CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM FOR AFFORESTATION AND REFORESTATION PROJECT ACTIVITIES (CDM-AR-PDD) Version 04

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PROJECT DESIGN DOCUMENT FORM
FOR AFFORESTATION AND REFORESTATION PROJECT ACTIVITIES (CDM-AR-PDD) - Version 04

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

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

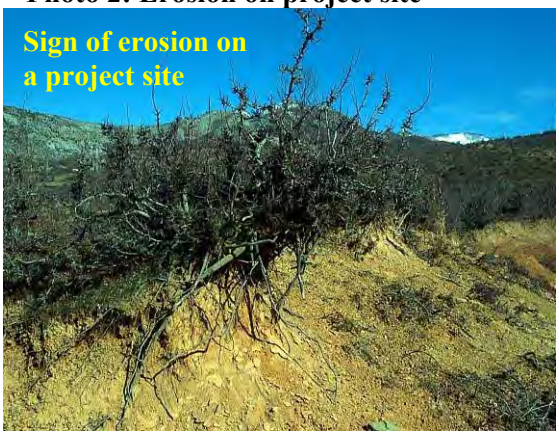
Assisted Natural Regeneration of Degraded Lands in Albania
Version 01 – July 21, 2008

A.2. Description of the proposed A/R CDM project activity:

Land degradation has been identified as a major issue for Albania. Currently, highly degraded land is subject to uncontrolled grazing which prevents the development of a protective vegetation cover. These terrains are eroding quickly, and the landscape looks devastated. It is essential that a vegetative cover is established soon, to halt erosion.

Photo 1: Degraded pasture land

Photo 2: Erosion on project site



It is planned to undertake the afforestation and reforestation of degraded lands, by setting aside and protecting land to make natural re-growth possible, leading to improvement in the livelihoods of poor rural households, reduced soil degradation, improved water quality and conservation of biodiversity.

This project supports a participatory approach within the community to reach a common agreement on the selection of sites and their protection from grazing, as well as planning and implementing the interventions needed to accompany this change.

The proposed A/R CDM project activity will be implemented within the confines of the larger umbrella of the Natural Resources Development Project (NRDP)[1], a World Bank loan project, which will support the implementation activities for the first 5 years. Interventions financed under the NRDP include: (a) protection of land from grazing by fencing therefore promoting natural seeds sources and enabling natural regeneration or re-growth; (b) supplemental planting at 200-500 seedlings per ha to enrich species

[1] Project name and ID: AL-Natural Resources Development Project - P082375 - Web site address: http://web.worldbank.org/external/projects/main?pagePK=104231&piPK=73230&theSitePK=40941&menuPK=228424&Projectid=P082375

diversity and to stabilize highly eroded areas, and (c) silvicultural works (vegetative cutting to promote growth such as coppicing, cleaning and thinning).

The activities implemented under the assisted natural regeneration fall under the afforestation/reforestation definition of the Marrakesh Accords.

The afforestation/reforestation activities will cover 6,316.7 ha distributed over five regions, in 24 communes that are among the poorest in the country, with a median poverty rate of 42%. Almost two-thirds of the communes rank in the lowest third of the poverty distribution as measured by "percent poor families".

The project contributes to national sustainable development in the following ways.

- Improved land management in hilly areas is key to controlling runoff into the sea and enhancing coastal and marine water quality and ecosystems in the Adriatic, identified as a high priority for conservation measures in the Mediterranean Action Plan. Albania, with its varied topography and combination of Mediterranean and Balkan influences, is rich in biodiversity and improved land use and forest management will help to restore natural ecosystems.

- A broader range of livelihood options for the rural poor will be promoted, thereby reducing pressure on over-exploit natural resources and provide stronger incentives for communities to manage their forest, pastoral and agricultural resources in a sustainable manner.

- The project provides an opportunity to bring critically needed sustainable revenue streams directly to poor rural communities in exchange of public good services, and can therefore have a significant impact on the livelihoods.

- Substantial employment benefits will be forthcoming during the initial years of the project. Additionally, over 80,000 people will benefit from the project through short and medium term employment generated by the reinvestment of the revenues from carbon sales, reduction of maintenance costs on irrigation and drainage infrastructure, reduction of the cost of water treatment and reduction of flood risk.

- Where alternative pasture or grazing resources are in short supply, grasses germinating within fenced-off areas will be available for cutting and collection and would serve as fodder for winter stall-feeding. Grass cutting will also serve to protect the young regeneration from fire hazard.

- The project would also provide significant erosion control benefits, which are valued by villagers.

- From year 5 onwards, the project would start producing several benefits such as small timber, firewood, nuts (e.g. chestnuts) and fruits (e.g. cherries) and medicinal products.

A.3. Project participants:

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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)
Government of Albania	Ministry of Environment, Forests and Water Administration, a public entity of the Government of Albania	No
Italy	International Bank for Reconstruction and Development as Trustee of the BioCarbon Fund	Yes
(*) 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.		

Ministry of Environment, Forests and Water Administration and its regional and district directorates (District Forestry Services-DFS) will be the lead agency with responsibility for project implementation for the whole crediting period and supporting the technical aspects of the project interventions.

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:

The project sites are spread over five regions of Albania (Figure 1) and show variability in terms of altitude, climate and soil conditions. The project boundaries are geographically delineated and represented in the forestry management plans. A/R CDM activity contains more than one discrete area of land and each discrete area has a unique geographical identification, with specific boundaries. The data and information on the project area are presented in Annex 8.

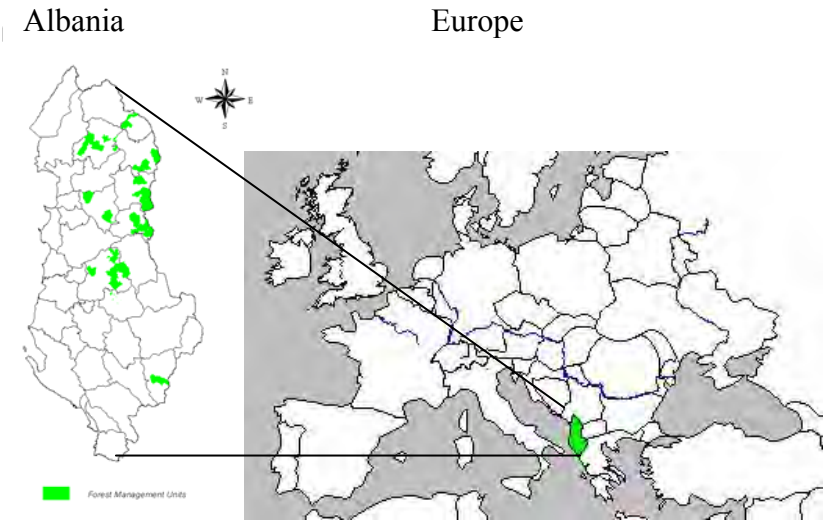

Figure 1 Project sites location

A.4.1.1. Host Party(ies):

Republic of Albania

A.4.1.2. Region/State/Province etc.:

The project will be implemented in 5 different regions of Albania, covering 10 different districts mainly in the central and northern part of the country.

A.4.1.3. City/Town/Community etc:

The project areas are located in 24 different communes, covering 117 different villages. For more detailed information please see table 1 in section A.4.2 below.

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:

Table 1 below shows the detailed breakdown of all the project areas by region, district, commune, and village.

Table 1 – Location of the project sites

Region	District	Commune	Village	Area (ha)
DIBER	Bulqize	Ostren	Okshtun Masa	59
DIBER	Bulqize	Ostren	Ostren Madh	16
DIBER	Bulqize	Ostren	Ostren Vogel	30
DIBER	Bulqize	Trebisht	Bala	13
DIBER	Bulqize	Trebisht	Celebi	39
DIBER	Bulqize	Trebisht	Vernice	11,7
DIBER	Bulqize	Zerqan	Krajk	20
DIBER	Bulqize	Zerqan	Sofrocan	40
DIBER	Bulqize	Zerqan	Zall Strikcan	20
DIBER	Diber	Maqellare	Bllate majtare	30
DIBER	Diber	Maqellare	Dovolan	16
DIBER	Diber	Maqellare	Erebare	10
DIBER	Diber	Maqellare	Herbel	15
DIBER	Diber	Maqellare	Kercisht i Eper	10
DIBER	Diber	Maqellare	Kercisht posht	12
DIBER	Diber	Maqellare	Kllopcisht	20
DIBER	Diber	Maqellare	Pocest	10
DIBER	Diber	Maqellare	Potgorce	10
DIBER	Diber	Melan	Bexhunec	32
DIBER	Diber	Melan	Greve	78
DIBER	Diber	Melan	Knike	52
DIBER	Diber	Melan	Melan	63
DIBER	Diber	Melan	Peke	56
DIBER	Diber	Melan	Pjece	26

Region	District	Commune	Village	Area (ha)
DIBER	Diber	Melan	Rabanat	21
DIBER	Diber	Melan	Rabdisht	15
DIBER	Diber	Sllove	Dipjak	12
DIBER	Diber	Sllove	Palama	30
DIBER	Diber	Sllove	Shumbat	105
DIBER	Diber	Sllove	Sllatine	55
DIBER	Diber	Sllove	Trojak	40
DIBER	Diber	Sllove	Venisht	18
DIBER	Diber	Sllove	Vlesha	24
DIBER	Diber	Sllove	Z.Kalis	35
DIBER	Diber	Tomin	Bahutaj	15
DIBER	Diber	Tomin	Brezhdan	50
DIBER	Diber	Tomin	Cetush	10
DIBER	Diber	Tomin	Dohoshisht	70
DIBER	Diber	Tomin	Pilafe	40
DIBER	Diber	Tomin	Rashnapoje	15
DIBER	Diber	Tomin	Selane	20
DIBER	Diber	Tomin	Staravec	50
DIBER	Diber	Tomin	Tomin	10
DIBER	Diber	Tomin	Ushtelenxe	20
DIBER	Diber	Tomin	Zdojan	30
DIBER	Mat	B. Klos	Bejni	479
DIBER	Mat	B. Klos	Ceruja	185
DIBER	Mat	B. Klos	Klop Katund	41
DIBER	Mat	B. Klos	Plesha	135
DIBER	Mat	B. Klos	Ploni Bardhe	183
DIBER	Mat	B. Klos	Potin	10
DIBER	Mat	Ulez	Bushkash	35
DIBER	Mat	Ulez	Lundre	36
DIBER	Mat	Ulez	Modhesh	312
ELBASAN	Elbasan	Gjinar	Derstile	10,5
ELBASAN	Elbasan	Gjinar	Gjinar	68
ELBASAN	Elbasan	Gjinar	Kafen	52
ELBASAN	Elbasan	Gjinar	Lleshan	40
ELBASAN	Elbasan	Gjinar	Moskarth	30
ELBASAN	Elbasan	Gjinar	Pashtresh	46
ELBASAN	Elbasan	Gjinar	Pobrat	104
ELBASAN	Elbasan	Labinot Mal	Guri Zi	60
ELBASAN	Elbasan	Labinot Mal	Labinot Mal	67,8
ELBASAN	Elbasan	Paper	Murras	19
ELBASAN	Elbasan	Paper	Pajun	28,3
ELBASAN	Elbasan	Paper	Paper	103
ELBASAN	Elbasan	Paper	Vidhas	161
ELBASAN	Elbasan	Shushice	Fush-Buall	30
ELBASAN	Elbasan	Shushice	Polis i vogel	197,5

Region	District	Commune	Village	Area (ha)
ELBASAN	Elbasan	Shushice	Shelcan	35
ELBASAN	Gramsh	Pishaj	Ceruja	46
ELBASAN	Gramsh	Pishaj	Cerunje	69,25
ELBASAN	Gramsh	Pishaj	Drize	68,5
ELBASAN	Gramsh	Pishaj	Galigat	70,75
ELBASAN	Gramsh	Pishaj	Gjengjorin	27
ELBASAN	Gramsh	Pishaj	Kocaj	63,75
ELBASAN	Gramsh	Pishaj	Kotorr	83,5
ELBASAN	Gramsh	Pishaj	Trashovic	64,5
ELBASAN	Gramsh	Pishaj	Vine	34,25
ELBASAN	Librazhd	Polis	Mirake	61
ELBASAN	Librazhd	Polis	Polis Gostime	109
KORCE	Kolonje	Barmash	Barmash	201
KORCE	Kolonje	Barmash	Radimisht	26
KORCE	Kolonje	Barmash	Shales	38
KUKES	Has	Golaj	Helshan	219,5
KUKES	Kukes	Bushtrice	Barruq	49
KUKES	Kukes	Bushtrice	Bushtrice	105
KUKES	Kukes	Bushtrice	Matranxh	32
KUKES	Kukes	Bushtrice	Palush	54
KUKES	Kukes	Bushtrice	Vile	20
KUKES	Kukes	Caje	Caje	30
KUKES	Kukes	Caje	Fshat	74
KUKES	Kukes	Caje	Shkinak	52
KUKES	Kukes	Shishtavec	Cernaleve	63,5
KUKES	Kukes	Shishtavec	Kollovoz	12
KUKES	Kukes	Shishtavec	Novosej	32
KUKES	Kukes	Shishtavec	Shishtavec	40
SHKODER	Puke	Qa-Mali	Kryezi	88,6
SHKODER	Puke	Qa-Mali	Qaf Mali	10
SHKODER	Puke	Qelez	Bregu	42,3
SHKODER	Puke	Qelez	Buzhal	22
SHKODER	Puke	Qelez	Dedaj	30
SHKODER	Puke	Qelez	Lekasan	11
SHKODER	Puke	Qelez	Levrushk	10
SHKODER	Puke	Qelez	Mardhinaq	10
SHKODER	Puke	Qelez	Midhe	11
SHKODER	Puke	Qelez	Qelez	25
SHKODER	Puke	Qelez	Ukth	14
SHKODER	Puke	Qerret	Gomsiqe	131,5
SHKODER	Puke	Qerret	Korthpule	25
SHKODER	Puke	Qerret	Kqire Eperme	30
SHKODER	Puke	Qerret	Luf	15
SHKODER	Puke	Qerret	Pla	50
SHKODER	Puke	Qerret	Qerret	15

Region	District	Commune	Village	Area (ha)
SHKODER	Puke	Qerret	Vrith	50,25
SHKODER	Puke	Rrape	Kabash	39,75
SHKODER	Puke	Rrape	Mece	53
SHKODER	Puke	Rrape	Rrape	46
Region 5	**Districts 10**	**Communes 24**	**Villages 117**	**Area 6316,7 ha**

Each project site belongs to a forest management unit and each discrete parcel with an ID number can be identified on the Forest Management map. The first two numbers of the ID of the plot refers to the Forest Management Unit (see Table 2 below), the last numbers refers to the parcel number: For example, the Plot with ID code 2037a would represent the parcel number 37a of Shpat-Shtermen Forest Management Unit.

Table 2 – Forest Management Unit codes for sites ID

ID_FMU	FMU
01	Barmash
02	Bushtrice
03	Dedaj-Buhot
04	Deshat Maqellare
05	Galigat Stror
06	Gjinar-Zavaline
07	Gramsh Vine
08	Helshan
09	Kaftalle-Gomsiqe
10	Kastriot-Sllove
11	Klenje
12	Kryezi
13	Kryezi-Bicaj
14	Kurdari-Pl.Bardhe
15	Labinot
25	Lubinje-Tunje
16	Lumi Bardhe
17	Paper-Shllak
18	Polis
19	Shishtavec-Zapod
20	Shpat-Shtermen
21	Trodhen
22	Tucep-Okshtun
23	Ulez
24	Zerqan

During the project development, the size and the location of the project area were negotiated with the villages. The sites were identified and delineated using topographic maps 1:25’000. The boundaries of sites will be marked during project implementation and prior to the first verification.

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):

Albania is a very mountainous country. The altitude, climate, geology and soil types strongly influence the ecosystems. In addition, traditional land use is a major factor that affects the distribution of vegetation. Taking into account these factors, the main strata identified in the project area are represented in Table 3. The stratification process led to the following strata.

Table 3 - Summary table of sites' stratification according to ecological condition

Stratum	Area (ha)	Percentage share (%)
Stratum 1: Mediterranean scrub (maquis) and garrigues	913,25	14,5
Stratum 2: Mixed oak and hornbeam or Macedonian oak, ash and hornbeam	1928,05	30,5
Stratum 3: Buxus and Juniper over Magmatic stones	3090,9	48,9
Stratum 4: Shrubs and small tree species or grassland with Juniper *(Juniperus nana*)	384,5	6,1
Total	**6316,7**	**100**

In the paragraphs below a description of the environmental conditions, including climate, hydrology, soils, as well as information on rare or endangered species, is provided for each stratum.

Stratum 1: Mediterranean scrub (maquis) and garrigues

The stratum represents the degraded Holly Oak (*Quercus ilex)* forests. The prevailing vegetation is affected by overgrazing and intensive cutting. Traditionally, shepherds used fires to improve herbaceous vegetation during early autumn. This tradition hastened the degradation processes and promoted changes in vegetation structure, favouring dry tolerant dwarf species such as *Spartium junceum, Salvia officinalis, Phlomis fruticosa, Paliurus spina-christi, Erica arborea, Cottynus coggygria* etc. As grazing is observed during wintertime, this stratum has been classified as winter pasture.

Table 4. Mediterranean scrubs (maquis) and garrigues

Plots ID	Ha	%
2076-2361-051c-0523d-0524b-0552a,51a-0720a-0774a-0785a-18166a-18167a-18169a-181b-182ab-2362b-25120a-25127a-2757,58,59a,59b-2761b-0518a-0524b-0530a-0531a-0532a-0770a-1829a-1863a-1864a-2081a	913,25	14,5

The measurements at the Elbasan hydro-meteorological station i.e., average annual temperature of 14.9^{0}C, annual precipitation of 1116.4mm, minimum temperature and maximum temperature of 6.6^{0}C and 23.5^{0}C, respectively (Hydro-meteorological Institute 2002), reflect the climate characteristics of this stratum. Gaussen's index of dryness is presented in the graph below:

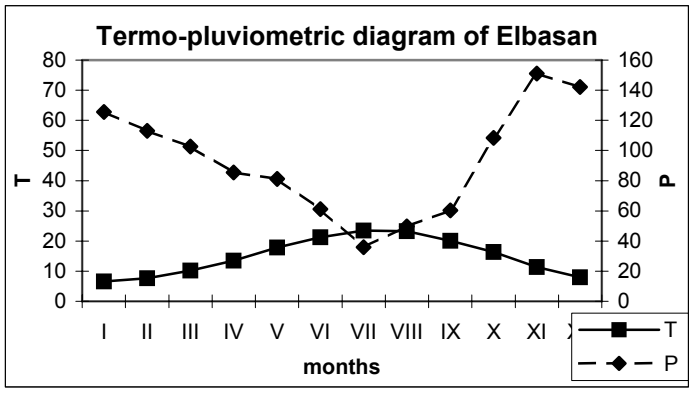

Figure 2 – Bagnouls-Gaussen graph of Elbasan region
(T=Mean monthly Temperature (°C); P= mean monthly precipitation (mm))

The area under grey-brown and brown soil type is 673.75ha and 239.5 ha, respectively. Soils are categorized as deep on 91.75 ha, shallow on 111 ha and medium on 710.5 ha. Based on the parent material, 457.75 ha are located on flysch, 174.5 on limestone and 281 ha on magmatic stone (ultra basic stone).

The evergreen vegetation is represented through Broad-Leaved Phillyrea *(Phillyrea latifolia),* Briar Tree Heath *(Erica arborea),* Strawberry Tree *(Arbutus unedo),* Prickly Juniper *(Juniperus oxycedrus),* Turpentine Tree *(Pistacia terebinthus), and* Flowering Ash *(Fraxinus ornus),* Wig Tree *(Cotynus coggygria),* Pubescent Oak *(Quercus pubescens),* Grey Sun-Rose *(Cistus incanus),* Hirsute Dorycnium *(Dorycnium hirsutum),* Christ's Thorn *(Paliurus spina-christi),* Elm Leaf Blackberry *(Rubus ulmifolius),* Evergreen Rose *(Rosa sempervirens),* Spanish Broom *(Spartium junceum),* Hawthorn *(Crataegus monogyna)* etc.

Endangered species associated with the stratum are: *Agrimonia eupatoria L., Dictamus albus L. Hypericum perforatum L.Origanum vulgare L.Salvia officinalis L. Quercus ilex L.* (E-category of IUCN), *Rosa andegavensis Bast*., (K-category of IUCN). A/R activities will support the protection and propagation of these species. The Holly forest or Mediterranean xerophytes forest is the potential vegetation anticipated in this stratum.

Stratum 2: Mixed oak and hornbeam or Macedonian oak, ash and hornbeam

This stratum represents moderate to severely degraded Turkey Oak *(Quercus cerris)* and Hungarian Oak (*Quercus frainetto*) areas that are subjected to deforestation, overgrazing and intensive harvest. Oak forests are the potential vegetation type of this stratum.

The major species of this scrub vegetation type include Oriental Hornbeam (*Carpinus orientalis)*, Flowering Ash (*Fraxinus ornus)*, Turkey Oak (*Quercus cerris)* and Hungarian Oak (*Quercus frainetto)*, Juniper *(Juniperus oxycedrus)*, Almond Pear Tree *(Pyrus amygdaliformis),* Blackthorn Tree *(Prunus*

spinosa), Hawthorn *(Crataegus monogyna), Evergreen Rose (Rosa sempervirens),* Elm Leaf Blackberry *(Rubus ulmifolius)* etc. These species also serve as the indicators of overgrazing.

Table 5 Formation of mixed oak and hornbeam or Macedonian oak, ash and hornbeam

Plots ID	Ha	%
0647-0117a-0121a-0122a-0154a-0158a-0159a-02109b-0284a-0289a-04106b-04116b-04137a,138a-04154a-04155b-04156a-04168a-04174e-04175a-04179a-04183a-04201c-04242c-0424a-04265d-04279a-04280b-0444a-0446a-0454a-0618b-0667a-0672d-10137b-10205b-10208b-10211b-10212b-10214b-10215a-10216c-10231b-10233b-10239a-10240a-10241b-10243a-1141a-1149b-117a-118a-1460b-1524a-1525a-1549a-1715a-17168a-17169a-17171a-17172a-17173a-17174a-17175a-2061a-2067d-2069a-22173b-22182b-229a-24151b-24157b-2447b-0519a-0553a-0554a-0614a-0649a-2046a-2066c	1928,05	30,5

The measurements at Gramsh hydro-meteorological station for this stratum show an average temperature of 12.1^{0}C, annual precipitation of 1098.2 mm, minimum and maximum temperatures of 6.2^{0}C and 23.7^{0}C, respectively (Hydro-meteorological Institute 2002). Gaussen's index of dryness this stratum is represented below.

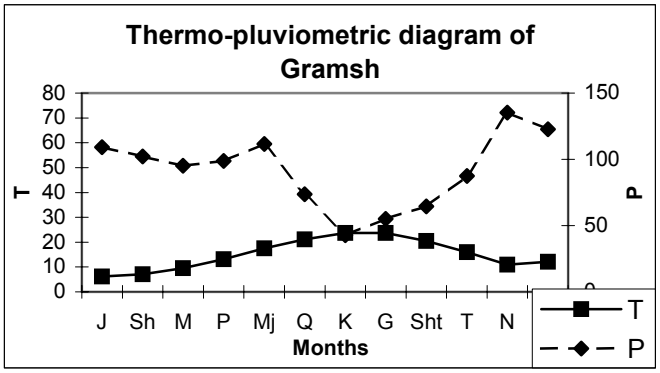

Figure 3 Bagnouls-Gaussen graph

(T=Mean monthly Temperature (°C); P= mean monthly precipitation (mm))

Photo 3 Labinot (Elbasan region)

The stratum is represented by brown soils in 808.3 ha, Grey-brown soils in 818 ha, and grey dark soils in 301.7.The 295 ha of the stratum is characterized with deep soils and the rest 1633.05 ha have medium depth.

In terms of the soil parent material of the stratum, clay schist is represented in 796.5 ha , conglomerate in 30 ha, of flysch in 308.75 ha, limestone in 587.5 ha, sandy schist in 73.3 ha, and 132 ha with other types.

The rare and endangered species identified in this stratum include *Agrimonia eupatoria L., Hypericum perforatum L., Chelidonum majus L., Dryopteris filix-mas (L.) Schott. Juniperus communis L. Juniperus oxycedrus L., Origanum vulgare, Valeriana officinalis L., Tilia platyphyllos Scop., Viscum album L., Alyssum bertoloni Desv., Crataegus heldraichii Boiss.*

Stratum 3: Buxus and Juniper over Magmatic stones

This stratum represents the degraded stage of the former oak forests as a result of long-term intensive harvests and overgrazing (depicted in photo 4 below). The characteristic vegetation of this stratum includes Box-Tree (*Buxus sempervirens),* Prickly Juniper *(Juniperus oxycedrus),* Flowering Ash (*Fraxinus ornus),* Black Pine *(Pinus nigra),* Oriental Hornbeam *(Carpinus orientalis),* European Forsythia *(Forsythia europaea),* Wig Tree *(Cotynus coggygria), Alison (Alyssum murale),* Bertoloni's Alison *(Alyssum bertoloni)* and oaks (*Quercus sp*.).

The black pine is the pioneer species and Turkey Oak and Hungarian Oak are the potential species of the vegetation type.

Table 6 Formation of Buxus and Juniper over Magmatic stones

Plots ID	Ha	%
035; 0322; 0331a; 0334a; 0340a; 0347b; 034b; 0330c; 0331c; 0327c;	3091	49

1258.59a; 1379a; 0358b; 03111ab; 037a; 032a; 03107a; 03104a; 0388a; 0357a; 0360b; 0317d; 0349a; 03112d; 13105b; 0867; 0876/b; 0878; 14105b; 14104b; 14103b; 14129a,b; 14108b; 1493b; 1494b; 1495b; 1490b; 1484b; 1485b; 1483b; 1496b; 02109/c; 0887/b; 0888; 0891a/b; 0896a/b; 0899a/b; 0277/a; 23146a; 23146b; 23147a; 2175a; 2176a; 2148a; 0291/b; 02156/b; 0614a; 2047/1; 1550c; 0457; 0414; 04173; 09126a; 0920; 0928; 09125; 09124; 0985a; 0979a; 127; 12113; 0416/a; 046/b; 02105/b; 0461/a; 0438; 0433; 0425; 04253/d; 04192; 04250; 04269; 1947/d; 04153; 10218; 10163; 10244; 10247; 10249; 23140a; 23141; 23144a; 10220; 10226; 2363b		

The climate characteristics of this stratum include an average temperature of 10^0C, annual precipitation of 2101.5 mm, minimum temperature and maximum temperature of 0.15^0C and 19.75^0C, respectively. (Hydro-meteorological Institute 2002). The Gaussen's index based on the mean monthly precipitation and temperature for the stratum is presented below.

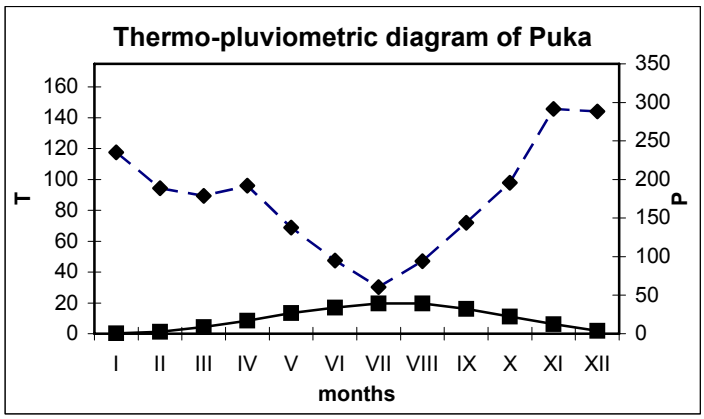

Figure 4 Bagnouls-Gaussen graph
(T=Mean monthly Temperature (°C); P= mean monthly precipitation (mm))

Photo 4

The species in protected status are *Forsythia europae Degen et Bald*. and *Festucopsis serpintin*i (C.E.Hubbard) Melderis. These endemic species create two forest associations, Forsythio-Pinetum and Festucopso-Pinetum leucodermis.

The stratum is represented by soils of medium depth in 2267.15 ha, shallow soils in 750.5 ha and in deep soils in 73.2 ha. In terms of soil type, brown soils cover 2231.4 ha, grey-brown soils in 838.5 ha and grey dark soils in 20 ha.

The soil parent material of the stratum covers ultra basic in 1367.9 ha, sandy schist in 874 ha, limestone in 276.5, clay schist in 494.5 ha and conglomerate in 78 ha.

Stratum 4: Shrubs and small tree species or grassland with Juniper *(Juniperus nana*)

This stratum represents the most degraded stage of former beech forests. The major species of this vegetation type are Common Juniper (*Juniperus communis spp. Nana),* Mat-Grass *(Nardus stricta*), individuals of Birch *(Betula pendula),* Hezel *(Corylus avellana),* Hornbeam *(Carpinus betulus),* Goat Willow *(Salix caprea),* Mouse-Ear Hawkweed *(Hieracium pilosella),* Blackthorn Tree *(Prunus spinosa),* Rose *(Rosa sp). etc.(see photo 5 below)*

Table 7 Open formation of dwarf species or grassland with Juniper (*Juniperus nana*)

Plots ID	Ha	% of total area
02157a-0252b-0265a-0266a-0269a-0270a-0278c-04159c-0448a-1960ab-1967b-1974bc-1989b,90bd-1995e	384,5	6

The climate features of the stratum include average temperature of 11.9^{0}C, annual precipitation of 910.5 mm, minimum temperature and maximum temperature of 0.5^{0}C and 22.3^{0}C (Hydro-meteorological Institute 2002)

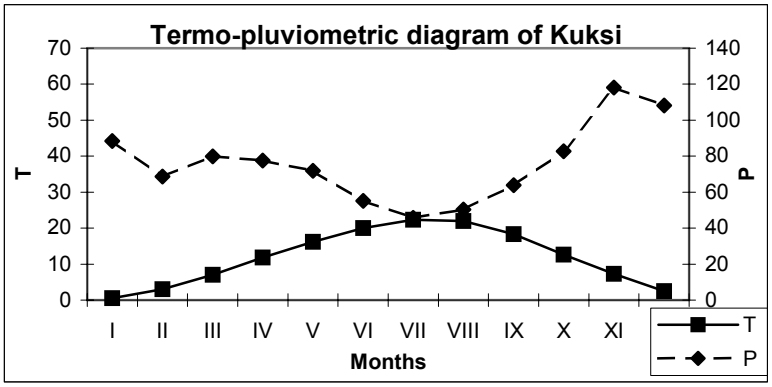

Figure 5 Bagnouls-Gaussen graph
(T=Mean monthly Temperature (°C); P= mean monthly precipitation (mm))

Photo 5

The vegetation cover in this stratum is low. Birch forests are a transitory phase and *Betula pendula* is a pioneer species. This kind of vegetation is located on the sub-alpine zone or beech vegetation belt. For this reason the planting of birch is recommended during the first phase of forest regeneration and could be the potential vegetation. This stratum is currently not used for grazing and the potential biomass is also expected to be small.

From the geological point of view, 104 ha of this vegetation type is located on flysch mother rock type, 188 ha on Clay schist, 28.5 ha on the limestone and 64 ha on ultra basic. In terms of the soil type, Dark Gray soils cover 198.5 ha , Brown soils cover 82 ha, Meadows cover 50 ha and Gray brown soils cover 54 ha. .

The rare, endemic and endangerment species are considerable within this type of vegetation and the following species may be mentioned as the most important ones*: Ranunculus degenii Kummerle., Ranunculus wettsteinii Dorfler. (endemic species), Arctostaphylos uva-ursi (L.) Sprengel, Atropa bella-donna L. Betula pendula Roth., Colchicum autumnale L., Dryopteris filix-mas (L.) Schott., Gentiana lutea L., Orchis sp. divaricata, Sambucus racemosa L., Satureja Montana L., Vaccinium uliginosum L., Fritellaria macedonica Bornm., Melampyrum heracleoticum Boiss et Orph., Barbarea vulgaris R.Br.*

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

See description under each stratum in section A.5.1.

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

The project has the components of assisted natural regeneration (the whole project area of 6,316.7 ha) and supplementary planting in a sub-set of **3264,20** ha.

- The species to be regenerated through natural regeneration are *Quercus spp*, *Acer spp, Tilia spp., Carpinus and Ulmus spp*.

- Supplementary planting would make use of a maximum of 500 seedlings per hectare to improve the density of existing regeneration. The supplemental planting is intended to (a) enrich the

existing species mixture and (b) fill in gaps where regeneration is poor or absent . The species to be planted are determined taking into account the suitability of the species for the sites. The species proposed for planting are broadleaf native species such as *Acer pseudoplatanus***,** *Betula verrucosa, Castanea sativa*,*Cerasus avium*, *Fagus sylvatica* , *Faraxinus excelsior*, *Juglans regia*, *Quercus cerris*, *Quercus frainetto*, *Quercus petraea* and the coniferous native species such as *Pinus halepensis* and *Pinus nigra,* as well as a small proportion of naturalized species such as *Robinia pseudoacacia* and *Populus canadiensis* (see Table 8). The community has preference for *Robinia pseudoaccacia* in pure formations to restore highly degraded areas. And *Populus Canadiensis* in wetland areas of the Shkumbini River and the Drini River basins.

Table 8 – Species selected for the afforestation/reforestation activities

Selected species	Total (ha)	% of afforested area	% of project area
Acer spp..	86,5	2,6	**1,4**
Castanea sativa	669,3	20,5	**10,6**
Cerasus avium	235,4	7,2	**3,7**
Fraxinus excelsior	58,0	1,8	**0,9**
Juglans regia	58,0	9,3	**0,9**
Quercus spp..	624,5	19,1	**9,9**
Betula verrucosa	579,0	17,7	**9,2**
Pinus spp..	351,5	10,8	**5,6**
Populus spp.	82,0	2,5	**1,3**
Robinia pseudoacacia	520,0	15,9	**8,2**
Totals	**3264,2**	**100,0**	**51,7**

The past experience has demonstrated that the use of above species offers the best chance for the success of plantations with respect to local ecological benefits, wood supply, soil and site stabilization, and improvement of landscapes of the project area.

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

The technical interventions that would support the human induced promotion of natural regeneration under the project are intended to protect the project sites from grazing pressure. In addition, coppicing to promote re-vegetation in the low-density shrubs, planting of seedlings on degraded slopes are the techniques that will be applied.

Only localized manual work will be employed and no machinery or fertilization will be used in the project.

Tthe project will seek to enhance project biomass productivity using the following interventions:

a. *Protection from grazing and facilitation of natural regeneration through physical and social fencing measures;*
b. *Supplemental planting at 200-500 seedlings per ha to enrich species diversity;*

c. Silvicultural measures to enhance biomass density.

a. Protection from grazing and facilitation of natural regeneration

To protect the sites from grazing and to facilitate natural regeneration, temporary fences (product of coppicing or thinning in shrubs) will be promoted.
In some cases there is no need for fencing as an agreement made under the project between the project developer and the village communities. In these areas, *social fencing* is expected to be more effective than physical barriers.

b. Supplementary planting

The forest species to be planted are determined as per the site and productive/protective scope of the plantation. In the project areas species to be planted are native broadleaf and coniferous species as well as naturalized broadleaf species. The supplementary planting is aimed to enrich the species composition, increase the project benefits (through the introduction of high value species) and fill bare areas.

As per the species growth, planting of seedlings will be done in two models (200 or 500 seedlings per hectare). Table 9 below presents a summary of stand models of supplemental planting.

Table 9 – Species proposed for planting and their density

	Species for supplementary planting	**Seedlings per hectare**	**Area (ha)**
Native broadleaves	*Betula verrucosa* *Cerasus avium,* *Fagus sylvatica* *Faraxinus excelsior,* *Juglans regia,* *Quercus cerris,* *Quercus frainetto,* *Quercus frainetto* *Quercus petraea Castanea Sativa*	200	2210.7
Native Coniferous	*Pinus halepensis* *Pinus nigra*	500	351.5
Exotic broadleaves	*Robinia pseudoacacia* *Populus canadiensis*	500	602.0

Local nurseries will provide seedlings for implementation of planting activities. There are twenty private and state nurseries that produce forest, ornamental, or fruit tree seedling for local needs within the vicinity of the project (see Table 10 below). The nurseries are sufficient for the production of seedlings and the nursery operators have the relevant skills for seedling production.

Table 10 - Distribution of nurseries in the project area

No	Region	District	Commune or	Area (m²)	Main production

				Private	State	
1	DIBER	BULQIZË	Zerqan	1,000		Forest seedlings
2			Bulqize	1,000		Forest seedlings
3		DIBËR	Kastriot	3,100		Fruit & Forest seedlings
4			Muhurr	1,200		Fruit & Forest seedlings
5			Tomin	600		Fruit & Forest seedlings
6		MAT	Lis	300		Fruit & Forest seedlings
7	ELBASAN	ELBASAN	Elbasan		20,000	Forest & Ornamental seedlings
8			Shirgjan	1,000		Forest & Ornamental seedlings
9			Gjinar	1,000		Forest seedlings
10		GRAMSH	Kukur	6,000		Forest seedlings
11		LIBRAZHD	L-Qendër	3,027		Forest seedlings
12	FIER	FIER	Qendër	20,000		Forest & Ornamental seedlings
13	KORCE	DEVOLL	Progër		50,000	Black pine, Black locust, etc.
14		KOLONJË	Ersekë	1,000		Ornamental seedlings
15		KORCE	Korçë	1,500		Forest seedlings
16			Mollaj	5,000		Forest & Ornamental seedlings
17	KUKES	KUKES	Novoseje	2,000		Forest seedlings
18		HAS	Krumë		1,200	Ornamental seedlings
19	LEZHE	LEZHË	Lezhe	10,000		Forest & Ornamental seedlings
20	SHKODER	PUKE	Puke	4,000		Forest seedlings
		TOTAL		**61,700**	**71,200**	

c. Silvicultural measures

The interventions aim to encourage regeneration of native species - *Quercus spp Acer spp, Tilia spp., Carpinus spp., Ulmus spp., etc.* There are different silvicultural interventions such as cleaning, thinning and coppicing based on the need for improvement of the planted sites.

Cleaning - The selective removal of unwanted trees in a stand that has not passed the sapling stage in order to free the saplings from the unnecessary competition. The intensity of removal is expected to be 10 - 15 % of the sapling density;

Thinning - The removal of selected stems from the stand is intended to enhance the diameter growth and height of the remaining trees. The intensity of removal is expected to be 10 - 15 % of the total stems.

Coppicing – It is a silvicultural system in which the entire stand is cleared from an area and is used as a means for removing low quality standing timber in order to regenerate new forest through vegetative means. In Albania, it is allowed to coppice 50% of the stand biomass.

The list of activities to be undertaken in each project site is presented in Annex 7.

In addition to improvements in biomass productivity of the project sites, the technical interventions are expected to improve the species diversity. The use of native species is expected to improve species mix and habitat. The inclusion of shrubs will result in improved diversity while the establishment of herbaceous ground cover in clearings will be beneficial for ground fauna. A mix of herbs and grasses will also increase the diversity of invertebrates.

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

An integral part of this project is the creation of forest and pasture user associations and enhancing their capacity through : i) introduction of participatory forest and pasture management in the communes; (ii) capacity-building measures to improve the governance of forest and pasture resources; and (iii) building the capacity of Government, drainage boards and commune staff, at district, regional and national levels.

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

The leakage due to displacement of grazing animals is minimized as manual collection of fodder is allowed. The biomass coppiced during cleaning and other management activities will be used as fodder for animals. It is expected that fodder collection from the project area will not be diminished in a significant way. Furthermore, exclusion of grazing will protect regeneration. The project would provide guidance for fodder collection and forest protection activities and encourage participation of local communities in the protection of forest and management of livestock.

There are two sources of leakage in this project: displacement of ruminant animals and transportation. The latter source is expected to be small due to negligible motor transportation activity.

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:

Legal title of the land:

The project will take place on communal forestland and pastureland owned by the state but given for communal use via a usufructuary right to the commune.
State forests and pastures are under public (state or communal) ownership.

Land use:

Forest and Pasture User Associations (FPUAs) manage pastures in cooperation with the commune. The FPUA oversees the grazing activities of farmers on high pastures .

Rights of access to the sequestered carbon:

At the time of preparing this PDD, there is no government policy on the legal status of carbon.
The state owns the trade able rights to the sequestered carbon. In the project area these rights have been handed over to the local government (communes) through usufruct. When the usufruct is transferred, the users may use forest products for their own use but they do not have the legal rights to sell the right to carbon and forest products. The state is expected to manage the rights to the sequestered carbon.

A.7. Assessment of the eligibility of the land:

The eligibility of the project plots was defined using the "Procedures to define the eligibility of lands for afforestation and reforestation project activities" approved by the CDM Executive Board[2]

[2] Available at the web site: http://cdm.unfccc.int/EB/Meetings/022/eb22_repan16.pdf

The following host country's definition of forest is used for the assessment of the eligible areas for the project[3]:

- Minimum tree crown cover: 30%
- Minimum land area: 0.1 ha
- Minimum tree height: 3 m

In order to select the areas that were not classified as forest on 31st December 1989, various land use and land cover inventories developed in Albania in the last 20 years (option 2(b) of the eligibility tool) were used. In particular, Albania National Forest Inventory (ANFI) for 1985, a forest management inventory system at land parcel level was used to assess the initial land use. The latest Forest Management Plans (FMP) and the plot level surveys were used to verify the non-forest land use. It has to be noted that both the ANFI and FMP distinguish between forest and non-forest land categories. As per the definitions of Albania National Forest Inventory (ANFI) 1985, and the Forest Management Plan, woodland and shrub lands are covered by shrubs and sparse trees (crown cover < 30% and height <3 m) and are primarily used for grazing (see Box 1).

Box 1 – Classification of land according to Albanian law

According to the Albanian law (No 9835, date 4.05.2005 - "On the Forests and Forest Service", Article 2) the following land classes are distinguished:

"Trees or groups of forest trees", are the single trees, everywhere they are, areas with forest trees of the size 0,05 ha, shelterbelts, urban parks, groups of trees planted in the small parcels and used for grazing.

"Forest", is the land area covered by a dense group of forest trees in a permanent way or with other sparse forest vegetation, with a surface more than 0,1 ha and with a vegetation coverage not less than 30%, which produces wood material, has impact on the surrounding environment and ensure the forest functions.

"Shrubs", are wood vegetation, with stems branched by the basis and not too high, which can be distinguished by the grass vegetation from the wood structure, and by the forests from the short stem and the lack of the main stem.

"Forest Land", is the land area with trees, shrubs or other forest vegetation with a coverage from 5 to 30%; bare areas, openings, bare rocks, eroded and non-productive lands, sandy lands, forest roads, not included in the other items of agriculture cadastre, ecologically and functionally related with the national forest fund, which together guarantee the forest functions.

Hence, only "Forest" land class conforms to the "forest definition for the CDM purposes". The site selection took into consideration the above-mentioned definitions, excluding the land classified as forest in both the past and recent FMPs.

[3] http://cdm.unfccc.int/DNA/ARDNA.html?CID=2

The current land use was determined through plot visits . The inventory resulted in assessment of percent of vegetation cover and potential height of woody vegetation (Annex 8, columns from U to Y in the main table worksheet).

The results of these classifications are presented in the two tables below. The aggregate results of the project area are presented in Table 11, and results for individual plots are included in Annex 9. Majority of the project area was classified as shrubs in ANFI 1985 and this classification was confirmed in the latest FMP. Field inspection grouped all land categories into grassland as it as it considered the broader as per IPCC land cover/land use classes[4]. The small differences between FMP classification and field inspection is due to the fact that some areas that were classified as arable land were not found to be in agricultural use during the field inspection.

The use of satellite images for land eligibility assessment was not possible under the Albanian conditions. In most of the plots that show more than 30% crown cover the tree height at does not exceed 3 m due to continuous grazing pressure. In these cases satellite images would misclassify the land covered by dwarf trees as forest land, leading to the exclusion of a large part of land that is actually eligible for AR CDM activities according to the host country definition of forest. Aerial photographs although provide a better identification of this kind of vegetation cover, unfortunately aerial photographic evidence is not available in Albania.

Table 11 - Classification of project area by land use/land cover types as per different inventories (in percent of total project area)

Inventory	Arable land	Others	Pasture	Shrubs	Woodland	Grassland
Land cover ANFI 1985	16,1%	3,1%	4,4%	74,4	2,0%	N/A
Past land use/cover '89 (from interviews)	16,4%	N/A	N/A	72,8%	0,6%	10,2%
Land cover in the latest FMP	1,5%	13,2%	7,4%	72,0%	6,0%	N/A
Land use in the latest FMP	-	-	87,9%	6,7%	5,4%	N/A
Present Land use by field inspection (according to IPCC land use classes)	0%	0%	N/A	N/A	N/A	100%

[4] IPCC Good Practice Guidance for LULUCF – 2003. Charter 2: "Basis for Consistent Representation of Land Areas"

Loss of biomass is observed on most land parcels included in the project, and the carbon stock is expected to be in a low steady state as grazing pressure prevents the woody vegetation from growing into trees and producing seeds as animals feed on leaves, buds, shoots, flowers, and unripe seeds if they are able to survive to this stage. Very limited number of seeds sprout as seedlings and are grazed. As a consequence there is no young regeneration in the project area..

Photo 6: Overgrazing of dwarf oaks

Planting will complement activities that support the exclusion of grazing and promote the plantings on bare patches. This combined approach promotes regeneration of native species such as *Quercus sp, Acer sp*, *Tilia sp*, *Carpinus sp*., *Ulmus sp*.,. and enriches biodiversity. As the project activity creates conditions for seed production and regeneration of dormant root stock over the project area and therefore qualifies as the assisted natural regeneration project activity.

A.8. Approach for addressing non-permanence:

In order to address non-permanence, the project participants have chosen the issuance of **tCERs** for net anthropogenic GHG removals by sinks to be achieved by the A/R CDM project activity,. In order to address the risks of unexpected releases of the sequestered carbon, an equivalent quantity of tCERs would be replaced in compliance with the modalities and procedures of A/R CDM project activities.

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

Table 12: **Estimates of net anthropogenic GHG removals by sinks**

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_2e)	Estimation of leakage (tonnes of CO_2 e)	Estimation of net anthropogenic GHG removals by sinks (tonnes of CO_2 e)
2007	332	4965	0	4633
2008	330	11409	0	11079
2009	327	19757	0	19430
2010	325	27665	0	27340
2011	323	28073	9	27741
2012	321	27608	0	27288
2013	318	27152	0	26833
2014	316	26703	0	26386
2015	314	26261	0	25947
2016	312	25826	9	25506
2017	310	25399	0	25089
2018	308	24979	0	24671
2019	305	24566	0	24260
2020	303	24159	0	23856
2021	301	23760	9	23450
2022	299	23367	0	23068
2023	297	22980	0	22683
2024	295	22600	0	22305
2025	293	22226	0	21933
2026	291	21859	9	21559
Total (tonnes of CO_2 e)	6221	461314	35	455058

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

The project is expected to be carried out within the context of the World Bank Natural Resources Development Project (NRDP) in Albania.

There is no public funding of carbon purchases that will result in a diversion of official development assistance and financial obligations of any Parties under UNFCCC. The information on public funding is provided in Annex 2.

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:

The project has started on **1 March 2006** and the first crediting period is expected to be up to 29 February 2026.

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

60 years

B.3 Choice of crediting period:

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

20 years (20yr-00mm) crediting period, renewable twice for a total crediting period of 60 years of the project period.

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

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:

Approved Afforestation and reforestation baseline and monitoring methodology AR-AM0003:

"Afforestation and reforestation of degraded land through tree planting, assisted natural regeneration and control of animal grazing – Version 4"

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 approved methodology AR-AM0003 was developed on the basis of Albania project. Therefore, the selected methodology appropriately fits the project conditions.

>> The proposed A/R CDM project complies with the following applicability conditions of the methodology.

1) The project activity can lead to a shift of pre-project activities outside the project boundary, e.g. a displacement of grazing and fuelwood collection activities, including charcoal production;

   - The displacement of grazing outside the project boundaries is anticipated and measures to minimize leakage will be implemented.

2) Lands to be afforested or reforested are severely degraded and the lands are still degrading or remain in a low carbon steady state;

   - The Lands to be reforested have been severely degraded over the last decades and are still degrading due to grazing, which prevents the existing vegetation to grow to woody stage. As a consequence, the existing vegetation continues to be well below the thresholds of the

national definition of forest. Most lands are covered with grasses and shrubs and very few growing trees are observed and erosion is easily recognizable on many plots.

3) Environmental conditions or anthropogenic pressures 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;

- The land proposed for A/R CDM activity is degraded due to many years of overgrazing and fodder collection. Remote location and poor road system make it economically unattractive for any other kind of investment. Several barriers prevent investors or local communities from using the land for economic revenue beyond the current pastoral activity. These include inaccessible commercial bank loans, lack of capacity for successful planting and lack of institutional arrangements.

- The widespread overgrazing and fodder collection does not allow the young regeneration to woody stage. The intensive grazing activity prevents encroachment of natural forest vegetation. Even the vegetation that progresses to woody stage is bushy and suppressed due to continuous damage from grazing and anthropogenic pressure. Hence, the establishment of natural regeneration is impossible without management interventions such as restrictions on grazing and closure of areas.

4) Lands will be afforested or reforested through promotion of natural regeneration and or direct planting or seeding;

- The land owners will install fences to prevent the grazing within the project boundary and will ensure the boundaries are visible in order to prevent the shepherds to move in the project areas (social fencing). In places where there is limited scope for natural regeneration, supplemental plantings will be implemented.

5) Site preparation does not cause significant longer term net decreases of soil carbon stocks or increases of non-CO2 emissions from soil;

- There is no large area in which plowing and other types of soil preparation is foreseen in the project areas. The seedlings are only planted in small holes, which will not cause a significant loss of soil carbon.

6) Carbon stocks in soil organic carbon, litter and dead wood can be expected to decrease more due to soil erosion and human intervention or increase less in the absence of the project activity, relative to the project scenario;

- There is soil organic carbon in the project area very low due to continuous soil degradation and consequent loss of soil carbon in absence of interventions. The reforestation project supports the protection of existing vegetation and supplemental tree plantings and enables prevention of soil erosion and loss of soil fertility. Furthermore, the project is expected to enhance the accumulation of soil organic carbon.

7) Flooding irrigation is not permitted;

- Flooding irrigation is not foreseen on any project plot.

8) Soil drainage and disturbance are insignificant, so that non CO2-greenhouse gas emissions from this type of activities can be neglected;

- Soil drainage is not foreseen at all on the project plots and the single planting of the trees will not cause a significant disturbance

9) The amount of nitrogen-fixing species (NFS) used in the AR CDM project activity is not significant, so that greenhouse gas emissions from denitrification can be neglected in the estimation of actual net greenhouse gas removals by sinks;

- A small proportion of nitrogen fixing species will be planted. As this species is long adapted to the region and will be confined to dry lands, therefore, no risk of N2O emissions is expected.

10) The AR CDM project activity is implemented on land where there are no other on-going or planned AR activities.

- There are no other ongoing or planned A/R activities in regions where the project plots are located partly due to lack of policies supporting afforestation and reforestation in Albania. The proposed AR-CDM project is the first of its kind in the country.

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

Table 13 Carbon pools under the project

Carbon pool	Selected (Yes/No)	Justification
Above-ground biomass	Yes	Major carbon pool. Both tree and non-tree Biomass components are covered
Below-ground biomass	Yes	Below-ground biomass stock is expected to increase due to the implementation of the A/R CDM project activity.
Dead wood	No	Deadwood is expected to increase due to implementation of the project activity (when compared with the soil carbon stock under baseline scenario). Therefore, non-accounting of deadwood pool is conservative as per applicability condition.
Litter	No	Litter is expected to increase due to implementation of the project activity (when compared with the soil carbon stock under baseline scenario). Therefore, non-accounting of deadwood pool is conservative as per applicability condition.

Soil organic carbon	No	Soil organic carbon is expected to increase due to implementation of the project activity (when compared with the soil carbon stock under baseline scenario). Therefore, non-accounting of deadwood pool is conservative as per applicability condition.

Table 14 Emissions sources included in the project boundary

Sources	Gas	Included	Justification/explanation
Use of fertilizers	CO_2	No	Not applicable
	CH_4	No	Not applicable
	N_2O	Yes	Not applicable as no fertilizer is used in the project
Combustion of fossil fuels	CO_2	Yes	Main gas of this source
	CH_4	No	Potential emissions are negligibly small
	N_2O	No	Potential emissions are negligibly small
Burning of biomass	CO_2	No	Not applicable as no burning is practiced in the project
	CH_4	Yes	Not applicable as no burning is practiced
	N_2O	Yes	Not applicable as no burning is practiced

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

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

Although the project sites are located in different climatic zones, the carbon status of all the sites is more or less equal: It is very low or decreasing. All sites have a baseline of continued degradation caused by overgrazing. For that reason all project sites could be categorized into one baseline stratum (according to AR-AM0003/Version 2, Ex-ante stratification Step 1, f) last sentence).

There are very few sites with growing trees (3 % of the area). The trees are either isolated or in small groups. The few growing trees were taken into account in the baseline assessment. These have also been considered as part of the ANFI, whose data are considered in the baseline assessment [5].

Considering the lack of significant differences in the carbon stocks of sites, one stratum was considered adequate to reflect the pre-existing conditions and baseline projections.

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

On each plot the future forest type was determined. According to the site conditions (climatic zone, status of degradation etc.), species suitable for each site and the expected management system were specified (see Annex 7 for details)

[5] ANFI 2004: Albanian National Forestry Inventory – Special study: Carbon sequestration and Kyoto Protocol. Government of Albania. Ministry of Agriculture & Food, Management Unit of the Forestry Project. Tirana.

For the calculation, the stand model, high forest broadleaf of ANFI 2004 was selected to represent the project scenario.

The choice was driven by the following reasons:

1. The coppice forests in Albania are under grazing pressure and therefore can not be considered to represent t the project scenario.
2. The growth rates of high broadleaf forest are representative of the degraded project sites in Albania.[6]
3. The participating experts (A. Proko, H. Kola, T. Lako, H. Schmidtke, W. Galinsky) agreed that the high forest broadleaf stand model represents the growth on the sites in a realistic manner.

There are some conifers planned to be planted, but they are embedded in broadleaf forests.

The stand models were derived from the Albanian National Forest Inventory ANFI and described in the ANFI report.

Step 3: Final ex-ante stratification

Only one stratum according to pre-existing conditions and baseline projections was identified. The boundaries of the plots were taken as boundaries of the strata and all plots were delineated as per the forest management maps.

Table 15 - Areas per stratum

***Ex ante* stratum**	**ha**
Total area	**6316.7**

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 baseline scenario of the project has been identified following the steps of the section II.4 of AR-NM0003/Version 2 methodology.

Step 1: Define the project boundary

The physical delineation of the project boundary is described in section A.4.1.4 above, while the steps followed in the land eligibility assessment are described in section C.1.

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

(a) Analyze the historical and existing land-use / land-cover changes in the context of the socioeconomic conditions.

[6] A study done during the Albania Forestry Project (World Bank 1996-2004, Project ID: P008271) measured the average increment and stand volume in 7-year-old restored oak coppice forest (similar to the CDM project). Average annual increment resulted is 8 m^3 /ha/year and the standing volume is 56 m3/ha, i.e., five times higher than that of ANFI coppice stand models. The study is available upon request at the NRDP PMU, Tirana.

Livestock accounts for nearly half of the agricultural GDP, but pastures have been poorly managed in the past, hence, their quality is low and overgrazing is common (ANFI 2004)[7]. Inappropriate crop choice, including subsistence cereal farming on steep sloping land, and poor soil conservation methods have contributed to serious soil degradation and reduced productivity. Since 1990, as much as 8% of the forest area was deforested (FAO-FRA 2000). The main reasons for deforestation were: increase in use of forests for fuel-wood, uncontrolled harvesting and grazing, and poor forest management. Fires, often related to agricultural residues burnings occur throughout Albania and cause significant damage to forests and pastures each year. Land degradation and erosion resulting from poor land use practices have increased the severity of flooding in low lying areas.

(b) Show that historical and current land-use / land-cover change has led to progressive degradation of the land over time including a decrease or steady state of the carbon stocks in the carbon pools.

The project sites are subject to grazing and the land that is already degraded is subjected to further degradation. There is no national or regional policy that promotes afforestation or reforestation activities. On the contrary, the forest area is decreasing due to grazing pressure and illegal wood collection.

Land degradation has been identified as one of the most important environmental issues in Albania mainly due to lack of sustainable management of natural resources (see also Annex 5: Environmental Impact Analysis).Currently, highly degraded land in rural areas is subject to uncontrolled grazing which prevents the development of vegetative cover. These lands are eroding rapidly and in many places the landscape has lost significant vegetation, and consequently lost productive soil.

The project will take place only on communal degraded pasture shrub areas that, for the most part, historically carried trees and were cleared in the past. The most likely use of these lands is as pastures. 85% of the project land is located on mountainous and hilly areas (Table 16) and extend up to 30% slopes, which cover more than two-thirds of the project area.

Soils on project areas range from medium to shallow depth (representing 76% and 18% of the project area, respectively - Table 18). The erosion risk on these lands increases under unsustainable management. The social assessment reported that about three-quarters of sample villages experienced landslides and about 40% of villages were subjected to flooding that is attributable to erosion (Lemel H., 2005 – Annex 6 Social Assessment).

Table 16 –Categorization of project area by physiographic

Morphology	ha	%
Flat	61.8	1
Low energy reliefe	836.8	13
Hilly	4508.2	71
Montainous	857.8	14
No data	52.0	1

[7] ANFI 2004: Albanian National Forestry Inventory – Special Study on Grazing Impact on Wooded Lands, Including Fuelwood Consumption Assessment. Prof. Vasilios Papanastasis. Government of Albania. Ministry of Agriculture & Food, Management Unit of the Forestry Project. Tirana.

Table 17- Slope gradient of the project area

Slope %	Ha	%
0-20	508.0	8
20-30	1550.4	25
30-40	2328.6	37
40-50	1552.5	25
50-80	377.3	6
Total	**6316.7**	**100**

Table 18 – Categorization of project area by soil depth

Soil depth	Ha	%
Deep	387	6.1
Medium	4773.2	75.6
Shallow	1156.5	18.3
Total	**6316.7**	**100.0**

Photo 6- Sign of erosion at project site

Hydrology

The areas included in the project are mainly denuded slopes, with compacted soils and low water infiltration capacity. Currently large volume of storm runoff is experienced. These events increase soil erosion, destabilize slopes, increase turbidity of water and transport of sediments leading to a general decrease in water quality.

People

Almost two-thirds of project communities have experienced substantial losses in population since the early '90's, fueled by dismal income earning and livelihood prospects, inadequate land, physical isolation due to and difficulties accessing basic services such as schools, clinics and markets. The most dramatic population decreases are evident in villages at the highest altitudes. Migrants have headed mainly to Tirana or other large urban centers in Albania or abroad but also to nearby villages or communal centers at lower elevations that offer more land per family, better road links, etc. There are signs that out-migration may be leveling off in many of the communities. Leaders in 60% of SA villages that experienced population declines described that the demographic situation has stabilized (Lemel H., 2005 – Annex 6 Social Assessment).

Flora and fauna
From the analysis of the species composition of the sites (floristic list in Annex III of the Environmental Impact Analysis), reveal a transition to degraded (pasture and shrub) ecosystems with the species represented by *Pyrus amygdaliformis, Prunus spinosa, Staehelina uniflosculosa, Alyssum murale, Epilobium angustifolium, Juniperus communis*, *J. nana, Paliurus spina-christi, Phlomis fruticosa, Rosa sempervirens, Rubus ulmifolius, Putoria calabrica, Thymus sp.div., Juniperus oxycedrus, Micromeria Juliana, Cistus incana, Ononis spinosa, Buxus sempervirens as well as* other secondary succession species.

The presence of wild animals, especially big mammals, abundant before degradation processes, would decrease because of intensive grazing activities, hunting and vegetation degradation processes.

The vegetation changes and the identification of stages, within the dynamic series is estimated on a comparative basis, by field observations and other studies (Proko & Kromidha 1999; Proko & Dida 2002)[8] and was used as basis for the site stratification.

The following categories represent the stratification of the project sites into ecological zones reported above (Section A.4.1.5.) as an effect of human disturbance from intensive wood cutting and overgrazing:

- *Typical Mediterranean scrubs - maquis, (Location: Shushice, Gramsh)*. Represents the degradation stage of the Holly Oak (Quercus ilex) forests.
- *Mixed oak and hornbeam formation or Macedonian Oak, Ash and Hornbeam (Location: Paper, Labinot, Polis)* Represents the moderate degradation stages of the Turkey Oak (Quercus cerris) and Hungarian Oak (Quercus frainetto) forests (Thermophilous mixed deciduous broadleaved forests).
- *Shibliak formation of Buxus and Juniper and thorny shrubs (Location: Puke, Mat) –* From a dynamic point of view represents the degradation stage of the oak forests
- *Open formation of Dwarf species or grassland with Juniperus nana (Location: Kukes)* - Represent the most degraded stage of beech forests.

[8] Proko A. and Kromidha G. 1999. Vegetation degradation stages and plants, which identify the erosion. Buletini I Shkencave Bujqësore (Bulletin of Agricultural Sciences) Tirana 1999 Nr. 2 p. 123 – 128.

Proko A. and Dida M. 2002 Vegetation characteristics and dynamism of forest ecosystems in the Vlora coastal region. Cahiers Options Mediterraneennes. La cooperazione italo – albanese per la valorizzazione della biodiversita Vol 53. p. 153 - 164

The continuation of the current land use will accelerate the on going degradation process.

(c) Identify and briefly describe national, local and sectoral land-use policies or regulations adopted before 11 November 2001 that may influence land-use / land-cover change

Although the Forest Management Plans include the amelioration of degraded forests, and the reforestation of degraded pasture, no real actions have been implemented so far due to lack of funds and lack of a policy that promote afforestation on grazing land in Albania. Moreover, there are no ongoing or planned A/R activities on grazing land in regions where the project plots are located. Partly this is a result from lack of policies, but to a great extent it is a consequence of limited tradition for afforestation in Albania. Therefore, without the proposed A/R CDM project activity, the project area will not be reforested.

(d) Identify alternative land uses including alternative future public or private activities on the degraded lands including any similar AR activity

A*lternative 1* – abandonment of lands would lead to further degradation and their subsequent regeneration would be difficult and costly. This alternative, although it is a plausible alternative, it would be infeasible considering the high costs of regeneration.

Alternative 2 – Reintroduction of degraded lands into the agricultural production cycle is expected too costly and on a large proportion of the degraded areas this may not also be feasible. As the degraded lands are not expected to be brought into agricultural uses in the foreseeable future, this alternative is not likely to be relevant.

Alternative 3 - Continuation of the existing and historical land use leading to further land degradation.
Alternative 4 - Implementation of the project as an assisted natural regeneration without being registered as a A/R CDM project activity is not expected to be realized in the baseline considering the major barriers in implementing this alternative in the baseline.

Table 19.

Alternative land uses	Baseline	Remarks
1. Abandonment of degraded lands from further grazing pressure	No	Considering the lack of knowledge of forest and pasture management at the community level and the prevalence of a farming and livestock based economy in these parts of Albania this scenario is not likely.
2. Reintroduction of degraded lands into the production cycle (agricultural uses).	No	The current level of degradation and the remoteness and inaccessibility of the lands makes this scenario unlikely.
3. Continuation of the existing and historical land use leading to further land degradation (baseline scenario)	Yes	Continuation of the current land use of the degraded lands will lead to continued loss of vegetative cover and severe soil erosion.
4. Implementation of the project as a non-CDM project	No	

The field surveys and interviews with communal governments as well as the project stakeholders' indicated that the only realistic and credible alternative land use is to continue the current degraded land

use considering the economic unattractiveness due to investment, technical and institutional barriers The high elevation and steep sloping terrain and lack of transportation in the project area also pose significant limitations for alternative land use. Therefore, there is no credible alternative land use in the project area beyond continuation of the current land use.

Step 3: Stratify the AR CDM project area

One baseline stratum has been identified according to Section C4

Step 4: Determine the baseline land-use / land-cover scenario for each stratum

The baseline land use / land cover scenario was identified as ongoing degradation due to overgrazing as described in Step 2

Step 5: Determine the baseline carbon stock change

The baseline stratum consists of isolated trees or their groups and shrubs. Therefore Step 5 b) has been applied. The living biomass stock change was estimated using the algometric equations of the stand model "coppice forests" of the ANFI.

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

As described in Section C.4 one single baseline stratum was identified. This is characterized by ongoing degradation and loss of carbon due to grazing. The few growing trees were estimated as a percentage of the baseline stratum and assessed as part of the baseline. The baseline stratum is titled as "degraded grazing land with few growing trees"

Grazing and land degradation would continue on the project sites without project interventions. The grazing pressure varies widely among the selected sites. Based on livestock data provided by the villages, the average stocking rate for the grazing areas of all project villages was found to be 3.0 SEU/ha[9] for a 7-month grazing period per year, which is higher than the estimated grazing capacity of 1.75 SEU/ha and reflects the incidence of overgrazing[10].

C.6. Assessment and demonstration of additionality:

The latest version of the *Tool for the Demonstration and Assessment of Additionality in A/R CDM Project Activities (Version 02)*[11] *is used to demonstrate the additionality of the project.*

Step 0. Preliminary screening based on the starting date of the A/R project activity

1. Evidence that the starting date of the A/R CDM project activity was after 31December 1999.

[9] Sheep Equivalent Unit per hectare. One SEU corresponds to one goat. 5 SEU are equivalent to one caw.

[10] Vasilios Papanastasis, 2005. "Report on Pasture Survey and Range Management Plan -Assessment & Design of Community - Based Carbon Sequestration in Albania". Agrotec Consortium, Rome, Italy

[11] http://cdm.unfccc.int/Reference/tools/ar/methAR_tool01_v02.pdf

The project was started on 1st March 2006. The documentary evidence pertaining to the project start date is in the form of contractual agreements with the Communes are available at the Forest and Pasture Policies Directorate-FPPD, Albanian Ministry of Environment, Tirana. The copies of the contractual agreements are presented in Annex 11.

2. *Provide evidence that the incentive from the planned sale of GHG emission allowances was seriously considered in the decision to proceed with the project activity.*

The proposal to under the project as an A/R CDM project activity was considered and it was included as a component of the Natural Resource Development Project of the World Bank initiated in 2005 (Project ID: P082375). Specifically, the Project Appraisal Document stated that "The BioCarbon Fund has expressed interest in purchasing emission reductions from Albania, resulting from the proposed A*ssisted Natural Regeneration of Degraded Lands* BioCarbon Fund project. The Letter of Interest from the BioCarbon Fund and the Emission Reduction Purchase Agreement between the BioCarbon Fund and the Ministry demonstrates –the active consideration of the CDM at the project design stage. The documentary evidence[12] in this regard is presented in Annex 10.

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

Sub-step 1a. Define alternatives to the project activity:

Alternatives to the project activity outlined in section C.5.1. (step 2 (d)) above are reproduced below.

From the discussion in section C5.1, it is clear that the first three alternatives would not be pertinent as project alternatives, the alternative 4 - implementation of the project as an assisted natural regeneration without being registered as a A/R CDM project activity is only possible as the project alternative. However, this alternative is subject to several barriers as outlined in sections below. The barriers are expected to be overcome by implementing the project as A/R CDM project activity.

Table 20.

Alternative land uses	Project	Remarks
1. Abandonment of degraded lands from further grazing pressure	No	Considering the lack of knowledge of forest and pasture management at the community level and the prevalence of a farming and livestock based economy in these parts of Albania this scenario is not likely.
2. Reintroduction of degraded lands into the agricultural production cycle	No	The current level of degradation and the remoteness and inaccessibility of the lands makes this scenario unlikely.

[12] Available at the following web site: http://www-wds.worldbank.org/external/default/main?pagePK=64193027&piPK=64187937&theSitePK=523679&menuPK=64187510&searchMenuPK=64187287&theSitePK=523679&entityID=000012009_20050520122107&searchMenuPK=64187287&theSitePK=523679

3. Continuation of the existing and historical land use leading to further land degradation (baseline scenario)	No	Continuation of the current land use of the degraded lands will lead to continued loss of vegetative cover and severe soil erosion.
4. Implementation of the project as an assisted natural regeneration without being registered as a A/R CDM project activity	Yes	

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

All land use alternatives identified in the sub-step 1a: are in compliance with the applicable legal and regulatory requirements. There is no policy, which requires or promotes A/R activities on grazing lands in Albania. Moreover, there are no ongoing or planned A/R activities on grazing land in regions where the project plots are located. In addition to lack of policies, there is a limited tradition for A/R activities in Albania. Therefore, without the proposed A/R CDM project activity, the area is not expected to be reforested, and the goals of reforestation programs would remain unfulfilled.

There are no mandatory legal provisions to regenerate the degraded lands and there has not been a history of assisted regeneration initiatives between 31 December 1989 and prior to the project. Therefore, alternative 4 is not likely to realized under the baseline scenario.

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

A outlined in section C5.1, the Alternative 3 - Continuation of the existing and historical land use leading to further land degradation is identified as the baseline scenario.

The surveys of local community stakeholders and interviews with communal governments also indicated that there is no credible alternative land use in the project area beyond continuation of the current land use.

Step 2. Investment analysis (not applied)

Step 3. Barrier analysis

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

Barriers that prevent implementation of the A/R CDM project activity are outlined below.

1) Absence of seed sources does not permit natural regeneration of the project area.

The existing tree vegetation is unable to produce seeds or small quantities of seed produced by the existing vegetation may not germinate due to soil compaction resulting from overgrazing. Grazing also prevents the development of the few seedlings that manage to germinate (for further details see also floristic list attached to the Annex 5 of PDD).

2) Lack of tradition of afforestation of pastureland.

This pilot project is the first of its kind in the country. The human induced natural regeneration was tested at a small scale in an earlier AFP World Bank project, which demonstrated that protecting highly degraded land against over-grazing could facilitate the seed production and the establishment of vegetation from dormant rootstock. On the basis of these limited experiment the present CDM A/R project was proposed.

3) Investment barrier due to absence of financial resources and access to credit to regenerate the degraded lands.

About 16,000 families in project villages will be potential beneficiaries of the CDM project. The mountainous communes and districts encompassed in the project are among the poorest in the country, with a median poverty rate[13] of 42%. Almost two-thirds rank in the lowest third of the poverty distribution as measured by "percent families poor". The vast majority of families possess under 0.5 hectare of land, less than half the size of holdings typical of plains areas. Land shortage is especially acute in communes and villages located above 800 meters elevation on steeply sloping terrain, where holdings can be as low as 0.1 ha. Land quality tends to be poor and productivity constrained by lack of irrigation (Social Assessment - Annex 6 pp.8-9).

4) Lack of organizational structures that support regeneration of degraded lands

5) Lack of knowledge needed to organize the afforestation effort;

The project activities are defining the area, evaluating and planning the appropriate measure like fencing, coppicing and planting site specific trees that must be ordered and bought from nurseries. The costs for that and the lack of planning and management capacity to conduct the project are the main barriers.

Step 4. Common practice analysis

There have been no comparable afforestation and reforestation initiatives in Albania. The earlier afforestation and reforestation activities on degraded lands were at a very small scale and did not have similar objectives as this project. Ttherefore, this project is considered a first of a kind approach in promoting the regeneration by assisting natural regeneration and as well as improving the improving the density.

Step 5. Impact of CDM registration

Each plot is subjected to at least one major barrier, which is removed as a result of the direct anthropogenic activity applied within the CDM A/R project activities.

[13] Based on 2004 INSTAT "head count" figures of the percentage of population whose per capita consumption falls below the poverty line. In the 2003 World Bank Poverty Assessment, extreme poverty is estimated at 3,047 Lek per month and the full poverty line at 4,891 Lek per month.

Given the potentialities of the present project, the BioCarbon Fund has expressed interest in purchasing emission reductions from Albania, for this purpose additional resources were allocated by NRDP specifically for the implementation of the CDM project, therefore removing the investment barrier.

The revenue from the sale of carbon credits would provide support to activities such as fencing, coppicing, cleaning and supplementary planting that support regeneration. This will create additional source of earnings for local populations making the grazing restrictions more palatable (see Annex 6).

Removing the grazing barrier (barrier 1) will permit the establishment of pre-existent vegetation by coppicing and cleaning activities, promoting natural seed sources and facilitating the survival of the seedlings (barrier 4) The overall effect of the project will be to improve soil stabilization with the development of forest cover and increasing root development. Soil organic matter will also increase as the result of improved primary productivity resulting in improved soil structure and fertility (barrier 2).

This project provides organizational structure through the involvement of the Forest and Pasture User Associations in the management of the project and share of carbon credits revenues among the villages involved in the project. FPUAs will be trained during the 5 years for the management of the project (barrier 7 and 8). The activities aim to:

- Assist the FPUAs involved in the project– During the NRDP implementation, specific training and capacity building activities will be carried out to provide support to the FPUAs involved in the carbon sequestration activities to coordinate and manage all the activities related to the A/R CDM activities. This should guarantee the future sustainability of the project.
- Training on Carbon Monitoring Activities – Within the NRDP activities the necessity to train appropriate personnel for project monitoring activities at both level it has been envisaged: local and national level.

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

Baseline
Referring to section II.5 of the methodology AR-AM0003, the following interpretation has been used:

Areas with few growing trees

The major part of the project area can be considered as “lands are still degrading or remaining in a low carbon steady state”. Although woody perennials exist, they are not “growing” due to grazing.

The baseline calculation takes into consideration that there are a few trees already growing, either as single trees or on small spots inside the project areas. These areas cannot be delineated separately, but the percentage was estimated in the field to only represent 3% of the total area.

Growing trees

We considered those trees as “growing” that were classified as “2-5 meters” or “> 5 meters” tall in the project plots (Annex 8). At this height the terminal sprout of the trees starts to escape from the animals’ grazing, but only from a height of five meters onwards trees can be considered safe from goats.
According to the project sites’ information, the part of the project areas with growing trees was estimated in the following tree crown cover classes within the project area:

- Absent
- 10-30%
- <10%

For the calculation of area with growing trees, the lands less than 10% crown cover and lands with crown cover between 10 and 30% were considered. The lands with single trees included all lands in the class "<10%". In the 10% to 30% crown cover class, lands between 20% and 30% crown cover were assessed carefully because a higher percentage of crown cover leads to exclusion of the land parcel from the project. From the assessment, it was noted that 187.3 ha or 3% of the project area (6'316.7 ha) was identified as stocked with growing trees.

Table 21

Area of growing trees	**ha**	**%**
Area with growing trees	187.3	3.0
Area without growing trees	6129.4	97.0
Total Area	**6316.7**	**100.0**

Knowing the area of the growing trees, a growth model was used to determine their contribution to the baseline removal by sinks. It can be assumed, that those few trees are growing according to the growth model of the coppice forest type, which was applied. Because the growing trees cover 3% of the project area, the model was applied with a reduction factor of 0.03 for the whole project area.

Estimation of carbon stock

The carbon stock estimation was estimated for the coppice that represents the baseline scenario. The data for carbon stock estimation of the project area is based on Albanian National Forestry Inventory ANFI.

The allometric equation used to calculate the stand volume was derived from the stand model of coppice forests (expanded volume) using the data of the Albanian NFI (2004), which provides the current annual increment in volume. Because the model provides expanded volume already, BEF was set to 1 and root to shoot ratio was set to 0. The wood density was taken as average of hornbeam and oak, which are the most common species among the growing trees.

$$Y = a(1 - e^{-bX})$$

Y = Volume of the stand in cu.mt
Coefficient Data:
a = 237.2127
b = 0.0069513642
Standard Error: 15.0111327
Correlation Coefficient: 0.9317210

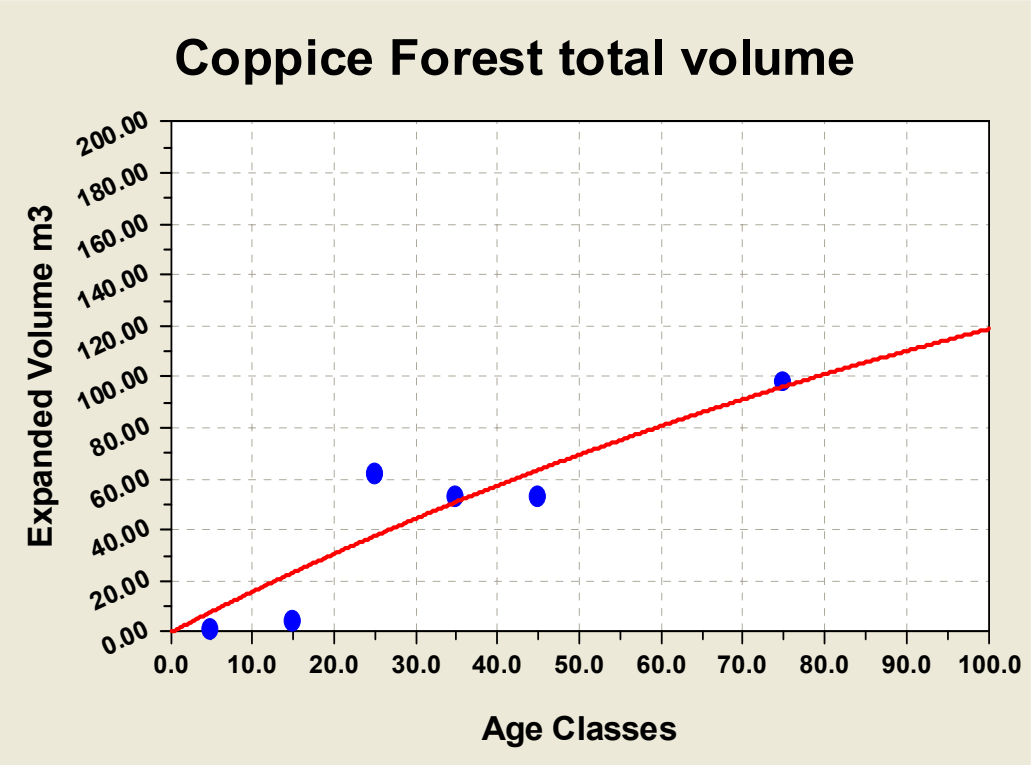

Figure 6 - Stand model Coppice Forest (source: ANFI report p. 125)[14]

For this part eq. 2, 3, 4, 5, 6 and 7 of the methodology (carbon gain-loss method) were applied

$C_{BSL} = \Delta C_{B,LB}$ (Eq. 2 of the meth)

Where

C_{BSL} = baseline net greenhouse gas removals by sinks; tonnes CO_2-e.
$\Delta C_{B,LB}$ = sum of the changes in living biomass carbon stocks in the baseline (above- and below-ground); tonnes CO_2-e.

Estimation of baseline $\Delta C_{B,LB}$ (changes in living biomass carbon stocks in the baseline):

$$\Delta C_{B,LB} = \sum_{t=1}^{t^*} \sum_{i=1}^{m_{BL}} \Delta C_{B,ikt} \quad \text{(Eq. 3 of the meth)}$$

where:

$\Delta C_{B,LB}$ = sum of the changes in living biomass carbon stocks in the baseline (above- and below-ground); tonnes CO_2-e.
$\Delta C_{B,ikt}$ = annual carbon stock change in living biomass in the baseline for stratum *i,* stand

[14] Source for stand models: Albanian National Forestry Inventory ANFI. Final Report, Government of Albania, Ministry of Agriculture & Food, Management Unit of the Forestry Project and The World Bank, 2004

model *k,* time *t;* tonnes CO_2-e. yr^{-1}
i = 1, 2, 3, ... m_{BL} baseline strata
k = 1, 2, 3, ... *K* stand model (see footnote 7)
t = 1, 2, 3, ...*t** years elapsed since the start of the AR CDM project activity

For areas with few growing trees method 1 (Carbon gain-loss method) was applied

$$\Delta C_{ikt} = \Delta C_{G,ikt} - \Delta C_{L,ikt} \qquad \text{(Eq. 4 of the meth)}$$

where:

ΔC_{ikt} = annual carbon stock change in living biomass for stratum *i,* for stand model *k,* time *t;* tonnes CO_2-e. yr^{-1}.
$\Delta C_{G,ikt}$ = annual increase in carbon *stock* due to biomass growth for stratum *i,* for stand model *k,* time *t*; tonnes CO_2-e. yr^{-1}
$\Delta C_{L,ikt}$ = 0 according to AR-AM003/Ver 02 This methodology conservatively excludes from the calculations carbon losses for the baseline scenario.

$\Delta C_{G,ikt}$: The volume was derived from the stand model of coppice forests (expanded volume) using the data of the Albanian NFI (2004), which provides the current annual increment in volume. Because the model provides expanded volume already, BEF was set to 1 and root to shoot ratio was set to 0. [15] The wood density was taken as average of hornbeam and oak, which are the most common species among the growing trees.

$$\Delta C_{Gikt} = A_{ikt} * C_{TOTAL,ikt} \qquad \text{(Eq. 5 of the meth.)}$$

where

ΔC_{Gikt} = annual increase in carbon stock due to biomass growth for stratum *i,* for stand model *k,* time *t*; tonnes CO_2-e. yr^{-1}
A_{ikt} = area of stratum *i,* for stand model *k,* at time *t*; hectare (ha)
Note: The area of a stratum *i* has a time notation because depending on baseline land use/cover projections stand models *k* may appear at different dates within the same stratum.
$C_{TOTAL,ikt}$= annual average increment rate in total carbon in stratum *i*, stand model *k,* time t; tonnes CO_2-e. ha^{-1} yr^{-1}
Note: $C_{TOTALikt}$ can be estimated as a constant annual average value

$$C_{TOTAL,ikt} = \sum_{j}^{J} G_{w,ijt} * (1 + R_j) * CF_j * \frac{44}{12} \qquad \text{(Eq. 6 of the meth.)}$$

$$\Delta G_{w,ijt} = I_{v,ijt} * D_j * BEF_{lj} \qquad \text{(Eq. 7 of the meth.)}$$

where:

[15] The tool expects an entry above 0 in the cell for root to shoot entry. There fore 0.001 was insert.

$C_{TOTAL,ikt}$= annual average increment rate in total carbon in stratum *i*, stand model *k,* time t; tonnes CO_2-e. ha^{-1} yr^{-1}
Note: $C_{TOTALikt}$ can be estimated as a constant annual average value.

$G_{w,ijt}$ = average annual above-ground biomass increment for stratum *i,* species *j*, at time *t*; tonnes d.m. ha^{-1} yr^{-1}

R_j = root-shoot ratio appropriate to increments for species *j*; dimensionless
Note: Care should be taken that the root-shoot ratio may change as a function of the above-ground biomass present at time (*t*) (see IPCC GPG, 2003, Annex 3.A1, Table 3A1.8)

CF_j = the carbon fraction for species *j*; tonnes C $(\text{tonne d.m.})^{-1}$

$I_{v,ijt}$ = average annual increment in merchantable volume for stratum *i,* species *j*; m^3 ha^{-1} yr^{-1}
Note: I_{vijt} is estimated as "current annual increment – CAI". The "mean annual increment" – MAI in the forestry jargon – can only be used if its use leads to conservative estimates.

D_j = basic wood density for species *j*; tonnes d.m. m^{-3}

$BEF_{1,j}$ = biomass expansion factor for conversion of annual net increment (including bark) in merchantable volume to total above-ground biomass increment for species *j;* dimensionless

Species-wise parameters

Two stand models were developed during the National Forestry Inventory, one for oak coppice forests and one for high forest broadleaf and they were published with expanded volumes in m^3. The expansion from stem volume to tree biomass is already included in the models. The baseline volume was calculated using the stand models developed during the ANFI.

Carbon content is equal 0.5. The basic wood density was assumed to be constant for each stratum and equal to the average from oak and hornbeam densities (oak and hornbeam contribute to majority of biomass present in the project area), i.e. (0.63+0.58)/2=0.605 tonnes d.m m^{-3}. The numerical values for both densities originate from the GPG LULUCF 2003.

There are 187.3 ha of growing trees or 3 % of the total area. The amount of baseline removal by the growing trees is 6221 tCO_2 in 20 years. As mentioned above this figure is very conservative.

Table 22 – Baseline calculations

A	B	C	D	E	F	G
	oak coppice Stand volume expanded aboveground			eq. 7	eq. 6	eq. 5
t age	***Iijt*** m3 ha-1	t	I_{vijt}	$\Delta G_{w,ijt}$	$C_{TOTAL,ikt}$	ΔC_{Gikt}
1	**0.56**					
2	**1.11**					
3	**1.67**	Project	annual increment			
4	**2.21**	Year	m3 ha^{-1} y^{-1}	t d.m. ha^{-1} y^{-1}	t CO_2 $ha^{-1}yr^{-1}$	t CO_2 yr^{-2}
5	**2.76**	1	0.54	0.33	1.79	332
6	**3.30**	2	0.54	0.33	1.77	330
7	**3.83**	3	0.54	0.33	1.76	327
8	**4.36**	4	0.53	0.32	1.75	325
9	**4.89**	5	0.53	0.32	1.74	323
10	**5.42**	6	0.53	0.32	1.73	321
11	**5.94**	7	0.52	0.32	1.71	318
12	**6.46**	8	0.52	0.32	1.70	316
13	**6.97**	9	0.51	0.31	1.69	314
14	**7.48**	10	0.51	0.31	1.68	312
15	**7.99**	11	0.51	0.31	1.67	310
16	**8.49**	12	0.50	0.31	1.66	308
17	**8.99**	13	0.50	0.31	1.64	305
18	**9.49**	14	0.50	0.30	1.63	303
19	**9.98**	15	0.49	0.30	1.62	301
20	**10.47**	16	0.49	0.30	1.61	299
21	**10.96**	17	0.49	0.30	1.60	297
22	**11.44**	18	0.48	0.29	1.59	295
23	**11.92**	19	0.48	0.29	1.58	293
24	**12.40**	20	0.48	0.29	1.57	291
25	**12.87**					6221
26	**13.34**		eq. 4			= $\Delta C_{B,LB}$
27	**13.81**		$\Delta C_{ikt} = \Delta C_{Gikt} - \Delta CL_{ikt}$			
28	**14.27**		$\Delta CL_{ikt} = 0$			
29	**14.73**		eq. 2			
30	**15.19**		**$C_{BSL} = \Delta C_{B,LB}$ =**		**6221**	**t CO2**

Table 23 - List of numerical values and sources of all data used in the above calculation

ID number[16]	Data variable	Data unit	Value applied	Comment
1	C_{BSL}	*t CO_2-e*		*Baseline net greenhouse gas removals by sinks. Used in eq. 2*
2	*I*	*No*	*1*	*baseline stratum*
3	*T*	*year*	*1-20*	*time*
	*t**	*year*		*number of years elapsed since start of the AR project activity*
4	*Tcp*	*Year*		*year at which the first crediting period ends*
5	*k*	*No*		*stand model coppice forest*
6	D_{oak}	*t d.m./m^3*	*0.58*	*wood density oak TABLE 3A.1.9-1 – GPG IPCC 2003*
7	$D_{hornbeam}$	*t d.m./m^3*	*0.63*	*wood density hornbeam TABLE 3A.1.9-1–GPG IPCC 2003*
8	*CF carbon fraction of d.m.*	*dimensionless*	*0.5*	*IPCC default*
9	*Iv,ijt*	*m^3 ha^{-1}*		*average annual increment in merchantable volume for stratum I, species j, time t Ref. 2, 3, 10, 11*
10	*v*	*m^3 ha^{-1}*		*merchantable volume*
11	*i*	*No*		*stratum index for both baseline strata and strata of the project scenario*
12	*j*	*No*		*species representing a specific stand model*
13	$\Delta G_{w,ijt}$	*tonnes d.m. ha^{-1} y^{-1}*		*Average annual above-ground biomass for stratum I, species j, time t, used in eq. 7. Ref. 12,11,3*
14	$C_{TOTAL,ikt}$	*tonnes of CO_2-e. ha^{-1} yr^{-1}*		*Annual average increment rate in total carbon in stratum i, stand model k, time t; used in eq. 6. Ref., 11, 3, 5*
15	ΔC_{Gikt}	*tonnes CO_2-e. yr^{-1}*		*annual increase in carbon stock due to biomass growth for stratum i, stand model k, time t; used in eq. 5 Ref. 11, 5, 3*
16	ΔC_{ikt}	*tonnes CO_2-e. yr^{-1}*		*Annual carbon stock change in living biomass in stratum i, stand model k, time t; used in eq. 4. Ref. 11, 3, 5*
17	*ΔCLikt*	*tonnes CO2-e. yr-1*	*0*	*Annual decrease in carbon stock due to biomass loss for stratum i, stand model k, time t, used in eq. 4. 16 Ref. 11, 5, 3*

[16] Please provide ID number for cross-referencing in the PDD.

18	*$\Delta CB,LB$*	*tonnes CO_2-e*		*sum of changes in living biomass carbon stocks in the baseline (above- and below-ground), used in eq. 2*

Table 24: Baseline net GHG removals by sinks (t co2e)

Please present final results of your calculations using the following tabular format.	
Year	**Annual estimation of baseline net anthropogenic GHG removals by sinks in tonnes of CO_2 e**
2007	332
2008	330
2009	327
2010	325
2011	323
2012	321
2013	318
2014	316
2015	314
2016	312
2017	310
2018	308
2019	305
2020	303
2021	301
2022	299
2023	297
2024	295
2025	293
2026	291
Total estimated baseline net GHG removals by sinks (tonnes of CO_2 e)	**6221**
Total number of crediting years	**20**
Annual average over the crediting period of estimated baseline net GHG removals by sinks (tonnes of CO_2 e)	**311**

In fact because of the ongoing degradation on 97% of the area the real sink is negative the baseline is conservative. For details on the calculation of the baseline see Annex 3.

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

28.04.2007 Hubertus Schmidtke, Agrotec S.p.A., Roma – SILVACONSULT AG, 8402 Winterthur/Switzerland
Lucia Perugini, Agrotec S.p.A., Roma – Univeristy of Tuscia, Viterbo /Italy
Thimaq Lako, Agrotec S.p.A., Roma

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 verifiable changes in carbon stocks in the carbon pools within the project boundary, minus the increase in non-CO_2 GHG emissions measured in CO_2 equivalents by sources that are increased as a result of the implementation of an AR CDM project activity, while avoiding double counting, within the project boundary, attributable to the AR CDM project activity. Therefore:

The basic equation is following

$$C_{ACTUAL} = \Delta C_{P,LB} - GHG_E \qquad \text{(Eq. 13 of the Meth.)}$$

where:

C_{ACTUAL} = actual net greenhouse gas removals by sinks; tonnes CO_2-e.

$\Delta C_{P,LB}$ = sum of the changes in living biomass carbon stocks under the project scenario (above- and below-ground); tonnes CO_2-e.

GHG_E = sum of the increases in non-CO_2 GHG emissions by sources within the project boundary as a result of implementation of an AR CDM project activity; tonnes CO_2-e.

Estimation of sum of the changes in living biomass carbon stocks under the project scenario ($\Delta C_{P,LB}$)

Treatment of pre-existing non-tree and tree vegetation

Removal of preexisting Vegetation

During the ANFI the volume of biomass for shrub was estimated with 0.27 tonnes of dry matter per ha of living biomass[17]. This means 3'034 tCO_2 on the project area. This is very conservative, because the project areas are more degraded than the average of the Albanian shrub land. During coppicing 50% of the existing aboveground biomass is cut and removed. In the case of fencing, the cut material is used for fencing too and will remain on the area for a certain time. To be conservative the whole amount of preexisting vegetation was assumed to be removed and included into the calculation as GHGe.

[17] ANFI Main Report p. 63

Table 25 - Removed pre-existing vegetation

Shrubs volume (ANFI 2004)	BEF	Root shoot ratio	Total shrub area	CF	C/CO_2
tdm ha-1	dimensionless	dimensionless	ha	dimensionless	dimensionless
0.27	x	x	6'317	0.5	44/12

GHG_E

Wooden biomass aboveground	**Total biomass aboveground**	**total biomass**	**Total biomass project area**	**Total carbon project area**	**Total CO_2 project area**	**Removed 50%**
tdm ha-1	tdm ha-1	tdm ha-1	t dm	tC	tCO_2	tCO_2
x	x	0.27	1'706	853	3'127	1'563

$$E_{biomassloss} = \sum_{t=1}^{t^*} \sum_{i=1}^{m_{PS}} \sum_{k=1}^{K} A_{ikt} * B_{non-tree,ikt} * CF_{non-tree} * \frac{44}{12} \qquad \text{(Eq. 14 of the meth.)}$$

where:

$E_{biomassloss}$	= decrease in the carbon stock in the living biomass carbon pools of non-tree vegetation in the year of site preparation, up to time t^*; tonnes CO_2-e.
A_{ikt}	= area of stratum stratum i, stand model k, time t; ha
$B_{non-tree,ikt}$	= average non-tree biomass stock on land to be planted before the start of a proposed A/R CDM project activity for stratum i, stand model k, time t; tonnes d.m. ha^{-1}
$CF_{non-tree}$	= carbon fraction of dry biomass in non-tree vegetation, tonnes C (tonnes d.m.)$^{-1}$
I	= 1, 2, 3, ... m_{ps} strata in the project scenario
K	= 1, 2, 3, …K stand model in the project scenario
t	= 1, 2, 3, ... t^* years elapsed since the start of the AR project activity

Table 26 below shows the result of 3'127 tCO_2 of biomass loss due to removal of pre-existing vegetation applying equation 14 of the methodology.

Table 26 - Biomass loss

Biomass loss

Implementation of project

year	%	ha	A_{ikt}
1	19	1204	A_{111}
2	23	1440	A_{112}
3	30	1900	A_{113}
4	28	1772	A_{114}
		6316.7	

	Biomass loss	0.27	= $B_{non\text{-}tree,ikt}$ t d.m. ha-1
year	**t CO_2**	0.5	= CF_i carbon fraction in d.m.
1	594	3.667	44/12 = conversion CO_2/C
2	719		
3	938		
4	876		
5	0		
6	0		
7	0		
8	0		
9	0		
10	0		
11	0		
12	0		
13	0		
14	0		
15	0		
16	0		
17	0		
18	0		
19	0		
20	0		
	3'127		
	= $E_{biomassloss}$ eq. 14		

Calculation of the living biomass of the project scenario

Main source for calculating the tree growth were stand models from ANFI. The most likely stand model for the project conditions is that of the high forest broadleaf. The participating experts considered the model as realistic and conservative.

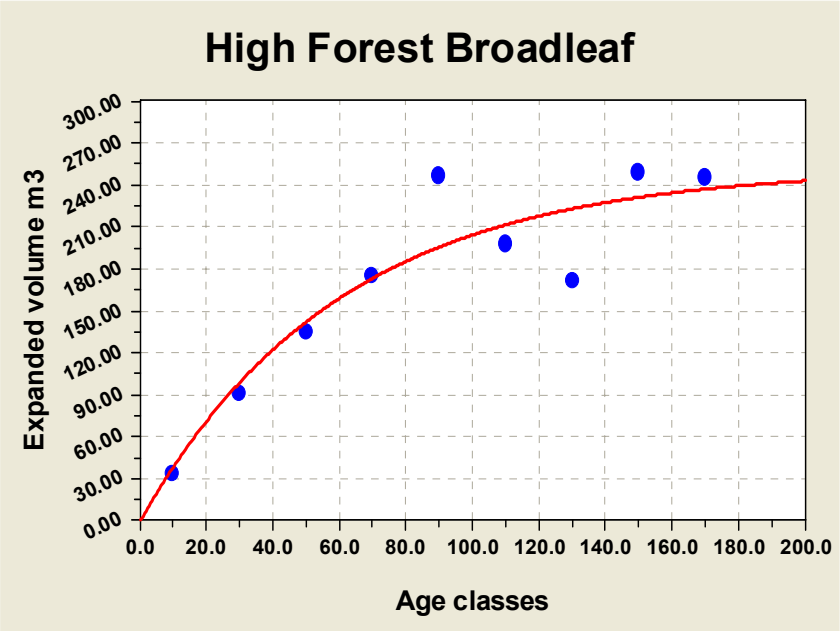

Figure 7 - Stand model High Forest Broadleaf (Source ANFI Main Report p. 124)[18]

$$Y = a(1 - e^{-bX})$$

Y = Volume of the stand in cu.mt

Coefficient Data:
a = 251.78899
b = 0.016680358
Standard Error: 27.2642476
Correlation Coefficient: 0.9573738

The sum of the changes in living biomass carbon stocks under the project scenario (above- and below-ground) are calculated using equation 15 of the methodology:

[18] Source for stand models: Albanian National Forestry Inventory ANFI. Final Report Government of Albania, Ministry of Agriculture & Food, Management Unit of the Forestry Project and The World Bank, 2004

$$\Delta C_{P,LB} = \sum_{t=1}^{t^*} \sum_{i=1}^{m_{PS}} \sum_{k=1}^{K} \Delta C_{LB,ikt} \qquad \text{(Eq. 15 of the meth.)}$$

where:

$\Delta C_{P,LB}$ = sum of the changes in living biomass carbon stocks in the project scenario (above and below-ground); tonnes CO_2-e.

$\Delta C_{LB,ikt}$ = annual carbon stock change in living biomass in the project scenario for stratum *I,* stand model *k*, time *t;* tonnes CO_2-e. yr^{-1}

i = 1, 2, 3, ... m_{ps} strata in the project scenario

K = 1, 2, 3, … K stand models in the project scenario

t = 1, 2, 3, ...t^* years elapsed since the start of the AR project activity

Calculations according to Equation 15 are done in the table below. The stand models represent the development of the stands according to the common practice. They include implicitly mortality and thinning and they implicate the gain loss method. In applying the equations (4), (5), (6) and (7) of the methodology the same variables used in the baseline were applied (see section C7).

Calculation of the average annual decrease in carbon stocks due to biomass loss for stratum *i,* stand model *k,* time *t* ($\Delta CL,ikt$)

$$\Delta C_{Likt} = L_{hr,\,ikt} + L_{fw,ikt} + L_{ot,ikt} \qquad \text{(Eq. 16 of the meth.)}$$

where:

$\Delta C_{L,ikt}$ = average annual decrease in carbon stocks due to biomass loss for stand model *k,* species *j,* time *t*

$L_{hr,ikt}$ = annual carbon loss due to commercial harvesting for stratum *i*, stand model *k*, time *t*; tonnes CO_2-e. yr^{-1}

$L_{fw,ikt}$ = annual carbon loss due to fuel wood gathering for stratum *i*, stand model *k*, time *t*; CO_2-e. yr^{-1}

$L_{ot,ikt}$ = annual natural losses (mortality) of carbon for stratum *i*, stand model *k*, time *t*; CO_2-e. yr^{-1}

Losses are not equal to zero since during the crediting period the plots will be subject to common silvicultural practices such as thinning and coppicing, although not totally harvested. The fact that we do not calculate the losses here is because the stand models represent the development of the stands according to the common practice. They include implicitly mortality and thinning. To avoid double counting of those lasses ΔC_{Likt} was set to zero.

$$\Delta C_{Likt} = 0$$

Estimation of GHG_E (increase in GHG emissions by sources within the project boundary as a result of the implementation of an AR CDM project activity)

An AR CDM project activity may increase GHG emissions, in particular CO_2, CH_4 and N_2O. The list below contains factors that may be attributable to the increase of GHG emissions:

- Emissions of greenhouse gases by burning of fossil fuels resulting from site preparation, thinning and logging;

- Emissions of greenhouse gases by biomass burning from site preparation (slash and burn activity);
- N2O emissions caused by nitrogen fertilization practices;
- CH4 emission as a result of flood irrigation. As per the conditions of applicability of this methodology (see Section I.3) this source of GHG emissions can be ignored in this methodology. The increase in GHG emission as a result of the implementation of the proposed AR CDM project activity within the project boundary can be estimated by:

$$GHG_E = E_{FuelBurn} + E_{BiomassBurn} + N_2O_{direct-N\ fertilizer} \quad (22)$$

where:

GHG_E = increase in GHG emission as a result of the implementation of the proposed AR CDM project activity within the project boundary; tonnes CO_2-e.

$E_{FuelBurn}$ = increase in GHG emission as a result of burning of fossil fuels within the project boundary; tonnes CO_2-e.

$E_{BiomassBurn}$ = increase in GHG emission as a result of biomass burning within the project boundary; tonnes CO_2-e.

$N_2O_{direct\ N\ fertilizer-}$ = increase in N_2O emission as a result of direct nitrogen application within the project boundary; tonnes CO_2-e.

$E_{FuelBurn} = 0$ This was set to zero, because project activities such as coppicing soil preparation and planting, will be carried out manually

$E_{BiomassBurn} = 0$ There is no slash and burn practice in Albania.

$N_2O_{direct-N\ fertilizer} = 0$ There is no fertilizing foreseen in the project activities.

Therefore $\mathbf{GHG_E} = 0$

Table 27 provides the results of the calculation of C_{ACTUAL}. The project will be implemented within the first three years. The growth of the stand model was multiplied with the area per year of the crediting period (column A). Column E shows the total growth per year ($\Delta C_{P,LB}$), column F shows the GHE-emissions (GHG_E), and Column G the biomass loss ($E_{biomassloss}$). The sum cell of column H shows the final result of the C_{ACTUAL}

$$C_{ACTUAL} = \Delta C_{P,LB} - E_{biomassloss} - GHG_E$$

The actual net removal by sinks was calculated from the stand models for high broadleaf forest according to the area that will be planted in each implementation year. The actual net removal by sinks is 458187 tCO_2 in the 20 years of the crediting period.

Table 27 - Actual net GHG removals by sinks

actual net GHG removals by sinks					
A	E	F	G	H	
	$\Delta C_{P,LB}$	GHG_E	$E_{biomassloss}$	C_{ACTUAL}	
	Trees Growth				
ha					
year	tCO_2			tCO_2	
1	4965	0	594	4371	
2	11409	0	719	10690	
3	19757	0	938	18819	
4	27665	0	876	26789	
5	28073	0	0	28073	
6	27608	0	0	27608	
7	27152	0	0	27152	
8	26703	0	0	26703	
9	26261	0	0	26261	
10	25826	0	0	25826	
11	25399	0	0	25399	
12	24979	0	0	24979	
13	24566	0	0	24566	
14	24159	0	0	24159	
15	23760	0	0	23760	
16	23367	0	0	23367	
17	22980	0	0	22980	
18	22600	0	0	22600	
19	22226	0	0	22226	
20	21859	0	0	21859	
Sum	**461314**	**0**	**3127**	**458187**	
	$\Delta C_{P,LB}$	GHG_E	$E_{biomassloss}$	C_{ACTUAL}	
	eq. 15	**eq. 22**	**eq. 14**	**eq. 13**	

Table 28.

S.No	Year	Annual carbon stock change ($t\ CO_2\text{-}e.yr^{-1}$)	Project emissions ($t\ CO_2\text{-}e.yr^{-1}$)	Actual net GHG removals by sinks ($t\ CO_2\text{-}e.yr^{-1}$)
1	2007	4965	594	4371

2	2008	11409	719	10690
3	2009	19757	938	18819
4	2010	27665	876	26789
5	2011	28073	0	28073
6	2012	27608	0	27608
7	2013	27152	0	27152
8	2014	26703	0	26703
9	2015	26261	0	26261
10	2016	25826	0	25826
11	2017	25399	0	25399
12	2018	24979	0	24979
13	2019	24566	0	24566
14	2020	24159	0	24159
15	2021	23760	0	23760
16	2022	23367	0	23367
17	2023	22980	0	22980
18	2024	22600	0	22600
19	2025	22226	0	22226
20	2026	21859	0	21859
	Total	**461314**	**3127**	**458187**

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

Leakage (LK) represents the increase in GHGs emissions by sources which occurs outside the boundary of an AR CDM project activity which is measurable and attributable to the AR CDM project activity. According to the guidance provided by the Executive Board, leakage also includes the decrease in carbon stocks which occurs outside the boundary of an AR CDM project activity which is measurable and attributable to the AR CDM project activity (see EB 22, Annex 15).

There are three sources of the leakage covered by this methodology:

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

$$LK = LK_{Vehicle} + LK_{ActivityDisplacement}\, LK_{Fencing} \qquad \text{(Eq. 31 of the meth.)}$$

where:

LK = total GHG emissions due to leakage; tonnes CO_2-e.
$LK_{Vehicle}$ = total GHG emissions due to fossil fuel combustion from vehicles; tonnes CO_2-e.
$LK_{ActivityDisplacement}$ = leakage due to activity displacement; tonnes CO_2-e.
$LK_{fencing}$ = leakage due to increased use of wood posts for fencing up to year t^*; tonnes CO_2-e.

Vehicle fossil fuel combustion due to transportation

This calculation takes into account the fuel used in the transport of material and seedlings to the sites, visits during the project design, travels of the PMU, project activities and activities associated with project verification. For the calculation of emissions due to transportation, the equation (23) of the methodology was applied. The variables applied are reported in Table 29 below. The calculation resulted to $LK_{Vehicle} = 50\ tCO_2$.

$$LK_{Vehicle} = LK_{Vehicle\ CO_2} \quad \textbf{(Eq. 32 of the meth.)}$$

$$LK_{Vehicle,\ CO_2} = \sum_{t=1}^{t^*} \sum_{x} \sum_{y} (EF_{xy} * FuelConsumption_{xyt}) \quad \textbf{(Eq. 33 of the meth.)}$$

$$FuelConsumption_{xyt} = n_{xyt} * k_{xyt} * e_{xyt} \quad \textbf{(Eq. 34 of the meth.)}$$

where:

$LK_{Vehicle}$	= total GHG emissions due to fossil fuel combustion from vehicles; tonnes CO_2-e.
$LK_{Vehicle,CO2}$	= total CO_2 emissions due to fossil fuel combustion from vehicles; tonnes CO_2-e.
x	= vehicle type
y	= fuel type
EF_{xy}	= CO_2 emission factor for vehicle type x with fuel type y; dimensionless
$FuelConsumption_{xyt}$	= consumption of fuel type y of vehicle type x at time t; liters
n_{xyt}	= number of vehicles
k_{xyt}	= kilometers traveled by each of vehicle type x with fuel type y at time t; km
e_{xyt}	= fuel efficiency of vehicle type x with fuel type y at time t; liters km^{-1}

Table 29 - Calculation of LKVehicle

Implementation 3 years	
221	sites
14	km dist. to nursery
10	no of transports
30'940	**km**
9.7	**tCO_2**

Planning/control 3 years	
221	Sites
13	km village to site
6	no of transports
17'238	**km**
5.4	**tCO_2**

Monitoring/Controlling	
years 5, 10, 15, 20	
221	Sites
13	km village to site
8	no of transports
22'984	**km**
7.2	**tCO_2**

PMU	
years 5, 10, 15, 20	
221	Sites
50	distance
8	no of transports
88'400	**km**
27.6	**tCO_2**

159'562	**km total**
49.8	**tCO_2 total**

Variable	Name	Value	unit
x	vehicle type	1	four wheel car
y	fuel type	1	Diesel
e_{xyt}	fuel efficiency	12	l/100 km
EF_{xy}	Emission factor	2.6	kg CO_2/l
k_{xyt}	kilometers	**159'562**	**km**
n_{xyt}	no. of vehicles	1	(dimensionless)
$FuelConsumption_{xyt}$	cons.of fuel	19'147	l
eq. 34		50	tCO_2
			tCO_2
$LK_{Vehicle}$ =	$LK_{Vehicle,CO2}$ =	50	tCO_2
eq. 32			

year1	5.0	tCO_2
year2	5.0	tCO_2
year3	5.0	tCO_2
year5	8.7	tCO_2
year10	8.7	tCO_2
year15	8.7	tCO_2
year20	8.7	tCO_2
$LK_{Vehicle}$ =	49.8	tCO_2

Leakage due to activity displacement

$$LK_{ActivityDisplacement} = LK_{conversion} + LK_{fuelwood} \quad \text{(Eq. 35 of the meth.)}$$

$LK_{ActivityDisplacement}$ = leakage due to activity displacement; tonnes CO_2-e.
$LK_{conversion}$ = leakage due to conversion of non-grassland to grassland; tonnes CO_2-e.
$LK_{fuelwood}$ = leakage due to the displacement of fuelwood collection; tonnes CO_2-e.

Estimation of $LK_{conversion}$ (leakage due to conversion of land to grazing land).

Project animals are displaced for a time period that varies from 5 years to 20. After that time they don't influence the growth of the trees any more.

$$Na_{BL} = \frac{sNa_{BL}}{SFR_{PAga}} \quad \textbf{(Eq. 36 of the meth.)}$$

Na_{BL} = average pre-project number of animals from the different livestock groups that are grazing in the project area; dimensionless
sNa_{BL} = sampled pre-project number of animals from the different livestock groups that are grazing in the project area; dimensionless
SFR_{PAga} = fraction of total project area sampled; dimensionless given the conditions under which this methodology is applicable (see Section I.3), particularly

Local animal census data were used to get the information on Na_{BL}. There are data existing from 2000 and from 2005. There are cases with increasing and cases with decreasing numbers of animals in that period. Because there is no general tendency the average was taken.

$SFR_{PAga} = 1$

There are sheep, goats and cows grazing on the project area. The different species were transformed into sheep equivalent units SEU

1 Goat = 1 SEU
1 Sheep = 1 SEU
1 Cow = 5 SEU

Table 30 – Sheep Equivalent Unit present in the project plots at village level (average value estimated from animal census 2000-2005)

Region	***District***	***Commune***	***Village***	***SEU in the project area at village level (source: statistics 2000-2005)***
DIBER	Diber	Tomin	Bahutaj	58
DIBER	Bulqize	Trebisht	Bala	19
KORCE	Kolonje	Barmash	Barmash	265
KUKES	Kukes	Bushtrice	Barruq	297

Region	*District*	*Commune*	*Village*	*SEU in the project area at village level (source: statistics 2000-2005)*
DIBER	Mat	B. Klos	Bejni	496
DIBER	Diber	Melan	Bexhunec	48
DIBER	Diber	Maqellare	Bllate majtare	15
SHKODER	Puke	Qelez	Bregu	49
DIBER	Diber	Tomin	Brezhdan	76
DIBER	Mat	Ulez	Bushkash	18
KUKES	Kukes	Bushtrice	Bushtrice	243
SHKODER	Puke	Qelez	Buzhal	8
KUKES	Kukes	Caje	Caje	202
DIBER	Bulqize	Trebisht	Celebi	87
KUKES	Kukes	Shishtavec	Cernaleve	57
DIBER	Mat	B. Klos	Ceruja	169
ELBASAN	Gramsh	Pishaj	Cerunja	169
DIBER	Diber	Tomin	Cetush	10
SHKODER	Puke	Qelez	Dedaj	275
ELBASAN	Elbasan	Gjinar	Derstile	21
DIBER	Diber	Sllove	Dipjak	7
DIBER	Diber	Tomin	Dohoshisht	83
DIBER	Diber	Maqellare	Dovolan	51
ELBASAN	Gramsh	Pishaj	Drize	529
DIBER	Diber	Maqellare	Erebare	7
KUKES	Kukes	Caje	Fshat	145
ELBASAN	Elbasan	Shushice	Fush-Buall	10
ELBASAN	Gramsh	Pishaj	Galigat	17
ELBASAN	Gramsh	Pishaj	Gjengjorin	35
ELBASAN	Elbasan	Gjinar	Gjinar	34
SHKODER	Puke	Qerret	Gomsiqe	315
DIBER	Diber	Melan	Greve	93
ELBASAN	Elbasan	Labinot Mal	Guri Zi	201
KUKES	Has	Golaj	Helshan	280
DIBER	Diber	Maqellare	Herbel	146
SHKODER	Puke	Rrape	Kabash	61
ELBASAN	Elbasan	Gjinar	Kafen	162
DIBER	Diber	Maqellare	Kercisht i Eper	23
DIBER	Diber	Maqellare	Kercisht posht	50
DIBER	Diber	Maqellare	Kllopcisht	92
DIBER	Mat	B. Klos	Klop Katund	120
DIBER	Diber	Melan	Knike	93
ELBASAN	Gramsh	Pishaj	Kocaj	107

Region	*District*	*Commune*	*Village*	*SEU in the project area at village level (source: statistics 2000-2005)*
KUKES	Kukes	Shishtavec	Kollovoz	25
SHKODER	Puke	Luf-Qerret	Korthpule	93
ELBASAN	Gramsh	Pishaj	Kotorr	525
SHKODER	Puke	Qerret	Kqire Eperme	95
DIBER	Bulqize	Zerqan	Krajk	35
SHKODER	Puke	Qa-Mali	Kryezi	215
ELBASAN	Elbasan	Labinot Mal	Labinot Mal	32
SHKODER	Puke	Qelez	Lekasan	61
SHKODER	Puke	Qelez	Levrushk	60
ELBASAN	Elbasan	Gjinar	Lleshan	241
SHKODER	Puke	Qerret	Luf	55
DIBER	Mat	Ulez	Lundre	170
SHKODER	Puke	Qelez	Mardhinaq	32
KUKES	Kukes	Bushtrice	Matranxh	76
SHKODER	Puke	Rrape	Mece	50
DIBER	Diber	Melan	Melan	81
SHKODER	Puke	Qelez	Midhe	11
ELBASAN	Librazhd	Polis	Mirake	243
DIBER	Mat	Ulez	Modhesh	303
ELBASAN	Elbasan	Gjinar	Moskarth	20
ELBASAN	Elbasan	Paper	Murras	149
KUKES	Kukes	Shishtavec	Novosej	32
DIBER	Bulqize	Ostren	Okshtun Masa	66
DIBER	Bulqize	Ostren	Ostren Madh	35
DIBER	Bulqize	Ostren	Ostren Vogel	122
ELBASAN	Elbasan	Paper	Pajun	139
DIBER	Diber	Sllove	Palama	26
KUKES	Kukes	Bushtrice	Palush	74
ELBASAN	Elbasan	Paper	Paper	781
ELBASAN	Elbasan	Gjinar	Pashtresh	94
DIBER	Diber	Melan	Pejce	36
DIBER	Diber	Melan	Peke	180
DIBER	Diber	Tomin	Pilafe	157
SHKODER	Puke	Qerret	Pla	123

Region	*District*	*Commune*	*Village*	*SEU in the project area at village level (source: statistics 2000-2005)*
DIBER	Mat	B. Klos	Plesha	755
DIBER	Mat	B. Klos	Ploni Bardhe	328
ELBASAN	Elbasan	Gjinar	Pobrat	121
DIBER	Diber	Maqellare	Pocest	38
ELBASAN	Librazhd	Polis	Polis Gostime	323
ELBASAN	Elbasan	Shushice	Polis i vogel	406
DIBER	Diber	Maqellare	Potgorce	15
DIBER	Mat	B. Klos	Potin	13
SHKODER	Puke	Qa-Mali	Qaf Mali	18
SHKODER	Puke	Qelez	Qelez	133
SHKODER	Puke	Qerret	Qerret	71
DIBER	Diber	Melan	Rabanat	30
DIBER	Diber	Melan	Rabdisht	51
KORCE	Kolonje	Barmash	Radimisht	30
DIBER	Diber	Tomin	Rashnapoje	53
SHKODER	Puke	Rrape	Rrape	656
DIBER	Diber	Tomin	Selane	55
KORCE	Kolonje	Barmash	Shales	115
ELBASAN	Elbasan	Shushice	Shelcan	82
KUKES	Kukes	Shishtavec	Shishtavec	50
KUKES	Kukes	Caje	Shkinak	162
DIBER	Diber	Sllove	Shumbat	180
DIBER	Diber	Sllove	Sllatine	405
DIBER	Bulqize	Zerqan	Sofrocan	26
DIBER	Diber	Tomin	Staravec	48
DIBER	Diber	Tomin	Tomin	10
ELBASAN	Gramsh	Pishaj	Trashovic	502
DIBER	Diber	Sllove	Trojak	98
SHKODER	Puke	Qelez	Ukth	13
DIBER	Diber	Tomin	Ushtelenxe	33
DIBER	Diber	Sllove	Venisht	51
DIBER	Bulqize	Trebisht	Vernice	45
ELBASAN	Elbasan	Paper	Vidhas	118
KUKES	Kukes	Bushtrice	Vile	20
ELBASAN	Gramsh	Pishaj	Vine	121
DIBER	Diber	Sllove	Vlesha	70
SHKODER	Puke	Luf-Qerret	Vrith	32

Region	*District*	*Commune*	*Village*	*SEU in the project area at village level (source: statistics 2000-2005)*
DIBER	Diber	Sllove	Z.Kalis	105
DIBER	Bulqize	Zerqan	Zall Strikcan	37
DIBER	Diber	Tomin	Zdojan	71
TOTAL[19]				**15'572**

In total, there are Na_{BL} = 15'572 SEU grazing for a_{gpl} = 6.62 months on average and will go on grazing in the baseline scenario. Related to 12 months there are 8'367 SEU.

Calculation of the average number of months per annum during which animals (SEU) are present in the project area $A_{SEUpl.}$

$$A_{SEUpl} = \frac{\sum_{i=1}^{I} (a_{SEUpl} * Na_{pl})}{\sum_{i=1}^{I} a_{SEUpl}} = 6.62$$

where

A_{SEUpl}	= average number of months per annum during which animals (SEU) are present in the project area; dimensionless
a_{SEUp}	= number of months per annum during which animals (SEU) are presen at plot *pl*; dimensionless
Na_{pl}	= number of animals (SEU) that are present at plot *pl*
i	= plot index (*I*=total number of plots); dimensionless

All animals present at the plots of the project will be displaced at the time of implementation.

$$Na_{outside,\,t} = Na_{BL} - Na_{AR,t} \qquad \text{(Eq. 37 of the meth.)}$$

where

$Na_{outside,\,t}$ = number of animals displaced outside the project area at year *t*; dimensionless
Na_{BL} = average pre-project number of animals from the different livestock groups that are grazing in the project area; dimensionless
$Na_{AR,t}$ = number of animals allowed in the project area under the proposed AR-CDM project activity at year *t*; dimensionless

$Na_{AR,t}$ = 0 No animals are allowed in the project area under the proposed AR-CDM activity, as long they are able to damage the growing trees.

[19] see table grazing data at plot level R225

$Na_{outside,\,t} = Na_{BL}$ = 15'572 SEU

With average of 6.62 months during which the animals (SEU) are present at the plots.

The number of animals to be displaced outside the project area is equal to the pre-project number of animals that are grazing on the project area. Eq. 37. No animals will be sold.

Animal displacement is assumed to occur in the first year of A/R CDM project activity. On the other side the animals displaced can be supported partially by the project fodder production, therefore the $LK_{conversion}$ cannot be set as zero for that reason according to equation (38) of the methodology ($Na_{BL} < Na_{AR,t}$ is not true).

The total area of grazing land in which the displaced animal population will be maintained can be estimated as follows:

$$GLA = EGL + NGL + XGL \qquad \text{(Eq. 39 of the meth.)}$$

where

GLA = total grazing land area outside the project boundary needed to feed the displaced animal populations; ha
EGL = total existing grazing land area outside the project boundary that is under the control of the animal owners (or the project participants) and that will receive part of the displaced animal populations, up to time t*; ha
NGL = total new grazing land area outside the project boundary to be converted to grazing land that is under the control of the animal owners (or the project participants) and that will receive another part of the displaced animal populations, up to time t*; ha
XGL = total geographically unidentifiable grazing land area outside the project boundary that will receive the remaining part of displaced animal populations, e.g. when the pre-project animal owners decide to sell the animals, up to time t*; ha

For the estimation of conversion of land into grazing land the methodology steps are followed:

Step 1: Data on pasture practice

The annual biomass consumption of animals over the project area to be planted at time t is calculated using the following equation

$$\Delta C_{LPAt} = \sum_{i=1}^{I}\sum_{an=1}^{An}(DBI_{an}\cdot n_{igt}\cdot a_{glp})\cdot 30\cdot 0{,}001\cdot\frac{1}{SFR_{PAga}} \qquad \text{(Eq. 40 of the Meth.)}$$

ΔC_{LPAt} = annual animal biomass consumption over the project area to be planted at time *t*; tonnes d.m. yr^{-1}
i = plot index (*I* = total number of plots); dimensionless
an = animal type index (*An* = total number of animal types); dimensionless
DBI_{an} = daily biomass intake by animal type *an*; kg d.m. $head^{-1}$ day^{-1}

n_{igt}	=	number of individual animals from the livestock group *g* at plot *i* at time *t*; dimensionless
a_{gpl}	=	number of months per annum during which animals from the livestock group *g* are present at plot *pl*; dimensionless
30	=	average number of days in month; dimensionless
SFR_{PAga}	=	fraction of total project area sampled; dimensionless
an	=	1 for taking SEU
DBI_{an}	=	1.4 kg d.m./day from expert judgment

The number of individual animals (***n_{igt}***) was estimated using the average data of statistical census for the years 2000 and 2005, therefore, the data available for all villages, SFR_{PAga} is set equal to one. The different group of animals (***n_{igt}***) are transformed in Sheep Equivalent Units (***an***) with a daily biomass intake (***DBI_{an}***) of 1.4 kg d.m. $head^{-1}$ day^{-1} (value reported in table 2 of the meth, referred to goats in developing countries). Number of months per annum during which animals are present at plot (***a_{gpl}***) is on average 6.62 months.

The resulting annual biomass consumption on project area is equal to 4'217 t d.m. yr^{-1}

Step 2 Identify the following variables:

a) *Na*: the total number of animals from the different livestock groups that are grazing in the project area (or in the sampled plots); dimensionless
b) *Nas*: the number of animals from the different livestock groups that the animal owners intend to sell as a consequence of the project implementation. Selling may be due to insufficient land under the control of the animal owners outside the project boundary; dimensionless
c) *EGL*: the existing grazing land areas outside the project boundary that are under the control of the animal owners and that will be used to maintain part of the displaced animal populations; ha. These areas shall be specified in the AR-CDM-PDD and subject to monitoring.
d) *NGL*: the new grazing land areas outside the project boundary that are under the control of the animal owners and that will be converted to grass-land to maintain another part of the displaced animal populations; ha. These areas shall be specified in the AR-CDM-PDD and subject to monitoring.

a) The number of animals was estimated using the statistical livestock census at village level referred to the years 2000 and 2005. The total number of animals present on village communal land was divided by hectares of communal land to retrieve the number of animals per hectare, and then multiplied by the area of project sites present in the village. Results are shown in Table 30 with 15'172 SEU present on the project area during 6.22 months per year as average. Related with 12 months there are 8'367 SEU present.

Na_{SEU} = 8'367

b) No animals shall be sold, therefore **Na_s = 0**

c) EGL: Existing grazing land areas outside the project boundary that are under control of the animal owners.

Each villager who owns livestock has a free access to the grazing lands of the village. These lands include **communal pastures and meadows, refused lands, and communal forests**. Besides these land use types, village territory also includes **arable lands**, which are owned by people who are legal residents of the village no matter if they live and work in the village or in another part of Albania or abroad. Although privately owned, these lands are grazed by livestock belonging to the farm owners of other villagers after the crop harvest or the whole period if they are not currently cultivated (fallow lands). This grazing right is established by tradition.

Villagers can graze their animals only in the territory of their own village. They do not have the right to move to the grazing lands of another (neighboring) village unless they make a personal arrangement with the village head and pay a fee. The same procedure is also followed in the case of transhumance to the summer or winter pastures with payment of fee. **State pastures and meadows** are not included in the village territory. Nevertheless, these areas are also grazed by livestock, usually of the neighboring villages. Under the Pastures and Meadows' law, the Forest Service rents them to individual livestock owners for a number of years (usually 10), who in exchange pay a fee per animal head and year. However, this law is not enforced everywhere and the usual case in for the state pastures is to be grazed by livestock farmers without a contract

Similar is the case with the **state forests**, too. They are not included in the village territory but they are grazed by the animals of the neighboring villages. Under the Forest law, the Forest Service must give the permission to an individual livestock farmer to graze in a particular forest who in exchange will pay a fee per animal head and year. Neither this law is always enforced, so in reality animals are freely grazing in the forests. The only exceptions where grazing is forbidden are the "protected forests" and those areas which have been cut in the high and coppice forests. It must be noted however that not all villages have access to state pastures and forests. (Papanastasis 2007)[20]

Grazing land inside the village boundary under the control of the villagers can be subdivided in communal land (forest land, forest, scrubland and pastures) private land (arable land) and refused land. The extension of this type of lands at village level is available in the Forest Management Plan of the communes.

Grazing land outside the village boundary under control of the villagers was not available at village level, therefore it was estimated interviewing 30 villages which includes 46 % of the project area

Therefore:

$$EGL = GA_{village} + GA_{OutsideVillage} - PA$$

Where:

$GA_{village}$	Grazing area inside village boundaries ($SFR_{PAga} = 1$) in ha
PA	Project area, part of village grazing area ($SFR_{PAga} = 1$) in ha

[20] Papanastasis V. 2007. Report on: Analysis of impacts of the displacement of grazing activities due to the Community - based Carbon Sequestration Project in Albania. Agrotec S.p.A, Rome

$GA_{ouside\ Village}$	Grazing area outside the village boundaries, mostly state summer pasture in the mountains (SFR_{PAga} = 0.4614) [21] in ha	
$GA_{village}$	= 81'980 ha	from census data
PA	= 6'316.7 ha	from implementation plan
$GA_{OutsideVillage}$	= 43'134 ha	evaluated by interview
EGL	**= 118'797 ha**	

Specification of EGL areas

$GA_{OutsideVillage}$ evaluated by interview

Randomly 30 villages were selected and interviewed on the grazing land under their control outside the village boundaries.

Table 31- Villages interviewed

NO	REGION	DISTRICT	COMMUNE	VILLAGES			
1	KORCE	Kolonje	Barmash	Barmash	Shales		
2	DIBER	Mat	Klos	Bejni	Ploni Bardhe		
3	DIBER	Mat	Ulez	Bushkash	Lundre	Modhesh	
4	SHKODER	Puke	Qelez	Buzhal	Dedaj		
5	KUKES	Kukes	Shishtavec	Cernaleve			
6	ELBASAN	Elbasan	Pishaj	Drize	Gjengjorin	Kocaj	Kotorr
7	KUKES	Has	Golaj	Helshan			
8	ELBASAN	Elbasan	Gjinar	Kafen			
9	ELBASAN	Elbasan	Labinot Mal	Labinot Mal			
10	DIBER	Diber	Melan	Melan	Rabdisht		
11	DIBER	Bulqize	Ostren	Okshtun Masa			
12	ELBASAN	Elbasan	Paper	Paper	Vidhas		
13	DIBER	Diber	Tomin	Pilafe	Zdojan		
14	ELBASAN	Librazhd	Polis	Polis Gostim			
15	ELBASAN	Elbasan	Shushice	Polis i Vogel			
16	KUKES	Kukes	Caje	Shkinak			
17	DIBER	Diber	Sllove	Sllatine	Trojak		
18	SHKODER	Puke	Luf-Qerret	Vrith			

[21] leakage.xls/Result_table/Z40

Table 32- Grazing area outside of the interviewed villages

VILLAGE	project area ha	AREAS FOR GRAZING OF ANIMALS OUTSIDE VILLAGE BOUNDARIES (Hectare)															
		STATE OWNED LAND					COMMUNAL LAND					PRIVATE LAND					
		Arable	Pastures	Shrub	Forest	Woodland	Arable	Pastures	Shrub	Forest	Woodland	Arable	Pastures	Shrub	Forest	Woodland	
Barmash	201	0	350	0	0	0	0	400	0	0	0	0	0	0	0	0	
Bejni	479	0	160	0	0	0	0	270	0	0	0	0	0	0	0	0	
Bushkash	35	0	330	250	0	0	0	0	0	0	0	0	0	0	0	0	
Buzhal	22	0	120	90	310	0	0	0	0	0	0	0	0	0	0	0	
Cernaleve	64	0	240	0	0	0	0	310	0	0	0	0	0	0	0	0	
Dedaj	30	0	70	260	90	0	0	0	0	0	160	0	0	0	0	0	
Drize	93	0	140	410	0	0	0	30	0	0	0	0	0	0	0	0	
Gjengjorin	27	0	90	330	0	0	0	0	140	0	0	0	0	0	0	0	
Helshan	220	0	0	0	0	0	0	1410	0	0	0	0	0	0	0	0	
Kafen	52	0	650	110	60	0	0	90	0	0	0	0	0	0	0	0	
Kocaj	45	0	70	190	220	0	0	150	0	0	0	0	0	0	0	0	
Kotorr	94	0	190	160	30	0	0	170	0	0	0	0	0	0	0	0	
Labinot Mal	68	0	290	70	280	0	0	0	60	0	0	0	0	0	0	0	
Lundre	36	0	50	370	110	0	0	0	0	0	0	0	0	0	0	0	
Melan	63	0	240	100	80	0	0	0	0	0	0	0	0	0	0	0	
Modhesh	312	0	210	120	70	0	0	0	0	0	0	0	0	0	0	0	
Okshtun Masa	59	0	190	240	160	0	0	90	0	0	0	0	0	0	0	0	
Paper	103	0	120	670	50	0	0	0	0	0	0	0	0	0	0	0	
Pilafe	40	0	120	290	70	0	0	0	0	0	0	0	0	0	0	0	
Ploni Bardhe	183	0	90	0	0	0	0	420	0	0	0	0	0	0	0	0	
Polis Gostim	109	0	0	0	0	0	0	710	0	0	0	0	0	0	0	0	
Polis i Vogel	204	0	290	130	0	0	0	160	0	0	0	0	0	0	0	0	
Rabdisht	15	0	320	110	90	0	0	0	0	0	0	0	0	0	0	0	
Shales	38	0	240	90	120	0	0	250	170	0	0	0	0	0	0	0	
Shkinak	52	0	630	0	30	0	0	710	0	0	0	0	0	0	0	0	
Sllatine	55	0	110	270	0	190	0	0	0	0	0	0	0	0	0	0	
Trojak	40	0	160	110	0	310	0	0	0	0	0	0	0	0	0	0	
Vidhas	161	0	420	920	20	0	0	0	0	0	0	0	0	0	0	0	
Vrith	25	0	130	270	90	0	0	60	0	0	0	0	0	0	0	0	
Zdojan	30	0	190	220	30	0	0	0	0	0	0	0	0	0	0	0	
Sample	2952.3	0.4674 SFR_{pAga}															
Total area	6316.7	1															

d) NGL

No new grazing land areas are expected to be used by the displaced animals because there are not any such lands in the Albanian villages. Farmers are not allowed to convert forests (state or communal) to grazing land nor do they have such a tradition (Papanastasis 2007)[22].

Step 3 Number of animals that can be displaced in EGL-areas

3a) Annual maximum biomass production of EGL

The maximum grazing capacity of EGL-areas was based on expert judgment[23].

[22] See footnote 20

[23] **Prof. Vasilios Papanastasis**, already involved as Grazing&Pasture expert in the Albanian National Forestry Inventory (Author of the Special Study on Grazing Impact on Wooded Lands, Including Fuelwood Consumption Assessment), and in 2005 for the preparation of the present project. He is a full Professor of Rangeland Ecology at the Aristotle University of Thessaloniki. **Dr. Ahmet Mehmeti**, Albanian grazing expert, has 33 years of experience in pasture and forest management, agro-forestry practices.

Table 33- Grazing Capacity according to expert judgment

Vegetation Type	Maximum Capacity (SEU/ha)	Maximum Capacity reduced by 70% (SEU/ha)	Annual biomass (Kg d.m./ha/yr)	Grazing period (months)
Arable Land	16	11,2	1.400	3
Pastures	4	2,8	700	6
Refused land	6,00	4,2	1.050	6
Shrub land	14,00	9,8	2.520	6
Forests	4	2,8	700	6
Forest Land	6,50	4,55	1.155	6

The maximum grazing capacity was then reduced by 70% to guarantee the conservativeness of the leakage calculation, taking into account the degraded conditions of the grazing land in Albania.[24]

According to the data structure available (data on whole villages, data on project area and data on grazing area outside the village):

$$\Delta C_{LmaxEGL} = \Delta C_{Lmaxvillage\ inside} - \Delta C_{LmaxPA} + \Delta C_{Lmaxvillageoutside}$$

Where:

$\Delta C_{LmaxEGL}$ = maximum annual biomass produced in EGL
$\Delta C_{Lmaxvillage\ inside}$ = maximum annual biomass produced in the whole village area
ΔC_{LmaxPA} = maximum annual biomass produced in the project area
$\Delta C_{Lmaxvillageoutside}$ = maximum annual biomass produced in areas outside the village boundaries

Equation 40 described above was used to calculate $\Delta C_{Lmaxvillage\ inside}$, ΔC_{LmaxPA} and $\Delta C_{Lmaxvillageoutside}$

$\Delta C_{LmaxEGL}$ = 141'120 t d.m. yr^{-1}
$\Delta C_{Lmaxvillage\ inside}$ = 96’074 t d.m. yr^{-1}
ΔC_{LmaxPA} = 9’739 t d.m. yr^{-1}
$\Delta C_{Lmaxvillageoutside}$ = 54’785 t d.m. yr^{-1}

The maximum annual biomass produced in EGL $\Delta C_{LmaxEGL}$ was 141'120 t d.m. yr^{-1}.

Step 3b Annual current biomass production of EGL for animal feeding (intake)

The current biomass production of EGL-areas was based on the grazing expert judgment.

[24] Expert judgement of **Prof. Vasilios Papanastasis**

According to the data structure available (data on the SEUs at village level, data on grazing area inside project boundaries, project area and data on grazing area outside the village)

$$\Delta C_{Lcurrent} = \Delta C_{Lcurrentvillage} - \Delta C_{LcurrentPA}$$

Where:

$\Delta C_{LcurrentEGL}$ = current annual biomass produced in EGL in t d.m. yr^{-1}
$\Delta C_{Lcurrentvillage}$ = current annual biomass produced in the whole village area in t d.m. yr^{-1}
$\Delta C_{LcurrentPA}$ = current annual biomass produced in the project area in t d.m. yr^{-1}

Equation 40 described above was used to calculate $\Delta C_{Lcurrentvillage\ inside}$ and $\Delta C_{LcurrentPA}$

$\Delta C_{Lcurrent}$ = 86'073 t d.m. yr^{-1}
$\Delta C_{Lcurrentvillage}$ = 90'290 t d.m. yr^{-1}
$\Delta C_{LcurrentPA}$ = 4'217 t d.m. yr^{-1}

The current annual biomass for feeding (intake) produced in EGL $\Delta C_{LcurrentEGL}$ was 86'073 t d.m. yr^{-1}.

Specification of the average number of animals already present in the EGL areas

$$Na_{EGL(t=1)} = Na_{PO} - Na_{PA}$$

Where

$Na_{EGL(t=1)}$ = number of animals already present in the EGL areas
Na_{PO} = total number of animals under control of the project owners
Na_{PA} = number of animals present on the project area

$Na_{EGL(t=1)}$ = 170'714 SEU
Na_{PO} = 179'148 SEU
Na_{PA} = 8'434 SEU

The number of animals present in EGL-areas ($Na_{EGL)}$ shall be subject to monitoring.

Step 3c) Determination if the EGL areas are sufficient for feeding the entire population of displaced animals.

$\Delta C_{LmaxEGL}$ = 141'120 t d.m. yr^{-1}
$\Delta C_{Lcurrent}$ = 86'073 t d.m. yr^{-1}
ΔCL_{Pat} = 4'217 t d.m. yr^{-1}

For ($\Delta C_{LmaxEGL}$- $\Delta C_{Lcurrent}$) ≥ ΔCL_{Pat} leakage due to activity displacement is et as zero.

EGL areas are sufficient for feeding the entire population of displaced animals.
No animals are to be displaced to NGL or XGL areas.

This calculation was undertaken for 30 villages which represent 46 % of the project area. Not only in the sum but also at village level no NGL or XGL is necessary.

Table 34 - NGL/XGL-test for 30 villages or 46% of the area

AM	AN biomass intake project area, to be displaced	AO biomass intake project area	AP	AQ	AR						
	t d.m. yr-1		t d.m. yr-1				SEU				
Summe von TOTAL biomass PA			EGL	EGL	EGL	NGL/XGL		EGL	EGL	EGL capacity above displ. SEU	XGL
Village	Summe	Summe	total production	intake	capacity for displ. Animals	if((ARcx-AOcx)>0;0; "NGL/XGL")	total capacity SEU	existing SEU	capacity for displ. SEU		SEU to be displaced on XGL
Barmash	57	57	2'769	719	2'050	0	5'538	1'438	4'100	0	0
Bejni	116	116	1'524	1'258	265	0	3'047	2'517	530	0	0
Bushkash	5	5	2'210	289	1'921	0	4'420	579	3'842	0	0
Buzhal	2	2	972	129	843	0	1'944	259	1'685	0	0
Cernaleve	15	15	1'134	754	380	0	2'268	1'508	759	0	0
Dedaj	69	69	1'662	601	1'061	0	3'324	1'201	2'123	0	0
Drize	178	178	1'930	607	1'323	0	3'861	1'214	2'647	0	0
Gjengjorin	18	18	1'771	178	1'592	0	3'541	356	3'185	0	0
Helshan	30	30	2'542	1'321	1'221	0	5'084	2'642	2'441	0	0
Kafen	82	82	2'446	351	2'095	0	4'893	702	4'191	0	0
Kocaj	44	44	1'459	224	1'235	0	2'918	448	2'471	0	0
Kotorr	99	99	1'509	376	1'133	0	3'019	752	2'266	0	0
Labinot Mal	12	12	2'734	2'135	599	0	5'467	4'270	1'197	0	0
Lundre	43	43	1'662	68	1'594	0	3'324	135	3'189	0	0
Melan	14	14	620	163	457	0	1'240	327	914	0	0
Modhesh	81	81	606	70	536	0	1'212	140	1'072	0	0
Okshtun Masa	14	14	1'321	196	1'125	0	2'642	392	2'250	0	0
Paper	394	394	2'390	1'752	637	0	4'779	3'504	1'275	0	0
Pilafe	31	31	1'288	261	1'027	0	2'576	522	2'054	0	0
Ploni Bardhe	75	75	1'349	496	853	0	2'698	992	1'707	0	0
Polis Gostime	163	163	1'295	739	555	0	2'589	1'478	1'111	0	0
Polis i vogel	161	161	1'618	439	1'178	0	3'235	878	2'357	0	0
Rabdisht	9	9	1'613	566	1'047	0	3'226	1'132	2'094	0	0
Shales	24	24	1'749	121	1'628	0	3'498	242	3'256	0	0
Shkinak	38	38	1'238	807	430	0	2'475	1'614	861	0	0
Sllatine	77	77	1'991	556	1'435	0	3'981	1'111	2'870	0	0
Trojak	20	20	875	379	496	0	1'750	758	991	0	0
Vidhas	60	60	3'551	2'858	692	0	7'101	5'717	1'384	0	0
Vrith	7	7	1'626	385	1'241	0	3'252	770	2'482	0	0
Zdojan	12	12	1'177	868	309	0	2'355	1'737	618	0	0

No conversion of land to grazing land is necessary or foreseen. No unidentifiable areas are used for displacement.

NGL = 0 ha, XGL = 0 ha, GLA = EGL

Steps 4, 5 and 6 of the determination of the GLA are skipped.

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

The pre project fuelwood collection on the project sites happens on a marginal level. The areas are degraded and only very few trees are present and are sometimes used for fuelwood collection. The amount per ha is nearly zero and would be difficult to monitor and measure.

The cleaning and thinning activities would guarantee a minimum supply of fuelwood from the project. In the stand model used for *ex ante* calculation the thinning is included.

$$FG_{BL} = \frac{sFG_{BL}}{SFRP_{Afw}} = 0 \qquad \text{(Eq. 49 of the meth.)}$$

$$FG_{AR,t} \geq 0$$

$$FG_{outside} = FG_{BL} - FG_{AR,t} \leq 0 \qquad \text{(Eq. 50 of the meth.)}$$

Where:

FG_{BL} = average pre-project annual volume of fuelwood gathering in the project area; m3 yr-1
sFG_{BL} = sampled average pre-project annual volume of fuelwood gathering in the project area; m3 yr^{-1}
SFR_{PAfw} = fraction of total plots or households in the project area sampled; dimensionless
$FG_{outside,t}$ = volume of fuelwood gathering displaced outside the project area at year *t*; m3 yr^{-1}
FG_{BL} = average pre-project annual volume of fuelwood gathering in the project area; m3 yr-1
$FG_{AR,t}$ = volume of fuelwood gathering allowed/planned in the project area under the proposed AR-CDM project activity; m3 yr^{-1}

As the project produces more fuelwood than the baseline case through cleanings and thinnings, therefore, the leakage from fuelwood collection is treated zero.

$LK_{fuelwood}$ is set as zero

Estimation of $LK_{fencing}$

The project sites will be fenced either by physical fencing or by social fencing. When building fences the material will be taken from the material that comes from coppicing inside the area. For this reason the leakage from fencing can be set to zero.

$LK_{fencing}$ is set as zero

Table 35 - Summary of Leakage

	leakage					
	$LK_{Vehicle}$		LK Act.Displ.	LK Fencing	LK	
project year	per year	cum.			cum.	per year
yr	tCO_2	tCO_2	tCO_2	tCO_2	tCO_2	tCO_2
1	5.0	5	0	0	5	5
2	5.0	10	0	0	10	5
3	5.0	15	0	0	15	5
4		15	0	0	15	0
5	8.7	24	0	0	24	9
6		24	0	0	24	0
7		24	0	0	24	0
8		24	0	0	24	0
9		24	0	0	24	0
10	9	32	0	0	32	9
11		32	0	0	32	0
12		32	0	0	32	0
13		32	0	0	32	0
14		32	0	0	32	0
15	9	41	0	0	41	9
16		41	0	0	41	0
17		41	0	0	41	0
18		41	0	0	41	0
19		41	0	0	41	0
20	9	50	0	0	50	9
					eq. 13	50
						LK

Table 36: Annual and cumulative leakage emissions associated with the project

Year	Annual leakage emissions ($t\ CO_2\text{-}e.yr^{-1}$)
2007	0

2008	0
2009	0
2010	0
2011	9
2012	0
2013	0
2014	0
2015	0
2016	9
2017	0
2018	0
2019	0
2020	0
2021	9
2022	0
2023	0
2024	0
2025	0
2026	9
Estimated leakage (t CO2 e)	35
Total number of crediting years	20
Annual average leakage over the crediting period (t CO2 e)	1.75

Test of significance of GHG emissions in A/R CDM project activities

According to EB 31, the Tool for testing significance of GHG emissions in A/R CDM project activities (Version 01) was applied.

The sum of decreases in carbon pools and increases in emissions that may be neglected shall be:

- less than 5% of the total decreases in carbon pools and increases in emissions, or
- less than 5% of net anthropogenic removals by sinks,
- whichever is lower.

Step 1. Estimate the A/R CDM project GHG emissions by sources (per each source) and possible decreases in carbon pools

Following potential sources were identified:

1. Removal of pre-existing vegetation
2. Leakage due to vehicle fossil fuel combustion due to transportation
3. Leakage due to activity displacement (conversion of land to grazing land and displacement of fuelwood collection)
4. Leakage due to fencing

Step 2 contents the estimation of the leakage per activity. The data were taken from section D 1.1 for sources 1. and 2. and from section D 2. for sources 3. and 4.

The estimations in sections D 1.1 and D2. are following the approved methodology (Step 3.) calculated in CO_2 equivalents (Step 4.)

Step 5: The relative contributions of the project GHG emissions by sources and possible decreases in carbon pools and emissions by leakage activities were calculated according to the following equation (IPCC 2003, Eq. 5.4.1):

$$RC_{Ei} = \frac{E_i}{\sum_{i=1}^{I} E_i}$$

RC = Relative contribution of each source i to the sum of project and leakage GHG emissions;
E_i = GHG emissions by sources of project and possible decreases in carbon pools and leakage emissions i as estimated under steps 1 and 2;
I = Index for individual sources of project and leakage GHG emissions (I = total number of sources considered under step 1 and 2).

Step 6.: Project and the leakage emissions were numbered in descending order of their relative contributions and ordered according to their ranks

Step 7.: The cumulative sum of the relative contributions RC_{Ei} (ordered according to the step 6) was calculated beginning with the lowest rank. Each individual source of project and leakage emissions was marked as it was included in the summation. The summation was ceased when the cumulative sum reached the lowest value not less than the threshold of 0.95.

The sum of decreases in carbon pools and increases in emissions that may be neglected shall be

- less than 5% of the total decreases in carbon pools and increases in emissions, or
- less than 5% of net anthropogenic removals by sinks,
- whichever is lower.

The total sum decreases in carbon pools and increases in emissions is 3084 tCO_2
The first condition: 5% of this is 154.2 tCO_2
Second condition: 5% of the net anthropogenic removals by sinks is 17'500 tCO_2.
The first condition must be taken into consideration because 154.2 tCO_2 is lower than 17'500 tCO_2
So there is nothing to neglect from the identified sources of GHG emission.

Table 37 - Calculation scheme of the tool for testing significance of GHG emissions in A/R CDM project activities

i	**Source of GHG emission Step 1**			**Step 2,3,4**	**E_i**	
1	Removal of pre-existing vegetation			See section D1.1.	3'034	tCO_2

2	Leakage due to vehicle fossil fuel combustion due to transportation	See section D.1.1	50	tCO_2
3	Leakage due to activity displacement (conversion of land to grazing land and displacement of fuelwood collection)	See section D.2.	0	tCO_2
4	Leakage due to fencing	See section D.2.	0	tCO_2

rank	GHG emissions relative		cumul.	marking	GHG emissions	
Step 6	**Step 5**		**Step 7**			
1	RC_{E4}	0.984	1.000	marked	3'034	tCO_2
2	RC_{E3}	0.016	0.016	marked	50	tCO_2
3	RC_{E2}	0	0	not marked	0	tCO_2
4	RC_{E1}	0	0	not marked	0	tCO_2

GHG emissions of not marked sources (step 7) can be neglected if their sum is lower than 3084 tCO_2 Because those sources are 0, they can be neglected.

SECTION E. Monitoring plan

The approved methodology proposes methods for monitoring the following elements:

- The proposed CDM AR **project activity** including the project boundary, forest establishment, and forest management activities;
- Actual net **GHG removals** by sinks including changes in carbon stock in above-ground biomass and below-ground biomass, increase in GHG emissions within the project boundary due to site preparation, transportation, thinning, logging and fertilization;
- **Leakage** due to displacement of grazing and fuelwood collection activities, vehicle use for transportation of staff, products and services, and increased use of wood posts for fencing;
- A **Quality Assurance/Quality Control** plan, including field measurements, data collection verification, data entry and archiving, as an integral part of the monitoring plan of the proposed AR CDM project activity, to ensure the integrity of data collected.

E.1. Monitoring of the project implementation:

Monitoring of project implementation includes:

• ***Monitoring of the project boundary***;

The project boundary is used to delineate the project area. The location of each node of the project boundary will be measured during fieldwork and archived in the database. The project boundary would need to be monitored at periodic intervals such as site preparation, planting, silvicultural operations, fire risk assessment etc.. Results of the monitoring will be inserted in the database and stored electronically and in paper formats.

• ***Monitoring of forest establishment***;

The nursery activities, planting progress and survival of planted seedlings will be monitored. The area, species planted and their survival rats are monitored at the end of the first, second and third years after planting. The survival percentage at the end of three year period is recorded in the project database Foresters will also monitor the methods of soil preparation. The information pertaining to site preparation, activities related to forest establishment are monitored and the data pertaining to monitoring variables will be inserted in the database and stored electronically and in paper formats.

• ***Monitoring of forest management***.

Besides silvicultural work such as coppicing, cleaning and supplementary planting will favor the creation of a forest cover. Cleaning, thinning etc. activities will be monitored to ensure that the correct practices are applied. Results of these activities will be reflected in volume measurements taken according to the Albanian National Forest Inventory rules. Forest management activities will be monitored to ensure that they are carried out as prescribed as per silvicultural guidelines. All these activities are directly human induced. See also section A.4.4, C1, and C.5.1,for further details. The interventions planned at each project sites are reported in Annex 7.

E.1.1. Monitoring of forest establishment and management:

During the project development the size and the location of the project area were negotiated with the villages and the figures on size are subject to the contractual arrangements. The sites were identified and delineated using topographic maps of 1:25'000. Either the exact lining of the fences is defined or the border is visible for the shepherds in case of "social fencing". The areas will be measured during the period leading to first verification, and monitored as per the approved methodology AR-AM0003-V2.

Table 38 - Data on project boundary to be collected during implementation

ID number[25]	Data variable	Data unit	Measured (m), calculated (c) estimated (e) or default (d)[26]	Recording frequency	Number of data points / Other measure of number of collected data	Comment
17	*borderpoints*	*X/Y coordinates*	*m*	*Full measurement during implementation and adjusted thereafter every 5-year*	100%	
18	*polygon*	*meter*	*c*	*Calculation during implementation and adjusted thereafter every 5-year*	100%	
19	*area*	*ha*	*c*	*Calculation during implementation and adjusted thereafter every 5-year*	100%	

The monitoring of the forest establishment is aimed to ensure that the planting quality conforms to the practice described in AR-CDM-PDD and implemented. For each site a "mini project" has been elaborated (see also annex 7 of PDD). This describes in detail the activities planned on the sites, which are the basis for project management according to the Methodology AR-AM003 Version 02. Local foresters after the first, second and third year after planting, during selection of project sites will monitor planting quality and survival. Foresters will also monitor the way of soil preparation. Results of the monitoring will be recorded in the database and stored in electronic and paper formats.

[25] Please provide ID number for cross-referencing in the PDD.

[26] Please provide full reference to data source.

The following monitoring activities shall be conducted in the first three years after planting:
• Confirm that site and soil preparations are implemented based on practice documented in PDD. If pre-vegetation is removed, emissions associated shall be accounted for (described in section below);

- 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 90 percent of the final planting density;
  - Final checking three years after the planting;
  - The checking of the survival rate will be conducted for each project site.
- Weeding/coppicing/cleaning/fencing checking: check and confirm that the site operation practice are implemented as described in the PDD;
- Survey and check that species and planting for each stratum shall be done;
- Document and justify any deviation from the planned forest establishment.

Table 39 - Data to be collected on forest establishment

ID number[27]	Data variable	Data unit	Measured (m), calculated (c) estimated (e) or default (d)[28]	Recording frequency	Number of data points / Other measure of number of collected data	Comment
20	*trees planted, planting scheme*	*No./ density*	*m*	*Yearly, for the first three years after planting*	*100%*	*Species wise*
21	*fencing*	*m*	*m*	*Yearly, for the first three years after start of project activities*	*100%*	
22	*coppicing*	*ha*	*m*	*Yearly, for the first three years after start of project activities*	*100%*	*During implementation phase*
23	*Survival rate*	*%*	*m*	*Yearly, for the first three years after planting*	*100%*	
24	*Re-planted trees, species*	*No., density*	*m*	*Yearly, for the first three years after start of project activities*	*100%*	*During implementation phase,*

[27] Please provide ID number for cross-referencing in the PDD.

[28] Please provide full reference to data source.

ID number[27]	Data variable	Data unit	Measured (m), calculated (c) estimated (e) or default (d)[28]	Recording frequency	Number of data points / Other measure of number of collected data	Comment
25	*Deviation from planning*			*Yearly, for the first three years after start of project activities*	*100%*	*During implementation phase, Reasons, measures*

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.

Quality Assurance and Quality Control (QA/QC)

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,

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 of documentation for verification purposes are proposed in this document and they will be adjusted periodically.
- Training courses on the field data collection and data analyses will be held for persons involving in the field measurement works. The training courses will ensure that each field-team members 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.

b) Verification of field data collection
To verify that plots have been installed and the measurements taken correctly,
- Randomly selected plots will be re-measured by teams other than those involved in the prior plot measurements
- Key re-measurement elements include the location of plots, DBH and tree height.
- The re-measurement data will be compared with the original measurement data. Errors assessed in the prior measurements will be corrected and recorded and would be used to calculate the measurement error.

c) Verification of data entry and analysis
To minimize the possible errors in the process of data entry, the entry of both field data and laboratory data will be reviewed by an independent expert team and compared with independent data to ensure that the data are realistic. Communication between all personnel involved in measuring and analyzing data will be used to resolve any apparent anomalies before the final analysis of the monitoring data is completed.

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 pools and non-CO_2 GHG and corresponding calculation spreadsheets;
- GIS products;
- Copies of the measuring and monitoring reports.

Table 40 - QC activities to be applied within the monitoring 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 organisations 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.2. Sampling design and stratification

Calculation of sample size

The number of sample plots is estimated as dependent on required accuracy however, no data on cost of establishing of sample plots were available.

The entry data:

- Total size of all strata (A), e.g. the total project area: A = ha.
- Only the stratum (A_i): A_1 = 6'316.7 ha
- Sample plot size (a): a = 0.02 ha;
- Standard deviation (S_h) for the stratum: S_1 = 10 m^3ha^{-1} , assumed high (conservative) value
- Approximate value of average of the estimated quantity (Q): Q_1= 20.2 m3/ha expanded volume according to the ANFI stand model high forest broadleaf at the age of 5 years
- Desired level of precision (p): p= 10%;
- $z_{\alpha/2}$ = value of the statistic z (normal probability density function), for α = 0.05 (implying a 95% confidence level): $z_{\alpha/2}$ = 1.9600 from table[29]

Then equation 59:

$$N = \frac{A}{AP};\ N_i = \frac{A_i}{AP};\ \mathrm{E} = \mathrm{Q}^*\mathrm{p}$$

$$N_i = \frac{A_i}{AP}; N_1 = 315'835$$

E = Q*p = 2.0 m^3ha^{-1}

When no information on costs is available, then:

[29] CRC Standard Probability and Statistics Tables and Formulae. Stephen M. Kokoska, Daniel Zwillinger

Eq. 62

$$n = \frac{\left[\sum_{i=1}^{m_{PS}} N_i * st_i\right]^2}{\left(N * \frac{E}{z_{\alpha/2}}\right)^2 + \sum_{i=1}^{m_{ps}} N_i * (st_i)^2} = 95$$

Equation 63 was not applied because only one stratum was selected.

For the project scenario stratum 1 (high forest broadleaf) 95 sample plot where calculated for the first monitoring event after five years. All necessary rounding were made towards the nearest higher integer number. The calculation is based on the expected average volume at the first monitoring event according to the stand model. The standard deviation was assumed conservatively with 10 m3/ha. If the standard deviation appears much lower or higher during the measurement campaign, the number of plots may be recalculated. Addition or deletion of sample plots must follow rules of random approach.

Random locating sampling plots

To avoid subjective choice of plot locations (plot centers, plot reference points, movement of plot centers to more "convenient" positions), the permanent sample plots shall be located systematically with a random start, which is considered good practice in GPG-LULUCF. The location, stratum and sub-stratum series number of each plots shall be recorded and archived. To be ensured that the sampling plots are distributed randomly, and spread as evenly as possible, table 41 should be consulted.

Partitioning of sample plots among strata and location of sample plots at projects sites.

The number of sample plots was calculated with 64 for stratum 1, which means a representative area of one sample plot of 85.5 ha. 18 sample plots were calculated for stratum 2, which means a representation area of one sample plot of 47 ha. Starting with the site list, a sample plot falls into a project site, where a representation area is completed. The amount of ha that is above the representation area is transferred to the next plot on the list. The highlighted cells of the table 41 indicate the sample plots.

Table 41: Partitioning of sample plots among strata and location of sample plots at projects sites.

Stratum		**6'317 ha**						Red cells mark the plots per site								
Number of plots		95														
Representation area per plot		66.8														
Divide the area of each site by this representation area																
The plot falls in that site, where the representation area is completed.																
The amount that is more with the specific aite is carried to the next one.																
Site ID	area ha	represen-ted area ha	No of samples	Plot No				Site ID	area ha	represen-ted area ha	No of samples	Plot No				
0457	20.0	20.0	0	1				0330c	17.3	25.9	0	21	0	0		
0647	30.0	50.0	0	1	0	0		0331a	15.0	40.9	0	21	0	0		
0867	34.5	84.5	1	1	0	0		0331c	10.5	51.4	0	21	0	0		
0878	20.5	38.2	0	2	0	0		0334a	27.5	78.9	1	21	0	0		
0888	22.5	60.7	0	2	0	0		0340a	11.5	23.6	0	22	0	0		
0951	50.3	111.0	1	2	0	0		0347b	14.0	37.6	0	22	0	0		
0981	46.5	90.7	1	3	0	0		034b	24.3	61.9	0	22	0	0		
1495	132.0	155.9	2	4	5	0		0357a	10.0	71.9	1	22	0	0		
2076	52.0	74.3	1	6	0	0		0358b	11.0	16.1	0	23	0	0		
2148	36.0	43.6	0	7	0	0		035a	18.0	34.1	0	23	0	0		
2361	10.0	53.6	0	7	0	0		0360b	10.0	44.1	0	23	0	0		
2649	10.0	63.6	0	7	0	0		037a	11.0	55.1	0	23	0	0		
14129	50.0	113.6	1	7	0	0		0388a	14.0	69.1	1	23	0	0		
23141	49.0	95.8	1	8	0	0		04106b	15.0	17.3	0	24	0	0		
0117a	55.0	84.0	1	9	0	0		04116b	21.0	38.3	0	24	0	0		
0121a	62.0	79.2	1	10	0	0		04137a, 138a	32.0	70.3	1	24	0	0		
0122a	29.0	41.4	0	11	0	0		0414a	50.0	53.5	0	25	0	0		
0154a	38.0	79.4	1	11	0	0		04153b	78.0	131.5	1	25	0	0		
0158a	55.0	67.6	1	12	0	0		04154a	40.0	104.8	1	26	0	0		
0159a	26.0	26.9	0	13	0	0		04155b	15.0	53.0	0	27	0	0		
02105b	20.0	46.9	0	13	0	0		04156a	36.0	89.0	1	27	0	0		
02109b	15.0	61.9	0	13	0	0		04159c	12.0	34.2	0	28	0	0		
02109c	34.0	95.9	1	13	0	0		04168a	12.0	46.2	0	28	0	0		
02156b	11.0	40.1	0	14	0	0		0416a	30.0	76.2	1	28	0	0		
02157a	54.0	94.1	1	14	0	0		04174e	18.0	27.4	0	29	0	0		
0252b	30.0	57.3	0	15	0	0		04175a	26.0	53.4	0	29	0	0		
0265a	28.0	85.3	1	15	0	0		04179a	38.0	91.4	1	29	0	0		
0266a	24.0	42.5	0	16	0	0		04183a	16.0	40.6	0	30	0	0		
0269a	44.0	86.5	1	16	0	0		04192c	10.0	50.6	0	30	0	0		
0270a	30.0	49.7	0	17	0	0		04201c	15.0	65.6	0	30	0	0		
0277a	23.5	73.2	1	17	0	0		04242c	10.0	75.6	1	30	0	0		
0278c	28.5	35.0	0	18	0	0		0424a	15.0	23.8	0	31	0	0		
0284a	32.0	67.0	1	18	0	0		04250b	10.0	33.8	0	31	0	0		
0289a	28.0	28.2	0	19	0	0		04253d	12.0	45.8	0	31	0	0		
0291b	14.0	42.2	0	19	0	0		0425b	10.0	55.8	0	31	0	0		
03104a	12.0	54.2	0	19	0	0		04265d	10.0	65.8	0	31	0	0		
03107a	18.0	72.2	1	19	0	0		04269b	30.0	95.8	1	31	0	0		
03111ab	20.0	25.4	0	20	0	0		04279a	10.0	39.1	0	32	0	0		
03112d	15.0	40.4	0	20	0	0		04280b	10.0	49.1	0	32	0	0		
0322a	13.0	53.4	0	20	0	0		0433a	30.0	79.1	1	32	0	0		
0327c	12.0	65.4	0	20	0	0		0438a	50.0	62.3	0	33	0	0		
032a	10.0	75.4	1	20	0	0		0444a	10.0	72.3	1	33	0	0		

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Site ID	area ha	represen-ted area ha	No of samples	Plot No		
0446a	10.0	15.5	0	34	0	0
0448a	10.0	25.5	0	34	0	0
0454a	10.0	35.5	0	34	0	0
0461a	50.0	85.5	1	34	0	0
046b	15.0	33.7	0	35	0	0
0473b	20.0	53.7	0	35	0	0
0518a	18.3	72.0	1	35	0	0
0519a	52.5	57.7	0	36	0	0
051c	20.0	77.7	1	36	0	0
0523d	15.0	25.9	0	37	0	0
0524b	48.5	74.4	1	37	0	0
0530a	20.3	27.9	0	38	0	0
0531a	45.0	72.9	1	38	0	0
0532a	18.3	24.3	0	39	0	0
0552a,51a	46.0	70.3	1	39	0	0
0553a	36.3	39.8	0	40	0	0
0554a	33.0	72.8	1	40	0	0
0614a	23.0	29.0	0	41	0	0
0618b	30.0	59.0	0	41	0	0
0649a	13.0	72.0	1	41	0	0
0667a	15.0	20.2	0	42	0	0
0672d	18.0	38.2	0	42	0	0
0720a	12.0	50.2	0	42	0	0
0720a	45.0	95.2	1	42	0	0
0770a	32.0	60.5	0	43	0	0
0774a	31.8	92.2	1	43	0	0
0785a	34.3	59.7	0	44	0	0
0876b	36.5	96.2	1	44	0	0
0887b	19.0	48.4	0	45	0	0
0891ab	28.0	76.4	1	45	0	0
0896ab	16.0	25.6	0	46	0	0
0899a	42.5	68.1	1	46	0	0
09124a	15.0	16.3	0	47	0	0
09125b	15.0	31.3	0	47	0	0
09126a	30.0	61.3	0	47	0	0
0920a	30.0	91.3	1	47	0	0
0928a	20.0	44.6	0	48	0	0
0935a	25.0	69.6	1	48	0	0
0979a	50.0	52.8	0	49	0	0
0985a	35.0	87.8	1	49	0	0
10137b	10.0	31.0	0	50	0	0
10163b	22.0	53.0	0	50	0	0
10205b	12.0	65.0	0	50	0	0
10208b	18.0	83.0	1	50	0	0
10211b	16.0	32.2	0	51	0	0
10212b	10.0	42.2	0	51	0	0
10214b	10.0	52.2	0	51	0	0
10215a	15.0	67.2	1	51	0	0
10216c	20.0	20.4	0	52	0	0
10218a	10.0	30.4	0	52	0	0
10220b	10.0	40.4	0	52	0	0

Site ID	area ha	represen-ted area ha	No of samples	Plot No		
10226b	14.0	54.4	0	52	0	0
10231b	11.0	65.4	0	52	0	0
10233b	24.0	89.4	1	52	0	0
10239a	10.0	32.6	0	53	0	0
10240a	10.0	42.6	0	53	0	0
10241b	20.0	62.6	0	53	0	0
10243a	10.0	72.6	1	53	0	0
10244b	16.0	21.9	0	54	0	0
10247b	28.0	49.9	0	54	0	0
10249a	23.0	72.9	1	54	0	0
1141a	13.0	19.1	0	55	0	0
1149b	11.7	30.8	0	55	0	0
117a	27.0	57.8	0	55	0	0
118a	12.0	69.8	1	55	0	0
12113a	15.6	18.6	0	56	0	0
1258b,59a	10.8	29.4	0	56	0	0
127a	26.8	56.2	0	56	0	0
13105b	10.0	66.2	0	56	0	0
1379a	25.4	91.6	1	56	0	0
1391b	10.0	34.8	0	57	0	0
14103b	49.0	83.8	1	57	0	0
14104b	59.0	76.0	1	58	0	0
14105b	25.0	34.3	0	59	0	0
14108b	41.0	75.3	1	59	0	0
1460b	10.0	18.5	0	60	0	0
1483b	75.0	93.5	1	60	0	0
1484b	105.0	131.7	1	61	0	0
1485b	80.0	144.9	2	62	63	0
1490b	88.0	99.3	1	64	0	0
1493b	57.0	89.6	1	65	0	0
1494b	202.0	224.8	3	66	67	68
1496b	60.0	84.4	1	69	0	0
1524a	20.5	38.2	0	70	0	0
1525a	60.0	98.2	1	70	0	0
1549a	22.3	53.7	0	71	0	0
1550c	25.0	78.7	1	71	0	0
1715a	28.3	40.2	0	72	0	0
17168a	55.0	95.2	1	72	0	0
17169a	46.0	74.4	1	73	0	0
17171a	60.0	67.6	1	74	0	0
17172a	20.0	20.8	0	75	0	0
17173a	19.0	39.8	0	75	0	0
17174a	37.0	76.8	1	75	0	0
17175a	46.0	56.1	0	76	0	0
18166a	44.0	100.1	1	76	0	0
18167a	15.0	48.3	0	77	0	0
18169a	50.0	98.3	1	77	0	0
181b	26.0	57.5	0	78	0	0
1829a	30.0	87.5	1	78	0	0
182ab	35.0	55.7	0	79	0	0
1863a	26.0	81.7	1	79	0	0

Site ID	area ha	represen-ted area ha	No of samples	Plot No		
1864a	24.0	38.9	0	80	0	0
1947d	23.5	62.4	0	80	0	0
1960ab	20.0	82.4	1	80	0	0
1967b	40.0	55.7	0	81	0	0
1974bc	12.0	67.7	1	81	0	0
1989b,90bd	20.0	20.9	0	82	0	0
1995e	32.0	52.9	0	82	0	0
2046a	22.0	74.9	1	82	0	0
2047/1	25.0	33.1	0	83	0	0
2061a	27.0	60.1	0	83	0	0
2066c	10.5	70.6	1	83	0	0
2067d	14.0	17.8	0	84	0	0
2069a	26.0	43.8	0	84	0	0
2081a	35.0	78.8	1	84	0	0
2175a	26.0	38.0	0	85	0	0
2176a	35.0	73.0	1	85	0	0
22173b	16.0	22.2	0	86	0	0
22182b	30.0	52.2	0	86	0	0
229a	59.0	111.2	1	86	0	0
23140a	20.0	64.5	0	87	0	0
23144a	58.0	122.5	1	87	0	0
23146a	35.0	90.7	1	88	0	0
23146b	50.0	73.9	1	89	0	0
23147a	39.0	46.1	0	90	0	0
2362b	13.0	59.1	0	90	0	0
2363b	12.0	71.1	1	90	0	0
24151b	20.0	24.3	0	91	0	0
24157b	40.0	64.3	0	91	0	0
2447b	20.0	84.3	1	91	0	0
25120a	39.5	57.1	0	92	0	0
25127a	25.0	82.1	1	92	0	0
2617b	10.0	25.3	0	93	0	0
2757,58,59a, 59b	116.5	141.8	2	93	94	0
2761b	31.0	39.2	0	95	0	0
	6'316.7					

The location of the sample plots inside the project sites was done randomly using GIS procedures..
The permanent sample plots would be located in order to conduct forest inventory and measure carbon stock. . The centers of permanent plots would be marked so that they can be easily located at 5-yearly inventories. The localization must be conducted precisely, that the plot can be found again.
Monitoring is planned after every fifth year during the crediting period, i.e. in 2012, 2017 and 2022.
There is no wood harvest expected in the form of thinning during the first crediting period. Collection of fodder is expected to be of uniform intensity over the project life thus, there is no danger of unfavourable coincidence of monitoring and harvest activities.

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

According to the methodology, the baseline carbon stock changes do not need to be monitored because the accepted baseline approach 22(a) assumes continuation of existing changes in carbon stock resulting in its further loss of regeneration ability.

For the renewal of crediting period, data necessary for determining the baseline renewal shall be collected and archived to demonstrate that the baseline approach and baseline scenario are still valid for the subsequent crediting period.

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

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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:

Actual GHG removals will be estimated using data for biomass growth. The biomass growth will be calculated as a function of volume growth estimated by means of the Albanian Volume Tables (a method typically used in the Albanian national Forest Inventory).

Measuring and estimating carbon stock changes over time

Carbon stock changes over time will be estimated using data for biomass growth. The biomass growth will be calculated as a function of volume growth estimated from the Albanian Volume Tables (a method typically used in the Albanian national Forest Inventory). Use of the Albanian Volume Tables is relatively simple and consists of the following steps:

Use of the Albanian Volume Tables is relatively simple and consists of the following steps:

1) Calculation of number and determine location of the circular sample plots corrected for slope (additional details are presented in Annex 4)
2) Separately for each species present in 200 m² sample plot and a radius of 7.98 m (corrected for slope – see Annex 4)), measurement of DBH of all trees with DBH greater than 4 cm and enumerate them. The procedures for diameter measurement are outlined in Annex 4;
3) Calculation of mean diameter per species present at the site and is used to assess the volume in the volume tables;
4) For each species, nine trees (three trees within the diameter category of the mean diameter, three of the next greater diameter category, and three of the next smaller diameter category) are selected. The heights of the nine trees are measured and average height is calculated. The procedures for measuring tree heights are presented in Annex 4;
5) For each species, height class should be assessed (according to species, mean diameter and average height);
6The volume per tree corresponding to average diameter is assessed from the volume table. The volume covers thickwood, middlewood, thin wood and firewood. Hence, it covers approximately aboveground biomass.
7) For each species, the volume is multiplied by number of trees on the sample plot to obtain volume per sample plot. The result should be multiplied by 10000m2/200m2=50 to obtain volume per hectare.
8) Volume per plot is a product of volume per hectare and area of the plot.

The volume of those trees that were existing trees in the baseline scenario prior to the project must be subtracted from the measured stand volume of the regenerated and planted stands. at periodic inventories.

$$V_{pc} = V_{pm} - V_{gb}$$

Where

V_{pc} = volume of the project area for the calculation of GHG removals by sinks.
V_{pm} = volume measured on the project area (including the trees under assisted regeneration and planted areas).
V_{gb} = volume of the pre-existing growing trees according to the stand model considered in the baseline.

The trees existing in the baseline will have lower increment than the planted or naturally regenerated ones. Taking the number and volume of pre-existing trees in the baseline into account , the approach is considered as conservative.

Albanian volume tables offer data on wood volume of stem and branches down to diameter of 2 cm hence, they cover approximately whole biomass of trees. The below–ground biomass is estimated using root/shoot ratio from Table 3A1.8 of the GPG LULUCF. Analysis of data in the table on root/shoot ratios leads to conclusion that in Albanian situation the most appropriate value is 0.35 (temperate broadleaf forest/plantation).

Calculation of carbon stock and carbon stock change

From the wood volume of each tree, the amount of CO_2 shall be calculated using the variables specified in the detailed Monitoring Plan tasks outlined in Annex 4 (density, CF, BEF, CO_2/C).

The amount of t CO_2 per plot should be multiplied by $10000m^2/200m^2=50$ to obtain the amount per hectare.

Accuracy assessment should be done according to the procedures of forest inventory.

Table 42 – Monitoring data to be collected on the changes in carbon stocks

ID number [30]	Data variable	Data unit	Measured (m), calculated (c), estimated (e) or default (d) [31] Source of data		Recording frequency	Number of sample plots at which the data will be monitored	Comment
28	*Stratum ID*	*Alpha numeric*	*m, e*	*Stratification map*	*Before the start of the project*	*100%*	*Each stratum has a particular combination of soil type, and possibly tree species, etc.*
29	*Sample plot ID*	*Alpha numeric*		*Project and plot map*	*Before the start of the project*	*100%*	*Numeric series ID will be assigned to each permanent sample plot*
30	*Plot location*		*m*	*Project and plot map and GPS locating*	*5 years*	*100%*	*Location of the plot and field measurement*
31	*Confidence level*	*%*		*CDM*	*Before the start of the project*	*100%*	*For the purpose of QA/QC and measuring and monitoring precision control*
32	*Precision level*	*%*		*CDM*	*Before the start of the project*	*100%*	*For the purpose of QA/QC and measuring and monitoring precision control*
33	*Tree species*			*Project design map*	*5 years*	*100%*	
34	*Age of plantation*	*year*	*m*	*Plot measurement*	*5 years*	*100% sampling plot*	*Counted since the planted year*
35	*Number of trees by species*	*number*	*m*	*Plot measurement*	*5 years*	*100% trees in plots*	*Counted in plot measurement*
36	*Diameter at breast height (DBH)*	*cm*	*m*	*Plot measurement*	*5 year*	*100% trees in plots*	*Measuring at each monitoring time per sampling method*

[30] Please provide ID number for cross-referencing in the PDD.

[31] Please provide full reference to data source.

ID number [30]	Data variable	Data unit	Measured (m), calculated (c), estimated (e) or default (d)[31] Source of data		Recording frequency	Number of sample plots at which the data will be monitored	Comment
37	*Mean DBH*	*cm*	*c*	*Calculated*	*5 year*	*100% of sampling plots*	
38	*Tree height*	*m*	*m*	*Plot measurement*	*5 year*	*100% trees in plots*	
39	*Mean tree height*	*m*	*c*	*Calculated*	*5 year*	*100% of sampling plots*	
40	*Wood density*	*t d.m. m^{-3}*	*d*	*Project data, GPG LULUCF*	*5 year*	*100% of sampling plots*	*Species specific*
41	*Biomass expansion factor (BEF)*	*dimensionless*	*d*	*GPG LULUCF*	*5 year*	*100% of sampling plots*	*constant=1*
42	*Carbon fraction*	*t C.(t d.m)$^{-1}$*	*d*	*IPCC*	*5 year*	*100% of sampling plots*	*IPCC default value*
43	*Root-shoot ratio*	*dimensionless*	*d*	*national inventory for LULUCF*	*5 year*	*100% of sampling plots*	*Species specific or GPG LULUCF default value for Quercus ilex = 0.35*
44	*Carbon stock in above-ground biomass of plots*	*t C ha^{-1}*	*c*	*Calculated from equation*	*5 year*	*100% of sampling plots*	
45	*Carbon stock in below-ground biomass of plots*	*t C ha^{-1}*	*c*	*Calculated from equation*	*5 year*	*100% of sampling plots*	
46	*Mean Carbon stock in aboveground biomass per unit area per stratum per species*	*t C ha^{-1}*	*c*	*Calculated from plot data*	*5 year*	*100% of strata and sub-strata*	
47	*Mean Carbon stock in belowground biomass per unit area per stratum per species*	*t C ha^{-1}*	*c*	*Calculated from plot data*	*5 year*	*100% of strata and sub-strata*	

ID number [30]	Data variable	Data unit	Measured (m), calculated (c), estimated (e) or default (d)[31] Source of data		Recording frequency	Number of sample plots at which the data will be monitored	Comment
48	*Area of stratum and sub-stratum*	*ha*	*m*	*Stratification map and data*	*5 year*	*100% of strata and sub-strata*	*Actual area of each stratum and sub-stratum*
49	*Carbon stock in aboveground biomass of stratum per species*	*t C*	*c*	*Calculated using equation*	*5 year*	*100% of strata and sub-strata*	
50	*Carbon stock in belowground biomass of r stratum per species*	*t C*	*c*	*Calculated using equation*	*5 year*	*100% of strata and sub-strata*	
51	*Annual carbon stock change in aboveground biomass of stratum per species*	*t C yr^{-1}*	*c*	*Calculated using equation*	*5 year*	*100% of strata and sub-strata*	
52	*Annual carbon stock change in belowground biomass of stratum per species*	*t C yr^{-1}*	*c*	*Calculated using equation*	*5 year*	*100% of strata and sub-strata*	
53	*Total carbon stock change in CO_2 eq.*	*t CO_2-e yr^{-1}*	*c*	*Calculated using equation*	*5 year*	*100% project area*	*Summing up carbon stock change in for all strata, sub-strata and tree species*

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:

The increase in GHG emissions by sources will happen only during the project establishment. This will result from coppicing of a part of the existing vegetation. The biomass harvested during coppicing will be mainly used for fencing however, part of it will be collected for fodder or left at plot (none will be burned). According to GPG LULUCF, it is assumed that CO_2 emission occurs in the year of harvest. In order to simplify calculations it was assumed that all coppicing is done during the first two years of the project duration. No mechanized work is planned for project preparation, but only manual work.
Coppicing and planting activities will result in necessity of transportation of workers and seedlings within the project area however, this will be done exclusively on foot or by animal power (hence, no GHG emission from transportation within the project boundary will add to the project emission).

The method applied for measuring and estimating carbon stock changes over time within the project area is a net method thus all biomass decrements resulting from silvicultural activities or fodder collection, etc. are implicitly covered.

All emissions resulting from transport activities outside the project boundary will be covered under leakage.

E.5. Leakage:

The two potential sources of leakage in this project are expected to be - transportation of people and products from the project area and displacement of ruminant animals. The latter one source is expected to be very small due to negligible transportation activity by means of cars.

The monitoring of transport would cover activities that influence the fossil fuel consumption for transport of project related staff and products and services to and from the project to areas outside the project boundary.

The project will include the complete or temporary exclusion of grazing activities from the sites through physical and social fencing, which will provide opportunities for the existent vegetation to establish.

Table 43 Monitoring Data for calculation of the project GHG emissions

ID no.	Data variable	Data unit	Measured (m), calculated (c), estimated (e) or default (d) [32] source of data		Recording frequency	No. of sample plots at which the data will be monitored	Comment
54	*Plot ID*	*Alpha numeric*	*m, e*	*Project map*	*Before the start of the project*	*100%*	*Each plot has a particular ID*
55	*Stratum ID*	*Alpha numeric*	*m, e*	*Stratification map*	*Before the start of the project*	*100%*	*Each stratum has a particular combination of soil type, and possibly tree species, etc.*
56	*Shrub cover*	*Alpha numeric*	*e*	*Project estimation*	*Before the start of the project*	*100%*	
57	*Tree cover*	*Alpha numeric*	*e*	*Project estimation*	*Before the start of the project*	*100%*	
58	*Tree and shrub volume*	*m^3ha^{-1}*	*c*	*Integrated Forest Management Project*	*Before the start of the project*	*100%*	
59	*Fraction of volume removed during coppicing*	*%*	*e*	*Albanian National Forest Inventory*	*Before the start of the project*	*100%*	*About 50% of shrub volume is removed. Coppicing reduces above ground biomass to enable resprouting.Hence, below ground biomass would not be affected.*
60	*Number of each vehicle type used*	*number*	*m*	*Monitoring of project activity*	*annually*	*100%*	*Monitoring number of each vehicle type used*
61	*Emission factors for road transportation*	*kg CO_2-e l^{-1}*	*d*	*GPG 2000, IPCC Guidelines, national inventory*	*annually*	*100%*	*National or local value has the priority*

[32] Please provide full reference to data source.

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ID no.	**Data variable**	**Data unit**	Measured (m), calculated (c), estimated (e) **or default (d)** [33] source of data		**Recording frequency**	No. of sample plots at which the data will be monitored	**Comment**
62	*Kilometers traveled by vehicles*	*km*	*m*	*Monitoring of project activity*	*annually*	*100%*	*Monitoring kilometers for each vehicle type and fuel type used*
63	*Fuel consumption per km*	*Litre km^{-1}*	*d*	*Local data, national data, IPCC*	*5 years*	*100%*	*estimated for each vehicle type and fuel type used*
64	*Fuel consumption for road transportation*	*litre*	*C*	*Calculated using equation*	*annually*	*100%*	*Calculated*
65	*Leakage due to vehicle use for transportation*	*t CO2-e yr-1*	*C*	*Calculated using equation*	*annually*	*100%*	*Calculated*

[33] Please provide full reference to data source.

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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:

For the type of AR CDM project activity to which this methodology applies, leakage shall be estimated as follows:

$LK_{Vehicle}$ = total GHG emissions due to fossil fuel combustion from vehicles; tonnes CO_2-e.
$LK_{ActivityDisplacement}$ = leakage due to activity displacement; tonnes CO2-e.
$LK_{fencing}$ = leakage due to increased use of wood posts for fencing up to year t*; tonnes CO_2-e.

$LK_{Vehicle}$ - Kilometres travelled by vehicles by type will be monitored through self-reporting of project participants or professional services and the data will be used for calculation of repayment or payment for the transportation work done.

- Fuel consumption per km by type of vehicle will be monitored according to factory data corrected for travelling through mountains and the data will be used for calculation of repayment or payment for the transportation work done.

- Number of vehicle used by type will be monitored through self-reporting of project participants or professional services and the data will be used for cross checking other data on transportation to ensure their consistency.

The self reporting will not lead to underestimation of the actual emissions due to the fact that underestimation of transportation work will end up in no payment for the not reported work.

$LK_{ActivityDisplacement}$ - Leakage due to conversion of land to grazing land is not attributable to the AR-CDM project activity if the conversion of land to grazing land occurs 5 years after the last measure taken to reduce animal populations in the project area. Monitoring of leakage due to the conversion of land to grazing land is therefore necessary only up to the fifth year after the last measure taken to reduce animal populations in the project area. Leakage due to fuelwood collection is not taken into consideration since this activity is not practiced or very marginal on project sites due to the lack of biomass on site.

$LK_{fencing}$- As per the guidance provided by the Executive Board (see EB22, Annex 15) leakage due to increased use of wood posts for fencing can be excluded from the calculation of leakages if *LKfencing* < 2% of actual net GHG removals by sinks (see EB22, Annex 15). Leakage due to fencing will be monitored during the years of forest establishment and will include only the fencing that may make use of posts coming outside the project boundary and not using the material coming from the coppicing and cleaning operations done within the project boundary.

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Table 44 Monitoring Data on leakage

ID number	Data variable	Data unit	Measured (m), calculated (c), estimated (e) or default (d)[34] Source of data		Recording frequency	Number of sample plots at which the data will be monitored	Comment
66	*Plot ID*	*Alpha numeric*	*m, e*	*Project map*	*Before the start of the project*	*100%*	*Each plot has a particular ID*
67	*Animal type index*	*Alpha numeric*	*m, e*	*Project data*	*Before the start of the project*	*100%*	*Each animal type has its own identifier*
68	*Daily Biomass Intake*	*kg DM head^{-1} day^{-1}*	*d*	*IPCC 1996 rev.*	*Before the start of the project*	*100%*	
69	*Number of animals by type*	*head*	*m*	*Project measurement*	*Before the start of the project, and after 5 years*	*100%*	
70	*Number of months per annum*	*month annum^{-1}*	*m*	*Project measurement*	*Before the start of the project*	*100%*	
71	*Number of each vehicle type used*	*number*		*Monitoring of project activity*	*annually*	*100%*	*Monitoring number of each vehicle type used*
72	*Emission factors for road transportation*	*kg CO_2-e l^{-1}*	*d*	*GPG 2000, IPCC Guidelines, national inventory*	*annually*	*100%*	*National or local value has the priority*
73	*Kilometres travelled by vehicles*	*km*	*m*	*Monitoring of project activity*	*annually*	*100%*	*Monitoring kilometers for each vehicle type and fuel type used*

[34] Please provide full reference to data source.

ID number	Data variable	Data unit	Measured (m), calculated (c), estimated (e) or default (d)[34] Source of data		Recording frequency	Number of sample plots at which the data will be monitored	Comment
74	*Fuel consumption per km*	*Litre km^{-1}*	*d*	*Local data, national data, IPCC*	*5 years*	*100%*	*estimated for each vehicle type and fuel type used*
75	*Fuel consumption for road transportation*	*litre*	*c*	*Calculated using equation (22)*	*annually*	*100%*	*Calculated using equation (22) via 4.1.07, 4.1.03, 4.1.04*
76	*Leakage due to vehicle use for transportation*	t CO_2-e yr^{-1}	*c*	*Calculated using equation (21)*	*annually*	*100%*	*Calculated using equation (21) via 4.1.02, 4.1.07*
77	*Ratio of molecular weights of carbon and CO_2*	*dimensionless*	*d*			*100% Area where posts are not deriving from the coppicing activities within the project boundaries but from not renewable sources*	
78	*Average volume of o wood posts*	*m^3*	*e*		*5 year*	*100% Area where posts are not deriving from the coppicing activities within the project boundaries but from not renewable sources*	*Estimated from sampling*
79	*Biomass expansion factor (BEF_2)*	*dimentionless*	*e*	*IPCC GPG LULUCF*	*5 year*	*100% Area where posts are not deriving from the coppicing activities within the project boundaries but from not renewable sources*	IPCC default in LULUCF GPG 2003, Table 3A.1.10
80	*Carbon fraction of dry matter of species j*	*Tonnes C (tonne d.m)$^{-1}$*	*e*	Literature, own studies	*Once per species or group of species*	*100% Area where posts are not deriving from the coppicing activities within the project boundaries but from not renewable sources*	Local/national data or IPCC default (= 0.5)
81	*Average distance between wood posts*	*m*	*m*	*Field sampling*	*5 year*	*100% Area where posts are not deriving from the coppicing activities within the project boundaries but from not renewable sources*	

ID number	Data variable	Data unit	Measured (m), calculated (c), estimated (e) or default (d)[34] Source of data		Recording frequency	Number of sample plots at which the data will be monitored	Comment
82	*Wood density of species j*	*t d.m. m^{-3}*	*e*	Local-derived, national inventory, IPCC GPG LULUCF	*5 year*	*100% Area where posts are not deriving from the coppicing activities within the project boundaries but from not renewable sources*	Local-derived and species-specific value have the priority
83	*Fraction of posts from off-site non-renewable sources*	*dimensionless*	*m*	Field measurements	*5 year*	*100% Area where posts are not deriving from the coppicing activities within the project boundaries but from not renewable sources*	
84	*Perimeter of the areas to be fenced at year t*	*m*	*m*	Field measurements, GPS, GIS	*5 year*	*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:

The leakage from displacement of grazing animals is minimized as the project area will be closed for animals but manual collection of fodder will be allowed (in a way that it will not interact with afforestation activities). The biomass coppiced during the afforestation activities and harvested during cleaning and other management activities will be also used as a fodder for animals. It is expected that fodder collection from the project area will not be diminished in a significant way however, excluding animal grazing will allow for avoiding harmful impacts.

The awareness generation activities undertaken within this project and voluntary participation by local people. These people are well aware of environmental changes adversely impacting their life and they understand that the project is a way to improve it. Hence, it is likely that they will follow rules on fodder collection from the project area.

E.6. Provide any additional quality control (QC) and quality assurance (QA) procedures undertaken for data monitored not included in section E.1.2

Table 45 – Quality control and quality assurance data monitored

Data ***(Indicate ID numbe)***		**Explain QA/QC procedures planned for these data, or why such procedures are not necessary.**
85 Plot location	*low*	*Random plot verification using GPS to ensure the consistent measuring and monitoring of the carbon stock change over time*
86 Plot Area	*low*	*Random verification over the project area to ensure the area of each plot is correctly measured*
87 Number of trees	*low*	*Random plot verification*
88 Diameter at breast height (DBH)	*low*	*- Field staff will be trained in advance* *- Data checked by a qualified person in cooperation with the field team* *- Randomly selected plots will be re-measured by teams other than those involved in the prior plot measurements, the measurements compared to check for errors; any errors found should be resolved, corrected and recorded. The re-measurement of permanent plots is to verify that measurement procedures were conducted properly.*
89 Tree height	*low*	*Random plot verification*
90 Root-shoot ratio	*low*	*Data that divert significantly from IPCC default value shall be verified*
91 Number of travelling vehicles	*low*	*The trip data are available in the project records and can be verified.*
92 Kilometres travelled by vehicles	*low*	*Project record shall be available and verified*
93 *Number of animals*	*low*	*Random verification by plot or village*

94 *Number of months*	*low*	*Random verification*

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 within the larger umbrella of the Natural Resources Development Project (NRDP), a World Bank loan project.

The project management is based on Forest and Pasture User Associations (FPUAs). These associations are non-governmental organizations consisting of members of the public that are using forest and pastoral resources in the territory of the commune. The main role of the FPUAs is to manage the communal forests and pastures in close cooperation with the commune. Farmers often graze their livestock collectively, especially on the high pastures: this is organized informally at village levels, with FPUA management. Each FPUA has a statute (based on a standard model), is officially registered, and is overseen by village commissions elected by all users of a village. All village commissions with all members form the general meeting that elects the board of the FPUA (with chair-person, vice-chair, and members).

A FPUA will make an agreement with a commune and Forest and Pasture Policies Directorate (FPPD) to use a part of the communal forest under the management of the commune for the purposes of the present project.

Regarding the role of the FPUAs within the project, the associations will be responsible for the planting and tending of the trees and of the annual reporting. With assistance of the NRDP and the FPPD, the FPUAs involved in the carbon sequestration project will organize themselves in an association - Communal Forests Users Carbon Association (CFCUA) – to facilitate the coordination and management of the project.
This Association will be responsible for the administrating and coordinating the project participants (FPUAs), facilitating and supervising the implementation of the proposed A/R CDM project activity, and organizing and coordinating the measuring and monitoring of the actual GHG removals by sinks and any leakage generated by the proposed A/R CDM project activity. Any activity data and monitoring and measuring data will be reported to and archived in the CFCUA in both electronic and paper copy.

The FPPD and its district forestry offices will provide technical instruction on reforestation and forest management, and conduct the specific supervision of the implementation of the proposed A/R CDM project activity, and collect specific activity data at routine basis.

The DFOs of the 10 districts involved in the project, under the coordination of the Carbon Association, will be responsible for measuring and monitoring of the actual GHG removals by sinks and any leakage generated by the proposed A/R CDM project activity.

The NRDP, will provide technical consultation and training in the measuring and monitoring of the actual GHG removals by sinks and any leakage generated by the proposed A/R CDM project activity, and will be responsible for drafting monitoring report.

An expert team will be established if any technical issues will arise, conducting checking and verification of measured and monitored data.

NOTE: All the organizational issues as well as contractual arrangements are described in details in the report "Legal and Institutional Analysis" (Agrotec S.p.A. Consortium, 2005) produced during the assignment "Assessment & Design of Community - Based Carbon Sequestration in Albania", available upon request to the Forest and Pasture Policies Directorate in Tirana. It should be noted that in the above-mentioned report the FPPD was called Directorate of Forest and Pasture (DGFP) and that the directorate is now under the Albanian Ministry of Environment.

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

Hubertus Schmidtke, Agrotec S.p.A., Roma – SILVACONSULT AG, 8402 Winterthur/Switzerland
Lucia Perugini, Agrotec S.p.A., Roma – Univeristy of Tuscia, Viterbo /Italy
Thimaq Lako, Agrotec S.p.A., Roma

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:

Analysis of the environmental impacts

The overall project structure and implementation plan show a general positive impact on environmental ecosystem services (see the Environmental Analysis of the project in annex 5 for details). The human induced natural regeneration will improve biodiversity by enhancing native species distribution and ecological succession. The location of project sites on the most erosion prone areas of Albania will improve soil stabilization, soil fertility and hydrology. The silvicultural practices are conducted using manual methods, thereby minimizing impacts on environment.

There is no likelihood of shifting grazing activities outside project areas. The Environmental Assessment details are presented in Annex 5.

Project activities

The proposed afforestation activities are aimed to restore the forest cover for protection and productive functions. This will be done through supplemental plantings, protection form grazing activities and silvicultural works. The activities pertaining to soil preparation will be minimized and localized. All the operations will be conducted manually without mechanical and/or chemical means with the aim to reduce environmental impacts in the environment.

The total size of the project is of 6,316.7 ha, spread over 5 regions. The average size of the discrete land parcels is expected to be of 30 ha.

Soils

Land degradation has been identified as one of the most important environmental issues in Albania. Currently, already highly degraded land in rural areas is subject to uncontrolled grazing which prevents the development of a protective vegetative cover. These lands are eroding rapidly and in many places the landscape looks devastated with a consequent loss of soil. The causes of land degradation are manly due to lack of sustainable management of natural resources.

The project will take place only on communal degraded pasture areas that, for the most part, historically carried trees, which were cleared in the past. The current alternative use is pasture and has become unstable under poor vegetation. The overall effect of the project will be to improve soil stabilization with the development of forest cover. Soil organic matter will also increase as result of increase in net primary productivity.

Hydrology

For the nature of the project (restoration of natural forest vegetation on forest degraded land) only positive effects are foreseen due to the project activities. In fact, increased vegetative cover will increase the moisture retention capacity of the land, thereby reducing surface runoff, soil erosion and downstream flood risk during storm events. Since most of the sites are located in hilly and mountainous regions the positive effects on watersheds will be highly significant.

Biodiversity

The project prevents the degradation of critical natural habitats, defined to include those habitats that are legally protected, officially proposed for protection, or unprotected but of known conservation value. Indigenous species will be planted, with a consequent increase in biodiversity. Previous experiences in the areas chosen proved that the biodiversity increased due to sustainable management of the degraded grazing areas (Albania Forestry Project-AFP, World Bank 1996 - 2004).

The promotion of natural regeneration will also lead to development of ecological succession on the project sites, creating the conditions for enhancing the dispersion of seeds to areas outside the project and for establishing species, which will maintain the forest cover in the future.

The habitat for wildlife would also improve as a consequence of the establishment of forest cover and natural succession, improving also animal biodiversity.

Other environmental factors

The project activities also provide indirect effects on the quality of the environment such as:

- Positive regional climate effects
- Lower ground temperatures
- Greater atmospheric humidity
- Improved water quality
- Reduced atmospheric dust
- Improved appearance of the landscape

- Increase in supply of food, browse, fuel, construction materials and other forest products, even while protecting soil and water resources.

Installation of fencing could lead to the intensification of grazing on adjacent and nearby land, leading in loosing of vegetation and soil cover and increased erosion.

The project has been discussed intensively with local communities that agreed on reserving land for the promotion of natural reforestation. They also reported no major objections to shifting part of their animals from the reserved areas and agreed on livestock size and grazing patterns in all project areas. The exclusion of grazing during the initial growth period would allow the trees to reach a sufficient height in order for the livestock to reenter in the plots. The assessment of when the trees have reach a sufficient height to not be harmed by livestock will be made separately for each plot.

Project risks

There are four identified potential risks that merit elaboration:

1. Insect pests and diseases;
2. Illegal cutting;
3. Natural regeneration failure;
4. Fires

1. There are no major reported insect pests or diseases for oak broadleaf high forest in Albania. The Gypsy moth (*Lymantria dispar*), which is an indigenous pest of broadleaf forests in Europe, is present and there have been a number of infestations. The L. *dispar* is expected to cause no discernible damage.
2. The practice of illegal cutting is widespread in Albania. It is however more or less limited to state forests. With the transfer of forest user rights to communes, the practice has stopped in forest areas that are now communal forests. The transfer of property rights is expected to commence before the end of the current decade. The risk of illegal cutting in project areas is considered negligible.

3. There is the risk that in the areas, which are fenced or set aside, to facilitate and promote regeneration, growth will fail and this will impact on the ability to sequester carbon. On the basis of the experience under the AFP project this is highly unlikely. The technical site selection criteria ensure to promote and sustain regeneration and –growth on the project sites.

4. With the transfer of user rights of forests to communes, the risk of fire has decreased as the forest areas are viewed as owned property. With the transfer of property rights, expected to begin before the end of the current decade, the risk due to fire will in all likelihood decrease further. The project has fire management plan to address risks from natural fires.

The details on the risk assessment are described in details in the report on "Permanence Analysis" (Agrotec S.p.A. Consortium, 2005) produced during the assignment "Assessment & Design of Community - Based Carbon Sequestration in Albania". The report will be made available upon request.

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:

The project participants and the Host Party consider no significant negative impacts. The Environmental Analysis of the National Resource Development Project NRDP also indicates the absence of negative impacts associated with the project. Additional details on the Environmental Analysis of the project are provided in Annex 5 and relevant documents would be made available upon request

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

No negative impacts have been identified. However, environmental monitoring plan and measures to address potential risks will be implemented and monitored as outlined in the Annex 5.

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

The project is expected to have positive socioeconomic impacts, in the short-term in the form of employment generated in communities where unemployment and poverty are severe, and in the medium term it is expected to improve the supplies of firewood and NTFPs such as fodder, medicinal plants, chestnuts, walnuts and cherries. The local communities are highly supportive of the project because of its contribution to to local economy.

The following factors also contribute sustain the socioeconomic benefits of the project.

- Phasing in of benefits of highest value to villagers such as employment especially targeting the , landless and vulnerable communities is expected to result in broad social support.
- Permitting grass to be cut as fodder from the sites during the closure period will compensate for short-term economic costs or losses due to grazing restrictions.
- Trends in livestock ownership such as a reduction in numbers of goats in most project villages are also likely to moderate any adverse consequences.

- Fostering increase in fodder productivity on arable land, introduce improved breeds of livestock, improve alternative pastures, all measures favored by SA respondents as ways to make restrictions more palatable. These measures are programmed within the larger NRDP project, which will be active in all villages where the CDM project is being implemented.

In addition, village commissions set up under the NRDP provide a mechanism for dealing with grievances likely to surface on issues of fairness in assigning employment grazing restrictions and other project specific socioeconomic impacts.

Strong recognition exists in the communities of the value of broad participation and inclusiveness, with the overwhelming majority that women should play an integral role in the management of natural resources. There is also strong support for village-centered management with communes and others such as Forest and Pasture User Associations and District Forestry Offices playing supportive role. The village commission arrangement established under the NRDP is expected to serve as a catalyst in ensuring improved awareness of the socioeconomic benefits of the project.

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:

Since all land encompassed in the project is land identified by communities as in common use and ownership, no land ownership conflicts or issues are anticipated. Impacts associated with the grazing restrictions are expected to be limited as these areas already degraded and over-grazed. The project design includes measures that would address grazing restrictions through enhanced fodder availability for collection in the project area and alternative grazing arrangements that would satisfy the community requirements without causing leakage. Increase in fodder production off-site to cover a 10-15% increase in requirements could also be achieved by applying certified seeds, which would entail no leakage. Pasture development and grazing management initiatives undertaken through the NRDP will also mitigate any negative economic consequences.

Employment connected with the project at about $120 per month. Additionally, villagers may be able to benefit from income through sale of medicinal and aromatic plants from year-3 onward. Something. The improved firewood, fodder, walnut, chestnut and medicinal plant production would improve the socioeconomic contribution of the project during the crediting period.

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:

No negative impact is considered significant by the project participant and the Host Party. The social assessment documentation is provided in the Annex 6.

The social assessment was a key element in final selection of project sites based on evaluation of possible adverse impacts in certain communities. It drew on views of local community leaders and members, both as to their concerns as well as their ideas on how best to address possible problems that might arise. These ideas are reflected in the project design and safeguards built in. Analysis of survey data helped pinpoint specific problem areas that will receive particular attention during implementation and will be reflected in the terms of contracts reached with local communities.

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

Remedial measures addressing any adverse impacts include employment preferences of those identified as most vulnerable, permitting cutting and collection of grass from the sites as fodder, as well as auxiliary measures to enhance fodder availability, livestock productivity and alternate sources of income generation available through the NRDP.

Adherence to employment preferences for vulnerable groups suffering the most adverse consequence and exemptions for livestock reductions where these are called for will be monitored on annual basis with information provided by FPUAs and village heads. They will also record the participation of the community, particularly women and newcomers.

During project implementation, aspects related to socioeconomic impacts and equity concerns will be assessed taking into account the grievances raised with village commissions and follow-up activities undertaken to resolve the outstanding socioeconomic issues.

SECTION H. Stakeholders' comments:

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

Stakeholders consulted during the project preparation included communal officials, District Forestry Service officers and village leaders. The comments and feedback of the stakeholders was taken into account in the project design and selection of project sites. The stakeholder comments were received through focus group meeting and surveys (see Annex 6 for details).

Comments were also recorded in written agreements or protocols of intent to proceed with the project. Informal meetings and interviews were also held with leaders and residents of the project villages. The social assessment surveys solicited the detailed views of 22 village heads and 203 households and facilitated analysis of socio-economic pertinent to household and community levels. The respondents of social assessment survey were informed of key elements of the proposed project and asked to state preferences and issues of concern.

H.2. Summary of the comments received:

Communal leaders, FPPD, NRDP staff, DFS officials and village leaders voiced universal support of the project emphasizing the broad benefits of the project that would ensue to local residents both in terms of employment and environmental protection. Some cited the record of communal support and protection of the forests demonstrated under the AFP. Some village leaders indicated the need for alternative arrangements to meet the grazing requirements of local communities (Caje).

Overall, comments of village leaders and residents were enthusiastic. It is clear that the prospects of employment and erosion control are perceived very positively and with anticipation. Many lauded the project as combining these elements. About 84% of sample households regarded erosion control as a major benefit anticipated from the project. Importance attached to erosion control correlated with the seriousness of this problem and its consequences in respective communities.

About 65% of respondents characterized income benefits from timber and non-timber products in project sites as significant to them, although these benefits ranked third behind employment and erosion control.

Clear preference was voiced, for trees with multiple benefits, particularly in communities residing in medium to lower altitudes. It is also clear from villagers' comments that there is a general preference for local community management at village level or even in some cases, hamlet/llagje level with a supportive role of communes, DFS and FPUAs.

Some concern was voiced about the possible reduction of of small ruminants. According to village leaders interviewed in the social assessment survey, in 3 of 22 study villages, grazing restrictions were expected to have some impact. The measures proposed to be implemented to address the impacts of grazing restrictions are expected to be adequate as village leaders were confident that residents would find grazing restrictions acceptable.

The need for taking villagers' views into account and sensitizing them about the project were also points made.

A point repeated by many of the village leaders was that benefits would have to be widely and fairly distributed, with broad community participation and consensus.

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

Overall, comments of village leaders and residents were enthusiastic. It is clear that the prospects of employment and erosion control are perceived very positively. Many lauded the project as combining these elements. According to the social assessment survey , 84% of sample households regarded erosion control as a major benefit anticipated from the project. Importance attached to erosion control highlighting the seriousness of this problem and its consequences in the communities.

About 65% of social assessment survey respondents characterized income benefits from timber and non-timber products in project sites as significant to them, although these benefits ranked third behind employment and erosion control.

All comments that were received during the project design and subsequent consultations were taken into account in the project preparation and the formal and informal feedback was also taken into account.

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 present project will be carried out in parallel with the implementation of the World Bank Natural Resources Development Project (NRDP) during 2005 to 2010. The NRDP is a US$ 19.4 million project and includes funding from the following sources:

- Government of Albania US$2.2 million
- International Development Agency (IDA) US$7 million
- Global Environment Facility (GEF) US$5 million
- Swedish International Development Agency (Sida) US$5.2 million

This project does not result in a diversion of ODA and. The documentary evidence on the non-diversion of ODA is presented in Annex 12 of this PDD.

Annex 3

BASELINE INFORMATION

The Albanian National Forest Inventory (ANFI 2004) includes a study based upon satellite remote sensing interpretation and analysis of the spatio-temporal and semantic aspects of land cover/use, which reveals the recent pattern of land use changes in the country and changes in names of the same land uses over years.

At national level the analysis results show that the following land use changes are easy discernible: "Forest" classes change into "Woodland" classes and "Woodland" classes into "Grassland" classes; conversion occurs from "Forest" classes into "Cultivated Area" classes, "Cultivated Area" classes into "Built-up Area" classes and "Grassland" classes into "Bare Land" classes. These land cover/use dynamics shows a gradual shift from classes with a tree cover to classes with less dense tree cover or even to classes completely deprived of trees. Furthermore, agricultural areas lose terrain to urban areas, whereas grasslands lose their vegetative cover. The distribution of the most significant changes indicates their regional occurrence. When looking at the spatial extent of the individual classes at national level, one can state that "Forest" and "Thicket" classes decrease, whereas "Built-up Area", "Woodland" and "Grassland" classes increase. The "Forest" classes decrease substantially, whereas "Built-up Area" classes increase considerably more than any other class.

At district level the most significant changes are conversions from "Forests" into "Herbaceous Crops" and from "Herbaceous Crops" into "Built-up Area", and modifications from "Forests" into "Woodlands", from "Woodlands" into "Grasslands", and from "Forests" into "Grasslands". Also here the land cover/use dynamics shows clearly the shift from tree-dominated vegetation domains into domains where trees are much less frequent or even absent. A considerable part of forests have been converted into agricultural fields, this change has potentially permanent character.

Major Land Cover/Use Changes in order of magnitude are from:

1. "Broadleaved deciduous (open) forest, usually coppice / Cultivated areas with herbaceous crops on sloping land" to "Cultivated areas with herbaceous crops on sloping land", containing 17.1 percent of total change, where forest has been replaced by cultivated fields;
2. "Broadleaved deciduous forest" to "Broadleaved deciduous open forest", containing 10.0 percent of total change, where the tree layer has changed from close canopy to open canopy;
3. "Broadleaved deciduous open forest" to "Sparse trees and shrubs with open to closed grass cover and rock outcrops", containing 3.8 percent of total change, where the three layer has become so sparse that the open-to-closed grass cover has become dominant;
4. "Cultivated areas with herbaceous crops on level land" to "Built-up areas", containing 3.3 percent of total change, where cultivated fields have been used for construction;
5. "Mediterranean maquis/Broadleaved deciduous forest (*Quercus* spp. and/or *Ostrya* spp. are dominant) usually coppice" to "Broadleaved deciduous forest", containing 2.8 percent of total change, where the Mediterranean maquis has disappeared;
6. "Broadleaved deciduous open forest" to "Sparse trees and shrubs with very open grass cover and rock outcrops", containing 2.0 percent of total change, where the tree layer has become so very sparse that the very open grass cover has become dominant;

7. "Broadleaved deciduous open forest" to "Broadleaved deciduous forest", containing 1.9 percent of total change, where the tree layer has changed from a open canopy to close canopy;
8. "Sparse trees and shrubs with very open grass cover and rock outcrops" to "Bare rocks and/or soils" containing 1.5 percent of total change, where the sparse vegetative cover has been removed.

The decrease in biomass/carbon stock in the categories of land outlined above highlights long term land degradation due to anthropogenic pressures. The degradation processes follow coppicing of forestland in the 1960s and 1970s, when the land was cleared to become state agricultural land. Part of the cleared land was terraced and planted with fruit trees but today it stays idle and constitutes the so called "refused" land, the future of which has not been resolved yet. The rest of the cleared land has been transferred to the communes under the supervision of the forest associations formed in each commune and currently is used as grazing land, which contributes to further degradation. The project plots are located on such a degraded land, which is clearly reflected in the project stratification. The project contains four strata:

1 The maquis, (Mediterranean scrubs) and garrigues

Represents the degraded stage of the former Quercus ilex forests. The degradation results from traditional use of forest and overgrazing, which result in substitution of forest by the typical Mediterranean scrubs (second stage). Next, as the result of further intensive harvesting and overgrazing, the garrigues vegetation is composed of thorny and sclerophyllous scrub, which substitutes maquis vegetation.

The final degradation stage of this vegetation series consists of sclerophyllous dwarf and scrub vegetation. The degradation of the forest vegetation is accompanied with erosion and desertification phenomena.

2 The formation of mixed oak and hornbeam or Macedonian oak, ash and hornbeam

Represents the advanced and severe degradation stages of the former Quercus cerris and Quercus frainetto forests. In the project area open canopy of hornbeam or Macedonian oak formations consist of shrub shaped individuals. Soil reveals signs of superficial erosion, which leads to further degradation of vegetation and soil. This ecosystem is under the ecological stress due to overgrazing and intensive collection of fodder. Grazing especially by goats keeps the production of biomass at very low level and woody species individuals, even oaks, have a dwarf shape. Further degradation leads to

The final degradation stage is represented by a formation of mixed species pseudo-maquis and grassland formations, where semi-shrub species (*Salvia officinalis, Salvia sclerosa, Morina persica*), and sclerophyllous species (*Thymus longicaulis, Teucrion pollium, Helianthemum numularum*) are the most characteristic species.

3 Formation of Buxus and Juniper over magmatic stones (Puke, Mat)
Represents the advanced degradation stage of the former oak forests caused by intensive coppicing, fodder collection and overgrazing.

4 Open formation of dwarf species or grassland with Juniperus nana (Kukes)
Represents the most degraded stage of the former beech forests. The existing vegetation is so rare that even grazing is no more possible and the vegetation is unable regrow in it scurrent state.

Hence, the degradation processes are widespread within the project area and significantly contribute to changes in all strata. It is justified to infer that the processes will be continued in the future unless relevant national or sectoral policies are applied, if any.

Impact of project activities on the neighboring land

The selected sites for the A/R CDM project cover an area of about 5 thousand ha of pastures located in 109 villages, which belong to 24 communes. These communes are distributed in 10 districts and 5 regions of Albania. Three of the regions, namely **Shkode**r, **Kukes** and **Diber**, are located it the north, the fourth region, **Elbasan**, is located it the middle and the fifth region, **Korce**, is located in the southwest of the country. The total area covered by 109 villages amounts to 63.161 ha and consists of forests and forest lands (50%), followed by arable lands (21%), shrublands (17%) and pastures (12%) (Table 1). The project area forms about 10% of this total land.

Officially, only pastures are considered as grazing lands in Albania. In reality however, forests and forestlands including high forests, coppice and shrublands are also grazed by livestock. Taking into account that the whole forest domain is used by livestock and the refused lands as well, then the total grazing area amounts to 55,406 ha. The project area corresponds to about 11% of the total grazing area (see: Table 1).

Table 1. Project area in relation to the total area and grazing area covered by the selected villages

Total area			Grazing area			Project area		
Type	Size (ha)	%	Type	Size (ha)	%	Size (ha)	% of total area	% of grazing area
Forests	26,905	42.5	Forests	27,905	48.9			
Forest lands	5,029	8.0	Forest land	5,029	9.1			
Shrublands	10,897	17.3	Shrublands	10,897	19.8			
Pastures	7,379	11.7	Pastures	7,379	13.4			
Arable lands	12,951	20.5	Refused land	4,836	8.8			
Total	63,161	100.0	Total	55,046	100.0	6,051	9.8	11.3

The project plots have been placed on current communal pastureland. The data collected using the field questionnaire, however, show that the present vegetation of these pastures is not uniform. It ranges from a plant cover of less than 30% to 100% with the dominant species being either herbaceous or shrubs. The selected sites are located in different elevation zones with most of them used as summer pastures and the remaining as winter pastures.

Stocking rate in villages involved in the project

The stocking rate, namely the number of animals in sheep equivalents (SEU) grazing per unit area at a certain time period was calculated by considering that all types of ruminants (sheep, goats and cattle) are grazing in forests and pastures, which fact is very close to the reality. The grazing period usually amounts

to 6 months per year while in the remaining 6 months animals either graze in the arable lands (after harvesting of crops) or fed in the barn with hay or tree foliage (in the case of goats) however, there are some plots which are grazed during the whole year. For the unit of sheep equivalents, one goat was considered equivalent to one sheep and one cow equivalent to five sheep. Horses and donkeys were not incorporated in the calculations because they graze in arable lands or fed with forage collected in arable fields.

Table 2. Evolution of number of grazing animals between 2000 and 2005, and pre-project vs. project stocking rate in regions involved in the A/R CDM project

Region	Year	Grazing animals (heads)			Stocking rate (SEU/ha)	
		Sheep	Goats	Cattle	Pre-project	Post-project
Diber	2000	12,189	9,801	7,735	2.6	3.0
	2005	14,010	6,487	8,105		
	%	+14.9	-33.8	+4.8		
Elbasan	2000	9,492	13,739	3,391	4.2	4.5
	2005	12,075	15,621	3,445		
	%	+27.2	+13.6	-13.7		
Korce	2000	1,080	830	140	1.0	1.1
	2005	1,203	649	144		
	%	+11.4	-21.8	+2.9		
Kukes	2000	11,149	1,179	5,234	4.3	4.6
	2005	15,070	1,900	3,478		
	%	+35.2	+61.2	-33.5		
Shkoder	2000	2,905	5,295	2,964	2.2	2.3
	2005	3,728	4,012	3,515		
	%	+28.3	-24.2	+18.6		
Total	2000	36,815	30,844	19,464	3.0	3.4
	2005	46,086	28,669	18,687		
	%	+25.2	-7.1	-4.0		

The stocking rate in each region and for the whole study area was calculated as a ratio between the number of livestock in 2005 (see: Table 2) after converting them to SEU and the total grazing area (forests, pastures and refused land – see Table 1). Table 2 shows that this stocking rate without excluding the "project sites" varies considerably among the five regions with the lowest being in **Korce** (1.0

SEU/ha) and the highest in **Kukes** and **Elbasan** (4.3 and 4.2 SEU/ha respectively) while the average for the whole study area amounts to 3.0 SEU/ha. Compared to the national average of 4.54 SEU/ha calculated with the livestock data of the year 2000 (see: ANFI, 2004), it can be concluded that the stocking rate of the selected villages is lower, suggesting that the problem of overgrazing is important but is not as acute as in other parts of Albania. Implementation of the project activities would increase the stocking rate only by ca. 10% if the project area had completely ceased to supply fodder. On the contrary, the project area will be closed for animals but manual collection of fodder will be allowed (in a way that it will not interact with afforestation activities). The biomass coppiced during the afforestation activities and harvested during cleaning and other management activities will be also used as a fodder for animals. It is expected that fodder collection from the project area will not be diminished in a significant way however, excluding animal grazing will allow for avoiding harmful impacts. This expectation is further justified through education activities undertaken within this project and voluntary participation by local people. These people are well aware of environmental changes adversely impacting their life and they understand that the project is a way to improve it. Hence, it is likely that they will follow rules of wise fodder collection from the project area.

Concluding, displacement of animals necessary for successful afforestation of the project plots will not have significantly unfavourable impact on areas beyond the project boundary.

Baseline calculation

Baseline stratum area	ha	%
No growing trees	6129.4	97.0
Growing trees	187.3	3.0
Total	6316.7	100

0.61	D_j = wood density
0.5	CF_j = carbon fraction in d.m.
1.00	BEF_{lj} = biomass expansion factor from merchantable volume to aboveground biomass
1.94	R_j = Root shoot ratio
3.667	44/12 = conversion CO_2/C

A	**B** oak coppice Stand volume expanded aboveground	**C**	**D**	**E**	**F**	**G**
				eq. 7	eq. 6	eq. 5
t age	***Iijt*** m3 ha-1	t	$\mathbf{I_{vijt}}$	$\mathbf{\Delta G_{w,ijt}}$	$\mathbf{C_{TOTAL,ikt}}$	ΔC_{Gikt}
1	**0.56**					
2	**1.11**					
3	**1.67**	Project	annual increment			

4	**2.21**	Year	m3 ha^{-1} y^{-1}	t d.m. ha^{-1} y^{-1}	t CO_2 $ha^{-1}yr^{-1}$	t CO_2 yr^{-2}
5	**2.76**	1	0.54	0.33	1.79	332
6	**3.30**	2	0.54	0.33	1.77	330
7	**3.83**	3	0.54	0.33	1.76	327
8	**4.36**	4	0.53	0.32	1.75	325
9	**4.89**	5	0.53	0.32	1.74	323
10	**5.42**	6	0.53	0.32	1.73	321
11	**5.94**	7	0.52	0.32	1.71	318
12	**6.46**	8	0.52	0.32	1.70	316
13	**6.97**	9	0.51	0.31	1.69	314
14	**7.48**	10	0.51	0.31	1.68	312
15	**7.99**	11	0.51	0.31	1.67	310
16	**8.49**	12	0.50	0.31	1.66	308
17	**8.99**	13	0.50	0.31	1.64	305
18	**9.49**	14	0.50	0.30	1.63	303
19	**9.98**	15	0.49	0.30	1.62	301
20	**10.47**	16	0.49	0.30	1.61	299
21	**10.96**	17	0.49	0.30	1.60	297
22	**11.44**	18	0.48	0.29	1.59	295
23	**11.92**	19	0.48	0.29	1.58	293
24	**12.40**	20	0.48	0.29	1.57	291
25	**12.87**					6221
26	**13.34**		eq. 4			= $\Delta C_{B,LB}$
27	**13.81**		$\Delta C_{ikt} = \Delta C_{Gikt} - \Delta CL_{ikt}$			
28	**14.27**		$\Delta CL_{ikt} = 0$			
29	**14.73**		eq. 2			
30	**15.19**		**$C_{BSL} = \Delta C_{B,LB}$ =**		**6221**	**t CO2**

Column A and B show the stand model of coppice forest for expanded timber volume from the ANFI. Column B shows the standing timber volume per age (year). It is assumed that the growing trees are in average according to year 5 of the stand model.

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Annex 4

MONITORING PLAN

1. Monitoring of the baseline net GHG removals

The baseline carbon stock changes need not be monitored after the project is established, because the accepted baseline approach 22(a) assumes continuation of existing changes in carbon pools within the project boundary from the time of project validation.

2. Monitoring of the proposed A/R CDM project activity

a) Monitoring actual project boundary

The project boundary is delineated using either forest management maps to specify the identification of the project through geo-referencing. The following procedures will be followed to monitor the project boundary and to record the details in the project database.

- Field surveys will be used to verify that the actual project boundary is consistent with the boundaries of the respective sites so that species planted on the sites could be verified from the field data;
- The information from monitoring of the project boundary would ensure that the land use and economic activities that occur outside the project are identified;
- Monitoring measures to assess the risk of fire and other natural events that occur within and outside the project boundary will be monitored as per the provisions of emergencies outlined in the monitoring plan;
- Personnel involved in the monitoring will be trained to identify the changes in project boundary and to record changes in the project database for reporting at the time of project verification.

b) Monitoring of the forest establishment

The activities pertaining to forest establishment are

- Information on planting schedule, location, area and species planted will be recorded in plot journals and archived in the project database
- Information on area planted by year in each stratum is confirmed through field surveys.
- Information on species composition and characteristics of planted species as well as pre-existing vegetation are recorded;
- The characteristics of stand models are recorded in the project database;
- The area and location of supplemental plantings undertaken to fill the gaps is recorded in the project database and identified on the strata maps;

Monitoring of post-planting activities to demonstrate the forest establishment

- Information on drainage, frost, and other climatic extremes that can impact stand establishment and stand growth will be recorded; Surveys are conducted annually for first 3-years to evaluate the survivals rates and to fill the gaps and survival rates of planted stock should be established by undertaking surveys during the initial establishment period.

- Final survival check is conducted in the permanent sample plots at the end of third year of plantation and survival percent estimated from surveys conducted at the end of 3 rd year is recorded in the project database. The survival percent at the end of the 3rd year will be reported for verification purposes.
- The number and periodicity of weeding and tending practices and frequency of the herbicide use will be monitored and recorded.
- Information pertaining to droughts and floods and other emergencies will be monitored and recorded and the area affected by them will be taken into account the ex post calculations of the carbon stock changes.

In case of fires, the causes, area affected, season, and duration of fire occurrence shall be also recorded and the emissions associated with the burning of biomass shall be calculated and accounted as part of project emissions.

c) Monitoring of the forest management

- Information on silvicultural management activities such as thinning, tending, harvesting, and other operations that influence the GHG removals by sinks will be monitored and the information is recorded in the project database.
- Quantity of fossil fuels used in silvicultural operations, transport of equipment and personnel and other management activities carried out in the project boundary will be monitored and recorded and the quantity of fossil fuels used in the operations will be calculated and archived;
- As the project does not use fertilizer, GHG emissions fertilizer application will not be monitored and the emissions from this source are treated as zero in the project database.
- Information on the occurrence of natural fires or other natural or human induced disturbances and the area and the biomass affected shall be recorded and reported;
- Deviations, if any, in the forest management activities from those outlined in the project design document will be monitored and the reasons for such deviations will be recorded.

3. Monitoring the actual net GHG removals by sinks data

a) Stratification

Post stratification will be conducted to address the possible changes of project boundary and planting scheme in comparison to the outline of the project design. The post-stratification will address the changes in carbon stocks in comparison to the details outlined in the project design. Strata or substrata could be aggregated if they represent similar carbon stock changes. Otherwise, new strata could be defined.

b) Sampling frame and sample size

The initial stratification led to two strata (coppice and high forest broadleaf) and the number of sample plots for each stratum is estimated as per the required accuracy. The costs of establishing of sample plots across the strata were assumed to remain constant; therefore, these were not taken into account the sample size calculations.

The entry data:

- Total size of all strata (A), e.g. the total project area: A = ha.
- The one stratum selected (A_i): A_1 = 6’316.7 ha

- Sample plot size (a): a = 0.02 ha;
- Standard deviation (S_h) for the stratum: S_1 = 10 m^3ha^{-1} , assumed high (conservative) value
- Approximate value of average of the estimated quantity (Q): Q_1= 20.2 m3/ha expanded volume according to the ANFI stand model high forest broadleaf at the age of 5 years
- Desired level of precision (p): p= 10%;
- $z_{\alpha/2}$ = value of the statistic z (normal probability density function), for α = 0.05 (implying a 95% confidence level): $z_{\alpha/2}$ = 1.9600 from table[35]

Then equation 59:

$$N_i = \frac{A_i}{AP}; N_1 = N = \frac{A}{AP} \quad N_i = \frac{A_i}{AP};\ \text{E} = \text{Q*p}$$

315'835

E = Q*p = 2.0 m^3ha^{-1}

When no information on costs is available, then:

Eq. 62

$$n = \frac{\left[\sum_{i=1}^{m_{PS}} N_i * st_i\right]^2}{\left(N * \frac{E}{z_{\alpha/2}}\right)^2 + \sum_{i=1}^{m_{ps}} N_i * (st_i)^2} = 95$$

Eq 63 was not applied because only one stratum was selected.

For the project scenario stratum 1 (high forest broadleaf) 95 sample plot where calculated for the first monitoring event after five years. All necessary rounding were made towards the nearest higher integer number. The calculation is based on the expected average volume at the first monitoring event according to the stand model. The standard deviation was assumed conservatively with 10 m3/ha. If the standard deviation appears much lower or higher during the measurement campaign, the number of plots may be recalculated. Addition or deletion of sample plots must follow rules of random approach.

c) Location of sampling plots

The permanent sample plots will be located systematically with a random start, which is considered good

[35] CRC Standard Probability and Statistics Tables and Formulae. Stephen M. Kokoska, Daniel Zwillinger

practice in GPG-LULUCF. This can be accomplished with the help of a GPS in the field. The geographical position (GPS coordinate), administrative location, stratum and sub-stratum series number of each plots will be recorded and archived. The sampling plots will be distributed randomly and evenly. The Table 1 presents the details of sample plot distribution.

The number of sample plot was calculated with 64 for stratum 1, which represents one sample plot per 85.5 ha. The stratum 2 is represented with 18 sample plots, which corresponds to one sample plot per 47 ha. In the site list, after meeting the a sample plot area threshold, the number of ha that is above the sample plot threshold is transferred to the next plot on the list. The highlighted cells in the Table 1 indicate the sample plots.

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Table 1: Partitioning of sample plots among strata and location of sample plots at projects sites.

Stratum		**6'317 ha**						Red cells mark the plots per site							
Number of plots		95													
Representation area per plot		66.8													
Divide the area of each site by this representation area															
The plot falls in that site, where the representation area is completed.															
The amount that is more with the specific aite is carried to the next one.															
Site ID	area ha	represen-ted area ha	No of samples	Plot No				Site ID	area ha	represen-ted area ha	No of samples	Plot No			
0457	20.0	20.0	0	1				0330c	17.3	25.9	0	21	0	0	
0647	30.0	50.0	0	1	0	0		0331a	15.0	40.9	0	21	0	0	
0867	34.5	84.5	1	1	0	0		0331c	10.5	51.4	0	21	0	0	
0878	20.5	38.2	0	2	0	0		0334a	27.5	78.9	1	21	0	0	
0888	22.5	60.7	0	2	0	0		0340a	11.5	23.6	0	22	0	0	
0951	50.3	111.0	1	2	0	0		0347b	14.0	37.6	0	22	0	0	
0981	46.5	90.7	1	3	0	0		034b	24.3	61.9	0	22	0	0	
1495	132.0	155.9	2	4	5	0		0357a	10.0	71.9	1	22	0	0	
2076	52.0	74.3	1	6	0	0		0358b	11.0	16.1	0	23	0	0	
2148	36.0	43.6	0	7	0	0		035a	18.0	34.1	0	23	0	0	
2361	10.0	53.6	0	7	0	0		0360b	10.0	44.1	0	23	0	0	
2649	10.0	63.6	0	7	0	0		037a	11.0	55.1	0	23	0	0	
14129	50.0	113.6	1	7	0	0		0388a	14.0	69.1	1	23	0	0	
23141	49.0	95.8	1	8	0	0		04106b	15.0	17.3	0	24	0	0	
0117a	55.0	84.0	1	9	0	0		04116b	21.0	38.3	0	24	0	0	
0121a	62.0	79.2	1	10	0	0		04137a, 138a	32.0	70.3	1	24	0	0	
0122a	29.0	41.4	0	11	0	0		0414a	50.0	53.5	0	25	0	0	
0154a	38.0	79.4	1	11	0	0		04153b	78.0	131.5	1	25	0	0	
0158a	55.0	67.6	1	12	0	0		04154a	40.0	104.8	1	26	0	0	
0159a	26.0	26.9	0	13	0	0		04155b	15.0	53.0	0	27	0	0	
02105b	20.0	46.9	0	13	0	0		04156a	36.0	89.0	1	27	0	0	
02109b	15.0	61.9	0	13	0	0		04159c	12.0	34.2	0	28	0	0	
02109c	34.0	95.9	1	13	0	0		04168a	12.0	46.2	0	28	0	0	
02156b	11.0	40.1	0	14	0	0		0416a	30.0	76.2	1	28	0	0	
02157a	54.0	94.1	1	14	0	0		04174e	18.0	27.4	0	29	0	0	
0252b	30.0	57.3	0	15	0	0		04175a	26.0	53.4	0	29	0	0	
0265a	28.0	85.3	1	15	0	0		04179a	38.0	91.4	1	29	0	0	
0266a	24.0	42.5	0	16	0	0		04183a	16.0	40.6	0	30	0	0	
0269a	44.0	86.5	1	16	0	0		04192c	10.0	50.6	0	30	0	0	
0270a	30.0	49.7	0	17	0	0		04201c	15.0	65.6	0	30	0	0	
0277a	23.5	73.2	1	17	0	0		04242c	10.0	75.6	1	30	0	0	
0278c	28.5	35.0	0	18	0	0		0424a	15.0	23.8	0	31	0	0	
0284a	32.0	67.0	1	18	0	0		04250b	10.0	33.8	0	31	0	0	
0289a	28.0	28.2	0	19	0	0		04253d	12.0	45.8	0	31	0	0	
0291b	14.0	42.2	0	19	0	0		0425b	10.0	55.8	0	31	0	0	
03104a	12.0	54.2	0	19	0	0		04265d	10.0	65.8	0	31	0	0	
03107a	18.0	72.2	1	19	0	0		04269b	30.0	95.8	1	31	0	0	
03111ab	20.0	25.4	0	20	0	0		04279a	10.0	39.1	0	32	0	0	
03112d	15.0	40.4	0	20	0	0		04280b	10.0	49.1	0	32	0	0	
0322a	13.0	53.4	0	20	0	0		0433a	30.0	79.1	1	32	0	0	
0327c	12.0	65.4	0	20	0	0		0438a	50.0	62.3	0	33	0	0	
032a	10.0	75.4	1	20	0	0		0444a	10.0	72.3	1	33	0	0	

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Site ID	area ha	represen-ted area ha	No of samples	Plot No		
0446a	10.0	15.5	0	34	0	0
0448a	10.0	25.5	0	34	0	0
0454a	10.0	35.5	0	34	0	0
0461a	50.0	85.5	1	34	0	0
046b	15.0	33.7	0	35	0	0
0473b	20.0	53.7	0	35	0	0
0518a	18.3	72.0	1	35	0	0
0519a	52.5	57.7	0	36	0	0
051c	20.0	77.7	1	36	0	0
0523d	15.0	25.9	0	37	0	0
0524b	48.5	74.4	1	37	0	0
0530a	20.3	27.9	0	38	0	0
0531a	45.0	72.9	1	38	0	0
0532a	18.3	24.3	0	39	0	0
0552a,51a	46.0	70.3	1	39	0	0
0553a	36.3	39.8	0	40	0	0
0554a	33.0	72.8	1	40	0	0
0614a	23.0	29.0	0	41	0	0
0618b	30.0	59.0	0	41	0	0
0649a	13.0	72.0	1	41	0	0
0667a	15.0	20.2	0	42	0	0
0672d	18.0	38.2	0	42	0	0
0720a	12.0	50.2	0	42	0	0
0720a	45.0	95.2	1	42	0	0
0770a	32.0	60.5	0	43	0	0
0774a	31.8	92.2	1	43	0	0
0785a	34.3	59.7	0	44	0	0
0876b	36.5	96.2	1	44	0	0
0887b	19.0	48.4	0	45	0	0
0891ab	28.0	76.4	1	45	0	0
0896ab	16.0	25.6	0	46	0	0
0899a	42.5	68.1	1	46	0	0
09124a	15.0	16.3	0	47	0	0
09125b	15.0	31.3	0	47	0	0
09126a	30.0	61.3	0	47	0	0
0920a	30.0	91.3	1	47	0	0
0928a	20.0	44.6	0	48	0	0
0935a	25.0	69.6	1	48	0	0
0979a	50.0	52.8	0	49	0	0
0985a	35.0	87.8	1	49	0	0
10137b	10.0	31.0	0	50	0	0
10163b	22.0	53.0	0	50	0	0
10205b	12.0	65.0	0	50	0	0
10208b	18.0	83.0	1	50	0	0
10211b	16.0	32.2	0	51	0	0
10212b	10.0	42.2	0	51	0	0
10214b	10.0	52.2	0	51	0	0
10215a	15.0	67.2	1	51	0	0
10216c	20.0	20.4	0	52	0	0
10218a	10.0	30.4	0	52	0	0
10220b	10.0	40.4	0	52	0	0
10226b	14.0	54.4	0	52	0	0
10231b	11.0	65.4	0	52	0	0
10233b	24.0	89.4	1	52	0	0
10239a	10.0	32.6	0	53	0	0
10240a	10.0	42.6	0	53	0	0
10241b	20.0	62.6	0	53	0	0
10243a	10.0	72.6	1	53	0	0
10244b	16.0	21.9	0	54	0	0
10247b	28.0	49.9	0	54	0	0
10249a	23.0	72.9	1	54	0	0
1141a	13.0	19.1	0	55	0	0
1149b	11.7	30.8	0	55	0	0
117a	27.0	57.8	0	55	0	0
118a	12.0	69.8	1	55	0	0
12113a	15.6	18.6	0	56	0	0
1258b,59a	10.8	29.4	0	56	0	0
127a	26.8	56.2	0	56	0	0
13105b	10.0	66.2	0	56	0	0
1379a	25.4	91.6	1	56	0	0
1391b	10.0	34.8	0	57	0	0
14103b	49.0	83.8	1	57	0	0
14104b	59.0	76.0	1	58	0	0
14105b	25.0	34.3	0	59	0	0
14108b	41.0	75.3	1	59	0	0
1460b	10.0	18.5	0	60	0	0
1483b	75.0	93.5	1	60	0	0
1484b	105.0	131.7	1	61	0	0
1485b	80.0	144.9	2	62	63	0
1490b	88.0	99.3	1	64	0	0
1493b	57.0	89.6	1	65	0	0
1494b	202.0	224.8	3	66	67	68
1496b	60.0	84.4	1	69	0	0
1524a	20.5	38.2	0	70	0	0
1525a	60.0	98.2	1	70	0	0
1549a	22.3	53.7	0	71	0	0
1550c	25.0	78.7	1	71	0	0
1715a	28.3	40.2	0	72	0	0
17168a	55.0	95.2	1	72	0	0
17169a	46.0	74.4	1	73	0	0
17171a	60.0	67.6	1	74	0	0
17172a	20.0	20.8	0	75	0	0
17173a	19.0	39.8	0	75	0	0
17174a	37.0	76.8	1	75	0	0
17175a	46.0	56.1	0	76	0	0
18166a	44.0	100.1	1	76	0	0
18167a	15.0	48.3	0	77	0	0
18169a	50.0	98.3	1	77	0	0
181b	26.0	57.5	0	78	0	0
1829a	30.0	87.5	1	78	0	0
182ab	35.0	55.7	0	79	0	0
1863a	26.0	81.7	1	79	0	0

Site ID	area ha	represen-ted area ha	No of samples	Plot No		
1864a	24.0	38.9	0	80	0	0
1947d	23.5	62.4	0	80	0	0
1960ab	20.0	82.4	1	80	0	0
1967b	40.0	55.7	0	81	0	0
1974bc	12.0	67.7	1	81	0	0
1989b,90bd	20.0	20.9	0	82	0	0
1995e	32.0	52.9	0	82	0	0
2046a	22.0	74.9	1	82	0	0
2047/1	25.0	33.1	0	83	0	0
2061a	27.0	60.1	0	83	0	0
2066c	10.5	70.6	1	83	0	0
2067d	14.0	17.8	0	84	0	0
2069a	26.0	43.8	0	84	0	0
2081a	35.0	78.8	1	84	0	0
2175a	26.0	38.0	0	85	0	0
2176a	35.0	73.0	1	85	0	0
22173b	16.0	22.2	0	86	0	0
22182b	30.0	52.2	0	86	0	0
229a	59.0	111.2	1	86	0	0
23140a	20.0	64.5	0	87	0	0
23144a	58.0	122.5	1	87	0	0
23146a	35.0	90.7	1	88	0	0
23146b	50.0	73.9	1	89	0	0
23147a	39.0	46.1	0	90	0	0
2362b	13.0	59.1	0	90	0	0
2363b	12.0	71.1	1	90	0	0
24151b	20.0	24.3	0	91	0	0
24157b	40.0	64.3	0	91	0	0
2447b	20.0	84.3	1	91	0	0
25120a	39.5	57.1	0	92	0	0
25127a	25.0	82.1	1	92	0	0
2617b	10.0	25.3	0	93	0	0
2757,58,59a, 59b	116.5	141.8	2	93	94	0
2761b	31.0	39.2	0	95	0	0
	6'316.7					

The location of the sample plots inside the project sites will be selected at random using GIS procedures.

d) Plot size and demarcation

If a plot is intersected by a forest boundary line the mirror method after Schmid-Haas is applied. The plot center is mirrored with the boundary line (mirror axis) to the outside forest area. From this mirrored plot center, a new plot is defined. The trees inside this plot are considered twice. This is marked in the field form.

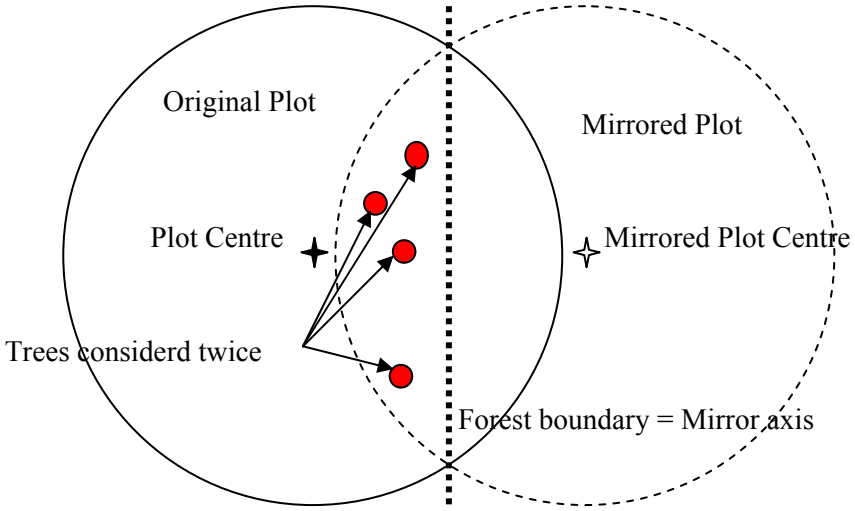

Figure 1: Mirror method for plots at forest boundary.

Table 2: Determination of circular plot radii.

Inclination (%)	Inclination (degrees)	200 m² radius (m)
0-10	0.0	7.98
15	8.5	8.02
20	11.3	8.06
25	14.0	8.10
30	16.7	8.15
35	19.3	8.21
40	21.8	8.28
45	24.2	8.36
50	26.6	8.44
55	28.8	8.52
60	31.0	8.62
65	33.0	8.71
70	35.0	8.82
75	36.9	8.92

Inclination (%)	Inclination (degrees)	200 m² radius (m)
80	38.7	9.03
85	40.4	9.14
90	42.0	9.25
95	43.5	9.37
100	45.0	9.49
105	46.4	9.61
110	47.7	9.73
115	49.0	9.85
120	50.2	9.97
125	51.3	10.09
130	52.4	10.22
135	53.5	10.34
140	54.5	10.47
145	55.4	10.59

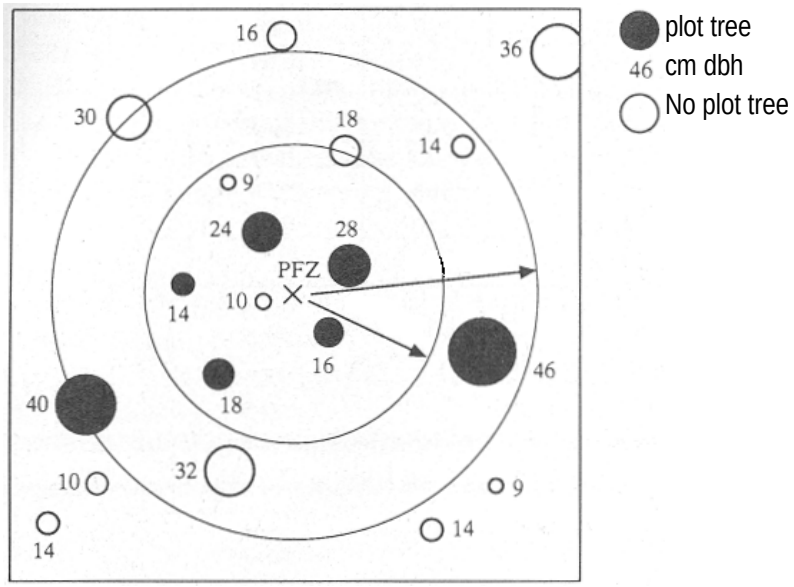

Figure 3: Plot of the national forest inventory with concentric circles

The centers of the circular permanent sample plots are marked to facilitate the measurement of trees located on the plot at each inventory and subsequent inventories. The precise location of plots is recorded as they would need to be identified at the subsequent verification.

The management activities planned within this project will not allow for major harvest during the first crediting period. Collection of fodder is expected to be of similar intensity over the whole project lifetime thus, there is no danger of unfavourable coincidence of monitoring and harvest activities.

e) Frequency of monitoring

Monitoring is planned at five-year intervals during the crediting period.

f) Data on tree vegetation parameters for calculation of above ground tree biomass

Carbon stock changes over time will be estimated using data for biomass growth. The biomass growth will be calculated as a function of volume growth estimated from the Albanian Volume Tables (a method typically used in the Albanian national Forest Inventory). Use of the Albanian Volume Tables is relatively simple and consists of the following steps:

Use of the Albanian volume tables is relatively simple and consists of the following steps:

1) Calculation of number and determine location of the circular sample plots corrected for slope.
2) Separately for each species present in 200 m² sample plot and a radius of 7.98 m (corrected for slope), measurement of DBH of all trees with DBH greater than 4 cm will be conducted.
3) Calculation of mean diameter per species presents at the site and is used to assess the volume in the volume tables.
4) For each species, nine trees (three trees within the diameter category of the mean diameter, three of the next greater diameter category, and three of the next smaller diameter category) are selected. The heights of the nine trees are measured and average height is calculated.

5) For each species, height class should be assessed (according to species, mean diameter and average height).
6) The volume per tree corresponding to average diameter is assessed from the volume table. The volume covers thickwood, middlewood, thin wood and firewood. Hence, it covers approximately aboveground biomass.
7) For each species, the volume is multiplied by number of trees on the sample plot to obtain volume per sample plot. The result should be multiplied by 10000m2/200m2=50 to obtain volume per hectare.
8) Volume per plot is a product of volume per hectare and area of the plot.

g) Procedures for measurement of tree biomass

Tree diameter

The tree diameter is the diameter of a tree stem measured at breast height (1.3 m). (See Figure 0-2)

- The diameter is measured with a caliper. In cases of irregular stem forms or diameters above 80 cm the circumference is measured with the distance tape.
- The caliper is held perpendicular to the stem axis with the axis of the caliper pointing towards the plot center.
- The measurement is rounded down to full centimeters.
- The minimum diameter to be measured is 4 cm.

Trees with inclined stem axis are skipped if the measurement point at 1.3 m is outside the plot. Trees with inclined stem are measured if the bottom of the stem is outside but the measurement point of dbh is inside the plot.

Special cases of tree diameter measurement

1. Branch or knot at 1.3 m: One diameter measurement is done above and one below the disturbance, calculating the diameter as average of the two measurements.
2. Forked tree/twin stem above 1.3 m: It is considered as one single tree.
3. Forked tree/twin stem below 1.3 m: It is considered as two trees. Each stem is measured separately (and gets its own tree number).
4. Bifurcation at 1.3 m: In this case the measurement is taken below the bifurcation.
5. Measurement impossible: The diameter at breast height gets the value ‘0’ and the reason is given as remark in Figure below.

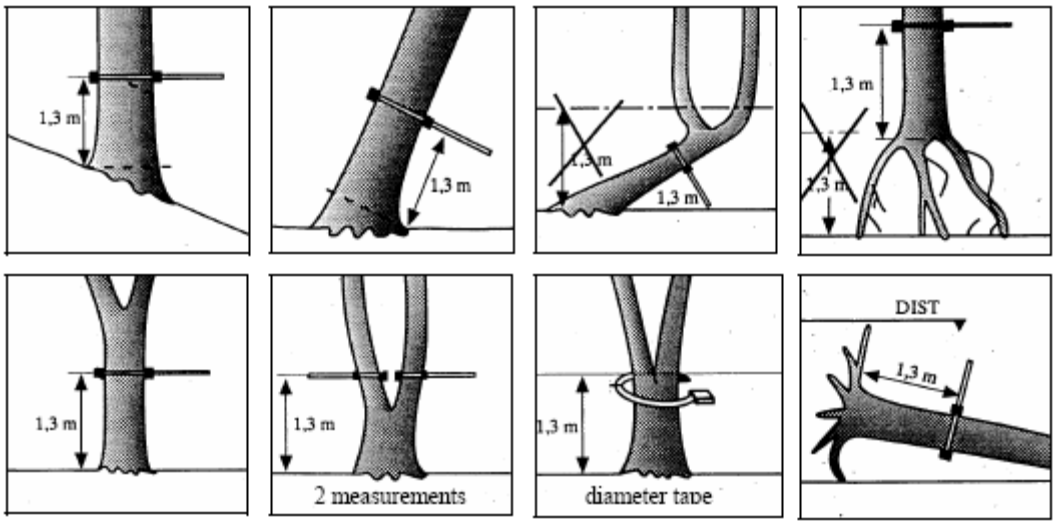

Figure 4: Examples of diameter measurements.

Tree height

For each site, the yield class will be determined by measuring minimum three tree heights. If the tree heights of several trees are the same, one measurement can be used for several trees.

Three tree heights of each species will be measured per plot starting from Azimuth 0. Trees with inclined stem axis are skipped. The instruments used can be Vertex III, which was used during the ANFI or other common instruments for tree height measurements such as SUUNTO, HAAGA. The technical handling of the instruments as per their standard operating procedures.

h) Procedures for the maintenance of equipment used in vegetation measurement

The common procedures to be followed in the maintenance of equipment used in vegetation measurement are outlined below. In case no ready guidance on the procedures is available, the recommendations of local forest management agency will be followed.

- When compass is used in the field, it is calibrated to compensate for the local difference between magnetic and true north (magnetic declination) and adjustment is completed in order to facilitate the recording of accurate bearing.

- The aspect measurements are recorded to the nearest eight directions: N, S, E, W, NE, SE, NW and SW. The same procedure is used to determine the azimuth to any desired target object such as a tree and the azimuth value should be recorded to the nearest percent, The azimuth direction is expressed in degrees: North at 360 (zero) degrees, East at 90, South at 180, and West at 270.

- It is recommended to use DBH tapes made of steel or aluminum, and cloth tapes should be avoided considering their propensity for wear and tear that could result in measurement inaccuracies.

- Pacing can be useful to establish the relationship between map and photo information with the measurements on the ground. One step represents half of a pace and two steps equal one pace. Therefore, crew should be trained in pacing on flat ground.

Field recording of vegetation measurement data

The formats used in Albanian national forest inventory will be followed for recording and reporting vegetation measurement data. The formats outlined below illustrate the details that would be collected during plot measurements.

Plot data form

Stand /Plot ID	/	Overstory	/
Starting point		Type class	/
Date	/ /	Understorey	/ /
Aspect/Slope	/	Groundcover	/ /
Crew initials		Weather	1 2 3 4

Plot tree summary

SNo	Spp	Crown class	DBH	Ht	Remarks

i) Calculation of volume

The volume of those trees that were existing and growing trees already at the beginning of project must be subtracted from the measured volumes of the periodic inventories. Also the growth of the trees estimated in the baseline calculation must be subtracted. Because the growing trees are single ones or in small spots the delineation was not applicable. They will be measured randomly in the subsequent inventories together with the new growing trees.

$$V_{pc} = V_{pm} - V_{gb}$$

Where

V_{pc} = accountable project volume for GHG emission reduction.
V_{pm} = volume measured on the whole area (including the growing tree areas).
V_{gb} = volume of the pre-existing trees as per the stand model considered in the baseline.

The growing trees will have lower increment than the planted or naturally regenerated ones. Taking the pre-existing volume of the growing trees into account in the baseline, the approach is conservative.

j) Calculation of carbon stock and carbon stock change

Data for calculation of change in the above ground carbon stock would be based on the biomass measurements of permanent sample plots. Carbon stock changes over time will be calculated using data on biomass growth.

From the wood volume of trees, the carbon stock in CO_{2e} shall be calculated (density, CF, BEF, CO_2/C).

The amount of t CO_2 per plot should be multiplied by $10000m^2/200m^2=50$ to obtain the amount per hectare.

The method applied for measuring and estimating carbon stock changes over time within the project area is a net method thus all biomass decrements resulting from silvicultural activities or fodder collection, etc. are implicitly covered.

Accuracy assessment of the carbon stock calculations would be done as per the guidance of the methodology and the procedures of the Albanian national forest inventory.

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

There are no significant GHG emissions associated with the implementation of the project as there is no biomass burning involved in the site preparation and no fertilization is foreseen in the project and as planting activities are carried using manual methods, the emissions from the use of fossil fuels are expected to be insignificant. Therefore $\mathbf{GHG_E}$ are expected to be insignificant.

When machinery or vehicles are used in the project activities, the following information will be recorded.

- Categories of vehicle and machinery used in the project along with technical and operational efficiency characteristics.
- Amount of fuel used in each type of vehicle, machinery and equipment for completing unit project activity
- Quantity of fuel use in the site preparation, nursery and planting stock development
- Assumptions and default parameter values on GHG emissions from burning fossil fuels

Procedures for emergency preparedness for cases where emergencies could cause unintended emissions

- *Procedures to assess the GHG emissions due to fire in the boundary*

  The project would implement fire management plan and feedback of local communities. The forest management plan guidelines on fire prevention measures such as establishment of fire lines, reduction of fuel load, clearance of brushwood and dry vegetation close to the project parcels would be implemented. The project would further implement rapid response fire suppression measures.

  In case of accidental fires, the area and carbon stock affected would be assessed using surveys. The procedures used for calculation of GHG emissions from natural fires would be adopted to account the project emissions and recorded in the project database.

Step 1: The area subjected to biomass burning would be assessed using sampling methods and/or field survey methods and recorded in the project database.

Step 2: The amount of non-CO2 emissions is assessed based on the CO2 emissions from biomass burning, therefore, CO2 emissions from biomass burning would be estimated as precursor to the estimation of non-CO2 emissions.

Step 3: Data on combustion efficiencies are adopted from the Tables 3A.1.12, 3A.1.14 GPG/LULUCF) and data on emission factors of non-CO2 gases are adopted from Tables 3.A 15 and 3.A.16 of GPG-LULUCF to estimate the emissions. The mean emission factors of CH_4 (0.012) and N2O (0.007) released from biomass burning should be used.

- *Procedures to assess the impact of pest infestation on the carbon stock of the project*

  In case of pest damage, monitoring team would assess the area affected and the carbon stock of the pest affected area and implement pest management measures to minimize negative impacts on the remaining carbon stock in the project boundary and to prevent the spread of infestation to areas outside project boundary.

- *Impact of droughts and floods on carbon stocks in the project boundary*

  Procedures would be implemented to assess the weather related natural hazard events such as droughts and floods in the project area and survival of plantations in the affected areas. The data from field surveys of the affected areas would be used to assess the impact of droughts and floods on the carbon stocks of the project.

5. Monitoring the leakage

a) Leakage emissions resulting from transport activities

The leakage from transport of project staff for activities associated with project and transport to areas outside the project boundary is calculated by monitoring the project activities that involve staff travel and product transportation to areas outside the project boundary. The project transport activities such as movement of nursery inputs, planting material from nursery to planting sites, movement of labour, transport of harvested products to markets and for other uses outside the project boundary are monitored and accounted.

The fossil fuel emissions will be estimated based on the numbers of vehicles, distance travelled, fuel consumption, and emission factors. The data required for the estimation of leakage such as the distance travelled by the project to areas outside the project each year and amount of fossil fuels consumed in the transportation of the project personnel and the quantity of the thinned wood, distance travelled to the market and the quantity of fossil fuels consumed would be collected from the project database. The annual leakage associated with the transportation of project personnel and products to areas outside the project would be calculated using the steps outlined below.

*Step 1***:** Collection of information on the distance travelled using different types of vehicles and their fuel consumption.

ID no	Variable	Source of data	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
95	*Number of vehicle used by type*	*Monitoring of project activity, transportation*	*number*	*m*	*Annually, monthly, daily as appropriate*	*100%*	*Electronic and paper*	*Monitoring number of each vehicle type used*
96	*Kilometres travelled by vehicles by type*	*Monitoring of project activity, transportation*	*km*	*m*	*Annually, monthly, daily as appropriate*	*100%*	*Electronic and paper*	*Monitoring kilometers for each vehicle type and fuel type used*
97	*Fuel consumption per km by type of vehicle*	*Local data, national data, IPCC*	*Litre km^{-1}*	*e*	*5 years*	*100%*	*Electronic and paper*	*Estimated for each vehicle type and fuel type used*

*Step 2***:** Adoption of emission factors for different types of fuel types

Fossil fuels	Emission factors (kg/litre) CO2e
Diesel	
Petrol	

The additional parameter from local studies, IPCC default factors and God Practice Guidance on LULUCF and published literature relevant to the project context would be used.

*Step 3***:** Estimation of CO2 emissions from leakage associated with transport outside the project boundary

b) Displacement of grazing and other economic activities

The displacement of grazing and other economic activities such as fuelwood collection are not expected under the project considering the fodder collection arrangements made during the grazing restriction period. In addition, the amount of surplus land available for grazing and fodder collection and lower biomass density prevalent in the project boundary minimize the risk of grazing. Nevertheless, the project management would monitor the factors influencing the economic activities in the vicinity of the project in order to account the emissions.

6. Quality Assurance and Quality Control (QA/QC)

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,

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 are proposed in this document and they will be adjusted periodically.
- Training courses on the field data collection and data analyses will be held for persons involving in the field measurement works. The training courses will ensure that each field-team members is fully aware of all procedures and the importance of collecting data as accurately as possible.

b) Verification of field data

To verify that plots have been installed and the measurements taken correctly,
- Randomly selected plots will be re-measured by teams other than those involved in the prior plot measurements
- Key re-measurement elements include the location of plots, DBH and tree height.
- The re-measurement data will be compared with the original measurement data. Errors assessed in the prior measurements will be corrected and recorded and would be used to calculate the measurement error.

c) Verification of data entry and analysis

To minimize the possible errors in the process of data entry, the entry of both field data and laboratory data will be reviewed by an independent expert team and compared with independent data to ensure that the data are realistic. Communication between all personnel involved in measuring and analyzing data will be used to resolve any apparent anomalies before the final analysis of the monitoring data is completed.

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 pools and non-CO_2 GHG and corresponding calculation spreadsheets;
- GIS products;
- Copies of the measuring and monitoring reports.

7. Monitoring of socioeconomic issues

In the years of project verification, local administration units will fill in a questionnaire on the socioeconomic issues relevant to the project and the legal title of lands subjected to the CDM A/R activities. The government for the whole crediting period guarantees rights of access to the carbon pools.

In this context, the project monitoring would consider the socioeconomic factors influencing the status of carbon pools.

Annex 5

ENVIRONMENTAL ASSESSMENT

Enclosed as separate document

Annex 6

SOCIAL ASSESSMENT

Enclosed as separate document

Annex 7

LIST OF A/R ACTIVITIES FOR EACH PROJECT SITE

Enclosed as separate document

Annex 8

PROJECT SITE DATABASE

Enclosed as separate document

Annex 9

CLASSIFICATION OF INDIVIDUAL PLOTS BY LAND USE/LAND COVER TYPES

Enclosed as separate document

Annex 10

WORLD BANK PROJECT APPRAILSAL DOCUMENT

Enclosed as separate document

Annex 11

CONTRACTURAL AGREEMENTS WITH THE COMMUNES

Enclosed as separate document

Annex 12

DOCUMENTARY EVIDENCE ON THE NON-DIVERSION OF ODA

Enclosed as separate document

PROJECT DESIGN DOCUMENT FORM
FOR AFFORESTATION AND REFORESTATION PROJECT ACTIVITIES (CDM-AR-PDD) - Version 04

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History of the document

Version	Date	Nature of revision
04	EB35, Annex 20 19 October 2007	• Restructuring of section A; • Section "Monitoring of forest establishment and management" replaces sections: "Monitoring of the project boundary", and "Monitoring of forest management"; • Introduced a new section allowing for explicit description of SOPs and quality control/quality assurance (QA/QC) procedures if required by the selected approved methodology; • Change in design of the section "Monitoring of the baseline net GHG removals by sinks" allowing for more efficient presentation of data.
03	EB26, Annex 19 29 September 2006	Revisions in different sections to reflect equivalent forms used by the Meth Panel and assist in making more transparent the selection of an approved methodology for a proposed A/R CDM project activity.
02	EB23, Annex 15a/b 24 February 2006	Inclusion of a section on the assessment of the eligibility of land and the Sampling design and stratification during monitoring
01	EB15, Annex 6 03 September 2004	Initial adoption