



**PROJECT DESIGN DOCUMENT FORM FOR
AFFORESTATION AND REFORESTATION CDM PROJECT ACTIVITIES (F-CDM-AR-PDD)
Version 06.0**

PROJECT DESIGN DOCUMENT (PDD)

Title of the project activity	Afforestation of Degraded Shengle Ecological Zone in Helinge'er of Inner Mongolia, China
Version number of the PDD	01
Completion date of the PDD	17/08/2012
Project participant(s)	Hesheng Forest Silviculture Co. Ltd.
Host Party(ies)	People's Republic of China
Sectoral scope and selected methodology(ies)	14, Afforestation and reforestation of degraded land" (AR-ACM0001/Version 05.2.0)
Estimated amount of annual average GHG removals by sinks	7,195 tCO ₂ equivalent

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

>> The proposed A/R CDM project activity will be implemented in Helinge'er County, Hohhot, Inner Mongolia. Located in the north edge of Loess Plateau with annual mean precipitation around 400mm, the proposed project area belongs to arid and semiarid climate and transitional zone from forests to steppe, and has been suffering from severe drought, desertification, soil erosion and other hazards (windstorm and sandstorm). The project lands have been un-forested land since 1950s. The project area also fall within the corridor between two of China's biodiversity priority conservation areas, West Ordos-Helanshan Mountain-Daqingshan Mountain and Taihangshan Mountain, as listed in the China Biodiversity Conservation Strategy and Action Plan issued by the Ministry of Environmental Protection. Local communities of the project areas live below the poverty line of China.

To restore degraded lands, control soil erosion and desertification, improve biodiversity conservation and livelihood of local communities, the proposed A/R CDM project activity plans to establish 2,190.71 hectare (ha) of tree-shrub mixed forests by direct planting on degraded lands in 13 villages of 4 towns/townships in Helinge'er County, started from July 20th 2011. The main planting models/tree species are Mongolian Scotch pine (*Pinus sylvestris* var. *mongolica*, 47.06 ha), Chinese pine (*Pinus tabulaeformis*, 7.65 ha), Chinese pine + Seabuckthorn (719.48 ha), Mongolian Scotch pine + apricot (*Armeniaca sibirica*) (877.70 ha) and Mongolian Scotch pine + seabuckthorn (538.82 ha). It is expected to produce 215,837 tCO₂ equivalent of long-term CER within 30 years crediting period, with an annual mean of 7,195 tCO₂ equivalent. All species used are native to local, without any invasive alien species or genetically modified organisms. Most of the lands to be planted were deforested before 1950s and have never been reforested since then. At the same time, the proposed A/R CDM project activity will comply and be certified with the Climate, Community and Biodiversity (CCB) Standard.

Both the operating entity (Hesheng Forest Silviculture Co. Ltd.) and local farmers hold a view that the proposed A/R CDM project activity will contribute to poverty alleviation and environment (e.g., biodiversity conservation and soil erosion and desertification control), thus contribute to sustainable development. The audit of the CCB would demonstrate that the proposed A/R CDM project activity will not only benefit to climate change mitigation, but also have co-benefits to local communities and environmental conservation, consequently enhance climate change adaptation.

In the proposed A/R CDM project activity, local farmers/communities will contribute lands. The operating entity will invest in forest establishment (including site preparation, seedling, planting, weeding, etc.), provide technical inputs, project preparation (including PDD preparation, validation, registration, verification, etc.) and manage the plantations during the crediting period, as well as take the natural and investment risks. The shareholding contractual arrangements will be made between the farmers/communities, the operation entity and local governments with regard to establishment of the plantation, the management responsibilities, inputs and benefit sharing. During the crediting period the farmers/communities will share 60 per cent of income from wood and non-wood products and the operation entity will share 40 per cent. All carbon credits produced by the proposed project during the crediting period will belong to the operation entity. After the end of the crediting period, the plantation to be established will be completely owned by farmers/communities.

A.2. Location of project activity

A.2.1. Host Party(ies)

>>People's Republic of China

A.2.2. Region/State/Province etc.

>> Inner Mongolia Autonomous Region

A.2.3. City/Town/Community etc.

>> The proposed A/R CDM project activity is located in 13 villages of 4 townships in Helinger'er County, Inner Mongolia Autonomous Region, P.R.China, with a total area of 2,190.71 ha on 21 parcels of lands (Table A-0-1 and Figure A.0.1).

Table A-0-1 List of townships and villages involved

Towns/ Townships	Villages	Local Names	Land ID	Land area (ha)
Yangqungou	Baiqikou	Zhangbahaobeiliang	HL-YQ-01	31.81
		Jiaoniquananliang	HL-YQ-02	92.26
		Wudaougoucunxi	HL-YQ-03	74.89
		Wudaogoubeiliang	HL-YQ-04	66.91
	Dawan	Nanliangwushunanliang	HL-YQ-05	329.41
	Wujianfang	Sijianfangnanliang	HL-YQ-05	333.84
	Gedongping	Gedongpingxiliang	HL-YQ-06	51.94
		Guoxianyaobeiliang	HL-YQ-07	19.67
	Shizuizi	Erdaogoudongliang	HL-YQ-08	39.22
		Jinggouxiliang	HL-YQ-09	148.42
Xindianzi	Yulincheng	Shuiquannanliang	HL-XD-01	86.93
	Xindianzi	Shuiquannanliang	HL-XD-01	6.43
	Shanbaodai	Yijianfangnanliang	HL-XD-02	85.22
		Shanbaodaixiliang	HL-XD-03	61.24
		Shanbaodaixiliang	HL-XD-04	45.88
		Shanbaodainanliang	HL-XD-05	71.87
	Xinfeng	Baiyanshannanliang	HL-XD-06	31.64
		Hailiutundongliang	HL-XD-07	136.95
	Haolaigou	Nanliuhaonanliang	HL-XD-08	94.38
		Baiyangoudongnanliang	HL-XD-08	76.74
		Yanyadongbeiliang	HL-XD-09	38.22
		Haolaigouxinanliang	HL-XD-09	73.37
Heilaoyao	Shuimo	Chahanbanshengxiliang	HL-HL-01	138.76
Shengle	Baiyantu	Baiyantubeiliang	HL-SL-01	39.70
	Taigedou	Taigedoubeiliang	HL-SL-02	15.01
Total				2,190.71

Figure A.0.1 Project region of the proposed A/R CDM project activity

A.2.4. Physical/Geographical location

>>see Figure A.0.1 and Table A-0-1.

A.2.5. Geographical boundaries

>> The specific project boundaries (the geographical positions (longitude, latitude) at each corner of each of 21 parcels) are measured using GPS. The shp files of the project boundary produced by GIS will be provided to DOE for validation. See also figure A.0.1.

A.3. Environmental conditions

>>The climate, hydrology, soils, ecosystem of the project areas are described below^{1,2,3}.

Climate

Located in the mid Inner Mongolia, HONGE'ER County belongs to typical temperate steppe climate of temperate semi-arid continental monsoon climatic zone. Controlled by both West Siberian cold current and southeast monsoon, the climate is characterized by sufficient sunshine, less and concentrated precipitation, high evaporation and distinct four seasons, in particular, dry and windy in the spring and winter. The mean annual temperature is 5.6°C with an extreme temperature of -34.5°C and 37.5°C. The mean frost free day is 118 days. The mean annual sunshine is 2,941.8 hours, with annual cumulative temperature over 10°C up to 2,769°C.

The mean annual precipitation is 417.5 mm with a range between 202-702 mm. The precipitation during July – September accounts for 64.5 per cent of the annual total precipitation. The mean annual evaporation is up to 1,811.6 mm.

There were frequent catastrophic climatic events relating to drought, rainstorm, windstorm and hailstone. The occurrence probability is 5-27 per cent for severe drought and 50 per cent for drought. The probability with normal precipitation is only 18 per cent. At the same time rainstorm also occurs frequently. The maximum precipitation recorded was 36.6 mm per hour or 84.7 mm per day. This is subjected to severe soil erosion especially for loess hilly lands in the project area. The windstorm usually occurs in the spring (March – May). There are 14 gale days annually in average with a maximum 38 days. Frequent windstorm exacerbates the drought in the spring but also results in severe sandification and desertification. Hailstone occurs every year, 3.3 days per year in average with a maximum 8 days.

Hydrology

Belonging to the Yellow River Watershed, there are 11 rivers in the HONGE'ER County, with a total length of 217.5 kilometer. Hunhe River is the first order branch of the Yellow River, with a length of 75 kilometers. Among the rivers in the county, Hunhe River, Baobehe River, Chafanghe River and Gulibanjihe River are perennial rivers and all other rivers are intermittent rivers. The rivers are recharged mainly by precipitation and few by underground water. Due to uneven distribution of precipitation, loess soil and less vegetation cover, rainstorm in summer usually bring short-term flooding and cause a significant soil erosions (see also figure B.0.1 in Section B). There is no water logging and wetland in the project area.

¹ Editorial Board of HONGE'ER County Annal. 1993. HONGE'ER County Annal. People's Press of Inner Mongolia.

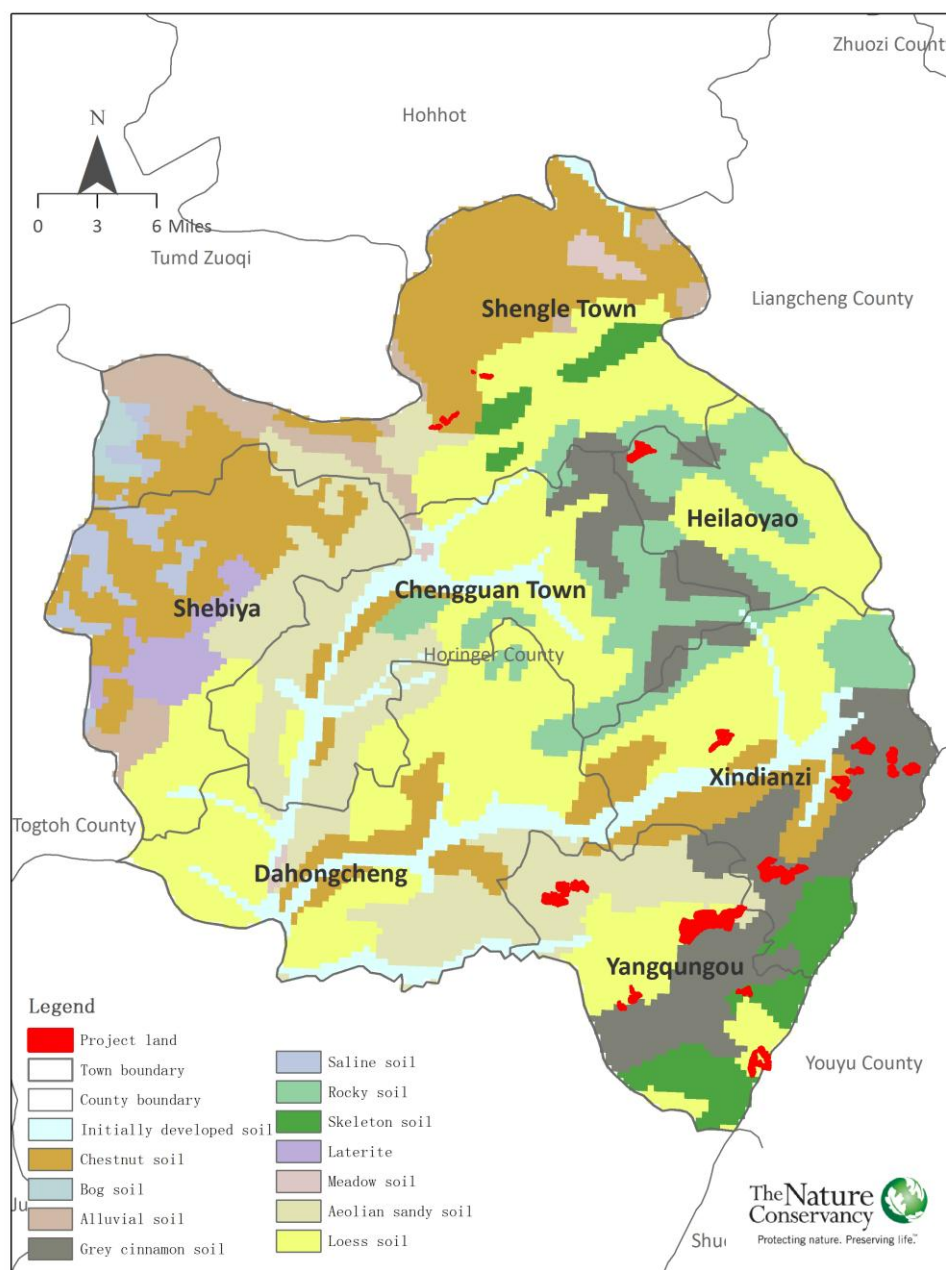
² Coordination Office of the Second Survey on Land Use Survey in HONGE'ER County. 2010. Proceedings on the second survey on land use in HONGE'ER County, December 2010, HONGE'ER.

³ Comprehensive Survey Team of Inner Mongolia and Ningxia, Chinese Academy of Science. 1985. Vegetation in Inner Mongolia. Science Press.

Soils

Located in the loess hilly area, soils in the project area include chestnut soil, grey cinnamon soil, loess soil and aeolian sandy soil (Figure A.0.2). All of them are mineral soil developed from loess. Soil depth in the project area is mostly over 80 cm. Soil fertility is poor, with soil organic matter content at 0.65 per cent and soil total nitrogen content at 0.064 per cent for cinnamon soil. The aeolian sandy soil is even worse. The content of soil organic matter and total nitrogen for grey cinnamon soil is 1.17 per cent and 0.08 per cent, respectively. The content of soil phosphorus is also very low and mostly is fixed by soil, i.e., unavailability for plants. The soil pH value is 8-8.5. Soils in the project area have not been managed or used for many years.

Figure A.0.2 Soils in the project area⁴



⁴ Developed from data download from Resource and Environment Science Data Center (<http://www.resdc.cn/first.asp>)

Ecosystems

Vegetation in the project region is a mixture of mid-Asia flora, north China flora and Mongolia steppe flora. There is a distinct vertical vegetation zone in the east and south of the project area, e.g., from bottom to top of mountains, Stipa steppe, thyme community and wormwood community; rose (*Rosa xanthine*) and almond (*Prunus pedunculata*) shrub vegetation; sparse forests including Chinese pine, birch and poplar; and hardhack community. Vegetation in the hilly area in the mid and north of the project area belongs to zonic temperate steppe, dominated by stipa. However, natural Stipa steppe was damaged due to historical repeated cultivation, and replaced by secondary communities such as thyme, perennial lespedeza, wormwood, *Ostriopsis davidiana*, seabuckthorn, etc. Natural vegetation in the west and southwest of the project area has been extinct due to long-term cultivation.

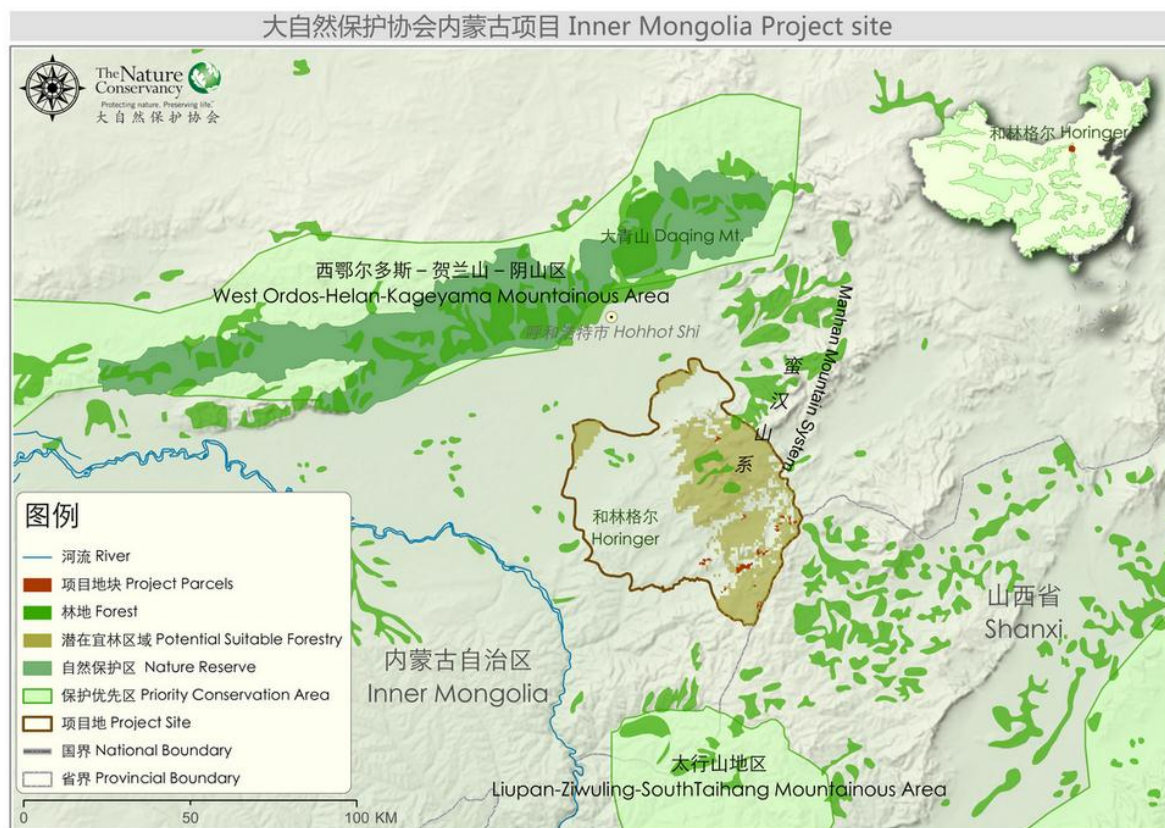
All the project lands are non-forest lands over 50 years. The vegetation is mainly composed of herbaceous plants dominated by stipa (*Stipa* sp.), thyme (*Thymus* sp.) and wormwood, with more or less shrub species such as Caragana (*Caragana* sp.) and Seabuckthorn (*Hippophae* sp.). There is no existing trees on project lands. Due to severe soil erosion, sandification and desertification, the project area is in the degraded and degrading condition (refers to Section B.2 below).

The presence of rare and endangered species and their habitats:

The project area is located in the south of Daqingshan Mountain of the Yingshan Mountain range in the mid-Inner Mongolia, and the joint of Mongolia Plateau and Loess Plateau. Complex landform and transitional climate zone have fostered an array of biological diversity. The project area falls on the corridor between two of China's 32 terrestrial priority conservation areas (e.g., the West Ordos – Helanshan Mountain – Yingshan Mountain priority conservation area and the Taihangshan Mountain priority conservation area), as listed in the China Biodiversity Conservation Strategy and Action Plan⁵, issued by the Ministry of Environmental Protection (Figure A.0.3).

⁵ The Ministry of Environmental Protection. 2010. China Biodiversity Conservation Strategy and Action Plan (2011-2030)

Figure A.0.3 China's Terrestrial Priority Conservation Areas (PCAs) with proposed project county



There are three nature reserves in the project region, i.e., Daqingshan National Nature Reserve, Nantianmeng Nature Reserve and Baieryeshaba Nature Reserve. There is a national forest park in the northeast of the project area. All lands in the proposed A/R CDM project activity fall on corridors connecting the reserves and/or forest park (Figure A.0.3). These nature reserves are key habitats for rare and endangered species, including 3 species of plants listed under the category II in the national protected rare and endangered plants, and 1 species of animals listed under the category I in the national protected rare and endangered animals and 13 species under the category II (see Table A-0-2 and Table A-0-3 for details)^{6,7}.

However, based on baseline survey no protected or endangered species and IUCN species have been found on the proposed project lands. These lands currently have low biodiversity. The biodiversity baseline survey object on the project lands includes plants, mammals, rodents, amphibians, crawler and birds. The random sample with the same size and orientation as the carbon baseline survey (see Appendix 8 for the baseline information) was used to survey the plant biodiversity and rare and endangered species. The rail- snare was used to survey the species and community of amphibian, crawler and rodent. Two random sample along-line surveys were carried out across each site biyearly to search and track record any individual, spoor, defecation of mammal and birds, and confirm the specie.

⁶ Nantianmeng Forestry Farm. 2010. Brief introduction of Nantianmeng Forestry Farm. Internal Report.

⁷ Institute of Forestry Inventory and Planning in Inner Mongolia. 2007. Report on forest inventory and management plan in Helinge'er County. March 2007

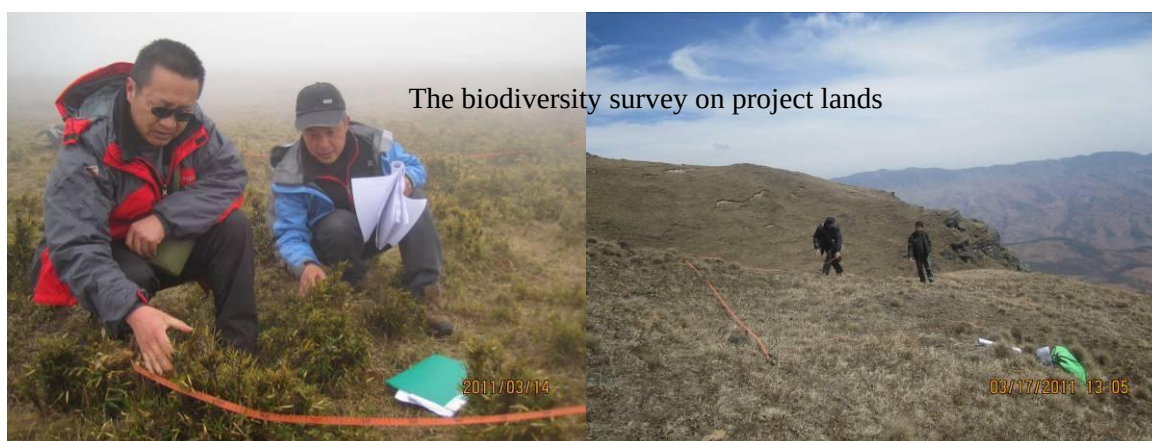


Table A-0-2 National protected plants in the project regions

Species protected	Endemic species	Category under National protection	IUCN Red Book	China endangered species Red Book (RDB)
<i>Prunus mongolica Maxim</i>		II		VU A2c
<i>Picea crassifolia</i>				NT/VU A2c
<i>Picea meyeri</i>				NT/VU A2c
<i>Juniperus rigida</i>				NT/VU A2c
<i>Orobanchae coerulescens</i>				NT/VU A2c
<i>Glycine soja</i>		II		
<i>Nostoc commune var. flagelliforme</i>		II		

Notes: VU for vulnerable, NT for near threatened

Table A-0-3 National protected animals in the project regions

Species protected	Endemic species	Category under National protection	IUCN Red Book	China endangered species Red Book (RDB)
<i>Aegypius monachus</i>		II	LR/nt	V
<i>Accipiter nisus</i>		II		
<i>Buteo hemilasius</i>		II		
<i>Aquila chrysaetos</i>		I		V
<i>Falco tinnunculus</i>		II		
<i>Falco subbuteo</i>		II		
<i>Falco cherrug</i>		II	VU	V
* <i>Falco peregrinus</i>		II		R
<i>Bubo bubo</i>		II		R
<i>Asio otus</i>		II		
<i>Athene noctua</i>		II		
* <i>Cygnus columbianus</i>		II		V
<i>Martes foina</i>		II		V

Notes:

IUCN Red Book: VU for vulnerable, LR/nt for low risk/near threatened

RDB: R for rare, V for vulnerable

A.4. Technologies and/or measures

>>

Technical standards/regulations to be employed:

- Artificial Afforestation Technical Regulation: GB/T 15776-2006;
- Artificial Afforestation Technical Regulation for Inner Mongolia Autonomous Region: DB15/T389-2003;
- State Non-commercial Forest Construction-Technical regulation: GB/T 18337.3-2001;
- non-commercial forest construction-verification regulation:GB/T 18337.4-2008;
- Design Code for Afforestation Operation: LY/T 1607-2003;
- Tree Seedling Quality Grading of Major Species for Afforestation in Inner Mongolia: DB15/T374-2002;
- Technical Regulations for Cultivation of Tree Seedlings: GB/T 6001-1985;
- Rules for Forest Tree Seed Testing :GB2772-1999
- Technical Regulations for Container Seedling Cultivation: LY1000-1991.

The local forestry agencies, i.e., Inner Mongolia Forestry Department, Holinger'er Forestry Bureaus, Inner Mongolia Research Institute of Forestry, Inner Mongolia Forestry Inventory and Planning Institute, The Nature Conservancy China Program, University of Inner Mongolia and Agricultural University of Inner Mongolia etc. will provide technical consultation and guidance, including training courses, and conduct quality control to the preparation and implementation of the proposed A/R CDM project activity. The most up-to-date technologies and silvicultural models will be adopted.

Species and varieties selected:

Based on the site conditions, the proposed A/R CDM project activity will plant following tree and shrub species native to project area:

- Mongolian Scotch Pine: *Pinus sylvestris* var. *mongolica*
- Chinese pine: *Pinus tabulaeformis*
- Apricot: *Armeniaca sibirica*
- Seabuckthorn: *Hippophae* sp.



Site and soil preparation:

Site burning and overall tillage will not be employed during the site and soil preparation in order to prevent soil erosion, to minimize greenhouse gas emissions and to protect existing carbon stocks. There are two types of site and soil preparation: horizontal ditch and small pits. Site and soil will be conducted manually at least 1 month before planting.

- Horizontal ditch for easy gradient slope: Ditches (270 cm length, 80 cm width and 60 cm depth) will be dug along the contours of slopes, with an interval 30 cm between ditches on the same contour. Soil will be moved back to the ditch up to 30 cm.
- Pits for steep slope: Pits (100 cm X 70 cm in diameter and 60 cm in depth) will be dug along the contours of slopes. The pits will be laid out in a triangular pattern on the slope.

Genetic Sources and Nursery Practices:

All seedlings used in the proposed A/R CDM project activities will be bred in local nurseries using seed collected from local seed orchard or parent trees. All seedlings used shall be certified, quarantined and tagged, i.e., each batch of seedlings should have quality certificate, quarantine certificate and tag indicating the production area and quality grade. The seedlings are qualified according to standard GB 6000-1999. Only the quality grade I and II can be used. Transplanted seedlings of fir, spruce and alder will be used. Poplar will be planted by grafting (Table A-0-4).

Table A-0-4 Standard for seedling grading⁸

Species	Seedling types	Seedling age	Standard for grade I and II			
			Minimum diameter at base (cm)	Minimum height (cm)	Root	
					Minimum length of main root (cm)	Minimum number of lateral roots with length over 5cm
Chinese pine	2-2	0.6	35	20	15	2-2
Mongolia Scotch pine	2-2	0.5	30	20	15	2-2
Apricot	1-2	0.8	80	25	10	1-2
Seabuckthorn	1-2	0.35	30	25	10	1-2

Planting

Trees and shrub species will be planted in mixed arrangements so as to reduce risk of fire, disease and pest insect and enhance environmental and social benefits. Six planting models will be implemented (table A-0-5). Figure A.0.4 below present an example of species arrangement and planting model.

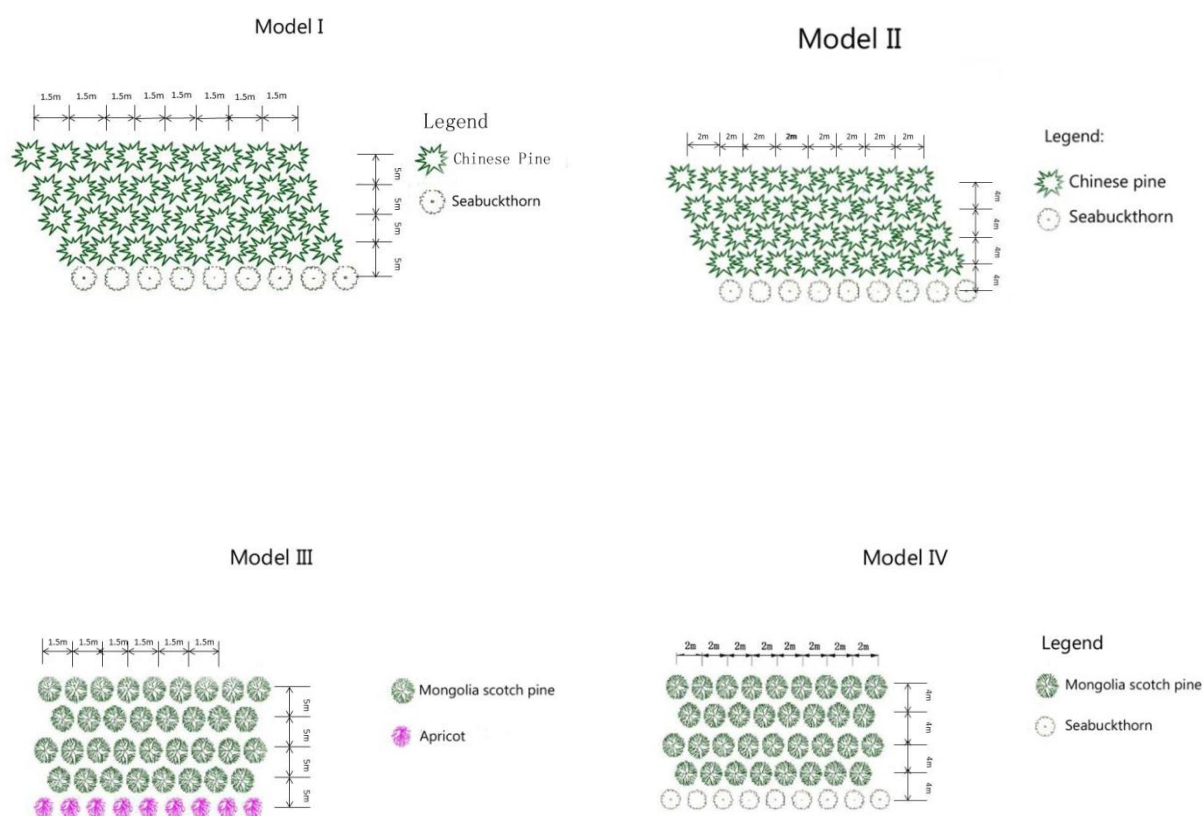
Planting activities started in 2011 and will last four years. The planting is implemented mainly in the raining season (April – May in the spring and September – October in the autumn). Table A-0-6 presents the model arrangements and planting plan for each parcel of lands.

To ensure high survival rate and good growth of seedlings in the early stages, weeds will be cut manually twice in the first two years after planting and once a year in the 3rd-5th year after planting. At the time of weeding, irrigation will be applied. Survival rates will be checked and re-planting will be conducted one year after planting if the rate is lower than 80%. The land parcels will be enclosed after planting to prevent planted young trees from being disturbed by human activities or illegal grazing, until the stand canopy closure.

Table A-0-5 planting models

Model ID	Area (ha)	Species and mixture ratio	Way of mixture	Space	Planting density (number/ha)
I	40.82	4 Chinese pine +1 seabuckthorn	row	1.5m × 5m	1333
II	678.66	4 Chinese pine +1 seabuckthorn	row	2m × 4m	1250
III	877.70	4 Mongolia Scotch pine +1 apricot	row	1.5m × 5m	1333
IV	538.82	4 Mongolia Scotch pine +1 seabuckthorn	row	2m × 4m	1250
V	47.06	Mongolia Scotch pine		3m × 4m	840
VI	7.65	Chinese pine		4m × 4m	630
total	2190.71				

Figure A.0.4 Planting models



⁸ Data source: Tree Seedling Quality Grading of Major Species for Afforestation in Inner Mongolia (DB15/T374-2002)



Table A-0-6 Planting models and plan

Land ID	Sub-compartment	Planting models	Planting time	Area (ha)
HL-SL-01	01-5	VI	2012	3.31
HL-SL-01	01-8	V	2012	4.54
HL-SL-01	01-10	V	2012	7.47
HL-SL-01	01-14	V	2011	15.01
HL-SL-01	01-16	V	2012	6.36
HL-SL-01	01-17	VI	2012	3.02
HL-SL-02	02-2	V	2012	1.08
HL-SL-02	02-5	V	2012	11.22
HL-SL-02	02-18	VI	2012	1.33
HL-SL-02	03-5	V	2012	1.38
HL-XD-01	01-01	III	2013	33.38
HL-XD-01	01-02	III	2013	8.85
HL-XD-01	01-03	III	2013	44.70
HL-XD-01	01-04	III	2013	6.43
HL-XD-08	08-01	II	2013	76.74
HL-XD-08	08-02	II	2013	35.43
HL-XD-08	08-03	II	2013	58.95
HL-XD-09	09-01	II	2013	73.37
HL-XD-09	09-02	II	2013	38.22
HL-XD-02	02-01	III	2014	34.71
HL-XD-02	02-02	III	2014	29.49
HL-XD-02	02-03	III	2014	21.02
HL-XD-03	03-01	IV	2014	61.24
HL-XD-04	04-01	II	2014	45.88
HL-XD-05	05-01	II	2014	44.81
HL-XD-05	05-02	III	2014	27.06
HL-XD-06	06-01	IV	2014	31.64
HL-XD-07	07-01	III	2014	49.92
HL-XD-07	07-02	IV	2014	59.29
HL-XD-07	07-03	III	2014	27.73
HL-YQ-05	05-01	IV	2013	22.22
HL-YQ-05	05-02	III	2013	59.33
HL-YQ-05	05-03	IV	2013	71.7
HL-YQ-05	05-04	III	2013	50.22
HL-YQ-05	05-05	III	2013	23.84
HL-YQ-05	05-06	III	2013	102.1
HL-YQ-05	05-07	III	2013	151.34
HL-YQ-05	05-08	IV	2013	182.5
HL-YQ-01	01-01	III	2014	31.81
HL-YQ-02	02-01	III	2014	62.82
HL-YQ-02	02-02	III	2014	29.44
HL-YQ-03	03-01	IV	2014	52.39
HL-YQ-03	03-02	IV	2014	22.50
HL-YQ-04	04-01	III	2014	27.42
HL-YQ-04	04-02	IV	2014	17.66
HL-YQ-04	04-03	III	2014	21.83
HL-YQ-06	06-01	III	2014	22.99
HL-YQ-06	06-02	IV	2014	17.68

HL-YQ-06	06-03	III	2014	11.27
HL-YQ-07	07-01	I	2014	19.67
HL-YQ-08	08-01	II	2014	39.22
HL-YQ-09	09-01	II	2014	49.34
HL-YQ-09	09-02	II	2014	33.36
HL-YQ-09	09-03	II	2014	20.23
HL-YQ-09	09-04	II	2014	45.49
HL-HL-01	01-01	II	2014	54.49
HL-HL-01	01-02	I	2014	21.15
HL-HL-01	01-03	II	2014	63.13

Forest management

There will be no thinning and final harvesting within the project lifetime. Dead organic matter (litter and dead wood) will not be removed.

A.5. Parties and project participants

Party involved (host) indicates a host Party	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as a project participant (Yes/No)
People's Republic of China	Hesheng Forest Silviculture Co. Ltd.	No
...	...	

A.6. Legal title to the land and rights to tCERs/ICERs issued for project activity

>> Both the land ownership and land tenure right of all the 2,190.71ha of lands in the proposed A/R CDM project activity belong to relevant village collectively. However 57.34 ha of lands are contracted to individual household for a period of 30 years. There is no land ownership/tenure conflict.

Based on the shareholding contracts between the farmers/ communities, the operation entity and local governments, during the crediting period the farmers/communities will share 60 per cent of income from wood and non-wood products and the operation entity will share 40 per cent. All carbon credits produced by the proposed project during the crediting period will belong to the operation entity. After the end of the crediting period, the plantation to be established will be completely owned by farmers/communities.

To effectively promote and govern CDM project activities in China, the Chinese government issued the *Measures for Operation and Management of Clean Development Mechanism Projects in China* on Oct 12, 2005 and revised on August 3 2011, effective immediately. Based on the *Measures*, the Chinese Government allows any sponsor to apply, invest in, and implement a CDM project activity as long as it meets basic requirements stipulated in the *Measures*. The right of access to the sequestered carbon belongs fully to participants after Chinese government taxes 2% of transfer value⁹.

A.7. Assessment of the eligibility of the land

>> As communicated by the Chinese DNA, the Chinese Government defines forests as land having growing trees with:

- A minimum area of 0.067 hectares;

⁹ <http://cdm.ccchina.gov.cn/>

- A minimum tree crown cover of 20%; and
- A minimum height of 2 meters.

Therefore, the threshold values of the forest definition of Chinese government comply with the UNFCCC definition and are to be used for the purposes of the Kyoto Protocol.

The land eligibility is demonstrated using *the Procedures to Define the Eligibility of Lands for Afforestation and Reforestation Project Activities (version 01)* approved by the Executive Board¹⁰.

- (a) the land at the moment the project starts is not a forest, which has been demonstrated by:
- (i) Ground-based survey indicate that the lands to be planted in the proposed A/R CDM project activity are degraded and comprise low-productivity barren lands with or without grazing, covered mostly with grasses and/or bush (refer to Section B.2 and Appendix 8):
 - Current woody vegetation on the land is below the forest thresholds communicated by Chinese DNA;
 - The land is not covered by young natural stands or plantations which have the potential to reach, without direct human intervention, the thresholds communicated by Chinese DNA;
 - The land has been non-forested lands at least since 1989, rather than temporarily unstocked as a result of either direct human intervention such as harvesting or indirect natural causes such as fire or insect damage; and
 - Grazing and lack of available seed sources prevent significant encroachment or regeneration of natural woody vegetation to an extent that could be expected to exceed, without human intervention, the thresholds adopted by the Chinese DNA for definition of forest.
 - (ii) Recent land use/cover maps from satellite images in 2004 also demonstrates that the lands to be planted are non-forested lands.
- (b) the activity is an eligible CDM afforestation or reforestation project activity, which is demonstrated by:
- (i) Interviewing with local farmers/communities on land use/cover history and important events that have impacted the land use/cover indicates that the lands to be planted in the proposed A/R CDM project activity have been non-forested lands since at least 1950 (see Section F for details).
 - (ii) Land use/cover maps derived from satellite images in 1987 also demonstrate that the lands to be planted were non forested lands before 1990.

Note. The maps will be provided to DOE for confirmation of the eligibility of lands.

A.8. Approach for addressing non-permanence

>> The issuance of ICER for the net anthropogenic GHG removals by sinks achieved by the proposed A/R CDM project activity is chosen.

A.9. Public funding of project activity

>> The cost to be incurred during the crediting period will be covered by private grant. There is no available public funding that will result in a diversion of official development assistance and financial obligations of any Parties under UNFCCC.

¹⁰ <http://cdm.unfccc.int/Reference/Procedures/index.html>

SECTION B. Application of selected approved baseline and monitoring methodology

B.1. Reference of methodology

>> Consolidated afforestation and reforestation baseline and monitoring methodology “Afforestation and reforestation of degraded land” (AR-ACM0001/Version 05.2.0)¹¹ is applied. Latest version of following methodological tools for A/R CDM project activity have also been used based on the requirement of the methodology applied:

- Procedures to demonstrate the eligibility of lands for afforestation and reforestation CDM project activities (version 01);
- Guidance on application of the definition of the project boundary to A/R CDM project activities (version 01.0);
- Tool for the identification of degraded or degrading lands for consideration in implementing CDM A/R project activities (version 01);
- Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities (version 01);
- Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities (version 02.1.0);
- Estimation of non-CO₂ GHG emissions resulting from burning of biomass attributable to an A/R CDM project activity (version 04.0.0);
- Estimation of the increase in GHG emissions attributable to displacement of pre-project agricultural activities in A/R CDM project activity (version 01);
- Tool for estimation of change in soil organic carbon stocks due to the implementation of A/R CDM project activities (version 01.1.0);
- Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities (version 02.0.0);
- Calculation of the number of sample plots for measurements within A/R CDM project activities (version 02.1.0);
- Guidelines on conditions under which increase in GHG emissions attributable to displacement of pre-project crop cultivation activities in A/R CDM project activity is insignificant (version 01.0);
- Guidelines on conditions under which increase in GHG emissions related to displacement of pre-project grazing activities in A/R CDM project activity is insignificant (version 01.0).

B.2. Applicability of methodology

>> The proposed A/R CDM project activity complies with the conditions under which the chosen methodology applies in the following ways:

Condition (a) *The A/R CDM project activity is implemented on degraded lands, which are expected to remain degraded or to continue to degrade in the absence of the project, hence the land cannot be expected to revert to a non-degraded state without human intervention.*

--Assessment: This condition was demonstrated following the procedures in “Tool for the identification of degraded or degrading lands for consideration in implementing CDM A/R project activities” as below:

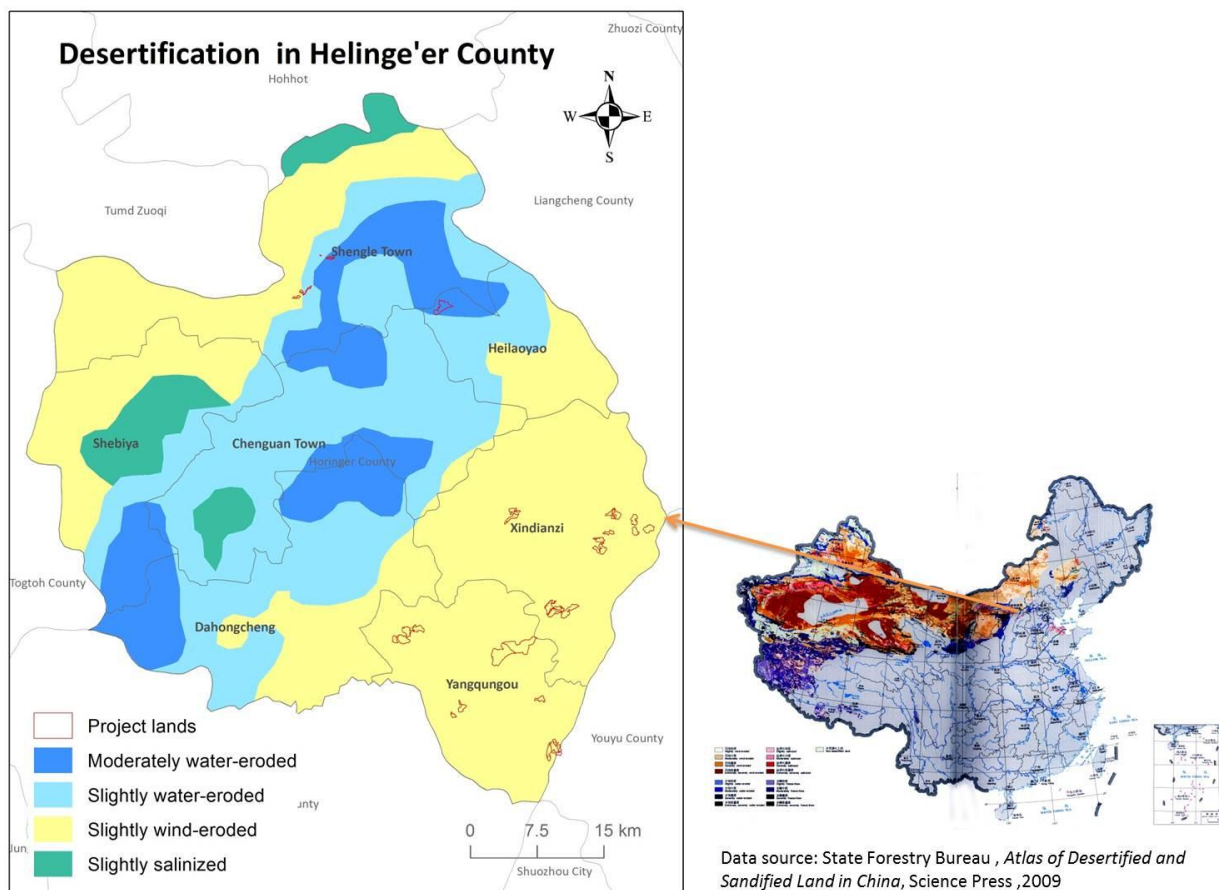
- (a) *Provide documented evidence that the area has been classified as “degraded” under verifiable local, regional, national or international land classification system or peer-review study, participatory rural appraisal, satellite imagery and/or photographic evidence in the last 10 years. If the documented 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.*

¹¹ <http://cdm.unfccc.int/methodologies/ARmethodologies/approved>

Evidence below comply the criteria:

- Map of Distribution of Desertified and Sandified Lands in China indicates that project area is located in the area with slight wind erosion or slight-moderate water erosion¹² (Figure B.0.1).
- Map of Desert and Desertification in China indicates that part of project area is located in sand dune area¹³ (Figure B.0.2).

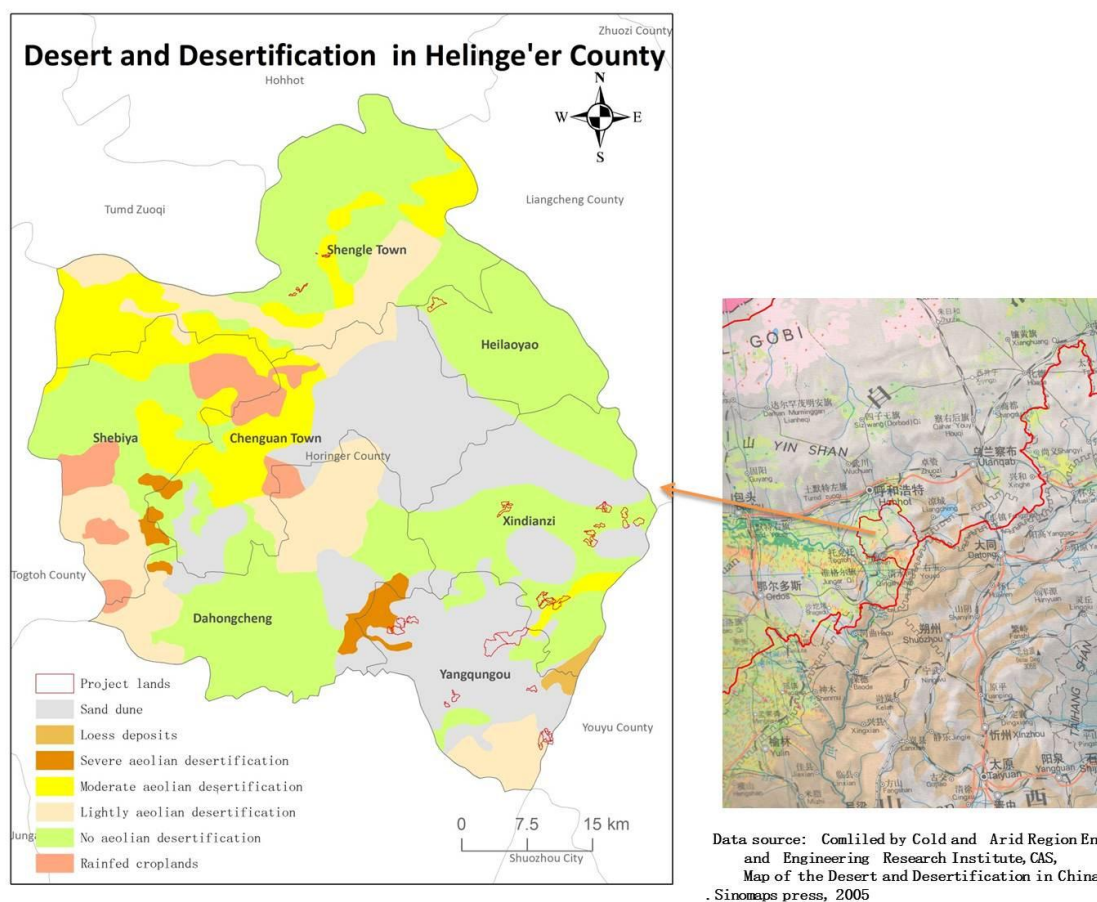
Figure B.0.1 Distribution of Desertified and Sandified Lands in Helinge'er County



¹² State Forestry Administration. 2009. Atlas of Desertified and Sandified Land in China. Science Press

¹³ Institute of Cold and Arid Environment and Engineer, Chinese Academy of Science. 2005. Maps of Desert and Desertification in China. Sinomap Press.

Figure B.0.2 Distribution of Desertification Lands in Helinge'er County



- (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 armour layers); gully, sheet or rill erosion, landslides, or other forms of mass-movement erosion; (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, dessication, 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.

Visual assessment during baseline survey and PRA process found that due to desertification and sandification as well as soil erosion, the project lands are degraded and degrading, indicating by (i) full of exposed sub-soil horizons, gully, sheet or rill erosion; (ii) presence of stipa and wormwood locally known to be related to the condition of degradation of the land.



Condition (b) *If at least a part of the project activity is implemented on organic soils, drainage of these soils is not allowed and not more than 10% of their area may be disturbed as result of soil preparation for planting.*

-- Assessment: Soils in the project area include chestnut cinnamon soil, grey cinnamon soil and aeolian sandy soil. All of them are mineral soil.

Condition (c) *The land does not fall into wetland category.*

-- Assessment: The proposed project lands are not any types of wetland.

Condition (d) *Litter will remain on site and not be removed in the A/R CDM project activity*

-- Assessment: Litter will not be collected in the proposed A/R CDM project activity (refer to Section A.4)

Condition (e) *Ploughing/ripping/scarification attributable to the A/R CDM project activity, if any, is:*

- (i) Done in accordance with appropriate soil conservation practices, e.g. follows the land contour; and*
- (ii) Limited to the first five years from the year of initial site preparation; and*
- (iii) Not repeated, if at all, within a period of 20 years.*

-- Assessment: soil will be prepared by small pit that:

- (i) follows the land contour; and*
- (ii) Limited to the first five years from the year of initial site preparation; and*
- (iii) Not repeated, if at all, within a period of 20 years.*

B.3. Carbon pools and emission sources

Carbon pools	Selected?	Justification / Explanation
Above-ground biomass	Yes	Major carbon pool subjected to project activity
Below-ground biomass	Yes	Below-ground biomass stock is expected to increase due to the implementation of the A/R CDM project activity
Dead wood	Yes	Under the applicability conditions of this methodology, carbon stock in this pool is likely to increase in project compared to the baseline.
Litter	Yes	Under the applicability conditions of this methodology, carbon stock in this pool is likely to increase in project compared to the baseline.
Soil organic carbon (SOC)	Yes	Under the applicability conditions of this methodology, carbon stock in this pool is likely to increase in project compared to the baseline.

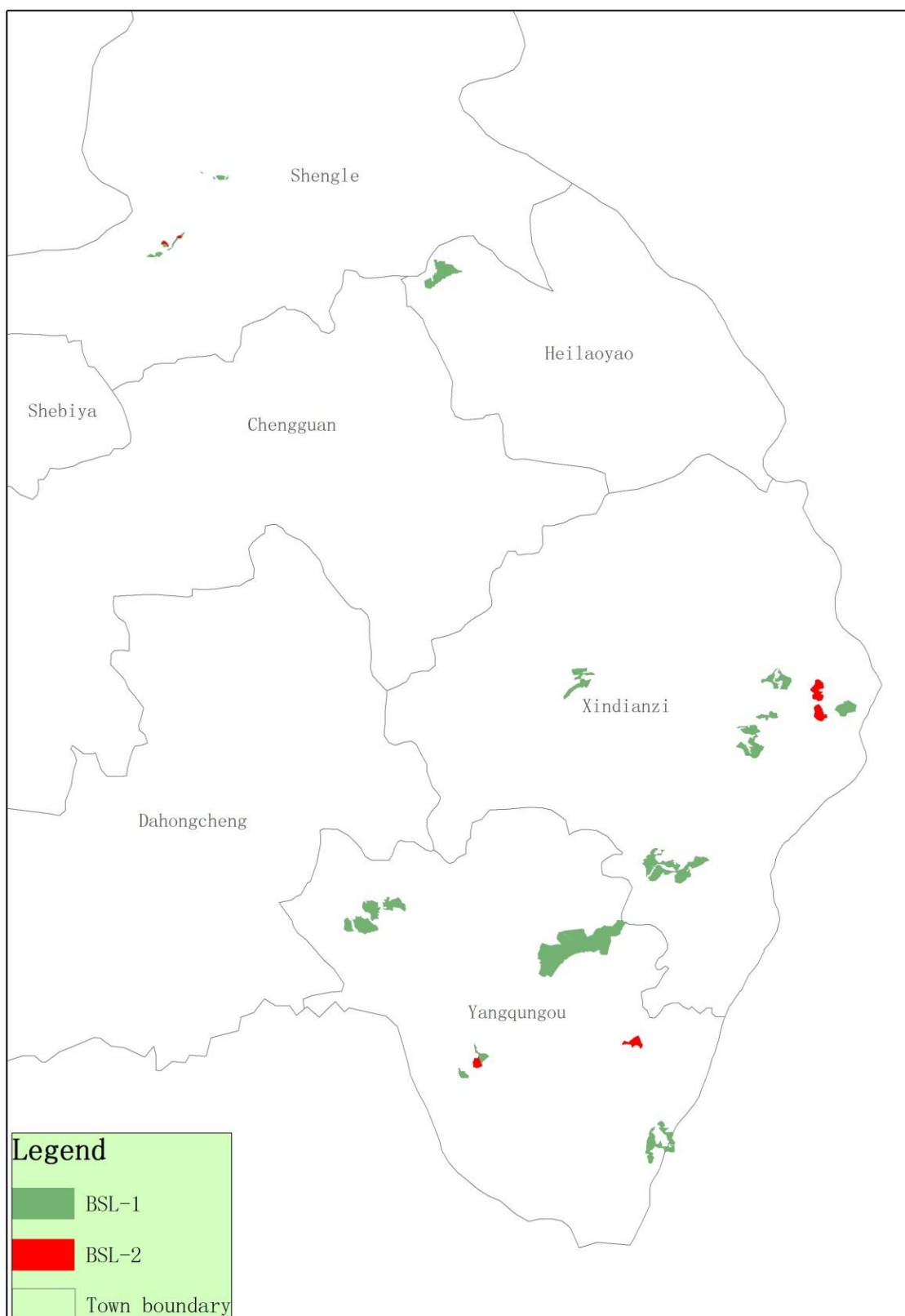
Sources	GHGs	Included?	Justification / Explanation
Burning of woody biomass	CO ₂	Excluded	Carbon stock decreases due to burning are accounted as a change in carbon stock
	CH ₄	Included	Burning of woody biomass for the purpose of site preparation or as part of forest management can lead to significant levels of emissions of methane
	N ₂ O	Included	Burning of woody biomass for the purpose of site preparation or as part of forest management can lead to significant levels of emissions of nitrous oxide

B.4. Identification of strata

>>The crown cover of vegetation in the project areas ranges from 15% to 60%, mainly covered by herbaceous weeds grass, with or without tiny bush (crown cover 0-25%). There are almost no pre-project living trees. In according to the methodology applied, the project area is stratified into two baseline strata for baseline net GHG removals by sinks based on crown cover of bush. See Table B-0-1 for details and Figure B.0.3 for the stratification map.

Table B-0-1 Baseline stratification

Stratum ID	Crown cover of bush	Area (ha)	Land ID
BSL-1	0-5%	1,937.72	HL-YQ-01, HL-YQ-02, HL-YQ-03, HL-YQ-04, HL-YQ-05, HL-YQ-06, HL-YQ-09, HL-XD-01, HL-XD-02, HL-XD-05, HL-XD-06, HL-XD-07, HL-XD-08, HL-XD-08, HL-XD-09, HL-XD-09, HL-SL-01, HL-SL-02
BSL-2	6-30%	252.99	HL-XD-03, HL-XD-04, HL-YQ-06, HL-YQ-07, HL-YQ-08, HL-SL-01, HL-SL-02
total		2,190.71	

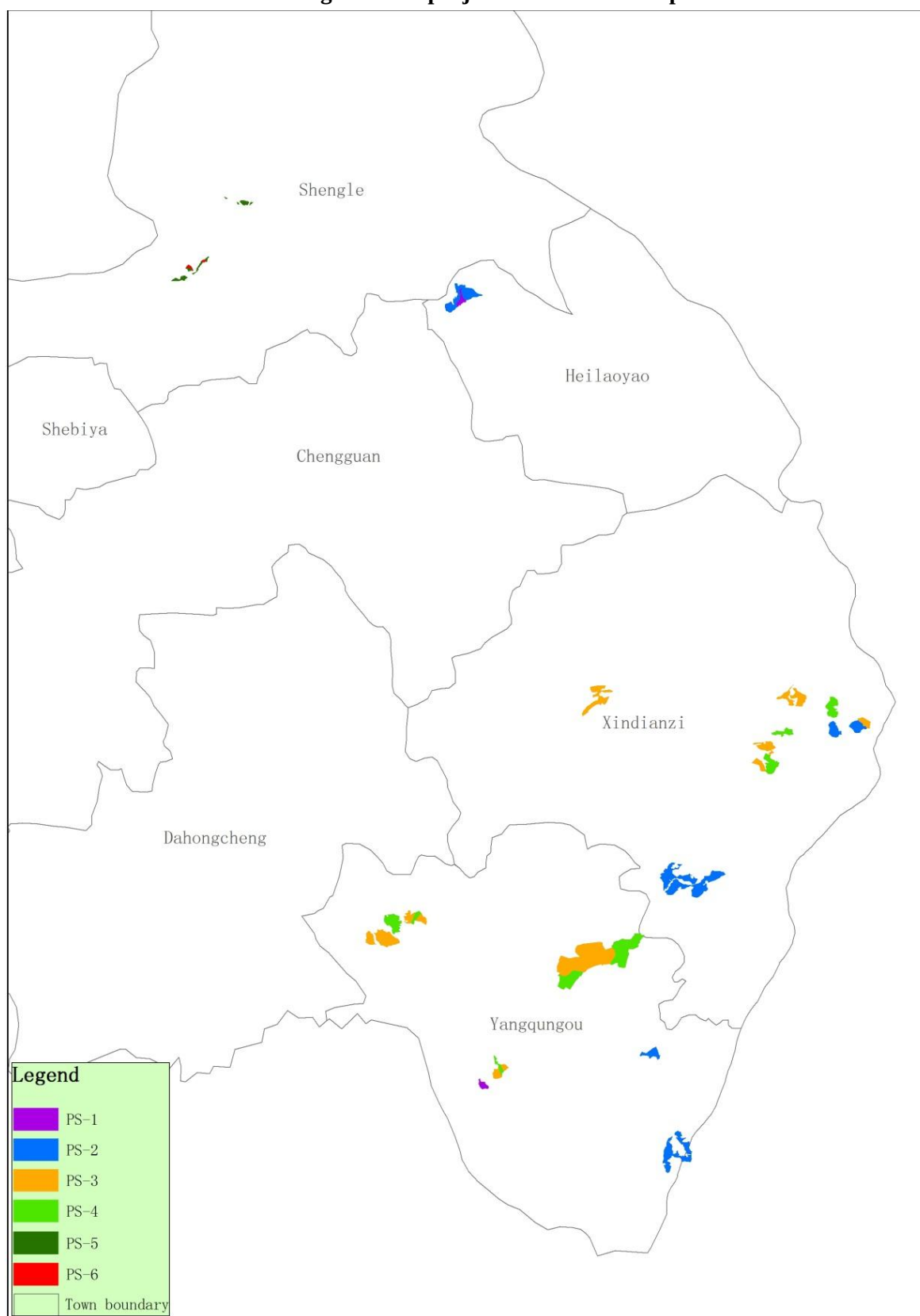
Figure B.0.3 Baseline stratification map



For the actual net GHG removals by sinks, the stratification for ex ante estimations was based on the project planting models/management plan following methodology applied. As both pine species to be planted similar and slow growth rate and the variation of carbon stock of forests planted at two consecutive years are generally small. Therefore, forests planted at two consecutive years were merged into one stratum. See Table B-0-2 for project strata and Figure B.0.4 for an example of stratification map.

Table B-0-2 Project stratification

Stratum ID	Planting models	Planting time	Area (ha)
PS-1	4 Chinese pine +1 seabuckthorn (1333/ha)	2014	40.82
PS-2	4 Chinese pine +1 seabuckthorn (1250/ha)	2013-2014	678.66
PS-3	4 Mongolia Scotch pine +1 apricot	2013-2014	877.70
PS-4	4 Mongolia Scotch pine +1 seabuckthorn	2013-2014	538.82
PS-5	Mongolia Scotch pine	2011-2012	47.06
PS-6	Chinese pine	2012	7.65
Total			2190.71

Figure B.0.4 project stratification map

B.5. Establishment and description of baseline scenario

>>see section B.6 below.

B.6. Demonstration of additionality

>> A/R Methodological tool “Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities” was followed to identify the baseline scenario and demonstrate the additionality, as below.

STEP 0: Preliminary screening based on the starting date of the project activity

The proposed A/R CDM project started on 20 July 2011, and the proof that the lands to be planted are eligible for the A/R CDM project activity has been detailed in Section A.7 above based on the definition of forest per Chinese DNA, land use/cover maps derived from satellite images in 1987 and 2004, field surveys and interviews with local communities.

The incentive of the planned sale of GHG emission reductions is evidenced by the notification in writing of the commencement of the project activity and of its intention to seek CDM status, which was submitted by the project implementation entity, Hesheng Forest Silviculture Co. Ltd, to Chinese DNA on December 29th 2011. Such notifications were confirmed by Chinese DNA on December 30th 2011 and CDM Executive Board on December 30th 2011.

The Nature Conservancy (TNC) China Program has done project identification in 2010 and the project development since early 2011. A training courses was held on November 11-13 2010.

STEP 1: Identification of alternative land use scenarios to the proposed A/R CDM project activity***Sub-step 1a: Identify credible alternative land use scenarios to the proposed CDM project activity***

The following procedures are used to identify credible alternative land use scenarios to the proposed CDM project activity:

- a) **Analyzing the historical and existing land-use / land-cover changes and identifying key factors that influence the land-use / land-cover change over times:** Collected information demonstrates that the lands to be afforested have been non-forests for at least 50 years. Currently the project lands are mainly covered by herbaceous plants with a few shrubs (see Section F and Appendix 8 for detail description).
- b) **Interviews with local farmers and staff from local forestry bureau** indicate that crown cover of both tree and non-tree vegetation has been decreasing in recent decades due to soil and wind erosion as well as desertification (see Section F and Appendix 8). Under the current conditions, the land will continue to degrade and soil/wind erosion as well as desertification will accelerate. This will result either in the continued decrease of the carbon stocks both in living biomass and soils, or at least, maintenance of these stocks at a low level (see also section B.2 for the demonstration of the land degradation).
- c) **National, local and sectoral land-use policies or regulations:** Since the 1980s, China has successively issued and revised a series of laws and administrative regulations related to forestry. These have included, among others, the Regulations for Implementing the Forest Law, the Regulations for Grain for Green, the Regulations for the Protection of Wild Plants and Animals, the Regulation for Nature Reserve, the Regulation for Forest Fire Control, and the Regulation for Forest Diseases and Pests Control, etc. In the 1990s, to encourage forestation, China initiated a policy that would bring direct benefit to those who planted trees. Villages that owned lands were permitted to contract with farmers to use village land for forestry purposes. The contracts were long term; up to

30-50 years or more. Within this period, the right to use the land will not be changed and the land-use contract can be prolonged should the farmers apply.

To facilitate the restoration of forest resources, the Chinese Government has launched several programs over the past years, including the Grain for Green Program (started in 2001) that subsidized farmers to convert cropland on steep slopes to forests (the Grain for Green), the Intensively Managed Commercial Timber Plantation Base Program (started in 2000), the Natural Forest Conservation Program (launched in 1998), as well as 3N (northeast, north and northwest) Sheltering Forest Construction Program.

- d) **Regional forestation rate and their relevance to the proposed A/R CDM project activity:** There were some forestations in the project county. Around a half of forestation was conducted on cropland under the Grain for Green Program, and a half was implemented under 3N Sheltering Forest Construction Program. Cropland that was planted, usually is not a type of the proposed project lands. Under the Grain for Green Program, government subsidizes around 4,600 US\$/ha for farmers to take forestation on desertified farmland within 8 years and it was decided to extend the subsidy period, however the only conversion of farmland to forest is eligible for the subsidy while tree planting on other types of lands is not eligible. Other forestation activities were invested by State Government, but the investment criteria was around 230 US\$/ha in the past and increased to around 700 US\$/ha more recently. The criteria can only cover labour cost for site preparation, without any fund for seedlings, planting, weeding and forest managing. As a result, such forestation failed frequently in most cases. Part of the project lands is failed planted lands through such forestation. Hence, to increase the survival rate, such forestation was conducted on lands with good site conditions. Moreover, due to the high inflation in China in recent years, the price of seedlings and other materials as well as labour and transportation costs are increasing rapidly. This further prevents local communities from forestation on the degraded lands. Therefore, with the proposed A/R CDM project activity, the governmental subsidy for afforestation on cropland will not be reduced and the forestation on degraded land will not be impacted.

The whole project area has been legally defined by local governments for forestry purposes on which other land uses such as agriculture and grazing are prohibited under China's well enforced forest law. Therefore, the identified realistic and credible land-use scenarios that would have occurred on the land within the proposed project boundary in the absence of the proposed A/R CDM project activity are:

- The proposed project not undertaken as an A/R CDM project;
- Continuation of current degraded and degrading barren lands.

Sub-step 1b. Consistency of credible alternative land use scenarios with enforced mandatory applicable laws and regulations

Current laws and/or regulations allow both the continuation of the current situation and forestation on the degraded lands. Therefore, the identified alternatives are in compliance with applicable legal and regulatory requirements, currently and in the foreseeable future. The current grazing that exists on some project lands is not systematically controlled, because local community do not have the awareness of environment and sustainable land use and the local government does not have sufficient funds to assist local farmers or provide alternative income, and thus does not take strict measures to stop these activities, which sometimes can provide the only source of income to local people who live below the poverty level (see also Appendix 8).

STEP 2: Barrier analysis

Sub-step 2a: Identification of barriers that would prevent the implementation of at least one alternative land use scenarios:

a) Investment barriers

- Lack of access to credit: The project lands are collectively owned by local village. No credit

mechanisms exist for local communities to make long-term investment in plantation forestry. Agriculture and husbandry are the main income source for local communities in the project area. However, agricultural productivity is very low due to unfavourable climate. Helinge'er is categorized as "national poverty county" as assessed by the State Council¹⁴. The income of farmers in the project villages is lower than relevant town/townships and county level. The mean annual income per capita in the project areas is only US\$ 460 with the lowest at US\$ 202. It was US\$110 for the poorest natural village (see Section E.1 for details). It is extremely difficult for local communities to afford the high initial plantation establishment investment.

- Debt funding not available for this project activity: There is no opportunity to get long-term commercial loans from banks for the purpose of forestation in the project area due to the unfavourable climate, high risk and the economical unattractiveness degraded lands.
- b) **Technological barriers:** Local communities usually do not have access to quality seed sources and also lack the necessary skills to produce high quality seedlings and to perform successful tree planting especially under drought climatic conditions. In addition they lack the knowledge and experience to prevent planted trees from fire, and attack by pest and disease.

Sub-step 2b: Elimination of land use scenarios that are prevented by the identified barriers.

The alternative land use scenario "proposed project not undertaken as an A/R CDM project" identified in sub-step 1a above can be eliminated from land use scenarios due to barriers faced. The alternative land use (continued status as barren land with agricultural cultivation or grazing) does not face the above-mentioned barriers.

Sub-step 2c. Determination of baseline scenario (if allowed by the barrier analysis)

Is forestation without being registered as an A/R CDM project activity included in the list of land use scenarios that are not prevented by any barrier?

→ no, then:

Does the list contain only one land use scenario?

→yes, the remaining land use is the baseline scenario.

STEP 3: Investment analysis

N/A

STEP 4: Common practice analysis

There were some forestations in the project county. They were invested by State Government, but the investment criteria was around 230 US\$/ha in the past and increased to around 700 US\$/ha more recently. The criteria can only cover labour cost for site preparation, without any fund for seedlings, planting, weeding and forest managing. As a result, such forestation failed frequently in most cases. Part of the project lands is failed planted lands through such forestation. Hence, to increase the survival rate, such forestation was conducted on lands with good site conditions. Moreover, due to the high inflation in China in recent years, the price of seedlings and other materials as well as labour and transportation costs are increasing rapidly. This further prevents local communities from forestation on the degraded lands. Therefore, with the proposed A/R CDM project activity, the governmental subsidy for afforestation on cropland will not be reduced and the forestation on degraded land will not be impacted.

¹⁴ http://cpad.gov.cn/data/2006/1119/article_331579.htm

B.7. GHG removals by sinks**B.7.1. Explanation of methodology**

>>

Baseline net GHG removals by sinks

The baseline net GHG removals by sinks is the sum of the changes in carbon stocks in the selected carbon pools within the project boundary that would have occurred in the absence of the A/R CDM project activity. Under the applicability conditions of the methodology applied:

- Changes in carbon stock of above-ground and below-ground biomass of non-tree vegetation is conservatively assumed to be zero for all strata in the baseline scenario, i.e., $\Delta C_{SHRUB_BSL,t} = 0$;
- It is expected that the baseline dead wood and litter carbon pools will not show a permanent net increase. It is therefore conservative to assume that the sum of the changes in the carbon stocks of dead wood and litter carbon pools is zero for all strata in the baseline scenario, i.e., $\Delta C_{DW_BSL,t} = 0$, and $\Delta C_{LI_BSL,t} = 0$;
- Since carbon stock in SOC is unlikely to increase in the baseline, the change in carbon stock in SOC may be conservatively assumed to be zero for all strata in the baseline scenario, i.e., $\Delta C_{SOC_BSL,t} = 0$.

Based on the baseline survey (see Appendix 8), there is no pre-project living trees, i.e., $\Delta C_{TREE_BSL,t} = 0$.

Therefore the baseline net GHG removals by sinks ($\Delta C_{BSL,t}$) are:

$$\Delta C_{BSL,t} = \Delta C_{TREE_BSL,t} + \Delta C_{SHRUB_BSL,t} + \Delta C_{DW_BSL,t} + \Delta C_{LI_BSL,t} + \Delta C_{SOC_BSL,t} = 0$$

Where t represent 1, 2, 3, . . . t^* years elapsed since the start of the A/R CDM project activity

Actual net GHG removals by sinks:

The actual net greenhouse gas removals by sinks represent the sum of the changes in carbon stocks in the carbon pools within the project boundary, minus the increase in GHG emissions measured in CO₂ equivalents by sources that are increased as a result of the implementation of the proposed A/R CDM project activity, while avoiding double counting, within the project boundary, attributable to the A/R CDM project activity. The aboveground biomass, belowground biomass, dead wood, litter and soil organic matter are the pools to be accounted for, i.e.,

$$\Delta C_t = \Delta C_{TREE_PROJ,t} + \Delta C_{DW_PROJ,t} + \Delta C_{LI_PROJ,t} + \Delta C_{SOC_AL,t} \quad (\text{B.1})$$

Where

ΔC_t	Change in carbon stock in all selected carbon pools in the project scenario, in year t ; t CO ₂ -e
$\Delta C_{TREE_PROJ,t}$	Change in carbon stock in tree biomass in project, in year t , as estimated in the tool “Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities”; t CO ₂ -e
$\Delta C_{DW_PROJ,t}$	Change in carbon stock in dead wood biomass in project, in year t , as estimated in the tool “Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities”; t CO ₂ -e
$\Delta C_{LI_PROJ,t}$	Change in carbon stock in litter biomass in project, in year t , as estimated in the tool “Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities”; t CO ₂ -e

$\Delta C_{SOC_AL,t}$	Change in carbon stock in SOC in project, in year t , in areas of land meeting the applicability conditions of the tool “Tool for estimation of change in soil organic carbon stocks due to the implementation of A/R CDM project activities”, as estimated in the same tool; t CO ₂ -e
t	1, 2, 3, ... t^* years elapsed since the start of the A/R CDM project activity

Due to unavailability of relevant growth and biomass data, the carbon stock changes in living biomass of Seabuckthorn and apricot are conservatively neglected for the ex ante estimation.

(1) Change in carbon stock in tree biomass

Local growth curves of diameter at breast height (DBH) and tree height (H) are used to estimate time-series DBH and H of trees to be planted¹⁵ (mean value estimated from 12 growth curves was used). Volume equations from national forest inventory¹⁶ were then used to calculate tree volume, as follows

- *Pinus Tabulaeformis*:

$$V = 0.000066492455 \cdot DBH^{1.8655617} \cdot H^{0.93768879}$$
$$V_s = 0.33050596446 \cdot (1 - e^{(-0.029683022346463 \cdot A)})^{3.094640905157} \quad (B.2)$$

- *Pinus Sylvestris*:

$$V = 0.000082179346 \cdot DBH^{1.8318749} \cdot H^{0.88035001}$$
$$V_s = 0.31225810398 \cdot (1 - e^{(-0.07402135899476 \cdot A)})^{2.527119706049} \quad (B.3)$$

DBH	Diameter at breast height, cm
H	Tree height, m
V	Standing volume of tree, m ³ /tree

The standing volume per hectare is estimated by multiplying volume estimated using above equations and number of trees per hectare. Following BEF method (equation (1), (10) and (11) in the methodological tool “Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities” (version 02.1.0), spreadsheet developed by Biocarbon of the World Bank¹⁷ is used to estimate carbon stock changes in living tree biomass. Data and parameters used are listed in Section B.7.2 below.

The estimated changes in carbon stock of tree biomass to be established in the proposed A/R CDM project activity is summarized in Table B-0-3 below.

(2) Change in carbon stock in dead organic matter

Default methods (Equation (9) and (15)) in the methodological tool “Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities (version 01.1.0) are applied to estimate the changes in carbon stock in dead organic matter. DF_{DW} is chosen from default value for temperate/boreal area. DF_{LI} is estimated using national biomass database for plantation, see Section B.7.2 for chosen values of parameters. Estimated carbon stock changes in dead organic matter are listed in Table B-0-3 below.

(3) Change in carbon stock in mineral soils

¹⁵ Yang M L. 2008. Studies on the Growth Pattern and Response to Environment of Artificial *Pinus Sylvestris* and *Pinus Tabulaeformis* in Manhan Mountain. MS thesis of Agricultural University of Inner Mongolia. S758.1

¹⁶ Chinese Ministry of Agriculture and Forestry. 1978. Volume table of trees. Beijing: Technical Standard Press

¹⁷ www.biocarfund.org

The methodological tool “Tool for estimation of change in soil organic carbon stocks due to the implementation of A/R CDM project activities” (Version 1.1.0) and the associated “approved spreadsheet to facilitate the calculation of changes in soil organic carbon stocks”¹⁸ are used to the changes in carbon stock in mineral soils due to the implementation of the proposed A/R CDM project activity. The applicability conditions of the tool is met as described below.

- (a) The areas of land to which this tool is applied:
 - (i) are severely degraded barren lands and do not fall into wetland category; or
 - (ii) belong to HAC soils that do not contain organic soils as defined in “Annex A: glossary” of the IPCC GPG LULUCF 2003;
 - (iii) are not subject to any of the land management practices and application of inputs as listed in the Tables 1 and 2 of the tool;
- (b) The A/R CDM project activity meets the following conditions:
 - (i) Litter will not be collected and removed thus will remain on site and is not removed in the A/R CDM project activity;
 - (ii) Soil disturbance attributable to the A/R CDM project activity, if any, is:
 - In accordance with appropriate soil conservation practices, e.g. follows the land contours as described in Section A.4;
 - Only limited to soil disturbance for site preparation before planting and such disturbance is not repeated within the crediting period (30 years).

Based on the calculation, soil carbon stock will increased by $0.75 \text{ tC.ha}^{-1}.\text{yr}^{-1}$ within 20 years following the planting. Estimated carbon stock changes in mineral soils are summarized in Table B-0-3 below.

(4) Changes in carbon stock in planted shrub biomass

For the ex ante estimate, carbon stock changes in planted shrub biomass are conservatively assumed to be zero. However, this will be monitored for the ex post estimate.

(5) Emission of pre-project living biomass

As described in Appendix 8, there is no pre-project living trees. Based on the methodology applied, under the applicability conditions (the lands to be planted are degraded and degrading lands) of the methodology changes in carbon stock of above-ground and below-ground biomass of non-tree vegetation are assumed to be zero for all strata in the project scenario.

(6) Estimates of the increase in GHG emissions by sources

There will be no biomass burning during site preparation and forest management, and based on the methodology applied there will be no GHG emissions from clearing, burning and decay of existing vegetation due to implementation of an A/R CDM project activity, i.e., $GHG_E = 0$.

Therefore, the actual net GHG removals by sinks that represent the sum of carbon stock changes minus GHG emissions by sources are summarized in Table B-0-3 below.

Table B-0-3 Ex ante estimate of the actual net GHG removals by sinks

Year	Carbon Stock Changes (tCO ₂ /yr)				Emission by sources (tCO ₂ e/yr)	actual net GHG removals by sinks	
	Biomass	Dead Wood	Litter	SOC		tCO ₂ e/yr	Cumulative (tCO ₂ e)
2011	0	0	0	0	0	0	0
2012	0	218	242	41	0	501	501
2013	0	218	242	150	0	610	1,111

¹⁸ <http://cdm.unfccc.int/Reference/tools/index.html>

2014	0	218	242	3,009	0	3,468	4,579
2015	0	218	242	6,024	0	6,484	11,063
2016	1	218	242	6,024	0	6,485	17,547
2017	3	218	242	6,024	0	6,487	24,035
2018	12	218	242	6,024	0	6,496	30,531
2019	39	218	242	6,024	0	6,523	37,054
2020	97	218	242	6,024	0	6,581	43,635
2021	246	218	242	6,024	0	6,730	50,365
2022	555	218	242	6,024	0	7,039	57,404
2023	988	218	242	6,024	0	7,472	64,876
2024	1,471	218	242	6,024	0	7,955	72,832
2025	1,990	218	242	6,024	0	8,474	81,306
2026	2,530	218	242	6,024	0	9,014	90,320
2027	3,065	218	242	6,024	0	9,549	99,869
2028	3,571	218	242	6,024	0	10,055	109,923
2029	4,031	218	242	6,024	0	10,515	120,438
2030	4,434	218	242	6,024	0	10,918	131,356
2031	4,777	218	242	6,024	0	11,261	142,617
2032	5,057	218	242	5,983	0	11,500	154,117
2033	5,276	218	242	5,874	0	11,609	165,727
2034	5,435	218	242	3,016	0	8,910	174,637
2035	5,537	218	242	0	0	5,996	180,633
2036	5,584	218	242	0	0	6,043	186,677
2037	5,578	218	242	0	0	6,037	192,714
2038	5,522	218	242	0	0	5,981	198,695
2039	5,418	218	242	0	0	5,877	204,573
2040	5,269	218	242	0	0	5,728	210,301
2041	5,077	218	242	0	0	5,536	215,837
Total	81,564	6,525	7,259	120,489	0	215,837	

leakage:

Currently all 2,190.71 ha of project lands are defined for forestry purpose by local government. Among them 525.12 ha of lands are barren lands without any pre-project management activity, and 1,665.59 ha of barren lands have sporadic grazing. See Table Appendix 8-0-1 for details. Although the grazing are illegal, as the result of the implementation of the proposed A/R CDM project activity, these pre-project activity may be temporarily or permanently displaced from the project area to other locations.

The procedures contained in the methodological tool “Guidelines on conditions under which increase in GHG emissions related to displacement of pre-project grazing activities in A/R CDM project activity is insignificant” (version 01) as follow:

The increase in GHG emissions due to displacement of pre-project grazing activities attributable to the A/R CDM project activity is insignificant if at least one of the conditions (a) to (d) below is met:

(a) Total area subjected to pre-project grazing activities to be displaced is less than 5% of the area of the entire A/R CDM project activity, or less than 50 ha;

Assessment: the condition is **not met** as the total area subjected to pre-project grazing activities to be displaced is more than 5% of the area of the entire A/R CDM project activity, and more than 50 ha.

(b) The total area expected to be displaced is more than 5% of the entire A/R CDM project activity or more than 50 ha, and the n -a ha (where “ n ” is the area in ha expected to be displaced and “ a ” is 5% of the total project area or 50 ha) are displaced to:

- (i) Areas of land that can be identified as degraded or degrading. The identification shall be conducted using the most recent version of the “Tool for the identification of degraded or degrading lands for consideration in implementing CDM A/R project activities”; and/or

Assessment: the condition is **met** as based on the assessment in Section B.2, the area that grazing is expected to be displaced is degraded or degrading lands.

- (ii) Existing grasslands with the carrying capacity that allows for accommodation of the displaced animals during the entire period of displacement;

Assessment: Livestock grazing on lands both within and outside the project boundary controlled by the project participants is surveyed for each village using Participatory Rural Assessment (Table Appendix 8-0-1, Section E and F). The total daily dry matter intake of grazing animals within and outside the project boundary is then estimate, i.e.,

$$DMI = \frac{\sum_g DMI_g \cdot N_g}{1000} \cdot 365 \quad (B.4)$$

Where:

DMI Total daily dry matter intake of grazing animals; t d.m. yr⁻¹

DMI_g Daily dry matter intake per grazing animal of animal type g ; kg d.m.head⁻¹day⁻¹. It is chosen from table 3 in the annex of the methodological tool “Estimation of GHG emissions related to displacement of grazing activities in A/R CDM project activity” (version 02)¹⁹.

N_g Total number of grazing animals of animal type g within and outside the project boundary.

g Animal types

Based on the table 3.4.2 of the IPCC Good Practice Guidance for Land Use, Land Use Change and Forestry, the above-ground annual net primary productivity (ANPP) in tonnes dry biomass is 2.2 t d.m. ha⁻¹yr⁻¹. This value is used to estimate total ANPP of grazing lands outside the project boundary. If the ANPP is larger than DMI, existing grazing lands outside the project boundary can accommodate all displaced animals, without overgrazing.

Table B-0-4 indicates that the existing grazing lands outside the project boundary can accommodate all grazing animals. This condition is **complied**.

Therefore, the increase in emissions of greenhouse gases due to displacement of pre-project grazing animals attributable to the A/R CDM project activity is insignificant and is accounted as zero.

Table B-0-4 Estimates of potential displacement of grazing animals

Township	Village	land ID	Land within project boundary			Existing grassland outside the project boundary under the control of the PPs			ANPP (t d.m./yr)	DMI (t d.m./yr)
			Area (ha)	Cattle /horse /hinny	Goat /sheep	Area (ha)	Cattle /horse /hinny	Goat /sheep		

¹⁹ http://cdm.unfccc.int/EB/Meetings/039/eb39_repan12.pdf



Xindianzi	Haolaigou	HL-XD-08 HL-XD-09	282.71	0	653	3,837.29	0	4,288	8,442	8,296
	Shanbaodai	HL-XD-02 HL-XD-03 HL-XD-04 HL-XD-05	264.21	0	172	1,201.79	0	1,355	2,644	2,564
	Yulincheng	HL-XD-01	86.93	0	15	346.40	0	367	762	641
	Xindianzi	HL-XD-01	6.43	0	187	1,593.57	0	1,760	3,506	3,269
	Xinfeng	HL-XD-06 HL-XD-07	168.59	0	238	1,393.41	0	1,342	3,066	2,653
Yangqungou	Wujianfang	HL-YQ-05	333.84	0	183	2,186.16	0	2,466	4,810	4,448
	Dawan	HL-YQ-05	329.41	0	155	1,651.59	0	1,844	3,633	3,356
Heilaoyao	Shuimo	HL-HL-01	138.76	0	18	794.57	0	1,009	1,748	1,724
Shengle	Baiyantu	HL-SL-01	39.70	0	41	594.00	0	1,243	3,178	1,024
	Taigedou	HL-SL-02	15.01	0	27	1,444.71	0	569	1,307	2,132
total			1665.59	0	1,689	15043.49	0	16,243	33,096	30,108

B.7.2. Data and parameters fixed ex ante

(Copy this table for each data and parameter.)

Data / Parameter	$BEF_{2,j}$			
Unit	dimensionless			
Description	Biomass expansion factor for conversion of stem biomass to above-ground tree biomass, for tree species j			
Source of data	Parameters used by GHG inventory in land use change and forestry sector for China's second national communication			
Value(s) applied	Species	Values	Number of samples	Standard deviation
	Chinese pine	1.606	253	0.371
	Scotch pine	2.652	62	1.296
Choice of data or Measurement methods and procedures	National default value			
Purpose of data	Calculation of actual net GHG removal by sinks			
Additional comment				

Data / Parameter	D_j			
Unit	t d.m.m ⁻³			
Description	Basic wood density of tree species j			
Source of data	Parameters used by GHG inventory in land use change and forestry sector for China's second national communication			
Value(s) applied	Species	Values	Number of samples	Standard deviation
	Chinese pine	0.360	15	0.012
	Scotch pine	0.375	22	0.006
Choice of data or Measurement methods and procedures	National default value			
Purpose of data	Calculation of actual net GHG removal by sinks			
Additional comment				

Data / Parameter	R_j			
Unit	dimensionless			
Description	Root-shoot ratio for tree species j ; dimensionless			
Source of data	Parameters used by GHG inventory in land use change and forestry sector for China's second national communication			
Value(s) applied	Species	Values	Number of samples	Standard deviation
	Chinese pine	0.251	264	0.083
	Scotch pine	0.244	42	0.168
Choice of data or Measurement methods and procedures	National default value			
Purpose of data	Calculation of actual net GHG removal by sinks			
Additional comment				

Data / Parameter	CF_{TREE}			
Unit	t C (t d.m.) ⁻¹			
Description	Carbon fraction of tree biomass			
Source of data	IPCC default value			
Value(s) applied	0.5			
Choice of data or Measurement methods and procedures	no local value			
Purpose of data	Calculation of actual net GHG removal by sinks			
Additional comment				

Data / Parameter	DF_{DW}
Unit	percent
Description	Conservative default factor expressing carbon stock in dead wood as a percentage of carbon stock in tree biomass
Source of data	Default value for temperate/boreal forest in the methodological tool “Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities”.
Value(s) applied	8%
Choice of data or Measurement methods and procedures	No local value. Default value is used
Purpose of data	Calculation of actual net GHG removal by sinks
Additional comment	

Data / Parameter	DF_{LI}
Unit	percent
Description	Default factor for the relationship between carbon stock in litter and carbon stock in living trees
Source of data	biomass database of China. Values chosen from plantation
Value(s) applied	8.9% (number of samples: 12, standard deviation 4.646%)
Choice of data or Measurement methods and procedures	national value
Purpose of data	Calculation of actual net GHG removal by sinks
Additional comment	

Data / Parameter	BDR_{SF}
Unit	dimensionless
Description	Ratio of biomass per hectare in land having a shrub crown cover of 1.0 (i.e. 100%) and the default above-ground biomass content in forest in the region/country where the A/R CDM project is located
Source of data	default value
Value(s) applied	0.1
Choice of data or Measurement methods and procedures	No local data
Purpose of data	Calculation of actual net GHG removal by sinks
Additional comment	

Data / Parameter	B_{FOREST}
Unit	t d.m./ha
Description	Default above-ground biomass content in forest in the region/country where the A/R CDM project is located
Source of data	Helinge'er County forest inventory, and BEF and wood density used by GHG inventory in land use change and forestry sector for China's second national communication
Value(s) applied	46.21
Choice of data or Measurement methods and procedures	Estimated based on local forest data
Purpose of data	Calculation of actual net GHG removal by sinks
Additional comment	

Data / Parameter	R_s
Unit	dimensionless
Description	Root-shoot ratio for shrubs
Source of data	default value
Value(s) applied	0.40
Choice of data or Measurement methods and procedures	Local data unavailable
Purpose of data	Calculation of actual net GHG removal by sinks
Additional comment	

Data / Parameter	CF_s
Unit	t C (t d.m.) ⁻¹
Description	Carbon fraction of shrub biomass
Source of data	IPCC default value
Value(s) applied	0.5
Choice of data or Measurement methods and procedures	no local value
Purpose of data	Calculation of actual net GHG removal by sinks
Additional comment	

B.7.3. Ex ante calculation of net anthropogenic GHG removals by sinks

>>The net anthropogenic GHG removals by sinks is the actual net GHG removals by sinks, minus baseline net GHG removals by sinks, minus leakage. See section B.7.1 for the detail estimation method, section B.7.4 for the summary table, and calculation spreadsheet attached.

**B.7.4. Summary of ex ante estimates of GHG removals by sinks**

Year	Baseline net GHG removals by sinks (tCO ₂ e)	Actual net GHG removals by sinks (tCO ₂ e)	Leakage (tCO ₂ e)	Net anthropogenic GHG removals by sinks (tCO ₂ e)	Cumulative net anthropogenic GHG removals by sinks (tCO ₂ e)
2011	0	0	0	0	0
2012	0	501	0	501	501
2013	0	610	0	610	1,111
2014	0	3,468	0	3,468	4,579
2015	0	6,484	0	6,484	11,063
2016	0	6,485	0	6,485	17,547
2017	0	6,487	0	6,487	24,035
2018	0	6,496	0	6,496	30,531
2019	0	6,523	0	6,523	37,054
2020	0	6,581	0	6,581	43,635
2021	0	6,730	0	6,730	50,365
2022	0	7,039	0	7,039	57,404
2023	0	7,472	0	7,472	64,876
2024	0	7,955	0	7,955	72,832
2025	0	8,474	0	8,474	81,306
2026	0	9,014	0	9,014	90,320
2027	0	9,549	0	9,549	99,869
2028	0	10,055	0	10,055	109,923
2029	0	10,515	0	10,515	120,438
2030	0	10,918	0	10,918	131,356
2031	0	11,261	0	11,261	142,617
2032	0	11,500	0	11,500	154,117
2033	0	11,609	0	11,609	165,727
2034	0	8,910	0	8,910	174,637
2035	0	5,996	0	5,996	180,633
2036	0	6,043	0	6,043	186,677
2037	0	6,037	0	6,037	192,714
2038	0	5,981	0	5,981	198,695
2039	0	5,877	0	5,877	204,573
2040	0	5,728	0	5,728	210,301
2041	0	5,536	0	5,536	215,837
Total	0	215,837	0	215,837	
Total number of crediting years	30 year 0 months				
Annual average over the crediting period	0	7,195	0	7,195	

B.8. Monitoring plan

B.8.1. Data and parameters to be monitored

(Copy this table for each data and parameter.)

Data / Parameter	$A_{p,i}$
Unit	ha
Description	Area of sample p in stratum i
Source of data	Field measurement
Value(s) applied	
Measurement methods and procedures	following the procedures contained in the “non-commercial forest construction-verification regulation” (GB/T 18337.4-2001) and the “Technical specifications in the national inventory of forestry resources”
Monitoring frequency	Every five years since the year of the initial verification
QA/QC procedures	following the “non-commercial forest construction-verification regulation” (GB/T 18337.4-2001) and the “Technical specifications in the national inventory of forestry resources”
Purpose of data	Calculation of actual net GHG removal by sinks
Additional comment	

Data / Parameter	A_i
Unit	ha
Description	Area of stratum i
Source of data	Field measurement
Value(s) applied	
Measurement methods and procedures	following the procedures contained in the “non-commercial forest construction-verification regulation” (GB/T 18337.4-2001) and the “Technical specifications in the national inventory of forestry resources”
Monitoring frequency	Every five years since the year of the initial verification
QA/QC procedures	following the “non-commercial forest construction-verification regulation” (GB/T 18337.4-2001) and the “Technical specifications in the national inventory of forestry resources”
Purpose of data	Calculation of actual net GHG removal by sinks
Additional comment	

Data / Parameter	<i>DBH</i>
Unit	cm
Description	The diameter at breast height (1.3m above ground) of the tree with minimum diameter above 2 centimeter
Source of data	Field measurements in sample plots
Value(s) applied	
Measurement methods and procedures	following the procedures contained in the “Technical specifications in the national inventory of forestry resources”
Monitoring frequency	Every five years since the year of the initial verification
QA/QC procedures	following the procedures contained in the “Technical specifications in the national inventory of forestry resources”
Purpose of data	Calculation of actual net GHG removal by sinks
Additional comment	

Data / Parameter	<i>H</i>
Unit	m
Description	Height of trees
Source of data	Field measurements in sample plots
Value(s) applied	
Measurement methods and procedures	following the procedures contained in the “Technical specifications in the national inventory of forestry resources”
Monitoring frequency	Every five years since the year of the initial verification
QA/QC procedures	following the procedures contained in the “Technical specifications in the national inventory of forestry resources”
Purpose of data	Calculation of actual net GHG removal by sinks
Additional comment	

Data / Parameter	<i>CC_{SHRUB,i,t}</i>
Unit	percent
Description	Crown cover of shrubs in shrub biomass stratum i at a given point of time in year t
Source of data	Field measurements in sample plots
Value(s) applied	Every five years since the year of the initial verification
Measurement methods and procedures	following the procedures contained in the “Technical specifications in the national inventory of forestry resources”
Monitoring frequency	
QA/QC procedures	following the procedures contained in the “Technical specifications in the national inventory of forestry resources”
Purpose of data	Calculation of actual net GHG removal by sinks
Additional comment	

Data / Parameter	$A_{SHRUB,i}$
Unit	ha
Description	Area of shrub stratum i
Source of data	Field measurement
Value(s) applied	
Measurement methods and procedures	following the procedures contained in the “non-commercial forest construction-verification regulation” (GB/T 18337.4-2001) and the “Technical specifications in the national inventory of forestry resources”
Monitoring frequency	Every five years since the year of the initial verification
QA/QC procedures	following the “non-commercial forest construction-verification regulation” (GB/T 18337.4-2001) and the “Technical specifications in the national inventory of forestry resources”
Purpose of data	Calculation of actual net GHG removal by sinks
Additional comment	

B.8.2. Sampling plan and stratification

>>

Stratification:

The *ex ante* strata are shown in Section B.4 and Table B-0-2, which will be used as a basis for monitoring. However, since there is usually a diversion in the planned forest establishment and management practice, as well as unexpected disturbances, this *ex ante* stratification shall be updated regularly (based on *ex post* stratification):

- Unexpected disturbances occurring during the crediting period (e.g. due to fire, pests or disease outbreaks), affecting different parts of an originally homogeneous stratum or stand in a different way;
- Forest establishment and management (site preparation, planting, thinning, harvesting) may be implemented at different intensities, dates and spatial locations than originally planned in the PDD;
- Two different strata may be similar enough to allow merging into one stratum. If this occurs, *ex post* stratification may be required. The possible need for *ex post* stratification will be evaluated at each monitoring event and changes in the strata will be reported to the DOE for review and verification.

Sampling plan

A permanent sampling plot will be established and measured periodically for monitoring purposes. Equations (1) and (4) in methodological tool “Calculation of the number of sample plots for measurements within A/R CDM project activities” (version 02.1.0) have been used to calculate the number of plots for each stratum (Table B-0-5). The standard deviation of each stratum (s_i) is conservatively set as 30% of the living biomass at the end of the crediting period, as estimated in Section B.7.1. The Acceptable margin of error was set as the default value equal to 10% of the mean biomass stock within the project boundary. To ensure statistical independence for each stratum, a minimum of 3 plots will be set for each stratum. At the same time, the area that each sampling plot represents shall not more than 50 hectare based on expert judgement.

However, the number of sampling plots shall be modified if any stratum and/or area deviate from PDD using the tool. The size of plots is set at 400 m² (approximately 20 m x 20 m). To avoid subjective choice of plot locations (plot centres, plot reference points, movement of plot centres to more “convenient” positions), the permanent sample plots will be set systematically with a random start. It ensures that the

sampling plots will be evenly and randomly spread in project sites. This will be accomplished with the help of a GPS in the field. The geographical position (GPS coordinate), administrative location, stratum and sub-stratum series number of each plot will be recorded and archived. The measuring of the sampling plots will follow the technical specifications in local forest inventory^{20,21}.

The planting activity will be implemented from 2011 to 2014 (Table A-0-6 for details). There will be no thinning or harvesting during the crediting period, as a result the coincidence with peaks in carbon stocks can be avoided. The first monitoring and verification will be conducted in the year 2021, with a subsequent monitoring and verification interval of 5 years, i.e., in 2026, 2031, 2036 and 2041 respectively, the end of the crediting period.

Table B-0-5 Number of sampling plots for each stratum

Stratum ID	Planting models	Planting Year	Area (ha)	Number of sampling plots
PS-1	4 Chinese pine +1 seabuckthorn (1333/ha)	2014	40.82	3
PS-2	4 Chinese pine +1 seabuckthorn (1250/ha)	2013-2014	678.66	14
PS-3	4 Mongolia Scotch pine +1 apricot	2013-2014	877.70	18
PS-4	4 Mongolia Scotch pine +1 seabuckthorn	2013-2014	538.82	11
PS-5	Mongolia Scotch pine	2011-2012	47.06	3
PS-6	Chinese pine	2012	7.65	3
Total			2190.71	46

B.8.3. Other elements of monitoring plan

>> The baseline net GHG removals by sinks will not be monitored. Based on the baseline study and as per the approved methodology applied, the potential sources of leakages in the proposed A/R CDM project activity is the displacement of grazing activities. The leakage from the displacement is insignificant as elaborated in Section B.7.1, therefore will not be monitored.

Operational and management structure:

The project stakeholders include China Green Carbon Foundation (CGCF), Lao Niu Foundation, Inner Mongolia Forestry Department (IMFD), The Nature Conservancy (TNC), Hesheng Forest Silviculture Co. Ltd., Helinge'er County Forestry Bureau and involved communities. The local forestry agencies, i.e., Inner Mongolia Forestry Department, Holinger'er Forestry Bureaus, Inner Mongolia Research Institute of Forestry, Inner Mongolia Forestry Inventory and Planning Institute, The Nature Conservancy China Program, University of Inner Mongolia and Agricultural University of Inner Mongolia etc. will provide technical consultation and guidance, including training courses, conduct quality control to the preparation and implementation of the proposed A/R CDM project activity, and develop and implement the proposed project.

To facilitate the development and implementation of the project, the Lao Niu Special Fund for Ecological Restoration (LNSFER) was jointly established by CGCF, LNF, IMFD and TNC, governed by LNSFER Executive Board. The LNSFER Executive Board, composed of the representatives from CGCF, LNF, IMFD and TNC, is responsible for major decision-making, instruction, approval and supporting of the overall implementation.

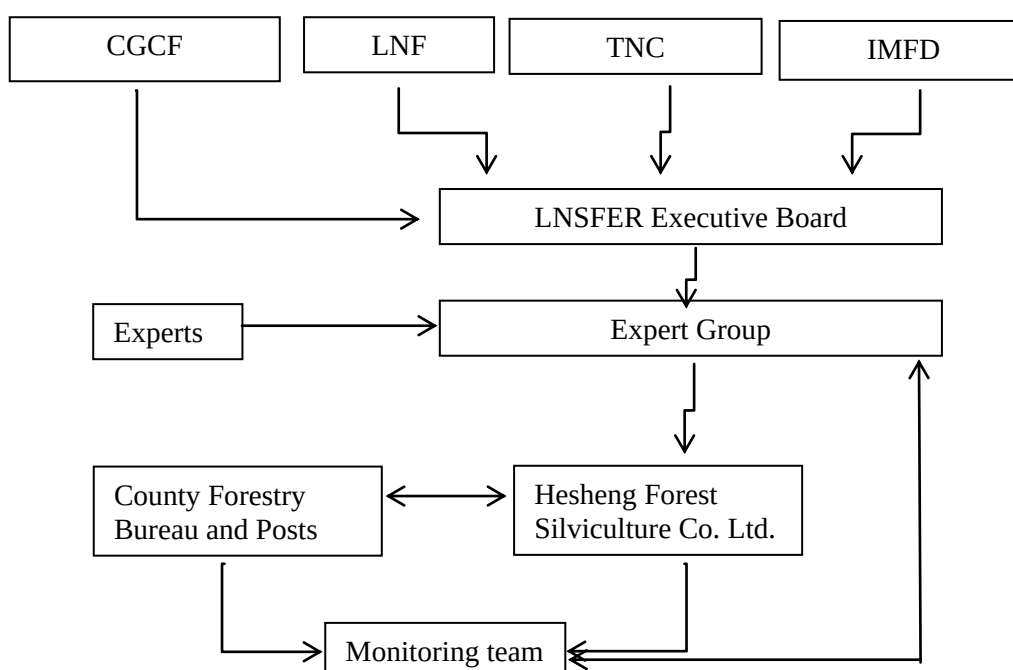
An expert group has also been established to support the work of the LNSFER Executive Board. The expert group is composed of 5-7 experts and representative from the LNSFER Executive Board. The responsibilities of the expert group are:

²⁰ State Forestry Administration. 2004. Technical specifications in the inventory of forestry resources in China.

²¹ DB15/T41-92: Technical guidelines on forest resource planning and designing.

- To review and approve forestation design;
- To review project budget and delivery;
- To review and approve survival checking plan and project monitoring plan;
- To organize independent third party to verify forestation and monitoring activities;
- To review forestation verification report, monitoring report; and
- To conduct quality assurance.

To monitor actual net GHG removals by sinks, an operation and management structure is prepared as shown in figure below. It should be noted that Hesheng Forest Silviculture Co. Ltd. and Helinge'er county forestry bureau will be responsible for daily monitoring and data management and Hesheng Forest Silviculture Co. Ltd. and Helinge'er will conduct the quality assurance of the daily data collection.



Measures to be implemented to minimize potential leakage:

- Strengthening and improving the administration of forest logging: Logging license will be strictly implemented to avoid illegal logging and deforestation, in particularly the forest land controlled by the project participants;
- Providing subsidy for non-commercial forests by including forests to be established under the scope of the national or provincial non-commercial forests;
- Making efforts to introduce project and techniques for social development, including enhancing feed-lot, by working with local authority for poverty alleviation and NGOs from home and abroad;
- Training courses for the awareness of forest protection and legal land use and techniques for alternative income generation.

Following procedures for periodic review of the implementation of measures to minimize leakage will be conducted:

- a. Periodic review of illegal logging activities; in particular, those relevant to the implementation of the proposed A/R CDM project activity, based on relevant data of forest administration from local forestry sector;
- b. Periodic review of subsidies delivered as non-commercial forests;
- c. Periodic review of projects and techniques for social development available to the participants and their implementation, including feed-lots;
- d. Periodic review of training courses for forest protection awareness and their effectiveness as well as technical training for alternative income-generation.

SECTION C. Duration and crediting period

C.1. Duration of project activity

C.1.1. Start date of project activity

>> 20/07/2011 is the starting date of the proposed A/R CDM project activity and the crediting period. The project implementation entity, Hesheng Forest Silviculture Co. Ltd, informed Chinese DNA and CDM Executive Board on December 29th 2011 in writing of the commencement of the project activity and of its intention to seek CDM status. Such notifications were confirmed by Chinese DNA on December 30th 2011 and received by CDM Executive Board on December 30th 2011²².

C.1.2. Expected operational lifetime of project activity

>>30 years 0 month

C.2. Crediting period of project activity

C.2.1. Type of crediting period

>> fixed crediting period

C.2.2. Start date of crediting period

>>20/07/2011

C.2.3. Length of crediting period

>>30 years 0 month

SECTION D. Environmental impacts

D.1. Analysis of environmental impacts

>>Through establishing 2,190.71 ha of forests on degraded lands that suffer from severe soil and wind erosion, desertification and human disturbance, using native species, the proposed activities will greatly increase the forest cover in project region, and provide the following additional local environmental benefits.

- **Biodiversity conservation**

As described in Section A.3 above, the project area fall between priority conservation area and nature reserves. The proposed A/R CDM project activity will provide significant positive biodiversity benefits by:

- Restoring forest vegetation on degraded lands between nature reserves will create additional buffer zone and corridors, hence enhance the connectivity between forests, and provide much needed expansion of important wildlife habitat areas. This will facilitate gene flow through allowing once-isolated wildlife groups to interact and enhance the viability of their populations.
- Generating increased income to local communities from the proposed A/R CDM project activity.

²² https://cdm.unfccc.int/Projects/PriorCDM/notifications/index_html

This will reduce the tendency of local communities to degrade biodiversity through practices such as illegal grazing, illegal poaching and NTFP collection (such as Chinese medicine collection) in the nature reserves, and hence alleviate conflicts between conservation and economic activities of local communities.

- **Controlling soil/wind erosion and desertification**

Due to severe soil/wind erosion and desertification as well as human disturbance, most of the projects lands are severely degraded. If the current situation remains, the lands will degrade further and the soil/wind erosion and desertification will become increasingly severe (see Section B.2 for details). The forest restoration will assist the control of both soil/wind erosion control and desertification in this area.

- **Other environmental services**

- Regulating hydrological flows which in turn alleviates drought risk and reduces flooding risks;
- Building and improving nutrient cycling within soil; and
- Contributing to local climate stabilization and improving local living conditions.

Risk analysis and countermeasures:

- **Fire risk:** Burning in neighboring cropland brings the threat of fire to the forests. This can be alleviated by providing technical and awareness training to local farmers/communities, mixture planting and strengthening patrolling and monitoring.
- **Site preparation:** The site preparation will disturb the vegetation and soil in the planting sites. The main technical measures taken to mitigate the impact is to plant the trees with a low density (630-1333 trees/shrub per hectare), and retain the existing vegetation as much as possible. The site preparation will be done along the contours of the slope to reduce soil loss. Therefore, the site and soil preparation will have minor temporary negative impact on the original soil and vegetation.
- **Herbicide and pesticide application:** Improper herbicide and/or pesticide application would be harmful to the natural environment, by polluting the soil, water and air, as well posing a threat to wildlife. However, under the proposed A/R CDM activity, site preparation and weeding will be conducted manually without any herbicide application. Environmentally friendly measures will be adopted such as mixture planting, seed and seedling quarantine, and biological measures to control pests and diseases will be adopted. Therefore, the use of pesticide will be limited.

None of these risks and/or negative impacts are considered to be significant.

D.2. Environmental impact assessment

>>NA

SECTION E. Socio-economic impacts

E.1. Analysis of socio-economic impacts

>>Agriculture and husbandry are the main source of income for local communities in the project area. However, production is subjected to natural disasters such as sand storm, droughts and hailstone. Food productivity is very low and the mean per capita annual income in the project areas is only US\$460 with the lowest around US\$ 202. Income of some natural villages was much lower. For example the annual per capita income in Houquan village was US\$110. Around 5.3 per cent of rural people are ethnic minority and around 74 per cent of population are living below national poverty lines (Table E-0-1)²³. The annual

²³ The poverty line is 2300 RMB (around US\$ 360) per year based on latest criteria.

income per capita of all project villages is lower than the average level of the relevant project towns/townships and county. The low per capita incomes highlight the chronic and extreme poverty in rural China, and the project county is among China's poorest¹⁴.

Roads to the most of the project village are very poor and difficult to pass under rainy or snowing weather. Clean water resources for villagers and livestock are unavailable in most of project villages. Due to the decreasing underground water level, local villagers are facing greater challenge for drinking water. Some of villages have little coverage of mobile network.

Table E-0-1 Socio-economic profile in the project area

Townships	Villages	Number of households	Population			Labor		Mean annual fuelwood consumption per capita (kg)	Mean annual income per capita (US\$)
			total	Ethnic minority	Under poverty	total	Labors finding job outside		
Total	13	2,690	10,202	545	7,561	4,632	2,889	1,182	460
Xindianzi	Haolaigou	312	1,159	12	1,159	579	410	1,346	254
	Shanbaodai	193	772	17	700	390	270	1,125	429
	Xinfeng	213	898	189	898	364	210	949	202
	Yulincheng	282	1,228	23	1,228	620	380	919	238
	Xindianzi	688	2,247	150	1,573	1,130	580	919	952
Yangqungou	Gedongping	101	324	44	78	118	89	1,600	489
	Shizuizi	143	486	2	153	128	103	1,200	476
	Wujianfang	65	261	21	125	79	61	1,527	484
	Dawan	145	566	36	179	169	157	1,351	317
	Baiqikou	78	285	26	92	81	79	2,000	487
Heilaoyao	Shuimo	187	876	0	876	394	298	1,067	238
Shengle	Baiyantu	216	838	5	500	430	200	1,650	238
	Taigedou	67	262	20	0	150	52	1,637	794

To maximize the socio-economic benefit, the proposed A/R CDM project activity was designed following a participatory approach. Participatory Rural Assessment (PRA) methods were adopted in interviewing and consulting with farmers' households in the project areas to understand the local farmers/communities' preference and concerns so that the proposed A/R CDM project activity would better respond to their desires for livelihood development (see Section F below). Farmers exercised their preference in the choice of tree species and contractual production arrangements and shareholding arrangements between local farmers/communities and the operation entity (see Section F.2). The local farmers will participate in the forestation activities such as site preparation, seedling breeding, planting, weeding, thinning, etc. and will earn direct benefits during the crediting period. It is expected that over 10,000 villagers of 2,690 households from 13 villages of 4 towns/townships will benefit from the proposed project, around 5.3 percent of which are ethnic minorities and 74 per cent are under the poverty (Table E-0-2). The main socio-economic benefits of the project are described below.

- (1) **Income generation:** The total net income expected to be created by the proposed A/R CDM project activity in the crediting period is estimated at US\$ 49.18 million, including US\$ 29.74 million from employment and US\$ 19.44 million from apricot and seabuckthorn. The mean net annual income per capita will be increased by US\$ 160.7 or by 34.9 per cent, compared to the year 2011 (Table E-0-2). It should be noted that the income does not include potential huge tree asset after the end of the crediting period.
- (2) **Creating employment:** The proposed A/R CDM project activity will create about 1.14 million person-days of temporary employment opportunities from planting, weeding, thinning, protection,

etc. It will also create 18 long-term job positions for plantation maintenance and management during the project lifetime (Table E-0-3). Most employment opportunities will be taken by the local farmers/communities involved in the proposed A/R CDM project activity.

- (3) **Sustainable biomass fuel supply:** The local communities are, to some extent, dependent on fuel from biomass (herbaceous and shrub). The proposed A/R CDM activity will provide higher quality and more sustainable fuel sources for local farmers through tending, thinning, etc.
- (4) **Technical training and demonstration:** Preliminary interviews with local communities indicated that local farmers/communities are usually short of access to quality seed sources and lack the skills to produce high quality seedlings. They also lack the skill and experience to successfully undertake tree planting, and prevent planted trees from being damaged by fire, pest and disease. This is one of the significant barriers to local communities in attempting to plant trees on their lands. In the proposed A/R CDM project activity, the local forestry agencies/operation entity will organize training for local communities to assist them in understanding and addressing problems during the implementation of the proposed A/R CDM project activity, both on-site and off-site, which mainly include seed and seedling selection, nursery management, site preparation, planting and pest and fire management.

Table E-0-2 Income expected to generate by the proposed A/R CDM project activity

Townships	Villages	House-holds of beneficiary	Number of beneficiaries			Net income to be generated in the crediting period (10 ⁴ US\$)	Mean annual net income to be generated (10 ⁴ US\$)	Mean annual net income per capita to be generated (US\$)	Mean net income per capita in 2011 (US\$)	Percent of net income to be generated compared to 2011(%)
			Total	Ethnic minority	Under poverty					
total	13	2690	10202	545	7561	4917.8	163.9	160.7	460	34.9
Xindianzi	Haolaigou	312	1159	12	1159	567.2	18.9	163.1	254	64.2
	Shanbaodai	193	772	17	700	602.8	20.1	260.3	429	60.7
	Xinfeng	213	898	189	898	383.9	12.8	142.5	202	70.5
	Yulincheng	282	1228	23	1228	233.6	7.8	63.4	238	26.6
	Xindianzi	688	2247	150	1573	30.7	1.0	4.6	952	0.5
Yangqungou	Gedongping	101	324	44	78	175.1	5.8	180.2	489	36.9
	Shizuizi	143	486	2	153	372.7	12.4	255.6	476	53.7
	Wujianfang	65	261	21	125	755.7	25.2	965.1	484	199.4
	Dawan	145	566	36	179	798.2	26.6	470.1	318	148.1
	Baiqikou	78	285	26	92	641.4	21.4	750.2	487	154.0
Heilaoyao	Shuimo	187	876	0	876	281.8	9.4	107.2	238	45.0
Shengle	Baiyantu	216	838	5	500	27.4	0.9	10.9	238	4.6
	Taigedou	67	262	20	0	47.2	1.6	60.1	794	7.6

Table E-0-3 Employment position expected to be provided by the proposed A/R CDM project activity

Townships	Villages	Project land area (ha)	Temporary positions							Long-term position
			total	Land preparation	Soil preparation	Planting	Weeding	Protection	Supporting infrastructure and maintenance	

total	13	2190.71	1,141,141	2,191	182,817	47,012	635,898	262,228	10,994	18
Xindianzi	Haolaigou	282.71	141,417	283	19,083	5,715	81,523	33,925	888	2
	Shanbaodai	264.21	139,449	264	22,229	5,625	77,555	31,705	2,070	2
	Xinfeng	168.59	89,152	169	14,418	3,604	49,558	20,230	1,173	1
	Yulincheng	86.93	48,642	87	9,270	1,977	26,126	10,432	751	1
	Xindianzi	6.43	3,675	6	686	146	1,932	772	133	1
Yangqungou	Gedongping	71.61	39,213	72	6,945	1,561	21,306	8,593	737	1
	Shizui	187.64	94,244	188	12,666	3,793	54,108	22,517	973	1
	Wujianfang	333.84	174,954	334	28,458	7,132	98,110	40,061	861	2
	Dawan	329.41	177,334	329	31,453	7,255	97,857	39,529	912	2
	Baiqikou	265.87	142,981	266	24,730	5,813	78,777	31,904	1,491	2
Heilaoyao	Shuimo	138.76	70,728	139	10,195	2,834	40,274	16,652	635	1
Shengle	Baiyantu	15.01	5,524	15	956	433	2,433	1,621	65	1
	Taigedou	39.7	13,827	40	1,729	1,124	6,339	4,287	309	1

(5) Impacts on Religious and Cultural Resources

There are no cultural relics and/or cultural reserve that have been identified in the project area, and consequently, no damage to non-replicable cultural property will occur under the proposed A/R CDM project activity. Meanwhile, the project does not involve any sites for local social gatherings or other spiritual activities, thus the project activities will not impact the normal local gatherings and religious activities.

E.2. Socio-economic impact assessment

>>NA

SECTION F. Local stakeholders consultation

F.1. Solicitation of comments from local stakeholders

>> Comments by stakeholders have been invited through Participatory Rural Assessment in from April to June 2011. The PRA process involved all 13 villages of 4 towns/townships. This PRA process also collected information required for the identification of baseline scenario, demonstration of additionality and land eligibility, etc. The content of information, procedures, methods and results are summarized below.

1. Content of information:

- Basic information of local communities;
- Social-economic activities;
- Current and historic socio-economic profiles;
- Current and historic natural resources, land uses and environmental changes;
- Socio-economic and environmental issues faced by local communities;
- Public environmental awareness in local communities;
- Land use options and willingness of local communities;
- Desires, demands, concerns on the proposed A/R CDM project activity.

2. Procedures:

- a) **Establishing PRA team:** The teams were set up to conduct the PRA process, which consists of social experts, project officers, local government officials and technical staff with various background (forestry, sociology and ecology) from the operation entity, The Nature Conservancy, county forestry bureaus and township forestry stations.
- b) **Developing standard operating procedures for the field PRA process;**
- c) **Training:** A training workshop was held on April 14-15 for discussing and training of PRA teams in order to ensure all PRA members fully understand the purposes, contents, procedures and specific methods of the PRA field survey;



- d) **Preparation of PRA, including**
 - (i) **Developing and printing of project leaflet:** A project leaflet was prepared with a brief introduction to the project objectives, activities, benefits and risks, as well as the details of CDM A/R project activities. The leaflet was distributed to the proposed project communities at the time of the PRA process, and was explained by the PRA team.
 - (ii) **Collecting of existing information:** Collecting basic geographical, natural resources, land uses and socio-economic information and development plans of relevant project towns/townships, villages, including relevant maps and statistics;
 - (iii) **Developing PRA plan:** Developing detail PRA field survey plan including responsibility of each member of PRA team;
 - (iv) **Contacting** with relevant towns/townships, forestry stations and local NGOs and informing them PRA plan.
- e) **PRA survey: Following standard operating procedures to conduct PRA survey.**

3. Methods

- a) **Village meeting:** To acquire comprehensive information regarding the historic and current situation and existing problems in local communities, as well as to understand the needs and wishes of local farmers. A meeting of farmer representatives was held in each village. The representatives were nominated by each household itself. 39 village meetings were held during the PRA process. The general agenda are:
 - (i) Distributing project leaflets, introducing the project objectives and specific requests of A/R CDM project, and answering questions raised by villagers;
 - (ii) Introducing PRA team members and the purpose, contents, methods and time schedules of the PRA process;
 - (iii) Explaining the way of villagers' participation;
 - (iv) Collecting information on the social-economic and environmental problems faced by local communities and their demands; land use intention and barriers faced; willingness and ways

of participating of the proposed project and comments on the project design including favorable tree species.

- b) **Site visit:** Visiting project lands together with villagers, and observing and inquiring land ownerships and tenure, current and historic land use and land cover, and site, soil and vegetation information including desertification and sand erosion;
- c) **Semi-structured interviews:** This includes VIP interview, farmer household interview and group interview
 - (i) Interviewing of VIP: including villager leaders, distinguished villagers, elder villagers and head of ethnic minority. 22 VIPs were interviewed by the PRA team in total.
 - (ii) Interviewing of household: Some farmer households are selected for the interview. The interviewed households shall cover rich household, poor household, new inhabitant household, etc. 62 households are interviewed (Table F-0-1).



Table F-0-1 Communities and households in PRA process

Townships	No. of community meeting	No. of VIPs interviewed	No. of households interviewed	No. of Questionnaires	No. of Chronicle of events and Resource mapping
Xindianzi	16	9	25	39	16
Yangqungou	15	9	26	31	18
Helaoyao	3	2	4	6	2
Shengle	5	2	7	11	4
total	39	22	62	87	20

- d) **Resource mapping:** Resources map can directly reflect the relationships between communities and land uses. It can help PRA team to understand the local resources and land use information, including potential land use conflicts and potential displacement of baseline activities. 5-10 villagers (at least two females) who are familiar with local information were invited to map the community resources under the guidance of the PRA team. The villages were nominated by farmer representatives meeting taken into consideration of rich, poor, gender and ethnic minority. The map shall include following information:
 - Boundary of the village mapped;



- Major hills, rivers, roads, buildings;
 - Places of schools, factories and other organizations, settlements;
 - Land use and land tenures: forestry land, cropland, grazing land, barren land and their land ownerships and tenures;
 - Ownerships of forests and trees outside the forests;
 - Water resources for living, irrigation and livestock;
 - Species resources such as mineral resources, wildlife, rare plants as well as potential non-wood forest by-products;
 - Natural disaster: places subjected to natural disasters such as landslide, severe soil erosion, fires;
 - Programs that are implementing or have plan to be implemented.
- e) **Chronicle of events:** recording of important historic events relevant to forest management, biodiversity conservation and land uses and their driving forces, by interviewing with elders in the communities. This was done in combination with VIP interview mentioned above.
- f) **Questionnaire:** Questionnaire forms were developed and distributed among different stakeholders, including farmer households, village committees, forest farms, township governments, local forest stations and forestry bureaus and nature reserves. The questionnaires covered information and feedback on: the local socio-economic profiles, land use, land tenure and land management, farmer income and sources, farmers' preference in tree species selection and production arrangements, technical and financial barriers in forestation practice and etc.

F.2. Summary of the comments received

>>Found of the PRA are summarized as below:

1. Farmers/Communities: it was found that

- a) Before PRA process few of local farmers/communities have knowledge of carbon trading, CDM afforestation and reforestation, even never heard of these terms.
- b) All farmers realized that due to severe soil erosion, desertification, and land and vegetation degradation, frequent natural disasters (drought, hailstone, windstorm, sandstorm, etc.) that significantly impact agriculture, husbandry and livelihood. With these knowledge, currently local farmers and communities have a strong awareness of forest and environmental protection. They understand roles of forests in environmental conservation and the importance of forest restoration and conservation. They also have very strong awareness of biodiversity conservation. Through media (TV, newspaper, broadcasting) and local foresters and conservators as well as family members and friends, most of farmers are able to identify protected wild animals and plant species, and usually actively participate in the protection activities.
- c) Local farmers/communities expressed their interest in participating in the proposed A/R CDM project activity because they thought that their participation would bring the following benefits:
 - (i) Income generation from increased employment: Local farmers can get additional income by participating in the site preparation, planting and forest management practice.
 - (ii) Employment opportunities, especially being able to work locally which would mean that they could tend their cropland at the same time.
 - (iii) Rejuvenating their grasslands and barren lands would improve the local environment, shelter cropland and reduce the incidence and severity of drought, wind/sandstorm and other natural disasters.
 - (iv) Creation forests would benefit to next generations;
 - (v) Learning good practices for tree planting and forest management from technical training.

The PRA survey indicates that the project lands have been non-forested since at least the 1990s. All farmer households were willing to participate in the proposed A/R CDM project activity.

Most households interviewed prefer to cooperate with the forest companies by contractual arrangements rather than to simply lease lands. Local farmers/communities indicated that without the proposed A/R CDM project activity it would be impossible for them to plant trees on the project area due to the large pre-investment, lack of technical knowledge, organizational barriers and low economic return in terms of the degraded remote lands.

- d) During the PRA process, the preference assessment on tree species also indicates that local farmers and communities favor tree species native to local. They thought that alien species may negatively impacts local environment, even economic loss. The preference species of local communities are listed in Table F-0-2.

Table F-0-2 Tree species chosen by local farmers

Townships	Preference species
Yangqungou	Mongolia Scotch pine, apricot, seabuckthorn, Caragana
Xindianzi	Mongolia Scotch pine, apricot, Caragana
Heilaoyao	Chinese pine, Mongolia Scotch pine, apricot
Shengle	Mongolia Scotch pine, Caragana, seabuckthorn, apricot

- e) Local communities have strong demands and wishes for improving infrastructure. As said above the infrastructure (road, available clean water, etc) is very poor which has significantly impacted the livelihood and production activities. They wish to increase income through participating the project, but they have stronger wishes for the infrastructure improvement through the leading role of the project.

2. Forestry stations and town/township governments

Before the PRA process, county forestry bureau and forestry stations have knowledge of the forestation and carbon trading through conference, workshop and training courses. However, town/township governments have limited knowledge on the carbon trading.

They considered that the proposed A/R CDM project activity will increase the forest resources, improve the local environment, enhance biodiversity conservation and increase the income of local farmers and communities. They would provide counterpart funding as well as technical training and policy consultation to farmers/communities and planting entities, and supervise the implementation of the proposed A/R CDM project activity.

F.3. Report on consideration of comments received

>>The comments received from the PRA survey were fully taken into account as follows:

- ✓ Participation of local farmers/communities and project entity is on a voluntarily basis.
- ✓ Choice of shareholding arrangements for forestation activities was based on the preference of local farmers/communities.
- ✓ Preferences of local farmers/communities were taken into account in the selection of tree species.
- ✓ All tree species used are locally native and a mixed arrangement of species will be used;
- ✓ Fertilizers will not be applied in forestation and forest management;
- ✓ Use of chemical pesticides will be limited. Instead, the diseases and pests will be mainly controlled by mixed tree species arrangement and other biological measures;



- ✓ No herbicide will be applied. Weeds will be slashed manually;

SECTION G. Approval and authorization

>>The letter of approval from Chinese DNA is in the application process and is unavailable at the time of submitting the PDD to the validating DOE.

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Appendix 1: Contact information of project participants

Organization	Hesheng Forest Silviculture Co. Ltd.
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Building	
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Salutation	
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Appendix 2: Affirmation regarding public funding**Appendix 3: Applicability of selected methodology****Appendix 4: Further background information on ex ante calculation of removals by sinks****Appendix 5: Further background information on monitoring plan****Appendix 6: Geographic delineation of project boundary****Appendix 7: Summary of post registration changes**

Appendix 8: Baseline information

The baseline survey was conducted from April to November 2011. Its purpose is to provide information on the project boundary, site assessment and tree species (models) selection, land eligibility, baseline stratification, determination of baseline scenario and the ex ante estimation of baseline net removals by sinks and leakage. The survey includes:

- Selection of eligible lands and delineation of project boundary;
- Biodiversity survey
- Historic and current land use and intervention
- Current vegetation and baseline stratification
- natural regeneration of trees
- Grazing activity within and outside the project boundary.

For the purpose of the baseline survey, operation procedure has been developed based on required information of the approved methodology (AR-ACM0001/version 05.2.0) applied and CCB (Climate, Community, Biodiversity) standard. The baseline survey was conducted in combination with PRA process and socio-economic survey so that some vital information can be shared and verified. The methods and results are summarized below.

1. Determination of eligible lands and Delineation of the project boundary

The eligible lands have been determined based on land use/cover maps derived from satellite image, on-site survey and checking and interviewing with local communities. Specific steps were summarized below:

Step 1: Collecting and decoding satellite images in 1987 and 2004 and forest map of Helinge'er county in 2008 to produce land cover maps at two time points.

Step 2: Overlapping the land use/cover maps at two time points to produce preliminary lands that subject to be eligible A/R CDM project activity, i.e., the lands that are non-forested at the two time points. Identifying suitable lands for forest growth under climate change scenarios in next 100 years using BIOME 100.

Step 3: Holding a seminar to discuss site conditions and select lands suitable for afforestation/reforestation and as well as optimum tree species, and to exclude those lands unsuitable for tree planting. Participants of the seminar include forest experts from Chinese Academy of Science, Inner Mongolia University, China Ethnic University and Inner Mongolia Forestry Institute, and local level experts as well as technical staff from local forestry bureau and the project entity.

Step 4: Interviewing with local communities: (1) to understand historic land use/cover changes and relevant driving forces, and to confirm that the preliminary lands were not forests at least in 1990; (2) to understand land tenure and potential land use conflicts and the willingness of local communities in participating the project activity, and at the end to exclude those lands that exist land use conflicts or land tenure conflicts, or that local communities are not willing to participate.

Step 5: On-site checking of the land use and land cover to confirm that the lands are non-forested land currently, and measuring and verifying geographical boundary of selected land parcels using GPS. The measured boundary was then input and process on ArcGIS and the shp file of the project boundary will be submitted to DOE at the validation.

2. Driving force of deforestation and current land use

Based on information collected through interviewing with local foresters and elders in communities, the lands proposed to be planted had been natural forests historically, including Chinese pine forest and temperate deciduous broadleaf forest as those existing in Daqingshan Nature Reserve, Erlongshitai forest park and Aguimiao Nature Reserve in the north, northeast and southwest of the project area, respectively. However, as the project area is located in the transitional zone from agriculture to husbandry, these forests were destroyed and converted to non-forest lands before 1950s. Moreover the project area has been degrading due to severe soil erosion, desertification, and overgrazing and agricultural cultivation.

Currently all 2,190.71 ha of project lands are defined for forestry purpose by local government. All land are collectively owned by village, however 57.34 ha of lands are contracted to individual household. 1,665.59 ha of lands have grazing (illegally). See Table Appendix 8-0-1 for details.



Table Appendix 8-0-1 Current legal title to the land, land tenure, land use and land cover

Townships	Villages	Land ID	Area (ha)	Owner-ships	Land use right	vegetation	Shrub cover (%)	Land use
Yangqungou	Baiqikou	HL-YQ-01	31.81	Collective	Collective	Herbaceous		Barren land
		HL-YQ-02	92.26	Collective	Collective	Herbaceous		
		HL-YQ-03	74.89	Collective	Collective	Herbaceous		
		HL-YQ-04	66.91	Collective	Collective	Herbaceous		
	Dawan	HL-YQ-05	329.41	Collective	Collective	Herbaceous		Barren land with grazing
	Wujianfang	HL-YQ-05	333.84	Collective	Collective	Herbaceous		
	Gedongping	HL-YQ-06	51.94	Collective	Collective	Herbaceous +shrub	7%	Barren land
		HL-YQ-07	19.67	Collective	Collective	Herbaceous		
	Shizuizi	HL-YQ-08	39.22	Collective	Collective	Herbaceous +shrub	9%	Barren land
		HL-YQ-09	148.42	Collective	Collective	Herbaceous		
Xindianzi	Yulincheng	HL-XD-01	86.93	Collective	Collective	Herbaceous		Barren land with grazing
				Collective	Collective	Herbaceous		
	Xindianzi	HL-XD-01	6.43	Collective	Collective	Herbaceous		Barren land with grazing
	Shanbaodai	HL-XD-02	85.22	Collective	Collective	Herbaceous		
		HL-XD-03	61.24	Collective	Collective	Herbaceous +shrub	6%	
		HL-XD-04	45.88	Collective	Collective	Herbaceous +shrub	13%	
		HL-XD-05	71.87	Collective	Collective	Herbaceous		
	Xinfeng	HL-XD-06	31.64	Collective	Collective	Herbaceous		Barren land



		HL-XD-07	128.28	Collective	Collective	Herbaceous		with grazing
			8.67	Collective	household	Herbaceous		
		HL-XD-08	171.12	Collective	Collective	Herbaceous		
		HL-XD-09	62.92	Collective	Collective	Herbaceous		
			48.67	Collective	household	Herbaceous		
Heilaoyao	Shuimo	HL-HL-01	138.76	Collective	Collective	Herbaceous		Barren land with grazing
Shengle	Baiyantu	HL-SL-01	39.70	Collective	Collective	Herbaceous +shrub	6%	Barren land with grazing
	Taigedou	HL-SL-02	15.01	Collective	Collective	Herbaceous +shrub	7%	
total			2,190.71					

3. Current vegetation and baseline stratification

Visual assessment was applied to estimate vegetation crown cover of each parcel of land, and dominated species of pre-project trees, shrubs and herbaceous plants were recorded. For lands with shrub crown cover over 5%, sampling were applied to measure crown cover of shrubs for each shrub crown cover class visualized, i.e., 5-30%, 30-60% and >60%. The size of sampling plots is 20 meters by 20 meters. At least one plot should be measured for every 25 ha of lands and at least 10 sampling plots for each class should be measured. The sampling plots were selected systematically on ArcGIS platform, for which the project area was divided into grid of 25 ha and the cross point of the grid was chosen as the southwest corner of the sampling plot. Precision level of the measurement is 20% at 90% confidence level. In case of the precision level is not met, additional sampling should be randomly added.

Vegetation baseline survey indicates that the lands to be planted in the proposed A/R CDM project activity are currently non-forested, barren lands, covered mainly by herbaceous plants *stipa* (*Stipa* sp.), thyme (*Thymus* sp.) and wormwood. There are no pre-project living trees. The total vegetation crown cover is 15-60%, including 1,937.72 ha of lands with shrub crown cover less than 5%, and 252.99 ha of lands with shrub crown cover in a range 6-25% (15% in average, 10 sampling plots, 19% precision level at 90% confidence level). The main shrub species are *Caragana* (*Caragana* sp.) and *Seabuckthorn* (*Hippophae* sp.). See Table Appendix 8-0-1 for details. The project lands are therefore stratified into two baseline strata based on shrub crown cover as shown in Table B-0-1 and Figure B.0.3.

4. Natural regeneration of trees

At the same time of vegetation survey, natural regeneration of trees was investigated in the sampling plots. Species, numbers and height of seedlings and young trees natural regenerated in sampling plots should be recorded, if any, respectively as below.

- Sprout: tree seedlings below 30 cm in height
- Seedlings: height between 30 cm and 1.3 m
- Young trees: Height over 1.3 m and diameter at breast height less than 5 cm

The survey indicates that almost no natural regeneration of trees was found on the project lands. Main reason could be:

- The original forests have been cleared for many years, after repeatedly human disturbance (agricultural cultivation, over-grazing etc) as well as severe soil erosion, seed bank in soils does not exist anymore.
- There is no forest nearby for tree seed dispersing into the project lands.



History of the document

Version	Date	Nature of revision
06.0	EB 66 13 March 2012	Revision required to ensure consistency with the “Guidelines for completing the project design document form for afforestation and reforestation CDM project activities” (EB 66, Annex 10).
05	EB 55, Annex 22 30 July 2010	Restructuring to reflect changes applied in the design of approved A/R CDM baseline and monitoring methodologies. Due to the overall modification of the document, no highlights of the changes are provided.
04	EB 35, Annex 20 19 October 2007	• Restructuring of section A; • Section “Monitoring of forest establishment and management” replaces sections: “Monitoring of the project boundary”, and “Monitoring of forest management”; • Introduced a new section allowing for explicit description of SOPs and quality control/quality assurance (QA/QC) procedures if required by the selected approved methodology; • Change in design of the section “Monitoring of the baseline net GHG removals by sinks” allowing for more efficient presentation of data.
03	EB 26, Annex 19 29 September 2006	Revisions in different sections to reflect equivalent forms used by the Meth Panel and facilitating the transparent selection of an approved methodology for the proposed A/R CDM project activity.
02	EB 23, Annex 15a 24 February 2006	Inclusion of a section on the assessment of the eligibility of land and the Sampling design and stratification during monitoring.
01	EB15, Annex 6 03 September 2004	Initial adoption.
Decision Class: Regulatory Document Type: Form Business Function: Registration		