XINJIANG FUYUN IMPROVED GRASSLAND MANAGEMENT PROJECT

国家林业和草原局
西北调查规划院

Document Prepared By

National Forestry and Grassland Administration Northwest Investigation and Planning Institute

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History of CCB Status	NA
Gold Level Criteria	NA
Expected Verification Schedule	NA

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1 SUMMARY OF PROJECT BENEFITS

1.1 Unique Project Benefits

Outcome or Impact Estimated by the End of Project Lifetime	Section Reference
1) Restored 332,660 ha of degraded grassland, improved grassland productivity and forage quality in the project zone, and prevented continued degradation of grassland, which could significantly improve the ecological aesthetics value of local tourist resources.	2.1
2) Organized special community cultural activities for local residents, improved the interaction within the local Kazakh community, increased connection between local Kazakh herders and other community members, and indirectly promoted the diffusion of traditional culture.	4.2
3) Improve the habitat environment of wildlife and increase the biodiversity of the project area.	5.2

1.2 Standardized Benefit Metrics

Category	Metric	Estimated by the End of Project's Lifetime	Section Reference
GHG emission reductions or removals	Net estimated emission removals in the project area, measured against the without-project scenario	22,106,811 tCO_2e	3.2
	Net estimated emission reductions in the project area, measured against the without-project scenario	Not applicable	/
Forest[1] cover	For REDD[2] projects: Estimated number of hectares of reduced forest loss in the project area measured against the without-project scenario	Not applicable	/
	For ARR[3] projects: Estimated number of hectares of forest cover increased in the project area measured against the without-project scenario	Not applicable	/
Improved land management	Number of hectares of existing production forest land in which IFM[4] practices are expected to occur as a result of project activities, measured against the without-project scenario	Not applicable	/
	Number of hectares of non-forest land in which improved land management practices are expected to occurred as a result of project activities, measured against the without-project scenario	Not applicable	/
Training	Total number of community members who are expected to have improved skills and/or knowledge resulting from the training provided as part of project activities	5,084	2.3
	Number of female community members who are expected to have improved skills and/or knowledge resulting from training as part of project activities	2,542	2.3

[1] Land with woody vegetation that meets an internationally accepted definition (e.g., UNFCCC, FAO or IPCC) of what constitutes a forest, which includes threshold parameters, such as minimum forest area, tree height and level of crown cover, and may include mature, secondary, degraded and wetland forests (*VCS Program Definitions*)

[2] Reduced emissions from deforestation and forest degradation (REDD) - Activities that reduce GHG emissions by slowing or stopping conversion of forests to non-forest land and/or reduce the degradation of forest land where forest biomass is lost (*VCS Program Definitions*)

[3] Afforestation, reforestation and revegetation (ARR) - Activities that increase carbon stocks in woody biomass (and in some cases soils) by establishing, increasing and/or restoring vegetative cover through the planting, sowing and/or human-assisted natural regeneration of woody vegetation (*VCS Program Definitions*)

[4] Improved forest management (IFM) - Activities that change forest management practices and increase carbon stock on forest lands managed for wood products such as saw timber, pulpwood and fuelwood (*VCS Program Definitions*)

Category	Metric	Estimated by the End of Project's Lifetime	Section Reference
Employment	Total number of people expected to be employed in project activities,[5] expressed as the number of full-time employees[6]	898 [7]	2.3
	Number of women expected to be employed as a result of project activities, expressed as number of full-time employees	449 [8]	2.3
Livelihoods	Total number of people expected to have improved livelihoods[9] or income generated as a result of project activities	5,084	2.3
	Number of women expected to have improved livelihoods or income generated as a result of project activities	2,542	2.3
Health	Total number of people for whom health services are expected to improve as a result of project activities, measured against the without-project scenario	Not applicable	/
	Number of women for whom health services are expected to improve as a result of project activities, measured against the without-project scenario	Not applicable	/

[5] Employed in project activities means people directly working on project activities in return for compensation (financial or otherwise), including employees, contracted workers, sub-contracted workers and community members that are paid to carry out project-related work.

[6] Full time equivalency is calculated as the total number of hours worked (by full-time, part-time, temporary and/or seasonal staff) divided by the average number of hours worked in full-time jobs within the country, region or economic territory (adapted from the UN System of National Accounts (1993) paragraphs 17.14[15.102];[17.28])

[7] It is estimated that the total average number of working hours (including both temporary work and permanent work) per year would be 1,796,000 hours, and the legal working hours is 2,000 hours per year according to the *Labour Law of People's Republic of China*. Therefore, the total number of people expected to be employed in the project expressed as number of full-time employees is: 1,796,000 hours / 2,000 hours per employee = 898 employees (full-time equivalent)

[8] It is estimated that women would participate in half of the total average number of working hours per year. Therefore, the total number of women expected to be employed in the project expressed as number of full-time female employees is: (1,796,000 hours × 50%) / 2000 hours per employee = 449 employees (full-time equivalent)

[9] Livelihoods are the capabilities, assets (including material and social resources) and activities required for a means of living (Krantz, Lasse, 2001. *The Sustainable Livelihood Approach to Poverty Reduction*. SIDA). Livelihood benefits may include benefits reported in the Employment metrics of this table.

Category	Metric	Estimated by the End of Project's Lifetime	Section Reference
Education	Total number of people for whom access to, or quality of, education is expected to improve as a result of project activities, measured against the without-project scenario	Not applicable	/
	Number of women and girls for whom access to, or quality of, education is expected to improve as result of project activities, measured against the without-project scenario	Not applicable	/
Water	Total number of people who are expected to experience increased water quality and/or improved access to drinking water as a result of project activities, measured against the without-project scenario	Not applicable	/
	Number of women who are expected to experience increased water quality and/or improved access to drinking water as a result of project activities, measured against the without-project scenario	Not applicable	/
Well-being	Total number of community members whose well-being[10] is expected to improve as a result of project activities	5,084	2.3
	Number of women whose well-being is expected to improve as a result of project activities	2,542	2.3
Biodiversity conservation	Expected change in the number of hectares managed significantly better by the project for biodiversity conservation,[11] measured against the without-project scenario	849,333 ha	2.1

[10] Well-being is people's experience of the quality of their lives. Well-being benefits may include benefits reported in other metrics of this table (e.g. Training, Employment, Livelihoods, Health, Education and Water), and may also include other benefits such as strengthened legal rights to resources, increased food security, conservation of access to areas of cultural significance, etc.

[11] Managed for biodiversity conservation in this context means areas where specific management measures are being implemented as a part of project activities with an objective of enhancing biodiversity conservation, e.g. enhancing the status of endangered species

Category	Metric	Estimated by the End of Project's Lifetime	Section Reference
	Expected number of globally Critically Endangered or Endangered species[12] benefiting from reduced threats as a result of project activities,[13] measured against the without-project scenario	3	5.1

[12] Per IUCN's Red List of Threatened Species

[13] In the absence of direct population or occupancy measures, measurement of reduced threats may be used as evidence of benefit

2 GENERAL

2.1 Project Goals, Design and Long-Term Viability

2.1.1 Summary Description of the Project (G1.2)

The **Xinjiang Fuyun Improved Grassland Management Project** (hereafter referred to as "the project") is located in Fuyun County, Altay Prefecture, Xinjiang Uygur Autonomous Region, China. The project aims to restore 332,660 hectares (or 4,989,900 Mu[14]) of degraded grasslands in Fuyun by adopting a variety of measures, including grazing prohibition and grass planting. The project will increase carbon sequestration, reverse grassland degradation, contribute to local development and preserve cultural traditions.

According to the *Project Design Report*, Before the implementation of the project, there was severe degradation and desertification of the grasslands in this area due to the impact of climate change and human activities, the excellent forages in the plant community almost disappeared, and the natural reproduction and renewal ability was very low.

The national standard of China *Parameters for Degradation, Sandification and Salification of Rangelands* (GB 19377-2003) specifies indicators for the determination of degradation, sandification and salification levels (slight, moderate and severe)[15]. The project focuses on 332,660 hectares of moderately or severely degraded grasslands in Fuyun and adopts a combination of the following measures:

·**Grazing prohibition:** Grazing prohibited on severely degraded grasslands. This project sustainably manages 325,293.3 ha of severely degraded grasslands.

·**Grass planting**: Fencing and planting of native grass species on the moderately degraded grassland, grazing will be prohibited after the completion of grass planting and fence installation. The grass species are *Poa crymophila*, *Elymus nutans, Elymus sibiricus*, and *Agropyron cristatum*. There are 7,366.7 ha of moderately degraded grassland in this project has been sustainably managed through artificial grass planting and fencing.

Please refer to Section 2.1.11 for detailed descriptions.

The project is estimated to generate net GHG emission reductions and removals of 22,106,811 tCO_2e over the 40-year crediting period, with average net GHG emission reductions and removals of 552,670 tCO_2e per year.

Besides these main restoration measures, the project also alleviates soil desertification and restores grassland vegetation to improve soil carbon storage and local biodiversity through grassland management measures, such as daily management measures from other protection

[14] Mu is a unit of land area commonly used in China, equivalent to 1/15 hectares or 666.7 square meters.

[15] For instance, "decrease in above-ground grass yield" is one of the indicators that must be measured to determine the degradation level. Indicative values of decrease in above-ground grass yield for non-degraded grassland, slightly degraded grassland, moderately degraded grassland and severely degraded grassland are 0%~10%, 11%~20%, 21%~50% and > 50%, respectively.

projects like rodent and pest control and grassland fire prevention to ensure the long-term sustainable management of the project area.

The project is expected to achieve the following climate, community and biodiversity benefits:

· **Climate**: Restore the degraded grassland ecosystem, increase carbon sequestration and reduce GHG emissions.

· **Community**: Provide temporary and permanent job opportunities that bring income to participants; provide technical training and improve their knowledge and skills in sustainable grassland management; preserve the cultural traditions of local Kazakhs and other minority ethnic groups.

· **Biodiversity**: Increase vegetation cover with native grass species, provide suitable habitats for wild animals, and increase local biodiversity.

2.1.2 Project Scale

Project Scale	
Project	
Large project	√

2.1.3 Project Proponent (G1.1)

The project proponent Xinjiang Fuyun County State-owned Assets Investment Management Co., Ltd. is responsible for the management and operation of the project and has established a project working group (covering aspects of carbon sink, ecology, grassland, community, geographic information, etc.).

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2.1.4 Other Entities Involved in the Project

National Forestry and Grassland Administration Northwest Investigation and Planning Institute has rich experience in forestry and grassland projects in Northwest China. Also has a lot of experience in carbon project development including developing ARR projects under the VCS+CCB program,

and will work with the project proponent to ensure that the project successfully benefits from carbon revenues during its lifetime.

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2.1.5 Physical Parameters (G1.3)

As per *CCB Standards (version 3.1)*, the "project area" is defined as the land area in which project activities aim to generate net climate benefits, and the "project zone" is defined as the area encompassing the project area in which project activities that directly affect land and associated resources, including activities such as those related to the provision of alternative livelihoods and community development, are implemented.

For the project, the 332,660 hectares of grassland where restoration measures are implemented is defined as the project area, while the area under the administration of Fuyun County is defined as the project zone. Fuyun County is located in the northern part of Xinjiang Uyghur Autonomous Region, the eastern end of Altay Prefecture, and the northern border with Mongolia. The geographical coordinates of Fuyun are between east longitude 88°10' ~ 90°31' and north latitude 45°00' ~ 48°03'. The geographic boundaries of the project zone and the project area are shown in Figure 2.1 and Figure 2.2 in Section 2.1.7, and the associated KML file will be uploaded to Verra Registry.

The physical parameters[16] of the project zone are presented below.

Topography

The county is high in the north and low in the south, from the Altai Mountains to the southwest, with a clear descent to the lowest Irtysh River valley. The project zone is located in the upper reaches of the Irtysh River, the northern margin of the Junggar Basin, and the eastern slope of the Altai Mountains, with an altitude between 317 meters (the lowest point at the Sanquan depression) and 3863 meters (the highest point at the top of Duxin Wula Peak). The altitude of the project zone is generally between 800 meters and 1200 meters. The terrain in the county is complex, and the landform has five categories: mountain, basin, river valley, Gobi, and desert.

[16] According to *Project Design for Improved Grassland Management* of the project.

Soil

Fuyun County has complex landforms, diverse soil types, and obvious vertical and horizontal zonal distribution. The soil type of the project zone can be divided into mountain soil and plain soil. From the top to the bottom, the soil types of mountain soil are alpine glaciated soil, alpine meadow soil, forest meadow soil, mountain chernozem soil, mountain chestnut soil, and other soil types. Among them, the mountain soil has a thick soil layer, good water condition, and high organic matter content. The zonal types of plain soil are brown calcium soil and gray brown soil.

Climate

Fuyun County is a north temperate continental climate. As a result of low latitude, summer is short and not very hot, winter is long and cold, spring and autumn are cool and windy, and the temperature difference between day and night is large. Due to the great difference in height within the territory, the rise in altitude from the south to the north gradually becomes cold. The annual mean temperature is 1.9 °C, the annual extreme maximum temperature is 38.7 °C, the extreme minimum temperature is -49.8 °C, the annual accumulated temperature is 3063.1 °C $\geqslant$10 °C. The sunshine duration was 2869.8 h and the frost-free period was 140 days. The annual average rainfall is 158.3 mm and the annual evaporation potential is 1743 mm. The main disastrous weather is drought, dry hot wind, low temperatures, snowstorms, and cold wave strong temperatures.

Hydrology

The project zone is rich in water resources, mainly the Irtysh River and the Ulungu River, with an annual runoff of 43.5×10^8 m^3. The Irtysh River is an international river that flows from east to west across the county border of Habahe County to the Arctic Ocean, the source of China's only Arctic water system. The total length of the territory is 230 km, with an annual average runoff of 3.38 billion m^3 and a normal flow of 107.31 cubic meters per second. It is mainly injected by the three tributaries of the Hayurt River, the Kuyurt River, and the Kara-Irtysh River, and the water system is gradually broad from east to west, with a water collection area of 10,482 km^2. The Ulungu River is inland, originating in Qinghe County, with a total drainage length of 573km, and flowing into the Ulungu Lake in Fuhai County. In Fuyun County, it belongs to the middle and upper reaches, about 210km long, and the annual plain runoff is 9.7×10^8 m^3. There is no snow in the mountains of Fuyun County all year round. The water supply of the Irtysh River and the Ulungu River is mainly based on seasonal snowmelt and rainfall. 85% of the water in the first flood season (May-June) is supplied by snowmelt, and 50% of the water in the later flood season (July-August) is supplied by rainfall.

Types of vegetation

With superior natural conditions, the project zone has a wide variety of wild plants, with more than 71 families and 967 species according to statistics. Most of the forest distribution is concentrated in the northern Altai Mountains, accounting for 99.1% of the total forest area. The forest vegetation is mainly distributed in shady slopes, semi-shady slopes, and gullies between 1,000 and 2,400m. The trees are mainly broad-leaved species such as *Larix sibirica*, *Picea obovata*, *Betula pendula* and *Populus tremula*. Coniferous shrub is more common, in gentle slopes, and valley areas with good moisture conditions, there is a large area of broad-leaved shrub dominated by *Betula*

roundifolia. Grassland vegetation includes mountain meadow vegetation (including alpine, subalpine, and forest grassland), hillside meadow vegetation, and desert vegetation.

2.1.6 Social Parameters (G1.3)

The basic social parameters[17] of the project are presented below.

Main settlements

Fuyun County has jurisdiction over 5 towns (Kuertsis Town, Keketohai Town, Chacultu Town, Duge Town, and Karatunk Town), 5 townships (Turkhon Township, Kizilhilik Township, Kalabrugen Township, Kurte Township, and Tiemaik Township) and 76 administrative villages. It is a border county with Kazakh nationality as the main body and a multi-ethnic settlement. The Kazakh population of the county is 71,536, accounting for 74.39% of the total population, 19,797 Han people, accounting for 20.59%, there are 4,824 people from other ethnic groups, accounting for 5.02%. The total number of households in the county was 28,633, with 96,157 people. The urban population is 29,171 and the rural population 66,986.

Land use and economic activities

The *Land Management Law of the People's Republic of China* [18] defines three legal categories of land in China based on their use: agricultural land, land for construction use and other land. "Agricultural land" refers to land directly used for agricultural production, including cultivated land, wooded land, grassland as well as other agricultural land. "Land for construction use" refers to land on which buildings and structures are put up, including land for urban and rural housing and public facilities, land for industrial and mining use, land for building communications and water conservancy facilities, land for tourism and land for building military installations, etc. "Other land" refers to land other than that for agricultural and construction uses, and this category includes water and unused land. The use of any land must follow its legal category defined in Land Use Planning approved by the government. It is strictly forbidden for any individual or entity to change the use category of any land.

The total land area of the project zone is 3,369,960 hectares. About 92.4% of the total land area (3,113,427 hectares) is agricultural land (including grassland, cultivated land, and wooded land). The overwhelming majority of the agricultural land is grassland (3,034,876 hectares), accounting for 90.1% of the agricultural land, or 83.2% of the total land area. The rest is wooded land and cultivated land, accounting for 8.3% and 1.6% of the agricultural land, respectively. About 7.6% of the total land area (256,532 hectares) is classified as "other land" and the land for construction uses, including urban and rural residential areas, road water surface, sand dunes, and gullies. According to PRA report, 849,333 ha of grassland in the project zone are facing degradation.

The total GDP of the county was 6.557 billion RMB in 2020, of which the added value of the primary industry was 610.9 million RMB, the added value of the secondary industry was 4.163 billion RMB, and the added value of the tertiary industry was 1.782 billion RMB. The total output value of farming,

[17] According to *Participatory Rural Appraisal Report* of the project.

[18] http://www.gov.cn/banshi/2005-05/26/content_989.htm

forestry, animal husbandry, and fishery in the county was 1.05 billion RMB. For farming, wheat, maize, and beans are the most important crops. The grain output in the project zone is 13,7974,000 kg. Animal husbandry, on the other hand, is more closely related to the project. There were around 928,100 sheep and cattle raised by animal husbandry households in the project zone at the end of 2020. The per capita income of farmers and herdsmen was 16,260 RMB.

Animal husbandry is the most important agricultural activities. The project activities affect only the agricultural land used for animal husbandry in the project zone.

Relevant historic conditions

Fuyun 's name means “rich and containing treasure”. The project zone is a place where nomadic peoples in western China have been living and multiplying since ancient times, such as Xiongnu and Wara. According to historical records, Fuyun belongs to the Altay area, known as the grasslands of western Mongolia in ancient times. In 1950, the first meeting of people's representatives of all ethnic groups and all walks of life was held in Fuyun County, and the People's Government of Fuyun County was elected.

During recent decades, due to rapid population growth and livestock growth, pressure on local grassland resources has surged, and overgrazing that exceeds grassland carrying capacity has been common, leading to different levels of grassland degradation in various parts of the project zone.

Socio-cultural information

Land ownership

In China, all land is publicly owned, according to the *Property Law of the People’s Republic of China* [19] and the *Land Management Law of the People’s Republic of China* [20]. There are two types of ownership: ownership by the state and ownership by collectives.

The lands in the project area are collectively owned by village collectives. To initiate the project, the project proponent has been authorized the management right of the land in the project area as well as the right of carbon revenues generated by the project activities during the project crediting period.

Health and education

There are 66 schools in Fuyun County, including 50 kindergartens, 1 senior middle school, 4 junior middle schools, 10 primary schools, and 1 vocational and technical college.

There are 89 public medical and health institutions, 4 at the county level (a county hospital, a county center for disease control and prevention, maternal and a child health station, and an animal husbandry hospital), 9 township (town) health centers, 5 community health service stations, and

[19] http://www.gov.cn/flfg/2007-03/19/content_554452.htm

[20] http://www.gov.cn/banshi/2005-05/26/content_989.htm

71 village clinics. There are 1 private hospital and 23 private clinics. The county has 530 beds and 662 medical personnel.

Migration patterns

Due to the region's low economic level, many young people leave for large cities for employment opportunities.

2.1.7 Project Zone Map (G1.4-7, G1.13, CM1.2, B1.2)

The project is located in Fuyun County, Altay Prefecture, Xinjiang Uygur Autonomous Region, China. The geographical coordinates of the project are between east longitude 88°10' ~ 90°31' and north latitude 45°00' ~ 48°03'.

As defined in Section 2.1.5, the project zone, whose location is shown in Figure 2.1, refers to the entire Fuyun including all the subdistricts, towns/townships and villages under their administration, and the project area refers to the land where the project activities are implemented.

On the one hand, because measures such as grass planting and fencing that can restore grassland productivity and wildlife habitats are all located in the project area. On the other hand, only herders who graze in the project area are under the control of the local Forestry and Grass Bureau, while herders who graze in other areas are not under the grazing control of project activities. Therefore, there are no offsite biodiversity impacts areas and no negative well-being impacts on other stakeholders. Due to the sustainable management of the project area by project measures, the County Forestry and Grassland Bureau measures the grass yield of the surrounding grasslands in the project area and guides herders to graze in a reasonable area. So, there is leakage in the project zone due to grazing displacement activities. The offsite climate impact areas are defined as the project zone, which is outside of the project area.

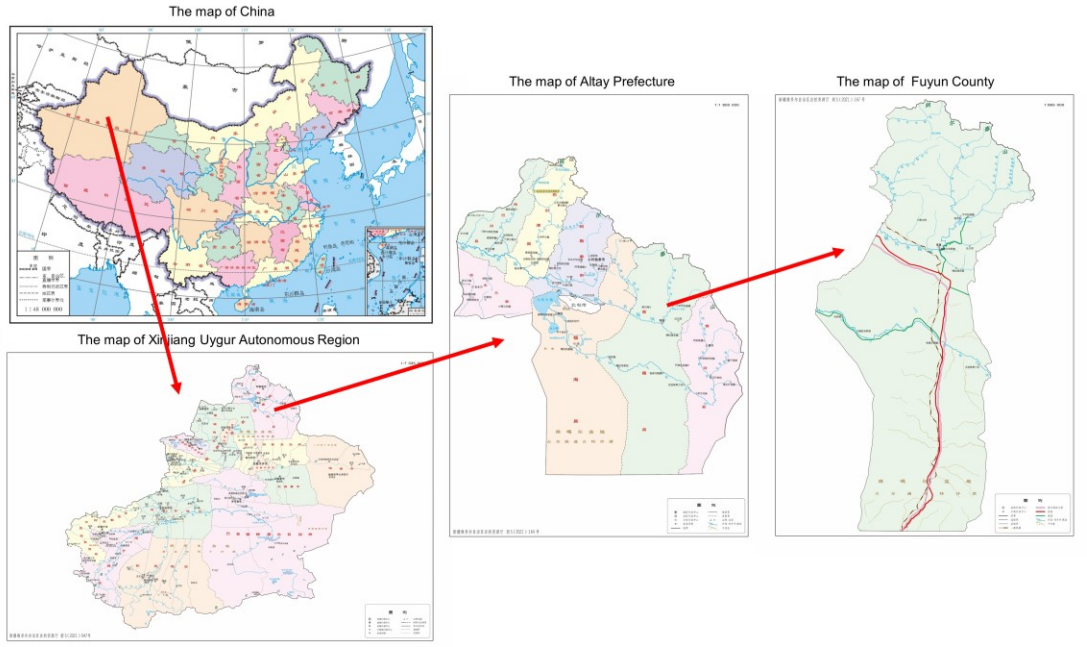

Figure 2.1 Location of the project

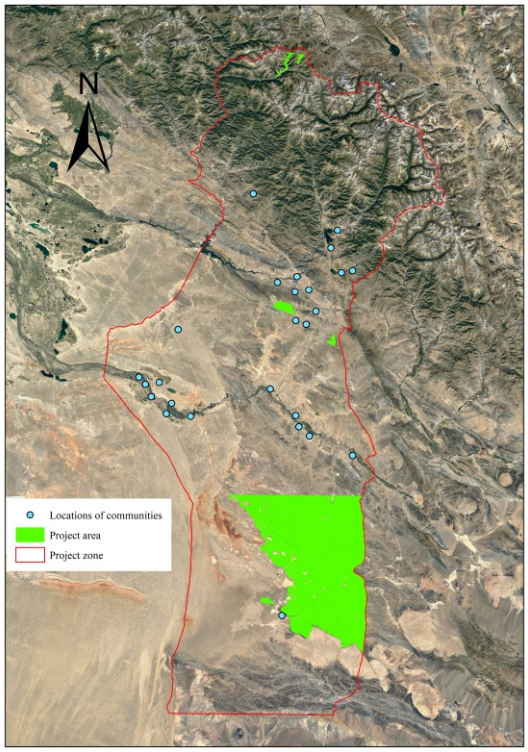

Figure 2.2 Satellite image of the project zone and project area

Figure 2.2 shows the boundaries of the project area and its location within the project zone. A KML file is also submitted separately to the Verra Registry for the identification of the project area.

Figure 2.2 also shows the location of communities. There is no high conservation value (HCV) area related to community well-being and no offsite climate and biodiversity impact areas. There are no negative well-being impacts on other stakeholders.

2.1.8 Stakeholder Identification (G1.5)

The "Stakeholder Analysis" tool in the *Social and Biodiversity Impact Assessment (SBIA) Manual* (part 2 – Social Impact Assessment Toolbox)[21] has been applied to identify the stakeholders.

Step 1: Brainstorm with key informants or focus groups to list and classify stakeholders

In April 2020, the project proponent, with support from the Forestry and Grassland Bureaus, held a series of consultation meetings as part of the Participatory Rural Appraisal (PRA) survey in villages involved in the project. During the meetings, participants brainstormed all the people or groups who might have an influence over or be impacted by the project. The village committees and village officials were considered to be the key informants who know best about local communities. As a result of the brainstorming, communities and other stakeholders identified as stakeholders are explained as follows.

[21] https://verra.org/wp-content/uploads/2016/05/SBIA_Part_2.pdf

1) Local residents

1.1 Local herders (Kazakhs and other minority ethnic groups)

The herders in the project zone are mostly Kazakhs and other minority ethnic groups. Their livelihood and their traditional culture are closely associated with the use and management of grassland; also, overgrazing and improper use of grassland have been important factors leading to the continued degradation of the grassland ecosystem. The implementation of the project could impact their traditional lifestyle, and they also influence the project due to their knowledge of local grassland resources.

1.2 Local women

Gender equality is a major concern during the project implementation; therefore, local women are identified as a distinct group. The project proponent adopts measures to ensure that women will have equal opportunities in the project decision-making and in participating in the project activities.

1.3 Workers involved in grass planting and fence installation

Local community members will be employed as workers in grass planting and fence installation, and in return, they will receive a payment of 200 RMB per day for their work. They also receive training regarding the project activities and sustainable grassland management.

1.4 Grassland guardians

Approximately 898 local herders were employed as grassland guardians, with an annual salary of 23,400 RMB per person. They will protect and manage the grassland under the guidance of the project proponent as well as the Forestry and Grassland Bureaus.

2) Village collectives

As stated in Section 2.1.6, the lands in the project area are collectively owned by village collectives. Therefore, the village collectives which own the project lands are identified as stakeholders.

3) Government agencies

3.1 Altay Forestry and Grassland Bureau

For any forestry- or grassland-related project to be implemented in the project zone (and in other parts of Altay Prefecture), the project design must be approved by Altay Forestry and Grassland Bureau. For the project, Altay Forestry and Grassland Bureau received, reviewed and approved the *Project Design Report*.

3.2 Fuyun Forestry and Grassland Bureau

Fuyun Forestry and Grassland Bureau is responsible for the supervision and management of the forestry- and grassland-related activities in Fuyun. During the project implementation, Fuyun Forestry and Grassland Bureau assists and participates in the implementation of various activities,

from grass planting to rodent prevention. Their participation largely affects whether the project can be successfully implemented.

3.3 Other government agencies

Fuyun Finance Bureau has agreed to provide most of the initial investment for the implementation of the project. Fuyun Agriculture and Animal Husbandry Bureau paid workers and grassland guardians. The government also supervises the overall impacts of the project in environmental and social aspects, to ensure that the project implementation complies with all applicable laws and regulations at all stages of its lifetime.

4) Other stakeholder groups

4.1 Scientific research institutions

Scientific research institutions are interested in grass species, grassland degradation mechanisms, grassland restoration processes, etc. They might carry out scientific research in the project area where degraded grassland is gradually restored.

4.2 Tourism companies

Along with the successful implementation of the project, the restored grassland will be of more aesthetic value and could attract more tourists for sightseeing, thus impacting tourism companies within or outside the project zone.

Step 2: Wealth or well-being ranking of local or community stakeholders

Reference to procedures: The “Who Counts First?” matrix evolved as part of the “Criteria and Indicators” for the sustainable forest management process of the Center for International Forestry Research (CIFOR), we also involve ranking stakeholder groups according to seven dimensions of well-being or importance:

The “Who Counts First?” matrix (Colfer 1999), an approach to looking at well-being and to deciding on the equity importance of stakeholder groups, described in Section 4.2 of *Social and Biodiversity Impact Assessment (SBIA) Manual* (part 2 – Social Impact Assessment Toolbox), has been adopted. Based on the approach, stakeholder groups are ranked according to seven dimensions of well-being or importance:

- D1: Proximity to the grassland
- D2: Pre-existing rights
- D3: Dependency on the grassland
- D4: Poverty level
- D5: Local or indigenous knowledge
- D6: Grassland/culture integration (i.e., the cultural importance of the grassland)
- D7: Power deficit of stakeholder group compared to other stakeholders

Each stakeholder group is scored, according to the extent that each dimension applies to them, with the following simple scoring system:

- 1 = high
- 2 = medium
- 3 = low

The result of this step is shown in Table 2.1 in which the following notations for the stakeholder groups are adopted:

- LH: local herders
- LW: local women
- WI: Workers involved in grass planting and fence installation
- GG: Grassland guardians
- VC: Village collectives
- AFGB: Altay Forestry and Grassland Bureau
- CFGB: County-levels Forestry and Grassland Bureaus
- OGA: Other government agencies
- SRI: Scientific research institutions
- TC: Tourism companies

Table 2.1 Scoring of stakeholder groups

	Local residents				VC	Government agencies			Other stakeholder groups	
	LH	LW	WI	GG		AFGB	CFGB	OGA	SRI	TC
D1	1	1	1	1	1	2	2	2	3	3
D2	2	2	2	2	2	1	1	1	3	3
D3	1	1	1	1	2	1	1	1	2	3
D4	1	1	1	1	2	3	3	3	3	3
D5	1	1	1	1	1	1	1	2	3	3
D6	2	2	2	2	1	2	2	2	3	3
D7	1	1	1	1	1	1	1	2	3	3
Average score	1.29	1.29	1.29	1.29	1.43	1.57	1.57	1.86	2.86	3

An average score over the seven dimensions is estimated for each stakeholder group. A cut-off point of 2 has been used; stakeholder group scores with less than 2 are regarded as important stakeholders from an equity perspective, while those scoring 2 or more are regarded as less critical.

Step 3: Analyze each stakeholder group in terms of their interests, motivation to participate and relationships with other stakeholders

The result of this step is summarized in Table 2.2.

Table 2.2 Stakeholder analysis profile matrix for the project

Stakeholder or stakeholder subgroup		**Interests in the project**	**Effect of the project on their interests**	**Relationship with other stakeholders (Partnership/ Conflict)?**
Local residents	Local herders	Job opportunities, knowledge and capacity in sustainable grassland management	Income increases and technical training received which improve their skills in grassland management	Partnership
	Local women			Partnership
	Workers			Partnership
	Grassland guardians			Partnership
Village collectives		Poverty reduction, knowledge and capacity in sustainable grassland management	Improved experience in sustainable grassland management	Partnership
Government agencies	Altay Forestry and Grassland Bureau	Project management, supervision and general management of grassland-related activities	Management experience in grassland management projects, improved environmental conditions	Partnership
	Fuyun Forestry and Grassland Bureau	Project management, supervision and general management of grassland-related activities	Management experience in grassland management projects, improved environmental conditions	Partnership
	Other government agencies	Financial support, social and environmental management, employment and well-being of residents	Enhanced experience in social and environmental management, increased employment and improved well-being for all	Partnership

Other stakeholder groups	Scientific research institutions	Data collection for research	Publication of scientific literature and academic achievement	Partnership
	Tourism companies	Potential tourism income	Potential income increases due to future tourism booming	Partnership

Step 4: Analysis of the level of influence and importance of each potential stakeholder group

"Influence" refers to the extent to which a stakeholder or stakeholder group has power over the project, and can therefore facilitate or hinder project interventions, and "Importance" refers to how much the achievement of project goals depends upon the involvement of a given stakeholder. The levels of influence and importance are classified into low, moderate, significant and critical.

Based on the previous steps, the analysis result of the influence and important levels is shown in Table 2.3.

Table 2.3 Relative influence and importance of different stakeholder groups

Importance / **Influence**		**Importance of stakeholders to project achievement**			
		Low	Moderate	Significant	Critical
Influence of stakeholder groups	Low	TC	SRI		
	Moderate				
	Significant		OGA	VC	AFGB, CFGB
	Highly influential				LH, LW, WI, GG

Step 5: Publish the stakeholder analysis results

Based on the analysis above, the importance of stakeholders to the project achievement and the influence of stakeholder groups are ranked as shown in Table 2.4. Refer to Section 2.1.9 for descriptions of each stakeholder group.

Table 2.4 Ranking of stakeholder groups

Category Code	Stakeholders Group	Rank
LH	Local herders (Kazakhs and other minority ethnic groups)	1
LW	Local women	
WI	Workers involved in grass planting and fence installation	
GG	Grassland guardians	
VC	Village collectives	2
AFGB	Altay Forestry and Grassland Bureau	
CFGB	Fuyun Forestry and Grassland Bureau	
OGA	Other government agencies	3
SRI	Scientific research institutes	4
TC	Tourism companies	5

The results of the stakeholder analysis described above are part of this Project Description which will be published on the Verra Registry to give access to everyone. In case any other person or group considers themselves as one of the project's stakeholders, they shall directly contact the project proponent.

Step 6: Continuous input/grievance mechanism

Different response mechanisms with different levels of stakeholder groups are described as follows.

First level

Before the start of the project, the project proponent must submit a scientifically prepared project design document to Altay Forestry and Grassland Bureau for approval. This project design document must be revised according to suggestions and questions raised by Altay Forestry and Grassland Bureau until final approval. After acquiring the approval, the project proponent would undertake the project activities, with the sessional guidance from the Fuyun Forestry and Grassland Bureau acting as both participator and supervisor. After completing the grazing prohibition and grass planting, the project proponent would invite the Forestry and Grassland Bureaus for inspection and acceptance of the project, and would take corrective measures if required. During the entire credit period, the project will always be under the supervision of the Forestry and Grassland Bureaus.

The second and third level

The project proponent has established a mechanism to collect and address the complaints or grievances of local community members, explained as follows.

The project proponent has appointed a team in charge of recording and collecting conflicts and grievances between local community members. Employed grassland guardians play an important role in dealing with conflicts and dissatisfaction, and they report to the project proponent. All grassland guardians are from local communities and their names and phone numbers have been made public in village meetings. In case of any conflicts and grievances, the stakeholders can contact a grassland guardian near them, and the grassland guardian will collect all the necessary information and then report to the specific staff. Also, the phone numbers of the Forestry and Grassland Bureaus have been published in village meetings so that all other stakeholders can easily give their feedback in case of any grievance.

Community members are encouraged to report any conflict to grassland guardians, who have a full understanding of actual conditions of the project implementation and will attempt to resolve the conflicts amicably; if they fail to solve the conflict within 5 days, they shall report to the grievance-redress team of the project proponent who shall propose a solution and act as mediation based on collected information from conflicted parties; if things do not work out within 30 days, the project proponent shall report to the local government, and follow relevant legal procedures of arbitration or litigation.

2.1.9 Stakeholder Descriptions (G1.6, G1.13)

Table 2.5 lists all the stakeholders identified in Section 2.1.8, including their rights, interests and overall relevance to the project.

Table 2.5 Stakeholders identified and their relevance to the project

Stakeholder	Rights, Interests and Overall Relevance to the Project
Local herders (Kazakhs and other minority ethnic groups)	**Rights:** • Grassland is closely associated with their livelihood and their culture; they use and manage the project area for generations. • Their knowledge about the grassland is crucial to the project's success; their opinion on the project is worth paying attention to, both before the project design phase and during the project's lifetime. **Interest:** • They would benefit from improved grassland conditions and hence improved well-being. • They will receive training on sustainable grassland management. • Some of them would be employed as temporary workers or permanent grassland guardians and receive payment for their work. **Overall relevance:**

	• The implementation of the project could impact their traditional lifestyle, and they also influence the project due to their knowledge of local grassland resources.
Local women	**Rights:** • As women, they have the right to equal opportunities as men in the project decision-making and in participating in the project activities. **Interest:** • They would also benefit from improved grassland conditions and hence improved well-being. • They will also receive training on sustainable grassland management. • They will receive the same amount of payment as men for their work when employed as temporary workers or permanent grassland guardians. **Overall relevance:** • Gender equality is a major concern during the project implementation; measures are adopted to ensure that women will have equal opportunities in the project decision-making and in participating in the project activities.
Workers involved in grass planting and fence installation	**Rights:** • They receive payment for their work on the project. • They receive technical training regarding the project activities and sustainable grassland management. **Interest:** • They will benefit from income increases due to their participation. • They will gain knowledge and skills in grass planting, fence installation and sustainable grassland management, etc. **Overall relevance:** • They are deeply and directly involved in the implementation of the project activities.
Grassland guardians	
Village collectives	**Rights:** • Village collectives own the lands within the project area and the ownership is non-transferrable. • They must ensure that the community members have equal rights in participating and applying for employment opportunities in their locality. **Interest:** • They could gain experience in community engagement and organization of community activities while assisting the project implementation. **Overall relevance:** • They directly own the lands in the project area.
Altay Forestry and Grassland Bureau	**Rights:**

	• They are in charge of reviewing and approving the *Project Design Report* and other issues related to the project in general. **Interest:** • Along with the project implementation, they would gain experience in grassland management which could be useful in similar grassland projects in the future. **Overall relevance:** • They are involved in the overall management of the project.
Fuyun Forestry and Grassland Bureau	**Rights:** • They must ensure the project's compliance with current laws and regulations. **Interest:** • Along with the project implementation, they would gain experience in grassland management which could be useful in similar grassland projects in the future. **Overall relevance:** • They are involved in the overall management of the project.
Other government agencies	**Rights:** • They have agreed to provide most of the initial investment for the implementation of the project. • They must ensure the project's compliance with current laws and regulations at all stages of its lifetime. **Interest:** •Along with the project implementation, they would gain experience in grassland management which could be useful in similar grassland projects in the future. **Overall relevance:** They provide important financial support as well as compliance supervision to the project implementation.
Scientific research institute	**Interest:** •Conducting scientific research in the project area could lead to the publication of scientific literature and associated academic achievement. **Overall relevance:** • Contribution to academic research and improved knowledge about grassland ecosystems.
Tourism companies	**Interest:** • After the grassland restoration, tourists might visit the project area, bringing income to tourism companies. **Overall relevance:** • Booming of local tourism.

2.1.10 Sectoral Scope and Project Type

According to Appendix 1 (Eligible AFOLU Project Categories) of *VCS Standard* version 4.4, eligible ALM activities are those that reduce net GHG emissions on croplands and grasslands by increasing carbon stocks in soils and woody biomass and/or decreasing CO_2, N_2O and/or CH_4 emissions from soils; eligible ALM activities include Improved Cropland Management (ICM), Improved Grassland Management (IGM) and Cropland and Grassland Land-use Conversions (CGLC).

The project restores degraded grassland by planting grass and sustainable management of grazing activities, thus increasing soil carbon stocks. The sectoral scope applicable to the project is VCS scope 14 “Agriculture, Forestry and Other Land Use (AFOLU)”; its AFOLU project category is Agricultural Land Management, and its activity type is Improved Grassland Management.

The project is not a grouped project.

2.1.11 Project Activities and Theory of Change (G1.8)

GHG emission reduction or removal activities

Total of 332,660 ha of degraded grassland has been managed scientifically by grazing prohibition and grass planting of local high-quality forage. And that reduces net GHG emissions by increasing carbon stocks, and/or reducing non-CO_2 GHG emissions.

There are two main restoration measures in the project: 1) Grazing is prohibited on severely degraded grasslands to protect the natural grassland resource. This project sustainably manages 325,293.3 ha of severely degraded grasslands. 2) Fencing and planting of native grass species on the moderately degraded grassland, grazing will be prohibited after the completion of grass planting and fence installation. The grass species are *Poa crymophila*, *Elymus nutans*, *Elymus sibiricus L.*, and *Agropyron cristatum*. There are 7,366.7 ha of moderately degraded grassland in this project has been sustainably managed through artificial grass planting and fencing.

Through scientific and sustainable management of grazing, relevant training about technical skills, scientific and effective management plan, alleviate soil desertification and restore grassland vegetation to improve soil carbon storage and local biodiversity and enhance the capabilities of local communities and residents.

These sustainable grazing management approaches will be conducted in conjunction with frequent **grassland patrolling** carried out by grassland guardians in charge of ensuring compliance of grazing activities with the project design. And the procedures for selecting high-quality grass seeds must be followed, and seed quality must conform to the national standard Quality Grading of the Grass Seeds (GB/6142-2008).

The project is not located within a jurisdiction covered by a jurisdictional REDD+ program; in fact, there are no REDD+ activities for now in China according to UNFCCC[22].

Theory of Change

The without-project scenario may have three focal issues:

(1) The project is located in Fuyun County with a fragile ecology. Due to the long-term climate change and overgrazing, the grassland ecosystem will continue to degrade, which will bring serious damage to the local environment and sustainable development.

(2) Continuous degradation of the grassland ecosystem will deteriorate the living environment of local herders and affect their livelihoods.

(3) Continuous degradation of the grassland ecosystem poses a long-term threat to local climate conditions and biodiversity.

The main objective of the project is to restore the degraded grassland ecosystem by planting grass seeds, grazing prohibition, and carrying out sustainable grassland management to address the above issues.

Focal issue 1 (Grassland ecosystem degradation focal issue):

In the absence of the project, the project area will remain as degraded grassland and the surrounding communities will be threatened by continued degradation of the grassland ecosystem. After the implementation of the project, the grassland coverage has increased and grazing measures have been improved, which is beneficial to the local environment through the maintenance of the water and soil, and healthy grassland ecosystem is an attractive landscape that could significantly benefit local tourist resources and promote the local economy.

Focal issue 2 (Local herders' livelihood focal issue):

Local herders live by grazing, in the absence of the project, the project area will remain as degraded grassland, the area available for grazing will gradually decrease, and their income will decrease in the long-term. The project will offer some short-term and long-term job opportunities for local residents which could increase the income of the households. The restoration of degraded grassland and sustainable grazing will improve the grazing productivity of local herders. The project provides equal job opportunities for local women and men which could build community capacity for gender equity by empowering women. In addition, the project is located in Fuyun County which is the traditional Kazakh region and the local residents employed by the project are mostly Kazakhs. The project will organize special community cultural activities for local residents which could provide more opportunities for Kazakhs to inherit their traditional culture and increase their social connection. All these will significantly improve the well-being of local communities.

Focal issue 3 (Threat to biodiversity focal issue):

[22] https://redd.unfccc.int/info-hub.html

In the absence of the project, the project area will continue to degrade with much threat to local climate and biodiversity conditions. There are 3 endangered species (*Aquila nipalensis*, *Equus ferus*, *Falco cherrug*) are listed in the IUCN Red List at the project site for its unique grassland habitat. The implementation of the project can preserve the natural habitats of wild animals by increasing vegetation cover and avoiding soil desertification in the project area. Therefore, the population of the endangered animals could be maintained and enhanced due to the better environment of the habitat which could increase the long-term biodiversity of the local ecosystem.

The Theory of Change of the project has been developed during a stakeholder workshop conducted before the project start. The results chain developed in the workshop is shown as follows:

Project activity: grass planting, fence installation and subsequent management

- Measures including grass planting, fence installation and subsequent management are implemented on 332,660 hectares of degraded grassland (*outputs*).
- Along with grass growth and sustainable grassland management, CO_2 is constantly sequestered into soil organic matter, and soil conditions improve (*outcomes*).
- Contributing to climate change mitigation (*climate impacts*), reversing grassland degradation, hence allowing habitats of native species to develop and expand (*biodiversity impacts*).

Project activity: employing local community members

- It is estimated that around 4,186 local community members will participate in grass seeding and fence installation, while around 898 local community members will be employed in long-term jobs as grassland guardians; both temporary workers and long-term grassland guardians will receive corresponding payment for their work (*outputs*).
- New opportunities bring income to local community members and improve their living conditions (*outcomes*).
- The income will improve rural livelihoods, lift some community members out of poverty, and empower women who would otherwise only stay at home doing traditional housework (*community impacts*).

Project activity: organization of grassland-related training sessions

- Training sessions related to grassland management will be provided to local communities (*outputs*).
- Local communities will have improved skills in planting and better knowledge of grassland management (*outcomes*).
- Improved grassland management skills will be useful for other grassland-related activities in the future, improving the employability of trained participants (*community impacts*); the training sessions will also contribute to the awareness about sustainable development amongst community members, who will in turn help preserve their living environment and natural habitats (*community & biodiversity impacts*).

The expected output, outcomes and impacts are summarized in Table 2.6.

Table 2.6 The expected output, outcomes and impacts of the project activities

Activity description	Expected climate, community, and/or biodiversity			Relevance to the project's objectives
	Outputs (short-term)	Outcomes (medium-term)	Impacts (long-term)	
Grass planting, fence installation and subsequent management	Grass planting, fence installation and subsequent management are implemented on 332,660 hectares of degraded grassland.	Sequestering CO_2 from the atmosphere into the soil organic matter	Contributing to climate change mitigation	Climate
		Soil conditions improve	Reversing grassland degradation, hence allowing habitats of native species to develop and expand	Biodiversity
Employing local community members	Local community members participate in the project activities; both temporary workers and long-term grassland guardians will receive corresponding payment for their work.	Improving the living conditions of local communities	Improving rural livelihoods; Lifting some community members out of poverty; Empowering women.	Community
Organization of grassland-related training sessions	Training sessions related to grassland management will be provided to local communities.	Local communities will have improved skills in planting and better knowledge of grassland management	Improving the employability of trained participants for other grassland-related activities in the future.	Community
			Raising awareness about sustainable development amongst community members, who will in turn help preserve their living environment and natural habitats.	Community & Biodiversity

2.1.12 Sustainable Development

The project provides many benefits which contribute to the United Nations' Sustainable Development Goals (SDGs) in the following aspects:

All the temporary workers involved in grass planting and fence installation are paid 200 RMB per day; long-term grassland guardians are paid 23,400 RMB per year. People from all community groups have been given an equal opportunity to participate in the work when they apply for jobs. The project proponent also consciously ensured that people from the poorest households could benefit from the project in the long term.

The project proponent follows strictly the *Labour Law of the People's Republic of China* and adapts them to meet the local conditions to ensure workers' health and safety during the implementation of the project activities. The workers' health and safety policy, including items covering the health insurance scheme for workplace accidents and evacuation plans, is made available for workers and implemented by the Forestry and Grassland Bureaus and village committees.

Around 50% of the community members directly involved in the project are women, which contributes to their importance in families and communities, and helps them gain skills and experience in sustainable forest management.

The project will generate GHG emission reductions and removals and mitigate climate change. The project is estimated to generate net GHG emission reductions and removals of 22,106,811 tCO_2e over the 40-year crediting period, with average net GHG emission reductions and removals of 552,670 tCO_2e per year.

The project will improve the quality and quantity of grass as well as associated vegetation and creatures, and hence enhance biodiversity conservation.

For monitoring and reporting, all the achievements will be recorded with related evidence, and the contributions to climate, community and biodiversity will be calculated and evaluated as per the related standard and methodologies.

2.1.13 Implementation Schedule (G1.9)

Date	Milestone(s) in the project's development and implementation
18-April-2020	The *Participatory Rural Appraisal (PRA) Report* was completed.
11- August -2020	The *Baseline Biodiversity Survey Report* was completed.
25-September-2020	The *Project Design Report* was completed.
12-November-2020	The *Project Design Report* was approved by Altay Forestry and Grassland Bureau.
01-June-2021	Start of grazing prohibition (also the project start date as well as the start of the project crediting period).
July -2021 to November -2021	Grass planting and fence installation in 2021.
June -2023 to September-2023	Fence installation in 2023.
20-September-2023	Completion of grass planting and fence installation.
28-September-2023	The draft Project Description and the Project Description summary were finished.

2.1.14 Project Start Date

According to *VCS Standard* version 4.4, an AFOLU project is the date on which activities that led to the generation of GHG emission reductions or removals are implemented (e.g., preparing land for seeding, planting, changing agricultural or forestry practices, rewetting, restoring hydrological functions, or implementing management or protection plans).

The project start date is 01-June-2021 when grazing prohibition and subsequent management started.

2.1.15 Benefits Assessment and Crediting Period (G1.9)

The project adopts a 40-year crediting period from 01-June-2021 to 31-May-2061.

The CCB benefits assessment period is the same as the project crediting period.

2.1.16 Differences in Assessment/Project Crediting Periods (G1.9)

Not applicable, as the assessment period and the crediting period are the same.

2.1.17 Estimated GHG Emission Reductions or Removals

Year	Estimated GHG emission reductions or removals (tCO_2e)
01-June-2021 to 31-May -2022	551,238
01-June-2022 to 31-May -2023	552,707
01-June-2023 to 31-May -2024	552,707
01-June-2024 to 31-May -2025	552,707
01-June-2025 to 31-May -2026	552,707
01-June-2026 to 31-May -2027	552,707
01-June-2027 to 31-May -2028	552,707
01-June-2028 to 31-May -2029	552,707
01-June-2029 to 31-May -2030	552,707
01-June-2030 to 31-May -2031	552,707
01-June-2031 to 31-May -2032	552,707
01-June-2032 to 31-May -2033	552,707
01-June-2033 to 31-May -2034	552,707
01-June-2034 to 31-May -2035	552,707
01-June-2035 to 31-May -2036	552,707
01-June-2036 to 31-May -2037	552,707
01-June-2037 to 31-May -2038	552,707
01-June-2038 to 31-May -2039	552,707
01-June-2039 to 31-May -2040	552,707
01-June-2040 to 31-May -2041	552,707
01-June-2041 to 31-May -2042	552,707
01-June-2042 to 31-May -2043	552,707
01-June-2043 to 31-May -2044	552,707
01-June-2044 to 31-May -2045	552,707
01-June-2045 to 31-May -2046	552,707
01-June-2046 to 31-May -2047	552,707
01-June-2047 to 31-May -2048	552,707
01-June-2048 to 31-May -2049	552,707
01-June-2049 to 31-May -2050	552,707
01-June-2050 to 31-May -2051	552,707
01-June-2051 to 31-May -2052	552,707

01-June-2052 to 31-May -2053	552,707
01-June-2053 to 31-May -2054	552,707
01-June-2054 to 31-May -2055	552,707
01-June-2055 to 31-May l-2056	552,707
01-June-2056 to 31-May -2057	552,707
01-June-2057 to 31-May -2058	552,707
01-June-2058 to 31-May-2059	552,707
01-June-2059 to 31-May-2060	552,707
01-June-2060 to 31-May-2061	552,707
Total estimated ERs	22,106,811
Total number of crediting years	40
Average annual ERs	552,670

2.1.18 Risks to the Project (G1.10)

Natural and human-induced risks to the expected climate, community, and biodiversity benefits during the project lifetime have been analyzed, and mitigation measures are designed. Refer to Table 2.7.

Table 2.7 Risk analysis of the project

Identify Risk	The potential impact of risk on climate, community and/or biodiversity benefits	Actions needed and designed to mitigate the risk
Fire	Before the project implementation, the project area was degraded grassland where vegetation coverage was very low; consequently, the risk of fire would be quite low in the early phase of the project. With the increase of grass coverage, the risk of fire may increase, especially if improper use of fire or other risky activities by people occur. Fire would release GHG which would have otherwise been sequestered by the project, hence undermining the expected climate benefits.	According to *Regulations on Grassland Fire Prevention*[23], the local government should carry out the construction of grassland fire prevention facilities, and strengthen grassland fire observation during dry periods to prevent fire. Once a fire occurs, the local government is responsible for immediate rescue. In addition, grassland guardians will receive training regarding fire prevention and control, and awareness campaigns will be organized for local communities. Frequent patrolling and monitoring will be conducted especially during dry seasons. The project proponent has established a *Grassland Management Manual* for the

[23] http://www.gov.cn/zhengce/2020-12/25/content_5574529.htm

		project which includes specific instructions in fire prevention and control.
Rodents and pests	Rodents and pests may damage the grass, which could undermine the expected climate and biodiversity benefits.	During frequent patrolling, grassland guardians will observe rodent or pest outbreaks immediately if they occur and report them before severe damage is done. Upon receiving reports of rodent or pest outbreaks, the Forestry and Grassland Bureaus as well as the project proponent will take immediate measures such as biological control (introduction of rodents' predators such as eagles) and use of pesticides, depending on the actual situation. Chemical pesticides are allowed only if there is a serious pest outbreak, and their use must strictly obey relevant national and regional pesticide policies. The project proponent has established a *Grassland Management Manual* for the project which includes specific instructions in rodent and pest control.
Overgrazing	Overgrazing is one of the main factors leading to grassland degradation. A few herders do not obey sustainable management, leading to overgrazing on parcels in the project area.	The project proponent and the Forestry and Grassland Bureaus will organize technical training and awareness campaigns to help herders adopt sustainable grazing practices.

2.1.19 Benefit Permanence (G1.11)

To maintain and enhance the climate, community and biodiversity benefits, the project adopts a variety of measures including grassland improvement, grazing prohibition and grass planting.

The project proponent and the Forestry and Grassland Bureaus will ensure that continuous use of the project grassland complies with the project design; any non-conformance or non-compliance, such as grazing in areas where grazing is prohibited, will be observed, reported, and corrected as soon as possible. Besides, they are also responsible for ensuring that relevant laws and regulations are strictly followed.

Financially, the project proponent, which has been authorized the management right of the land in the project area as well as the right of carbon revenues generated by the project activities during

the project crediting period, will make use of the carbon revenues in payment of grassland guardians and in organizing continuous training on sustainable grassland management, to ensure the project is continuously funded. Please refer to Section 2.1.20 for a detailed description.

The project proponent has long-term cooperation with the Forestry and Grassland Bureaus regarding grassland-related activities; in addition, an estimated number of 898 local herders will be employed as grassland guardians. Their professional knowledge and practical experience will guarantee the sustainable implementation and management of the project during the project period, and this cooperation would continue beyond the project lifetime through scientific research or other projects to be carried out in the project area.

Training regarding the sustainable use of local grassland resources are important parts of the project implementation; residents will gain awareness and become motivated in actively preserve their natural environment to avoid grassland degradation in the long run, thus ensuring the long-term community and biodiversity benefits.

All of the above could guarantee the long-term climate, community, and biodiversity benefits of the project.

2.1.20 Financial Sustainability (G1.12)

As the project area is widely scattered within the project zone, it is difficult for any landowner to raise enough funds and effectively implement the project activities over the entire project area during the entire project crediting period and beyond. Therefore, after rounds of seminars and meetings, local village collectives involved have agreed to authorize the project proponent of the use and management rights of the lands within the project boundary during the project crediting period.

The project has low or zero financial attraction, as the project is designed and implemented for ecological purposes instead of financial profits. The initial investment required by the project amounts to 172.18 million RMB. On top of that, continuous financial support of around 51.01 million RMB per year over the project lifetime, which includes notably annual payments to grassland guardians, would be needed to ensure continuous sustainable grassland management in the project area. This gap as well as continuous grassland management costs will be raised by the project proponent, who will sell carbon credits generated from the project and make use of the carbon revenues to ensure the financial sustainability of the project.

Therefore, with the initial government support and continuous carbon revenues, the project is financially sustainable.

2.1.21 Grouped Projects

Not applicable.

2.2 Without-project Land Use Scenario and Additionality

2.2.1 Land Use Scenarios without the Project (G2.1)

According to the Project Design Report, the project area is grassland. The land cover data from the Institute of Remote Sensing Information Processing (IRSIP), Wuhan University also show the same result, as illustrated in Figure 2.2 and Figure 2.3. It is noticed that the project area was always grassland from 2010 to 2020. This is further confirmed by satellite images of the project area in 2010 and 2020 as in Figure 2.4 and Figure 2.5. The project area had not been cleared of native ecosystems 10 years before the project start date; therefore, the project has not been implemented to generate GHG emissions for their subsequent reduction, removal, or destruction.

Besides, as described in the Participatory Rural Appraisal (PRA) Report and Project Design Report, Fuyun covers an area of 3,369,960 ha, of which the degraded grassland area is 849,333 ha, accounting for 25.2% of the total area.

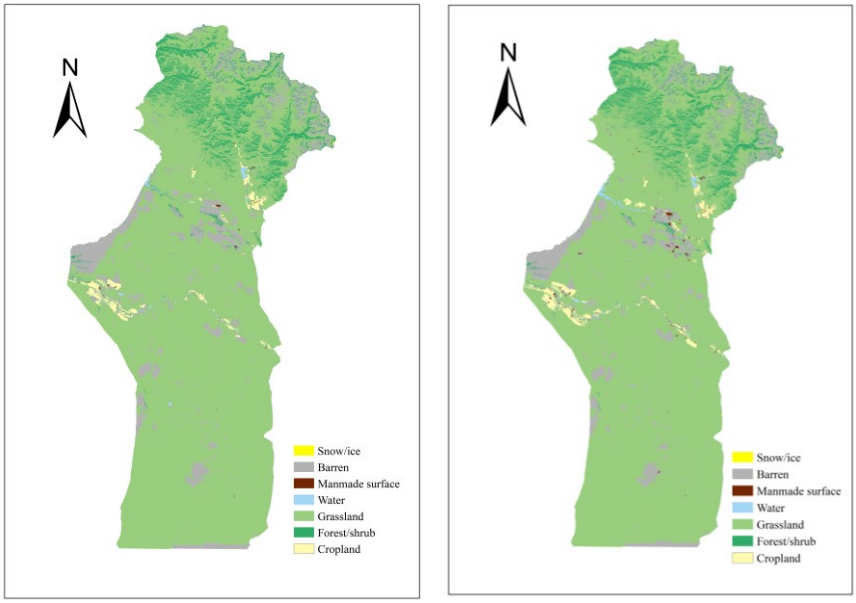

Figure 2.3 Land cover data[24] of the project zone in 2010 and 2020

[24] http://irsip.whu.edu.cn/

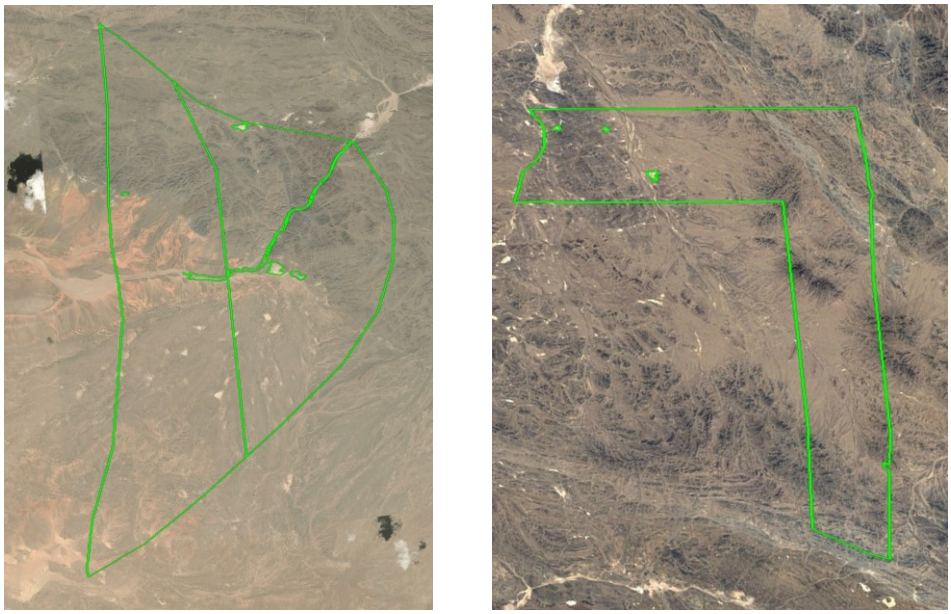

Figure 2.4 Satellite images of the project area in 2010

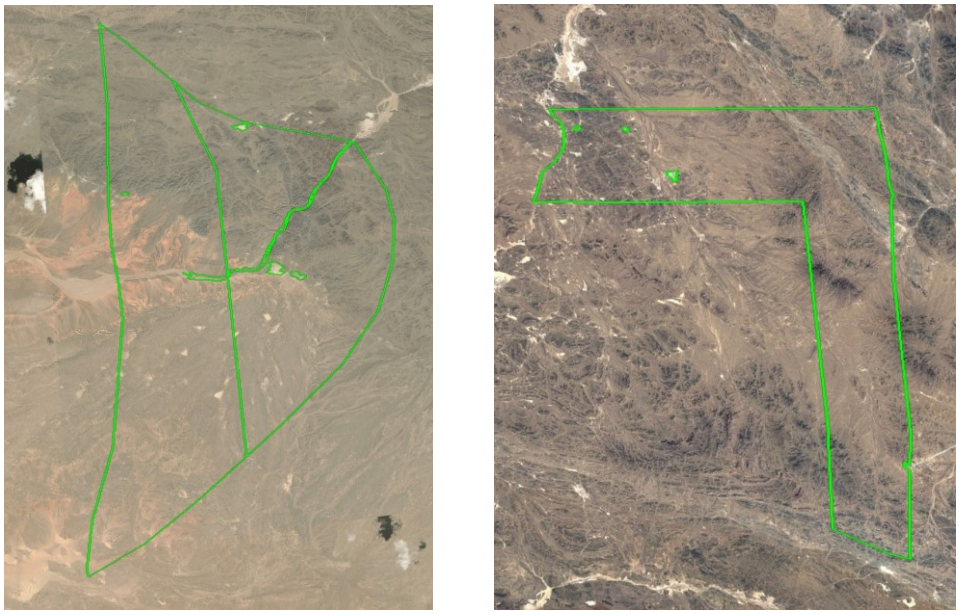

Figure 2.5 Satellite images of the project area in 2020

The baseline scenario is the same as the conditions existing before the project initiation and the lands will continue degradation without the project. Please refer to Section 3.1.4 (Baseline Scenario).

2.2.2 Most-Likely Scenario Justification (G2.1)

The most likely scenario is the same as the baseline scenario, i.e., the grassland involved in the project would continue to degrade without the implementation of the project. Please refer to section 3.1.4 for detailed information.

2.2.3 Community and Biodiversity Additionality (G2.2)

China has successively issued and revised a series of laws and administrative regulations related to grassland, such as *Grassland Law of the People's Republic of China*[25], *Regulations of the People's Republic of China on the Protection of Wild Plants*[26], *Regulations on Grassland Fire Prevention*[27], *Regulations of the People's Republic of China on Nature Reserves*[28], *Regulations on Forest Diseases and Pests Control*[29], etc. None of the laws and regulations mandate the restoration of degraded grassland.

Due to the dual influence of natural and anthropogenic factors, the grassland in the project zone has been continuously degrading to varying degrees for at least decades. Along with the degradation of grassland, the grass yield per unit area of grassland has decreased, threatening the livelihood of local herders as well as conditions of local biodiversity and grassland ecosystems. In addition, the project zone has a small economy and the local budget is quite tight. The restoration of degraded grassland would require huge investment and produce no financial benefits (other than VCS-related income).

Under the without-project scenario, the local herders would continue the traditional grazing practices due to a lack of knowledge and skills in sustainable grassland management. Such technical obstacles would lead to continuous degradation.

The project adopts a variety of measures including grazing prohibition and grass planting. The initial investment required by the project amounts to 172.18 million RMB. On top of that, continuous financial support of around 51.01 million RMB per year over the project lifetime, which includes notably annual payments to grassland guardians, would be needed to ensure continuous sustainable grassland management in the project area. The carbon revenues generated from the project would be used to pay the grassland guardian to organize regular training sessions prevent and control fire or rodent damage, etc., to ensure the permanence of community and biodiversity benefits throughout the project's lifetime.

2.2.4 Benefits to be used as Offsets (G2.2)

Not applicable.

[25] http://www.gov.cn/gongbao/content/2003/content_62420.htm

[26] http://www.gov.cn/gongbao/content/2019/content_5468858.htm

[27] http://www.gov.cn/zhengce/zhengceku/2008-12/05/content_2756.htm

[28] https://www.mee.gov.cn/ywgz/fgbz/xzfg/201805/t20180516_440442.shtml

[29] http://www.forestry.gov.cn/main/3950/20170314/459886.html

2.3 Stakeholder Engagement

2.3.1 Stakeholder Access to Project Documents (G3.1)

The full project documentation, including project description documents and monitoring reports, will be published on the Verra Registry for public comments. The local communities and other stakeholders can easily download them from the website. The project summary in Chinese will be disseminated to local communities by the local government. The project proponent will inform local stakeholders during regular village meetings regarding every key event throughout the project development, including listing, registration, monitoring and verification, issuance, etc.

2.3.2 Dissemination of Summary Project Documents (G3.1)

Along with the project implementation, the project documentation will be published on the Verra Registry for all stakeholders to obtain detailed project information and development progress. Also, the summary project description in Chinese will be disseminated to local communities by the local government and during the community monitoring activities, and the website to download all the summary project documents will be provided to communities during the meeting and published in the public bulletin boards in each village. In addition, the phone number of the contact person has been made known through regular village meetings so that any stakeholder can directly contact the project proponent and raise opinions if they wish so.

2.3.3 Informational Meetings with Stakeholders (G3.1)

To make sure that all the stakeholders are aware of the potential impacts of the project on their interests and that they participate actively and effectively in the project throughout the entire project lifetime, the project proponent appointed an investigation team who conducted the Participatory Rural Appraisal (PRA) survey in April 2020 in the villages involved in the project before the project start; in doing so, they obtained important information and data of the socio-economic condition of the project area and its surrounding area, understood local communities' opinions and their willingness to participate in the project activities, and analyzed the potential impact and benefits of the project.

A week before the start of the stakeholder consultation, the project proponent distributed printed copies of the project design to relevant community members and stakeholders, to make them have sufficient time before they may be asked to make with respect to participation in the project. During the stakeholder consultation in April 2020, the project proponent collected the stakeholders' feedback and suggestions (refer to Section 2.1.8 for details). During the consultation, questionnaires were distributed for opinion collection. The content of the discussions at the stakeholder consultation and the results of the questionnaire survey will be made publicly available to ensure that all stakeholders have access to and knowledge of the relevant information. Please refer to Section 2.3.7 for details.

2.3.4 Community Costs, Risks, and Benefits (G3.2)

During the PRA survey and the stakeholder consultation, the project proponent explained the potential costs, risks and benefits to the communities identified as stakeholders by using the Theory of Change, and invited them to share their opinions. The analysis based on the results chain is

clear and easy to understand. According to the analysis, the community benefits of the project include:

- Creation of job opportunities and income improvement,

- Training courses and capability establishment in sustainable grassland management,

- Improved conditions of equality between men and women.

Potential costs and risks have also been discussed, as follows:

- The grassland parcels available for grazing will be reduced, especially since grazing has been strictly forbidden.

The corresponding mitigation measures to the potential costs are as follows:

- The local government provides subsidies to the herders affected in the project area. The Forestry and Grassland Bureaus measure the grass yield of surrounding grassland parcels outside of the project area, and guide the herders to graze in areas reasonably. Also, the project provides job opportunities to local herders, which could increase their income.

2.3.5 Information to Stakeholders on Validation and Verification Process (G3.3)

The stakeholders are informed of the process of the project for CCB and VCS validation and verification during regular village meetings and from local bulletin boards. Also, the contact person's mobile phone number has been provided to all the stakeholders so they can directly make a call whenever they have any problem with the project process.

2.3.6 Site Visit Information and Opportunities to Communicate with Auditor (G3.3)

A week before the start of the site visit, the project proponent will inform the villages and communities as well as other stakeholders about the audit process, and invite them to select their representatives who will be available to meet the auditors during their visit; the project proponent is also responsible for arranging the site visit schedule to ensure that the visit takes place in an effective and well-organized manner. The site visit will start with an on-site stakeholder meeting with stakeholders' representatives; during the meeting, the representatives from local villages will have private conversations with the auditors, in the absence of others, regarding the implementation of the project activities. Following the stakeholder meeting, the auditors will spend several days visiting the project area and getting themselves informed of the planted species and planting patterns.

2.3.7 Stakeholder Consultations (G3.4)

As mentioned above, the stakeholder consultation took place in April 2020 before the project started; the stakeholders were asked to share their opinions about the project design, and they expressed their willingness to participate thin e following project implementation.

The stakeholder consultation took place in various forms which included meetings, group discussions, questionnaires and semi-structured interviews.

As defined earlier, the stakeholders are classified into the following groups:

1) Local residents

   1.1 Local herders (Kazakhs and other minority ethnic groups)

   1.2 Local women

   1.3 Workers involved in grass planting and fence installation

   1.4 Grassland guardians

2) Village collectives

3) Government agencies

   3.1 Altay Forestry and Grassland Bureau

   3.2 Fuyun Forestry and Grassland Bureau

   3.3 Other government agencies

4) Other stakeholder groups

   4.1 Scientific research institutions

   4.2 Tourism companies

As the project activities had not started by the time of this stakeholder consultation, groups 1.3 (workers involved in grass planting and fence installation) and 1.4 (grassland guardians) were not actual stakeholder groups yet; therefore, the group “local residents” focused on local herders and local women. The stakeholder consultation focused primarily on local residents (including women) because they are considered more crucial to the project's success and their participation is thus more valued, while the government agencies and other stakeholder groups were also consulted.

The first step of the stakeholder consultation was preliminary investigations conducted by the project proponent. They visited each village to organize a village meeting. Following a brief introduction, the project proponent informed the participants of the background, goal, planning and expected benefits of the project, and showed vector graphics and satellite images of the land, which was followed by group discussions between the project proponent and the residents which focused on the project implementation details, including the grass species selection, planting patterns, details on fencing, etc. During the group discussions, the project proponent also asked about the grazing practices of local residents, and learned about days of grazing per year, locations of pastures, livestock movement between different pastures, and other important information about how local people conducted grazing. The project proponent made ensure that this process was participatory because the herders’ knowledge about local land use and natural resources is

deemed essential to the project's success. After the discussions, the project proponent informed them of the schedule of a final decision-making stakeholder consultation which was going to take place later with representatives from all stakeholder groups. The project proponent announced the names of the representatives who had been selected randomly to participate in the final decision-making stakeholder consultation. The random selection process of representatives among local residents is explained as follows.

The total number of residents was aggregated and their name list was collected with the help of village collectives. The project proponent referenced CDM Guideline "*Sampling and Surveys for CDM project Activities and Programmes of Activities*" (version 04.0) to calculate the total sample size with the following equation.

$$n \geq \frac{1.645^2 N \times P(1-P)}{(N-1) \times 0.1^2 \times P^2 + 1.645^2 P(1-P)}$$

Where:

n	=	Sample size
N	=	Total number of residents
P	=	Expected proportion, defined as an empirical value of 0.8
1.645	=	Represents the 90% confidence required
0.1	=	Represents the 10% relative precision

The residents considered at this stage included all residents of the animal husbandry villages within the project zone; therefore, *N* (the total number of residents) was 4,985. The calculation result was 67. Considering a response rate of 80%, the project proponent adjusted the total sample size to 84 to make sure the household interview could represent the different community groups. As the group "local residents" included both "local herders" and "local women", the project proponent determined that the sample should include 42 men and 42 women for a total number of 84. Subsequently, the aggregated name list of residents was divided into men and women; simple sampling was conducted by selecting randomly from the name lists, to form two sub-samples of men and women, respectively; finally, the sub-samples were combined together to form the overall sample of the local residents. This sampling approach ensured that the selected sample could well represent the local residents.

The consultation of "village collectives" and "government agencies" was also conducted using the same questionnaire survey. The project proponent prepared 16 questionnaires for them, resulting in a total number of 100 questionnaires.

A week before the decision-making consultation, the representatives were informed of the date and the place of the event as well as the questionnaire survey. They were also informed how and where to collect a questionnaire by themselves in case they were not able to show up on that day. 100 questionnaires were distributed, and 83 copies were collected with valid answers, with a response rate of 83%. The basic information of the respondents is shown in Table 2.8 and summarized below:

- 59% of the respondents are male, and 41% are female;
- 20% of the respondents are between 20 and 30 years old, 52% are between 31 and 50, and 28% are above 50.
- 53% of the respondents finished the education of junior high school or below, 33% finished high school education, and 14% finished their college education or above.
- 37 local herders and 31 local women participated in the questionnaire survey; 7 representatives of village collectives, 6 representatives of the Forestry and Grassland Bureaus as well as 2 representatives of other government agencies responded to the questionnaires.

Considering the diversity of the respondents in terms of gender, age and education level as well as how representatives were selected, it is reasonable to believe that the responses received could comprehensively reflect the stakeholders' general attitudes towards the project.

Table 2.8 The representatives' basic information

Category	Condition	Number	Percentage
Gender	Male	49	59%
	Female	34	41%
Age	20~30	17	20%
	31~50	43	52%
	Above 50	23	28%
Education	Junior high school or below	44	53%
	High school	27	33%
	College education or above	12	14%
Stakeholder group	Local herders	37	44%
	Local women	31	37%
	Village collectives	7	8%
	The Forestry and Grassland Bureaus	6	7%
	Other government agencies	2	2%
Total	/	83	100%

The questions in the survey discussed the possible impacts that the project might have on individuals and community groups in terms of economic, social and biodiversity aspects. The interviewees were asked to answer Yes or No to some of the questions or to give detailed comments regarding the other questions.

Table 2.9 Questions and survey results

1. Do you have a general idea of the project?	Yes	100%
	No	0%
2. Do you know this project will bring carbon revenues?	Yes	65%
	No	35%
3. Do you wish to gain economic profits by participating in the project?	Yes	92%
	No	8%
4. Are you willing to participate in the project activities?	Yes	89%
	No	11%
5. In what activities do you wish to participate in the project?	Responses received: participation in land preparation, grass planting, fence installation, grassland patrolling, fire and rodent prevention and control.	
6. What do you think will be the main benefits for you from the project?	Responses received: job creation, income increase due to participation, improvement in grassland fertility and protection from continued degradation.	
7. Do you think the project will improve gender equality?	Yes	75%
	No	25%
8. Do you think the project will promote local sustainable development?	Yes	96%
	No	4%
9. What impact do you think the project will have on grassland conditions and local biodiversity?	Responses received: better grass growth, reduction in grassland degradation.	
10. Do you support the project?	Yes	100%
	No	0%

As shown in

Table 2.9, among the 83 people who answered the questionnaire, all of them have learned about the project; 92% of them were interested in participating in the project and wished to gain economic profits by participating in the project; 75% believed that the project would improve gender equality, and 96% agreed that the project would promote local sustainable development. They also well understood the benefits of the project: job creation, income increase due to participation, improvement in grassland fertility, and protection from continued degradation.

4% of the survey respondents were doubtful of the sustainable development contributions that the project could bring to the local area, 25% of them had doubts about the contribution of the project to gender equality, and 11% of them were not willing to participate in this project.

The project proponent addressed this issue by organizing semi-structured interviews with those who expressed doubts or unwillingness about the project. Through these interviews, the project proponent learned that their unwillingness mainly resulted from their unavailability in terms of schedule, the distance of the project area from their homes, and/or other better job opportunities. Regarding the doubts about the project benefits, the project proponent further explained the expected benefits of the project, such as GHG removals and climate change mitigation, improvement in grassland soil fertility and protection from grassland degradation, creation of job opportunities, income increase, technical training, etc. The project proponent particularly explained the measures to be taken in ensuring equal opportunities for men and women to participate in the project, hence contributing to gender equality. Eventually, they agreed that the project would bring benefits to the local area and promote local sustainable development.

The project proponent also had semi-structured interviews with representatives from the government agencies by focusing on their ability in project management and their tasks to be performed throughout the project implementation; local government discussed in details investment issues regarding the project, and expressed their support by agreeing to provide most of the initial funding required by the project (refer to Section 2.1.20).

For the consultation of “other stakeholder groups” (Scientific research institutions and Tourism companies), the project proponent invited representatives to a separate stakeholder meeting, in which the project proponent introduced the implementation plan of the project and explained the potential costs, risks and benefits. The participants all expressed their interest and support for the project implementation.

In summary, after in-depth communication in various forms as stated above, all stakeholders believed the project could bring benefits in various aspects, and finally supported the implementation of the project. Therefore, there was no change to the final version of the Project Design.

2.3.8 Continued Consultation and Adaptive Management (G3.4)

The identified stakeholders have been consulted before the project implementation and they all agreed and supported the project. Through the consultation, most of the stakeholders expressed their willingness to participate in grass planting, fence installation, grassland patrolling, rodent prevention and control, etc., as the project provides job opportunities to local communities, including both temporary jobs (grass planting, fence installation) and permanent jobs (grassland guardians).

Throughout the project lifetime, the project proponent will ensure an open and unhindered channel of communication with community members and relevant stakeholders to keep them informed of the project activities including planting, maintenance, monitoring as well as the VCS and CCB validation and verification process. The project staff in the field will maintain communications with the community groups and other stakeholders through in-person meetings. And the project

proponent will stay open to any suggestion and recommendation made by any identified community member or other stakeholder groups, and improve the management as necessary.

2.3.9 Stakeholder Consultation Channels (G3.5)

As stated in Section 2.3.3, a Participatory Rural Appraisal (PRA) survey was performed in the villages where the project is located before the project started. During the PRA survey, the project proponent held a stakeholder consultation to directly collect the stakeholders' recommendations and suggestions. All the stakeholders have been informed directly or through their legitimate representatives.

And as stated in Section 2.3.2, the project description summary in Chinese will be distributed among local communities during the community monitoring activity and the website for downloading all the summary project documents will be provided to communities during the meetings and also published in the public bulletin boards in each village. During the site visit of the VVB auditors, the representatives from local villages will have private conversations with the auditors regarding the implementation of the project activities. All these measures show that the consultations and participatory processes have been undertaken directly with communities as well as through their legitimate representatives and that adequate levels of information sharing have occurred.

2.3.10 Stakeholder Participation in Decision-Making and Implementation (G3.6)

In the project planning phase, stakeholders were fully involved in grass species selection, planting pattern selection, etc., through village meetings and the PRA survey. As mentioned above in Section 2.3.7, before the project started, local stakeholders were asked to raise their opinions during the PRA survey, and 83 valid questionnaires have been collected from the representatives of different stakeholder groups. During the distribution of the questionnaires, it was ensured that stakeholders of different ages, gender and cultural backgrounds were taken into account; the feedback from the interviews and the questionnaires have been seriously addressed immediately. Following the stakeholder consultation, all the stakeholders' representatives expressed their support for the implementation of the project.

To enable the effective participation of all communities in a culturally appropriate and gender-sensitive manner, the project proponent particularly encouraged the participation of women and fully respected the cultural traditions of the Kazakhs, by inviting local representatives from the All-China Women's Federation and Nationalities Bureau; they had interpreters translate for Kazakhs who do not speak Chinese.

The results from the PRA survey showed that the villagers unanimously support the project implementation, and women and the least privileged households were particularly active in expressing their willingness and expectations about the benefits that the project would bring.

During the project implementation, the local communities are directly involved in the project activities, and the project proponent acts as the coordinator in charge of the overall management. All the critical decision-making information will be made public to local stakeholders through village meetings and bulletin boards in villages, and the decisions should be revised after further discussion in case there is any disagreement from stakeholders.

2.3.11 Anti-Discrimination Assurance (G3.7)

Any discrimination based on any ground such as race, nation, ethnic group, sex or religion is prohibited in the job market by the *Labour Law of the People's Republic of China*[30]. The project proponent shall strictly obey the *Labour Law of the People's Republic of China* and has established the anti-discrimination rules in the project implementation, including providing equal job opportunities for any qualified workers regardless of gender, race, religion, no extra requirement for women or minorities, and equal pay for equal work, etc. In case any discrimination occurs, anyone could file a complaint to the project proponent or the local government to make sure that relevant laws and regulations are followed.

2.3.12 Feedback and Grievance Redress Procedure (G3.8)

In case of any conflict, stakeholders have various channels to raise their issues: they can directly or indirectly contact the project proponent; they can talk about the conflict during village meetings.

The project proponent has appointed a team in charge of recording and collecting conflicts and grievances between local community members. Employed grassland guardians play an important role in dealing with conflicts and dissatisfaction, and they report to the project proponent. All grassland guardians are from local communities and their names and phone numbers have been made public in village meetings. In case of any conflicts and grievances, the stakeholders can contact a grassland guardian near them, and the grassland guardian will collect all the necessary information and then report to the specific staff. Also, the phone numbers of the Forestry and Grassland Bureaus have been published in village meetings so that all other stakeholders can easily give their feedback in case of any grievance.

Community members are encouraged to report any conflict to grassland guardians, who have a full understanding of the actual conditions of the project implementation and will attempt to resolve the conflicts amicably; if they fail to solve the conflict within 5 days, they shall report to the grievance-redress team of the project proponent who shall propose a solution and act as mediation based on collected information from conflicted parties; if things do not work out within 30 days, the project proponent shall report to the local government, and follow relevant legal procedures of arbitration or litigation.

2.3.13 Accessibility of the Feedback and Grievance Redress Procedure (G3.8)

All the feedback and grievances received and the relevant solution shall be recorded and summarized in the project monitoring report in the next verification event, and all the project documents will be published on the Verra Registry; the website for downloading all the project documents will be provided to communities through public bulletin boards in each village.

2.3.14 Worker Training (G3.9)

A handbook has been provided to each employee involved in the project implementation. The handbook includes technical advice on their work, and all the workers received technical training immediately after they were hired. Such skills and knowledge are useful for grassland management,

[30] http://www.gov.cn/banshi/2005-05/25/content_905.htm

such as fire prevention, rodent and pest control, etc. Also, technical manuals have been distributed to each household in the local villages, including those who do not participate in the project. The community members will be trained equally as long as they live around the project area and are willing to participate in the training, so that the local capacity will not be lost.

Regular training courses on technical skills of grassland management are arranged regularly during the project implementation. Local workers will also receive training courses on relevant skills for their future employment. These skills will benefit the community members' careers in the long term.

2.3.15 Community Employment Opportunities (G3.10)

The project mobilizes the whole community's involvement, including women, minority groups and households living under the poverty line. All people from the communities are given an equal opportunity to fill all work positions if the job requirements are met. Women and vulnerable people who come from the poorest local households will not only be provided with equal opportunities but also consciously ensure that they can be part of the project.

The project creates both permanent and temporary job positions requiring different levels of skills. Candidates for the positions are subject to a selection process, which is made known to all communities in village meetings and on public bulletin boards in each village involved. The candidates' profiles are evaluated objectively, and their adjustment to the needs of the project is carefully examined.

The job positions fall into three categories according to the level of skills required:

- Specialized positions: professionals who perform specific technical and administrative tasks.

- Qualified positions: personnel who have acquired training and experience in the implementation of project activities through their work and who have specialized in a particular task.

- Unskilled positions: these positions do not require prerequisite skills, and they usually involve grass planting, fence installation, etc. The candidates' willingness to participate and enthusiasm about the project are valued a lot in the selection process. The project proponent gives priority to the residents neighboring the project area, and pays special attention to women, minority groups and households living under the poverty line. After being hired, they are given training courses on skills required in performing their task.

During the project implementation, about 4,186 local herders would participate in grass planting and fence installation (temporary jobs), and 898 local herders would be employed as grassland guardians (permanent jobs). Among the 5,084 job opportunities, 4,186 are temporary jobs, which lasted from 2021 to 2023, and 898 are permanent jobs, which lasted through the entire project crediting period. The male/female ratio would be 50:50, thus ensuring 2,542 job opportunities for women. All the employees will be provided with related skill training periodically. Local residents who are involved in grass planting would be compensated 200 RMB /day. Grassland Guardian would be paid around 23,400 RMB /year.

It is estimated that the total average number of working hours (including both temporary work and permanent work) per year would be 1,796,000 hours, and the legal working hours are 2,000 hours

per year according to the *Labour Law of People's Republic of China*. Therefore, the total number of people expected to be employed in the project expressed as number of full-time employees is 898 [31].

Similarly, it was estimated that women would participate in half of the total average number of working hours per year. Therefore, the total number of women expected to be employed in the project expressed as number of full-time female employees is 449 [32].

The current cost of the employment came from Fuyun Finance Bureau. However, the initial fund is not sufficient for the continued maintenance of the grassland, so the project is seeking for the subsidy of carbon credits which could help to mitigate the funding shortage and ensure sustainable management and restoration of the grassland ecosystem.

2.3.16 Relevant Laws and Regulations Related to Worker's Rights (G3.11)

The workers involved in the project activities are protected by the Labour Law of the People's Republic of China. No forced labor takes place. The workers are free to establish and join any labor organization. Regular training is provided to workers before they start work, and they are clearly informed about their rights and mechanism for grievance appeal, and the workers' rights are guaranteed in the labor contracts.

2.3.17 Occupational Safety Assessment (G3.12)

As the project implementation requires working in remote locations and assistance might be far away, the project proponent has identified potential risks to worker safety that could arise during the project implementation and designed measures to mitigate the harm that the risks might do to the workers, as shown in Table 2.10.

Table 2.10 Occupational safety risks identified and mitigation measures

Risks identified	Mitigation measures
Transport in the mountainous area	Drivers must have a valid driver's license for the vehicle transporting the workers. Drivers with a lot of experience in mountain driving in are preferred. Road safety training is provided to them before they take the job.
Improper use of dangerous tools (for example, shovels and spades) which might injure people	Workers have received training to make sure that they use the tools in a proper way. They are also told to wear protective equipment such as gloves or face shields if necessary.
Workers getting sick or injured	All the grassland stations within the project area are equipped with first aid kits which contain bandages, cotton balls or swabs, hand sanitizers, disinfectants,

[31] 1,796,000 hours / 2,000 hours per employee = 898 employees (full-time equivalent)

[32] (1,796,000 hours × 50%) / 2000 hours per employee = 449 employees (full-time equivalent)

	gloves, etc. as well as common medication such as aspirin, pain killers, anti-diarrhea medication. All workers have been informed of the location of grassland stations and have received training regarding the use of first aid kits.

2.4 Management Capacity

2.4.1 Project Governance Structures (G4.1)

In order to ensure the successful development and implementation of the project, a project work group and an expert group have been established. National Forestry and Grassland Administration Northwest Investigation and Planning Institute acts as the expert group, that shall guide and coordinate the overall project implementation and decision-making; Xinjiang Fuyun County State-owned Assets Investment Management Co., Ltd. and Fuyun Forestry and Grassland Bureaus as part of the working group whose responsibilities include daily supervision, data management, community and biodiversity monitoring, geographic information collection, etc.; the working group will provide technical support for the project development and implementation; the responsibility of local residents and communities is daily supervision and data management during the project implementation.

2.4.2 Required Technical Skills (G4.2)

The project requires technical skills of community engagement, biodiversity assessment and carbon measurement and monitoring to implement the project activities. Table 2.11 outlines the skills required per project activity.

Table 2.11 Key skills required to implement the project activities

Project Activity	Sub-project Activity	Key Skills Required
Grass planting and fence installation	Purchase of grass seeds and subsequent planting, purchase of fences and subsequent installation	Technical skills in grass planting and fence installation, GIS for site selection
Carbon stock measurement and monitoring	Soil carbon monitoring, land cover mapping, grazing management and monitoring	Soil sampling, soil organic carbon and bulk density measuring, GIS/remote sensing, recording of grazing management, recording of fossil fuel consumption.

Community engagement and development	Stakeholder consultation, livelihood development, and education program.	Organization of community activities, conflict resolution, business management, awareness raising and adult education, livelihoods and social science surveys.
Biodiversity assessment and monitoring	Continuous grassland protection, sustainable grassland management and biodiversity monitoring.	Rodent control, fire prevention and control, biodiversity survey and field investigation, infrared camera technology, GPS tracking technology.

2.4.3 Management Team Experience (G4.2)

As mentioned above, the project proponent and National Forestry and Grassland Administration Northwest Investigation and Planning Institute act as the expert group in charge of guiding and coordinating the overall implementation and decision-making throughout the project lifetime, while the project proponent and the Forestry and Grassland Bureaus have established the working group.

Fuyun Forestry and Grassland Bureau is specialized in grassland management thanks to their vast experience in the selection of grass seeds, organization of grass planting and fence installation, technical training, grassland protection and management, etc. They will also appoint experts to provide assistance and experience during the biodiversity monitoring.

Xinjiang Fuyun County State-owned Assets Investment Management Co., Ltd., is experienced in sustainable grassland management and will provide guidance in a variety of grassland protection and management issues including rodent control, fire control, technical training, carbon measurement and biodiversity assessment. They are also competent in community engagement and development including stakeholder consultation, organization of community activities, conflict intervention, social surveys and development of educational programs.

The project proponent is experienced in sustainable grassland management, afforestation, forest protection and management, forest damage control and providing technical training courses.

National Forestry and Grassland Administration Northwest Investigation and Planning Institute has gained a lot of experience in developing AFOLU projects under the VCS+CCB program and will calculate GHG emissions and removals and issue monitoring reports. They shared such experience with the local Forestry and Grassland Bureau in ensuring the smooth operations of the project implementation during the lifetime of the project.

2.4.4 Project Management Partnerships/Team Development (G4.2)

As explained in Section 2.4.1, the management team has a full set of key skills required by the project including grass planting and fence installation, carbon stock measurement and monitoring. community engagement, biodiversity assessment and monitoring. As described in Section 2.4.3 the project proponent and other stakeholders are experienced in sustainable grassland

management and VCS+CCB projects development. The project governance structure includes experts from all the above-mentioned entities.

In addition, thanks to their long-term development in Northwest China, the project proponent has established extensive cooperation with universities and research institutes in Xinjiang Uygur Autonomous Region as well as other regions of Northwest China on national key projects in grassland.

Therefore, the project management team and project participants have sufficient experience and skills required by the project.

2.4.5 Financial Health of Implementing Organization(s) (G4.3)

Fuyun Forestry and Grassland Bureau and Fuyun Finance Bureauare government agencies financially supported by the government; The project proponent and National Forestry and Grassland Administration Northwest Investigation and Planning Institute are also financially supported by the local government. Therefore, their financial health over the project's lifetime is guaranteed.

2.4.6 Avoidance of Corruption and Other Unethical Behavior (G4.3)

As legally registered entities, the project proponent and National Forestry and Grassland Administration Northwest Investigation and Planning Institute have the obligation to comply with relevant regulations, including the anti-corruption laws and regulations. The annual audit by the government makes sure that the project is implemented in full compliance with China's laws and regulations. According to the National Enterprise Credit Information Publicity System, neither of the entities have been involved in nor complicit in any form of corruption including bribery, embezzlement, fraud, favoritism, cronyism, nepotism, extortion, and collusion.

2.4.7 Commercially Sensitive Information (*Rules* 3.5.13 – 3.5.14)

None of the project documents is considered as commercially sensitive information, and all the documentations are available to any stakeholder.

2.5 Legal Status and Property Rights

2.5.1 Statutory and Customary Property Rights (G5.1)

The *Land Management Law of the People's Republic of China* [33] defines three legal categories of land in China based on their use: agricultural land, land for construction use and other land. "Agricultural land" refers to land directly used for agricultural production, including cultivated land, wooded land, grassland as well as other agricultural land. "Land for construction use" refers to land on which buildings and structures are put up, including land for urban and rural housing and public facilities, land for industrial and mining use, land for building communications and water conservancy facilities, land for tourism and land for building military installations, etc. "Other land" refers to land other than that for agricultural and construction uses, and this category includes water

[33] http://www.gov.cn/banshi/2005-05/26/content_989.htm

and unused land. The use of any land must follow its legal category defined in Land Use Planning approved by the government. It is strictly forbidden for any individual or entity to change the use category of any land.

According to Article 10 of the *Constitution of the People's Republic of China*[34] and the provisions of the *Land Management Law of the People's Republic of China*, the land belongs to the state or collectives and the ownership is non-transferable, while the land use right can be transferred by law.

The state-owned land shall be managed through the State Council and the collective-owned land shall be centrally managed by corresponding village committees. The "agricultural land" owned by farmers collectively or owned by the state but legally used by farmers collectively, shall be available for family-based contracting within a rural collective economic organization. Barren hills, gullies, mounds, and beaches, among others, that are not fit for family-based contracting may be available for contracting by means such as bidding, auction, and open consultation for planting, forestry, animal husbandry, and fishery production. Land owned by the state but legally used for agriculture may be available for contracting by entities or individuals for planting, forestry, animal husbandry, and fishery production. The landowner and a usufructuary shall enter into a contract according to the law to agree on the rights and obligations of both parties. Entities and individuals as usufructuaries shall have the obligation to protect and for the purposes specified in the contract, rationally utilize the land.

Disputes arising from the ownership or use right of land shall be settled through consultation among parties concerned; should consultation fails, the disputes should be handled by people's governments at and above the county level.

For the project, the grassland involved in the project area is collectively owned by village collectives and the ownership is non-transferable.

2.5.2 Recognition of Property Rights (G5.1)

As stated before, the grassland in the project area is collectively owned by village collectives and the ownership is non-transferable. To initiate the project, the project proponent has been authorized for the use and management rights of the land in the project area.

Considering the wide and scattered distribution of the project lands, it is difficult for any of the landowners to raise enough funds and effectively implement the project over the entire project area during the entire project crediting period. Therefore, after rounds of seminars and meetings, local villages who collectively own the project land have agreed to authorize the project proponent of the use and management rights of the lands within the project boundary during the project crediting period.

Fuyun Forestry and Grassland Bureau approved the *Project Design Report* and successfully raised funds for most of the initial investment from the government. The project proponent is in charge of the maintenance and overall management of the project land during the entire lifetime from 01-

[34] http://www.gov.cn/guoqing/2018-03/22/content_5276318.htm

June-2021 to 31-May-2061, and they are responsible for making use of the carbon revenues in sustainable development and management of the project area. In addition, the Project Proponent will also be responsible for the development of the carbon credits and the carbon revenue will be used for sustainable development and management of the project activities.

Therefore, all property rights involved in the project are recognized, respected and supported.

2.5.3 Free, Prior and Informed Consent (G5.2)

The lands in the project area are collectively owned by village collectives and the ownership is non-transferrable. There is no dispute over the ownership of the land in the project area. To initiate the project, the village collectives involved all agreed to authorize the project proponent the use and management rights of the land in the project area as well as the right to the carbon credits generated by the project, by signing the grassland contract agreement, and the leasing period is from 01- June-2021 to 31- May -2061. The agreement also set out the restitution to be allocated to the village collectives who transferred the use and management rights.

All property rights involved in the project are recognized, respected, and supported, and the landowners will be allocated with agreed restitution according to the arrangement. Therefore, the project will not encroach uninvited on private property, community property, or government property.

To make sure that all the stakeholders are aware of the potential impact of the project on their interests and to ensure their active and effective participation in the project throughout the entire project lifetime, the project proponent appointed an investigation team in charge of the Participatory Rural Appraisal (PRA) survey in the villages where the project area is located before the project start; in doing so, they obtained important information and data of the socio-economic condition of the project area and its surrounding area, understood local communities' opinions and their willingness to participate in the project activities, and analyzed the potential impact and benefits of the project.

The stakeholder consultation took place during the PRA survey and questionnaires were distributed to the participants to collect their feedback. A week before the start of the stakeholder consultation, the project owner entrusted representatives of grassland stations with delivering a Chinese version summary of the project design to relevant communities and stakeholder to make them have sufficient time before the decision they may be asked to make concerning participation in the project. In the stakeholder consultation, the Forestry and Grassland Bureaus and the project proponent explained further the potential costs, risks and benefits to relevant communities and stakeholders. The communities have realized that they might suffer from costs and risks such as decreasing flexibility in options, increasing competition within and between communities after the implementation of the project. The Forestry and Grassland Bureaus and the project proponent will also adopt mitigations to deal with the potential risks and costs. Also, they know that the implementation of the project would generate net GHG emission reductions and removals and mitigate climate change, improve soil and water conservation and grass cover, enhance local biodiversity, bring job opportunities and increase income for local communities and residents, provide technical skills and training, etc. The details of the stakeholder consultation have been summarized in Section 2.3 of this PD.

Throughout the lifetime of the project, the project proponent, through their on-site project staff, will maintain a direct line of communication with community members and relevant stakeholders. This will establish a commitment to communication and consultation to keep stakeholders informed of project activities including restoration, maintenance, monitoring and the CCB validation and verification process. The project staff in the field will maintain communications with the community groups and other stakeholders through in-person meetings. And the project will actively listen to recommendations made by any identified community members, or other stakeholder groups, and adapt and improve methods as necessary.

Therefore, all of the stakeholders are satisfied and believe that the project can improve the local ecological environment and increase household income, and all agree on the implementation of the project.

In conclusion, the project has received free, prior, and informed consent from relevant property rights holders prior to the start of the project activities.

2.5.4 Property Rights Protection (G5.3)

The project area belongs to village collectives and is used by local herders. To initiate the project, the project proponent has conducted full consultation with the herders, and the local village collectives have voluntarily authorized the use and management rights of the land in the project area to the project proponent during the crediting period by signing a land lease agreement. Therefore, the project activities will not lead to involuntary removal or relocation of property rights holders from their lands or territories, and does not force rights holders to relocate activities important to their culture or livelihood.

2.5.5 Illegal Activity Identification (G5.4)

Currently, all project lands are defined as grassland. According to Chinese grassland law[35], activities that destroy the grassland such as mining and construction without approval by local authorities are strictly prohibited. Prior to the implementation of the project, the project area was degraded grassland due to long-term overgrazing but no mining or construction or other destructive activities occurred on the grassland. During the project implementation, destructive activities will always be strictly prohibited by law.

Therefore, the project's climate, community and biodiversity impacts will not be affected by illegal activities.

2.5.6 Ongoing Disputes (G5.5)

The project proponent has been authorized the use and management rights of the lands in the project area; there are neither ongoing or unresolved conflicts or disputes over rights to lands, territories and resources nor any disputes that were resolved and recorded during the last twenty years.

[35] http://www.forestry.gov.cn/main/3949/20180918/1141201277620 82.html

2.5.7 National and Local Laws (G5.6)

The project conforms to all relevant laws, regulations and standards, as listed below:

Constitution of the People's Republic of China[36], *Grassland Law of the People's Republic of China*[37], *Law of the People's Republic of China on the Protection of Wildlife*[38], *Law of the People's Republic of China on Desert Prevention and Transformation*[39], *Production Safety Law of the People's Republic of China*[40], *Labour Law of the People's Republic of China*[41];

Regulations of the People's Republic of China on the Protection of Wild Plants[42], *Regulations on Grassland Fire Prevention*[43], *Regulations of the People's Republic of China on Nature Reserves*[44], *Regulations of Xinjiang Uygur Autonomous Regions on Grassland Management (Trial)*[45];

Parameters for degradation, sandification and salification of rangelands (GB 19377-2003);

Technical regulation of grass reseeding on sandy grassland (GB/T 27514-2011);

Technical specification for natural grassland improvement (DB63/T 390-2018);

Technical specification for fence construction of rangeland (NY/T 1237-2006);

According to the *Inspection and Acceptance Report* of the project, the project complies with all the regulations and laws above during its construction period and will be under regular inspection by the local government during the implementation period to ensure the continuous compliance.

2.5.8 Approvals (G5.7)

The project has been approved by Altay Forestry and Grassland Bureau.

2.5.9 Project Ownership (G5.8)

As stated in Section 2.5.2, the project proponent has been authorized for the use and management rights of the land in the project area as well as the right of carbon revenues generated from the project. The project proponent is in charge of the maintenance and overall management of the project land during the entire lifetime from 01-June-2021 to 31-May-2061, and they are responsible

[36] http://www.gov.cn/guoqing/2018-03/22/content_5276318.htm

[37] http://www.gov.cn/gongbao/content/2003/content_62420.htm

[38] http://www.npc.gov.cn/npc/c238/202001/a0d85c00a9a44b7a80fd88f2bb678253.shtml

[39] https://mee.gov.cn/ywgz/fgbz/fl/201811/t20181114_673626.shtml

[40] https://www.mem.gov.cn/fw/flfgbz/fl/202107/t20210716_392186.shtml

[41] http://www.gov.cn/banshi/2005-05/25/content_905.htm

[42] http://www.gov.cn/gongbao/content/2019/content_5468858.htm

[43] http://www.gov.cn/zhengce/zhengceku/2008-12/05/content_2756.htm

[44] https://www.mee.gov.cn/ywgz/fgbz/xzfg/201805/t20180516_440442.shtml

[45] http://www.law-lib.com/law/law_view.asp?id=45667

for making use of the carbon revenues in sustainable development and management of the project area.

Therefore, the project proponent has the unconditional, undisputed and unencumbered ability to claim that the project will generate the project's climate, community and biodiversity benefits.

2.5.10 Management of Double Counting Risk (G5.9)

This project will not seek to generate or has received any form of environmental or social credit.

2.5.11 Emissions Trading Programs and Other Binding Limits

The project will not seek to generate or has received any form of environmental credits, and the net GHG emission reductions and removals generated by the project will not be used for compliance under such programs or mechanisms.

China's national emissions trading scheme (ETS) only covers emission-intensive companies which emit 26,000 tons of CO_2e per year in eight industries (power generation, petrochemicals, chemicals, building materials, non-ferrous metals, papermaking, steel and aviation) [46]. Improved grassland management projects are not included in the mandatory emission control scheme and there is no emission cap enforced on the project proponent according to the list of companies included in China's ETS[47]. Therefore, it is confirmed that the emission reductions achieved by the project will not be double counted.

2.5.12 Other Forms of Environmental Credit

The project has not sought or received another form of GHG-related environmental credit, including renewable energy certificates.

2.5.13 Participation under Other GHG Programs

The project has not participated in any other GHG programs.

2.5.14 Projects Rejected by Other GHG Programs

The project has not been rejected by any other GHG programs.

2.5.15 Double Counting (G5.9)

The credits generated from the project will be sold as offsets on the VCS registry; the series number of the issued credits can be tracked to avoid any potential double counting.

[46] http://www.mee.gov.cn/xxgk2018/xxgk/xxgk05/202103/t20210330_826728.html

[47] http://mee.gov.cn/xxgk2018/xxgk/xxgk03/202012/W020201230736907682380.pdf

3 CLIMATE

3.1 Application of Methodology

3.1.1 Title and Reference of Methodology

The project applies the approved VCS methodology VM0026 “Sustainable Grassland Management” (version 1.1):

https://verra.org/methodology/vm0026-methodology-for-sustainable-grassland-management-sgm-v1-0/

The following methodological tools, to which the selected methodology refers, are also applied:

- VT0001 Tool for the Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities, version 3.0
- Tool for Identification of Degraded or Degrading Lands for Consideration in Implementing CDM AR Project Activities, version 1.0
- Guidelines for sampling and surveys for CDM project activities and programs of activities, version 4.0
- VMD0033 Estimation of Emissions from Market Leakage, version 1.0
- VMD0040 Leakage from Displacement of Grazing Activities, version 1.0

3.1.2 Applicability of Methodology

Appendix 1 (Eligible AFOLU project categories) of *VCS Standard* version 4.4 defines the types of activities that are included within each AFOLU project category. The project falls into the category of ALM (Agricultural Land Management).

Eligible ALM activities are those that reduce net GHG emissions on croplands and grasslands by increasing carbon stocks in soils and woody biomass and/or decreasing CO_2, N_2O and/or CH_4 emissions from soils. The project area shall not be cleared of native ecosystems within the 10-year period prior to the project start date. Eligible ALM activities include Improved Cropland Management (ICM), Improved Grassland Management (IGM) and Cropland and Grassland Land-use Conversions (CGLC).

Improved Grassland Management (IGM) includes practices that demonstrably reduce net GHG emissions of grassland ecosystems by increasing soil carbon stocks, reducing N_2O emissions and/or reducing CH_4 emissions.

By adopting a variety of measures including grass planting, fence installation and sustainable grassland management, the project increases soil carbon stocks and reduces N_2O and CH_4 emissions, thus reducing net GHG emissions of grassland ecosystems in the project area. And the GHG emission reductions and removals will be calculated according to the applied methodology

during verifications. In addition, the project area was not cleared of native ecosystems within the 10-year period prior to the project start date. Therefore, the project is an eligible IGM activity.

The applicability of VCS methodology VM0026 “Sustainable Grassland Management” (version 1.1) is shown in Table 3.1.

Table 3.1 Applicability of VM0026 (version 1.1)

Applicability criteria of VM0026 (version 1.1)	The project
1. The project area is grassland at the start of the project.	Applicable. According to the satellite image in 2010 and 2020 (Figure 2.2, 2.3, 2.4, 2.5), the project area is identified as grassland at the start of the project.
2. The project area is land that is degraded at the start of the project and degradation will continue in the baseline scenario on the basis that degradation drivers or pressures are still present in the baseline scenario. The procedures outlined in the latest version of the CDM Tool for Identification of Degraded or Degrading Lands for Consideration in Implementing CDM A/R Project Activities must be used to determine both that the land is degraded at the start of the project and that in the baseline scenario, the land will continue to degrade. The procedures outlined in the CDM Tool for Identification of Degraded or Degrading Lands for Consideration in Implementing CDM A/R Project Activities (Version 1.0) is described below. The presence of one of the following is enough for demonstrating that land is “degraded” and/or “degrading”: (a) Provide documented evidence that the area has been classified as “degraded” under a verifiable local, regional, national or international land classification system or peer-review study, participatory rural appraisal, satellite imagery and/or photographic evidence in the last 10 years. If	Applicable. The project area was degraded grassland and degradation would continue in the baseline scenario because overgrazing or unsustainable use of local grassland resources, as the main degradation driver, is still present in the baseline scenario. The demonstration following the CDM Tool for Identification of Degraded or Degrading Lands for Consideration in Implementing CDM A/R Project Activities applies (a), as follows. The national standard of China *Parameters for degradation, sandification and salification of rangelands* (GB 19377-2003) specifies indicators for the determination of degradation, sandification and salification levels (slight, moderate and severe). According to the *Project Design Report*, the degradation level of the project area has been examined under the guidance of GB 19377-2003 for the last ten years, and it has been shown that the project area belonged to severely or moderately degraded grassland. According to the PRA Report, the grassland in the project area has been degraded for more than ten years due to climate change and overgrazing, under the baseline scenario, herders still graze on degraded grassland, while no restoration activities are carried out. So, there was a reduction in plant productivity due to overgrazing. The land in the project

the documented evidence of degradation is older than ten years then: *(i) Provide evidence that the natural or anthropogenic degradation drivers and pressures that led to the land becoming "degraded" are still present and/or that there are no insufficient land management interventions to reverse degradation.* (b) Demonstrate through a comparative study that the candidate lands in the proposed project area have similar or equivalent conditions (e.g., vegetation, soil, climate, topography, altitude, soil class and land use) and socio-economic pressures and drivers of degradation to reference degraded lands elsewhere, verifiably classified and documented as degraded lands. The proof of similarity of lands should be made through verifiable documentation and/or visual field assessment and data sets. (c) Demonstrate through direct evidence based on selected indicators of land degradation that the area is "degraded" and/or "degrading" through conducting either a visual assessment of the state and condition of the indicators or a verifiable participatory rural appraisal (PRA). The indicators of degradation should be locally relevant and verifiable. Candidate lands shall be declared as "degraded" and/or "degrading" if they show at least one of the following: *(i) The severity and extent of soil compaction and soil erosion, as determined by the presence of: reductions in topsoil depth (as shown by root exposure, presence of pedestals; exposed sub-soil horizons or armor layers); gully, sheet or rill erosion, landslides, or other forms of mass-movement erosion;*	area is degraded at the start of the project and in the baseline scenario, the land will continue to degrade.

(ii) Decline in organic matter content and/or recession of vegetation cover as shown by reduction in plant cover or productivity due to overgrazing or other land management practices, thinning of topsoil organic layer, scarcity of topsoil litter and debris (GPS and photo evidence should be provided); *(iii) Presence of plant species locally known to be related to the condition of degradation of the land or field/lab tests showing nutrient depletion (e.g., reduced growth, leaf loss, desiccation, leaf chlorosis), salinity or alkalinity, toxic compounds and heavy metals;* *(iv) A reduction in plant cover or productivity due to overgrazing or other land management practices.*	
3. The project area is subject to livestock grazing, burning, and/or nitrogen fertilization in the baseline scenario.	Applicable. According to the PRA Report, grazing is the major agricultural activity in the project area in the baseline scenario; burning and nitrogen fertilization are not involved.
4. In the baseline scenario, more than 95 percent of animal dung from grazing animals deposited on grassland is allowed to lie as is, and is not managed, and in the project scenario, no more than 5 percent of the animal dung from grazing animals within the project area is managed with alternative manure management systems.	Applicable. In the baseline scenario, there is no restriction or regulation on the disposal of animal dung in the project area, and all animal dung deposited on grassland remains on the grassland. Grazing is forbidden in the project area, so, there is no animal dung under the project scenario. In the project scenario, no animal dung will be managed with alternative manure management systems.
5. The project area must not have been cleared of native ecosystems within the 10 years period prior to the project start date.	According to the Project Design Report and related satellite pictures of the project area, the project area is natural grassland, which is continuously degraded due to overgrazing and has not been cleared of native ecosystems within the 10 years period prior to the project start date.

6. The project area is located in a region where precipitation is less than evapotranspiration for most of the year and leaching is unlikely to occur.	Applicable. According to the *Project Design Report*, the annual evapotranspiration is greater than the annual precipitation in the project zone; as stated in Section 2.1.5, the annual average rainfall is 158.3 mm and the annual evaporation potential is 1743 mm in Fuyun. The precipitation is less than evapotranspiration for most of the year, so leaching is unlikely to occur.
7. If a biogeochemical model is selected for the estimation of change in soil carbon stocks, the following conditions must be met (refer to the methodology).	Irrelevant. The project does not apply any biogeochemical model; instead, the project applies a direct measurement approach for the estimation of change in soil carbon stocks.
8. Project activities must not include land use change.	Applicable. The project area remains to be grassland; the project activities do not change the land use of the project area.
9. Project activities must not lead to an increase in the use of fossil fuels and fuel wood from non-renewable sources for cooking and heating.	Applicable. Grazing is forbidden in the project area, herders graze around the project area under the guidance of the local forestry and grassland bureau, and use cow dung as fuel. The project activities will not lead to an increase in the use of fossil fuels and fuel wood.
10. Project activities must not occur on wetlands or peatlands.	Applicable. The project activity was implemented on degraded grassland, not involving wetlands and peatlands.

VT0001 *Tool for the Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities* (version 3.0) is applicable under the following conditions:

1) AFOLU activities the same or similar to the proposed project activity on the land within the proposed project boundary performed with or without being registered as the VCS AFOLU project shall not lead to violation of any applicable law even if the law is not enforced;

The restoration of degraded grassland is encouraged in China, and there is no legal prohibition to this type of project. Therefore, the proposed project activity on the land within the project boundary does not lead to a violation of any applicable law.

2) The use of this tool to determine additionality requires the baseline methodology to provide for a stepwise approach justifying the determination of the most plausible baseline scenario. Project

proponent(s) proposing new baseline methodologies shall ensure consistency between the determination of a baseline scenario and the determination of the additionality of project activity.

The baseline scenario is identified using the methodology VM0026 “Sustainable Grassland Management” (version 1.1), which provides for a stepwise approach justifying the determination of the most plausible baseline scenario. Please refer to Section 3.1.4 for details.

Therefore, the VT0001 *Tool for the Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities* (version 3.0) is applicable to the proposed project.

“Tool for Identification of Degraded or Degrading Lands for Consideration in Implementing CDM AR Project Activities” (version 1.0) provides a procedure for the identification of degraded or degrading lands for the application of A/R CDM methodologies. There is no mandatory applicability requirement.

In conclusion, the applied methodology and all the tools are applicable to the project.

3.1.3 Project Boundary

As stated before, the area under the administration of Fuyun has been defined as the project zone, and the 332,626.7 hectares of grassland, where improved grassland management project activities are implemented, are defined as the project area. Therefore, the project boundary includes the administrative boundaries of Fuyun, which have been illustrated in Figure 3.1.

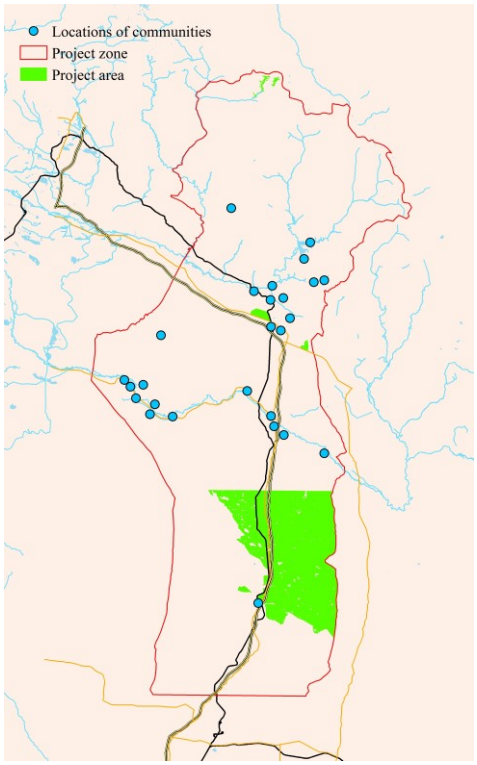

Figure 3.1 Satellite image of the project zone and project area

The selected carbon pools are shown in Table 3.2; relevant GHG sources, sinks and reservoirs for the project and baseline scenarios (including leakage) are shown in Table 3.3.

Table 3.2 Selected carbon pools

Carbon Pools	Included?	Justification/Explanation
Aboveground woody biomass	Yes	SGM may reduce aboveground woody biomass.
Aboveground non-woody biomass	No	The increase of aboveground non-woody biomass resulting from SGM is transient in nature and can be conservatively excluded.
Belowground biomass	No	It is a conservative choice to exclude the below-ground biomass.
Deadwood	No	None of the applicable SGM practices decrease dead wood.
Litter	No	None of the applicable SGM practices decrease the amount of litter.
Soil organic carbon	Yes	A major carbon pool affected by grassland management practices is expected to increase after adopt the ion of SGM practices.
Wood products	No	None of the applicable SGM practices increases or decreases wood products.

Table 3.3 GHG sources and carbon pools for the project and baseline scenarios

Source		Gas	Included?	Justification/Explanation
Baseline	Use of fertilizers	CO_2	No	Not applicable.
		CH_4	No	Not applicable.
		N_2O	No	No fertilizer would be used under the baseline scenario.
	Use of N-fixing species	CO_2	No	Not applicable.
		CH_4	No	Not applicable.
		N_2O	No	No N-fixing species would be used under the baseline scenario.
	Burning of biomass	CO_2	No	CO_2 emissions from biomass burning in grassland are not reported since they are largely balanced by the CO_2 that is reincorporated back into biomass via photosynthetic activity, within weeks to a few years after burning. Besides, no burning of biomass would occur under the baseline scenario.
		CH_4	No	No burning of biomass would occur under the baseline scenario.
		N_2O	No	No burning of biomass would occur under the baseline scenario.
	Manure deposition on grassland	CO_2	No	CO_2 emissions from biomass decomposition are not reported because net CO_2 emissions from this source are assumed to be zero – the CO_2 photosynthesized by plants is returned to the atmosphere as respired CO_2.
		CH_4	Yes	Significant emission source. Animal dung is directly disposed on the grassland, leading to CH_4 emissions.
		N_2O	Yes	Main gas for this source. Animal dung is directly disposed on the grassland, leading to N_2O emissions. Indirect N_2O emissions from leaching and runoff can be excluded from the project boundary since the annual precipitation is less than the annual potential evapotranspiration.
	Farming	CO_2	No	No farming machinery would be used under the baseline scenario.

Source		Gas	Included?	Justification/Explanation
	machine	CH_4	No	No farming machinery would be used under the baseline scenario.
		N_2O	No	No farming machinery would be used under the baseline scenario.
	Animal respiration / Enteric fermentation	CO_2	No	CO_2 emissions from animal respiration are not reported because net CO_2 emissions from this source are assumed to be zero – the CO_2 photosynthesized by plants is returned to the atmosphere as respired CO_2.
		CH_4	Yes	Main gas for this source.
		N_2O	No	No N_2O emission from enteric fermentation.
Project	Use of fertilizers	CO_2	No	Not applicable.
		CH_4	No	Not applicable.
		N_2O	No	No fertilizer would be used in the project.
	Use of N-fixing species	CO_2	No	Not applicable.
		CH_4	No	Not applicable.
		N_2O	No	No N-fixing species would be planted in the project.
	Burning of biomass	CO_2	No	No burning of biomass would occur in the project.
		CH_4	No	No burning of biomass would occur in the project.
		N_2O	NO	No burning of biomass would occur in the project.
	Manure deposition on grassland	CO_2	No	CO_2 emissions from biomass decomposition are not reported because net CO_2 emissions from this source are assumed to be zero – the CO_2 photosynthesized by plants is returned to the atmosphere as respired CO_2.
		CH_4	Yes	Significant emission source. Animal dung is directly disposed on the grassland, leading to CH_4 emissions.
		N_2O	Yes	Main gas for this source. Animal dung is directly disposed on the grassland, leading to N_2O emissions. Indirect N_2O emissions from leaching and runoff can be excluded from the project boundary since the annual precipitation is less than the annual potential evapotranspiration.

Source		Gas	Included?	Justification/Explanation
	Farming machine	CO_2	Yes	The use of fossil fuel in farming machinery (trucks and tractors) during the project implementation leads to CO_2 emissions.
		CH_4	No	Not the main gas for this source. Excluded for simplification.
		N_2O	No	Not the main gas for this source. Excluded for simplification.
	Animal respiration / Enteric fermentation	CO_2	No	CO_2 emissions from animal respiration are not reported because net CO_2 emissions from this source are assumed to be zero – the CO_2 photosynthesized by plants is returned to the atmosphere as respired CO_2.
		CH_4	Yes	Main gas for this source.
		N_2O	No	No N_2O emissions from enteric fermentation.

3.1.4 Baseline Scenario

The applied methodology VM0026 (version 1.1) uses a project method to determine the baseline scenario. The following steps are followed to identify the most plausible baseline scenario.

Step 1. Identification of alternative land use scenarios to the proposed SGM project

Sub-step 1a) Identify and list all credible alternative land use scenarios to the proposed SGM project:

According to VM0026 (version 1.1), the project proponent must refer to the VCS *Tool for the Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities* for guidance on the identification of realistic and credible alternative land uses. According to this tool, the identified land use scenarios shall at least include:

(i) Continuation of pre-project land use

(ii) Project activity on the land within the project boundary performed without being registered as the VCS AFOLU project;

(iii) If applicable, activities similar to the proposed project activity on at least part of the land within the project boundary of the proposed VCS AFOLU project at a rate resulting from:

- *Legal requirements; or*

- *Extrapolation of observed similar activities in the geographical area with similar socioeconomic and ecological conditions to the proposed VCS AFOLU project activity occurring in the period beginning ten years prior to the project start date.*

For Scenario (iii), the lands within the project boundary of the proposed VCS AFOLU project are all with the same legal requirements, and there are no legally mandatory requirements for similar project activities. According to the PRA Report and satellite images, the project area was grassland and continued to degrade more than ten years prior to the project start date. Therefore, Scenario (iii) is not applicable.

Scenario (i) continuation of pre-project land use is a common situation in Fuyun, and grassland degradation has been for constant and severe issue in the project zone for decades. Despite the presence of a series of laws and regulations related to grassland mentioned in Section 2.2.3, none of the laws and regulations or other regulatory framework sate the restoration of degraded grassland, for example, the activities such as grassland improvement, grass planting and fence installation implemented in the project. Therefore, the degradation of the grassland of the project area would continue in the absence of the project. Scenario (i) remains a possible baseline scenario.

Scenario (ii) faces technical and investment barriers which will be discussed in the following section. However, it does not violate any existing enforced mandatory applicable laws and regulations.

Outcome of Sub-step 1a: credible alternative land use scenarios that could have occurred on the land within the project boundary of the VCS AFOLU project: Scenario (i) and Scenario (ii).

Sub-step 1b) Check the consistency of credible alternative land use scenarios with enforced mandatory applicable laws and regulations:

China has successively issued and revised a series of laws and regulations related to grassland, Section 2.2.3. Although these laws and regulations have set overall development goals for grassland development and started in effect before the adoption by the COP of the CDM M&P (/decision 17/CP.7, 11 November 2001), none of them mandate the restoration of degraded grassland ecosystems. Therefore, Scenario (i) complies with mandatory applicable laws and regulations.

Although not mandated by law, restoration of degraded grassland is not restricted or prohibited, as long as the land use and the project activities comply with applicable laws and regulations. Therefore, Scenario (ii), project activity on the land within the project boundary performed without being registered as the VCS AFOLU project, also complies with mandatory applicable laws and regulations.

Outcome of Sub-step 1b: plausible alternative land use scenarios to the VCS AFOLU project activity that are in compliance with mandatory legislation and regulations taking into account their enforcement in the region or country and EB decisions on national and/or sectoral policies and regulations: Scenario (i) and Scenario (ii).

Step 2: Select the most plausible baseline scenario

Sub-step 2a) Barrier analysis:

The barrier analysis was conducted to identify realistic and credible barriers that prevent implementation of these land use scenarios following the procedures described in Step 3 of the VCS *Tool for the Demonstration and Assessment of Additionality in VCS AFOLU Project Activities*.

Scenario (i) is not faced with any barrier, and it is the business-as-usual scenario.

Scenario (ii) faces both investment barriers and technological barriers, discussed as follows.

1. Investment barriers

As stated before, the initial investment required by the project amounts to 172.18 million RMB. On top of that, continuous financial support of around 51.01 million RMB per year over the project lifetime, which includes notably annual payments of grassland guardians, would be needed to ensure continuous sustainable grassland management in the project area. In addition, the project does not produce any financial benefits if not registered as a VCS project. The gap in investment and continuous financial input constitutes the major investment barrier.

2. Technological barriers

In order to implement grassland improvement, grass planting and fence installation, the project proponent has to hire local residents, but local residents lack access to high-quality grass seeds and materials required, such as trucks, tractors, grass seed sowing machines, etc. In addition, grassland grazing management technology is still in its growing stages. Most herdsmen are still in the initial free grazing stage of their grazing management. Because of the expensive expense of the fence, the grazing restriction technique cannot be widely adopted. They also lack skills in grass planting, fence installation and sustainable grassland management such as fire prevention and rodent control. In addition, the lack of organizational instruments would also prevent them from gaining the skills required for implementing the project. If the project is registered as the VCS AFOLU and CCB project, carbon revenues generated from the project will be used to provide continuous trainings to ensure sustainable management over the project lifetime.

In summary, the project activity without being registered as the VCS AFOLU and CCB project, the above-mentioned investment barriers (lack of access to credit) and technological barriers (lack of access to planting materials and equipment for implementing the technology) would not be overcome.

Sub-step 2b) Eliminate alternative land use scenarios that face a barrier to implementation:

As discussed before, Scenario (i) is not prevented by any of the identified barriers.

Scenario (ii) faces both investment barriers (lack of access to credit) and technological barriers (lack of access to planting materials and equipment for implementing the technology). Therefore, Scenario (ii) is eliminated.

Sub-step 2c) Select most plausible baseline scenario (if allowed by barrier analysis):

Following the analysis in Sub-step 2a and 2b, the most plausible baseline scenario is Scenario (i), continuation of pre-project use. Under this scenario, the grassland in the project area would continue to degrade.

3.1.5 Additionality

Tool for the Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities (version 3.0) is applied to demonstrate the additionality.

Step 1. Identification of alternative land use scenarios to the proposed VCS AFOLU project activity

The analysis has been conducted in the previous section.

Step 2. Investment analysis

Sub-step 2a. Determine appropriate analysis method

The project generates no financial or economic benefits other than revenue from the sales of GHG credits. Therefore, the simple cost analysis (Option I) is applied.

Sub-step 2b. – Option I. Apply simple cost analysis

According to the *Project Design Report*, the initial investment (including grassland improvement, grass planting and fence installation) required by the project amounts to 172.18 million RMB; continuous financial support (notably annual payments of grassland guardians) of around 51.01 million RMB per year would be required over the project lifetime. The project does not produce any financial benefits other than VCS related income.

Then proceed to Step 4 (Common practice analysis).

Step 4. Common practice analysis

The previous steps shall be complemented with an analysis of the extent to which similar activities have already diffused in the geographical area of the proposed VCS AFOLU project activity.

According to the VCS *Tool for the Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities* (version 3.0), similar activities are defined as that which are of similar scale, take place in a comparable environment, inter alia, with respect to the regulatory framework and are undertaken in the relevant geographical area, subject to further guidance by the underlying methodology. Other registered VCS AFOLU project activities shall not be included in this analysis. Considerations shall be limited to the period beginning 10 years prior to the project start date.

As the framework conditions vary significantly between each province of China, similar projects are only comparable in the same province. The project is located in Xinjiang Uygur Autonomous Region, which is hence defined as the relevant geographical area for common practice analysis.

In terms of the project, similar activities should meet the applicability of the methodology VM0026 "Sustainable Grassland Management" (version 1.1): "the adoption of sustainable grassland management practices, such as improving the rotation of grazing animals between summer and winter pastures, limiting the timing and number of grazing animals on degraded pastures, and restoration of severely degraded land by replanting with perennial grasses and ensuring appropriate management over the long-term."

Considering ±50% of the project scale, the similar project scale is defined as 166,330 hectares ~ 498,990 hectares.

Considering the project start date of 01-June-2021, similar projects shall be limited to those which started implementation between 01-June-2011 and 01-June-2021.

Based on public and accessible information[48] and interviews with local authorities, it is found that no other degraded grassland restoration project of a scale similar has been implemented previously in Xinjiang Uygur Autonomous Region.

Therefore, the project activity is not a common practice.

In conclusion, the project activity is additional.

3.1.6 Methodology Deviations

Not applicable as the methodology is applied without any deviation.

3.2 Quantification of GHG Emission Reductions and Removals

3.2.1 Baseline Emissions

1. Baseline N_2O emissions due to fertilizer use

According to the Participatory Rural Appraisal (PRA) Report of the project, no nitrogen fertilizer was applied under the baseline scenario. Therefore, $BE_{N_2O_{SN,b}}$ (baseline N_2O emissions due to fertilizer use) = 0.

2. Baseline emissions due to the use of N-fixing species

According to the methodology VM0026 (version 1.1), N_2O emissions due to the use of N-fixing species in the baseline are excluded from the project boundary.

3. Baseline emissions due to burning of biomass

[48] http://www.delingha.gov.cn/zfxxgl/fdzdgknr/tjxx.htm

According to the Participatory Rural Appraisal (PRA) Report, no burning of biomass occurred in the project area under the baseline scenario. Therefore, $BE_{BB,b}$ (baseline emissions due to burning of biomass) = 0.

4. Baseline CH_4 emissions due to enteric fermentation

Baseline CH_4 emissions from enteric fermentation are calculated using the following:

$$BE_{CH_{4EF},b} = \frac{GWP_{CH_4} \times \sum_{l=1}^{L} P_{l,b} \times EF_l \times Days_{l,b}}{1000 \times 365} \quad \text{Equation 1}$$

Where:

$BE_{CH_{4EF},b}$	=	Baseline CH_4 emissions from enteric fermentation in baseline year b (t CO_2e)
GWP_{CH_4}	=	Global warming potential for CH_4 (t CO_2e/t CH_4)
$P_{l,b}$	=	Population of grazing livestock type l, in baseline year b (head)
l	=	Index of livestock type
EF_l	=	Enteric CH_4 emission factor per head of livestock type l per year (kg CH_4 / (head · year))
$Days_{l,b}$	=	Grazing days inside the project area for each livestock type l in baseline year b (days)
1000	=	Conversion factor for t CH_4 to kg CH_4
365	=	Conversion factor for years to days

5. Baseline N_2O and CH_4 emissions due to manure management

Baseline emissions from manure management include N_2O and CH_4 emissions from manure and urine deposited on grassland soil during the grazing season.

$$BE_{GHG_{MD},b} = BE_{N_2O_{MD},b} + BE_{CH_{4MD},b} \quad \text{Equation 2}$$

Where:

$BE_{N_2O_{MD},b}$	=	Baseline N_2O emissions from manure and urine deposited on grassland soil in baseline year b (t CO_2e)
$BE_{CH_{4MD},b}$	=	Baseline CH_4 emissions from manure and urine deposited on grassland soil in baseline year b (t CO_2e)

1) Baseline N_2O emissions from manure management

$$BE_{N_2O_{MD},b} = GWP_{N_2O} \times \left(BE_{D,N_2O_{MD},b} + BE_{ID,N_2O_{MD},b}\right) \quad \text{Equation 3}$$

Where:

GWP_{N_2O} = Global warming potential for N_2O (t CO_2e/t N_2O)

$BE_{D,N_2O_{MD},b}$ = Direct N_2O emissions from manure and urine deposited on grassland soil during the grazing season in baseline year b (t N_2O)

$BE_{ID,N_2O_{MD},b}$ = Indirect N_2O emissions from manure and urine deposited on grassland soil during the grazing season in baseline year b (t N_2O)

2) Baseline direct N_2O emissions from manure and urine deposited on grassland soils

Baseline direct N_2O emissions from manure and urine deposited on grassland soil are calculated using the following:

$$BE_{D,N_2O_{MD},b} = \sum_{l1=1}^{L1} F_{MD,l1,b} \times EF_{3,PRP,CPP} \times \frac{44}{28}$$ Equation 4

And/or

$$BE_{D,N_2O_{MD},b} = \sum_{l2=1}^{L2} F_{MD,l2,b} \times EF_{3,PRP,SO} \times \frac{44}{28}$$ Equation 5

Where:

$F_{MD,l1,b}$ = Annual amount of nitrogen in cattle, poultry and pigs manure and urine deposited on grassland soil during the grazing season in baseline year b, adjusted for volatilization as NH_3 and NO_X (t N)

$F_{MD,l2,b}$ = Annual amount of nitrogen in sheep and other animals' manure and urine deposited on grassland soil during the grazing season in baseline year b, adjusted for volatilization as NH_3 and NO_X (t N)

$EF_{3,PRP,CPP}$ = N_2O emission factor for cattle, poultry and pigs' manure and urine deposited on grassland soil during the grazing season (kg N_2O-N/kg N input)

$EF_{3,PRP,SO}$ = N_2O emission factor for sheep and other animals' manure and urine deposited on grassland soil during the grazing season (kg N_2O-N/kg N input)

L_1 = Index of livestock cattle, poultry and pigs

L_2 = Index of livestock sheep and other animals

$F_{MD,l1,b}$ and $F_{MD,l2,b}$ must be calculated using the following equation for livestock type *l*.

$$F_{MD,l,b} = \frac{P_{l,b} \times W_{l,b} \times Nex_l \times H_{l,b} \times Days_{l,b} \times (1 - Frac_{GAS,MD})}{1000a \times 24 \times 1000b}$$ Equation 6

Where:

$P_{l,b}$ = Population of livestock type l in baseline year b (head)

$W_{l,b}$	=	Average weight of livestock type l in baseline year b (kg livestock mass/head)
Nex_l	=	Nitrogen excretion of livestock type l (kg N deposited /(t livestock mass·day))
$1000a$	=	Conversion factor for t livestock mass to kg livestock mass
$H_{l,b}$	=	Average grazing hours per day for livestock type l in baseline year b (hour)
24	=	Conversion factor for days to hours
$Days_{l,b}$	=	Grazing days for livestock type l inside the project area in baseline year b (days)
$1000b$	=	Conversion factor for t N to kg N
$Frac_{GAS,MD}$	=	Fraction of volatilization from manure and urine deposited by grazing animals as NH_3 and NO_X (kg N volatilized/kg of N deposited)
l	=	Index of grazing livestock types

3) Baseline indirect N_2O emissions from manure and urine deposited on grassland soils

According to the methodology VM0026 (version 1.1) and the *Project Design Report*, the annual precipitation of the project area is less than annual potential evapotranspiration; indirect N_2O emissions from leaching and runoff can hence be excluded.

The indirect N_2O emissions from the atmospheric deposition of N volatilized as NH_3 and NO_x after urine and manure N is deposited on grassland soils in baseline year *b*, are calculated using the following:

$$BE_{ID,N_2O_{MD},b} = \sum_{l=1}^{L} F_{MD,l,b} \times Frac_{Gas,MD} \times EF_{4,MD} \times \frac{44}{28} \qquad \text{Equation 7}$$

Where:

$BE_{ID,N_2O_{MD},b}$	=	Indirect N_2O emissions from manure and urine deposited on grassland soil during the grazing season in baseline year b (t N_2O)
$F_{MD,l,b}$	=	Annual amount of manure and urine deposited on grassland soil from livestock type l during the grazing season in baseline year b, adjusted for volatilization as NH_3 and NO_X (t N)
$Frac_{Gas,MD}$	=	Fraction of volatilization from manure and urine deposited by grazing animals as NH_3 and NO_X (kg N volatilized/kg of N deposited)
$EF_{4,MD}$	=	N_2O emission factor for atmospheric deposition of urine and manure N on soils and water surfaces (kg N_2O-N/(kg NH_3-N + NO_X-N volatilized))
L	=	Index of grazing livestock types

4) CH_4 emissions from manure management

Baseline CH_4 emissions from manure management are calculated using the following:

$$BE_{CH_{4MD},b} = \frac{GWP_{CH_4} \times \sum_{l=1}^{L} EF_{lM} \times P_{l,b} \times H_{l,b} \times Days_{l,b}}{1000 \times 24 \times 365}$$ Equation 8

Where:

$P_{l,b}$	=	Population of grazing livestock type l, in baseline year b (head)
EF_{lM}	=	CH_4 emission factor from manure of livestock type l (kg CH_4/(head · year))
$H_{l,b}$	=	Average grazing hours per day for livestock type l in baseline year b (hour)
$Days_{l,b}$	=	Grazing days for livestock type l inside the project area in baseline year b (days)
1000	=	Conversion factor for t CH_4 to kg CH_4
365	=	Conversion factor for years to days
24	=	Conversion factor for days to hours

6. Baseline CO_2 emissions due to the use of fossil fuels for grassland management

According to the *Participatory Rural Appraisal (PRA) Report* and *Project Design Report*, the baseline scenario did not involve use of agricultural machinery. Therefore, $BE_{FC,b}$ (baseline CO_2 emissions due to the use of fossil fuels for grassland management) = 0.

7. Baseline emission removals from existing woody perennials

According to the Baseline Survey Report and Participatory Rural Appraisal (PRA) Report, there were no perennial woody plants in the project area under the baseline scenario. Therefore, $BRWP_b$ (baseline emission removals from existing woody perennials) = 0.

8. Baseline emission removals due to changes in soil organic carbon

Since the applicability conditions limit the project to land that is degraded and is continuing to degrade, it can be conservatively assumed that the changes in SOC in the baseline scenario is 0 zero, i.e., *BRS* = 0.

Baseline emissions and removals

The emissions and removals in baseline year *b* are calculated as follows:

$$BE_b = BE_{N_2O_{SN},b} + BE_{BB,b} + BE_{CH_{4EF},b} + BE_{GHG_{MD},b} + BE_{FC,b} - BRWP_b$$ Equation 9

Where:

BE_b = Baseline emissions and removals in year b (t CO_2e)

$BE_{N_2O_{SN},b}$ = Baseline N_2O emissions due to fertilizer use in baseline year b (t CO_2e)

$BE_{BB,b}$ = Baseline GHG emissions from biomass burning in baseline year b (t CO_2e)

$BE_{CH_{4EF},b}$ = Baseline CH_4 emissions from enteric fermentation in baseline year b (t CO_2e)

$BE_{GHG_{MD},b}$ = Baseline GHG emissions from manure management in baseline year b (t CO_2e)

$BE_{FC,b}$ = Baseline CO_2 emissions from farming machine fossil fuel consumption in baseline year b (t CO_2)

$BRWP_b$ = Baseline removals from existing woody perennials in baseline year b (t CO_2)

As described above, baseline CH_4 emissions due to enteric fermentation ($BE_{CH_{4EF},b}$) and baseline GHG emissions from manure management ($BE_{GHG_{MD},b}$) must be calculated, while other baseline emissions and removals in Equation 9 are 0.

$$BE_b = BE_{CH_{4EF},b} + BE_{GHG_{MD},b} = BE_{CH_{4EF},b} + BE_{N_2O_{MD},b} + BE_{CH_{4MD},b}$$ Equation 10

$$= \frac{GWP_{CH_4} \times \sum_{l=1}^{L} P_{l,b} \times EF_l \times Days_{l,b}}{1000 \times 365}$$

$$+ \frac{GWP_{CH_4} \times \sum_{l=1}^{L} EF_{lM} \times P_{l,b} \times H_{l,b} \times Days_{l,b}}{1000 \times 24 \times 365}$$

$$+ GWP_{N_2O} \times \sum_{l1=1}^{L1} \frac{P_{l,b} \times W_{l,b} \times Nex_l \times H_{l,b} \times Days_{l,b} \times (1 - Frac_{GAS,MD})}{1000a \times 24 \times 1000b} \times EF_{3,PRP,CPP} \times \frac{44}{28}$$

$$+ GWP_{N_2O} \times \sum_{l2=1}^{L2} \frac{P_{l,b} \times W_{l,b} \times Nex_l \times H_{l,b} \times Days_{l,b} \times (1 - Frac_{GAS,MD})}{1000a \times 24 \times 1000b} \times EF_{3,PRP,SO} \times \frac{44}{28}$$

= 149,020 tCO_2e

Please refer to the ER calculation sheet for detailed calculation.

3.2.2 Project Emissions

1. Project N_2O emissions due to fertilizer use

Project N_2O emissions due to fertilizer use equals the sum of project direct and indirect N_2O emissions in different management practices, as described using the following respectively.

$$PE_{N_2O_{SN},t} = GWP_{N_2O} \times \left(PE_{D,N_2O_{SN},t} + PE_{ID,N_2O_{SN},t}\right)$$ Equation 11

1) Project direct N2O emissions from synthetic nitrogen fertilizer use

$$PE_{D,N_2O_{SN},t} = F_{SN,t} \times EF_{Nfert} \times \frac{44}{28}$$ Equation 12

$$F_{SN,t} = \sum_{i=1}^{I} M_{SNi,t} \times NC_{SNi,p} \times \left(1 - Frac_{GAS,F}\right)$$ Equation 13

2) Project indirect N_2O emissions from the synthetic N fertilizer use:

Indirect N_2O emissions from leaching and runoff are excluded from the project boundary as described in Section 3.2.1. The N_2O emissions from the atmospheric deposition of N volatilized as NH_3 and NOx after fertilizer is applied to grassland soils under the project scenario in year t, is calculated using the below equation.

$$PE_{ID,N_2O_{SN},t} = \sum_{i=1}^{I} \left(F_{SNi,t} \times Frac_{GAS,F}\right) \times EF_{4,SN} \times \frac{44}{28}$$ Equation 14

Where:

$PE_{N_2O_{SN},t}$	=	Project N_2O emissions due to fertilizer use in year t (t CO_2e)
$PE_{D,N_2O_{SN},t}$	=	Project direct N_2O emissions from synthetic nitrogen fertilizer use in year t (t N_2O)
$PE_{ID,N_2O_{SN},t}$	=	Project indirect N_2O emissions from synthetic nitrogen fertilizer use in year t (t N_2O)
GWP_{N_2O}	=	Global-warming potential of N_2O
$F_{SN,t}$	=	Annual amount of synthetic fertilizer N applied to grassland soils in year t, adjusted for volatilization as NH_3 and NO_x (t N)
$F_{SNi,t}$	=	Annual amount of synthetic fertilizer N applied to grassland soils in year t, adjusted for volatilization as NH_3 and NO_x (t N)
EF_{Nfert}	=	N_2O emission factor for synthetic N fertilizer use (kg N_2O-N/kg N applied)
$\frac{44}{28}$	=	Conversion of N_2O-N to N_2O
$M_{SNi,t}$	=	Mass of synthetic N fertilizer type i applied in year t (t fertilizer)
$NC_{SNi,p}$	=	Nitrogen content of synthetic N fertilizer type i applied (g-N/g fertilizer)
$Frac_{GAS,F}$	=	Fraction of synthetic N fertilizer that volatilizes as NH_3 and NO_x (kg N volatilized/kg of N applied)
$EF_{4,SN}$	=	N_2O emission factor for atmospheric deposition of synthetic N on soils and water surfaces (kg N_2O-N/ (kg NH_3-N +NO_x-N volatilized)$^{-1}$)
I	=	Index of synthetic N fertilizer types

2. Project emissions due to the use of N-fixing species

According to the *Project Design Report*, the project activity does not involve N-fixing species. Therefore, $PE_{N_2O_{NF},t}$ (Project emissions due to the use of N-fixing species) = 0.

3. Project emissions due to burning of biomass

The project design excludes burning of biomass. Also, according to the grassland guardians' record, no burning of biomass occurred in the project. Therefore, $PE_{GHG_{BB},t}$ (Project emissions due to burning of biomass) = 0.

4. Project CH_4 emissions due to enteric fermentation

Project CH_4 emissions from enteric fermentation are calculated using the following:

$$PE_{CH_{4EF},t} = \frac{GWP_{CH_4} \times \sum_{l=1}^{L} P_{l,t} \times EF_l \times Days_{l,t}}{1000 \times 365} \quad \text{Equation 15}$$

Where:

GWP_{CH_4}	=	Global warming potential for CH_4 (t CO_2e/t CH_4)
$P_{l,t}$	=	Population of grazing livestock type *l* in year *t* under project (head)
l	=	Index of livestock type
EF_l	=	Enteric CH_4 emission factor per head of livestock type *l* per year (kg CH_4 head · year)
$Days_{l,t}$	=	Grazing days inside the project area for each livestock type *l* in project year *t* (days)
1000	=	Conversion factor for t CH_4 to kg CH_4
365	=	Conversion factor for years to days

5. Project N_2O and CH_4 emissions due to manure management

The project emissions from manure management include N_2O and CH_4 emissions from manure and urine deposited on grassland soil during the grazing season.

$$PE_{GHG_{MD},t} = PE_{N_2O_{MD},t} + PE_{CH_{4MD},t} \quad \text{Equation 16}$$

Where:

$PE_{N_2O_{MD},t}$	=	Project N_2O emissions from manure and urine deposited on grassland soil in year *t* (t CO_2e)

$PE_{CH_4 MD,t}$ = Project CH_4 emissions from manure and urine deposited on grassland soil in year *t* (t CO_2e)

1) Project N_2O emissions from manure management

The project emissions from manure and urine deposited on grassland soil during the grazing season include direct and indirect N_2O emissions from manure and urine deposited on grassland soil during the grazing season. Project N_2O emissions from manure and urine deposited on grassland soil are calculated as described in the following:

$$PE_{N_2O_{MD},t} = GWP_{N_2O} \times \left(PE_{D,N_2O_{MD},t} + PE_{ID,N_2O_{MD},t}\right) \quad \text{Equation 17}$$

Where:

GWP_{N_2O} = Global warming potential for N_2O (t CO_2e/t N_2O)

$PE_{D,N_2O_{MD},t}$ = Direct N_2O emissions from manure and urine deposited on grassland soil during the grazing season in year *t* (t N_2O)

$PE_{ID,N_2O_{MD},t}$ = Indirect N_2O emissions from manure and urine deposited on grassland soil during the grazing season in year *t* (t N_2O)

2) Project direct N_2O emissions from manure and urine deposited on grassland soils

Project direct N_2O emissions from manure and urine deposited on grassland soil are calculated using the following:

$$PE_{D,N_2O_{MD},t} = \sum_{l1=1}^{L1} F_{MD,l1,t} \times EF_{3,PRP,CPP} \times \frac{44}{28} \quad \text{Equation 18}$$

And/or

$$PE_{D,N_2O_{MD},t} = \sum_{l2=1}^{L2} F_{MD,l2,t} \times EF_{3,PRP,SO} \times \frac{44}{28} \quad \text{Equation 19}$$

Where:

$F_{MD,l1,t}$ = Annual amount of nitrogen in cattle, poultry and pigs' manure and urine deposited on grassland soil during the grazing season in year *t*, adjusted for volatilization as NH_3 and NO_x (t N)

$F_{MD,l2,t}$ = Annual amount of nitrogen in sheep and other animals' manure and urine deposited on grassland soil during the grazing season in year *t*, adjusted for volatilization as NH_3 and NO_x (t N)

$EF_{3,PRP,CPP}$ = N_2O emission factor for cattle, poultry and pigs' manure and urine deposited on grassland soil during the grazing season (kg N_2O-N/kg N input)

$EF_{3,PRP,SO}$ = N_2O emission factor for sheep and other animals' manure and urine deposited on grassland soil during the grazing season (kg N_2O-N/kg N input)

L_1 = Index of livestock cattle, poultry and pigs

L_2 = Index of livestock sheep and other animals

$F_{MD,l1,t}$ and $F_{MD,l2,t}$ must be calculated using the following equation for livestock type *l*.

$$F_{MD,l,t} = \frac{P_{l,t} \times W_{l,p} \times Nex_l \times H_{l,t} \times Days_{l,t} \times (1 - Frac_{GAS,MD})}{1000a \times 24 \times 1000b} \quad \text{Equation 20}$$

Where:

$P_{l,t}$	=	Population of livestock type *l* in year *t* (head)
$W_{l,p}$	=	Average weight of livestock type under project (kg livestock mass/head)
Nex_l	=	Nitrogen excretion of livestock type *l* (kg N deposited/ (t livestock mass ·day))
$H_{l,t}$	=	Average grazing hours per day for livestock type *l* in year *t* (hour)
$Days_{l,b}$	=	Grazing days for livestock type *l* inside the project area in baseline year *b* (days)
$Frac_{GAS,MD}$	=	Fraction of volatilization from manure and urine deposited by grazing animals as NH_3 and NO_x (kg N volatilized/kg of N deposited)
$1000a$	=	Conversion factor for t livestock mass to kg livestock mass
24	=	Conversion factor for days to hours
$1000b$	=	Conversion factor for t N to kg N
l	=	Index of grazing livestock types

3) Project indirect N_2O emissions from manure and urine deposited on grassland soils

According to the methodology VM0026 (version 1.1) and the *Project Design Report*, the annual precipitation of the project area is less than annual potential evapotranspiration; indirect N_2O emissions from leaching and runoff can hence be excluded.

Indirect N_2O emissions from the atmospheric deposition of N volatilized as NH_3 and NO_x after urine and manure N is deposited on grassland soils in year *t* under the project, are calculated using the following:

$$PE_{ID,N_2O_{MD},t} = \sum_{l=1}^{L} F_{MD,l,t} \times Frac_{Gas,MD} \times EF_{4,MD} \times \frac{44}{28} \quad \text{Equation 21}$$

Where:

$PE_{ID,N_2O_{MD},t}$	=	Indirect N_2O emissions from manure and urine deposited on grassland soil during the grazing season in year *t* (t N_2O)
$F_{MD,l,t}$	=	Annual amount of manure and urine deposited on grassland soil from livestock type *l* during the grazing season in Project year *t*, adjusted for volatilization as NH_3 and NO_x (t N)
$Frac_{Gas,MD}$	=	Fraction of volatilization from manure and urine deposited by grazing animals as NH_3 and NO_x (kg N volatilized/kg of N deposited)

$EF_{4,MD}$	=	N_2O emission factor for atmospheric deposition of urine and manure N on soils and water surfaces (kg N_2O-N/(kg NH_3-N + NO_x-N volatilized))
l	=	Index of grazing livestock types

4) CH_4 emissions from manure management

Project CH_4 emissions from manure management are calculated using the following:

$$PE_{CH_4MD,t} = \frac{GWP_{CH_4} \times \sum_{l=1}^{L} EF_{lM} \times P_{l,t} \times H_{l,t} \times Days_{l,t}}{1000 \times 24 \times 365}$$ Equation 22

Where:

$P_{l,t}$	=	Population of grazing livestock type *l*, in year *t* (head)
EF_{lM}	=	CH_4 emission factor from manure of livestock type *l* (kg CH_4/(head · year))
$H_{l,t}$	=	Average grazing hours per day for livestock type *l* in year *t* (hour)
$Days_{l,t}$	=	Grazing days for livestock type *l* inside the project area in year *t* (days)
1000	=	Conversion factor for t CH_4 to kg CH_4
365	=	Conversion factor for years to days
24	=	Conversion factor for days to hours

6. Project CO_2 emissions due to the use of fossil fuels

According to the *Project Design Report*, project emissions from the use of fossil fuels are larger than baseline emissions, although the project construction follows the principle of energy conservation and environmental protection. Therefore, the project emissions from the use of fossil fuels must be calculated.

$$PE_{FC,t} = \frac{\sum_{p=1}^{P} \sum_{j=1}^{J} FC_{p,j,k,t} \times EF_{CO_2,k} \times NCV_k}{1000}$$ Equation 23

Where:

$PE_{FC,t}$	=	Fuel consumption by fuel type *k*, by machine type *j*, on grassland parcel *p*, in year *t* (kg fuel/year)
$EF_{CO_2,k}$	=	CO_2 emission factor by fuel type *k* (t CO_2/GJ)
NCV_k	=	Thermal value of fuel type *k* (GJ/t fuel)
1000	=	Conversion factor for tonnes fuel to kg fuel
k	=	Index of fuel type
j	=	Index of machine type

P = Index of grassland parcel

7. Project removals from woody perennials

According to the *Project Design Report*, the project only plants grass on the degraded grasslands, and no woody plants are planted. Therefore, $PRWP_b$ (project removals from woody perennials) = 0.

8. Project removals due to changes in soil organic carbon

The methodology VM0026 (version 1.1) provides two options for estimating project removals due to changes in soil organic carbon:

Option 1: Estimate of project removals due to changes in SOC using a validated model

Option 2: Estimate of project removals due to changes in SOC using a measurement approach

The project applies Option 2 (direct measurement approach). According to the methodology, for measuring soil organic carbon stock changes, soil sampling must follow a scientifically established method (e.g., methods described in Carter and Gregoroch, 2006), or a nationally approved standard. The project follows the nationally approved standard *The Technical Specification for Soil Environmental Monitoring* (HJ/T 166-2004)[49] for soil sampling, and follows the national standard *Method for Determination of Soil Organic Matter* (NY/T 1121.6-2006)[50] for measuring SOC of the soil samples.

Sampling procedures have been designed such that the statistical significance of soil carbon stock changes between the baseline carbon stock and the carbon stock in time *t* can be determined with a 95 percent confidence interval. "Guidelines for sampling and surveys for CDM project activities and programmes of activities" (version 04.0) is followed to determine the sampling procedure and sample size.

The SOC stock in stratum *s*, sampling site *i*, under project in year *t* are calculated using the following:

$$P_{SOC_{mG,s,i,t}} = SOC_{mG,s,i,t} \times BD_{mG,s,i,t} \times Depth \times \left(1 - FC_{mG,s,i,t}\right) \times 0.1 \quad \text{Equation 24}$$

Where:

$P_{SOC_{mG,s,i,t}}$ = SOC stock in the top 30 cm (or greater depth if required) of soil for management practice mG, stratum *s*, sampling site i, under project in year *t* (t C/ha)

[49] Issued by the Ministry of Ecology and Environment of the People's Republic of China in 2004. Available from the link below: https://www.mee.gov.cn/image20010518/5406.pdf

[50] Issued by the Ministry of Agriculture of the People's Republic of China in 2006.

$SOC_{mG,s,i,t}$	=	SOC content in the top 30 cm of soil (or greater depth if required) for management practice mG, stratum *s*, sampling site i, under project in year *t* (g C/kg soil)
$BD_{mG,s,i,t}$	=	Soil bulk density in the top 30 cm of soil (or greater depth if required) for management practice mG, stratum *s*, sampling site i, under project in year *t* (g soil/cm3)
$Depth$	=	Top soil depth, for calculating grassland SOC stock in the top 30 cm of soil (or greater depth if required) (cm)
$FC_{mG,s,i,t}$	=	Percentage of rocks larger than 2mm, roots, and other dead residues with a diameter in the top 30 cm of soil (or greater depth if required), for management practice mG, stratum *s*, sampling site i, under project in year *t* (percent)
0.1	=	Conversion factor for SOC to t C/ha
mG	=	Index of management practice
s	=	Index of stratum
i	=	Index of sampling site

Calculate average carbon stock of all monitored sites in management practice mG, stratum *s*, under project using the following:

$$P_{SOC_{mG,s,t}} = \frac{\sum_i^I P_{SOC_{mG,s,i,t}}}{I}$$ Equation 25

Where:

$P_{SOC_{mG,s,t}}$	=	Average carbon stock in stratum *s* under project (t C/ha)
$P_{SOC_{mG,s,i,t}}$	=	SOC stock in the top 30 cm (or greater depth if required) of soil for management practice mG, stratum *s*, sampling site i under project in year *t* (t C/ha)
I	=	Monitored sites in stratum *s*, under project

The following is used to calculate the difference between the carbon stock for management practice mG under project in year *t*, and the carbon stock under the baseline scenario, for all strata.

$$P_{mG,t} = \sum_{s=1}^{S}\left(P_{SOC_{mG,s,t}} - SOC_{S,Baseline}\right) \times PA_{mG,s,t}$$ Equation 26

Where:

$P_{mG,t}$	=	Difference in the carbon stock between the project in year *t* and the baseline scenario (t C)
$PA_{mG,s,t}$	=	Project areas with management practice mG in stratum *s* in year *t* (ha)
$P_{SOC_{mG,s,t}}$	=	Average carbon stock in stratum *s* under project in year *t* (t C / ha)
$SOC_{S,Baseline}$	=	Baseline SOC stock of stratum *s*, in the top 30 cm soil layer (or greater depth if required) (t C / ha)
S	=	Strata under project

s = Index of stratum

The following is applied to calculate average carbon stock of all management practice, under project in year *t*.

$$P_t = \sum_{mG=1}^{M} P_{mG,t}$$ Equation 27

Where:

P_t = Carbon stock under project in year *t* (t C)

M = Number of management practice

For the first monitoring of SOC stock, the annual project removals due to changes in SOC stock in year *t* must be calculated using the following:

$$PR_t = \frac{(P_t)}{n} \times \frac{44}{12}$$ Equation 28

Where:

PR_t = Project removals due to changes in SOC in year *t* (t CO_2e)

n = Number of years from the project start date to year *t* (years)

For the second and subsequent monitoring of SOC stock, the annual project removals due to changes in SOC stock in year *t* must be calculated using the following:

$$PR_t = \frac{(P_t - P_{t-f})}{f} \times \frac{44}{12}$$ Equation 29

Where:

PR_t = Project removals due to changes in SOC in year *t* (t CO_2e)

P_t = Carbon stock under project in year *t* (t C)

P_{t-f} = Carbon stock under project in year *t* – f (t C)

f = SOC monitoring frequency (years)

9. Uncertainty analysis

All parameters are selected according to Section 9.1 and Section 9.2 of the methodology VM0026 (version 1.1), and soil organic carbon data are obtained by laboratory tests. For the project, the project proponent conducted a survey of all grazing agents whose livestock grazed in the project area prior to the project start date. This survey covered a full census of project participants and project nonparticipants whose livestock grazed in the project area during the baseline period (the one-year period prior to the project start date), including the numbers of cattle and sheep, grazing days, and other grazing information. Also, the project proponent and the Forestry and Grassland Bureaus recorded the amount of diesel consumed by the project. Therefore, the parameters

regarding grazing and diesel consumption are conservative, and the uncertainty associated with them is considered to be 0.

As mentioned before, the project uses Option 2 (direct measurement approach) to estimate project removals due to changes in SOC. The measured SOC change is derived from sample surveys undertaken within the project area, and the sample size is large, therefore a conservative estimate of carbon sequestration by carbon pools in the project scenario should be given by adopting a value that represents the lower bound of the 95 percent confidence interval (sample mean – 1.96 × standard error).

However, for the ex-ante estimation in this PD, the SOC changes in project scenario are based on literature[51]. Therefore, the uncertainty is considered to be zero. And the conservative approach will be adopted in the following verifications.

Project net GHG emissions by sources and removals by sinks are calculated as follows:

$$PE_t = PE_{N_2O_{SN},t} + PE_{N_2O_{NF,}t} + PE_{GHG_{BB},t} + PE_{CH_{4EF},t} + PE_{GHG_{MD},t} + PE_{FC,t} - PRWP_t - PR_t$$

Equation 30

Where:

PE_t	=	Project net GHG emissions by sources and removals by sinks in year *t* (t CO_2e)
$PE_{N_2O_{SN},t}$	=	Project N_2O emissions due to fertilizer use in year *t* (t CO_2e)
$PE_{N_2O_{NF,}t}$	=	Project N_2O emissions as a result of N-fixing species within the project area in year *t* (t CO_2e)
$PE_{GHG_{BB},t}$	=	Project GHG emissions from biomass burning in year *t* (t CO_2e)
$PE_{CH_{4EF},t}$	=	Project CH_4 emissions from enteric fermentation in year *t* (t CO_2e)
$PE_{GHG_{MD},t}$	=	Project GHG emissions from manure management in year *t* (t CO_2e)
$PE_{FC,t}$	=	Project CO_2 emissions from farming machine fossil fuel consumption in year *t* (t CO_2)
$PRWP_t$	=	Project average net change in carbon stocks of existing woody biomass in year *t* (t CO_2)
PR_t	=	Project removals due to changes in SOC in year *t* (t CO_2e)

As described above, project CH_4 emissions due to enteric fermentation, project N_2O and CH_4 emissions due to manure management, project CO_2 emissions due to the use of fossil fuels, and project removals due to changes in soil organic carbon should be calculated.

[51] Li Wen, Gao Wenxia, Shi Shangli et al. (2016) Changes in organic carbon and nitrogen storage in alpine meadows under different management regimes.

Equation 31

$$PE_t = PE_{CH_{4EF},t} + PE_{GHG_{MD},t} + PE_{FC,t} - PR_t$$

$$= PE_{CH_{4EF},t} + PE_{N_2O_{MD},t} + PE_{CH_{4MD},t} + PE_{FC,t} - PR_t$$

$$= PE_{CH_{4EF},t} + GWP_{N_2O} \times \left(PE_{D,N_2O_{MD},t} + PE_{ID,N_2O_{MD},t}\right) + PE_{CH_{4MD},t} + PE_{FC,t} - PR_t$$

$$+ \frac{GWP_{CH_4} \times \sum_{l=1}^{L} P_{l,t} \times EF_l \times Days_{l,t}}{1000 \times 365}$$

$$+ GWP_{N_2O} \times \sum_{l1=1}^{L1} \frac{P_{l,t} \times W_{l,p} \times Nex_l \times H_{l,t} \times Days_{l,t} \times (1 - Frac_{GAS,MD})}{1000a \times 24 \times 1000b} \times EF_{3,PRP,CPP} \times \frac{44}{28}$$

$$+ GWP_{N_2O} \times \sum_{l2=1}^{L2} \frac{P_{l,t} \times W_{l,p} \times Nex_l \times H_{l,t} \times Days_{l,t} \times (1 - Frac_{GAS,MD})}{1000a \times 24 \times 1000b} \times EF_{3,PRP,SO} \times \frac{44}{28}$$

$$+ GWP_{N_2O} \times \sum_{l=1}^{L} F_{MD,l,t} \times Frac_{Gas,MD} \times EF_{4,MD} \times \frac{44}{28}$$

$$+ \frac{GWP_{CH_4} \times \sum_{l=1}^{L} EF_{lM} \times P_{l,t} \times H_{l,t} \times Days_{l,t}}{1000 \times 24 \times 365}$$

$$+ \frac{\sum_{p=1}^{P} \sum_{j=1}^{J} FC_{p,j,k,t} \times EF_{CO_2,k} \times NCV_k}{1000}$$

$$- \frac{\sum_{mG=1}^{M} \sum_{s=1}^{S} \left(\frac{\sum_{i}^{I} SOC_{mG,s,i,t} \times BD_{mG,s,i,t} \times Depth \times \left(1 - FC_{mG,s,i,t}\right) \times 0.1}{I} - SOC_{S,Baseline} \right) \times PA_{mG,s,t}}{n} \times \frac{44}{12}$$

Project net GHG emissions during the crediting period is summarized in the following table, please refer to ER spreadsheet for detailed calculation.

Table 3.4 The ex-ante estimation of project GHG emissions removals during the crediting period

Year	$PE_{CH4EF,t}$	$PE_{N2OMD,t}$	$PE_{CH4MD,t}$	$PE_{FC,t}$	PR_t	PE_t
	t CO_2e	t CO_2e	t CO_2e	t CO_2e	t CO_2e	t CO_2e
2021	15,785	177	228	2,751	430,389	18,941
2022	15,785	177	228	0	430,389	16,190
2023	15,785	177	228	0	430,389	16,190
2024	15,785	177	228	0	430,389	16,190
2025	15,785	177	228	0	430,389	16,190
2026	15,785	177	228	0	430,389	16,190
2027	15,785	177	228	0	430,389	16,190
2028	15,785	177	228	0	430,389	16,190
2029	15,785	177	228	0	430,389	16,190
2030	15,785	177	228	0	430,389	16,190
2031	15,785	177	228	0	430,389	16,190
2032	15,785	177	228	0	430,389	16,190
2033	15,785	177	228	0	430,389	16,190
2034	15,785	177	228	0	430,389	16,190

2035	15,785	177	228	0	430,389	16,190
2036	15,785	177	228	0	430,389	16,190
2037	15,785	177	228	0	430,389	16,190
2038	15,785	177	228	0	430,389	16,190
2039	15,785	177	228	0	430,389	16,190
2040	15,785	177	228	0	430,389	16,190
2041	15,785	177	228	0	430,389	16,190
2042	15,785	177	228	0	430,389	16,190
2043	15,785	177	228	0	430,389	16,190
2044	15,785	177	228	0	430,389	16,190
2045	15,785	177	228	0	430,389	16,190
2046	15,785	177	228	0	430,389	16,190
2047	15,785	177	228	0	430,389	16,190
2048	15,785	177	228	0	430,389	16,190
2049	15,785	177	228	0	430,389	16,190
2050	15,785	177	228	0	430,389	16,190
2051	15,785	177	228	0	430,389	16,190
2052	15,785	177	228	0	430,389	16,190
2053	15,785	177	228	0	430,389	16,190
2054	15,785	177	228	0	430,389	16,190
2055	15,785	177	228	0	430,389	16,190
2056	15,785	177	228	0	430,389	16,190
2057	15,785	177	228	0	430,389	16,190
2058	15,785	177	228	0	430,389	16,190
2059	15,785	177	228	0	430,389	16,190
2060	15,785	177	228	0	430,389	16,190
Total	**631,400**	**7,080**	**9,120**	**2,751**	**17,215,560**	**650,351**

3.2.3 Leakage

Under this methodology, project activities must not involve increase in use of fossil fuels or fuel wood and must not include significantly different manure management practices. Therefore, the only potential sources of leakage in this methodology estimated as follows:

$$LE_t = LE_{M,t} + LE_{GD,t}$$ Equation 32

Where:

LE_t = Leakage emissions in year *t* (t CO_2e)

$LE_{M,t}$ = Leakage emissions due to market leakage in year *t* (t CO_2e)

$LE_{GD,t}$ = Leakage emissions due to grazing displacement in year *t* (t CO_2e)

Market leakage must be assessed and quantified using VCS Module VMD0033 Estimation of Emissions from Market Leakage.

This module provides methods for estimating whether reductions in the production of commodities (such as wood, animals or agricultural products) resulting from the project activity is likely to result in increased emissions from the production of those products elsewhere, and provides methods for determining the volume of such emissions.

The main production of commodities associated with the project is cattle and sheep. As grazing is strictly managed during the implementation of the project, the Forestry and Grassland Bureaus measure the grass yield of surrounding grassland parcels outside of the project area, and guide the herders to graze in areas in a reasonable manner. The project would not lead to reductions in the production of cattle and sheep. Therefore, the market leakage is considered to be 0.

Leakage from displacement of grazing activities to outside the project boundary must be assessed and quantified using VCS module VMD0040 Leakage from Displacement of Grazing Activities.

This module is applicable under the following condition:

• The project area is subject to livestock grazing in the baseline scenario.

According to the *PRA Report* and *Project Design Report*, local herders graze their herds in the project area under the baseline scenario, which shows the applicability of this module to the project.

The procedures for the assessment of leakage emissions due to grazing displacement are as follows:

1) Assess whether Grazing Displacement Takes Place

According to the *Baseline Survey Report* and the *Project Design Report*, local herders graze their herds in the project area under the baseline scenario, and the grazing activities will be controlled in compliance with the *Project Design Report* under the project scenario. Since the grazing demand of herders does not decline in a short time, grazing displacement is likely to take place. Proceed to the next step.

2) Survey of Grazing Displacement and Relocation Plans

According to VMD0040 (version 1.0), a survey must be conducted of all grazing agents whose livestock graze in the project area prior to the project start date. The period covered by this survey must be consistent with the baseline period used to quantify baseline emissions within the project area (i.e., covering the five-year period prior to the project start date, or if management records for this period are unavailable, at a minimum covering the one-year period prior to the project start date). This survey must cover a full census or representative sample of project participants and project non-participants whose livestock graze in the project area during the baseline period covered by the survey. Where sample surveys are used, sampling approaches must enable estimation of the sample mean within a 95 percent confidence interval to a precision of 15 percent. For both types of grazing agent, the survey must quantify the number and type of livestock and the duration of each year that these livestock graze in the project area. The survey must additionally collect data on the number and type of livestock, and duration, that livestock under the control of

project participants graze outside the project area during the period covered by the survey. For both types of grazing agent, the survey must also collect information on intended location of grazing after implementation of the project.

Prior to the project implementation, the project proponent conducted a survey of all grazing agents whose livestock grazed in the project area prior to the project start date. This survey was conducted from 1-March-2020 to 14-March-2020, which meets the requirement of VMD0040 (version 1.0). Covering a full census of project participants and project non-participants whose livestock grazed in the project area during the baseline period (the one-year period prior to the project start date), this survey recorded the number and type of livestock and the duration of each year that these livestock graze in the project area; it also collected data on the number and type of livestock, and duration, that livestock under the control of project participants graze outside the project area during the period covered by the survey.

The survey results show that during the baseline period the project participants grazed 116,575 cattle and 516,689 sheep in the project area for about 208 days per year and for 8 hours per day. The project non-participants did not graze in the project area; they would not graze under the project scenario, either. According to the survey, the alternative grazing parcels are mainly located in the grass-livestock balance area around the project implementation area.

3) Prepare a Grazing Displacement Management Plan

A grazing displacement management plan has been prepared on the basis of the survey of grazing displacement and relocation plans. The grazing displacement management plan must record planned grazing activities for all livestock that are to be relocated to lands outside the project area and that are under the control of project participants. The project non-participants would not graze in the project area both under the baseline scenario and the project scenario.

The grazing displacement management plan was completed in September 2020. This plan shall be implemented by grassland guardians, who are in charge of patrolling the project area for management and protection every 15 days, recording and reporting grazing displacement to the Forestry and Grassland Bureau. After receiving the reports from the grassland guardians, the Forestry and Grassland Bureau shall complete the grazing displacement management plan every year with the following data:

• The identity of each grazing agent;

• The number and type of livestock to be relocated;

• The number of days each year which they will graze outside the project area (measured in days, or the whole year if appropriate);

• The location and area in hectares of each land parcel to which grazing will be relocated;

• A unique identifier code (where applicable) for each land parcel to which grazing will be relocated;

• The type of land (grassland, forest land, cropland) of each parcel to which grazing will be relocated, and where appropriate note the status (e.g., degradation level) of the lands to which grazing will be relocated; and

• Any planned actions to avoid loss of above- or belowground carbon pools on the land parcels to which grazing will be relocated.

Since grazing plans for project non-participants are not available, the future location of grazing was listed as unidentified grassland. Therefore, the location and area in hectares of each land parcel to which grazing will be relocated and the unique identifier code (where applicable) for each land parcel to which grazing will be relocated would not be recorded.

In July and August each year, the Forestry and Grassland Bureaus measure the grass yield of the grassland around the project area, and calculate the livestock amount allowed under grass-livestock balance. And the project participants graze their livestock in the designated area under the guidance of the Forestry and Grassland Bureaus and grassland guardians. The specific parcels available for grazing by project participants may change from year to year, based on the actual grassland conditions. And the grazing displacement management plan must record the number and type of livestock to be relocated and the type of land (grassland, forest land, cropland) to which grazing is planned to be displaced. In this case, the type of land to which grazing may be displaced must be categorized as unidentified grassland.

From August to October in 2019, the Forestry and Grassland Bureaus interviewed all grazing agents and conducted a survey of Grazing Displacement to record and collect the information of the number and type of livestock to be relocated and their average grazing time. Within the scope of project implementation, grazing frequency will be strictly controlled, and project participants would receive subsidies. The project proponent and the Forestry and Grassland Bureaus will visit the project participants to investigate the project situation and provide subsidies.

4) Determine whether Lands to which Livestock are Displaced are Identified or Unidentified

The grazing displacement management plan does not record the geographic location to which livestock under the control of project participants are relocated. Besides, the process of identifying the specific land areas to which livestock will be relocated would be not feasible at reasonable cost (because project non-participants are scattered over wide distances and not contactable at reasonable cost). Therefore, the land to which livestock grazing activity is displaced should be categorized as unidentified.

For unidentified land, assessment procedures mandate the use of conservative assumptions that do not underestimate the effects of grazing displacement on carbon stocks in unidentified lands, and in the case of land that remains unidentified after monitoring begins, conservative assumptions that do not underestimate leakage emissions caused by grazing displacement must also be used.

5) Define the Type of Land to which Grazing will be Relocated

The project participants graze in the designated area under the guidance of the Forestry and Grassland Bureaus and grassland guardians. But the specific land parcels available for grazing by

project participants may change from year to year, based on the actual grassland conditions such as grass yield. Therefore, the unidentified lands should be categorized as unidentified grassland.

Based on the description above, the alternative grazing areas of the project are mainly unidentified grassland areas.

Estimation of Leakage Emissions due to Displacement of Livestock Grazing to Unidentified Grasslands

According to the *Project Design Report*, the leakage caused by different grassland management practices are different. Therefore, the leakage from different management practices is calculated respectively. Please refer to the ER calculation sheet for details.

Step 1: Estimate the area of grassland needed to sustain the population of livestock relocated to unidentified grasslands

$$DMI_{GUI,t} = \sum_{l=1}^{L} \left(\frac{DMI_{day,I} \times P_{GUI,I,t}}{1000} \times DayS_{GUI,I,t} \right) \quad \text{Equation 33}$$

Where:

$DMI_{GUI,t}$	=	Dry matter intake required to sustain the total number of livestock of all types *l* relocated to unidentified grasslands in year *t* (t dm)
$DMI_{day,I}$	=	Daily dry matter intake requirement of each type of livestock *l* (kg dm/(head · day))
$P_{GUI,I,t}$	=	Population of livestock of each type relocated to unidentified grasslands in year *t* (head)
$DayS_{GUI,I,t}$	=	Days that the population of each type of relocated livestock of type *l* graze in unidentified grassland in year *t* (days)

The total area of unidentified grassland required to sustain the population of livestock relocated to unidentified grassland is to be calculated as:

Where:

$Area_{GUI,t}$	=	Area required to sustain the population of livestock displaced to unidentified grasslands in year *t* (ha)
$DMI_{GUI,t}$	=	Dry matter intake required to sustain the total number of livestock of all types *l* relocated to unidentified grasslands in year *t* (t dm)
$ANPP_{GUI,REF}$	=	Aboveground net primary productivity in the reference region that is the likely location of unidentified grasslands to which livestock are relocated (t dm/ha)

Step 2: Assess the risk of soil carbon loss due to overgrazing in unidentified grasslands

In the project area, subsidies are provided to herders for complying with the guidance from the project proponent. The grazing relocated will take place in a way that ensures grass-livestock balance and hence will not lead to grassland degradation. In addition, the establishment of artificial forage grassland and the construction of animal sheds will alleviate the grazing pressure on natural

grassland. Therefore, the impact of alternative grazing on the productivity of unidentified grassland will be limited.

The calculation result of Step 1 shows that the annually average area of unidentified grassland required to sustain the population of livestock relocated to unidentified grassland is 25,425 ha (see the ER calculation sheet for details), which is significantly smaller than the grass-livestock balance area in the project zone.

The main goal of grass-livestock balance is to calculate a reasonable livestock carrying capacity and hence ensure the sustainable development of animal husbandry based on rational utilization of grassland resources, according to *Measures for the management of grass-livestock balance* [52] issued by the Ministry of Agriculture and Rural Affairs of China. With these measures taken, grassland degradation in undetermined grass-livestock balance areas will not occur.

Therefore, the grazing displacement will not lead to consumption exceeding 50 percent of available biomass, and leakage due to soil carbon loss does not need to be accounted for.

Step 3: Estimate emissions from livestock displacement to unidentified grasslands

Step 3a: Estimate methane emissions from enteric fermentation by livestock displaced to unidentified grasslands

Calculate the leakage emissions due to enteric fermentation by livestock displaced to all unidentified grasslands outside the project area using:

$$LE_{GUI,CH_{4EF},t} = \frac{\sum_{l=1}^{L} P_{GUI,l,t} \times Days_{GUI,l,t} \times GWP_{CH_4} \times EF_l}{1000 \times 365} \quad \text{Equation 34}$$

Where:

$LE_{GUI,CH_{4EF},t}$	=	Leakage emissions in year *t* from enteric fermentation by livestock displaced to unidentified grasslands (t CO_2e)
$P_{GUI,l,t}$	=	Population of grazing livestock type *l* in year *t* displaced outside the project area to unidentified grasslands (head)
$Days_{GUI,l,t}$	=	Days in year *t* that livestock of each type *l* grazes on unidentified grassland (days)
GWP_{CH_4}	=	Global-warming potential of CH_4 (t CO_2e/t CH_4)
EF_l	=	Enteric CH_4 emission factor per head of livestock type *l* per year (kg CH_4/(ha · year))
l	=	Index of grazing livestock types

Step 3b: Estimate GHG emissions from manure management

Calculate the N_2O and CH_4 leakage emissions due to manure deposition on grassland caused by relocating the livestock to unidentified grasslands outside the project area using:

[52] http://www.fgs.moa.gov.cn/flfg/201006/t20100606_6315632.htm

$$LE_{GUI_{MD},t} = LE_{GUI,N_2O_{MD},t} + LE_{GUI,CH_{4MD},t}$$ Equation 35

Where:

$LE_{GUI_{MD},t}$ = Leakage emissions from manure and urine deposited on unidentified grassland in year *t* (t CO_2e)

$LE_{GUI,N_2O_{MD},t}$ = Leakage emissions from manure and urine deposited on unidentified grassland in year *t* (t CO_2e)

$LE_{GUI,CH_{4MD},t}$ = Leakage CH_4 emissions from manure and urine deposited on unidentified grasslands in year *t* (t CO_2e)

$LE_{GUI,N_2O_{MD},t}$ is calculated as the sum of direct N_2O emissions and indirect N_2O emissions using:

$$LE_{GUIN_2O_{MD},t} = GWP_{N_2O} \times \left(LE_{GUI_D,N_2O_{MD},t} + LE_{GUI_{ID},N_2O_{MD},t}\right)$$ Equation 36

Where:

$LE_{GUIN_2O_{MD},t}$ = Leakage N_2O emission from manure and urine deposited on unidentified grasslands in year *t* (t CO_2e)

GWP_{N_2O} = Global-warming potential of N_2O (t CO_2e/t N_2O)

$LE_{GUI_D,N_2O_{MD},t}$ = Leakage direct N_2O emissions from manure and urine deposited on unidentified grasslands in year *t* (t N_2O)

$LE_{UI_{ID},N_2O_{MD},t}$ = Leakage indirect N_2O emissions from manure and urine deposited on unidentified grasslands in year *t* (t N_2O)

Leakage direct N_2O emission from manure and urine deposited on unidentified grasslands $LE_{GUI_D,N_20_{MD,t}}$ is calculated using:

$$LE_{GUI_D,N_2O_{MD},t} = \sum_{l1=1}^{L1} F_{MD,GUI,t,l1} \times EF_{3,PRP,CPP} \times \frac{44}{28}$$ Equation 37

And/or

$$LE_{GUI_D,N_2O_{MD},t} = \sum_{l2=1}^{L2} F_{MD,GUI,t,l2} \times EF_{3,PRP,SO} \times \frac{44}{28}$$ Equation 38

Where:

$LE_{GUI_D,N_2O_{MD},t}$ = Leakage direct N_2O emissions from manure and urine deposited on unidentified grasslands in year *t* (t N_2O)

$F_{MD,GUI,t,l1}$ = Annual amount of nitrogen in cattle, poultry and pig manure and urine deposited on unidentified grasslands in year *t*, adjusted for volatilization as NH_3 and NO_x (t N)

$F_{MD,GUI,t,l2}$ = Annual amount of nitrogen in sheep and other animal manure and urine deposited on unidentified grasslands in year *t*, adjusted for volatilization as NH_3 and NO_x (t N)

$EF_{3,PRP,CPP}$ = N_2O emission factor for cattle (dairy, non-dairy and buffalo), poultry and pigs' manure and urine deposited on grasslands (kg N_2O-N/kg N input)

$EF_{3,PRP,SO}$ = N_2O emission factor for sheep and other animals' manure and urine deposited on grasslands (kg N_2O-N/kg N input)

$$F_{MD,GUI,t,l} = \frac{P_{GUI,l,t} \times W_l \times Nex_l \times H_{GUI,t} \times Days_{GUI,l,t} \times (1 - Frac_{GAS,MD})}{1000a \times 24 \times 1000b}$$ Equation 39

Where:

$F_{MD,GUI,t,l}$	=	Annual amount of nitrogen in manure and urine deposited on unidentified grasslands by livestock type *l*, adjusted for volatilization as NH_3 and NO_x (t N)
$P_{GUI,l,t}$	=	Population of grazing livestock type *l* in year *t* displaced outside the project area to unidentified grasslands (head)
W_l	=	Average weight of livestock *l* displaced to unidentified grasslands (kg/head)
Nex_l	=	Nitrogen excretion from livestock type *l* (kg N/ (t animal mass·day))
$1000a$	=	Conversion factor for nitrogen excretion (kg/t livestock mass) to nitrogen excretion (kg/kg livestock mass)
$H_{GUI,t}$	=	Average grazing hours per day during grazing season for livestock of each type l displaced to unidentified grassland in year *t* (hours)
24	=	Conversion day to hour
$Days_{GUI,l,t}$	=	Grazing days in year *t* for livestock type *l* displaced to unidentified grasslands (days)
$1000b$	=	Conversion factor for kg to t
$Frac_{GAS,MD}$	=	Fraction of volatilization from manure and urine deposited by grazing animals as NH_3 and NO_x (kg N volatilized/kg of N deposited)
t	=	Year
l	=	Index of grazing livestock types

Leakage from indirect N_2O emissions from atmospheric deposition of N volatilized from urine and manure N deposited on unidentified grasslands is calculated using:

$$LE_{GUI_{ID},N_2O_{MD},t} = \sum_{l=1}^{L} F_{MD,GUI,t,l} \times Frac_{Gas,MD} \times EF_4 \times \frac{44}{28}$$ Equation 40

Where:

$LE_{GUI_{ID},N_2O_{MD},t}$	=	Leakage indirect N_2O emissions from manure and urine deposited on unidentified grasslands in year *t* (t N_2O)
$F_{MD,GUI,t,l}$	=	Annual amount of nitrogen in manure and urine deposited on unidentified grasslands by livestock type *l*, adjusted for volatilization as NH_3 and NO_x (t N)
$Frac_{Gas,MD}$	=	Fraction of volatilization from manure and urine deposited by grazing animals as NH_3 and NO_x (kg N volatilized/kg of N deposited)
EF_4	=	N_2O emission factor for atmospheric deposition of manure N on soils and water surfaces under project activity (kg N_2O-N/(kg NH_3-N + NO_x-N volatilized))

CH_4 emission from manure management due to displacement of livestock to unidentified grasslands is calculated using:

$$LE_{GUI,CH_{4MD},t} = \frac{GWP_{CH_4} \times \sum_{l=1}^{L} EF_{lm} \times P_{GUI,l,t} \times H_{GUI,l,t} \times Days_{GUI,l,t}}{1000 \times 24 \times 365}$$ Equation 41

Where:

$LE_{GUI,CH_{4MD},t}$	=	Leakage CH_4 emissions from manure and urine deposited on unidentified grasslands in year t (t CO_2e)
GWP_{CH_4}	=	Global-warming potential of CH_4 (t CO_2e/t CH_4)
EF_{lm}	=	CH_4 emission factor per head of livestock type *l* in manure management system m (kg CH_4/(head · yr))
$P_{GUI,l,t}$	=	Population of livestock type *l* in year *t* displaced to unidentified grasslands (head)
$H_{GUI,l,t}$	=	Average grazing hours per day during grazing season for livestock of each type l displaced to unidentified grassland in year *t* (hours)
$Days_{GUI,l,t}$	=	Grazing days in year *t* for livestock type *l* displaced to unidentified grasslands (days)
1000	=	Conversion factor for kg to t

Step 4: Calculate total leakage emissions from relocation of grazing to unidentified grasslands

Total leakage emissions from relocation of grazing to unidentified grasslands must be calculated as:

$$LE_{GUI,t} = LE_{OGGUI,t} + LE_{GUI,CH_{4EF,}t} + LE_{GUI_{MD,t}} \quad \text{Equation 42}$$

Where:

$LE_{GUI,t}$	=	Leakage due to displacement of livestock to unidentified grasslands in year *t* (t CO_2e)
$LE_{OGGUI,t}$	=	Leakage due to soil carbon loss resulting from overgrazing due to displacement of livestock to unidentified grasslands in year *t* (t CO_2e)
$LE_{GUI,CH_{4EF,}t}$	=	Leakage due to enteric fermentation by livestock displaced to unidentified grasslands in year *t* (t CO_2e)
$LE_{GUI_{MD,t}}$	=	Leakage due to N_2O and CH_4 emissions in manure and urine deposited on grasslands by livestock displaced to unidentified grasslands in year *t* (t CO_2e)

As described above, leakage emissions due to grazing displacement are calculated as follows:

$$LE_t = LE_{GD,t} = LE_{GUI,t} = LE_{GUI,CH_{4EF,}t} + LE_{GUI_{MD,t}} \quad \text{Equation 43}$$

$$= LE_{GUI,CH_{4EF,}t} + LE_{GUI,N_2O_{MD},t} + LE_{GUI,CH_4MD,t}$$

$$= \frac{\sum_{l=1}^{L} P_{GUI,l,t} \times Days_{GUI,l,t} \times GWP_{CH_4} \times EF_l}{1000 \times 365}$$

$$+GWP_{N_2O} \times \sum_{l1=1}^{L1} \frac{P_{GUI,l,t} \times W_l \times Nex_l \times H_{GUI,t} \times Days_{GUI,l,t} \times (1 - Frac_{GAS,MD})}{1000a \times 24 \times 1000b} \times EF_{3,PRP,CPP} \times \frac{44}{28}$$

$$+GWP_{N_2O} \times \sum_{l2=1}^{L2} \frac{P_{GUI,l,t} \times W_l \times Nex_l \times H_{GUI,t} \times Days_{GUI,l,t} \times (1 - Frac_{GAS,MD})}{1000a \times 24 \times 1000b} \times EF_{3,PRP,SO} \times \frac{44}{28}$$

$$+GWP_{N_2O} \times \sum_{l=1}^{L} F_{MD,GUI,l,t} \times Frac_{Gas,MD} \times EF_4 \times \frac{44}{28}$$

$$+\frac{GWP_{CH_4} \times \sum_{l=1}^{L} EF_{lm} \times P_{GUI,l,t} \times H_{GUI,l,t} \times Days_{GUI,l,t}}{1000 \times 24 \times 365}$$

Table 3.5 The Estimation of leakage emissions from relocation of grazing during the crediting period

Year	$LE_{GUI,CH4EF,t}$	$LE_{GUI,N2OMD,t}$	$LE_{GUI,CH4MD,t}$	LE_t
	t CO_2e	t CO_2e	t CO_2e	t CO_2e
2021	16,371	168	163	16,702
2022	18,653	190	180	19,023
2023	18,653	190	180	19,023
2024	18,653	190	180	19,023
2025	18,653	190	180	19,023
2026	18,653	190	180	19,023
2027	18,653	190	180	19,023
2028	18,653	190	180	19,023
2029	18,653	190	180	19,023
2030	18,653	190	180	19,023
2031	18,653	190	180	19,023
2032	18,653	190	180	19,023
2033	18,653	190	180	19,023
2034	18,653	190	180	19,023
2035	18,653	190	180	19,023
2036	18,653	190	180	19,023
2037	18,653	190	180	19,023
2038	18,653	190	180	19,023
2039	18,653	190	180	19,023
2040	18,653	190	180	19,023
2041	18,653	190	180	19,023
2042	18,653	190	180	19,023
2043	18,653	190	180	19,023
2044	18,653	190	180	19,023
2045	18,653	190	180	19,023
2046	18,653	190	180	19,023
2047	18,653	190	180	19,023
2048	18,653	190	180	19,023
2049	18,653	190	180	19,023
2050	18,653	190	180	19,023
2051	18,653	190	180	19,023
2052	18,653	190	180	19,023
2053	18,653	190	180	19,023
2054	18,653	190	180	19,023
2055	18,653	190	180	19,023
2056	18,653	190	180	19,023

2057	18,653	190	180	19,023
2058	18,653	190	180	19,023
2059	18,653	190	180	19,023
2060	18,653	190	180	19,023
Total	743,838	7,578	7,183	758,599

3.2.4 Net GHG Emission Reductions and Removals

The amount of emission reductions achieved by the project in project year *t* must be calculated as follows:

$$ER_t = BE_b - PE_t - LE_t$$ Equation 44

Where:

ER_t = Emission reductions in year *t* (t CO_2e)

BE_b = Baseline emissions and removals in year *b* (t CO_2e)

PE_t = Project emissions and removals in year *t* (t CO_2e)

LE_t = Leakage emissions in year *t* (t CO_2e)

The net anthropogenic GHG removals by sinks by the project are summarized below.

Table 3.6 The net GHG emission removals

Year	Estimated baseline emissions or removals	Estimated project emissions[53]	Estimated leakage emissions	Estimated project removals	Estimated net GHG emission reductions and removals
	t CO_2e	t CO_2e	t CO_2e	t CO_2e	t CO_2e
2021	149,020	18,941	9,230	430,389	551,238
2022	149,020	16,190	10,512	430,389	552,707
2023	149,020	16,190	10,512	430,389	552,707
2024	149,020	16,190	10,512	430,389	552,707
2025	149,020	16,190	10,512	430,389	552,707
2026	149,020	16,190	10,512	430,389	552,707
2027	149,020	16,190	10,512	430,389	552,707
2028	149,020	16,190	10,512	430,389	552,707
2029	149,020	16,190	10,512	430,389	552,707
2030	149,020	16,190	10,512	430,389	552,707
2031	149,020	16,190	10,512	430,389	552,707
2032	149,020	16,190	10,512	430,389	552,707

[53] Project removals are excluded.

2033	149,020	16,190	10,512	430,389	552,707
2034	149,020	16,190	10,512	430,389	552,707
2035	149,020	16,190	10,512	430,389	552,707
2036	149,020	16,190	10,512	430,389	552,707
2037	149,020	16,190	10,512	430,389	552,707
2038	149,020	16,190	10,512	430,389	552,707
2039	149,020	16,190	10,512	430,389	552,707
2040	149,020	16,190	10,512	430,389	552,707
2041	149,020	16,190	10,512	430,389	552,707
2042	149,020	16,190	10,512	430,389	552,707
2043	149,020	16,190	10,512	430,389	552,707
2044	149,020	16,190	10,512	430,389	552,707
2045	149,020	16,190	10,512	430,389	552,707
2046	149,020	16,190	10,512	430,389	552,707
2047	149,020	16,190	10,512	430,389	552,707
2048	149,020	16,190	10,512	430,389	552,707
2049	149,020	16,190	10,512	430,389	552,707
2050	149,020	16,190	10,512	430,389	552,707
2051	149,020	16,190	10,512	430,389	552,707
2052	149,020	16,190	10,512	430,389	552,707
2053	149,020	16,190	10,512	430,389	552,707
2054	149,020	16,190	10,512	430,389	552,707
2055	149,020	16,190	10,512	430,389	552,707
2056	149,020	16,190	10,512	430,389	552,707
2057	149,020	16,190	10,512	430,389	552,707
2058	149,020	16,190	10,512	430,389	552,707
2059	149,020	16,190	10,512	430,389	552,707
2060	149,020	16,190	10,512	430,389	552,707
Total	**5,960,800**	**650,351**	**419,198**	**17,215,560**	**22,106,811**
Annual average	**149,020**	**16,259**	**10,480**	**430,389**	**552,670**

3.3 Monitoring

3.3.1 Data and Parameters Available at Validation

Data / Parameter	GWP_{N_2O}
Data unit	t CO_2e/t N_2O
Description	Global-warming potential for N_2O
Source of data	*VCS Standard* version 4.4
Value applied	265
Justification of choice of data or description of measurement methods and procedures applied	Default value
Purpose of data	Calculation of baseline emissions Calculation of project emissions Calculation of leakage emissions
Comments	NA

Data / Parameter	EF_{Nfert}
Data unit	kg N_2O-N/kg N applied
Description	N_2O emission factor for synthetic N fertilizer use
Source of data	2019 IPCC Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value applied	0.005
Justification of choice of data or description of measurement methods and procedures applied	The default value recommended by the 2019 IPCC Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories (Table 11.1, Chapter 11, Volume 4) of IPCC good practice guidance for AFOLU has been followed. Since the project area belongs to cool temperate, dry IPCC climate zones, the default factor is 0.005.
Purpose of Data	Calculation of project emissions
Comments	NA

Data / Parameter	$Frac_{GAS,F}$
Data unit	kg N volatilized/kg N applied
Description	Fraction of synthetic N fertilizer that volatilizes as NH_3 and NO_x

Source of data	2019 IPCC Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value applied	0.11
Justification of choice of data or description of measurement methods and procedures applied	Default value
Purpose of data	Calculation of baseline emissions
Comments	NA

Data / Parameter	$EF_{4,SN}$
Data unit	kg N_2O-N/ (kg NH_3-N + NO_x-N volatilized)
Description	N_2O emission factor for atmospheric deposition of synthetic N on soils and water surfaces
Source of data	2019 IPCC Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value applied	0.01
Justification of choice of data or description of measurement methods and procedures applied	Default value
Purpose of data	Calculation of project emissions
Comments	NA

Data / Parameter	$EF_{4,MD}$
Data unit	kg N_2O-N/ (kg NH_3-N + NO_x-N volatilized)
Description	N_2O emission factor for atmospheric deposition of urine and manure N on soils and water surfaces
Source of data	2019 IPCC Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value applied	0.005
Justification of choice of data or description of measurement methods and procedures applied	Default value
Purpose of data	Calculation of baseline emissions Calculation of project emissions Calculation of leakage emissions

Comments	NA

Data / Parameter	GWP_{CH_4}
Data unit	t CO_2e/t CH_4
Description	Global-warming potential for CH_4
Source of data	*VCS Standard* version 4.4
Value applied	28
Justification of choice of data or description of measurement methods and procedures applied	Default value
Purpose of data	Calculation of baseline emissions Calculation of project emissions Calculation of leakage emissions
Comments	NA

Data / Parameter	$P_{l,b}$
Data unit	Head
Description	Population of grazing livestock type *l*, in baseline year *b*
Source of data	PRA Report
Value applied	Cattle: 116,575 Sheep: 516,689
Justification of choice of data or description of measurement methods and procedures applied	The livestock population were obtained from a sample survey of the livestock grazing in the project area in the year prior to the project start date during the baseline period.
Purpose of data	Calculation of baseline emissions
Comments	NA

Data / Parameter	EF_l
Data unit	kg CH_4/ (head · year)
Description	Enteric CH_4 emission factor per head of livestock type *l* per year
Source of data	2019 IPCC Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value applied	Cattle: 56 Sheep: 5

Justification of choice of data or description of measurement methods and procedures applied	Due to detailed data are unavailable. the default value recommended by the 2019 IPCC Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories (Table 10.10 or 10.11, Chapter 10, Volume 4). According to the Project Design Report, the local productivity system is a low productivity system based on animal feeding systems where locally produced roughage (e.g. crop residues) or low-quality rangelands represent the major source of feed utilized. So the default factor of sheep is 5. The cattle in the project area are basically yaks, not dairy cattle, so the default value is 56.
Purpose of data	Calculation of baseline emissions Calculation of project emissions Calculation of leakage emissions
Comments	NA

Data / Parameter	$EF_{3,PRP,CPP}$
Data unit	kg N_2O-N/kg N input
Description	N_2O emission factor for cattle (dairy, non-dairy and buffalo), poultry and pigs' manure and urine deposited on or applied to grassland
Source of data	2019 IPCC Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value applied	0.002
Justification of choice of data or description of measurement methods and procedures applied	Default value recommended by 2019 IPCC Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories (Table 11.1, Chapter 11, Volume 4).
Purpose of data	Calculation of baseline emissions Calculation of project emissions Calculation of leakage emissions
Comments	NA

Data / Parameter	$EF_{3,PRP,SO}$
Data unit	kg N_2O-N/kg N input
Description	N_2O emission factor for sheep and other animals' manure and urine deposited on or applied to grassland
Source of data	2019 IPCC Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value applied	0.003

Justification of choice of data or description of measurement methods and procedures applied	Default value recommended by 2019 IPCC Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories (Table 11.1, Chapter 11, Volume 4).
Purpose of data	Calculation of baseline emissions Calculation of project emissions Calculation of leakage emissions
Comments	NA

Data / Parameter	Nex_l
Data unit	kg N deposited/ (t livestock mass · day)
Description	Nitrogen excretion of livestock type *l*
Source of data	2019 IPCC Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value applied	Cattle: 0.38 Sheep: 0.32
Justification of choice of data or description of measurement methods and procedures applied	Due to detailed data are unavailable. the default value recommended by the 2019 IPCC Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories (Table 10.19, Chapter 10, Volume 4).
Purpose of data	Calculation of baseline emissions Calculation of project emissions Calculation of leakage emissions
Comments	NA

Data / Parameter	$W_{l,b}$
Data unit	kg
Description	Average weight of livestock *l*, in baseline year *b*
Source of data	Local expert judgment
Value applied	Cattle: 300 Sheep: 45
Justification of choice of data or description of measurement methods and procedures applied	PRA Report, data from local expert judgement that are specific to the project area.
Purpose of data	Calculation of baseline emissions

Comments	NA

Data / Parameter	$W_{l,p}$
Data unit	kg
Description	Average weight of livestock under project
Source of data	Local expert judgment
Value applied	Cattle: 300 Sheep: 45
Justification of choice of data or description of measurement methods and procedures applied	PRA Report, data from local expert judgement that are specific to the project area.
Purpose of data	Calculation of project emissions
Comments	NA

Data / Parameter	$Days_{l,b}$
Data unit	Days
Description	Grazing days for livestock type *l* in baseline year *b*
Source of data	Grazing Displacement Management Plan
Value applied	Baseline scenario: 208
Justification of choice of data or description of measurement methods and procedures applied	Value obtained from the Grazing Displacement Management Plan
Purpose of data	Calculation of baseline emissions Calculation of project emissions
Comments	NA

Data / Parameter	$H_{l,b}$
Data unit	Hours
Description	Average grazing hours for livestock type *l* per day during the grazing season in baseline year *b*
Source of data	Grazing Displacement Management Plan
Value applied	8

Justification of choice of data or description of measurement methods and procedures applied	Value obtained from the Grazing Displacement Management Plan
Purpose of data	Calculation of baseline emissions Calculation of project emissions
Comments	NA

Data / Parameter	$Frac_{GAS,MD}$
Data unit	kg N volatilized/kg of N deposited
Description	Fraction of volatilization from manure and urine deposited by grazing animals as NH_3 and NO_x
Source of data	2019 IPCC Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value applied	Cattle: 0.212 Sheep: 0.212
Justification of choice of data or description of measurement methods and procedures applied	Due to detailed data are unavailable, the default value recommended by the 2019 IPCC Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories. According to the methodology, the project activities cannot involve the manure management system, so Table 8A.1, Chapter 11, Volume 4 is finally adopted.
Purpose of data	Calculation of baseline emissions Calculation of project emissions Calculation of leakage emissions
Comments	NA

Data / Parameter	$EF_{l,M}$
Data unit	kg CH_4/ (head · year)
Description	CH_4 emission factor from manure of livestock type *l*
Source of data	2019 IPCC Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value applied	Cattle: 0.6 Sheep: 0.6
Justification of choice of data or description of	Due to detailed data are unavailable, the default value recommended by the 2019 IPCC Refinement to the 2006 IPCC

measurement methods and procedures applied	Guidelines for National Greenhouse Gas Inventories. According to the methodology, the project activities involve the Pasture Range and Paddock management system, so Table 10.14, Chapter 10, Volume 4 is finally adopted.
Purpose of data	Calculation of baseline emissions Calculation of project emissions Calculation of leakage emissions
Comments	NA

Data / Parameter	$EF_{CO_2,k}$
Data unit	t CO_2/GJ
Description	CO_2 emission factor by fuel type *k*
Source of data	2019 IPCC Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value applied	Gasoline: 0.0693 Diesel: 0.0741
Justification of choice of data or description of measurement methods and procedures applied	Default value
Purpose of data	Calculation of project emissions
Comments	NA

Data / Parameter	NCV_k
Data unit	GJ/t fuel
Description	Thermal value of fuel type *k*
Source of data	2019 IPCC Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value applied	Gasoline: 44.3 Diesel: 43.0
Justification of choice of data or description of measurement methods and procedures applied	Default value
Purpose of data	Calculation of baseline emissions Calculation of project emissions

Comments	NA

Data / Parameter	$SOC_{S,Baseline}$
Data unit	t C/ha
Description	Baseline SOC stock in the top 30 cm of soil layer (or greater depth if required) in stratum *s*
Source of data	Laboratory test data
Value applied	Please refer to the ER calculation sheet for details.
Justification of choice of data or description of measurement methods and procedures applied	Option 2 (direct measurement approach) is applied to estimate project removals due to changes in SOC. Therefore, the project proponent must follow the procedures for the sampling and measurement of soil properties, including bulk density and organic carbon concentrations, that are outlined in Option 2 in Section 8.2.8 of the methodology VM0026 (version 1.1) to determine the value of $SOC_{S,Baseline}$, less than two years prior to the project start time. The project follows the nationally approved standard *The Technical Specification for Soil Environmental Monitoring* (HJ/T 166-2004)[54] for soil sampling, and follows the national standard *Method for Determination of Soil Organic Matter* (NY/T 1121.6-2006)[55] for measuring SOC of the soil samples.
Purpose of data	Calculation of baseline emissions
Comments	NA

Data / Parameter	$DMI_{day,l}$
Data unit	kg dm/(head · day)
Description	Daily dry matter intake requirement of each type of livestock *l*
Source of data	*Calculation of rangeland carrying capacity* (NY/T 635-2015), issued by the Ministry of Agriculture and Rural Affairs of the People's Republic of China
Value applied	Cattle: 8.1 Sheep: 1.8
Justification of choice of data or description of	Default value

[54] Issued by the Ministry of Ecology and Environment of the People's Republic of China in 2004. Available from the link below: https://www.mee.gov.cn/image20010518/5406.pdf

[55] Issued by the Ministry of Agriculture of the People's Republic of China in 2006.

measurement methods and procedures applied	
Purpose of data	Calculation of leakage emissions
Comments	NA

Data / Parameter	$ANPP_{GUI,REF}$
Data unit	t dm/ha
Description	Aboveground net primary productivity in the reference region that is the likely location of unidentified grasslands to which livestock are relocated
Source of data	Peer-reviewed study: Tian J, Xiong JN, Zhang YC, Cheng WM, He YC, Ye CC, HE W. Quantitative Assessment of the Effects of Climate Change and Human Activities on Grassland NPP in Altay Prefecture. Journal of Resources and Ecology, 2021, 12 (6): 748-748.
Value applied	1.89
Justification of choice of data or description of measurement methods and procedures applied	Value from published studies near the project region.
Purpose of data	Calculation of leakage emissions
Comments	NA

Data / Parameter	$H_{GUI,l,t}$
Data unit	Hours
Description	Average grazing hours per day during grazing season for livestock of each type *l* displaced to unidentified grassland in year *t*
Source of data	Survey of Grazing Displacement conducted by the project proponent and the Forestry and Grassland Bureaus.
Value applied	8
Justification of choice of data or description of measurement methods and procedures applied	Survey result
Purpose of data	Calculation of leakage emissions
Comments	NA

3.3.2 Data and Parameters Monitored

Data / Parameter	$P_{l,t}$
Data unit	Head
Description	Population of livestock type *l* under project in year *t*
Source of data	Project records
Description of measurement methods and procedures to be applied	The project proponent and the County Forestry and Grassland Bureau visit all the project participants every year to investigate the situation of the project. When distributing subsidies in every year, the local herders' grazing type, number of cattle and sheep grazed will be verified whether it meet the standards of our project management measures. The verification method is mainly based on the number of livestock in cowshed and sheepfold of herder's households. Then this part of the data will be recorded into an electronic file, which will be summarized by various grassroots units to the local forestry and grassland bureau.
Frequency of monitoring/recording	Annually
Value applied	The ex-ante values come from Grazing Displacement Management Plan. Please refer to the ER calculation sheet for details.
Monitoring equipment	NA
QA/QC procedures to be applied	Guidance provided in IPCC, 2003 Chapter 5 or IPCC, 2000 Chapter 8 is applied
Purpose of data	Calculation of project emissions
Calculation method	NA
Comments	NA

Data / Parameter	$H_{l,t}$
Data unit	Hours

Description	Average grazing hours per day of livestock type *l* during grazing season in year *t*
Source of data	Project records
Description of measurement methods and procedures to be applied	The project proponent and the County Forestry and Grassland Bureau visit all the project participants every year to investigate the situation of the project. When distributing subsidies in every year, the grazing time will be verified whether it meet the standards of our project management measures. The verification method is mainly based on questionnaire surveys and patrol records of grassland guardians. Then this part of the data will be recorded into an electronic file, which will be summarized by various grassroots units to the local forestry and grassland bureau.
Frequency of monitoring/recording	Annually
Value applied	The ex-ante value comes from Grazing Displacement Management Plan. Please refer to the ER calculation sheet for details.
Monitoring equipment	NA
QA/QC procedures to be applied	Guidance provided in IPCC, 2003 Chapter 5 or IPCC, 2000 Chapter 8 is applied
Purpose of data	Calculation of project emissions
Calculation method	NA
Comments	NA

Data / Parameter	$Days_{l,t}$
Data unit	Days
Description	Grazing days of lives tock *l* in year *t* under project
Source of data	Project records
Description of measurement methods and procedures to be applied	The project proponent and the County Forestry and Grassland Bureau visit all the project participants every year to investigate the situation of the project.

	When distributing subsidies in every year, the grazing time will be verified whether it meet the standards of our project management measures. The verification method is mainly based on questionnaire surveys and patrol records of grassland guardians. Then this part of the data will be recorded into an electronic file, which will be summarized by various grassroots units to the local forestry and grassland bureau.
Frequency of monitoring/recording	Annually
Value applied	The ex-ante value comes from Grazing Displacement Management Plan. Please refer to the ER calculation sheet for details.
Monitoring equipment	NA
QA/QC procedures to be applied	Cross-check with previous records. The survey must be reconducted if a significant change is observed.
Purpose of data	Calculation of project emissions
Calculation method	NA
Comments	NA

Data / Parameter	$W_{l,p}$
Data unit	kg
Description	Average weight of livestock under project
Source of data	Local expert judgment
Description of measurement methods and procedures to be applied	NA
Frequency of monitoring/recording	Recorded with each measurement taken
Value applied	Cattle: 300 Sheep: 45
Monitoring equipment	NA
QA/QC procedures to be applied	Cross-check with previous records. The survey must be reconducted if a significant change is observed.

Purpose of data	Calculation of project emissions
Calculation method	NA
Comments	NA

Data / Parameter	$FC_{p,j,k,t}$
Data unit	kg fuel
Description	Fuel consumption by type *k*, machine type *j*, parcel grassland *p*, in year *t* under project
Source of data	Project records
Description of measurement methods and procedures to be applied	The project proponent records the fossil fuel consumption.
Frequency of monitoring/recording	Recorded following each application of the machines that consume fossil fuel.
Value applied	The ex-ante value comes from the *Project Design Report*. Please refer to the ER calculation sheet for details.
Monitoring equipment	NA
QA/QC procedures to be applied	Guidance provided in IPCC, 2003 Chapter 5 or IPCC, 2000 Chapter 8 is applied
Purpose of data	Calculation of project emissions
Calculation method	NA
Comments	NA

Data / Parameter	$PA_{mG,s,i,t}$
Data unit	ha
Description	Project areas of grassland with management practice *mG* in stratum *s* in year *t*
Source of data	Project records

Description of measurement methods and procedures to be applied	Record the area of grassland with management practice *mG* in stratum *s*.
Frequency of monitoring/recording	Verify the management practice that has been implemented on each grassland parcel and report annually.
Value applied	The ex-ante value comes from the *Project Design Report*.
Monitoring equipment	NA
QA/QC procedures to be applied	Cross-check with previous records and satellite images.
Purpose of data	Calculation of project emissions
Calculation method	NA
Comments	NA

Data / Parameter	$SOC_{mG,s,i,t}$
Data unit	g C/kg soil
Description	SOC stock in the top 30 cm of soil (or greater depth if required) for management practice mG, stratum *s* (or greater depth if desired), sampling site *i*
Source of data	Project records
Description of measurement methods and procedures to be applied	Handling, storage, processing, measurement, and quality control of soil samples must follow scientifically established procedures such as the procedures described in Carter and Gregoroch, 2006, OECD, 1998, or nationally approved standards. Soil sampling based on the nationally-approved standard Soil Quality Guidelines for Soil Sampling Techniques (GB/T 361972018). The SOC measurement based on the nationally-approved standard Method for Determination of Soil Organic Matter (NY/T 1121.6-2006) was used to.
Frequency of monitoring/recording	At least once every five years, at the end of growing season in the year measured, until the end of the project crediting period.

Value applied	For ex-ante calculation, the growth rate of SOC would be 2.47% per year, which comes from literature sources[56]. Please refer to the ER calculation sheet for details.
Monitoring equipment	Soil sampler, electric furnace, test tube, oil bath pot, wire cage and dropper.
QA/QC procedures to be applied	The collection of soil samples for measuring SOC must be carried by suitably trained staff. The measurement of SOC will be carried out by a laboratory that can demonstrate adherence to the principles of good laboratory practices, outlined in OECD (1998).
Purpose of data	Calculation of project emissions
Calculation method	NA
Comments	NA

Data / Parameter	$BD_{mG,s,i,t}$
Data unit	g soil/cm^3
Description	Soil bulk density in the top 30 cm of soil (or greater depth if required) for management practice mG, stratum *s* (or greater depth if desired), sampling site *i*
Source of data	Project records
Description of measurement methods and procedures to be applied	Handling, storage, processing, measurement, and quality control of soil samples must follow scientifically established procedures such as the procedures described in Carter and Gregoroch, 2006, OECD, 1998, or nationally approved standards. The project follows the nationally approved standard *Soil Quality Guidelines for Soil Sampling Techniques* (GB/T 361972018) for soil sampling, and follows the national standard *Method for Determination of soil bulk density* (NY/T 1121.4-2006) for $BD_{mG,s,i,t}$ measurement.
Frequency of monitoring/recording	At least once every five years, at the end of growing season in the year measured, until the end of the project crediting period.

[56] Li Hong. Effects of Grazing on Plant and Soil Microbial Community Characteristics in Mountain Meadow on the Northern Slope of the Tianshan Mountain[D]. Xinjiang Agricultural University,2022.

Value applied	For ex ante calculation, the annual average increase in SOC is applied (refer to the previous parameter). This parameter is thus irrelevant in ex ante calculation.
Monitoring equipment	Soil sampler, electronic scale, drying oven.
QA/QC procedures to be applied	The collection of soil samples for measuring soil bulk density will be carried by suitably trained staff. The measurement of soil bulk density will be carried out by a laboratory that can demonstrate adherence to the principles of good laboratory practices, outlined in OECD (1998).
Purpose of data	Calculation of project emissions
Calculation method	NA
Comments	NA

Data / Parameter	$FC_{mG,s,i,t}$
Data unit	percent
Description	Percentage of rocks with a diameter larger than 2 mm, roots, and other dead residues in the top 30 cm of soil (or greater depth if desired), for management practice mG, stratum *s*, sampling site *i*
Source of data	Project records
Description of measurement methods and procedures to be applied	Handling, storage, processing, measurement, and quality control of soil samples must follow scientifically established procedures such as the procedures described in Carter and Gregoroch, 2006, OECD, 1998, or nationally approved standards. The project follows the nationally approved standard *Soil Quality Guidelines for Soil Sampling Techniques* (GB/T 361972018) for soil sampling. There is no nationally recognized standard for measuring $FC_{mG,s,i,t}$; therefore, the following research is applied: Xie yingge, Li xia. Research progress on determination methods of gravel content in soil[J]. Soils, 2012,44(1):17-22.
Frequency of monitoring/recording	At least once every five years, at the end of growing season in the year measured, until the end of the project crediting period.
Value applied	For ex ante calculation, the annual average increase in SOC is applied. This parameter is thus irrelevant in ex ante calculation.

Monitoring equipment	Soil sampler, electronic scale and sieve.
QA/QC procedures to be applied	The collection of soil samples for measuring $FC_{mG,s,i,t}$ will be carried by suitably trained staff. The measurement of $FC_{mG,s,i,t}$ will be carried out by a laboratory that can demonstrate adherence to the principles of good laboratory practices, outlined in OECD (1998).
Purpose of data	Calculation of project emissions
Calculation method	NA
Comments	NA

Data / Parameter	$Depth$
Data unit	cm
Description	Total soil depth, for calculating grassland SOC stock in the top 30 cm of soil (or greater depth if required)
Source of data	Project records
Description of measurement methods and procedures to be applied	The value for soil depth must be consistent with the measurements taken. Soil properties must be measured to the full depth of affected soil layer. Where the full depth of affected soil layer is not known, a minimum depth of 30 cm must be applied.
Frequency of monitoring/recording	Recorded with each measurement taken
Value applied	As the full depth of affected soil layers is not known, a depth of 30 cm is applied for the project.
Monitoring equipment	Soil sampler
QA/QC procedures to be applied	NA
Purpose of data	Calculation of project emissions
Calculation method	NA
Comments	NA

Data / Parameter	$P_{GUI,l,t}$

Data unit	Head
Description	Total population of livestock of each type relocated to unidentified grasslands in year *t*
Source of data	Project grazing records
Description of measurement methods and procedures to be applied	The numbers of grazing in unidentified grasslands are recorded annually as part of the project grazing records.
Frequency of monitoring/recording	Annually
Value applied	Please refer to the ER calculation sheet for details.
Monitoring equipment	NA
QA/QC procedures to be applied	Guidance provided in IPCC, 2003 Chapter 5 or IPCC, 2000 Chapter 8 is applied
Purpose of data	Calculation of project leakage
Calculation method	NA
Comments	NA

Data / Parameter	$Days_{GUI,l,t}$
Data unit	days
Description	Days that the population of each type of relocated livestock of type *l* graze in unidentified grassland in year *t*
Source of data	Project grazing records
Description of measurement methods and procedures to be applied	The numbers of days livestock of each type graze in unidentified grassland are recorded as part of the project grazing records.
Frequency of monitoring/recording	Annually
Value applied	105
Monitoring equipment	NA

QA/QC procedures to be applied	Guidance provided in IPCC, 2003 Chapter 5 or IPCC, 2000 Chapter 8 is applied
Purpose of data	Calculation of project leakage
Calculation method	NA
Comments	NA

3.3.3 Monitoring Plan

1. Operation and management structure

The project proponent hires local herders and community members (monitoring staff and auditing staff) for daily supervision and data management during the project implementation while the office manager oversees the whole working group. A monitoring team has been established by National Forestry and Grassland Administration Northwest Investigation and Planning Institute to carry out the monitoring work.

The responsibilities of each role in the team structure are:

- **Monitoring manager** has the overall management responsibility, especially supervising the implementation of the monitoring plan, and assigning each member of the monitoring team their individual responsibility during the monitoring.
- **Expert group** provides professional advice related to monitoring activities to make sure all the monitoring activities meet the requirements of VCS and CCB standards and the monitoring plan. The expert group also reviews the monitoring results before each verification. If any non-conformance is observed, the expert group will ask the monitoring team to take necessary measures (for example, repeating some of the monitoring activities or calculation) until all the non-conformances are corrected.
- **Monitoring group** conducts the following monitoring process, measures the required parameters of the project as listed in Section 3.3.2 particularly, and collects all the original evidence and data and make relevant records.
- **Auditing group** performs internal verification of the measurement, reviews all the monitoring records and documents, cross-checks evidence and calculates emission removals during each verification period.

A Monitoring Manual will be provided to each of the monitoring team members with detailed explanations; a training workshop will be held for the monitoring team members in order to ensure all members fully understand the purposes, contents, procedures and specific methods of the monitoring process.

Before each verification, the detailed monitoring plan will be reviewed by the expert group from the project proponent and National Forestry and Grassland Administration Northwest Investigation and Planning Institute, and then the monitoring activities will be scheduled. The project proponent is responsible for ensuring that monitoring is implemented in line with the monitoring plan. If any non-

conformance is observed, the expert group will require the monitoring team to take necessary measures (redo some of the monitoring activities or calculation) until all the non-conformances are corrected. If part of the monitoring plan is unable to be implemented, or the monitoring would permanently deviate from the applied methodologies, the applied standardized baselines, or the other applied methodological regulatory documents, the project participants shall describe the nature and extent of the non-conforming monitoring in a revised monitoring plan and submit it to Verra to request a change of the monitoring plan.

2. Monitoring process

1) Monitoring of the applicability conditions listed in methodology

As mentioned in Section 3.2, the methodology VM0026 (version 1.1) "Sustainable Grassland Management" is applicable under the following conditions:

- The project area is grassland at the start of the project. The project area is land that is degraded at the start of the project and degradation will continue under the baseline scenario on the basis that degradation drivers or pressures are still present under the baseline scenario. The procedures outlined in the latest version of the CDM Tool for Identification of Degraded or Degrading Lands for Consideration in Implementing CDM A/R Project Activities must be used to determine both that the land is degraded at the start of the project and that under the baseline scenario the land will continue to degrade.
- The project area is subject to livestock grazing, burning, and/or nitrogen fertilization under the baseline scenario.
- Under the baseline scenario, more than 95 percent of animal dung from grazing animals deposited on grassland is allowed to lie as is, and is not managed, and in the project scenario no more than 5 percent of the animal dung from grazing animals within the project area is managed with alternative manure management systems.
- According to the analysis in Section 3.2, all the conditions are applicable at the start of the project activity due to the baseline survey. During the following verification, the project proponent should monitor the possible change of the project boundary, if there is a change to the project boundary, the applicability conditions should be re-assessed for the changed project area.

Step 1: Monitoring of boundary

The coordinates of the project boundary should be measured and managed strictly in accordance with regulations, and saved in GIS files. Boundary information needs to be stored in both electronic and printed versions by the project proponent, and the other project participants should keep a backup. Files need to be saved at least two years after the end of the crediting period.

In order to obtain valid and reliable boundary information, the monitoring team must use GPS or other verifiable methods to verify the project boundary and to determine the actual boundaries of sustainable grassland management. If the actual boundary is larger than the boundary in the project design, the excess section is not included in the project boundary; instead, if the actual border boundary is smaller than the boundary in the project design, the project boundary should be based

on the actual boundary. Any change in the boundary must be located by GPS or appropriate spatial data (e.g., satellite imagery).

Step 2: Go through applicability checklist

If there is any change in the boundary, the monitoring team will go through a specific checklist of the applicability conditions and records all relevant results for each monitoring period.

In case of any non-conformance of the applicability conditions, the expert group should evaluate the situation and submit the deviation or change to the methodology to Verra for approval.

2) Monitoring of project implementation

Information must be provided, and recorded in the project description to establish:

A record of the grazing agents (e.g., herder households) involved the project.

- The project proponent should record each household involved in the sustainable grassland management project (including area, type, grassland degradation level, livestock species and numbers, etc).
- Each household should be given a unique ID. Their name, location of their land, and date of entering into the agreement and leaving the agreement should be recorded.

A record of the geographic location of the project area for all areas of grassland.

- The geodetic coordinates of the project area (and any stratification inside the area) must be established, recorded and archived. This can be achieved by field survey (e.g., using GPS), or by using geo-referenced spatial data (e.g., maps, GIS datasets).

A record of grassland management

- The grassland management plan, together with a record of the plan as actually implemented during the project crediting period must be available for validation and verification.
- Subsidies received by each household in the project area due to sustainable management measures.

3) Recording of data and parameters monitored

The following parameters must be recorded and monitored during the project. When applying the equations provided in the methodology VM0026 (version 1.1) for the ex-ante calculation of net anthropogenic GHG removals by sinks, the project proponent must provide transparent estimations for the parameters that are monitored during the project crediting period. These estimates must be based on measured or existing published data where possible and the project proponent must apply a conservative approach: that is, if different values for a parameter are equally plausible, a value that does not lead to over-estimation of net anthropogenic GHG removals by sinks must be selected.

For the estimate of annual CH_4 emissions from enteric fermentation, population of livestock type *l* and grazing days of livestock type *l* must be recorded annually during the project crediting period.

For the estimate of annual CH_4 and N_2O emissions from manure deposition during grazing, grazing days of livestock of type *l*, and average grazing hours per day of livestock type *l* during the grazing season must be recorded in every grazing season, in each year during the project crediting period.

For the estimate of annual CO_2 emissions due to the use of fossil fuels for SGM, the following parameters must be recorded at each time a management practice using machines is adopted and reported annually during the project crediting period:

- Quantity of fuel consumption;
- Fuel type;
- Machine type.

To estimate project removals due to changes in SOC, the following parameters must be monitored at least once every five years during the project crediting period. The soil sampling, handling and storage, processing and measurement, and quality control procedures implemented in soil organic carbon analysis that follow a scientific peer-reviewed or nationally approved standard.

- SOC content;
- Soil bulk density;
- Percentage of rocks with a diameter larger than 2 mm, roots and other dead residues;
- Carbonate content.

As mentioned in Section 3.2, the project uses Option 2 (direct measurement approach) to determine project removals due to changes in SOC, and the sampling procedures have been designed such that the statistical significance of soil carbon stock changes between the baseline carbon stock and the carbon stock in year *t* can be determined with a 95 percent confidence interval. "Guidelines for sampling and surveys for CDM project activities and programmes of activities" (version 04.0) is followed to determine the sampling procedure and sample size.

For the estimate of leakage emissions, the monitoring parameters required in the VCS modules VMD0040 Estimation of Leakage Emissions from Displacement of Grazing Activity due to Implementation of Sustainable Grassland Management Activities must be recorded annually during the project crediting period.

- Total population of each type of livestock *l* displaced to unidentified grasslands
- Number days that livestock of each type *l* graze on unidentified grasslands
- Area required to sustain the population of livestock displaced to unidentified grasslands
- Aboveground net primary productivity in the unidentified grasslands

4) Sampling design and stratification

As mentioned above, project removals due to changes in SOC will be determined by Option 2 (direct measurement approach); the nationally approved standards *The Technical Specification for*

Soil Environmental Monitoring (HJ/T 166-2004)[57] and *Method for Determination of Soil Organic Matter* (NY/T 1121.6-2006)[58] will be followed.

Due to the heterogeneity of soil carbon, stratification of the project area into relatively homogeneous units can either increase the measuring precision without increasing the cost unduly or reduce the cost without reducing measuring precision because of the lower variance within each homogeneous unit.

According to the methodology VM0026 (version 1.1), four main requirements should be met before the stratified sampling is chosen:

- Population must be stratified in advance of the sampling.

=> The project area has been stratified before sampling.

- Classes must be exhaustive and mutually exclusive (i.e., all elements of the population must fall into exactly one class).

=> For the project, a class corresponds to a specific grassland management practice and grassland degradation level; the classification is exhaustive and mutually exclusive and all grasslands in the project area fall into exactly one class.

- Classes must differ in the attribute or property under study, otherwise there is no gain in precision over simple random sampling.

=> The accumulation of soil carbon is closely related to grassland management practice; also, degraded grasslands have different potential in soil carbon increase depending on their initial degradation level (severe, moderate or light). For the project, the stratification is based on overall consideration of the grassland degradation level and management practice.

- Selection of items to represent each class (i.e., the sample drawn from each class) must be random.

=> The locations of the sample sites were set by systematic sampling with a random start. For each stratum, use GIS to set random start plots, and then set the constraint boundary for the other plots (within the range of the certain stratum and the horizontal and vertical distances from the boundary should be no less than 30 meters).

Table 3.7 Ex ante stratification of the project

Stratum	Area (hectares)	Soil texture	Management practice
S1	7,366.7	Sandy loam	Fence installation, grass planting, and grazing prohibition

[57] Issued by the Ministry of Ecology and Environment of the People's Republic of China in 2004. Available from the link below: https://www.mee.gov.cn/image20010518/5406.pdf

[58] Issued by the Ministry of Agriculture of the People's Republic of China in 2006.

S2	131,053.3	Sandy	Grazing prohibition
S3	194,240	Sandy loam	Grazing prohibition
Total	332,660		

Updating of strata

The ex-post stratification must be updated due to the following reasons:

- Unexpected disturbances occurring during the project crediting period (e.g., due to fire, pests or disease outbreaks), affecting differently various parts of an originally homogeneous stratum;
- Grassland management activities (different grazing approaches) may be implemented in a way that affects the existing stratification.

Established strata may be merged if reasons for their establishment have disappeared.

Sampling framework

"Guidelines for sampling and surveys for CDM project activities and programmes of activities" (version 4.0) should be followed to determine the sampling procedure and sample size.

According to "Guidelines for sampling and surveys for CDM project activities and programmes of activities" (version 4.0), the project proponents may use the sample size calculator available in the CDM website.

The project monitoring team have randomly selected 6 preliminary sample plots for each stratum, following which, the mean SOC and the standard deviation of SOC in each stratum were estimated. The final number of sample plots were then calculated based on the results from the preliminary samples.

5) Monitoring for leakage emissions

For the estimate of leakage emissions, the monitoring parameters required in the VCS modules VMD0040 Estimation of Leakage Emissions from Displacement of Grazing Activity due to Implementation of Sustainable Grassland Management Activities must be recorded annually during the project crediting period.

3. Monitoring frequency

The monitoring of the project implementation will take place at least every five years after the project registration in order to ensure the continuity of the benefits. Periodic verification of the project benefits will take place at least every five years.

4. Data management

All information and data collected as part of monitoring must be archived electronically by the project proponent; all the material must have a physical copy for backup. All data collected shall be archived for a period of at least two years after the end of the last crediting period.

5. QA/QC procedures

Training will be provided to the staff to guarantee the implementation of the monitoring plan, all the relevant staff are obliged to take the training courses before the monitoring starts.

The monitoring team will check the monitoring equipment regularly to ensure that they are in good condition before each monitoring activities.

If part of the validated monitoring plan fails to be conducted during the following monitoring process, an updated monitoring plan should be submitted to VVB during the corresponding verification by indicating any deviation from the original plan and the reason for the deviation.

All soil samples need to be backed up. If there is a problem with the testing equipment or the data is abnormal, the test of the soil sample must be performed again.

3.3.4 Dissemination of Monitoring Plan and Results (CL4.2)

The monitoring plan and results of each verification event will be made publicly available on the Verra Registry so that they can be easily downloaded by stakeholders. Also, the summary of the project description in Chinese and the summary of the monitoring report in Chinese for each verification event will be disseminated to local communities by the local government. At the same time, public notice boards in each village will be used to publicize the information regarding how to access to the monitoring plan and results on the internet. Technical staff from the Forestry and Grassland Bureaus will explain the monitoring plan to local villagers, especially to those who are illiterate or unable to speak Mandarin. In addition, the phone number of the contact person is made known during regular village meetings so that any stakeholder can directly contact the project proponent when they wish so. The monitoring team should collect and read all the comments received from stakeholders and answer their questions regarding the monitoring plan and results.

3.4 Optional Criterion: Climate Change Adaptation Benefits

Not applicable.

3.4.1 Regional Climate Change Scenarios (GL1.1)

Not applicable.

3.4.2 Climate Change Impacts (GL1.2)

Not applicable.

3.4.3 Measures Needed and Designed for Adaptation (GL1.3)

Not applicable.

4 COMMUNITY

4.1 Without-Project Community Scenario

4.1.1 Descriptions of Communities at Project Start (CM1.1)

Fuyun covers a total land area of 3,369,960 hectares. About 92.4% of the total land area (3,113,427 hectares) is agricultural land (including grassland, cultivated land, and wooded land). The overwhelming majority of the agricultural land is grassland (3,034,876 hectares), accounting for 90.1% of the agricultural land, or 83.2% of the total land area. The rest is wooded land and cultivated land, accounting for 8.3% and 1.6% of the agricultural land, respectively. About 7.6% of the total land area (256,532 hectares) is classified as “other land” and the land for construction uses, including urban and rural residential areas, road water surface, sand dunes, and gullies.

Animal husbandry is the most important agricultural activity. The project activities affect only the agricultural land used for animal husbandry in the project zone.

Well-being information

The total GDP of the county was 6.557 billion RMB in 2020, of which the added value of the primary industry was 610.9 million RMB, the added value of the secondary industry was 4.163 billion RMB, and the added value of the tertiary industry was 1.782 billion RMB. The total output value of farming, forestry, animal husbandry, and fishery in the county was 1.05 billion RMB. For farming, wheat, maize, and beans are the most important crops. The grain output in the project zone is 13,7974,000 kg. Animal husbandry, on the other hand, is more closely related to the project. There were around 928,100 sheep and cattle raised by animal husbandry households in the project zone at the end of 2020.

There are 50 kindergartens, 10 primary schools, 4 middle schools, 1 high school, and 1 vocational school in the project zone.

There are 89 public medical and health institutions in the project zone, including 4 county-level institutions (1 county hospital, 1 disease prevention and control center, 1 maternal and child health institution, and 1 animal husbandry hospital), 9 township health centers, 5 community health service stations and 71 village clinics. There are 1 private hospital and 23 private clinics. There are 530 medical beds and 662 medical professionals (including doctors, nurses, and other professionals).

At the project start, grazing was the traditional livelihood for local residents, and there were not many other job opportunities offered. Local women used to stay at home doing housework, and most of them had no income. The per capita disposable income of farmers and herdsmen is 16,260 RMB, which is much lower than that of developed areas. Overgrazing is the main factor leading to grassland degradation, which may reduce grazing productivity and is not conducive to increasing the income of local herders in the long-term.

Natural grassland is an important part of the ecological system in Fuyun County, which has irreplaceable functions in improving the regional ecological environment, maintaining soil and water, preventing wind and fixing sand, regulating climate, and so on. At the same time, it is also an important means of production of grassland animal husbandry and plays an important role in promoting the economic development of pastoral areas.

Increasing the income of farmers and herdsmen is the most prominent problem in the rural economic development of Fuyun County. The natural grassland is the main economic resource of the pastoral area in Fuyun County. Before the economic structure of the pastoral area had been fundamentally improved and the non-agricultural industry had not been fully developed, grassland animal husbandry was still the primary source of income increase of herdsmen over a long period, but the grassland degradation has seriously restricted the economic development of the pastoral area.

Community characteristics

Kazakh is one of the world's most famous nomads. This is mainly because the herders usually have to raise hundreds of cattle and sheep to survive, so they need to constantly choose pastures to meet the supply of cattle and sheep. When they settle down in a place, they check out the local pasture, water resources, etc. Herdsmen generally follow the natural and do not wait until the surrounding grass has been eaten up before moving. In order to resist the harsh winter, for the circulation of the grassland, but also for their own cattle and sheep to survive, they forage for water, grass and raise cattle. Moreover, such a traditional transition life has continued for nearly 3,000 years, the history of the Kazakh is written in nomadism.

The total population in the project zone was 96,157 by the end of 2020. Fuyun is a multi-ethnic county, including Han, Kazakh, Hui, Mongolian, etc. The local languages are mainly Mandarin and Kazakh.

A variety of cultural traditions and practices flourish in the project zone. Horse racing is a national intangible cultural heritage project. Provincially recognized intangible cultural heritages include Kazakh traditional embroidery, Qiaxiu, Diaoyang, and Bata.

Diversity within the community

Among the 96,157 people living within the project zone, 50.28% were male and 49.72% were female. The urbanization rate is 30.33%. There are 29 ethnic groups in the project zone, including Han, Kazakh, Hui, Mongolian, etc. Kazakhs are the most populous ethnic group, followed by Han people. Among them, Kazakhs accounted for 74.39% (71,536 people) of the total population, and Han people accounted for 20.59% (19,797 people) of the total population.

4.1.2 Interactions between Communities and Community Groups (CM1.1)

The community groups of the project including Local residents, local women, local herders, grassland guardians, village collectives, and other stakeholders were barely active. Before the implementation of the project, local residents lived by grazing, and most of the female rural workers had to stay at home with no income. Other community groups are far from the project area. So, the interaction between community groups was considered incipient and/or superficial due to the

geographic distance and the absence of common activities to be carried out jointly by the communities.

Due to a limited amount of job opportunities, some young community members have to leave their communities for large cities to work as migrant workers, leaving many of the elderly at home without a stable income. Also, the interaction between community groups could be described as incipient and/or superficial due to the geographic distance and the absence of common activities to be carried out jointly by the community groups.

4.1.3 High Conservation Values (CM1.2)

No HCVs related to community well-being in the project zone have been identified.

4.1.4 Without-Project Scenario: Community (CM1.3)

At the start of the project, local herders lived by grazing, and the grassland will continue to degrade due to overgrazing. So, the local community will stay at the current well-being level with no potential income increase.

In addition, without the implementation of the project, the traditional livelihood of local Kazakh herding and grazing would be continuously threatened by the degradation of the grassland ecosystem, which will further affect the development of local animal husbandry and tourism. Due to the lack of a new economic growth engine, local medical, educational, and cultural undertakings cannot develop better. Therefore, the well-being of the community may deteriorate further.

4.2 Net Positive Community Impacts

4.2.1 Expected Community Impacts (CM2.1)

As identified in Section 2.1.8, the following stakeholder groups will be affected by the project.

1) Local residents

1.1 Local herders (Kazakhs and other minority ethnic groups)

1.2 Local women

1.3 Workers involved in grass planting and fence installation

1.4 Grassland guardians

2) Village collectives

3) Government agencies

3.1 Altay Forestry and Grassland Bureau

3.2 Fuyun Forestry and Grassland Bureau

3.3 Other government agencies

4) Other stakeholder groups

4.1 Scientific research institutions

4.2 Tourism companies

Among them, local residents, village collectives, and government agencies are considered "communities" [59] or "community groups" [60], while scientific research institutions and tourism companies are "other stakeholders"[61], according to *CCB Program Definitions* version 3.0.

The outputs, outcomes and impacts of the project have been discussed with the Theory of Change in Section 2.1.11.

With a variety of measures implemented, the project will reverse grassland degradation, and improve fertility and other conditions of the grassland which is vital to the livelihood of local residents (mostly Kazakhs) who live on grazing animals, hence ensuring their long-term living conditions as well as preservation of their cultural traditions. By providing both temporary and permanent employment opportunities, the project brings income to workers and grassland guardians that will improve their livelihoods. Particularly, as the least privileged households are favored in grassland guardian employment, the project lifts some community members out of poverty; as men and women will enjoy the same job opportunities, gender equality will also be improved.

In addition, training sessions related to grassland management provided to local communities will improve the employability of trained participants; the training sessions will also contribute to the awareness about sustainable development amongst community members, who will in turn help preserve their living environment and natural habitats.

Community Group	Local herders (Kazakhs and other minority ethnic groups)
Impact(s)	Improvement in grassland conditions, improvement in living conditions
Type of Benefit/Cost/Risk	Predicted direct benefits
Change in Well-being	Subsidies are provided to herder households for complying with the guidance from the project proponent. Job opportunities, both temporary jobs (grass planting, fence installation) and permanent jobs (grassland guardians), are created due to the project.

[59] All groups of people—including Indigenous Peoples, mobile peoples and other local communities—who derive income, livelihood or cultural values and other contributions to well-being from the project area at the start of the project and/or under the with-project scenario.

[60] Groups whose members derive similar income, livelihood and/or cultural values and other contributions to well-being from the Project Area and whose values are different from those of other groups.

[61] All groups are other than communities that can potentially affect or be affected by the project activities and who may live within or outside the project zone.

	Also, grassland degradation will be reversed and grassland conditions will be improved, allowing for long-term grazing and better preservation of their traditional lifestyle.

Community Group	Local women
Impact(s)	Improvement in grassland conditions, improvement in living conditions, improvement in gender equality
Type of Benefit/Cost/Risk	Predicted direct benefits
Change in Well-being	Subsidies are provided to herder households for complying with the guidance from the project proponent. Job opportunities, both temporary jobs (grass planting, fence installation) and permanent jobs (grassland guardians), are created due to the project. Gender equality is one of the core principles in employing workers. Also, grassland degradation will be reversed and grassland conditions will be improved, allowing for long-term grazing and better preservation of their traditional lifestyle.

Community Group	Workers involved in grass planting and fence installation
Impact(s)	Improvement in living conditions, improvement in grassland-related capabilities
Type of Benefit/Cost/Risk	Predicted direct benefits
Change in Well-being	Local community members employed as workers in grass planting and fence installation will receive a payment of 200 RMB per day for their work. They also receive training regarding the project activities and sustainable grassland management.

Community Group	Grassland guardians
Impact(s)	Improvement in living conditions, improvement in grassland-related capabilities
Type of Benefit/Cost/Risk	Predicted direct benefits
Change in Well-being	It is estimated that 898 local herders would be employed as grassland guardians with an annual salary of 23,400 RMB per person. They also receive training regarding the project activities and sustainable grassland management.

Community Group	Village collectives
Impact(s)	Improvement in grassland conditions, poverty reduction

Type of Benefit/Cost/Risk	Predicted direct benefits
Change in Well-being	The project will not change the ownership of the project land, but some herders are affected by the project, due to grazing was strictly forbidden. However, herders in the project area can receive corresponding subsidies for the prohibition of grazing and according to the stakeholder consultation, all of the local herders are satisfied with this subsidy policy, and the herders could conduct grazing outside of the project area under related guidance of local Forestry and Grassland Bureau. The related leakage emission from the displacement of grazing activities has also been taken into account. The project will restore the degraded grassland and improve grassland productivity, thus allowing for long-term grazing and better preservation of the local traditional lifestyle. Also, the job opportunities, especially long-term jobs as grassland guardians, will mainly be provided to the least privileged households and hence contribute to poverty reduction.

Community Group	Altay Forestry and Grassland Bureau
Impact(s)	Improved experience in grassland restoration projects
Type of Benefit/Cost/Risk	Predicted indirect benefits
Change in Well-being	They assist and participate in routine management during the implementation phase of the project. In doing so, they will gain experience and capability in community engagement, stakeholder consultation, monitoring activities and other issues regarding the management of grassland restoration projects (especially for arid areas), which will be useful for similar projects in the future.

Community Group	Fuyun Forestry and Grassland Bureau
Impact(s)	Improved experience in grassland restoration projects
Type of Benefit/Cost/Risk	Predicted indirect benefits
Change in Well-being	Fuyun Forestry and Grassland Bureau is responsible for the supervision and management of local grassland and ecological construction, the project implementation could help them to improve local environmental situations. Restore the degraded grassland and alleviated the grassland ecological crisis.

Community Group	Other government agencies
Impact(s)	Improved experience in grassland restoration projects

Type of Benefit/Cost/Risk	Predicted indirect benefits
Change in Well-being	They supervise the overall impacts of the project in environmental and social aspects, to ensure that the project implementation complies with all applicable laws and regulations at all stages of its lifetime. During the process, they will also gain experience and capability related to grassland restoration projects, which will be useful for similar projects in the future. Create 5,084 job opportunities (898 permanent jobs and 4,186 temporary jobs) which solve employment issues.

4.2.2 Negative Community Impact Mitigation (CM2.2)

For the herders whose area of grazing is reduced due to grazing control measures of the project, the Forestry and Grassland Bureaus measure the grass yield of surrounding grassland parcels outside of the project area and guide the herders to graze in areas in a reasonable manner, so that the project will not affect herders' grazing and income.

Meanwhile, the project proponent and the Forestry and Grassland Bureaus promised the herders that they would receive subsidies if they agreed to comply with grazing control management as part of the project implementation.

In addition, no HCVs related to community well-being have been identified in the project zone. Therefore, all the negative well-being impacts have been mitigated.

4.2.3 Net Positive Community Well-Being (CM2.3, GL1.4)

Section 4.2.1 shows the anticipated benefits / positive impacts of the project for all identified community groups; Section 4.2.2 shows that potential costs and risks have been mitigated.

Therefore, the anticipated net well-being impacts of the project are predicted to be positive. Specifically, the project brings the following benefits:

Preserving local grassland conditions

The implementation of the project will restore 332,660 ha of degraded grassland and prevent it from further degradation, allowing local herders to make use of local grassland resources sustainably.

Improving family incomes of local residents

The project provides job opportunities to local communities, including both temporary jobs (grass planting, fence installation) and permanent jobs (grassland guardians). All employees taking the jobs will receive corresponding payment. It is estimated that 898 people will be employed as long-term grassland guardians and will receive an annual salary of 23,400 RMB per person. Also, sustainable grazing is conducive to the protection of grassland and could increase the total production of herding and maintain a long-term benefit for local herders.

In addition, local tourism could also benefit from the higher aesthetic value of the improved grassland, and they could have the opportunity to increase their income in the tourism business in the future.

Benefit to the conservation of traditional Kazakh culture

As mentioned in Section 4.1.1, The project is located in Fuyun County where the local Kazakhs comprise a large proportion (74.39%) of the total population. The traditional livelihood of local Kazakh is herding and grazing which has been threatened by the degradation of the grassland ecosystem. The implementation of the project will restore the ecosystem of the traditional grassland for local Kazakhs which is beneficial to the conservation of the traditional culture. In addition, the job and training opportunities provided by the project could bring more opportunities for local Kazakh to work together and organize more social activities and hence increase the interaction within the community.

Improving gender equality

There is evidence that when women receive income, positive welfare outcomes are more likely: gender equity can thus be key to wider poverty and equity impacts. The project provides equal job opportunities to men and women, which is of particular importance to women who would otherwise only stay at home doing traditional housework.

Establishing technical capability of local residents

Regular training sessions will be organized to provide technical capability building among community members. The technical skills and knowledge that they receive from the project include grassland management, rodent prevention and control, forage growth improvement, etc. These skills will benefit the long-term development of the local communities.

4.2.4 High Conservation Values Protected (CM2.4)

Not applicable, as no HCVs related to community well-being in the project zone have been identified.

4.3 Other Stakeholder Impacts

4.3.1 Impacts on Other Stakeholders (CM3.1)

“Other stakeholders” identified for the project include scientific research institutions and tourism companies. The project does not harm the well-being of other stakeholders. Instead, it could provide grassland data and information for scientific research and tourism opportunities for these two stakeholder groups, respectively.

4.3.2 Mitigation of Negative Impacts on Other Stakeholders (CM3.2)

The project will not lead to negative well-being impacts on other stakeholders; therefore, mitigation measures are not required.

4.3.3 Net Impacts on Other Stakeholders (CM3.3)

As stated in Section 4.3.1 and Section 4.3.2, the project does not lead to negative impacts on other stakeholders, and it could provide potential benefits to them. Therefore, it is anticipated that the project will have neutral or positive net impacts on other stakeholders.

4.4 Community Impact Monitoring

4.4.1 Community Monitoring Plan (CM4.1, CM4.2, GL1.4, GL2.2, GL2.3, GL2.5)

The impacts identified with the Theory of Change refer mainly to long-term changes, according to the *Social and Biodiversity Impact Assessment (SBIA) Manual* (part 1 – Core Guidance for Project Proponents), which recommends project proponents identify and monitor short- and medium-term changes in the form of project outputs and outcomes, or indicators derived from these rather than try to track longer-term impacts from the outset.

For the project, quantitative indicators derived from the outputs/outcomes/impacts have been developed as variables to be monitored in the monitoring plan, under the guidance of *SBIA Manual* Part 1. Table 4.1 gives a brief introduction of the indicators to be monitored and the associated monitoring methods.

Table 4.1 Brief introduction of the community monitoring plan

Impact	Indicator	Indicator type	Data collection method	Who?	When?	Where?	Cost to project
Improvement in living conditions	- Number of residents who participated in temporary jobs - Number of residents employed in permanent jobs	Output	Working contracts	Project proponent	Before every verification	Communities	Low
	- Payment received for working in temporary jobs - Salaries received by grassland guardians	Output	Payment records	Project proponent	Before every verification	Communities	Low
Poverty reduction	- Number of residents employed in permanent jobs - Salaries received by grassland guardians	Output	Working contracts and payment records	Project proponent	Before every verification	Communities	Low
Improvement in grassland-related capabilities	- Number of training sessions - Number of people who participated in the training sessions	Output	Training records	Project proponent	Before every verification	Communities	Low
Improvement in gender equality	- Number of women who participated in temporary jobs, and the percentage in the total number - Number of women employed in permanent jobs, and the percentage in the total number	Output	Working contracts	Project proponent	Before every verification	Communities	Low
	- Payment received by women for working in temporary jobs - Salaries received by female grassland guardians	Output	Payment records	Project proponent	Before every verification	Communities	Low

	- Percentage of women who have perceived improvement in gender equality	Outcome	Questionnaire survey, interviews	Project proponent	Before every verification	Communities	Medium
Improvement in grassland conditions	- SOC change in grassland soil	Outcome	Soil sampling and testing	Project proponent	Before every verification	In conjunction with climate monitoring	Medium
	- Percentage of people who have perceived improvement in grassland conditions	Outcome	Questionnaire survey, interviews, group discussions	Project proponent	Before every verification	Communities	Medium
Improved experience in grassland restoration projects	- Percentage of people who have gained experience and knowledge in afforestation projects	Outcome	Questionnaire survey, interviews, group discussions	Project proponent	Before every verification	Government agencies	Medium

A detailed community monitoring plan has been developed to fully understand the social-economic changes resulting from the project activities, and to address issues raised and difficulties encountered during the project implementation as well as opinions and comments from the communities on the project activities. The community monitoring process emphasizes the participation of community members, adopts participatory procedures, and will be conducted every five years after initial monitoring, as described below.

Procedures:

a) Establishing a community monitoring team. The responsibilities of each role in the team are:

- **Monitoring manager** has the overall management responsibility, especially supervising the implementation of the monitoring plan, and assigning each member of the monitoring team their individual responsibility during the monitoring.
- **Expert group** provides professional advice related to monitoring activities to make sure all the monitoring activities meet the requirements of VCS and CCB standards and the monitoring plan. The expert group also reviews the monitoring results before each verification. If any non-conformance is observed, the expert group will ask the monitoring team to take necessary measures (for example, repeating some of the monitoring activities or calculations) until all the non-conformances are corrected.
- **Monitoring group** conducts the following monitoring process, measures the required parameters of the project as listed in Section 3.3.2 particularly, collects all the original evidence, and data and makes relevant records.
- **Auditing group** performs internal verification of the measurement, reviews all the monitoring records and documents, cross-checks evidence, and calculates emission removals during each verification period.

b) Standard operation procedures (SOPs) will be developed, and the SOPs are compiled into a Monitoring Manual;

c) Training: The Monitoring Manual will be provided to each of the monitoring team members with detailed explanations; a training workshop will be held for the monitoring team members in order to ensure all members fully understand the purposes, contents, procedures and specific methods of the monitoring process;

d) Preparation: all villages involved will be informed about the monitoring plan and monitoring schedule before the survey.

e) The community monitoring will be conducted following the Monitoring Manual and the SOPs.

Methods:

a) Village meetings: a meeting of villager representatives will be held in each of the villages sampled. The general agenda are:

(i) Introducing the community monitoring team members and the purpose, procedures, methods and schedules of the monitoring process;

(ii) Explaining how villagers will participate in the process;

(iii) Collecting information regarding the project progress, social-economic and environmental benefits resulting from the project, existing problems/difficulties encountered by local communities during the project implementation, as well as comments and suggestions on the project improvement.

b) Semi-structured interviews: this includes VIP interviews, household interviews, and group interviews.

(i) VIP interviews: including village leaders, distinguished villagers, elderly villagers, and heads of minority ethnic groups.

(ii) Household interviews: some households will be selected for the interview. The interviews shall cover households of different income levels (both well-off ones and poor ones).

(iii) Group interviews: villagers are grouped based on their belonging to one of the stakeholder groups. The group interviews will be conducted as part of the village meetings.

c) Questionnaires: Questionnaire forms will be developed and distributed among different stakeholders, including members from all the stakeholder groups identified previously.

4.4.2 Monitoring Plan Dissemination (CM4.3)

The community monitoring plan and monitoring results for each verification will be published on the Verra Registry so that any stakeholder can easily download them. Printed copies of the monitoring manual and monitoring report summaries will be distributed among local stakeholders by the Forestry and Grassland Bureaus and the project proponent. At the same time, public bulletin boards are used to publicize information regarding how to access the monitoring results through the internet. Technical staff from the Forestry and Grassland Bureaus will explain the monitoring manual and results to local villagers, especially those who are illiterate or unable to speak Mandarin. Also, the phone number of a contact person has been published in case any stakeholder wants to directly contact the project proponent and raise opinions.

4.5 Optional Criterion: Exceptional Community Benefits

Not applicable.

4.5.1 Exceptional Community Criteria (GL2.1)

Not applicable.

4.5.2 Short-term and Long-term Community Benefits (GL2.2)

Not applicable.

4.5.3 Community Participation Risks (GL2.3)

Not applicable.

4.5.4 Marginalized and/or Vulnerable Community Groups (GL2.4)

Not applicable.

4.5.5 Net Impacts on Women (GL2.5)

Not applicable.

4.5.6 Benefit Sharing Mechanisms (GL2.6)

Not applicable.

4.5.7 Benefits, Costs, and Risks Communication (GL2.7)

Not applicable.

4.5.8 Governance and Implementation Structures (GL2.8)

Not applicable.

4.5.9 Smallholders/Community Members Capacity Development (GL2.9)

Not applicable.

5 BIODIVERSITY

5.1 Without-Project Biodiversity Scenario

5.1.1 Existing Conditions (B1.1)

Biodiversity within the project zone at the start of the project

The grassland in the project area is an important habitat and breeding place for wild animals. In recent years, due to overgrazing, grassland in the project area has been degraded to varying degrees and even desertification, which has seriously damaged the growth conditions of plants and the habitat on which wild animals depend, resulting in the decline of biodiversity.

With superior natural conditions, the project zone has a wide variety of wild plants, with more than 71 families and 967 species according to statistics. Among them, there are 5 species of pteridophytes belonging to 7 families, 9 species of gymnosperms belonging to 3 families, and 939 species of angiosperms belonging to 61 families. Trees are mainly broad-leaved tree species including *Larix sibirica*, *Picea obovata*, *Betula pendula*, and *Populus tremula*. The main shrub species include *Sorbus sibirica*, *Spiraea sp*, *Betula rotundifolia* and *Lonicera caerulea var. altaica*. The main herb species include *Artemisia sp*, *Carex sp*, *Alchemilla japonica*, and *Poa annua*.

There are 54 mammal species, including *Martes zibellina*, *Gulo gulo*, *Capra sibirica*, and *Cuon alpinus*, and 222 bird species, including *Ciconia nigra*, *Aquila chrysaetos*, *Milvus migrans*, *Buteo rufinus*, *Falco subbuteo*, *Asio flammeus*, and *Anthropoides virg*. There are 3 animal species that are both nationally protected species and globally endangered species according to the IUCN Red List of Threatened Species, as shown in Table 5.1.

Table 5.1 IUCN endangered animal species in the project zone

No.	Family	Species	National protection level	IUCN level [62]
01	Accipitridae	*Aquila nipalensis*	First-class	EN
02	Equidae	*Equus ferus*	First-class	EN
03	Falconidae	*Falco cherrug*	First-class	EN

Threats to the biodiversity

Due to various factors including climate change and human activities, the grassland in the project zone has been facing different levels of degradation and even desertification, which means habitat degradation for the endangered animals as well as other species, constantly threatening local biodiversity.

Insect and rodent damage factors

Serious insect and rodent damage are one of the important factors for grassland degradation in the project zone. The main rodents include *Ochotona curzoniae*, Myospalax fannieri, *Meriones unguiculatus*, etc. These rodents directly destroy grassland vegetation by gnawing grass leaves and roots, and have the living habits of digging holes, burrowing and accumulating sand and soil, damaging grassroots, burying forage plants, and destroying soil structure indirectly inhibiting the normal breeding of forage. In addition, rats competed with cattle and sheep for forage, which further exacerbated the contradiction between forage and livestock.

Overload overgrazing

Long-term overgrazing is the main cause of grassland degradation and desertification in project zone. Grassland overgrazing is mainly due to two reasons: one is the decline of the absolute amount of grassland suitable for grazing, resulting in a significant reduction in the area of grassland available for livestock grazing; Second, the animal husbandry population has increased, the total amount of livestock has increased, and the grazing intensity has increased. Specifically, the adverse effects of overgrazing on grassland ecosystems mainly include three aspects: first, it reduces the overall productivity of grassland by feeding a large number of plants; Second, selective feeding significantly inhibits the growth of high-quality forages, provids space for the invasion of inedible poisonous weeds and weeds, and the community tended to degenerate; Third, the high intensity and high-density trampling of livestock leads to the increase of soil compactness, the

[62] According to https://www.iucn.org/resources/conservation-tools/iucn-red-list-threatened-species, the IUCN Red List of Threatened Species defines these categories: extinct (EX), extinct in the wild (EW), critically endangered (CR), endangered (EN), vulnerable (VU), near threatened (NT) and least concern (LC).

decrease of porosity, and it is difficult to effectively retain water, which is not conducive to root growth and development. Grassland degradation and destruction lead to the loss of biological habitat and the reduction of animal population.

5.1.2 High Conservation Values (B1.2)

1 HCV has been identified related to biodiversity in the project zone, as follows:

High Conservation Value	Rare, threatened, or endangered (RTE) species
Qualifying Attribute	The species listed in Table 5.1 are Rare, threatened or endangered (RTE) species, which fall into the category of HCV 1 (Species diversity)[63].
Focal Area	The project zone

5.1.3 Without-project Scenario: Biodiversity (B1.3)

Under the without-project land use scenario, the current grassland degradation in the project area would continue. Grassland degradation is the process of grassland soil gradually losing its organic matter and its ability in water conservation, and the increasing difficulty for grass species to survive; along with soil and vegetation degradation, animals could also lose their original habitats and would not be able to survive in lands which are becoming more arid with less plants. In summary, the without-project land use poses great threat to local biodiversity conditions.

5.2 Net Positive Biodiversity Impacts

5.2.1 Expected Biodiversity Changes (B2.1)

Biodiversity Element	Grassland productivity in the project area
Estimated Change	Positive (the productivity is expected to increase)
Justification of Change	Grass planting will significantly increase grassland productivity quickly in a short period. Sustainable grassland management will allow grassland productivity to gradually increase over a long period until an equilibrium is reached.

Biodiversity Element	Grass cover in the project area
Estimated Change	Positive (the grass cover is expected to increase)
Justification of Change	Grass planting as well as sustainable grassland management measures will benefit grass growth.

[63] Defined as “concentrations of biological diversity including endemic species, and rare, threatened or endangered species, that are significant at global, regional, or national levels”. Refer to: https://www.hcvnetwork.org

Biodiversity Element	Number of grass species in the project area
Estimated Change	Positive (the number of grass species is expected to increase)
Justification of Change	Four native grass species have been planted, followed sustainable grassland management measures which will maintain their growth in the project area.

Biodiversity Element	Threats to endangered animals
Estimated Change	Positive (the threats are expected to reduce)
Justification of Change	Improved grassland conditions will allow habitats of animal species, including the endangered species, to develop and expand, hence reducing the threats to their survival.

5.2.2 Mitigation Measures (B2.3)

The early phase of the project involves planting local grass species scientifically and reasonably and excludes burning or any other destructive activities on existing vegetation. Therefore, grass planting will not lead to any negative impacts on biodiversity or the HCV identified in the project zone. No mitigation measures are required.

During the continuous grassland management over the project lifetime, training courses are regularly provided to those who participate in the project activities, to ensure that the project area is managed in a sustainable way. Therefore, the project implementation will not lead to negative impacts on biodiversity or the HCV, and the mitigation measures are hence not required.

5.2.3 Net Positive Biodiversity Impacts (B2.2, GL1.4)

As mentioned before, under the without-project scenario, the project area will continue to degrade, constantly threatening local biodiversity conditions. The project aims to restore severely or moderately degraded grasslands by adopting a variety of measures, and eventually preserve and improve biodiversity conditions of the project zone, or the Altay Prefecture in general.

First, four native grass species are planted in this project; the mixed planting will have more positive impacts on biodiversity.

Second, continuous management measures such as grazing prohibition will alleviate the grazing pressure on the project lands, allowing for the gradual restoration of grassland vegetation. In addition, other efforts on rodent and fire prevention and control are also beneficial to grassland restoration.

Third, along with improvement in grassland productivity and increase in vegetation cover, soil ability in water and fertility retention will be enhanced, and the overall local micro-climate will be improved, which will benefit animals due to the restoration of their habitats.

In addition, as analyzed in the previous section, the project will not lead to negative impacts on biodiversity or the HCV.

Therefore, the project's anticipated net impacts on biodiversity in the project zone are expected to be positive compared with the without-project scenario.

5.2.4 High Conservation Values Protected (B2.4)

The HCV identified in Section 5.1.2 is Rare, threatened, or endangered (RTE) species (as listed in Table 5.1).

The project implementation does not affect the existing vegetation, as stated previously, and thus will not affect the habitats of these threatened or endangered species. Instead, the project increases vegetation cover and restores degraded grassland, leading to the expansion of their original habitats, facilitating their gene flow and gradually contributing to their population growth. Therefore, these species will not be negatively affected by the project.

It is concluded that no HCVs related to biodiversity are negatively affected by the project.

5.2.5 Species Used (B2.5)

Native grass species *Elymus nutans, Festuca sinensis*, and *Poa crymophila* are used by the project.

5.2.6 Invasive Species (B2.5)

All grass species are native, and no invasive species have been or will be introduced into any area affected by the project.

5.2.7 Impacts of Non-native Species (B2.6)

Not applicable as there is no use of non-native species in the project zone.

5.2.8 GMO Exclusion (B2.7)

No GMOs are used in the project.

5.2.9 Inputs Justification (B2.8)

According to the *Project Design Report*, no chemical fertilizer is applied in the project area; only manure is applied.

If there is a pest or rodent outbreak that could lead to negative impacts on local biodiversity, chemical pesticides and/or biological control agents could be applied. Refer to the tables below.

Name	Chemical pesticides
Justification of Use	Chemical pesticides are allowed only if there is a serious pest outbreak, and their use must strictly obey relevant national and regional pesticide policies.
Potential Adverse Effect	Improper use of pesticides could lead to soil pollution, water pollution as well as damage to the habitat of wildlife. Pesticide will be strictly managed by well-trained staff to minimize the potential

	negative impact. Also, the mixed species arrangement, seed quality control and other environmentally friendly measures would reduce the likelihood of pest outbreaks and hence the necessity of chemical pesticide use. In particular, biological measures to control pests will be favored over chemical pesticides. With all these measures taken, the pesticide application and its impact will be limited.

Name	Biological control agents
Justification of Use	During regular overseeing carried out by grassland guardians, any outbreak of pests or rodents will be observed and reported; biological control will be the top choice and it will be implemented immediately in a way that follows local pest and rodent control policy.
Potential Adverse Effect	Biological control agents refer to natural enemies of pests or rodents. The biological control may have potential adverse effects on the ecology of plants and animals if exotic natural enemies are used. The project area is planted with native grass species, and there are native natural enemies for pest and rodent control. Meanwhile, the project has established a risk evaluation mechanism to avoid the use of exotic natural enemies in the process of biological control. Therefore, this method is environmentally friendly and does not have any side effects on humans or the environment.

5.2.10 Waste Products (B2.9)

The waste products resulting from the project activities may include rubbish and human waste.

Rubbish: Local workers have received associated training and will clear off the rubbish, such as plastics, metals, papers ,and other abandoned items, from the project area regularly when they work on the grassland. The grassland guardians will also carry out frequent visits under the guidance of the project proponent to ensure that waste products are well-identified and cleaned.

Human waste: there might be human waste because there is no toilet in the field. However, its amount will be quite small and it is biodegradable without any impact on the environment; there is no particular mitigation required.

5.3 Offsite Biodiversity Impacts

5.3.1 Negative Offsite Biodiversity Impacts (B3.1) and Mitigation Measures (B3.2)

The project will not lead to negative offsite biodiversity impacts. Therefore, mitigation measures are not required.

5.3.2 Net Offsite Biodiversity Benefits (B3.3)

As there are no potential negative offsite impacts on biodiversity, the net offsite biodiversity benefits are positive or neutral.

5.4 Biodiversity Impact Monitoring

5.4.1 Biodiversity Monitoring Plan (B4.1, B4.2, GL1.4, GL3.4)

The operation and management structure of the monitoring team has been shown in Section 3.3.3. The responsibilities of each role in the team are:

- **Monitoring manager** has the overall management responsibility, especially supervising the implementation of the monitoring plan, and assigning each member of the monitoring team their individual responsibility during the monitoring.
- **Expert group** provides professional advice related to monitoring activities to make sure all the monitoring activities meet the requirements of VCS and CCB standards and the monitoring plan. The expert group also reviews the monitoring results before each verification. If any non-conformance is observed, the expert group will ask the monitoring team to take necessary measures (for example, repeating some of the monitoring activities or calculations) until all the non-conformances are corrected.
- **Monitoring group** conducts the following monitoring process, measures the required parameters of the project as listed in Section 3.3.2 particularly, and collects all the original evidence and data and makes relevant records.
- **Auditing group** performs internal verification of the measurement, reviews all the monitoring records and documents, cross-checks evidence and calculates emission removals during each verification period.

A Monitoring Manual will be provided to each of the monitoring team members with detailed explanations; a training workshop will be held for the monitoring team members in order to ensure all members fully understand the purposes, contents, procedures and specific methods of the monitoring process.

SBIA Manual part 3 recommends choosing multiple indicators as natural systems are extremely complex, and even variables that are carefully chosen to reflect the health of a system will sometimes fluctuate for reasons unrelated to the project. Also, according to *SBIA Manual* part 3, the most commonly used conceptual framework for biodiversity indicators classifies them into pressure, state, and response indicators. Other recommendations for selecting indicators (use indicators that can be monitored with relative ease, use indicators that reflect local conditions) described in *SBIA Manual* part 3 are also considered when designing the biodiversity monitoring plan.

The biodiversity monitoring plan focuses mainly on the following types of indicators:

- State variables: quantity and quality of the grassland in the project area; status of plant and animal species (for measuring the status of endangered animals, “reduced threats” has been selected as

an indicator; in the absence of direct population or occupancy measures, measurement of reduced threats may be used as evidence of benefit);

- Pressure variables: frequency or intensity of anthropogenic impacts that are directly harmful to biodiversity in the project zone;

- Response variables: frequency or intensity of project interventions relevant to biodiversity.

All the monitoring results will be reviewed by the auditing group and examined by the expert group to ensure that actual biodiversity impacts have been correctly monitored.

The detailed description of the biodiversity monitoring plan is shown in Table 5.2.

Table 5.2 Monitoring indicators for biodiversity

Indicator type	Description	Monitoring indicator	Unit	Monitoring method	Monitoring frequency
State variables	Quantity and quality of the grassland in the project area	Grassland productivity	kg/ha	For each stratum, 3 sample sites are installed to monitor productivity. In every sample site, pull a sample line along the slope direction, and set a sample quadrat every 10 meters and a totally 3 quadrats are selected. Each quadrat is a square of 1m×1m (area of 1 m^2). In each quadrat, measure the fresh weight of all aboveground biomass. Then put the fresh aboveground biomass sample into an envelope, mark it, and send it to a laboratory, where the sample is dried at 80 °C for 48 hours so that the dried biomass weight can be measured. The productivity of each sample site is calculated as the mean value of three quadrats. The final grassland productivity of each stratum is calculated as the mean value of three sample sites.	Before every verification
		Vegetation cover of the grassland in the project area	ha	Monitoring of the vegetation cover is carried out along with monitoring of grassland productivity. Each stratum has 3 sites; each site has 3 quadrats of 1m×1m each. Estimate the coverage of plants in each quadrat by visual inspection, that is, visually estimate the vertical projection area of all plants in the quadrat.	Before every verification
	Status of plant and animal species	Number of grass species	/	Monitoring of grass species is carried out along with monitoring of grassland productivity. Each stratum has 3 sites; each site has 3 quadrats of 1m×1m each. The grass species in each quadrat will be recorded and the records will be aggregated to obtain the number of species.	Before every verification

		The numbers for endangered animals	/	Transect lines, each with a length of around 3 km, will be set to monitor endangered animals; these lines must be randomly selected near the sample plots set for monitoring of climate. The monitoring team will walk along each transect line for at least one day to observe the occurrence of animals. And the set-up of transect lines must comply with *Technical Regulations on Biodiversity Survey and Assessment - Birds* and *Technical Regulations on Biodiversity Survey and Assessment – Land Mammals* issued by the Ministry of Ecology and Environment of the People's Republic of China.	Before every verification
		Reduced threats to endangered animals (area of grassland restoration)	ha	The grassland guardians regularly patrol the area under their supervision, once every 15 days, and report the situation to the Forestry and Grassland Bureau.	Before every verification
Pressure variables	Frequency or intensity of anthropogenic impacts that are directly harmful to biodiversity in the project zone	Number of fires that affect the project area	/	The grassland guardians regularly patrol the area under their supervision, once every 15 days, and report any fire to the Forestry and Grassland Bureaus. The Forestry and Grassland Bureaus shall record the number of fires that affect the project area every year *b*ased on the reports from the grassland guardians.	Once every year
		Area of grassland that suffers from rodents or pests	ha	The grassland guardians regularly patrol the area under their supervision, once every 15 days, and report any rodent or pest damage to the Forestry and Grassland Bureaus. The Forestry and Grassland Bureaus shall record the area of grassland that suffers from rodents or pests every year *b*ased on the reports from the grassland guardians.	Once every year

		Overgrazing	ha	The grassland guardians regularly patrol the area under their supervision, once every 15 days, to ensure that grazing is conducted in compliance with the project design, and they will report any non-conformance to the Forestry and Grassland Bureaus. The Forestry and Grassland Bureau shall record overgrazing events every year *b*ased on the reports from the grassland guardians.	Once every year
		Chemical pesticides	t	The grassland guardians regularly patrol the area under their supervision, once every 15 days, and report applications of chemical pesticides to the Forestry and Grassland Bureaus. The Forestry and Grassland Bureaus shall record applications of chemical pesticides every year *b*ased on the reports from the grassland guardians.	Once every year
Response variables	Frequency or intensity of project interventions relevant to biodiversity	Area of grassland where fire prevention and control is implemented	ha	The Forestry and Grassland Bureaus record the area of grassland where fire prevention and control is implemented every year *b*ased on the reports from the grassland guardians.	Once every year
		Area of grassland where rodent/pest prevention and control is implemented	ha	The Forestry and Grassland Bureaus record the area of grassland where rodent/pest prevention and control is implemented every year *b*ased on the reports from the grassland guardians.	Once every year
		Area of grassland where sustainable grassland management is implemented	ha	The Forestry and Grassland Bureaus record the area of grassland where sustainable grassland management is implemented every year *b*ased on the reports from the grassland guardians.	Once every year

5.4.2 Biodiversity Monitoring Plan Dissemination (B4.3)

The biodiversity monitoring plan and monitoring results for each verification will be published on the Verra Registry so that any stakeholder can easily download them. Printed copies of the monitoring manual and monitoring report summaries will be distributed among local stakeholders by the Forestry and Grassland Bureaus and the project proponent. At the same time, public bulletin boards are used to publicize information regarding how to access the monitoring results through the internet. Technical staff from the Forestry and Grassland Bureaus will explain the monitoring manual and results to local villagers, especially those who are illiterate or unable to speak Mandarin. Also, the phone number of a contact person has been published in case any stakeholder wants to directly contact the project proponent and raise opinions.

5.5 Optional Criterion: Exceptional Biodiversity Benefits

Not applicable.

5.5.1 High Biodiversity Conservation Priority Status (GL3.1)

Not applicable.

5.5.2 Trigger Species Population Trends (GL3.2, GL3.3)

Not applicable.

APPENDICES

Not applicable.