CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM FOR AFFORESTATION AND REFORESTATION PROJECT ACTIVITIES (CDM-AR-PDD) Version 06

CONTENTS

PROJECT DESIGN DOCUMENT FORM
FOR AFFORESTATION AND REFORESTATION PROJECT ACTIVITIES (CDM-AR-PDD) - Version 06

SECTION A. General description of the proposed A/R CDM project activity:

A.1. Title of the proposed A/R CDM project activity:

>> Afforestation and Reforestation on Degraded Lands in Northwest Sichuan, China
Version 06
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A.2. Description of the proposed A/R CDM project activity:

>>The proposed A/R CDM project activity will be implemented at the upper reaches of Minjiang River and Jialingjiang River, the main first order branches of the Yangtze River. The project area is also one of the key areas of the biodiversity conservation. Living in the remote steep mountains, local farmers/commumities (mostly ethnic minority Tibet, Qiang and Hui) are living below the poverty level. To contribute to the local sustainable development, the proposed A/R CDM project activity, Reforestation on Degraded Lands in Northwest Sichuan, China, aims to:

- Sequester carbon dioxide and mitigating climate change;
- Enhance biodiversity conservation by increasing the connectivity of forests adjacent to nature reserves;
- Improve soil and water conservation in the upper reaches of the Yangtze River;
- Generate income for local communities.

To achieve the objectives, in the proposed A/R CDM project activity, 2,251.8 hectare (ha) of multiple-use forest will be established by direct planting on degraded lands in five counties (Beichuan, Lixian, Maoxian, Pingwu and Qingchuan) in the northwestern Sichuan Province, including 330.5 ha of *Betula luminifera,* 62.4 ha of *Betula albo-sinensis*, 156.4 ha of *Magnolia officinalis*, 294.2 ha of *Quercus acutissima*, 467.0 ha of *Cupressus chengiana*, 109 ha of *Platycladus orientalis*, 274.0 ha of *Cunninghmia lanceolata*, 223.3 ha of *Pinus tabulaeformis,* 66.0 ha of *Pinus massonia*, 63.0 ha of *Poplus szechuanica*, 120.4 ha of *Larix gmelinii*, and 86.0 ha of *Picea asperata*. All species used are native to local, without any invasive alien species or genetically modified organisms. Most of the lands to be planted were deforestated in 1950s through 1980s and have never been reforested since then. At the same time, the proposed A/R CDM project activity will be used as a trial application of the Climate, Community and Biodiversity Standard (CCB) under the support of the Conservation International.

Both the operating entity (Daduhe Forest Administration) and local farmers hold a view that the proposed A/R CDM project activity will contribute to poverty alleviation and environment (biodiversity conservation and soil erosion 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 (see detail in Section H).

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, 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. In return, the farmers/communities share 70% of the net income from timber and 30% of carbon benefit, and own non-wood forest products.

A.3. Project participants:

>>Table A.1. List of project participants:

Name of 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	Daduhe Forestation Bureau	NO
(*) In accordance with the CDM A/R modalities and procedures, at the time of making the CDM-AR-PDD public at the stage of validation, a Party involved may or may not have provided its approval. At the time of requesting registration, the approval by the Party(ies) involved is required.		
Note. When the CDM-AR-PDD is prepared to support a proposed new baseline and monitoring methodology (form CDM-AR-NM), at least the host Party(ies) and any known project participant (e.g. those proposing a new methodology) shall be identified.		

A.4. Description of location and boundaries of the A/R CDM project activity:

A.4.1. Location of the proposed A/R CDM project activity:

A.4.1.1. Host Party(ies):

>>P.R. China

A.4.1.2. Region/State/Province etc:

>>Sichuan Province

A.4.1.3. City/Town/Community etc:

>> The proposed A/R CDM project activity is located in 28 villages of 21 towns/townships in five counties (i.e., Beichuan, Lixian, Maoxian, Pingwu and Qingchuan) in the northwest of Sichuan Province, P.R.China (Fig.A.1.), including 5 villages of 2 towns/townships in Lixian County, 1 village in Maoxiao County, 13 villages of 10 towns/townships in Qingchuan County, 4 villages of 4 towns/townships in Pingwu County and 5 villages of 4 towns/townships in Beichuan County (Table A.2.).

Fig. A.1. Project region of the proposed A/R CDM project activity:

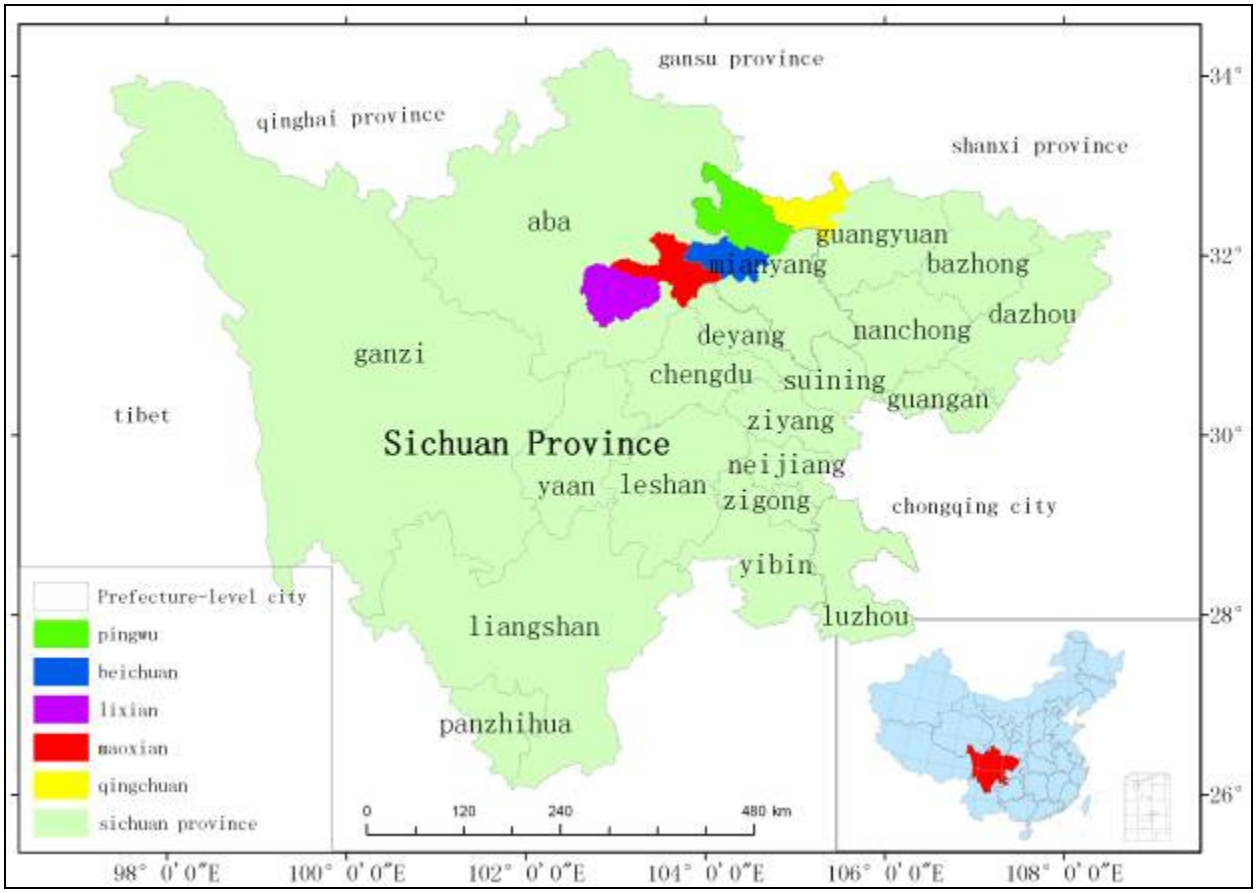


Table A.2. List of townships and villages involved:

Counties	Towns/ Townships	Villages	Land ID	Local names	Area(ha)*
Beichuan	Xiaoba	Yongxin	BC-YX-2006-01	Sanchagou	29.1
	Chenjiaba	Tongbao	BC-TB-2006-01	Damaopo	28.4
			BC-TB-2006-02	Damaopo	6.3
			BC-TB-2006-03	Longchiliang	23.6
	Duba	Huangdimiao	BC-HDM-2006-01	Jianheya	56.8
	Qingpian	Anmian	BC-AM-2006-01	Qishuliangzi	19.0
		Zhenghe	BC-ZH-2006-01	Aozhaowan	37.0
Lixian	Ganbao	Rierzhu, Ganbao, Xionger	LX-XE-2006-01	Xiongershan	200.4
		Xionger, Lianhe	LX-XE-2006-02	Xiongershan	378.5
	Xuecheng	Shajing	LX-XE-2006-03	Xiongershan	168.9
Maoxian	Nanxin	Bieli	MX-BL-2006-01	Chimuping	234.9

Pingwu	Gaochun	Wuyi	PW-WY-2006-01	Jingyingshan, Shijialiang, Shijiawan	109.8
	Shuijing	Xinhua	PW-XH-2006-01	Meiziping, Jingzhulin	42.2
	Nanba	Tongjiang	PW-TJ-2006-01	Fengxiangshu	14.5
	Pingtong	Xinyuan	PW-XY -2006-01	Mazhiping	24.1
Qingchuan	Baijia	Huajian	QC-HJ-2006-01	Hougouping	50.5
			QC-HJ-2006-02	Hougouping	9.8
	Dayuan	Shuojia	QC-SJ-2006-01	Gongjiawan, Dabeishan	107.1
	Fangshi	Xinqiao	QC-XQ-2006-02	Denzhuangling	125.0
			QC-XQ-2006-01	Zhongjianliang	52.9
	Kongqi	Yaolin	QC-YL-2006-01	Tianchibao	23.3
	Malu	Caiqi	QC-CX-2006-02	Xiaofetan	34.4
			QC-CX-2006-01	Xiaofetan	45.5
		Fangshi	QC-FS-2006-01	Bayanwo	60.2
	Maoba	Jingjia	QC-JJ-2006-01	Xiangyanzi	45.2
	Qiaolou	Hexi	QC-HX-2006-01	Baijiawan	44.0
	Qingqi	Dongqiao	QC-DQ-2006-01	Shipoliang	39.2
			QC-DQ-2006-02	Dongshan	28.8
		Luoyigou	QC-LYG-2006-01	Miaobeihou	58.2
			QC-LYG-2006-02	Miaobeihou	16.2
		Weiba	QC-WB-2006-01	Guniuwan	38.4
	Sanguo	Dongyang	QC-DY-2006-01	Dachaoli	15.5
			QC-DY-2006-02	Siertai	12.0
			QC-DY-2006-03	Dachaoli	5.0
			QC-DY-2006-04	Fangniuping	5.3
	Zhuyuan	Qingjiang	QC-QJ-2006-01	Taba	61.8

* root in the "field calculator" of GIS depend on the final digital map, and help one decimal digit.

A.4.2. Detailed geographic delineation of the project boundary, including information allowing the unique identification(s) of the proposed A/R CDM project activity:

>> The project boundaries and geographical locations are indicated in figures below and the specific geographical positions (longitude, latitude) at each corner of each of 36 parcels, including 89 plots (See table A.3 in Annex) have been determined by land use/cover maps followed by verification for each corner of polygonal site using GPS and interviewing with local farmers (see Fig. A.2 through Fig. A.6 in the Annex).

A.5. Technical description of the A/R CDM project activity:

A.5.1. Description of the present environmental conditions of the area planned for the proposed A/R CDM project activity, including a concise description of climate, hydrology, soils, ecosystems (including land use):

>>The project area is located at the transitional zone from Western Sichuan Plateau to Sichuan Basin. Deep valleys intervein among high mountains, with a mean elevation 2000-3500m. The environmental conditions of the project area planed for the proposed A/R CDM projefct activity are summarized as follows[1]:

Climate:

Climate in Lixian County belongs to mountainous monsoon climate, controlled by west current and southwest monsoon. There are apparent two drought seasons and two rainy seasons annually. Drought seasons appear in the winter and summer (July and August) while rainy seasons occur in the spring and autumn. Due to the high mountains and deep valleys, there is an apparent vertical climatic feature. The annual mean air temperature varies among 6-9℃ with significant daily and seasonal variations. Annual precipitation is 400-900mm, increase with the increasing of the elevation. Annual mean evaporation is 739.3mm, with extreme evaporation of 1656.7mm. The climate of the project lands in Lixian County belongs to warm-temperate and temperate climate.

In Maoxian County, the mean annual temperature is 11.9℃ with extreme lowest temperature -11.6℃ and highest temperature up to 29.4℃. The mean annual precipitation is 481.4 mm which is much lower than mean annual evaporation (1445.5 mm). There is apparent vertical climatic feature, and drought and raining season.

The climate in Qingchuan County belongs to subtropical moist monsoon climate. The mean annual temperature is 13.7℃, decreasing from southeast to the northwest. There are 233 days of frost-free days. The mean annual precipitation is 993 mm, mainly occurring in summer and autumn, and the precipitation increases with the increasing elevation. The mean annual sunshine is 1100-1500 hours and the mean annual relative air humidity is 75 per cent.

The climate in Pingwu County belongs also to the subtropical monsoon climate, with a mean annual temperature of 14.7℃, mean annual precipitation of 806 mm, annual evaporation 1089.7 mm, extreme highest temperature 37℃ and extreme lowest temperature.

Beichuan County has a subtropical wet monsoon climate, with mean annual temperature 15.6℃, annual precipitation 1400 mm and annual frost-free days 282 days. 86 percent of precipitation occurs from May to September, accounting for 86%. Due to the complex landform, there is a typical drought in winter and spring, and flood in summer and autumn.

There are frequent natural disasters in the project area. For example, frequent land slide in Qingchuan County and Beichuan County, frequent drought in both spring and summer in Pingwu County.

Soil:

There is an apparent vertical spectrum of soils in Lixian County and Maoxian County. They are mountainous dry cinnamon soil (1442-2000m), mountainous cinnamon soil (2000-2800m), mountainous brown soil (2800-3500m), mountainous podzolic soil (3500~4200m), subalpine meadow soil and alpine meadow soil (4200~4400m).Soil for the lands to be planted in Lixian County is mountainous cinnamon

[1] Data sources: Forest Inventory in Sichuan Province, 2001; Forest inventory in Liangshan Prefecture, 2005; Forest inventory in Lixian County, 2003; Forest inventory in Maoxian County, 2005; Forest inventory in Qingchuan County, 2003; Forest inventory in Pingwu County, 1998; Forest inventory in Beichuan County, 2001

soil, with sparse vegetation and severe soil erosion, and it is brown soil in Maoxian County, with less soil erosion.

The zonic soil in Qingchuan County is yellow earth. However there is also a vertical variation. The yellow earth is generally distributed below 1100 m. It is mountainous yellow earth at 1100-1500 m, mountainous yellow-brown soil at 1500-1900 m, brown soil at 1900-2400 m, and mountainous podzolic soil at 2400-2800 m and mountainous meadow over 2800 m. The soil for lands to be planted in Qingchuan County is mountainous yellow earth, with a pH value 5.5-6.5, loam texture. The parent rock of the soil includes schist, shale, sand stone, lime stone, etc.

Soils in Beichuan County and Pingwu County include mountainous yellow earth at 540-1450 m, mountainous yellow-brown soil at 1450-2100 m, brown soil and dark brown soil at 2200-3000 m, alpine meadow soil at 3700-4000 m. The soil for lands to be planted in Beichuan and Pingwu County is mountainous yellow earth, with a pH value 5.5-6.5

Hydrology:

The project areas are located at the upper stream of Minjiang River, Jialinjiang River and Fujiang River, all of which are the first order branches of the Yangtze River.

Lixian County: Zagulao River, the branch stream of the Minjiang River flows through the county. The Zagulao River is 157.4 km in length and has a mean discharge of 63.9 $m^3 s^{-1}$, an annual mean soil transportation around 2.1 million tonnes and annual surface runoff 3.47 billion m^3. It has 48 branches among which 9 branches have their watershed area over 100 km^2 each. The lands to be planted in the proposed A/R CDM project activity are located on the steep slopes at two sides of the mainstream of the Zagulao River. There are also 95 natural lakes in the county with a total water volume up to 113 million m^3.

Maoxian Count: Heisuihe River that is the branch stream of the Minjiang River and Tumenhe River that is the branch of Fujiang River, flow through the county.

Qingchuan County:There are over 19 rivers with watershed area each over 50 km^2, including Bailongjiang River, Qingzhujiang River and Qiaozhuang River. The total length is over 550 km, with a river density 0.17 km per km^2 and the mean surface runoff 170 million cubic meter. All of these rivers belong to Jialinjiang River.

Pingwu County: Hujiang River, Duobuhe River and Qingyijiang River and their branches flow through the county.

Beichuan County: Hujiang River and its branches distributed in the county, with a total watershed area of 2625 km^2.

Ecosystem:

Ecosystem in Lixian County, due to the vertical climatic feature, There is an apparent vertical vegetation spectrum. The vegetation from 1442 m to 2000m belongs to warm-temperate xerosere shrub and herbs, with sparse natural vegetation cover, dominated by such shrubs as Sophora viciifolia (vetchleaf sophora), Convolvulus tragacuthoides (Spiny glorybind), Bauhinia variegate (Buddhist bauhinia), Indigofera tinctoria (True indigo), Berberis sp (barberry), Periploca sepium (Chinese silkvine), etc.,and herbaceous plants. At the elevation 2000-2500m, zonic vegetation is temperate needle-leaf and broadleaf mixed forest, dominated by Qurcus liaodongensis, poplar sp, Cupressus chengiana, Acer sp, Pinus tabulaeformis, etc. At the elevation 2500-3000m, it is needle-leaf and broadleaf mixed forest belt, with tree species dominated by Hemlock, Quercus sp, Abies sp, Spruce sp, Pinus, Pinus armandi (Armand pine), Acer sp,

birch, bass etc. At the elevation 3000-4000 m it is subalpine needle-leaf forest belt, with main species including Abies sp, Spruce, larch, Betula albo-sinensis, oak and birch. The subapline meadow is distributed at elevation 4000-4400m. Lands to be planted in Lixian County in the proposed A/R CDM project activity is located in the drought valley with a elevation 1700-2600m above sea level and slope gradient 20-35 degree. The lands have been non-forested lands in the memory of local people. Adapted to the drought climate, the lands are currently covered with sparse shrub and herbaceous plants including Artemisia apiacea (Celery wormwood), Caryopteris sp (Bluebeard), Selaginella tamariscina----Sophora viciifolia, Berberis sp grassland andA rtemisia apiacea, Caryopteris sp----Berberis sp, Sophora viciifolia, and rosebush.

The ecosystems in Maoxian are similar to those in Lixian County. Located at 2400-3000m above sea level with slope gradient 25-35 degree, the lands to be planted in Maoxian County in the proposed A/R CDM project activity are covered with shrub and/or grass dominated by gramineous grass and ranunculus grass, a secondary vegetation following the deforestation of original needle-leaf and broadleaf mixed forest.

In Qingchuan County, it is evergreen and deciduous broadleaf forest belt below 1100m, dominated by such species as oak, maple, masson pine, cypress, etc. It is replaced by deciduous forests at 1100-1900m above sea level, dominated by oak, birch, basswood, etc.. At 1900-2800m above sea level it is dark coniferous forests composed mainly of abies and spruce. The vegetation above 2800m is mainly meadow and shrub. Located at elevation 1000-1800m above sea level with slope gradient 10-30 degree, lands to be planted in Qingchuan County in the proposed A/R CDM project activity are covered with shrub and/or grass, including cogon-raspberry bush, cogon-hickory bush or cogon grass, the secondary vegetation following the deforestation of original deciduous broadleaf forests and human intervention.

The zonic vegetation in Pingwu County is evergreen broadleaf forests at elevation 600-1600m, evergreen and deciduous mixed broadleaf forests at 1600-2200m, needleleaf and broadleaf mixed forests at 2200-2800m, dark coniferous forests at 2800-3500m, and sub-alpine shrub vegetation above 3500 m above sea level. Lands to be planted in Pingwu County in the proposed A/R CDM project activity are located at elevation 1300-1900m above sea level with slope gradient 15-22 degree. Current vegetation are grass and shrub species dominated by gramineous, fern-raspberry, Vitex negundo, Pyracantha fortuneana (firethorn), Berberis sp bush and gramineous grass and fern, a zonic vegetation after the deforestation of original broadleaf forests or needleleaf and broadleaf mixed forests followed by human intervention.

The zonic vegetation in Beichuan County is evergreen broadleaf forests at elevation 540-1800m, evergreen and deciduous mixed broadleaf forests at 1800-2200m, needleleaf and broadleaf mixed forests at 2200-2800m, dark coniferous forests at 2800-3500m, and sub-alpine shrub vegetation above 3500m. Lands to be planted in Beichuan County in the proposed A/R CDM project activity is covered with shrub and/or grass, at elevation 1400-2300m above sea level and slope gradient 20-30 degree. Major species covering on lands include Diplopterygium glaucum-Indigofera tinctoria, Sophora viciifolia bush, fern, gramineous grass, and fern-rosebush and raspberry bush.

The lands to be afforested or reforested were mostly deforested in 1950s-1980s. Currently 234.9 ha of lands (in Maoxian) are grazing lands and a few other pieces of lands are sporadically grazing, and all other lands are abandoned barren lands (Table A.4.). However grazing is illegal activities because all lands within the project boundary are legally defined as forestry land. There is no land tenure conflict. (see table A.4. for the current land use/cover and deforestation time).

Table A.4. Current land use/cover and deforestation time of the lands to be planted:

Counties	Towns/ Townships	Villages	Plot ID	Current land use	Current vegetation	deforestation time
Beichuan	Xiaoba	Yongxin	BC-YX-2006-01-01	Barren land	Shrub land dominated by Diplopterygium glaucum-Indigofera tinctoria, Sophora viciifolia bush	Early 1960s due to agricultural cultivation
	Chenjiaba	Tongbao	BC-TB-2006-01-01	Sporadic grazing	Grassland dominated by fern, gramineous herb	Late 1950s due to agricultural cultivation
			BC-TB-2006-02-01		Grassland dominated by fern, gramineous herb	Late 1950s due to agricultural cultivation
			BC-TB-2006-03-01		Shrub land dominated by fern-Indigofera tinctoria, Sophora viciifolia bush	Late 1950s due to agricultural cultivation
	Duba	Huangdi miao	BC-HDM-2006-01-01 BC-HDM-2006-01-02 BC-HDM-2006-01-03	Sporadic grazing	Shrub land dominated by fern-rosebush, raspberry bush	1960s due to agricultural cultivation
	Qingpian	Anmian	BC-AM-2006-01-01	Barren land	Grassland dominated by fern, gramineous herb	Early 1960s due to cultivation for medicine
		Zenghe	BC-ZH-2006-01-01 BC-ZH-2006-01-02			
Lixian	Ganbao, Xuecheng	Rierzhu, Ganbao, Xionger, Lianhe,Jingsha	LX-XE-2006-01-01 LX-XE-2006-01-02 LX-XE-2006-01-03 LX-XE-2006-01-04 LX-XE-2006-01-05 LX-XE-2006-01-06 LX-XE-2006-01-07 LX-XE-2006-02-01 LX-XE-2006-02-02 LX-XE-2006-02-03 LX-XE-2006-02-04 LX-XE-2006-02-05 LX-XE-2006-02-06 LX-XE-2006-02-07 LX-XE-2006-02-08 LX-XE-2006-02-09 LX-XE-2006-03-03 LX-XE-2006-03-04 LX-XE-2006-03-05 LX-XE-2006-03-06	Sporadic grazing	Grassland, with shrub crown cover less than 10%, dominated by Artemisia apiacea, Caryopteris sp, Selaginella tamariscina—Sophora viciifolia, Berberis sp	Over 100 years
		Xionger, Lianhe,Shajing	LX-XE-2006-01-08 LX-XE-2006-02-10 LX-XE-2006-02-11 LX-XE-2006-02-12 LX-XE-2006-03-01 LX-XE-2006-03-02	Sporadic grazing	Shrub-grassland, with shrub crown cover about 40%, dominated by Artemisia apiacea,Caryopteris sp—Berberis sp, Sophora viciifolia, rosebush	Over 100 years
Maoxian	Nanxin	Bieli	MX-BL-2006-01-01 MX-BL-2006-01-02 MX-BL-2006-01-03 MX-BL-2006-01-04 MX-BL-2006-01-05 MX-BL-2006-01-06	Grazing land	Grassland dominated by gramineous herb and ranunculaceous herb	Early 1970s due to cultivation for medicine planting and grazing
Pingwu	Gaochun	Wuyi	PW-WY-2006-01-01	Barren land	Shrub-grassland with shrub crown cover less than 30%, dominated by gramineous herb, fern-raspberry, Vitex negundo, firethorn, Berberis sp bush	Late 1950s and early 1960s due to Iron and Steel Campaign

			PW-WY-2006-01-02	Barren land	Grassland dominated by gramineous herb and fern	Late 1950s and early 1960s due to Iron and Steel Campaign
			PW-WY-2006-01-03	Barren land	Shrub-grassland with shrub crown cover less than 30%, dominated by gramineous herb, fern-raspberry, Vitex negundo, firethorn, Berberis sp bush	Late 1950s and early 1960s due to Iron and Steel Campaign
	Shuijing	Xinhua	PW-XH-2006-01-01 PW-XH-2006-01-02	Barren land	Shrub-grassland with shrub crown cover less than 30%, dominated by gramineous herb, fern-rosebush, Vitex negundo bush	Late 1950s and early 1960s due to Iron and Steel Campaign
	Nanba	Tongjiang	PW-TJ-2006-01-01	Barren land	Grassland dominated by gramineous herb and fern	Late 1950s and early 1960s due to Iron and Steel Campaign
	Pingtong	Xinyuan	PW-XY -2006-01-01	Barren land	Grassland dominated by gramineous herb and fern	Late 1950s and early 1960s due to Iron and Steel Campaign
Qingchuan	Baijia	Huajian	QC-HJ-2006-01-01 QC-HJ-2006-01-02 QC-HJ-2006-02-01	Barren land	Shrub-grassland with shrub crown cover 30-40%, dominated by fern	1950s-1970 due to Iron and Steel Campaign
	Dayuan	Shuojia	QC-SJ-2006-01-01 QC-SJ-2006-01-02 QC-SJ-2006-01-03 QC-SJ-2006-01-04	Sporadic grazing	Grassland dominated by fern and cogon herbs	Late 1950s due to Iron and Steel Campaign
	Fangshi	Xinqiao	QC-XQ-2006-01-01 QC-XQ-2006-01-02 QC-XQ-2006-02-01 QC-XQ-2006-02-02 QC-XQ-2006-02-03 QC-XQ-2006-02-04 QC-XQ-2006-02-05	Sporadic grazing	Shrub-grassland with shrub crown cover 30-40%, dominated by fern	1950s-1970 due to Iron and Steel Campaign
	Kongqi	Yaolin	QC-YL-2006-01-01 QC-YL-2006-01-02	Barren land	Shrub-grassland dominated by fern, cogon-hickory bush	Early 1980s due to land tenure reform
	Malu	Laiqi	QC-CX-2006-01-01 QC-CX-2006-01-02 QC-CX-2006-02-01	Barren land	Shrub-grassland with shrub crown cover 30-40%, dominated by fern	Early 1960s due to Iron and Steel Campaign
		Fangshi	QC-FS-2006-01-01 QC-FS-2006-01-02 QC-FS-2006-01-03	Sporadic grazing	Shrub-grassland with shrub crown cover 30-40%, dominated by fern	Early 1980s due to land tenure reform
	Maoba	Jingjia	QC-JJ-2006-01-01 QC-JJ-2006-01-02	Barren land	Grassland dominated byfern and cogon bush	1950s-1970 due to Iron and Steel Campaign
	Qiaolou	Hexi	QC-HX-2006-01-01	Sporadic grazing	Shrub-grassland with shrub crown cover 30-40%, dominated by fern-hickory bush	Early 1980s due to land tenure reform
			QC-HX-2006-01-02	Sporadic grazing	Shrub-grassland with shrub crown cover less than 30%, dominated by fern	Early 1980s due to land tenure reform
	Qingqi	Dongqiao	QC-DQ-2006-01-01 QC-DQ-2006-02-02	Sporadic grazing	Shrub-grassland with shrub crown cover less than 30%, dominated bycogon-raspberry bush	Early 1980s due to land tenure reform
		Luoyigou	QC-LYG-2006-01-01 QC-LYG-2006-01-02 QC-LYG-2006-02-01	Barren land	Shrub-grassland with shrub crown cover 30-40%, dominated by fern and cogon bush	1950s-1970 due to Iron and Steel Campaign
		Weiba	QC-WB-2006-01-01 QC-WB-2006-01-02	Barren land	Shrub-grassland with shrub crown cover 30-40%, dominated by fern and cogon bush	Early 1980s due to land tenure reform
	Sanguo	Dongyang	QC-DY-2006-01-01	Barren land	Grassland dominated by gramineous herb	1950s-1970 due to Iron and Steel Campaign

			QC-DY-2006-02-01 QC-DY-200603-01 QC-DY-200604-01	Barren land	Grassland dominated by cogon	1950s-1970 due to Iron and Steel Campaign
	Zhuyuan	Qingjiang	QC-QJ-2006-01-01 QC-QJ-2006-01-02 QC-QJ-2006-01-03	Barren land	Shrub-grassland with shrub crown cover 30-40%, dominated by fern	1950s-1970 due to Iron and Steel Campaign

A.5.2. Description of the presence, if any, of rare or endangered species and their habitats:

>> The five counties within which the proposed A/R CDM project activity will be implemented have very rich biodiversity. There are 2 national nature reserves and 7 provincial nature reserves. Over 3000 species of high plants, 85 species of beasts, 210 species of birds, 18 species of amphibians, 19 species of reptiles, 12 species of fishes and 287 species of insects have been recorded in these nature reserves. Among them, seven plant species are listed in category I of national protected plants, and other 6 species in category II. *Moschus berezovskii, Moschus moschiferus, Ailuropoda melanoleuca, Rhinopi the cus bieti*, *Budorcas taxicolor, Panthera uncial, Neofelis nebulosa,* etc. are listed in the category I of the national protected animals. *Lophophorus Ihuysii*, *Tetraophasis obscurus,* Tetrastes sewerzowi, *Aquila chrysaetos* and *Grus nigricollis* belong to catetory I of the national protected birds.

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 in the project sides includes plant, mammal, rodent, amphibian, crawler and bird. The random sample with the same size and orientation as the carbon baseline survey (see annex 3 the baseline info.) was used to survey the plant biodiversity and research endangered species in each stratification. 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, dejection of mammal and birds, and confirm the specie.

The biodiversity baseline survey in and around project sites .

A.5.3. Species and varieties selected for the proposed A/R CDM project activity:

>> Please see Table A.5. for the species used in the proposed A/R CDM project activity. All species are native to local. No GMO will be used.

Table A.5. Species used in the proposed A/R CDM project activity per County:

Species	Counties					Total (ha.)
	Beichuan	Lixian	Maoxian	Pingwu	Qingchuan	
Platycladus orientalis		109.0				**109.0**
Betula luminifera	56.4				274.1	**330.5**
Poplus Szechuanica			63.0			**63.0**
Betula albo-sinensis	28.0	34.4				**62.4**
Magnolia officinalis	115.8			40.6		**156.4**
Larix gmelinii				120.0		**120.0**
Quercus acutissima				30.0	264.2	**294.2**
Pinus massoniana					66.0	**66.0**
Cupressus chengiana		358.0				**358.0**
Cupressus chengiana		109.0				**109.0**
Cunninghmia lanceolata					274.0	**274.0**
Pinus tabulaeformis		137.4	85.9			**223.3**
Picea asperata			86.0			**86.0**
Total (ha.)	**200.2**	**747.8**	**234.9**	**190.6**	**878.3**	**2251.8**

A.5.4. Technology to be employed by the proposed A/R CDM project activity:

>> Environmental-friendly techniques will be employed through direct planting on degraded lands in the proposed A/R CDM project activity. The following technical standards will be strictly followed:

- State Technical Standards for Afforesation/Reforestation: GB/T 15776-1995;
- State Technical Standards for Establishing Eironmental Service Forests: GB/T 18337.1-2001, GB/T 18337.2-2001, GB/T 18337.3-2001;

- State Technical Standards for Designing of Afforesation/Reforestation: LY/T 1607-2003;
- State Technical Standards for Watershed Management: GB/T 16453.1-16453.6-1996
- State Technical Standards for Forest Management: GB/T 15781-1995;
- State Quality Standard for Seed of Trees: GB 7908-1999
- Standards for Seedling Qualification: GB 6000-1999;
- Technical Standard for Seedling Breading: GB/T 6001-1985;
- Technical Standard for Container Seedling Breeding: LY1000-1991.

The local forestry agencies, i.e., Sichuan Provincial Forestry Department, Forestry Bureaus at county level, China Office of The Nature Conservancy, China Office of the Conservation International and the Chinese Academy of Forestry 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. Project participants will also seek advice from other local, national, and international forestry experts. The most up-to-date technologies and silvicultural models will be adopted.

Species arrangements:

Tree species will be planted in mixed block arrangements (mixed at landscape level, same species within each subcompartment) to minimize risks (fire, pest insects and disease) and maximize environmental and social benefits. Please see table A.6. for species and model to be planted in each County. Fig. A.7. and Fig. A.8. below presents some examples of species arrangement.

Fig. A.7. Species Combination and Reforestation model arrangement in Bieli village of Nanxin Township, Maoxian County, Sichuan Province:

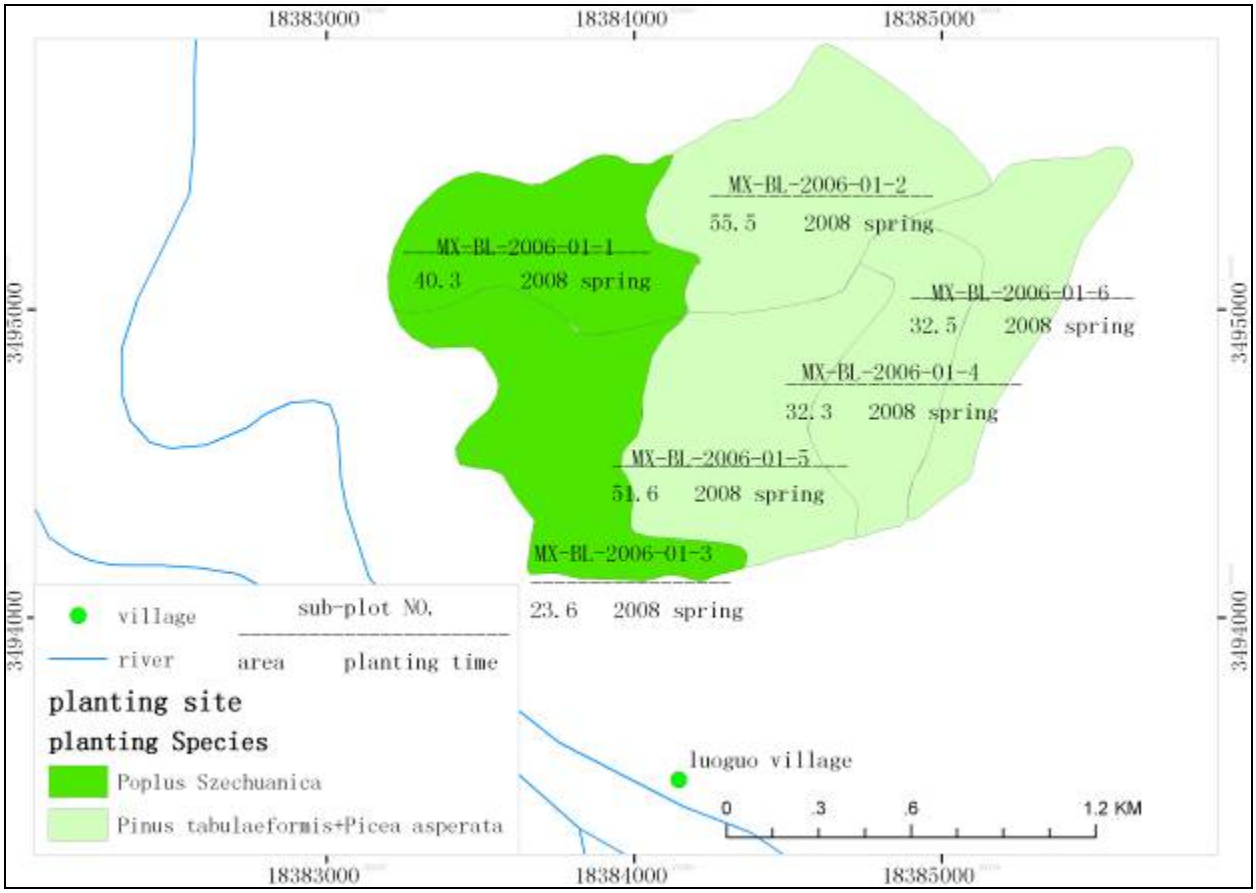


Fig. A.8. Species-combination and afforestation/reforestation model arrangement in Shajin village, Xuecheng township, Lixian County, Sichuan Province:

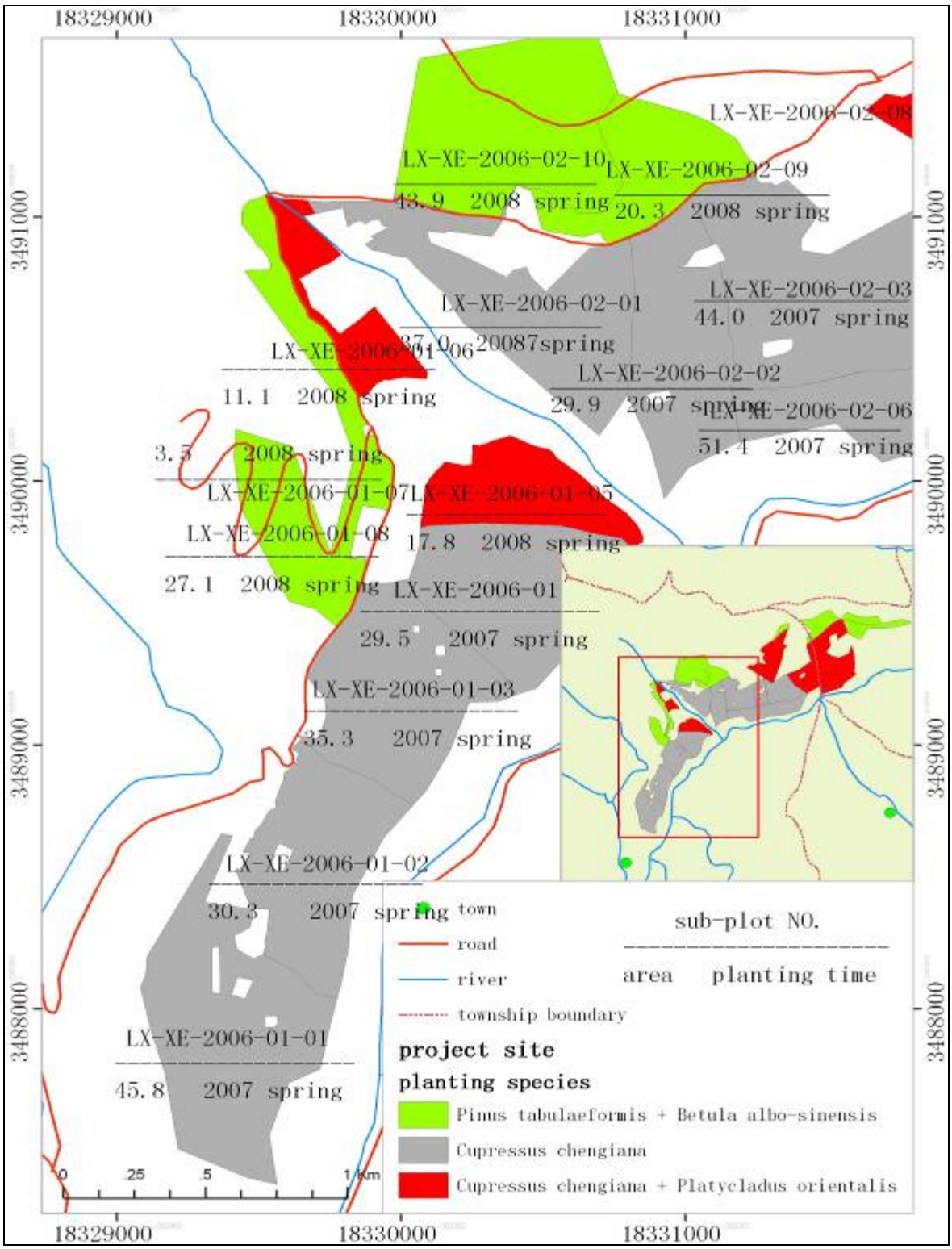


Table A.6. Species arrangement and time to be planted for each land parcel:

County	Land ID	Area (ha)	Species arrangement	planted time
Beichuan	BC-HDM-2006-01	56.8	*Magnolia officinalis* + *Betula luminifera*	Spring 2008
	BC-AM-2006-01	19.0	*Betula luminifera* + *Betula albo-sinensis*	Spring 2008
	BC-YX-2006-01	29.1	*Magnolia officinalis*	Spring 2008
	BC-ZH-2006-01	37.0	*Betula luminifera* + *Betula albo-sinensis*	Spring 2008
	BC-TB-2006-01	28.4	*Magnolia officinalis*	Spring 2008
	BC-TB-2006-02	6.3	*Magnolia officinalis*	Spring 2008
	BC-TB-2006-03	23.6	*Magnolia officinalis*	Spring 2008
Lixian	LX-XE-2006-01	140.9	*Cupressus chengiana*	Spring 2007
	LX-XE-2006-02	217.1	*Cupressus chengiana*	Spring 2007
	LX-XE-2006-01	28.9	*Cupressus chengiana* + *Platycladus orientalis*	Spring 2008
	LX-XE-2006-02	90.4	*Cupressus chengiana* + *Platycladus orientalis*	Spring 2008
	LX-XE-2006-03	98.7	*Cupressus chengiana* + *Platycladus orientalis*	Spring 2008
	LX-XE-2006-01	30.6	*Pinus tabulaeformis* + *Betula albo-sinensis*	Spring 2008
	LX-XE-2006-02	71.0	*Pinus tabulaeformis* + *Betula albo-sinensis*	Spring 2008
	LX-XE-2006-03	70.2	*Pinus tabulaeformis* + *Betula albo-sinensis*	Spring 2008
Maoxian	MX-BL-2006-01	63.0	*Poplus szechuanica*	Spring 2008
	MX-BL-2006-01	171.9	*Picea asperata* + *Pinus tabulaeformis*	Spring 2008
Pingwu	PW-WY-2006-01	109.8	*Larix gmelinii* + *Quercus acutissima*	Autumn 2007
	PW-XH-2006-01	16.5	*Magnolia officinalis*	Autumn 2007
	PW-XH-2006-01	25.7	*Larix gmelinii* + *Quercus acutissima*	Autumn 2007
	PW-TJ-2006-01	14.5	*Larix gmelinii* + *Quercus acutissima*	Autumn 2007
	PW-XY-2006-01	24.1	*Magnolia officinalis*	Autumn 2007
Qingchuan	QC-HJ-2006-01	50.5	*Pinus manssoniana* + *Quercus acutissima*	Autumn 2007
	QC-HJ-2006-02	9.8	*Pinus manssoniana* + *Quercus acutissima*	Autumn 2007
	QC-SJ-2006-01	107.1	*Cunninghamia lanceolata* + *Betula luminifera*	Autumn 2007
	QC-XQ-2006-02	125.0	*Cunninghamia lanceolata* + *Betula luminifera*	Autumn 2007
	QC-XQ-2006-01	52.9	*Cunninghamia lanceolata* + *Betula luminifera*	Autumn 2007

	QC-YL-2006-01	23.3	*Cunninghamia lanceolata + Betula luminifera*	Autumn 2007
	QC-CX-2006-02	34.4	*Pinus manssoniana + Quercus acutissima*	Autumn 2007
	QC-CX-2006-01	45.5	*Pinus manssoniana + Quercus acutissima*	Autumn 2007
	QC-FS-2006-01	60.2	*Pinus manssoniana + Quercus acutissima*	Autumn 2007
	QC-JJ-2006-01	45.2	*Cunninghamia lanceolata + Betula luminifera*	Autumn 2007
	QC-HX-2006-01	44.0	*Cunninghamia lanceolata + Betula luminifera*	Autumn 2007
	QC-DQ-2006-01	39.2	*Pinus manssoniana + Quercus acutissima*	Autumn 2007
	QC-DQ-2006-02	28.8	*Pinus manssoniana + Quercus acutissima*	Autumn 2007
	QC-LYG-2006-01	58.2	*Cunninghamia lanceolata + Betula luminifera*	Autumn 2007
	QC-LYG-2006-02	16.2	*Cunninghamia lanceolata + Betula luminifera*	Autumn 2007
	QC-WB-2006-01	38.4	*Cunninghamia lanceolata + Betula luminifera*	Autumn 2007
	QC-DY-2006-01	15.5	*Cunninghamia lanceolata + Betula luminifera*	Autumn 2007
	QC-DY-2006-02	12.0	*Cunninghamia lanceolata + Betula luminifera*	Autumn 2007
	QC-DY-2006-03	5.0	*Cunninghamia lanceolata + Betula luminifera*	Autumn 2007
	QC-DY-2006-04	5.3	*Cunninghamia lanceolata + Betula luminifera*	Autumn 2007
	QC-QJ-2006-01	61.8	*Pinus manssoniana + Quercus acutissima*	Autumn 2007

Genetic Sources and Nursery Practices:

All seedlings used in the proposed A/R CDM project activity will be bred in local nuseries 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. Table A.7. lists the standard for seedling grading for tree species used in the proposed A/R CDM project activity.

Table A.7. Standard for seedling grading[2]:

Species	**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**
Platycladus orientalis	<1	0.30	15		
Cunninghmia lanceolata	<1	0.30	16	15	10
Betula luminifera	<1	0.35	30	18	7
Magnolia officinalis	<1	0.40	30	20	5
Betula albo-sinensis	<1	0.35	30	18	7
Larix gmelinii	<1	0.30	15		
Cupressus chengiana (transplanted seedlings)	2-5	1.00	100	40	20
Cupressus chengiana (bag seedling)	1	0.30	20	15	6
Pinus tabulaeformis	<1	0.30	12		
Pinus massoniana	<2	0.30	16		
Quercus acutissima	<1	0.70	60	18	4
Picea asperata	2	0.3	16	20	7

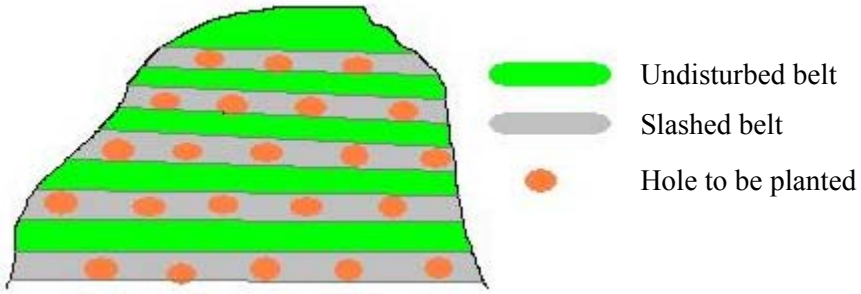
[2] Data source: Standards for Seedling Qualification: GB 6000-1999

Plastic bag (5 cm in diameter and 15 cm length) that hold soils mixed with 20 percent of organic soil will be used to seedlings of *Platycladus orientalis, Cupressus chengiana, Pinus tabulaeformis, Pinus manssoniana,*and *Larix gmelinii.* This technique ensures the control of the growing conditions in the initial stage after planting, and thus increases the survival rate and early growth. *Quercus acutissima* will be reforested by direct seeding. *Poplus szechuanica* will be planted by clone cutting. Transplanted seedlings of *Cupressus chengiana* will be used.

Site and Soil Preparation:

To prevent soil erosion and protect existing carbon stocks, site burning and overall tillage will not be employed during the site and soil preparation. Existing non-tree vegetation will be slashed manually along landform contour with a width 100 cm and piled on-site. Small holes (with 40 cm in diameter and 30 cm in depth for *Magnolia officinalis, Larix gmelinii, P. massoniana, P. tabulaeformis, Cunninghmia lanceolata;* with 60 cm in diameter 50 cm in depth for *Betula albo-sinensis, Betula luminifera, Cupressus chengiana* and *Platycladus orientalis,*); and with 30 cm in diameter and 20 cm in depth for *Quercus acutissima*) will be dug manually along slashed belts in autumn or winter. Especially 2-3 cm in diameter of hole will be bored for clone cutting of *Poplus szechuanica*, The holes will be arranged in a triangle form on slope (Fig. A-9). Even though, the limited removal of pre-existing vegetation will be accounted as carbon stock decrease.

Fig. A.9. Sketch map for the planting holes:



Forest Establishment:

Trees will be planted within 2 years starting in the spring 2007 (see Table A.6. for the planting plan of each species and site). The planting is preferably conducted in the cloudy days. No machinery will be used in the planting. *Quercus acutissima* will be reforested by direct seeding and other species will be planted by direct planting.

The number of trees to be planted per hectare is determined based on the State Technical Standards for Establishing Eironmental Service Forests (GB/T 18337.1-2001) as follows:

- *Magnolia officinalis, Poplus szechuanica , Betula luminifera* and *Betula albo-sinensis*. 2.0 m × 3.0 m, 1667 trees per hectare;
- *Quercus acutissima*. 1.5 m × 1.5 m, 4444 trees per hectare;
- *Cunninghmia lanceolata, Platycladus orientalis, Cupressus chengiana, Pinus tabulaeformis, P.massoniana, Larix gmelinii* and *Picea asperata*. 2.0m × 2.0m, 2500 trees per hectare.

Revetment will be built at lower slope side of planting holes to hold soil and rain water for planted young trees.

To ensure high survival rates and good growth in the early stages, weeding and scarification will be

implemented manually twice a year in the first 3 years after planting, and weed slashing once in 4-5th year. Weeding and scarification shall not be conducted in raining season. Survival rates will be checked 6 months after planting and re-planting will be conducted using bigger seedlings if the survival rate is lower than 85 percent.

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.

Forest Management:

Part of the established plantations will be thinned at 15-40 year-old depending on the natural sparse rate and the actual growth condition of trees in different stratum and species, with thinning intensity 20-30%(including the nature sparse rate) of standing volume and plantations density, varied with tree species and site productivity (see Table A.8. for detail thinning plan). The aim of management in artificial thinning is promoting the growth of forest more than obtaining the lumber except the *Quercus acutissima*. The plantation to be planted in Maoxian County will not be harvested for the purpose of the watershed protection. The other species and cases will be harvested at the age of 10-80 years (see Table A.8. for detail).

On the other hand if the livability is below 70% of the preceding period the remedial replanting should be carried out. And all plantations will be regenerated by direct planting after harvesting. Both the thinning, harvesting and replanting will be conducted manually without any mechanical equipment.

Table A.8. Plantation management:

Counties	Tree species	Thinning age	Thinning Intensity *(% of standing trees)	Harvest age
Beichuan	*Betula luminifera*	15 and 25-yr-old	30%	30-yr-old
	Betula albo-sinensis	15 and 25-yr-old	30%	30-yr-old
	Magnolia officinalis	15 and 25-yr-old	30%	30-yr-old
Lixian	*Betula albo-sinensis*	40-yr-old	20%	80-yr-old
	Platycladus orientalis	40-yr-old	20%	80-yr-old
	Cupressus chengiana	40-yr-old	20%	80-yr-old
	Pinus tabulaeformis	40-yr-old	20%	60-yr-old
Maoxian	*Poplus szechuanica*			No harvesting
	Pinus tabulaeformis			No harvesting
	Picea asperata			No harvesting
Pingwu	*Quercus acutissima*			10-yr-old
	Magnolia officinalis	15 and 25-yr-old	30%	30-yr-old
	Larix gmelinii	15 and 25-yr-old	30%	30-yr-old
Qingchuan	*Betula luminifera*	15 and 25-yr-old	30%	30-yr-old
	Quercus acutissima			10-yr-old
	Pinus massoniana	15 and 25-yr-old	30%	30-yr-old
	Cunninghmia lanceolata	15 and 25-yr-old	30%	30-yr-old

* the thinning intensity is the total of natural death and cut sparse rate of the standing trees.

A.5.5. Transfer of technology/know-how,if applicable:

>>There will be no technology transfer from Annex-I countries to the Host Country.

A.5.6. Proposed measures to be implemented to minimize potential leakage:

>> Potential leakage associated with the proposed A/R CDM project activity may include the use of vehicles for the transportation of products, fertilizer and other production materials and the displacement of grazing activity, outside the project area. Although potential transportation leakage is relatively small, the proposed A/R CDM project activity will make effort for vehicles to be full-loaded on both to and return ways so as to minimize the leakage. The leakage due to the displacement of grazing are unlikely occur due to the governmental license control of tree logging, however, the proposed A/R CDM project activity will strictly enforce the Forest Laws and its related regulations, and avoid tree logging due to displacement of grazing by control license issuance.

A.6. Description of legal title to the land, current land tenure and rights to tCERs / lCERs issued for the proposed A/R CDM project activity:

>>Except for 4.5 ha of lands in Lixian County is state-owned, all other lands to be planted in the proposed A/R CDM project activity are collective owned by villages. Most of land tenure belongs to local villages or villagers group. Except for 58.2 ha of lands in Tongbao village of Chenjiaba Township that are contracted to individual farmers for a period 2004-2053 (50 years) and 56.8 ha of lands in Huangdimiao village of Duba Township in Beichuan that are contracted to individual farmers for a period 2001-2030 (30 years). There is no land ownership/tenure conflict.

Table A.9. Current legal title to the land and the land tenure:

Counties	Towns/ Townships	Villages	Land ID	Legal title to the land	Land tenure	Area (ha)
Beichuan	Xiaoba	Yongxin	BC-YX-2006-01	village	Villagers group	29.1
	Chenjiaba	Tongbao	BC-TB-2006-01 BC-TB-2006-02 BC-TB-2006-03	village	Individual farmers	58.3
	Duba	Huangdimiao	BC-HDM-2006-01	village	Individual farmers	56.8
	Qingpian	Anmian	BC-AM-2006-01	village	Villagers group	19.0
		Zenghe	BC-ZH-2006-01	village	village	37.0
Lixian	Ganbao, Xuecheng	Rierzhu, Ganbao, Xionger, Lianhe,Jingsha	LX-XE-2006-01 LX-XE-2006-02 LX-XE-2006-03-01 LX-XE-2006-03-02 LX-XE-2006-03-03 LX-XE-2006-03-04 LX-XE-2006-03-	villages	village	743.3

			05			
			LX-XE-2006-03-06	State-owned	state	4.5
Maoxian	Nanxin	Bieli	MX-BL-2006-01	village	village	234.9
Pingwu	Gaochun	Wuyi	PW-WY-2006-01	village	village	109.8
	Shuijing	Xinhua	PW-XH-2006-01	village	village	42.2
	Nanba	Tongjiang	PW-TJ-2006-01	village	village	14.5
	Pingtong	Xinyuan	PW-XY -2006-01	village	village	24.1
Qingchuan	Baijia	Huajian	QC-HJ-2006-01 QC-HJ-2006-02	village	village	60.3
	Dayuan	Shuojia	QC-SJ-2006-01	village	Villagers group	107.1
	Fangshi	Xinqiao	QC-XQ-2006-01 QC-XQ-2006-02	village	village	177.9
	Kongqi	Yaolin	QC-YL-2006-01	village	village	23.3
	Malu	Laiqi	QC-CX-2006-01 QC-CX-2006-02	village	village	79.9
		Fangshi	QC-FS-2006-01	village	village	60.2
	Maoba	Jingjia	QC-JJ-2006-01	village	village	45.2
	Qiaolou	Hexi	QC-HX-2006-01	village	Villagers group	44.0
	Qingqi	Dongqiao	QC-DQ-2006-01	village	village	68.0
			QC-DQ-2006-02			
		Luoyigou	QC-LYG-2006-01 QC-LYG-2006-02	village	village	74.4
		Weiba	QC-WB-2006-01	village	Villagers group	38.4
	Sanguo	Dongyang	QC-DY-2006-01 QC-DY-2006-02 QC-DY-2006-03 QC-DY-2006-04	village	Villagers group	37.8
	Zhuyuan	Qingjiang	QC-QJ-2006-01	village	Villagers group	61.8

Under the contractual arrangement in the proposed A/R CDM project activity, local communities and the implementing entity involved have the right to use the lands. They own 70% of the timber and other wood and non-wood forest products benefit, and they should have the license, which is issued by the local government, to harvest the timber.

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, 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 value[3].

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;
- 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 Board[4].

(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 or illegally grazing land covered mostly with grasses and a few shrubs (see also Table A.4., Table A.6.):

- ✓ 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, fuel collecting 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) Most recent (in 2000) land use/cover maps showed in Annex 6 also demonstrates that the lands to be planted are non forested lands. The maps were derived from forestry inventory that is conducted once every ten years.

[3] http://cdm.ccchina.gov.cn/

[4] http://cdm.unfccc.int/Reference/Procedures/methAR_proc03.pdf

(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 1989 (see Section H). The lands in Lixian County have been non-forested lands at least a century ago.

(ii) Land use/cover maps before 1990 also demonstrate that the lands to be planted were non forested lands before 1990.

Note. the actual GIS systems have a much higher resolution than the pictures inserted in here in the PDD, and have been confirmed by the DOE for the eligibility of lands. The lands to be planted in the proposed A/R CDM project activity are marked with red lines in these figures.

A.8. Approach for addressing non-permanence:

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

A.9. Estimated amount of net anthropogenic GHG removals by sinks over the chosen crediting period:

>> Table A.10. below:

Table A.10. Estimated amount of net anthropogenic GHG removals by sinks in the first crediting period:

Summary of results obtained in Sections C.7., D.1., and D.2.				
Year	**Estimation of baseline net GHG removals by sinks (tonnes of CO_2 e)**	**Estimation of actual net GHG removals by sinks (tonnes of CO_2 e)**	**Estimation of leakage (tonnes of CO_2 e)**	**Estimation of net anthropogenic GHG removals by sinks (tonnes of CO_2 e)**
2007	-170	1,496	-6	-50,120
2008	-164	6,155	1	5,989
2009	-158	14,174	0	14,016
2010	-151	21,529	0	21,378
2011	-144	27,627	0	27,483
2012	-137	32,847	0	32,710
2013	-129	37,341	0	37,212
2014	-122	41,227	0	41,105
2015	-115	44,613	0	44,498
2016	-108	47,599	0	47,490
2017	-102	50,263	0	50,161
2018	-95	-30,225	0	-30,320
2019	-89	28,956	0	28,867
2020	-84	43,874	0	43,790
2021	-78	45,856	-35	45,742
2022	-73	18,838	12	18,752
2023	-68	-7,895	0	-7,963
2024	-64	13,367	0	13,303
2025	-60	38,603	0	38,543
2026	-56	38,021	0	37,965
Total (tonnes of CO2 e)	2168	514,265	-55	460,603

A.10. Public funding of the proposed A/R CDM project activity:

>> The establishment cost in the proposed A/R CDM project activity is estimated to be around US$ 1.99 million, among which US$ 0.89 million will be from local commercial bank, US$ 0.70 million from government equity and US$ 0.39 million from the participants themselves. There is no available public funding that will result in a diversion of official development assistance and financial obligations of any Parties under UNFCCC.

SECTION B. Duration of the project activity / crediting period:

B.1. Starting date of the proposed A/R CDM project activity and of the crediting period:

>> January 4th, 2007 is the starting date of the proposed A/R CDM project activity and the crediting period[5]. The contract between Conservation International (the project prophase development bankroller) and Carbon sequestration office of the Forestry Department of Sichuan Province on project baseline survey (08/30/2006-10/31/2006) indicates the consideration of AR-CDM before project start.

B.2. Expected operational lifetime of the proposed A/R CDM project activity:

>> 60 years 0 month

B.3. Choice of crediting period:

B.3.1. Length of the renewable crediting period (in years and months), if selected:

>>20 years 0 month

B.3.2. Length of the fixed crediting period (in years and months), if selected:

>>N/A

SECTION C. Application of an approved baseline and monitoring methodology:

C.1. Title and reference of the approved baseline and monitoring methodology applied to the proposed A/R CDM project activity:

>> The revised approved afforestation and reforestation baseline methodology "Afforestation and reforestation of degraded land through tree planting, assisted natural regeneration and control of animal grazing" (AR-AM0003/version 03)[6] is applied.

C.2. Assessment of the applicability of the selected approved methodology to the proposed A/R CDM project activity and justification of the choice of the methodology:

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

- As presented in Table A.4., some parcels of lands to be planted in the proposed A/R CDM project activity are currently grazing lands or sporadically grazing lands, thus are subjected to a shift of pre-project grazing activities outside the project boundary.
- Lands to be afforested or reforested are severely degraded and the lands are still degrading or remain in a low carbon steady state. Most lands are currently covered by grasses, shrubs and a few spotted growing trees. But the tree crown cover on this land is below the thresholds for defining a forest set by Chinese DNA that are consistent with decision 3/CMP.1 and 5/CMP.1, and would not reach the

[5] The Forestation Design and Plan Documents of each county indicates that at the beginning of 2007, the project executor has actually carried out the planting work.

[6] http://cdm.unfccc.int/methodologies/DB/U3WW9YEC2X333WW8CPVQ6CGVY6IBPJ/view.html

threshold under continuation of current management (see also Table A.4. above and Annex 3 below).

- Unavailability of natural seed sources, environmental conditions, and/or anthropogenic pressures (grazing, fuelwood collection, fire, etc.), do not permit the encroachment of natural tree vegetation that leads to the establishment of forests according to the threshold values of the national definition of forest for CDM purposes in China.
- Lands will be afforested or reforested through direct planting or sowing in the proposed A/R CDM project activity (see Section A.4.4.).
- As elaborated in Section A.4.4., trees will be planted with low density (1667-2500 trees per hectare), small hole site preparation (30-60 cm in diameter or 0.07-0.28 m^2). As a result, the maximum surface area disturbed by site preparation is estimated to be 7.1% of the total land surface. In addition, there will be no site burning. Therefore the site preparation will not cause significant long-term net emissions from soil carbon.
- In the context of degraded and degrading lands, carbon stocks in soil organic matter, litter and deadwood will decrease more or increase less in the absence of the project activity, relative to the project scenario.
- There will be no flood irrigation in the proposed A/R CDM project activity (see Section.A.5.4.).
- There will be no soil drainage in the proposed A/R CDM project activity so that non CO_2-greenhouse gas emissions from this type of activities can be neglected (see Section.A.5.4.).
- No species used in the proposed A/R CDM project activity are not nitrogen-fixing species, thus there

will be no greenhouse gas emissions from denitrification (see Section.A.5.4.).

- Due to the degraded, degrading and remote features, the lands to be planted have been non-forested lands for many years, even over a hundred years. The limited fund also prevents government from invest on the remote degraded lands. Currently there are no other on-going or planned afforestation or reforestation activities on the lands to be planted in the proposed A/R CDM project activity.

C.3. Assessment of the selected carbon pools and emission sources of the approved methodology to the proposed CDM project activity:

>>Table C.1. Selection of carbon pools:

Carbon Pools	Selected (answer with yes or no)	Justification / Explanation
Above ground	Yes	Major carbon pool subjected to the project activity
Below ground	Yes	Major carbon pool subjected to the project activity
Dead wood	No	Conservatively omitted by the approved methodology applied
Litter	No	Conservatively omitted by the approved methodology applied
Soil organic carbon	No	Conservatively omitted by the approved methodology applied

Table C.2. GHG emissions by sources other than those resulting from changes in carbon pools:

Source	Gas	Included/ excluded	Justification / Explanation
Combustion of fossil fuels used for vehicles	CO_2	Included	Potential significant emission source due to transportation
	CH_4	Excluded	Potential emission is negligibly small as per the methodology applied
	N_2O	Excluded	Potential emission is negligibly small as per the methodology applied

There will be no biomass burning, no machinery and fertilizers to be used either for site preparation, planting, or for forest management. Therefore, emissions due to biomass burning, Fossil fuel burning from machinery using and fertilization are not taken into account.

C.4. Description of strata identified using the *ex ante* stratification:

>> The ex ante stratification procedures in Section II.3 of the approved methodology applied have been followed as below:

Step 1. Stratification according to pre-existing conditions and baseline projections:

Based on field survey and interviewing, the lands to be afforested or reforested in the proposed A/R CDM project activity are distributed in five counties that have different climate, soil, vegetation and landform. Within each county, vegetation and grazing activity are the major factors that will influence pre-existing conditions and baseline projections. 14 baseline strata were identified. The detail stratification is classified as follow step:

a) Define the factors influencing carbon stock changes. These factors may include soil, climate, previous land use, existing vegetation type, degree of anthropogenic pressure in the baseline scenario, etc. The project lands are distributed in five counties that have different climate (see the Fig. C.1.), physiognomy, elevation, all of these lead to different vegetation and land use. So, first of all the lands distributed in different county are classified into five cursory types.

b) In the field survey and interviewing, we collected local site information of classification tables, the land use/cover, vegetation and landforms, depend on field survey and use of satellite images, maps, and literature reviews of site information concerning key factors identified above. (see the Fig. C.2. as an example)

c) Displayed in Table D.7., we collected the information on pre-project distribution of ruminant animals, and included it as the key factor in Stratification.

d) Carry out the preliminary stratification and supplementary sampling for site specifications for each stratum based on the collected information, including land cover, land use and tenure, soil, elevation and grazing.

e) Perfect the preliminary stratification based on supplementary information collected above, and carry out the final stratification (Table C.3.), there is no different between the primary and final stratification.

Fig. C.1. The Accumulated temperature of average daily temperature ≥ 5 ℃:

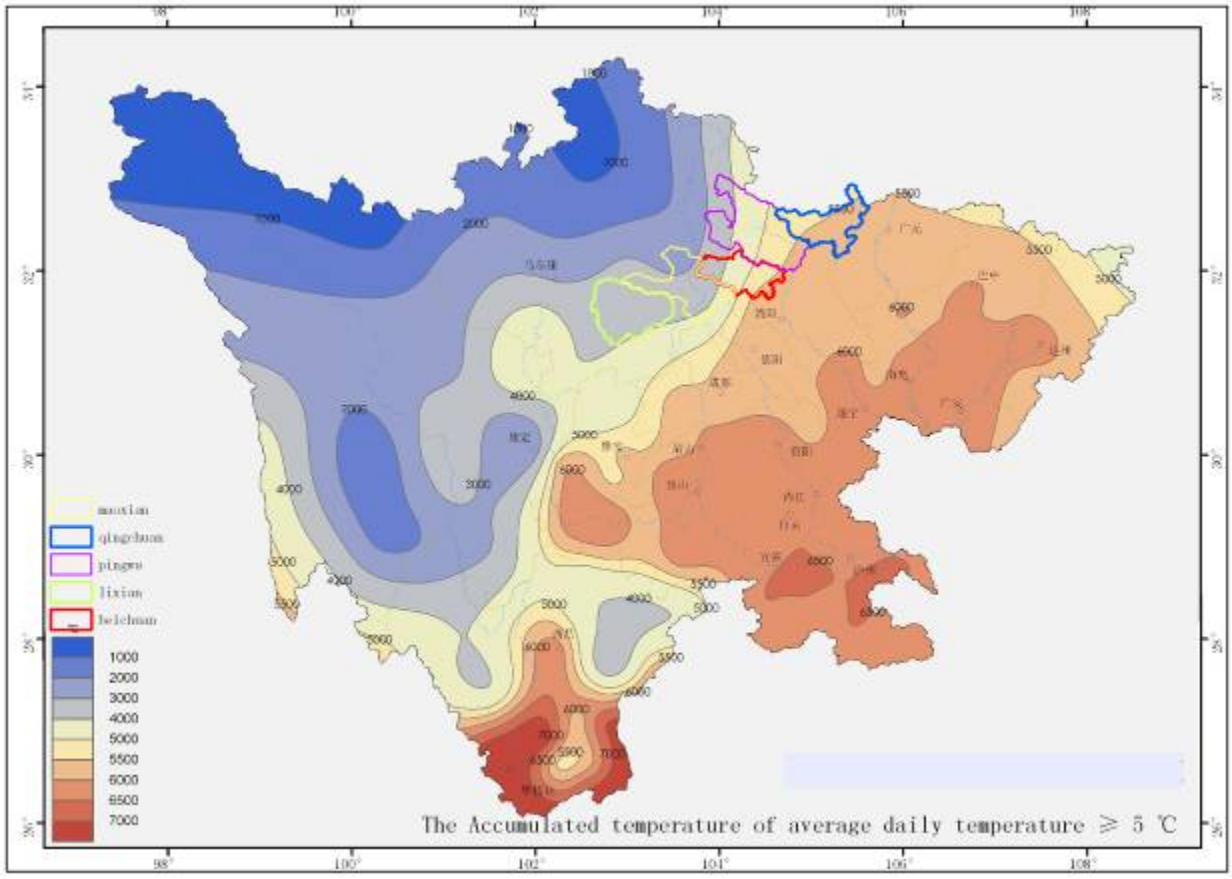


Fig. C.2. the land cover map of project sites in Lixian coounty(2000):

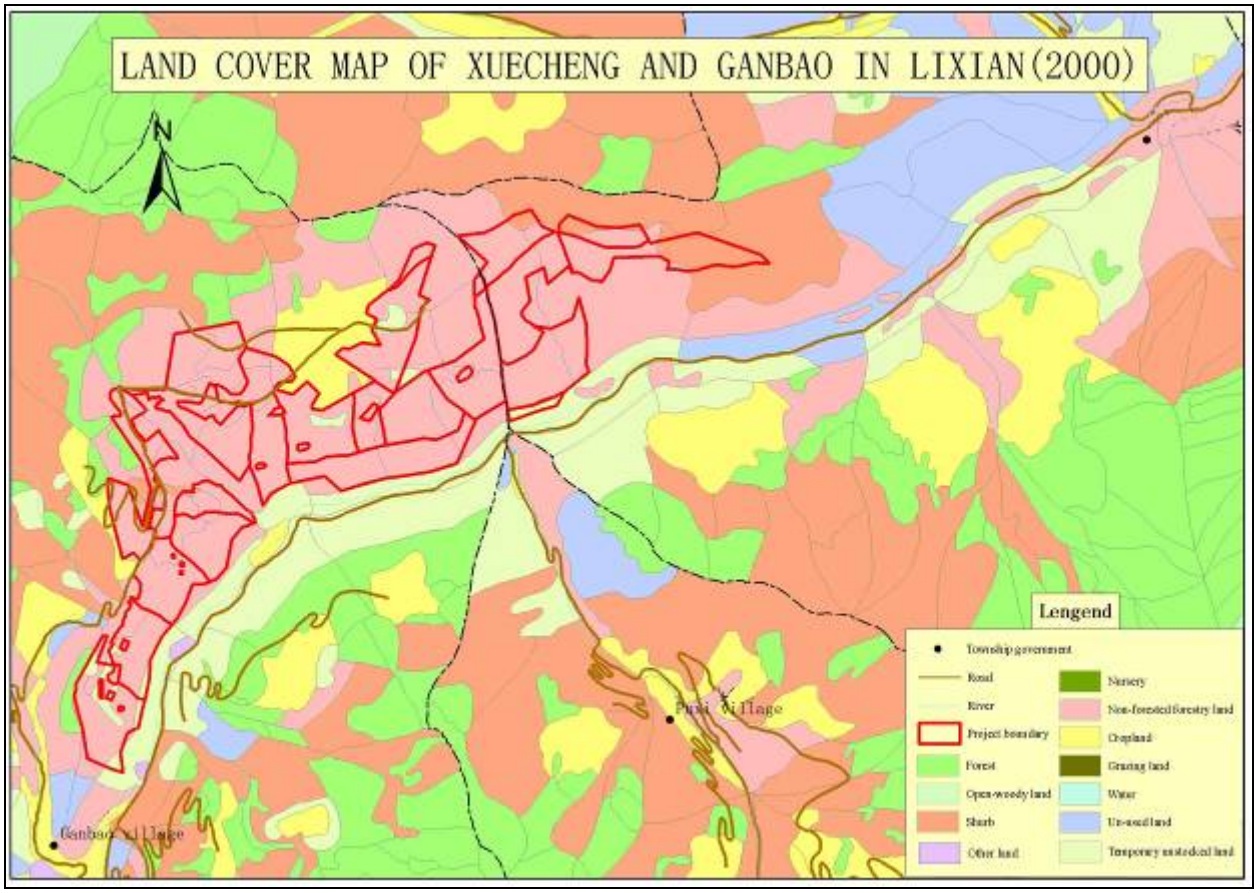


Table C.3 Baseline strata identified:

Stratum ID	Vegetation*	Pre-project trees	Natural Regeneration	Grazing	Fuelwood collection	Degraded degree	Soil type	Elevation (m)	Land ID	plot ID	Area (ha)	Eligible Area
BLS-LX-□	V-1	No	No	Sporadic	No	more heavily	Cinnamon	1700-2700	LX-XE-2006-01 LX-XE-2006-02 LX-XE-2006-03	LX-XE-2006-01:01-07 LX-XE-2006-02:01-09 LX-XE-2006-03:03-06	626.8	626.8
BLS-LX-□	V-2	No	No	Sporadic	Sporadic	more heavily	Cinnamon	2400-2700	LX-XE-2006-01 LX-XE-2006-02 LX-XE-2006-03	LX-XE-2006-01:08 LX-XE-2006-02:10-12 LX-XE-2006-03 :01-02	120.0	120.0
BLS-MX-□	V-1	Yes	No	Yes	No	more heavily	Yellow earth	2400-3000	MX-BL-2006-01	MX-BL-2006-01: 01-06	234.9	234.9
BLS-QC-□	V-1	Yes	Yes	Sporadic	No	heavily	Yellow earth	1160-1500	QC-SJ-2006-01	QC-SJ-2006-01: 01-04	107.1	107.1
BLS-QC-□	V-1	Yes	No	Sporadic	No	heavily	Yellow earth	1100-1700	QC-JJ-2006-01 QC-DY-2006-01 QC-DY-2006-02 QC-DY-2006-03 QC-DY-2006-04	QC-JJ-2006-01: 01-02 QC-DY-2006-01: 01 QC-DY-2006-02: 01 QC-DY-2006-03: 01 QC-DY-2006-04: 01	83.0	83.0
BLS-QC-□	V-2	Yes	No	Sporadic	No	Moderately	Yellow earth	1330-1800	QC-XQ-2006-02	QC-XQ-2006-02: 01-05	125.0	125.0
BLS-QC-□	V-2	Yes	No	Yes	No	Moderately	Yellow earth	1000-1550	QC-XQ-2006-01 QC-HX-2006-01 QC-DQ-2006-01 QC-DQ-2006-02	QC-XQ-2006-01: 01-02 QC-HX-2006-01: 01-02 QC-DQ-2006-01: 01 QC-DQ-2006-02: 01	164.9	164.9
BLS-QC-□	V-3	Yes	Yes	Sporadic	No	Lightly	Yellow earth	650-1270	QC-FS-2006-01 QC-HJ-2006-01 QC-HJ-2006-02	QC-FS-2006-01: 01-03 QC-HJ-2006-01: 01-02 QC-HJ-2006-02: 01	120.5	120.5
BLS-QC-□	V-3	Yes	No	Sporadic	No	Lightly	Yellow earth	600-1200	QC-CX-2006-01 QC-CX-2006-02 QC-QJ-2006-01	QC-CX-2006-01: 01-02 QC-CX-2006-02: 01 QC-QJ-2006-01: 01-03;	141.7	141.7
BLS-QC-□	V-4	Yes	No	Sporadic	No	Lightly	Yellow earth	1100-1600	QC-YL-2006-01 QC-WB-2006-01 QC-LYG-2006-01 QC-LYG-2006-02	QC-YL-2006-01: 01-02 QC-WB-2006-01: 01-02 QC-LYG-2006-01: 01-02 QC-LYG-2006-02: 01	136.1	136.1

BLS-BC-□	V-1	Yes	No	Sporadic	No	heavily	Yellow earth	1400-2400	BC-AM-2006-01 BC-TB-2006-01 BC-TB-2006-02 BC-ZH-2006-01	BC-AM-2006-01: 01 BC-TB-2006-01: 01 BC-TB-2006-02: 02 BC-ZH-2006-01: 01-02	90.7	90.7
BLS-BC-□	V-2	Yes	No	Sporadic	No	Moderately	Yellow earth	1400-1900	BC-YX-2006-01 BC-TB-2006-03 BC-HDM-2006-01	BC-YX-2006-01: 01 BC-TB-2006-03: 03 BC-HDM-2006-01: 01-03	109.5	109.5
BLS-PW-□	V-1	Yes, dominated by *A. nepalensis*	Yes	Sporadic	No	heavily	Yellow earth	1300-1540	PW-TJ-2006-01 PW-WY-2006-01 PW-XY-2006-01	PW-TJ-2006-01: 01 PW-WY-2006-01: 02 PW-XY-2006-01: 01	70.2	70.2
BLS-PW-□	V-2	Yes, dominated by *A. nepalensis*	Yes	Sporadic	No	Moderately	Yellow earth	1360-1880	PW-WY-2006-01 PW-XH-2006-02	PW-WY-2006-01: 01,03 PW-XH-2006-02: 01-02	120.5	120.5

*Notes. V-1. grass cover over 50%, shrub cover below 10%;
V-2. grass cover around 30%, shrub cover around 40%, shrub height below 1.0m;
V-3. grass cover around 20%, shrub cover 50-60%, shrub height 1-1.5m;
V-4. grass cover below 20%, shrub cover over 60%, shrub height over 1.5m.

Step 2. Stratification according to the planned AR CDM project activity:

Since the project activity was planned based on the influencing factors, and each sub-compartment has same species and time of planting. Therefore in the project scenario, the lands are stratified into 12 strata based on species and time to be planted and management schedules (Table C.5.). The stand model been defined, depending on the following steps:

a) The species or species combination to be planted together in one single location and at the same date to create a "stand model" (Table C.4.);

Table C.4. Planting species and time:

County	Land ID	Area (ha)	Species to be planted	Combination ratio
Beichuan	BC-HDM-2006-01	56.8	*Magnolia officinalis + Betula luminifera*	1:1
	BC-AM-2006-01	19.0	*Betula luminifera + Betula albo-sinensis*	1:1
	BC-YX-2006-01	29.1	*Magnolia officinalis*	1
	BC-ZH-2006-01	37.0	*Betula luminifera + Betula albo-sinensis*	1:1
	BC-TB-2006-01	28.4	*Magnolia officinalis*	1
	BC-TB-2006-02	6.3	*Magnolia officinalis*	1
	BC-TB-2006-03	23.6	*Magnolia officinalis*	1
Lixian	LX-XE-2006-01	140.9	*Cupressus chengiana*	1
	LX-XE-2006-02	217.1	*Cupressus chengiana*	1
	LX-XE-2006-01	28.9	*Cupressus chengiana + Platycladus orientalis*	1:1
	LX-XE-2006-02	90.4	*Cupressus chengiana + Platycladus orientalis*	1:1
	LX-XE-2006-03	98.7	*Cupressus chengiana + Platycladus orientalis*	1:1
	LX-XE-2006-01	30.6	*Pinus tabulaeformis + Betula albo-sinensis*	4:1
	LX-XE-2006-02	71.0	*Pinus tabulaeformis + Betula albo-sinensis*	4:1
	LX-XE-2006-03	70.2	*Pinus tabulaeformis + Betula albo-sinensis*	4:1
Maoxian	MX-BL-2006-01	63.0	*Poplus szechuanica*	1
	MX-BL-2006-01	171.9	*Picea asperata + Pinus tabulaeformis*	1:1
Pingwu	PW-WY-2006-01	109.8	*Larix gmelinii + Quercus acutissima*	4:1
	PW-XH-2006-01	16.5	*Magnolia officinalis*	1
	PW-XH-2006-01	25.7	*Larix gmelinii + Quercus acutissima*	4:1
	PW-TJ-2006-01	14.5	*Larix gmelinii + Quercus acutissima*	4:1
	PW-XY-2006-01	24.1	*Magnolia officinalis*	1
Qingchuan	QC-HJ-2006-01	50.5	*Pinus massoniana + Quercus acutissima*	1:4
	QC-HJ-2006-02	9.8	*Pinus massoniana + Quercus acutissima*	1:4
	QC-SJ-2006-01	107.1	*Cunninghmia lanceolata + Betula luminifera*	1:1
	QC-XQ-2006-02	125.0	*Cunninghmia lanceolata + Betula luminifera*	1:1
	QC-XQ-2006-01	52.9	*Cunninghmia lanceolata + Betula luminifera*	1:1
	QC-YL-2006-01	23.3	*Cunninghmia lanceolata + Betula luminifera*	1:1
	QC-CX-2006-02	34.4	*Pinus massoniana + Quercus acutissima*	1:4
	QC-CX-2006-01	45.5	*Pinus massoniana + Quercus acutissima*	1:4

	QC-FS-2006-01	60.2	*Pinus massoniana + Quercus acutissima*	1:4
	QC-JJ-2006-01	45.2	*Cunninghmia lanceolata + Betula luminifera*	1:1
	QC-HX-2006-01	44.0	*Cunninghmia lanceolata + Betula luminifera*	1:1
	QC-DQ-2006-01	39.2	*Pinus massoniana + Quercus acutissima*	1:4
	QC-DQ-2006-02	28.8	*Pinus massoniana + Quercus acutissima*	1:4
	QC-LYG-2006-01	58.2	*Cunninghmia lanceolata + Betula luminifera*	1:1
	QC-LYG-2006-02	16.2	*Cunninghmia lanceolata + Betula luminifera*	1:1
	QC-WB-2006-01	38.4	*Cunninghmia lanceolata + Betula luminifera*	1:1
	QC-DY-2006-01	15.5	*Cunninghmia lanceolata + Betula luminifera*	1:1
	QC-DY-2006-02	12.0	*Cunninghmia lanceolata + Betula luminifera*	1:1
	QC-DY-2006-03	5.0	*Cunninghmia lanceolata + Betula luminifera*	1:1
	QC-DY-2006-04	5.3	*Cunninghmia lanceolata + Betula luminifera*	1:1
	QC-QJ-2006-01	61.8	*Pinus massoniana + Quercus acutissima*	1:4

b) The data for volume functions are derived from National Forestry Inventory. For regional aspects only data from southwest China were used. Different site conditions were not used as stratification criteria. However, we conclude that growth assumptions for Maoxian and Lixian are too optimistic since these lands are heavily degraded. Applying volume functions based on data from existing forests will lead to considerable overestimation of growth and, hence, of actual net GHG removals. So in order to calculate a conservative GHG removals, the growth assumptions within strata PS-LX-I, PS-LX-II, PS-LX-III, PS-MX-I and PS-MX-II and any stratum with similar site conditions were corrected, to increase 10% of the nature thinning rat to 30% ten years, relative to the national standard of 20%. But this does not immediately affect stratification as a whole, which was also based on localities.

c) Planting, fertilization, thinning, harvesting, coppicing, and replanting cycle scheduled for each stand model, by specifying.

Table C.5. management details:

county	Tree species	Planting density (trees/ha)	fertilization	Thinning age years	Thinning Intensity	Harvest age	replanting cycle
Beichuan	*Betula luminifera*	1667	No	15,25	30%	30	2037
	Betula albo-sinensis	1667	No	15,25	30%	30	2037
	Magnolia officinalis	1667	No	15,25	30%	30	2037
Lixian	*Betula albo-sinensis*	2500	No	40	20%	80	2087
	Platycladus orientalis	2500	No	40	20%	80	2087
	Cupressus chengiana	2500	No	40	20%	80	2087
	Pinus tabulaeformis	2500	No	40	20%	60	2067
Maoxian	*Poplus szechuanica*	1667	No	No	0%	No	No
	Pinus tabulaeformis	2500	No	No	0%	No	No
	Picea asperata	2500	No	No	0%	No	No
Pingwu	*Quercus acutissima*	4444	No	No	0%	10	2017\2027

							\2037
	Magnolia officinalis	1667	No	15,25	30%	30	2037
	Larix gmelinii	2500	No	15,25	30%	30	2037
Qingchuan	*Betula luminifera*	1667	No	15,25	30%	30	2037
	Quercus acutissima	4444	No	No	0%	10	2017\2027 \2037
	Pinus massoniana	2500	No	15,25	30%	30	2037
	Cunninghmia lanceolata	2500	No	15,25	30%	30	2037

Table C.6. Strata based on planned activities:

Stratum ID	Species to be planted	Area (ha)	Planting season	Thinning age	Thinning intensity	Harvest age	Land ID	plot- ID
PS-BC-I	*Betula luminifera + Betula albo-sinensis*	56.0	Spring 2008	15 and 25	30%	30	BC-AM-2006-01 BC-ZH-2006-01	BC-AM-2006-01:01 BC-ZH-2006-01:01-02
PS-BC-II	*Magnolia officinalis*	87.4	Spring 2008	15 and 25	30%	30	BC-TB-2006-01 BC-TB-2006-02 BC-TB-2006-03 BC-YX-2006-01	BC-TB-2006-01:01 BC-TB-2006-02:01 BC-TB-2006-03:01 BC-YX-2006-01:01
PS-BC-III	*Magnolia officinalis + Betula luminifera*	56.8	Spring 2008	15 and 25	30%	30	BC-HDM-2006-01	BC-HDM-2006-01:01-03
PS-LX-I	*Pinus tabulaeformis + Betula albo-sinensis*	171.8	Spring 2007	40	20%	80/60	LX-XE-2006-01 LX-XE-2006-02	LX-XE-2006-01:01-04 LX-XE-2006-02:01-06
PS- LX-II	*Cupressus chengiana*	358.0	Spring 2007	40	20%	80	LX-XE-2006-01 LX-XE-2006-02 LX-XE-2006-03	LX-XE-2006-01:05-06 LX-XE-2006-02:07-08 LX-XE-2006-03:03 LX-XE-2006-03:05-06
PS- LX-III	*Cupressus chengiana + Platycladus orientalis*	218.0	Spring 2008	40	20%	80	LX-XE-2006-01 LX-XE-2006-02 LX-XE-2006-03	LX-XE-2006-01:07-08 LX-XE-2006-02:09-12 LX-XE-2006-03:01-04
PS-MX-I	*Poplus szechuanica*	63.0	Spring 2008				MX-BL-2006-01	MX-BL-2006-01:01-03
PS-MX-II	*Picea asperata + Pinus tabulaeformis*	171.9	Spring 2008				MX-BL-2006-01	MX-BL-2006-01:02 MX-BL-2006-01:04-06
PS-PW-I	*Magnolia officinalis*	40.6	Autumn 2007	15 and 25	30%	30	PW-XY-2006-01 PW-XH-2006-01	PW-XY-2006-01:01 PW-XH-2006-01:02
PS-PW-II	*Larix gmelinii + Quercus acutissima*	150.0	Autumn 2007	15 and 25 / no	30%	30/10	PW-WY-2006-01 PW-XH-2006-01 PW-TJ-2006-01	PW-WY-2006-01:01-03 PW-XH-2006-01:01 PW-TJ-2006-01:01
PS-QC-I	*Pinus massoniana + Quercus acutissima*	330.2	Autumn 2007	15 and 25 / no	30%	30/10	QC-DQ-2006-01 QC-DQ-2006-02 QC-FS-2006-01 QC-CX-2006-01 QC-CX-2006-02 QC-QJ-2006-01 QC-HJ-2006-01 QC-HJ-2006-02	QC-DQ-2006-01:01 QC-DQ-2006-02:01 QC-FS-2006-01:01-03 QC-CX-2006-01:01-02 QC-CX-2006-02:01 QC-QJ-2006-01:01-03 QC-HJ-2006-01:01-02 QC-HJ-2006-02:01

PS-QC-II	*Cunninghmia lanceolata + Betula luminifera*	548.1	Autumn 2007	15 and 25	30%	30	QC-JJ-2006-01 QC-DY-2006-01 QC-DY-2006-02 QC-DY-2006-03 QC-DY-2006-04 QC-SJ-2006-01 QC-YL-2006-01 QC-LYG-2006-01 QC-LYG-2006-02 QC-WB-2006-01 QC-XQ-2006-01 QC-XQ-2006-02 QC-HX-2006-01	QC-JJ-2006-01:01-02 QC-DY-2006-01:01 QC-DY-2006-02:01 QC-DY-2006-03:01 QC-DY-2006-04:01 QC-SJ-2006-01:01-04 QC-YL-2006-01:01-02 QC-LYG-2006-01:01-02 QC-LYG-2006-02:01 QC-WB-2006-01:01-02 QC-XQ-2006-01:01-02 QC-XQ-2006-02:01-05 QC-HX-2006-01:01-02

Step 3. Final ex ante stratification:

Both the baseline stratification and project stratification described in Step 1 and Step 2 above have been built into GIS platform and stratification maps have been produced (see Fig.C.3. and Fig.C.4. for an example of baseline stratification map and project stratification map). Since the stratification is based on project maps, the strata boundary is well consistent with project boundary.

Fig. C.3. Baseline stratification map in Qingxi, Village, Qingchuan County:

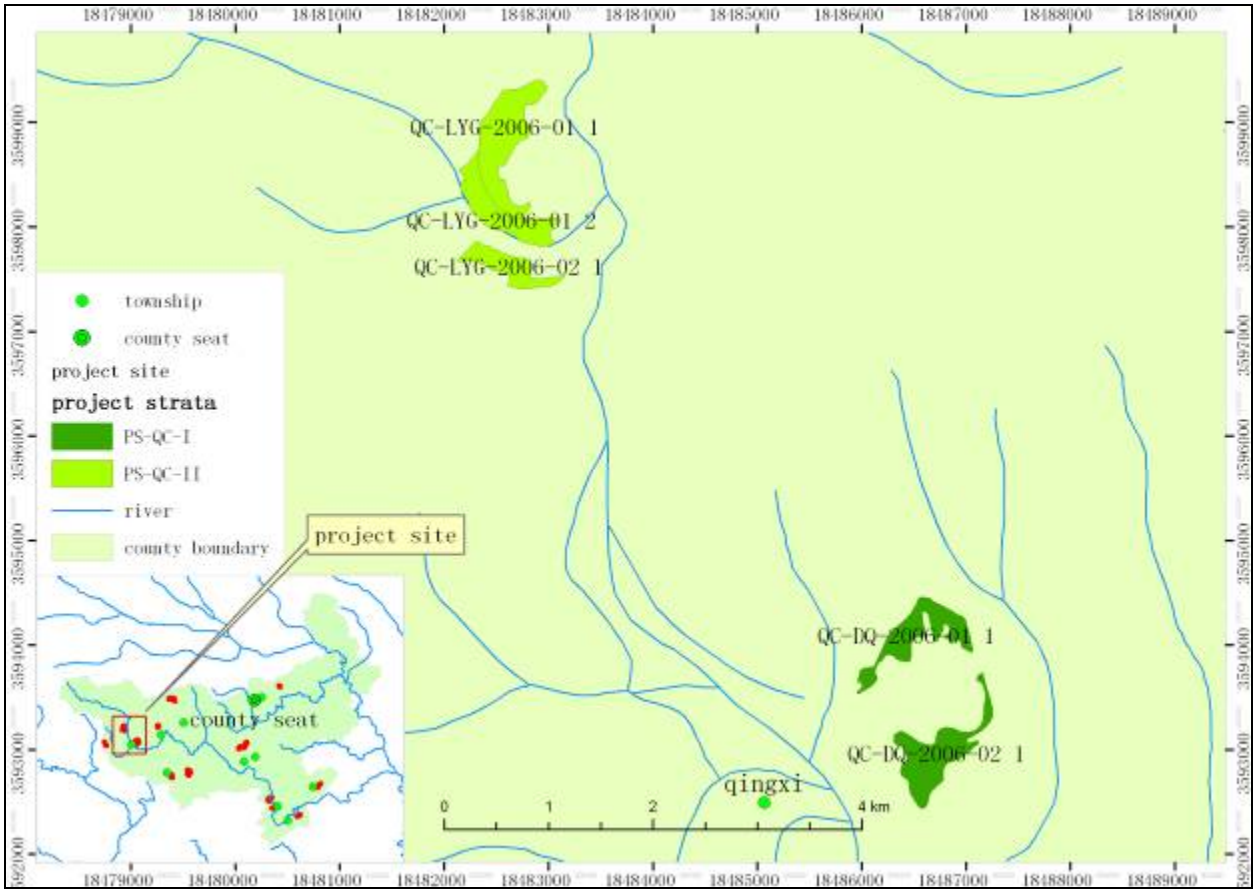
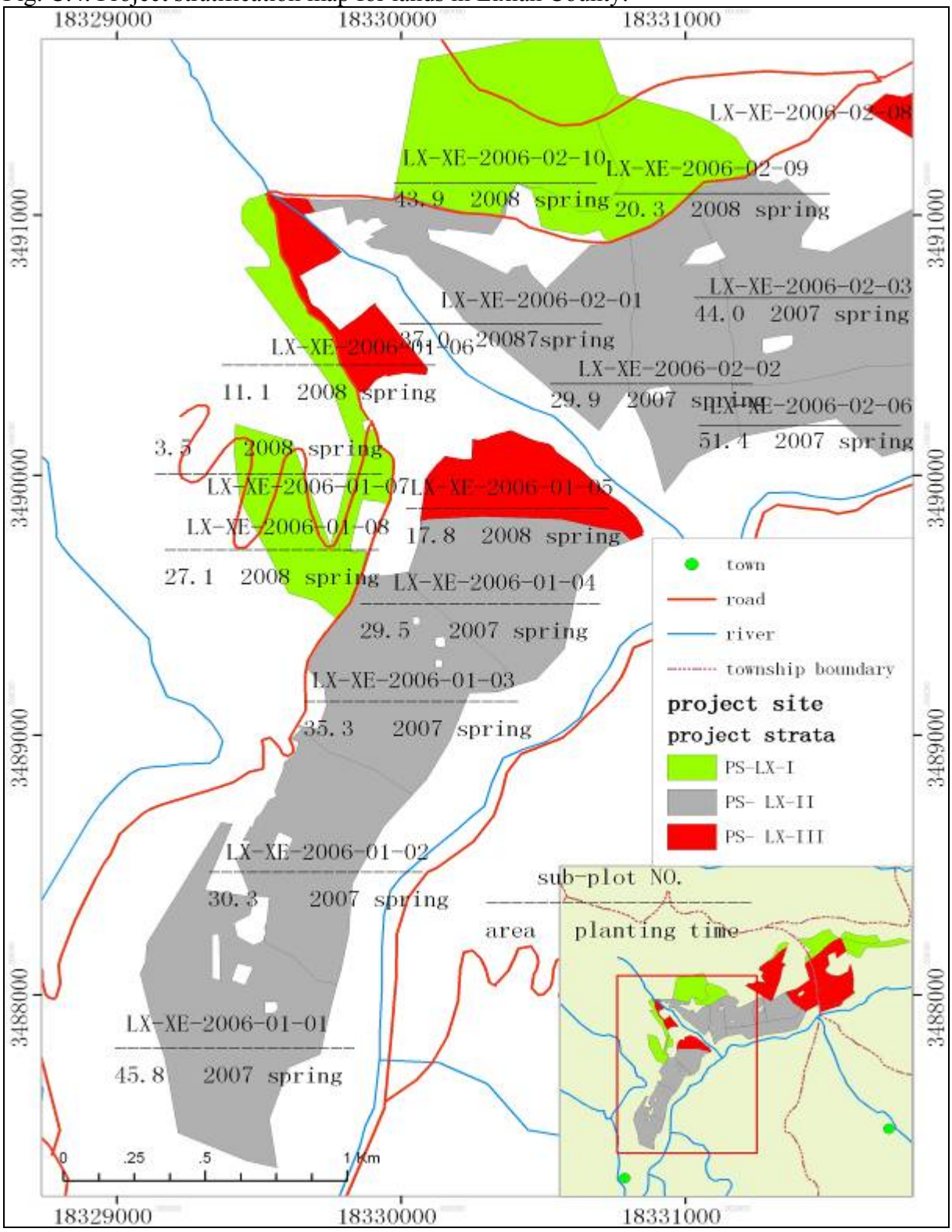


Fig. C.4. Project stratification map for lands in Lixian County:



C.5. Identification of the baseline scenario:

>>

C.5.1. Description of the application of the procedure to identify the most plausible baseline scenario (separately for each stratum defined in C.4.):

>> The most plausible baseline scenario has been determined with steps presented in Section II.4 of the revised approved methodology AR-AM0003/version 03, as follows:

Step 1. Define the project boundary as described in Section A.4.2.

Step 2. Analyze historical land use, local and sectoral land-use policies or regulations and land use alternatives:

a) As presented in table A.4., lands to be planted within the project boundary had been forested lands in the history, from a century ago to 1980s. However, the areas suffered several large-scale events of deforestation since then, mainly caused by unreasonable policies. Currently, the lands are degraded barren lands of low productivity with a few grazing activities, covered with some grasses, shrubs and spotted trees. Since all lands within the project boundary are legally forestry lands, the current grazing or sporadic grazing activities are illegal. The crown cover of the spotted trees is below 20% that is the threshold of forest definition in China, and will not exceed 20% with continuation of current management such as grazing, fuel wood collection, frequent fire, soil erosion (see Annex 3 for details).

b) Interview with local farmers indicated that crown cover of both tree and non-tree vegetation have been decreasing in the last decades due to illegal grazing, fire and/or fuelwood collecting, and soil erosion become more and more severe (see Section H)

c) National, local and sectoral land-use policies or regulations

Since 1980s, China has successively issued and revised a series of laws and administrative regulations related to forestry, such as 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, China initiated a policy of "the one who planted trees will be the one to benefit" to encourage afforestation/reforestation on barren lands. The villages owning barren lands were allowed to be contracted with farmers for forestry purposes, with 30-50 years or even longer contract period. Within this period, the right of using lands will not be changed. The land use contract can be prolonged if the farmers apply for it.

To facilitate the restoration of forest resources, the Chinese government has launched several programs over the past years, such as the Grain for Green Program (started in 2001) that subsidizes farmers to convert degraded cropland to forests, the Intensively Managed Commercial Timber Plantation Base Program (started in 2000), the Natural Forest Conservation Program (launched in 1998), the Nature Reserve Development and Wild Conservation Program (started in 2000), etc.

Although these programs had set overall development goals for forestry development and were started before the adoption by the COP of the CDM M&P (/decision 17/CP.7, 11 November 2001), none of the programs are related to degraded lands. The commercial timber plantation base program usually target to productive lands with high economic return.

Moreover, they are not legally- or policy-binding, and meeting the goals depends largely on the availability of funds. There is a large financial gap to realize these goals. As the domestic funds for the afforestation/reforestation in this region have been limited for many years, and mainly used for planting trees on the economically attractive lands or more accessible lands. The project lands are so remote that they are not attractive for timber markets and are usually not target lands for the reforestation/afforestation programmers. In addition, local farmers/communities are usually not able to fully finance forest establishment because it is difficult for them to get loans from local banks for the purpose of afforestation/reforestation on remote degraded lands (loans for agricultural activities and afforestation/reforestation on near and non-degraded economically attractive lands are much easier to obtain).

Therefore, without the proposed A/R CDM project activity the project sites will not be afforested/reforested as a result of national or sectoral policies, and will continue to degrade. With the project activity the on-going reforestation programs will not be reduced.

d) The field surveys, interviews with stakeholders (Section H for details) and social economic analysis indicated that the plausible alternative land uses available to the project participants are either continuation of the current status of the land (keeping barren status or illegal grazing) or forest plantation because the barren lands to be planted are legally restricted for forestry purposes by government. As a result other land uses, e.g., agriculture, are not allowed.

In terms of the forestry land uses, the investment analysis indicates that the financial internal return rate (FIRR) without the carbon revenue for the type of proposed A/R project activity is only 5.36% which is much lower than the required rate of return (RRR) by Chinese government (see step 2 of the additionality test in Section C.6. for details). As described in paragraph c) above there are apparent investment barriers and other barriers that prevent the implementation of the type of the project activity (see also step 3 of the additionality test in Section C.6. for detail).

Step 3. Stratify the A/R CDM project area as described in Section C.4. above.

Step 4. Determine the baseline land-use / land-cover scenario for each stratum. The field survey indicates that there is no possibility of natural encroachment of trees because:

a) There are few if any seed source that can disperse onto the project sites due to the large distance of project lands to adjacent forests.

b) Although there are spotted growing trees, the grass and shrub cover prevents seeds from landing on mineral soil and competes with young seedlings. This is also supported by the fact that the lands to be reforested have been non-forested lands at least since 1980s

Therefore, the baseline scenario is the continuation of historical or existing land use, i.e., the abandoned barren lands with illegal grazing activities.

Step 3. Determine the baseline carbon stock changes. See Section C.7. below.

C.5.2. Description of the identified baseline scenario (separately for each stratum defined in Section C.4.):

>> As described in Section C.5.1. above, the baseline scenario of all baseline strata identified in Section C.4. is the continuation of historical or existing land use, i.e., the abandoned barren lands with illegal

grazing activity. Based on the revised approved methodology AR-AM0003/version 03 applied, the baseline carbon stock change can be estimated by steps as follow:

a) For those strata without growing trees, the sum of carbon stock changes the sum of carbon stock changes is set as zero in all carbon pools;

b) For those strata with growing trees, the sum of carbon stock changes is set zero in the soil organic carbon, dead wood and litter carbon pools, and a net positive change is estimated in the living biomass carbon pools based on the projection of number, growth rate of trees, allometric equations, IPCC good practice guidance, and local or national or IPCC default parameters (see Section D.1. and Annex 3 for details).

C.6. Assessment and demonstration of additionality :

>> The steps as outlined in the additionality tool7(EB35, Annex 17, version 02,) are followed to demonstrate that the proposed A/R CDM project activity is additional and not the baseline scenario. Both investment analysis and barrier arguments (steps 2 and 3) are used.

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

The proposed A/R CDM project started on 1 January 2007, and the proof that the land was not forest can be found in land eligibility elaborated in Section A.7. above.

The incentive of planned sale of GHG emission allowances is evidenced by the project implementation plan by the Conservation International (CI), baseline survey that was conducted in the summer 2006 and cooperative contracts signed by the operating entity and local communities. Without the GHG allowance sales, the project would not be economically attractive, and would face significant barriers.

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:

Since the lands to be planted are restricted to forestry purposes by governments, other land uses are impossible, therefore the identified alternative land uses are:

- Continuation of current barren lands or illegal grazing lands;
- Afforestation / reforestation of the land within the project boundary performed without being registered as the A/R CDM project activity;

As elaborated in Section C.5.1., although there are several national forestry programs related to forestation activities that have been implemented since the adoption by the COP of the CDM M&P (decision 17/CP.7, 11 November 2001), these programs are not legally-binding and are currently not accessible to the proposed project lands due to the degraded and remote feature of the lands and lack of enough funding. Therefore, forestation activities requested by national and/or sectoral land-use policies or regulations are not a credible alternative land use in the project area.

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

Current laws and/or regulations allow the continuation of the current situation and the afforestation or reforestation on the degraded lands. Therefore, the identified alternatives are in compliance with

[7] http://cdm.unfccc.int/EB/Meetings/035/eb35_repan17.pdf

applicable legal and regulatory requirements, currently and in the foreseeable future. The current illegal grazing that exist on project lands are not systematically enforced in the project area because local government usually turns a blink eye to and does not take strict measures to stop these activities especially when income, more or less, can be brought to local people who live under poverty in deep mountainous area.

Sub-step 1c. Selection of the baseline scenario:

As elaborated in Section C.5. above, the most plausible baseline scenario alternative is the continuation of current degraded barren lands.

STEP 2. Investment analysis:

Sub-step 2a. Determine appropriate analysis method:

The benchmark analysis method (Option III) is chosen. The PIN Financial Analysis spreadsheet developed by the World Bank BioCarbon Fund[8] is used to conduct the investment analysis in which FIRR with and without the carbon benefit are the relevant indicators.

Sub-step 2b – Option III. Apply benchmark analysis:

The required rate of return (RRR) on equity is 8% for investment projects based on the standard issued by the National Reform and Development Commission (NDRC) which is applicable to forestry projects. This means projects can be approved by the government or adopted by forestry enterprises only when their FIRR is expected to be higher than this threshold value.

Sub-step 2c. Calculation and comparison of financial indicators:

The FIRR of the proposed A/R CDM project activity was calculated, both without and with carbon finance, and is 5.36% and 8.39% (at $5.00 per tonne of CO_2-e). When carbon benefit was included, the FIRR exceeded the benchmark so that the proposed A/R CDM project activity is financially attractive. When carbon benefit was excluded, the FIRR was significantly below the benchmark, so that the proposed A/R CDM project activity is not financially attractive in absence of the sale of carbon credits.

Detailed calculation is summarized as following:

The planting is proposed to be conducted in the spring and autumn of 2007 and spring 2008. The cost (US$/ha) in the first 3 years from all seedling have been planted to forest was implemented are listed in Table C.5. below. The cost is estimated based on budget standards for afforestation/reforestation in the National Natural Forestry Protection Program and the Grain For Green Program, the standard for project budgeting in Sichuan Province, market information issued by Provincial and local governments in 2006, in combination of local social-economic and market profiles. For those areas to be planted in the autumn 2007 and Spring 2008, costs for weeding and fire and disease control will occur through 2008-2010. The preparation cost (140,000 US$) is also included for baseline study, PDD preparation, validation and verification (Table C.7.).

The operation costs include thinning and harvesting, timber transportation, replanting after harvest, maintenance, administration, fire, pest and disease control, etc. from the 4th year after planting onward until the end of the crediting period. Revenues include income from selling wood and non-wood product and carbon credits (Table C.8.).

[8] www.biocarfund.org

Table C.7. Establishment costs per step in US$/ha:

	Platycladus orientalis	*B. luminifera*	*Poplus szechuanica*	*B. albo-sinensis (Beichuan/Lixian)*	*M. officinalis*	*Larix gmelinii*	*Q. acutissima*	*P. massoniana*	*C. chengiana(tran-splanted seedlings /tube seedlings))*	*C. lanceolata*	*P. tabulae-formis*	*Picea asperata*
1 Establishment	**798.7**	**678.6**	**350.1**	**678.6/610.4**	**700.2**	**844.2**	**705.2**	**844.2**	**1263.0/776.0**	**711.0**	**776.0**	**776.0**
1.1 site preparation	272.7	340.9	34.1	340.9/272.7	340.9	340.9	340.9	340.9	272.7	340.9	272.7	272.7
1.2 seedlings	162.3	64.9	43.3	64.9	86.6	162.3	23.4	162.3	649.4/162.3	97.4	162.3	162.3
1.3 planting	159.1	68.2	68.2	68.2	68.2	136.4	136.4	136.4	136.4	68.2	136.4	136.4
1.4 weeding (3 years)	204.5	204.5	204.5	204.5	204.5	204.5	204.5	204.5	204.5	204.5	204.5	204.5
2 Equipment and infrastructure	**10.4**	**10.4**	**10.4**	**10.4**	**10.4**	**10.4**	**10.4**	**10.4**	**10.4**	**10.4**	**10.4**	**10.4**
2.1 road and protection	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8
2.2 tools	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
3 Other costs (designing, training, technical demonstration and consultation, administration, supervision and, etc)	**64.7**	**55.1**	**28.8**	**55.1/49.7**	**56.8**	**68.4**	**57.2**	**68.4**	**101.9/62.9**	**57.7**	**62.9**	**62.9**
4 Total	**873.8**	**744.1**	**389.3**	**744.1/670.5**	**767.5**	**922.9**	**772.8**	**922.9**	**1375.2/849.3**	**779.1**	**849.3**	**849.3**

Table C.8. Parameters for estimating operating costs and revenues:

Year	Item	*B. luminifera* and *B. albosinensis*	*M. officinalis*		*L. gmelinii*	*P. massoniana*	*C. lanceolata*
		timber	timber	bark	timber	timber	timber
First thinning	Standing volume at thinning (m^3/ha)	75.9	39.5		58.5	68.7	68.2
	Timber output ratio (%)	60	65		55	55	55
	Thinning timber output (m^3/ha)	45.5	25.7		32.2	37.8	37.5
Second thinning	Standing volume at thinning (m^3/ha)	71.7	41.9		83.9	82.3	85.1
	Timber output ratio (%)	60	65		55	55	55
	Thinning timber output (m^3/ha)	43.0	27.3		46.1	45.3	46.8
Harvest	Standing volume at harvest (m^3/ha)	178.9	98.6		229.2	218.7	228.9
	Timber output ratio (%)	60	65		55	55	55
	Harvest timber output (m^3/ha)	107.3	64.1		126.1	120.3	125.9
Other product	Bark output (t/ha)			30			
Harvest cost	Timber (US$/$m^3$)	19.74	19.74		19.74	19.74	19.74
	Bark (US$/t)			157.9			
Transportation cost	Timber (US$/$m^3$)	13.16	13.16		13.16	13.16	13.16
	Bark (US$/t)			13.2			
Selling price	Timber (US$/$m^3$)	52	52		52	52	52
	Bark (US$/t)			400			
Tax (% of gross benefit)		15%	15%	15%	15%	15%	15%

- all the parameters come from local forestry department and Office Price Stabilization.
- the exchange rate to US of all finance analysis is 7.0.

Sup-step 2d. Sensitivity analysis:

The most important factors influencing the FIRR for the proposed A/R CDM project activity are the product output, product price and operating costs. The establishment costs are 21.9% of the total cost (1.99 versus 9.08 million US$) and will occur in the first 3 years. As a result, this cost has a smaller impact on the FIRR. Sensitivity analyses with ±10% variations of the most important factors show that the FIRR without carbon will be below RRR (8%) in the case of (Table C.7.):

- 10% increase in product output or price, or
- 10% decrease in operating cost

And the FIRR with carbon revenue will still be above RRR in the case of

- 10% decrease in product output or price, or
- 10% increase in operating cost

This infers that the proposed A/R CDM project activity is still economically unattractive in absence of carbon benefit, and is still attractive with carbon revenues, if 10% changes in the key assumptions are assumed.

Table C.9. Sensitive analysis:

Parameters	Variation	FIRR (%)
	Without carbon benefit	
Product price	+10%	6.36
	-10%	4.19
Product Output	+10%	6.36
	-10%	4.19
Operating cost	+10%	4.81
	-10%	5.87
	With carbon benefit (at $5.00 per tonne of CO_2-e, and estimation of net GHG removal)	
Product price	+10%	9.35
	-10%	6.85
Product Output	+10%	9.01
	-10%	7.23
Operating cost	+10%	7.72
	-10%	8.62

Year	Estimation of net anthropogenic GHG removals by sinks (tonnes of CO_2 e)
2007	-50,120
2008	5,989
2009	14,016
2010	21,378
2011	27,483
2012	32,710
2013	37,212
2014	41,105
2015	44,498
2016	47,490
2017	50,161
2018	-30,320
2019	28,867
2020	43,790
2021	45,742
2022	18,752
2023	-7,963
2024	13,303
2025	38,543
2026	37,965
Total (tonnes of CO2 e)	460,603

STEP 3. Barrier analysis:

Sub-step 3a. Identify barriers that would prevent the implementation of the type of the proposed project activity:

a) financial barriers:

- Hardly possible for local farmers to invest in forestation. Agricultural are the main income sources for local communities in the project area. However, agricultural production is subjected to flooding, drought and other disasters. Food productivity is very low and the mean annual gross income per capita in the project areas is only US$ 210 with the lowest at US$ 109 in Bieli Village of Maoxian County (see Table G.1.). Under this situation, many farmers still live below the national poverty level. It is hardly possible for local farmers/communities to afford the high plantation establishment investment in the early stage, because all incomes from wood and non-wood products will occur quite some time after the initial investment.
- Lack of debt funding from bank to invest in forestation. Because of its long investment cycle and high investment risk of forestation, no credit mechanisms are in place for farmers to make long term investment in plantation forestry without mortgage property and third party guarantee. The references from local forestry bureau depending on interviewing to local bank indicate that the chance to get long-term commercial loans from banks for the individual farmer is low due to high risk and the economical unattractiveness in the context of remote lands (loans for agricultural activities and a few short-term fast-growing species afforestation/reforestation on non-degraded economically attractive lands nearby are a bit easier to obtain).

b) Technological barriers.

- Interviews with local communities indicate that local farmers/communities are usually short of access to quality seed sources and lack skills for producing high quality seedlings and for successful tree planting, as well as for preventing planted trees from being subject to fire, pest and disease attack.
- Forestry companies and forestry farms are experienced for afforestation/reforestation on lands nearby with good conditions but have no experiences on remote degraded lands as all of their previous afforestation/reforestation activities occurred on lands that are easily accessible and have good site and soil conditions (planting and management are more easier).

Sub-step 3b. Show that the identified barriers would not prevent the implementation of at least one of the alternatives (except the proposed project activity):

a) Investment support by the project entity

- The entity of this proposed CDM-AR project, Daduhe Forestation Bureau, is a large-scale

state-owned forestry enterprise, with abundant property, forest resource and additional industry, it's more easier to obtain loan from the bank.

- As the CDM A/R project inaugurate a new way of forestry management in China, the entity as a inaugurator in the CDM domain, should stand the racket of economy risk. So it may obtain vigorously support (see the LoA from DNA and the National Development and Reform Commission) based on leading on the CDM-AR project from the government.
- Under this proposed CDM-AR project all the individual farmers are organised and make terms with the entity to invest in forestation based on the cooperation contract. According as the contract, all related farmers have just to take the investment by land use right, and obtain 70% of the sale of the timber and 30% of the carbon revenues as investment income.

b) Technological support

- The Daduhe Forestation Bureau is a subordinate enterprise of the Sichuan Forestry Department with abundant technological strength and policy advantage to eliminate barriers.
- The project entity has been engaging in forestation, forest management work more than 10 years, has completed successfully forestation 100,000 hectares, manages 20,000 hectares forests for a long time.

The alternative land use (continued status as barren or grazing land use) does not face the above-mentioned barriers.

STEP 4. Common practice analysis:

There is no similar forestation activities diffused on those similar degraded, deserted and community mutual lands in the geographical area of the proposed A/R CDM project activity. The region is defined with the relevant counties chosen for the reforestation as part of the Sichuan province.

Most of those lands included in this proposed A/R CDM project are common property owned by the community of village, but without an economic project the value in use and management of those degraded lands is very low. So after the harvest of the virgin forest on the project lands during the capital construction period of China from 1950s to 1970s, those land are keeping in obsolescent and degraded situation, and there are sufficient area available outside of the project range is much more.

The absence of reforestations by villagers underlines that also from a community perspective this is not attractive:

So there is no reforestations on similar sited of community lands.There was a reforestation project ***Conversion Farmland to Forest*** in China from 1999 to 2009. The government provide commissariat and financing to help local farmers give up farming in barren farmland, and plant trees on which. But the range is limited in private barren farmland under cultivating.
The project supplies through assistance and funding the means to overcome barriers and financial constraints for the participating land owners.

C.7. Estimation of the *ex ante* baseline net GHG removals by sinks:

>>Please see Annex 3 for detail methods and parameters applied for the ex ante estimation of the baseline net GHG removals by sinks

Table C.10. Estimated baseline net GHG removals by sinks:

Year	Annual estimation of baseline net anthropogenic GHG removals by sinks in tonnes of CO_2 e
2007	170.1
2008	164.4
2009	157.9
2010	151.0
2011	143.8
2012	136.5
2013	129.3
2014	122.1
2015	115.1
2016	108.3
2017	101.8
2018	95.5
2019	89.5
2020	83.8
2021	78.4
2022	73.3
2023	68.5
2024	63.9
2025	59.6
2026	55.6
Total estimated baseline net GHG removals by sinks (tonnes of CO2 e)	2,168.3
Total number of crediting years	20
Annual average over the crediting period of estimated baseline net GHG removals by sinks (tonnes of CO2 e)	108.4

C.8. Date of completion of the baseline study and the name of person(s)/entity(ies) determining the baseline:

>> Date of completion of the baseline study is Oct 30 2006

Name of persons/entity determining the baseline:

- Chengdu Office, Conservation International
  - Mr. Caifu Tang,, tangcaifu@conservation.org.cn
- The Nature Conservancy China Program, Conservation and Climate Change group
  - Mr. Ma Jian, jma@tnc.org.cn
- Department of Forestry, Sicuhan Province
  - Ms. Wu Baozhen, Mr. Deng Qiang, Mr. Hou Yuanqing, Ms. Chen Chan
- Institute of Sichuan Forestry Inventory and Planning, China
  - Mr. Yanzhou Zhang, zyzjm0787@sina.com

- Forestry Bureau of Beichuan County, Lixian County, Maoxian County, Qingchuan County and Pingwu County
- Institute of Forest Ecology, Environment and Protection, the Chinese Academy of Forestry
  - Dr. Xiaoquan Zhang, xiaoquan@caf.ac.cn

All of these organization and staff are not project participants.

SECTION D. Estimation of *ex ante* actual net GHG removals by sinks, leakage and estimated amount of net anthropogenic GHG removals by sinks over the chosen crediting period:

D.1. Estimate of the *ex ante* 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 non-CO2 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.

a. Estimate of carbon stock changes in living biomass:

a.1. Loss of pre-project tree and non-tree vegetation:

It is conservatively assumed that all pre-project tree and non tree vegetation will be died out. Therefore, the carbon stock loss of pre-project tree and non-tree vegetation equals to the carbon stock at the start of the proposed A/R CDM project activity, table D.1. (see Annex 3 for detail estimation).

Table D.1. carbon loss of pre-project tree and non-tree vegetation:

Baseline strata ID	Area (ha)	Carbon loss (tCO_2)								
		Non-tree vegetation			Trees			Total		
		AGB	BGB	Sub-total	AGB	BGB	Sub-total	AGB	BGB	Total
BLS-BC-□	90.7	532.4	553.7	1,086.1	31.9	7.4	39.2	564.3	561.0	1,125.3
BLS-BC-□	109.5	1,607.1	922.2	2,529.3	104.3	24.1	128.3	1,711.4	946.2	2,657.6
BLS-LX-□	626.8	3,880.1	2,728.4	6,608.4	0.0	0.0	0.0	3,880.1	2,728.4	6,608.5
BLS-LX-□	121.0	1,564.2	972.8	2,537.0	0.0	0.0	0.0	1,564.2	972.8	2,537.0
BLS-MX-□	234.9	1,584.4	1,237.9	2,822.2	30.3	7.0	37.3	1,614.7	1,244.9	2,859.6
BLS-PW-□	70.1	720.9	1,211.1	1,932.0	3.2	0.7	3.9	724.1	1,211.8	1,935.9
BLS-PW-□	120.5	1,706.5	3,073.8	4,780.2	10.3	2.4	12.7	1,716.8	3,076.1	4,792.9
BLS-QC-□	107.1	668.8	853.2	1,522.0	42.8	9.9	52.7	711.6	863.1	1,574.7
BLS-QC-II	83.0	421.7	746.5	1,168.2	0.0	0.0	0.0	421.7	746.5	1,168.2
BLS-QC-□	125.0	2,097.3	1,928.7	4,026.0	67.9	14.9	82.8	2,165.2	1,943.5	4,108.7
BLS-QC-IV	164.9	2,980.3	2,279.6	5,259.8	11.9	2.4	14.3	2,992.2	2,281.9	5,274.1
BLS-QC-V	120.5	2,153.8	2,274.4	4,428.2	0.0	0.0	0.0	2,153.8	2,274.4	4,428.2
BLS-QC-VI	141.7	3,026.5	2,612.9	5,639.3	47.2	11.5	58.7	3,073.7	2,624.4	5,698.1
BLS-QC-VII	136.1	4,131.6	2,504.3	6,635.9	28.6	6.6	35.2	4,160.2	2,510.9	6,671.1
Total	**2251.8**	**27,075.4**	**23,899.3**	**50,974.7**	**378.3**	**86.8**	**465.1**	**27,454.0**	**23,986.2**	**51,440.2**

AGB: aboveground biomass; BGB: belowground biomass

a.2. Estimates of carbon stock changes in living biomass of planted trees:

Stock change method presented in Section II.5 and II.7.1 of the approved methodology applied is used. As presented in table C.4., the only difference within each project stratum is tree species. Since tree species are planted in a way of block mixture, stand within each single block can be treated as pure

plantation. Therefore we define the stand models within each project stratum based on tree species, i.e., the subscript k in formula (20) of the approved methodology applied represents tree species in our calculation.

Local growth curves are used to estimate the average merchantable volume of each species (V_{ikt}), assuming that the curves can apply to all strata (Table D.2.).

Table D.2. Local growth curves for species planted in the proposed A/R CDM project activity:

Platycladus orientalis and *Cupressus chengiana*[9]	$V = NT_{(A)} \cdot 0.334267111595 \cdot (1 - e^{-0.0473470306465 \cdot A})^{3.289912305617}$
Cunninghmia lanceolata[9]	$V = NT_{(A)} \cdot 0.31225810398 \cdot (1 - e^{-0.07402135899476 \cdot A})^{2.527119706049}$
Pinus massoniana [9]	$V = NT_{(A)} \cdot 0.2903179349968 \cdot (1 - e^{-0.07526212201956 \cdot A})^{2.380556958577}$
Quercus acutissima[9]	$V = NT_{(A)} \cdot 0.1363196248518 \cdot (1 - e^{-0.06436380714486 \cdot A})^{2.425820624933}$
Larix gmelinii [9]	$V = NT_{(A)} \cdot 0.3032245111661 \cdot (1 - e^{-0.09092308039843 \cdot A})^{3.84121196496}$
Picea asperata [9]	$V = NT_{(A)} \cdot 0.33050596446 \cdot (1 - e^{-0.029683022346463 \cdot A})^{3.094640905157}$
Pinus tabulaeformis [9]	$V = NT_{(A)} \cdot 0.200346 \cdot (1 - e^{-0.054764 \cdot A})^{2.978562}$
Magnolia officinalis[10]	$V = NT_{(A)} \cdot 0.151/(1 + 265.2323 \cdot e^{-0.4144 \cdot A})$
Poplus szechuanica [9]	$V = NT_{(A)} \cdot 0.3057 \cdot (1 - e^{-0.1444 \cdot A})^{2.3398}$
Betula luminifera and *Betula albo-sinensis* [9]	$V = NT_{(A)} \cdot 0.30583851880298 \cdot (1 - e^{-0.08987338464923 \cdot A})^{1.5875471045008}$

Note. For equations in Table D.2.

V	stem volume at time t for the project scenario, m^3 ha^{-1}
$NT_{(A)}$	Number of trees at age A, tree ha^{-1}
A	Stand age, year

These curves were derived from local forestry inventories data that have been carried out every five years since the 1990s, or publications. Taken into account natural mortality, the number of trees is assumed to be 80% of initial planting density (the survival rate in third year after planting usually reaches to 85-90% in the project area). There will be no fuelwood gathering of living trees. Thinning and harvesting will also be accounted based on forest management plan for each project stratum (Table C.4.). The average merchantable volume is then converted into carbon stock via wood density (WD) and Biomass Expansion Factors (BEF) and root-shoot ratio (R) (Table D.3.) based on equation (10)-(11) presented in the approved methodology applied, using LULUCF Sequestration Input Tools developed by the World Bank BioCarbon Fund (www.biocarfund.org). The carbon stock and carbon stock changes of the planted trees for each project stratum are presented in Table D.4. and Table D.5. respectively. Please see attached spreadsheet for the detail calculation.

[9] Derived using plot data of national forestry inventory in Sichuan that conducted once every 5 years.

[10] Zhao T, Fu D, Tian G et al. 1993. Studies on the growth model for Magnolia officinalis. Journal of Central South Forestry College, 13(1).

Table D.3. Wood density, BEF and Root-shoot ratio for species used in the proposed A/R CDM project activity[11]:

Tree species	Wood Density (tonnes d.m.m^{-3})	BEF	Root-shoot ratio
Cunninghamia lanceolata	0.307 (54, 0.009)	1.74 (251, 0.08)	0.219 (261, 0.004)
Betula sp.	0.541 (62, 0.018)	1.37 (15, 0.04)	0.231 (21, 0.018)
Magnolia officinalis	0.598 (482, 0.012)	1.67 (133, 0.04)	0.260 (146, 0.010)
Cupressus chengiana and *Platycladus orientalis*	0.478 (32, 0.015)	1.77 (45, 0.06)	0.244 (50, 0.009)
Poplus szechuanica	0.378 (144, 0.009)	1.59 (108, 0.03)	0.291 (107, 0.012)
Pinus tabulaeformis	0.360 (15, 0.012)	1.62 (74, 0.04)	0.231 (89, 0.006)
Larix gmelinii	0.490 (13, 0.039)	1.37 (106, 0.02)	0.236 (129, 0.006)
Pinus massoniana	0.380 (43, 0.019)	1.54 (221, 0.03)	0.200 (202, 0.007)
Picea asperata	0.342 (15, 0.012)	2.05 (49, 0.14)	0.201 (49, 0.005)
Quercus sp.	0.676 (82, 0.012)	1.57 (74, 0.05)	0.277 (77, 0.009)

Note. data in parentheses represent number of samples and standard error respectively. Parameters for *Magnolia officinalis* are those for hardwood broadleaf species.

[11] Institute of Forest Ecology and Environment, CAF, Updated Database for China GHG Inventory in Forestry Sector.

Table D.4. Ex ante estimates of carbon stock in living biomass of planted trees (tC):

Year	PS-BC-I	PS-BC-II	PS-BC-III	PS-LX-I	PS-LX-II	PS-LX-III	PS-MX-I	PS-MX-II	PS-PW-I	PS-PW-II	PS-QC-I	PS-QC-II	Total
2007	0	0	0	0	389	0	0	0	19	0	0	0	408
2008	0	41	14	0	751	0	0	0	29	14	129	1,108	2,087
2009	212	63	128	133	1,270	3	91	2	44	89	639	3,278	5,952
2010	594	94	332	388	1,959	28	392	18	66	268	1,575	6,109	11,824
2011	1,055	142	582	720	2,825	99	864	56	100	585	2,922	9,408	19,358
2012	1,557	214	860	1,112	3,871	237	1,450	125	150	1,062	4,644	13,036	28,317
2013	2,077	321	1,158	1,556	5,093	457	2,102	227	223	1,706	6,692	16,889	38,501
2014	2,598	478	1,473	2,042	6,489	774	2,781	366	330	2,514	9,019	20,880	49,744
2015	3,111	708	1,809	2,565	8,048	1,193	3,458	544	484	3,475	11,573	24,944	61,912
2016	3,610	1,037	2,169	3,119	9,763	1,720	4,113	759	699	4,572	14,309	29,024	74,893
2017	4,089	1,497	2,562	3,700	11,620	2,357	4,733	1,012	988	5,783	17,184	33,077	88,601
2018	4,546	2,118	2,997	4,302	9,526	3,102	5,310	1,300	1,361	5,198	3,531	37,068	80,358
2019	4,979	2,917	3,477	4,362	11,000	2,766	4,089	1,136	1,814	6,327	4,420	40,968	88,255
2020	5,387	3,887	4,001	4,880	12,547	3,431	4,427	1,384	2,325	7,539	5,655	44,757	100,221
2021	5,771	4,981	4,553	5,399	14,158	4,161	4,732	1,653	2,856	8,817	7,227	48,418	112,727
2022	6,131	6,120	5,107	5,918	15,824	4,953	5,005	1,940	3,364	10,142	7,509	45,853	117,864
2023	6,466	7,208	5,632	6,434	17,535	5,801	5,249	2,245	2,669	8,234	9,514	38,725	115,711
2024	4,746	5,718	4,273	5,698	19,283	6,698	5,465	2,565	2,926	9,257	11,747	40,981	119,357
2025	4,949	6,270	4,556	6,149	21,060	7,640	5,656	2,899	3,125	10,285	14,166	43,129	129,885
2026	5,137	6,696	4,791	6,597	22,858	8,621	5,825	3,245	3,272	11,309	16,733	45,168	140,254

Table D.5. Ex ante estimates of carbon stock changes in living biomass of planted trees (t CO_2 yr^{-1}):

Year	PS-BC-I	PS-BC-II	PS-BC-III	PS-LX-I	PS-LX-II	PS-LX-III	PS-MX-I	PS-MX-II	PS-PW-I	PS-PW-II	PS-QC-I	PS-QC-II	Total
2007	0	0	0	0	1,425	0	0	0	71	0	0	0	1,496
2008	0	152	50	0	1,329	0	0	0	36	52	475	4,061	6,155
2009	777	78	419	489	1,903	11	334	9	54	274	1,868	7,957	14,174
2010	1,401	117	748	934	2,526	92	1,103	57	82	656	3,431	10,384	21,529
2011	1,692	175	916	1,217	3,175	260	1,729	141	123	1,163	4,941	12,095	27,627
2012	1,841	263	1,019	1,440	3,833	505	2,151	250	182	1,747	6,313	13,304	32,847
2013	1,904	391	1,093	1,625	4,484	810	2,391	376	269	2,361	7,513	14,125	37,341
2014	1,911	577	1,158	1,783	5,116	1,159	2,489	511	393	2,964	8,530	14,637	41,227
2015	1,882	842	1,229	1,918	5,719	1,538	2,481	650	563	3,524	9,366	14,900	44,613
2016	1,828	1,207	1,321	2,033	6,286	1,933	2,401	790	787	4,021	10,032	14,961	47,599
2017	1,757	1,687	1,442	2,129	6,810	2,334	2,273	926	1,062	4,441	10,541	14,861	50,263
2018	1,676	2,277	1,593	2,207	-7,679	2,731	2,116	1,058	1,368	-2,144	-50,059	14,632	-30,225
2019	1,588	2,932	1,763	221	5,405	-1,231	-4,476	-602	1,660	4,139	3,257	14,301	28,956
2020	1,498	3,556	1,921	1,898	5,673	2,438	1,239	910	1,872	4,446	4,532	13,892	43,874
2021	1,407	4,012	2,023	1,905	5,907	2,679	1,118	985	1,948	4,686	5,761	13,424	45,856
2022	1,317	4,173	2,030	1,903	6,107	2,903	1,002	1,055	1,862	4,858	1,035	-9,407	18,838
2023	1,230	3,990	1,926	1,893	6,274	3,107	894	1,117	-2,549	-6,997	7,353	-26,133	-7,895
2024	-6,307	-5,461	-4,981	-2,702	6,410	3,291	793	1,174	944	3,749	8,186	8,272	13,367
2025	745	2,022	1,038	1,657	6,516	3,455	701	1,224	730	3,770	8,871	7,875	38,603
2026	691	1,565	861	1,643	6,593	3,597	618	1,267	540	3,756	9,413	7,477	38,021
total	18,837	24,554	17,568	24,191	83,813	31,612	21,357	11,897	11,998	41,466	61,355	165,616	514,265

b. Estimates of the increase in GHG emissions by sources:

There will be no significant GHG emissions by sources that are increased as a result of the implementation of the A/R CDM project activity within the project boundary, because:

- The site preparation, thinning as well as the logging in the proposed A/R CDM project activity will be conducted manually, without using machinery tools that consume fossil fuel;
- There will be no biomass burning during site preparation thus GHG emissions from slash and burn activity are nil;
- There will be no N-fertilizer application, thus the direct N_2O emissions caused by N fertilization practices can be omitted;
- No flood irrigation will be used in the proposed A/R CDM project activity.

Therefore, $GHG_E=0$.

D.2. Estimate of the *ex ante* leakage:

>> Based on the approved baseline and monitoring methodology applied, there are three potential sources of the leakage (LK):

- GHGs emissions caused by vehicle fossil fuel combustion due to transportation of seedling, labours, staff and harvest products to or from project sites, $LK_{Vehicle}$;
- Carbon stock decreases caused by displacement of pre-project grazing and fuelwood collection activities, $LK_{Activity\ Displacement}$;
- Carbon stock decreases caused by the increased use of wood posts for fencing, $LK_{fencing}$.

a. Estimation of $LK_{Vehicle}$:

Labors used for the proposed A/R CDM project activity are from local villages, hence transportation for labors is not needed. All seedlings used in the proposed A/R CDM project activity will be bred either in local nuseries or bought from nurseries nearby and tranported to the project lands. There is also a need for transporting thinned or harvested timber. A medium size track, heavy track, livestock and manpower will be used, depending on the location of the project lands. Based on the amount of seedlings and seed needed for afforestation/reforestation and the expected output of thinned or harvested timber, the leakage caused by vehicle uses is estimated using equation (32)-(34) in Section II.8.1 of the approved methodology AR-AM0003/version 03 applied for each parcel of lands and each species. The emission factor is 2.6353 kg CO_2 $litre^{-1}$ for diesel and 2.49 kg CO_2 $litre^{-1}$ for gasoline for all vehicle (from China's national initial national communication). The expected leakage is 55 t CO_2-e by the end of the crediting period (Table D.6. below).

Table D.6. Estimates of leakage:

Year No.	Year	Annual Leakage (t CO_2-e yr^{-1})	Cumulative Leakage (t CO_2-e)
1	2007	6	6
2	2008	1	8
3	2009	0	8
4	2010	0	8
5	2011	0	8
6	2012	0	8

7	2013	0	8
8	2014	0	8
9	2015	0	8
10	2016	0	8
11	2017	0	8
12	2018	0	8
13	2019	0	8
14	2020	0	8
15	2021	35	43
16	2022	12	55
17	2023	0	55
18	2024	0	55
19	2025	0	55
20	2026	0	55

b. Estimation of $LK_{Activity\ Displacement}$**:**

All lands to be planted in the proposed A/R CDM project activity are subjected to fuelwood collection, and some parcels of lands have grazing animals although this is illegal. Thus, as the result of the project activity, grazing and fuelwood collection may be temporarily or permanently displaced from the project sites to other locations. The displacement may result in leakage if the new grazing areas are obtained by converting stocked areas, particularly forests, to grazing land, and if the displaced fuelwood collection results in degradation or deforestation of forests and devegetaion of other lands.

b.1. Estimation of $LK_{Conversion}$ (Leakage due to conversion of land to grazing land)
The pre-project animal population and the number of grazing month from different livestock groups on lands within the project boundary and outside the project boundary that are under the control of the project participants have been surveyed using Participatory Rural Appraisal (PRA), with a result summarized in Table D.7. below. The annual biomass consumption of the animals over the project lands and existing grazing lands is estimated using equation (40) of the approved methodology applied. DMI is from table 2 in Section II.8.2.1 of the approved methodology applied.

The total annual net primary production (*ANPP*) is estimated based on land area and ANNP per hectare which is default values from Table 3.4.2 of IPCC good practice guidance LULUCF.

Table D.7. indicates that there are sufficient existing grazing lands under the control of the project participants that are far from its maximum animal holding capacity, i.e., even if all pre-project animals are displaced to the existing grazing lands outside the project boundary but under the control of the project participants, the existing grazing lands are still under the grazing capacity. Therefore, $LK_{Conversion}=0$.

b.2. Estimation of $LK_{fuelwood}$ (Leakage due to displacement of fuelwood collection)

Any harvesting of trees (including harvesting for fuelwood) should be approved by local government ex ante, including harvest as fuelwood. However, local government usually do not issue harvest licence for the purpose of harvesting fuelwood. This has been well-enforced all over China. Therefore, local communities usually collect shrub, deadwood and living branches of trees for cooking and heating although these are the main energy sources (see also table H.1. for fuelwood consumption). Only a few of fuel are collected from the project lands. Moreover, local farmers will be able to collect fuel within the project boundary without compromising the growth of trees established under the proposed A/R CDM project activity, including dead wood and branches and shrubs growing between the trees during the early stages of succession. Therefore, as the result of the proposed A/R CDM project activity, leakage from the displacement of fuelwood collection is nil, i.e., $LK_{fuelwood}=0$.

c. Estimation of $LK_{fencing}$:

No wood post will be used in the proposed A/R CDM project activity. Therefore, there will be no leakage induced by the use of wood post, i.e. $LK_{fencing}$ =0.

Table D.7. Pre-project animal populations and land available for adopting displaced animals:

County	Villages	Animals within the project boundary									Existing grazing land outside the project boundary under the control of the animal owners						
		Area (ha)	Number of animals (head)				Number of months for grazing			Biomass consumption (t d.m)	Area (ha)	Exixting number of animals (head)			Biomass consumption (t d.m)	ANPP	
			Cattle	Horse	Sheep	Others	Cattle	Horse	Sheep			Cattle	Horse	Sheep		d.m/ha	t d.m.
Beichuan	Zenghe	37.0								0	233.3	25	10	100	61	8.2	1,913
	Anmian	19.0								0	166.7	12	10	100	47	8.2	1,367
	Yongxin	29.1								0	100.0	9	10	100	44	8.2	820
	Huangdimiao	56.8	10	10			6	6		22	186.7	10	19	100	55	8.2	1,531
	Tongbao	58.3							6	0	120.0	15	14	80	50	8.2	984
Lixian	Lianhe	247.4			30				10	12	233.3	24	13	100	106	2.2	513
	Ganbao	82.6	10	14	90		10	10	10	78	863.3	95	75	450	482	2.2	1,899
	Rierzhu	76.1			10				10	4	753.3	98	57	320	404	2.2	1,657
	Xiong-er	172.8		20	20			10	10	44	466.7	60	58	130	263	2.2	1,027
	Jingsha	164.4		5	50			10	10	29	433.3	30	35	165	181	2.2	953
	State owned	4.5															
Maoxian	Bieli	234.9	27	30	180		10	10	12	187	566.7	30	30	200	202	5.8	3,287
Pingwu	Wuyi	109.8	3		20		7		10	12	113.3	12	13	50	51	7.0	793
	Tong-jiang	14.5	5		0		7			6	116.0	6	14		25	7.0	812
	Xinyuan	24.1	5		30		7		10	18	198.0	5	13	30	34	7.0	1,386
	Xinhua	42.2	5				7			6	166.7	15	11		33	7.0	1,167
Qingchuan	Dongqiao	68.0	15	10			6	4	2	23	433.3	20	10	70	34	7.0	3,033
	Hexi	44.0	25				8		10	36	363.3	32	20	180	145	7.0	2,543
	Dongyang	37.8								0	1153.3	20	15	230	140	7.0	8,073
	Luoyigou	74.4								0	166.7	15	7		32	7.0	1,167
	Huajian	60.3								0	253.3	25	18	120	109	7.0	1,773
	Fangshi	60.2	15				11			30	283.3	20	15	60	97	7.0	1,983
	Laiqi	79.9	0				5			0	243.0	10	10	0	18	7.0	1,701
	Xinqiao	177.9	45				5			41	421.3	38	24	130	96	7.0	2,949
	Shuojia	107.1	50		100		7		7	90	465.0	15	20	130	80	7.0	3,255

	Jingjia	45.2								0	357.0	23	32	240	135	7.0	2,499
	Qingjiang	61.8								0	240.0	12	13		32	7.0	1,680
	Weiba	38.4								0	280.0	23	15	200	102	7.0	1,960
	Yaolin	23.3								0	253.3	17	12	65	54	7.0	1,773

SECTION E. Monitoring plan:

E.1. Monitoring of the project implementation:

>>

E.1.1. Monitoring of forest establishment and management:

>>

a. Monitoring of the project boundary:

To demonstrate that the actual area afforested or reforested conforms to the afforestation or reforestation area outlined in the project plan. The following activities are foreseen:

- Field surveys concerning the actual project boundary within which A/R activity has occurred, land by land;
- Measuring geographical positions (latitude and longitude of each corner polygon land) using GPS;
- Checking whether the actual boundary is consistent with the description in the CDM-AR-PDD;
- Input the measured geographical positions that are in conformity with the description in the CDM-AR-PDD into the GIS system and calculate the area of each stratum and stand;
- The project boundary shall be monitored periodically all through the crediting period, including through remote sensing as applicable. If the forest area changes during the crediting period, for instance, because deforestation occurs on the project area, the specific location and area of the deforested land shall be identified. Similarly, if the planting on certain lands within the project boundary fails these lands will be documented.

ID number	Data variable	Data unit	Measured (m), calculated (c) estimated (e) or default (d)	Recording frequency	Number of data points / Other measure of number of collected data	Comment
1.1.1.01	*Latitude and longitude for project boundary*	*numeric*	*m*	*5 years*	*Each corner of project polygon land*	*This shall be measured at each monitoring event*
1.1.1.02	*Latitude and longitude for failed planting sites*	*numeric*	*m*	*First monitoring event*	*Each corner of failed planting polygon site*	
1.1.1.03	*Latitude and longitude for deforested sites*	*numeric*	*m*	*5 years*	*Each corner of deforested polygon site*	*This shall be measured at each monitoring event*
1.1.1.04	*Area of failed planting for*	*ha*	*c*	*First monitorin*	*All strata and species*	*Calculated via measured*

	each species in each stratum			*g event*		*boundary*
1.1.1.05	*Area of deforested sites for each species in each stratum*	*ha*	*c*	*5 years*	*All strata and species*	*Calculated via measured boundary*
1.1.1.06	*stand characteristics*	*description*	*m*	*5 years*	*All sites*	*Descript the stand characteristics of each site,*

b. Monitoring of forest establishment:

To ensure that the planting quality conforms to the practice described in AR-CDM-PDD and is well implemented, the following monitoring activities will be conducted in the first three years after planting:

- To confirm that site and soil preparations are implemented based on practice documented in PDD, e.g., no slash and burn, no overall plough. If slash and burn of pre-existing vegetation occur, emissions associated shall be accounted for based on monitoring methodology applied:
  - ✓ Slash and burn: date, location, area, biomass removed, burning and other measures undertaken;
  - ✓ Overall plough: date, location and area for each stratum
- Planting: date, location, area, tree species (establishment of the stand models);
- Fertilization: date, location, area, tree species, amount and type of fertilizer applied, etc, in the first 3 years;
- Survival checking:
  - ✓ The initial survival rate of planted trees shall be counted three months after the planting, and re-planting shall be conducted if the survival rate is lower than 85 percent of the final planting density;
  - ✓ Final checking three years after the planting;
  - ✓ The checking of the survival rate.
- Weeding and fertilization checking: check and confirm that the weeding and fertilization practice is implemented as described in the PDD;
- Survey and check that species and planting for each stratum are in line with the PDD;
- Document and justify any deviation from the planned forest establishment.

ID number	Data variable	Data unit	Measured (m), calculated (c) estimated (e) or default (d)	Recording frequency	Number of data points / Other measure of number of collected data	Comment
1.1.2.01	*Date of planting*	*time*	*m*	*Planting*	*All strata*	*Be accordant with plan*
1.1.2.02	*Area of slash and burn for*	*ha*	*m*	*Once before each*	*All strata*	*To confirm there is no slash and burn*

	each statum			*planting*		
1.1.2.03	*Area of overall plough*	*ha*	*m*	*Once before each planting*	*All strata*	*To confirm there is no overall plough*
1.1.2.04	*Amount of each type of fertilizer applied in each stratum*	*kg*	*m*	*In the first 3 years*	*All strata*	*To confirm no N-fertilizer applied*
1.1.2.05	*N content for each type of fertilizer applied*	*gN.(Kg N-fertilizer)$^{-1}$*	*m*	*every time of fostering*	*All types of fertilizer applied*	*To confirm no N-fertilizer applied*
1.1.2.06	*Survival rate*	*dimension less*	*m*	*3 months and 3 years after planting*	*All species and strata*	*This e* may be conducted using permanent or temporary sample plots

c. Monitoring of forest management:

Forest management practices to be monitored include:

- Thinning: date, location, area, tree species, thinning intensity, volumes or biomass removed;
- Harvesting: date, location, area, tree species, volumes or biomass removed;
- Coppicing: date, location, area, tree species, volumes or biomass removed;
- Fuel wood collection: date, location, area, tree species, volumes or biomass removed;
- Checking and confirming that harvested lands are re-planted, re-sowed or coppiced as planned or as required by forest law;
- Checking and ensuring that good conditions exist for natural regeneration if harvested lands are allowed to regenerate naturally;
- Monitoring of disturbances: date, location, area (GPS coordinates and remote sensing, as applicable), tree species, type of disturbance, biomass lost, implemented corrective measures, change in the boundary of strata and stands.

ID number	Data variable	Data unit	Measured (m), calculated (c) estimated (e) or default (d)	Recording frequency	Number of data points / Other measure of number of collected data	Comment
1.1.3.01	*Area thinned*	*ha*	*m*	*annually*	*All strata and species*	*Record location, species and area*

1.1.3.02	*Thinning intensity*	*m^3/ha*	*m*	*annually*	*All strata and species*	*Thinned volume*
1.1.3.03	*Harvest area*	*ha*	*m*	*annually*	*All strata and species*	*Record location, species and area*
1.1.3.04	*Harvest volume*	*m^3/ha*	*m*	*annually*	*All strata and species*	
1.1.3.05	*disturbance*	*area*	*m*	*annually*	*All strata and species*	*Location, area, species and type of disturbance, volume or biomass loss, changes strata/project boundary due to the disturbance*

E.1.2. If required by the selected approved methodology, describe or provide reference to, SOPs and quality control/quality assurance (QA/QC) procedures applied:

>> To ensure the net anthropogenic GHG removals by sinks to be measured and monitored precisely, credibly, verifiably and transparently, a quality assurance and quality control (QA/QC) procedure will be implemented, including:

a) Reliable field measurements:

To ensure the reliable field measurements:

- Standard Operating Procedures (SOPs) for each step of the field measurements, including all detail phases of the field measurements and provisions for documentation for verification purposes, will be developed and adhered to over time.
- Training courses on the field data collection and data analyses will be held for persons involving in the field measurement work. The training courses should ensure that each field-team member is fully aware of all procedures and the importance of collecting data as accurately as possible. To achieve this, both classroom examination and field examination will be conducted, and only those that have passed the examination can join the team. Test plots will be established and used for the field examination in which all measurements of pertinent components and procedures will be examined.
- A document that shows that these steps have been followed will be presented as a part of the monitoring report. The document will list all names of the field team and the project leader will certify that the team is trained;
- Any new staff will be adequately trained.

b) Verification of field data collection:

To verify that the plots have been installed and the measurements taken correctly, the following work would be undertaken:

- 15% of randomly selected plots will be re-measured by another team

- Key re-measurement elements include the location of plots, DBH and tree height of all trees present.
- The re-measurement data will be compared with the original measurement data. Any deviation between measurement and re-measurement below 5% will be considered tolerable and error above 5%. Any errors found will be corrected and recorded. Any errors discovered will be expressed as a percentage of all plots that have been rechecked to provide an estimate of the measurement error.

c) Verification of data entry and analysis:

Reliable estimation of carbon stock in pools requires proper entry of data into the data analyses spreadsheets. To minimize the possible errors in the process of data entry, the entry of both field data and laboratory data will be reviewed using expert judgement and, where necessary, compared with independent data to ensure that the data are realistic. Communication between all personnel involved in measuring and analysing data will be used to resolve any apparent anomalies before the final analysis of the monitoring data is completed. If there are any problems with the monitoring plot data that cannot be resolved, the plot should not be used in the analysis.

d) Data maintenance and archiving:

Data archiving will take both electronic and paper forms, and copies of all data will be provided to each project participant. All electronic data and reports will also be copied on durable media such as CDs and copies of the CDs are stored in multiple locations. The archives include:

- Copies of all original field measurement data, laboratory data, data analysis spreadsheet;
- Estimates of the carbon stock changes in all chosen pools and non-CO_2 GHG and corresponding calculation spreadsheets;
- GIS products;
- Copies of the measuring and monitoring reports.

E.2. Sampling design and stratification:

>>

a. Ex post stratification:

The ex ante project stratification presented in Section C.4 will be used as a basis for monitoring. However, since there is usually diversion of planned forest establishment and management practice as well as unexpected disturbance, 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 differently different parts of an originally homogeneous stratum or stand;
- Forest establishment and management (clearing, planting, thinning, harvesting, coppicing, re-replanting) may be implemented at different intensities, dates and spatial locations than originally planned in the PDD;
- Eligible land areas as defined in the AR-CDM-PDD not yet under the control of the project participant at the start of the project activity have become under the control of the project participants;

- Two different strata may be similar enough to allow their merging into one stratum. If one of the above occurs, ex-post stratification may be required. The possible need for ex-post stratification shall be evaluated at each monitoring event and changes in the strata should be reported to the DOE for verification.

b. Sampling size and plot allocation among strata:

Permanent sampling plot will be established and measured periodically for monitoring purposes. Assuming the cost for establishing a sample plot for each stratum is constant, equations (62) and (63) in Section III.2.2.1. of the approved methodology applied have been used to calculate the number of plots for each stratum (Table E.1. below). The average standing volume (Q, $m^3.ha^{-1}$) of mature plantations have been calculated based on growth curves (Table D.2.). The standard deviation of each stratum (st_i) is set as the 20% of the standing volume. The precision level was set as 10%. To ensure statistically independence for each stratum, minimum 3 plots are set for each stratum.

However, it is possible to reasonably modify the sample size after the first monitoring event based on the variation of the carbon stock changes and possible disturbance.

Table E.1. Number of monitoring plots for each stratum:

Stratum ID	Area (ha)	Number of plots
PS-BC-I	56	3
PS-BC-II	87.4	3
PS-BC-III	56.8	4
PS-LX-I	171.8	4
PS- LX-II	358	8
PS- LX-III	218	5
PS-MX-I	63	3
PS-MX-II	171.9	3
PS-PW-I	40.6	3
PS-PW-II	150	5
PS-QC-I	330.2	7
PS-QC-II	548.1	21
total	**2251.8**	**69**

c. Sampling plot size:

The stands to be established are relative dense (1600-2500 trees per hectare). The size of plots is hence set as 400 m^2 (including 64-100 trees within each sampling plot).

d. Locating sampling plots:

Following the guidance in the Section 2.2.1. of the approved methodology applied, the permanent sample plots will be located systematically with a random start.

e. Monitoring frequency:

The planting activity started in 2007. *Betula luminifera, Betula albo-sinensis, Magnolia officinalis,Larix gmelinii, Pinus massoniana and Cunninghmia lanceolata* will be thinned at age 15 and 25. *Quercus acutissima* will be harvested at age 10. To avoid the coincidence with peaks in carbon stocks, the first monitoring will be conducted in the year 2012, with a subsequent monitoring interval of 5 years, i.e., in 2017, 2022, and 2027 respectively. Verification will be conducted in 2012, 2017, 2022, 2027 (table E.2.).

Table E.2. Monitoring times versus harvest and thinning time:

Year No	Year	Monitoring	Verification	Harvesting	Thinning
1	2007				
2	2008				
3	2009				
4	2010				
5	2011				
6	2012	X	X		
7	2013				
8	2014				
9	2015				
10	2016			X	
11	2017	X	X		
12	2018				
13	2019				
14	2020				
15	2021				X
16	2022	X	X		
17	2023				
18	2024				
19	2025				
20	2026				X
21	2027	X	X		

f. Measuring and estimating carbon stock changes over time:

The growth of individual trees on plots will be measured at each monitoring event. Pre-existing trees will not be measured and accounted for as a conservative manner. Non-tree vegetation such as herbaceous plants, grasses, and shrubs will not be measured and accounted as per methodology applied. The carbon stock changes in living biomass of trees on each plot are then estimated through Biomass Expansion Factors (BEF) method.

g. Monitoring GHG emissions by sources increased as results of the A/R CDM project activity:

As there will be no slash and burn site preparation, overall ploughing, N-fertilizer application and flood irrigation as well as no machinery tools to be used within the project boundary, hence no significant GHG emissions by sources as results of the proposed A/R CDM project activity.

E.3. Monitoring of the baseline net GHG removals by sinks, if required by the selected approved methodology:

>> Monitoring of the baseline net GHG removals by sinks is not needed as per the revised approved methodology AR-AM0003/version 03 applied. However, to renew crediting period, relevant data necessary for determining the renewed baseline, including net greenhouse gas removals by sinks during the crediting period, will be collected and archived to determine whether the baseline approach and baseline scenario are still valid or have to be updated.

The carbon stock changes in the baseline scenario can be estimated by measuring carbon stock in the above-ground biomass at the end of the crediting period. At least 3 randomly selected baseline plots outside the project boundary will be measured and serve as proxy and accurately reflect the development of the degraded lands in the absence of the project activity, at 10% precision level and 95% confidence

level. If the precision level is not achieved, more baseline plots will be measured. Measuring the carbon stock change in above-ground biomass is sufficient for the purpose of baseline scenario checking.

ID number	Data variable	Data unit	Measured (m), calculated (c) estimated (e) or default (d)	Recording frequency	Number of sample plots at which the data will be monitored	Comment
2.3.01	*Baseline Stratum ID*	*Alpha numeric*	*defined*	*20 years*	*100% strata*	*Stratum identification for baseline scenario checking*
2.3.02	*Carbon stock in above-ground biomass at the end of the crediting period*	*t CO2*	*c*	*End of the crediting period*	*100% baseline plots*	*Calculated based on baseline plot measurement for different strata*
	National, local and sectoral policies that may influence land use in the absence of the proposed AR CDM project activity	*n.a.*	*collected*	*Start and end of the crediting period*	*As complete as possible*	
	Natural and anthropogenic factors influencing land use, land cover and natural regeneration	*n.a*	*collected*	*Start and end of the crediting period*	*As complete as possible*	
2.3.03	*Carbon stock in above-ground biomass at the start of the crediting period*	*t CO2*	*c*	*start of the crediting period*	*100% baseline plots*	*Calculated based on baseline plot measurement for different strata*
2.3.06	*Baseline carbon stock change in aboveground biomass*	*t CO2-e. yr^{-1}*	*c*	*20 years*	*100%*	

E.4. Monitoring of the actual net GHG removals by sinks:

>>

E.4.1. Data to be collected in order to monitor the verifiable changes in carbon stock in the carbon pools within the project boundary resulting from the proposed A/R CDM project activity:

>> Step-wise procedures (BEF method) and equation (66)-(73) in Section III.5.1 of the approved baseline and monitoring methodology (AR-AM0003/version 03) will be followed to monitor the verifiable carbon stock changes in the above-ground and below-ground living biomass within the project boundary.

The volume of the commercial component of trees in equation (68) is calculated based on locally derived equations as follows[12]

- *Pinus tabulaeformis* $V=0.000066492455\times DBH^{1.8655617}\times H^{0.937768879}$
- *Pinus massoniana* $V=0.000060049144\times DHH^{1.8719753}\times H^{0.97180232}$
- *Cupressus chengiana* and

  Platycladus orientalis $V=0.000057173591\times DHH^{1.8813305}\times H^{0.99568845}$
- *Quercus acutissima* $V=0.000059599784\times DHH^{1.8564005}\times H^{0.98056206}$
- *Betula sp.* $V=0.000048941911\times DHH^{2.0172708}\times H^{0.88580889}$
- *Cunninghmia lanceolata* $V=0.000058777042\times DHH^{1.9699831}\times H^{0.89646157}$
- *Picea asperata* $V=0.000056790543\times DHH^{1.8517320}\times H^{0.334624}$
- *Larix gmelinii* $V=0.000068320\times DHH^{1.74163}\times H^{1.11525}$
- *Other broadleaf trees* $V=0.000052750716\times DHH^{1.9450324}\times H^{0.93885330}$

Where:

V	Commercial volume of tree, $m^3.tree^{-1}$
DBH	diameter at breast height, cm
H	tree height, m

The commercial volume is then summed for all trees within a plot and expresses as volume per unit area ($m^3.ha^{-1}$), and the mean merchantable volume per unit area for stratum i and species j, MV_{ijt}, is then calculated from plot value.

The species-specific biomass expansion factor for conversion of biomass of merchantable volume to above-ground biomass (BEF_j), wood density (D_j) and root-shoot ratio (R_j) used in Equation (68) and (69) are listed in Table D.3. above. These parameters are estimated from published data. However, the average value of BEF may result in significant errors because BEF usually decreases with the increase of plantation age. Therefore effort will be made to analyze the data so as to derive age-dependent equations for BEF_j. IPCC default value (0.5) for the carbon fraction (CF) will be used. These value shall be updated every five years if the value from national inventory is updated in the future.
In the field monitoring work of each plot, the *DBH* and *H* of every tree in the plot should be measured. The measurement of "Methods Manual for Measuring Terrestrial Carbon[13]" from *Winrock International*

[12] Sichuan Forestry Department. 1984. Yield table and growth curve for forestry inventory in Sichuan.

[13] http://www.winrock.org/Ecosystems/tools.asp?BU=908

will be used in the field research.

ID number	Data variable	Data unit	Measured (m), calculated (c) estimated (e) or default (d)	Recording frequency	Number of sample plots at which the data will be monitored	Comment
2.1.1.01	*Project stratum ID*	*Alpha numeric*	*defined*	*At stand establishment*	*100%*	*Each stand has a particular year to be planted under each stratum*
2.1.1.02	*Stand ID*	*Alpha numeric*	*defined*	*At stand establishment*	*100%*	*Each stand has a particular year to be planted under each stratum*
2.1.1.03	*Total size of all strata (A), e.g. the total project area*	*Hectares*	*m*	*Before the start of the project and adjusted thereafter every 5-year*	*100%*	
	Area of stratum i	*Hectares*	*m*	*Before the start of the project and adjusted thereafter every 5-year*	*100%*	
2.1.1.04	*Desired level of precision (p)*	*%*	*defined*	*Before the start of the project*	*100%*	*10% will be used for the purpose of QA/QC and measuring and monitoring precision control*
2.1.1.05	*Standard deviation for each stratum i (st_i)*	*Kg dry matter/ha*	*e*	*At each monitoring event*	*100%*	*Used for estimating numbers of sample plots*

						of each stratum and stand
	Above-ground biomass of a tree of species j	*kg dry matter /tree*	*c*	*5-year*	*100%*	*(Eq. 74) of the used methodology*
	Carbon stock in aboveground biomass per tree of species j	*kg C /tree*	*c*	*5-year*	*100%*	*(Eq. 75) of the used methodology*
	Carbon stock in belowground biomass per tree of species j	*kg C /tree*	*c*	*5-year*	*100%*	*(Eq. 75) of the used methodology*
2.1.1.06	*Sample size for stratum i*	*Dimensionless*	*c*	*Before the start of the project and adjusted thereafter every 5-year*	*100%*	*(Eq. 61 or Eq. 63 of the used methodology) Calculated for each stratum*
2.1.1.07	*Sample plot ID*	*Alpha numeric*	*defined*	*Before the first monitoring event*	*100%*	*Numeric series ID will be assigned to each permanent sample plot (e.g., 1, 2, 3, ... pl, ...)*
	Ration of molecular weights of carbon and CO_2	*Dimensionless*	*Universal constant*			*=44/12*
	Total number of plots in stratum i, stand model k	*Dimensionless*	*m*	*5 years*	*100%*	
	Sample plot area (AP)	*m^2*	*m*	*5 years*	*100%*	
	Allowable		*c*	*5 years*	*100% of stand*	*Equation (59)*

	error				*models*	
	Confidence level	*%*	*defined*	*Before the first monitoring event*	*100%*	*=95%*
	Total size of all strata (A), e.g. the total project area	*hectare*	*m*	*Before the start of the project and adjusted thereafter every 5-year*	*100%*	
	Area of stratum i (A_i)	*hectare*	*m*	*Before the start of the project and adjusted thereafter every 5-year*	*100%*	
	Maximum possible number of sample plots in the project area (N)	*Dimensionless*	*c*	*5 years*	*100%*	*Equation (59)*
	Sample size (total number of sample plots required) in the project area (n)	*Dimensionless*	*c*	*5 years*	*100%*	*Equation (62)*
	Maximum possible number of sample plots in stratum i (N_i)	*Dimensionless*	*c*	*5 years*	*100%*	*Equation (59)*
	Sample size for stratum i (n_i)	*Dimensionless*	*c*	*5 years*	*100%*	*Equation (63)*
2.1.1.08	*Plot location (latitude/longitude)*	*m*	*m*	*5 years*	*100% sample plots*	*Using GPS to locate before start of each field measurement*

2.1.1.09	*Tree species (j)*	*Dimensionless*	*m*	*5 years*	*100%*	
2.1.1.10	*Age of plantation*	*year*	*m*	*5 years*	*100%*	*Counted since the planted year*
	Tree ID (1, 2, 3, … tr … TR = total number of trees in plot)	*Dimensionless*	*m*	*5 years*	*100%*	
	Plot expansion factor from per plot values to per hectare values	*Dimensionless*	*c*	*5 years*	*100%*	*Eq. 76 in used methodology*
	Value of the statistic z (normal probability density function), for α = 0.05 (implying a 95% confidence level)	*Dimensionless*	*m*	*5 years*	*100%*	
2.1.1.11	*Number of trees in the sample plot*	*Number*	*m*	*5 year*	*100% of the trees in the plots*	*Counted in plot measurement*
2.1.1.12	*Diameter at breast height of living and standing dead trees (DBH)*	*cm*	*m*	*5 years*	*100% trees in plots*	*Measuring at each monitoring time per sampling method*
2.1.1.13	*Tree height*	*m*	*m*	*5 years*	*100% trees in plots*	*Measuring at each monitoring time per sampling method*
2.1.1.14	*Mean merchantable volume per unit area for stratum i, species j, time*	$m^3.ha^{-1}$	*c*	*5 years*	*100% trees in plots*	

	t (MV_{ijt})					
2.1.1.15	*Wood density of species j (D_j)*	*t d.m.m^{-3}*	*e*	*5 years*	*100% of species or species group*	*Species-derived from China national GHG inventory in LUCF sector*
2.1.1.16	*Biomass expansion factor (BEF)*	*Dimensionless*	*e*	*5 years*	*100% of sampling plots*	*Species-derived from China national GHG inventory in LUCF sector*
2.1.1.17	*Carbon fraction of species j (CF_j)*	*dimensionless*	*e*	*Once per species*	*100% of species or species group*	*IPCC default (0.5) is used*
2.1.1.18	*Root-shoot ratio*	*Dimensionless*	*e*	*5 years*	*100%*	*Species-derived from China national GHG inventory in LUCF sector*
2.1.1.19	*Carbon stock in above-ground biomass for stratum i, species j,time t ($C_{AB,ijt}$)*	*tonnes C*	*c*	*5 years*	*100%*	*Equation (70)*
	Actual net greenhouse gas removals by sinks	*Tonnes CO_2-e*	*c*	*5 years*	*100%*	*Equation (65)*
2.1.1.20	*Carbon stock in below-ground biomass for stratum i, species j,time t ($C_{BB,ijt}$)*	*tonnes C*	*c*	*5 years*	*100%*	*Equation (71)*
2.1.1.21	*Mean carbon stock in aboveground biomass per unit area for stratum i,*	*tonnes C.ha^{-1}*	*c*	*5 years*	*100%*	*Equation (68)*

	species j, time t ($MC_{AB,ijt}$)					
2.1.1.22	*Mean carbon stock in belowground biomass per unit area for stratum i, species j, time t ($MC_{BB,ijt}$)*	*tonnes $C.ha^{-1}$*	*c*	*5 years*	*100%*	*Equation (69)*
2.1.1.23	*Area of stratum i, stand model k, at time t (Aikt)*	*hectare*	*m*	*yearly*	*100%*	*Measured for different strata and stands*
2.1.1.24	*Annual carbon stock change in above-ground biomass for stratum i, stand model k, time t ($\Delta C_{AB,ikt}$)*	*tonnes $C.yr^{-1}$*	*c*	*5 years*	*100%*	*Equation (72)*
2.1.1.25	*Annual carbon stock change in below-ground biomass for stratum i, stand model k, time t ($\Delta C_{BB,ikt}$)*	*tonnes $C.yr^{-1}$*	*c*	*5 years*	*100%*	*Equation (73)*
	Annual carbon stock change in living biomass in the project scenario for stratum i, stand model k, time t ($\Delta C_{P,ikt}$)	*tonnes CO_2-e.yr^{-1}*	*c*	*5 years*	*100%*	*Equation (67)*
	Sum of the changes in living biomass carbon stocks in the project scenario (above- and below-ground)	*tonnes CO_2-e*	*c*	*5 years*	*100%*	*Equation (66)*

	$(\Delta C_{P,LB})$					

E.4.2. Data to be collected in order to monitor the GHG emissions by the sources, measured in units of CO_2 equivalent, that are increased as a result of the implementation of the proposed A/R CDM project activity within the project boundary:

>>No emission sources within the project boundary.

ID number	Data variable	Data unit	Measured (m), calculated (c) estimated (e) or default (d)	Recording frequency	Number of sample plots at which the data will be monitored	Comment

E.5. Leakage:

>> As per the approve methodology applied, there are three potential sources of leakages in the proposed A/R CDM project activity, i.e., fossil fuel combustion by vehicles, displacement of grazing and fuelwood collection, and the use of wood post for fencing. However, as elaborated in Section D-2 above, The leakage from the displacement of grazing and fuelwood collection and the use of wood post for fencing is nil. Therefore the leakage source to be monitored in the proposed A/R CDM project activity is the fossil fuel combustion due to vehicle use. The step-wise procedures and formula in Section III.7 of the approved methodology applied will be followed to monitor the leakage.

E.5.1. If applicable, please describe the data and information that will be collected in order to monitor leakage of the proposed A/R CDM project activity:

>> National default values from national GHG inventory will be used for GHG emission from use of vehicles, e.g., 2.6353kg CO2 per litre of diesel and gasoline for vehicles that commonly used by local farmers. The diesel consumption is 0.1-0.2 litre per km dependent on type of vehicles.

ID number	Data variable	Data unit	Measured (m), calculated (c) estimated (e) or default (d)	Recording frequency	Number of data points	Comment
	Vehicle type (x)	*dimensionless*	*m*	*yearly*	*100%*	
	Fuel type (y)	*dimensionless*	*m*	*yearly*	*100%*	
3.1.01	*Number of each vehicle type used (n_{xyt})*	*dimensionless*	*m*	*yearly*	*100%*	*Monitoring number of each vehicle type used*
3.1.02	*CO2 emission factor for vehicle type x with fuel type y*	*kg CO_2 l^{-1}*	*e*	*At the start of the project*	*100%*	*China national GHG inventory in transportation sector*

	(EF_{xy})					
3.1.03	*Kilometers traveled by each of vehicle type x with fuel type y at time t (k_{xyt})*	*km*	*m*	*yearly*	*100%*	*Monitoring kilometers for each vehicle type and fuel type used*
3.1.04	*Fuel efficiency of Vehicle type x with fuel type y at time t (e_{xy})*	*liter km^{-1}*	*e*	*5 years*	*100%*	*Estimated for each vehicle type and fuel type used*
3.1.05	*Consumption of fuel type y of vehicle type x at time t*	liters	*c*	*yearly*	*100%*	*Equation (102)*
3.1.06	*Total GHG emissions due to fossil fuel combustion from vehicles ($LK_{vehicle}$)*	*tonnes CO2-e*	*c*	*yearly*	*100%*	*Equation (100)*

E.5.2. Specify the procedures for the periodic review of implementation of activities and measures to minimize leakage, if required by the selected approved methodology:

>> Leakage associated with the proposed A/R CDM project activity, in terms of the use of vehicles for the transportation of staff and products outside the project area, is small. This leakage will be monitored at daily bases whenever there are any activities such as planting, management, thinning, Coppicing, harvesting and replanting, and accounted following steps described in Section III.7 of the approved methodology applied.

E.6. Provide any additional quality control (QC) and quality assurance (QA) procedures undertaken for data monitored not included in section E.1.3:

>> Quality Control (QC) is a system of routine technical activities, to measure and control the quality of the inventory as it is being developed. The QC system is designed to:

- Provide routine and consistent checks to ensure data integrity, correctness, and completeness;
- Identify and address errors and omissions;
- Document and archive inventory material and record all QC activities.

QC activities include general methods such as accuracy checks on data acquisition and calculations and the use of approved standardized procedures for emission calculations, measurements, estimating uncertainties, archiving information and reporting. Higher tier QC activities include technical reviews of source or sink categories, activity and emission factor data, and methods.

Quality Assurance (QA) activities include a planned system of review procedures conducted by personnel not directly involved in the inventory compilation/development process. Reviews, preferably by

independent third parties, should be performed upon a finalized inventory following the implementation of QC procedures. Reviews verify that data quality objectives were met, ensure that the inventory represents the best possible estimates of emissions and sinks given the current state of scientific knowledge and data available, and support the effectiveness of the QC program.

To ensure the net anthropogenic GHG removals by sinks to be measured and monitored precisely, credibly, verifiably and transparently, a quality assurance and quality control (QA/QC) procedure shall be implemented, including (1) collection of reliable field measurement; (2) verification of methods used to collect field data; (3) verification of data entry and analysis techniques; and (4) data maintenance and archiving. If after implementing the QA/QC plan it is found that the targeted precision level is not met, then additional field measurements need to be conducted until the targeted precision level is achieved.

Reliable field measurements:
Collecting reliable field measurement data is an important step in the quality assurance plan. Persons involving in the field measurement work should be fully trained in the field data collection and data analyses. Standard Operating Procedures (SOPs) for each step of the field measurements shall be developed and adhered to at all times. These SOPs should detail all phases of the field measurements and contain provisions for documentation for verification purposes, so that measurements are comparable over time and can be checked and repeated in a consistent fashion. To ensure the collection of reliable field data:

- Field-team members shall be fully aware of all procedures and the importance of collecting data as accurately as possible;
- Field teams shall install test plots if needed in the field and measure all pertinent components using the SOPs;
- Field measurements shall be checked by a qualified person to correct any errors in techniques;
- A document that shows that these steps have been followed shall be presented as a part of the project documents. The document will list all names of the field team and the project leader will certify that the team is trained;
- Any new staff is adequately trained.

Verification of field data collection:
To verify that plots have been installed and the measurements taken correctly, 10-20% of plots shall be randomly selected and re-measured independently. Key re-measurement elements include the location of plots, DBH and tree height. The re-measurement data shall be compared with the original measurement data. Any deviation between measurement and re-measurement below 5% will be considered tolerable and error above 5%. Any errors found shall be corrected and recorded. Any errors discovered should be expressed as a percentage of all plots that have been rechecked to provide an estimate of the measurement error.

Verification of data entry and analysis:
Reliable estimation of carbon stock in pools requires proper entry of data into the data analyses spreadsheets. To minimize the possible errors in this process, the entry of both field data and laboratory data shall be reviewed using expert judgment and, where necessary, comparison with independent data to ensure that the data are realistic. Communication between all personnel involved in measuring and analyzing data should be used to resolve any apparent anomalies before the final analysis of the monitoring data is completed. If there are any problems with the monitoring plot data that cannot be resolved, the plot should not be used in the analysis.

Data maintenance and archiving:

Because of the long-term nature of the A/R CDM project activity, data shall be archived and maintained safely. Data archiving shall take both electronic and paper forms, and copies of all data shall be provided to each project participant. All electronic data and reports shall also be copied on durable media such as CDs and copies of the CDs are stored in multiple locations. The archives shall include:

- Copies of all original field measurement data, laboratory data, data analysis spreadsheet;
- Estimates of the carbon stock changes in all pools and non-CO_2 GHG and corresponding calculation spreadsheets;
- GIS products;
- Copies of the measuring and monitoring reports.

Quality control activities and procedures:

QC activity	Procedures
Check that assumptions and criteria for the selection of activity data, emission factors and other estimation parameters are documented.	• Cross-check descriptions of activity data, emission factors and other estimation parameters with information on source and sink categories and ensure that these are properly recorded and archived.
Check for transcription errors in data input and reference.	• Confirm that bibliographical data references are properly cited in the internal documentation • Cross-check a sample of input data from each source category (either measurements or parameters used in calculations) for transcription errors.
Check that emissions and removals are calculated correctly.	• Reproduce a representative sample of emission or removal calculations. • Selectively mimic complex model calculations with abbreviated calculations to judge relative accuracy.
Check that parameter and units are correctly recorded and that appropriate conversion factors are used.	• Check that units are properly labeled in calculation sheets. • Check that units are correctly carried through from beginning to end of calculations. • Check that conversion factors are correct. • Check that temporal and spatial adjustment factors are used correctly.
Check the integrity of database files.	• Confirm that the appropriate data processing steps are correctly represented in the database. • Confirm that data relationships are correctly represented in the database. • Ensure that data fields are properly labeled and have the correct design specifications. • Ensure that adequate documentation of database and model structure and operation are archived.
Check for consistency in data between categories.	• Identify parameters (e.g., activity data, and constants) that are common to multiple categories of sources and sinks, and confirm that there is consistency in the values used for these parameters in the emissions calculations.
Check that the movement of inventory data among processing steps is correct	• Check that emission and removal data are correctly aggregated from lower reporting levels to higher reporting levels when preparing summaries.

	• Check that emission and removal data are correctly transcribed between different intermediate products.
Check that uncertainties in emissions and removals are estimated or calculated correctly.	• Check that qualifications of individuals providing expert judgment for uncertainty estimates are appropriate. • Check that qualifications, assumptions and expert judgments are recorded. Check that calculated uncertainties are complete and calculated correctly. • If necessary, duplicate error calculations on a small sample of the probability distributions used by Monte Carlo analyses.
Undertake review of internal documentation	• Check that there is detailed internal documentation to support the estimates and enable reproduction of the emission and removal and uncertainty estimates. • Check that inventory data, supporting data, and inventory records are archived and stored to facilitate detailed review. • Check integrity of any data archiving arrangements of outside organizations involved in inventory preparation.
Check time series consistency.	• Check for temporal consistency in time series input data for each category of sources and sinks. • Check for consistency in the algorithm/method used for calculations throughout the time series.
Undertake completeness checks.	• Confirm that estimates are reported for all categories of sources and sinks and for all years. • Check that known data gaps that may result in incomplete emissions estimates are documented and treated in a conservative way.
Compare estimates to previous estimates.	• For each category, current inventory estimates should be compared to previous estimates, if available. If there are significant changes or departures from expected trends, re-check estimates and explain the difference.

E.7. Please describe the operational and management structure(s) that the project operator will implement in order to monitor actual GHG removals by sinks and any leakage generated by the proposed A/R CDM project activity:

>> The proposed A/R CDM project activity will be implemented under the following operational and management structure:

- The provincial and county Project Management Offices (PMOs) that have been established will be responsible for coordinating the project participants, providing technical services, including arranging training to the planting entities and farmers/communities involved, supervising the implementation of the proposed A/R CDM project activity, as well as organizing a technical support panel (TSP) to carry out the monitoring of the project implementation performance and impacts, including measuring and monitoring of the actual GHG removals by sinks and any leakage generated by the proposed A/R CDM project activity. The relevant information and data will be documented and archived in the PMOs and project entities in both electronic and paper copy.
- The Sichuan Forestry Inventory and Planning Institute, will take the lead for measuring and monitoring of the actual GHG removals by sinks and any leakage generated by the proposed A/R

CDM project activity. They will closely work with county PMOs and the project entities by providing technical guidance on the monitoring work, jointly carry out the field measurement and necessary survey, as well as the data collection and analysis. The project entities will take care of the requested routine measurement, data collection and documentation filing according to the project monitoring plan.

- The Chinese Academy of Forestry will provide technical consultation and training in the measuring and monitoring of the actual GHG removals by sinks and leakage generated by the proposed A/R CDM project activity to provincial and county technicians, as well as the project entity staff. They will also verify field data and data entry and analysis as well as drafting the monitoring report.

E.8. Name of person(s)/entity(ies) applying the monitoring plan:

>> Name of persons/entity applying the monitoring plan:

- Chengdu Office, Conservation International
  - Mr. Caifu Tang,, tangcaifu@conservation.org.cn
- The Nature Conservancy China Program, Conservation and Climate Change group
  - Mr. Ma Jian, jma@tnc.org.cn
- Department of Forestry, Sicuhan Province
  - Ms. Wu Baozhen, Mr. Deng Qiang, Mr. Hou Yuanqing, Ms. Chen Chan
- Institute of Sichuan Forestry Inventory and Planning, China
  - Mr. Yanzhou Zhang, zyzjm0787@sina.com
- Institute of Forest Ecology, Environment and Protection, the Chinese Academy of Forestry
  - Dr. Xiaoquan Zhang, xiaoquan@caf.ac.cn

All entities and persons mentioned above are not project participants.

SECTION F. Environmental impacts of the proposed A/R CDM project activity:

F.1. Documentation on the analysis of the environmental impacts, including impacts on biodiversity and natural ecosystems, and impacts outside the project boundary of the proposed A/R CDM project activity:

>> The CCB standards have been applied in the project design to ensure the integrated benefit of climate, communities and biodiversity. The CCB will be verified at the same time of the validation.
Through establishing 2251.8 ha of multiple-use forests in the upper reaches of the main branches of the Yangtze River that suffers from soil erosion and on the lands close to reserves, the Environment Impacts Analysis issued by the local environment protection bureau indicates that the proposed A/R CDM project activity will increase the forest coverage and provide the following additional environmental benefits.

Enhancing biodiversity and ecosystem integrity:

Many lands to be planted in the proposed A/R CDM project activity are close to nature reserves. The target species of these nature reserves are giant panda, golden monkey, leopard, etc. For example, lands in Lixian County are 8 kilometers away from Sichuan Miyaluo Nature Reserve. Many rare and endangered wildlife such as giant panda, golden monkey and leopard live in the reserve. Adapted to the drought climate, the lands are currently covered with sparse shrub and herbaceous plants including Artemisia apiacea (Celery wormwood), Caryopteris sp (Bluebeard), Selaginella tamariscina--Sophora viciifolia, Berberis sp grassland andA rtemisia apiacea, Caryopteris sp----Berberis sp, Sophora viciifolia, and rosebush, with poor biodiversity.

The lands at Luoyigou, Weiba, Dongqiao and Hexi villages in Qingchuan Country are 3-5 kilometers away from the Tangjiahe National Nature Reserve, and the lands at Dongyang and Yaolin villages are 1 kilometers away from Dongyanggou Provincial Nature Reserve. These lands are covered with shrub and/or grass, including cogon-raspberry bush, cogon-hickory bush or cogon grass, the secondary vegetation following the deforestation of original deciduous broadleaf forests and human intervention, and without rare and endangered species.

In Beichuan County, the land at Yongxin village is 8.5 kilometers away from Piankou Provincial Nature Reserve, and the lands at Zhenghe and Anmian villages are 2 kilometers away from Xiaozhaigou Provincial Nature Reserve. These lands are covered with shrub and/or grass including Diplopterygium glaucum-Indigofera tinctoria, Sophora viciifolia bush, fern, gramineous grass, and fern-rosebush and raspberry bush.

The forests to be established with native species will contribute to the biodiversity conservation by:

- Providing corridors to enhance the viability of wildlife populations through facilitation of gene flow.
- Restoring connectivity between forests will increase the protected forests scope to improve the status of currently unprotected species.
- Generating increased income to local communities from the proposed A/R CDM project activity. This will reduce their tendency to degrade biodiversity through practices such as poaching, forest fires and illegal logging and NTFP collection in the nature reserve. These activities are key threats to the nature reserve management.

Controlling soil erosion:

Due to the consecutive deforestation, subsequent over-use of fuelwood collection, illegal grazing and frequent fire, most lands are severely degraded and suffer from serious soil erosions that directly threaten the streams and rivers below. If the current situation remains as it has been, the lands will degrade further and the soil erosion will become more and more severely. The forest restoration will improve soil and water erosion control in this area.

Improving 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, reducing flood and drought disaster;
- Stabilizing soil to mitigate land slide that have been frequently occurred in the project area.

Improving watershed management and contributing to the outside of the project boundary and the ecosystem improvement, through demonstration and extension of the project experience to other areas:

The project located in SW China in the upper reaches of Minjiang River and Jialingjiang River, the main first order branches of the Yangtze River. All project site seat in the headstream region of above rivers. So the proposed project can improve soil and water conservation in the upper reaches of the Yangtze River, it's take a impotent function to promote hydrology safe, and avoid the flood disaster.

Building incentives to people to invest in sustainable land use:

Risk analysis and countermeasures:

- **Fire and pest risk.** This can be alleviated through technical and awareness training to local farmers/communities, strengthening patrolling and monitoring, as well as building the fire-break belt. Furthermore, a mixed species arrangements will be adopted to reduce fire and pest risks.
- **Site preparation.** The site preparation will disturb the vegetation and soil in the planting sites. The main technical measures to be employed in mitigating the impacts are to plant the trees with low density (1667-2500 trees per hectare), limited hole site preparation (30-60 cm in diameter or 0.07-0.28 m^2), retaining the existing vegetation as mush as possible (see also Section A.5.4). As a result, the surface area disturbed by site preparation is estimated to account for 7.1% of the total land surface. The hole will be dug along the landform contour in triangle form to reduce the soil loss. Therefore the site and soil preparation will have minor negative impacts on original soil and vegetation.
- **Fertilization.** In the proposed A/R CDM project activity, phospherus fertilizer will be applied within the small planting hole rather than overall dispersing, so that the potential risk of the fertilization application can be reduced to minimum.
- **Pesticide.** improper pesticide application would be harmful to natural environment, including polluting soil, water and air conditions, as well as the habitat of the wildlife. However under the proposed A/R CDM activity, the environmental friendly measures will be adapted such as mixed species arrangement, seed and seedling quarantine. Especially the biological measures to control pests and diseases will be adopted. Therefore, the pesticide application will be limited.

None of these risks and/or negative impacts is considered to be significant. See the document (EIA) issued by local environmental bureau, stating that for the purpose of restoring degraded land.

F.2. If any negative impact is considered significant by the project participants or the host Party, a statement that project participants have undertaken an environmental impact assessment, in accordance with the procedures required by the host Party, including conclusions and all references to support documentation:

>> No significant negative impacts have been identified due to the environmental-friendly techniques adopted in the proposed A/R CDM project activity, e.g., avoidance of slash and burn and overall tillage, choice of native tree species and their mixed spatial arrangement, etc.

F.3. Description of planned monitoring and remedial measures to address significant impacts referred to in section F.2. above:

>>N/A

SECTION G. Socio-economic impacts of the proposed A/R CDM project activity:

G.1. Documentation on the analysis of the major socio-economic impacts, including impacts outside the project boundary of the proposed A/R CDM project activity:

>> The CCB standards have been applied in the project design to ensure the integrated benefit of climate, communities and biodiversity. The CCB will be verified at the same time of the validation.

Agriculture and/or grazing are the main sources of income for local communities in the project area. However, due to severe soil erosion, agricultural production has suffered very much from flood, drought and other disasters. Food productivity is very low and the mean annual gross income per capita in the project areas is only US$ 210 with the lowest at US$ 109 in Bieli Village of Maoxian County (see Table G.1.). To maximize the socio-economic benefit, the afforestation/reforestation design was prepared with a participatory approach. PRA methods were adopted in interviewing and consulting with farmer households in the project areas to understand the local farmers/communities' preferences, wishes and concerns, so that the proposed A/R CDM project activity would better respond to their desires for livelihood development (see also Section H below). The local farmers will participate the project activity such as site preparation, planting, weeding, thinning, harvesting, etc. and earning direct benefits during the crediting period. It is expected that 28 villages of 21 towns/townships from 5 counties will benefit from the proposed project. The main socio-economic benefits of the project include:

(1) Income generation. About 12,745 local farmers of 3,231 households will benefit from the project, including 5,384 people of ethnic minorities. The total income is estimated at US$ 9.2 million within the 30 years period, including about US$ 6.1 million from employment, US$ 2.5 million from sales of wood and non-wood products and US$ 5.5 million from sales of CERs. The mean net annual income per capita will be increased by US$ 24 or by 10.3% compared to the year 2006 (table G.2. below). The income generation is especially important for ethnic minorities in Beichuan, Lixian and Maoxian County and some villages in Qingchuan County, where the ethnic minority groups take the majority in the villages. With two third of population being Qiang, Beichuan County is the only Qiang autonomous county in China (Table G.4.).

(2) Employment. The proposed A/R CDM project activity will create over 1 million person-days of temporary employment opportunities from planting, weeding and tending, thinning, harvesting, etc. It will also create 38 long-term job positions during the crediting period (Table G.3.). Most employment opportunities will be taken by the local farmers/communities involved in the proposed A/R CDM project activity and beyond (whose lands do not fall within the project boundary).

(3) Strengthening social cohesion. As indicated earlier, individual farmer households/ communities are too weak to successfully manipulate the chain from investment, production to market especially for the timber and non-wood forest products which will take a much longer period than food and livestock production. In addition, the lack of organizational instruments also prevents them from overcoming technological barriers. Overall the proposed A/R CDM project activity will entail close interaction between individuals, communities, companies and government, with intensified communication among them and supporting networks for social and productive services, especially for the ethnic minorities.

(4) Technical training and demonstration. Interview with local communities indicated that local farmers/communities are usually short of access to quality seed sources and lack skills for producing high quality seedlings and for successful tree planting, as well as for preventing

planted trees from being subject to fire, pest and disease attack. This is one of the important barriers of local communities in planting trees on their lands. In the proposed A/R CDM project activity, the local forestry agencies as well as companies/farms will organize the training for local communities to assist them in understanding and evaluating the issues of hosting the proposed A/R CDM project activity, both on-site and off-site such as seed and seedling selection, nursery management, site preparation, planting models and Integrated Pest Management.

Potential socio-economic risks and countermeasures:

(1) 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.

(2) Ethnic Minority Groups

The project areas are mixed habitated by up to 11 ethnic minority groups, including Tibet, qiang, hui, man, etc. According to the social assessment done by the social assessment team, there are equal rights for the ethnic minority groups to access to development opportunities.

(3) Economic risk

The potential economic risks will be poor management of the plantations established under the project such as lack of pest and fire control, which would contribute to project failure and farmers' loss. This risk will be mitigated by providing technical assistance and training to farmers and communities, by local forestry agencies, forestry research and design institutions, as well as by the extension network of the forestry sector. The operating entity is experienced in afforestation and reforestation, which will also provide the technical assistance to the farmers/communities.

Table G.1. Socio-economic Profiles of Project Areas :

County	Town/ Township	Villages	Area to be planted (ha)	Number of household	Popu-lation	Number of labors	People employed outside	Population of ethnic minority	Forest area (ha)	Number of live-stock (head)	Cropland area (ha)	Food production per capita (kg)	Mean annual gross income per capita (US$)	Annual fuelwood Consumption per capita (kg)
Beichuan	Qingpian	Zhenghe	37.0	112	488	240	72	432	106.6	720	1.4	350	386	3000
		Anmian	19.0	102	391	213	65	363	41.3	605	2.0	320	264	2800
	Xiaoba	Yongxin	29.1	81	305	245	75	492	24.5	450	2.5	350	371	2000
	Chenjiaba	Tongbao	58.3	187	715	466	140	280	9.4	950	7.4	360	262	2000
	Duba	Huangdimiao	56.8	140	524	263	80	424	48.0	1365	2.3	350	270	2500
Lixian	Ganbao	Ganbao	82.6	215	895	623	148	850	19.3	1800	2.4	400	192	1000
		Lianhe	247.4	37	243	126	47	243	15.0	274	1.9	400	128	2000
		Rierzhu	76.1	164	678	350	60	663	156.0	1800	2.6	400	167	2000
		xiong'er	172.8	102	465	312	14	465	35.1	2220	1.5	430	295	2000
	Xuecheng	shaJing	164.4	172	608	262	96	382	26.0	373	3.5	78	199	800
	State owned		4.5											
Maoxian	Nanxin	Bieli	234.9	318	1560	1200	48	1560	226.7	2700	110.0	100	109	1000
Pingwu	Gaochun	Wuyi	109.8	386	1240	1038	120	0	25.3	651	12.0	680	282	900
	Nanba	Tongjiang	14.5	167	607	205	58	0	59.7	40	30.5	400	233	850
	Shuijing	Xinhua	42.2	174	794	402	70	0	58.1	136	19.9	530	333	800
	Pingtong	Xinyuan	24.1	171	607	365	116	577	34.5	26	20.6	420	328	810
Qingchuan	Qiaolou	Hexi	44.0	349	1154	714	180	420	23.3	572	8.1	700	199	900
	Baijia	Huajian	60.3	281	1023	594	50	0	56.5	220	5.1	530	244	500
	Malu	Fangshi	60.2	262	1028	498	123	0	18.8	125	1.4	350	253	350
		caiqi	79.9	100	362	300	20	0	75.7	120	3.2	600	295	920

	Fangshi	Xinqiao	177.9	279	1018	550	120	0	40.9	1215	11.8	573	192	500
	Zhuyuan	Qingjiang	61.8	683	2730	1315	200	0	60.6	1370	6.9	780	151	300
	Qingqi	Weiba	38.4	316	1070	500	163	0	180.0	1243	8.3	697	255	600
		Dongqiao	68.0	224	940	660	69	468	22.2	700	4.0	400	179	300
		Luoyigou	74.4	254	960	618	55	0	28.1	970	3.9	720	203	700
	Dayuan	Shuojia	107.1	151	565	300	50	539	375.9	400	5.4	400	196	500
	Kongqi	Yaolin	23.3	211	812	404	61	0	92.5	705	9.0	450	253	800
	Maoba	Jingjia	45.2	161	624	200	56	0	45.1	200	5.6	500	141	900
	Sanguo	Dongyang	37.8	700	2400	1520	116	0	449.9	2720	19.8	730	241	800

Table G.2. Income generated by project activities:

County	Townships	Villages that benefit	Number of households that benefit	Number of Beneficiaries	Net income within lifetime of the project (US$ `000)				Added annual net income (US$'000)	Added annual net income per capita (US$'000)	Net income per capita in 2006 (US$'000)	Income increase compared to 2006 (%)
					Labours	Wood & non-wood product	CERs	total				
Beichuan	Qingpian	Zhenghe	35	125	130.3	84.0	8.1	222.5	7.417	0.059	0.376	15.69%
		Anmian	42	159	66.9	43.1	4.2	114.3	3.810	0.024	0.265	9.06%
	Xiaoba	Yongxin	19	72	206.1	169.5	6.4	382.0	12.733	0.177	0.273	64.84%
	Chenjiaba	Tongbao	29	108	412.9	339.6	12.8	765.3	25.510	0.236	0.267	88.39%
	Duba	Huangdimiao	29	129	301.2	229.9	12.5	543.6	18.120	0.140	0.391	35.81%
Lixian	Ganbao	Ganbao	215	895	62.0	0.0	18.1	80.1	2.670	0.003	0.195	1.54%
		Lianhe	37	243	185.5	0.0	54.3	239.8	7.993	0.033	0.129	25.58%
		Rierzhu	164	678	57.1	0.0	16.7	73.8	2.460	0.004	0.169	2.37%
		xiong'er	102	465	128.3	0.0	37.9	166.2	5.540	0.012	0.299	4.01%
	Xuecheng	shaJing	172	608	122.4	0.0	36.1	158.5	5.283	0.009	0.202	4.46%
	State owned	State owned			3.4	0.0	1.0	4.4	0.147	0.000	0.000	0.00%
Maoxian	Nanxin	Bieli	318	1560	156.9	0.0	51.6	208.5	6.950	0.004	0.110	3.64%
Pingwu	Gaochun	Wuyi	233	780	340.9	238.7	24.1	603.6	20.120	0.026	0.286	9.09%
	Nanba	Tongjiang	22	102	45.0	31.5	3.2	79.7	2.657	0.026	0.338	7.69%
	Shuijing	Xinhua	60	292	196.8	152.0	9.3	358.0	11.933	0.041	0.236	17.37%
	Pingtong	Xinyuan	15	66	170.7	140.4	5.3	316.4	10.547	0.160	0.332	48.19%
Qingchuan	Qiaolou	Hexi	117	424	158.9	103.6	9.7	272.2	9.073	0.021	0.247	8.50%
	Baijia	Huajian	281	1081	83.9	152.0	13.2	249.1	8.303	0.008	0.199	4.02%
	Malu	Fangshi	262	990	83.5	151.8	13.2	248.5	8.283	0.008	0.195	4.10%
		caiqi	100	420	111.0	201.5	17.5	330.0	11.000	0.026	0.256	10.16%
	Fangshi	Xinqiao	279	1044	642.5	418.7	39.1	1100.3	36.677	0.035	0.299	11.71%
	Zhuyuan	Qingjiang	37	143	86.0	155.8	13.6	255.4	8.513	0.060	0.256	23.44%

	Qingqi	Weiba	41	131	138.7	90.4	8.4	237.5	7.917	0.060	0.143	41.96%
		Dongqiao	224	879	94.5	171.5	14.9	280.8	9.360	0.011	0.201	5.47%
		Luoyigou	254	840	268.7	175.1	16.3	460.1	15.337	0.018	0.182	9.89%
	Dayuan	Shuojia	48	163	386.8	252.1	23.5	662.4	22.080	0.135	0.205	65.85%
	Kongqi	Yaolin	21	84	84.2	54.8	5.1	144.1	4.803	0.057	0.259	22.01%
	Maoba	Jingjia	42	144	163.2	106.4	9.9	279.5	9.317	0.065	0.244	26.64%
	Sanguo	Dongyang	33	120	136.5	89.0	8.3	233.8	7.793	0.065	0.153	42.48%
Total			**2387.0**	**9263.0**	**5024.4**	**3551.4**	**494.5**	**9070.3**	**302.343**	**0.024**	**0.231**	**10.39%**

Table G.3. Employment created by project activities:

County	Townships	Villages	Temporary position created by the project				Long term position
			planting	Weeding & tending	thinning	total	
Beichuan	Qingpian	Zhenghe	3,330	2,775	22,570	28,675	1
		Anmian	1,710	1,425	11,590	14,725	1
	Xiaoba	Yongxin	2,619	2183	40,536	45,338	1
	Chenjiaba	Tongbao	5,247	4373	81,212	90,832	1
	Duba	Huangdimiao	5,112	4,260	56,885	66,257	1
Lixian	Ganbao	Ganbao	7,434	6,195	0	13,629	8
		Lianhe	22,245	18,555	0	40,800	
		Rierzhu	6,849	5708	0	12,557	
		xiong'er	15,267	12,960	0	28,227	
	Xuecheng	shaJing	14,586	12,330	0	26,916	
	State owned	State owned	405	338	0	743	
Maoxian	Nanxin	Bieli	16,889	17,618	0	34,507	4
Pingwu	Gaochun	Wuyi	11,529	8,235	55,226	74,990	2
	Nanba	Tongjiang	1,523	1,088	7,296	9,907	1
	Shuijing	Xinhua	4,184	3,165	35,942	43,291	1
	Pingtong	Xinyuan	2,169	1808	33,571	37,548	1
Qingchuan	Qiaolou	Hexi	3,960	3,300	27,698	34,958	1
	Baijia	Huajian	6,332	4,523	7,599	18,454	2
	Malu	Fangshi	6,321	4,515	7,536	18,372	1
		caiqi	8,390	5,993	10,048	24,431	1
	Fangshi	Xinqiao	16,011	13,343	111,990	141,344	2
	Zhuyuan	Qingjiang	6,489	4,635	7,787	18,911	1
	Qingqi	Weiba	3,456	2,880	24,173	30,509	1
		Dongqiao	7,140	5,100	8,541	20,781	1
		Luoyigou	6,696	5,580	46,835	59,111	1
	Dayuan	Shuojia	9,639	8,033	67,421	85,093	1
	Kongqi	Yaolin	2,097	1,748	14,669	18,514	1
	Maoba	Jingjia	4,068	3,390	28,453	35,911	2
	Sanguo	Dongyang	3,402	2,835	23,795	30,032	1
Total			205,099	168,891	731,373	1,105,363	38

Table G.4. Ethnic minorities that benefit from the project:

County	Townships	Villages	Number of households that benefit	Number of Beneficiaries	Number of Minority beneficiaries			
					Tibet	Qiang	Hui	total
Beichuan	Qingpian	Zhenghe	35	125		120		120
		Anmian	42	159		152		152

	Xiaoba	Yongxin	19	72		61		61
	Chenjiaba	Tongbao	29	108		59		59
	Duba	Huangdimiao	29	129		81		81
Lixian	Ganbao	Ganbao	215	895	850			850
		Lianhe	37	243	243			243
		Rierzhu	164	678	663			663
		xiong'er	102	465	465			465
	Xuecheng	shaJing	172	608	382			382
	State owned							
Maoxian	Nanxin	Bieli	318	1560	1560			1560
Pingwu	Gaochun	Wuyi	233	780				
	Nanba	Tongjiang	22	102				
	Shuijing	Xinhua	60	292				
	Pingtong	Xinyuan	15	66				
Qingchuan	Qiaolou	Hexi	117	424			154	154
	Baijia	Huajian	281	1081				
	Malu	Fangshi	262	990				
		caiqi	100	420				
	Fangshi	Xinqiao	279	1044				
	Zhuyuan	Qingjiang	37	143				
	Qingqi	Weiba	41	131				
		Dongqiao	224	879			438	438
		Luoyigou	254	840				
	Dayuan	Shuojia	48	163			156	156
	Kongqi	Yaolin	21	84				
	Maoba	Jingjia	42	144				
	Sanguo	Dongyang	33	120				
Total			**3,231**	**12,745**	**4,163**	**473**	**748**	**5,384**

G.2. If any negative impact is considered significant by the project participants or the host Party, a statement that project participants have undertaken a socio-economic impact assessment, in accordance with the procedures required by the host Party, including conclusions and all references to supporting documentation:

>> None of the potential risks is considered to be significant and no significant negative impacts have been identified.

G.3. Description of planned monitoring and remedial measures to address significant impacts referred to in section G.2 above:

>> Although there is no significant negative socio-economic impact, the monitoring plan including the mitigation measures to address any potential risks will be implemented.

SECTION H. Stakeholders' comments:

H.1. Brief description of how comments by local stakeholders have been invited and compiled:

>> Comments by stakeholders have been invited using PRA approach. The step-wise procedures to obtain the comments are:

Step 1. A 3-day training courses was held on August 2-4 2006 in Chengdu so that the team members can fully understand the importance, procedures, methods and how to use the assessment tools. Social assessment experts from the Conservation Internation, Sichuan Academy of Social Science and Sichuan Forestry Department were invited to give lectures and 23 staff from 5 counties involved attended the training courses.

Step 2. Organizing assessment team, collecting related social-economic data, developing assessment plan and preparing tools needed for PRA.

Step 3. Conducting PRA by various group. Each group was lead by an expert. Specific PRA method includes:

(1) Semi-Structure Interview:

(a) Interviewing with key persons such as village head, senior villagers and VIPs that are familiar with local social-economy, land and forest resources, land use and land tenure, fuelwood consumption, grazing activities, important historic events and environment conditions, and based on the interview developing resource map of local communities, agricultural seasoning and historic event-records.

(b) Interviewing with farmer households. 10-15 households from each of 29 project villages of 5 counties, 348 households in total, have been randomly selected and interviewed. See Table H.1. for the number of household interviewed.

Table H.1. Number of household interviewed and questionaired:

Counties	Qingchuan	Pingwu	Beichuan	Maoxian	Lixian	Total
Number of Townships	10	4	4	1	2	**21**
Number of villages	14	4	5	1	5	**29**
Number of households interviewed	178	40	54	16	60	**348**

(c) Questionnaire forms were developed and distributed among different stakeholders, including households interviewed above, villages, town/township governments, local forest posts and forestry bureau and nature reserves. The questionnaire forms were collected and analyzed to understand the local socio-economic profiles, land use, land tenure, income and sources, land management ways, awareness, technical know-how, favorable tree species, technical and financial barriers, need and desire of farmers in the ways to participating in the proposed A/R CDM project activity from relevant stakeholders.

(2) Seminar of farmers' representatives. To briefly introduce the concept, benefits and risks, procedures and modalities of CDM afforestation/reforestation project, to get comprehensive information of the historic and current situation and existing problems in local communities, as

well as to understand the need and desire of local farmers, a meeting of farmer representatives was held in each village. Favorable tree species were also discussed.

Step 4. Drafting reports;

Step 5. Expert seminar to discuss the draft report;

Step 6. Supplementary survey and report revision based on output of the expert seminar.

H.2. Summary of the comments received:

>> Comments from local farmers, villages and companies/farms, etc. are summarized as follow:

1. Primary stakeholders:

(1) Farmers/communities

Local farmers are well acquainted with the environmental benefits of forests. They understand that forests can contribute to sustainable environmental and socio-economic development through controlling soil erosion, cleaning air, protecting cropland and mitigating flood and drought. They also have a good conservation awareness of rare and endangered wild animals and plants. Most of them can tell the names of some protected animals in the vicinity and can voluntarily and actively participate the wildlife conservation.

At the time of the interview, local farmers had little knowledge on the concept of the carbon credit, even had not heard the terms. After the introduction by the team, local farmers/communities expresses their strong interests to participate in the proposed A/R CDM project activity because they thought that through participating in the proposed A/R CDM project activity they can obtain the following benefits:

- ✓ Employment chance. They do not have to find jobs far away from hometown, which make it possible to look after their cropland and/or livestock at the same time.
- ✓ Income increase from selling wood and non-woody forest products and CER trade in addition to direct products.
- ✓ Greening their non-forested lands that can improve local environment, shelter cropland and reduce drought, flood, land slide and other natural disasters.
- ✓ Learning good practice on tree planting and forest management from technical training.

Many farmers regard the carbon trade invisible and intangible, hence still suspect the trueness of the carbon transaction. More training work s are necessary.

The survey showed the proposed production arrangements. the household offer lands for forest establishment as equity. The operating entity will invest in forest establishment (including site preparation, seedling, 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 operating entity invests in seedlings, fertilizer, pesticide and forest management, and provide technical inputs and undertake related risks. Local farmers/communities indicated that without the proposed small-scale A/R CDM project activity it is impossible for them to plant trees on the project area due to huge pre-investment, technical unknown how, organizational barriers and low economic return in terms of the degraded remote lands.

During the PRA process, the assessment on tree species also indicates that local farmers/communities like native species and prefer tree species in orders as listed in Table H.2. However they would like to accept the recommendation of experts concerning the choice of tree species.

Table H.2. Preference order of tree species by local communities:

Counties	**Preference Order of Tree Species (From High to Low)**
Qingchuan	*Cunninghamia lanceolata, Betula sp. Liquidambar formosana, Quercus acutissima, Pinus massoniana*
Pingwu	*C. lanceolata, Betula sp., larix sp., Quercus acutissima*
Beichuan	*Magnolia officinalis, Betula sp., Alder sp., Larix sp*
Maoxian	*Betula sp., Acer sp., C. lanceolata, Quercus sp., Pinus tabulaeformis, poplar sp.*
Lixian	*Cupressus chengiana, Platycladus orientalis, Ulmus sp., Pinus tabulaeformis, Quercus sp.*

(2) The operating entity

The operating entity, Daduhe Forestation Administration, that focuses its business on afforestation/ reforestation and forest management in Western Sichuan Province, is very interested in participating in the proposed A/R CDM project activity. They would like to invest in the afforestation/reforestation on the economically unattractive lands because:

- They can share part of income from sale of CERs that have no market risk, in addition to wood products;
- The commercial loan can alleviate their financial pressure from pre-investment, without the proposed A/R CDM project activity such loans is difficult to obtain in the context of remote degraded lands.
- Without the proposed A/R CDM project activity, they would be unwilling to invest in the afforestation or reforestation on the degraded lands due to the unacceptably low economic revenues.

With regard to the financing arrangements, the operating entity prefers to rent lands from local farmers/communities and pay labor costs in addition to land lease costs. However, they would also accept the share holder arrangement as the project promoted.

2. Secondary stakeholders:

(1) Local government. 17 questionaire forms have been received from local government or governmental department. County Forestry Bureaus and forestry posts view that the proposed A/R CDM project activity will increase forest resources, improve the local environment and increase income of local farmers/communities, as well as demonstrate best practice of watershed management to other watershed areas. They would provide technical training and consultation to farmers/communities and planting entities, and supervise the implementation of the proposed A/R CDM project activity.

(2) Local Governments. County and township/town governments consider that the proposed A/R CDM project activity can improve local economy and alleviate local poverty especially for the ethnic minorities, and at the same time benefit to globally climate change mitigation and biodiversity conservation as well as improve watershed management. Therefore, the proposed A/R CDM project activity would have great impacts as if technical best practices developed by the proposed A/R CDM project activity are extended to neighbouring areas or local communities that do not involve in the project. They proposed to apply environmental-friendly pesticide or biological measures to control pest insect and disease, and over 90 percent of governments recommend to use organic manure as fertilizers rather than chemical fertilizers.

H.3. Report on how due account was taken of any comments received:

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

- More intensive training courses will be held at local communities so that local farmers can fully understand the carbon credit and the trueness of the transaction.
- Participation of local farmers/communities and companies/farms is on a voluntarily basis.
- Choice of financing arrangements 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 native to local, and a mixed species arrangements will be used;
- Compound and/or organic fertilizers will be applied through small holes rather than overall dispersion;
- Use of chemical pesticides will be limited. Rather, disease and pest will be controlled by mixed tree species arrangement and other biological measures;
- Slash and burn site preparation and overall ploughing for soil preparation will not be used.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROPOSED A/R CDM PROJECT ACTIVITY

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

The establishment cost in the proposed A/R CDM project activity is estimated to be around US$ 1.99 million, among which US$ 0.89 million will be from local commercial bank, US$ 0.70 million from government equity and US$ 0.39 million from the participants themselves. There is no available public funding that will result in a diversion of official development assistance and financial obligations of any Parties under UNFCCC.

Annex 3

BASELINE INFORMATION

To provide transparent information for the project boundary, baseline stratification, determination of baseline scenario and the ex ante estimation of baseline net removals by sinks and leakage. Baseline survey was conducted in the summer and autumn 2006. The survey include:

- Project boundary;
- Baseline stratification;
- Pre-project carbon stock in living biomass of non-tree vegetation
- Pre-project spotted trees;
- Grazing activity within and outside the project boundary.

Methodological guidelines for baseline survey for FCCB project in Sichuan Province have been developed and followed. The guidelines are based on methodological manual for measuring terrestrial carbon pool by Winrock International[14] and the approved methodology applied.

1. Determination of project boundary

Step 1. Determining potential eligible lands by overlap land use/cover maps in 2000 and pre-1990;

Step 2. Interviewing with local farmers to verify that the candidate lands have not been forested lands since January 1 1990;

Step 3. On-site measuring geographical coordinates of each corner of polygon site using GPS (see table.A.3. e.g);

Step 4. Inputting GPS-measured coordinates in GIS platform and producing project boundary maps (see Fig. A.2. through Fig. A.6.).

2. Baseline stratification

Step 1. Field study tours on each parcel of land to inspect the existing vegetation, soil condition and erosion status;

Step 2. Interview with local farmers on land use/cover history, important events that have impacted the land use/cover, and current human interventions (grazing, collecting of fuel, etc);

Step 3. Based on field survey and interviewing, the lands to be afforested or reforested in the proposed A/R CDM project activity are distributed in five counties that have different climate, soil, vegetation and landform. Within each county, vegetation and grazing activity are the major factors that will influence pre-existing conditions and baseline projections. The project lands were therefore stratified into 14 baseline strata (Table C.3.).

[14] http://www.winrock.org/ecosystems/files/Winrock_Methods_Manual_SOPs_2005_Chinese_Edition.pdf

Step 4. The baseline strata and project strata have been built into GIS platform to produce baseline strata map (see Fig C.3. and Fig C.4. for an example of baseline strata map and project strata map).

3. Pre-project carbon stock in living biomass of non-tree vegetation

Plots have been randomly selected for measuring pre-project carbon stock in living biomass of non-tree vegetation and pre-project trees, for each baseline stratum. The number of sample plots for each baseline stratum depends on pre-project vegetation types and the area of stratum, and use the expressions issued by the CDM-EB[15].

Step 1. Confirm an expected required error 10% and confidence level 95%.

Step 2. Suppose an initialization for the sample plots number 10-20, depending on the total project and the strata area size.

Step3. Carry out the advance baseline survey to obtain a rudimental baseline data, and calculate the required sample plots number use the equation as follow, depending on the mean and standard deviation of the advance survey result:

$$n = \frac{\left[\sum_{i=1}^{L} N_i \cdot st_i \cdot \sqrt{C_i}\right] \cdot \left[\sum_{i=1}^{L} N_i \cdot st_i \cdot \frac{1}{\sqrt{C_i}}\right]}{\left(N \cdot \frac{E_1}{z_{a/2}}\right)^2 + \sum_{i=1}^{L} N_i \cdot \left(st_i\right)^2}$$

Where:

n	Sample size (total number of sample plots required) in the project area
i	1,2,3,……..L project strata
a	1-a is probability that the estimate of the mean is within the error bound E
$Z_{a/2}$	value of the statistic z (embedded in Excel as: inverse of standard normal probability cumulative distribution), for e.g. 1-α = 0.05 (implying a 95% confidence level) $Z_{a/2}$=1.9599
C_i	cost of establishment of a sample plot for each stratum *i;* e.g. US $
N_i	maximum possible number of sample plots in stratum *i*
s_{ti}	standard deviation for each stratum *i*; dimensionless
E_1	allowable error of the estimated quantity *Q (*approximate average value of the estimated quantity *Q,* (e.g. aboveground wood volume per hectare); e.g. m^3/ ha *)*

See Table Annex 1 for the specific number of sample plots.

Step4. Use the random distribute procedure in the GIS to distribute sample plots on the map and direct the sample plots through the stochastic direction in the field survey.

[15] Calculation of the number of sample plots for measurements within A/R CDM project activities (Version 01)EB 31

The size of sub-plots is 1 m ×1 m and 50 cm × 50 cm for aboveground and belowground biomass of herbaceous plants, and 2 m ×2 m and 1 m ×1 m for aboveground biomass and belowground biomass of shrubs. For four major large shrubs (*Coriaria nepalensis, Rubus faberi, Berberis sp., Zanthoxylum simulans*), the sub-plot size is 5m ×5 m. Pre-project trees were measured within circular plots with radius 20 m.

Table Annex 1. Number of plot for each baseline stratum:

Baseline strata ID	Number plots/subplots				
	Plot	Grass subplot	Shrub subplot	Large shrub subplot	Circular plot for pre-project trees
BLS-BC-□	13	52			13
BLS-BC-□	13		52		13
BLS-LX-□	45	180			45
BLS-LX-□	20	80	4	1	20
BLS-MX-□	20	80	10		20
BLS-PW-□	20	48	35		20
BLS-PW-□	25	56	63		25
BLS-QC-□	9	36	11		9
BLS-QC-II	6	24	6		6
BLS-QC-□	9	11	36		9
BLS-QC-IV	8	17	32		8
BLS-QC-□	8	18	32		8
BLS-QC-□I	10	13	40		10
BLS-QC-□	11	38	40	20	11

Step5. Field measurements and calculate:
Except for large shrubs, the aboveground biomass and belowground biomass of herbaceous plants and shrubs were measured by cutting down and weighing the whole sample fresh biomass within the plot area. Well-mixed samples of leaf, caudex, flower and fructification (80-120g for each sample) for aboveground and belowground materials were then collected and oven dried to determine dry-to-wet matter ratios. These ratios are then used to convert the entire sample to oven-dry matter.

$$Dry \cdot mass = \left(\frac{subsample \cdot dry \cdot mass}{subsample \cdot fresh \cdot mass} \right) \times fresh \cdot mass \cdot of \cdot whole \cdot sample$$

Extrapolate from plot measurements to larger scale is use to calculate the whole mass of each strata:

$$Scaling \cdot factor = \frac{10000 \cdot m^2}{Area \cdot of \cdot plot \cdot m^2}$$

For large shrubs, a study for four major large shrubs (*Coriaria nepalensis, Rubus faberi, Berberis sp., Zanthoxylum simulans*) has been conducted before baseline survey, which resulted in following allometric equations:

Coriaria nepalensi $SB=129.1004\times(DB^2\times SH)^{0.9011}$

Rubus faberi $SB=4.7748\times(DB^2\times SH)^2+101.72\times DB^2\times SH+14.628$

Berberis sp $SB=336.477\times DB^{1.0463}\times CD^{1.0348}$

Zanthoxylum simulans $SB=93.9375\times(DB\times CD)^{1.5869}$

Where:

SB	Shrub biomass (kg)
DB	Diameter at base of shrub (cm)
SH	Shrub height (m)
CD	Crown diameter of shrub (cm)

Therefore during field measurement, the diameter at base, height, crown diameter and number of shrub stems were measured for the large shrubs, followed by biomass estimation using allometric equations above.

The carbon stock in pre-project living biomass of non-trees was calculated with 95% of confidence level and 10% error level, and convert biomass to carbon, the results are listed in Table Annex 2 as below:

Table Annex 2. Carbon stock in pre-project living biomass of non-tree vegetation:

Stratum ID	**Area (ha)**	**Carbon stock per ha (tC/ha)**			**Carbon stock (tC)**		
		AGB	**BGB**	**total**	**AGB**	**BGB**	**total**
BLS-BC-□	90.7	1.6 (0.3)	1.7 (0.3)	3.3	145.2	151.0	296.1
BLS-BC-□	109.5	4.0 (1.0)	2.3 (0.5)	6.3	438.3	251.5	689.9
BLS-LX-□	626.8	1.7 (0.5)	1.2 (0.5)	2.9	1058.2	744.1	1802.3
BLS-LX-□	121.0	3.5 (1.1)	2.2 (1.3)	5.7	426.6	265.3	691.9
BLS-MX-□	234.9	1.8 (0.8)	1.4 (0.6)	3.3	432.1	337.6	769.8
BLS-PW-□	70.1	2.8 (1.1)	4.7 (1.3)	7.5	196.6	330.3	527.0
BLS-PW-□	120.5	3.9 (1.2)	7.0 (1.4)	10.8	465.4	838.3	1303.7
BLS-QC-□	107.1	1.7 (0.8)	2.2 (0.9)	3.9	182.4	232.7	415.1
BLS-QC-II	83.0	1.4 (0.8)	2.5 (0.9)	3.8	115.0	203.6	318.5
BLS-QC-□	125.0	4.6 (1.3)	4.2 (1.3)	8.8	572.0	526.0	1097.9
BLS-QC-IV	164.9	4.9 (0.9)	3.8 (1.2)	8.7	812.8	621.7	1434.5
BLS-QC-□	120.5	4.9 (1.1)	5.2 (1.1)	10.0	587.4	620.3	1207.6
BLS-QC-□I	141.7	5.8 (1.1)	5.0 (1.1)	10.9	825.4	712.6	1538.0
BLS-QC-□	136.1	8.3 (2.6)	5.0 (1.7)	13.3	1126.8	683.0	1809.9
Total	**2251.8**	**3.3**	**2.9**	**6.2**	**7384.2**	**6518.0**	**13902.2**

* the values in brackets is the S.E (Standard Error)

4. Pre-project spotted trees

Allometric volume equations presented in Section E.4.1 are used to estimate the standing volume of the pre-project spotted trees. For lands or strata with very spotted pre-existing trees, all trees have been surveyed during the baseline reseach.

Step1. Choose an equation that most matches the area, species, and land cover type of this project .

Step2. Locate the temporary round plots with radius of 20m, depending on the sample size and plot location determined in the non-tree vegetation sample plan as above.

Step3.Measure DBH and Height of all spotted trees with in the 20m radius round plot:

(a) Place 1.3 m pole along tree,

(b) Measure DBH at 1.3 m using DBH tape,

(c) Push hook of DBH tape into bark

(d) Pull tape to RIGHT

(e) Pull tape around tree and ABOVE hook

(f) Numbers on tape should be right side up

(g) If the tree is leaning, wrap DBH tape along tree angle, NOT parallel to ground

(h) Boundary trees: if >50% of tree inside plot, then measure the tree

(i) Forked tree: measure both, record as two trees

(j) Always measure 1.3 m from up slope side of tree

Step4. Use allometric volume equation presented in Section E.4.1 to estimate volume of all sample trees from DBH and Height:

Example Equation:

$$V=0.000066492455\times DBH^{1.8655617}\times H^{0.93768879}$$

Step5. The standing volume is then converted to aboveground and belowground biomass via parameters

Mass (g) =Volume (cm^3) ×density (g/cm^3)

Step6. Extrapolate from plot measurements to larger scale is use to calculate the whole mass of each strata listed in Table Annex 3 bellow.

$$Scaling\cdot factor=\frac{10000\cdot m^2}{Area\cdot of\cdot plot\cdot m^2}$$

Table Annex 3. Carbon stock in pre-project living trees(parameters for Betula sp. have been used for all other broadleaf species):

Stratum ID	Area (ha)	Carbon stock (tC)		
		AGB	BGB	total
BLS-BC-I	90.7	8.7	2.0	10.7
BLS-BC-II	109.5	28.4	6.6	35.0
BLS-LX-I	626.8			

BLS-LX-II	121.0			
BLS-MX-I	234.9	8.3	1.9	10.2
BLS-PW-I	70.1	0.9	0.2	1.1
BLS-PW-II	120.5	2.8	0.6	3.5
BLS-QC-I	107.1	11.7	2.7	14.4
BLS-QC-II	83.0			
BLS-QC-III	125.0	18.5	4.1	22.6
BLS-QC-IV	164.9	3.2	0.6	3.9
BLS-QC-V	120.5			
BLS-QC-V I	141.7	12.9	3.1	16.0
BLS-QC-VII	136.1	7.8	1.8	9.6
Total	**2251.8**	**103.2**	**23.7**	**126.9**

Age and crown radius of all trees within circular plots were measured. The potential crown diameter at maturity has been estimated. The crown area for 1 tree at maturity is estimated about 50 m^2, and maximum 16 trees per hectare gives 804 m^2, equivalent to 8.04% of crown cover (see Table Annex 4. below, which is below the threshold of 20% for defining as a forest.

Table Annex 4. Pre-project living trees:

Stratum ID	Area (ha)	Dominant tree species	Number of trees per ha		Mean age	Mean DBH (cm)	Mean height (m)	Mean crown diameter (m)	Estimated crown diameter at maturity (m)	Crown cover at maturity (%)	
			max	mean						max	mean
BLS-BC-I	90.7	*Rhus delavayi Franch+Betula spp.*	16	4	20	12.44	10.5	3.4	8	8.04	2.01
BLS-BC-II	109.5	*Rhus delavayi Franch*	16	8	20	16.33	8.26	3.3	8	8.04	4.02
BLS-LX-I	626.8		0	0							
BLS-LX-II	121		0	0							
BLS-MX-I	234.9	*Crataegi cuneatae*	16	8	48	7.59	4.8	3.7	5	3.14	1.57
BLS-PW-I	70.1	*Alnus cremastogyne+Juglans regia+Betula spp.*	16	9	5	6	2.25	3.4	8	8.04	4.52
BLS-PW-II	120.5	*uglans regia+Betula spp.*	16	4	6	8.5	5.13	3.8	8	8.04	2.01
BLS-QC-I	107.1	*Alnus cremastogyne*	16	11	18	8.55	8.92	4.2	8	8.04	5.53
BLS-QC-II	83		0	0							
BLS-QC-III	125	*Cedrus atlantica*	16	8	11	12.26	10.83	3	6	4.52	2.26
BLS-QC-IV	164.9	*Pinus massoniana+Keteleeria davidiana*	16	8	11	8.08	2.89	3	6	4.52	2.26
BLS-QC-V	120.5		0	0							

BLS-QC-VI	141.7	*Cupressaceae spp.*	16	4	26	17	4.58	4.8	6	4.52	1.13
BLS-QC-VII	136.1	*Juglans regia+Alnus cremastogyne*	16	6	9	10.46	5.65	3.6	8	8.04	3.02

5. Baseline net removal by sinks

The carbon stock in living biomass of pre-project growing trees is expected to increase in the absence of the proposed A/R CDM project activity, due to continuous growth of the living trees. The carbon stock in the living biomass of pre-project trees has been predicted using formulae[16].

$$C_{it} = \sum_{j=1}^{J} (C_{AB,ijt} + C_{BB,ijt})$$

$$C_{AB,ijt} = A_{it} \cdot V_{ijt} \cdot D_j \cdot BEF_{2,j} \cdot CF$$

$$C_{BB,ijt} = C_{AB,ijt} \cdot R_j$$

$$V_{ijt} = V_{ijt,s} \cdot N_j$$

Where:

C_{it}	carbon stock in living biomass for stratum i, time t; tonnes C.
A_{it}	area of stratum i, at time t; hectare (ha)
$C_{AB,ijt}$	carbon stock in above-ground biomass for stratum *i,* species *j*, at time *t;* tones C
$C_{BB,ijt}$	carbon stock in below-ground biomass for stratum *i,* species *j*, at time *t;* tones C
V_{ijt}	average standing volume of stratum *i,* species *j*, at time *t;* m^3 ha^{-1}
D_j	wood density for species j; tonnes d.m. m^{-3} standing volume, from table D.3.
$BEF_{2,j}$	biomass expansion factor for conversion of standing volume to aboveground tree biomass for species j; dimensionless
CF	Carbon fraction, dimensionless, CF=0.5 (IPCC default)
R_j	root-shoot ratio for species j; dimensionless , from table D.3.
$V_{ijt,s}$	average standing volume per tree in stratum *i,* species *j*, at time *t;* m^3 $tree^{-1}$
N_j	Number of pre-project living trees for species j; trees ha^{-1}

BEF for single trees is likely bigger than forests and there is no BEF for single trees. To make our estimation conservative, we assumed that BEF for single trees is 50% bigger than that for forests in from table D.3.

$V_{ijt,s}$ is estimated based on the growth curves presented in Table D.2.

The estimated baseline net GHG removals by sinks are the sum of the carbon stock change in above- and below-ground biomass. Detail information is listed in Table annex 5. and Table annex 6. below.

[16] Refer to equation (9)-(11) presented in the revised approved baseline and monitoring methodology applied (AR-AM0003/Version 03).

Table annex 5. Estimates of baseline carbon stock changes:

Year No.	Year	Carbon stock change in aboveground biomass (t CO_2 yr^{-1})	Carbon stock change in belowground biomass (t CO_2 yr^{-1})	Baseline net GHG removals by sinks (t CO_2 yr^{-1})	Cumulative Baseline net GHG removals by sinks (t CO_2)
1	2007	138.8	31.3	170.1	170.1
2	2008	134.2	30.2	164.4	334.5
3	2009	128.9	29.0	157.9	492.5
4	2010	123.2	27.7	151.0	643.4
5	2011	117.4	26.4	143.8	787.3
6	2012	111.5	25.1	136.5	923.8
7	2013	105.5	23.7	129.3	1053.0
8	2014	99.7	22.4	122.1	1175.1
9	2015	94.0	21.1	115.1	1290.2
10	2016	88.4	19.9	108.3	1398.5
11	2017	83.1	18.6	101.8	1500.2
12	2018	78.0	17.5	95.5	1595.7
13	2019	73.1	16.4	89.5	1685.2
14	2020	68.4	15.3	83.8	1769.0
15	2021	64.0	14.4	78.4	1847.4
16	2022	59.9	13.4	73.3	1920.7
17	2023	55.9	12.5	68.5	1989.1
18	2024	52.2	11.7	63.9	2053.0
19	2025	48.7	10.9	59.6	2112.7
20	2026	45.4	10.2	55.6	2168.3

Table annex 6. Baseline net removal by sinks broken by baseline strata (t CO_2 yr^{-1}):

Year No.	Year	Baseline net removals by sinks broken by strata										
		BLS-BC-□	BLS-BC-□	BLS-MX-□	BLS-PW-□	BLS-PW-□	BLS-QC-□	BLS-QC-□	BLS-QC-IV	BLS-QC-VI	BLS-QC-VII	Total
1	2007	5.7	13.7	2.6	24.2	18.2	21.6	19.1	26.2	11.3	27.5	170.1
2	2008	5.2	12.7	2.4	23.8	17.7	20.0	19.2	26.1	11.2	26.0	164.4
3	2009	4.8	11.7	2.2	23.2	17.0	18.5	19.1	25.8	11.1	24.6	157.9
4	2010	4.5	10.8	2.0	22.3	16.2	17.0	18.9	25.3	11.0	23.1	151.0
5	2011	4.1	9.9	1.8	21.2	15.4	15.7	18.5	24.7	10.9	21.6	143.8
6	2012	3.8	9.1	1.7	20.1	14.5	14.5	18.1	23.9	10.7	20.2	136.5
7	2013	3.5	8.4	1.5	19.0	13.6	13.3	17.6	23.1	10.5	18.8	129.3
8	2014	3.2	7.7	1.4	17.8	12.8	12.3	17.0	22.2	10.3	17.4	122.1
9	2015	2.9	7.1	1.3	16.7	11.9	11.3	16.4	21.3	10.1	16.2	115.1
10	2016	2.7	6.5	1.2	15.6	11.1	10.3	15.7	20.3	9.9	15.0	108.3
11	2017	2.5	6.0	1.1	14.5	10.3	9.5	15.0	19.4	9.7	13.9	101.8
12	2018	2.3	5.5	1.0	13.5	9.6	8.7	14.4	18.4	9.5	12.8	95.5
13	2019	2.1	5.0	0.9	12.5	8.8	8.0	13.7	17.5	9.2	11.8	89.5
14	2020	1.9	4.6	0.8	11.6	8.2	7.3	13.0	16.5	9.0	10.9	83.8
15	2021	1.7	4.2	0.7	10.7	7.6	6.7	12.3	15.6	8.7	10.0	78.4
16	2022	1.6	3.9	0.7	9.9	7.0	6.2	11.7	14.7	8.5	9.2	73.3
17	2023	1.5	3.5	0.6	9.1	6.4	5.7	11.0	13.9	8.2	8.5	68.5
18	2024	1.3	3.2	0.6	8.4	5.9	5.2	10.4	13.1	8.0	7.8	63.9
19	2025	1.2	3.0	0.5	7.7	5.4	4.7	9.8	12.3	7.7	7.2	59.6
20	2026	1.1	2.7	0.5	7.1	5.0	4.3	9.2	11.5	7.5	6.6	55.6

Annex 4

MONITORING PLAN

All information has been included in Section E above. Therefore Annex 4 here is left intentionally blank.

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Annex:
Table A.3 vector data on project boundaries corners and project sites map
Lixian:

longitude	latitude	longitude	latitude	longitude	latitude
LX-XE-2006-01-01:		**LX-XE-2006-01-02:**		**LX-XE-2006-01-03:**	
18329464.0	3488377.1	18329527.2	3488284.3	18330098.8	3489492.4
18329465.4	3488306.6	18329535.1	3488371.5	18330415.9	3489190.8
18329411.2	3488275.6	18329535.4	3488375.0	18330414.1	3489190.1
18329421.5	3488223.9	18329476.3	3488379.6	18330339.0	3489162.0
18329477.8	3488188.8	18329476.3	3488379.2	18330238.4	3489162.0
18329519.6	3488226.8	18329467.2	3488388.1	18330171.4	3488977.6
18329619.1	3488144.0	18329418.9	3488518.5	18330040.8	3488770.8
18329704.2	3488053.6	18329470.6	3488590.8	18329643.1	3489016.1
18329774.0	3488039.6	18329442.2	3488590.8	18329708.4	3489023.6
18329713.5	3487769.1	18329555.8	3488786.8	18329735.7	3489111.7
18329602.4	3487717.4	18329591.5	3488897.5	18329729.7	3489178.4
18329534.6	3487519.7	18329625.6	3488927.5	18329662.1	3489261.1
18329561.9	3487332.7	18329638.7	3488970.7	18329731.1	3489398.2
18329454.8	3487359.5	18329610.1	3488983.0	18329731.1	3489398.2
18329213.7	3487466.6	18329643.1	3489016.1	18329855.0	3489604.7
18329117.8	3487922.6	18330040.8	3488770.8	18329855.0	3489604.7
18329080.8	3488081.0	18329935.7	3488645.1	18329856.2	3489610.3
18329104.6	3488197.2	18329827.2	3488428.0	18329856.2	3489610.3
18329365.9	3488661.9	18329814.3	3488234.2	18329907.5	3489610.3
18329404.9	3488655.7	18329774.0	3488039.6	18330024.0	3489629.0
18329307.8	3488402.2	18329704.2	3488053.6	18330098.8	3489492.4
18329464.0	3488377.1	18329518.0	3488202.5	18330151.9	3489377.4
18329362.1	3488053.4	18329527.2	3488284.3	18330124.2	3489376.8
18329359.5	3488234.2	18329532.5	3488537.7	18330127.4	3489336.6
18329333.7	3488231.6	18329581.5	3488514.3	18330156.0	3489338.8
18329333.7	3488061.1	18329620.0	3488600.7	18330151.9	3489377.4
18329362.1	3488053.4	18329567.5	3488627.5	18330040.0	3489453.3
18329478.4	3488105.0	18329532.5	3488537.7	18330041.3	3489422.9
18329424.1	3488120.5	**LX-XE-2006-01-05:**		18330064.2	3489422.9
18329400.8	3488053.4	18330066.2	3489835.0	18330064.3	3489452.5
18329449.9	3488035.3	18330082.8	3489981.6	18330040.0	3489453.3
18329478.4	3488105.0	18330148.4	3490073.0	18330119.4	3489290.0
18329519.7	3487970.7	18330246.0	3490064.2	18330119.4	3489260.5
18329519.7	3487926.7	18330249.2	3490137.8	18330142.3	3489260.5
18329571.2	3487927.3	18330384.1	3490174.6	18330144.1	3489287.0
18329561.0	3487970.7	18330523.1	3490122.7	18330119.4	3489290.0
18329519.7	3487970.7	18330813.7	3489862.7	**LX-XE-2006-01-06:**	
LX-XE-2006-01-04:		18330870.3	3489781.1	18329523.4	3491086.4
18330024.0	3489629.0	18330836.4	3489760.5	18329657.6	3491001.7
18330066.2	3489835.0	18330690.2	3489851.4	18329789.7	3490858.9

18330248.0	3489808.9	18330362.8	3489864.1	18329789.9	3490858.7
18330362.8	3489864.1	18330248.0	3489808.9	18329788.1	3490857.3
18330690.2	3489851.4	18330066.2	3489835.0	18329641.4	3490767.0
18330836.4	3489760.5	**LX-XE-2006-01-08:**		18329784.7	3490558.1
18330779.3	3489736.5	18329415.0	3490196.1	18329802.7	3490574.6
18330722.6	3489716.5	18329614.8	3490131.0	18329802.8	3490574.9
18330623.9	3489597.7	18329749.6	3489726.6	18329908.8	3490663.4
18330573.6	3489329.5	18329833.3	3490093.9	18329981.7	3490558.4
18330415.9	3489190.8	18329749.6	3490349.5	18330092.7	3490409.5
18330098.8	3489492.4	18329448.0	3490795.1	18330035.8	3490393.1
18330024.0	3489629.0	18329530.1	3490799.0	18329941.9	3490386.5
LX-XE-2006-01-07:		18329490.4	3490893.5	18329854.2	3490307.4
18329778.1	3489703.6	18329437.1	3491015.5	18329826.3	3490350.2
18329863.9	3490018.5	18329523.0	3491088.6	18329826.3	3490350.2
18329910.9	3490162.6	18329523.0	3491088.6	18329780.9	3490433.8
18329915.1	3490118.9	18329523.4	3491086.4	18329780.9	3490433.8
18329961.0	3490088.3	18329534.8	3491028.8	18329769.0	3490505.5
18329972.5	3490004.1	18329534.8	3491028.8	18329769.0	3490505.5
18329964.8	3489889.4	18329553.9	3490993.0	18329742.7	3490562.9
18329963.1	3489885.9	18329553.9	3490993.0	18329742.7	3490562.9
18329943.4	3489891.3	18329570.7	3490899.8	18329702.1	3490598.7
18329922.7	3489897.1	18329570.7	3490899.8	18329675.8	3490634.5
18329884.5	3489900.9	18329589.8	3490828.1	18329675.8	3490634.5
18329865.4	3489908.6	18329589.8	3490828.1	18329623.2	3490749.2
18329853.9	3489874.1	18329623.2	3490749.2	18329623.2	3490749.2
18329823.3	3489740.3	18329623.2	3490749.2	18329589.8	3490828.1
18329819.5	3489709.7	18329675.8	3490634.5	18329589.8	3490828.1
18329825.5	3489709.2	18329675.8	3490634.5	18329570.7	3490899.8
18329778.1	3489703.6	18329702.1	3490598.7	18329570.7	3490899.8
LX-XE-2006-02-01:		18329702.1	3490598.7	18329553.9	3490993.0
18329526.0	3491084.9	18329742.7	3490562.9	18329553.9	3490993.0
18329906.5	3491072.0	18329769.0	3490505.5	18329534.8	3491028.8
18329970.4	3491059.0	18329769.0	3490505.5	18329534.8	3491028.8
18329975.9	3491091.4	18329780.9	3490433.8	18329523.4	3491086.4
18330007.9	3491074.2	18329780.9	3490433.8	**LX-XE-2006-02-02:**	
18330007.9	3491074.2	18329826.3	3490350.2	18330792.1	3490418.8
18330077.2	3491052.7	18329826.3	3490350.2	18330792.1	3490418.8
18330077.2	3491052.7	18329854.2	3490307.4	18330812.5	3490474.1
18330177.6	3491021.6	18329854.2	3490307.4	18330812.5	3490474.1
18330177.6	3491021.6	18329841.3	3490306.4	18330806.7	3490584.8
18330251.6	3491007.3	18329896.0	3490216.7	18330806.7	3490584.8
18330251.6	3491007.3	18329862.5	3490207.1	18330824.2	3490680.9
18330347.2	3490995.3	18329869.4	3490170.9	18330824.2	3490680.9
18330347.2	3490995.3	18329909.9	3490173.7	18330815.4	3490812.0
18330356.1	3490993.0	18329910.9	3490162.6	18330815.4	3490812.0

18330359.9	3490991.6	18329863.9	3490018.5	18330804.9	3490914.6
18330359.9	3490991.6	18329778.1	3489703.6	18330804.9	3490914.6
18330318.1	3490926.7	18329825.5	3489709.2	18330861.0	3490940.1
18330090.8	3490947.4	18329883.7	3489704.6	18330861.0	3490940.1
18330100.8	3490902.3	18329855.0	3489604.7	18330946.4	3490979.5
18330370.1	3490772.6	18329855.0	3489604.7	18330946.4	3490979.5
18330439.6	3490810.4	18329732.5	3489407.1	18331027.0	3491044.0
18330509.4	3490717.4	18329659.1	3489471.3	18331027.0	3491044.0
18330672.1	3490893.1	18329555.0	3489412.8	18331039.7	3491015.9
18330705.3	3490927.6	18329433.5	3489903.3	18331039.7	3491015.9
18330705.3	3490927.6	18329415.0	3490196.1	18331056.9	3490986.7
18330733.9	3490896.5	**LX-XE-2006-02-03:**		18331056.9	3490986.7
18330803.8	3490925.6	18331027.0	3491044.0	18331083.4	3490925.6
18330803.8	3490925.6	18331027.0	3491044.0	18331083.4	3490925.6
18330804.9	3490914.6	18331056.6	3491067.6	18331096.9	3490896.0
18330804.9	3490914.6	18331217.4	3491017.2	18331096.9	3490896.0
18330815.4	3490812.0	18331356.9	3491141.2	18331033.9	3490869.9
18330815.4	3490812.0	18331477.4	3491025.4	18330979.6	3490810.4
18330824.2	3490680.9	18331407.1	3490917.0	18331080.4	3490810.4
18330824.2	3490680.9	18331406.3	3490874.7	18331117.8	3490827.6
18330806.7	3490584.8	18331502.8	3490857.8	18331125.5	3490799.4
18330806.7	3490584.8	18331615.3	3490921.6	18331125.5	3490799.4
18330812.5	3490474.1	18331809.4	3491030.4	18331130.0	3490782.9
18330812.5	3490474.1	18331800.0	3490689.7	18331130.0	3490782.9
18330792.1	3490418.8	18331855.7	3490449.9	18331138.9	3490728.2
18330792.1	3490418.8	18331165.0	3490340.1	18331138.9	3490728.2
18330800.9	3490334.3	18331165.0	3490340.1	18331147.5	3490675.1
18330800.9	3490334.3	18331162.1	3490348.9	18331147.5	3490675.1
18330800.2	3490309.1	18331162.1	3490348.9	18331153.3	3490555.7
18330800.2	3490309.1	18331170.8	3490424.6	18331153.3	3490555.7
18330695.8	3490171.8	18331170.8	3490424.6	18331165.0	3490526.6
18330220.0	3490596.0	18331165.0	3490526.6	18331165.0	3490526.6
18330056.2	3490804.2	18331165.0	3490526.6	18331170.8	3490424.6
18329896.6	3490874.9	18331153.3	3490555.7	18331170.8	3490424.6
18329891.8	3490926.1	18331153.3	3490555.7	18331162.1	3490348.9
18329957.4	3490962.4	18331147.5	3490675.1	18331162.1	3490348.9
18329923.5	3490991.4	18331147.5	3490675.1	18331160.7	3490325.0
18329872.6	3490971.5	18331138.9	3490728.2	18331160.7	3490325.0
18329811.2	3490962.5	18331138.9	3490728.2	18331198.7	3490151.7
18329794.1	3491037.2	18331130.0	3490782.9	18330925.5	3489932.8
18329657.6	3491001.7	18331130.0	3490782.9	18330800.2	3490309.1
18329525.9	3491084.9	18331125.5	3490799.4	18330800.2	3490309.1
18329526.0	3491084.9	18331125.5	3490799.4	18330800.9	3490334.3
LX-XE-2006-02-04:		18331117.8	3490827.6	18330800.9	3490334.3
18332211.4	3491030.5	18331117.8	3490827.6	18330792.1	3490418.8

18332211.4	3491030.5	18331096.9	3490896.0	18330857.2	3490323.8
18332207.9	3491021.8	18331096.9	3490896.0	18330869.4	3490285.8
18332207.9	3491021.8	18331083.4	3490925.6	18330956.2	3490315.6
18332070.9	3490876.1	18331083.4	3490925.6	18330938.6	3490345.5
18332070.9	3490876.1	18331056.9	3490986.7	18330857.2	3490323.8
18332070.9	3490817.9	18331056.9	3490986.7	**LX-XE-2006-02-05:**	
18332070.9	3490817.9	18331039.7	3491015.9	18332211.4	3491030.5
18332100.1	3490669.3	18331039.7	3491015.9	18332429.5	3491184.1
18332100.1	3490669.3	18331027.0	3491044.0	18332532.6	3491247.0
18332125.7	3490521.5	18331027.0	3491044.0	18332612.8	3491126.6
18331855.7	3490449.9	18331027.0	3491044.0	18332612.8	3491126.6
18331800.0	3490689.7	18331271.0	3490524.6	18332720.6	3490972.3
18331809.4	3491030.4	18331283.2	3490464.9	18332720.6	3490972.3
18331875.3	3491067.3	18331376.8	3490502.9	18332891.2	3490850.5
18332015.8	3491146.0	18331375.5	3490540.8	18332831.3	3490663.5
18332193.3	3491030.5	18331271.0	3490524.6	18332125.7	3490521.5
18332211.4	3491030.5	**LX-XE-2006-02-06:**		18332125.7	3490521.5
18332052.3	3490898.6	18331160.7	3490325.0	18332100.1	3490669.3
18332002.7	3490923.6	18331160.7	3490325.0	18332100.1	3490669.3
18331871.1	3490784.6	18331165.0	3490340.1	18332070.9	3490817.9
18331969.3	3490756.2	18331855.7	3490449.9	18332070.9	3490817.9
18332052.3	3490898.6	18332125.7	3490521.5	18332070.9	3490876.1
LX-XE-2006-02-07:		18332831.3	3490663.5	18332070.9	3490876.1
18332891.2	3490850.5	18332891.2	3490850.5	18332207.9	3491021.8
18332720.6	3490972.3	18333002.9	3490762.1	18332207.9	3491021.8
18332612.8	3491126.6	18332819.6	3490345.1	18332211.4	3491030.5
18332612.8	3491126.6	18332560.3	3490258.6	**LX-XE-2006-02-08:**	
18332532.6	3491247.0	18331691.1	3490071.3	18332193.3	3491030.5
18332532.6	3491247.0	18331528.8	3490217.7	18332015.8	3491146.0
18333086.9	3491557.9	18331198.7	3490151.7	18332021.0	3491148.9
18332994.3	3491854.4	18331160.7	3490325.0	18331632.7	3491405.5
18332993.0	3491974.1	**LX-XE-2006-02-09:**		18331704.5	3491468.3
18333101.1	3492053.3	18330406.9	3491124.4	18331767.3	3491456.4
18333103.9	3492055.6	18330454.7	3491105.3	18331893.0	3491519.2
18333249.2	3491341.5	18330454.7	3491105.3	18332075.6	3491492.3
18333249.2	3491341.5	18330488.2	3491107.6	18331985.8	3491641.9
18333250.7	3491333.5	18330571.8	3491062.2	18331934.9	3491806.5
18333250.7	3491333.5	18330571.8	3491062.2	18331955.9	3491881.3
18333303.2	3490951.9	18330619.6	3491016.8	18332153.6	3492038.9
18333303.2	3490951.9	18330619.6	3491016.8	18332261.1	3492089.7
18333300.1	3490949.7	18330782.1	3491129.2	18332261.1	3492089.7
18333002.9	3490762.1	18330782.1	3491129.2	18332335.2	3492180.5
18332891.2	3490850.5	18330767.7	3491162.6	18332335.2	3492180.5
18332819.4	3491185.1	18330767.7	3491162.6	18332385.4	3492230.7
18332856.7	3491123.9	18330710.4	3491294.0	18332385.4	3492230.7

18333000.6	3491241.4	18330710.4	3491294.0	18332572.1	3492360.4
18332933.1	3491288.5	18330691.3	3491360.9	18332452.5	3491983.6
18332819.4	3491185.1	18330691.3	3491360.9	18332555.2	3491934.3
LX-XE-2006-02-10:		18330746.2	3491451.7	18332218.1	3491041.5
18329975.9	3491091.4	18330746.2	3491451.7	18332211.4	3491030.5
18330062.6	3491600.8	18330761.7	3491473.6	18332211.4	3491030.5
18330678.4	3491723.5	18331048.2	3491385.4	18332193.3	3491030.5
18330761.7	3491473.6	18331177.4	3491298.8	**LX-XE-2006-02-11:**	
18330746.2	3491451.7	18331243.1	3491193.9	18332572.1	3492360.4
18330746.2	3491451.7	18331211.7	3491142.7	18332385.4	3492230.7
18330691.3	3491360.9	18331082.9	3491131.1	18332385.4	3492230.7
18330710.4	3491294.0	18331039.0	3491077.3	18332335.2	3492180.5
18330710.4	3491294.0	18331056.6	3491067.6	18332335.2	3492180.5
18330767.7	3491162.6	18331056.6	3491067.6	18332261.1	3492089.7
18330767.7	3491162.6	18331027.0	3491044.0	18332153.6	3492038.9
18330782.1	3491129.2	18331027.0	3491044.0	18332427.0	3492529.0
18330703.2	3491016.8	18331027.0	3491044.0	18332605.2	3492464.8
18330619.6	3491016.8	18331027.0	3491044.0	18332572.1	3492360.4
18330571.8	3491062.2	18330946.4	3490979.5	**LX-XE-2006-02-12:**	
18330571.8	3491062.2	18330946.4	3490979.5	18333101.1	3492053.3
18330488.2	3491107.6	18330861.0	3490940.1	18332993.0	3491974.1
18330488.2	3491107.6	18330861.0	3490940.1	18332991.3	3492135.7
18330454.7	3491105.3	18330804.9	3490914.6	18333044.8	3492207.9
18330406.9	3491124.4	18330804.9	3490914.6	18333101.1	3492053.3
18330406.9	3491124.4	18330733.9	3490896.5	**LX-XE-2006-03-01:**	
18330405.6	3491121.9	18330713.5	3490914.0	18333771.3	3492601.7
18330405.6	3491121.9	18330713.5	3490914.0	18333563.3	3492474.4
18330359.9	3490991.6	18330705.3	3490927.6	18333429.5	3492350.1
18330359.9	3490991.6	18330705.3	3490927.6	18333279.0	3492204.4
18330356.1	3490993.0	18330636.0	3490924.1	18333101.1	3492053.3
18330251.6	3491007.3	18330495.8	3490948.3	18333044.8	3492207.9
18330251.6	3491007.3	18330406.9	3491124.4	18333116.9	3492305.2
18330177.6	3491021.6	**LX-XE-2006-03-02:**		18332827.2	3492562.4
18330177.6	3491021.6	18334687.1	3492519.4	18333091.7	3492589.9
18330077.2	3491052.7	18334513.7	3492446.9	18333361.3	3492757.3
18330077.2	3491052.7	18334259.3	3492451.2	18333542.5	3492813.0
18330007.9	3491074.2	18334010.6	3492546.4	18333771.3	3492601.7
18330007.9	3491074.2	18333821.4	3492595.9	**LX-XE-2006-03-03:**	
18329975.9	3491091.4	18333853.2	3492750.9	18333800.7	3492589.4
18329975.9	3491091.4	18334139.0	3492670.5	18333800.7	3492589.4
LX-XE-2006-03-04:		18334602.3	3492668.9	18333820.6	3492544.6
18333800.7	3492589.4	18334687.1	3492519.4	18333820.6	3492544.6
18333821.4	3492595.9	**LX-XE-2006-03-05:**		18333862.2	3492447.5
18334010.6	3492546.4	18333249.2	3491341.5	18333862.2	3492447.5
18334259.3	3492451.2	18333567.4	3491452.3	18333864.7	3492439.1

18334513.7	3492446.9	18333564.0	3491688.1	18333864.7	3492439.1
18334687.1	3492519.4	18333733.5	3491653.1	18333883.0	3492378.1
18335164.7	3492589.9	18333927.3	3491744.9	18333883.0	3492378.1
18335778.3	3492376.1	18333948.3	3491754.9	18333900.3	3492333.0
18335811.0	3492288.0	18333948.5	3491755.5	18333900.3	3492333.0
18335170.5	3492204.6	18334010.5	3491964.1	18333917.7	3492288.0
18334882.1	3492183.7	18334077.2	3491705.4	18333917.7	3492288.0
18334887.8	3492317.2	18334091.1	3491466.1	18333952.5	3492199.4
18334348.8	3492348.7	18334112.6	3491238.3	18333705.2	3492094.1
18334229.1	3492109.7	18333873.0	3491041.9	18333665.5	3492254.4
18333952.5	3492199.4	18333565.3	3490911.5	18333493.4	3492158.8
18333883.0	3492378.1	18333315.6	3490858.4	18333534.5	3491926.3
18333800.7	3492589.4	18333249.2	3491341.5	18333453.4	3491786.6
LX-XE-2006-03-06:				18333567.1	3491687.4
18333315.6	3490858.4			18333567.4	3491452.3
18333565.3	3490911.5			18333249.2	3491341.5
18333873.0	3491041.9			18333103.9	3492055.6
18333794.5	3490906.9			18333279.0	3492204.4
18333612.0	3490854.1			18333429.5	3492350.1
18333333.5	3490753.3			18333563.3	3492474.4
18333315.6	3490858.4			18333771.3	3492601.7

Maoxian:

longitude	**latitude**	**longitude**	**latitude**	**longitude**	**latitude**
MX-BL-2006-01-01:		**MX-BL-2006-01-02:**		**MX-BL-2006-01-03:**	
18384167.7	3495187.7	18385167.2	3495411.6	18384052.0	3494262.0
18384164.6	3495041.0	18385095.7	3495367.9	18384350.0	3494226.8
18384189.1	3494989.3	18384902.0	3495301.5	18384361.0	3494168.1
18384144.5	3494973.2	18384902.0	3495301.5	18384266.0	3494135.5
18384026.0	3494945.0	18384900.0	3495299.0	18384028.0	3494117.3
18383833.4	3494920.3	18384732.5	3495152.5	18383662.0	3494140.0
18383728.6	3495001.4	18384654.0	3495046.0	18383654.0	3494343.0
18383630.0	3495060.0	18384633.6	3495040.7	18383530.0	3494481.5
18383548.0	3495074.0	18384632.4	3495040.4	18383434.0	3494495.8
18383370.0	3495005.0	18384460.0	3495003.3	18383420.0	3494553.8
18383218.0	3494996.0	18384330.0	3494986.3	18383522.0	3494668.5
18383202.0	3495038.5	18384189.1	3494989.3	18383550.0	3494786.8
18383218.0	3495196.3	18384164.6	3495041.0	18383476.0	3494877.3
18383298.0	3495332.5	18384167.7	3495187.7	18383340.0	3494873.5
18383488.0	3495446.3	18384042.0	3495271.5	18383276.0	3494908.5
18383656.0	3495405.0	18384068.0	3495392.5	18383218.0	3494996.0
18383898.0	3495502.5	18384068.3	3495392.9	18383370.0	3495005.0
18383990.0	3495472.5	18384098.0	3495437.0	18383548.0	3495074.0
18384127.2	3495502.4	18384128.8	3495504.1	18383630.0	3495060.0
18384098.0	3495437.0	18384312.0	3495614.0	18383728.6	3495001.4
18384068.3	3495392.9	18384512.0	3495714.5	18383833.4	3494920.3

18384068.0	3495392.5	18384584.0	3495840.3	18384026.0	3494945.0
18384042.0	3495271.5	18384687.5	3495851.0	18384171.4	3494982.5
18384167.7	3495187.7	18384884.0	3495694.8	18384166.3	3494976.8
MX-BL-2006-01-04:		18385030.0	3495577.0	18384166.3	3494976.8
18384361.0	3494168.1	18385167.2	3495411.6	18384088.6	3494896.6
18384350.0	3494226.8	**MX-BL-2006-01-05:**		18384026.0	3494707.8
18384052.0	3494262.0	18385124.0	3495082.6	18383962.0	3494537.0
18384000.0	3494394.3	18385030.0	3494820.3	18383992.0	3494420.8
18383999.8	3494394.9	18384962.0	3494559.8	18383999.8	3494394.9
18383992.0	3494420.8	18384896.8	3494415.0	18384000.0	3494394.3
18383962.0	3494537.0	18384885.6	3494324.3	18384052.0	3494262.0
18384026.0	3494707.8	18384723.4	3494265.8	**MX-BL-2006-01-06:**	
18384088.6	3494896.6	18384569.6	3494595.2	18384885.6	3494324.3
18384166.3	3494976.8	18384586.9	3494705.6	18384896.8	3494415.0
18384166.3	3494976.8	18384688.0	3494861.0	18384962.0	3494559.8
18384171.4	3494982.5	18384826.0	3495023.0	18385030.0	3494820.3
18384171.7	3494982.9	18384732.5	3495152.5	18385124.0	3495082.6
18384189.1	3494989.3	18384900.0	3495299.0	18385124.0	3495082.7
18384330.0	3494986.3	18384900.0	3495299.0	18385124.0	3495082.8
18384460.0	3495003.3	18385116.0	3495196.3	18385124.0	3495082.8
18384632.4	3495040.4	18385124.0	3495082.9	18385124.0	3495082.9
18384633.6	3495040.7	18385124.0	3495082.8	18385116.0	3495196.3
18384654.0	3495046.0	18385124.0	3495082.8	18384902.0	3495296.3
18384732.5	3495152.5	18385124.0	3495082.7	18384902.0	3495301.5
18384826.0	3495023.0	18385124.0	3495082.6	18384902.0	3495301.5
18384688.0	3494861.0	**MX-BL-2006-01-06:**		18385095.7	3495367.9
18384586.9	3494705.6	18385528.0	3495323.8	18385167.2	3495411.6
18384569.6	3494595.2	18385390.0	3495029.8	18385224.0	3495469.5
18384723.4	3494265.8	18385226.0	3494775.8	18385524.0	3495521.5
18384576.0	3494216.3	18385082.0	3494445.0	18385566.0	3495529.0
18384361.0	3494168.1	18384885.6	3494324.3	18385620.0	3495486.3

Beichuan:

longitude	**latitude**	**longitude**	**latitude**	**longitude**	**latitude**
BC-TB-2006-01-01:		**BC-TB-2006-02-01:**		**BC-TB-2006-03-01:**	
18454233.9	3534562.2	18454786.9	3533043.8	18456289.5	3530642.5
18454311.0	3534007.7	18454790.3	3532989.3	18456038.0	3530638.6
18454275.6	3533957.7	18454712.6	3532952.2	18455824.3	3530572.2
18454275.6	3533868.1	18454700.5	3532877.0	18455849.1	3530711.6
18454311.0	3533807.6	18454740.2	3532881.4	18455695.3	3530818.4
18454188.0	3533759.7	18454805.9	3532852.0	18455833.4	3530815.8
18454146.3	3533968.1	18454794.7	3532733.6	18455871.2	3530931.8
18454071.3	3534005.6	18454595.1	3532624.8	18455873.8	3531019.1
18454096.3	3534216.2	18454568.3	3532833.8	18455754.0	3531032.1
18454167.2	3534422.6	18454620.2	3532937.5	18455815.2	3531213.2
18454140.1	3534483.0	18454563.2	3532986.7	18455872.5	3531215.8

18454040.0	3534483.0	18454786.9	3533043.8	18455910.3	3531116.8
18454029.6	3534637.3	**BC-AM-2006-01-01:**		18456164.4	3531273.1
18454054.6	3534722.7	18404471.4	3546602.6	18456195.6	3531124.6
18454192.2	3534849.9	18404541.7	3546544.2	18456266.0	3531202.8
18454271.4	3534802.0	18404467.5	3546406.3	18456271.2	3530811.9
18454352.7	3534687.3	18404272.5	3546403.7	18456289.5	3530642.5
18454379.8	3534603.9	18404151.6	3546303.6	18456137.3	3531007.3
18454340.2	3534483.0	18404080.1	3546624.7	18456074.6	3530914.7
18454540.3	3534282.9	18404150.3	3546688.4	18455950.0	3531100.8
18454550.7	3534187.0	18404255.6	3546606.5	18455946.5	3530970.6
18454517.4	3534086.9	18404255.6	3546727.4	18456087.2	3530771.9
18454594.5	3533936.8	18404488.3	3546984.9	18456087.3	3530771.9
18454409.0	3533878.5	18404647.0	3547026.5	18456137.3	3531007.3
18454404.8	3534020.2	18404779.6	3547004.4	**BC-ZH-2006-01-01:**	
18454456.9	3534036.9	18404710.7	3546857.5	18403459.7	3547748.2
18454233.9	3534562.2	18404457.1	3546778.1	18403862.1	3547987.8
BC-ZH-2006-01-02:		18404648.3	3546720.9	18403933.2	3547960.2
18403933.2	3547960.2	18404627.2	3546627.4	18403968.5	3547894.7
18404069.4	3548034.9	18404471.4	3546602.6	18404000.3	3547757.6
18404267.2	3548100.9	**BC-YX-2006-01-01:**		18404045.9	3547654.4
18404283.4	3547991.9	18422843.0	3546018.4	18403656.2	3547382.2
18404448.9	3547841.1	18422091.6	3546310.8	18403459.7	3547748.2
18404442.2	3547676.9	18422535.9	3546706.1	**BC-HDM-2006-01-02:**	
18404261.9	3547508.7	18422769.5	3546670.2	18448923.6	3541254.2
18404167.6	3547662.1	18422988.4	3546126.2	18448998.3	3541147.5
18404045.9	3547654.4	18422843.0	3546018.4	18449140.0	3540917.3
18404000.3	3547757.6	**BC-HDM-2006-01-03:**		18449066.9	3540840.7
18403968.5	3547894.7	18448847.9	3541363.7	18448953.9	3540808.9
18403933.2	3547960.2	18449206.5	3541483.8	18448731.3	3540810.6
BC-HDM-2006-01-01:		18449268.4	3541181.7	18448704.7	3540706.4
18448653.5	3541581.0	18449342.6	3541222.3	18448468.0	3540658.7
18448847.4	3541364.1	18449388.5	3541003.2	18448376.1	3540983.8
18448923.6	3541254.2	18449268.4	3540801.8	18448456.4	3541025.8
18448839.1	3541222.8	18449213.6	3540870.7	18448671.3	3541128.2
18448671.3	3541128.2	18449140.0	3540917.3	18448839.1	3541222.8
18448456.4	3541025.8	18448998.3	3541147.5	18448923.6	3541254.2
18448415.0	3541153.4	18448923.6	3541254.2		
18448487.4	3541356.6	18448847.9	3541363.7		

Pingwu:

longitude	latitude	longitude	latitude	longitude	latitude
PW-WY-2006-01-01:		**PW-WY-2006-01-02:**		**PW-WY-2006-01-03:**	
18471956.0	3587379.0	18470854.8	3588745.0	18471534.4	3588827.8
18471711.0	3587349.0	18471630.6	3588646.0	18471628.0	3588814.5
18471683.0	3587319.0	18471657.0	3588541.0	18471630.7	3588646.0

18471690.0	3587168.0	18471450.0	3588346.0	18470855.2	3588744.9
18471590.0	3587099.0	18471475.2	3588286.8	18471038.0	3588922.0
18471515.0	3586935.0	18471454.4	3588137.4	18471193.0	3589057.0
18471129.0	3587063.0	18471384.3	3588075.0	18471328.0	3589205.0
18471132.0	3587086.0	18471286.0	3588183.8	18471598.0	3589129.0
18470852.0	3587377.0	18471217.8	3588255.1	18471560.9	3589083.9
18470828.0	3587564.0	18471053.4	3588280.0	18471420.7	3588878.7
18470602.0	3587790.0	18470978.9	3588531.2	18471534.4	3588827.8
18470637.7	3588438.2	18470857.9	3588525.0	**PW-XH-2006-01-01:**	
18470659.4	3588621.2	18470697.1	3588651.2	18422151.5	3596691.4
18470696.6	3588652.2	18470721.4	3588667.7	18422497.0	3596785.0
18470857.9	3588528.1	**PW-XH-2006-01-02:**		18422901.0	3597122.0
18470978.9	3588531.2	18421750.2	3596565.8	18422858.0	3596657.0
18471050.3	3588289.3	18422151.5	3596691.4	18422635.0	3596420.0
18470978.9	3587910.8	18422302.5	3596582.4	18422489.3	3596372.6
18470916.9	3587817.8	18422489.3	3596372.6	18422302.5	3596582.4
18470972.7	3587498.3	18422179.1	3596180.4	18422151.5	3596691.4
18471044.0	3587402.1	18421967.9	3596198.2	**PW-TJ-2006-01-01:**	
18471344.9	3587256.3	18421825.9	3596291.1	18479953.6	3565408.3
18471552.8	3587318.4	18421772.8	3596378.7	18480163.5	3565541.5
18471642.7	3587461.0	**PW-XY-2006-01-01:**		18480566.0	3565686.0
18471813.3	3587482.8	18470130.1	3551699.2	18480679.0	3565524.0
18471940.5	3587538.6	18470251.9	3551831.7	18480573.0	3565420.0
18471956.0	3587379.0	18470535.2	3552001.6	18480554.8	3565324.8
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Qingchuan:

longitude	latitude	longitude	latitude	longitude	Latitude
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18477650.0	3592377.8	18496941.8	3582099.1	18518249.9	3592001.7
18477678.3	3592311.8	18497032.6	3581971.9	18518319.6	3592107.6
18477680.7	3592215.2	18497108.3	3581796.4	18518348.7	3592122.1
18477584.1	3592111.5	18497087.1	3581654.1	**QC-XQ-2006-02-01**	
18477473.3	3592111.5	18497153.7	3581430.1	18502596.4	3583207.3
18477433.2	3592142.1	18497135.5	3581369.5	18502550.7	3583183.2
18477254.2	3592074.5	18497093.7	3581312.4	18502358.3	3583024.4
18477213.2	3592113.3	18497093.7	3581312.4	18502242.8	3582971.5
18477251.8	3592170.4	18497093.1	3581312.0	18502062.5	3582973.9
18477188.2	3592234.0	18497090.1	3581245.4	18501872.4	3583002.8
18477155.2	3592316.5	18497108.3	3581118.3	18501771.4	3583005.2
18477134.0	3592396.6	18497129.5	3580867.0	18501689.1	3582977.4
QC-WB-2006-01-01		18497053.8	3580848.9	18501745.0	3583029.2
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18477233.0	3592691.2	18496578.5	3581533.0	18502250.1	3583207.2
18477207.0	3592776.0	18496953.9	3581542.1	18502202.0	3583250.5
18477119.8	3592875.0	18497093.7	3581312.4	18502177.9	3583339.5
18477075.1	3592905.6	**QC-XQ-2006-01-02**		18502151.4	3583411.6
18477091.6	3592948.0	18497093.7	3581312.4	18502120.2	3583481.4
18477136.3	3592971.6	18496953.9	3581542.1	18502072.1	3583531.9
18477126.9	3593065.8	18496578.5	3581533.0	18502038.4	3583589.6
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18477143.4	3593501.7	**QC-XQ-2006-02-03**		18501877.3	3583772.4
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18477359.1	3592874.6	18501842.8	3582898.4	**QC-XQ-2006-02-02**	
18477357.8	3592783.1	18501841.2	3582740.6	18502450.7	3582436.9
18477542.9	3592538.2	18501829.2	3582631.1	18502343.9	3582500.1
QC-XQ-2006-02-04		18501865.2	3582627.6	18502305.3	3582521.7
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18501842.8	3582898.4	18501901.3	3582788.7	18502235.6	3582622.7
18501670.2	3582951.8	18501959.0	3582774.3	18502197.1	3582649.2
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18501891.7	3582254.8	18502343.9	3582500.1	18502560.3	3582565.0
18501836.4	3582199.4	18502450.7	3582436.9	18502502.6	3582480.8
18501771.4	3582197.0	18502454.5	3582382.2	18502450.7	3582436.9
18501711.3	3582105.6	18502372.7	3582365.4	**QC-XQ-2006-02-05**	
18501588.6	3582105.6	18502288.5	3582281.2	18502014.4	3582803.1
18501547.7	3582151.3	18502237.2	3582217.1	18501930.2	3582887.3
18501562.2	3582218.7	18502187.5	3582283.6	18501547.7	3582151.3
18501670.4	3582228.3	18502127.4	3582476.0	18501588.6	3582105.6
18501752.2	3582290.8	18502052.8	3582507.3	18501711.3	3582105.6
18501848.4	3582307.7	18501832.1	3582428.6	18501771.4	3582197.0
18501832.1	3582428.6	18501757.5	3582417.1	18501836.4	3582199.4
18502052.8	3582507.3	18501789.1	3582485.6	18501891.7	3582254.8

18502127.4	3582476.0	18501769.0	3582500.1	18501949.4	3582264.4
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18502237.2	3582217.1	18501636.7	3582526.5	18501985.5	3582076.8
QC-YL-2006-01-01		18501557.4	3582615.5	18502083.1	3582049.5
18529180.0	3613278.7	18501591.0	3582726.2	18502036.0	3581773.7
18529160.2	3613259.6	18501670.2	3582951.8	18502081.7	3581564.5
18529108.1	3613153.8	18501842.8	3582898.4	18502035.0	3581516.8
18529005.6	3613057.8	**QC-YL-2006-01-02**		18501502.1	3582009.4
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18528705.6	3613259.9	18529160.2	3613259.6	18501757.5	3582417.1
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18528718.1	3613437.8	18529104.8	3612675.3	18501562.2	3582218.7
18528778.8	3613473.3	18529057.5	3612643.7	18501547.7	3582151.3
18528919.3	3613389.8	18528903.0	3612823.4		
18529140.6	3613306.8	18528881.9	3612960.2		
18529180.0	3613278.7				

Fig. A.2. Project sites in Lixian County:

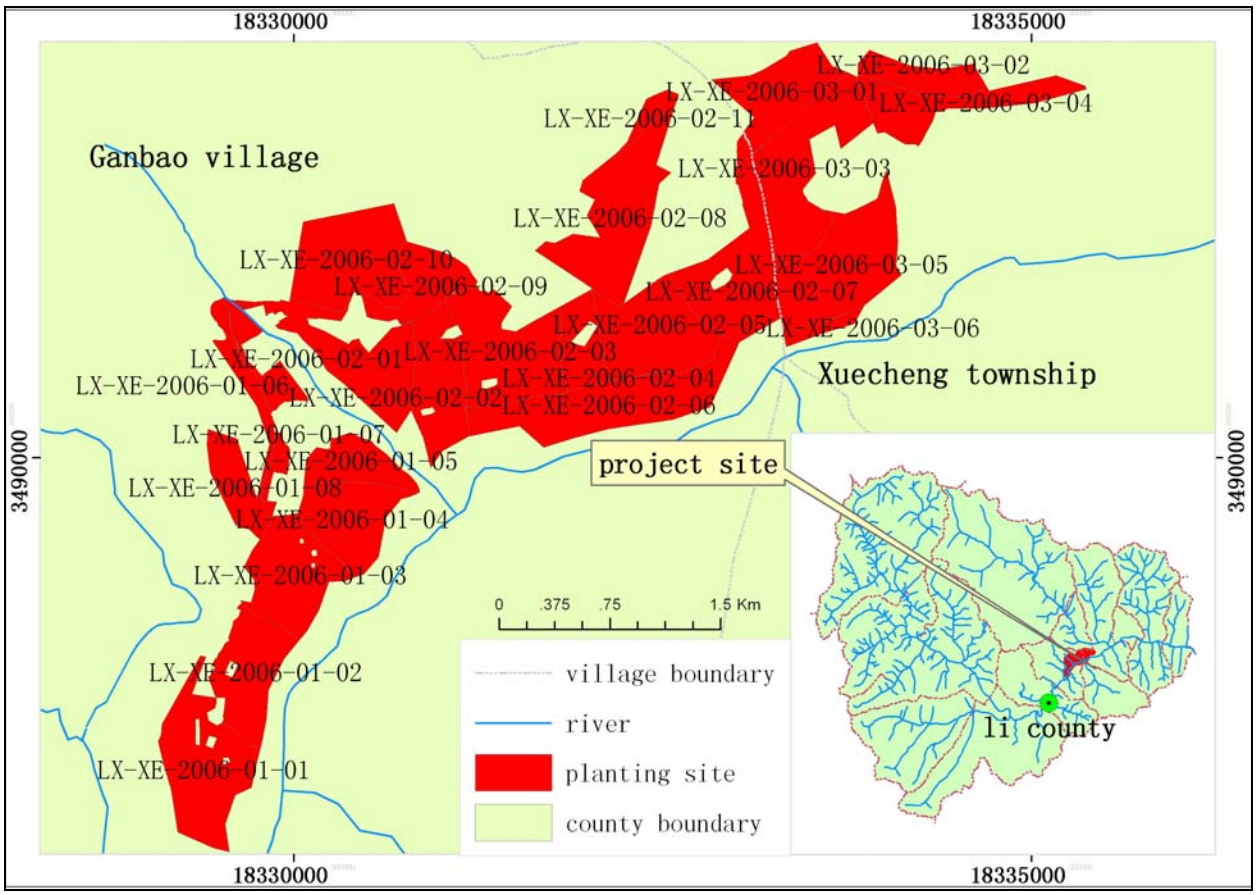

Fig. A.3. Project sites in Maoxian County:

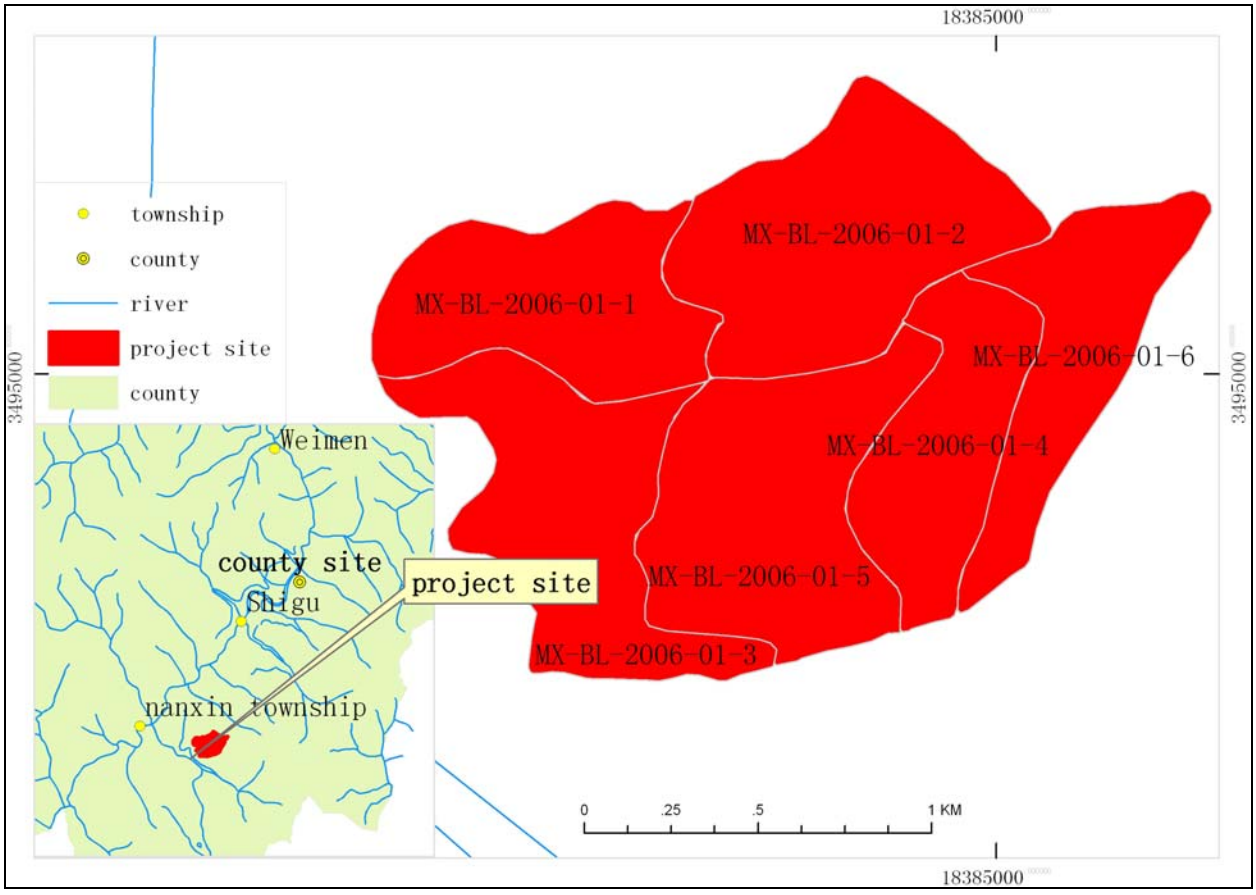

Fig. A.4.1. Project sites in Beichuan County-I:

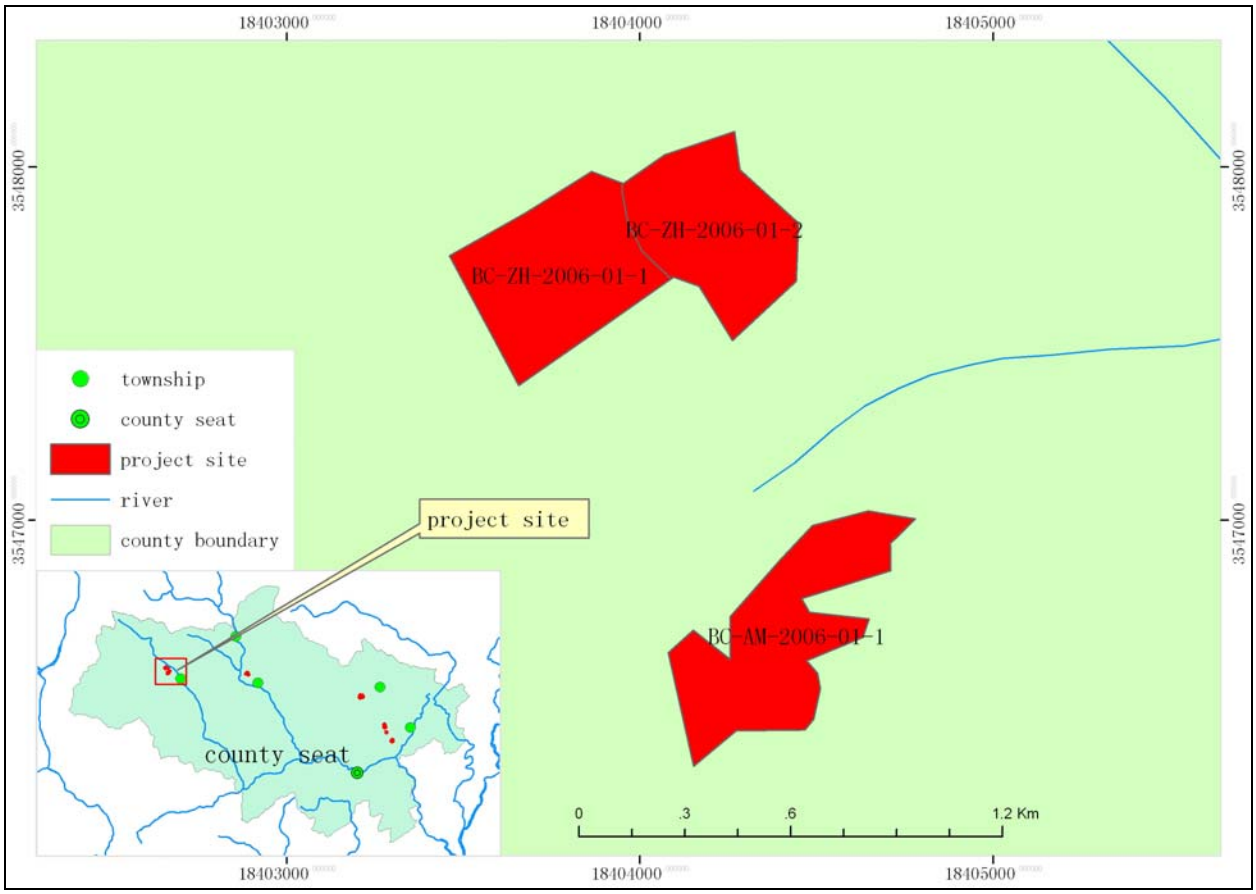

Fig. A.4.2. Project sites in Beichuan County-II:

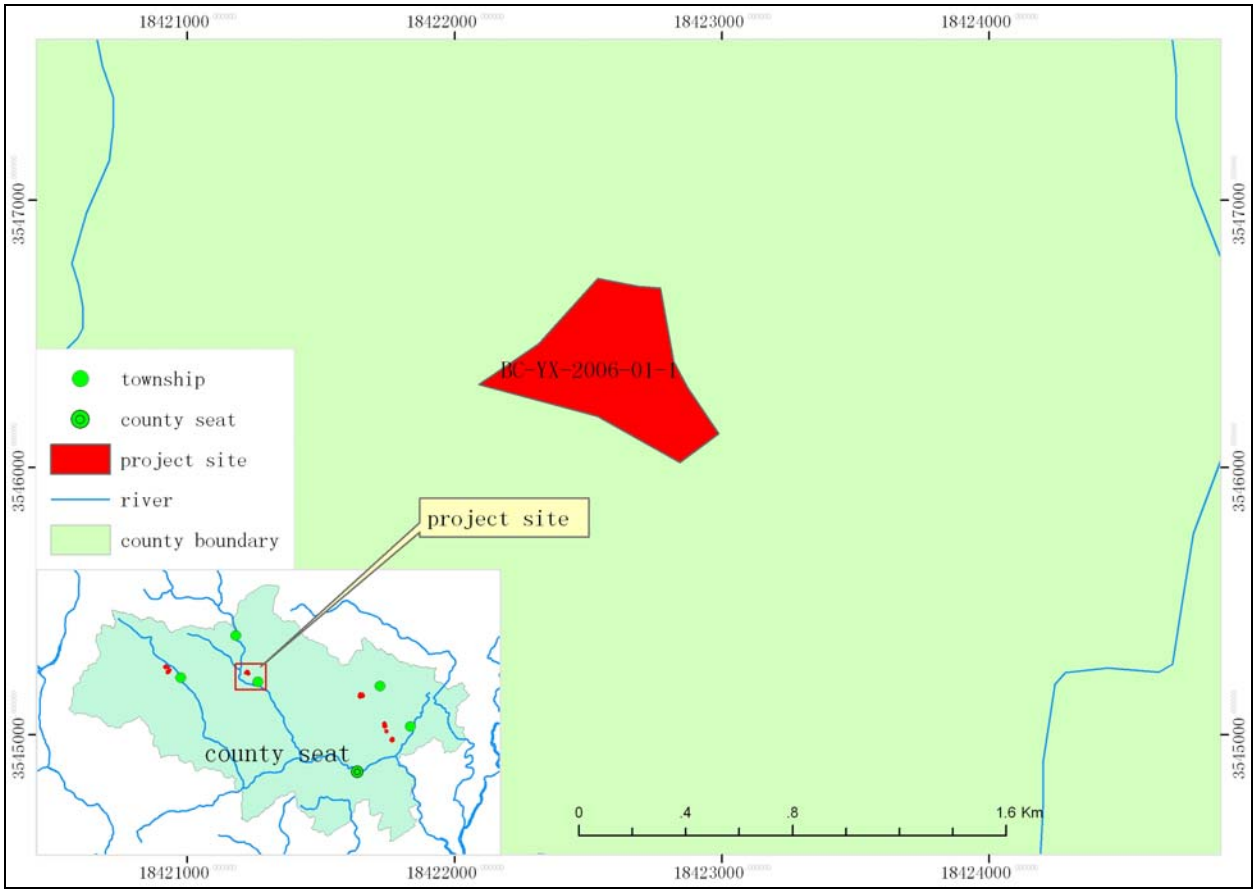

Fig. A.4.3. Project sites in Beichuan County-Ⅲ:

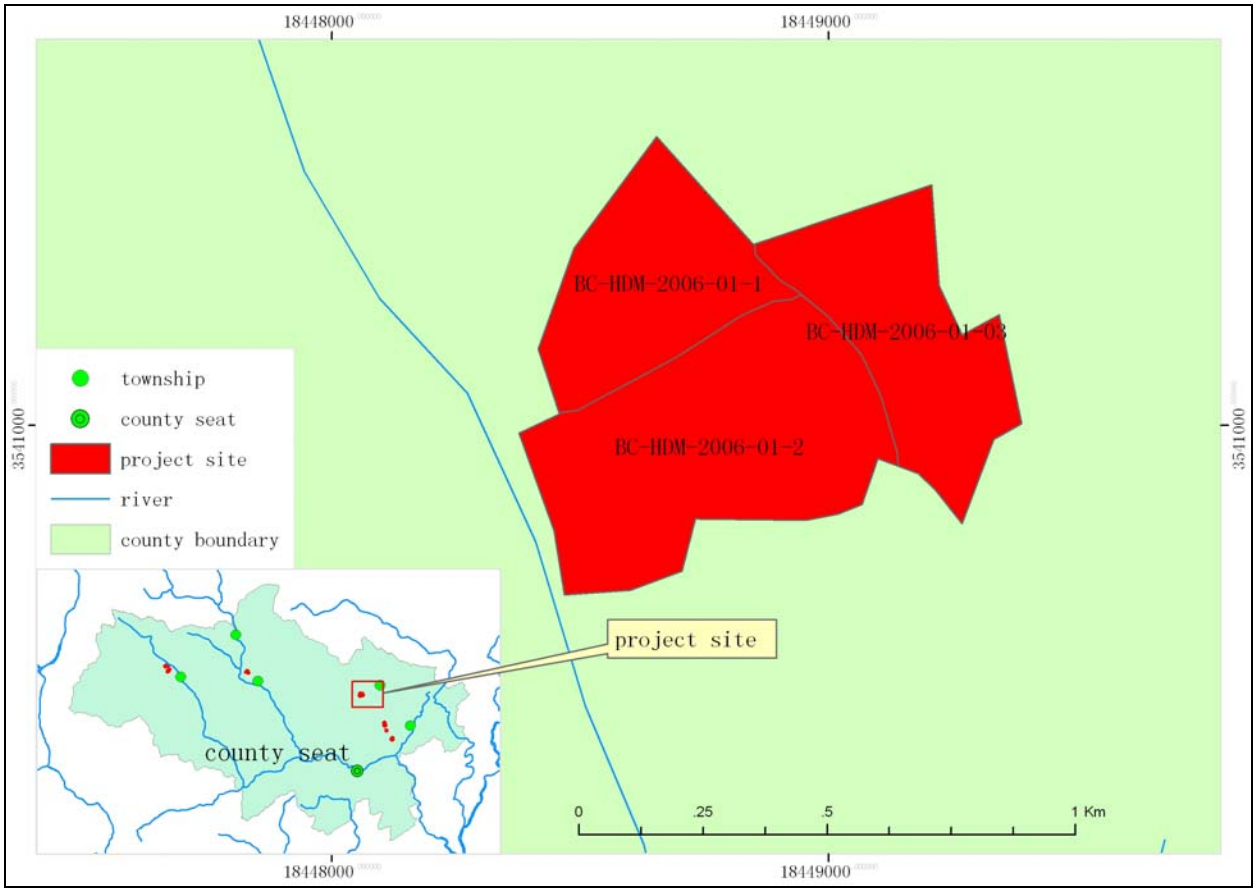

Fig. A.4.4. Project sites in Beichuan County-IV:

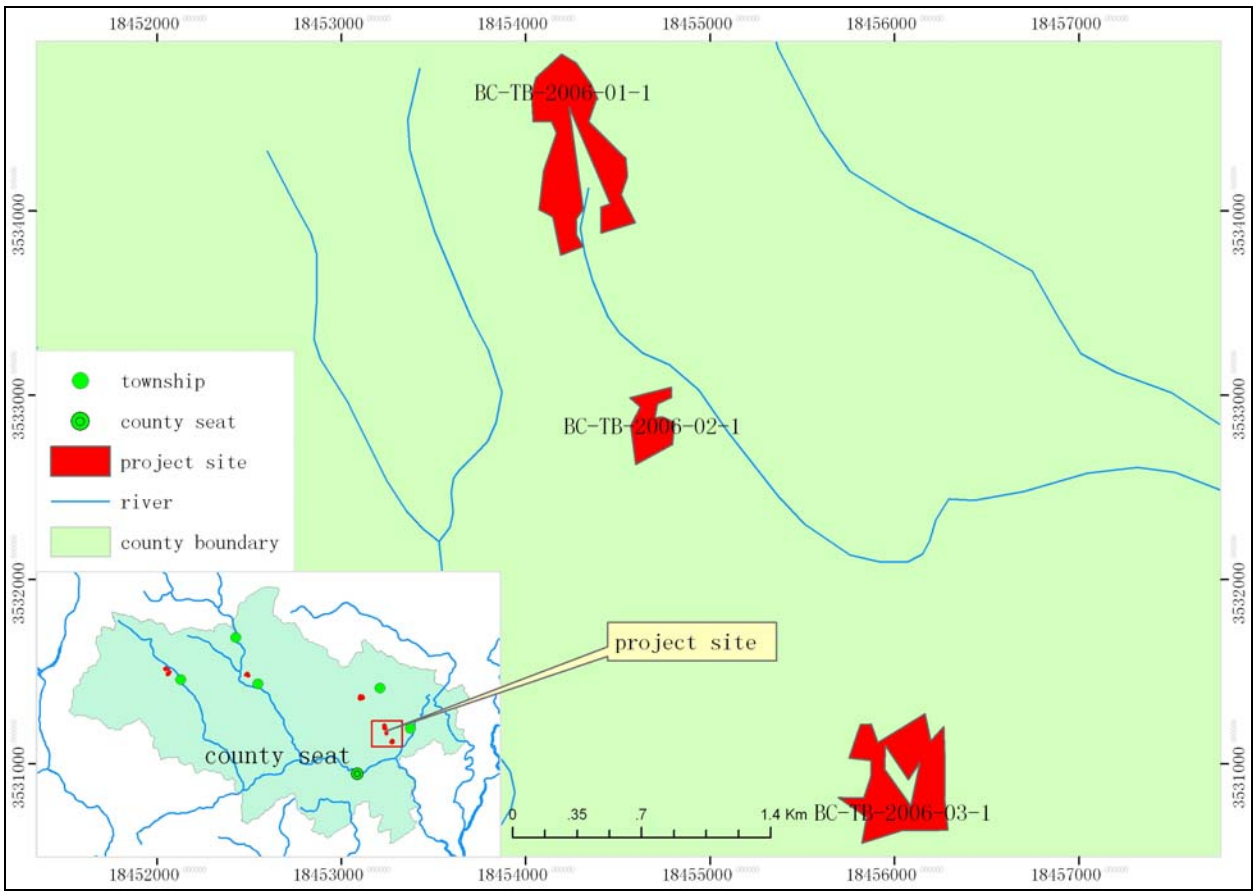

Fig. A.5.1. Project sites in Pingwu County-I:

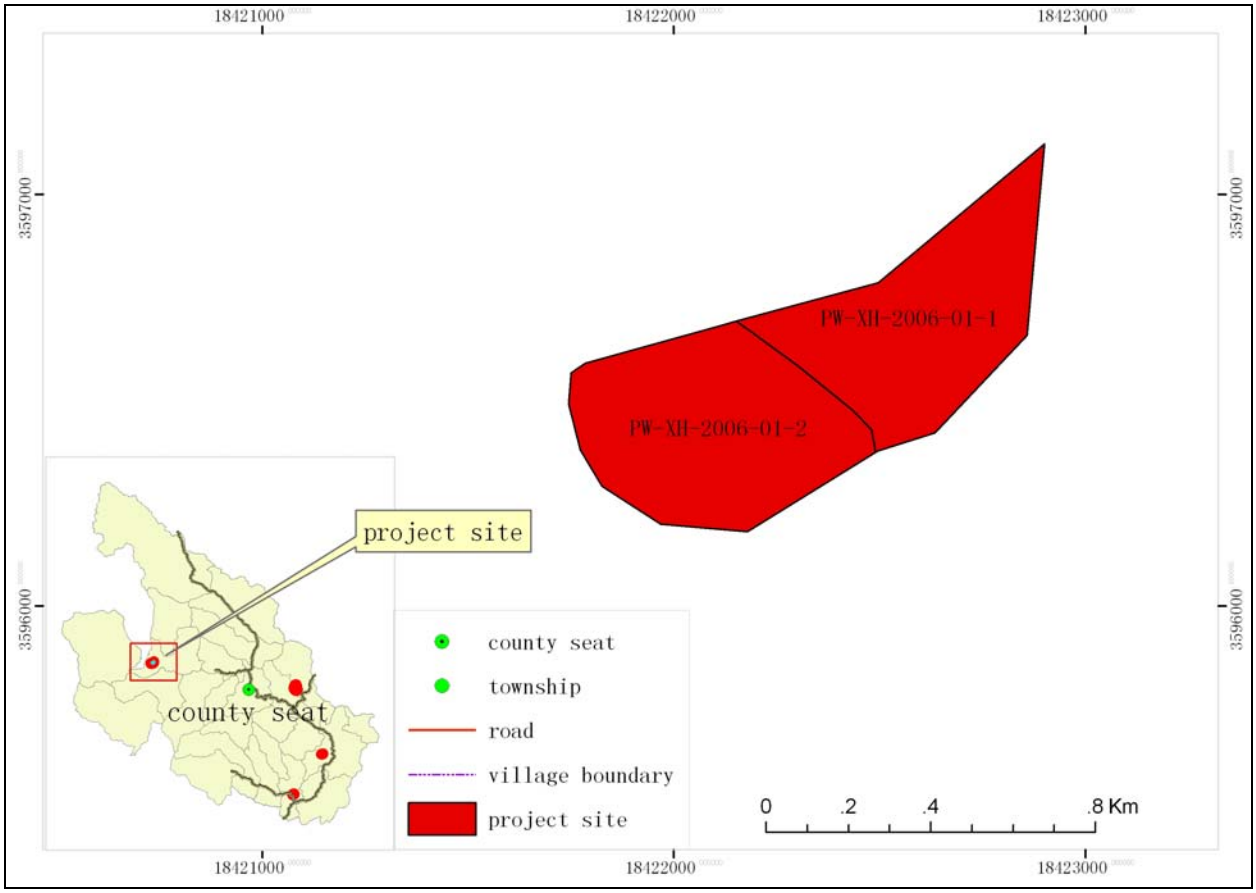

Fig. A.5.2. Project sites in Pingwu County-II:

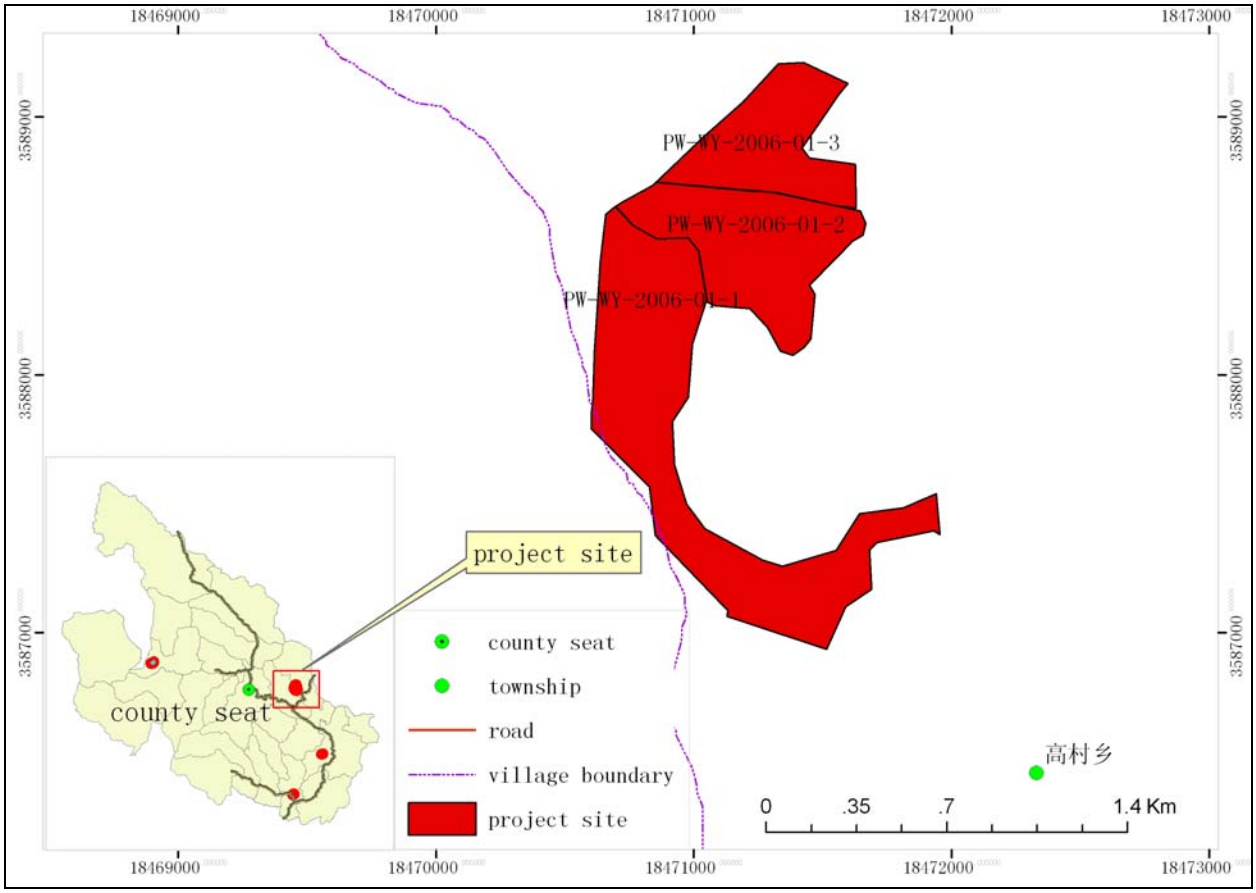

Fig. A.5.3. Project sites in Pingwu County-III:

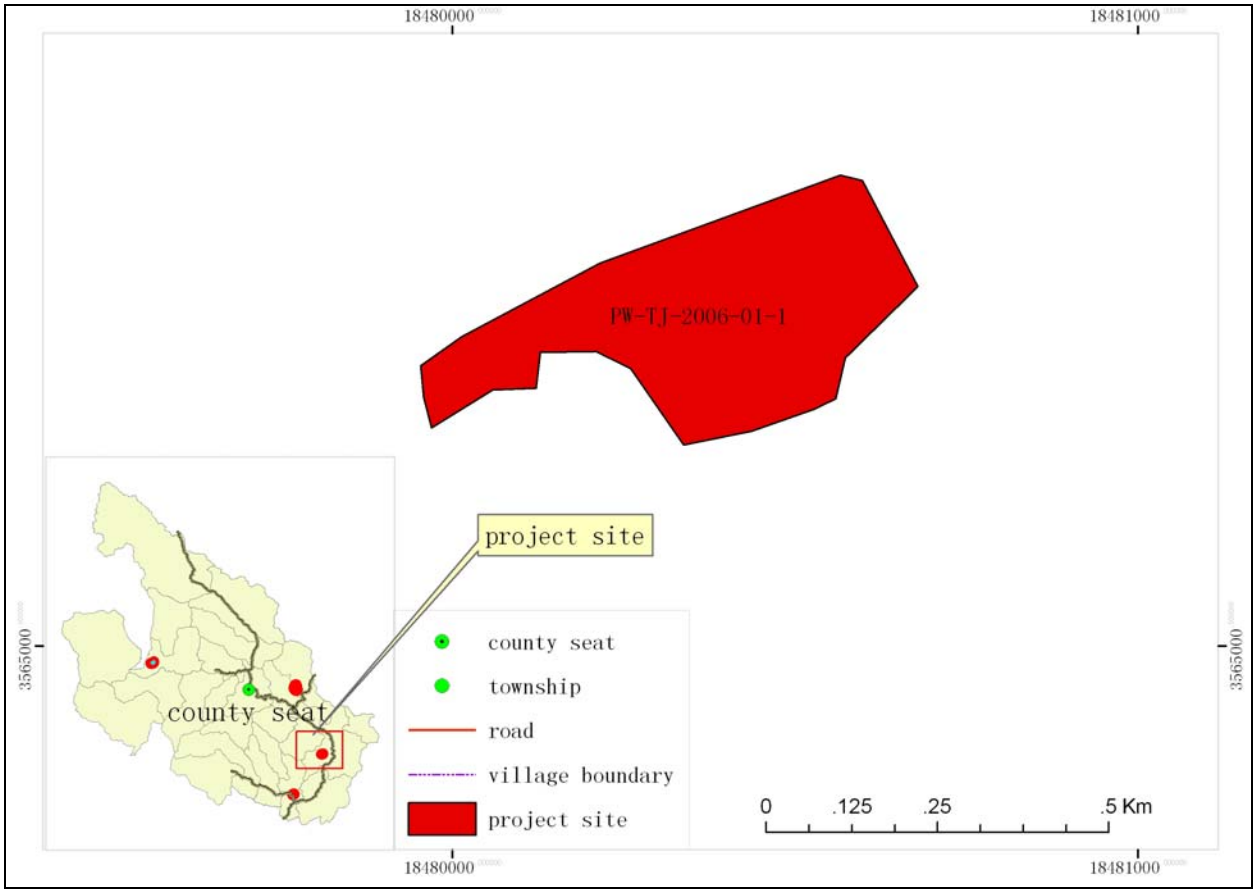

Fig. A.5.4. Project sites in Pingwu County-IV:

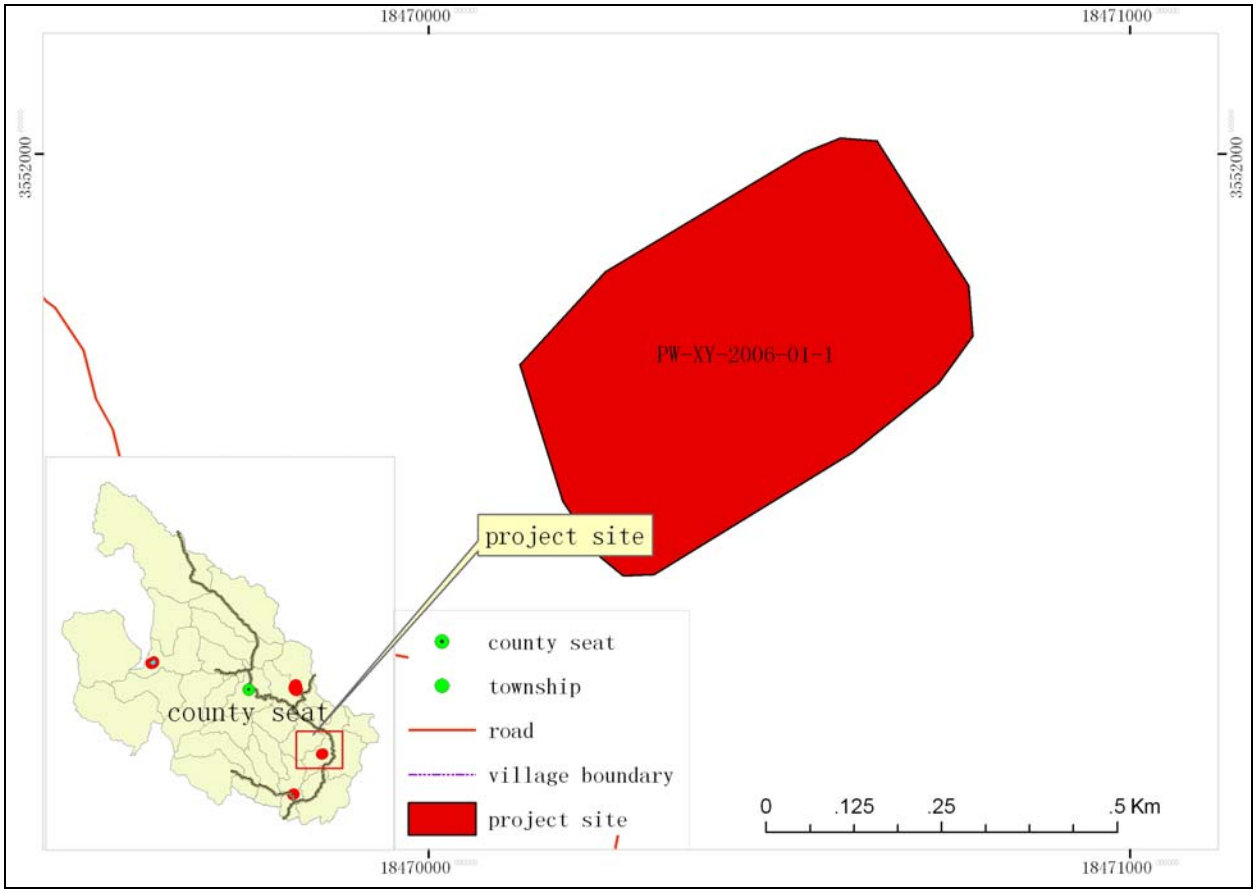

Fig. A.6.1. Project sites in Qingchuan County-I:

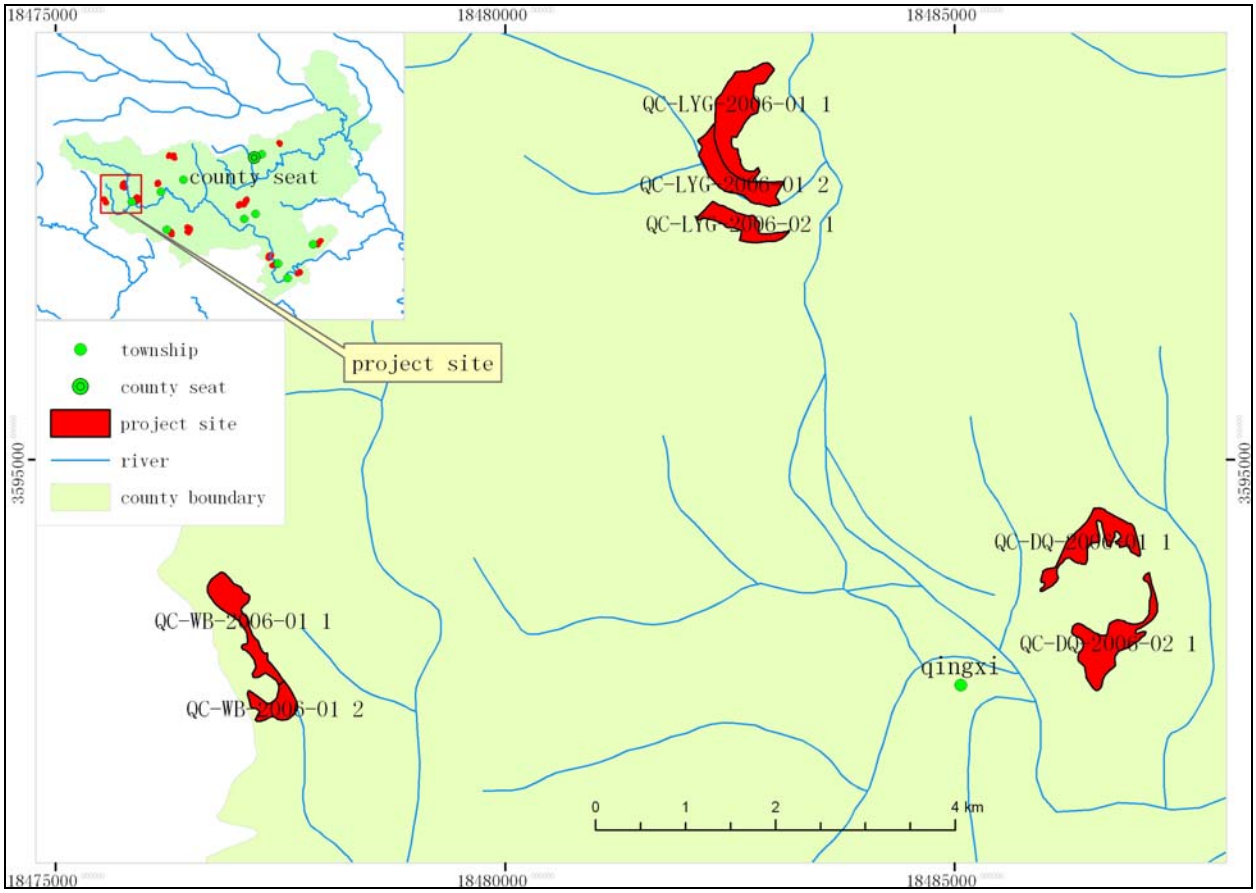

Fig. A.6.2. Project sites in Qingchuan County-II:

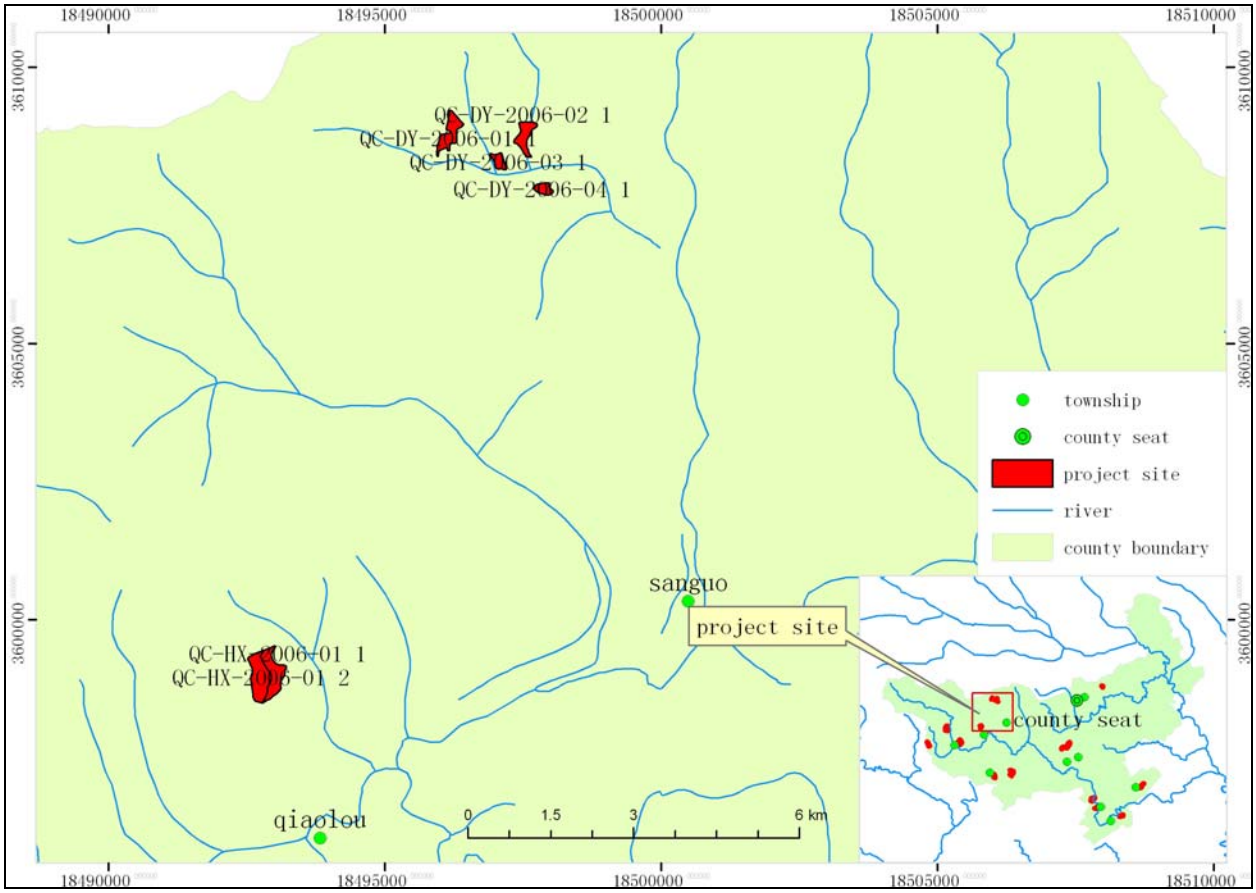

Fig. A.6.3. Project sites in Qingchuan County-III:

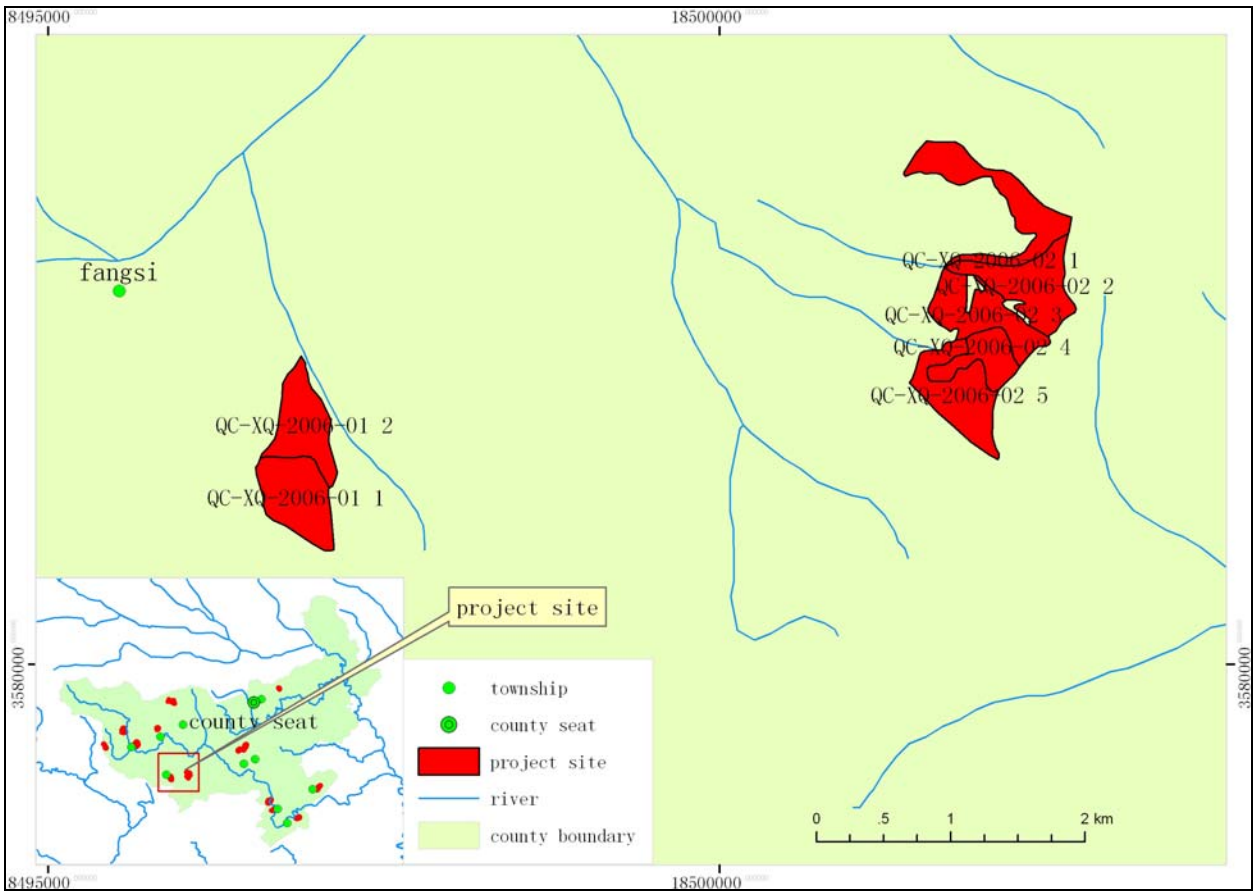

Fig. A.6.4. Project sites in Qingchuan County-IV:

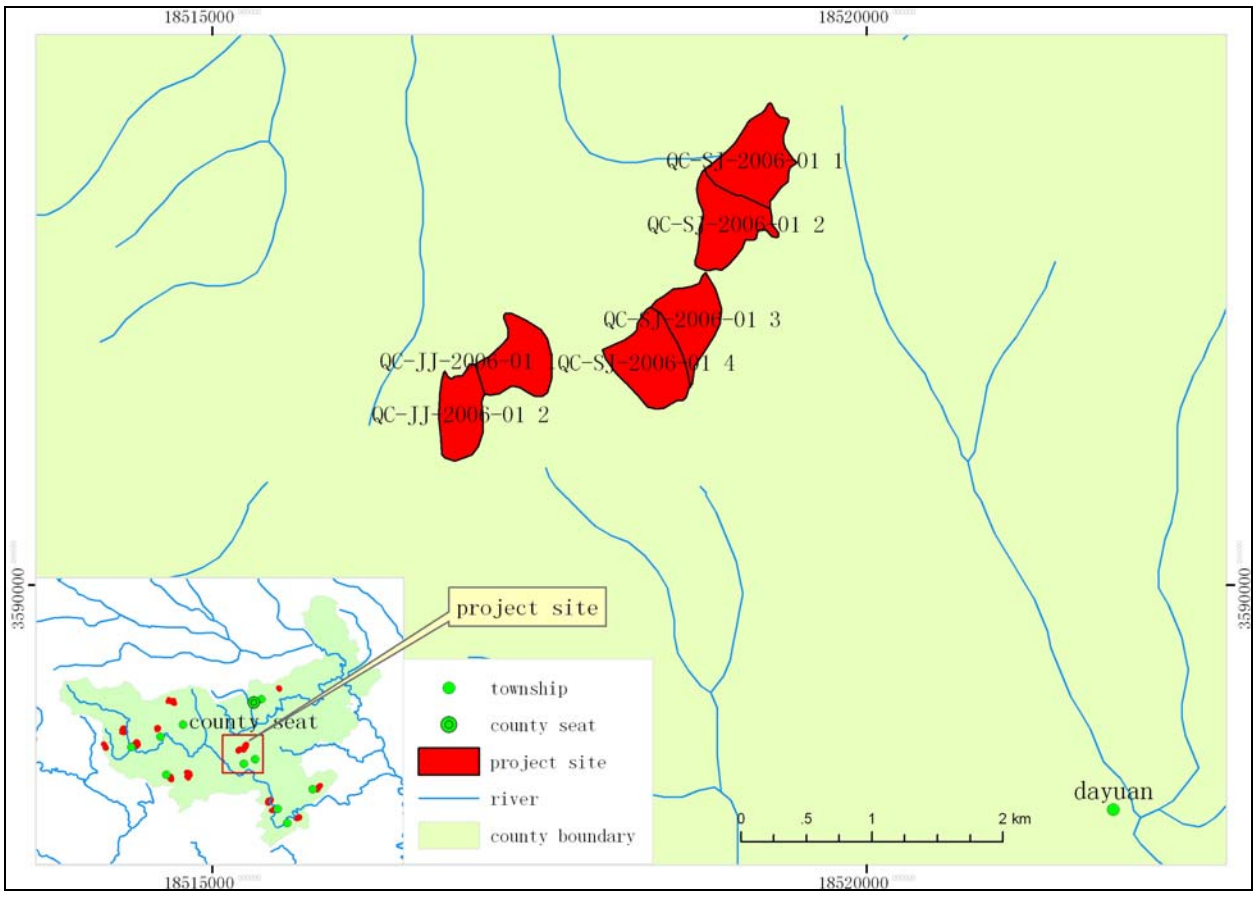

Fig. A.6.5. Project sites in Qingchuan County-V:

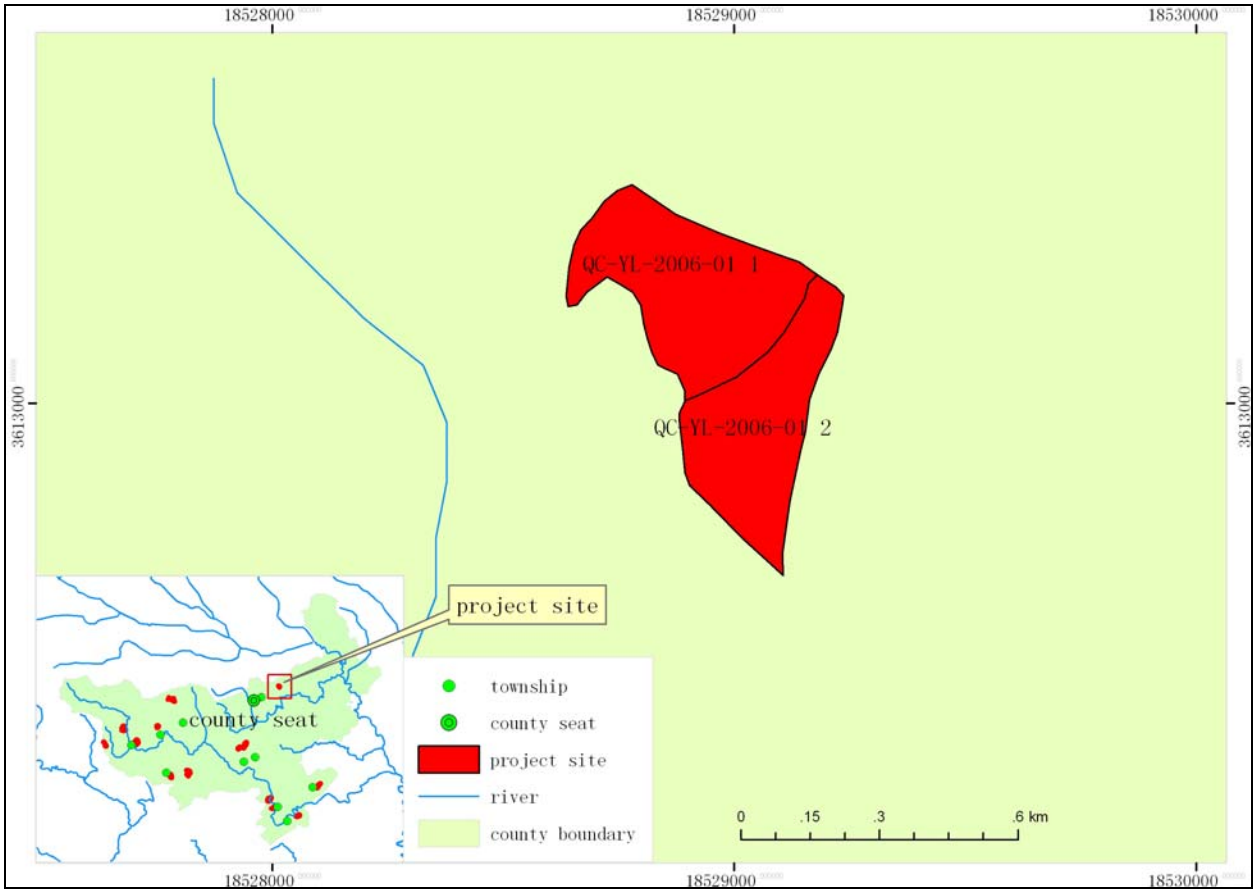

Fig. A.6.6. Project sites in Qingchuan County-VI: