CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM FOR A/R CDM PROJECT ACTIVITIES
(CDM-AR-PDD)
(Version 05)

TABLE OF CONTENTS

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

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

Moldova Community Forestry Development Project. Version: 7

Date: 2/11/ 2012

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

Soil erosion and landslides are major limiting factors from the economic and environmental point of view for land use in the Republic of Moldova. These problems if allowed to continue could result in long-term adverse impacts on the land productivity in several parts of the country.

The Moldova Community Forestry Development Project is implemented as an AR CDM project. The purpose of the project activity is to create new community forests on the area of 8,468.84 ha by means of reforestation of degraded lands, application of agro-forestry practices, creation of forest protection belts, that will enhance GHG removals by sinks, improve forest and pastoral resources at local and regional level, provide wood to the local population, and contribute to local and regional sustainable development.

The project proposes to restore the productivity of several categories of degraded lands such as degraded pastures, glades and abandoned arable lands through AR activities involving native and naturalized locally adaptive species. Based on site productivity, project lands can be categorized under the site productivity classes I, II, III and IV (site productivity class is a unit for the estimation of the productivity of forest stand, is established as a relation between the age and the average height of the forest stand; for every species the yield tables are developed[1]). The poor site quality (III-IV site classes representing low productivity occupy 97% from the total area) along with high degree of degradation consequently represent low productivity.

The species for planting are selected based on suitability to soil as well as climate and adaptability to the sites. Local communities also actively participated in species selection. Villagers' preferences for species are motivated by the following aspects: soil improvement, rotation period time, as well as delivery of social and economic benefits.

As a result, the project expects to establish vegetation on severely degraded lands. Locally adapted and naturalized species such as *Robinia pseudoacacia,Gleditsia triacanthos* mixed with native species are planted on these lands. The long-term experience (more than 50 years) of forest management in Moldova

[1] - Giurgiu, V., Decei, J. and Armasecu. Biometrics of Trees and Stands in Romania – Dedrometric Tables. CERES, Bucharest 1972 [Original Romanian Title: S., 1972: Biometria arborilor şi arboretelor din România – Tabele dendrometrice. Editura "CERES", Bucuresti]
- The USSR State Committee on Forestry – Normative References for the Taxation of Forest in Ukraine and Moldova. Kiev "Harvest" (Ukrainian and Moldavian Yield Tables), p. 225; p. 259. [Original Russian Title: Gosudarstvennyi Komitet SSSR po lesnomu hozeastvu (1987). Normativno-spavochnye materialy dlea taksatstyi lesov Ukrainy I Moldavii. Kiev "Urojai" (Ukrainian and Moldavian Yield Tables), p. 225; p. 259.]

has shown that *Robinia* is widely adapted to poor sites, on which other species are not cost effective. The *Robinia* plantations account for more than 50% of area afforested in the country since 1950. Native species such as *Quercus sp.* help improve site conditions and vegetative cover of restored lands if planted after one or two rotations of naturalized and locally adaptive species. Project areas planted with *Quercus sp.* are proposed to be managed over a 100 year rotation, areas planted with *Robinia sp.* and associated species are to be managed under 31-year rotation. On partially degraded sites, on the other hand, native species such as Oak (*Quercus sp.*) are chosen as lead species. Other broadleaf species and shrubs are planted to improve floral diversity. The project expects to improve soil conditions and promote regeneration of native species over the long-term.

The activities undertaken under the project include: site preparation, nursery management, planting stock development, planting, protection, and management of plantations. The planting activities under the project activities are implemented from 2006 and 2009. These activities involved manual and mechanical methods of soil preparation and planting. The post-planting activities included protection, gap planting, tending, pest management, thinning, fire control, and harvesting. **No nitrogenous fertilizers** have been used in the project and **no biomass burning activities are practiced.** However, the project proposes to monitor biomass burning that may occur from natural fires.

The Agency Moldsilva is the implementation entity of the project. Moldsilva and local councils traditionally lacked financial resources to restore degraded lands. Due to lack of investments, public and community lands degraded over time, have shown significant productivity declines and have become susceptible to erosion and landslides. In the absence of restorative action, these lands are expected to degrade further and continue to be the major sources of GHG emissions. The local councils are expected to manage the planted sites as per approved management plan. A monitoring plan is in place to ensure that the project activities are implemented as per project design document; monitoring and verification of carbon pools at regular intervals will assess progress.

The incentive in the form of revenue from sale of temporary certified emission reduction credits (tCERs) from /reforestation activities under the CDM not only has served to catalyze the project, but it also has motivated the establishment of key legally-binding institutional arrangements as well as stakeholder relationships involving Moldsilva and 289 local councils who represent the Moldova's rural communities. The communities own a significant part (93.8%) of the project total area (8,468.84 ha) and the remainder (6.2%) is managed by other possessors. As per contractual arrangement, Moldsilva is authorized to undertake reforestation (AR) and maintenance activities on lands owned by local councils and to manage these lands until after the establishment of forest. The lands will be fully transferred back to local councils upon completion of the contract term for subsequent management by the respective localities. Land ownership, however, rests with the local councils for the entirety of the contract duration.

The past forest management of Moldsilva has shown that AR activities with locally adaptive and naturalized species is a cost-effective option to prevent soil erosion and landslides, stabilize slopes, and generate wood and non-wood product supplies to meet the requirements of rural communities. As native species often require better soil conditions, their share will be increased to the extent possible in the subsequent crediting periods on the lands restored using naturalized species.

The following national policies and legal provisions of Republic of Moldova's form the basis for undertaking this project.
Land Code (no 350-XIV/July 12, 2001)
(http://lex.justice.md/index.php?action=view&view=doc&lang=1&id=313324),

Forest Code (law no. 887/June, 21, 1996) (http://lex.justice.md/index.php?action=view&view=doc&lang=1&id=311740), Water Code (no. 440-XIII/ April, 27, 1995) (http://lex.justice.md/index.php?action=view&view=doc&lang=1&id=311611), Law on Rehabilitation of Degraded Lands through Afforestation (1041-XIV/June, 15, 2000) (http://lex.justice.md/index.php?action=view&view=doc&lang=1&id=312730), Strategy on Sustainable Development of Forestry Sector (no. 350-XV din 12.07.2001) (http://lex.justice.md/index.php?action=view&view=doc&lang=1&id=308876), National Strategy and Action Plan for Biodiversity Conservation (no.112-XV/April 27, 2001) (http://lex.justice.md/index.php?action=view&view=doc&lang=1&id=307364), and the national initiatives implemented under the UN Framework Convention on Climate Change, the Convention on Biological Diversity and the UN Convention to Combat Desertification.

The AR CDM project activity promotes **sustainable development** of the **Republic of Moldova**. It is implemented **over 8,468.84 ha** of degraded lands. The project contributes to **sustainable development** in several ways, including: degraded lands restoration; prevention of soil erosion; increase in forest cover; soil productivity improvement; improved fuelwood supply; availability of timber and non-timber products to meet rural communities' needs; replenishment of carbon stocks on degraded lands; and climate change mitigation among others. Some of the anticipated benefits are outlined below.

- ***Prevention of future land degradation***: The project will prevent landslides, improve hydrological regime and minimize water and wind erosion. The forested areas will act as shelter-belts and limit adverse impacts of degraded lands' soil erosion on adjoining lands.

- ***Supply of forest products and services***: Local population will benefit from increases in supplies of forest products. In the medium to long-term, the project will provide multiple products, services, and income from sale of timber and non-timber products such as medicinal plants, honey from beekeeping etc., and fuelwood supplies to meet the household cooking energy needs of the rural and urban households.

- ***Community based management of degraded lands****:* The project activity is made possible with active cooperation of local councils, who own about 94% of lands under the project, and are expected to manage these lands after their transfer from Moldsilva.

- ***Local employment***: The project is expected to create local employment through activities such as planting, weeding, tending, thinning, protection, and harvest of wood. The project will provide employment to men in site preparation, planting and harvesting, and to women in nursery management, weeding, and collection of non-timber forest products.

- ***Increase in GHG removals in soil and biomass pools***: The project activity is expected to enhance the GHG removals by restoring soil productivity and accrual of above-and below-ground carbon pools.

- ***Biodiversity conservation***: Biodiversity benefits of the project are expected to be in terms of protection of threatened species, improvements in ecological succession and habitat restoration of for endangered flora and fauna.

The project crediting period is 30 years (2006-2036) and the estimated annual average of net anthropogenic GHG removals by sinks is 39,056.94 tCO_2e for a total of 1,171,708 tCO_2e over the crediting period.

A.3. Project participants:

Please list project participants and Party(ies) involved and provide contact information in Annex 1. Information shall be indicated using the following tabular format.

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 Moldova (host)	Public entity – Agency Moldsilva, International Bank for Reconstruction and Development as custodian of the BioCarbon Fund	No
(*) In accordance with the A/R CDM modalities and procedures, at the time of making the CDM-AR-PDD public at the stage of validation, a Party involved may or may not have provided its approval. At the time of requesting registration, the approval by the Party(ies) involved is required.		
Note: When the CDM-AR-PDD is prepared to support a proposed new baseline and monitoring methodology (form CDM-AR-NM), at least the host Party(ies) and any known project participant (e.g. those proposing a new methodology) shall be identified.		

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

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

A.4.1.1. Host Party(ies):

Republic of Moldova is the Host Party. Agency Moldsilva is the implementing agency. It represents the participant local communities and has contractual arrangements with all of them for management of the forested areas under the project.

A.4.1.2. Region/State/Province:

All districts of the country, except Transnistria

A.4.1.3. City/Town/Community (if applicable):

All districts of the country, except Transnistria

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:

Republic of Moldova is situated in the South-eastern Europe between $45^0$28’ – $48^0$30’ Northern latitude and $26^0$30’ – $30^0$05’ Eastern longitude. The project covers all districts of Republic of Moldova except the

eastern territories of Transnistria. The AR CDM project covers 8,468.84 ha spread over 770 sites (merged in 693 polygons) in 278 communities (local councils, municipalities), spread over 21 forest enterprises in different parts of the country.

The project areas and project boundary conforms to the guidelines outlined in the Section III.1 of the approved methodology AR-AM0002 (version 03). The project boundaries have been defined using GPS and represented shape files in GIS format (Annex 6) and are verified according to Standard Operating Procedures (SOPs) – SOP 1 from the BioCarbon Fund Manual for Monitoring of A/R CDM Projects[2]. In addition, 4-6 digital photographs of each plot are recorded and archived in the project database. All plots are represented on cadastral maps of 1:10,000 and on digital map in MapInfo GIS format. Annex 5 of this PDD lists the details of the project sites in different forest enterprises and geographical zones of the country. The shape file of the project area with all the discrete area land parcels is presented in Annex 6. **Table 1** presents the distribution of project area by land use category and by forest enterprise.

Table 1: Categories of lands included in the project.

Nr.	**Forest enterprises**	**Degraded lands, ha**			**Pastures, ha**			**Total, ha**
		Eroded lands	Degraded arable lands	**Sub-total**	Pastures	Glades/ open grounds	**Sub-total**	
1.	Straseni	142.61		142.61	31.15		31.15	173.76
2.	Soroca	272.65	99.8	372.45	153.73		153.73	526.18
3.	Edinet	149.7		149.7	279.4		279.4	429.1
4.	Orhei	115.16		115.16	2.5		2.5	117.66
5.	Nisporeni	127.34	46.7	174.04	71.24		71.24	245.28
6.	Iargara	201.14		201.14	735.87	126.79	862.66	1063.8
7.	Hincesti	173.32		173.32	90.11		90.11	263.43
8.	Glodeni	187.3	18	205.3	108.3		108.3	313.6
9.	Calarasi	183.19		183.19	25.7		25.7	208.89
10.	Balti	82.2	34.3	116.5	269.9	17.6	287.5	404
11.	Manta-V	15		15	276.73		276.73	291.73
12.	Telenesti	28.67	148.97	177.64	62.45		62.45	240.09
13.	Ungheni	274.57		274.57	153.66	65.72	219.38	493.95
14.	Silva-Sud	57.84		57.84	446.25		446.25	504.09
15.	Ialoveni (Rezeni)	11	6	17	484.95	5.9	490.85	507.85
16.	Chisinau	434.38	6.6	440.98	178.36		178.36	619.34
17.	Tighina	402.97	296.17	699.14	320.1		320.1	1019.24
18.	Comrat	95.9		95.9	169		169	264.9
19.	Plaiul Fagului	3.02		3.02	35.3		35.3	38.32
20.	Padurea Domneasca	67.98		67.98			0	67.98
21.	Cimislia	16.2		16.2	659.45		659.45	675.65
Total:		3042.14	656.54	3698.68	4554.15	216.01	4770.16	**8468.84**

Source: *Records according to the General Land Cadastre (2005), Project Implementation Unit, Moldsilva (ICAS), Chisinau.*

[2] http://wbcarbonfinance.org/docs/Manual_for_Monitornig_of_CDM_AR_Projects_Part_I-SOPs.pdf

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

A.5.1. Concise description of the present environmental conditions of the area planned for the proposed A/R CDM project activity, including:

A.5.1.1. Climate:

Moldova's proximity to the Black Sea gives it a mild and sunny climate. The climate is moderately continental: the summers are warm and long, with temperatures averaging about 20°C, and the winters are relatively mild and dry, with January temperatures averaging −4°C. Annual rainfall, which ranges from around 600 millimeters in the north to 400 millimeters in the south, can vary greatly; long dry spells are not unusual. The heaviest rainfall occurs in early summer and again in October; heavy showers and thunderstorms are common. Because of the irregular terrain, heavy summer rains often cause erosion and river silting.

A.5.1.2. Hydrology:

There are 3,621 rivers and water-springs in Moldova. All of them form part of the Black Sea basin and can be categorized as follows: the Dniester Basin Rivers, the Pruth Basin Rivers and the southern region rivers falling into either the Danube estuary or in the Black Sea coastal salt lakes. The majority of rivers are small in size. The largest rivers include: the Dniester (1,352 km long, including 657 km in Moldova, with the annual water debit of approximately 10 cubic km), the Pruth (976 km long, including 695 km in Moldova, with the annual water debit of about 2.4 cubic km), the Reut (286 km long), the Cogilnic (243 km long, including 125 km in Moldova), the Bic (155 km long), the Botna (152 km long).

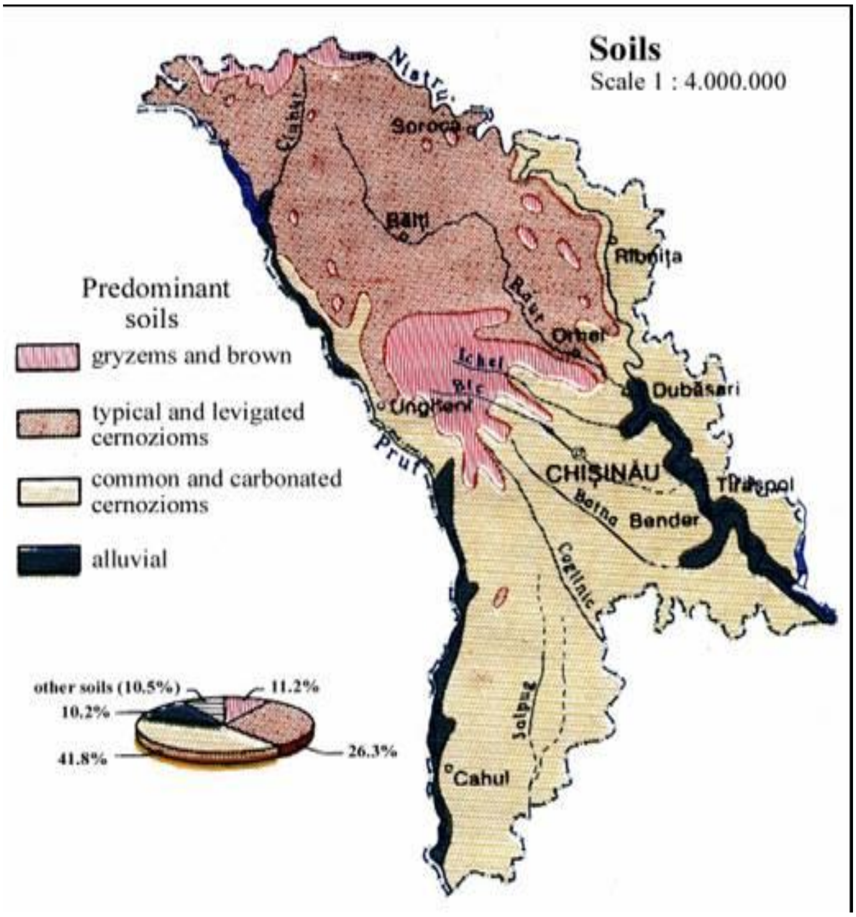
The principal water sources feeding the rivers are snowfalls and rainfalls, whereas the subsoil water plays only a minor role. The majority of precipitations occur in the form of rainfall, whereas snow accounts for as little as 10% of the total precipitations. High water levels are observed in spring due to the melting snow (40-50% of the annual flow). In summer the water levels in rivers - and in particular in small rivers – can rise considerably after storm rainfall, sometimes causing disastrous floods.

There are approximately 60 natural lakes in Moldova. Most of them are the lakes located in the high-water beds of the rivers Pruth (Beleu, Rotunda, Fontan) and Dniester (Old Dniester, Cuciurgan). There exist in addition above 3500 water storage ponds created and maintained for diverse economic purposes (such as: irrigation, fishing, recreation, industrial and household needs, protection from floods). The large water-storage reservoirs have been created for hydro-power plants: Costesti–Stinca (735.0 mln.m^3) on the river Pruth jointly with Romania; and Dubasari (277.4 mln.m^3) on the Dniester river.

A.5.1.3. Soils:

The soil types of Moldova can be categorized into chernozem (75%), dark brown and forest grey (11%), and meadow (9%) etc. **Figure 1** presents the distribution of soil types by the country's territory and **Table 3** contains soil types met on the project sites. Lands that were covered with forest and/or steppe vegetation in the past have been subjected to wind and water erosion, landslide, gully and ravine formation.

Figure 1: Soil types of Moldova



Source: Republic of Moldova. Geo-morphological conditions. Map series edited by Gh. Sirodoev, 2007

Soil erosion

The soil erosion is observed in the form of mass movement (landslides and soil creep) and particle movement (through-wash, rain splash, rain flow, rill wash and gully erosion) in several plots throughout the project area. The erosion and unsustainable land use practices contribute to significant loss of soil organic carbon and agricultural productivity. Foregone agricultural production is estimated by ISA to be US$40 Million per year. [3] Annual loss of soils ranges from 5-10 t/ha/yr for slightly eroded land to over 30 t/ha/yr for highly eroded lands.[4] **Table 2** presents the average annual loss of soil organic matter and soil carbon under different soil erosion intensities. The soil loss increases several-fold in response to the increases in slope and erosion.

[3]The World Bank/ FAO (2007): Rural Productivity in Moldova- Managing Natural Vulnerability, The World Bank Sustainable Development Department Europe and Central Asia Region, p.7 http://siteresources.worldbank.org/INTMOLDOVA/Resources/RuralProductivity.pdf

[4]Ibid.

Table 2: Loss of soil, organic matter and carbon from lands through erosion.

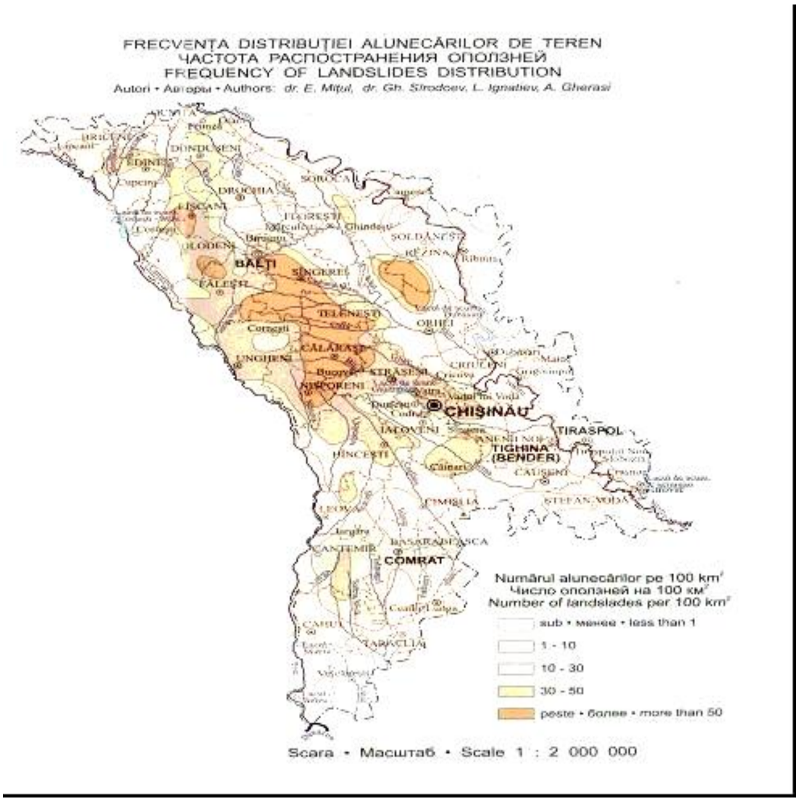
Slope(°)	Magnitude of erosion	Dehumification, t/ha/year	Loss of soil through erosion, t/ha/year	Loss of humus through erosion, t/ha/year	Total loss of organic carbon, t/ha/year
0	No erosion	0.6	0	0.00	0.35
1-2	slight	0.6	10	0.35	0.55
2-4	little	0.5	20	0.70	0.69
4-6	moderate	0.4	30	0.90	0.75
6-8	strong	0.4	50	1.10	0.87
8-10	excessive*	0.3	60	0.90	0.69

* Eroded soils from abrupt slopes have low humus content; therefore, dehumification is less important.

***Source**: Information system on the quality of the soil cover of Moldova (database), Chisinau, Pontos, 2000; Project Implementation Unit, Moldsilva (ICAS), Chisinau*

The geology and soil type are the major factors that contribute to mass movement of soil and landslides. **Figure 2** presents the distribution of landslide occurrences in Moldova. Considering the high intensity of erosion in the north and the central regions, project sites located in these regions are subject to more frequent landslide events in comparison to those observed in the southern region.

Figure 2: Distribution of landslides



Source: Republic of Moldova. Geo-morphological conditions. Map series edited by Gh. Sirodoev, 2007

Seventeen types of soils were identified during the description of initial conditions of lands under the project **(Table 3)**. The chernoziom (77%) forms the largest soil type. About 65% from the project area is affected by strong and excessive erosion. More details about the soil types and erosion are included in the project database.

Table 3: Status of erosion process on the project sites.

Soil type	Code soil type	Total area, ha	Repartition by the level of erosion and other adverse factors									*Share, %*
			S_1	S_{1-2}	S_2	S_{2-3}	S_{2-4}	S_3	S_{3-4}	S_4	Other factors	
Typical cernoziom	1201	3422.77	1001.36	586.83	1497.76	198.22		138.6				*40.4*
Cernoziom pseudorendzinic	1205	240.2				15.01		225.19				*2.8*
Gley cernoziom	1207	800.54	185.56	90.62	334.19	17.9		162.77			9.5	*9.5*
Carbonate cernoziom	1221	568.99	33.05	39.38	432.31	39.52		8.73		16		*6.7*
Meadow cernoziom	1222	3.5	3.5									*0.0*
Alkalized cernoziom	1301	985.53	307.98	160.9	353.51	89.14					74	*11.6*
Podzol cernoziom	1401	293.39	107	47.5	98.39	40.5						*3.5*
Cernoziom podzol salt	1407	165.35	3		82.94			79.41				*2.0*
Forest grey soil	1601	78.71		15.6	55.01	8.1						*0.9*
Forest dark grey	1609	46.16	20.3	13.2	12.66							*0.5*
Forest light grey	1610	7.95			3.23						4.72	*0.1*
Brown podzol	2201	14		6	8							*0.2*
Soils damaged by f	9000	563.24	56.46	25.57	307.37	93.62		67.35	12	0.87		*6.7*
Alluvial soil	9501	55.55	9.6	0.88							45.07	*0.7*
Erodisoils	9601	868.2		138.9	5	509.5	64.7	135.4		14.7		*10.3*
Degraded soils	9801	354.76			126.6	222.92		5.24				*4.2*
Total		**8468.84**	**1727.81**	**1125.38**	**3316.97**	**1234.43**	**64.7**	**822.69**	**12**	**31.57**	**133.29**	***100.0***
Share, %		*100,0*	*20.4*	*13.3*	*39.2*	*14.6*	*0.8*	*9.7*	*0.1*	*0.4*	*1.6*	

***Source**: Records according to the General Land Cadastre (2005), Calculation based on the project data. Project Implementation Unit, Moldsilva (ICAS), Chisinau*

Table 4 summarizes information on degraded lands of the project affected with erosion and other adverse factors. As shown in the table below, most project sites are affected by strong to very strong surface and gully erosion.

Table 4: Summary of soil erosion status of the project sites.

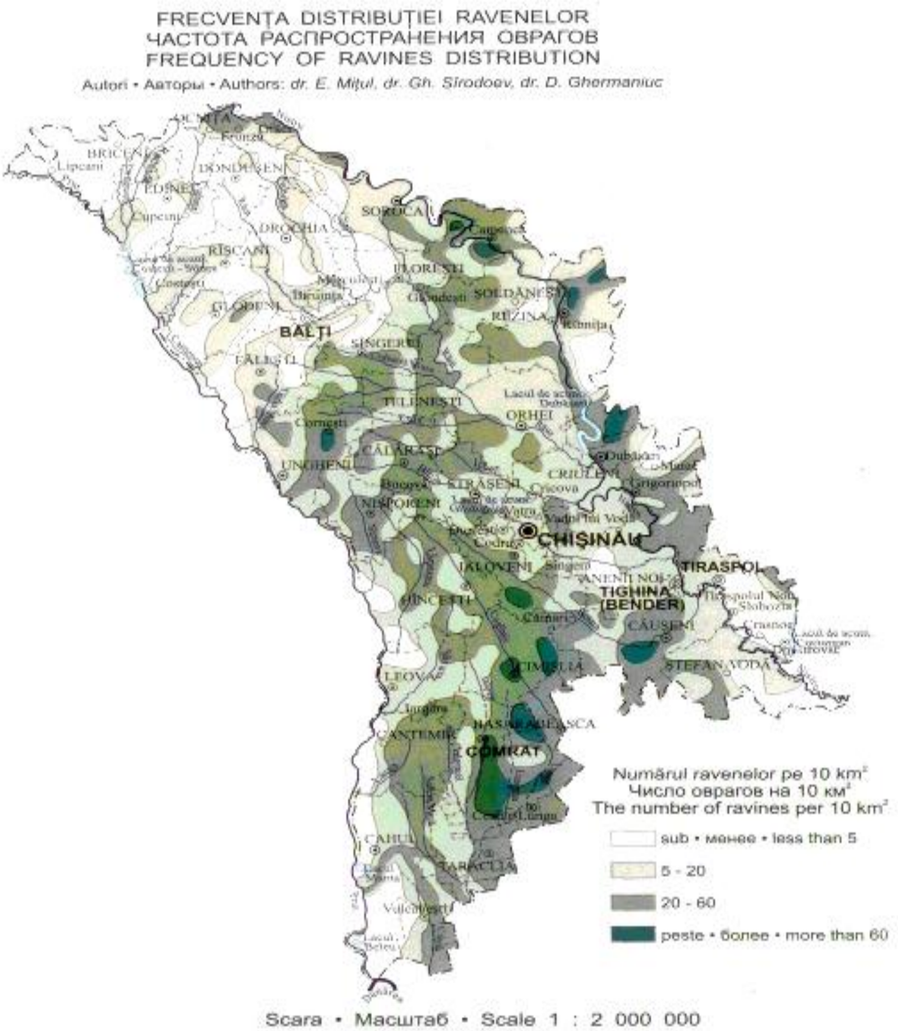
	S_1* moderate	**S_2**** strong	**S_3 ***** very strong	**S_4** excessive	**Other** adverse factor	**Total**
No. of parcels	254	430	66	6	14	770
Area. ha	2853.2	4551.4	899.39	31.57	133.29	8468.8
Share,%	*33.7*	*53.7*	*10.6*	*0.4*	*1.6*	*100.0*

* include S_1-S_2, ** includes S_2-S_3, *** includes S_2-S_4 and S_3-S_4.

Source: *Calculation based on the project data. Project Implementation Unit, Moldsilva, Chisinau.*

Figure 3 highlights the distribution of ravines on the country. The severity of ravines increases in the southern region.

Figure 3: Distribution of ravines.

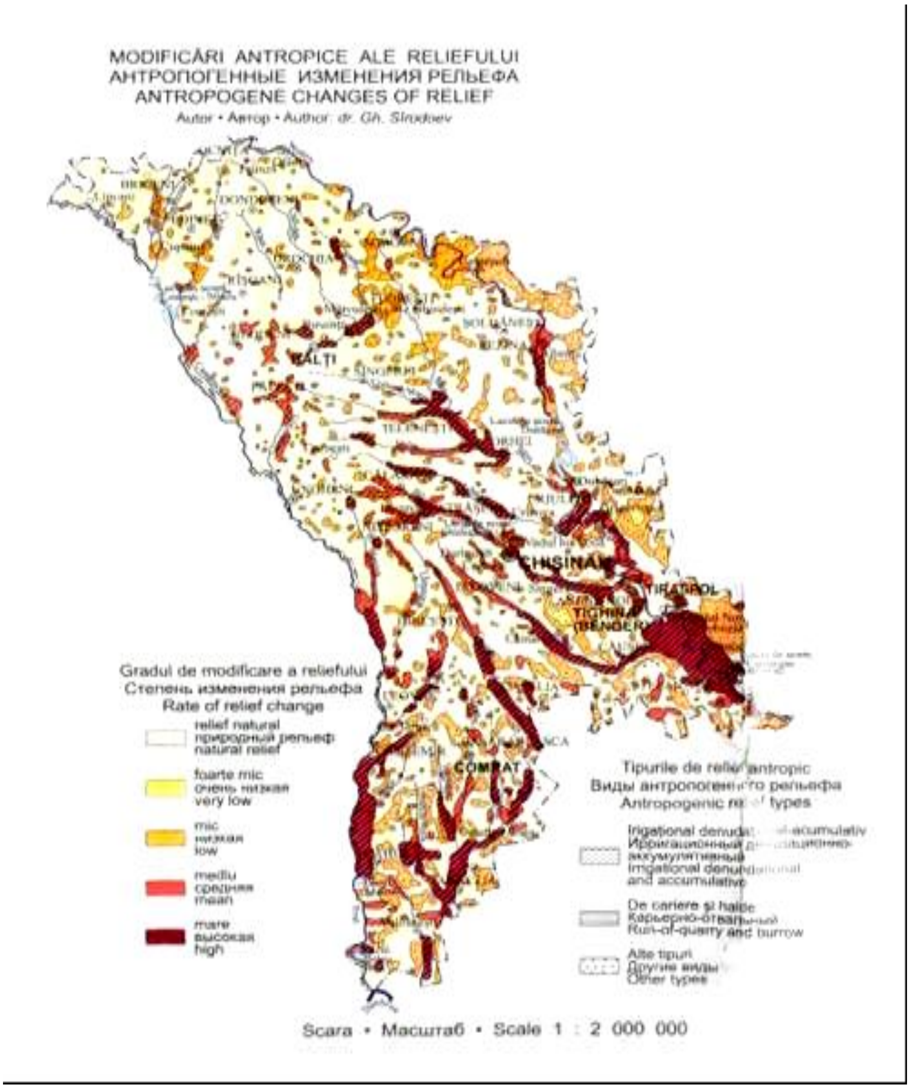


Source: Republic of Moldova. Geo-morphological conditions. Map series edited by Gh. Sirodoev, 2007

Figure 4 highlights anthropogenic influence on land use and relief. Taking into account the information from **Figures 2 to 4**, it is clear that the geographic and anthropogenic factors together contribute to landslides in the north and the central regions and to severe soil erosion in the southern region.

The AR CDM project is expected to increase the humus levels of the soils at the rate of 0.005-0.01% per annum, which is expected to increase the soil organic matter over time and contribute to the stabilization of degraded lands[5]).

Figure 4: Anthropogenic influences on land use and relief



Source: Republic of Moldova. Geo-morphological conditions. Map series edited by Gh. Sirodoev, 2007

[5] *The Information System on the Quality of the Soil Cover of Moldova (Database), Chisinau, Pontos, 2000;*

A.5.1.4. Ecosystems:

Based on ecosystem diversity, the three bio-geographic regions (the broadleaf Central European forests, the Mediterranean forests, and the Eurasian steppe) are recognized in Moldova. The most diverse areas are located in the floodplains and wet regions; and the most threatened diversity is located in the steppe region, which has undergone significant fragmentation due to conversion to other land use categories and subsequent invasion of weedy species. These negative changes have also resulted in the undesirable consequences for wildlife habitat.

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

Figure 5 presents the distribution of natural reserve areas protected under legislation. The establishment of natural reserves helped to limit the adverse anthropogenic impacts on the floral and faunal diversity.

Figure 5: **Protected areas and landscape reserves of Moldova**

Source: Republic of Moldova. Geo-morphological conditions. Map series edited by Gh. Sirodoev, 2007

The Northern, Central, and Southern geographic zones show distinct differences in their ecosystems and floral diversity. The floral diversity of degraded lands is significantly low. The vegetation comprises

hardy species resistant to adverse factors (grazing, salinization, carbonates etc.) mixed with weeds. The *northern* zone represents damp climate and forest soils with characteristic pedunculate oak (*Quercus robur*) and cherry vegetation. *The central zone* is a compact massif comparable to broadleaf forests of the Central Europe. The soils of Central region range from brown to grey and light grey on slopes to dark grey in depressions, and support *Quercus petraea, Quercus robur and Fagus sylvatica* vegetation. The *southern zone* is a dry steppe characterized by downy oak (*Quercus pubescens*) mixed with pedunculate oak (*Quercus robur*). Downy oak (*Quercus pubescens*) predominate on the South and South Western slopes at low elevations.

In the northern zone, primary floral species include: *Stipo capillatae, Bothriochloetum herbosum, Festuceto valesiaci, Bothriochloetum herbosum, Festuceto valesiaci, Bothriochloetum ischaemii, Poaeto bulbos, Bothriochloetum ischaemii,Poaeto angustifolii, Festuceto valesiaci, and Bothriochloetum iscaemii.*

The floral species found on pastures in the central zone are: *Festuca sulcata; Stipeta ucraini, S. lessinae, S. pennatae, S. tirsi, S. pulcherrimae, Fistuceta valesiaci,* and *S. herbosum*. The floral species found on pastures in the southern zone, on the other hand, are: *Festucetum herbosum, Festucetum valesiaceae,Festuca valesiaca, Festuea sulcata, Stipeta ucraini, S. lessinae, S. pennatae, S. tirsi, S. pulcherrimae, Fistuceta valesiaci,* and *S. herbosum*.

Differences with regards to faunal diversity among the project zones are also important. There is significant decline in the faunal diversity on degraded lands with the largest decline reflected on the degraded lands of the southern zone. The *threatened* species ofvertebrate fauna on degraded lands include: *Sicista subtilis, Cricetus cricetus, Mustela eversmanni, Aquila rapax, Circus cyaneus, Circus macrourus, Circus pygargus, Otis tarda, Tetrax tetrax, Vipera ursine, Elaphe quatuorlineata*. **Table 5** presents the faunal diversity of the project area in the northern, central and southern zones.

Table 5: Faunal diversity of the project area (pastures and degraded lands).

Order	**Northern Zone**		**Central Zone**		**Southern Zone**	
	Pastures	Degraded lands	Pastures	Degraded lands	Pastures	Degraded lands
Mammals	14	13	14	14	11	6
Birds	17	6	18	6	19	5
Reptiles	3	3	3	3	8	5
Amphibians	2	1	2	1	2	1
TOTAL:	**36**	**23**	**37**	**24**	**40**	**17**

Source: *Dr. A. Munteanu – Head of Lab., Institute of Zoology, Moldova Academy of Sciences (personal communication).*

Some of the fauna species in the project zones are threatened. About 13 threatened bird species are reported to nest on the project sites. In case of amphibians, two threatened species are reported to be associated with the pasture lands and one threatened species is associated with the degraded lands. In case of mammals, two threatened species of rodents, *Spermaphilus citellus* and *S. suslica* are reported to be associated with the project area, and *Spermaphilus citellus* is listed in the Red Data Book of Moldova and Europe. The number of rare and endangered species of the project area is presented in **Table 6**. A large proportion of bird and reptile species in southern zone are threatened.

Table 6: Occurrence of threatened species in the project area.

Order	Northern Zone		Central Zone		Southern Zone	
	Pastures	Degraded lands	Pastures	Degraded lands	Pastures	Degraded lands
Mammals	2	1	1	1	1	-
Birds	4	-	4	-	5	-
Reptiles	-	-	1	-	4	2
Amphibians	1	-	1	-	1	-
TOTAL	**7**	**1**	**7**	**1**	**11**	**2**

Source: *Dr. A. Munteanu – Head of Lab., Institute of Zoology, Moldova Academy of Sciences (personal communication).*

The spatial diversity and species density depends on the status of vegetation and its extent of disturbance. A comparison of Table 5 and Table 6 shows that a large number of faunal species in the pastures are threatened. Anthropogenic influences are assumed to be the major factors contributing to high proportion of threatened species in the pastures. In fact, during the field phase of the baseline study, endangered faunal species have been not registered.

Invertebrates have not been studied in detail with regards to their status and distribution in the project area. It has been reported that several invertebrates are found in the ecotone between pasture and degraded lands. Therefore, restoration of the ecotone is critical for restoring the endemic diversity.

During the field phase of the baseline study, no rare and endangered species were observed. During project implementation, independent biodiversity monitoring will be carried out by Botanical Garden of the Academy of Sciences of Moldova and the findings on the biodiversity (including those on endangered species) in the project areas will be recorded in the project database and reported. Independent biodiversity monitoring plan and indicators are outlined in detail in the Monitoring Plan, Annex 4 of the PDD.

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

The project consists of several species, as specified in the table below:

Table 7: Project species and strata

Species	Strata			
	Robinia pseudo-acacia III	**Robinia pseudo-acacia IV**	**Quercus III**	**Quercus IV**
Robinia pseudoacacia	4500	4500	0	0
Quercus	0	0	4500	4500
Acer	480	600	0	600
Carpinus	0	0	480	0
Fraxinus	240	0	480	600

Other broad-lived hardwood species[6]	300	0300	300	300
Tilia	0	0	240	0
Ulmus	480	600	0	0
Total	6,000.00	6,000.00	6,000.00	6,000.00

On partially degraded sites, and where vegetation conditions permit, native species such as *Quercus sp* are planted. On poor lands, locally adapted fast growing, non-native and naturalized species such as *Robinia* and *Gleditschia* are used. The past experience has demonstrated that the successful establishment of locally adapted species for land reclamation stabilizes the soils prior to the establishment of native species that require better soil conditions. The fast growing locally adapted species have also been successful in meeting the rural fuelwood needs from degraded lands. A large proportion of shrub species (enumerated above) have also been included in the planting activity to maximize soil conservation and erosion control objectives.

Improved seed and planting stock: As part of the measures to promote improved planting stock, seed collected from rigorously selected plus trees and provenances have been used in the production of nursery stock. Standard operational procedures have been followed in collection of seed and planting stock development.

Nursery technology and improved practices: To improve the germination of seed and establishment of seedlings, seeds are subjected to scarification and other special treatments. For the seeds of *Robinia*, *Gleditsia*, and *Sophora*, dormancy is interrupted through treatment with water at the temperatures of 60º-80ºC and stirring the seed in hot water for 20-30 minutes and soaking in water for about 12-24 hours. Improved germination results are obtained by treating seed with micronutrients and biofertilizers. In addition, seeds are treated with fungicides and insecticides prior to sowing.

The nursery practices that contributed to improved seed germination are harrowing, mulching, weed control, tillage and irrigation. To promote favorable conditions for seedling growth, manual or mechanical weeding is carried out at periodic intervals. However, no fertilization is used either during nursery or during the forest establishment stage.

Forest establishment: Tending operations are done to maximize the survival of seedlings in the second and third years. These operations focus on protection, weeding, pest management and fire control and implemented as per the recommended technical and silvicultural guidelines of Moldsilva[7]. To ensure high survival rates, gaps are planted in the second and third years.

Short and long rotation species: The project activities use short rotation and long rotation species. *Robinia* is a short rotation species *used in* plantings during the last 5 decades. Therefore Robinia along with other species with similar silvicultural characteristics are used as short rotation species in the project. Depending on the improvements in site productivity, native long rotation species are proposed to replace

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[6]Other broad-leaved hardwoods *include Gleditschia triachantos, Sophora japonica, Malus silvestry, Pyrus pyraster, and Ribes. Shrubs are also planted, including,Crataegus laevigata, Crataegus monogyna, Cornus mass, Corylus avellana, Eleagnus angustifolia, Prunus cerasifera, Cotinus coggygria, Rosa canina, and Ligustum vulgaris.*

[7] M.S (1995): Technical guidelines for the stands management in Moldova, Forestry Research and Management Centre Chisinau, 1995

the fast growing short rotation species after one to two rotations. **Figure 6** shows the afforested areas of the project.

Figure 6: Area afforested under the project

***Source**: Project Implementation Unit, Moldsilva (ICAS), Chisinau.*

The following criteria are used in the selection of species for planting under the project:

1. Adaptability of species to soils and climate that establish quickly on degraded lands and create favorable conditions for the subsequent establishment of native species.

2. Fast growing species that are preferred by local communities (e.g. *Robinia pseudoacacia, Gleditschia triachantos,*) and that have locally adapted to variety of soils, slope and elevation. They require short period for canopy closure and harvested over a short rotation period. The rotation period for Robinia under the project is 31 years.

3. Slow growing native species (*Quercus*, *Fraxinus*) are given priority on less degraded sites as they need better soils for their establishment and require more than 10 years to complete the canopy closure. These species have long rotation period, e.g. the rotation period for oak under the project is 100 years.

4. Species preferences of the local communities for fuelwood, timber, and non-wood forest products are taken into account.

5. Low fodder collection costs to the local communities from fodder available in the established plantations.

Main species description

An overview on some species included under species-groups is presented below.

Quercus robur is commonly known as the English oak or pedunculate oak– is spread throughout the Republic of Moldova. It is a large deciduous tree 25–35 m tall (exceptionally to 50 m). It has lobed and nearly sessile (very short-stalked) leaves 7–14 cm long. Flowering takes place in mid spring, and their fruit, called acorns, ripen by the following autumn. The acorns are 2–2.5 cm long, pedunculate (having a

peduncle or acorn-stalk, 3–7 cm long) with one to four acorns on each peduncle. The acorns form a valuable food resource for several small mammals and some birds. At early stages (the first 5-10 years) it grows slowly, then grows at a moderate growth until the rotation period and is resistant to cold. It grows well on fertile soils and soils with low humidity and is also resistant to drought. Its timber has wide range of uses (construction, furniture, crafts, etc.).

Quercus rubra– is widely adapted to variety of climate conditions. The long rotation of up to 100 years, ability to grow on several soil types, resistance to diseases, deep root system and high biomass accumulation and litter production capabilities reflects its role in improving the site quality. It produces high quality timber that can be used for structural purposes in construction activities. The acorns are important sources of food for many species of birds and mammals.

***Robinia pseudoacacia* –** is a short rotation species with a rotation of 25-35 years. It is a major source of fuel wood and windbreak. It is a hardy species with well-developed root system and is known to survive on a variety of soils and to endure droughts. The history of its introduction in Moldova during more than one hundred years has shown that it is a pioneer and no aggressive species with strong ability to adapt to degraded lands. Plantations of *Robinia* in Moldova (more than 130 thousand ha) are the main sources of fuelwood supply.

***Fraxinus excelsior* –** it grows up to 40 m, prefers to grow in deep, moist, well drained and fertile soil. It also grows best on northern and eastern sides of hills where the atmosphere is moist and cool. Has not single leaves but are compound and made up of several “leaflets”.The bark is smooth and grey with fissures that appear as it grows older. People have used the hardwood timber of Ash for many years. Its timber is one of the toughest and a natural shock absorber. The wood can take a hard blow without splintering and so is used where strength and flexibility are needed. Used for tool and sport handles: hammers, axes, spades, hockey sticks and oars. The attractive grain, the strength and the way it can be easily bent means that Ash is also widely used for furniture.

Carpinus betulus (European or common hornbeam) is a hornbeam native to Moldova. It is a small to medium-size tree reaching heights of 15–25 m. The leaves are alternate, 4–9 cm long, with prominent veins giving a distinctive corrugated texture, and a serrated margin. The bark is smooth and greenish-grey, even in old trees. Hornbeam is a shade-loving tree, which prefers moderate soil fertility and moisture. It has a shallow, wide-spreading root system and is marked by the production of stump sprouts when cut back. The wood is heavy and hard, and is used for tools and building constructions. It also burns hot and slowly, making it very suitable firewood.

Ulmus campestris; often called U. carpinifolia, U. foliacea, and U. minor), a deciduous tree related to the genus Ulmus of the family Ulmaceae; it is up to 30 m tall and 1.5 m in diameter. The leaves are petiolate, whole, compact, asymmetrical, and usually bare on the top. The flowers, with a rusty red perianth, are gathered in fascicles. The tree blooms in March and April before the leaves appear. The flowers are melliferous. The smooth-leaved elm reproduces by means of seeds, root offshoots, and root shoots from the tree stump. The tree lives up to 300 years. The young trees grow rapidly. They like plenty of light and are drought resistant but do poorly in frost. The wood is used in such trades as machine construction and joinery.

Acer campestre (Field Maple) - is a deciduous tree reaching 15–25 m tall, with a trunk up to 1 m diameter, with finely fissured, often somewhat corky bark. The shoots are brown, with dark brown winter buds. The leaves are in opposite pairs, 5–16 cm long (including the 3–9 cm petiole) and 5–10 cm broad,

with five blunt, rounded lobes with a smooth margin. he wood is white, hard and strong, and used for furniture, flooring, wood turning and musical instruments, though the small size of the tree and its relatively slow growth make it an unimportant wood.

Acer platanoides (Norway Maple) - It is a deciduous tree growing to 20–30 m tall with a trunk up to 1.5 m diameter, and a broad, rounded crown. The bark is grey-brown and shallowly grooved; unlike many other maples, mature trees do not tend to develop a shaggy bark. The shoots are green at first, soon becoming pale brown; the winter buds are shiny red-brown. The wood is hard, yellowish-white to pale reddish, with the heartwood not distinct; it is used for furniture and turnery.

Shrubs**:** The shrub species including *Cotinus coggygria, Crataegus monogyna, Rosa canina, Corylus avelana, Cornus mas, Prunus cerasifera, Ligustum vulgaris* have been planted in between the tree species have the ability to adapt to wide range of conditions in the degraded lands and contribute to the improvement of soil fertility.
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A.5.4. Technology to be employed by the proposed A/R CDM project activity:

The project activities are undertaken as per the national guidelines on scientific forest management[8] and silvicultural practices implemented by Moldsilva on the degraded lands[9].

The project adopted scientific methods in delineating project boundary and site preparation, improved seed, nursery technologies and planting methods, silvicultural operations, integrated soil and water conservation, and environmentally safe management practices. The technologies and practices implemented under the project are as follows:

Use of GPS in the demarcation of project boundary: The project uses Global Position System (GPS) and Geographic Information Systems (GIS) to delineate the project boundary and to verify the location of project sites. These technologies will be used throughout the project implementation period to cost-effectively monitor and account carbon stock changes in the project.
Site preparation: The project adopts anti-erosion, surface leveling, slope control, landslide prevention, and runoff reduction measures. In order to prevent soil erosion and limit GHG emissions, biomass burning is not be used in the site preparation. Mechanical preparation is selectively used for sites with heavy weed infestation and to break hard sub-soil. Site preparation activities are carried out as per the recommended soil management practices.

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

The project has organized training programs and conferences to generate awareness on the sustainable land management and forest management. Several training programs have been conducted to train the project personnel on aspects related to project management, monitoring and community awareness. The training and outreach programs organized under the project are as follows:

[8] National guidelines: Technical guidance for forest regeneration and afforestation of forest in Moldova. Chisinau 1996 [Original Romanian Title: Îndrumările tehnice pentru regenerarea pădurilor şi împădurirea terenurilor forestiere din Republica Moldova”, Kisinew, 1996.]

[9]The forest management and silvicultural expertise of Moldsilva during the last 50 years contributed to successful plantations of over 300,000 ha and helped in increasing the forest cover from 6% to 10.7%.

1) Carbon Finance Document (CFD) has been presented at the technical meeting with Chief forest engineers and engineers for forest fund from 21 forest enterprises, December 19, 2007, Vadul-lui-Voda.
2) 2006-2009: Forest enterprise level training programs have been organized to strengthen the implementation of the project.
3) 2008: Technical meetings with the executors of the field work have been organized to train them on the use of GPS devices and digital photos, as well as on the completion of field worksheets and other technical issues.
4) 2008: Technical meetings involving the representatives of territorial divisions of Moldsilva and local councils were organized to discuss the importance of planting of forest crops on degraded lands, how to ensure sustainable management of new created forests and involvement of local population in this process.

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:

Out of total project area of 8,468.84 ha, about 93.8% of area is under the control of local councils, other possessors manage the remaining area. All possessors hold legal titles over the project lands, which can be cross-checked during validation. The councils signed usufruct contracts with Moldsilva permitting the agency to carry out plantations and to maintain them until canopy closure for a period of up to 10 years. After termination of contracts, local councils will continue management activities. After termination of contracts, local councils will continue management activities. The model of the contract between Moldsilva and local councils in presented in Annex15a.

Law on improvement of degraded lands through reforestation (1041-XIV/2000, dated 15/06/2000) forms the legal base for this AR CDM project. The land allocation for planting activity has been done as per the provisions of the Land Code and Governmental Decisions no 246 and dated 03/05/1996 and no 1451 as of 21/12/2007 on the approval of Regulations on the assignment, change of destination and exchange of lands and as per the procedure outlined below:

- Creation of commission for identification of degraded lands owned by local community, and decision on land improvement through reforestation (the participants are representatives of local public bodies, environmental bodies, regional forest enterprises and various land owners). The result of the commission's work is a document containing information on characteristics of selected land (owner, land use category, soil condition, etc.).

- Based on this document, the land owner (in the project case - the democratically elected local council) develops a decision on the allocation of land for reforestation and management regime.

- An application for transfer of land use rights to Moldsilva is submitted to the Government. After receiving the necessary permits, the Government issued a decision on final approval of transfer. It is important to point out that including after the transfer, the ownership over the land remains with the local communities.

Local councils sign a contract with the Agency Moldsilva establishing the rights and obligations of both parties. The contract spells out the Moldsilva will organize and carry out planting, protection measures and management of forests until canopy closure stage according to the management plan. Local

communities are entitled to all forest products resulting from the project activity (fodder, wood products, fuelwood, hunting, medicinal plants, forest fruits and berries). In turn, the local communities surrender their right to the tCERs generated by the project activity. For this purpose, Moldsilva and local councils have signed additional agreements according to which the rights of the Agency Moldsilva to the emissions reductions generated from the afforested lands are recognized (Annex 15b). Moldsilva will use the proceeds from tCERs sale in order to recover a portion (30%) of the investment costs. At the termination of contracts, forest plantation management obligation will be returned to the local council. The local community must commit to maintaining the forest for 100 years.

The following institutional arrangements define the rights and access to sequestered carbon:

- Legal basis of dialogue and partnership between local councils and Moldsilva clarifies the status of transferred lands and reflects the lack of conflict concerning the rights and ownership to the lands;

- Large-scale participation of communities creates economy of scale regarding the costs of protection, and reduces the transaction costs of monitoring large number of sites as per the bottom-up approach to site selection; and

- Long-term project horizon and legally binding contractual arrangements between Moldsilva and local councils are expected to hedge against the non-permanency risk to a significant extent.

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

The project qualifies as the reforestation activity as per the draft decision CMP-1 of CP7 of Marrakech Accords (2001)[10]. The degraded sites lack woody vegetation and have not been planted after 31/12/1989. They thus comply with the definition of reforestation under the CDM. Only limited natural regeneration has been witnessed on project sites. As pointed out in the literature on the widely studied problem of soil erosion in Moldova, e.g. by Summer/ Diernhofer (2003): "The rapid soil erosion in Moldova has serious implications for the long-term sustainability of the agricultural production in Moldova, as the natural regenerative capacity of soils is low." [11]

The Republic of Moldova has defined the criteria for "forest" as laid out in section F, paragraph 8 a-c of the annex to the decision -/CMP.1, modalities and procedures for reforestation and reforestation project activities under the Clean Development Mechanism (http://cdm.unfccc.int/DNA) making it eligible to host the AR CDM project activity.

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[10] Draft decision -/CMP.1 Land-use, land-use change and forestry (LULUCF) from CP. 7 "Marrakech Accords" on the definitions, modalities, rules and guidelines relating to LULUCF under the Kyoto Protocol.

(c) "**Reforestation**" is the direct human-induced conversion of non-forested land to forested land through planting, seeding and/or the human-induced promotion of natural seed sources, on land that was forested but that has been converted to non-forested land. For the first commitment period, reforestation activities will be limited to reforestation occurring on those lands that did not contain forest on 31 December 1989

[11] Summer, Wolfgang/ Dierenhofer, Wolfgang (2003): Soil Erosion in the Republic of Moldova – the importance of institutional arrangements, in: Erosion Prediction in Ungauged Basins: Integrating Methods and Techniques, IAHS Publication no. 279, 2003, p. 28 iahs.info/redbooks/a279/iahs_279_0024.pdf

As per the Order Nr 7-P as of 11/01/2006 of the State Forestry Agency, Moldsilva (under the provisions of the Forest Code– Articles 3, 11 and 12 Statutes of Moldsilva, and approved by the Government of Republic of Moldova), the following criteria define the forest.

- A minimum area of 0.25 hectares covered with vegetation;
- A minimum tree crown cover or stocking level of 30%; and
- A minimum height of 5 meters.

The above thresholds comply with the UNFCCC definition of forest for the purposes of reforestation activities under the Clean Development Mechanism of the Kyoto Protocol[12].

The project follows the *Procedures to Demonstrate the Eligibility of Lands for Afforestation and Reforestation Project Activities* (Annex 18, EB35)[13]. The eligibility of lands to be included in the project is demonstrated using the information:

a) Baseline field studies conducted prior to the project indicate that the lands to be reforested under the proposed AR CDM project activity include low productive bare lands and lands in different stages of degradation that do not meet, and are incapable of attaining, the thresholds of definition of forest as communicated by the Designated National Authority of Republic of Moldova to the UNFCCC.

b) The soil and land use/cover maps, matched to GPS coordinates of the project lands, demonstrate that the lands falling under the project are affected by severe forms of soil erosion, landslides and other forms of degradation that limit the use of such lands for other productive purposes.

c) The data on land use from official records, matched to GPS coordinates of the project lands, demonstrate that the project lands to be reforested have been without forest since 1989.

A.8. Approach for addressing non-permanence:

Adoption of 30-year crediting period and generation of the **temporary Certified Emissions Reductions** (**t-CER**)is the approach to address permanence. In this context, project design, crediting period and institutional and contractual arrangements involving Moldsilva and local councils and regulatory framework are organized to address the issues of non-permanence. Agency Moldsilva (through its territorial structures - forest enterprises) and local councils entered into contractual arrangements (the length of contracts is 10 years) to improve degraded lands though reforestation. According to the provisions of the contracts, local councils are obliged to "… allot through the decision of Local Council lands for reforestation and to maintain these lands as forested area ***during next 100 years***."

[12]For LULUCF activities under Articles1 3.3 and 3.4, the following definitions shall apply: (a) "**Forest**" is a minimum area of land of 0.05-1.0 hectares with tree crown cover (or equivalent stocking level) of more than 10-30 per cent with trees with the potential to reach a minimum height of 2-5 metres at maturity *in situ*. A forest may consist either of closed forest formations where trees of various storeys and undergrowth cover a high proportion of the ground or open forest. Young natural stands and all plantations which have yet to reach a crown density of 10-30 per cent or tree height of 2-5 metres are included under forest, as are areas normally forming part of the forest which are temporarily unstocked as a result of human intervention or natural causes but which are expected to revert to forest.

[13]http://cdm.unfccc.int/EB/035/eb35_repan18.pdf

The project addresses non-permanence by use of species with rotation periods longer than the operational length of the project and crediting period. The planting activity involves species of different rotation lengths. The short rotation species such as *Robinia* will be replanted and regenerated at the end of their rotation. The adoption of long rotation species such as *Quercus*, and 100-year operational period of the project ensures the permanent vegetative cover of lands as a result of the reforestation activities.

The rotation age of species planted in the project is 31 years for *Robinia pseudoacacia* and up to 100 years for the slow growing species such as *Quercus, Carpinus, Ulmus campestris, Fraxinus excelsior*. The first verification will take place in 2012, and subsequent verifications are expected in 2017, 2022 and 2027. First harvesting will only occur in 2037. It is therefore clarified that the verification schedules of the project do not coincide with carbon peaks.

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

Table 8: Estimation of net anthropogenic GHG removals by sinks

Year	Estimation of baseline net GHG removals by sinks (tonnes of CO_2 e)	Estimation of actual net GHG removals by sinks (tonnes of CO_2 e)	Estimation of leakage (tonnes of CO_2 e)	Estimation of net anthropogenic GHG removals by sinks (tonnes of CO_2 e)
2006	588	2,163	0	1,575
2007	1,647	24,539	0	22,893
2008	3,154	75,053	0	71,899
2009	5,123	144,464	0	139,342
2010	7,551	223,819	0	216,268
2011	10,382	300,812	0	290,431
2012	13,615	374,250	0	360,635
2013	17,251	445,099	0	427,848
2014	21,289	503,783	0	482,493
2015	25,730	554,123	0	528,392
2016	30,485	604,727	0	574,242
2017	35,554	651,897	0	616,343
2018	40,937	699,120	0	658,183
2019	46,634	746,055	0	699,421
2020	52,645	794,173	0	741,528
2021	58,945	841,574	0	782,629
2022	65,534	887,954	0	822,419
2023	72,413	933,319	0	860,907
2024	79,580	978,181	0	898,601
2025	87,034	1,022,958	0	935,925
2026	94,693	1,064,861	0	970,168
2027	102,559	1,102,202	0	999,642
2028	110,631	1,136,448	0	1,025,817
2029	118,909	1,169,103	0	1,050,193
2030	127,394	1,201,758	0	1,074,364
2031	136,051	1,233,075	0	1,097,025

2032	144,880	1,262,389	0	1,117,508
2033	153,883	1,290,258	0	1,136,375
2034	163,058	1,317,314	0	1,154,256
2035	172,407	1,344,115	0	1,171,708
Total ($t CO_2$-e)				**1,171,708**

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

The project is financed and implemented by the Forestry Agency Moldsilva with the participation of local councils. The revenue from the sale of temporary Certified Emissions Reductions (tCERs) of the project is expected to partially supplement the Moldsilva's financial resources needed for implementation and management of the project.

This project does not receive funding from any sources related to the Official Development Assistance and the Parties to the Annex I of the Kyoto Protocol for its implementation.

A project Japanese grant of US $ 975,900 that is not directly connected to the project supports the income generation and natural resource management activities of the forest enterprises in whose jurisdiction the project is implemented. It is a capacity building activity implemented throughout the country.The activities undertaken under the grant indirectly contribute to prevention of leakage in the project area.

The Japanese PHRD grant is not a diversion of ODA as there is no revenue (including receipt of CERs from the project) to the Japanese government from the PHRD grant. According to paragraph 10, p.3 OECD guidelines: ….if instead of receiving CERs, a donor has agreed with the host country not to receive any of the generated CERs, or if the project does not generate CERs (e.g. a capacity development activity), no deduction would be necessary."

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 starting date of the project is 01/11/2006. This is the date when the first planting began. This fact can be confirmed by the acts of technical reception of planting works (e.g. Primaria Taul, area 10.5 ha, Primaria Cernoleuca, area 11.5 ha (Forest Enterprise Edinet), primaria Lozova, area 3.7 ha (Forest Enterprise Straseni), Primaria Nisporeni, area 4.2 ha (Forest Enterprise Nisporeni) etc.

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

100 years.

B.3 Choice of crediting period:

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

N.A.

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

The fixed crediting period of 30 years (30-yr-00-mm).

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 A/R methodology AR-AM0002 (version 03): Restoration of degraded lands through afforestation/reforestation[14] is applied to the proposed project.

For the purpose of the project the following tools and guidelines were used: "Tool for the Demonstration and Assessment of Addionality in A/R CDM Project Activities" (version 02) (EB 35 Annex 17)[15]; "Tool for the identification of degraded or degrading lands for consideration in implementing CDM A/R project activities" (version 01) (EB 41 Annex 15)[16].For assessment of land eligibility the "Procedures to demonstrate the eligibility of lands for afforestation and reforestation CDM project activities" v. 01, EB 35, Annex 18[17] has been applied.

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

The application of approved methodology AR-AM0002 (version 03) to the project context is demonstrated by showing that the project meets all applicability conditions of the methodology AR-AM0002 (version 03) outlined below.

- The project activity does not lead to a shift of pre-project activities outside the project boundary, i.e. the land under the project activity provide at least the same amount of goods and services as in the absence of the project activity.

    (a) Grazing that occurred on the project land can be absorbed by adequate alternative land available to villagers for their livestock. In addition, livestock numbers in Moldova are declining[18] which implies a reduction in grazing activity (and therefore pressure) throughout the country.

    (b) The project provides more goods and services relative to the situation in the absence of the project. The goods and services from the project include: i) the hay production under the project scenario is significantly greater than in the baseline scenario. The project permits hay collection on the project sites after five years of project implementation; ii) the hay collection will also

[14] http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_521G64I2VT53AZ88A9YHXZWNX9ZBUB

[15] http://cdm.unfccc.int/methodologies/ARmethodologies/tools/ar-am-tool-01-v2.pdf

[16] http://cdm.unfccc.int/methodologies/ARmethodologies/tools/ar-am-tool-13-v1.pdf

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

[18] National Bureau of Statistics of the Republic of Moldova, Livestock and Poultry as of January 1 (2003-2010), http://www.statistica.md/pageview.php?l=en&idc=315&id=2281

provide additional employment for local communities; iii) project also permits fodder production between tree rows for the first five years of the project; and iv) the project provides significant employment opportunities to local communities in nursery, planting and protection activities. Therefore, additional goods and services provided by the project include:

- Employment creation: seven workers were employed per ha of forest plantation establishment who were paid 700 Moldova lei (US$ 58) each per ha (8,468ha in total). The project also provided significant employment in nursery establishment activities.
- Medicinal plants: on some project plots, medicinal plants and roses (for teas) were planted. On some plots, 500kg/year are harvested (12 Moldovan Lei (1US$) kilo)
- Hay collection: The project permits hay collection on the project sites after five years of project implementation

In contrast, the goods provided by the baseline is incidental grazing, which is insignificant relative to the goods and services generated by the project.

In conclusion, the project provides more goods and services to the non-project scenario and complies with the stipulation of the methodology, i.e., the project provide at least the same amount of goods and services as in the absences of the project activity.

(c) The leakage prevention activities included in the project to improve livestock management, high value breeds and programs to reduce less productive livestock under a Japanese PHRD grant are aimed at preventing the shifting in grazing pressure to areas outside the project. The project monitoring will also cover the implementation progress of leakage prevention measures in the project

- Lands to be reforested are severely degraded (due to such agents as soil erosion, landslides, or other physical constraints as well as anthropogenic actions) with the vegetation indicators (tree crown cover and height) below the thresholds for defining forests, as communicated by the DNA consistent with decision 11/CP.7 and 19/CP.9, and the lands are still degrading. As outlined in the previous sections, the lands are eligible for AR project considering they are in various stages of degradation.

As outlined in the previous sections, the lands are eligible for AR project considering they are in various stages of degradation. In conformity with the approved methodology AR-AM0002 (version 03), the project covers lands categorized as degraded lands under the official land use classification of Republic of Moldova. The governmental decision no 636, 26/05/2003 of Republic of Moldova (http://lex.justice.md/index.php?action=view&view=doc&lang=1&id=303581) categorizes degraded lands as those that have negative anthropogenic or natural processes that could cause at least 5% or more of loss in productivity and corresponding increase in the restoration expenditure. Such lands have also been found to show productivity declines as observed from the loss of carbon pools in the baseline scenario. Degraded lands are adversely affected by physical, chemical, and biological processes such as accelerated erosion, leaching, soil compaction, salinization, flooding, loss of fertility, and decline in natural regeneration, disruption of hydrological cycle, and are subject to increased drought risk[19]. Several

[19] A detailed categorization of degraded lands is represented as per Article 21 of the Law on the Improvement of Degraded Lands by the means of afforestation (nr. 1041-XIV, 15/06/2000) and presented in Section A.4.1.4

anthropogenic and natural causes are responsible for land degradation as documented in the literature[20].

In compliance with applicability conditions of AR-AM0002 (version 03), the A/R methodological tool (EB41 Annex 15) - "Tool for the identification of degraded or degrading lands for consideration in implementing CDM A/R project activities (version 01)[21]" was applied to demonstrate that all project lands are considered degraded or degrading.

As per the Article 2 of the Law on Improvement of Degraded Lands through Afforestation (nr. 1041-XIV, 15/10/2000)[22] the degraded lands are identified as lands subjected to erosion, destructive action of anthropogenic factors and have lost the capacity for agricultural production. The following categories of lands are categorized as degraded lands:

- Lands with strong and excessive superficial erosion;
- Lands with depth/linear erosion – surface erosion, ravine and gully erosion;
- Lands affected by active landslides, crumbling, wash-out etc;
- Sandy soils exposed to wind and water erosion;
- Stony soils and lands with the deposition of heavy sediment;
- Lands with the permanent excess humidity; and
- Low or unproductive lands.

The degraded status of lands is assessed for the lands included in the project. For this purpose, the A/R methodological tool (Annex 15, EB41) – "Tool for the identification of degraded or degrading lands for consideration in implementing CDM A/R project activities (version 01)"[23] was applied to demonstrate that all project lands are considered degraded or degrading.

In accordance with the tool, the degraded/degrading status is demonstrated on project lands by the following criteria:

Stage 1: classification as "degraded" under international land classification system (within last 10 years):

As per the FAO National Soil Degradation map[24] of 2008 (referenced in the "Tool for the identification of degraded or degrading lands for consideration in implementing CDM A/R project activities" (version 01)), the territory of Moldova is categorized as affected by severe to very severe human induced degradation. The map quantifies the severity of human induced degradation regionally, and categorizes all of Moldova as severe to very severe human-induced degradation (Figure 7).

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[20] There is large convergence of views of most researchers on the topic, e.g., Chisholm, A., and R. Dumsday, Eds., (1987) *Land Degradation*, Cambridge Univ. Press, Cambridge; Barrow, C. J. *Land Degradation* (1991) Cambridge Univ. Press, Cambridge; Eswaran, H., R. Lal and P.F. Reich (2001) Land degradation: an overview. In: Bridges, E.M., I.D. Hannam, L.R. Oldeman, F.W.T. Pening de Vries, S.J. Scherr, and S. Sompatpanit (eds.). Responses to Land Degradation. Proc. 2nd.International Conference on Land Degradation and Desertification, Khon Kaen, Thailand.Oxford Press.

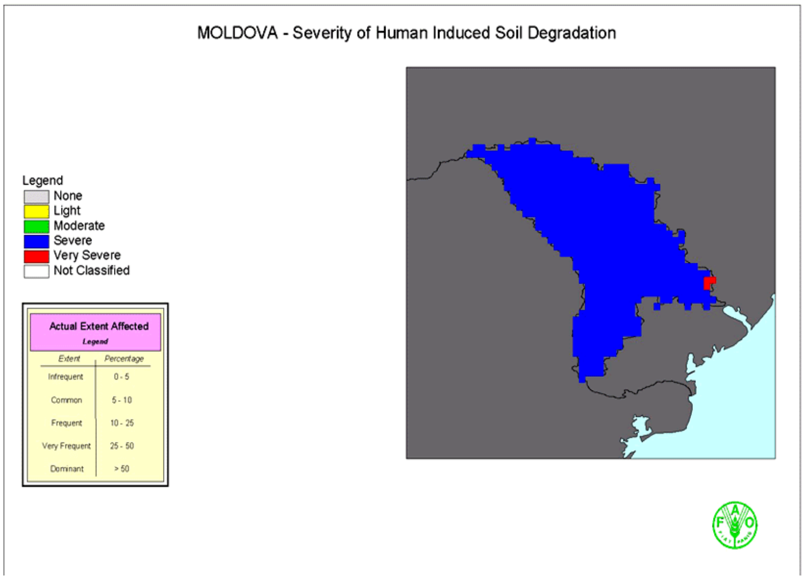
[21] http://cdm.unfccc.int/methodologies/ARmethodologies/tools/ar-am-tool-13-v1.pdf

[22](http://lex.justice.md/index.php?action=view&view=doc&lang=1&id=312730)

[23]http://cdm.unfccc.int/EB/041/eb41_repan15.pdf

[24]FAO, 2008.National Soil Degradation Maps.http://www.fao.org/landandwater/agll/glasod/glasodmaps.jsp

Figure 7.FAO National Soil Degradation map.



Source: FAO, 2008

According to the Land Cadastre (as of 30/12/1989 and 01/01/2005) developed at the local level (primaria, raion) and approved annually by the national Government, 3698.68 ha of the project area are qualified as "degraded lands" and are not included in any other land use category (agricultural, forestry, transport etc.). This land designation also meets the definition of Article 2 of the Law on Improvement of Degraded Lands through Afforestation (Law 1041-XIV, 15/06/2000, administered by Moldsilva).

These international and national categorizations provide a strong indication that the land that is part of the project area is degraded at the time of the assessment. The land can also be considered as further degrading since the anthropogenic pressures that in Moldova led to the degradation status of the land are still present: farmland exploitation and poor farming methods, low reforestation rate (only 10% of the Moldovan territory was forested in 2005, with an increase of only 0.2% between 1990-2000 and 2000-2005)[25], grazing pressure and the use of technologies harmful for the environment led to considerable reduction in productivity and had a destructive impact on the soil.

The factors that drive this degradation process remain virulent in Moldova. Annually, the area of eroded lands grows at an average of 0.9%, and the annual losses of fertile soil are estimated at 26 million tonnes.[26] Land management interventions remain insufficient to reverse the degradation process. Further evidence that project lands are expected to continue to degrade is provided in Table 6 of this PDD (p.15) illustrating the average annual loss of soil organic matter and soil carbon under different soil erosion intensities.

Stage 2 of the CDM tool is applied to demonstrate degraded condition on the remaining 4,770.16 ha of the project area that is under "pasture" designation as a management designation (i.e. it is not a

[25] FAO, 2009 State of the World's Forests, p. 112 http://www.pefc.org/images/stories/documents/external/i0350e.pdf

[26] Summary on World Day to Combat Desertification, June 17, 2011 "Forests Keep Drylands Working", http://www.meteo.md/mold/17062011en.htm

characterization of the land use status). For these sites, the further criteria of the CDM tool, referencing comparative study and direct visual assessments, are applied.

The baseline study provides a “comparative study” that shows equivalent conditions between “pasture” and “degraded” sites (full text from the CDM AR tool copied below):

“Demonstrate through a comparative study that the candidate lands in the proposed project area have similar or equivalent conditions (e.g. vegetation, soil, climate, topography, altitude, soil class and land use) and socio-economic pressures and drivers of degradation to reference degraded lands elsewhere, verifiably classified and documented as degraded lands. The proof of similarity of lands should be made through verifiable documentation and/or visual field assessment and data sets”.

(i) Comparison of candidate lands to degraded lands under similar conditions

The “comparative study” that shows equivalent conditions between “pasture” and “degraded” was conducted as part of the baseline study.

The baseline soil C study confirms that there is no significant difference between the pasture and degraded designations in terms of base soil C stocks (see Section 4.1.3 of the baseline study). Analysis of 100 soil samples taken from project sites with “degraded” and “pasture” designations, revealed that average soil carbon content (0-30cm) on degraded landswas64.7 t/ha +/- 28.9 t/ha (90% confidence interval), as compared with “pasture” lands which averaged 56,7t/ha +/- 21.5 t/ha (90% confidence interval). Thus, “pasture” sites have comparable levels of soil carbon and by extension levels of degradation in soil carbon stocks from their natural state, as officially designated degraded sites, and have equivalent conditions for categorization as degraded lands as per the A/R methodological tool.

(ii) Direct visual field evidence

Stage 2 also involved “direct visual field evidence”, documented by 4-6 photographs prior to project implementation for each project site (presented in the project database including all project sites) and visual field appraisal of degradation indicators including severe soil erosion and landslides and/or decreases in organic matter or vegetation cover. Soil erosion and landslides are common features throughout the project area.

Visual appraisals were conducted in the field applying the following indicators:

1) topographic position
- the slope: the degree of slope, slope length
- in the valley
2) the presence of gullies, landslides - equivalent to CDM tool criteria III. (c) (i)
3) the presence and condition of existing vegetation- equivalent to CDM tool criteria III. (c) (ii)
4) presence of plant indicators of soil condition (Saltwort (*Salicornia*) - presence of salts, reed - excess humidity) - equivalent to CDM tool criteria III. (c) (iii)
5) presence of litter
6) soil color

The above observed conditions conform to the visual assessment criteria of the CDM tool. Evaluation of the above indicators at each site resulted in an erosion status designation applied in the field (S1, S2, S3, S4) and recorded in the project database. The categories represent moderate (S1) to excessive (S4) surface

erosion. A spreadsheet detailing erosion status as appraised in the field for each project parcel is also attached (see Annex 6). Based on these criteria (and other CDM criteria such as eligibility etc.), sites were also excluded from the list of available lands for the CDM project activity suggested by local governments. These lists have been made available for crosscheck during validation.

Additional documented evidence of initial condition of land parcels included in the project exists in the form of digital photographs archived in the project database.

The **Figure 8** below demonstrates typical landslide activity on lands in the project area. Soil erosion can be observed in the form of mass movement (landslides and soil creep) and particle movement (through-wash, rain splash, rain flow, rill wash and gully erosion) in several plots throughout the project area.

In summary, re-establishment of vegetation on eroded sites is unlikely. The baseline study confirms (a) the limited existence of on-site seed banks; and (b) the reduced availability of external seed sources. Carbon pools of degraded lands show a declining trend in the above ground biomass, including woody shrubs; declining or low steady state soil carbon and litter; and absence of deadwood component in the project area

Figure 8: Status of degraded lands

Source*: Project Implementation Unit, Moldsilva (ICAS), Chisinau*

The Annex 3 on baseline information provides details on the methods used in demonstrating the degraded status of lands. Annex 5 presents the list of land parcels and their degradation status in 1995 and 2005. The cadastral and land use information in 1995 and 2005 for the project area shows that the productivity of areas decreased over the period**.** The cadastral and land use information in 1995 and 2005 for the project area shows that the productivity of areas decreased over the period (Annex 14a). An example of information obtained from the cadastral office on the land use categories is presented in Annex 14b.

Additional documented evidence of initial condition of land parcels included in the project exists in the form of digital photographs that are stored in the project database.

Soil erosion can be observed in the form of mass movement (landslides and soil creep) and particle movement (through-wash, rain splash, rain flow, rill wash and gully erosion) in several plots throughout the project area.

In summary, re-establishment of vegetation on eroded sites is unlikely. The baseline study showed (a) the sporadic existence of on-site seed banks; and (b) the limited availability of external seed sources. Carbon pools of degraded lands show a declining trend in the above ground biomass, including woody shrubs; declining or low steady state soil carbon and litter; and absence of deadwood component in the project area.

(iii) Environmental conditions and human-caused degradation do not permit significant encroachment of natural forest vegetation.

The adverse environmental conditions of the project sites have not permitted the establishment of vegetation to the extent that could lead to establishment of forest. Even if sporadic natural regeneration processes are observed, experts converge that even if these occasional natural regeneration processes were assisted by forest management activities, they would not develop into a forest. The evidence from the baseline line study demonstrated the limited availability of (a) on-site seed pool required for natural regeneration; (b) external seed sources that enable natural regeneration; and (c) seed sprouting and growth of young trees required regenerating the degraded lands by natural means. Finally, as discussed earlier in this section, the causes for soil degradation in still remain virulent in Moldova or worsen in the absence of interventions. Natural regeneration potential in Moldova is therefore notoriously low and any signs of natural regeneration occurring on the project land are not significant.

- The application of the procedure for determining the baseline scenario in section II.4 leads to the conclusion that the baseline approach 22(a) (existing or historical changes in carbon stocks in the carbon pools with the project boundary) is the most appropriate choice for determination of the baseline scenario and that the land would remain degraded in the absence of the project activity.

The data and information collected on the project sites supports the use of baseline approach 22(a) - existing or historical carbon stocks for identifying the most plausible baseline scenario of the project.

a) Historical and existing patterns of the land use in Moldova highlight the demands on the land use and the resulting loss of productivity over past several decades.
b) The past national and sector policies of Moldova have not provided fiscal and other incentives to stakeholders for restoring the degraded lands.
c) Degraded lands have been traditionally used for meeting the needs of the local communities. However, financial constraints of the government and public agencies such as Moldsilva prevent them to invest in the restoration of degraded lands. As a consequence, the continuation of the past land use has contributed to further degradation.
d) There has been no continuity in reforestation nationally during the 10 years prior to the project start date, indicating low priority for restoration of degraded lands. Average annual rate of pre-project reforestation at the national level is used to calculate the pre-project reforestation rate of 1,51% of the available national level degraded land and is adopted as the baseline scenario for the pre-project AR for the crediting period. Even if the baseline AR rates continue in the absence of the project, it is reasonable to assume that this small AR rate has an insignificant role in restoring the degraded lands.
e) Considering the lack of mandatory policies for restoring the degraded lands, public and communal lands are likely to degrade further and affect the local ecology, reducing their capacity

to recover through natural processes, and could spread the degradation to the adjoining lands. Therefore, likelihood of regeneration of degraded lands through ecological succession appears remote.

f) Although the national and sector policies highlight the need for restoring degraded lands, the lack of required resources perpetuate the government and public agencies' practice to maintain historical land use.

C.3. Description of strata identified using the *ex ante* stratification:

The species included in the project, their growth characteristics and management will influence the actual net greenhouse gas removals by sinks. Therefore, in selecting the species for the project, species composition, suitability of species to the planting site, species mix, silvicultural characteristics, growth rates and rotation period and silvicultural management were taken into account in the *ex ante* stratification.

Species proposed for the restoration of degraded lands were categorized into main and associate species. The associate species grown in mixture with main species were aggregated under the main species groups taking into account their common growth characteristics. Additionally, rotation cycles of species - mix of short rotation and long rotation species, their end use and management requirements such as planting, thinning, harvesting and replanting cycles were also considered.

For the purpose of final *ex-ante* stratification, main species *Quercus* and *Robinia*, planted either as sole stands or mixed with associated species were recognized. Based on the species types chosen for planting on rich and poor soils, 4 *ex-ante* project strata are determined. The project strata are noted below:

1) *Robinia_Rich Soils/Rich soils;*
2) *Robinia_Poor Soils/Poor soils;*
3) *Quercus_Rich Soils/Poor soils;*
4) *Quercus_Poor Soils/Poor soils;*

The typology of *ex ante* stratification is presented in **Table 9** below.

Table 9: Ex-ante stratification for assessing carbon stock changes in the biomass.

Project strata	**Total**		**Baseline strata**			
			Poor soils (humus <2%)		*Rich soils (humus >2%)*	
	Area, ha	Nr. of sites	Area, ha	Nr. of sites	Area, ha	Nr. of sites
Robinia	8324.02	742	2096.33	194	6227.69	548
Quercus	144.82	28	69.06	10	75.76	18
Total	**8468.84**	**770**	**2165.39**	**204**	**6303.45**	**566**

Source*: Calculation based on the project data. Project Implementation Unit, Moldsilva (ICAS), Chisinau.*

C.4. Identification of the baseline scenario (if the "Combined Tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities" is applied proceed to paragraph C.6):

C.4.1. Description of the application of the approach to identify the most plausible baseline scenario (separately for each stratum):

The most plausible baseline scenario is identified using the **steps** outlined in the Section II.4 of the approved methodology AR-AM0002 (version 03).

Step 1: Information from land records, field surveys and local councils supplemented with information from interviews of the local communities is used to list the plausible scenarios of existing and future land use activities on degraded lands.

Data and information needed in the analysis of baseline information is stored at the PIU and Forest Enterprises. The information used for the Baseline Study is stored at PIU Office. PIU manages the data base (electronic version of GPS coordinates, digital images of the project sites and data on the characteristics of sites). PIU also manages paper files for each plot containing all information on location, area, contracts, degradation status at start date, etc. Each Forest Enterprise has data and information pertaining to the land use; information pertaining to eligibility of lands, degraded status of lands, vegetation and geographic characteristics of the project sites, data and information from cadastral maps, data and information collected by field staff on sites considered for the project, etc stored in paper format in different registers.

In accordance with the baseline approach 22(a) and as per the **five** steps of the approved methodology AR-AM0002 (version 03), the following scenarios of land use alternatives are identified.

Listing of scenarios of land use alternatives

Scenario 1: Degraded lands are abandoned (or subject to continued hay collection) and regenerated through natural succession to forest cover.

Scenario 2: Degraded lands that are abandoned (or subject to continued hay collection) will degrade further.

Scenario 3: Investment in engineering structures to stabilize the degraded sites prone to landslides and soil erosion.

Scenario 4: Degraded lands converted to productive agriculture or perennial plantations (orchards or vineyards).

Scenario 5: Degraded lands restored through afforestation and reforestation.

S*cenario 1* is considered unlikely due to the highly degraded status of lands and limited availability of seed sources, which is elaborated previously.

Scenario 2 is considered most likely. Degraded lands are prone to severe forms of landslides and erosion that result in further degradation, a process that continues without direct intervention. This, and the unlikelihood of Scenario 1, is also supported by demonstrated historic increases in eroded lands in Moldova (Table 10) – i.e. that the condition of such lands is not improving. Between 1996 and 2006 there was a net increase in degraded lands nationally of 6.6% per year; i.e. more land is coming into degraded status than is being restored by pre-project (baseline) afforestation/reforestation activities.

Table 10: Dynamics of eroded lands within agricultural lands in the Republic of Moldova.

Degree of soil erosion	Year 1965		Year 1975		Year 1995		Year 2005	
	1000 ha	%	1000 ha	%	1000 ha	%	1000 ha	%
no erosion	*1517.4*	*71.9*	*1457.2*	*69*	*1287.5*	*61*	*1233.3*	*58.4*
Slight	302.4	14.3	341.9	16.2	485.3	23	504.8	23.9
Moderate	195.6	9.3	213	10.1	244.6	11.6	259.3	12.3
strong	96.2	4.5	99.5	4.7	94.2	4.4	114.2	5.4
Total eroded soils	*594.2*	*28.1*	*654.4*	*31*	*824.1*	*39*	*878.3*	*41.6*
Total studied agricultural lands	**2111.6**	**100**	**2111.6**	**100**	**2111.6**	**100**	**2111.6**	**100**

Source: *Republic of Moldova Land Cadastre, 1965-2005*

Scenario 3 is considered unlikely. Although use of engineering structures to stabilize the landslides and to minimize erosion is a possible alternative, it is a costly and infeasible alternative considering the large financial resources required for the task. As engineering investments can only stabilize the sites but not increase the productivity of lands, this scenario has negligible effect on baseline carbon stocks.

Scenario 4 is not feasible due to lack of economic incentives, and is not substantiated by recent demographic and land use trends. Degraded lands tend to be excluded from production or subjected to marginal subsistence use (hay collection). Restoring these sites to productive use requires significant start-up and recurring management costs, which result in negative NPV for even long timeframes, thus these alternate land uses are less attractive than continued non-use or hay collection. Available parcels also tend to be small (about 37% of the sites are less than 5 ha) and widely distributed, which makes an organized, productive use at scale difficult. Furthermore, review of cadastral maps and demographic data reveal no historic or recent trends that would validate such a baseline. Since 1990, there has been a 37% decrease in the area of perennial plantations (orchards and vineyards combined) and 4% decrease in all cultivated lands (Table 11), hence there has been no identifiable trend in land use to these uses. Demographic data also show a population exodus, especially from rural areas, meaning less population pressure for agricultural uses.

Table 11: Dynamics of cultivated lands in the Republic of Moldova during 1990-2005.

Year	Total perennial plantations (orchards and vineyards)		Total cultivated lands	
	thousand ha	percentage in comparison with 1990, %	thousand ha	percentage in comparison with 1990, %
1990	474.1	100.0	2208	100.0
1991	473.5	99.9	2210	100.1
1992	470.8	99.3	2215	100.3
1993	466.0	98.3	2211	100.1
1994	448.4	94.6	2207	100.0
1995	430.7	90.8	2205	99.9
1996	412.6	87.0	2197	99.5
1997	399.1	84.2	2195	99.4
1998	385.8	81.4	2196	99.5
1999	370.8	78.2	2185	99.0

2000	352.3	74.3	2173	98.4
2001	334.9	70.6	2175	98.5
2002	305.7	64.5	2148	97.3
2003	300.8	63.4	2146	97.2
2004	298.0	62.9	2138	96.9
2005	297.8	62.8	2131	96.5

Source: *Republic of Moldova Land Cadastre, 1990-2005*

Scenario 5 – reforestation through initiative by local councils, is considered unlikely due to investment barriers and lack of economic incentives. Therefore, investments needed to reclaim these degraded lands cannot be realized in the foreseeable future. Project baseline takes into account the annual rate of reforestation as "business as usual" at national level, which is 1.51% from degraded lands available at the beginning of the project.

Step 2: The alternative uses are assessed taking into account the information on the land use in the region, attractiveness of land use, feedback from stakeholders, and national or sectoral policies that impact the project area. The information considered included:

- Information received from the technical staff in the region with reference to the alternative land uses;
- Application of Step 2 (investment analysis) or Step 3 (barrier analysis) of the A/R "Tool for the demonstration and assessment of additionality in A/R CDM project activities" (version 02), to demonstrate that the land use in the absence of the CDM, is unattractive (see section C4 for further elaboration);
- The lands have not been in the agricultural use because of their low productivity and prohibitive barriers in their use.

Step 3: The data and information from official sources, field data and information from local councils are used to demonstrate the lands to be planted are "degraded" by applying the Step 3a and Step 3b below:

Step 3a: The historical and existing land use/cover change, social-economic context and factors influencing the land use/cover change, data from archives and cadastral maps and field data from the base line study were considered to reflect the continuation of land degradation.

1. Vegetation degradation - the tree and non-tree vegetation has decreased for reasons other than sustainable harvesting activities. For example, during the period 1992-1997 the total recorded volume of illegal logging constituted about 1,200,000 cubic meters. Forests and ant other types of vegetation managed by communities have been reduced by 13%27.
2. Soil degradation - soil erosion has increased over the period; soil organic matter has decreased in the recent past as observed from the measurements of the baseline study. The area of eroded lands has been increased during 40-year period with 284,000 ha, increasing annually with 7,100 ha[28].

[27]D. Galupa et.al. Illegal logging of forestry vegetation in the Republic of Moldova: Analytical study, - Chisinau, 2011.[Original Title: D.Galupa et al.Taierile ilicite ale vegetatiei forestiere in R.Moldova: Studiul analitic,- Chisinau, 2011]

[28]Andries, V.Cerbari, V.Filipciuc. Soil quality in Moldova, problems and solutions. Academician I.A.Krupenikov – 100-year anniversary: Collection of scientific articles/Academy of Sciences of Moldova, Institute of Soil Science, Agrochemistry and Soil Protection after Nicolae Dimo, Eco-Tiras, Chisinau, 2012. [Original Title: S.Andries, V.Cerbari, V.Filipciuc. Calitatea solurilor in Moldova, probleme si solutii. Academicianul I.A.Krupenikov – 100 ani:Culegeri de art.st./Acad.de Stiinte a Moldovei, Inst.de Pedologie, Agrochimie si Protectie a Solului "Nicolae Dimo", Eco-Tiras, – Chisinau, 2012]

3. Anthropogenic influences - loss of soil and vegetation are related to the anthropogenic actions.

The procedures followed to demonstrate the degraded status of lands using AR methodological tool (Annex 15, EB41) - "Tool for the identification of degraded or degrading lands for consideration in implementing CDM A/R project activities (version 01)" are discussed in detail in section B.2.

Step 3b: The evidence from the baseline study demonstrated limited accessibility of (a) on-site seed pool that is required for natural regeneration; (b) external seed sources that enable natural regeneration; and of (c) seed sprouting and growth of young trees required to regenerate the degraded lands by natural means. It also confirmed that the causes for soil degradation still remain virulent, or worsen, in Moldova. Natural regeneration potential in Moldova is therefore notoriously low any signs of natural regeneration occurring on the project land are not significant. All district Land Relations and Cadastre Offices have confirmed by certificates that on project sites no cases of natural regeneration on the project sites have been recorded since 1989.

Moreover, considering the small rates of pre-project planting undertaken historically over a 10-year period, degraded lands are not likely to get restored with such low rates of pre-project afforestation and reforestation activities. As a consequence, lands are expected to degrade further, thereby limiting the alternative uses for the degraded lands.

Step 4: The results of baseline study summarized in Annex 3 on baseline information demonstrates that the lands do not show significant deviation from the historical land use pattern taking into account the data on land use practices and pre-project planting rates over the most recent 10-year period.

The small and insignificant rates of planting activity undertaken on the degraded lands over 10 year period prior to the project also highlight that the national and sector land-use policies adopted did not influence the planting rates or alternative uses of the degraded lands.

The following legal and regulatory policies of the Republic of Moldova related to land use have been adopted prior to November 2001.

- Forest Code, N. 887-XIII from 21/06/1996, *Monitorul Oficial N.4-5/36 from 01/01/1997.*
- Land Code, N.828 from 25/12/1991, *Monitorul Parlamentului of the Republic of Moldova 1993, N.3 art.58, 59, 60.*
- Law on Natural Resources, N.1102-XIII from 06/02/1997, *Monitorul Oficial N.40/337 from 19/06/1997.*
- Law on Environmental Protection, N.515-XII from 16/06/1993, *Monitorul Oficial N.10/283 from 30/10/1993.*
- Law on State Protected Natural Areas Fund, N.1538-XIII from 25.02.98, *Monitorul Oficial N.66-68/442 from 16/07/1998.*
- Law on the Protection Water Zones and Belts, N.440-XIII from 27.04.95, *Monitorul Oficial N.43/482 from 03/08/1995.*
- Law on the Improvement of Degraded Lands through Afforestation, N. 1041-XIV from 15/06/2000, *Monitorul Oficial N.141-143 from 09/11/2000.*
- Decision of the Parliament, N.350-XV from 12/07/2001 on the Strategy for Sustainable Development of Forestry Sector, *Monitorul Oficial N.133-135 from 08/11/2001.*
- Decision of the Parliament approving the National Strategy and Action Plan on Biological Diversity Conservation, N.122-XV from 27/04/2001, *Monitorul Oficial N.90-91/700 from 02/08/2001.*

- Decision of the Government nr. 595 as of 29/10/1996 "On the Improvement of the Management of Forestry Economy and Protection of Forest Vegetation".

While the national laws and regulations of the Republic of Moldova on land use outline provisions for restoration of degraded lands these provisions are not implemented due to the lack of financial resources and do not influence the project area.

Step 5: The data and information on vegetation, soil, physiography (slope, aspect, altitude etc.) and land use over a 10-year period prior to the project and the changes in adjoining land use do not lead to more profitable alternative(s) and do not lead to an increase in the carbon stocks or other profitable uses for the lands under the project.

As it was discussed above, an alternative land use could be the cultivation of fruit trees or establishment of vineyards. But on low quality pastures or degraded land foreseen for reforestation within the project this is unlikely. It would require investment which would only make sense on the more fertile lands. Besides, there are many aged or abandoned vineyards and fruit orchards on better land and would be rehabilitated first. Moreover, since 1990, there has been a 37% decrease in the area of perennial plantations (orchards and vineyards combined) and 4% decrease in all cultivated lands (Table 11), hence there has been no identifiable trend in land use to these uses. Demographic data also show a population exodus, especially from rural areas, meaning less population pressure for agricultural uses. This fact can be also confirmed by the data from General Land Cadastre demonstrating the increase of area of abandoned/fallow lands from 6,400 ha in 2001 to 16,000 ha in 2006.

Identification of the baseline scenario

As land degradation is a long-term process that has significant historical relevance, it relates the existing land use with the past land use as per the baseline approach 22 (a). Analysis of above scenarios shows that **Scenario 2** is the one that most closely reflects the baseline.

The land use patterns of different regions of the country do not allow the consideration of *scenario 1*. Financial constraints do not permit land use alternatives under *scenario 3* and *scenario 4*. So the only realistic land-use option that can be expected without the project is further increase in the soil erosion and landslides, which could lead to further degradation of lands and their eventual abandonment with likely adverse impacts on adjacent lands and negative consequences for land and communities in the medium to long-term. Additional information from household surveys, ecological assessments, land capability classification, field studies on land use pattern, experience of local councils that oversee the management of community lands are considered in demonstrating the applicability of the baseline scenario.

As carbon stocks of the baseline are expected to decline under continuous degradation, the net carbon stock under the baseline is conservatively assumed to be **constant.** Following the provisions of approved methodology AR-AM0002 (version 03), the baseline net GHG removals by sinks from bare and degraded lands (70.82%) are set to zero, taking into account the data and evidence available from the baseline study.[29]

The application of steps 1 to 5 and the analysis of the alternatives demonstrate that the **scenario 2** conforms to the baseline approach 22(a) (existing or historical changes in carbon stocks in the carbon

[29] The baseline calculation also takes into account GHG removals by sinks from pre-existing biomass (28.46%) and pre-project reforestation 0.72%) of the project area (See page 40).

pools within the project boundary), and "lands to be planted are degraded lands and will continue to degrade in absence of the project".

The land use alternatives with reference to the baseline and their characteristics are summarized below.

Table 12: Land use scenarios with reference to the baseline.

Alternative scenario	Baseline	Remarks
1. Abandonment of degraded lands (or continued hay collection) and natural succession to forest	No	Scenario is not likely to be realized due to the highly degraded land conditions and limited availability of seed sources. Lack of historical trend confirmed from land use data.
2. Abandonment of degraded lands (or continued hay collection) leading to further degradation	Yes	Degraded lands are expected to degrade further due to propensity for landslides and continued erosion in the absence of direct intervention. Historical trend confirmed through field studies and land use data[30],[31].
3. Use of engineering structures to stabilize the land slides and to minimize erosion	No	Considering the large financial resources required for accomplishing the task, this is an unfeasible alternative.
4. Degraded lands converted to productive agriculture or perennial plantations (orchards or vineyards)	No	Unlikely due to investment barriers and lack of economic incentives, and dwindling rural population. Not supported by historical land use trends.
5. Degraded lands restored through afforestation and reforestation	No	Feasibility of this scenario is limited considering the financial constraints of the Moldsilva and local councils and absence of incentives to overcome the investment barriers. Project baseline takes into account business as usual rate of reforestation by Moldsilva of 128.26 ha.

C.4.2. Description of the identified baseline scenario (separately for each stratum):

As per the section II.5 of the methodology, AR-AM0002 (version 03), two categories of land use were evaluated for soil organic carbon under the baseline scenario, i.e., (*i*) degraded lands and (*ii*) degraded lands on which small rates of planting were undertaken in the baseline scenario (AR activity implemented prior to the project).

(i) Degraded lands

The sampling procedures outlined in **Annex 3** of the PDD under the baseline information demonstrated a continuous decline in soil organic carbon and as well as the baseline net GHG removal by sinks. This is done to establish the degraded status of lands under the project.

For strata without growing trees or isolated trees with declining overall carbon in all the pools, the project assumes that the carbon stocks would remain constant in the absence of the project, i.e., the baseline net GHG removals by sinks are zero (equation B1 of AR AM0002 version 03). For strata with

[30] FAO, 2008.National Soil Degradation Maps.http://www.fao.org/landandwater/agll/glasod/glasodmaps.jsp

[31] Information system on the quality of soil cover of the Republic of Moldova (database), Chisinau, Pontos, 2000 [Original Romanian Title: Sistemul informational privind calitatea invelisului de sol al Republicii Moldova (banca de date)]

isolated trees, the baseline net GHG removals by sinks are estimated based on equation B2 of AR AM0002 (version 03).

The share of pre-project planting is insignificant in relation to the total available degraded land (average annual rate of pre-project planting is60.98 ha or 0.72 of available degraded land was planted annually during the 10-years prior to the project). Furthermore, pre-project planting was scattered throughout the country, precluding a strict demarcation of pre-project AR strata under the baseline.

To calculate the change in soil carbon pool for areas corresponding to pre-project strata, the methods outlined in the *ex-ante* estimation of changes in soil organic carbon under the section II. 7 (a.5) of AR-AM0002 (version 03) were considered to establish the parameters. The variables influencing soil carbon such as soil depth, bulk density, and concentration of soil organic carbon in areas representing the pre-project were also collected.

Considering the very small proportion of annual pre-project planting and slow rate of change in the soil organic carbon, the baseline net GHG removals by sinks were found to be insensitive to the small changes in soil carbon attributable to the pre-project AR activity and change in the soil organic carbon does not alter the net negative change in the carbon pools of the baseline.

Considering the degraded status of soils and the expected negative change in carbon stock of the baseline and lack of vegetation, carbon loss in soil is expected to dominate the total carbon stock change under the baseline. As part of the baseline study, rich and poor sites were sampled to establish the baseline carbon stock and expected changes in the baseline over time. **Table 13** presents the rich and poor sites by forest enterprise.

As changes in carbon pools of degraded lands and pasture lands are expected to follow the similar trends and both categories of lands lack either aboveground vegetation or have sparse vegetation that is well below the thresholds of the definition of forest and both categories of lands (degraded lands and pasture lands) do not significantly differ in the initial soil carbon stock as per the baseline study, the two classes of lands were combined for the baseline assessment purpose and categorized under ***rich*** and ***poor*** soils based on the relative levels of humus content and site productivity. As a consequence baseline scenario is categorized into ***two*** strata - *rich soil strata* and *poor soil strata*.

Stratum representing rich soils

The rich soils have relatively high humus content and are assumed to represent the sites with more than 63 tC/ha (> 63 tC/ha)

Stratum representing poor soils

The poor soils have low humus content and are assumed to represent the sites with less than 63 tC/ha (≤ 63 tC/ha).

Table 13: ”Poor” and “rich” soil strata of the baseline by forest enterprise.

No	Forest enterprise	Poor soils (humus <2%)		Rich soils (humus >2%)		Total	
		Area, ha	No of sites	Area, ha	No of sites	Area, ha	No of sites
1	Straseni	85.04	8	88.72	17	173.76	25
2	Soroca	137.74	17	388.44	31	526.18	48

3	Edinet	0	0	429.1	49	429.1	49
4	Orhei	0	0	117.66	12	117.66	12
5	Nisporeni	61.9	5	183.38	14	245.28	19
6	Iargara	279.23	22	784.57	60	1063.8	82
7	Hincesti	68.24	11	195.19	22	263.43	33
8	Glodeni	76.5	3	237.1	14	313.6	17
9	Calarasi	118.79	19	90.1	14	208.89	33
10	Balti	89	8	315	39	404	47
11	Manta-V	88.18	4	203.55	10	291.73	14
12	Telenesti	51.12	9	188.97	43	240.09	52
13	Ungheni	187.26	31	306.69	35	493.95	66
14	Silva-sud	189.15	11	314.94	20	504.09	31
15	Ialoveni	143.02	22	364.83	45	507.85	67
16	Chisinau	163.39	12	455.95	46	619.34	58
17	Tighina	410.23	19	609.01	26	1019.24	45
18	Comrat	16	2	248.9	9	264.9	11
19	Plaiul Fagului	0.6	1	37.72	12	38.32	13
20	Padurea Domneasca	0	0	67.98	9	67.98	9
21	Cimislia	0	0	675.65	39	675.65	39
Total project		**2165.39**	**204**	**6303.45**	**566**	**8468.84**	**770**

Source: *Calculation based on the project data. Project Implementation Unit, Moldsilva (ICAS), Chisinau.*

The following steps are followed in characterizing the baseline strata and in determining the baseline net GHG removals:

a) Rich and poor sites are further categorized into bare lands and lands with isolated pre-existing vegetation; and lands that are likely to have small rates of planting (pre-project AR activity undertaken historically) in the absence of the project.

b) Determination of the sum of changes in carbon stock for each stratum:

- For the strata without growing trees (5,977.86 ha), sum of carbon stock changes in all the carbon pools are estimated. If the net changes in carbon stocks are negative, the baseline net GHG removals by sinks are set to zero (equation B1 of AR AM0002, version 03);

- For the strata with growing trees (2,410.00 ha), the sum of carbon stock changes in above-ground and below-ground biomass is determined \ based on the data from growth models (yield tables) and allometric equations, and local or national yield data estimates (equation B2 of AR AM0002, version 03); and

- For strata that relate to the pre-project AR (60.98 ha), the changes in carbon stock of biomass and of soil pools is estimated following the methods outlined in Section II. 5 and Section II.7 of the approved methodology AR-AM0002 (version 03).

c) Sum of the baseline net GHG removals by sinks across all strata.

The baseline net GHG removals by sinks of all strata are summed over the period corresponding to the project scenario to maintain consistency between the baseline net GHG removals by sinks and the actual net GHG removals by sinks. Calculations of the baseline GHG removals by sinks are presented in Annex 11 (TARAM).

C.5. Assessment and demonstration of additionality (if the "Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities" is not used):

The most recent version of the CDM Executive Board approved "*Tool for the Demonstration and Assessment of Additionality in AR CDM project activities (version 02)"* (Annex 17, EB35)[32] is used to demonstrate the additionality per the steps of additionality tool.

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

The decision to implement the project activity was triggered in response to CDM incentive. The project was initiated on 1 November 2006.

The project complies with the provisions of the tool for the demonstration and assessment of additionality and highlights that the reforestation activities in the absence of the CDM are unattractive. The incentive from the sale of GHG emission allowances was seriously considered in the decision to proceed with the project activity was assessed taking into account the official and legal documentation and communication involving the project participants and the authorized national agencies and the UNFCCC guidelines. The sample documentary evidence demonstrating the active consideration of the CDM incentive is listed below.

- During a World Bank mission undertaken in October 2005, the possibility of a follow up operation was discussed. This is evidenced in the Aide-Memoire of the World Bank mission October 6-10, 2005.
- PIN for Moldova Community Forestry Development Project was submitted to the World Bank in spring 2006. This fact is also mentioned in the Aide-Memoire of the World Bank supervision mission from 09/10/2006- 15/10/2006.
- Letter dated 03/12/2003, nr. 01-07/887 from the Moldsilva, Republic of Moldova to the UNFCCC outlining the definition of forest applicable to Afforestation and Reforestation projects implemented in the Republic of Moldova.
- BioCarbon Fund (BioCF) and the Agency Moldsilva (project entity) signed a Letter of Intent on 21/09/2007 to purchase an agreed amount of Emissions Reductions from Moldova Community Forestry Development Project. The letter confirms the BioCF's interest in obtaining the *Certified Emission Reductions achieved by a project under the Clean Development Mechanism defined under Article 12 of the Kyoto Protocol to the United Nations Framework Convention on Climate Change* provided it meets the quality standards of the PCF and the project confirms to the World Bank environmental and social safeguards. The letter further confirms the intent of both the project participants to enter into an Emissions Reductions Purchase Agreement.
- Official World Bank supervision mission for Moldova Community Forestry Project (31/10/2008)

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

- Virtual Concept Review package for Moldova Community Forestry Project sent by World Bank Task Team Leader 06/02/2009
- Minutes of Virtual Decision Meeting Moldova Community Forestry Project (19/05/2009)
- DNA has issued the Letter of Approval for Moldova Community Forestry Development Project on 30/04/2010 (Annex 7).
- Moldova Community Forestry Project Progress Report (19/08/2010)

Step 1. Identification of alternative land use scenarios to the proposed A/R CDM project activity

Sub-step 1 a. Identify credible alternative land use scenario to the proposed CDM project activity

Consistent with policies and regulation of Republic of Moldova, the plausible alternatives are evaluated for their distinctness from the baseline scenario, conformity to the provisions of additionality and eligibility as the project scenario.

Scenario 1: Degraded lands are abandoned (or subject to continued hay collection) and regenerate through natural succession to forest cover.

Scenario 2: Degraded lands are abandoned (or subject to continued hay collection) and will degrade further.
Scenario 3: Investment in engineering structures is undertaken to stabilize the degraded sites prone to land slides and soil erosion.

Scenario 4: Degraded lands are converted to productive agriculture or perennial plantations (orchards or vineyards).

Scenario 5: Degraded lands are restored through afforestation and reforestation.

The *scenario 2* is identified as the baseline scenario in the baseline study. From the remaining alternatives to the project activity, *scenario* 1, *scenario 3 and scenario 4* are infeasible taking into account the reasons outlined in section B.4. The *scenario 5*, project activity implementation as a non-CDM project is unlikely without additional resources, as the elements of project activity such as investment needs of restoration, institutional arrangements of involving stakeholders, and improvements in the technical capacity of Moldsilva require financial resources to overcome the multiple barriers of the project entity, which prevented restoration of degraded lands in the past.

The lack of investment capacity of the Moldsilva and the local councils and absence of incentives have discouraged investment in the restoration of degraded lands and this situation is likely to continue under the baseline scenario. For these reasons, *Scenario 5* - implementing the project activity as a non-CDM project is also not feasible. Implementation of this alternative as a CDM project partially helps to overcome the investment gap through the sale of CERs and permit the collaboration of Moldsilva and local councils for sharing the investment and revenue from implementing this alternative as the project.

The alternatives and their characteristics are summarized in the **table 11.**

For reasons outlined above, alternatives to project activity, i.e., scenario 1, scenario 3, and scenario 4 are **not** feasible, and scenario 2 is the **baseline scenario**. Therefore, only **scenario 5** has potential to evolve as the **project** scenario provided financing constraints and other barriers are alleviated with the sale of CERs, if the project is implemented as the CDM project.

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

The alternatives identified are consistent with the following legal and regulatory policies of the Republic of Moldova (before 11 November 2001).

- Forest Code, N. 887-XIII from 21/06/1996 *Monitorul Oficial N.4-5/36 from 01/01/1997.*
- Land Code, N.828 from 25/12/1991, *Monitorul Parlamentului of the Republic of Moldova 1993, N.3 art.58, 59, 60.*
- Law on Natural Resources, N.1102-XIII from 06/02/1997, *Monitorul Oficial N.40/337 from 19/06/1997.*
- Law on Environmental Protection, N.515-XII from 16/06/1993, *Monitorul Oficial N.10/283 from 30/10/1993.*
- Law on State Protected Natural Areas Fund, N.1538-XIII from 25.02.98, *Monitorul Oficial N.66-68/442 from 16/07/1998.*
- Law on the Protection Water Zones and Belts, N.440-XIII from 27.04.95, *Monitorul Oficial N.43/482 from 03/08/1995.*
- Law on the Improvement of Degraded Lands through Afforestation, N. 1041-XIV from 15/06/2000, *Monitorul Oficial N.141-143 from 09/11/2000.*
- Decision of the Parliament, N.350-XV from 12/07/2001 on the Strategy for Sustainable Development of Forestry Sector, *Monitorul Oficial N.133-135 from 08/11/2001.*
- Decision of the Parliament approving the National Strategy and Action Plan on Biological Diversity Conservation, N.122-XV from 27/04/2001, *Monitorul Oficial N.90-91/700 from 02/08/2001.*
- Decision of the Government nr. 595 as of 29/10/1996 "On the Improvement of the Management of Forestry Economy and Protection of Forest Vegetation".

In addition to the national and sector policies, the reforestation rate for the period of 10-years from 1996 to 2005 is taken into account. The annual rate of reforestation in the country during the 10 years prior to the project is assessed at 0.69% of the available degraded lands nationally. The low annual pre-project AR rate also highlights the lack of investments in implementing the national and sector policies related to forestry and land use.

All baseline scenario alternatives are compliant with existing regulations. While the national laws and regulation of the Republic of Moldova on land use outline provisions for restoration of degraded lands these provisions are not implemented due to the lack of financial resources.

Sub-step 1c. Selection of the baseline scenario

The steps of approved baseline methodology AR-AM0002 (version 03) are used to select the baseline scenario. The details of baseline selection are presented in the section B5 above.

Step 2: Investment analysis

As part of the step 2 of the A/R Methodological Tool: "Tool for the Demonstration and Assessment of Additionality in A/R CDM Project Activities" (Version 02), investment analysis has been conducted. In conducting the investment analysis, "Guidance on the assessment of investment analysis", (version 05) (EB 62, Annex 5) has been followed.

Sub-step 2a. Determine appropriate analysis method

Option III. Benchmark analysis is used to evaluate the financial attractiveness of the project. The IRR and NPV are used as indicators of the investment analysis.

Sub-step 2b – Option III. Benchmark analysis

Considering the limited financial resources available with Moldsilva and local councils, an option was to consider borrowing from a financial institution to implement the AR activity. Considering that Moldsilva is a public agency and investment in forest sector is a long-term investment (i.e., the earliest revenue that can be generated from harvest of timber is 30 years for Robinia pseudocacia). Therefore, the relevant benchmark rate chosen was the long term interest rate specified by the National Bank of Moldova, which reflects the opportunity cost of capital for long-term investment activities in the country.

There are no special credits for forestry activities in Moldovan commercial banks, thus the relevant benchmark value (9% for the Republic of Moldova for the Group 3: 14. Afforestation and reforestation) was applied according to the "Guidelines on the Assessment of investment analysis" (EB 62 Annex 5)[33].

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

Investment analysis compares the discounted costs and returns of the AR CDM project. NPV and IRR are used as the financial indicators of the benchmark analysis.

The following aspects of the "Guidance on the assessment of investment analysis", (version 05) (EB 62, Annex 5) have been followed in conducting the investment analysis.

- The period of the assessment of the investment decision = 30 years (paragraph 3).
- Fair value of assets of the project = The residual fair value of the project in year 30 is calculated based on the market value of standing stock of timber and is used for in the calculations of NPV and IRR of the project (paragraph 4).
- Input values used in all investment analysis correspond to the time of the investment decision (paragraph 6).
- Investment analysis is presented in a transparent manner in the spreadsheet and included as annex to the PDD (paragraph 8).
- Benchmark interest rate is the rate specified by the "Guidelines on the Assessment of investment analysis" (EB 62 Annex 5) (paragraph 12).

Sensitivity analysis of the NPV and IRR of the project investment was conducted by assessing changes in costs and revenues of the project and the results of analysis are presented in the section under sensitivity analysis below (paragraphs 20 and 21).

[33] http://cdm.unfccc.int/Reference/Guidclarif/reg/reg_guid03.pdf

The cash flow analysis considers the costs incurred in site preparation, nursery activities, production of seedlings, planting, tending, protection, thinning and harvesting and other expenditure incurred on the afforested area. **Table 14** presents the cost estimates of reforestation activity per hectare.

Table 14: Item-wise costs of the AR activity ($ US/ha).

Activity	Robinia & assoc. sps	Quercus & assoc. sps
Site preparation		
Machinery & Manual	1261,35	1293,0
Establishment		
Seedlings	87,8	130,8
Planting, tending, thinning etc.	112,025	124,3
Infrastructure		
Transport of seedlings	34,4	34,4
Guard	309,1	309,1
Labour		
Skilled labour	51,615	56,8
Unskilled labour	313,976	544,1
Monitoring		
Inventory & monitoring	38,7	38,7
Validation& verification	24,8	24,8
Total	**2233,77**	**2556,0**

The revenue from forest products during the 30-year crediting period includes the revenue from the sale of fuelwood and timber from thinning and harvest, as well as revenue from the sale of non-timber forest products such as honey, leases for hunting etc. **Table 15** presents the revenue per ha from forest products over a 30-year crediting period. Main revenues are coming from wood products.

Revenues from hunting activities are calculated on the basis of Governmental Decision nr. 187 on 20/02/2008 which approved regulations on the lease of forest fund lands for hunting.

Table 15: Revenue from forest products per ha over a 30-year crediting period ($ US/ha).

Product	***Robinia*& ass. sps.**	***Quercus*& ass. sps.**
Revenue from wood products		
Sawn timber >14 cm	10.8	41.9
Timber for construction 12-24 cm	23	68.9
Secondary construction timber <11 cm	147.3	112.9
Fuel wood	488	505.8
Branches	71.4	66.3
Total wood products	***740.5***	***795.8***
Revenue from non-wood products		
Hunting	978	978
Medicinal plants, forest fruits and berries	39	39
Total non-wood products	***1017***	***1017***

TOTAL GENERAL	**1757.5**	**1812.8**

Source: *Calculation based on the project data. Project Implementation Unit, Moldsilva (ICAS), Chisinau.*

Financial analysis is conducted to evaluate the profitability of the project at 30-year interval, which coincides with 30-year crediting period.

Financial performance of the project is assessed in two steps. In the first step, performance of stand models on one hectare in each class of land is assessed. In the second step, performance of the overall project area is evaluated.

The data and parameters on costs and revenues and information on financial analysis are presented in Annex.

Performance at 30 years

The results of the financial analysis of stand models per ha adopted in the project are presented in **Table 16** below.

Table 16: Financial analysis of net benefits of reforestation stand models on one hectare of over 30-year period.

Modules	Cash Flow/ Investment needed per ha_with project scenario (USD)																															NPV per ha (USD)* @9,0%	IRR per ha (%)
	Years																																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	**Total**	**30 yrs**	**30 yrs**
Modul 1/ Pasture																																	
R III	-509	-432	-194	-24	44	41	45	45	45	45	66	45	45	45	45	204	45	45	45	45	131	45	45	45	45	45	45	45	45	45	**261**	-342	6.8%
R IV	-509	-432	-194	-24	44	42	44	44	44	44	57	45	45	45	45	156	45	45	45	45	131	45	45	45	45	45	45	45	45	45	**201**	-420	6.0%
Q III	-509	-535	-312	-212	-130	-78	-25	45	45	45	39	45	45	45	45	79	45	45	45	45	39	45	45	45	45	45	45	45	45	45	**-753**	-1,058	2.56%
Q IV	-509	-535	-312	-212	-130	-78	-25	45	45	45	39	45	45	45	45	79	45	45	45	45	39	45	45	45	45	45	45	45	45	45	**-753**	-1,100	1.7%
Modul 2/ Degraded Land																																	
R III	-1,273	-388	-184	-26	44	41	45	45	45	45	66	45	45	45	45	204	45	45	45	45	131	45	45	45	45	45	45	45	45	45	**-450**	-998	4.4%
R IV	-1,273	-388	-184	-26	44	42	44	45	45	45	57	45	45	45	45	170	45	45	45	45	131	45	45	45	45	45	45	45	45	45	**-494**	-1,072	3.7%

The above results in Table 16 show that the discounted cash flow is negative or insignificant in all strata. Considering that the degraded lands have very low productivity (site production class III and IV), very small returns from thinning are anticipated from the project. The negative NPV of the investment at 9.0% for the crediting period clearly demonstrates that forestry activity is not a financially viable option generating revenue from timber and non-timber products.

The most likely alternate land use, hay collection, generates net revenue of US$ 2-52 per ha annually. Assuming initial net revenues of $8 and $83 per ha and an annual 10% decrease in productivity, hay collection generates NPVs of US$64-668 per ha over a comparable timeframe, still easily exceeding values generated from reforestation. However, costs of land degradation are not considered under hay collection scenarios. Therefore, investment analysis demonstrates that the project is additional from the financial or investment analysis perspective.

Performance without carbon revenue

Table 17 presents the NPV and IRR of without carbon project scenario at 30-year crediting period. The financial performance of the project continues to be negative at the Moldova's bank lending rate of 9%., The carbon value although plays a positive role and marginally improves the IRR, it does not cover the project investment costs at 9% discount rate over the project crediting period.

Table 17: NPV (9% discount rate) and IRR of the project scenario at 30 year crediting period taking into account revenues without carbon.

NPV/IRR	Without Carbon
NPV, USD	-3,241,131
IRR	5.7%

***Source**: Project Implementation Unit, Moldsilva (ICAS), Chisinau. Calculations based on the project data.*

Sub-step 2d. Sensitivity analysis

Sensitivity analysis is conducted in compliance of the paragraphs 20 and 21 of the "Guidance on the assessment of investment, version 05 (EB 62, Annex 5) to examine the influence of timber price, project cost and carbon price on the general project performance. Sensitivity analysis was carried out for increase and decrease in timber price by 10% and 50%. Scenario for timber price with the increase/decrease by 50% is based on the trend of timber price in Moldova during 2002-2006.

Table 18: Sensitivity analysis

Sensitivity		Without Carbon
10% decrease in timber price	NPV	-3,455,801
	IRR	5.3%
10% increase in timber price	NPV	-3,026,460
	IRR	6.0%
50% decrease in timber price	NPV	-4,314,482
	IRR	(-3.5%)
50% increase in timber price	NPV	-2,167,779
	IRR	(7.1%)

***Source**: Project Implementation Unit, Moldsilva (ICAS), Chisinau. Calculations based on the project data.*

Based on sensitivity analysis, it is clear that the project will continue to face unfavorable revenue and cost streams.

According to the "Tool for the demonstration and Assessment of Additionality in A/R CDM Project Activities" (version 02) (EB 35 Annex 17), if the proposed A/R CDM project activity without the financial benefits from CDM is not financially most attractive (IRR is lower than the benchmark: negative <9%), then proceed directly to Step 4 (Common practices analysis).

Step 4: Common practice analysis

Historically (1946-1991) small and insignificant afforestation and reforestation activities on community degraded lands in Republic of Moldova occurred, and starting with 1997 these processes were stopped.

Planting activities during 1997-2001 were primarily concentrated on the public lands of the forest fund managed by the Agency “Moldsilva”. Starting with 2002 owing to the implementation of AR CDM project activity Moldova Soil Conservation Project (launched in 2002) forestation rate starts to increase on the account of community degraded lands.

Table 19: Afforestation/reforestation of degraded lands during 1996-2005

Reference year	Area afforested during the pre-project period, ha[34]
1996	229.0
1997	283.0
1998	329.0
1999	324.0
2000	207.0
2001	208.0
2002	1934.0
2003	1189.0
2004	746.0
2005	828.0

As previously discussed, lands included in the project are degraded and are practically excluded from the general production cycle. These require for local communities significant investment for improvement of soils and reintegration of these lands in the productive cycle. Since local communities do not possess these needed investments, the most likely outcome is that the lands would remain in unproductive state.

Table 20: Main differences between pre-project forestation activities and proposed CDM project activity

Main differences between:	
Pre-project forestation activities	**Proposed CDM activity**
Forestation activities area carried out on all categories of land	Degraded lands
Forestation activities area carried out on: All types of land properties (state public, public property of local public administration and private property (community lands))	State public, public property of local public administration (community lands)
Forestation activities area carried out on: All categories of land use (degraded arable lands, degraded orchards and vineyards, degraded stands, cutting areas, degraded pastures, glades and open place etc.)	Only lands uncovered with forest vegetation at the date of 31.12.1989.
Benefits obtained from Pre-project forestation activities include: forest wood and non-wood products; ecosystem services (water air, recreation)	Benefits: forest wood and non-wood products; ecosystem services (water air, recreation) plus additional benefits obtained form selling of carbon emission reductions
Investments for forestation activities come from: the state budget, Moldsilva's budget, National Ecological Fund, private invested (limited)	Investments for CDM project are provided from Moldsilva's budget, taking into consideration partial recovery of it own investments from the account of emissions reduction sale.

[34] Acts of Technical Reception (1996-2005), Moldsilva

C.6. Identification of the baseline scenario and demonstration of additionality using the "Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities" (if required by the selected approved methodology):

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

Data and parameters that are available at **validation**:

Data / Parameter:	$\Delta C_{BDL\_ijk,t}$
Description/unit:	Average annual change in the carbon stocks of bare lands or degraded lands with sparse pre-existing vegetation in stratum i substratum j species k in t $CO_2 yr^{-1}$
Value applied:	Set to zero
Source of data:	Project; see PDD section C.7 a (i)
Justification of choice / Measurement procedures (if any):	Default
Any comment:	According to the baseline study carbon stocks of bare lands with sparse pre-existing vegetation is expected to show a steady decline..

Data / Parameter:	$\Delta C_{BDL\_LB_{ijk},t}$
Description/unit:	Sum of annual changes in the carbon stocks of living biomass (above- and below-ground) in stratum i substratum j species k in t CO_2 yr^{-1}
Value applied:	<table><tr><td></td><td>Above-ground Biomass</td><td>Below-ground Biomass</td></tr><tr><td>Stratum 1: Rich Soils</td><td>9,826.03</td><td>2,358.25</td></tr><tr><td>Stratum 2: Poor Soils</td><td>2,696.67</td><td>647.20</td></tr></table>
Source of data:	Sample plot measurements to assess pre-existing vegetation in the baseline. See Annex 9 Pre-existing Biomass, worksheet "Pre-existing Biomass Calc." cells AI54:AJ56
Justification of choice / Measurement procedures (if any):	Ex ante calculation based on project data
Any comment:	>>

Data / Parameter:	$\Delta C_{BAR,_{ijk},t}$
Description/unit:	Average annual change in the carbon stocks of pre-project A/R attributable to stratum i sub-stratum j species k in t CO_2 yr^{-1}
Value applied:	<table><tr><td>Baseline strata with Pre-AR</td><td>**tCO2e**</td></tr></table>

	Robinia pseudoacacia III/ — 3,843.52 Robinia pseudoacacia IV — 1,296.86 Quercus III — 47.06 Quercus IV — 41.83
Source of data:	Calculation based on the data on pre-project reforestation. See TARAM worksheet Pre-AR Cells C308:D312
Justification of choice / Measurement procedures (if any):	Ex ante calculation based on project data
Any comment:	

Data / Parameter:	$\Delta C_{BAR\_LB\_Tree_{ijk,t}}$
Description/unit:	Average annual change in the carbon stocks of living tree biomass pools (above-ground and below-ground tree biomass) of the pre-project A/R attributable to stratum i sub-stratum j species k in t CO_2 yr^{-1}
Value applied:	see table below
Source of data:	Based on the data on pre-project reforestation. See TARAM, Pre-AR worksheet Cells C224, H224, M224, R224 (above-ground biomass), and C260, H260, M260, R260 (below-ground biomass)
Justification of choice / Measurement procedures (if any):	Ex ante calculation based on project data
Any comment:	>>

Species/strata	*Above-ground biomass*	*Below-ground biomass*
Robinia pseudoacacia III / Rich Soil	155.2	49.7
Robinia pseudoacacia IV / Poor Soil	31.8	10.9
Quercus III / Rich Soil	0.2	0.1
Quercus IV / Poor Soil	0.1	0.1

Data / Parameter:	$\Delta C_{BAR\_S_{ijk,t}}$
Description/unit:	Average annual change in the carbon stocks of soil pool of the pre-project A/R attributable to stratum i sub-stratum j species k in t CO2 yr^{-1}
Value applied:	*0.77 tCO_2 yr^{-1}*
Source of data:	See TARAM worksheet Pre-AR cell U296
Justification of choice / Measurement procedures (if any):	Ex ante calculation based on project data
Any comment:	This value is only available at the project level because the baseline soil C study confirmed that there is no significant difference between the pasture (“rich soils”) and degraded lands (“poor soil”)in terms of base soil C stock (see Pre-AR worksheet in TARAM cells Q266:Q295).

Data / Parameter:	$\Delta C_{BSL,t}$
Description/unit:	Baseline net GHG removals by sinks in year *t*int CO_2eq yr^{-1}
Value applied:	172,407 tCO2e in year 30
Source of data:	See yearly values in TARAM worksheet “CERs” cells F15:44.
Justification of choice / Measurement procedures (if any):	Data based on pre-project reforestation used for calculation of baseline net GHG removals by sinks
Any comment:	Sum of baseline net greenhouse gas removals by sinks for the certain monitoring period

Data / Parameter:	$\Delta C_{ijk,t}$
Description/unit:	Average annual change in carbon stock in stratum i sub-stratum j species k in t CO_2eq yr^{-1}
Value applied:	N/A
Source of data:	Project
Justification of choice / Measurement procedures (if any):	Carbon gain-loss method to estimate the carbon stock changes
Any comment:	

Data / Parameter:	$\Delta C_{G,ijk,t}$
Description/unit:	Average annual growth in carbon *stock* for stratum *I* sub-stratum *j* species *k* in t CO_2eq yr^{-1}
Value applied:	N/A
Source of data:	
Justification of choice / Measurement procedures (if any):	Carbon gain-loss method to estimate the carbon stock changes
Any comment:	

Data / Parameter:	$\Delta C_{L,ijk,t}$
Description/unit:	Average annual loss in carbon *stock* for stratum *i*sub-stratum *j*species *k* in t CO_2eq yr^{-1}
Value applied:	N/A
Source of data:	
Justification of choice / Measurement procedures (if any):	Carbon gain-lossmethod to estimate the carbon stock changes

Any comment:	

Data / Parameter:	$\Delta G_{Mean\_LB\_Tree,ijk}$
Description/unit:	Average annual increment of total dry biomass of living trees for stratum *i* sub-stratum *j* species *k* in t.d.m. ha^{-1} yr^{-1}
Value applied:	N/A
Source of data:	N/A
Justification of choice / Measurement procedures (if any):	N/A
Any comment:	

Data / Parameter:	$\mathbf{CF_k}$
Description/unit:	Carbon fraction for species *k (for biomass)/* tonnes C (tonne d.m.)-1
Value applied:	0.5 (default)
Source of data:	IPCC (2003)
Justification of choice / Measurement procedures (if any):	Default
Any comment:	>>

Data / Parameter:	44/12
Description/unit:	Ratio of molecular weights of CO_2 and of carbon/ dimensionless
Value applied:	44/12
Source of data:	Universal constant
Justification of choice / Measurement procedures (if any):	Default
Any comment:	>>

Data / Parameter:	$G_{w,ijk}$
Description/unit:	Average annual aboveground dry biomass increment of living trees for stratum *i* sub-stratum *j* species *k* in t.d.m. ha^{-1} yr^{-1}
Value applied:	N/A
Source of data:	N/A
Justification of choice / Measurement procedures (if any):	N/A
Any comment:	

<table>
<tr><td>Data / Parameter:</td><td>Rk</td></tr>
<tr><td>Description/unit:</td><td>Root-shoot ratio for species k age class j, dimensionless. The root-shoot ratio may change as a function of the above-ground biomass present in year t</td></tr>
<tr><td>Value applied:</td><td>
<table>
<tr><th></th><th colspan="3">Root to shoot Ratio</th><th>Use Rj-1 when ABGB</th><th colspan="2">Use Rj-2 when ABGB is between</th><th>Use Rj-3 when ABGB is above</th><th></th></tr>
<tr><th>Species</th><th>Rj-</th><th>Rj-</th><th>Rj-</th><th>t.d.m. ha-1</th><th colspan="2">t.d.m. ha-1</th><th>t.d.m. ha-1</th><th>Sources</th></tr>
<tr><td>Robinia pseudoacacia III</td><td>0.63</td><td>0.46</td><td>0.32</td><td>20</td><td>20</td><td>80</td><td>80</td><td>1</td></tr>
<tr><td>Robinia pseudoacacia IV</td><td>0.67</td><td>0.55</td><td>0.33</td><td>15</td><td>15</td><td>50</td><td>50</td><td>1</td></tr>
<tr><td>Quercus spp. III</td><td>0.62</td><td>0.56</td><td>0.46</td><td>10</td><td>10</td><td>40</td><td>40</td><td>2</td></tr>
<tr><td>Quercus spp. IV</td><td>0.67</td><td>0.58</td><td>0.49</td><td>10</td><td>10</td><td>35</td><td>35</td><td>2</td></tr>
<tr><td>Juglans Regia</td><td></td><td>0.24</td><td></td><td></td><td></td><td></td><td></td><td>3</td></tr>
</table>
</td></tr>
<tr><td>Source of data:</td><td>1.Calculation based on V.Giurgiu.D.Draghiciu. Mathematical and auxological models and yield tables for trees. Editura Ceres, Bucuresti 2004, page 537. Tabel 10.3.
2.Calculation based on USSR State Forestry Committee (1987). Normative and reference materials for the taxation of Ukrainian and Moldavian forests. Kiev: Publisher house “Urojai” (Ukrainian and Moldavian Yield Tables), p. 225; p. 259.
3. IPCC, 2003. Good Practice Guidance for Land Use, Land-Use Change and Forestry. Table A3.A.1.8</td></tr>
<tr><td>Justification of choice / Measurement procedures (if any):</td><td>Based on published data</td></tr>
<tr><td>Any comment:</td><td>Species have been grouped according to similar growth behaviour and based on similarity of parameters used for ex-ante calculations</td></tr>
</table>

Data / Parameter:	$I_{v,ijk}$
Description/unit:	Average annual increment in merchantable volume for stratum*i* sub-stratum *j* species *k* in $m^3\ ha^{-1}\ yr^{-1}$
Value applied:	N/A
Source of data:	N/A
Justification of choice / Measurement procedures (if any):	N/A
Any comment:	

Data / Parameter:	Dk
Description/unit:	Basic wood density for species k in t.d.m. m^{-3}
Value applied:	**Species** | **WD** | ***Source*** Robinia pseudoacacia III | 0.7 | *1* Robinia pseudoacacia IV | 0.7 | *1* Quercus spp. III | 0.68 | *2* Quercus spp. IV | 0.68 | *2* Juglans Regia (pre-existing biomass) | 0.64 | *3*
Source of data:	1.Report on testing of wood material samples, The Furniture and Wood Articles Testing and Certification Centre, Chisinau, 2003. 2.Osadciev V.G., Ivankov P.T., Sergovschi P.S. et. Al: Spravocinik po derevoobrabotke (dlea tzehov şirpotreba leshozov), Moskva, 1955 3.Sachsse, H., *Einheimische Nutzhoelzer*. 1984, Hamburg: Parey. 160pp
Justification of choice / Measurement procedures (if any):	Published data
Any comment:	Biomass of Ulmus was calculated using yield table of Quercus IV since no data is available, for Ulmus. In forestry and management planning practice indicators for Ulmus are used those as for Quercus.

Data / Parameter:	$BEF_{1,jk}$
Description/unit:	Biomass expansion factor for conversion of annual net increment (including bark) in the merchantable volume to total aboveground biomass increment for species *k* age class *j*, dimensionless
Value applied:	**Species** | **BEF** | ***Source*** Robinia pseudoacacia III | N/A | - Robinia pseudoacacia IV | N/A | - Quercus spp. III | N/A | - Quercus spp. IV | N/A | - Juglans regia (pre-existing biomass) | 1.3 | *1*
Source of data:	1.IPCC, 2003. Good Practice Guidance for Land Use, Land-Use Change and Forestry. Table A3.A.1.8.
Justification of choice / Measurement procedures (if any):	Publish data applicable to project
Any comment:	

Data / Parameter:	$\Delta C_{LB,ijk}$
Description/unit:	Average annual change in the carbon stocks of biomass for stratum *i* sub-stratum *j* species *k* in t C yr^{-1}

<table>
<tr><td>Value applied:</td><td>

Baseline Strata	Pre-existing biomass	Pre-AR
Robinia pseudoacacia III	406.14	2,217.22
Robinia pseudoacacia IV	111.46	3,967.71
Quercus III	-	105.83
Quercus IV	-	31.74

</td></tr>
<tr><td>Source of data:</td><td>See worksheet Pre-AR in TARAM cells C318:E322
Also see worksheet Pre-existing Biomass calc. cells AD62 and AD63 in REF 119 Annex 9_Pre-existing Biomass for pre-existing biomass values.</td></tr>
<tr><td>Justification of choice / Measurement procedures (if any):</td><td>Ex ante calculation based on project data</td></tr>
<tr><td>Any comment:</td><td></td></tr>
</table>

Data / Parameter:	$C_{2,LB,ijk}$
Description/unit:	Carbon stock in the biomass of stratum *i* sub-stratum *j* species *k* calculated at measurement time period 2 in t C
Value applied:	N/A
Source of data:	N/A
Justification of choice / Measurement procedures (if any):	N/A
Any comment:	

<table>
<tr><td>Data / Parameter:</td><td>$C_{1,LB,ijk}$</td></tr>
<tr><td>Description/unit:</td><td>Carbon stock in the biomass of stratum i sub-stratum j species k, calculated at measurement time period 1 in t C</td></tr>
<tr><td>Value applied:</td><td>

	Stratum 1 (Robinia): Rich Soils	Stratum 2 (Robinia): Poor Soils
Carbon Stock in the biomass per stratum	51,506.29	14,135.46

</td></tr>
<tr><td>Source of data:</td><td>Calculations for pre-existing biomass, see Annex 9 Pre-existing Biomass Analysis, Worksheet Pre-Existing Biomass Calc., Cell AD67:AE69</td></tr>
<tr><td>Justification of choice / Measurement procedures (if any):</td><td>Ex ante calculation based on project data</td></tr>
<tr><td>Any comment:</td><td></td></tr>
</table>

Data / Parameter:	T_B
Description/unit:	Interval in years between measurement periods 2 and 1 to assess the biomass

	change
Value applied:	N/A
Source of data:	N/A
Justification of choice / Measurement procedures (if any):	N/A
Any comment:	

Data / Parameter:	$C_{2,LB\_Tree,ijk}$
Description/unit:	Total carbon stock in living biomass of trees for stratum*i* sub-stratum *j* species *k* calculated at time 2 in t C
Value applied:	N/A
Source of data:	N/A
Justification of choice / Measurement procedures (if any):	N/A
Any comment:	

Data / Parameter:	$C_{1,LB\_Tree,ijk}$
Description/unit:	Total carbon stock in living biomass of trees for stratum*i* sub-stratum *j* species *k* calculated at time 1 in t C
Value applied:	See $C_{1,LB,ijk}$
Source of data:	Calculated
Justification of choice / Measurement procedures (if any):	Ex ante calculation based on project data
Any comment:	

Data / Parameter:	$C_{AB\_Tree,ijk}$
Description/unit:	Carbon stock in aboveground tree biomass for stratum *i* sub-stratum *j* species *k* in t C
Value applied:	<table><tr><td></td><td>Stratum 1: Rich Soil (Robinia)</td><td>Stratum 2: Poor Soils (Robinia)</td></tr><tr><td>Carbon stock in aboveground tree biomass per stratum</td><td>41,537.33</td><td>11,399.56</td></tr></table>
Source of data:	Calculations for pre-existing biomass, see Annex 9 Pre-existing Biomass Analysis, Worksheet Pre-Existing Biomass Calc., Cell AD73 and AE75
Justification of choice / Measurement	Ex ante calculation based on project data

procedures (if any):	
Any comment:	

Data / Parameter:	$C_{BB\_Tree,ijk}$
Description/unit:	Carbon stock in belowground tree biomass for stratum *i* sub-stratum *j* species *k* in t C
Value applied:	(see table below)
Source of data:	Calculations for pre-existing biomass, see Annex 9 Pre-existing Biomass Analysis, Worksheet Pre-Existing Biomass Calc., Cell AD79:AE81
Justification of choice / Measurement procedures (if any):	Ex ante calculation based on project data
Any comment:	

	Stratum 1: Rich Soil (Robinia)	Stratum 2: Poor Soils (Robinia)
Carbon stock in belowground tree biomass per stratum	9,968.96	2,735.90

Data / Parameter:	V_{ijk}
Description/unit:	Merchantable volume of stratum i sub-stratum j species k in m^3 ha^{-1}
Value applied:	(see table below)
Source of data:	See worksheet Pre-existing Biomass Calc in REF 119 Annex 9_Pre-existing Biomass, cells AD85:AE90. Also see column J and cell A205 for sources of tree volume.
Justification of choice / Measurement procedures (if any):	Ex ante calculation based on project data
Any comment:	

Strata	**Average Volume per ha, (m3 ha-1)**
Robinia Rich III soils	6.25
Robinia IV Poor Soils	1.85
Quercus III Rich soils	-
Quercus IV Rich soils	-

Data / Parameter:	$f(DBH,H)$
Description/unit:	Allometric equation quantifying the relationship between above-ground biomass to the diameter at breast height (*DBH*) and tree height (*H*) of tree species *k* in kg $tree^{-1}$
Value applied:	(see table below)

Species	**Allometric equation**
Robinia pseudoacacia III	M=1.0806/1000*(exp 4.7961+2.0594*lnD)
Robinia pseudoacacia IV	M=1.0806/1000*(exp 4.7961+2.0594*lnD)
Quercus spp. III	M=0.837/1000*(exp 5.5568+1.2265*lnD)
Quercus spp. IV	M=0.837/1000*(exp 5.5568+1.2265*lnD)

Source of data:	Blujdea, V. et al. 2011. Allometric biomass equations for young broadleaved trees in plantations in Romania. Forest Ecology and Management.. V264. Issue January 15 2012. P. 172-184
Justification of choice / Measurement procedures (if any):	Ex ante calculation based on project data
Any comment:	See Annex 11 a_inputs for stand models and pre AR

Data / Parameter:	nTR_{ik}
Description/unit:	Number of trees in stratum$i$ species k in trees ha^{-1}
Value applied:	see table below
Source of data:	National guidelines: Technical guidance for forest regeneration and afforestation of forest in Moldova. Chisinau 1996 [Original Romanian Title: Îndrumările privind regenerare si impadurirea terenurilor in Moldova.
Justification of choice / Measurement procedures (if any):	Ex ante calculation based on project data
Any comment:	

Species	Strata: Robinia pseudo-acacia III	Robinia pseudo-acacia IV	Quercus III	Quercus IV
Robinia pseudoacacia	4500	4500	0	0
Quercus	0	0	4500	4500
Acer	480	600	0	600
Carpinus	0	0	480	0
Fraxinus	240	0	480	600
Other broad-lived hardwood species[35]	300	0300	300	300
Tilia	0	0	240	0
Ulmus	480	600	0	0
Total	6,000.00	6,000.00	6,000.00	6,000.00

Data / Parameter:	$\Delta C_{SOC,ijk}$
Description/unit:	Annual average change in the carbon stock of soil pool of stratum i sub-stratum j species k in t C
Value applied:	see table below

Baseline strata	**tC yr -1**
Robinia pseudoacacia III	191.79
Robinia pseudoacacia IV	64.71

[35]Other broad-leaved hardwoods *include Gleditschia triachantos, Sophora japonica, Malus sylvestris, Pyrus pyraster, and Ribes. Shrubs are also planted, including, Crataegus laevigata, Crataegus monogyna, Cornus mas, Corylus avellana, Elaeagnus angustifolia, Prunus cerasifera, Cotinus coggygria, Rosa canina, and Ligustum vulgaris.*

	Quercus III: 2.35 Quercus IV: 2.09
Source of data:	*See worksheet Pre-AR cells C327:D331 in TARAM.*
Justification of choice / Measurement procedures (if any):	Ex ante calculation based on project data
Any comment:	

Data / Parameter:	$C_{SOC\ 2,ijk}$
Description/unit:	Carbon stock in the soil for stratum *i* sub-stratum *j* under species *k* calculated at time 2 in t C
Value applied:	N/A
Source of data:	N/A
Justification of choice / Measurement procedures (if any):	N/A
Any comment:	

Data / Parameter:	$C_{SOC\ 1,ijk}$
Description/unit:	Carbon stock in the soil for stratum *i* sub-stratum *j* under species *k* calculated at time 1 in t C
Value applied:	See $\Delta C_{SOC,ijk}$
Source of data:	Calculated
Justification of choice / Measurement procedures (if any):	Ex ante calculation based on project data
Any comment:	

Data / Parameter:	T_S
Description/unit:	Interval in years between period 2 and 1 to assess the change in soil organic carbon
Value applied:	N/A
Source of data:	N/A
Justification of choice / Measurement procedures (if any):	N/A
Any comment:	

The project takes into account the two possible land uses in the baseline scenario - (*i*) degraded bare lands and (*ii*) degraded lands on which small rates of planting occurred prior to the project (pre-project AR activity undertaken historically) that could be expected to continue in the absence of the project.

(a) Verifiable changes in carbon stocks in the carbon pools

(i) Degraded bare lands and lands with isolated vegetation

Based on the results of baseline study, for degraded bare lands and for degraded lands with sparse non-woody vegetation, the *baseline net GHG removals by sinks* are set to zero for the crediting period as these are expected to show a steady decline in the carbon stock as confirmed from the data analysis of the baseline study.

The trends in the carbon pools of bare degraded and degraded lands with sparse non-woody vegetation show a declining trend in the above ground biomass; declining or low steady state in soil carbon and litter; and absence of deadwood component in the project area. Therefore, the net GHG removals in the baseline scenario for these types of lands are expected to decline over time or remain in a low steady state, highlighting the continued degradation of these lands in the absence of restoration measures (See Table 21).

Table 21: Baseline GHG removals (t CO_2e).

Please present final results of your calculations using the following tabular format.	
Year	**Annual estimation of baseline net GHG removals by sinks; t CO_2-e**
2006	588
2007	1,059
2008	1,508
2009	1,968
2010	2,428
2011	2,831
2012	3,233
2013	3,636
2014	4,038
2015	4,441
2016	4,755
2017	5,069
2018	5,383
2019	5,697
2020	6,011
2021	6,300
2022	6,589
2023	6,878
2024	7,167
2025	7,454
2026	7,660
2027	7,866
2028	8,072
2029	8,278
2030	8,484
2031	8,657
2032	8,830
2033	9,003
2034	9,175
2035	9,348
Total estimated baseline net GHG removals by sinks; t CO_2-e	172,407
Total number of crediting years	30
Annual average over the crediting period of estimated baseline net GHG removals by sinks; t CO_2-e	5,747

Source: Project Implementation Unit, Moldsilva (ICAS), Chisinau, Calculation based on the project data. See TARAM CERs worksheet cells H15:44

As prescribed in the methodology, the changes in carbon stocks of living biomass in lands with isolated trees were estimated. An inventory of stocks of pre-existing tree biomass was undertaken. In a

preliminary examination it was found that some sectors had woody vegetation (trees and / or shrubs of category III, which is not the result of the project activities. The inventory was carried out as follows:.[36]

Delineation of the inventory area. The inventory was focused on distinct subsets of pre-existing project area with trees (portions of old orchards / gardens, areas with noticeable natural regeneration etc.), which were identified and delineated. Project areas with predominant herbaceous vegetation (e. g. pastures) were excluded (their woody biomass stocks are zero or are insignificant).

Delineation of land parcels with pre-existing woody vegetation was made based on examination of land parcels during the baseline study (including digital photos) and further clarification with the help of OrthoPhoto plans and overlapping with images from Google Earth. Once defined, the sectors concerned were mapped and area calculated. The total inventory area is 2,410 ha or 28% of the total project area (8,468.84 ha).

Sampling and allocation of sample plots. Non-stratified random sampling was applied in the 2,410 ha with pre-existing woody vegetation. Sample size was 30 plots, allocated within the inventory area by assembling a list of parcels and assigning plots with probability weighted to the relative size of the parcel. As a landmark the coordinates of the randomly selected points within the parcels delineating the plot corners were used and located with GPS Garmin eTrex.

The shape and size of sample plots. Because pre-existing trees are rare and unevenly distributed on the surface (patches, solitary trees, etc.), large sample plots with fixed area for above- and below-ground living biomass stocks were used as a way to include heterogeneity stocks. Sample plots were rectangles of 20 meters by 80 meters (1600 m^2), 6.4 times the large sample plots used for regular project inventory / monitoring.

SW corner of each sample plot was permanently marked. Markers of the plots were not prominently displayed to ensure that permanent plots do not receive differential treatment during the project implementation. Coordinates for each permanent sample plot were recorded with GPS to help locate them in the future. The slope was measured and recorded where exceeded 15%along an axis of the rectangular parcel.

Measurement and calculation. In each sample plot, all pre-existing trees and shrubs (trees of the category III) with breast height diameter of 6 cm and more (DBH, in accordance with minimum DBH for large sample plots) were measured and recorded in field worksheets, being marked in the field with wax chalk. *Note that this diameter threshold is below the 10 cm minimum DBH for inventory plots used in the project monitoring plan, and is thus conservative for estimating baseline stocks*. Trees planted as the result of the project activity were not measured.

Field measurements were carried out by specialists in 2 teams (6 people: first team – 18 samples (no. 1-15, 18-20) and second team – 12 samples (No. 16-17, 21-30). Teams were preliminary instructed on the set tasks and methods of work. Equipment used for the work included: GPS Garmin eTrex, camera, geodesic compass (BG 1), metal tapes of 5 and 30 meters, wooden poles (1 m), caliper, dendrometer VN-1/Suunto PM-5/1520, big hammer, wax chalk etc. Original copies of field measurements (written forms and electronic files), GPS coordinates of sample plots, and images of plots are archived at PIU. Results of measurements per each PSP are attached in Annex 9.

[36] Methodology ARAM0002 V03 does not apply - “Guidance on conditions under which the change in carbon stocks in existing live woody vegetation are insignificant” (CDM EB 46, Annex 16 (version 01)

In total 179 trees and bushes with diameter from 6 cm and larger were measured. None tree was measured in plots having uneven distribution of trees. Cumulative results of calculations are presented in Table 17. On average 6 trees were measured on one PSP (See Table 22).

Table 22: Volume of biomass in pre-existent forest vegetation in the area of MCFDP.

Nr. PSP	ID code of the plot	Community	No of measured trees	Plot area, ha	Volume, m^3	
					1. Per PSP	2. per ha
1	70731486	Bascalia (96F)	7	0.16	0.62	3.94
2	70721465	Cupcui	20	0.16	0.71	4.48
3	70721492	Saratica Noua	31	0.16	1.95	12.20
4	70721492	Saratica Noua	3	0.16	0.17	1.10
5	70721457	Cneazevca	9	0.16	1.10	6.88
6	70721461	Sarateni	0	0.16	0	0.00
7	70721471	Toceni	9	0.16	0.07	0.50
8	151521383	Albota de Sus	21	0.16	0.39	2.48
9	202011270	Cioc-Maidan	1	0.16	0.15	0.94
10	161621294	Gangura	0	0.16	0	0.00
11	161621297	Gangura	0	0.16	0	0.00
12	191921786	Brezoia	8	0.16	0.12	0.79
13	191911412	Hadgimus	3	0.16	0.02	0.15
14	80861624	Pascani	10	0.16	0.09	0.59
15	80861625	Pascani	8	0.16	0.12	0.78
16	10121100	Straseni	9	0.16	0.58	3.64
17	222211743	Ustia	1	0.16	0.00	0.04
18	80821632	Sarata Galbena	5	0.16	0.76	4.77
19	80821632	Sarata Galbena	5	0.16	0.04	0.29
20	80871651	Negrea	2	0.16	0.01	0.10
21	131321549	Tirsitei	0	0.16	0	0.00
22	30331588	Frunze	6	0.16	0.53	3.32
23	30341601	Arionesti	0	0.16	0	0.00
24	20211037	Rublenita	0	0.16	0	0.00
25	20211001	Regina Maria	0	0.16	0	0.00
26	212111733	Cornesti	0	0.16	0	0.00
27	50551760	Clisova	12	0.16	0.29	1.82
28	111121132	Chiscareni	2	0.16	0.05	0.32
29	111121127	Glinjeni	3	0.16	0.05	0.36
30	141411230	Magurele	4	0.16	0.09	0.59
Average			***6.0***	**0.16**	***0.3***	***1.7***

PSP: Permanent Sample Plot

Because in most cases the height**s** of inventoried trees are not within the normal yield tables, assessment of biomass from pre-existing forest vegetation was carried out using several sources. This is mainly because those trees have grown as solitary specimens (outside the canopy) and unfavorable conditions have influenced them over time (e.g., humidity and poor soil conditions, grazing, fire, etc.) Thus, the table volume of small stems of oaks was used in the case of trees with diameters between 6 and 8 cm

inclusive.[37]Note that because of the very large amplitude of growth conditions, some tables for oak contain up to 8 sets of highs. Oak yield tables[38] were used in cases in which volume of trees species were unavailable in the above-mentioned cube tables, this is common practice In the Republic of Moldova. Otherwise the average form index method was used[39] to determine tree volume, applying the following equation:

$$\mathbf{V= 0{,}39 \times D^2 \times H,}$$

where:
0,39 – average form index;
D – diameter at height of 1,3 m, in cm;
H – tree height, m.

Incremental growth of individual trees was estimated using yield tables[40], summed up to get incremental growth per plot and expanded to the hectare level. The average incremental growth per hectare for all strata is 0.11 m3 ha-1. Since *Juglans regia* is the dominating species (i.e., 35 percent) in the sampled pre-existing biomass, its BEF (1.3[41]) and wood density (0.64[42]) values were applied in estimating carbon stock changes. Calculations were performed as per equation B.2 of the methodology and the calculated value is 15,528.15 tCO2e:

$$\Delta C_{BDL_{ijk,t}} = \Delta C_{BDL\_LB_{ijk,t}}$$

$\Delta C_{BDL\_LB_{ijk,t}}$ Sum of annual changes in the carbon stocks of living biomass (above- and below-ground) in stratum *i* substratum *j* species *k* in t CO_2 yr^{-1}

(ii) *Degraded lands with pre-project AR*

According to methodology ARAM0002 version 03 the biomass removals from the pre-existing A/R activity has to be treated as part of the baseline scenario. Some A/R activities have been undertaken in the region historically on lands that are as degraded as in the project area and are expected to continue in the absence of the project at certain average annual rate.

The pre-project AR rate is calculated as per the steps outlined in AR-AM0002 version 03 methodology. The pre-project planting occurred between 1996 and 2005. Planting activities carried out during 1996-

[37]The USSR State Committee on Forestry – Normative References for the Taxation of Forest in Ukraine and Moldova. Kiev "Harvest" (Ukrainian and Moldavian Yield Tables), p. 225; p. 259. [Original Russian Title: Gosudarstvennyi Komitet SSSR po lesnomu hozeastvu (1987). Normativno-spavochnye materialy dlea taksatstyi lesov Ukrainy I Moldavii. Kiev "Urojai" (Ukrainian and Moldavian Yield Tables), p. 225; p. 259.]

[38]G.A. Poritschii, N.V.Shikimaka, Assortment tables for taxation of oak stands, Kyev, 1974. [originalRussianSource: Г.А. Порицкий, Н. В. Шикимака, Сортиментные таблицы для таксации древостоев дуба на корню, Киев, 1974].

[39]V. Giurgiu, Dendrometry, Ed. Agrosilvica, 1971, p. 126 [Original Romanian source: V. Giurgiu, Dendrometria, Ed. Agrosilvică, 1971, p. 126]

[40]The USSR State Commitee on Forestry – Normative References for the Taxation of Forest in Ukraine and Moldova. Kiev "Harvest" (Ukrainian and Moldavian Yield Tables), p. 358; p. 359. [Original Russian Title: Gosudarstvennyi Komitet SSSR po lesnomu hozeastvu (1987). Normativno-spavochnye materialy dlea taksatstyi lesov Ukrainy I Moldavii. Kiev "Urojai" (Ukrainian and Moldavian Yield Tables), p. 358; p. 359.]

[41]IPCC, 2003. Good Practice Guidance for Land Use, Land-Use Change and Forestry. Table A3.A.1.10

[42]Sachsse, H., Einheimische Nutzhoelzer. 1984, Hamburg: Parey. 160pp

2001 focused primarily on lands within the forest fund (e.g., cutting area, degraded stands, lost forest crops, forest crops etc.) Plantings occurring from 2002 to 2006 include reforestation carried out by Moldsilva under the CDM Moldova Soil Conservation Project, spread out in the whole country. The share of afforested lands applicable to the calculation of baseline increased in the 2002-2006 period as lands previously not been covered with forests vegetation became eligible for reforestation.

Pre-project AR undertaken as part of the baseline is estimated following procedures in Section 5 (ii) of the methodology AR-AM0002 (version 03).The average annual area afforested over the pre-project period was calculated following Steps 1-4 of the methodology.

Step 1: Data on pre-project A/R in Moldova comes from official Moldsilva reports (called "acts of technical reception") issued by Moldsilva, and signed by Moldsilva officials and Moldsilva Director General (Gheorghe Vdovii, Vasile Mahu and Anatoli Popusoi)[43]. According to these records (Annex 8 of PDD), the average annual area of degraded lands afforested at the national level during the previous 10-year period (1996-2005) is 596 ha. The available degraded land for afforestation in Moldova in 2006 is 86,832 ha.

Step 2: N.A. as public records with information on the pre-project A/R activity are available.
Step 3: N.A.

Step 4: As can be seen in the acts of technical reception, the species used in the pre-project A/R are common to the species used in the project scenario, such as Quercus, Fraxinus, Robinia, Gleditsia triancanthos, Ulmus, etc. The baseline GHG removals by sinks from pre-project A/R have been calculated following the steps and methods outlined for the ex-ante estimation of the actual net GHG removals by sinks in Section 7 of AR-AM0002 v.3. The result can be found in table 22 of this PDD.

Step 5: Carbon stock change in soil organic matter (t C ha-1 yr-1) is consistent with values applied in stand models, which have been calculated based on equation B.35 as per the methodology.

Step 6: changes in non-tree biomass, deadwood, and litter pools for the pre-project A/R were set to zero since these pools are likely to increase under the pre-project A/R, therefore, such treatment is justified.

Calculations of pre-project afforestation rate are presented in **Table 23**.

Table 23: Rate of AR activity under the baseline scenario during 1996-2005 (ha).

Reference year	**Area afforested during the pre-project period, ha[44]**
1996	229.0
1997	283.0
1998	329.0
1999	324.0
2000	207.0

[43]Acts of Technical Reception (1996-2005), Moldsilva, Annex XX

Reference year	Area afforested during the pre-project period, ha[44]
2001	208.0
2002	1934.0
2003	1189.0
2004	746.0
2005	828.0
Average annual pre-project AR undertaken on degraded lands at the national level over 10-year period prior to the project, ha	627.7.0
Total area of degraded land (ha) available for restoration through afforestation and reforestation activity at the national level in 2006, ha	86,832
Annual pre-project AR rate undertaken on degraded lands at the national level (Percentage of average annual pre-project AR area relative to total area of degraded land available for A/R at the national level).	0.72%
Average annual rate of pre-project AR applicable as the baseline AR to the project context, ha (using average annual area=Step 1 of 4ii from AR-AM0002 (version 03)	60.98

Source*: Acts of technical reception 1996-2005. Moldsilva.*

Pre-project AR undertaken as part of the baseline is estimated by applying equation B.3 of the methodology AR-AM0002 (version 03) as below.[45]

$$\Delta C_{BAR_{ijk,t}} = [\Delta C_{BAR\_LB\_Tree_{ijk,t}} + \Delta C_{BAR\_S_{ijk,t}}]$$

where:

$\Delta C_{BAR_{ijk,t}}$ Average annual change in the carbon stocks of pre-project AR attributable to stratum *i* sub-stratum *j* species *k* in t CO_2yr^{-1}.

$\Delta C_{BAR\_LB\_Tree_{ijk,t}}$ Average annual change in the carbon stocks of living tree biomass pools (above-ground and below-ground tree biomass) of the pre-project AR attributable to stratum *i* sub-stratum *j* species *k* in t CO_2yr^{-1}

$\Delta C_{BAR\_S_{ijk,t}}$ Average annual change in the carbon stocks of soil pool of the pre-project AR attributable to stratum *i* sub-stratum *j* species *k* in t CO_2yr^{-1}

Increases in non-tree biomass, litter, and dead wood pools are considered to be negligible and are treated as zero. Soil organic carbon in pre-project A/R activity conservatively applies the same increment rate as in stand model 4 (0.90813667 t C ha-1 yr-1).

Table 24.: Baseline Net Removals due to Pre-AR Activities

Project year	Above-ground biomass	Below-ground biomass	Soil organic carbon	Total carbon stock change in pre-existing AR
age	t CO2e	t CO2e	t CO2e	t CO2e
1	-	-	70.01	70.01

[45]TARAM was used for estimation of baseline GHG removals due to pre-project A/R activities.

2	295	106	210.02	611.34
3	885	296	420.04	1,601.68
4	1,770	582	700.06	3,052.18
5	2,951	962	1,050.09	4,962.85
6	4,382	1,424	1,470.13	7,276.07
7	6,066	1,966	1,960.17	9,991.84
8	8,000	2,590	2,520.22	13,110.15
9	10,186	3,294	3,150.28	16,631.01
10	12,624	4,080	3,850.34	20,554.41
11	15,246	4,925	4,620.41	24,791.81
12	18,053	5,830	5,460.48	29,343.20
13	21,044	6,794	6,370.56	34,208.58
14	24,220	7,817	7,350.65	39,387.95
15	27,580	8,901	8,400.74	44,881.31
16	31,106	10,037	9,520.84	50,663.73
17	34,797	11,227	10,710.95	56,735.19
18	38,655	12,470	11,971.06	63,095.71
19	42,677	13,767	13,301.17	69,745.28
20	46,865	15,116	14,701.30	76,681.48
21	51,207	16,515	16,101.42	83,823.74
22	55,706	17,964	17,501.54	91,172.08
23	60,361	19,464	18,901.67	98,726.47
24	65,171	21,014	20,301.79	106,486.94
25	70,137	22,614	21,701.92	114,453.47
26	75,234	24,257	23,102.04	122,592.83
27	80,462	25,941	24,502.16	130,905.00
28	85,820	27,667	25,902.29	139,390.00
29	91,310	29,436	27,302.41	148,047.82
30	96,930	31,246	28,702.53	156,878.47

Source: TARAM worksheet Pre-AR cells A263:E:295

Finally, the baseline net GHG removals by sinks were estimated using equation B.4 of the approved methodology AR-AM0002 (version 03) as follows.

$$\Delta C_{BSL,t} \quad = \quad \sum_i \sum_j [\sum_k \Delta C_{BAR\ ijk,t} + \Delta C_{BDL\ ijk,t}]$$

where:

$\Delta C_{BSL,t}$ = baseline net GHG removals by sinks in year *t*int CO_2e yr^{-1}

$\Delta C_{BAR_{ijk,t}}$ = average annual change in the carbon stocks of pre-project AR attributable to stratum *i* sub-stratum *j* species *k* in t $CO_2 yr^{-1}$.

$\Delta C_{BDL,\ ijk,t}$ = average annual change in the carbon stocks of bare lands or degraded lands with sparse pre-existing vegetation in stratum *I* substratum *j* species *k* in t $CO_2 yr^{-1}$ set to zero

As per the baseline approach 22(a) adopted in the AR-AM0002 (version 03), the estimated *ex-ante* net baseline GHG removals by sinks are frozen for the crediting period. The baseline net GHG removals of the pre-project AR are summed over the period corresponding to the project scenario to maintain consistency between the baseline net GHG removals by sinks and the actual net GHG removals by sinks (Table 27).

Table 25: Baseline Net Annual GHG Removals by Sinks (t CO_2e).

Project year	**GHG removals in bare lands**	**Annual GHG removals in pre-existing vegetation**	**Annual GHG removals in pre-AR activities**	**Baseline Net Annual GHG Removals by Sinks**
Age	t CO2e	tCO2e	t CO2e	t CO2e
1	0	518	70	588
2	0	518	541	1,059
3	0	518	990	1,508
4	0	518	1,451	1,968
5	0	518	1,911	2,428
6	0	518	2,313	2,831
7	0	518	2,716	3,233
8	0	518	3,118	3,636
9	0	518	3,521	4,038
10	0	518	3,923	4,441
11	0	518	4,237	4,755
12	0	518	4,551	5,069
13	0	518	4,865	5,383
14	0	518	5,179	5,697
15	0	518	5,493	6,011
16	0	518	5,782	6,300
17	0	518	6,071	6,589
18	0	518	6,361	6,878
19	0	518	6,650	7,167
20	0	518	6,936	7,454
21	0	518	7,142	7,660
22	0	518	7,348	7,866
23	0	518	7,554	8,072
24	0	518	7,760	8,278
25	0	518	7,967	8,484
26	0	518	8,139	8,657
27	0	518	8,312	8,830
28	0	518	8,485	9,003
29	0	518	8,658	9,175
30	0	518	8,831	9,348

Source: *See TARAM worksheet CERs Cells D15:44; F15:44; H15:44*

Note: As per the methodology AR-AM 0002 (version 03), for the years in which the baseline net GHG removals by sinks represent negative values, they are assumed to be zero.

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. *Ex ante* estimation of actual net GHG removals by sinks:

a. Verifiable changes in carbon stocks in the carbon pools

The AR-AM0002 (version 03) provides for two options – empirical based method and model based approach for the ex ante estimation of carbon stock changes.

For purposes of ex-ante estimation of carbon stock changes, the empirical method is employed, referencing species- and site condition-specific volume growth and yield tables (expressed in total tree aboveground volume including stem, branches and bark) from similar sites in Romania (Giurgiu 1972, Annex 13a and Annex 13b). Species-specific wood density estimates employed were derived from wood samples collected in Moldova (Kapp et al 2003). Carbon stocks in belowground biomass were estimated applying the root: shoot ratios developed from local species-specific biometric tables[46]. Shrub biomass was estimated by modeling from local studies. Soil carbon sequestration was modeled from chronosequences of sites of known age measured on representative plantings in Moldova (Shoch et al 2003).[47]

In order to account the risks from unanticipated events such as drought, pests, and fire, illegal felling and grazing, a 5% allowance is made to account for these risks. Therefore, the risk adjusted *ex ante* actual net GHG removals by sinks should be conservative.

Calculations were performed according to equations B.17—B.21, B24-B30 of the methodology using TARAM v.1.3.

$$\Delta C_{ijk,t} = [\Delta C_{AB,ijk,t} + \Delta C_{BB,ijk,t} + \Delta C_{DW,ijk,t} + \Delta C_{L,ijk,t} + \Delta C_{SOC,ijk,t}] \bullet [44/12]$$

(Equation B.17 of ARAM003 v3)

where:

$\Delta C_{ijk,t}$	Average annual change in carbon stock in the pools for stratum *i* sub-stratum *j* species *k* in t CO_2 yr^{-1} in year *t*
$\Delta C_{AB,ijk,t}$	Average annual change in carbon stock in aboveground biomass for stratum *i* sub-stratum *j* species *k* in t C yr^{-1} in year *t*
$\Delta C_{BB,ijk,t}$	Average annual change in carbon stock in belowground biomass for stratum *i* sub-stratum *j* species *k* in t C yr^{-1} in year *t*
$\Delta C_{DW,ijk,t}$	Average annual change in carbon stock in deadwood for stratum *i* sub-stratum *j*

[46] - Giurgiu, V., Decei, J. and Armasecu. Biometrics of Trees and Stands in Romania – Dedrometric Tables. CERES, Bucharest 1972 [Original Romanian Title: S., 1972: Biometria arborilor şi arboretelor din România – Tabele dendrometrice. Editura "CERES", Bucuresti]

[47] Shoch, D., Brown, S., Galupa, D., Talmaci, I. and L. Spitoc. 2003. Moldova Soil Conservation Project Monitoring Plan.

	species k in t C yr^{-1} in year t
$\Delta C_{L,ijk,t}$	Average annual change in carbon stock in litter for stratum i sub-stratum j species k in t C yr^{-1} in year t
$\Delta C_{SOC,ijk,t}$	Average annual change in carbon stock in soil organic matter for stratum i substratum j species k in t C yr^{-1} in year t
44/12	Ratio of molecular weights of carbon and CO_2, dimensionless

Changes in the Carbon stocks of above-ground biomass

$$\Delta C_{AB,ijk,t} = (C_{AB,ijk,t_2} - C_{AB,ijk,t_1}) / T_B \quad \text{(B.18)}$$

$$C_{AB,ijk} = (C_{AB\_Tree,ijk} + C_{AB\_NTree,ijk}) \quad \text{(B.19)}$$

a.1.1. Above-ground biomass of tree (C_{AB_Tree})

Changes in the carbon stock of tree biomass were calculated using a combination of Biomass Expansion Factor and Allometric Equation methods. For species such as *Robinia pseudoacacia* and *Quercus spp.* increment in diameter was obtained from correspondent yield tables and specific allometric equations were used to estimate their growth. For other species (i.e., Fraxinus, Carpinus, Tilia, and other broad-leaved hardwood species), growth volume data was directly obtained from yield tables. *Quercus sp*. growth data was applied to Ulmus and Acer species due to lack of data for these species; this is a common practice in forestry management and planning in Moldova. In calculating species growth per hectare basis, planting density of yield tables at different ages was adopted for the project..[48]

Steps 1 and 2: Available allometric equations were applied for *Robinia pseudoacacia III*, *Robinia pseudoacacia IV*, *Quercus III* and *Quercus IV*.[49] Diameter and densities were obtained from yield tables developed in Romania, Ukraine and Moldova.[50] Due to lack of data, growth estimated for *Quercus* was applied for *Acer spp. III*, *Acer spp. IV*, *Ulmus spp III* and *Ulmus IV*. Forestry and management planning practice indicators for *Ulmus* and *Quercus* are used those as for *Quercus* in Moldova.

$$C_{AB\_Tree,ijk} = A_{ijk} \bullet nTR_{ik} \bullet f_k(DBH, H) \bullet CF_k \bullet (1/1000) \quad \text{(B.21)}$$

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[48] See Annex 11a.

[49] Blujdea, V. et al. 2011. Allometric biomass equations for young broadleaved trees in plantations in Romania.Forest Ecology and Management. V264. Issue January 15 2012. P. 172-184

[50] Giurgiu, V., Decei, J. and Armasecu.Biometrics of Trees and Stands in Romania – Dedrometric Tables.CERES, Bucharest 1972 and The USSR State Commitee on Forestry – Normative References for the Taxation of Forest in Ukraine for Robinia. Moldova. Kiev “Harvest” (Ukrainian and Moldavian Yield Tables) for Quercus.

where:

$f_k(DBH,H)$	Allometric equation quantifying the relationship between above-ground biomass tree of species *k* in kg tree^{-1} to the diameter at breast height (*DBH*) and tree height (*H*) for species *k*, dimensionless. Mean *DBH* and *H* values can be estimated for stratum *i* sub-stratum *j* species *k*
$DBH(t),H(t)$	Growth/yield table that represents merchantable volume as a function of tree age
A_{ijk}	Area of stratum *i* substratum *j* and species *k* in ha
nTR_{ik}	Number of trees in stratum *i* species *k* in trees ha^{-1}
CF_k	Carbon fraction for species *k* in t C (t.d.m.)$^{-1}$

Biomass Expansion Factor Method

Step 1.The Biomass Expansion Factor method was applied for species such as *Tilia III*, *Carpinus III, Franxinus III, and Fraxinus IV*. The growth of the remainder species, representing less than 5 percent of the stand models, was calculated using yield tables of other broad-lived hardwoods (OBLH) developed in Romania.[51]. Due to data constrains shrubs are conservatively neglected in ex-ante estimations.[52]

For estimation of below-ground biomass step 2 and equation B.31 of the methodology

$$\Delta C_{BB\_Tree,ijk} = I_{Tree,ijk} \cdot D_k \cdot BEF_{jk} \bullet R_{T,k} \bullet CF_k$$

where:

$\Delta C_{BB\_Tree,ijk}$	Average annual below-ground tree biomass increment of stratum *i* sub-stratum *j* species *k* in t C.ha^{-1}
$R_{T,k}$	Root-shoot ratio of tree species *k*; dimensionless

In cases for which biomass was directly estimated from allometric equations, the root-to-shoot ratio was similarly applied.
The herb biomass and its below-ground biomass are ignored for ex-ante estimation, as per the methodology.

Changes in soil organic carbon (t C ha-1 yr-1) were estimated by applying equations B.35-B37 of the methodology (see Table 23).

$$\Delta C_{SOC_{ijk}} = \left[(C_{SOC\_For_{ijk}} - C_{SOC\_Non\_For_i}) \bullet A_{ijk} \right] / T_{For,ijk} \qquad \textbf{(B.35)}$$

[51]European Forest Institue.The EFISCEN Inventory Data Base. Yield table for other broad-lived hardwoods in Romania. http://www.efi.int/databases/efiscen/results.php

[52]See “Growth calculation ” worksheet in REF 120 Annex 11a-inputs, spreadsheet.

$$C_{SOC\_For_{ijk}} = C_{SOC\_REF_{ijk}} \bullet f_{ijk} \qquad \textbf{(B.36)}$$

where:

$\Delta C_{SOC,ijk}$	Average annual carbon stock change in soil organic matter for stratum *i* sub-stratum *j* species *k* in t C. yr^{-1}
$C_{SOC\_For,ijk}$	Soil organic carbon stock of afforested/reforested area or forested area that corresponds to the stratum *i* sub-stratum *j* species *k* in t C.ha^{-1}
$C_{SOC\_Non\_For,i}$	Soil organic carbon stock of non-forested degraded lands that correspond to the stratum *i* sub-stratum *j* species *k* in t C.ha^{-1}
A_{ijk}	Area of stratum *i* substratum *j* species *k* in ha
$T_{For,ijk}$	Time period required for transition from *SOCNon-For, ij* to *SOCFor, ijk* in years
$C_{SOC\_REF,ijk}$	Reference soil organic carbon stock under the native unmanaged in t C.ha^{-1}. The SOCREF refers to the stable soil organic carbon under native forests (Table 3.2.4 of Good Practice Guidance on LULUCF)
f_{ijk}	Adjustment factor for the effect of management intensity, dimensionless. The value for adjustment factor is expected to range between 0-1. If specific value is not available, default value between 0.5 and 1.0 shall be chosen

As per Table 3.2.4 of the Good Practice Guidance on LULUCF the reference soil organic carbon stock under the native unmanaged for Moldova is 95 t C ha -1. The climatic regime applicable to the project is the moist cold temperate and soils of the project are chernozems. Therefore, SOC_{REF} stock for mineral soil corresponding to moist cold temperate climate regime and high activity clay (HAC) in the above-mentioned table has been adopted.

Specific value for the adjustment factor was found in Table 6 of the *AR AM Tool for estimation of changes in soil organic carbon stocks due to the implementation of A/R CDM project activities*.[53]*(version 1.1.0)* The equations of this tool were not applied in this ex-ante estimations, it is cited here only in reference to data in Table 6 with regards to management factor for severely degraded lands (0.7).

Soil organic carbon stock of afforested/reforested area was estimated using values from soil field study. The soil carbon stock on degraded soils and pastures reported in the baseline study were applied. According to this study the carbon stock per hectare in degraded lands is 64.80 and in pasture lands 56.70. A weighted average of these values (60.23 t C ha^{-1}) was calculated and used as soil organic carbon stock of afforested/reforested area. Finally the time period required for transition from SOC non-fir to SOC fore was calculated as 20 years, as this figure is within the project crediting period.

Calculation of the carbon stock changes based on the empirical method

Table 26: Estimation of the project carbon stock changes (t CO_2e).

Year of the project implementation	Calendar year	Estimated annual change in carbon stocks of the project

[53]http://cdm.unfccc.int/methodologies/ARmethodologies/tools/ar-am-tool-16-v1.1.0.pdf

Year of the project implementation	Calendar year	Estimated annual change in carbon stocks of the project
1	2006	2,163
2	2007	22,376
3	2008	50,514
4	2009	69,411
5	2010	79,355
6	2011	76,993
7	2012	73,438
8	2013	70,849
9	2014	58,684
10	2015	50,340
11	2016	50,604
12	2017	47,170
13	2018	47,223
14	2019	46,935
15	2020	48,118
16	2021	47,401
17	2022	46,380
18	2023	45,366
19	2024	44,861
20	2025	44,778
21	2026	41,903
22	2027	37,340
23	2028	34,246
24	2029	32,655
25	2030	32,655
26	2031	31,318
27	2032	29,313
28	2033	27,869
29	2034	27,056
30	2035	26,801
Estimated project carbon stock change (t CO_2 e)		1,344,115
Total number of crediting years		30
Annual average project carbon change over the crediting period (t CO_2 e)		44,803.83

Source: *TARAM worksheet CERs Cells J15:46.*

b. GHG emissions by sources

As per the methodology AR-AM0002 (version 03) emissions from the biomass loss during site preparation and emissions associated with biomass burning are considered assessment for the project context.

As per the paragraph 35 of the report of 42nd EB meeting, the Board clarified the guidance on accounting GHG emissions in A/R CDM project activities from the following sources: (i) fertilizer application, (ii) removal of herbaceous vegetation, and (iii) transportation; and agreed that emissions from these sources may be considered as insignificant and hence can be neglected in A/R baseline and monitoring methodologies and tools.

As per the paragraph 37 of the report of EB 44th meeting, the GHG emissions from the sources related to A/R CDM project activities: (a) fossil fuel combustion in A/R CDM project activities; (b) collection of wood from non-renewable sources to be used for fencing of the project area; and (c) Nitrous oxide (N_2O) emissions from decomposition of litter and fine roots from N-fixing trees are insignificant in A/R CDM project activities and may therefore be neglected in A/R baseline and monitoring methodologies.

Hence, as per EB42 and EB44 decisions, the project emissions relating to (1) fossil fuel consumption related to implementation of the project, (2) biomass loss during site preparation from removal of herbaceous biomass in site preparation, and (3) fertilizer application are **not** considered in the project. No woody biomass was removed from project sites in the process of site preparation.

Therefore, the only source of GHG emissions pertinent to the project context is the emissions from biomass burning. However, as per the clarification presented below, this source of GHG emissions is not applicable to the project.

b.2 Calculation of emissions from biomass burning

As national regulation of the Republic of Moldova prohibits burning of biomass in afforestation and reforestation activities, therefore the emissions from biomass burning are not relevant for the ex ante estimation purposes. However, any natural occurrences of fire will be monitored during the project implementation and recorded. **Table 27** presents the increase in emissions from the AR project.

Table 27: Increase in emissions from the AR project.

Project implementation year	Calendar year	Emissions from the biomass loss, $tCO_2e\ yr^{-1}$	Emissions from biomass burning, $tCO_2e\ yr^{-1}$	Total project emissions, $tCO_2e\ yr^{-1}$
1	2006	0	0	0
2	2007	0	0	0
3	2008	0	0	0
4	2009	0	0	0
5	2010	0	0	0
6	2011	0	0	0
7	2012	0	0	0
8	2013	0	0	0
9	2014	0	0	0
10	2015	0	0	0
11	2016	0	0	0
12	2017	0	0	0
13	2018	0	0	0
14	2019	0	0	0

Project implementation year	Calendar year	Emissions from the biomass loss, $tCO_2e\ yr^{-1}$	Emissions from biomass burning, $tCO_2e\ yr^{-1}$	Total project emissions, $tCO_2e\ yr^{-1}$
15	2020	0	0	0
16	2021	0	0	0
17	2022	0	0	0
18	2023	0	0	0
19	2024	0	0	0
20	2025	0	0	0
21	2026	0	0	0
22	2027	0	0	0
23	2028	0	0	0
24	2029	0	0	0
25	2030	0	0	0
26	2031	0	0	0
27	2032	0	0	0
28	2033	0	0	0
29	2034	0	0	0
30	2035	0	0	0
Total		**0**	**0**	**0**

Source: *Project Implementation Unit, Moldsilva (ICAS), Chisinau. Calculation based on the project data. Calculations were obtained using TARAM (see Annex 11).*

c. Estimation of actual net GHG removals by sinks

In order to calculate the actual net GHG removals by sinks, the project emissions are subtracted from the project carbon stock changes. The total actual net GHG removals by sinks over 30-year crediting period are estimated at **1,344,115 (Table 28)**.

Table 28: Actual net GHG removals by sinks from the project.

Year of project implementation	Calendar year	Total carbon stock change, $tCO_2e\ yr^{-1}$	Total project emissions, $tCO_2e\ yr^{-1}$	Actual net GHG removals by sinks, $t\ CO_2\text{-}e\ yr^{-1}$
1	2006	2,163	0	2,163
2	2007	24,539	0	24,539
3	2008	75,053	0	75,053
4	2009	144,464	0	144,464
5	2010	223,819	0	223,819
6	2011	300,812	0	300,812
7	2012	374,250	0	374,250
8	2013	445,099	0	445,099
9	2014	503,783	0	503,783
10	2015	554,123	0	554,123
11	2016	604,727	0	604,727
12	2017	651,897	0	651,897
13	2018	699,120	0	699,120
14	2019	746,055	0	746,055

Year of project implementation	Calendar year	Total carbon stock change, $tCO_2e\ yr^{-1}$	Total project emissions, $tCO_2e\ yr^{-1}$	Actual net GHG removals by sinks, $t\ CO_2\text{-}e\ yr^{-1}$
15	2020	794,173	0	794,173
16	2021	841,574	0	841,574
17	2022	887,954	0	887,954
18	2023	933,319	0	933,319
19	2024	978,181	0	978,181
20	2025	1,022,958	0	1,022,958
21	2026	1,064,861	0	1,064,861
22	2027	1,102,202	0	1,102,202
23	2028	1,136,448	0	1,136,448
24	2029	1,169,103	0	1,169,103
25	2030	1,201,758	0	1,201,758
26	2031	1,233,075	0	1,233,075
27	2032	1,262,389	0	1,262,389
28	2033	1,290,258	0	1,290,258
29	2034	1,317,314	0	1,317,314
30	2035	1,344,115	0	1,344,115
Total		**1,344,115**		**1,344,115**

Source: *Project Implementation Unit, Moldsilva (ICAS), Chisinau. Calculation based on the project data. TARAM worksheet CERs cells J15:45*

Table 29: Data needed for actual ex-ante GHG removals estimations

<table>
<tr><th>Data Parameters</th><th>Description</th><th>Vintage</th><th>Resolution</th><th>Sources</th><th>Values</th></tr>
<tr><td>A_{ijk}</td><td>Area of stratum i sub-stratum j species k in ha</td><td>Most recent</td><td>Local</td><td>Based on area of project sites by strata</td><td>
<table>
<tr><th>Strata</th><th>Strata Name</th><th>Area (ha)</th></tr>
<tr><td>1</td><td>Robinia_Rich Soils/soluri bogate;</td><td>6,227.69</td></tr>
<tr><td>2</td><td>Robinia_Poor Soils/soluri sarace;</td><td>2,096.33</td></tr>
<tr><td>3</td><td>Quercus_Rich Soils/soluri bogate;</td><td>75.76</td></tr>
<tr><td>4</td><td>Quercus_Poor Soils/soluri sarace</td><td>69.06</td></tr>
<tr><td colspan="2">TOTAL</td><td>8,468.84</td></tr>
</table>
</td></tr>
<tr><td>R_{jk}</td><td>Root-to-shoot ratio for species k age class j, dimensionless. The root-to-shoot ratio may change as a function of the above-ground biomass presented in year t.</td><td>Most recent</td><td>Global, national and local</td><td>See next cell, below next table</td><td>
<table>
<tr><th></th><th colspan="3">R/S Ratio</th><th></th></tr>
<tr><th>Species</th><th>Rj-1</th><th>Rj-2</th><th>Rj-3</th><th>Source</th></tr>
<tr><td>Robinia p. III</td><td>0.63</td><td>0.46</td><td>0.32</td><td>1</td></tr>
<tr><td>Robinia IV</td><td>0.67</td><td>0.55</td><td>0.33</td><td>1</td></tr>
<tr><td>Quercus III</td><td>0.62</td><td>0.56</td><td>0.46</td><td>2</td></tr>
<tr><td>Quercus IV</td><td>0.67</td><td>0.58</td><td>0.49</td><td>2</td></tr>
<tr><td>Acer spp. III</td><td>0.34</td><td>0.28</td><td>0.20</td><td>3</td></tr>
<tr><td>Acer spp. IV</td><td>0.37</td><td>0.30</td><td>0.21</td><td>3</td></tr>
<tr><td>Other BLH III</td><td>0.34</td><td>0.28</td><td>0.20</td><td>3</td></tr>
<tr><td>Other BLH IV</td><td>0.37</td><td>0.30</td><td>0.21</td><td>3</td></tr>
<tr><td>Fraxinus III</td><td>0.34</td><td>0.28</td><td>0.20</td><td>3</td></tr>
<tr><td>Fraxinus IV</td><td>0.37</td><td>0.30</td><td>0.21</td><td>3</td></tr>
<tr><td>Carpinus III</td><td>0.43</td><td>0.35</td><td>0.25</td><td>3</td></tr>
<tr><td>Tilia III</td><td>0.26</td><td>0.21</td><td>0.15</td><td>3</td></tr>
<tr><td>Ulmus III</td><td>0.34</td><td>0.28</td><td>0.20</td><td>3</td></tr>
<tr><td>Ulmus IV</td><td>0.37</td><td>0.30</td><td>0.21</td><td>3</td></tr>
</table>
1.Calculation based on V.Giurgiu.D.Draghiciu. Mathematical and auxological models and yield tables for trees. Editura Ceres, Bucuresti 2004, page 537. Tabel 10.3.
2.Calculation based on USSR State Forestry Committee (1987). Normative and reference materials for the taxation of Ukrainian and Moldavian forests. Kiev: Publisher house “Urojai” (Ukrainian and Moldavian Yield Tables), p. 225; p. 259.
3.Rj-1; Rj-3; Applicability of Rj according to above-ground biomass (AGB) - are calculated according to the media on the species Quercus and Robinia

Note: Other BLHS means Other Broad-leaved Harwood Species
</td></tr>
</table>

<table>
<tr>
<td>Dk</td>
<td>Basic wood density for species k in t.d.m. m^{-3}</td>
<td>Most recent</td>
<td>Global and local</td>
<td>See next cell, below the table</td>
<td>
<table>
<tr><th>Species</th><th>WD</th><th>Source</th></tr>
<tr><td>Robinia III</td><td>0.7</td><td>2</td></tr>
<tr><td>Robinia IV</td><td>0.7</td><td>2</td></tr>
<tr><td>Quercus spp. I</td><td>0.7</td><td>3</td></tr>
<tr><td>Quercus spp. I</td><td>0.7</td><td>3</td></tr>
<tr><td>Acer spp. III</td><td>0.7</td><td>1</td></tr>
<tr><td>Acer spp. IV</td><td>0.7</td><td>1</td></tr>
<tr><td>Other BLH III</td><td>0.7</td><td>1</td></tr>
<tr><td>Other BLH IV</td><td>0.7</td><td>1</td></tr>
<tr><td>Fraxinus III</td><td>0.7</td><td>1</td></tr>
<tr><td>Fraxinus IV</td><td>0.7</td><td>1</td></tr>
<tr><td>Carpinus III</td><td>0.8</td><td>1</td></tr>
<tr><td>Tilia III</td><td>0.5</td><td>1</td></tr>
<tr><td>Ulmus III</td><td>N/A</td><td></td></tr>
<tr><td>Ulmus IV</td><td>N/A</td><td></td></tr>
</table>
Note: Other BLHS means Other Broad-leaved Harwood Species
</td>
</tr>
<tr>
<td>$BEF_{1,jk}$</td>
<td>Biomass expansion factor for conversion of annual net increment (including bark) in the merchantable volume to total aboveground biomass increment for species k age class j, dimensionless</td>
<td>Most recent</td>
<td>Global, national and local</td>
<td>See next cell, below the table.</td>
<td>
<table>
<tr><th>Species</th><th>BEF</th><th>Source</th></tr>
<tr><td>Robinia III</td><td>N/A</td><td></td></tr>
<tr><td>Robinia IV</td><td>N/A</td><td></td></tr>
<tr><td>Quercus spp. I</td><td>N/A</td><td></td></tr>
<tr><td>Quercus spp. I</td><td>N/A</td><td></td></tr>
<tr><td>Acer spp. III</td><td>1.2</td><td>1</td></tr>
<tr><td>Acer spp. IV</td><td>1.2</td><td>1</td></tr>
<tr><td>Other BLH III</td><td>1.2</td><td>1</td></tr>
<tr><td>Other BLH IV</td><td>1.2</td><td>1</td></tr>
<tr><td>Fraxinus III</td><td>1.2</td><td>1</td></tr>
<tr><td>Fraxinus IV</td><td>1.2</td><td>1</td></tr>
<tr><td>Carpinus III</td><td>1.2</td><td>1</td></tr>
<tr><td>Tilia III</td><td>1.2</td><td>1</td></tr>
<tr><td>Ulmus III</td><td>N/A</td><td></td></tr>
<tr><td>Ulmus IV</td><td>N/A</td><td></td></tr>
</table>
1.National Inventory Report: 1990-2005. Greenhouse Gas Sources and Sinks in the Republic of Moldova. Ministry of Environment and Natural Resurces, Chisinau, 2009 p. 234-255 (http://www.clima.md).
Note: Other BLHS means Other Broad-leaved Harwood Species
</td>
</tr>
</table>

<table>
<tr>
<td>$\Delta C_{ijk,t}$</td>
<td>Average annual change in carbon stock in the pools for stratum i sub-stratum j species k in t CO_2 yr^{-1} in year t</td>
<td>Most recent</td>
<td>Stratum/ species</td>
<td>Calculated See TARAM Worksheet SM4 cells G423:H448</td>
<td>
Stratum 1: Quercus rich soils
<table>
<tr><th>Species</th><th>tCO2e yr-1</th></tr>
<tr><td>Quercus III</td><td>7.26</td></tr>
<tr><td>Fraxinus III</td><td>0.08</td></tr>
<tr><td>Carpinus III</td><td>0.09</td></tr>
<tr><td>Tilia III</td><td>0.01</td></tr>
<tr><td>OBLH III</td><td>0.00</td></tr>
</table>
Stratum 2: Quercus poor soils
<table>
<tr><th>Species</th><th>tCO2e yr-1</th></tr>
<tr><td>Quercus IV</td><td>5.56</td></tr>
<tr><td>Fraxinus IV</td><td>0.10</td></tr>
<tr><td>Acer IV</td><td>0.08</td></tr>
<tr><td>OBLH IV</td><td>0.01</td></tr>
</table>
Stratum 3: Robinia poor soils
<table>
<tr><th>Species</th><th>tCO2e yr-1</th></tr>
<tr><td>Robinia III</td><td>1,445.21</td></tr>
<tr><td>Ulmus III</td><td>2.78</td></tr>
<tr><td>Acer III</td><td>2.46</td></tr>
<tr><td>OBLH III</td><td>0.13</td></tr>
</table>
Stratum 4: Robinia rich soils
<table>
<tr><th>Species</th><th>tCO2e yr-1</th></tr>
<tr><td>Robinia III</td><td>6,699.56</td></tr>
<tr><td>Ulmus III</td><td>5.28</td></tr>
<tr><td>Acer III</td><td>5.62</td></tr>
<tr><td>Fraxinus III</td><td>2.08</td></tr>
<tr><td>OBLH III</td><td>0.00</td></tr>
</table>
</td>
</tr>
</table>

$\Delta C_{AB,ijk,t}$	Average annual change in carbon stock in aboveground biomass for stratum *i* sub-stratum *j* species *k* in t C yr^{-1} in year *t*	Most recent	Stratum/ species	Calculated See TARAM Worksheet SM4 Cells A423:B448	See stratum tables below

Stratum 1: Quercus rich soils

Species	tCe yr-1
Quercus III	4.48
Fraxinus III	0.06
Carpinus III	0.06
Tilia III	0.00
OBLH III	0.00

Stratum 2: Quercus poor soils

Species	tCe yr-1
Quercus IV	3.33
Fraxinus IV	0.07
Acer IV	0.06
OBLH IV	0.01

Stratum 3: Robinia poor soils

Species	tCe yr-1
Robinia III	902.75
Ulmus III	2.03
Acer III	1.80
OBLH III	0.10

Stratum 4: Robinia rich soils

Species	tCe yr-1
Robinia III	4,411.51
Ulmus III	3.94
Acer III	4.19
Fraxinus III	1.04
OBLH III	0.00

$\Delta C_{BB,ijk,t}$	Average annual change in carbon stock in belowground biomass for stratum *i* sub-stratum *j* species *k* in t C yr^{-1} in year *t*	Most recent	Stratum/ species	Calculated See TARAM worksheet SM4 cells D423:E448	*Stratum 1: Quercus rich soils* Species / tC yr-1 Quercus III: 2.78 Fraxinus III: 0.02 Carpinus III: 0.03 Tilia III: 0.00 OBLH III: 0.00 *Stratum 2: Quercus poor soils* **Species** / tC yr-1 Quercus IV: 2.23 Fraxinus IV: 0.03 Acer IV: 0.02 OBLH IV: 0.00 *Stratum 3: Robinia poor soils* **Species** / tC yr-1 Robinia III: 542.46 Ulmus III: 0.75 Acer III: 0.66 OBLH III: 0.04 *Stratum 4: Robinia rich soils* **Species** / tC yr-1 Robinia III: 2,288.04 Ulmus III: 1.34 Acer III: 1.43 Fraxinus III: 1.04 OBLH III: 0.00
$\Delta C_{DW,ijk,t}$	Average annual change in carbon stock in deadwood for stratum *i* sub-stratum *j* species *k* in t C yr^{-1} in year *t*	N/A	N/A	N/A	N/A
$\Delta C_{L,ijk,t}$	Average annual change in carbon stock in litter for stratum *i* sub-stratum *j* species *k* in t C yr^{-1} in year *t*	N/A	N/A	N/A	N/A

$\Delta C_{SOC,ijk,t}$	Average annual change in carbon stock in soil organic matter for stratum *i* substratum *j* species *k* in t C yr^{-1} in year *t*	Most recent	Stratum/ species	Calculated See TARAM worksheet SM4 cells J422:K427	(blank) / tC yr-1 Stratu 1: Quercus rich soils / 0.77 Stratum 2: Quercus poor soils / 0.77 Stratum 3: Robinia poor soils / 0.77 Stratum 4: Robinia rich soils / 0.77
$C_{AB,ijk,t2}$	Carbon stock in above-ground biomass for stratum *i* sub-stratum *j* species *k* calculated at time t_2 in t C	N/A	N/A	N/A	N/A
$C_{AB,ijk,t1}$	Carbon stock in above-ground biomass for stratum *i* sub-stratum *j* species *k* calculated at time t_1 in t C	Most recent	Stratum/ species	Calculated See TARAM worksheet SM4 cells Q422:R447	*Stratum 1: Quercus rich soils* Species / t C Quercus III / 3,922.41 Fraxinus III / 325.11 Carpinus III / 501.23 Tilia III / 167.04 OBLH III / 124.05 *Stratum 2: Quercus poor soils* **Species** / t C Quercus IV / 1,717.96 Fraxinus IV / 153.14 Acer IV / 119.27 OBLH IV / 32.74 *Stratum 3: Robinia poor soils* **Species** / t C Robinia III / 349,261.81 Ulmus III / 4,034.62 Acer III / 3,620.36 OBLH III / 993.80 *Stratum 4: Robinia rich soils* **Species** / t C Robinia III / 3,047,733.94 Ulmus III / 34,799.57 Acer III / 34,392.90 Fraxinus III / 11,063.19 OBLH III / 9,831.68

$C_{AB\_Tree,ijk}$	Carbon stock in above-ground biomass of living trees for stratum *i* substratum *j* species *k* in t C	Most recent	Stratum/ species	Calculated as above	As above
$C_{AB\_NTree,ijk}$	Carbon stock in above-ground biomass of non-tree vegetation for stratum *i* substratum *j* species *k* in t C	N/A	N/A	N/A	N/A
$\Delta C_{AB\_Tree,ijk,t}$	Average annual change in the above-ground tree biomass in stratum *i*, sub-stratum *j* species *k* at year *t*in t C	Most recent	Stratum/ species	Calculated See TARAM worksheet SM4 cells A454:B479	
$\Delta C_{AB\_NTree,ijk,t}$	Average annual change in the above-ground non-tree biomass in stratum *i*, sub-stratum *j* species *k* at year *t*in t C	N/A	N/A	N/A	N/A

<table>
<tr><td>$\Delta C_{AB\_Tree,\ ijk}$</td><td>Average annual above-ground tree biomass increment for stratum i sub-stratum j species k in t.d.m. ha^{-1} yr^{-1}</td><td>Most recent</td><td>Stratum/ species</td><td>Calculated See TARAM worksheet SM4 cells D454:E479</td><td>
Stratum 1: Quercus rich soils
<table>
<tr><th>Species</th><th>t.d.m.ha-1yr-1</th></tr>
<tr><td>Quercus III</td><td>0.16</td></tr>
<tr><td>Fraxinus III</td><td>0.02</td></tr>
<tr><td>Carpinus III</td><td>0.02</td></tr>
<tr><td>Tilia III</td><td>0.01</td></tr>
<tr><td>OBLH III</td><td>0.00</td></tr>
</table>
Stratum 2: Quercus poor soils
<table>
<tr><th>Species</th><th>t.d.m.ha-1yr-1</th></tr>
<tr><td>Quercus IV</td><td>0.13</td></tr>
<tr><td>Fraxinus IV</td><td>0.02</td></tr>
<tr><td>Acer IV</td><td>0.02</td></tr>
<tr><td>OBLH IV</td><td>0.00</td></tr>
</table>
Stratum 3: Robinia poor soils
<table>
<tr><th>Species</th><th>t.d.m.ha-1yr-1</th></tr>
<tr><td>Robinia III</td><td>1.15</td></tr>
<tr><td>Ulmus III</td><td>0.02</td></tr>
<tr><td>Acer III</td><td>0.02</td></tr>
<tr><td>OBLH III</td><td>0.00</td></tr>
</table>
Stratum 4: Robinia rich soils
<table>
<tr><th>Species</th><th>t.d.m.ha-1yr-1</th></tr>
<tr><td>Robinia III</td><td>1.89</td></tr>
<tr><td>Ulmus III</td><td>0.02</td></tr>
<tr><td>Acer III</td><td>0.02</td></tr>
<tr><td>Fraxinus III</td><td>0.02</td></tr>
<tr><td>OBLH III</td><td>0.00</td></tr>
</table>
</td></tr>
<tr><td>$G_{AB\_Stem,\ ijk}$</td><td>Stem biomass increment in stratum i sub-stratum j species k in t.d.m. ha^{-1}</td><td>N/A</td><td>N/A</td><td>N/A</td><td>N/A</td></tr>
<tr><td>$G_{AB\_Foliage,\ ijk}$</td><td>Foliage biomass increment ($G_{AB\_Stem,\ ijk}$ * Ff) in stratum i sub-stratum j species k in t.d.m. ha^{-1}</td><td>N/A</td><td>N/A</td><td>N/A</td><td>N/A</td></tr>
</table>

<table>
<tr><td>$G_{AB\_Branch, ijk}$</td><td>Branch biomass increment ($G_{AB\_Stem, ijk}$* Fb) in stratum i sub-stratum j species k in t.d.m. ha^{-1}</td><td>N/A</td><td>N/A</td><td>N/A</td><td>N/A</td></tr>
<tr><td>CF_k</td><td>Carbon fraction for species k, dimensionless</td><td>Most recent</td><td>Species</td><td>GPG-LULUCF</td><td>0.5</td></tr>
<tr><td>$\Delta C_{AB\_Tree, ijk}$</td><td>Annual change in the above-ground tree biomass in stratum i sub-stratum j species k int C</td><td>Most recent</td><td>Stratum/ species</td><td>Calculated See TARAM worksheet cells I455:J479</td><td>
Stratum 1: Quercus rich soils
<table>
<tr><th>Species</th><th>t C yr-1</th></tr>
<tr><td>Quercus III</td><td>6.10</td></tr>
<tr><td>Fraxinus III</td><td>0.08</td></tr>
<tr><td>Carpinus III</td><td>0.09</td></tr>
<tr><td>Tilia III</td><td>0.01</td></tr>
<tr><td>OBLH III</td><td>0.00</td></tr>
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Stratum 2: Quercus poor soils
<table>
<tr><th>Species</th><th>t.d.m.ha-1yr-1</th></tr>
<tr><td>Quercus IV</td><td>4.52</td></tr>
<tr><td>Fraxinus IV</td><td>0.10</td></tr>
<tr><td>Acer IV</td><td>0.08</td></tr>
<tr><td>OBLH IV</td><td>0.00</td></tr>
</table>
Stratum 3: Robinia poor soils
<table>
<tr><th>Species</th><th>t.d.m.ha-1yr-1</th></tr>
<tr><td>Robinia III</td><td>1,263.85</td></tr>
<tr><td>Ulmus III</td><td>2.31</td></tr>
<tr><td>Acer III</td><td>2.37</td></tr>
<tr><td>OBLH III</td><td>0.13</td></tr>
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Stratum 4: Robinia rich soils
<table>
<tr><th>Species</th><th>t.d.m.ha-1yr-1</th></tr>
<tr><td>Robinia III</td><td>6,176.12</td></tr>
<tr><td>Ulmus III</td><td>4.10</td></tr>
<tr><td>Acer III</td><td>5.54</td></tr>
<tr><td>Fraxinus III</td><td>4.04</td></tr>
<tr><td>OBLH III</td><td>0.00</td></tr>
</table>
</td></tr>
</table>

$\Delta C_{AB\_Tree\_Growth,ijk}$	Annual growth in tree biomass in stratum *i* sub-stratum *j* species *k* t C. ha^{-1}	Most recent	Stratum/ species	Calculated See TARAM worksheet SM4 cells L454:M479	*Stratum 1: Quercus rich soils* **Species** / **tC ha-1** Quercus III 1.22 Fraxinus III 0.02 Carpinus III 0.02 Tilia III 0.00 OBLH III 0.00 *Stratum 2: Quercus poor soils* **Species** / **tC ha-1** Quercus IV 0.91 Fraxinus IV 0.02 Acer IV 0.02 OBLH IV 0.00 *Stratum 3: Robinia poor soils* **Species** / **tC ha-1** Robinia III 246.20 Ulmus III 0.55 Acer III 0.49 OBLH III 0.03 *Stratum 4: Robinia rich soils* **Species** / **tC ha-1** Robinia III 1,203.14 Ulmus III 1.07 Acer III 1.14 Fraxinus III 0.28 OBLH III 0.00

<table>
<tr>
<td>$\Delta C_{AB\_Tree\_Loss,\ ijk}$</td>
<td>Annual loss in tree biomass in stratum i, sub-stratum j species k in t C. ha^{-1}</td>
<td>Most recent</td>
<td>Stratum/ species</td>
<td>Calculated See TARAM worksheet SM4 cells S454:T479</td>
<td>
Stratum 1: Quercus rich soils
<table>
<tr><th>Species</th><th>tC ha-1</th></tr>
<tr><td>Quercus III</td><td>0.01</td></tr>
<tr><td>Fraxinus III</td><td>0.00</td></tr>
<tr><td>Carpinus III</td><td>0.00</td></tr>
<tr><td>Tilia III</td><td>0.00</td></tr>
<tr><td>OBLH III</td><td>0.00</td></tr>
</table>
Stratum 2: Quercus poor soils
<table>
<tr><th>Species</th><th>tC ha-1</th></tr>
<tr><td>Quercus IV</td><td>0.00</td></tr>
<tr><td>Fraxinus IV</td><td>0.00</td></tr>
<tr><td>Acer IV</td><td>0.00</td></tr>
<tr><td>OBLH IV</td><td>0.00</td></tr>
</table>
Stratum 3: Robinia poor soils
<table>
<tr><th>Species</th><th>tC ha-1</th></tr>
<tr><td>Robinia III</td><td>0.03</td></tr>
<tr><td>Ulmus III</td><td>0.00</td></tr>
<tr><td>Acer III</td><td>0.00</td></tr>
<tr><td>OBLH III</td><td>0.00</td></tr>
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Stratum 4: Robinia rich soils
<table>
<tr><th>Species</th><th>tC ha-1</th></tr>
<tr><td>Robinia III</td><td>0.05</td></tr>
<tr><td>Ulmus III</td><td>0.00</td></tr>
<tr><td>Acer III</td><td>0.00</td></tr>
<tr><td>Fraxinus III</td><td>0.00</td></tr>
<tr><td>OBLH III</td><td>0.00</td></tr>
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<table>
<tr>
<td>$\Delta C_{AB\_Tree\_Harvest,\ ijk}$</td>
<td>Annual change in the loss of tree biomass from harvest in stratum i sub-stratum j species k in t.d.m. ha^{-1} yr^{-1}</td>
<td>Most recent</td>
<td>Stratum/ species</td>
<td>Calculated See TARAM worksheet SM4 cells V454:W479</td>
<td>
Stratum 1: Quercus rich soils
<table>
<tr><th>Species</th><th>t.d.m. ha-1 yr-1</th></tr>
<tr><td>Quercus III</td><td>-</td></tr>
<tr><td>Fraxinus III</td><td>-</td></tr>
<tr><td>Carpinus III</td><td>-</td></tr>
<tr><td>Tilia III</td><td>-</td></tr>
<tr><td>OBLH III</td><td>-</td></tr>
</table>
Stratum 2: Quercus poor soils
<table>
<tr><th>Species</th><th>t.d.m. ha-1 yr-1</th></tr>
<tr><td>Quercus IV</td><td>-</td></tr>
<tr><td>Fraxinus IV</td><td>-</td></tr>
<tr><td>Acer IV</td><td>-</td></tr>
<tr><td>OBLH IV</td><td>-</td></tr>
</table>
Stratum 3: Robinia poor soils
<table>
<tr><th>Species</th><th>t.d.m. ha-1 yr-1</th></tr>
<tr><td>Robinia III</td><td>-</td></tr>
<tr><td>Ulmus III</td><td>-</td></tr>
<tr><td>Acer III</td><td>-</td></tr>
<tr><td>OBLH III</td><td>-</td></tr>
</table>
Stratum 4: Robinia rich soils
<table>
<tr><th>Species</th><th>t.d.m. ha-1 yr-1</th></tr>
<tr><td>Robinia III</td><td>-</td></tr>
<tr><td>Ulmus III</td><td>-</td></tr>
<tr><td>Acer III</td><td>-</td></tr>
<tr><td>Fraxinus III</td><td>-</td></tr>
<tr><td>OBLH III</td><td>-</td></tr>
</table>
</td>
</tr>
<tr>
<td>$\Delta C_{AB\_Tree\_Dist,\ ijk}$</td>
<td>Annual change in the loss of tree biomass from disturbance in stratum i sub-stratum j species k in t.d.m. ha^{-1} yr^{-1}</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</table>

$f_j(DBH,H)$	Allometric equation quantifying the relationship between above-ground biomass (d.m. ha^{-1}) to the mean diameter at breast height (*DBH*) and mean tree height (*H*) for species *k*; dimensionless	Most recent	Local /	Local/National Blujdea, V. et al. 2011. Allometric biomass equations for young broadleaved trees in plantations in Romania. Forest Ecology and Management.. V264. Issue January 15 2012. P. 172-184	Robinia pseudoacacia: M=1.0806/1000*(exp 4.7961+2.0594*lnD) Quercus: M=0.837/1000*(exp 5.5568+1.2265*lnD)

$DBH(t), H(t)$	Growth/yield table that represents merchantable volume as a function of tree age	Most recent	Local / Global default	Local/National/	*Acer III and IV; Ulmus III and IV:* No growth data is available for this species. In Moldova, forestry and management planning practice indicators for this species are used those as for Quercus. Therefore data for Quercus is applied. *Other broad-leaved hardwoods III and IV:* European Forest Institue. The EFISCEN Inventory Data Base. Yield table for other broad-lived hardwoods in Romania. http://www.efi.int/databases/efiscen/results.php *Fraxinus III and IV, Carpinus III and Tilia III:* Simplified Yield tables, Ministry of Forest Economics, Forest Reasearch and Project Institute, Bucuresti, 1968 *Robinia pseudoacacia III and IV*: Giurgiu, V., Decei, J. and Armasecu. Biometrics of Trees and Stands in Romania – Dedrometric Tables. CERES, Bucharest 1972 *Quercus III and IV*: The USSR State Commitee on Forestry – Normative References for the Taxation of Forest in Ukraine and Moldova. Kiev “Harvest” (Ukrainian and Moldavian Yield Tables)

$\Delta C_{AB\_Tree,\ ijk}$	Average annual above-ground tree biomass increment for stratum *i* sub-stratum *j* species *k* in t.d.m. ha^{-1} yr^{-1}	Most recent	Stratum/ species	Calculated See TARAM worksheet SM4 cells D454:E479	*Stratum 1: Quercus rich soils* **Species** — **t.d.m.ha-1yr-1** Quercus III — 0.16 Fraxinus III — 0.02 Carpinus III — 0.02 Tilia III — 0.01 OBLH III — 0.00 *Stratum 2: Quercus poor soils* **Species** — **t.d.m.ha-1yr-1** Quercus IV — 0.13 Fraxinus IV — 0.02 Acer IV — 0.02 OBLH IV — 0.00 *Stratum 3: Robinia poor soils* **Species** — **t.d.m.ha-1yr-1** Robinia III — 1.15 Ulmus III — 0.02 Acer III — 0.02 OBLH III — 0.00 *Stratum 4: Robinia rich soils* **Species** — **t.d.m.ha-1yr-1** Robinia III — 1.89 Ulmus III — 0.02 Acer III — 0.02 Fraxinus III — 0.02 OBLH III — 0.00
$I_{Tree,ijk}$	Average annual increment of merchantable timber volume for stratum *i* sub-stratum *j* species *k* in m^3 ha^{-1} yr^{-1}	Most recent	Local / Global default	Local/National/ See REF 120 Annex 11a worksheet "Growth calculation" cells AV58:AW63	**Species** — **m3 ha-1 yr-1** OBLH — 3.69 Fraxinus III — 4.41 Fraxinus IV — 3.54 Carpinus III — 5.32 Tilia III — 6.68
$C_{AB\_NTree\_Shrub,ijk}$	Carbon stock in aboveground biomass of shrub for stratum *i* substratum *j* species *k* in t C	N/A	N/A	N/A	N/A

$C_{AB\_NTree\_Herb,ijk}$	Carbon stock in aboveground herb biomass for stratum *i* substratum *j* species *k* in t C	N/A	N/A	N/A	N/A
$B_{AB\_NTree\_Shrub,ijk}$	Above-ground non-tree shrub biomass of woody perennials in stratum *i* sub-stratum *j* (age class of tree) species *k* in t.d.m. ha^{-1}	N/A	N/A	N/A	N/A
D^2_{ijk}	Sumof all diameters squared for the woody perennial in stratum *i* sub-stratum *j* (age class of tree) species *k* incm	N/A	N/A	N/A	N/A
H_i	Height of the woody perennial from base to its tip in stratum *i* sub-stratum *j* (age class of tree) species *k* in *m*	N/A	N/A	N/A	N/A
CF_s	Carbon fraction for shrub in t C $(t.d.m.)^{-1}$	N/A	N/A	N/A	N/A
A_Shrub,ijk	Area of stratum *i* substratum *j* and shrub species *k* in ha	N/A	N/A	N/A	N/A
$f_k(DB, H, C, N)$	Allometric equation linking above-ground biomass in d.m. ha^{-1} of shrubs to diameter at base (*DB*), shrub height (*H*), crown area/diameter (*CA*) and number of stems (*N*)	N/A	N/A	N/A	N/A

<table>
<tr><td>$C_{BB,ijk,t2}$</td><td>Carbon stock in belowground biomass for stratum i sub-stratum j species k calculated at time t_2 in t C</td><td>N/A</td><td>N/A</td><td>N/A</td><td>N/A</td></tr>
<tr><td>$C_{BB,ijk,t1}$</td><td>Carbon stock in belowground biomass for stratum i sub-stratum j species k calculated at time t_1 in t C</td><td>Most recent</td><td>Stratum/ species</td><td>Local/National/ GPG-LULUCF See TARAM worksheet SM4 cells H485:I510</td><td>
Stratum 1: Quercus rich soils
<table>
<tr><th>Species</th><th>t C</th></tr>
<tr><td>Quercus III</td><td>1,823.92</td></tr>
<tr><td>Fraxinus III</td><td>8.84</td></tr>
<tr><td>Carpinus III</td><td>17.24</td></tr>
<tr><td>Tilia III</td><td>1.74</td></tr>
<tr><td>OBLH III</td><td>2.11</td></tr>
</table>
Stratum 2: Quercus poor soils
<table>
<tr><th>Species</th><th>t C</th></tr>
<tr><td>Quercus IV</td><td>1,288.47</td></tr>
<tr><td>Fraxinus IV</td><td>15.31</td></tr>
<tr><td>Acer IV</td><td>11.93</td></tr>
<tr><td>OBLH IV</td><td>1.64</td></tr>
</table>
Stratum 3: Robinia poor soils
<table>
<tr><th>Species</th><th>t C</th></tr>
<tr><td>Robinia III</td><td>261,946.36</td></tr>
<tr><td>Ulmus III</td><td>403.46</td></tr>
<tr><td>Acer III</td><td>362.04</td></tr>
<tr><td>OBLH III</td><td>49.69</td></tr>
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Stratum 4: Robinia rich soils
<table>
<tr><th>Species</th><th>t C</th></tr>
<tr><td>Robinia III</td><td>1,083,483.83</td></tr>
<tr><td>Ulmus III</td><td>946.55</td></tr>
<tr><td>Acer III</td><td>935.49</td></tr>
<tr><td>Fraxinus III</td><td>442.53</td></tr>
<tr><td>OBLH III</td><td>167.14</td></tr>
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</td></tr>
<tr><td>$C_{BB\_Tree,ijk}$</td><td>Carbon stock in belowground biomass of living trees for stratum i substratum j species k in t C</td><td>Most recent</td><td>Stratum/ species</td><td>As above</td><td>As above</td></tr>
</table>

$C_{AB\_NTree\_Shrub,ijk}$	Carbon stock in belowground biomass of non-tree shrubs for stratum *i* substratum *j* species *k* in t C	N/A	N/A	N/A	N/A
$C_{BB\_NTree\_Herb,ijk}$	Carbon stock in belowground biomass of herb for stratum *i* substratum *j* species *k* in t C	N/A	N/A	N/A	N/A
$\Delta C_{BB\_Tree,ijk,t}$	Annual change in the belowground tree biomass in stratum *i* sub-stratum *j* species *k* at time *t* in t C	Most recent	Stratum/ species	Calculated See TARAM worksheet SM4 cells S485:T510	see tables below

Stratum 1: Quercus rich soils

Species	tC
Quercus III	2.78
Fraxinus III	0.02
Carpinus III	0.03
Tilia III	0.00
OBLH III	0.00

Stratum 2: Quercus poor soils

Species	tC
Quercus IV	2.23
Fraxinus IV	0.03
Acer IV	0.02
OBLH IV	0.00

Stratum 3: Robinia poor soils

Species	tC
Robinia III	542.46
Ulmus III	0.75
Acer III	0.66
OBLH III	0.04

Stratum 4: Robinia rich soils

Species	tC
Robinia III	2,288.04
Ulmus III	1.34
Acer III	1.43
Fraxinus III	1.04
OBLH III	0.00

<table>
<tr><td>$\Delta C_{BB\_NTree\_Shrub,ijk,t}$</td><td>Annual carbon stock change in the belowground non-tree shrub biomass in stratum i sub-stratum j species k at time t in t C yr^{-1}</td><td>N/A</td><td>N/A</td><td>N/A</td><td>N/A</td></tr>
<tr><td>$\Delta C_{BB\_NTree\_Herb,ijk,t}$</td><td>Annual carbon stock change in the belowground herb biomass in stratum i sub-stratum j species k at time t in t C yr^{-1}</td><td>N/A</td><td>N/A</td><td>N/A</td><td>N/A</td></tr>
<tr><td>$\Delta C_{BB,ijk}$</td><td>Average annual below-ground tree biomass increment of stratum i sub-stratum j species k in t $C.ha^{-1}$</td><td></td><td></td><td>See TARAM worksheet SM4 cells O485:P510</td><td>
Stratum 1: Quercus rich soils
<table>
<tr><td>Species</td><td>t C ha -1</td></tr>
<tr><td>Quercus III</td><td>0.05</td></tr>
<tr><td>Fraxinus III</td><td>0.00</td></tr>
<tr><td>Carpinus III</td><td>0.00</td></tr>
<tr><td>Tilia III</td><td>0.00</td></tr>
<tr><td>OBLH III</td><td>0.00</td></tr>
</table>
Stratum 2: Quercus poor soils
<table>
<tr><td>Species</td><td>t C ha -1</td></tr>
<tr><td>Quercus IV</td><td>0.04</td></tr>
<tr><td>Fraxinus IV</td><td>0.00</td></tr>
<tr><td>Acer IV</td><td>0.00</td></tr>
<tr><td>OBLH IV</td><td>0.00</td></tr>
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Stratum 3: Robinia poor soils
<table>
<tr><td>Species</td><td>t C ha -1</td></tr>
<tr><td>Robinia III</td><td>0.35</td></tr>
<tr><td>Ulmus III</td><td>0.00</td></tr>
<tr><td>Acer III</td><td>0.00</td></tr>
<tr><td>OBLH III</td><td>0.00</td></tr>
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Stratum 4: Robinia rich soils
<table>
<tr><td>Species</td><td>t C ha -1</td></tr>
<tr><td>Robinia III</td><td>0.49</td></tr>
<tr><td>Ulmus III</td><td>0.00</td></tr>
<tr><td>Acer III</td><td>0.00</td></tr>
<tr><td>Fraxinus III</td><td>0.00</td></tr>
<tr><td>OBLH III</td><td>0.00</td></tr>
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</td></tr>
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<table>
<tr><td>$R_{T,k,}$</td><td>Root-shoot ratio of tree species k, dimensionless</td><td></td><td></td><td></td><td>See worksheet “Parameters” in REF 120 Annex 11a_inputs spreadsheet, cells I4:P21.</td></tr>
<tr><td>$C_{BB,ijk}$</td><td>Below-ground biomass of stratum isub-stratum j species k in t.d.m. ha^{-1}</td><td></td><td></td><td>See TARAM worksheet SM4, cells A514:B539</td><td>
Stratum 1: Quercus rich soils
<table>
<tr><td>Species</td><td>t.d.m. ha^{-1}</td></tr>
<tr><td>Quercus III</td><td>64.20</td></tr>
<tr><td>Fraxinus III</td><td>2.92</td></tr>
<tr><td>Carpinus III</td><td>5.69</td></tr>
<tr><td>Tilia III</td><td>463.94</td></tr>
<tr><td>OBLH III</td><td>-</td></tr>
</table>
Stratum 2: Quercus poor soils
<table>
<tr><td>Species</td><td>t.d.m. ha^{-1}</td></tr>
<tr><td>Quercus IV</td><td>49.75</td></tr>
<tr><td>Fraxinus IV</td><td>4.44</td></tr>
<tr><td>Acer IV</td><td>3.45</td></tr>
<tr><td>OBLH IV</td><td>0.95</td></tr>
</table>
Stratum 3: Robinia poor soils
<table>
<tr><td>Species</td><td>t.d.m. ha^{-1}</td></tr>
<tr><td>Robinia III</td><td>333.21</td></tr>
<tr><td>Ulmus III</td><td>3.85</td></tr>
<tr><td>Acer III</td><td>3.45</td></tr>
<tr><td>OBLH III</td><td>0.95</td></tr>
</table>
Stratum 4: Robinia rich soils
<table>
<tr><td>Species</td><td>t.d.m. ha^{-1}</td></tr>
<tr><td>Robinia III</td><td>463.94</td></tr>
<tr><td>Ulmus III</td><td>3.80</td></tr>
<tr><td>Acer III</td><td>3.76</td></tr>
<tr><td>Fraxinus III</td><td>3.55</td></tr>
<tr><td>OBLH III</td><td>1.07</td></tr>
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<tr><td>$C_{AB\_Stem,ijk}$</td><td>Carbon stock of stem biomass of stratum i sub-stratum j species k in t C ha^{-1}</td><td>N⁄A</td><td>N⁄A</td><td>N⁄A</td><td>N⁄A</td></tr>
<tr><td>$R_{T,k,F}$</td><td>Root biomass as fraction of stem biomass for species k, dimensionless</td><td>Most recent</td><td>Local / Global default</td><td>Local/National/ GPG-LULUCF</td><td>See worksheet “Parameters” in REF 120 Annex 11a_inpus, cells I4:P22</td></tr>
<tr><td>$R_{S,}$</td><td>Root-shoot ratio of shrub species k, dimensionless</td><td>N⁄A</td><td>N⁄A</td><td>N⁄A</td><td>N⁄A</td></tr>
</table>

<table>
<tr>
<td>$B_{BB,ijk}$</td>
<td>Below-ground tree biomass of stratum i sub-stratum j species k (t.d.m. ha^{-1})</td>
<td>Most recent</td>
<td>Local / Global default</td>
<td>Local/National/ GPG-LULUCF See TARAM worksheet SM4 cells A514:B539 (same as in row 43 in this table)</td>
<td>
Stratum 1: Quercus rich soils
<table>
<tr><td>Species</td><td>t.d.m. ha^{-1}</td></tr>
<tr><td>Quercus III</td><td>64.20</td></tr>
<tr><td>Fraxinus III</td><td>2.92</td></tr>
<tr><td>Carpinus III</td><td>5.69</td></tr>
<tr><td>Tilia III</td><td>463.94</td></tr>
<tr><td>OBLH III</td><td>-</td></tr>
</table>
Stratum 2: Quercus poor soils
<table>
<tr><td>Species</td><td>t.d.m. ha^{-1}</td></tr>
<tr><td>Quercus IV</td><td>49.75</td></tr>
<tr><td>Fraxinus IV</td><td>4.44</td></tr>
<tr><td>Acer IV</td><td>3.45</td></tr>
<tr><td>OBLH IV</td><td>0.95</td></tr>
</table>
Stratum 3: Robinia poor soils
<table>
<tr><td>Species</td><td>t.d.m. ha^{-1}</td></tr>
<tr><td>Robinia III</td><td>333.21</td></tr>
<tr><td>Ulmus III</td><td>3.85</td></tr>
<tr><td>Acer III</td><td>3.45</td></tr>
<tr><td>OBLH III</td><td>0.95</td></tr>
</table>
Stratum 4: Robinia rich soils
<table>
<tr><td>Species</td><td>t.d.m. ha^{-1}</td></tr>
<tr><td>Robinia III</td><td>463.94</td></tr>
<tr><td>Ulmus III</td><td>3.80</td></tr>
<tr><td>Acer III</td><td>3.76</td></tr>
<tr><td>Fraxinus III</td><td>3.55</td></tr>
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</tr>
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<table>
<tr>
<td>$B_{AB,ijk}$</td>
<td>Above-ground tree biomass of stratum i sub-stratum j species k (t.d.m. ha^{-1})</td>
<td>Most recent</td>
<td>Local / Global default</td>
<td>Local/National/ GPG-LULUCF See TARAM worksheet SM4 cells H512:I539</td>
<td>
Stratum 1: Quercus rich soils
<table>
<tr><td>Species</td><td>t.d.m. ha^{-1}</td></tr>
<tr><td>Quercus III</td><td>103.55</td></tr>
<tr><td>Fraxinus III</td><td>8.58</td></tr>
<tr><td>Carpinus III</td><td>13.23</td></tr>
<tr><td>Tilia III</td><td>4.41</td></tr>
<tr><td>OBLH III</td><td>3.27</td></tr>
</table>
Stratum 2: Quercus poor soils
<table>
<tr><td>Species</td><td>t.d.m. ha^{-1}</td></tr>
<tr><td>Quercus IV</td><td>74.26</td></tr>
<tr><td>Fraxinus IV</td><td>11.99</td></tr>
<tr><td>Acer IV</td><td>9.34</td></tr>
<tr><td>OBLH IV</td><td>2.56</td></tr>
</table>
Stratum 3: Robinia poor soils
<table>
<tr><td>Species</td><td>t.d.m. ha^{-1}</td></tr>
<tr><td>Robinia III</td><td>589.09</td></tr>
<tr><td>Ulmus III</td><td>10.40</td></tr>
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Stratum 4: Robinia rich soils
<table>
<tr><td>Species</td><td>t.d.m. ha^{-1}</td></tr>
<tr><td>Robinia III</td><td>978.77</td></tr>
<tr><td>Ulmus III</td><td>11.18</td></tr>
<tr><td>Acer III</td><td>11.05</td></tr>
<tr><td>Fraxinus III</td><td>10.45</td></tr>
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</td>
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<tr>
<td>$\Delta C_{DW,ijk}$</td>
<td>Average annual change in the carbon stock of dead wood in stratum i sub-stratum j species k in t C yr^{-1}</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
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<table>
<tr><td>M_k</td><td>Average annual rate of natural mortality for species k, dimensionless</td><td>Most recent</td><td>Local / Global default</td><td>Local/National/ GPG-LULUCF See TARAM worksheet SM4 cells L514:M539</td><td>
Stratum 1: Quercus rich soils
<table>
<tr><td>Species</td><td>t C yr^{-1}</td></tr>
<tr><td>Quercus III</td><td>0.01%</td></tr>
<tr><td>Fraxinus III</td><td>0.01%</td></tr>
<tr><td>Carpinus III</td><td>0.01%</td></tr>
<tr><td>Tilia III</td><td>0.01%</td></tr>
<tr><td>OBLH III</td><td>0.01%</td></tr>
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Stratum 2: Quercus poor soils
<table>
<tr><td>Species</td><td>t C yr^{-1}</td></tr>
<tr><td>Quercus IV</td><td>0.01%</td></tr>
<tr><td>Fraxinus IV</td><td>0.01%</td></tr>
<tr><td>Acer IV</td><td>0.01%</td></tr>
<tr><td>OBLH IV</td><td>0.01%</td></tr>
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Stratum 3: Robinia poor soils
<table>
<tr><td>Species</td><td>t C yr^{-1}</td></tr>
<tr><td>Robinia III</td><td>0.01%</td></tr>
<tr><td>Ulmus III</td><td>0.01%</td></tr>
<tr><td>Acer III</td><td>0.01%</td></tr>
<tr><td>OBLH III</td><td>0.01%</td></tr>
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Stratum 4: Robinia rich soils
<table>
<tr><td>Species</td><td>t C yr^{-1}</td></tr>
<tr><td>Robinia III</td><td>0.01%</td></tr>
<tr><td>Ulmus III</td><td>0.01%</td></tr>
<tr><td>Acer III</td><td>0.01%</td></tr>
<tr><td>Fraxinus III</td><td>0.01%</td></tr>
<tr><td>OBLH III</td><td>0.01%</td></tr>
</table>
</td></tr>
<tr><td>DC_k</td><td>Decomposition factor for species k, dimensionless</td><td>N/A</td><td>N/A</td><td>N/A</td><td>N/A</td></tr>
<tr><td>$\Delta C_{SOC,ijk}$</td><td>Average annual carbon stock change in soil organic matter for stratum i sub-stratum j species k in t C. yr^{-1}</td><td>Most recent</td><td>Stratum/ species</td><td></td><td>
<table>
<tr><td>Stratum 1: Quercus rich soils</td><td>0.313096</td></tr>
<tr><td>Stratum 2: Quercus poor soils</td><td>0.313096</td></tr>
<tr><td>Stratum 3: Robinia poor soils</td><td>0.313096</td></tr>
<tr><td>Stratum 4: Robinia rich soils</td><td>0.313096</td></tr>
</table>
</td></tr>
</table>

$C_{SOC\_For,ijk}$	Soil organic carbon stock of afforested/reforested area or forested area that corresponds to the stratum *i* sub-stratum *j* species *k* in t C.ha^{-1}	Most recent	Project	Calculated See TARAM Worksheet SM1 cell 21; SM2 cell 21; SM3 cell 21; SM4 cell 21; Pre-AR cell 15.	66.5
$C_{SOC\_Non\_For,i}$	Soil organic carbon stock of non-forested degraded lands that correspond to the stratum *i* sub-stratum *j* species *k* in t C.ha^{-1}	Most recent	Project	Calculated See TARAM Worksheet SM1 cell 20; SM2 cell 20; SM3 cell 20; SM4 cell 20; Pre-AR cell 14.	60.23
$T_{For,ijk}$	Time period required for transition from *SOCNon-For,ij* to *SOCFor,ijk* in years	Most recent	default	N/A.	20
$C_{SOC\_REF,ijk}$	Reference soil organic carbon stock under the native unmanaged in t C ha^{-1}	Most recent	default	Table 3.2.4 of the Good Practice Guidance on LULUCF	95
f_{ijk}	Adjustment factor for the effect of management intensity, dimensionless	N/A	N/A	Table 6 of EB60 Report Annex 12, page 10.	0.7

$C_{SOCC\_Non\_For,i}$	Soil organic carbon content of non-forested degraded land that corresponds to stratum *i* species *k* as determined in laboratory in g C	Most recent	Project	Calculated See TARAM Worksheet SM1 cell H20; SM2 cell H20; SM3 cell H20; SM4 cell H20; Pre-AR cell H14.	60.23
BD_i	Bulk density(soil mass/volume of sample) of non-forested land that corresponds to stratum *i* as determined in laboratorying.c m^{-3}	N⁄A	N⁄A	N⁄A	N⁄A
D_i	Soil depth corresponding to stratum *i* in cm	N⁄A	N⁄A	N⁄A	N⁄A
$FC_{,kt}$	1 – (% volume of coarse fragments/100) to adjust the proportion of volume of sample occupied by coarse fragment of > 2mm of in stratum *i*, dimensionless	N⁄A	N⁄A	N⁄A	N⁄A
M	Multiplier to convert units into t C ha^{-1}	N⁄A	N⁄A	N⁄A	N⁄A
GHG_E	Sum of increases in GHG emissions within the project boundary from the implementation of the proposed A/R CDM project activity in t CO_2e	Most recent	Stratum/ species	Local	Zero. See section D.1 in PDD

$E_{BiomassLoss}$	Increase in GHG emissions from the loss of biomass in the site preparation within the project boundary in t CO_2	Most recent	Local / Global default	Local	Zero. See section D.1 in PDD
$E_{BiomassBurn}$	Increase in GHG emissions from the biomass burning within the project boundary in t CO_2e	Most recent	Local / Global default	Local	Zero. See section D.1 in PDD
$A_{NT\_Biomass\_Loss,i}$	Area of stratum *i* in ha	N/A	N/A	N/A	N/A
$B_{AB\_NTree,i}$	Average biomass stock of non-tree vegetation on land to be planted before the start of a proposed A/R CDM project activity for stratum *i* in t.d.m. ha^{-1}	N/A	N/A	N/A	N/A
CF_{NTree}	Carbon fraction of dry biomass in non-tree vegetation in t C $(t.d.m.)^{-1}$	N/A	N/A	N/A	N/A
$A_{BiomassBurn,i}$	Area of biomass burn in stratum *i* in ha yr^{-1}	N/A	N/A	N/A	N/A
$B_{AB,i}$	Average stock in aboveground biomass for stratum *i* prior to burn in t.d.m. ha	N/A	N/A	N/A	N/A
CE	Combustion efficiency, dimensionless, (IPCC default =0.5)	N/A	N/A	N/A	N/A

$E_{BiomassBurn,CH4}$	CH_4 emission from biomass burning in slashes and burn in t CO_2-eq yr^{-1}	N/A	N/A	N/A	N/A
GWP_{CH4}	Global warming potential for CH_4	N/A	N/A	N/A	N/A
EF_{CH4}	Emission factor for CH_4 t CH_4 (t C)$^{-1}$ (IPCC default for CH_4 = 0.012)	N/A	N/A	N/A	N/A
$12/44$	Ratio of molecular weights of carbon and CO_2; dimensionless		Global default	IPCC	
$16/12$	Ratio of molecular weights of CH_4 and carbon; dimensionless	N/A	N/A	N/A	N/A
$E_{Non-CO2,\ BiomassBurn}$	Increase in non-CO_2 emission from biomass burning in t CO_2eq yr^{-1}	N/A	N/A	N/A	N/A
ΔC_{ACTUAL}	Actual net greenhouse gas removals by sinks in t CO_2-eq yr^{-1}	Most recent	Project specific	Calculated See TARAM worksheet CERs cell J45	1,855,994

<table>
<tr>
<td>ΔC_{ijk}</td>
<td>Average annual carbon stock change in living biomass of trees for stratum i sub-stratum j species k in t CO_2 yr^{-1}</td>
<td>Most recent</td>
<td>Project specific</td>
<td>Calculated See TARAM worksheet SM4 cells Y485:Z510</td>
<td>
<table>
<tr><th>Species</th><th>t CO2 yr</th></tr>
<tr><td>Quercus III</td><td>412.75</td></tr>
<tr><td>Fraxinus III</td><td>0.50</td></tr>
<tr><td>Carpinus III</td><td>0.53</td></tr>
<tr><td>Tilia III</td><td>0.02</td></tr>
<tr><td>OBLH III</td><td>0.02</td></tr>
</table>
Stratum 2: Quercus poor soils
<table>
<tr><th>Species</th><th>t CO2 yr</th></tr>
<tr><td>Quercus IV</td><td>287.74</td></tr>
<tr><td>Fraxinus IV</td><td>0.69</td></tr>
<tr><td>Acer IV</td><td>0.56</td></tr>
<tr><td>OBLH IV</td><td>0.04</td></tr>
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Stratum 3: Robinia poor soils
<table>
<tr><th>Species</th><th>t CO2 yr</th></tr>
<tr><td>Robinia III</td><td>2,272,223.43</td></tr>
<tr><td>Ulmus III</td><td>583.59</td></tr>
<tr><td>Acer III</td><td>515.56</td></tr>
<tr><td>OBLH III</td><td>13.76</td></tr>
</table>
Stratum 4: Robinia rich soils
<table>
<tr><th>Species</th><th>t CO2 yr</th></tr>
<tr><td>Robinia III</td><td>15,328,883.20</td></tr>
<tr><td>Ulmus III</td><td>7.07</td></tr>
<tr><td>Acer III</td><td>8.01</td></tr>
<tr><td>Fraxinus III</td><td>2.15</td></tr>
<tr><td>OBLH III</td><td>0.00</td></tr>
</table>
</td>
</tr>
<tr>
<td>GHG_E</td>
<td>GHG emissions by sources within the project boundary as a result of the implementation of an A/R CDM project activity in t CO_2-eq yr^{-1}</td>
<td>Most recent</td>
<td>Project specific</td>
<td>Calculated</td>
<td>Zero</td>
</tr>
<tr>
<td>LK_t</td>
<td>CO_2 emissions from leakage t CO_2eq yr^{-1}</td>
<td>Most recent</td>
<td>Project specific</td>
<td>Estimated</td>
<td>Zero</td>
</tr>
</table>

C_{AR-CDM}	Net anthropogenic greenhouse gas removals by sinks int CO_2eq yr^{-1}	Current	Project specific	Calculated	1,171,708 at year 30. See TARAM worksheet CERs for yearly values cells L15:44
ΔC_{ACTUAL}	Actual net greenhouse gas removals by sinks in t CO_2eq yr^{-1}	Current	Project specific	Calculated	1,344,115 at year 30. See TARAM worksheet CERs for yearly values cells J15:44
ΔC_{BSL}	Baseline net greenhouse gas removals by sinks in t CO_2-eq yr^{-1}	Current	Project specific	Calculated	172,407 at year 30. See TARAM worksheet CERs for yearly values cells G15:44
LK	Leakage in t CO_2-eq yr^{-1}	Current	Project specific	Calculated	Zero

D.2. *Ex ante* estimation of leakage:

Estimation of *ex ante* leakage

Per EB decision of the paragraph 35 of the report of the 42nd meeting report, fossil fuel emissions from the transport need not be accounted. Therefore, leakage emissions from transport of personnel and products outside the project are excluded from calculations. The project does not lead to the displacement of pre-project economic activities and does not cause any forms of leakage. Therefore leakage is considered **zero**.

$$LK_t = 0$$

where

LK_t CO_2 emissions from leakage; t CO_2eq yr^{-1}

SECTION E. Monitoring plan

E.1. Monitoring of the project implementation:

>>

E.1.1. Monitoring of forest establishment and management if required for the compliance with the applicability conditions of the selected approved methodology:

Forest establishment:

The monitoring of the forest establishment will cover site preparation, planting and establishment of the forest as per the guidelines of AR-AM0002 (version 03).

Monitoring of site preparation and planting activities

- Monitoring will cover aspects related to site preparation and amount of vegetation affected.
- Information on planting schedule, location, area, species planted will be recorded and archived in the project database

- Information on the age class-wise area planted in each stratum and sub-stratum is confirmed through field surveys.
- Information on species composition and characteristics of planted species and pre-existing vegetation, if any observed on the strata are recorded. The spacing and characteristics of the stand models are recorded in the project database;

Assessment of planting activities is carried out to confirm the quality of work within two weeks after completion of planting activities.

Monitoring of post-planting activities to demonstrate the forest establishment

Survival rates of planted trees and shrubs are counted based on annual surveys. The land parcels with low survival rates are replanted till canopy closure stage. The area and location of supplemental plantings undertaken to fill the gaps is recorded in the project database and identified on the strata maps.
Number and periodicity of tending activities will be monitored and recorded.

Information on the occurrence of droughts and floods and other emergencies will be monitored and recorded and the area affected by them will be excluded from the ex post calculations of the carbon stock changes.

In case of fires, their causes, area affected, season, and duration of fire occurrence will be recorded and the emissions associated with the burning of biomass will be calculated.

Table 30: Information on forest management activities to be monitored to demonstrate the forest establishment

ID number[54]	Data variable	Data unit	Measured (m), calculated (c) estimated (e) or default (d)[55]	Recording frequency	Number of data points / Other measure of number of collected data	Comment
E1.2.1	Survival percent	percent	m	Annually till canopy closure stage (3-8 years)	100%	Survival rates of planted stock are established according to technical regulations in force until canopy closure stage.
E.1.2.2	Plantatio n failure	Area in ha	m	At 5 year intervals	100%	Plantation failures due to natural (drought, flooding, fire etc) or anthropogenic reasons are recorded; area is deducted in the ER calculations and reported at the

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

[55] Please provide full reference to data source.

						subsequent verification.
E.1.2.3	Natural and anthropogenic events	Alphanumeric	m	Annually - After the start of the project	100%	The natural and anthropogenic events occurring within and outside the boundary that influence the project and project boundary

Standard operational procedures to monitor the parameters in Table 28 are listed in the Manual for Monitoring of CDM afforestation and reforestation projects (Part 1) published by the BioCarbon Fund.[56]

Standard Operational Procedures:
Forest establishment
The monitoring of forest establishment includes:

- Data pertaining to species composition, spacing, and planting schedule are monitored.
- Information on planting stock, method of planting and technologies used are assessed.
- The occurrence of droughts and floods and other emergencies that influence the forest establishment is monitored.
- Deviations from the planned activities are assessed to examine their influence on the project activities.
- Areas with the survival rate lower than the established indicators are replanted. The area and location of supplemental plantings undertaken to fill the gaps are recorded in the project database.

Quality assurance and quality control of monitoring of forest establishment
Personnel different from supervisors or personnel in-charge of filling the forest establishment forms must check the activities within one month after the end of the planting season and should verify that:

- Each discrete area proposed for seeding/planting/assisted natural regeneration implemented the relevant activities.
- Planted species and planting densities conform to the details presented in the PDD. Any deviation must be explained and justified.
- The summation of discrete areas reported as planted equals the total to the area proposed for planting. Any deviation must be explained and justified.
- Forms are correctly filled without missing information. Project and discrete area ID codes are consistently used.

A pre-defined percentage of the discrete areas (e.g. 5 or 10%, depending on the differences among strata) should be visited in the field after planting activities are completed in order to check the quality of activities implemented and their

Monitoring of Survival rate of planted seedlings

[56] See http://wbcarbonfinance.org/docs/Manual_for_Monitornig_of_CDM_AR_Projects_Part_I-SOPs.pdf

- Collect data about the initial number of planted seedlings per hectare (from planting records). If several species are used in separate stand models, data on number of seedlings planted by species and stand model should be collected. If a mix of species planted is considered as a group, please collect data for all the mix of species in corresponding group(s).
- After the plot is delimited, please record plot area in the survival form. Record project id, plot location, planting year, and date of assessment.
- Count the number of surviving seedlings in the plot for each species and record it in the survival form.
- Record comments relevant for the assessment
- Survival of each species of the species i is calculated as:

$$S_i\% = \frac{numberofsurvivingtreesofspeciesiinplot}{numberofplantedtreesofspeciesiinplot} * 100$$

- Survival rate for all the plot is calculated considering all trees in plot:

$$S\% = \frac{\sum_{i=1}^{n} NS_i}{\sum_{i=1}^{n} NP_i} * 100$$

Where:
S%: Survival rate (in percentage).
i = 1 to n : List of species planted in the plot
NS_i : Number of surviving trees of species *i* in the plot.
NP_i : Number of planted trees of species *i* in the plot.

Quality assurance and quality control of monitoring survival of planted seedlings

A person different to the staff in charge of establishing and monitoring sampling plots, including survival plots, must verify no more than one month after the date of collection of survival data that:

- Each defined stratum is considered in the report.
- Discrete areas are is represented in the survival sampling
- Forms are correctly filled and there is no missing information. Project and discrete areas ID codes are consistently used.

A predefined percentage of the survival sampling plots (e.g. 5 or 10%) should be visited in the field right after activities are finished and re-measured to check the quality of the accomplished activities. If survival rates of the re-sampled plots differ by more than 10% to the original sample, then a full re-measurement of survival plots must be accomplished.

The procedure for monitoring of silvicultural activities consists of tracking dates and areas affected, and preparation of report with a summary of activities implemented (e.g., stand or discrete area ID, type of activity, area affected and other relevant data)

Table 31: Information on the forest management activities to calculate the carbon stocks in the biomass

Stand ID: Quercus robur species stratum									
Stand age	Quercus_rich soil			Quercus_poor soil			Biomass burning from natural fires	Other management measures that influence carbon stock changes	Remarks
	Stand volume	Thinning / harvest	Fuel-wood	Stand volume	Thinning/ harvest	Fuel-wood			
	V_{ijt}	H_{ijt}	FG_{ijt}	V_{ijt}	H_{ijt}	FG_{ijt}			
	m^3ha^{-1}	m^3ha^{-1}	m^3ha^{-1}	m^3ha^{-1}	m^3ha^{-1}	m^3ha^{-1}	$Td.m.ha^{-1}$		
1									
2									
3									
Crediting period									

E.1.2. Information on how geographic coordinates of the project boundary are established, recorded and archived:

Project Boundary:

Project boundary represents the boundaries of discrete land parcels on which project activities are implemented. The provisions of AR- AM0002 (version 03) on the monitoring of the project boundary will be fully complied during the project implementation. The data on project boundary collected and archived in the project database and will be made available at the time of verification. The steps proposed to be implemented as part of monitoring of project boundary are as below:

- Field surveys will be conducted at periodic intervals to verify the permanent markers used in delineating the project boundary;
- The project boundary is delineated using the GPS by measuring and recording the latitude and the longitude of the polygons that represent the geographical positions. Furthermore, field surveys are used to verify that the actual project boundary is consistent with the GPS coordinates and boundaries of the respective sites and species planted could be verified from the GPS and the field survey data;
- The monitoring of the project boundary provides information on land use and economic activities that occur outside the project are easily 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 on emergencies outlined in the monitoring plan;
- Personnel involved in the monitoring will be trained to identify the changes in the boundary and to record changes in the project database for the purpose of reporting at the time of project verification.

Table 32: Information on the project boundary

ID number[57]	**Data variable**	**Data unit**	**Measured (m), calculated (c) estimated (e) or default (d)**[58]	**Recording frequency**	**Number of data points / Other measure of number of collected data**	**Comment**
E.1.1.1	GPS coordinates	numeric	m	At the start of the project	100%	The project boundary in terms of the latitude and longitude of the land parcels are recorded and checked at 5 yearly intervals. Any changes observed to the project boundary during the field surveys will be recorded and reported to the DOE at the time of subsequent verification.

Procedure for monitoring boundaries (of discrete areas or disturbed areas)

- Turn on the GPS unit and allow it to initialize to gather location information and to identify GPS satellites. This process can take several minutes. The GPS unit's main screen will display when it is complete.
- Note the dilution of precision (DOP) error. The DOP measures the error caused by the geometry between the user and the satellites. This information will indicate map accuracy. The GPS user manual may be referred for information on how to find the DOP.
- Begin by setting a waypoint at starting location. A waypoint records the GPS coordinates of a user-defined location. Some GPS units will have a button on the outside of the unit. Others may require navigating to a menu. The GPS user's manual may be referred for instructions.
- Decide whether you want to plot a map with a track or a route. With a track, the GPS unit automatically records GPS coordinates along your direction of travel at a predefined distance. A route shows a path of waypoints that you collect as you move. If you are unable to travel the distance of the area you want to map because of topography or terrain (e.g., wetland in the way), a route is the better option.
- Follow the perimeter of the area you wish to plot. Note distinct features for setting a waypoint. Most GPS units allow you to include description, but typing text in the GPS is a slow process. Therefore,

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

[58] Please provide full reference to data source.

carrying a field notebook to note the names and descriptions of the points of traverse is recommended.

- After moving along the track boundaries, return to the beginning waypoint. If you set up a tracking feature, stop the tracking through GPS unit's menu.
- Upload the GPS coordinate data to the computer and process it with mapping software. The user manual of the mapping software may be consulted for instructions. Most mapping software programs permit inclusion of information recorded in the field notebook while traversing along routes and/or waypoints.

Quality assurance and quality control when monitoring project boundary
Data collection

Regardless of the type of GPS receiver, data collection standards and quality control measures shall be followed in order to produce accurate data.

- Satellite availability: GPS device must track at least four satellites to get a 3-D position.
- Satellite geometry or distribution of satellites in the sky affects the computation of your position. This is often referred to as Position Dilution of Precision (PDOP). Satellites that are spread out have better geometry and give accurate reading than when they are clustered together. PDOP is determined by geographic location, the time of a day on which measurements are made, and obstructions that block satellite signals. PDOP is expressed as a number. The lower PDOP numbers are preferable to higher numbers. On some GPS receivers. PDOP can be adjusted to allow for recording of points at different levels of accuracy. The best results are obtained when PDOP is less than 7 (PDOP of 6 is preferred). The user should not increase the allowable PDOP value to more than 8 unless data on a position is collected overriding the accuracy. In the flexible field work schedules, GPS users should increase mapping accuracy by using planning charts and targeting the data collection during the times of a day when satellite availability and geometry are best.
- Length of time GPS data file is open: Positional accuracy will be better the longer a file is open and more GPS positions are collected and averaged. The GPS user manual may be consulted for relevant guidance).
- Multi-path error or signal interference: Multi-path error occurs due to the reflection of signals. GPS signals may be reflected by surfaces near the antennae, causing error in the travel time and the GPS positions. Although the multi-path error is mostly beyond the control of a GPS user, adjustments such as positioning the GPS with unobstructed view of the sky, using offsets from better satellite reception areas to the target location (refer to *0* below), and using an external antenna could minimize the likelihood of this error.

Data handling when monitoring project boundary

- Personnel involved in the monitoring are trained to verify the geographic boundary and to record the data in the project database for reporting at the time of project verification.
- The monitored data and information on the boundary are checked to ensure consistency with the data recorded in the project database and the registered PDD; and reasons, if any, for the change are recorded.
- Monitoring procedures of the project boundary need to ensure that the land use activities within and outside of the project can be identified.

It is important that field crews returning from the field should transfer GPS files to the database and backed-up storage. Files should be transferred to an appropriately-named folder (such as “Raw” or “Backup”). Communicate with the GPS support person to determine how the files are stored as well as differentially corrected (if required2), and entered into the database.

E.1.3. If required by the selected approved methodology, describe, or provide reference to, SOPs and quality control (QC) and quality assurance (QA) procedures undertaken for data monitored, if not included in the relevant sections below:

Table 33: Evaluation procedures for QA/QC

Data *(Indicate ID number)*	Uncertainty level of data (High /Medium/Low)	**Explain QA/QC procedures planned for these data, or why such procedures are not necessary**
E.4.1.1.07 Plot location	Low	Verification of the plot locations through random checks
E.4.1.1.09 No. of Trees	Low	Tree counts are taken on the nested plots. The data collection and recording procedures are randomly verified.
E.4.1.1.10 Diameter at breast height (DBH)	Low	Considering the large number of measurements taken, the measurement error is likely to be small. The random re-measurements are used to verify the prior measurements.
E.4.1.1.12 Tree height	Low	Measurement, data collection and recording procedures are subject to random re-measurements and verification.
E4.1.1.1.13 Merchantable volume	Low	The equations used in the estimation of volume shall be verified
E4.1.1.1.14 Biomass expansion factor (BEF)	Low	Data from available studies is compared to select the representative factors
E.4.1.1.15 Shrub biomass	Low	Measurements, data collection and recording procedures are randomly verified.
E.4.1.1.17 Wood density	Low	Data from literature and local estimates shall be verified.
E.4.1.1.18 Litter	Low	Sampling, data collection, laboratory procedures are randomly verified.
E.4.1.1.19 Below ground biomass	Low	Data from literature and local estimates should be checked.
E.4.1.1.20 Root shoot ratio	Low	Data from literature and local estimates should be checked
E.1.1.21 Standing dead wood	Low	Measurements follow the procedures of live tree measurement. Data collection and recording procedures are verified as per the decomposition classes.
E.4.1.1.22 Lying dead wood	Low	Measurements on line intersect methods shall be verified, data collection and recording procedures are subject to random checks.
E.4.1.1.23 Total deadwood	Low	Calculations shall be verified
E.4.1.1.24 Soil carbon	Medium	Procedures on soil sampling, bulk density sampling and laboratory methods shall be randomly verified.

E.2. Sampling design and stratification:

The stratification of the project is based on the species groups used in the project. The strata are further categorized into sub-strata based on the year of planting. The need for *ex post* stratification will be evaluated at each monitoring event based on the area affected in disturbances, and management activities implemented in each stratum and sub-stratum. Changes in the strata will be reported to the DOE for verification. A stratification map is prepared outlining the project boundaries, species composition, and year of planting. The physical features relating to project boundary and management variables such as thinning and harvesting will be represented on the stratification map. The carbon stock changes in each stratum and substratum shall be monitored by adopting the sampling strategy outlined below.

(b) Sampling

A stratified sampling design is used to estimate the verifiable changes in carbon stocks in the carbon pools of the project and the corresponding sampling error. The monitoring data are based on the record of field measurements at each monitoring interval as per the monitoring frequency adopted for each pool. The nested plot approach is proposed for the measurement of the carbon pools since it permits efficient measurement of tree growth through time (e.g. a representative number of both small and large trees are measured on the same plots. The plot markers of permanent plots will not be prominently displayed to ensure that the sample plots do not receive differential treatment. The GPS coordinates would also be used to identify the plots.

Above-ground tree vegetation: Considering the large covariance between the observations at successive sampling events, permanent sample plots are used to estimate the changes in the biomass pool. Permanent sample plots facilitate the development of plot and management histories as the tree vegetation grows.

Non-tree woody (shrub) vegetation: Non-tree woody vegetation will be measured within the nested plots to estimate the pool. The number of plots used for measuring the non-tree woody vegetation will be based on the relative significance of the shrub layer and as per the steps and procedures outlined in the approved methodology AR-AM0002 (version 03). Non-tree woody biomass will be estimated applying allometric equations relating measured parameters (e.g. shrub height, crown diameter, or basal diameter) with aboveground biomass, as permitted in AR-AM0002 (version 03).

Litter: A frame of constant size (e.g. 50x60 cm) is used to sample the litter. The frames can be located at four corners of the larger tree sampling plots to measure the litter biomass and steps and procedures outlined in the approved methodology AR-AM0002 (version 03) and monitoring plan will be used to evaluate the changes in the litter pool.

Soil: Considering the slow changes in the soil carbon, monitoring of changes in the soil carbon will be done between 10 to 20 year intervals. Considering the productivity differences of the lands, the soil monitoring is costly. Therefore, In order to minimize the monitoring costs temporary plots will be used to compare the mean stocks of two *independent* temporally-separated pools during the monitoring interval.

Sampling framework to target 10% precision level

As per the EB guidelines, a precision level of 10% in the mean with a 90% confidence interval is adopted for the estimation of carbon pools. The total error comprises sampling, measurement, model and other

errors. Sampling errors account for more than 3/4 of total error. Therefore, in order to achieve a 10% precision level**,** a7% sampling error needs to be targeted and the remaining 3% error can account other types of errors. By increasing the sample size and the plot size, it is possible to increase the precision and decrease the variability of the estimate. Within the overall precision level of 10%, different precision levels could be defined for individual pools taking into account the variation observed in the respective pools.

Sample size

Using the equation M.1 and M.2 in Section III of the methodology the number of permanent sample plots and their geographic allocation are calculated. The sample size for subsequent monitoring interval will be modified if variation is observed in carbon stock changes after the first monitoring event based on *n* samples. **Annex 12** presents the spreadsheet calculations on the sample size requirements for the project.

Sample size for measuring the carbon stock changes in the carbon pools of biomass

The area covered under major species group is used to calculate the sample size of the project. Equations M1 and M2 of the approved methodology AR-AM0002 (version 03) are used to calculate the sample size. A sample size of 203 permanent sample plots is estimated as the sample size required for monitoring the aboveground biomass. The sample size estimation procedures of the monitoring plan allow for increasing the sample size taking into account variability observed in the biomass estimates. **Table34** and **Table 35** present the number of sample plots calculated for monitoring the carbon stock changes in the above ground biomass.

Table 34: Number of sample plots for measuring the changes in living biomass.

Stratum no.	Project Stratum	Calculated number of sample plots	Required number of sample plots
1	Quercus_RichSoil	2	3
2	Quercus_PoorSoi	1	3
3	Robinia_RichSoil	163	163
4	Robinia_PoorSoil	34	34
Total		**200**	**203**

Note: for strata *Quercus_RichSoil* and *Quercus_PoorSoil* number of sample plots was increased to achieve the acceptable data precision.
Source: *Calculation based on the project data. Project Implementation Unit, Moldsilva (ICAS), Chisinau.*

Table 35: Number of sample plots for measuring the changes in living biomass by forest enterprise.

Nr.	**Forest enterprise**	**Including by strata**									
		Robinia rich soil		Robinia poor soil		Quercus rich soil		Quercus poor soil		**Total**	
		ha	nr. of sample plots	ha	nr. of sample plots	ha	nr. of sample plots	ha	nr. of sample plots	ha	nr. of sample plots
1	Straseni	87.72	2	85.04	1	1.00	0	0	0	173.76	3
2	Soroca	388.44	11	137.74	3	0	0	0	0	526.18	14
3	Edinet	429.10	11	0	0	0	0	0	0	429.10	11
4	Orhei	117.66	3	0	0	0	0	0	0	117.66	3

Nr.	Forest enterprise	Including by strata									
		Robinia rich soil		Robinia poor soil		Quercus rich soil		Quercus poor soil		**Total**	
		ha	nr. of sample plots	ha	nr. of sample plots	ha	nr. of sample plots	ha	nr. of sample plots	ha	nr. of sample plots
5	Nisporeni	183.38	5	61.90	1	0	0	0	0	245.28	6
6	Iargara	778.27	20	265.93	4	6.30	0	13.30	1	1063.80	25
7	Hincesti	195.19	5	68.24	1	0	0	0	0	263.43	6
8	Glodeni	237.10	6	76.50	1	0	0	0	0	313.60	7
9	Calarasi	90.10	3	118.79	2	0	0	0	0	208.89	5
10	Balti	291.10	7	89.00	2	23.90	1	0	0	404.00	10
11	Manta-V	203.55	6	88.18	1	0	0	0	0	291.73	7
12	Telenesti	184.97	5	43.65	1	4.00	0	7.47	0	240.09	6
13	Ungheni	300.69	7	182.08	3	6.00	0	5.18	1	493.95	11
14	Silva-sud	312.94	9	157.55	2	2.00	1	31.60	1	504.09	13
15	Ialoveni	364.33	9	131.51	3	0.50	0	11.51	0	507.85	12
16	Chisinau	453.95	12	163.39	2	2.00	0	0	0	619.34	14
17	Tighina	609.01	16	410.23	7	0	0	0	0	1019.24	23
18	Comrat	248.90	6	16.00	0	0	0	0	0	264.90	6
19	Plaiul Fagului	7.66	0	0.60	0	30.06	1	0	0	38.32	1
20	Padurea Domneasca	67.98	2	0	0	0	0	0	0	67.98	2
21	Cimislia	675.65	18	0	0	0	0	0	0	675.65	18
TOTAL		**6227.69**	**163**	**2096.33**	**34**	**75.76**	**3**	**69.06**	**3**	**8468.84**	**203**

Source: *Calculation based on the project data. Project Implementation Unit, Moldsilva (ICAS), Chisinau.*

Sample size for measuring the carbon stock changes in the soil

The rich and poor soils based on the soil productivity criteria are used to calculate the sample plots and their geographic allocation to different forest enterprises. A total of 45 sample plots are estimated in order to measure the carbon stock changes in the soil. **Table 36** presents the number of sample plots calculated for monitoring the carbon stock changes in the soil.

Table 36: Number of sample plots for assessing the carbon stock changes in the soil.

Nr.	Forest enterprise	Total sample plots		Including by strata:			
				Poor soils (humus <2%)		*Rich soils (humus >2%)*	
		ha	nr. samples	ha	nr. samples	ha	nr. samples
1	Straseni	173.76	0	85.04	0	88.72	0
2	Soroca	526.18	3	137.74	0	388.44	3
3	Edinet	429.10	2	0	0	429.1	2
4	Orhei	117.66	1	0	0	117.66	1
5	Nisporeni	245.28	1	61.9	0	183.38	1
6	Iargara	1063.80	6	279.23	1	784.57	5

Nr.	**Forest enterprise**	**Total sample plots**		**Including by strata:**			
				Poor soils (humus <2%)		*Rich soils (humus >2%)*	
		ha	nr. samples	ha	nr. samples	ha	nr. samples
7	Hincesti	263.43	1	68.24	0	195.19	1
8	Glodeni	313.60	2	76.5	0	237.1	2
9	Calarasi	208.89	0	118.79	0	90.1	0
10	Balti	404.00	3	89	1	315	2
11	Manta-V	291.73	2	88.18	0	203.55	2
12	Telenesti	240.09	1	51.12	0	188.97	1
13	Ungheni	493.95	2	187.26	0	306.69	2
14	Silva-sud	504.09	3	189.15	1	314.94	2
15	Ialoveni	507.85	2	143.02	0	364.83	2
16	Chisinau	619.34	4	163.39	1	455.95	3
17	Tighina	1019.24	4	410.23	0	609.01	4
18	Comrat	264.90	2	16	0	248.9	2
19	Plaiul Fagului	38.32	1	0.6	1	37.72	0
20	Padurea Domneasca	67.98	0	0	0	67.98	0
21	Cimislia	675.65	5	0	0	675.65	5
TOTAL		**8468.84**	**45**	**2165.39**	**5**	**6303.45**	**40**

Source: *Calculation based on the project data. Project Implementation Unit, Moldsilva (ICAS), Chisinau.*

(c) Allocation of plots

The sample plots will be designated systematically to cover the land parcels. Plots are assigned to forest enterprises and designated systematically by selecting a random start from the list, and consecutively assigning the plots. Within each planting site, plot locations have equal chance of representing the site.

For the purpose of defining the location of PSP, the following procedure was applied:

- First, all land parcels of a respective stratum were grouped together in an excel database.
- Based on the predefined number of PSP, Visual Basic Application was used to randomly generate the project sectors in which the PSP would be located.
- For the determination of location of PSP within the previously identified sectors, a specially developed computer module (RandRoute) was used to randomly generate GPS coordinates within those sectors. These coordinates represent one corner (SW) of the PSP.

The aboveground biomass and soil carbon sampling require separate monitoring frameworks. The permanent sample plots with an area of 250 m^2 (sides of 5 x 50 m) will be used for aboveground biomass monitoring. In the field, plots are located with coordinates of one corner (South-West point) that is randomly selected. The location of the permanent sample plot should be done as per the following criteria:

a) Large side of the sample plot is usually located along the tree planting rows, and small side - perpendicular to it.
b) If by its corner coordinates of the sample plot is placed at the edge of the plantation, the long side of the permanent sample plot should be directed toward the centre of plantation.

Plot markers will not be prominently displayed to ensure that permanent plots do not receive differential treatment from forestry personnel.

Temporary sample plots will be used for monitoring changes in the soil carbon. It is not necessary that the same plots be revisited over time as soil carbon monitoring will focus on comparing the mean stocks of two *independent*, temporally-separated pools, temporary plots can be used. Thus, location of soil carbon plots will not be permanently marked.

During the sample plot establishment the field crew will follow a protocol in which all steps are recorded beginning with the starting point and surveying sample plots recording azimuth, horizontal distance and polygonal layouts and fixed points in the surrounding are recorded.

(d) Sample plot area

Plot area has major influence on the sampling intensity, stand density, and the resources needed in the field measurement. Therefore, increasing the plot area decreases the variability between two samples, which permits the use of small sample size at the same level of precision. The coefficient of variation of basal area increases as sample plot size decreases. Therefore, the plot areas of different strata shall be used to determine the optimum plot area that minimizes the coefficient of variation. The relationship between plot size and sample size is used to determine the sampling strategy that minimizes the overall cost of monitoring

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

As per the methodology, parameters of the baseline GHG removals by sinks are fixed ex ante.

Therefore, no parameters of the baseline will be monitored in the project

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

Data and parameters that are available at validation:

Data / Parameter:	Stratum ID
Description/unit:	Number to identify a stratum
Value applied:	Alpha numeric
Source of data:	Project
Justification of choice / Measurement procedures (if any):	Stratum ID is used to identify each stratum of the project
Any comment:	Taking into changes to strata, further strata are to be identified during subsequent monitoring periods

Data / Parameter:	Sub-stratum ID
Description/unit:	Number to identify a sub-stratum
Value applied:	Alpha numeric

Source of data:	Project
Justification of choice / Measurement procedures (if any):	Not Applicable
Any comment:	Sub-stratification is not adopted in the project

Data / Parameter:	p
Description/unit:	Level of precision to be applied to calculations
Value applied:	10%
Source of data:	Statistical procedure
Justification of choice / Measurement procedures (if any):	Precision level is adopted as per the requirements of methodology
Any comment:	

Data / Parameter:	$f_j(DBH,H)$
Description/unit:	Allometric equation quantifying the relationship between above-ground biomass (d.m. ha^{-1}) to the diameter at breast height (*DBH*); or *DBH* and tree height (*H*) for species *k*;
Value applied:	See equations listed in attached REF 120 Annex 11a_Inputs, worksheet “Parameters”
Source of data:	Blujdea, V. et al. 2011. Allometric biomass equations for young broadleaved trees in plantations in Romania. Forest Ecology and Management.. V264. Issue January 15 2012. P. 172-184 Giurgiu, V., Decei, J. and Armasecu. Biometrics of Trees and Stands in Romania – Dedrometric Tables. CERES, Bucharest 1972 The USSR State Commitee on Forestry – Normative References for the Taxation of Forest in Ukraine and Moldova. Kiev “Harvest” (Ukrainian and Moldavian Yield Tables)
Justification of choice / Measurement procedures (if any):	Published species-specific or group of species-specificallometric equations are applied. The allometric equations of closely related species or those with similar growth characteristics are used for species that do not have published values
Any comment:	

Data / Parameter:	V_k
Description/unit:	Merchantable volume of tree, m^3
Value applied:	Not Applicable
Source of data:	NA
Justification of choice / Measurement procedures (if any):	Not Applicable as project uses allometric method to calculate biomass

Any comment:	

Data / Parameter:	$BEF_{2,i}$
Description/unit:	Biomass expansion factor
Value applied:	Not Applicable
Source of data:	N/A
Justification of choice / Measurement procedures (if any):	Not Applicable as project uses allometric method to calculate biomass
Any comment:	

Data / Parameter:	D_k
Description/unit:	Wood density; kg/m^3
Value applied:	Not Applicable
Source of data:	N/A
Justification of choice / Measurement procedures (if any):	Not Applicable as project uses allometric method to calculate biomass
Any comment:	

Data / Parameter:	$R_{T},_k$
Description/unit:	Root-shoot ratio for tree biomass of species k
Value applied:	See values in attached REF 120 Annex 11a_Inputs, worksheet "Parameters"
Source of data:	Based on the published literature
Justification of choice / Measurement procedures (if any):	Published species-specific or group of species-specific root-shoot ratio values are applied. The root-shoot ratio values of closely related species or those with similar growth characteristics are used for species that do not have published values
Any comment:	

Data / Parameter:	$R_{s,k}$
Description/unit:	Root-shoot ratio for shrub biomass for shrub species k
Value applied:	See values in REF 120 Annex 11a_Inputs, worksheet "Parameters"
Source of data:	Based on the published literature
Justification of choice / Measurement procedures (if any):	Published species-specific or group of species-specific root-shoot ratio values are applied. The root-shoot ratio values of closely related species or those with similar growth characteristics are used for species that do not have published values
Any comment:	

Data / Parameter:	CF_t
Description/unit:	Carbon fraction of tree biomass; tones C (tonne d.m.)$^{-1}$
Value applied:	0.5
Source of data:	IPCC 2003 GPG LULUF

Justification of choice / Measurement procedures (if any):	Default carbon fraction value is used to convert biomass into carbon stock
Any comment:	

Data / Parameter:	CF_{shrub}
Description/unit:	Carbon fraction of shrub biomass tones C (tonne d.m.)-1
Value applied:	0.45
Source of data:	IPC 2003 GPG LULUCF
Justification of choice / Measurement procedures (if any):	Default carbon fraction value is used to convert biomass into carbon stock
Any comment:	

Data / Parameter:	CF_L
Description/unit:	Tonnes C (tonne d.m.)-1
Value applied:	0.37
Source of data:	AR CDM Methodology - AR AM 0002, version 03
Justification of choice / Measurement procedures (if any):	Default carbon fraction value is used to convert biomass into carbon stock
Any comment:	

Data / Parameter:	CE
Description/unit:	Biomass combustion efficiency
Value applied:	0.5
Source of data:	AR CDM Methodology - AR AM 0002, version 03
Justification of choice / Measurement procedures (if any):	Default biomass combustion value noted in the methodology
Any comment:	

Data and parameters that are monitored:

Data / Parameter:	st_i
Description/unit:	Standard deviation of carbon stock of stratum *i*; tonnes
Source of data:	Project monitoring
Measurement procedures:	Calculated based on sample plot measurements
Monitoring frequency:	Monitoring period corresponding to a periodic verification
QA/QC procedures:	Mean and standard deviation of carbon stock of each stratum is checked for each

	stratum
Any comment:	

Data / Parameter:	n
Description/unit:	Sample size, dimensionless
Source of data:	Project monitoring
Measurement procedures:	Calculated
Monitoring frequency:	Monitoring period corresponding to a periodic verification
QA/QC procedures:	Sample size calculated is checked to comply with the precision requirements of the methodology for estimation of GHG removals by sinks
Any comment:	

Data / Parameter:	**PL_{ID}**
Description/unit:	Sample Plot ID; Dimensionless
Source of data:	Project monitoring
Measurement procedures:	Not Applicable
Monitoring frequency:	Monitoring period corresponding to periodic verifications
QA/QC procedures:	Sample plot ID is checked prior to conducting biomass measurement on a sample plot
Any comment:	

Data / Parameter:	Plot location
Description/unit:	Latitude/longitude
Source of data:	Project monitoring
Measurement procedures:	Not Applicable
Monitoring frequency:	Monitoring period corresponding to periodic verifications
QA/QC procedures:	Plot location by stratum is checked prior to conducting a sample plot measurement
Any comment:	

Data / Parameter:	**t ID**
Description/unit:	Age of plantation; year
Source of data:	Project monitoring
Measurement procedures:	Not Applicable
Monitoring frequency:	Monitoring period corresponding to periodic verifications
QA/QC procedures:	Age to checked during the monitoring event
Any comment:	

Data / Parameter:	**tr ID**
Description/unit:	Number of trees; dimensionless
Source of data:	Sample plot measurement
Measurement procedures:	Based on sample plot measurement
Monitoring frequency:	At the end of the monitoring period corresponding to periodic verifications
QA/QC procedures:	Number of trees measured on sample plots to be checked for consistency with diameter measurements recorded on respective plots
Any comment:	

Data / Parameter:	DBH/DCH
Description/unit:	Diameter at breast height (DBH)/Diameter at collar height (DCH)
Source of data:	Project monitoring
Measurement procedures:	Measurement of sample plots
Monitoring frequency:	At the end of monitoring period of each periodic verification
QA/QC procedures:	Diameter measurements are randomly checked to ensure accuracy
Any comment:	

Data / Parameter:	Mean DBH/DCH
Description/unit:	Mean Diameter at breast height (DBH)/Diameter at collar height (DCH)
Source of data:	Project monitoring
Measurement procedures:	Not Applicable
Monitoring frequency:	Not Applicable as it is the calculated value
QA/QC procedures:	Calculated value to be checked
Any comment:	

Data / Parameter:	H_t
Description/unit:	Height of tree; meters
Source of data:	Project monitoring
Measurement procedures:	Measurement of sample plots
Monitoring frequency:	At the end of monitoring period of each periodic verification
QA/QC procedures:	Height measurements are randomly checked to ensure accuracy
Any comment:	

Data / Parameter:	Mean H
Description/unit:	Mean height of tree; meters
Source of data:	Project monitoring
Measurement procedures:	Measurement of sample plots
Monitoring	Not Applicable as it is the calculated value

frequency:	
QA/QC procedures:	Calculated value to be checked
Any comment:	

Data / Parameter:	$C_{AB\_Tree_k}$
Description/unit:	Carbon stock of above-ground tree biomass of species *k;* t.d.m. ha^{-}
Source of data:	Project monitoring
Measurement procedures:	Not Applicable
Monitoring frequency:	Not Applicable as it is a calculated value
QA/QC procedures:	Calculated value to be checked
Any comment:	

Data / Parameter:	**s ID**
Description/unit:	Number of shrub species; dimensionless
Source of data:	Project monitoring
Measurement procedures:	Measurement of sample plots
Monitoring frequency:	At the end of monitoring period of each periodic verification
QA/QC procedures:	Checked as part of sample plot measurement
Any comment:	

Data / Parameter:	Ds,k
Description/unit:	Diameter at the base of shrub species; cm
Source of data:	Project monitoring
Measurement procedures:	Measurement of sample plots
Monitoring frequency:	At the end of monitoring period of each periodic verification
QA/QC procedures:	Diameter at the base of shrubs are randomly checked to ensure accuracyof measurement
Any comment:	

Data / Parameter:	H_s
Description/unit:	Height of shrubs; meters
Source of data:	Project monitoring
Measurement procedures:	Not Applicable as shrub height is not measured in the project
Monitoring frequency:	Not Applicable
QA/QC procedures:	Not applicable as shrub height is not measured in the project
Any comment:	

Data / Parameter:	Dcs,k
Description/unit:	Crown diameter of shrub species; cm
Source of data:	Project monitoring
Measurement procedures:	Not Applicable as crown diameter of shrubs is not measured in the project
Monitoring frequency:	Not applicable
QA/QC procedures:	Not applicable as crown diameter of shrubs is not measured in the project
Any comment:	

Data / Parameter:	sr_k ID
Description/unit:	Number of stems of shrub species
Source of data:	Project monitoring
Measurement procedures:	Measurement of sample plots
Monitoring frequency:	At the end of monitoring period of each periodic verification
QA/QC procedures:	Random checks are to be conducted during measurement to ensure accuracy
Any comment:	

Data / Parameter:	$C_{AB\_NTree\_Shrub,m,i}$
Description/unit:	Carbon stock of above-ground shrub biomass for tree stratum *i* for monitoring period *m;* t $C.ha^{-1}$
Source of data:	Project monitoring
Measurement procedures:	Not Applicable
Monitoring frequency:	Not Applicable as it is a calculated value
QA/QC procedures:	Calculated value to be checked
Any comment:	

Data / Parameter:	$A_{s,i}$
Description/unit:	Area under shrubs in stratum i; ha
Source of data:	Project monitoring
Measurement procedures:	Not Applicable
Monitoring frequency:	Not Applicable as it is a calculated value
QA/QC procedures:	Calculated value to be checked
Any comment:	

Data / Parameter:	$MC_{AB\_NTree\_Shrub,m,i}$
Description/unit:	Mean carbon stock of above-ground shrub biomass for stratum *i* for monitoring period *m;* t $C.ha^{-1}$
Source of data:	Project monitoring
Measurement	Not Applicable

procedures:	
Monitoring frequency:	Not Applicable as it is a calculated value
QA/QC procedures:	Calculated value to be checked

Data / Parameter:	$MC_{AB\_Tree,m,i}$
Description/unit:	Mean carbon stock of above-ground tree biomass for stratum *i* for monitoring period m*;* t $C.ha^{-1}$
Source of data:	Project monitoring
Measurement procedures:	Not Applicable
Monitoring frequency:	Not Applicable as it is a calculated value
QA/QC procedures:	Calculated value to be checked
Any comment:	

Data / Parameter:	$C_{BB\_Tree,m,i}$
Description/unit:	Carbon stock of the below-ground tree biomass for stratum *i* for monitoring period *m;* t C
Source of data:	Project monitoring
Measurement procedures:	Not Applicable
Monitoring frequency:	Not Applicable as it is a calculated value
QA/QC procedures:	Calculated value to be checked
Any comment:	

Data / Parameter:	$C_{BB\_NTree\_shrub,m,i}$
Description/unit:	Carbon stock of the below-ground shrub biomass for stratum *i*for monitoring period *m;* t C
Source of data:	Project monitoring
Measurement procedures:	Not Applicable
Monitoring frequency:	Not Applicable as it is a calculated value
QA/QC procedures:	Calculated value to be checked
Any comment:	

Data / Parameter:	$\Delta C_{BB,i,t}$
Description/unit:	Average annual carbon stock change in the below-ground biomass in stratum *i*; t C. yr^{-1}
Source of data:	Project monitoring
Measurement procedures:	Not Applicable
Monitoring	Not Applicable as it is a calculated value

frequency:	
QA/QC procedures:	Calculated value to be checked
Any comment:	

Data / Parameter:	$C_{SDW,m,i}$
Description/unit:	Standing deadwood in stratum *i* at monitoring event *m*; t C
Source of data:	Sample plot measurement
Measurement procedures:	Measurement on sample plots as per the procedures followed for live trees.
Monitoring frequency:	At the end of monitoring period of each periodic verification
QA/QC procedures:	Diameter of the standing dead trees are randomly checked to ensure accuracy
Any comment:	

Data / Parameter:	$C_{LDW,m,i}$
Description/unit:	Lying dead wood in stratum *i* at monitoring event *m*; t C
Source of data:	Sample plot measurement
Measurement procedures:	Measurement on sample plots using the transect method
Monitoring frequency:	At the end of monitoring period of each periodic verification
QA/QC procedures:	Measurements of dead trees on the transects laid out on sample plots are randomly checked to ensure accuracyof measurement
Any comment:	

Data / Parameter:	$C_{DW,m,i}$
Description/unit:	Total deadwood in stratum *i* at monitoring event *m*; t C
Source of data:	Sample plot measurement
Measurement procedures:	Not Applicable
Monitoring frequency:	Not Applicable as it is a calculated value
QA/QC procedures:	Calculated value to be checked
Any comment:	

Data / Parameter:	CF_{DW}
Description/unit:	Carbon fraction in dead wood
Source of data:	IPCC (2003) GPG LULUCF; published data
Measurement procedures:	Default
Monitoring frequency:	Not monitored
QA/QC procedures:	
Any comment:	

Data / Parameter:	$C_{L,m,i}$
Description/unit:	Carbon in litter biomass for stratum *i*at monitoring period *m*; t C
Source of data:	Sample Plot measurement
Measurement procedures:	Collection and weighing of litter on sample plots and subsequent laboratory analysis
Monitoring frequency:	At the end of monitoring period of each periodic verification
QA/QC procedures:	Litter sample measurements are randomly checked to ensure accuracy
Any comment:	

Data / Parameter:	$C_{SOC\_Sample,m,i,p}$
Description/unit:	Soil organic carbon samples in plot *p*for stratum *i*at monitoring period *m*; g C
Source of data:	Sample plot measurement and laboratory analysis
Measurement procedures:	Laboratory analysis
Monitoring frequency:	At the end of monitoring period of one or more periodic verifications
QA/QC procedures:	Soil sample measurements are randomly checked to ensure accuracy
Any comment:	

Data / Parameter:	$BD_{i,p}$
Description/unit:	Bulk density(soil mass/volume of sample) of plot *p*in stratum *i* at monitoring period *m;* t m^{-3}
Source of data:	Laboratory analysis
Measurement procedures:	Laboratory analysis
Monitoring frequency:	At the end of monitoring period of one or more periodic verifications
QA/QC procedures:	Bulk density is randomly checked to ensure accuracy
Any comment:	

Data / Parameter:	$Depth_{i,p}$
Description/unit:	Soil depth at which soil sample is collected in plots of stratum *i;* cm
Source of data:	Sample plot measurements
Measurement procedures:	Not Applicable
Monitoring frequency:	At the end of monitoring period of one or more periodic verifications
QA/QC procedures:	Soil depth is randomly checked
Any comment:	

Data / Parameter:	A_i
Description/unit:	Area of stratum i/Hectares
Source of data:	Project monitoring
Measurement	GIS/GPS

procedures:	
Monitoring frequency:	At the start of the project and thereafter at monitoring interval prior to each verification
QA/QC procedures:	Area of stratum checked from the records and field information during each monitoring period
Any comment:	

Data / Parameter:	***AP***
Description/unit:	Sample plot area; m^2
Source of data:	Monitoring measurement
Measurement procedures:	GPS, tape
Monitoring frequency:	At the end of the monitoring period corresponding to periodic verifications
QA/QC procedures:	Plot location and area to be checked prior to undertaking sample plot measurements
Any comment:	

Data / Parameter:	$\Delta C_{SOC,i,t}$
Description/unit:	Annual average change in the carbon stock of soil organic carbon pool in stratum *i*at monitoring period *m*; t C yr^{-1}
Source of data:	Sample plot measurement
Measurement procedures:	Not Applicable
Monitoring frequency:	Not Applicable as it is a calculated value
QA/QC procedures:	Calculated value to be checked
Any comment:	

Data / Parameter:	$C_{SOC,m,i}$
Description/unit:	Soil Organic Carbonfor stratum *i*at monitoring period *m*; t C
Source of data:	Sample plot measurement
Measurement procedures:	Not Applicable
Monitoring frequency:	Not Applicable as it is a calculated value
QA/QC procedures:	Calculated value to be checked
Any comment:	

Data / Parameter:	$MC_{SOC,m,i}$
Description/unit:	Mean carbon stock in the soil organic carbon pool in stratum *i* at monitoring event *m* in t C ha^{-1}
Source of data:	Sample plot measurement
Measurement procedures:	Not Applicable
Monitoring	Not Applicable as it is a calculated value

frequency:	
QA/QC procedures:	Calculated value to be checked
Any comment:	

Data / Parameter:	$C_{SOC\,m,i} = [\ MC_{SOC_{m,i}} - 90\% Confidence\,Interval\ ] \bullet A_i]$
Description/unit:	Mean soil organic carbon with 90% confidence interval for stratum *i*at monitoring period *m*; t C
Source of data:	Sample plot measurement
Measurement procedures:	Not Applicable
Monitoring frequency:	Not Applicable as it is a calculated value
QA/QC procedures:	Calculated value to be checked
Any comment:	

Data / Parameter:	$\Delta C_{i,t}$
Description/unit:	Annual change in the carbon stock of pools for stratum *i*; t CO_2-eq yr^{-1}in year *t*
Source of data:	Sample plot measurement
Measurement procedures:	Not Applicable
Monitoring frequency:	Not Applicable as it is a calculated value
QA/QC procedures:	Calculated value to be checked
Any comment:	

Data / Parameter:	$A_{NT\_Biomass\_Loss\ ,i}$
Description/unit:	Area of biomass loss due to burn in stratum i
Source of data:	Project monitoring
Measurement procedures:	Measurement of area affected by fire
Monitoring frequency:	Subsequent to the occurrence of each fire event
QA/QC procedures:	Random checks are conducted to ensure accurate assessment of the area burnt
Any comment:	

Data / Parameter:	$B_{AB\_NTtree,i}$
Description/unit:	Mean biomass stock of non-tree vegetation before the start for stratum *i*;t.d.m.ha^{-1}
Source of data:	Based on the data the baseline study
Measurement procedures:	Not Applicable
Monitoring frequency:	Not Applicable
QA/QC procedures:	Not Applicable
Any comment:	

Data / Parameter:	$E_{BiomassBurn,CO2}$
Description/unit:	CO_2 emissions from biomass burn; t CO_2eq yr^{-1}
Source of data:	Project monitoring
Measurement procedures:	Not Applicable
Monitoring frequency:	Not Applicable as it is a calculated value
QA/QC procedures:	Calculated value to be checked
Any comment:	

Data / Parameter:	$E_{BiomassBurn,CH4}$
Description/unit:	CH_4 emissions from biomass burn; t CO_2eq yr^{-1}
Source of data:	Project monitoring
Measurement procedures:	Not Applicable
Monitoring frequency:	Not Applicable as it is a calculated value
QA/QC procedures:	Calculated value to be checked
Any comment:	

Data / Parameter:	$E_{BiomassLoss,i}$
Description/unit:	Total GHG emissions due to biomass loss from burn for stratum *i;* t CO_2eq yr^{-1}
Source of data:	Project monitoring
Measurement procedures:	Not Applicable
Monitoring frequency:	Not Applicable as it is a calculated value
QA/QC procedures:	Calculated value to be checked
Any comment:	

E.5. Leakage:

In line with the applicability of the methodology, no leakage is anticipated in the project from the displacement of economic activities outside the project boundary. Therefore, no monitoring of leakage is required.

E.5.1. Proposed measures to be implemented to minimize potential leakage:

Monitoring of leakage prevention measures

The project is not expected to result in leakage from the displacement of pre-project grazing and other economic activities as the project design incorporated measures to enhance the socioeconomic status of communities and ensure that the pre-project activities such as grazing are not displaced to areas outside project. The following socioeconomic measures act as leakage prevention measures.

- Implementation of pasture management improvement programs to improve pasture productivity and to avoid the damaging of newly created forest through grazing.
- Implementation of participatory land-use planning is intended to avoid land-use conflicts resulting from grazing and other forms of leakage
- Assistance to livestock holders and landowners for the improvement of the livestock/pasture management intended to prevent leakage
- Facility of hay collection for the purpose fodder from the project area.
- Provision of direct and indirect employment to local communities in the nursery activities, site preparation, planting, establishment, protection and management of forests on community lands under the project throughout the country.
- Implementation of agro-forestry practices on afforested lands within the project (grass harvesting and / or growing of agricultural crops between rows of planted trees, collecting of berries and forest fruits, medicinal plants etc.)
- Benefit-sharing arrangements in the project area to ensure commitments of local stakeholders to prevent leakage
- Imparting training in skill development programs to promote the alternative livelihood opportunities
- Incentives to households to pursue improved land use alternatives on the existing lands

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:

N.A.

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

Additional QC and QA are part of the project CDM operational plan and the BioCarbon Fund Manual for Monitoring of AR CDM projects.

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

Organization of the project monitoring

The main participants of the process of project implementation are the Agency Moldsilva, the World Bank, local communities, allocated land for reforestation etc. All these units have responsibilities and obligations defined through operating regulations, orders of the Agency Moldsilva, bilateral contracts / agreements and other related documents in force. The following responsibilities were defined:

I. The Agency Moldsilva will provide through:

a) Forest Fund, Guard and Protection Department:
- General coordination of implementation activities, project control and monitoring, including the cooperation with other ministries, departments, local public authorities, communities, NGO etc.;
- Approval of plans for carrying out of management of forest areas;
- Provision and distribution of forest products among enterprises;

- Approval of technical support and annual inventory of forest areas;
- Approval of forest management plans on tending activities in newly created forests, final harvest, and works on stands regeneration/continuity;

b) Forestry units (forest enterprises, forestry and hunting enterprises and natural reserves):

- Identification of plots available for planting, signing of agreements with possessors of lands;
- Approval of agreements at territorial cadastre agencies and/or public notary;
- Receive plots for management/provisional use;
- Accomplishment of projects for plantation of forest crops;
- Soil preparation, planting, completion of forest crops;
- Technical support and annual inventory of forest crops;
- Carrying out of tending activities, ensuring protection of forest crops;
- Accounting of expenditures for each plot;
- Coordination of plantation inventory with public local authorities and environmental authorities;
- Transfer of forest crops in canopy closure stage (category of forest), coordination of relevant acts;
- Submission of reports to the Agency Moldsilva, as well as relevant information to PIU.

c) Forest Research and Management Institute (Project Implementation Unit):

- Coordination of project technical and management activities;
- Evidence and mapping of project land parcels using GPS and GIS and establishment of polygons
- Supervision of stipulations observance of planting projects, techniques and technologies;
- Monitoring of carbon stocks, project emissions and ecological and social benefits;
- Verification and inventories of plantations;
- Comparing of data obtained from forestry enterprises and data collected independently;
- Preparation for the verification by third person;
- Elaboration and submission of annual reports to corresponding organizations;
- Technical support forest management (e.g., tending, maintenance, insurance of integrity etc.);
- Organization and development of seminars and trainings within the framework of the project;
- Coordination and collaboration with other projects.

II. The World Bank (BioCarbon Fund):

- Development of the project documentation (Baseline Study, Monitoring Plan, PDD etc.);
- Submission of the project for registration at UNFCCC Secretariat;
- Verification of the project implementation process, including by the hiring of third party;
- Payment of contracted emission reductions.

III. Other participants:

a) Communities that allocated lands for the reforestation under MSCP will carry out:
   - Examination of the issue of reforestation of degraded lands at the meetings of local Councils, and other lands with forestry vegetation used for different protective purposes;
   - Creation of commission for selection of lands, consisting of representatives from mayoralties and territorial forestry units etc;
   - Allocation of lands established for reforestation through the Decisions of local Councils, stipulating their use for the following 100 years, used for growing of forestry vegetation;
   - Documentary transmission of identified lands for reforestation;
   - Participation in inventory of forest plantations;
   - Contribution into the implementation of agreements on reforestation, concluded between forestry units and solutions for possible conflicts (e.g., illegal grazing, logging, opening of roads, mines, etc.).

b) Raional cadastre services:

- Participation in Commission on the selection of lands for reforestation;
- Preparation of documentation for the allocation of lands for areforestation;
- Approval of acts of annual inventory of forest plantations;
- Cadastre accounting of lands;

c) Territory ecological offices:

- Participation in the inventory of forest plantations;
- Monitoring of national and local programs on forest use, regeneration, and protection;
- Supervision of the observance of standards for the use of forest products;
- Protection of rare and endangered fauna and flora and species from the project sites;
- Establishment and observance of norms for collection of animals and birds;
- Analysis of the condition of new created forests.

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 environmental impacts

>>

The measures implemented as part of the project are expected to lead to several positive environmental impacts. The following measures implemented in the project are illustrative of the actions that enhance the positive environmental impacts.

- The tree species planted in the southern dry parts of the country are expected to survive and coppice better in the events of drought and natural fire occurrences. The *Quercus spp, Robinia* sp and their associate species included in the plantation design generate significant biomass and enrich the soils.

- Increased biomass and litter levels reduce the run offs and improves the water holding capacity of lands and thereby contributing to the rapid rates of nutrient cycling and organic matter accumulation.

- Natural risks such as fire and pest management are addressed through a management plan. The management planprescribes measures to avoid risk of natural fires to the afforested sites. The species mix of planting activity is expected to reduce fire and pest risk. Training and awareness generation activities proposed under the project are to limit the risks. Additionally, the risk adjustment to the calculation of GHG removals by sinks also lead to the conservative estimates of actual net GHG removals by sinks.

- The care employed in site preparation will minimize biomass and soil loss in the site preparation activities.

- The major species types are grown mixed with associated species to improve the diversity of areas planted.

Analysis of the project’s positive environmental impacts is outlined below.

- The project is expected to conserve significant quantities of humus and reduce severe forms of erosion.
- The project will regenerate soil profile and improve organic accumulation by 3-5 t/ha/year
- The project will mitigate the occurrences of landslides, thereby preventing the adverse impacts on the productivity of adjoining lands.
- Run off on lands is expected to decline and moisture holding capacity is expected to improve
- Productivity of agricultural lands adjoining the degraded lands is expected to increase over medium to long-term.
- The planting of locally adapted species enhance floral diversity. The herbaceous vegetation is also expected to increase the habitat diversity, species dispersal, and diversity.

Scoring the environmental impact

The comparative assessment of environmental impact of the baseline and project scenarios are rated on an ordinal scale of 0 to 3 to evaluate these scenarios on the environmental criteria to demonstrate the positive environmental impacts of the project.

Potential environmental impacts under the baseline scenario

The environmental impacts of the baseline scenario summarized in **Table 37**shows the negative impacts of degraded lands strongly reflected on the soil, water, biodiversity and the landscape are anticipated to result in large GHG emissions over time. In the absence of interventions, negative impacts and the unsustainable land use is expected to continue and expand further resulting in more adverse impacts on the land and water resources.

Table 37: Potential environmental impacts of the baseline scenario.

Land use category	**Soil**	**Water**	**Climate**	**CO_2**	**Flora**	**Fauna**	**Landscape**
Landslides	-3	-3	0	-2	-1	0	-3
Ravines	-3	-3	0	-2	-3	+1	-3
Other degraded lands	-3	-3	0	-1	-3	0	-2
Subtotal-degraded lands	**-9**	**-9**	**0**	**-5**	**-7**	**+1**	**-5**
Degraded arable lands	-3	-2	0	0	0	0	-1
Degraded pastures	-1	-1	0	0	0	0	0
Glades and open places	-1	-1	0	-1	-1	-1	+1
Subtotal-pastures	**-5**	**-4**	**0**	**-1**	**-1**	**-1**	**0**
Baseline impacts	**-14**	**-15**	**0**	**-6**	**-8**	**0**	**-5**

Note: Likely impacts were evaluated on a scale of +3 to -3; where +3 refers to major positive impact and –3 refer to major negative impact.
Source*: Project Implementation Unit, Moldsilva (ICAS), Chisinau.*

Potential environmental impacts under the project

The environmental impacts of the project are expected to be positive in terms of stabilizing slopes, preventing run off and improving water retention capacity. The project is expected to have positive impacts on the livelihoods of local communities by ensuring the additional supplies of forest products. The higher levels of biodiversity in the afforested areas are expected to support the recreational activities on the project sites.

Water: The project impacts are expected to be positive in terms of rise in water table, decrease in run off, and improvement in water quality.

Climate: Planting activity will improve the microclimate and reduce the wind speed as the planted sites as windbreaks. The increase in the net anthropogenic GHG removals by sinks neutralizes the GHG emissions from degraded lands.

Landscape: Planting activity will also result in the decrease of landslides and gully formation, improve the diversity of landscape, promote the connectivity of forest patches, and improve the dispersal of flora and fauna. The reforestation activities will improve the employment opportunities through nursery and plantation works and collection of non-timber forest products, thereby reducing the pressure on adjoining lands.

The **Table 38**below shows short term and long term impacts of the project scenario. All project impacts over the medium-term (5 years) and long-term (project period) are expected to be positive. The project has significant positive impacts considering the influence of A/R activities on several components of the ecosystem such as soil, water, flora, and fauna.

Table 38: Short term and long term environmental impacts of the project.

Activity	Soils		Water		Climate		Flora		Fauna		Landscape	
	ST	LT	ST	LT	*ST*	*LT*	ST	LT	ST	LT	ST	LT
1. Soil preparation	*-1*	*+2*	*-1*	*0*	*0*	*0*	*-1*	*0*	*-1*	*0*	*-1*	*0*
2. Planting	*+3*	*+3*	*0*	*+1*	*+2*	*+2*	*+3*	*+3*	*+1*	*+3*	*0*	*+3*
3. Maintenance	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
4. Replanting	*+1*	*+1*	*0*	*+1*	*+1*	*+1*	*+1*	*+1*	*0*	*+1*	*0*	*+1*
5. Disease control	*-1*	*0*	*-1*	*0*	*0*	*0*	*-1*	*0*	*-1*	*0*	*0*	*0*
6. Harvesting	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
7. Wood transport	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Project impacts	*+2*	*+6*	*-2*	*+2*	*+3*	*+3*	*+2*	*+4*	*-1*	*+4*	*-1*	*+4*

Note*: Likely impacts are evaluated on a scale from –3 to +3, where +3 refers to major positive impact and –3 refer to major negative impact. No road construction is planned. ST = short term (< 5 years), LT = long term (≥ 5 years).*
Source*: Project Implementation Unit, Moldsilva (ICAS), Chisinau.*

Biodiversity impacts of the project

The study to analyze the biodiversity impacts of the project conducted by the Project Implementation Unit found that the project has significant positive impacts on the biodiversity in terms of increasing the floral and faunal diversity and enhancing the habitat diversity. The comparison of the Flora and Fauna columns of **Table 31**and **Table 32**indicate that on the long-term environmental impacts of the baseline scenario are negative, where as the long-term environmental impacts of the project scenario are significantly positive.

The biodiversity monitoring procedures outlined in detail in Annex 5 – Monitoring Plan for flora and Avifauna would be implemented during the project implementation and the findings on the biodiversity impacts of the project would be recorded in the project database and reported.

Environmental management measures proposed for implementation under the project

Project implementation will have mostly positive impact. The negative impacts on soil, water and biodiversity during the site preparation are small and insignificant. In order to minimize these impacts a number of mitigation measures outlined in **Table 39**are implemented**.**

Table 39: Measures preventing the occurrence of adverse environmental impacts.

#	Mitigation measures	Phase	Responsibility
1.	Assessment of reforestation activities with respect to (a) site preparation; (b) planting; (c) maintenance and tree protection; (d) thinning, harvesting and other silvicultural practices	1-5 years	FE, Moldsilva
2.	Implementation of soil conservation technologies (such as contour plugging, conservation tillage) and soil preparation	1-5 years	FE
3.	Use of mechanical and vegetative structures to reduce erosion and landslides	1-15 years	Moldsilva, ME, FE, LC
4.	Mixture of locally adaptive species (trees and bushes) that increase habitat diversity	1-5 years	FE, Moldsilva
5	Create shrubs using *Rosa canina*, *Prunus spinoza* etc. for habitat of various fauna species	1-5 years	FE
6.	Carry out tending activities in the periods less disturbing for fauna (late fall and winter);	5-15 years	FE
7.	Creation of green hedge around the afforested sites to reduce access of grazing animals	1-5 years	FE
8.	Connecting afforested lands, natural habitats and protected areas	1-5 years	FE, LC
9.	Disseminating information to local authorities and communities about the project implementation	1-5 years	FE

Note: FE – Forest Enterprise; ME - Ministry of Environment; and LC - Local Councils
Source*: Project Implementation Unit, Moldsilva (ICAS), Chisinau.*

Transboundary environmental impacts of the project

The project parcels cover small patches of land, e.g., more than 80% of the project area is covered under land parcels that are less than 20 ha. Considering the small size of the project land parcels, the project is expected to have localized positive trans-boundary environmental impacts in terms of improved micro-climate, enhanced soil moisture, and improved faunal diversity on lands adjoining to the project. The project is expected to contribute forest patches enriching the overall landscape, which has been advanced as a greater determinant of biotic dispersal and habitat suitability for associated species. The negative environmental impacts of the project are expected to be either non-existent or insignificant. The biodiversity monitoring procedures outlined in the Monitoring Report will be extended to assess the trans-boundary impacts. In this context, small sample plots will be selected at random ensuring a minimum distance between points of 250 meters for floral and avian monitoring in project plots and control plots on adjoining sites to establish reference conditions and to monitor the site over time.

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:

Environmental impact assessment

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No negative impacts are anticipated from the project. Therefore, no environmental impact assessment (EIA) beyond the project study is warranted. The Republic of Moldova regulation and legal procedures do not require an EIA as part of the reforestation activities. However, the project has conducted the EIA in 2008.

Undertaking following activities completed the environmental due diligence requirements:

- The Environmental Management Plan (EMP) was published in the local press and posted on the web pages of the Forest Research and Management Institute before the signing of the Emissions Reductions Purchase Agreement (ERPA) in December 2008.

- The Environmental Impact Assessment (EIA) report was posted on the web pages of the Forest Research and Management Institute in December 2008.

- Summary of the project, its Environmental Assessment and Environmental Management Plan were disseminated to NGOs, academia and state institutions.

- Forest Research and Management Institute in association with the Regional Environmental Office/Moldova organized a special presentation on the environmental impacts of the project during February 2009.

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

As it was already mentioned above, the project implementation will have mostly positive impacts, although unessential negative impacts could be observed on the soil quality, water and biodiversity at the beginning of the project implementation, during the site preparation. In order to minimize these impacts a number of mitigation measures are proposed and presented in the table 40. Since enhancing biodiversity and prevention of the negative impact of soil preparation are very important, these issues are reflected below.

Table 40: Remedial measures to address environmental impact

#	Mitigation measures	Phase	Responsibility
1.	Strictly observe forestry normative documents throughout all afforestation activities: (a) soil preparation; (b) planting; (c) maintenance and trees protection; (d) thinning and harvesting	1-5 years	FE, Moldsilva
2.	Apply for sites preparation the soil conservation processing technologies (such as contour plugging, conservation tillage) and minimizing mechanical soil preparation	1-5 years	FE
3.	Use (where is feasible) hydro technical installations, that will reduce erosion and would prevent landslides development	1-15 years	Moldsilva, MENR, FE, LA

#	Mitigation measures	Phase	Responsibility
4.	Limited use of exotic species and of the mixture of attendant indigenous species (trees and bushes); increase habitat diversity	1-5 years	FE, Moldsilva
5	Create margins and bushes overgrowth using *Rosa canina*, *Prunus spinoza* etc. as places for reproduction, food, shelter for various fauna species	1-5 years	FE
6.	Carry out tending activities (harvesting of wooden mass from the tending cuttings) in the periods less disturbing for fauna (late fall and winter);	5-15 years	FE
7.	Create of "green hedge" around the afforested sites that would reduce the access of the animals for grazing	1-5 years	FE
8.	Connect of afforested lands to the Ecological network, to other forests, natural habitats and protected areas	1-5 years	FE, LA
9.	Systematically inform local authorities and communities about the project implementation, publishing and disseminating public awareness materials in order to get public support	1-5 years	FE

FE –Forest Enterprise
Moldsilva –Forest Agency Moldsilva;
MENR - Ministry of Ecology and Natural Resources;
LA - Local Authorities.

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

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

Analysis of socio-economic impacts

The project will have positive impact on local communities and their livelihoods and will generate additional income and employment. The plantation activities will be major sources of fuel-wood and timber supplies and that the local population is expected to benefit from the increased availability of fuelwood. Average of 1.3 m^3/ha/yr of fuelwood and timber is expected to be harvested sustainable from the project areas or about 176 thousand m^3 during the whole crediting period. The income from selling medicinal plants and forest fruits is expected to be in on average of 1.3 US$/ha/yr or about 268 thousand US dollars during the crediting period. The socio-economic benefits of short rotation species will higher than those of the long-rotation species.

The following socioeconomic indicators will be used to assess the socioeconomic impacts of the project.

- The number of seasonal and temporary jobs in seed collection, protection, and plantation created per year as a result of project activity.
- Number of permanent jobs created over the project period.
- Number of community forestry contracts signed between the project entity and local councils.
- Fuel wood supplied by the project entity to the local communities from afforested sites.
- Area of adjacent lands affected by the land slides and the population affected in the land slides.
- Number of communal groups of forest users or forest management committees trained in the soil conservation and forest management activities.

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:

Socio-economic impact assessment

The project is expected to reduce landslides, improve the productivity of degraded lands and will ensure the additional supply of fuelwood, timber, and non-timber products and employment opportunities to local communities. The timber supplies from the project will contribute to stable timber and fuelwood prices. The non-timber benefits such as medicinal plants, bee-keeping, fruits and berries (e.g. walnut), mushrooms, and vines for basket making are expected to improve near term revenue of the local councils. In the long run, additional benefits could result from tourism and recreation.

The project is expected to improve the management of communal lands and promote sustainable rural livelihoods. Local Councils would be able to supply forest products from the project areas to poor and vulnerable groups (e.g. pensioners and female-headed households) at low cost.

The project will have positive impacts on the neighboring agricultural lands in terms of yield improvement and water holding capacity. In addition, site preparation, planting, weeding, tending, protection, thinning, and harvesting activities are the major sources of employment to local people.

The project design incorporated measures to enhance the socioeconomic status of communities and to ensure that their livelihoods are not affected and the pre-project economic activities are not displaced to areas outside project. The socioeconomic measures and programs implemented based on the feedback from public consultations at the level of local council, mayoralty, forest enterprise and national government contribute to the prevention of economic activity displacement. Therefore, no leakage from activity displacement is expected from the project. The socioeconomic measures outlined below are expected to enhance the positive socioeconomic impacts and as well as prevent the displacement of economic activities to outside the project.

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

Compensation of stakeholders and economic incentives

- Households affected by the project activities, e.g. those whose traditional grazing rights are restricted are expected to receive assistance from the project entity under a Japanese Grant "Community Support Program for sustainable and integrated forest management and carbon sequestration through reforestation" of US$ 975.900 so that the rotational grazing is adjusted such that it is not shifted to areas that were not used for the purpose. The assistance is expected to contribute to livestock and pasture improvement programs and compensate households to pursue alternative activities and strengthen training programs for skill development in order to promote the alternative livelihood opportunities.

- Incentives to local communities to promote the management of afforested areas and other degraded public lands so that a good balance between economic and environmental benefits will enhance the protection of afforested areas.

Legal and institutional issues:

- The benefit-sharing arrangements of the afforested areas organized in a way that ensure the legally binding commitments of the stakeholders;
- Amendments to the provisions of Forest Code increase the community and private sector participation in the forest management process;
- Strengthened institutional capacity of local councils and Moldsilva promotes the role of stake holders in the management of afforested areas;

Capacity and technical assistance:

- Harmonizing the planting activities with agricultural operations is intended to generate temporary employment opportunities to rural communities;
- Assistance to livestock holders and improvements to the livestock/pasture management are intended to prevent leakage;
- Development of integrated and participatory land-use planning is intended to avoid land-use conflicts;
- Training local communities in forest management and soil conservation activities is intended to promote the long-term commitments of local communities to soil and water conservations measure

SECTION H. Stakeholders' comments

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

Solicitation of comments from local stakeholders

The Republic of Moldova's Forest Code, Nr. 887-XIII, 21/06/1996, Art. 23 notes that the citizens and public associations have the right to obtain information from the forestry and environmental authorities on the condition of forestry and hunting funds, and measures implemented with the funds in accordance with the legislation.

Law on the environmental protection Nr. 1515-XII, 16/06/1993, Article 30 recognizes the right of all persons to have a) full information on environmental conditions and population health; b) the right to participate in disputes on draft laws, economic programs or other related activities.

In compliance with the above national laws and regulation and CDM rules, stakeholder consultations were undertaken in the design of the project and continued during project preparation and implementation. The main stakeholders are local communities.

Success in implementation of Moldova Soil Conservation Project (MSCP) has shown to people in rural areas how degraded lands can be restored through reforestation, and which are economic, social and

environmental benefits, and in fact the feedback on the MSCP received by communities was to involve direct community participation in a new project, as has been done for the MCFDP.

At the same time the analytic and scientific report on the study carried out by Independent Social and Information Service OPINIA in 2005 was used. The main purpose of the study was to identify the opinion, attitude of local population (within the project area) vis-à-vis of implementation of reforestation project, establishment of social benefits and risks of the project etc. During the study the face-to-face method was used, using special developed questionnaire (69 questions).

When the idea to develop a new project - Moldova Community Forestry Development Project has emerged, representatives of forest enterprises have informed municipalities about this during working sessions. Local forest enterprise staff work closely with communities and are in continuous direct communication with the groups they serve. The stakeholder consultations were in the form of formal and informal meetings and workshops.At these meetings were discussed: the project purpose, the benefits for local people and the responsibilities of town halls (primarias) during the process of project implementation. Consultations were helpful in obtaining stakeholder comments. Local communities expressed specific preferences related to the species proposed for planting (priority given for naturalized species and fast growing species such as Robinia etc.). The minutes of the meetings were documented in and are kept in PIU office. The following consultations highlight the issues discussed.

1) Carbon Finance Document (CFD) has been presented at the technical meeting with Chief forest engineers and engineers for forest fund from 21 forest enterprises, December 19, 2007, Vadul-lui-Voda.
2) Information of the project implementation has been disseminated to all district (raion) executive committees from the country, Executive Committee of TAU Gagauzia (letter nr. 01-07/067 from 01/08/2008).
3) The information with regard to the project was disseminated at the meetings with the public local authorities, local councils and local communities during January - September 2008.
4) Reports on EIA and EMP were posted on the website of the Forestry Research and Management Institute (www.icas.com.md) on 15/12/2008.
5) During December 2007 – September 2008, Forestry Agency Moldsilva has organized 4 technical meetings with the participants from the state forest units (Chief Forest Engineers, Engineers for Forest Regeneration and Forest Fund, etc) and 16 working meetings with the representatives of the local public authorities were organized.
6) On 12/12/2009 the workshop organized by the Forestry Research and Management Institute jointly with the Regional Environmental Centre from Moldova (REC Moldova) took place. Representatives from NGOs, academic institutions, education institutions and mass-media participate din the workshop on Environmental Management Plan developed under Moldova Community Forestry Development Project.

H.2. Summary of the comments received:

The project activity has received very positive feedback from the local stakeholders. The received comments are in favor of the project activity. The following comments were received as part of consultation process.

- The project should consult with local communities in the selection of species for planting.
- Guidelines need to be implemented in the harvest and of non-timber forest products such as fruits, berries, hazelnuts, walnuts, medicinal plants, haymaking, and bee keeping.

- Permission for collection of fodder in the project area needs to be provided to mitigate the risk of illegal grazing.
- There is a need for cooperation between Forestry Agency "Moldsilva" and non-governmental organizations in managing communal forests;
- There is a need to ensure the sustainability of newly created forests through cooperation with local population;
- Local population should be provided opportunities to take part in forest management planning and maintenance of community forests and forest vegetation;
- There is a need to disseminate periodic information on the project implementation, as well as on the implementation of other programs promoting forest management.

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

Moldsilva provided detailed replies to stakeholder comments and implemented the following measures to address public comments received from the consultation process.

1. Fodder collection and hay making between trees rows in the afforested areas is permissible as per legislation in force (the Forest Code, Regulations on haymaking and grazing of animals on areas under the forest fund).
2. The preferences of local people will be given priority in the planting activities. For example, community preferences for species such as *Rosa canina*, *Crataegus monogyna*, *Malus sylvestris*, *Prunus avium*, *Sambucus nigra, Cornus mas* are taken into account.
3. As per Article 32 of the Forest Code, people have free access to the areas of forest fund for recreational purposes and harvest of non-timber products such as fruits, berries, walnuts, mushrooms etc. (with the exception of sectors);
4. The local communities can get direct and indirect employment in planting activities in nursery development, site preparation, planting, establishment, protection and management of forests on project lands.
5. Reforestation of degraded lands will improve the landscapes and improve recreation value of forest created under the project.

Annex 1

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

Annex 3

BASELINE INFORMATION

Annex 4

MONITORING PLAN

Project participants may add further annexes as appropriate

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History of the document

Version	Date	Nature of revision
05	EB 55, Annex 22 30 July 2010	Restructuring to reflect changes applied in the design of approved A/R CDM baseline and monitoring methodologies.Due to the overall modification of the document, no highlights of the changes are provided.
04	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 facilitating the transparent selection of an approved methodology for the proposed A/R CDM project activity.
02	EB23, Annex 15a 24 February 2006	Inclusion of a section on the assessment of the eligibility of land and the Sampling design and stratification during monitoring.
01	EB15, Annex 6 03 September 2004	Initial adoption.
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