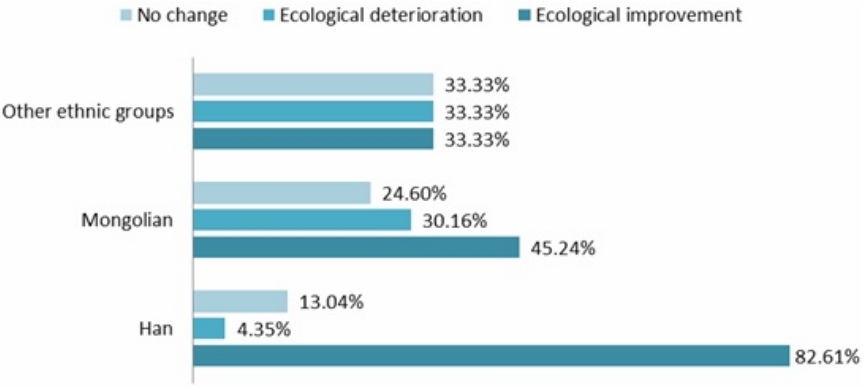


Figure 18 Ecological Status of Pastoral Area in the Future



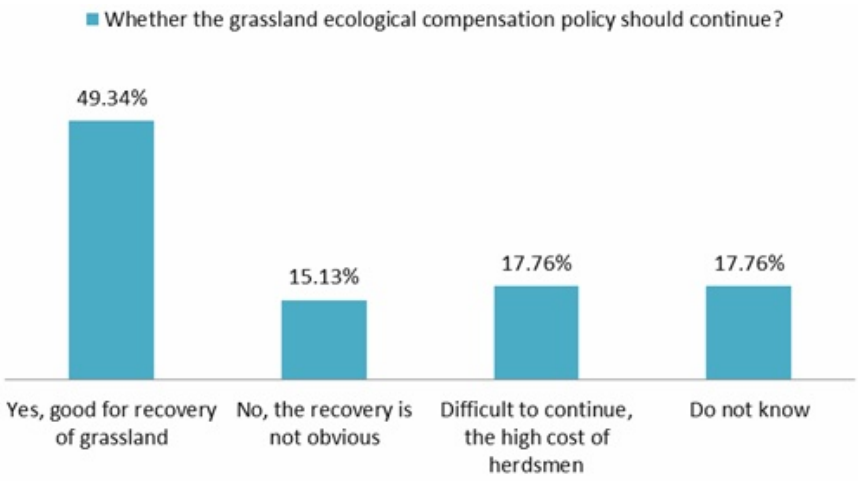
Results in Table 6 reveals that ethnic group is the only factor significantly influencing the respondents to predict the ecological status of their pastoral area will be in the future. Figure 18 shows that there are about 83 per cent of the Han respondents thinking that the ecological status of the pastoral area will become better in the future while only about 45 per cent of the Mongol respondents have the same thinking. In fact, about 30 per cent of Mongol respondents think that the status of the pastoral area will become worse in the future, much higher than the proportion of Mongol respondents who think that there will be no change in the status of the pastoral area in the future.

Therefore, there is indeed a difference in attitude between the Han and Mongol ethnic groups towards the grassland ecological compensation policy (while the results of other ethnic groups are not significant). The main difference between the results of the Mongol and Han respondents is that they live in different pastoral areas with a difference in ecological status. Hence it is important for the local government to investigate the herdsmen in different pastoral areas and encourage them to participate in the grassland project.

About the future prospect of the grassland ecological compensation policy, Figure 19 shows that almost half of the respondents thought that the policy should continue because it is good for the recovery of grassland; however, about 18 per cent of the respondents thought that the policy is difficult to continue because the changes in life style will bring high cost to the herdsmen.

In conclusion, from the ecological analysis we can know that not all of the local herdsmen could know the grassland ecological compensation well, and this may has an influence on their attitude towards the policy and the projects. If the local herdsmen do not fully understand the policy, rational judgments are hard to come by, and they will find it difficult to actively cooperate within the implementation of grassland policies and

Figure 19 Should the Grassland Ecological Compensation Policy Continue?



projects. However, the grassland ecological compensation policy is good for the recovery of the grassland ecosystem and most of the herdsmen are optimistic about the future development of grassland ecology although the recovery speed is not very significant. However, the government still seems to lack good propaganda of the related policy and projects and the various ethnic groups' understanding ability regarding the grassland ecological compensation policy is also not well recognised by the government.

11.3.2. Economic benefit analysis of grassland ecological compensation policy

Figure 20 shows that the majority of the respondents think that the standards of grassland ecological compensation are low and

Figure 20 Standards of Grassland Ecological Compensation

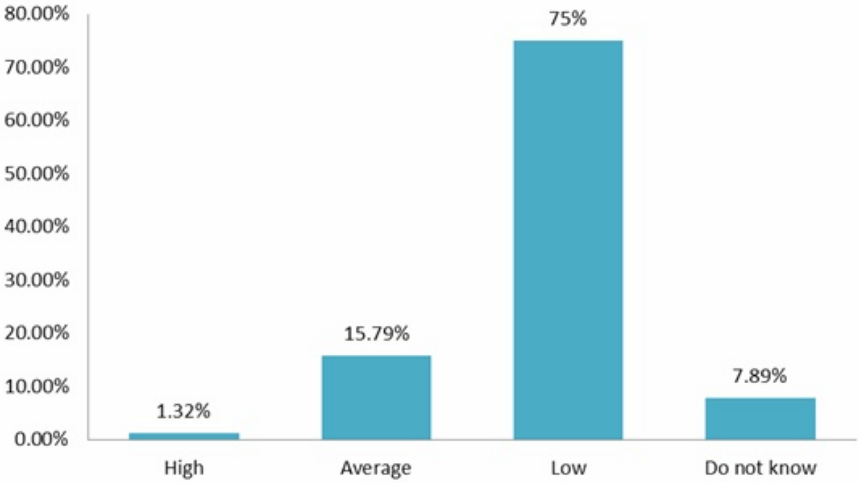
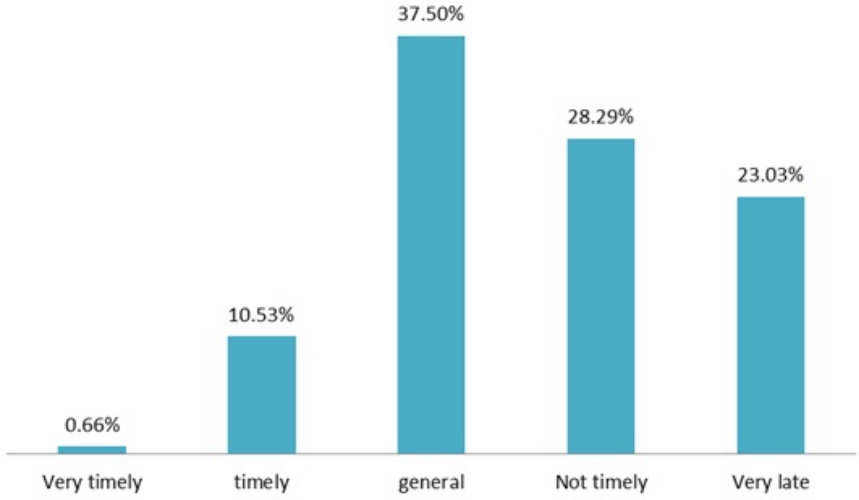


Figure 21 Are Compensation Payments Timely?



as revealed in Figure 21 only less the one per cent (0.66%) of respondents hold the view that the compensation payments are very timely. In terms of usage, in Figure 22 we can observe that most respondents state that they spend the compensation payments mainly on daily expenses while those who cite spending on entertainment only accounts for about 8 per cent. Hence, the current compensation payments standards do not seem to be effective in improving the quality of life of the herdsmen and in fact most of them are facing problem in trying to save the compensation payments for housing and education of their children.

Figure 22 Usage of Compensation Payments

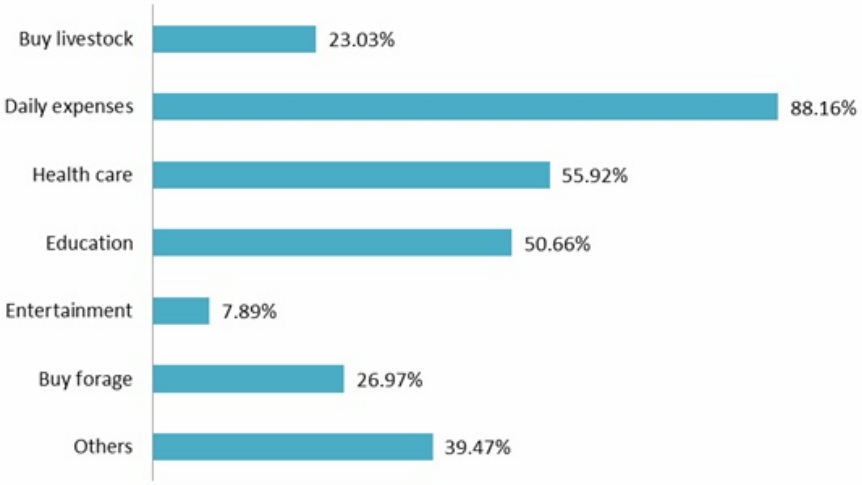


Table 7 Economic Benefit – Chi-square Analysis (P-value)

Variables	**Are you willing to leave the pasture area after grazing ban?**	**Facing main difficulty of settling in the city after grazing ban?**	**Impact of compensation on your family life?**
Gender	0.633	0.394	0.606
Age	0.461	0.024	0.293
Ethnic group	0.020	0.540	0.160
Education level	0.074	0.038	0.084

Results in Table 7 reveal that the variable of ethnic group can significantly influence the respondents' willingness to leave the pasture area after the grazing ban. While Figure 23 shows that regardless of which ethnic group, most of the respondents are willing to stay in pasture area after grazing ban, the percentage of the Mongol respondents who are willing to stay in pasture area is notably the highest (81%) among all.

Table 7 also reveals that both the age and education level can significantly influence the factors which affect the respondents settling in the city. Figure 24 shows the relationship between the age of the respondents and the factors affecting settling in the city. For people who are 44 years old and below, the main difficulty of settling in the city is the problem of re-employment. For people who are between 45 and 59 years old, the main difficulties of settling in the city are problem of re-employment and inability to afford housing. For people who are 60 years old and above, all of them think that the main difficulty of settling in the city is the inability to afford housing. It is obvious that people of different generations have different needs and face different difficulties and the grassland ecological compensation and the related projects do not cover different needs of different age groups.

Figure 23 Willingness to Leave Pasture Area after Grazing Ban

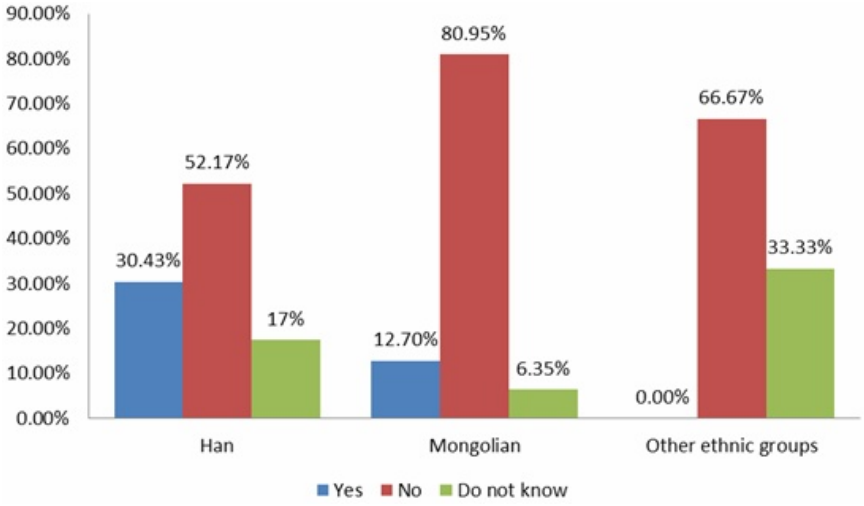
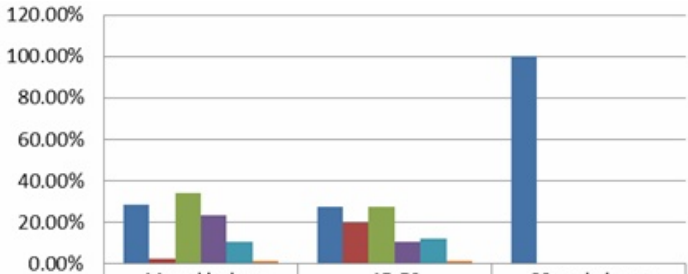


Figure 24 Main Difficulty of Settling in the City after Grazing Ban



	44 and below	45-59	60 and above
Cannot afford the house	28.24%	27.69%	100.00%
No education or skill	2.35%	20%	
Re-employment difficulties	34%	28%	
Increased family living expenses	23.53%	10.77%	
Not used to live in city	10.59%	12.31%	
Others	1.17%	1.54%	0%

Figure 25 Impact of Compensation on Family Life

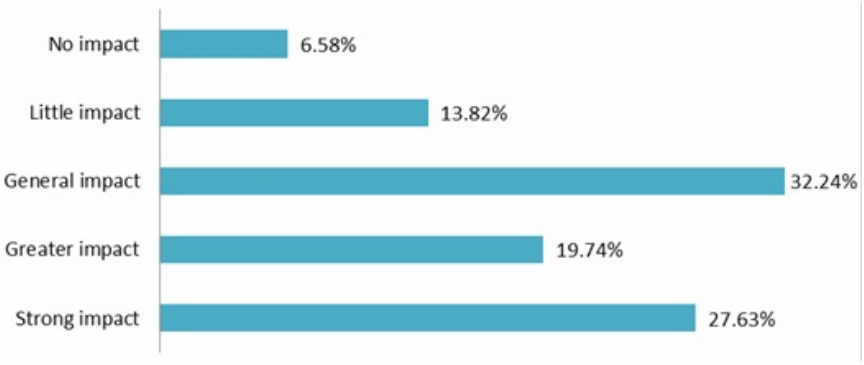


Figure 25 shows the impact of compensation on the respondents' family life. The majority of the respondents cite general impact on their family life. During the interview of some herdsmen's families, some of the herdsmen reflect that because the amount of the compensation is low for the whole family, they do not think that the compensation has a significant influence on their life. Another group of herdsmen reflect that after the grazing ban, they do not have access to other ways for earning money. Therefore, the compensation is extremely important for their family and all of their expenditures are from the compensation. This is the reason why there has been no significant result in the question of the impact of compensation on herders' family life.

In conclusion, from the economic benefit analysis we see that although the grassland ecological compensation policy does not have negative impact on the herdsmen's life, the compensation payment standards have failed to improve the herdsmen's life quality and the compensation payments are sometime not timely enough. Because of the grazing ban and grassland ecological projects, the life style of most of the local herdsmen' family and their way of earning money have changed. The local herdsmen have to find new way to earn money and

some of them have to move to the city. The majority of the respondents prefer to live in pasture area instead of living in urban area because of the re-employment and housing problems, and there-employment problem is in fact linked to the herdsmen's lack of skills training as well as the re-employment policy. Therefore, how to improve the life quality of the herdsmen after the grazing ban and at the same time guarantee the implementation of the policy should be taken into consideration.

11.3.3. Social benefit analysis of grassland ecological compensation policy

Regarding the herder society's view in general about government action towards their grazing activity, Figure 26 shows that about 63 per cent of the respondents think that the amount of grazing approved by the government is not reasonable, while Figure 27 reveals that there still exists the phenomenon of herdsmen not following the grassland policy, such as overgrazing after the grazing ban.

Figure 26 Whether Amount of Grazing Approved by Government Is Reasonable

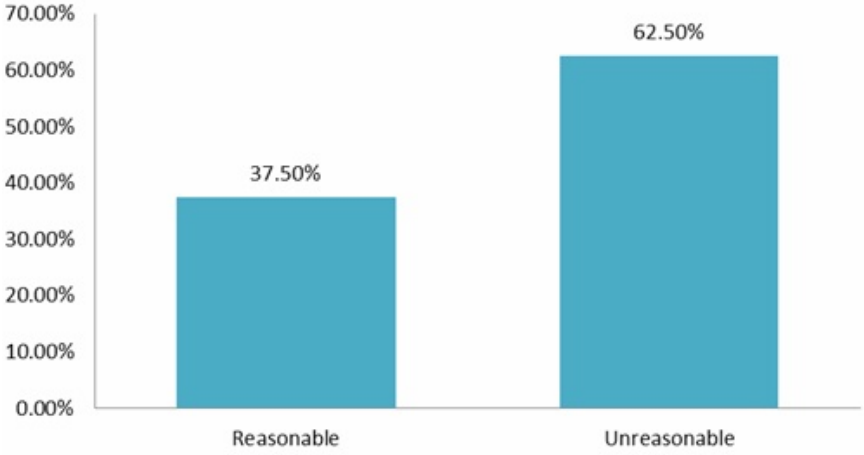


Figure 27 Phenomenon of Herdsmen Not Following Grassland Policy

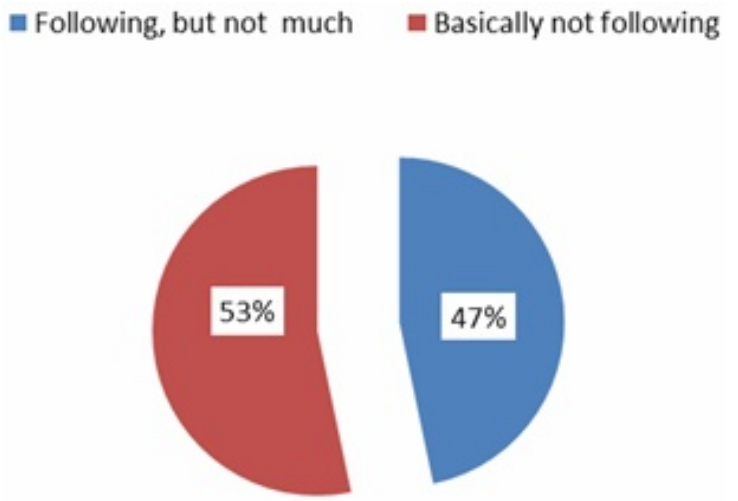
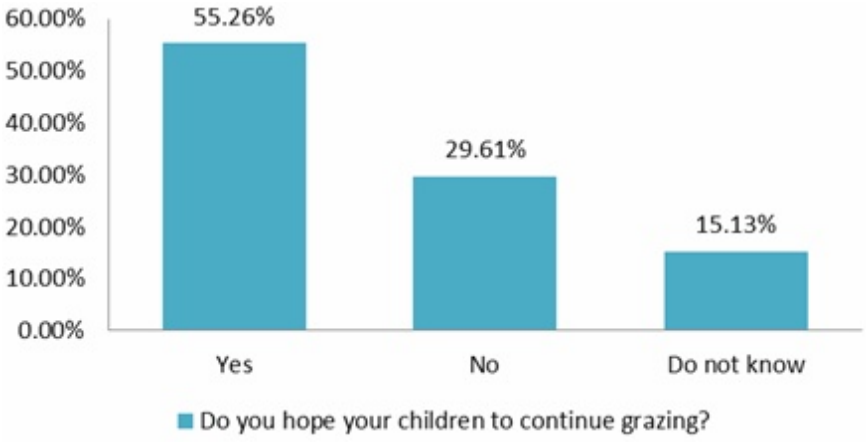


Figure 28 Hope for Children to Continue Grazing



Regarding the herder society's opinion in general about the future of grazing, Figure 28 shows that about 55 per cent of the respondents do hope that their children would continue grazing while about 30 per cent do not hope so. In a way the nomadic culture and education level do act to restrict the mind of the herdsmen and some of them never do think much about their children's future and possible alternative way of life.

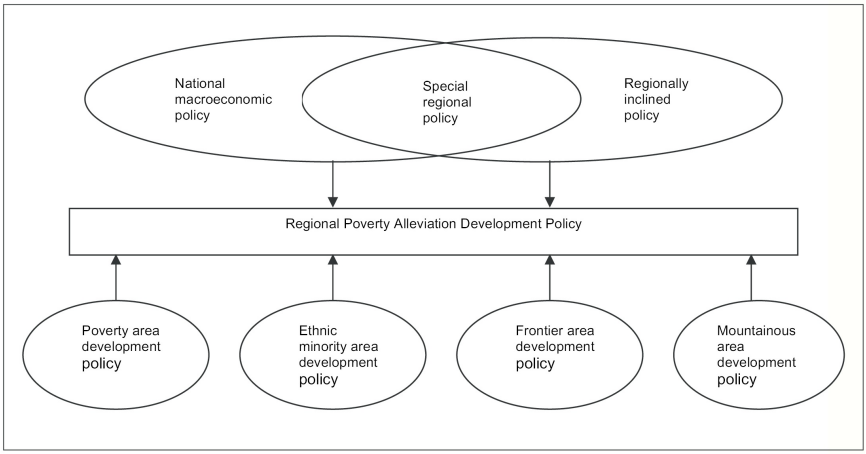
The social benefit analysis largely shows that as a herder is more willing to live in pastoral areas, and most herders still hope that their future generations can continue grazing. This means that the grassland ecological compensation policy, while having wide coverage, still lacks relevance. When it comes to specific areas, due to the different conditions in different regions and pastoral areas, the policy may not have significant ecological and economic benefits. The State needs to invest great effort in the integration of towns and cities in pastoral areas. It is not only necessary to solve the problem of herdsmen's relocation; the most important issue is to make long-term plans and provide policy support for the pastoralists in terms of their economic sources.

12. Conclusion

As poverty and inequality constitute one of the most, if not *the* most, critical challenges China faces in her next phase of politico-socioeconomic development, and poverty in China has the properties of being concentrated in the western region and in the ethnic minority areas (Figure 29), ethnoregionalization of poverty inevitably ensues, presenting China not only with economic challenges but also long-term sociopolitical security risks. Furthermore, if poverty could be seen as a multiconcept construct, it is pertinent that all crucial dimensions – regional, ethnic, urban vs rural, environmental, resource exploitation,

literacy, health care, employment, industrial structure and economic openness, etc. (Yeoh, 2008a: 23-27; Yeoh, 2008b) – of this problem would have to be given due emphasis in any policy response.

Figure 29 China's Regional Poverty Alleviation and Economic Development Policy Framework



Source: Adapted from Wu (2006: 111), Table 4-8 for Sichuan-Yunnan-Tibet ethnic regional economic development.

Focusing particularly on the issue of government policy response to the problem of grassland degradation as a representative case of the above problem issue, through the analysis conducted by Suruna on data collected from her native Alxa League for her MPA research paper that Emile supervised on the effect of the grassland ecological compensation with the case of Alxa Left Banner from the perspectives of herdsmen's attitude and income, we see that the quality of life of pastoralists has improved since the beginning of fixing of farm output quotas for each

household. However, after the grazing ban, the cost of living for pastoralists has also increased. There are both the direct costs and the opportunity costs in herdsmen's life after the grazing ban. The majority of the herders' income is from grazing before the grazing ban and they have to depend on the grassland ecological compensation payments after the grazing ban as well as look for other way for earning money. Most of the herdsmen's families have incurred loans and their amount of loans has also increased after the grazing ban.

The answers to the question of what are the effects of the current grassland ecological compensation policy on herdsmen are as follows:

a) Herdsmen's cost of living has increased despite improved quality of life.
b) Herdsmen's loan issue is obvious and housing purchase occupies the main flow of funds. Large percentage of herdsmen have difficulty in living in urban area because of the problems of housing purchase and re-employment, especially for the old.
c) Herdsmen need opportunity and policy support to deal with the re-employment problem.

Based on the our analysis from ecological, economic and social perspectives, we can see that from the ecological aspect, current grassland ecological compensation policy is good for the recovery of the grassland ecosystem and most of the herdsmen are optimistic about the future development of the grassland ecosystem. From the economic aspect, while the current grassland ecological compensation policy has not been observed to have negative impact on the herdsmen's life, it is noted that the compensation payments have failed to improve the herdsmen's life quality and most of the herdsmen surveyed are not willing to live in urban areas. From the social aspect, our analysis shows that while the current grassland ecological compensation policy has wide

coverage, it still lacks relevance due to the difference conditions of different pastoral areas.

The answers to the question of whether the current grassland ecological compensation is efficient enough are as follows:

a) The current grassland ecological policy is good for the recovery of the grassland ecosystem but the recovery is slow.
b) The current policy has wide coverage but lacks relevance due to the different conditions in different regions and pastoral areas.
c) There is a lack of government explanation and propaganda and other ways for herdsmen to know about the current grassland policy. Pastoralists have low awareness of the grassland ecological compensation policy, which will affect the herdsmen's attitude towards participation and cause conflicts between the government and the herders.
d) The compensation payments are not timely enough and cannot meet the needs of the herdsmen's family life.
e) There is a need for long-term plans and provision of policy support for the pastoralists in terms of their economic sources.

Notes

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1. *luan* (亂).
2. "Provinces", "*zizhiqu*" (自治區) and "*zhixiashi*" (直轄市) in China refer to the country's 31 *sheng* / 省 (i.e. provinces of Anhui / 安徽, Fujian / 福建, Gansu / 甘肅, Guangdong / 廣東, Guizhou / 貴州, Hainan / 海南, Hebei / 河北, Heilongjiang / 黑龍江, Henan / 河南, Hubei / 湖北, Hunan / 湖南, Jiangsu / 江蘇, Jiangxi / 江西, Jilin / 吉林, Liaoning / 遼寧, Qinghai / 青海, Shaanxi / 陝西, Shandong / 山東, Shanxi / 山西, Sichuan / 四川, Yunnan / 雲南 and Zhejiang / 浙江), *zizhiqu* (i.e. "autonomous regions" – each a first-level administrative subdivision having its own local government, and a minority entity that has a higher population of a particular minority ethnic group – of Guangxi / 廣西 of the Zhuang, Nei Monggol/Inner Mongolia / 內蒙古 of the Mongols, Ningxia / 寧夏 of the Hui, Xizang/Tibet / 西藏 of the Tibetans and Xinjiang / 新疆 of the Uyghurs) and *zhixiashi* (municipality directly ruled by the central government – Beijing / 北京, Chongqing / 重慶, Shanghai / 上海 and Tianjin / 天津).
3. As the applicant of poverty relief fund and the last user of the funds, the county (*xian* / 縣) is the most important and basic unit in the work of poverty alleviation (Chai *et al.*, 2004: 16).
4. "China should no longer have poor counties within 15 years: top poverty alleviation official" (reported by Nectar Gan), *South China Morning Post* (Hong Kong), 13 March 2015. <*https://www.scmp.com/news/china/article/1736661/china-should-no-longer-have-poor-counties-within-15-years-top-*

poverty>

5. Ministry of Foreign Affairs of the People's Republic of China and United Nations System in China (2013). *China's progress towards the Millennium Development Goals - 2013 report*, pp. 41-42.
6. Original source: *Zhongguo Shanqu Fazhan Baogao 2003*, pp. 246-247.
7. *Oriental Daily* (東方日報 , Malaysian daily in Chinese), 4th March 2008.
8. "*Mu*" (畝) is a Chinese land area unit. 1 *mu* = 666.67 m^2.
9. Ministry of Foreign Affairs of the People's Republic of China and United Nations System in China (2013). *China's progress towards the Millennium Development Goals - 2013 report*, pp. 42-43.
10. Ministry of Agriculture of the People's Republic of China (2010). *China National Grassland Monitoring Report*.
11. Ministry of Agriculture of the People's Republic of China (2011). *China National Grassland Monitoring Report*.
12. *People's Daily*, UNCCD; the 13th conference of UN Convention to Combat Desertification. Inner Mongolia, Ordos. 2017-09-16
13. *China Statistical Yearbook 2008*. National Bureau of Statistics of China.
14. *China's grasslands: past and future*. Chinadialogue special series (the bilingual source of high-quality news, analysis and discussion on all environmental issues, with a special focus on China). *<https://www.chinadialogue.net/>*
15. "Inner Mongolia overview", 2014-10-21, expochina2015.org.
16. In Inner Mongolia, the terminology for administrative units differs from other parts of China. Prefectures (*zhou* / 州), are known as "leagues" (*meng* / 盟), while counties (*xian* / 縣) are known as "banners" (*qi* / 旗), townships (*xiang* / 鄉) are known as *sumu* and villages (*cun* / 村) are known as *gaqa/gacha*. Alxa Left Banner has six *sumu*.
17. Inner Mongolia Autonomous Region Statistical Bureau (2003). *Inner Mongolia Statistical Yearbook 2003*. Beijing: China Statistics Press.

18. Jilantai is a town of Alxa League which has the largest salt chemical industry in Alxa League.
19. Based on the field investigation, some northern herdsmen have up to more than 100,000 *mu* of grassland while some southern herdsmen have only 135 *mu* of grassland.
20. Cited from "Alxa Left Banner grassland ecological protection subsidy incentive mechanism implementation" (Trial). (in Chinese)
21. Cited from "Alxa Left Banner grassland ecological protection subsidy incentive mechanism implementation" (Trial). (in Chinese)

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