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

CONTENTS

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 06 – June 22, 2009

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 to halt erosion.

Photo 1: Degraded pasture land

Photo 2: Erosion on project site

It is planned to undertake the reforestation of degraded lands, by assisting the natural regeneration of vegetation that would result in improved biomass accumulation on degraded lands, reduced soil degradation, improved water quality, conservation of biodiversity and translates into improvement in the livelihoods of poor rural households,.

This project supports a participatory approach within the community to reach a common agreement on the selection of sites and their protection from grazing, and facilitate implementation of 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 to promote natural seed sources to enable natural regeneration

[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

or re-growth; (b) supplemental planting at 200-500 seedlings per ha to enrich species 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 reforestation definition of the Marrakesh Accords.

The reforestation activities will cover 6272.36 ha 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 control runoff into the sea and to enhance coastal and marine water quality and ecosystems in the Adriatic, identified as a high priority for conservation measures under the Mediterranean Action Plan. Albania, with its varied topography and combination of Mediterranean and Balkan influences, is rich in biodiversity and could facilitate restoration of natural ecosystems through improvements in land use and forest management.

- A broad range of livelihood options for the rural poor will be promoted, thereby reducing pressure on over-exploited natural resources and providing 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 cost of water treatment and 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.

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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)
Republic of Albania	Ministry of Environment, Forests and Water Administration, a public entity of the Republic of Albania	No
Republic of 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.		

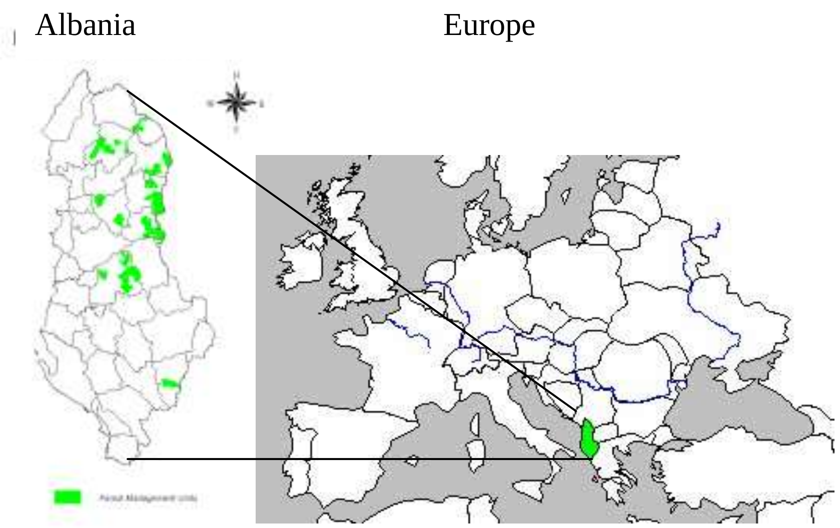
Ministry of Environment, Forests and Water Administration and its regional and district directorates will be the lead agency with responsibility for project implementation for the whole crediting period and supporting the technical aspects of the project interventions.

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 a separate project site database available upon request.

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.

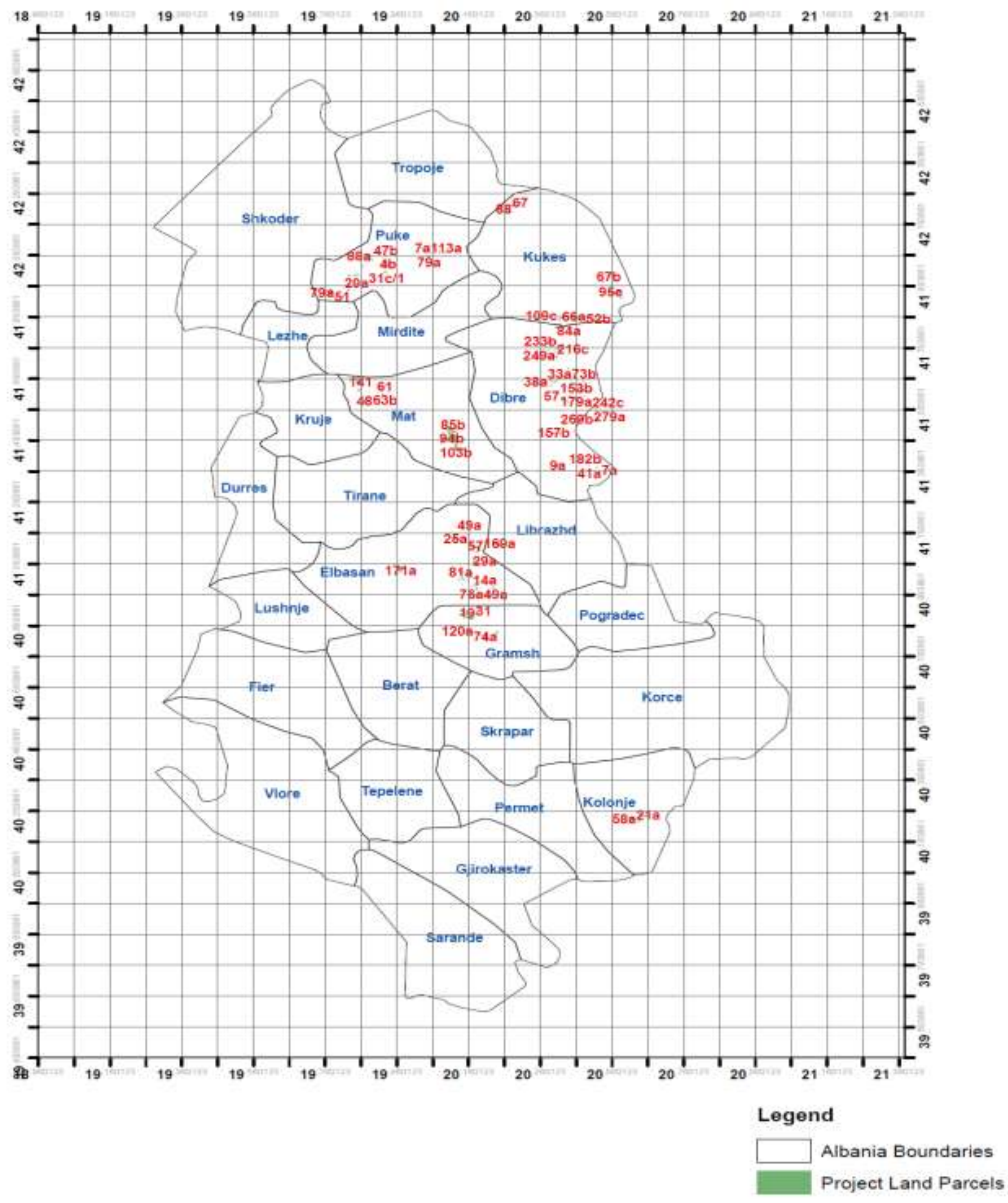
A.4.1.3. City/Town/Community etc:

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.

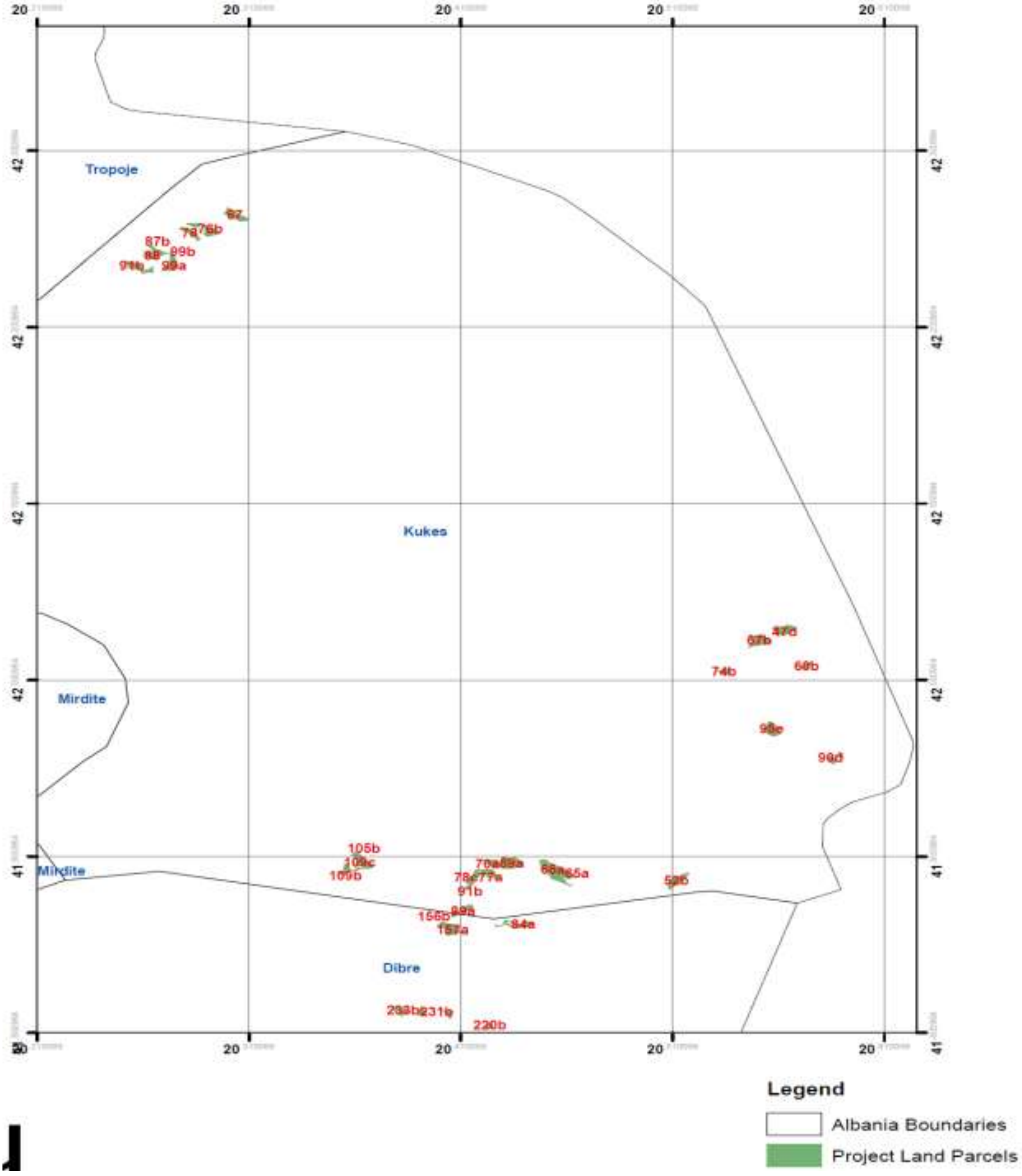
A.4.2 Detailed geographic delineation of the project boundary, including information allowing the unique identification(s) of the proposed A/R CDM project activity:

The land parcels are represented in WGS84 coordinate system on the maps of the project area presented below.

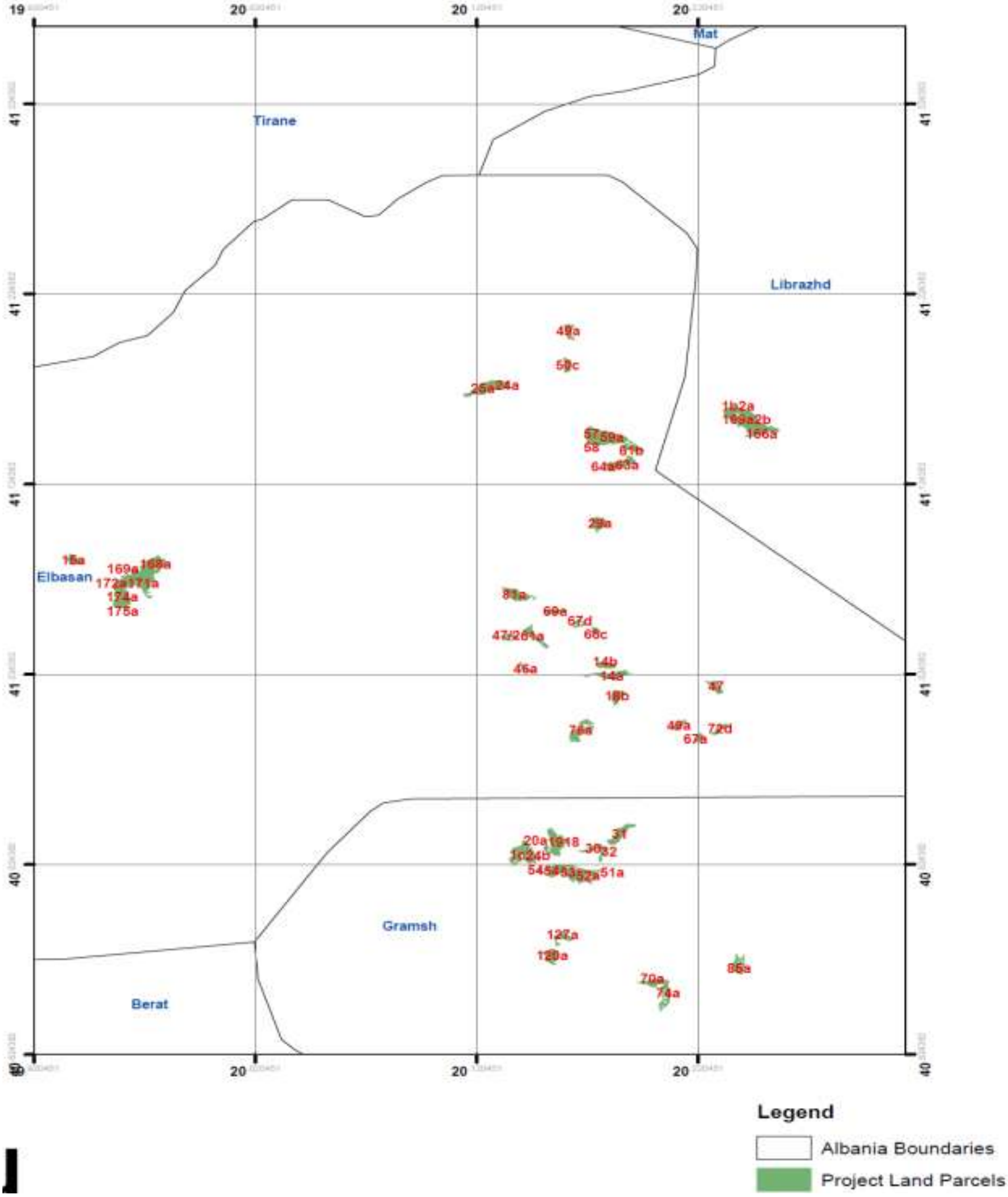
Map 1 – Map of Alkbania showing the location of the project sites



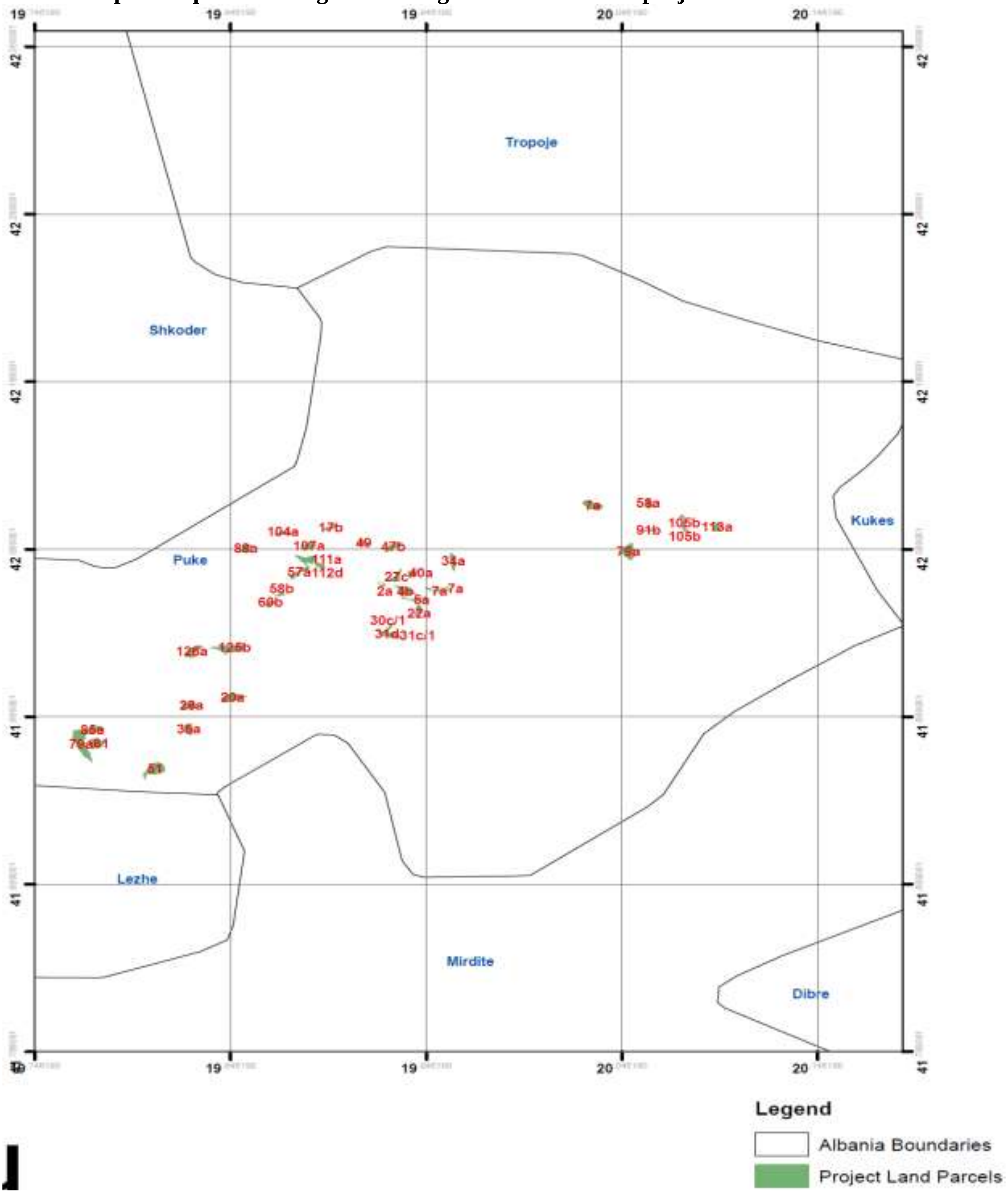
Map 2 – Map of Kukes region showing the location of the project sites



Map 3 – Map of Elbasan, Gramsh and Librazhd regions showing the location of the project sites



Map 4: Map of Puke region showing the location of the project sites



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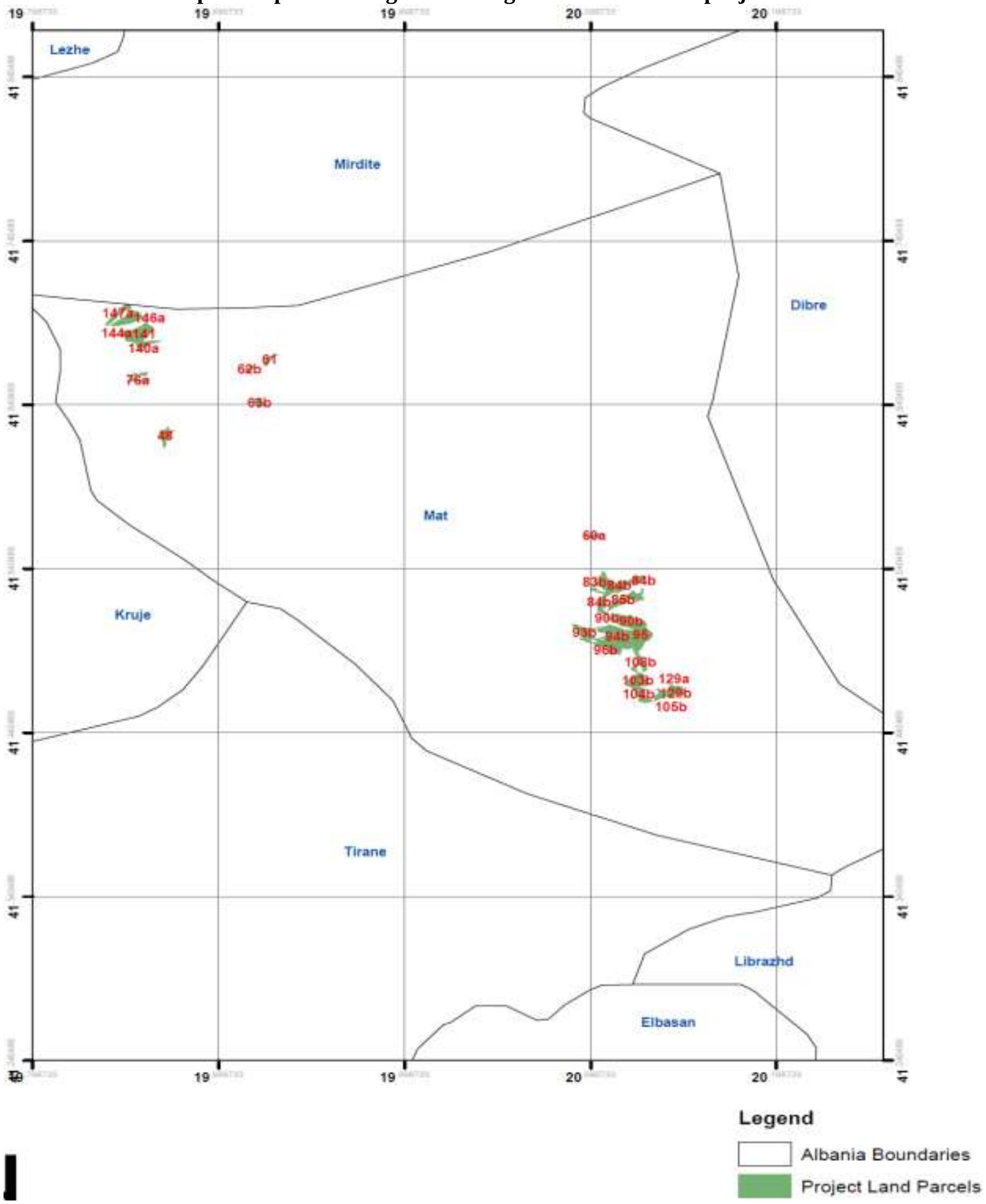
Map 5: Map of Mat region showing the location of the project sites



Map 6: Map of Kolonje region showing the location of the project sites

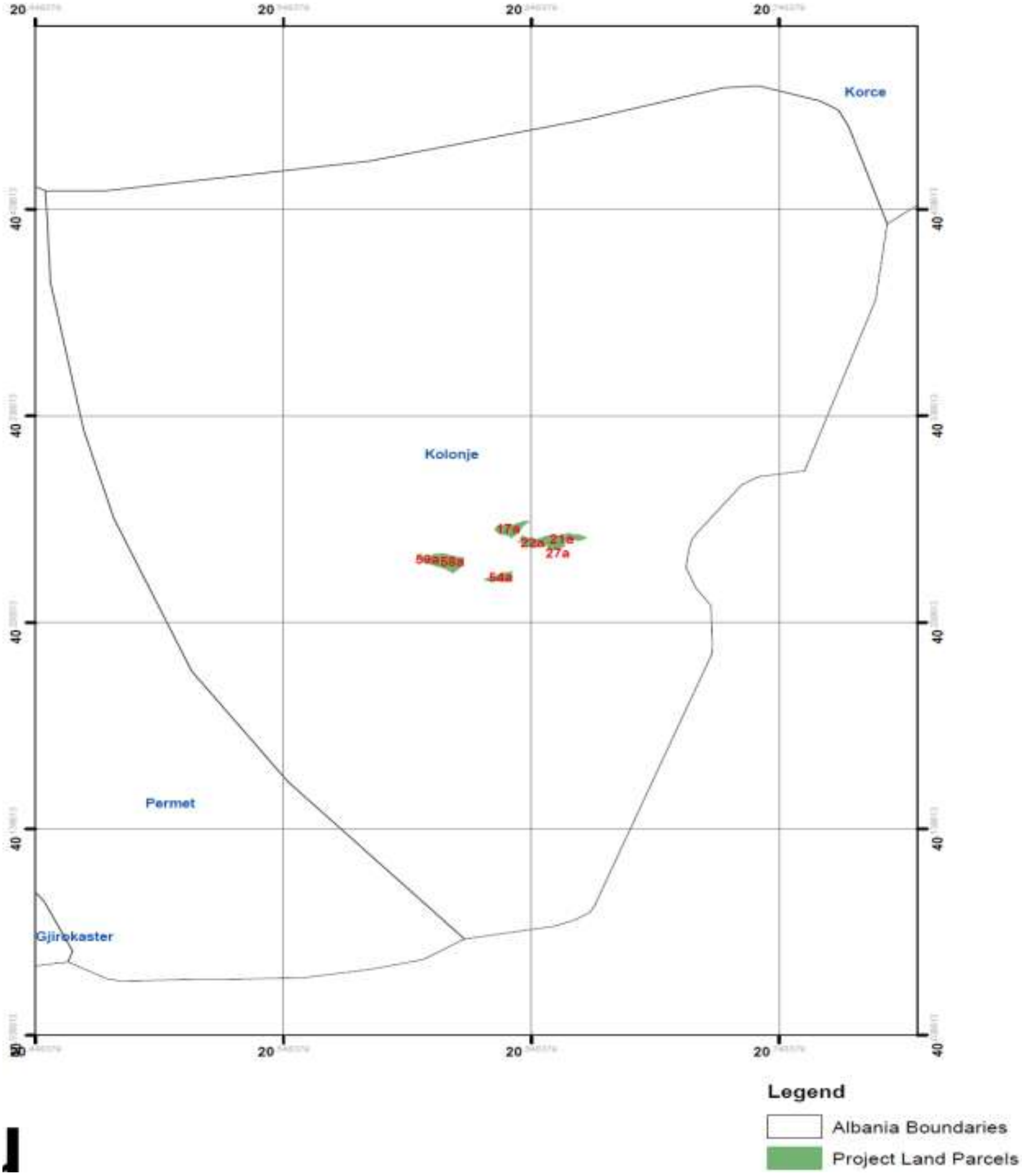


Table 2 below shows the detailed breakdown of all the project areas by region, district, commune, and village.

Table 2 – Location of the project sites

Region	District	Commune	Village	Area
DIBER	Bulqize	Ostren	Ostren Madh	13.38
DIBER	Bulqize	Ostren	Ostren Vogel	22.55
DIBER	Bulqize	Ostren	Okshtun Masa	77.30
DIBER	Bulqize	Trebisht	Bala	13.53
DIBER	Bulqize	Trebisht	Celebi	13.90
DIBER	Bulqize	Trebisht	Vernice	18.94
DIBER	Bulqize	Trebisht	Celebi	30.23
DIBER	Bulqize	Zerqan	Krajk	18.76
DIBER	Bulqize	Zerqan	Zall Strikcan	23.60
DIBER	Bulqize	Zerqan	Sofrocan	41.54
DIBER	Diber	Maqellare	Kercisht i Eper	2.39
DIBER	Diber	Maqellare	Erebare	8.02
DIBER	Diber	Maqellare	Kllopcisht	11.69
DIBER	Diber	Maqellare	Kercisht posht	13.02
DIBER	Diber	Maqellare	Pocest	14.03
DIBER	Diber	Maqellare	Herbel	14.23
DIBER	Diber	Maqellare	Kllopcisht	15.48
DIBER	Diber	Maqellare	Potgorce	15.82
DIBER	Diber	Maqellare	Dovolan	20.78
DIBER	Diber	Maqellare	Bllate majtare	32.85
DIBER	Diber	Melan	Rabanat	6.12
DIBER	Diber	Melan	Rabdisht	11.90
DIBER	Diber	Melan	Knike	12.20
DIBER	Diber	Melan	Melan	12.50
DIBER	Diber	Melan	Bexhunec	14.20
DIBER	Diber	Melan	Melan	17.70
DIBER	Diber	Melan	Pjece	20.78
DIBER	Diber	Melan	Peke	26.25
DIBER	Diber	Melan	Peke	27.69
DIBER	Diber	Melan	Knike	38.75
DIBER	Diber	Melan	Melan	43.25
DIBER	Diber	Melan	Greve	90.93
DIBER	Diber	Sllove	Palama	8.89
DIBER	Diber	Sllove	Dipjak	8.90
DIBER	Diber	Sllove	Palama	8.96
DIBER	Diber	Sllove	Palama	9.38
DIBER	Diber	Sllove	Vlesha	9.52
DIBER	Diber	Sllove	Trojak	9.83
DIBER	Diber	Sllove	Sllatine	10.21
DIBER	Diber	Sllove	Vlesha	11.01
DIBER	Diber	Sllove	Sllatine	11.96
DIBER	Diber	Sllove	Shumbat	12.06

DIBER	Diber	Sllove	Z.Kalis	12.76
DIBER	Diber	Sllove	Trojak	13.20
DIBER	Diber	Sllove	Sllatine	14.60
DIBER	Diber	Sllove	Trojak	17.20
DIBER	Diber	Sllove	Shumbat	18.99
DIBER	Diber	Sllove	Venisht	20.92
DIBER	Diber	Sllove	Sllatine	21.80
DIBER	Diber	Sllove	Shumbat	21.88
DIBER	Diber	Sllove	Z.Kalis	21.89
DIBER	Diber	Sllove	Shumbat	25.70
DIBER	Diber	Sllove	Shumbat	28.20
DIBER	Diber	Tomin	Pilafe	3.79
DIBER	Diber	Tomin	Dohoshisht	4.69
DIBER	Diber	Tomin	Tomin	6.19
DIBER	Diber	Tomin	Staravec	7.71
DIBER	Diber	Tomin	Ushtelenxe	9.98
DIBER	Diber	Tomin	Rashnapoje	12.28
DIBER	Diber	Tomin	Pilafe	12.80
DIBER	Diber	Tomin	Cetush	13.93
DIBER	Diber	Tomin	Bahutaj	14.97
DIBER	Diber	Tomin	Ushtelenxe	16.50
DIBER	Diber	Tomin	Dohoshisht	19.67
DIBER	Diber	Tomin	Selane	20.79
DIBER	Diber	Tomin	Zdojan	29.24
DIBER	Diber	Tomin	Brezhdan	52.47
DIBER	Mat	B. Klos	Potin	14.10
DIBER	Mat	B. Klos	Ploni Bardhe	24.96
DIBER	Mat	B. Klos	Klos Katund	45.80
DIBER	Mat	B. Klos	Bejni	46.43
DIBER	Mat	B. Klos	Ploni Bardhe	51.90
DIBER	Mat	B. Klos	Ploni Bardhe	52.96
DIBER	Mat	B. Klos	Ploni Bardhe	59.67
DIBER	Mat	B. Klos	Plesha	63.50
DIBER	Mat	B. Klos	Plesha	78.60
DIBER	Mat	B. Klos	Ceruja	79.89
DIBER	Mat	B. Klos	Bejni	89.20
DIBER	Mat	B. Klos	Ceruja	112.50
DIBER	Mat	B. Klos	Bejni	117.81
DIBER	Mat	B. Klos	Bejni	183.20
DIBER	Mat	Ulez	Modhesh	15.90
DIBER	Mat	Ulez	Modhesh	17.42
DIBER	Mat	Ulez	Lundre	40.00
DIBER	Mat	Ulez	Bushkash	10.70
DIBER	Mat	Ulez	Bushkash	17.67
DIBER	Mat	Ulez	Bushkash	20.93
DIBER	Mat	Ulez	Modhesh	31.55

DIBER	Mat	Ulez	Modhesh	31.70
DIBER	Mat	Ulez	Modhesh	40.86
DIBER	Mat	Ulez	Modhesh	41.80
DIBER	Mat	Ulez	Modhesh	56.19
DIBER	Mat	Ulez	Modhesh	60.41
Total DIBER				2692.85
ELBASAN	Elbasan	Gjinar	Pashtresh	10.42
ELBASAN	Elbasan	Gjinar	Pashtresh	15.08
ELBASAN	Elbasan	Gjinar	Pashtresh	16.22
ELBASAN	Elbasan	Gjinar	Pobrat	22.43
ELBASAN	Elbasan	Gjinar	Gjinar	23.13
ELBASAN	Elbasan	Gjinar	Moskarth	29.44
ELBASAN	Elbasan	Gjinar	Gjinar	42.81
ELBASAN	Elbasan	Gjinar	Kafen	49.06
ELBASAN	Elbasan	Gjinar	Pobrat	8.54
ELBASAN	Elbasan	Gjinar	Derstile	9.49
ELBASAN	Elbasan	Gjinar	Lleshan	11.98
ELBASAN	Elbasan	Gjinar	Pobrat	15.52
ELBASAN	Elbasan	Gjinar	Lleshan	16.21
ELBASAN	Elbasan	Gjinar	Pobrat	35.04
ELBASAN	Elbasan	Labinot Mal	Labinot Mal	19.06
ELBASAN	Elbasan	Labinot Mal	Labinot Mal	22.56
ELBASAN	Elbasan	Labinot Mal	Labinot Mal	22.79
ELBASAN	Elbasan	Labinot Mal	Guri Zi	53.53
ELBASAN	Elbasan	Paper	Murras	18.62
ELBASAN	Elbasan	Paper	Paper	20.17
ELBASAN	Elbasan	Paper	Paper	20.48
ELBASAN	Elbasan	Paper	Pajun	22.80
ELBASAN	Elbasan	Paper	Paper	36.75
ELBASAN	Elbasan	Paper	Vidhas	48.66
ELBASAN	Elbasan	Paper	Vidhas	54.34
ELBASAN	Elbasan	Paper	Vidhas	56.10
ELBASAN	Elbasan	Shushice	Polis i vogel	23.45
ELBASAN	Elbasan	Shushice	Polis i vogel	24.40
ELBASAN	Elbasan	Shushice	Polis i vogel	32.44
ELBASAN	Elbasan	Shushice	Fush-Buall	33.68
ELBASAN	Elbasan	Shushice	Shelcan	44.84
ELBASAN	Elbasan	Shushice	Polis i vogel	110.70
ELBASAN	Gramsh	Pishaj	Gjengjorin	10.09
ELBASAN	Gramsh	Pishaj	Gjengjorin	10.51
ELBASAN	Gramsh	Pishaj	Galigat	12.93
ELBASAN	Gramsh	Pishaj	Kotorr	13.06
ELBASAN	Gramsh	Pishaj	Kotorr	16.48
ELBASAN	Gramsh	Pishaj	Cerunje	32.08
ELBASAN	Gramsh	Pishaj	Cerunje	32.70
ELBASAN	Gramsh	Pishaj	Drize	36.26

ELBASAN	Gramsh	Pishaj	Drize	37.76
ELBASAN	Gramsh	Pishaj	Kotorr	45.50
ELBASAN	Gramsh	Pishaj	Galigat	52.84
ELBASAN	Gramsh	Pishaj	Ceruja	61.30
ELBASAN	Gramsh	Pishaj	Kocaj	31.62
ELBASAN	Gramsh	Pishaj	Vine	35.95
ELBASAN	Gramsh	Pishaj	Kocaj	37.74
ELBASAN	Gramsh	Pishaj	Trashovic	24.12
ELBASAN	Gramsh	Pishaj	Trashovic	36.22
ELBASAN	Librazhd	Polis	Mirake	12.29
ELBASAN	Librazhd	Polis	Polis Gostime	13.46
ELBASAN	Librazhd	Polis	Mirake	37.30
ELBASAN	Librazhd	Polis	Polis Gostime	46.03
ELBASAN	Librazhd	Polis	Polis Gostime	52.20
Total ELBASAN				1659.19
KORCE	Kolonje	Barmash	Shales	34.36
KORCE	Kolonje	Barmash	Radimisht	34.83
KORCE	Kolonje	Barmash	Barmash	37.62
KORCE	Kolonje	Barmash	Barmash	53.44
KORCE	Kolonje	Barmash	Barmash	59.82
KORCE	Kolonje	Barmash	Barmash	60.27
Total KORCE				280.34
KUKES	Has	Golaj	Helshan	13.90
KUKES	Has	Golaj	Helshan	17.34
KUKES	Has	Golaj	Helshan	20.68
KUKES	Has	Golaj	Helshan	21.39
KUKES	Has	Golaj	Helshan	23.00
KUKES	Has	Golaj	Helshan	38.10
KUKES	Has	Golaj	Helshan	38.20
KUKES	Has	Golaj	Helshan	41.31
KUKES	Kukes	Bushtrice	Bushtrice	10.39
KUKES	Kukes	Bushtrice	Bushtrice	12.05
KUKES	Kukes	Bushtrice	Barruq	16.18
KUKES	Kukes	Bushtrice	Bushtrice	19.94
KUKES	Kukes	Bushtrice	Vile	24.66
KUKES	Kukes	Bushtrice	Bushtrice	26.14
KUKES	Kukes	Bushtrice	Barruq	26.72
KUKES	Kukes	Bushtrice	Bushtrice	27.73
KUKES	Kukes	Bushtrice	Matranxh	33.20
KUKES	Kukes	Bushtrice	Palush	36.94
KUKES	Kukes	Caje	Fshat	31.34
KUKES	Kukes	Caje	Shkinak	35.05
KUKES	Kukes	Caje	Caje	38.20
KUKES	Kukes	Caje	Fshat	44.52
KUKES	Kukes	Caje	Shkinak	64.33
KUKES	Kukes	Shishtavec	Kollovoz	11.40

KUKES	Kukes	Shishtavec	Shishtavec	11.95
KUKES	Kukes	Shishtavec	Shishtavec	19.90
KUKES	Kukes	Shishtavec	Cernaleve	37.78
KUKES	Kukes	Shishtavec	Novosej	39.31
KUKES	Kukes	Shishtavec	Cernaleve	45.69
Total KUKES				827.33
SHKODER	Puke	Qa-Mali	Kryezi	14.60
SHKODER	Puke	Qa-Mali	Kryezi	30.75
SHKODER	Puke	Qa-Mali	Kryezi	8.40
SHKODER	Puke	Qa-Mali	Qaf Mali	13.78
SHKODER	Puke	Qa-Mali	Kryezi	17.21
SHKODER	Puke	Qa-Mali	Kryezi	40.25
SHKODER	Puke	Qelez	Levrushk	3.60
SHKODER	Puke	Qelez	Midhe	6.14
SHKODER	Puke	Qelez	Buzhal	10.09
SHKODER	Puke	Qelez	Buzhal	12.00
SHKODER	Puke	Qelez	Qelez	12.05
SHKODER	Puke	Qelez	Lekasan	15.90
SHKODER	Puke	Qelez	Bregu	18.91
SHKODER	Puke	Qelez	Dedaj	19.86
SHKODER	Puke	Qelez	Ukth	23.54
SHKODER	Puke	Qelez	Dedaj	31.00
SHKODER	Puke	Qelez	Bregu	32.56
SHKODER	Puke	Qelez	Qelez	10.49
SHKODER	Puke	Qelez	Mardhinaq	12.13
SHKODER	Puke	Qerret	Luf	16.82
SHKODER	Puke	Qerret	Korthpule	20.09
SHKODER	Puke	Qerret	Pla	21.20
SHKODER	Puke	Qerret	Qerret	29.82
SHKODER	Puke	Qerret	Pla	30.86
SHKODER	Puke	Qerret	Gomsiqe	31.18
SHKODER	Puke	Qerret	Gomsiqe	36.91
SHKODER	Puke	Qerret	Kqire Eperme	37.32
SHKODER	Puke	Qerret	Vrith	52.21
SHKODER	Puke	Qerret	Gomsiqe	71.54
SHKODER	Puke	Rrape	Rrape	10.28
SHKODER	Puke	Rrape	Kabash	10.52
SHKODER	Puke	Rrape	Rrape	13.13
SHKODER	Puke	Rrape	Rrape	13.17
SHKODER	Puke	Rrape	Kabash	13.28
SHKODER	Puke	Rrape	Mece	13.48
SHKODER	Puke	Rrape	Mece	18.92
SHKODER	Puke	Rrape	Kabash	19.27
SHKODER	Puke	Rrape	Mece	19.39
Total SHKODER				812.64
Regions 5	**Districts 10**	**Communes 24**	**Villages 117**	**Area 6272.36**

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 refersto the Forest Management Unit (see
Table **3** 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 3 – Forest Management Unit codes for sites ID

ID	Forest Management Unit (FMU)	Total
1	Barmash	280.34
2	Bushtrice	447.38
3	Dedaj-Buhot	317.10
4	Deshat Maqellare	695.58
5	Galigat Stror	361.50
6	Gjinar-Zavaline	159.54
7	Gostime - Koprik	49.06
8	Gramsh Vine	105.31
9	Helshan	213.93
10	Kaftalle-Gomsiqe	347.94
11	Kastriot-Sllove	317.89
12	Klenje	76.60
13	Kryezi	45.35
14	Kryezi-Bicaj	79.63
15	Kurdari-Pl.Bardhe	1020.52
16	Labinot	117.94
17	Lubinje-Tunje	60.35
18	Paper-Shllak	277.92
19	Polis	161.28
20	Polis - Vasjan	269.51
21	Qelez	22.61
22	Shishtavec-Zapod	166.02
23	Shpat-Shtermen	96.78
24	Trodhen	73.31
25	Tucep-Okshtun	113.23
26	Ulez	311.81
27	Zerqan	83.91
Total		6272.36

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 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 ecozones represented in the project area are outlined in Table 3.

Table 4 (a) – Ecozones represented in the project area

Stratum	Area (ha)	Percentage share (%)
Ecozone 1: Mediterranean scrub (maquis) and garrigues	917.76	14.6
Ecozone 2: Mixed oak and hornbeam or Macedonian oak, ash and hornbeam	1878.71	30
Ecozone 3: Buxus and Juniper over Magmatic stones	3058.93	48.8
Ecozone 4: Shrubs and small tree species or grassland with Juniper (*Juniperus nana*)	416.96	6.6
Total	6272.36	100

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

Ecozone 1: Mediterranean scrub (maquis) and garrigues

The ecozone 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 ecozone has been classified as winter pasture.

Table 4 (b). 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	917.76	14.6

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

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 ecozone. Gaussen's index of dryness is presented in the graph below:

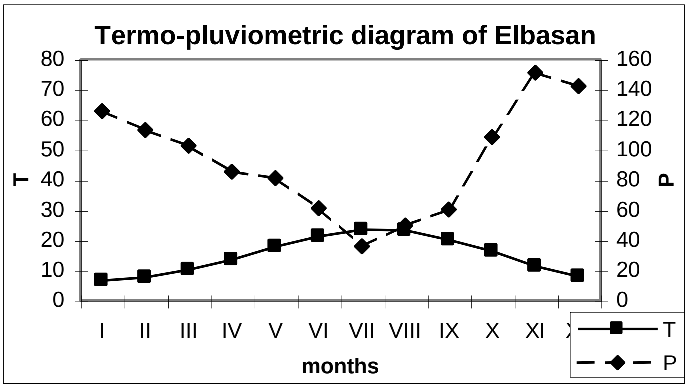


Figure 2 – Bagnouls-Gaussen graph of Elbasan region (T=Mean monthly Temperature (°C); P= mean monthly precipitation (mm))

The area under grey-brown and brown soil type is 697.80 ha and 219.96 ha, respectively. Soils are categorized as deep on 106.7 ha, shallow on 113.97 ha and medium on 697.09 ha. Based on the parent material, 458.60 ha are located on flysch, 183.91 ha on limestone and 275.25 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 ecozone 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). Reforetation activities will support the protection and propagation of these species. The Holly forest or Mediterranean xerophytes forest is the potential vegetation anticipated in this ecozone.

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

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

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	1878.71	30

The measurements at Gramsh hydro-meteorological station for this ecozone 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 ecozone is represented below.

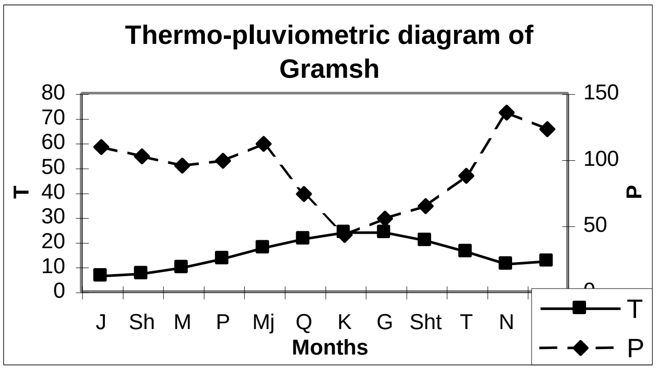


Figure 3 Bagnouls-Gaussen graph

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

Photo 3 Labinot (Elbasan region)

The ecozone is represented by brown soils in 818.04 ha, Grey-brown soils in 732.81 ha, and grey dark soils in 327,86. The 302.89 ha of the ecozone is characterized with shallow soils and the rest 1575.82 ha have medium depth.

In terms of the soil parent material of the ecozone, clay schist is represented in 786.48 ha , conglomerate in 29.44 ha, of flysch in 295.69 ha, limestone in 597.01 ha, sandy schist in 76.31 ha, and 93.78 ha with other types.

The rare and endangered species identified in this ecozone 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.*

Ecozone 3: Buxus and Juniper over Magmatic stones

This ecozone 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 ecozone 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; 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	3058.93	48.8

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

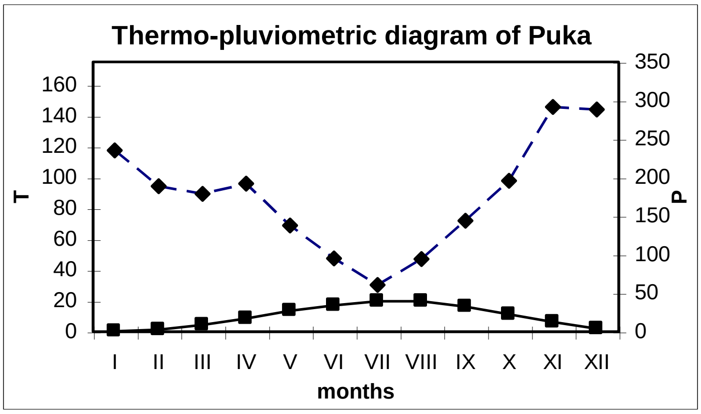


Figure 4 Bagnouls-Gaussen graph
(T=Mean monthly Temperature (°C); P= mean monthly precipitation (mm))

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 ecozone is represented by soils of medium depth in 2236.15 ha, shallow soils in 739.24 ha and in deep soils in 83.53 ha. In terms of soil type, brown soils cover 2215.29 ha, grey-brown soils in 818.98 ha and grey dark soils in 24.66 ha.

The soil parent material of the ecozone covers ultra basic in 1422.72 ha, sandy schist in 843.66 ha, limestone in 290.34, clay schist in 411.28 ha and conglomerate in 90.93 ha

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

This ecozone 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	416.96	6.6

The climate features of the ecozone 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)

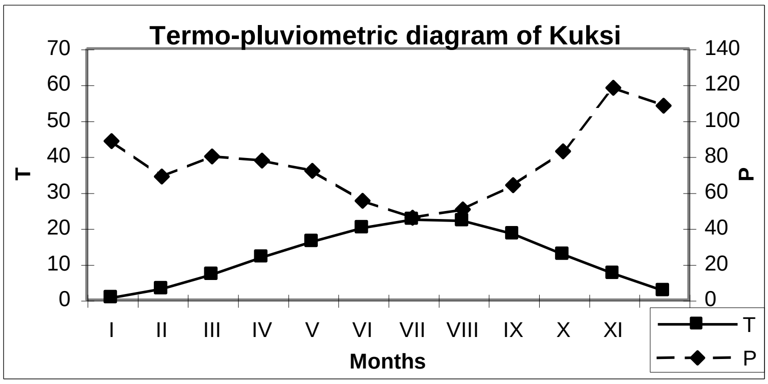


Figure 5 Bagnouls-Gaussen graph
(T=Mean monthly Temperature (°C); P= mean monthly precipitation (mm))

Photo 5

The vegetation cover in this ecozone 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 ecozone 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 endangered 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:

The endangered species have been identified during the field visit of each project site. The occurrence of such species by ecozone is presented section A.5.1. A floristic list for each project site was compiled with Latin name of the species and the percentage of coverage of the species. The floristic list is attached to the Environmental Impact Analysis carried out for the present AR CDM project activity.

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 **3,264.20** 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 the 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 reforestation activities

Selected species	Total (ha)	% of reforested 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 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 to revegetate barren 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,* *Acer spp.* *Faraxinus excelsior,* *Juglans regia,* *Quercus cerris,* *Quercus frainetto,* *Quercus frainetto* *Quercus petraea* *Castanea Sativa*	200	2310.7
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 seedlings 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 Municipality	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 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 a separate document available upon request.

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 tradable 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 can not 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 reforestation project activities" approved by the CDM Executive Board[2]

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).

[2] http://cdm.unfccc.int/methodologies/ARmethodologies/Tools/methAR_proc02_v01.pdf

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

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.

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.

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 a separate table available upon request. 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 considered appropriate 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 plot data shows the plots identified for the project meet the land eligibility criteria as they are below the crown threshold and tree height criteria adopted and due to biotic pressure in terms of livestock movement and grazing on the sites, the regeneration that exists is likely to destroyed and not likely to grow and become as per the host country definition of forest.

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

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%

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 biotic pressure from livestock movement and *grazing* activities *prevents the woody vegetation from growing into trees.* 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

Eligibility of lands with activities implemented at the start of the project in Decemebr 2004

Considering the threats to regeneration, The key to establishing regeneration is through protection and supplemental planting activities implemented with the community involvement. The meetings with communes and preparation of contracts for protection of land parcels were the real actions that initiated the protection activities at the commune level. After initiating consultations, meetings, and contractual arrangements, the project started on December 20, 2004.

The lands chosen for protection had vegetation below the thresholds of forests and regeneration on the lands has been subjected to multiple threats of biotic pressure. Parameters of forest definition were used to assess the eligibility of land parcels undewr the project. With the protection and management of

communities, the crown closure is expected to take place on these lands. The project will complement activities that exclude 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:

The used stand model comes from the Albanian National Inventory ANFI. This was derived from inventory data. It reflects the average standing timber volume of the forest type by year. Implicitely any thinnigs are covered by this inventory based stand model. Because it is a statistical approach by forest type and year there are not certain years of thinnings determined. The statistical approach covers different conditions with different dates for thinning. This is the reason why in average the standing timber volume is always increasing (GHG removal).

The values presented in this table are the annual net anthropogenic GHG removals by sinks. Whereas the corresponding cumulative GHG removals by sinks presented in the TARAM show consistent increase over the crediting period. The thinning in the project are insignificant and are taken into account in the calculations of cumulative GHG removals by sinks and the management system followed does not anticipate harvesting during the crediting period. The TARAM calculations also reflect the information on thinning and harvesting in the calculations of cumulative GHG removals by sinks.

The insignificant impacts of thinning and absence of harvesting translate into consistent increases in the biomass during the crediting period and avoids the coincidence of peaks in carbon stocks and verification.

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)**	**Estimation of net anthropogenic GHG removals by sinks (tonnes of CO_2 e)**
2005	88.60	6871.89	0.00	6783.30
2006	259.16	14230.78	0.00	13971.62
2007	531.09	24128.34	0.00	23597.25
2008	441.60	27824.28	0.00	27382.68
2009	324.41	27717.12	0.00	27392.71
2010	322.16	27258.62	0.00	26936.46
2011	319.93	26807.71	0.00	26487.78
2012	317.72	26364.26	0.00	26046.54
2013	315.52	25928.14	0.00	25612.62
2014	313.33	25499.24	0.00	25185.91
2015	311.16	25077.43	0.00	24766.27
2016	309.00	24662.60	0.00	24353.59
2017	306.86	24254.63	0.00	23947.76
2018	304.74	23853.41	0.00	23548.67
2019	302.63	23458.82	0.00	23156.20
2020	300.53	23070.77	0.00	22770.24
2021	298.45	22689.13	0.00	22390.68
2022	296.38	22313.81	0.00	22017.42
2023	294.33	21944.69	0.00	21650.36
2024	292.29	21581.68	0.00	21289.39
Total (tones of CO2e	6249.88	465537.32	0.00	459287.44

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 20 December 2004 .

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. (see section D.2 for details)

2) Lands to be 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 (see section C.5.1 step 2 for details)

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 grazing activities (extensive under low numbers or intensive under high livestock numbers) do not allow the young regeneration to reach woody stage as they prevents establishment of forest. 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. This is likely to be the case under low or high livestock densities.

- The animal census of Albania for years 2000 and 2005 indicate that there is no significant trend as increases or decreases in livestock density in different areas are not uniform. The livestock movement in a region has multiple impacts and small relative changes in livestock numbers do not necessarily support causation between livestock numbers and regeneration of areas. Considering the complex roles of grazing on an area such as a major source of fire risk (referred below); compaction of soil under the impact of livestock movement and trampling, changes in vegetation composition with weed and other plant species that indicate degradaing status of soils.

- The small changes in livestock population do not alter the other multiple impacts of biotic pressure on regeneration areas such as fire risk. The "*Update on forest fire situation in Albania-International Forest Fire News (IFFN) No. 28 (January – June 2003) p. 73-81*"[5] states that high fire incidence of on pastures is high because sheperds traditionally use fire to promote new shoot growth that is palatable for livestock. The fires spread to adjoining areas and destroy regeneration.. As the risk of fires in grazing areas can be more significant and dramatic. Considering the complex relationship between grazing and fire risk, relative changes in livestock population do not significantly alter the probability of fire occurrences as

[5] Update on forest fire situation in Albania-International Forest Fire News (IFFN) No. 28 (January – June 2003) p. 73-81

their risk continues exist for regeneration areas under high or low livestock numbers in a region.

- The studies and surveys show that migration from rural to urban areas has stabilized in the recent past. Therefore, future livestock densities may not significantly be lower than those observed in the recent past considering that livestock contributes to a significant portion of Albania's economy. As migration is linked economic factors, worsening economic conditions due sluggish economic activity in recessionary periods and resulting lack of employment in urban areas may tend to increase its dependence on livestock economy in rural areas. Therefore, risk to regeneration establishment and forest growth from grazing activities continues to exist although its impact may be more or less visible in some areas highlighting that local perceptions may not be supported by census data even in areas that have seen a decline in livestock population and the biotic pressure form grazing activities remains a significant risk to the forest establishment on the parcels.

- Considering that the growth of vegetation and livestock density two different biological systems with different growth have complex interface, a unit change in livestock density may have significantly different levels of grazing impacts on regeneration, therefore, generalization of small changes in livestock with long term impacts on regeneration are not likely to be realistic.

- The communal areas have been poorly managed, hence the biomass is low and considering that the growth of vegetation and livestock density of different biological systems provide foe a complex interface, i.e., a unit change in livestock density may have different levels of impacts on regeneration even under similar grazing pressure and generalization of relative changes in livestock density and corresponding changes in the impacts on regeneration would not be feasible. Considering that the growth of vegetation and livestock density two different biological systems with different growth have complex interface, a unit change in livestock density may have significantly different levels of grazing impacts on regeneration, therefore, generalization of small changes in livestock with long term impacts on regeneration are not likely to be realistic. Therefore, assumption that livestock pressure continues to be a risk to forest risk is consistent and conservative.

- 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[6] for a 6-month grazing period per year, which is higher than the estimated grazing capacity of 1.75 SEU/ha and therefore the project sites reflects the incidence of overgrazing[7]. Considering the low carrying capacity of the area, the marginal variations in the livestock densities in different regions do not alter the degrading status of forest or reverse the adverse impact on regeneration status of the parcels.
- The data and information on demographic trends, fire occurrence and animal census support the information on the aspects of grazing pressure and natural regeration preeesnted above.

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

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

- Demographic trend data and analysis: *Evolution of demography in Albania (1961-2003)*; Source: FAOSTAT, year 2005: http://faostat.fao.org/faostat/help-copyright/copyright-e.htm (last updated 9th february 2005) |Date=22-07-2006
- Update on forest fire situation in Albania- International Forest Fire News (IFFN) No. 28 (January – June 2003) p. 73-81
- Albania Animal Census Data 2000 and 2005.

(See section C.5.1 for details).

4) Lands will be 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 (see section A.5.4 for details).

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 (see section A.5.4 for details).

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 (see section C.5.1 for details). 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 CO_2-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 (see section A.5.4)

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 (less than 10 % of the project area, see table 8 for details) . As this species is long adapted to the region and will be confined to dry lands, therefore, no risk of N_2O 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 reforestation in Albania. The proposed AR-CDM project is the first of its kind in the country. Because of the Government of Albania's interest in capturing carbon finance resources, and the BioCarbon Fund's interest in purchasing ERs from Albania, it was decided to promote carbon sequestration through assisted natural regeneration in 30 communes in under a sub-component of the NRDP. This sub-component would not have been created had the BioCF not expressed interest in purchasing ERs from the communities.

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 litter 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 soil pool is conservative as per applicability condition.

Project boundary

The A/R CDM project activity contain 261 discrete areas. Each discrete area has been identified geographically and the boundaries are mapped and represented using GIS. All the discrete areas included in the boundary are eligible for A/R CDM project activity. The latest version of the tool "*Procedures to demonstrate the eligibility of lands for afforestation and reforestation CDM project activities*" has beenapproved to demonstrate the eligibility of parcels. The mission sources considered in the project boundary are noted below.

Table 14 Emissions sources included in the project boundary

Sources	Gas	Included	Justification/explanation
Combustion of fossil fuels	CO_2	No	Potential emissions are negligibly small in the project context and thus will be ignored
	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	Could be pontetial source of emissions but it is not considered for ex-ante estimates but included to MP as this may occur due to unintentional fires.
	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 ecozones (as described in section A.5.1), the carbon status of all the sites is more or less same: It is low or decreasing. The sites have a baseline of continued degradation due to loss of vegetation and therefore were categorized into one baseline stratum (according to AR-AM0003/Version 4, The application of sub-steps of step 1 facilitated in such stratification of the baseline.

For the Sub-steps 1a, 1b and 1c: Data and from field visits of the parcels, land use pattern of communes and survey and questionnaire data were used to assess the factors influencing the parcels.

(a) Loss of biomass is observed on most land parcels included in the project, and the above ground carbon stock is expected to either decline or remain in a low steady state because of unfavorable physiographic conditions and continuous biotic pressure. The physiographic factors *in terms of steep slopes, low site productivity an d* and poor soil depth, low pre-existing vegetation coupled with grazing pressure increases adverse conditions for forest establishment in the baseline context.

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 [8].

(b) The primary information on sites with regard to land and vegetation and information from maps and literature and regional studies used to assess the factors influencing vegetation on the sites indicated a combination of the influence of physical and biotic factors on the vegetation status of the pre-project case..

(c) The available data on livestock density and distribution prior to the project showed that grazing pressure is an important variable in influencing the vegetation status on most land parcels.

(d) The preliminary stratification based on information collected on physical variables such as terrain, slopes, vegetation status and livestock on most parcels showed similar physical and biotic pressure that is likely to impact vegetation status.

(e) Additional information such as vegetation composition, tenure, land use and grazing pressure showed similar trend of low levels regeneration. Considering the communal status of land, its unregulated use has resulted in the loss of regeneration ability of sites. The land parcels although located in different ecozones show similar land use and grazing patterns.

In addition to the data and information sources used forr sub-steps 1a, 1b, and 1c, the sources of envidence used for 1d/1e are as follows.

Site productivity attributes: Data and Information based on Albanian National Forest Inventory

Grazing and biotic pressure: 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

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

According to the site conditions (climatic zone, status of degradation etc.), species suitable for each site and the expected management system were specified to select the stand model relevant to the project scenario. The sub-steps of step 2 outlined in the methodology were followed in the identification of the stand models and stratification of the project activity.

(a) The major native species on the sites, their regeneration status and management regimes were assessed. For assessing the choice of stand models, management regimes of the species considered under the project, their regeneration status and their silvilcultual regimes such as pruning, thinning and harvesting were assessed.

[8] 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.

Based on information from ANFI 2004, the most likely stand model suited to the project context was identified as broadleaf high forest. The participating experts considered this model is realistic, consistent and conservative to the requirements of the project scenario.

The broadleaf high forest model was considered relevant as silvicultural practices such as pruning and thinning are implemented and the stand are not totally harvested. As the broadleaf high forest stand model represents the development of the stands according to the common practice, the expert view was that there is no need to the calculate the losses by implicitly considering mortality and thinning based on the gain loss method.

In summary, the choice of ANFI broad leaf high forest was driven by the following reasons:

1. The coppice forests in Albania are under grazing pressure and therefore cannot be considered to represent the project scenario.
2. The growth rates of high broadleaf forest are representative of the degraded project sites in Albania.[9]
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.

The broadleaf coppice forest was considered but not selected because the local experts and those associated with ANFI considered that coppice forest does not represent the evolution of the likely forest under the project scenario because protection of regeneration leads to establishment of new stands that are not significantly affected by the previous management regimes.

(b) The species composition, geographic location of land parcels and their areas were considered for the stand model establishment. For supplemental plantings, the information on planting schedule was taken into account. Some conifers were also considered for planting, but they have been embedded in broadleaf forest.

Step 3: Final ex-ante stratification

(a) The boundary of land parcels included in the stratum are identified as per steps B.1 and B.2 using and geo-referenced. Checks were implemented to assess the consistency of the parcel boundaries with the overall project boundary.

(b) The geo-referenced data has been represented using a Geographical Information System (GIS) to facilitate consistency with the project boundary, precise overlay of baseline and project scenario strata, transparent monitoring and *ex post* stratification.

The baseline stratum remains fixed for the crediting period and the changes to project stratum would be done through ex post stratification taking into account the factors such as fire, pest and other unforeseen affect the stratum or management regimes and intensity change during the project period.

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[9] 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.

Final stratification map

Considering that the areas with trees and areas can not be separated with ease, the ex ante stratificaitin considered **one stratum** is identified . The boundaries of the plots were taken as boundaries of the strata and all plots were delineated using GIS.

Table 15 - Areas per stratum

***Ex ante* stratum**	**ha**
Total area	6272.36

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-AM0003/Version 4 methodology.

Step 1: Define the project boundary

The physical delineation of the project boundary is described in section A.4.2 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.*

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)[10]. 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.*

[10] 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.

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 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. 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.

Table 16 –Categorization of project area by physiographic

Morphology	ha	%
Flat	54.99	1
Low energy reliefe	771.89	12
Hilly	4466.95	71
Montainous	894.32	14
No data	84.21	1
Total	**6272.36**	**100**

Table 17- Slope gradient of the project area

Slope %	Ha	%
0-20	496.05	8
20-30	1470.00	23
30-40	2389.88	38
40-50	1541.05	25
50-80	375.37	6
Total	**6272.36**	**100**

Table 18 – Categorization of project area by soil depth

Soil depth	**Ha**	**%**
Deep	399.95	6
Medium	4716.31	75
Shallow	1156.10	18
Total	**6272.36**	**100**

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

Migrants from rural areas 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.

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)[11] 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.

The continuation of the current land use will accelerate the on going degradation process. The baseline carbon stock changes presented in **Table 22** reflect the impact of continuation of current land use on 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 reforestation 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 reforestation in Albania. Therefore, without the proposed A/R CDM project activity, the project area will not be reforested.

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[11] 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

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

Alternative 1 – 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 2 - Continuation of the existing and historical land use leading to further land degradation.

Alternative 3 - Implementation of assisted natural regeneration project without consideration of CDM is not expected to be realized considering the major barriers in implementing this alternative.

Table 19. Land use alternatives

Alternative land uses	Baseline	Remarks
1. 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.
2. 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.
3. Implementation of the project as a non-CDM project	No	Constraints in raising additional financial resources and limited capacity and knowledge base needed for protection and management of forest at the commune level.

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 land with few growing trees"

Grazing and land degradation would continue on the project sites without project interventions. The estimation of SEU/ha using 2000 and 2005 census indicates that on average SEU/ha may not have changed significantly although changes in the composition of livestock in some areas are observed. The grazing pressure varies among the selected sites.

The risk to regeneration establishment and forest growth from grazing activities continues to exist although its impact may be more or less visible in some areas reflecting local perceptions that may not be supported by census data in some areas and even areas in which livestock population has seen a marginal decline, the grazing pressure remains significant to affect the forest establishment on the parcels. The communal areas have been poorly managed for a long period, consequently the grazing risk is still common. Considering that the growth of vegetation and livestock density two different biological systems with different growth have complex interface, a unit change in livestock density may have different levels of grazing impacts in the regeneration.

The expert report on the study of impacts of displacement of grazing activities conducted by Prof. Vasilios Papanastasis, noted that the average stocking rate for grazing areas estimated, at 3.0 SEU/ha[12] for a 6-month grazing period per year was higher than the estimated grazing capacity of 1.75 SEU/ha and therefore the sites reflects the risk of overgrazing.[13]. Consdering the low carrying capacity of of land the relatively changes in livestock population is not likely to revsesrse the risk of of regeneration

Grazing and fire risk occur together as the risk of fires in grazing areas can be more significant and dramatic. Considering the complex relationship between grazing and fire risk, relative changes in livestock population do not significantly alter the probability of fire occurrences as their risk continues exist for regeneration areas under high or low livestock numbers in a region. The *"Update on forest fire situation in Albania- International Forest Fire News (IFFN) No. 28 (January – June 2003) p. 73-8"1*[14]

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

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

[14] Update on forest fire situation in Albania-International Forest Fire News (IFFN) No. 28 (January – June 2003) p. 73-81

noted high fire incidence on pastures because sheperds traditionally use fire to promote new shoot growth that is palatable for livestock. The fires spread to adjoining areas and destroy regeneration..

Additionally, considering the low carrying capacity of the area, the marginal variations in the livestock densities in different regions do not alter the degrading status of forest or reverse the adverse impact on regeneration status of the parcels.

Considering the complex interaction of livestock, human and natural factors, the areas will not be able to establish regeneration and grow into forest in the absence of the project.

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)*[15] *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.

   The project has started on 20 December 2004. 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 available separately upon request.

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 undertake 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 in 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 early consideration of the CDM at the project design stage. The documentary evidence[16] in this regard is available in the World Bank's Project Appraisal Document (available upon request). The Letter of No Objection was issued by the Ministry of Environment on 24th of July 2004 where it is specifically mentions the intent of the BioCarbon Fund to purchase the emission reductions from the project. The copy of the letter been submitted to the DOE.

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

[16] 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

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 C.5.1, 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. Assessment of alternative scenarios

Alternative land uses	Project	Barrier	Remarks
1. Reintroduction of degraded lands into the agricultural production cycle	No	Barriers no 1 and 2 in sub-step 3a below	The major reasons for lands not under agricultural use are their degraded status. Tables 16 to 18 demonstrate that these land are degraded and are subject to large ecological limitations that are not easy to overcome, which makes it uneconomical to put back these lands into agricultural production. Therefore, restoring production on these lands is expected to be expensive proposition as sustaining agriculture productivity requires productive land use. The level of degradation and the remoteness of the land parcels make these lands inaccessible for agricyltural use and makes this scenario unlikely.
2. 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.
3. Implementation of the project as an assisted natural regeneration without being registered as a A/R CDM project activity	Yes	Barrier 1, 2 and 3 in sub-step 3a below	Constraints in raising additional financial resources, limited capacity and knowledge base needed for protection and management of forest at the commune level.

Sub-step 1b. Consistency of credible land use 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 realize under the baseline scenario.

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

A outlined in section C.5.1, 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) Ecological barriers:

The project is subject to multiple ecological barriers associated with physiography, biotic pressure, degraded lands, and fire incidence as outlined below.

Physiography: As shown in **Tables 16 to 18**, the physiographic conditions in terms of steep slopes, low site productivity and lack of soil depth translates to low carrying capacity of the sites. The data from Tables 16 to 18 indicate the most part of project area has slope gradient of more than 30%. In such cases, most regeneration does not established unless protected. Most of the project area is located on hilly terrain with steep slopes of 30% to 50% and more. Significant additional resources are required to support natural regeneration activities in such physographic conditions.

Biotic pressure: The biotic pressure from livestock movement leads to soil compaction and does not permit germination of seed and establishment of seedlings. The seed that germinates gets browed by the livestock and seedlings that get established are at the constant risk of damaged under the biotic pressure. Exlcusion of livestock requires investment in the closure of affected areas, improving the awareness of

communicaties with regard to risk of grazing to forest regeneration and seeking their participation in addressing the issue. The plot level data in **Annex 9** reflect the grazing pressire at the level of communes that are in the vicinity of lpots.

Risk of fire: The *"Update on forest fire situation in Albania-International Forest Fire News (IFFN) No. 28 (January – June 2003) p. 73-81"*[17] states that high fire incidence due to indiscriminate use of fire to promote new shoot growth that is palatable for livestock. The fires hae high probability of spreading to adjoining areas and destroy regeneration.. As the risk of fires in grazing areas can be more significant and dramatic, considering the complex relationship between grazing and fire risk, relative changes in livestock population do not significantly alter the probability of fire occurrences as their risk of fire continues to exist for regeneration areas under high or low livestock numbers in a region. The National Forest Fire Management Strategy[18] calls for investment and community initiatives to address the fire risk to natural regeneration areas. .

Interaction of phicsal and biological systems: The complex interface of physical and biological systems in the project area reflect in poor regeneration. In the absence of vegetation cover, and adequate supporting soil layer and humus, seed that falls to the ground is washed in the run off and very few seed that sprout as seedlings are later grazed and the regeneration that gets established is at the constant risk of being grazed. As a consequence the young regeneration is not likely to survive and grow into woody vegetation in the project area.

The impacts of grazing and fire risk that occur together can have dramatic impacts considering the complex relationship between grazing and fire risk. The fire incidence on pastures continues to be high because sheperds traditionally use fire to promote new shoot growth that is palatable for livestock. The fires spread to adjoining areas and destroy regeneration.There is a need for significant resources to implement measures in regeneration areas and at the level of communes that can reduce the risk of grazing and fire occurrence

2) **Lack of tradition of reforestation – first of its kind activity**.

This pilot project is the *first of its kind* in the country.. The letter of the Directorate of Forests and Pasture Policies, under the Ministry of Environment states that the project is a first of its kind for protection and promotion of natural regeneration on communal lands by promoting use rights. (The letter is enclosed in Annex10 related to Additionality.

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. The concept of natural regeneration of degraded lands was examined on an experimental basis as a small component of Albania Forestry Project (AFP). The AFP was implemented to strengthen institutional, administrative, forest management, communal pasture and protected area management. The World bank provided partial

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[17] Update on forest fire situation in Albania-International Forest Fire News (IFFN) No. 28 (January – June 2003) p. 73-81

[18] DGFP 2001: National Forest Fire Management Strategy, Directorate General for Forest Protection, Tirana, Albania.

financial assistance along with Government of Italy, Government of Switzerland and Italy/FAO trust fund for implementing the project. The AFP focused on testing concepts and evaluating the evaluating the institutional needs of complementary regeneration (or reforestation by plantation or direct seeding in areas of high forests that: (i) have been harvested and where the natural regeneration has partially or totally failed, and (ii) located on highly erosive soils (i.e. clay soils on steep slopes). DGFP was to carry out a study of the high forest areas with failed regeneration to identify those locations where reforestation was expected to generate sufficient environmental benefits to make reforestation with indigenous species economically viable. On the basis of this experiment, the present CDM A/R project was proposed.

The knowledge related to the evaluation of regeneration status and planning the appropriate protection measure such as fencing and coppicing and reforestation of species suitable to specific sites must be organized and relevant nursery management and site preparation activities need to implemented. These efforts require significant level of knowledge of forest management measures and instructional arrangements, which require time and resources to train local communities to facilitate participation in the protection and reforestation efforts and management and organizational capacity to conduct the project - the main barriers that require additional resources for knowledge and capacity development at the commune and levels.

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

The project can not be implemented considering the barriers to investment required for the protection and regeneration of areas. The Directorate of Forests and Pasture Policies has significant budget shortages, which place a major limitation on its resoureces allocated to knowledge promotion and capacity development to the local communities.

The cost of implementing the AR project is estimated at $2.2 million. Considering the chronic budget shortages of the Directorate, it would not have been be possible for the Directorate to implement the project from its budget resources. The Directorate is also unable to borrow from financial institutions and no alternative financial schemes from financial institutions exist to support the forest protection activities to exclude grazing for the purposes of natural regeneration and to support supplemental reforestation**.**

The protection and planting activities planned to be implemented with the participation and support of local communities that account for about 16,000 families in villages in the vicinity of the project areas. The local commues also do not have resources to invest in forest protection activities as communes and districts encompassed in the project are among the poorest in the country, with a median poverty rate[19] 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. Therefore, it is difficult to generate commune level resources for protection from grazing and related managed activities to restore the degraded lands. For these reasons, the investment barrier acts as a prohibitive barrier in undertaking the project.

[19] 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.

Step 4. Common practice analysis

For the purpose of common practice analysis, the region by default has been defined as Albania. There have been no comparable reforestation initiatives in Albania. The earlier reforestation and reforestation activities on degraded lands were at a very small scale and did not have similar objectives as this project. Therefore, 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. Afforestation activities implemented in Albania are insignificant as can be assessed from the data on afforestation conducted in the country for the period 2003 to 2009. The evidence on area afforested is presented to the DOE as a part of the supporting documents. This clearly demonstrates that afforestation/reforestation activities conducted under the project are not part of the common practice.

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.

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.

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.

Baseline stratification

One stratum is considered to adequately represent the baseline as the area with growing trees and without growing trees was not considered separate stratum because the coverage of the trees is estimated as a percentage of the overall area. Therefore its boundary cannot be delineated. Considering the objective of the baseline assessment was to accurately estimate the carbon stock changes of pre-existing trees in the baseline, the separation of areas with trees and without trees was not practicable because of the difficulties in the delineation of these areas.

Growing trees

We considered those trees as "growing" that were classified as "2-5 meters" or "> 5 meters" tall in the project plots. 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 188.17 ha or 3% of the project area (6272.36 ha) was identified as stocked with growing trees.

Table 21

Area of growing trees	ha	%
Area with growing trees	188.17	3
Area without growing trees	6084.19	97
Total Area	**6272.36**	**100**

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.

Shrubs

Shrubs were excluded from the carbon stock assessment because they were considered to have a decreasing growing stock. As shrubs are close to the ground, the impact of grazing and fire occurrence have significant negative impact on the shrib growth. In such situations, as per the methodology, the baseline net GHG removals by sinks are equal to 0.

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

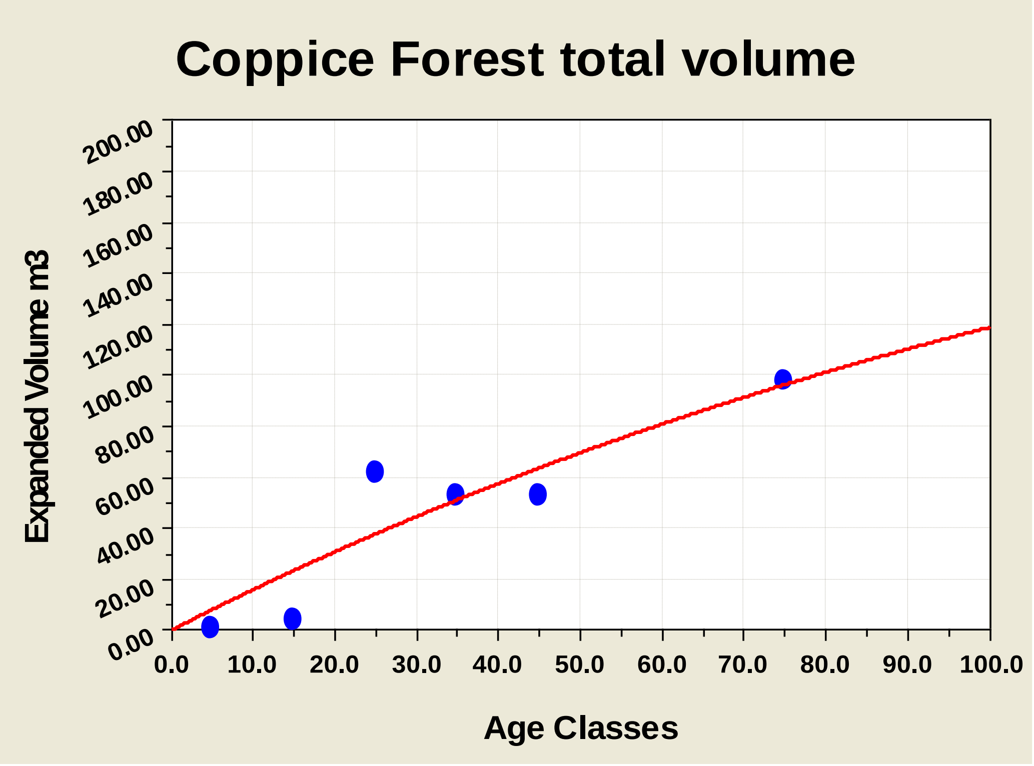

Figure 6 - Stand model Coppice Forest (source: ANFI report p. 125)[20]

The curve of figure 6 shows the expanded total biomass volume (aboveground and belowground biomass). This is shown in the left part of the table below. Table 22 shows in column B only the aboveground biomass (right part of the table below). This was recalculated from the function of Figure 6

[20] 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

by using the root shoot ratio. This was made to be fully in compliance with the methodology. In table 22 column F the root shoot ratio is used again to come back to the total biomass (aboveground and belowground) using Equation 6 of the methodology.

Function from Figure 6:

lijt = (237.2127*(1-EXP(-0.0069513642*age)))

Function from Figure 6 corrected with root shoot ratio:

Iijt = (237.2127*(1-EXP(-0.0069513642*age)))/(1+1.94)

The areas were categorized under one stratum as the area with growing trees cannot be considered a separate stratum from the area without growing trees since the coverage of the trees is estimated as a percentage of the overall project area.

The calculation procedures involving equations 2, 3, 4, 5, 6 and 7 of the methodology (carbon gain-loss method) were applied to estimate the carbon stock change.

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

Where

CBSL = baseline net greenhouse gas removals by sinks; tonnes CO2-e.

ΔCB,LB = sum of the changes in living biomass carbon stocks in the baseline (above- and below-ground); tonnes CO2-e.

Estimation of baseline *ΔCB,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:

ΔCB,LB = sum of the changes in living biomass carbon stocks in the baseline (above- and below-ground); tonnes CO2-e.

ΔCB,ikt = annual carbon stock change in living biomass in the baseline for stratum *i*, stand model *k*, time *t;* tonnes CO2-e. yr-1

i = 1, 2, 3, … *mBL* 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

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

where:

ΔCikt = annual carbon stock change in living biomass for stratum *i,* for stand model *k,* time

t; tonnes CO2-e. yr-1.

ΔCG,ikt = annual increase in carbon *stock* due to biomass growth for stratum *i,* for stand model *k,* time *t*; tonnes CO2-e. yr-1

ΔCL,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. [21] The wood density was taken as average of hornbeam and oak, which are the most common species among the growing trees.

$$\Delta C_{Gikt} = A_{ikt} * C_{TOTAL,ikt}$$ (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 CO2-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 CO2-e. ha-1 yr-1
Note: *CTOTALikt* can be estimated as a constant annual average value

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

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

where:

$C_{TOTAL,ikt}$= annual average increment rate in total carbon in stratum *i*, stand model *k,* time t; tonnes CO2-e. ha-1 yr-1
Note: *CTOTALikt* can be estimated as a constant annual average value.

Gw,ijt = average annual above-ground biomass increment for stratum *i,* species *j,* at time *t*; tonnes d.m. ha-1 yr-1

Rj = 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

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

above-ground biomass present at time (*t*) (see IPCC GPG, 2003, Annex 3.A1, Table 3A1.8)

CFj = the carbon fraction for species *j*; tonnes C (tonne d.m.)-1

Iv,ijt = average annual increment in merchantable volume for stratum *i,* species *j*; m3 ha-1 yr-1

Note: *Ivijt* 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.

Dj = basic wood density for species *j*; tonnes d.m. m-3

BEF1,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 188.17 ha of growing trees or 3 % of the total area. The amount of baseline removal by the growing trees is 6249.88 tCO_2 in 20 years. As mentioned above this figure is very conservative.

Table 22 – Baseline calculations

A ***t*** age	**B** oak coppice Stand volume expanded aboveground ***Iijt*** m3 ha-1	**C** oak coppice Stand volume expanded aboveground for the 3% of the area ***Iijt*** m3 ha-1
1	**0.56**	**0.0168**
2	**1.11**	**0.0333**
3	**1.67**	**0.0501**
4	**2.21**	**0.0664**
5	**2.76**	**0.0827**
6	**3.30**	**0.0989**
7	**3.83**	**0.1150**
8	**4.36**	**0.1309**
9	**4.89**	**0.1468**
10	**5.42**	**0.1625**
11	**5.94**	**0.1782**
12	**6.46**	**0.1937**
13	**6.97**	**0.2091**
14	**7.48**	**0.2245**
15	**7.99**	**0.2397**
16	**8.49**	**0.2548**
17	**8.99**	**0.2698**
18	**9.49**	**0.2847**
19	**9.98**	**0.2995**
20	**10.47**	**0.3142**
21	**10.96**	**0.3288**
22	**11.44**	**0.3433**
23	**11.92**	**0.3576**
24	**12.40**	**0.3719**
25	**12.87**	**0.3861**
26	**13.34**	**0.4002**
27	**13.81**	**0.4142**
28	**14.27**	**0.4281**
29	**14.73**	**0.4419**
30	**15.19**	**0.4556**

D	E	F	G	H	I
		eq. 7	eq. 6		eq. 5
t	I_{vijt}	$\Delta G_{w,ijt}$	$C_{TOTAL,ikt}$	A_{ikt}	ΔC_{Gikt}
Project	annual increment				
Year	m3 ha^{-1} y^{-1}	t d.m. ha^{-1} y^{-1}	t CO_2 $ha^{-1}yr^{-1}$	ha	t CO_2 yr^{-1}
1	0.0163	0.0099	0.0532	1666	88.60
2	0.0162	0.0098	0.0528	3281	259.16
3	0.0161	0.0097	0.0524	5547	531.09
4	0.0160	0.0097	0.0521	6272.36	441.60
5	0.0159	0.0096	0.0517	6272.36	324.41
6	0.0158	0.0095	0.0514	6272.36	322.16
7	0.0156	0.0095	0.0510	6272.36	319.93
8	0.0155	0.0094	0.0507	6272.36	317.72
9	0.0154	0.0093	0.0503	6272.36	315.52
10	0.0153	0.0093	0.0500	6272.36	313.33
11	0.0152	0.0092	0.0496	6272.36	311.16
12	0.0151	0.0091	0.0493	6272.36	309.00
13	0.0150	0.0091	0.0489	6272.36	306.86
14	0.0149	0.0090	0.0486	6272.36	304.74
15	0.0148	0.0090	0.0482	6272.36	302.63
16	0.0147	0.0089	0.0479	6272.36	300.53
17	0.0146	0.0088	0.0476	6272.36	298.45
18	0.0145	0.0088	0.0473	6272.36	296.38
19	0.0144	0.0087	0.0469	6272.36	294.33
20	0.0143	0.0086	0.0466	6272.36	292.29
					6249.88
	eq. 4				$= \Delta C_{B,LB}$
	$\Delta C_{ikt} = \Delta C_{Gikt} - \Delta CL_{ikt}$				
	$\Delta CL_{ikt} = 0$				
		eq. 2			
	$C_{BSL} = \Delta C_{B,LB}$ =		**6249.88**		**t CO2**

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

ID number[22]	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*

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

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*
18	*ΔCB,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 CO_2e)

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
2005	88.60
2006	259.16
2007	531.09
2008	441.60
2009	324.41
2010	322.16
2011	319.93
2012	317.72
2013	315.52
2014	313.33
2015	311.16
2016	309.00
2017	306.86
2018	304.74
2019	302.63
2020	300.53
2021	298.45
2022	296.38
2023	294.33
2024	292.29
Total estimated baseline net GHG removals by sinks (tonnes of CO_2 e)	**6249.88**
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)	**312.49**

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
Vasilios Panastasis, Agrotec S.p.A., Roma – Aristotle University/Greece

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 (ΔCP,LB)

Treatment of pre-existing non-tree and tree vegetation

Removal of preexisting Vegetation

The ANFI the volume of biomass for shrub was estimated with 0.27 tonnes of dry matter per ha of living biomass[23]. 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.

Table 25 - Removed pre-existing vegetation

Shrubs volume (ANFI 2004)	BEF	Root shoot ratio	Total shrub area	CF	C/CO_2
tdm ha-1	dimensionles s	dimensionles s	ha	dimensionles s	dimensionles s
0.27	x	x	6,272.36	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	1693.54	846.77	3104.82	1552.41

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

where:

Ebiomassloss = 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 CO2-e.
Aikt = area of stratum stratum *i*, stand model *k*, time *t*; ha
Bnon-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, …*mps* 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.

[23] The definition of woodland and shrubs in the ANFI report is the following: These two categories cover all the land that falls below the definition of forest and it is not expected to exceed the forest threshold. These areas are covered by shrubs and sparse trees (< 30% and potential (ANFI Main Report, 2001 p. 63)

Table 26 - Biomass loss

Biomass loss

Implementation of project

year	%	ha	A_{ikt}
1	27	1666	A_{111}
2	26	1615	A_{112}
3	36	2266	A_{113}
4	12	725.36	A_{114}
		6272.36	

	Biomass loss		
year	**t CO_2**	0.27	= $B_{non\text{-}tree,ikt}$ t d.m. ha-1
		0.5	= CF_j carbon fraction in d.m.
1	824,67	3.667	44/12 = conversion CO_2/C
2	799,43		
3	1121,67		
4	359.05		
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		
	3104.82		
	= $E_{biomassloss}$	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.

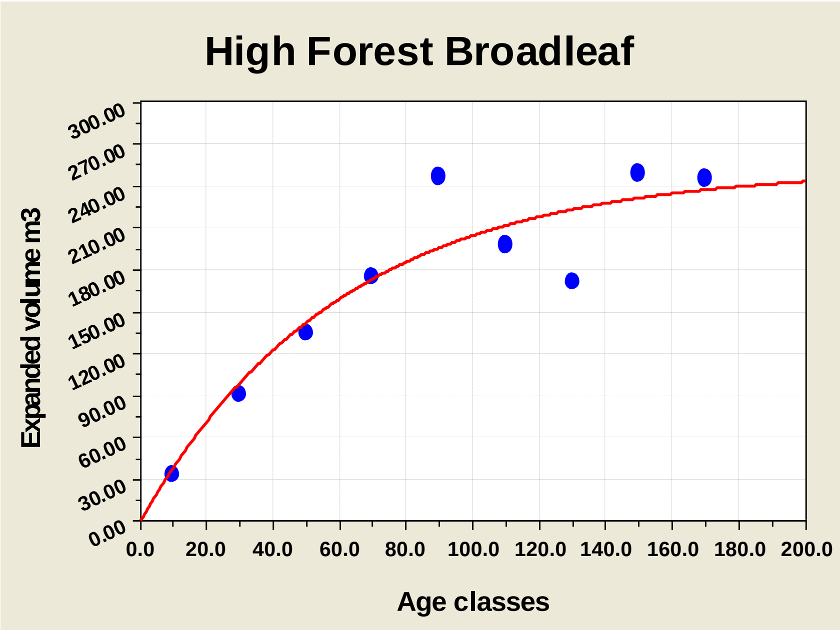

Figure 7 - Stand model High Forest Broadleaf (Source ANFI Main Report p. 124)[24]

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

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:

[24] 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

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

where:

ΔCP,LB = sum of the changes in living biomass carbon stocks in the project scenario (above and
below-ground); tonnes CO2-e.
ΔCLB,ikt = annual carbon stock change in living biomass in the project scenario for stratum *I*, stand model *k*, time *t;* tonnes CO2-e. yr-1
i = 1, 2, 3*, ... mps* 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 based on 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* (*ΔCL,ikt*)

$\Delta CLikt = Lhr, ikt + Lfw,ikt + Lot,ikt$ **(**Eq. 16 of the meth.**)**

where:

ΔCL,ikt = average annual decrease in carbon stocks due to biomass loss for stand model *k*, species *j*, time *t*
Lhr,ikt = annual carbon loss due to commercial harvesting for stratum *i*, stand model *k*, time *t*; tonnes CO2-e. yr^{-1}
Lfw,ikt = annual carbon loss due to fuel wood gathering for stratum *i*, stand model *k*, time *t*; CO2-e. yr^{-1}
Lot,ikt = annual natural losses (mortality) of carbon for stratum *i*, stand model *k*, time *t*; CO2-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 Δ*CLikt* was set to zero.

$\Delta CLikt = 0$

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);
- 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:

$$GHGE = EFuelBurn + EBiomassBurn \quad (22)$$

where:

GHGE = increase in GHG emission as a result of the implementation of the proposed AR CDM project activity within the project boundary; tonnes CO2-e.
EFuelBurn = increase in GHG emission as a result of burning of fossil fuels within the project boundary; tonnes CO2-e.
EBiomassBurn = increase in GHG emission as a result of biomass burning within the project boundary; tonnes CO2-e.

EFuelBurn = 0 This was set to zero, because project activities such as coppicing soil preparation and planting, will be carried out manually

EBiomassBurn = 0 There is no slash and burn practice in Albania.

Therefore $\mathbf{GHG_E} = 0$

Table 27 provides the results of the calculation of *CACTUAL*. 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 (*ΔCP,LB*), column F shows the GHE-emissions *(GHGE)*, and Column G the biomass loss ($E_{biomassloss}$). The sum cell of column H shows the final result of the *CACTUAL*

$$CACTUAL = \Delta CP,LB - E_{biomassloss} - GHGE$$

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 458,187 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 $\Delta C_{P,LB}$ Trees Growth	F GHG_E	G $E_{biomassloss}$	H C_{ACTUAL}
ha				
year	tCO_2			tCO_2
1	7696.56	0	824.67	6871.89
2	15030.20	0	799.43	14230.78
3	25250.01	0	1121.67	24128.34
4	28183.33	0	359.05	27824.28
5	27717.12	0	0	27717.12
6	27258.62	0	0	27258.62
7	26807.71	0	0	26807.71
8	26364.26	0	0	26364.26
9	25928.14	0	0	25928.14
10	25499.24	0	0	25499.24
11	25077.43	0	0	25077.43
12	24662.60	0	0	24662.60
13	24254.63	0	0	24254.63
14	23853.41	0	0	23853.41
15	23458.82	0	0	23458.82
16	23070.77	0	0	23070.77
17	22689.13	0	0	22689.13
18	22313.81	0	0	22313.81
19	21944.69	0	0	21944.69
20	21581.68	0	0	21581.68
Sum	468642.14	**0**	3104.82	465537.32
	$\Delta C_{P,LB}$	GHG_E	$E_{biomassloss}$	C_{ACTUAL}
	eq. 15	eq. 22	eq. 14	eq. 13

Table 28. Net GHG removals by sinks

The used stand model comes from the Albanian National Inventory ANFI. This was derived from inventory data. It reflects the average standing timber volume of the forest type by year. Implicitely any thinnigs are covered by this inventory based stand model. Because it is a statistical approach by forest type and year there are not certain years of thinnings determined. The statistical approach covers different conditions with different dates for thinning. This is the reason why in average the standing timber volume is always increasing (GHG removal).

The values presented in this table are the annual net anthropogenic GHG removals by sinks. Whereas the corresponding cumulative GHG removals by sinks presented in the TARAM show consistent increase over the crediting period. The thinning in the project are insignificant and are taken into account in the calculations of cumulative GHG removals by sinks and the management system followed does not anticipate harvesting during the crediting period. The TARAM calculations also reflect the information on thinning and harvesting in the calculations of cumulative GHG removals by sinks. The insignificant impacts of thinning and absence of harvesting translate into consistent increases in the biomass during the crediting period and avoids the coincidence of peaks in carbon stocks and verification.

S.No	Year	Annual carbon stock change (t CO_2-e.yr^{-1})	Project emissions (t CO_2-e.yr^{-1})	Actual net GHG removals by sinks (t CO_2-e.yr^{-1})
1	**2005**	6871.89	0	6871.89
2	**2006**	14230.78	0	14230.78
3	**2007**	24128.34	0	24128.34
4	**2008**	27824.28	0	27824.28
5	**2009**	27717.12	0	27717.12
6	**2010**	27258.62	0	27258.62
7	**2011**	26807.71	0	26807.71
8	**2012**	26364.26	0	26364.26
9	**2013**	25928.14	0	25928.14
10	**2014**	25499.24	0	25499.24
11	**2015**	25077.43	0	25077.43
12	**2016**	24662.60	0	24662.60
13	**2017**	24254.63	0	24254.63
14	**2018**	23853.41	0	23853.41
15	**2019**	23458.82	0	23458.82
16	**2020**	23070.77	0	23070.77
17	**2021**	22689.13	0	22689.13
18	**2022**	22313.81	0	22313.81
19	**2023**	21944.69	0	21944.69
20	**2024**	21581.68	0	21581.68
	Total	**465537.32**	**0**	**465537.32**

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:

- 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**.

$$LK = LK_{ActivityDisplacement}\ LK_{Fencing}$$ (Eq. 31 of the meth.)

where:

LK = total GHG emissions due to leakage; tonnes CO2-e.
LKActivityDisplacement = leakage due to activity displacement; tonnes CO2-e.
LKfencing = leakage due to increased use of wood posts for fencing up to year *t**; tonnes CO2-e.

Leakage due to activity displacement

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

LKActivityDisplacement = leakage due to activity displacement; tonnes CO2-e.
LKconversion = leakage due to conversion of non-grassland to grassland; tonnes CO2-e.
LKfuelwood = leakage due to the displacement of fuelwood collection; tonnes CO2-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.

$$Na_{BL} = \frac{sNa_{BL}}{SFR_{PAga}}$$ (**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 29 – Sheep Equivalent Unit present in the project plots at village level (average value estimated from animal census 2000-2005)

Village	***SEU in the project area at village level (source: statistics 2000-2005)***
Bahutaj	31
Bala	44
Barmash	223
Barruq	62
Bejni	917
Bexhunec	43
Bllate majtare	56
Bregu	33
Brezhdan	95
Bushkash	23
Bushtrice	293
Buzhal	14
Caje	58
Celebi	99
Cernaleve	340
Ceruja	1049
Cerunja	236
Cetush	19
Dedaj	75

Village	*SEU in the project area at village level (source: statistics 2000-2005)*
Dipjak	16
Dohoshisht	30
Dovolan	28
Drize	183
Erebare	11
Fshat	242
Gjengjorin	34
Gjinar	407
Gomsiqe	330
Greve	199
Guri Zi	150
Helshan	635
Herbel	47
Kabash	65
Kafen	48
Kercisht i Eper	3
Kercisht posht	47
Kllopcisht	83
Knike	48
Kocaj	111
Kollovoz	50
Kqire Eperme	34
Krajk	54
Kryezi	616
Labinot Mal	112
Lekasan	20
Levrushk	5
Lleshan	122
Luf	16
Lundre	17
Mardhinaq	35
Matranxh	191
Mece	51

Village	*SEU in the project area at village level (source: statistics 2000-2005)*
Melan	123
Midhe	10
Mirake	153
Modhesh	138
Moskarth	179
Murras	90
Novosej	274
Okshtun Masa	56
Ostren Madh	26
Ostren Vogel	37
Pajun	129
Palama	35
Palush	86
Paper	547
Pashtresh	137
Pejce	55
Peke	137
Pilafe	21
Pla	59
Plesha	392
Ploni Bardhe	228
Pobrat	454
Pocest	31
Polis Gostime	244
Polis i vogel	241
Potgorce	15
Potin	77
Qaf Mali	27
Qelez	66
Qerret	26
Rabanat	11
Rabdisht	12
Radimisht	42

Village	*SEU in the project area at village level (source: statistics 2000-2005)*
Rashnapoje	18
Rrape	65
Selane	23
Shales	12
Shishtavec	167
Shkinak	520
Shumbat	320
Sllatine	58
Sofrocan	211
Staravec	7
Tomin	11
Trashovic	182
Trojak	140
Ukth	57
Ushtelenxe	96
Venisht	32
Vernice	15
Vidhas	1234
Vile	37
Vine	44
Vlesha	48
Z.Kalis	135
Zall Strikcan	88
Zdojan	133
Derstile	11
Fush-Buall	20
Galigat	57
Korthpule	19
Kotorr	77
Shelcan	372
Vrith	65
Klos Katund	117
Total	16,297

In total, there are Na_{BL} = 16,297 SEU grazing on project area. The number of months per annum during which the animals are present (a_{gpl}) varies among the different plots according to the information collected during the field survey (Column AF in the "Project sites information database"), on average 6.7 months the animals (SEU) are present at the plots.
Calculation of the average number of months per annum during which animals (SEU) are present in the project area $A_{SEUpl.}$

$$A_{SEUpl} = \frac{\sum_{i=1}^{I}(a_{SEUpl} * Na_{pl})}{\sum_{i=1}^{I} a_{SEUpl}} = 6.7$$

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

Calculating the incidence to 12 months there are 9,170 SEU on the project site.

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

$$Na_{outside,\ t} = Na_{BL} - Na_{AR,t} \qquad \text{(Eq. 31 of the meth.)}$$

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.

$Na_{outside,\ t} = Na_{BL}$ = 16,297 SEU

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. No animals will be sold.

Animal displacement is assumed to occur in the first years 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 (32) 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:

$$GLA = EGL + NGL + XGL \qquad \text{(Eq. 33 of the meth.)}$$

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

$$\Delta C_{LPAt} = \sum_{i=1}^{I}\sum_{an=1}^{An}(DBI_{an} \cdot n_{igt} \cdot a_{glp}) \cdot 30 \cdot 0{,}001 \cdot \frac{1}{SFR_{PAga}} \qquad \text{(Eq. 34 of the Meth.)}$$

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 ($\boldsymbol{n_{igt}}$) 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 ($\boldsymbol{n_{igt}}$) are transformed in Sheep Equivalent Units (***an***) with a daily biomass intake ($\boldsymbol{DBI_{an}}$) 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 ($\boldsymbol{a_{gpl}}$) is defined at plot level according to on site surveys.

The resulting annual biomass consumption on project area is equal to 4622 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 29 with **16,2967** SEU present on the project area during 6.7 months per year as average. Related with 12 months there are 9,170 SEU present.

$\mathbf{Na_{SEU}}$ **=** 9,170

b) No animals shall be sold, therefore $\mathbf{Na_s = 0}$

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)[25]

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
$GA_{ouside\ Village}$	Grazing area outside the village boundaries, mostly state summer pasture in the mountains ($SFR_{PAga} = 0.459$) in ha

$GA_{village}$	= 81,980 ha	from forest management plan data
PA	= 6,272.3 ha	from implementation plan
$GA_{OutsideVillage}$	= 43,900 ha	evaluated by interview
EGL	**= 119,608 ha**	

[25] 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

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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 30 - 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			

Table 31
- 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	211,1	0	350	0	0	0	0	400	0	0	0	0	0	0	0	0
Bejni	436,6	0	160	0	0	0	0	270	0	0	0	0	0	0	0	0
Bushkash	49,3	0	330	250	0	0	0	0	0	0	0	0	0	0	0	0
Buzhal	22,1	0	120	90	310	0	0	0	0	0	0	0	0	0	0	0
Cernaleve	83,5	0	240	0	0	0	0	310	0	0	0	0	0	0	0	0
Dedaj	50,9	0	70	260	90	0	0	0	0	0	160	0	0	0	0	0
Drize	74,1	0	140	410	0	0	0	30	0	0	0	0	0	0	0	0
Gjengjorin	20,6	0	90	330	0	0	0	0	140	0	0	0	0	0	0	0
Helshan	213,9	0	0	0	0	0	0	1410	0	0	0	0	0	0	0	0
Kafen	49,1	0	650	110	60	0	0	90	0	0	0	0	0	0	0	0
Kocaj	69,3	0	70	190	220	0	0	150	0	0	0	0	0	0	0	0
Kotorr	75,1	0	190	160	30	0	0	170	0	0	0	0	0	0	0	0
Labinot Mal	64,5	0	290	70	280	0	0	0	60	0	0	0	0	0	0	0
Lundre	40	0	50	370	110	0	0	0	0	0	0	0	0	0	0	0
Melan	73,4	0	240	100	80	0	0	0	0	0	0	0	0	0	0	0
Modhesh	295,9	0	210	120	70	0	0	0	0	0	0	0	0	0	0	0
Okshtun Masa	77,4	0	190	240	160	0	0	90	0	0	0	0	0	0	0	0
Paper	77,5	0	120	670	50	0	0	0	0	0	0	0	0	0	0	0
Pilafe	16,6	0	120	290	70	0	0	0	0	0	0	0	0	0	0	0
Ploni Bardhe	189,6	0	90	0	0	0	0	420	0	0	0	0	0	0	0	0
Polis Gostim	14	0	0	0	0	0	0	710	0	0	0	0	0	0	0	0
Polis i Vogel	190,9	0	290	130	0	0	0	160	0	0	0	0	0	0	0	0
Rabdisht	11,9	0	320	110	90	0	0	0	0	0	0	0	0	0	0	0
Shales	34,4	0	240	90	120	0	0	250	170	0	0	0	0	0	0	0
Shkinak	99,4	0	630	0	30	0	0	710	0	0	0	0	0	0	0	0
Sllatine	58,6	0	110	270	0	190	0	0	0	0	0	0	0	0	0	0
Trojak	40,2	0	160	110	0	310	0	0	0	0	0	0	0	0	0	0
Vidhas	159,1	0	420	920	20	0	0	0	0	0	0	0	0	0	0	0
Vrith	52,2	0	130	270	90	0	0	60	0	0	0	0	0	0	0	0
Zdojan	29,2	0	190	220	30	0	0	0	0	0	0	0	0	0	0	0
Sample	2880,4	0,4592 SFR_{PAga}														
Total area	6272,3	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)[26].

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[27].

[26] See footnote 24

[27] **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

Table 32- Grazing Capacity according to expert judgment

Vegetation Type	Maximum Capacity (SEU/ha)	Maximum Capacity reduced to 70% (SEU/ha)	Annual biomass (Kg d.m./ha/yr)	Grazing period (months)
Arable Land	16	11.2	1400	3
Pastures	4	2.8	700	6
Refused land	6	4.2	1050	6
Shrub land	14	9.8	2520	6
Forests	4	2.8	700	6
Forest Land	6.5	4.55	1155	6

The maximum grazing capacity was then reduced to 70% to guarantee the conservativeness of the leakage calculation, taking into account the degraded conditions of the grazing land in Albania.[28]

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
$\Delta C_{Lmaxvillageoutside}$ = maximum annual biomass produced in areas outside the village boundaries

$\Delta C_{Lmaxvillage\ inside}$, ΔC_{LmaxPA} and $\Delta C_{Lmaxvillageoutside}$ were calculated multiplying the maximum grazing capacity (reported in table 32 above) of each vegetation type, by the area related to each vegetation type. Data on vegetation cover on pasture land within the village was taken from the Forest Management Plans. ΔC_{LmaxPA} was calculated for each project site, multiplying its area by the vegetation type classification of the plot as reported in the Forest Management Plans[29]. $\Delta C_{Lmaxvillageoutside}$ was calculated through interviews (the results are shown in table 31 above).

$\Delta C_{LmaxEGL}$ = 139,172 t d.m. yr^{-1}
$\Delta C_{Lmaxvillage\ inside}$ = 92,573 t d.m. yr^{-1}

the Aristotle University of Thessaloniki. **Dr. Ahmet Mehmeti**, Albanian grazing expert, has 33 years of experience in pasture and forest management, agro-forestry practices.

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

[29] List of the classification for each project site according the FMP is available upon request in the "project site information.xls" file.

ΔC_{LmaxPA} = 9,159 t d.m. yr^{-1}
$\Delta C_{Lmaxvillageoutside}$ = 54,758 t d.m. yr^{-1}

The maximum annual biomass produced in EGL $\Delta C_{LmaxEGL}$ was 139,172 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.

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

$\Delta C_{Lcurrent}$ = 85,669 t d.m. yr^{-1}
$\Delta C_{Lcurrentvillage}$ = 90,290 t d.m. yr^{-1}
$\Delta C_{LcurrentPA}$ = 4,622 t d.m. yr^{-1}

The list of parameters used in Eq.34 for calculating $\Delta C_{Lcurrentvillage}$ are the follwoing :

an=1 for taking Sheep Equivalent Unit (SEU)
SFR_{PAg}= 1
n_{igt}= Average of number of livestock (in SEU) reported in the livestock census 2000-2005 at village level
a_{gpt}= 12
DBI_{an}=1.4 kg d.m./day from expert judgment (1 SEU correspond to 1 goat)

While the list of parameters used in Eq.34 for calculating $\Delta C_{LcurrentPA}$ are the follwoing :

an=1 for taking Sheep Equivalent Unit (SEU)
SFR_{PAg}= 1
n_{igt}= For each project site, the average grazing pressure (SEU/ha) was taken from the census 2000-2005 at village level, and then multiplied by the plot area
a_{gpt}= Data source: field surveys (list of the grazing periods for each project site is present in the file “project sites information.xls” available upon request.
DBI_{an}=1.4 kg d.m./day from expert judgment (1 SEU correspond to 1 goat)

The current annual biomass for feeding (intake) produced in EGL $\Delta C_{LcurrentEGL}$ is 85,669 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

$Na_{EGL(t=1)}$	**= 169,978 SEU**
Na_{PO}	= 179,148 SEU
Na_{PA}	= 9,170 SEU

The data on the mumber of animals are based on livestock census 2000-2005 (the data are reported in the file “project site information.xls” available upon request).

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.

$\Delta C_{LmaxEGL}$	= **139,172** t d.m. yr^{-1}
$\Delta C_{Lcurrent}$	= **85,669** t d.m. yr^{-1}
ΔCL_{Pat}	= 4,622 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 33 - 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	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	capacity above 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.

$$FG_{BL} = \frac{sFG_{BL}}{SFRP_{Afw}} = 0$$ (Eq. 43 of the meth.)

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

$$FG_{outside} = FG_{BL} - FG_{AR,t} \leq 0$$ (Eq. 44 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 34: Annual and cumulative leakage emissions associated with the project

Year	Annual leakage emissions ($t\ CO_2\text{-}e.yr^{-1}$)
2005	0
2006	0
2007	0
2008	0
2009	0
2010	0
2011	0
2012	0
2013	0
2014	0
2015	0
2016	0
2017	0
2018	0
2019	0
2020	0
2021	0
2022	0
2023	0
2024	0
Estimated leakage (t CO2 e)	0
Total number of crediting years	0
Annual average leakage over the crediting period (t CO2 e)	0

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 activity displacement (conversion of land to grazing land and displacement of fuelwood collection)
3. 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*;*

Ei = 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 *RCEi* (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 3,084 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

Table 35 - 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	3,03 4	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 3,084 tCO_2 Because those sources are 0, they can be neglected.

As the sum of decreases in carbon pools and increases in emissions are lower than 5%, 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.

• ***Monitoring of forest management***.
The ex-ante stratification will be updated according to the actual stock changes in the carbon pools measured during the first monitoring event. Ex-post strata shall be recorded and geo-referenced preferably using a Geographical Information System.

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-V4.

Table 36 - Data on project boundary to be collected during implementation

ID number [30]	Data variable	Data unit	Measured (m), calculated (c) estimated (e) or default (d)[31]	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. This describes in detail the activities planned on the sites, which are the basis for project management according to the Methodology AR-AM003 Version 04. 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.

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

[31] 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 37 - Data to be collected on forest establishment and management

ID number [32]	Data variable	Data unit	Measured (m), calculated (c) estimated (e) or default (d)[33]	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,*

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

[33] Please provide full reference to data source.

ID number[32]	Data variable	Data unit	Measured (m), calculated (c) estimated (e) or default (d)[33]	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*
26	*Thinning*	m^3	*c*	*At each thinning event*	*100%*	*For each species including information on the area of intervention, location and thinning intensity*
27	*Harvesting*	m^3	*c*	*Each harvesting event*	*100%*	*For each species including information on the area of intervention and location*
28	*Coppincing*	m^3	*c*	*Each coppicing event*	*100%*	*For each species including information on the area of intervention and location*

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-CO2 GHG and corresponding calculation spreadsheets;
- GIS products;
- Copies of the measuring and monitoring reports.

Table 38 - 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

Monitoring of strata

The possible need for *ex post* stratification will be evaluated at each monitoring event and changes in the strata should be reported to the DOE for verification. Monitoring of strata and stand boundaries will be done using a Geographical Information System (GIS). The database on strata will be updated at periodic intervals taking into account the following aspects:

- Unexpected disturbances occurring during the crediting period (e.g. due to fire, pests or disease outbreaks), affecting differently different parts of an originally homogeneous stratum or stand;

- Changes in the forest management regime if any occurring during the project period (e.g., pruning, thinning, etc.) and the dates and locations implementing the management regime shall be monitored and recoreded.

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 = 6,272.36 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[34]

Then equation 59:

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

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

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

When no information on costs is available, then:

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.

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

For the one project stratum (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, the table in Annex 4 Monitoring Plan should be consulted.

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 40 – Monitoring actual net GHG removals by sinks

ID number	Data Variable		Source of data	Data unit	Measured (m) calculated (c) estimated (e)	Recording frequency	Propor-tion of data moni-tored	Comment
2.1.1.04	p	Desired level of precision (e.g. 10%)		%	Defined	Before the start of the project	100 %	For the purpose of QA/QC and measuring and monitoring precision control
2.1.2.08	$PBBikt$	Average proportion of biomass burnt for stratum i, stand model k, time t	Measured after slash and burn	Dimensionless	m	Annually	100 %	Sampling survey after slas and burn
2.1.1.07	^{PL}ID	Sample plot ID (1, 2, 3, … pl, …)	Project and plot map, GIS	Alpha numeric	Defined	Before the start of the project	100%	Numeric series ID will be assigned to each permanent sample plot
	$PLik$	Total number of plots in stra-tum i, stand model k	Field measurement	Dimensionless	m	5-year	100%	
2.1.1.20	Rj	Root-shoot ratio	Local-derived, national inventory	Dimensionless	e	5 year	100% of sampling plots	Local-derived and species specific value have the priority
	$16/12$	Ratio of molecular weights of CH4 and carbon	Universal constant	Dimensionless	Universal constant			
	$44/12$	Ratio of molecular weights of carbon and CO2	Universal constant	Dimensionless	Universal constant			

	44/28	Ratio of molecular weights of N2O and nitrogen	Universal constant	Dimensionless	Universal constant			
2.1.1.03		Confidence level (e.g. 95%)	AR-CDM-PDD	%	Defined	Before the start of the project	100%	For the purpose of QA/QC and measuring and monitoring precision control

ID number	Data Variable		Source of data	Data unit	Measured (m) calculated (c) estimated (e)	Recording frequency	Proportion of data monitored	Comment
	A	Total size of all strata (A), e.g the total project area	GIS or/and GPS	Hectares	m	Before the start of the project and adjusted thereafter every 5-year	100%	
	Ai	Area of stratum i	GIS or/and GPS	Hectares	m	Before the start of the project and adjusted thereafter every 5-year	100%	
2.1.2.18	AN,ikt	Area of with N applied in stratum i, stand model k, at time t	Monitoring activ-Ity	Hectares	m	yearly	100 %	For different tree species or management intensity
2.1.1.25	$Aikt$	Area of stratum i, stand model k, at time t	GIS or/and GPS	Hectares	m	yearly	100%	Measured for different strata and stands
2.1.2.06	AB,ikt	Area of slash and burn in stratum i, species j, at time t	Measurement	Hectares	m	yearly	100%	Measured for different strata and stands
	AP	Sample plot area	Field measurement	m^2	m	5-year	100%	
2.1.1.18	BEF	Biomass expansion factor (BEF)	Local-derived, national inventory, IPCC GPG LULUCF	dimensionless	e	5 year	100 % of sampling plots	Local-derived and speciesspecific value have the priority (IPCC default in LULUCF GPG 2003, Table 3A.1.10)
2.1.2.07	B_{ijt}	Average above-ground biomass stock before burning for stratum i, species j, time t	Field measurement	tonnes d.m. ha^{-1}	m	Before burning	Sample p lots	
2.1.2.12	N/C $ratio$	Nitrogen-carbon ratio	Literature	dimensionless	e	Once per species or group of species		IPCC default value (0.01) is used if no appropriate value

ID number	Data Variable		Source of data	Data unit	Measured (m) calculated (c) estimated (e)	Recording frequency	Proportion of data monitored	Comment
2.1.1.21	CAB,ijt	Carbon stock in above-ground biomass forstratum *i*, species *j*, time *t*	Calculations	tonnes C	c	5-year	100%	(Eq. 70)
	$CACTUAL$	Actual net greenhouse gas removals by sinks	Calculations	tonnes CO2e.	c	5-year	100%	(Eq. 65)
2.1.1.22	CBB,ijt	Carbon stock in below-ground biomass for stratum*i*, species *j*, time *t*	Calculations	tonnes C	c	5-year	100%	(Eq. 71)
2.1.2.09	*CE*	Average biomass combustion efficiency	GPG LULUCF, National Inventory	dimensionless	e	Before the start of the project	100 %	IPCC default value (0.5) is used if no appropriate value
2.1.2.10	*CF*	Carbon fraction of biomass burnt	Local , national , IPCC	tonnes C (tonne d.m.)$^{-1}$	e	Once per crediting period		Local-derived and speciesspecific value have the priority (IPCC default = 0.5)
2.1.1.19	*CFj*	Carbon fraction of species *j*	Local, national, GPG for LULUCF	tonne C tonne^{-1}	e	Once per species	100% of species or species	Local-derived and species-specific value have the priority (IPCCdefault = 0.5)
	Ci	Cost of establishment of a sample plot for each stratum *i*	measurement	US $ or local currency	m	5-years	100%	

ID number	Data Variable		Source of data	Data unit	Measured (m) calculated (c) estimated (e)	Recording frequency	Proportion of data monitored	Comment
2.1.1.12	*DBH*	Diameter at breast height of living and standing dead trees	Plot measurement	cm (living/dead)	m	5 year	100% trees in plots	Measuring at each monitoring time per sampling method
2.1.1.17	*Dj*	Wood density of species *j*	Local-derived, national inventory, IPCC GPG LULUCF	t d.m. m-3	e	5 year	100% of sampling plots	Local-derived and species-specific value have the priority
	E	Allowable error	Calculations	Depends on the variable calculated	c	5-year	100% of the variables	(Eq. 59)
2.1.2.15	*E Biomass Burn*	Increase in GHG emission as a result of biomass burning within the project boundary	Calculations	tonnes CO2-e.	c	5-year	100%	(Eq. 90)
2.1.2.14	*EBiomass Burn,CH4*	CH4 emission from biomass burning in slash and burn	Calculations	tonnes CO2-e.	c	5-year	100%	(Eq. 93)
2.1.2.13	*EBiomass Burn,*	N2O emission from biomass burning in slash and burn	Calculations	tonnes CO2-e.	c	5-year	100%	(Eq. 92)
2.1.2.11	*E Biomass Burn,*	CO2 emission from biomass burning in slash and burn	Calculations	tonnes CO2-e.	c	5-year	100%	(Eq. 91)

ID number	Data Variable		Source of data	Data unit	Measured (m) calculated (c) estimated (e)	Recording frequency	Proportion of data monitored	Comment
	$ERN20$	Emission ratio for N2O	Literature	Dimensionless	e	Yearly		(IPCC default = 0.007)
	$^{ER}CH4$	Emission ratio for CH4	Literature	Dimensionless	e	Yearly		(IPCC default = 0.012)
	$fj(DBH, H)$	Allometric equation for species j linking above-ground tree biomass (kg tree^{-1}) to diameter at breast height (DBH) and possibly tree height (H) measured in plots for stratum i, species j, time t	Literature or field measurements	kg tree^{-1}	m-e-c	Once per species	For all major species or group of species	Use local/global equations validated for local conditions

ID number	Data Variable		Source of data	Data unit	Measured (m) calculated (c) estimated (e)	Recording frequency	Proportion of data monitored	Comment
2.1.2.25	$GHGE$	Increase in GHG emission as a result of the implementation of the proposed AR CDM project activity within the project boundary	Calculations	tonnes CO2-e.	c	5-year	100%	(Eq. 88)
	GW^PCH4	Global Warming Potential for CH4	IPCC literature - EB decisions		e	Once per commitment period		(IPCC default = 21)
2.1.1.38	$Hijt$	Annually harvested volume and fuel wood for stratum i, species j, at time t	Harvesting statistics	m 3	c	Annually	100% stands	Annually recorded
2.1.1.01	iID	Stratum ID (1, 2, 3, … mSP project scenario (ex-post) strata)	Stand map, GIS	Alpha numeric	Defined	At stand establishment	100 %	Each stand has a particular year to be planted under each stratum
2.1.1.02	^{ID}ikt	Stand ID	Stand map, GIS	Alpha numeric	Defined	At stand establishment	100%	Each stand has a particular year to be planted under each stratum
2.1.1.09	j	Tree species	Project list		m	5 years	100%	Arranged in PDD
	kID	Stand model ID (1, 2, 3, … i …SPS)	AR-CDM-PDD	Dimensionless		5 years	100%	May require ex -$post$ adjustments

ID number	Data Variable		Source of data	Data unit	Measured (m) calculated (c) estimated (e)	Recording frequency	Proportion of data monitored	Comment
2.1.1.08	*lat/long*	Plot location	Project and plot map and GPS Locating, GIS		m	5 years	100%	Using GPS to locate before start of the project and at time of eachfield measurement
2.1.1.23	$^{M}CAB,ijt$	Mean carbon stock in above-ground biomass per unit area for stratum i, species j, time t	Calculations	tonnes C ha^{-1}	c	5-year	100%	(Eq. 68)
2.1.1.24	$^{M}CBB,ijt$	Mean carbon stock in below-ground biomass per unit area for stratum i, species j, time t	Calculations	tonnes C ha^{-1}	c	5-year	100%	(Eq. 69)
2.1.1.16	$MVijt$	Mean merchantable volume per unit area for stratum i, species j, time t		m3 ha^{-1}	m3	5 year	100% of sampling plots	Calculated from 2.1.1.13 and Possibly 2.1.1.15 using local-derived equations, or directly measured by field instrument
	N	Maximum possible number of sample plots in the project area	Calculations	Dimensionless	c	5-years	100%	(Eq. 59)
	n	Sample size (total number of sample plots required) in the project area	Calculations	Dimensionless	c	5-years	100%	(Eq. 60 or Eq. 62)
	Ni	Maximum possible number of sample plots in stratum i	Calculations	Dimensionless	c	Before the project start; thereafter adjusted tevery 5-year	100 %	(Eq. 59)

ID number	Data Variable		Source of data	Data unit	Measured (m) calculated (c) estimated (e)	Recording frequency	Proportion of data monitored	Comment
2.1.1.06	n_i	Sample size for stratum *i*	Calculations	Dimensionless	c	Before the project start; adjusted thereafter every 5-year	100%	(Eq. 61 or Eq. 63) Calculated for each stratum
2.1.1.04	*p*	Desired level of precision (e.g. 10%)		%	defined	Before the start of the project	100 %	For QA/QC and measuring and monitoring precision control

ID number	Data Variable		Source of data	Data unit	Measured (m) calculated (c) estimated (e)	Recording frequency	Proportion of data monitored	Comment
2.1.2.08	^{PBB}ikt	Proportion of biomass burnt	Measured after slash and burn	Dimensionless	m	Annually	100%	Sampling survey after slash and burn
	^{PBB}ikt	Average proportion of biomass burnt for stratum *i*, stand model *k*, time *t*	Field estimates or literature	Dimensionless	e	Before burning	sample plots	Used for estimating numbers of sample plots of each stratum and stand, as necessary
2.1.1.07	$PLID$	Sample plot ID (1, 2, 3, … pl)	Project and plot map, GIS	Alpha numeric	defined	Before the start of the project	100%	Numeric series ID will be assigned to each permanent sample plot
	^{PL}ik	Total number of plots in stratum *i*, stand model *k*	Field measurement	Dimensionless	m	5-year	100%	
2.1.1.20	Rj	Root-shoot ratio	Local-derived, national inventory,	Dimensionless	e	5 year	100% of sampling plots	Local-derived and species-specific value have the priority
2.1.1.05	sti	Standard deviation for each stratum *i*			e	At each monitoring event	100%	Used for estimating numbers of sample plots of each stratum and stand, as necessary
	$TBABj$	Above-ground biomass of a tree of species *j*	Calculations	kg dry matter $tree^{-1}$	c	5-year	100%	(Eq. 74)
	$^{T}CABj$	Carbon stock in above-ground biomass per tree of species *j*	Calculations	k g C $tree^{-1}$	c	5- y ear	100%	(Eq. 75)
	$^{T}CBBj$	Carbon stock in below-ground biomass per tree of species *j*	Calculations	k g C $tree^{-1}$	c	5- y ear	100%	(Eq. 75)
2.1.1.10	tID	Age of plantation (1, …years)	GIS	Year	m	At stand establishment	100%	Counted since the planted year
	$t^{r}ID$	Tree ID (1, 2, 3, … tr … TR = total number of trees in plot)	Field measurement	Dimensionless	m	5-year	100%	

ID number	Data Variable		Source of data	Data unit	Measured (m) calculated (c) estimated (e)	Recording frequency	Proportion of data monitored	Comment
	XF	Plot expansion factor from per plot values to per hectare values (Eq. 76)	Calculations	Dimensionless	c	5-year	100%	(Eq. 78)
	$z\alpha/2$	Value of the statistic *z* (normal probability density functio n), for α = 0.05 (implying a 95 % confidence level)	Statistic book	Dimensionless	m	5-years	0%	
2.1.1.28	¨*CAB,ijt*	Annual carbon stock change in above-ground biomass for stratum *i*, species *j*, time *t*	Calculations	tonnes C yr^{-1}	c	5-year	100%	(Eq. 86)
2.1.1.28	¨*CAB,ikt*	Annual carbon stock change in above-ground biomass for stratum *i*, stand model *k*, time *t*	Calculations	tonnes C yr^{-1}	c	5-year	100%	(Eq. 72)
2.1.1.29	¨*CBB,ijt*	Annual carbon stock change in below-ground biomass for stratum *i*, species j, time *t*	Calculations	tonnes C yr^{-1}	c	5-year	100%	(Eq. 87)
2.1.1.29	¨*CBB,ikt*	Annual carbon stock change in below-ground biomass for stratum *i*, stand model *k*, time *t*	Calculations	tonnes C yr^{-1}	c	5-year	100%	(Eq. 73)
	~*CB,ikt*	Annual carbon stock change in living biomass in the baseline for stratum *i*, stand model *k*, time *t*	Calculations	tonnes CO2-e. yr^{-1}	c	5-year	100 %	(Eq. 67)

ID number	Data Variable		Source of data	Data unit	Measured (m) calculated (c) estimated (e)	Recording frequency	Proportion of data monitored	Comment
	$\sim CLB,ikt$	Annual carbon stock change in living biomass in the project scenario for stratum *i*, stand model *k*, time *t*	Calculations	tonnes CO2-e. yr^{-1}	c	5-year	100 %	(Eq. 67)
	$\sim CP,LB$	Sum of the changes in living biomass carbon stocks in the project scenario (above- and below-ground)	Calculations	tonnes CO2-e.	c	5-year	100%	(Eq. 66)
	$\sim^{M}CAB,ikt$	Mean carbons stock change in above-ground biomass stratum *i*, stand model *k* at year *t*	Calculations	tonnes C ha^{-1} yr^{-1}	c	5-year	100%	(Eq. 79)
	$\sim^{M}CAB,ikT$	Mean carbons stock change in above-ground biomass stratum *i*, stand model *k*, between two monitoring events	Calculations	tonnes C ha^{-1}	c	5-year	100%	(Eq. 84)
	$\sim^{M}CBB,ikt$	Mean carbons stock change in below-ground biomass stratum *i*, species *j* at year *t*	Calculations	year t tonnes C ha^{-1} yr^{-1}	c	5-year	100 %	(Eq. 85)
	$\sim^{M}CBB,ikT$	Mean carbons stock change in below-ground biomass stratum *i*, species *j*, between two monitoring events	Calculations	tonnes C ha^{-1}	c	5-year	100%	(Eq. 83)

	$\sim PCAB,ijT$	Plot level mean carbon stock change in above-ground biomass in stratum *i*, species *j* between two monitoring events	Calculations	tonnes C ha^{-1}	c	5-year	100%	(Eq. 77)

ID number	Data Variable		Source of data	Data unit	Measured (m) calculated (c) estimated (e)	Recording frequency	Proportion of data monitored	Comment
	$\sim^{P}CBB,ijT$	Plot level mean carbon stock change below-ground biomass in stratum *i*, species *j* between between two monitoring events	Calculations	t C ha^{-1}	c	5-year	100%	(Eq. 82)
	$\sim^{TC}ABjt$	Carbon stock change in above-ground biomass per tree of species *j* in year *t*	Calculations	kg C $tree^{-1}$ yr^{-1}	c	5-year	100%	(Eq. 76)
	$\sim^{T}CABjT$	Carbon stock change in above-ground biomass per tree of species *j* between two monitoring events	Calculations	kg C $tree^{-1}$	c	5-year	100%	(Eq. 76)
	$\sim TCAB,jt$	Carbon stock change in below-ground biomass per tree of species *j* in year *t*	Calculations	kg C $tree^{-1}$ yr^{-1}	c	5-year	100%	(Eq. 76)
	$\sim^{T}CBBjT$	Carbon stock change in below-ground biomass per tree of species *j* between two monitoring events	Calculations	kg C $tree^{-1}$	c	5-year	100%	(Eq. 81)

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 emissions from transportation within the project boundary will add to the project emission).

There are no GHG emissions associated with the implementation of the project, therefore monitoring of the project emissions is not anticipated in this project except for occurenc eof any natural fires.

E.5. Leakage:

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

The potential source of leakage in this project is expected to be displacement of animals.

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.

Considering that leakage is not likely to occur as the existing grazing land is larger than the grazing need, there is no need to monitor the grazing activity outside the project border. For the implementation phase (first five years) the year and the proportion of the displaced animals will be recorded. This monitoring activity will be conducted by a random sample interviews of 10% land/animal owners in the project area. For the early start projects monitoring of leakage once in 5 years is adequate as year displacement is known through survey and is also considering that the project start date is prior to the availability of the approved methodology for the project.
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Table E-6: Data to be collected and archived for leakage

ID Number		Data Variable	Source of data	Data unit	Measured (m) calculated (c) estimated (e)	Recording frequency	Proportion of data monitored	Comment
	dNa_{EGlt}	Number of animals displaced in EGL areas at time t	Calculations	dimensionless	c	Yearly/once in 5 years	10%	10% of the land/animal owners shall be questioned on number of displaced animals.by year. For the early start projects monitoring of leakage once in 5 years is sufficient as year of displacement is known through surveys.

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:

$LK_{ActivityDisplacement}$ = 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.

$LK_{ActivityDisplacement}$ - 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 is very marginal on project sites due to the lack of biomass on site.

As per EB42, monitoring of leakage associated with the use of fencing posts is not required as it is considered insignificant.

Considering that leakage is not likely to occur as the existing grazing land is larger than the grazing need, there is no need to monitor the grazing activity outside the project border. For the implementation phase (first five years) the year and the proportion of the displaced animals will be recorded. This monitoring activity will be conducted by a random sample interview fo the land owners.

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 reforestation activities). The biomass coppiced during the reforestation 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 43 – Quality control and quality assurance data monitored

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

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:

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. 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.

Project activities

The proposed reforestation 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.

Positive impacts on rare and endangered species are also expected due to the promotion of the establishment of enhanced vegetation types (in terms of ecological succession), in comparison with the pre-project situation where degradation processes and overgrazing led to the lost of habitats.

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 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 Environmental Analysis.

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 can be provided upon request.

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.

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 separately and available upon request.

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 reforestation activities). The biomass coppiced during the reforestation 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 reforestation 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	6084.19	97
Growing trees	188.17	3
Total	6272.36	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	C	D	E	F	G	H	I
	oak coppice Stand volume expanded aboveground	oak coppice Stand volume expanded aboveground for the 3% of the area			eq. 7	eq. 6		eq. 5
t age	***Iijt*** m3 ha-1	***Iijt*** m3 ha-1	t	I_{vijt}	$\Delta G_{w,ijt}$	$C_{TOTAL,ikt}$	A_{ikt}	ΔC_{Gikt}
1	**0.56**	**0.0168**						
2	**1.11**	**0.0333**						
3	**1.67**	**0.0501**	Project	annual increment				
4	**2.21**	**0.0664**	Year	m3 ha^{-1} y^{-1}	t d.m. ha^{-1} y^{-1}	t CO_2 $ha^{-1}yr^{-1}$	ha	t CO_2 yr^{-1}
5	**2.76**	**0.0827**	1	0.0163	0.0099	0.0532	1666	88.60
6	**3.30**	**0.0989**	2	0.0162	0.0098	0.0528	3281	259.16
7	**3.83**	**0.1150**	3	0.0161	0.0097	0.0524	5547	531.09
8	**4.36**	**0.1309**	4	0.0160	0.0097	0.0521	6272.36	441.60
9	**4.89**	**0.1468**	5	0.0159	0.0096	0.0517	6272.36	324.41
10	**5.42**	**0.1625**	6	0.0158	0.0095	0.0514	6272.36	322.16
11	**5.94**	**0.1782**	7	0.0156	0.0095	0.0510	6272.36	319.93
12	**6.46**	**0.1937**	8	0.0155	0.0094	0.0507	6272.36	317.72
13	**6.97**	**0.2091**	9	0.0154	0.0093	0.0503	6272.36	315.52
14	**7.48**	**0.2245**	10	0.0153	0.0093	0.0500	6272.36	313.33
15	**7.99**	**0.2397**	11	0.0152	0.0092	0.0496	6272.36	311.16
16	**8.49**	**0.2548**	12	0.0151	0.0091	0.0493	6272.36	309.00
17	**8.99**	**0.2698**	13	0.0150	0.0091	0.0489	6272.36	306.86
18	**9.49**	**0.2847**	14	0.0149	0.0090	0.0486	6272.36	304.74
19	**9.98**	**0.2995**	15	0.0148	0.0090	0.0482	6272.36	302.63
20	**10.47**	**0.3142**	16	0.0147	0.0089	0.0479	6272.36	300.53
21	**10.96**	**0.3288**	17	0.0146	0.0088	0.0476	6272.36	298.45

22	**11.44**	**0.3433**	18	0.0145	0.0088	0.0473	6272.36	296.38
23	**11.92**	**0.3576**	19	0.0144	0.0087	0.0469	6272.36	294.33
24	**12.40**	**0.3719**	20	0.0143	0.0086	0.0466	6272.36	292.29
25	**12.87**	**0.3861**						6249.88 = $\Delta C_{B,LB}$
26	**13.34**	**0.4002**		eq. 4				
27	**13.81**	**0.4142**		$\Delta C_{ikt} = \Delta C_{Gikt} - \Delta CL_{ikt}$				
28	**14.27**	**0.4281**		$\Delta CL_{ikt} = 0$				
29	**14.73**	**0.4419**		eq. 2				
30	**15.19**	**0.4556**		**$C_{BSL} = \Delta C_{B,LB}$ =**		**6249.88**		**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;
- Any changes in project boundary during implementation will be monitored for verification.
- 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 5-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 one stratum the number of sample plots 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 = 6,272.36 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:

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

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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 95 sample plot where calculated for the first monitoring event. All necessary roundings 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.

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

c) Location of sampling plots

The permanent sample plots will be located systematically with a random start, which is considered good 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 number of each plot 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 plots was calculated with 95 which means a representation area of one sample plot of 66.5 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 below indicate the sample plots.

The exact geographical coordinates of each sample plot shall be chosen randomly in advance of the field work.

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

Stratum	**6'272.36 ha**	Red cells mark the plots per site
Number of plots	95.00	
Representation area per plot	66.02	

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		
02156b	10.39	10.4	0	1		
0269a	44.77	55.2	0	1	0	0
0270a	30.11	85.3	1	1	0	0
0277a	26.71	46.0	0	2	0	0
0278c	20.97	66.9	1	2	0	0
0284a	34.01	34.9	0	3	0	0
03112d	4.36	39.3	0	3	0	0
037a	3.50	42.8	0	3	0	0
037a	6.50	49.3	0	3	0	0
037a	3.25	52.5	0	3	0	0
037a	2.66	55.2	0	3	0	0
0388a	23.54	78.7	1	3	0	0
04116b	6.12	18.8	0	4	0	0
04137a	4.73	23.6	0	4	0	0
04137a	2.01	25.6	0	4	0	0
0414a	4.69	30.2	0	4	0	0
04153b	91.97	122.2	1	4	0	0
04154a	38.75	94.9	1	5	0	0
04155a	12.38	41.3	0	6	0	0
04156a	45.31	86.6	1	6	0	0
04159c	1.76	22.3	0	7	0	0
04159c	4.49	26.8	0	7	0	0
04168a	5.91	32.7	0	7	0	0
04168b	6.56	39.3	0	7	0	0
0416a	3.79	43.1	0	7	0	0
04175a	20.78	63.9	0	7	0	0
04179a	27.69	91.6	1	7	0	0
04183a	20.79	46.3	0	8	0	0
04192c	8.02	54.3	0	8	0	0
04201c	14.23	68.6	1	8	0	0
0425b	10.43	13.0	0	9	0	0
0425b	2.42	15.4	0	9	0	0
04265d	2.39	17.8	0	9	0	0
0448a	6.19	24.0	0	9	0	0
0473b	20.79	44.8	0	9	0	0
051c	36.26	81.0	1	9	0	0
0523d	10.09	25.1	0	10	0	0
867	38.10	63.2	0	10	0	0
0876b	41.31	104.5	1	10	0	0
878	21.39	59.9	0	11	0	0
0887b	17.34	77.2	1	11	0	0
0891a	7.36	18.5	0	12	0	0

Site ID	area ha	represen-ted area ha	No of samples	Plot No		
0891b	15.64	38.7	0	12	0	0
0896a	4.60	43.3	0	12	0	0
0896b	9.32	52.6	0	12	0	0
0928a	6.55	59.2	0	12	0	0
0979a	71.54	130.7	1	12	0	0
10137b	1.09	66.2	1	13	0	0
10137b	7.77	8.3	0	14	0	0
10163b	21.88	30.2	0	14	0	0
10212a	13.20	43.4	0	14	0	0
10215a	14.91	58.3	0	14	0	0
10218a	13.60	71.9	1	14	0	0
10220b	9.52	15.8	0	15	0	0
10226b	11.01	26.8	0	15	0	0
10233b	22.41	49.2	0	15	0	0
10239a	8.95	58.2	0	15	0	0
10240a	9.38	67.6	1	15	0	0
10243a	17.20	19.2	0	16	0	0
10244b	18.99	38.1	0	16	0	0
1141a	13.53	51.7	0	16	0	0
1149b	18.94	70.6	1	16	0	0
117a	30.23	35.2	0	17	0	0
118a	2.82	38.1	0	17	0	0
127a	28.07	66.1	1	17	0	0
13105b	11.78	12.3	0	18	0	0
1391b	8.40	20.7	0	18	0	0
1495	117.81	138.5	2	18	19	0
1524a	22.79	30.1	0	20	0	0
1525a	53.53	83.6	1	20	0	0
1549a	22.56	40.5	0	21	0	0
17168a	54.34	94.9	1	21	0	0
17169a	48.66	77.9	1	22	0	0
17171a	56.10	68.4	1	23	0	0
17173a	18.62	21.4	0	24	0	0
17174a	36.75	58.1	0	24	0	0
17175a	20.48	78.6	1	24	0	0
18167a	13.46	26.5	0	25	0	0
182b	14.08	40.5	0	25	0	0
1989b	3.05	43.6	0	25	0	0
2061a	35.04	78.6	1	25	0	0
2066c	9.49	22.5	0	26	0	0
22182b	22.55	45.1	0	26	0	0
2617b	10.49	55.5	0	26	0	0

Site ID	area ha	represen-ted area ha	No of samples	Plot No		
2759a	36.84	92.4	1	26	0	0
0291b	11.79	38.6	0	27	0	0
0289a	27.73	66.3	1	27	0	0
1967b	45.69	46.4	0	28	0	0
1995e	32.46	78.8	1	28	0	0
03104a	12.05	25.3	0	29	0	0
03107a	18.92	44.2	0	29	0	0
0357a	19.86	64.0	0	29	0	0
0360b	10.09	74.1	1	29	0	0
0322a	13.17	21.7	0	30	0	0
0331c/1	10.81	32.5	0	30	0	0
0347b	20.54	53.0	0	30	0	0
951	52.21	105.2	1	30	0	0
14129a	23.44	63.1	0	31	0	0
14108b	45.80	108.9	1	31	0	0
1493b	46.43	89.7	1	32	0	0
1496b	63.50	87.6	1	33	0	0
2175a	6.44	28.4	0	34	0	0
23140b	24.29	52.7	0	34	0	0
2363b	15.75	68.4	1	34	0	0
457	19.67	22.5	0	35	0	0
0433a	31.64	54.1	0	35	0	0
0438a	52.47	106.6	1	35	0	0
0444a	9.98	51.0	0	36	0	0
0454a	13.93	64.9	0	36	0	0
0461a	7.71	72.6	1	36	0	0
04279a	13.92	20.9	0	37	0	0
04280b	11.69	32.6	0	37	0	0
04106b	9.54	42.1	0	37	0	0
04174e	26.25	68.4	1	37	0	0
24151b	18.76	21.5	0	38	0	0
2447b	23.60	45.1	0	38	0	0
118a	11.11	56.2	0	38	0	0
17172a	20.17	76.4	1	38	0	0
1550c	19.06	29.9	0	39	0	0
2729a	33.68	63.5	0	39	0	0
2763a	24.40	87.9	1	39	0	0
0614a	42.81	65.1	0	40	0	0
2046a	8.54	73.7	1	40	0	0
531	45.50	53.6	0	41	0	0
553	32.08	85.6	1	41	0	0
0770a	31.62	51.6	0	42	0	0
2361	20.24	71.9	1	42	0	0
04269b	32.85	39.1	0	43	0	0
10208b	20.92	60.0	0	43	0	0
10216c	21.97	82.0	1	43	0	0
10231b	9.25	25.7	0	44	0	0
10247b	25.70	51.4	0	44	0	0
10249a	28.20	79.6	1	44	0	0
0265a	23.19	37.1	0	45	0	0
1258a	10.03	47.2	0	45	0	0

Site ID	area ha	represen-ted area ha	No of samples	Plot No		
1259c	4.565	51.7	0	45	0	0
09124a	16.816	68.5	1	45	0	0
24157b	41.545	44.5	0	46	0	0
0446a	7.302	51.8	0	46	0	0
0446a	9.206	61.0	0	46	0	0
046b	14.971	75.9	1	46	0	0
04159c	4.771	15.1	0	47	0	0
04159c	1.064	16.2	0	47	0	0
04250b	15.820	32.0	0	47	0	0
25120a	36.223	68.2	1	47	0	0
23141	56.187	58.8	0	48	0	0
888	20.683	79.5	1	48	0	0
0899b	15.540	29.4	0	49	0	0
0899a	22.706	52.1	0	49	0	0
02109b	16.177	68.3	1	49	0	0
10214b	10.328	13.0	0	50	0	0
10205b	8.890	21.9	0	50	0	0
04155b	5.516	27.4	0	50	0	0
0424a	12.280	39.7	0	50	0	0
229a	45.247	84.9	1	50	0	0
229a	32.093	51.4	0	51	0	0
22173b	13.380	64.8	0	51	0	0
1483b	63.736	128.5	1	51	0	0
1483b	6.201	69.1	1	52	0	0
1483b	8.650	12.1	0	53	0	0
1484b	33.849	46.0	0	53	0	0
1484b	78.699	124.7	1	53	0	0
1485b	79.886	138.9	2	54	55	0
1490b	5.355	13.1	0	56	0	0
1490b	17.729	30.8	0	56	0	0
1490b	66.094	96.9	1	56	0	0
14103b	59.796	91.1	1	57	0	0
14104b	52.589	78.0	1	58	0	0
14105b	24.964	37.4	0	59	0	0
14129b	25.828	63.2	0	59	0	0
23147a	39.096	102.3	1	59	0	0
2175a	9.507	46.2	0	60	0	0
2176a	17.416	63.6	0	60	0	0
2148	24.771	88.4	1	60	0	0
0985a	36.911	59.7	0	61	0	0
13105b	2.031	61.7	0	61	0	0
2649	12.146	73.9	1	61	0	0
0334a	18.911	27.2	0	62	0	0
03111b	13.342	40.5	0	62	0	0
0358b	6.142	46.6	0	62	0	0
1715a	22.804	69.4	1	62	0	0
2757	35.012	38.8	0	63	0	0
2759b	19.189	58.0	0	63	0	0
2758	19.691	77.7	1	63	0	0
2764a	23.448	35.6	0	64	0	0
2761b	32.444	68.0	1	64	0	0

Site ID	area ha	represen-ted area ha	No of samples	Plot No		
0154a	34.36	99.4	1	79	0	0
13113a	17.21	51.0	0	80	0	0
03112d	7.68	58.7	0	80	0	0
091285b	29.82	88.5	1	80	0	0
0920a	39.50	62.4	0	81	0	0
0928a	14.64	77.1	1	81	0	0
0935a	18.68	30.1	0	82	0	0
981	31.18	61.3	0	82	0	0
032a	3.60	64.9	0	82	0	0
0327c	19.27	84.2	1	82	0	0
034b	32.60	51.2	0	83	0	0
0340a	13.53	64.7	0	83	0	0
035b	12.04	76.7	1	83	0	0
0252b	38.20	49.3	0	84	0	0
0266a	64.33	113.6	1	84	0	0
02157a	36.99	85.0	1	85	0	0
10241b	9.83	29.2	0	86	0	0
10211b	12.10	41.3	0	86	0	0
1960b	11.96	53.3	0	86	0	0
1947d	37.78	91.1	1	86	0	0
1974b	5.87	31.3	0	87	0	0
1974c	4.28	35.6	0	87	0	0
1990d	5.20	40.8	0	87	0	0
1990d	4.16	44.9	0	87	0	0
1990b	4.41	49.3	0	87	0	0
02109c	26.72	76.1	1	87	0	0
02105b	24.66	35.1	0	88	0	0
04138a	6.52	41.6	0	88	0	0
04253d	13.00	54.6	0	88	0	0
04242c	14.03	68.7	1	88	0	0
1494b	179.28	182.3	2	89	90	0
1460a	10.92	62.0	0	91	0	0
2362b	10.80	72.8	1	91	0	0
23144a	60.73	67.9	1	92	0	0
23146b	31.55	33.8	0	93	0	0
23146a	40.86	74.7	1	93	0	0
09126a	30.86	40.0	0	94	0	0
0331d	10.29	50.2	0	94	0	0
0330c/1	13.28	63.5	0	94	0	0
03111a	17.57	81.1	1	94	0	0
1379a	40.09	55.6	0	95	0	0
	6'223					

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.

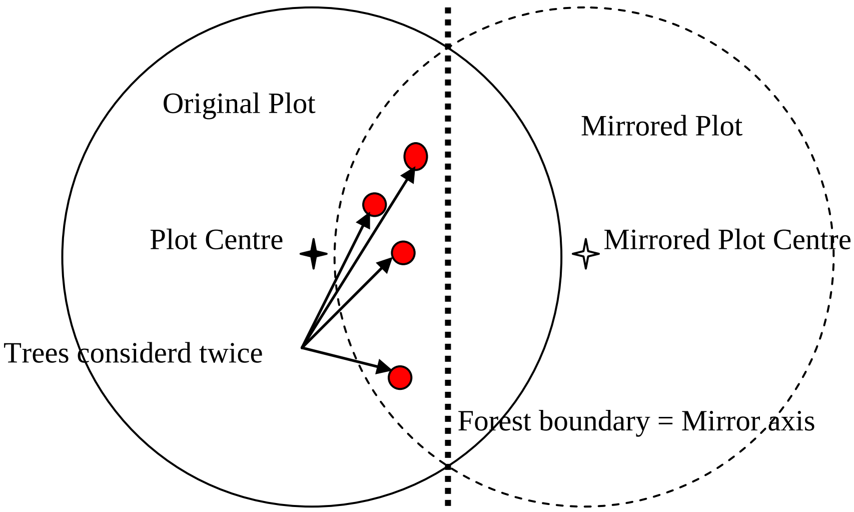

Figure 1: Mirror method for plots at forest boundary.

Table 2: Determination of circular plot radii.

Inclination (%)	Inclination (degrees)	200 m² radius (m)	Inclination (%)	Inclination (degrees)	200 m² radius (m)
0-10	0.0	7.98	80	38.7	9.03
15	8.5	8.02	85	40.4	9.14
20	11.3	8.06	90	42.0	9.25
25	14.0	8.10	95	43.5	9.37
30	16.7	8.15	100	45.0	9.49
35	19.3	8.21	105	46.4	9.61
40	21.8	8.28	110	47.7	9.73
45	24.2	8.36	115	49.0	9.85
50	26.6	8.44	120	50.2	9.97
55	28.8	8.52	125	51.3	10.09
60	31.0	8.62	130	52.4	10.22
65	33.0	8.71	135	53.5	10.34
70	35.0	8.82	140	54.5	10.47
75	36.9	8.92	145	55.4	10.59

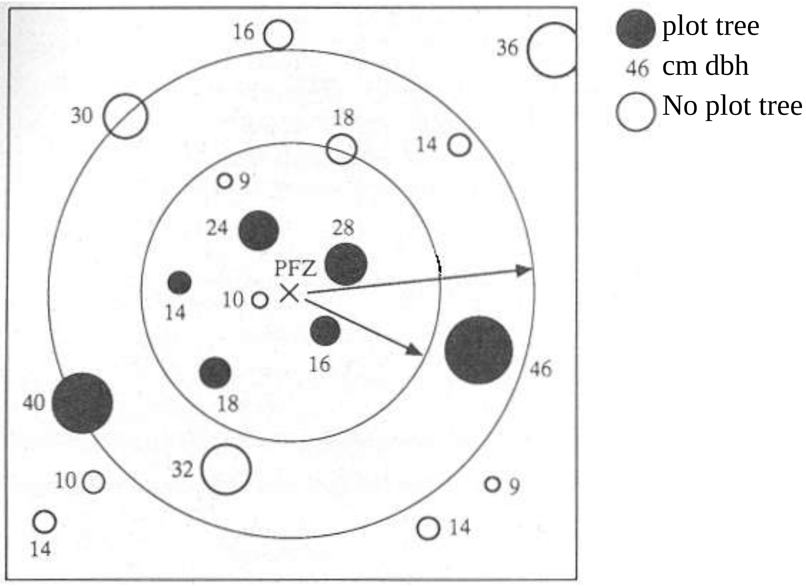

Figure 3: Plot of the national forest inventory with concentric circles

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.

1. Monitoring and verification event: second half of 2012
2. Monitoring and verification event: second half of 2016
3. Monitoring and verification event: second half of 2020
4. Monitoring and verification event: second half of 2024

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.

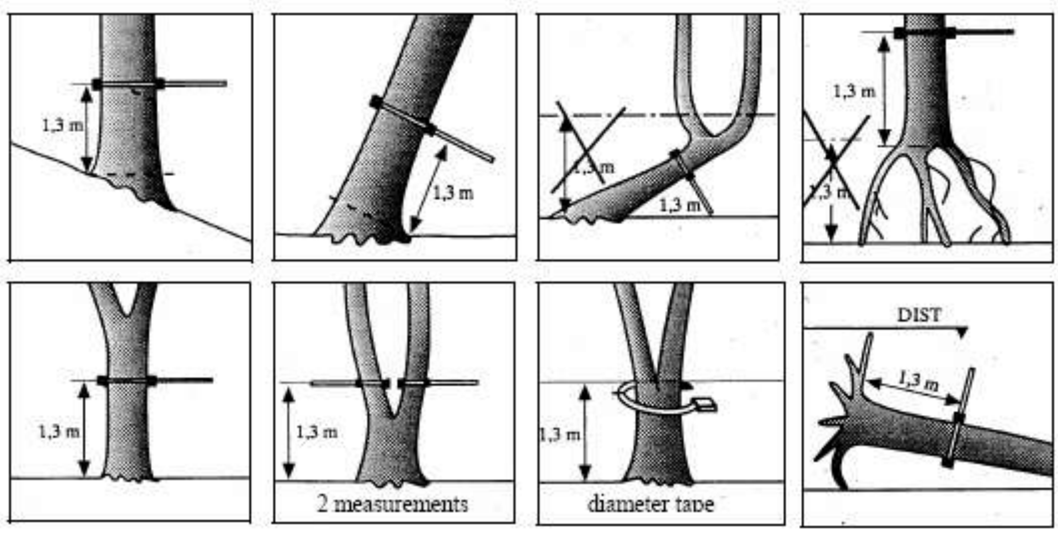

Figure 4: Examples of diameter measurements.

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

Displacement of grazing and other economic activities

The displacement of grazing is only expected to occur to EGL areas. Displacement of other economic activities such as fuelwood collection is not expected under the project. 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.

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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