CLIMATE, COMMUNITY AND BIODIVERSITY STANDARDS PROJECT DESIGN DOCUMENT FORM FOR AFFORESTATION AND REFORESTATION PROJECT ACTIVITIES (CCB-AR-PDD)
(Second edition)

Niassa Forest Project

CONTENTS

I. Basic Data:

Green Resources AS (GRAS) is a leading plantation, carbon offset and renewable energy company in Eastern Africa. GRAS is conducting afforestation/ reforestation (A/R) activities in Uganda, Tanzania and Mozambique, with the purpose of deriving revenue streams from the sale of carbon offsets and timber, whilst simultaneously promoting sustainable development through its projects' community and environmental benefits. The Niassa Forest Project (NFP) is being developed under the UNFCCC's Clean Development Mechanism (CDM), applying A/R methodology, AR-ACM0003 Version 01.0.0 "Afforestation and reforestation of lands except wetlands".

Version 01: 28th March 2013

II. General Section:

G1 Original Conditions in the Project Area

G.1.1 Describe the location of the project and basic physical parameters

The project is located in the Lichinga and Sanga districts of the Niassa province of Mozambique: the Malulu parcel in Sanga, and the Malica and Ntiuile parcels in Lichinga. Within the Sanga district, the Malulu parcel is located in the Unango parish; Malica and Ntiuile are located in Chimbonila parish. Parishes are the smallest territorial administrative divisions in Mozambique.

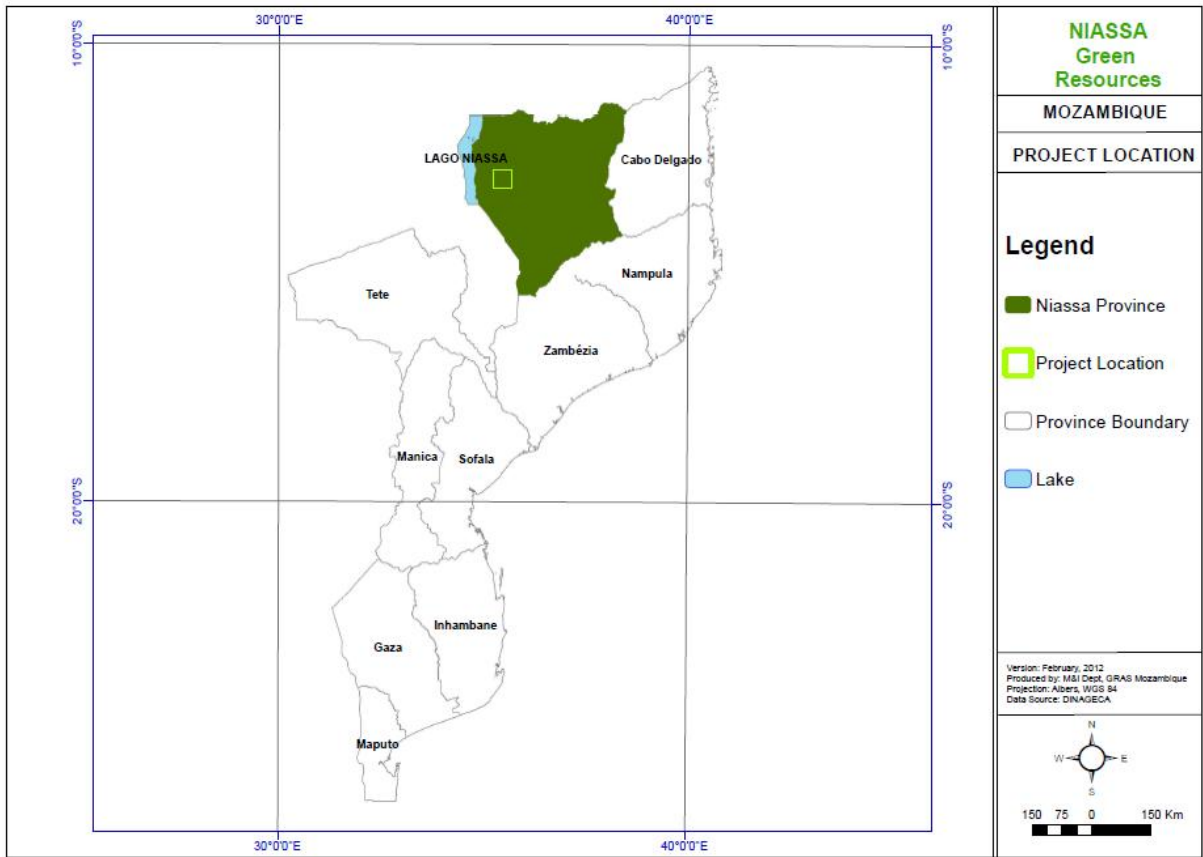Figure G.1.1.1   Project location within Mozambique

Figure G.1.1 .2   Project location within Niassa Province
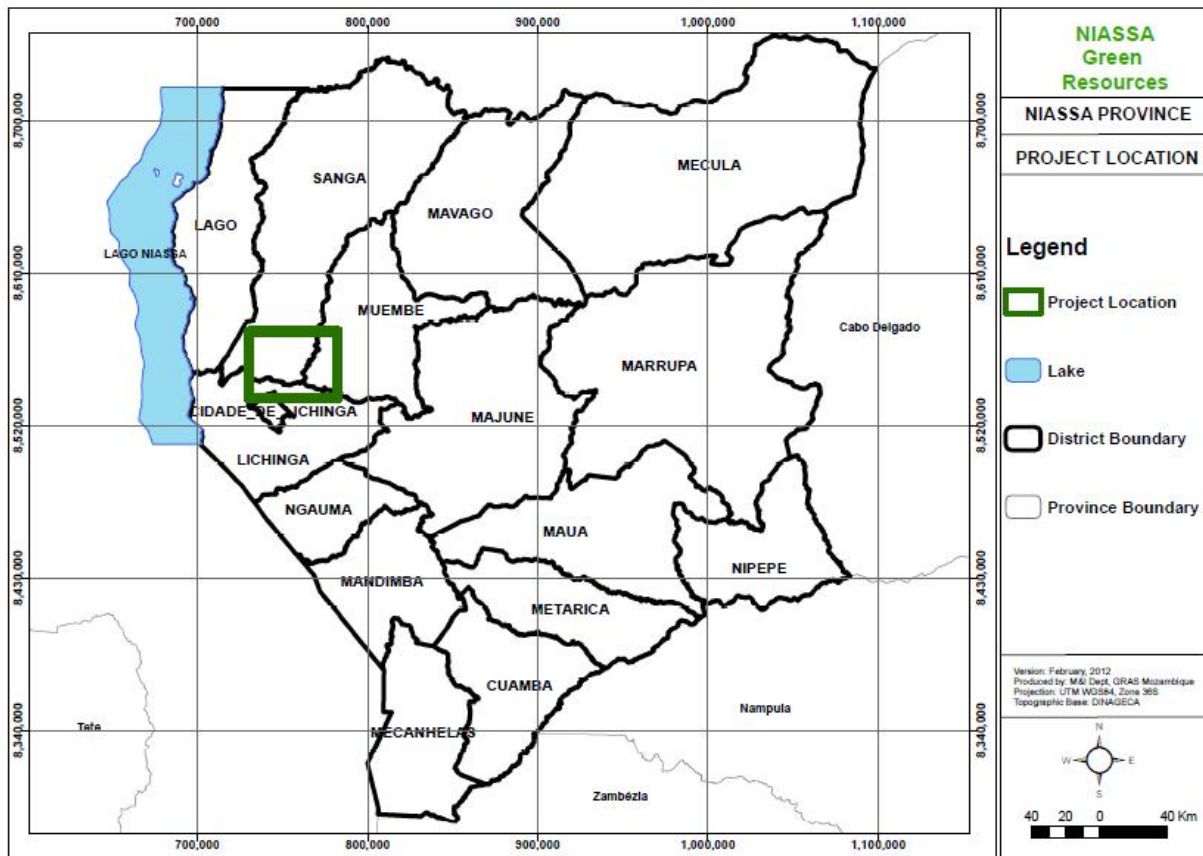
The nearest city to the project is Lichinga, which is the provincial capital of Niassa Province. Lichinga is located approximately 20km from the closest Lichinga project parcel, Malica.

NGR's headquarter is located in Lichinga: Av. Do Trabalho, 36, Lichinga town, Niassa Province.

The following are the villages surrounding the project:

Malulu: Malulu village
Malica: Nconda village and Malica village
Ntiuile: Ntiuile village and Luissa village

Malulu

There are two villages surrounding the Malulu parcel of land: the Malulu and Miala villages. The Malulu village comprises of four communities; Cavargo I and II, Ilinga and Antigos Combatentes. Miala village contains only one community, the Miala community. Therefore there are a total of five communities surrounding the Malulu parcel.

Malica

The Malica parcel is surrounded by two villages comprises 3 communities (Malica, Nconda and Naossa) and Ngongote village 3 communities (Ngongote, Selenge and Chiimbasongo).

Ntiuile

The Ntiuile parcel is surrounded by two villages: Ntiuile and Luissa villages, which comprise 1 neighborhood of the same name each.

These communities have given land to NGR and thus are the main communities impacted by NRP.

The following maps show the land-class cover of project areas and location of surrounding villages.

Figure G.1.1.3   Project location and communities
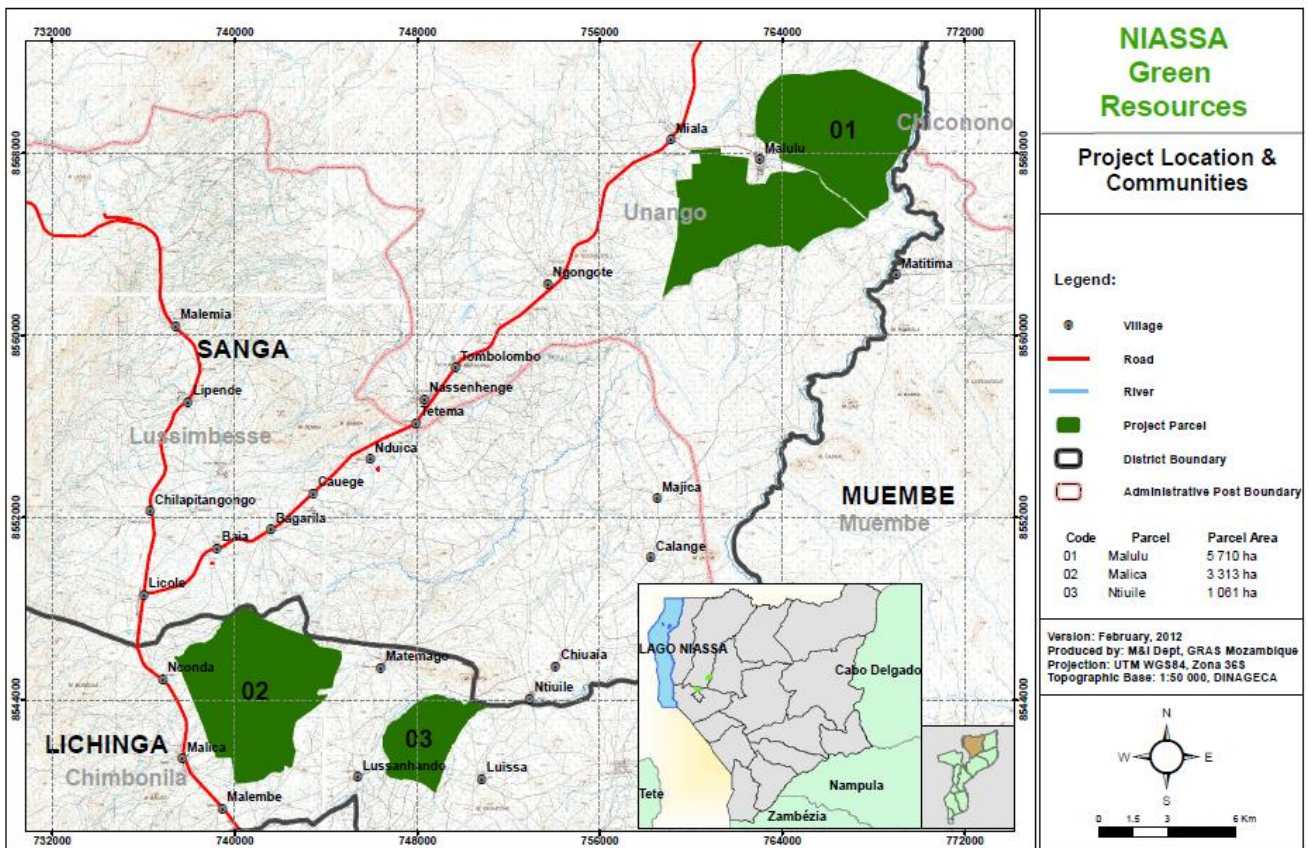
Climate:

The project area has a temperate monsoon climate that is strongly influenced by altitude. Mean annual temperature is 19.1ºC varying between 24.3ºC maximum and 13.9ºC minimum. Temperature ranges by season with a mean temperature in July of 15°C whilst

a mean of 22°C in October (figure A.5.1.1 below). The minimum monthly average observed was in July 1978 (8.3ºC) and the monthly maximum in November 1996 (29.7ºC).

G.1.1.4 Mean annual rainfall and temperature in Lichinga[1]

Source: National Meteorology Institute

Within the project areas, it is possible to observe two distinct seasons - the hot and humid season, from December to March, and the cool and dry season, from April to November. The mean annual rainfall is 1,100 mm in Liching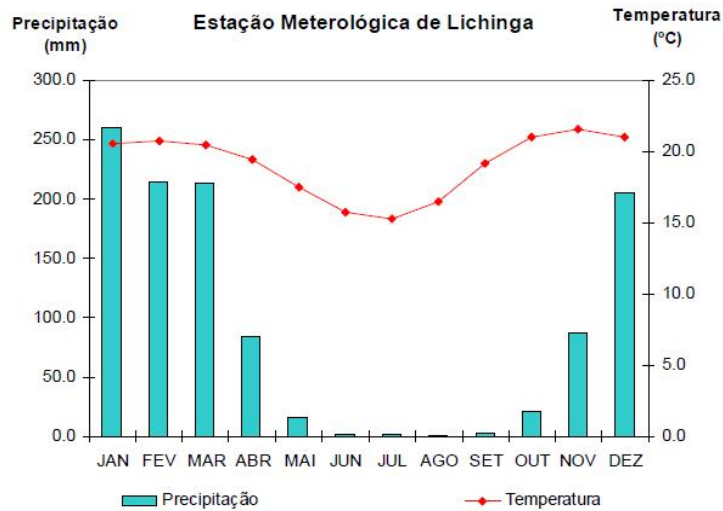a. The majority (80%) of rain falls in the summer months between December and April with monthly averages of 209, 260, 214 and 212 mm respectively. The May to October months are the driest, with monthly averages of less than 22 mm, representing only 4.3% of annual rainfall. There are, however, great variations between years, reaching a maximum of 1,711 mm in 1989 and minimums of 698 and 700 mm in 1994 and 1995.

Hydrology:

NGR project areas are part of the hydrographic basin of Rovuma river. Within Rovuma river basin, specifically, the project area falls in the Lucheringo and Lugenda river subbasins. Important rivers and watercourses in this region are: Luchimua, Luelele, Lupolo, Luatize and Lucuise rivers. Lucheringo River, a river with gentle waterslope, has an average flow of 0.7 m3/s, varying between 0.05 m3/s and 17.9 m3/s, depending on the dry and rainy seasons respectively (data between 1970 and 1981) (IMPACTO, 2007 citing Austral Consultoria e Projectos, 1994).

Turbidity levels in this river are between 7.4 and 10.0 NTU, pH between 7.2 and 7.7, concentrations of nitrates (NO3) lower than 0.45 mg/litre, nitrites (NO2) between 0.03 and 0.05 mg/litre, chlorine (Cl) between 0.7 and 1.8 mg/litre, carbonates (CO3) at 0.0 mg/litre, sulphates (SO4) between 2.6 and 3.0 mg/litre and phosphates (PO4) at 0.34 mg/litre.

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[1] EIA, 2007

In terms of geo-hydrology, the project area is in a zone of very weak permeability (cartographic unit C2). Limited ground water occurs in these areas with average flows generally less than 3 m3/h (Impacto, 2007 citing Geo-hidrologia de Moçambique, 1987). Also in the project area there are zones identified as group C3, where the permeability of the rock is weak or zero. These areas are mountainous, without a significant alteration mantle, and almost totally lacking in ground water with average flows generally less than 1 m3/h. Their appearance is related with springs (Source: Geo-hidrologia de Moçambique, 1987).

Soils:

Niassa Province is part of the Niassa Great plateau. The Province borders on the west with the Rift Valley (Lake Niassa) which penetrates the plateau in the north-south direction. The project area is in the Pre-Cambrian basalt complex (more than 600 million years old) which occupies the greater part of northern Mozambique. The most common rocks in the basal complex are metamorphic rocks, such as: gnaisses, granites, migmatites, anphibolites, micaschists and other ancient rocks.

The soils of the region are well structured consisting of a mixture of soil and alluvial clay deposits. They are normally average soils, red, and fertile (see figure 6 below). The soils are well drained but the infiltration is low due to high clay content. Some stone lines occur especially in the more broken areas and near outcrops of rock surface.

They are easily worked at field capacity but set hard when dry. Where stone-line soil area occurs should be planted with pine.

G.1.2 Types and condition of vegetation within the project area:

During the Ecological survey in Malulu area (2008), three major ecosystems were identified; grassland, shrub savannah and woodland. These ecosystems can easily be identified in the field as wells as on satellite images. However, sub-ecosystem categories must be identified on the ground due to their relatively small size and undifferentiated spectrum. These sub-ecosystems include short grass and tall grass as sub-categories of grassland, and miombo woodland and riverine forest as sub-categories of woodland.

The major ecosystems were identified as natural vegetation characteristic of the Lichinga plateau. Single storey miombo woodlands are dominated by *Brachystegia* and *Julbernardia* interspersed by shrub savannas of *Protea* and *Cussonia*, and grasslands of *Hyparrhenia* and *Cymbopogon*. Based on the observations in the ecological study, it is evident that these ecosystems are in a steady state. However, tall grasslands which are typically abandoned agricultural land were considered the most unstable ecosystems representing an earlier succession stage of woodland. Small scale subsistence agriculture and uncontrolled fire plays an important role in impeding the progress of this succession to later stages[2].

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[2] Ecological identification and characterization of the ecosystems of the Sanga area held by Malonda Tree Farms, by Almeida A. Sitoe, (2008) *Departamento de Engenharia Florestal, Universidade Eduardo Mondlane*

175 plant species were identified as grasses (37), forbs (52), shrubs (27), trees (48), lianas (2), epiphytes (1), palms (1) and bamboos (1). Most of these species have local uses, including wild fruits (e.g. *Uapaca*), medicines (e.g. *Securidaca longipedunculata*), timber (e.g. *Pterocarpus angolensis*) and thatch grass (e.g. *Hyparrhenia* sp) among others[3].

Very few exotic species were found, but domesticated plants such as mangos were found scattered in the abandoned machambas. No alien invasive species were observed during the ecological study (2008), but local grasses use the regular occurrence of clearance for agriculture and severe fire disturbance to occupy and dominate extensive areas.

G.1.3 Boundaries of the project area and the project zone:

The project boundary, geographical location and polygons of the discrete land blocks of the proposed CDM A/R project activity are shown in Figures G.1.3.1 - 3. The specific geographical coordinates/positions (longitude, latitude) of the polygons were determined using GIS and are shown in figure G.1.3.4 below.

The total project area is 5,252 ha.

Figure G.1.3.1   Project boundary (CDM eligible area) of Malulu parcel

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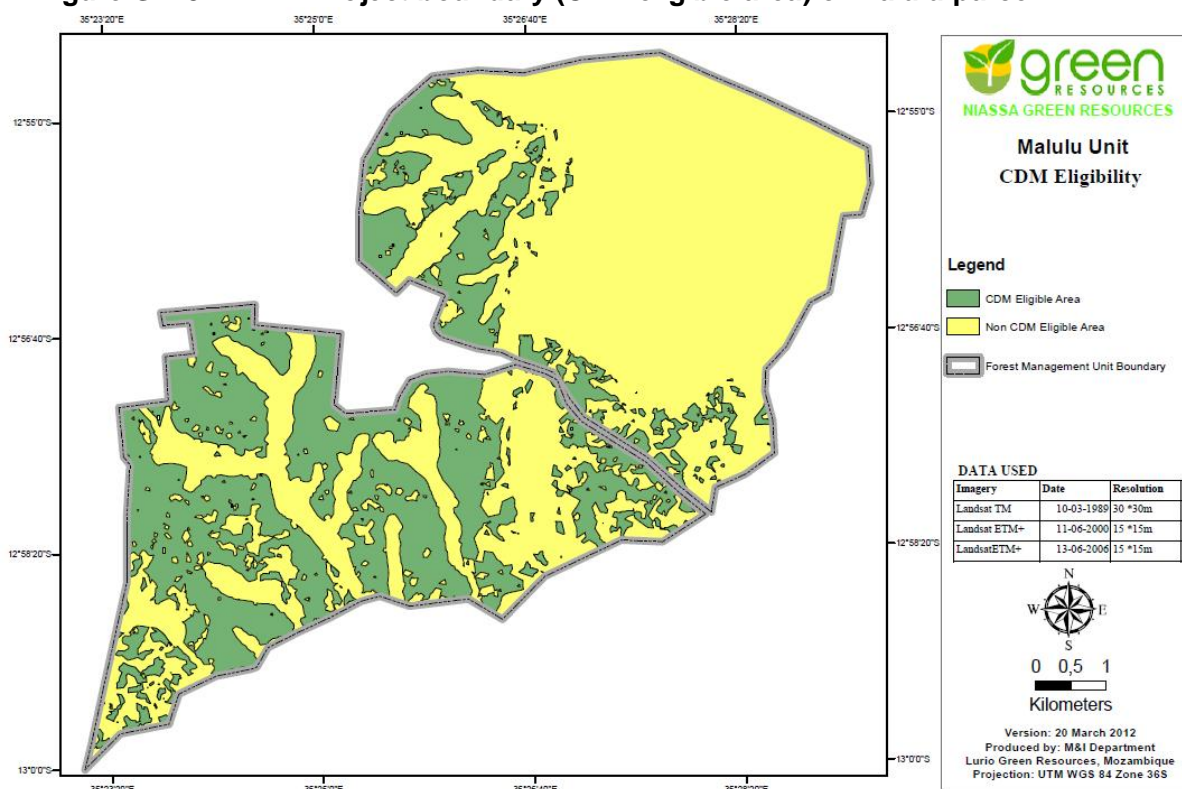
[3] Ecological identification and characterization of the ecosystems of the Sanga area held by Malonda Tree Farms, by Almeida A. Sitoe, (2008) *Departamento de Engenharia Florestal, Universidade Eduardo Mondlane*

Figure G.1.3.2   Project boundary (CDM eligible area) of Malica parcel
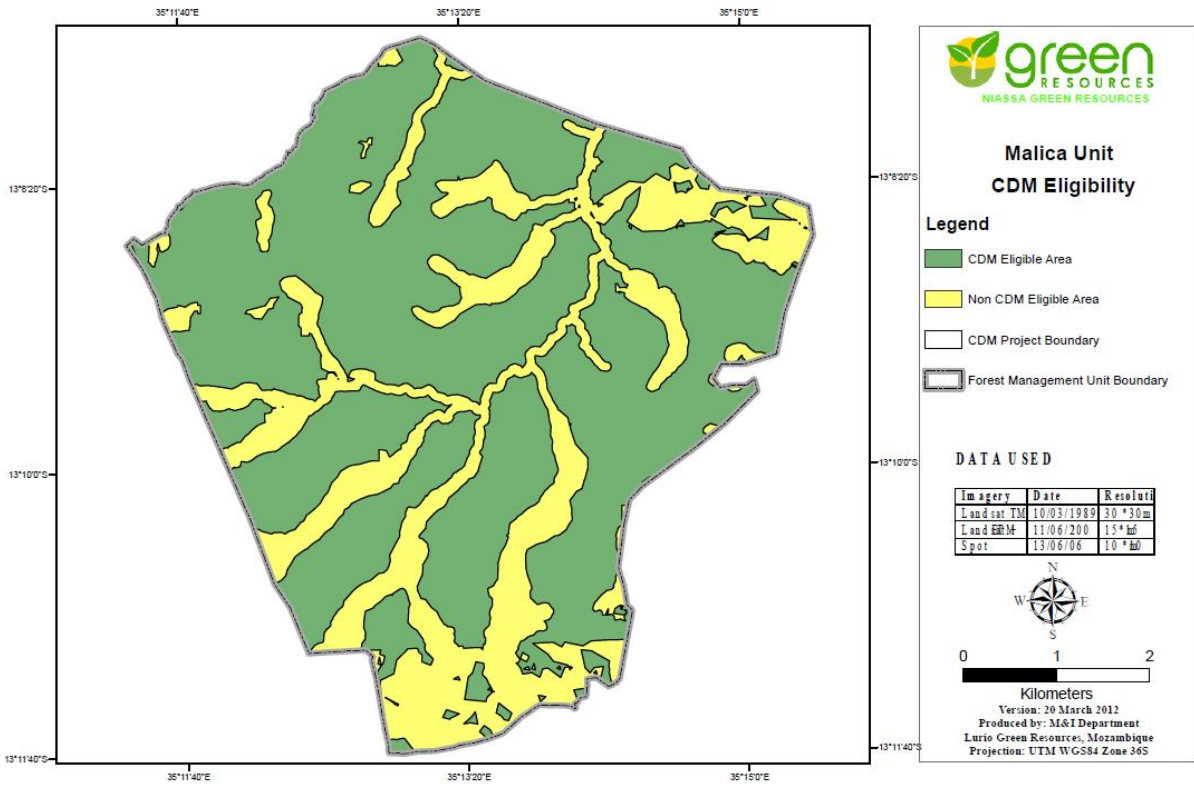
Figure G.1.3.3   Project boundary (CDM eligible area) of Ntiuile parcel
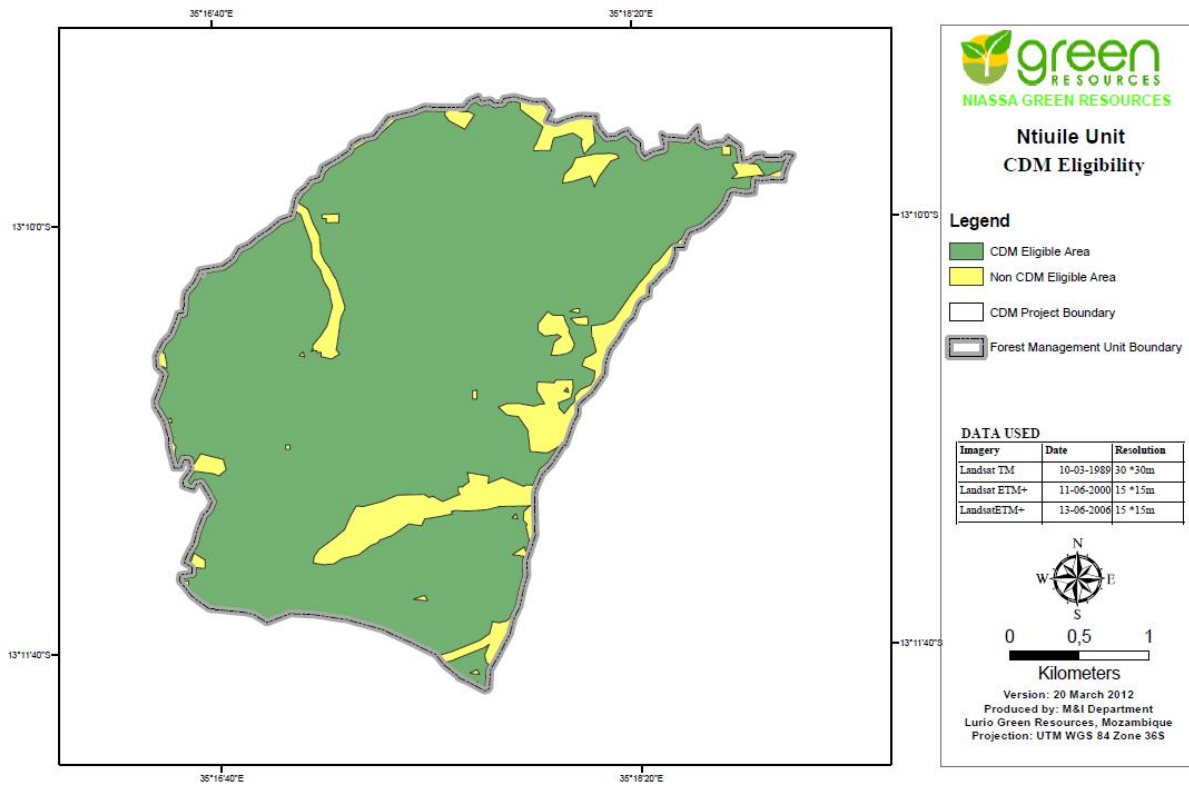
Figure G.1.3.4   Unique identification of the polygons of the NRP

Malulu
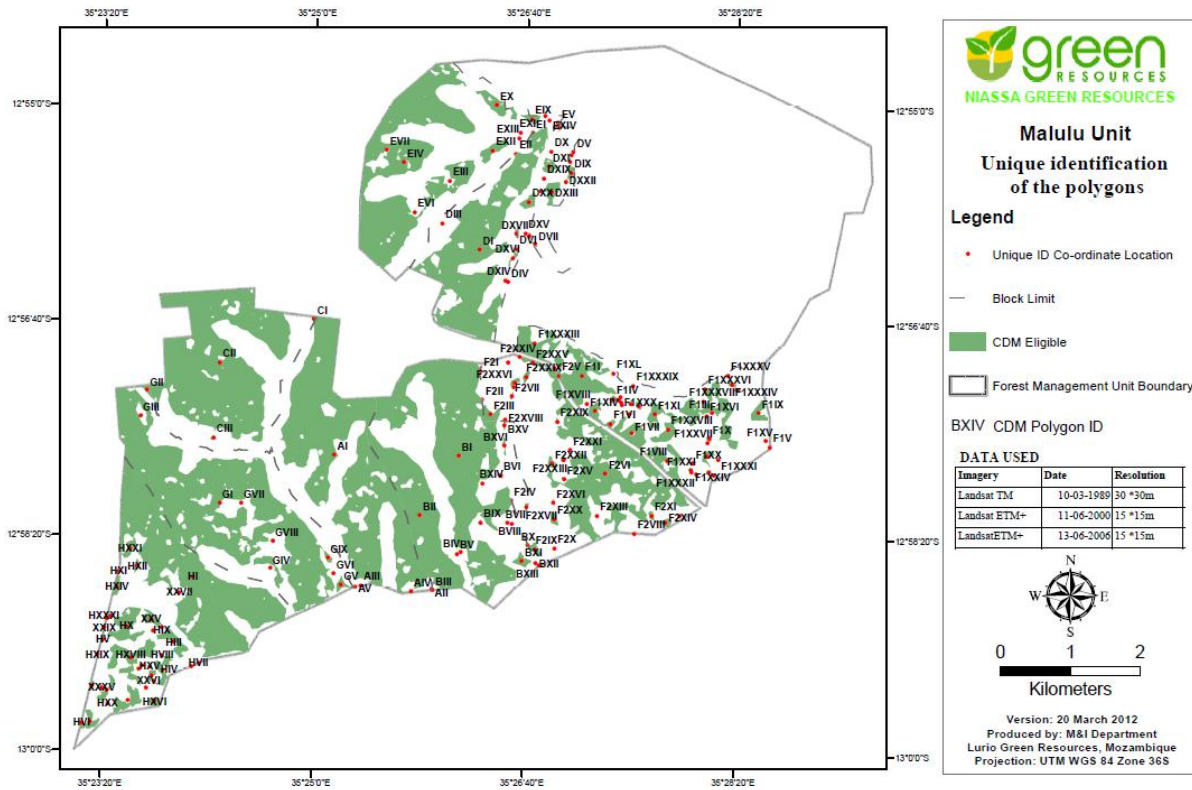
Block ID	Area, ha	Eastings	Northings
AI	270.829	762461.995	8565861.541
AII	0.077	763852.703	8563942.929
AIII	0.001	762836.600	8563992.713
AIV	0.205	763556.768	8563908.220
AV	0.006	762758.504	8563978.238
BI	225.961	764241.015	8565847.102
BII	91.715	763682.873	8564994.716
BIII	0.024	763864.717	8563929.899
BIV	0.123	764270.269	8564473.341
BV	0.029	764213.637	8564448.005
BVI	0.311	764836.628	8565565.574
BVII	0.009	765000.735	8564875.483
BVIII	0.058	764936.342	8564894.215
BIX	0.214	764551.427	8564893.240
BX	0.019	765223.758	8564563.922
BXI	2.498	765139.872	8564344.750
BXII	0.007	765335.996	8564317.610

BXIII	0.000	765383.338	8564284.427
BXIV	0.026	764579.103	8565451.766
BXV	0.352	764892.219	8566280.031
BXVI	0.571	764890.533	8565990.696
CI	0.310	762172.511	8567799.080
CII	234.722	760827.829	8567176.779
CIII	0.292	760735.092	8566104.314
DI	155.776	764537.860	8568788.238
DII	0.248	765673.784	8570536.647
DIII	0.007	764004.291	8569165.673
DIV	0.028	764945.556	8568322.575
DV	0.116	765880.046	8570179.368
DVI	0.069	765065.706	8568799.157
DVII	0.253	765330.448	8568863.701
DVIII	0.198	765251.076	8568985.586
DIX	1.537	765847.138	8569886.108
DX	0.027	765565.833	8570191.931
DXI	2.793	765534.377	8569976.451
DXII	0.054	765414.241	8569625.070
DXIII	4.311	765572.194	8569611.666
DXIV	0.014	764907.897	8568347.712
DXV	0.000	765193.432	8569020.258
DXVI	0.706	765017.603	8568667.319
DXVII	0.336	765062.726	8569013.198
DXVIII	0.186	765830.668	8570039.112
DXIX	0.122	765459.701	8569805.660
DXX	2.906	765243.420	8569468.095
DXXI	0.120	765849.681	8570132.214
DXXII	0.122	765771.607	8569760.446
EI	0.000	765299.638	8570446.912
EII	0.063	765059.433	8570156.864
EIII	18.514	764110.455	8569770.000
EIV	161.724	763458.746	8570037.487
EV	0.080	765662.396	8570595.839
EVI	0.062	763611.178	8569324.177
EVII	0.015	763212.326	8570212.487
EVIII	0.040	765475.984	8570687.729
EIX	2.210	765288.244	8570653.888
EX	7.330	764783.731	8570854.526
EXI	0.039	765127.497	8570456.315
EXII	5.264	764727.529	8570203.341
EXIII	0.014	765106.857	8570381.374
EXIV	0.001	765536.846	8570633.324

F1I	30.149	766001.559	8566985.679
F1II	0.021	765604.997	8567099.871
F1III	20.415	767855.569	8566454.892
F1IV	0.805	766449.475	8566647.715
F1V	0.001	768682.680	8565965.418
F1VI	1.006	766405.838	8566298.561
F1VII	9.326	766710.824	8566164.508
F1VIII	10.656	767215.992	8565769.982
F1IX	3.477	768526.123	8566453.872
F1X	0.488	767817.623	8566085.515
F1XI	4.861	767041.095	8566431.353
F1XII	0.060	766678.570	8566441.952
F1XIII	0.672	766806.248	8566559.669
F1XIV	0.015	766569.576	8566571.912
F1XV	0.108	768626.048	8566056.192
F1XVI	0.062	767784.196	8566412.071
F1XVII	0.011	767731.413	8566619.054
F1XVIII	0.062	766072.959	8566592.202
F1XIX	1.586	767789.690	8565831.267
F1XX	0.330	767581.654	8565734.162
F1XXI	0.080	767548.473	8565641.519
F1XXII	0.274	767810.077	8565603.010
F1XXIII	0.088	767886.165	8565557.917
F1XXIV	0.015	767566.144	8565604.110
F1XXV	2.986	766187.074	8566486.411
F1XXVI	0.083	766529.163	8566633.535
F1XXVII	0.006	767794.995	8566034.067
F1XXVIII	6.989	767231.134	8566217.050
F1XXIX	0.287	766694.486	8566581.542
F1XXX	0.005	766558.165	8566604.777
F1XXXI	0.131	767944.987	8565778.818
F1XXXII	0.276	767632.565	8565573.577
F1XXXIII	15.353	765325.820	8567450.653
F1XXXIV	0.606	768142.577	8566860.384
F1XXXV	0.129	768082.948	8566991.115
F1XXXVI	0.068	767755.004	8566794.670
F1XXXVII	0.489	768224.154	8566781.134
F1XXXVIII	0.061	766551.221	8566683.909
F1XXXIX	0.001	766731.942	8566846.250
F1XL	0.041	766447.984	8567021.469
F2I	0.116	764550.359	8567051.445
F2II	0.014	764575.642	8566643.904
F2III	3.482	764696.127	8566431.137

F2IV	0.000	764986.588	8565210.187
F2V	0.509	765672.242	8566991.040
F2VI	125.924	766333.652	8565589.550
F2VII	0.256	764997.342	8566693.150
F2VIII	0.093	766748.002	8564734.649
F2IX	1.728	765324.217	8564511.060
F2X	0.010	765605.332	8564527.176
F2XI	0.699	766992.666	8564990.909
F2XII	0.120	767392.670	8564981.873
F2XIII	0.001	766213.906	8564993.339
F2XIV	1.347	767190.791	8564889.553
F2XV	0.258	765743.060	8565511.288
F2XVI	0.186	765590.495	8565175.596
F2XVII	0.400	765205.814	8565112.655
F2XVIII	0.076	764906.281	8566361.096
F2XIX	0.249	765649.110	8566335.123
F2XX	1.456	765600.315	8564943.427
F2XXI	0.079	765829.303	8565926.787
F2XXII	1.425	765569.014	8565736.373
F2XXIII	0.326	765735.795	8565792.168
F2XXIV	0.019	765113.932	8567251.750
F2XXV	1.481	765297.072	8567168.226
F2XXVI	0.946	765040.674	8566896.785
F2XXVII	0.006	765026.981	8566821.851
F2XXVIII	0.212	764943.506	8567173.435
F2XXIX	0.969	765202.319	8566976.933
GI	280.199	760827.300	8565183.867
GII	1.020	759793.498	8566787.206
GIII	0.031	759700.430	8566424.936
GIV	4.850	761547.906	8564244.464
GV	1.657	762561.336	8564004.030
GVI	0.021	762454.768	8564174.793
GVII	0.030	761134.107	8565171.393
GVIII	0.203	761584.985	8564638.139
GIX	0.985	762372.535	8564395.334
HI	478.000	760440.948	8564117.439
HII	3.230	758968.011	8562063.397
HIII	5.830	760168.492	8563191.138
HIV	4.130	760014.523	8562795.838
HV	0.001	760518.896	8562888.533
HVI	0.006	759999.895	8563007.919
HVII	0.015	760002.176	8563395.647
HVIII	0.311	759154.787	8563227.723

HIX	0.011	758851.569	8562045.149
HX	12.300	759493.775	8563422.560
HXI	0.027	759379.812	8564199.611
HXII	0.778	759641.655	8564273.175
HXIII	0.032	760416.172	8562844.537
HXIV	1.960	759360.633	8563979.666
HXV	0.020	759212.342	8563523.301
HXVI	14.400	759555.391	8562964.911
HXVII	0.000	759082.712	8563012.361
HXVIII	0.015	759824.887	8562846.690
HXIX	1.490	759893.476	8562338.219
HXX	0.005	759222.770	8562321.401
HXXI	2.480	759541.025	8564530.342
HXXII	0.003	759663.631	8562801.894
HXXIII	0.513	758997.868	8562572.633
HXXIV	0.142	759872.688	8563355.308
HXXV	0.009	760246.784	8563902.836
HXXVI	0.158	759722.255	8562857.579
HXXVII	0.002	759178.350	8563397.401
HXXVIII	3.450	759849.593	8563520.522
HXXIX	0.006	759888.604	8562641.624
HXXX	1.070	759850.644	8562723.187
HXXXI	0.517	759269.790	8563565.776
HXXXII	6.420	759513.230	8562354.796
HXXXIII	2.540	759209.732	8562504.997
HXXXIV	0.105	759770.227	8562539.535
HXXXV	0.174	759135.652	8562543.775

Malica
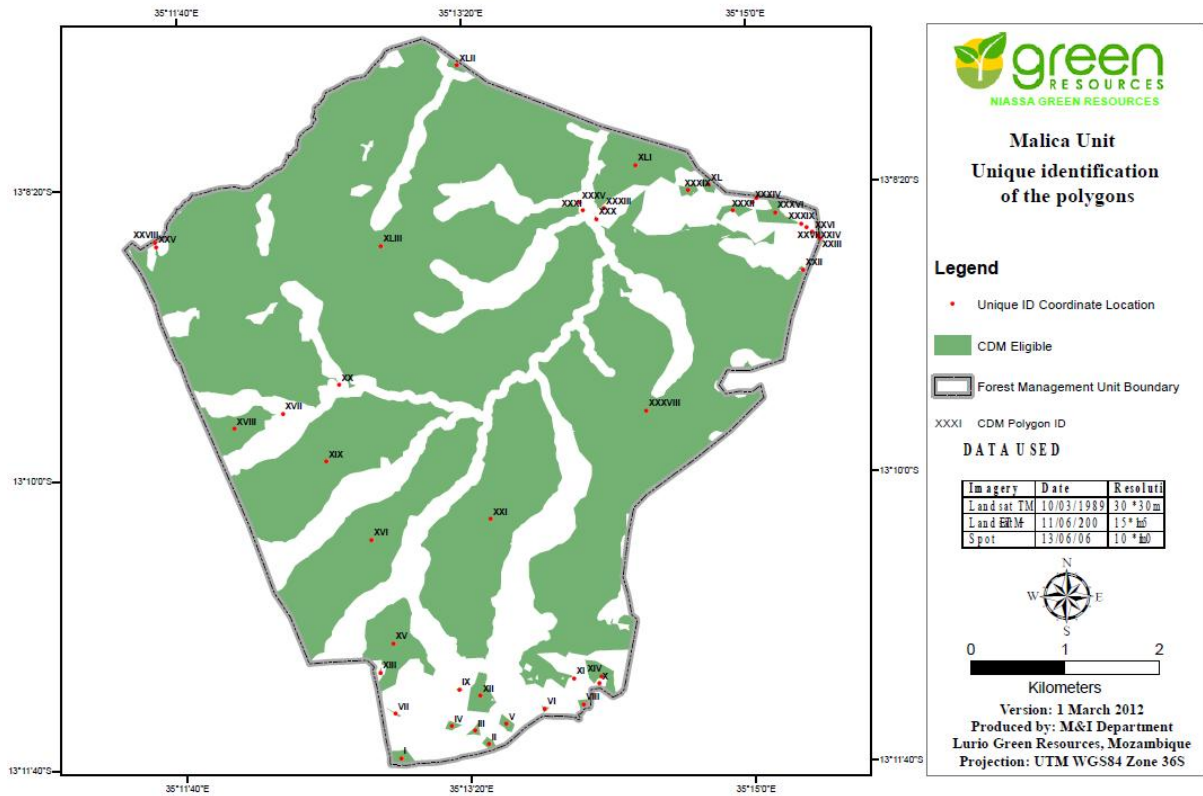
Block ID	Area, ha	Eastings	Northings
I	3.585	740115.067	8540385.501
II	1.162	741053.192	8540514.585
III	0.838	740905.873	8540657.474
IV	0.929	740661.058	8540718.302
V	1.629	741239.591	8540726.725
VI	0.261	741649.107	8540875.467
VII	0.129	740065.484	8540861.124
VIII	0.951	742064.474	8540917.223
IX	0.122	740751.836	8541104.898
X	0.062	742235.724	8541133.785
XI	0.062	741966.761	8541192.597
XII	7.855	740970.268	8541030.257
XIII	0.155	739919.452	8541303.339
XIV	6.056	742258.730	8541210.433
XV	36.939	740060.861	8541611.563
XVI	159.180	739855.592	8542711.886
XVII	0.001	738947.888	8544075.718
XVIII	21.752	738430.755	8543926.885
XIX	157.909	739397.114	8543555.091

XX	0.001	739549.886	8544364.539
XXI	209.503	741123.106	8542904.103
XXII	0.323	744501.244	8545478.971
XXIII	0.002	744683.886	8545807.337
XXIV	0.024	744664.681	8545840.432
XXV	0.000	737646.320	8545879.269
XXVI	0.043	744605.971	8545873.379
XXVII	0.003	744543.496	8545920.505
XXVIII	0.000	737634.865	8545926.535
XXXIX	0.027	744487.184	8545962.937
XXX	0.053	742316.512	8546067.249
XXXI	0.029	742180.940	8546159.462
XXXII	2.780	743767.953	8546119.902
XXXIII	0.122	742399.889	8546175.065
XXXIV	0.062	743976.983	8546206.222
XXXV	0.036	742145.048	8546241.136
XXXVI	6.609	744215.899	8546092.174
XXXVII	0.294	744024.523	8546252.236
XXXVIII	585.069	742801.914	8544019.666
XXXIX	1.723	743300.201	8546347.473
XL	1.873	743517.880	8546397.523
XLI	46.627	742747.159	8546629.391
XLII	1.841	740877.440	8547730.371
XLIII	1102.034	740028.683	8545832.780
I	3.585	740115.067	8540385.501
II	1.162	741053.192	8540514.585

Ntiuile
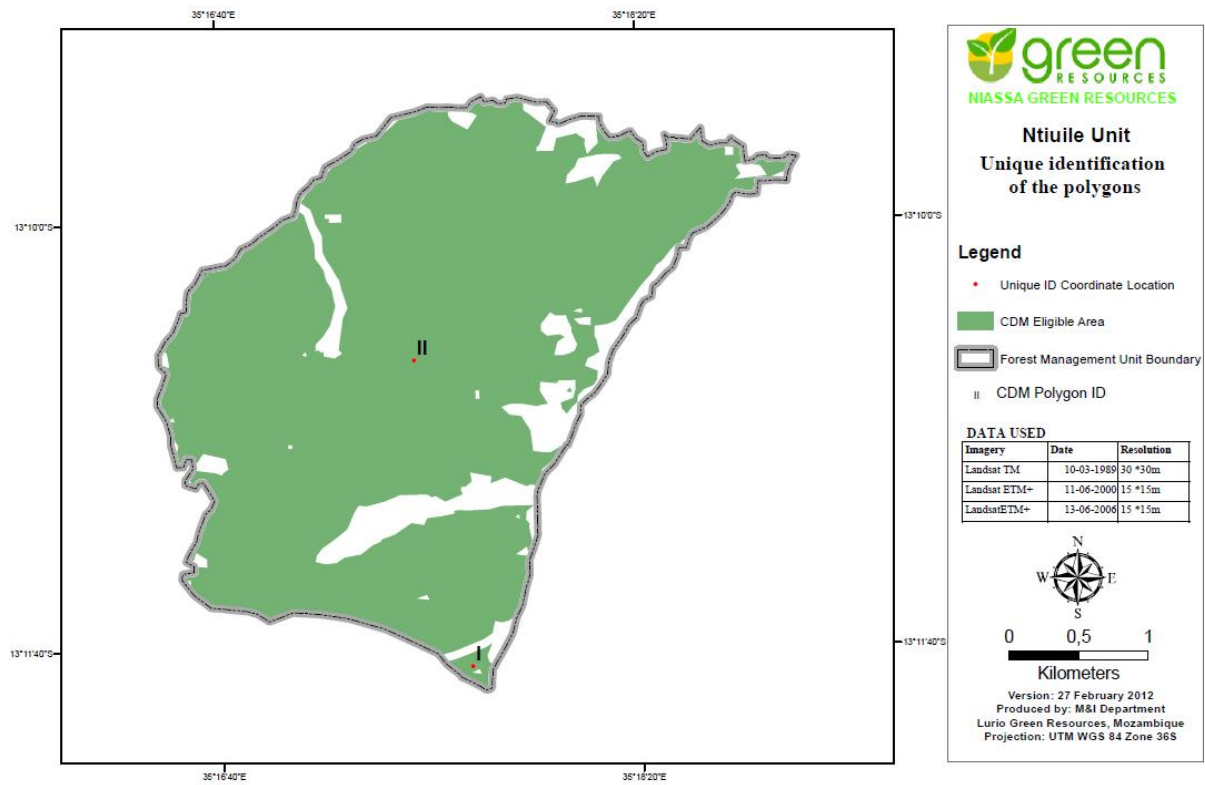
Block ID	Area, ha	Eastings	Northings
I	5.000	748675.983	8540092.352
II	913.300	748304.438	8542301.479

Figure G.1.3.5 shows the project zone – this is the A/R CDM project area as well as the areas within the parcels of land which are not part of the A/R CDM project – for example, the forest in the north east of the Malulu parcel, as well as wetlands. The villages shown in the map surrounding the parcels are villages that will potentially be impacted by the project and thus also make up part of the project zone.

Figure G.1.3.5   Project zone
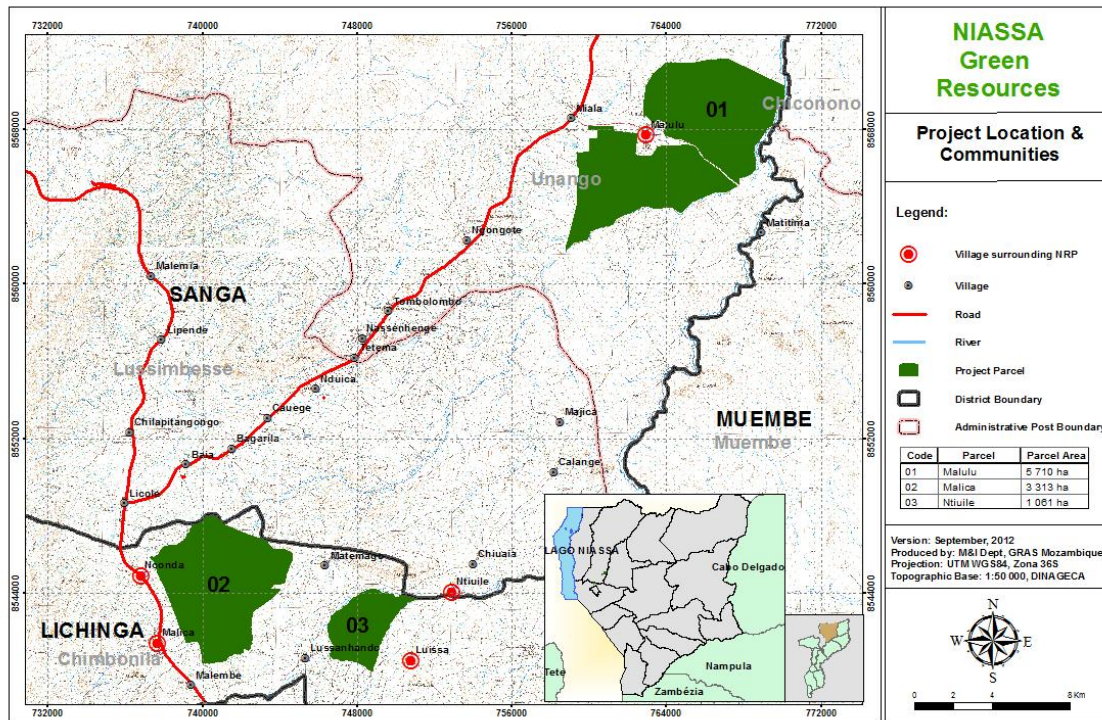
G.1.4 Current carbon stocks at the project site(s), using methodologies from the Intergovernmental Panel on Climate Change's Good Practice Guidance (IPCC GPG) or other internationally approved methodologies (e.g. from the CDM Executive Board):

Through assessment of the project area it is clear that there is a succession of degradation of the land. This has been substantiated through assessments of satellite imagery as well as through assessments of the project site (EIA, SEIA). The CDM rules allow PPs to conservatively assume that the baseline carbon stock changes are zero, and thus, in light of this, since the PP can sustain that there is degradation through slash-and-burn activities in the area, it is not necessary to determine the pre-project carbon stocks – see section G.2.3.

NFP sits in Lichinga and Sanga Districts of Niassa province, the least populated of the country. The 2007 census reported that the total population in Lichinga district was 95.172 inhabitants while Sanga district had, in total, 56.282 inhabitants with 48 to 52% average ratio between male to female. There are 5 villages near NGR project areas (shown in figure G1.3.5) namely Malulu, Malica, Nconda, Ntiuile and Luissa, with approximately 19,921 inhabitants (being 6,632 and 13,289 inhabitants in Sanga and Lichinga Districts respectively) (2007 Census).

In terms of Ethnicity, the vast majority of people in the area of Malica and Ntuile are Yao and speak Yao, while in the Malulu area, are Yaos and Ajauas, speaking mainly Yao, Swahili and Ngoni (due to the influence of Tanzania). In all villages, the majority of residents were born within their villages, with Malica and Nconda having the fewest people born outside of their own villages. The population in the settlements of the project area is young, 49% in Malulu and 45% in Malica and Ntuile being under 15 years old. The average people per household is 6 with nearly half of the population in active age.

Both men and women farm the Machambas, while woman do additional tasks such as cooking, cleaning, fetching water and wood. Youth were reported as either looking for employment or assisting with farm work.
It is generally seen as acceptable for women to work on plantations in the area, including NGR. 36% of NGR's workers in the Ntiuile project area are women, while the figure is 39% for the Malica area. Workers were selected through local traditional leadership structures.

Most housing is found within villages; though during the rainy season people also maintain houses at machambas that are further afield. Houses are normally built with mud bricks and have grass roofs. Aside from a primary residential structure some households were found to have a second residential structure, approximately half were found to have a kitchen and 71% a bathroom structure. Common additional structures include chicken coups and grain storage facilities. In the Malulu area, where the NGR plantation project is more developed, some households have been improving, using burned brick blocks and zinc roofs, these belong mainly to families that have at least one member working on NGR plantations.

There is little evidence of major wealth disparities in the area, with the standard of living being similar between households. Households have minimal material possessions, with many households possessing few basic possessions such as beds and pots and pans. However, the possession of bicycles and radios are prioritized as being important items, as well as, agriculture tools.

The communities feel that they are poorly resourced in terms of social infrastructure, for example people in Luissa pointed out that the lack of maternity facilities at the clinic has a negative impact on local child mortality rates, while the school only has 2 classrooms for Grade 1-5. In Malica people pointed out that more wells are needed, while in Nconda people feel that they are lacking any social facilities.

On average students are enrolled in primary school education between 6 and 11 years old and the average number of students per room is 45 and schools normally have 2-3 classrooms. There are no secondary schools in the Ntiuile and Malica project areas, so children need to travel as far as Lichinga for secondary education, which is regarded as impossible by most households. Another reason for children not attending school is that they are important in helping with domestic activities. In Malulu, in 2008, local authorities began the construction of a secondary school, with 3 classrooms to teach Grade 8-10.

The illiteracy rate in Niassa Province is very high, reaching 62.3%, of where 72.2% are women and 44.5% are men. The SEIA confirms this, levels of education amongst adults in the Ntuile and Malica areas are in average of only 22% having primary level education and 2% secondary level, while in Malulu area it seems to be higher with households reporting 30% and 21%, respectively.

In the context of social development activities, NGR has established several adult literacy programmes for workers. The objective of the literacy programmes is to promote an integral development of the workers through the implementation of an Adult Education and Literacy system, which aims to train the workers to gain writing, reading and calculation knowledge, as well as to promote the participation of workers in social activities, stimulate a good performance at the work place, strength the negotiations capacity of the worker – employee and facilitate the access to the legal instruments that regulate the work relation. Besides the literacy, during the lessons the students were empowered in basic knowledge of STD, HIV/AIDS, sexual and reproductive health, nutrition, fight against controlled forest fire, decentralized planning and community participation.

> G.1.6 A description of current land use and customary and legal property rights including community property in the project zone, identifying any ongoing or unresolved conflicts or disputes and identifying and describing any disputes over land tenure that were resolved during the last ten years (see also G5).

The area is classified as grassland, mainly mosaic at succession stage of abandoned agricultural land with patches of areas currently cultivated. The flatland is currently dominated by smallholder subsistence farmers, covering areas of about 1-2 ha (see figure below). The common crops are maize, beans, cassava, peanuts and sweat potatoes among other food crops. The dambos and grasslands along the water streams are also occasionally cultivated for high water demanding crops such as cabbage, tomatoes, sugarcane etc.

The main livelihood activity in the area is agriculture, with nearly all households being engaged in agricultural activities for subsistence purposes. Therefore, grassland is basically a mosaic of cultivated machambas with recently or late abandoned machambas (3-5 years). Other key livelihood activities in woodland and shrub savana areas in the region include natural resource usage, such as collecting fuel wood, gathering wild fruit and vegetables, medicinal plants and making charcoal for sale. Many households are also involved in limited trade of agricultural goods in order to obtain cash to purchase other household essentials such as cooking oil, soap and clothing.

The vast majority of people in all project areas have occupied land for over 10 years. The SEIA confirmed that land is either inherited by children or attributed by the community leader, though most of the households stated that they settled on the plot independently. This practice is recognised by the land law in Mozambique, which allows traditional land ownership and the rights of rural residents to use and occupy land. Once land has been

occupied for over 10 years, the occupier then has the right to gain a title deed (Landry 2009, Malonda 2008).

Potential land conflicts between farmers and plantation companies, including NGR, were reported through the SEIA and the socio-economic assessment. All land conflicts would be resolved with the farmers, communities and relevant authorities using PRO 03 of the SOP. In 2008 a land conflict management model was developed and Malulo and Miala community management committee was established, as a means of facilitating conflict mitigation and negotiation between NGR and the communities.

Figure G.1.6-1: Current land-use. Smallholder subsistence agriculture

G.1.7 A description of current biodiversity within the project zone (diversity of species and ecosystems) and threats to that biodiversity, using appropriate methodologies, substantiated where possible with appropriate reference material.

Biodiversity was assessed in the project zone during the field work for the ecological survey (2008).The following sections indicate in detail the procedures used and information found along transects outside the sampling points.

Methodology

Grass and herbaceous layer

A 1x1m transect was used within each sample point (20 in total) to measure the above and below ground grass and herbaceous biomass using destructive methods. Fresh weight was measured in the field using a digital 0,005 kg precision scale. Root and shoot samples were taken. Grass and herbaceous species within the sample plot and in the surrounding area were identified to species by an experienced botanist, and specimens were collected for further identification (see figure G.1.7-1).
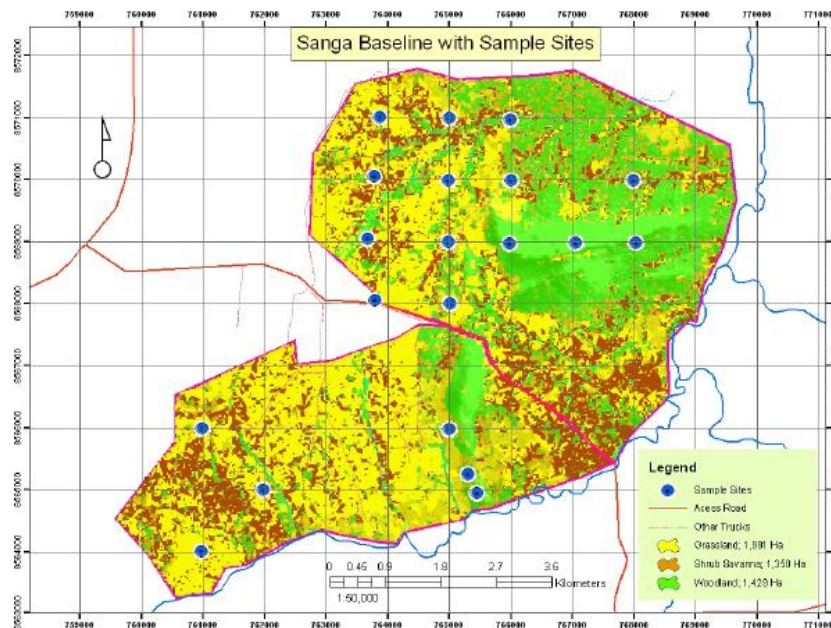

Figure G.1.7-1: Map of baseline vegetation in Malulu along with sample plots

Tree and shrub layer

A 0.1 ha plot, 20x50m was established at each sample point where trees and shrubs were found (17 in total). In general, the open grasslands did not have shrub or grass layer. However, there were areas with few scattered trees and shrubs within the open grassland. Within the 0.1 ha plot, all trees and shrubs of dbh >5 cm were identified to species and dbh measured using a diameter tape. Height was estimated for all trees and shrubs, while commercial height was estimated only for trees or shrubs with dbh >10 cm. Trees and shrubs with 5>dbh>2 cm were identified to species, measured by dbh and total height in a 20x20m subplot. Because of their large number, smaller trees were sampled in smaller plots within the larger plots.

Fauna

Whilst carrying out the sampling, observations were made for fauna in the area. Animal tracks and droppings were searched for to assess fauna species; however, very little was observed in the area covered.

The field work to assess the project biodiversity found an array of different plant and tree species; however, no animals or birds were recorded from the sample plots, showing that the area has poor fauna biodiversity. All species listed in the field inventory were screened against the IUCN's Redlist and were not listed. They are therefore not classed as rare or endangered.

Ecosystems

Three major ecosystems were identified in the study area as a) grassland, b) shrub savanna and c) woodland (see figure G.1.7-1). These ecosystems can easily be identified in the field as well as from the satellite images. Those secondary ecosystems that are easy to identify in the field, but not so easily identifiable on satellite images include, riverine forests (subclass of woodland, together with the dominant Miombo woodland), tall grass and short grass, the latter is particularly found in wetlands, dambos and in active and recently abandoned machambas (as subclasses of grassland).

A. grassland   B. shrub savanna   C. woodland

Figure G.1.7-2: Photos of the major ecosystems found in the project area
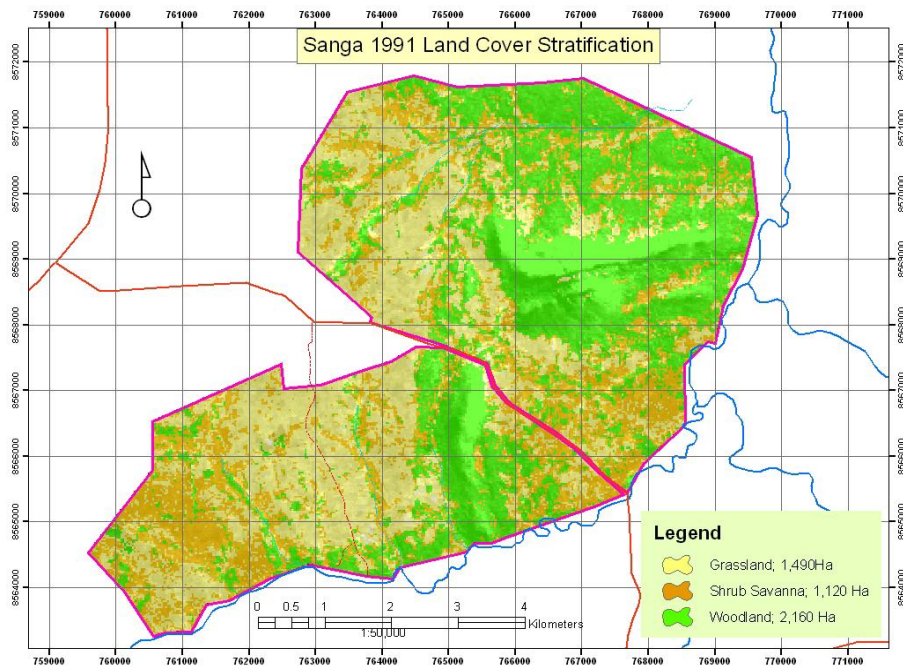
Figure G.1.7-3: Land cover stratification for Sanga District.

A total of 173 plant species were identified in the study area, most of which are herbaceous (52 forbs and 37 grasses) (see Table G.1.7-2). Fifty eight families were represented. Poaceae, the grass family, is the most extensively represented family with 37 species followed by Fabaceae and Asteraceae with 12 species each.

Table G.1.7-1: Number of plant species identified in the study area

Life form	No of species
Grass	37
Forbs	52
Lianas	2
Palm	1
Parasite	1
Shrub	27
Tree	48
Bamboo	1
Unspecified	4
Total	173

A total of 48 tree species were found in all ecosystems. Woodland and shrub savanna had both the highest count of trees species with 28 species, while grassland only had 7 species. Although woodland and shrub savanna had the same number of species, it is notable the difference in species composition. The occurrence of small sized trees such as *Cussonia*, *Catunaregam*, *Dichrostachys* among others marks the difference between the woodland and shrub savanna. However, it is also notable the occurrence of the common species of woodland within the shrub savanna, particularly *Brachystegia.*

Species diversity for trees, estimated by the Shannon diversity index, was higher in the shrub savanna (3.0) followed by woodland (2.5) and grassland (1.5). The Shannon index is function of the number of species and the way their relative abundance is distributed[4]. Although the woodland and the shrub savanna have the same number of species, shrub savanna species abundance is more evenly distributed than that of the woodland, which is highly dominated by few species (Figure G.1.7-4). The five most abundant woodland tree species comprise about 70% of the total number of stems, with 23 species sharing the remaining 30% of the stems.

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[4] Ecological identification and characterization of the ecosystems of the Sanga area held by Malonda Tree Farms, by Almeida A. Sitoe, (2008) *Departamento de Engenharia Florestal, Universidade Eduardo Mondlane*

Table G.1.7-2: Tree species abundance (trees/ha, dbh>5cm) by ecosystem type

Nr	Species	Woodland	Shrub savanna	Grassland
1	Brachystegia spiciformis	86.3	16.7	11.7
2	Julbernardia globiflora	58.8	11.7	
3	Brachystegia boehmii	46.3	25.0	
4	Diplorhinchus condylocarpon	23.8	13.3	
5	Parinari curatellifolia	22.5	3.3	
6	Rourea orientalis	16.3		
7	Pericopsis angolensis	12.5	6.7	
8	Pseudolachnostylis maprouneifolia	10.0	10.0	
9	Uapaca nitida	10.0	11.7	
10	Brachystegia utilis	8.8	3.3	
11	Hymenocardia acida	6.3	13.3	
12	Combretum appiculatum	5.0	1.7	
13	Diospirus kirki	5.0		
14	Fabaceae	5.0		
15	Swartzia madagascariensis	3.8		
16	Monotes engleri	3.8		
17	Pterocarpus angolensis	3.8	3.3	
18	Balanites maughami	2.5	6.7	
19	Terminalia gazensis	2.5	1.7	
20	Garcinia livingstoney	1.3		
21	Acacia karoo	1.3		
22	Lannea sp.	1.3	6.7	
23	Ximenea caffra	1.3		
24	Stereospermum kunthianum	1.3		
25	Ochna arborea	1.3		
26	Ozoroa sp.	1.3		
27	Bridelia cathartica	1.3		
28	Zanha golugensis	1.3	6.7	
29	Brachystegia aleni		16.7	
30	Catunaregam spinosa		1.7	
31	Cussonia paniculata		11.7	
32	Dichrostachys cinerea		3.3	
33	Gymnosporea sp.		1.7	
34	Kigelia africana		1.7	
35	Piliostigma thonningii		3.3	1.7
36	Protea sp.		6.7	
37	Securidaca longipedunculata		1.7	
38	Syzygium guinense		8.3	
39	Uapaca kirkiana		15.0	
40	Vitex doniana		1.7	
41	Annona senegalensis			1.7
42	Antidesma venosum			1.7
43	Faidherbia albida			20.0
44	Ficus sycomorus			1.7
45	Mangifera indica			5.0
	Total	343.8	215.0	43.3
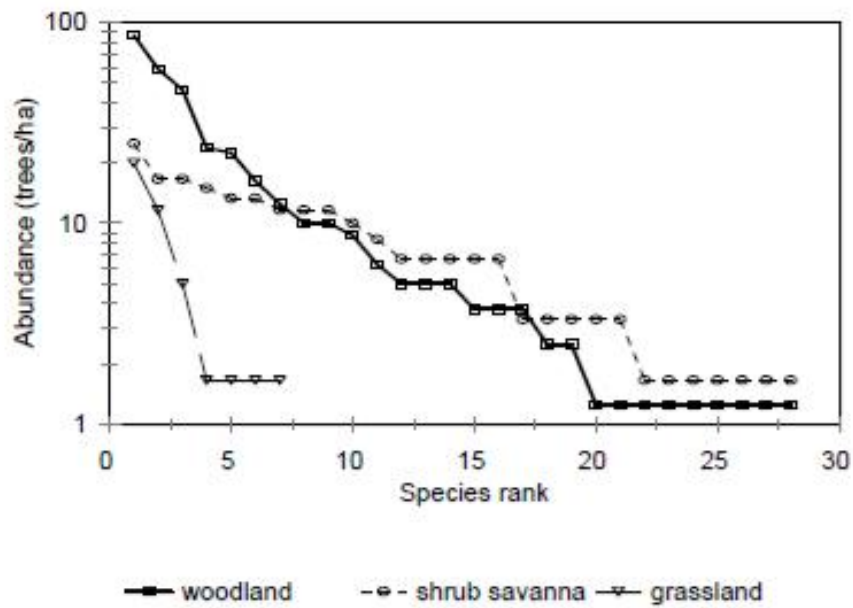
Figure G.1.7-4: Rank species abundance for tree species (dbh>5cm) by ecosystem type
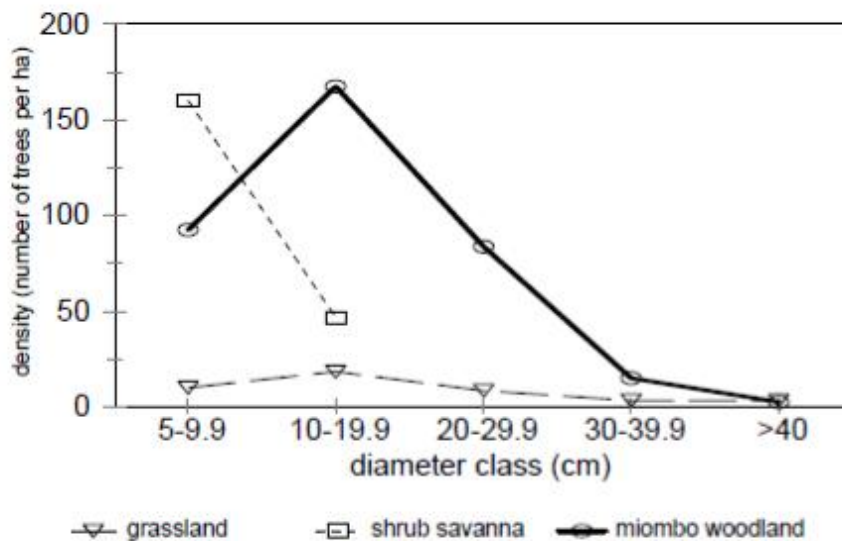
Figure G.1.7-5: Diameter class distribution of trees (dbh>5cm) by ecosystem type

The size distributions of tree species within the ecosystems are shown in figure G.1.7-5, where the differences between the ecosystems are evident. The grassland includes cultivated land where trees of all sizes have been left scattered. These include exotic domesticated fruit trees such as mangos (*Mangifera indica*), but also wild native trees such as fig (*Ficus sycomorus*) and the wild anona (*Annona senegalensis*). The shrub savanna is only represented by small size trees of no more than dbh 20 cm. The woodland is

dominated by trees with a dbh less than 30 cm, with a few trees reaching a dbh over 40 cm[5].

A total of 29 species were found in the shrub category, of which 26 were found in shrub savanna ecosystem while 4 and 5 were found in grassland and woodland respectively (table G.1.7-3). The density of shrubs is particularly high in shrub savanna (387,5 plants/ha) compared to 29,2 and 56,3 plants/ha in the grassland and the woodland respectively.

Table G.1.7-3: Shrubs and small size trees (dbh>2-5cm) abundance by ecosystem

Nr	Species	Shrub savanna	Grassland	Woodland
1	Brachystegia aleni	91.7		
2	Brachystegia boehmii	75.0		
3	Brachystegia spiciformis	37.5	4.2	
4	Zamha golugensis	20.8		
5	Cussonia paniculata	16.7		
6	Diplorhinchus condylocarpon	16.7		
7	Uapaca kirkiana	12.5		
8	Protea sp	12.5		
9	Monotes engleri	12.5		
10	Pericopsis angolensis	12.5		
11	Rourea orientalis	8.3		
12	Lannea sp.	8.3		
13	Julbernardia globiflora	8.3		37.5
14	Oxitenanthera abyssinica	4.2		
15	Piliostigma thonningii	4.2	4.2	
16	Pterocarpus angolensis	4.2		
17	Hymenocardia acida	4.2		
18	Hornocarpum sp.	4.2		
19	Gymnosporea sp.	4.2		
20	Syzygium guinense	4.2		
21	Terminalia gazensis	4.2		
22	Combretum apiculatum	4.2		
23	Brachystegia utilis	4.2		
24	Uapaca nitida	4.2		6.3
25	Vitex doniana	4.2	16.7	
26	Ochna arborea	4.2		6.3
27	Faidherbia albida		4.2	
28	Acacia karoo			3.1
29	Uapaca zanzibarica			3.1
	Total	387.5	29.2	56.3

Grass and herbaceous species

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[5] Ecological identification and characterization of the ecosystems of the Sanga area held by Malonda Tree Farms, by Almeida A. Sitoe, (2008) *Departamento de Engenharia Florestal, Universidade Eduardo Mondlane*

Within the sampled area, a total of 45 species of grasses and forbs were identified. The most frequent species were the grasses Themeda triandra (35%), Hyperthelia dissolute (30%), Andropogon gayanos (25%), Cymbopogon escavatos (25%) and Melinis repens (25%). Grasslands, particularly recently abandoned and cultivated machambas showed the highest content of herbaceous and grass species (up to 11 species). The woodlands and the tall grass within the long-abandoned machambas share the low number of grass and herbaceous species (2-4 species).

Figure G.1.7-6: Grassland: Tall grass to the left and short grass in a dambo to the right

Table G.1.7-4: Grass and herbaceous plants by sample plot

Nr	Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	D	freq (%)
1	Themeda triandra								1	1	1						1		1	1	1		35
2	Hyperthelia dissoluta			1				1		1		1					1			1			30
3	Melinis repens		1				1					1		1	1								25
4	Cymbopogon escavatus			1	1				1	1		1											25
5	Andropogon gayanos										1						1		1	1	1		25
6	Schizachyrium	1			1	1																1	20
7	Vernonia colorata			1							1											1	15
8	Pennisetum setaceus						1					1			1								15
9	Bidens pilosa						1								1	1							15
10	Panicum maximum																1	1		1			15
11	Aleanotis	1	1																				10
12	Blumea elata						1								1								10
13	Leonotis (pequena)						1								1								10
14	Digitaria eriantha										1				1								10
15	Monocymbium cereciforme												1	1									10
16	Eragrostis aspera														1	1							10
17	Ageratum cenizoide														1	1							10
18	Tricodesma zeilanicum														1	1							10
19	Hyparrhenia filipendula																1	1					10
20	Acristashia leucotris																1	1					10
21	Tristashia leucotrix																		1	1			10
22	Heteropogon contortus	1																					5
23	Indigofera	1																					5
24	cf Indigofera	1																					5

#	Species	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15	P16	P17	P18	P19	P20	Total
25	*Andropogon*	1																				5
26	*Poligala sp*	1																				5
27	*cf Flaveria*																			1		5
28	*Ceratia*																			1		5
29	*cf Coix lacrima*																			1		5
30	*Grewia*																			1		5
31	*Cyperus*																			1		5
32	*Eneapogon*			1																		5
33	*Pogonarthria squarrosa*						1															5
34	*Bubufilum*						1															5
35	*Poacea (2)*								1													5
36	*Imperata cilindica*																			1		5
37	*Phragmitis australis*																			1		5
38	*Tridax procumbens*													1								5
39	*Crotalaria sp*													1								5
40	*Triumpheta pentandra*													1								5
41	*Celosia sp.*													1								5
42	*Eragrostis ciliaris*														1							5
43	*Eleuane indica*														1							5
44	*Cloris gayani*														1							5
45	*Lodetia simplex*																		1			5
46	*Cymbopogon dieterlenii*																					0
	Number of species per plot	5	4	2	3	1	1	5	3	3	3	4	4	2	1 / 10	1	5	4	3	4	4	9

For more details, please refer to the Ecological Survey from 2008.

G.1.8 An evaluation of whether the project zone includes any of the following High Conservation Values (HCVs) and a description of the qualifying attributes:

Using the NGR's internal procedure (PRO 10 of the SOP), developed based on the WWF and Proforest[6] guidelines, to identify/assess the existing High Conservation Value (HCV) areas in NGR project area, no HCV values were found in the project zone. This is justified by the following reasons:

- The ecological assessments did not find in the area forests with high values or significant concentrations of biodiversity at national, regional or global level;

- The existing patches of remnants/ natural vegetation are representatives of the miombo woodlands which are widespread all over the country hence, the area is not particularly rich in endemic species and no RTEs or rare ecosystems have been identified in the area

- In the project area there are no forests that supply basic services in critical situations (e.g. watershed protection or erosion control)

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[6] Jennings,,S., R. Nussbaum, N. Judd and T. Evans (2003). Part 3: *Identifying and managing High Conservation Values Forests: a guide for forest managers.* WWF and IKEA Co-operation on Forest Projects.

- None of the values identified are critical to meet the basic needs/livelihoods of the local communities and no forests in the area were considered critical for the cultural identity of the local communities

This is supported through the FSC® report which has assessed the project against HCVs[7].

Although not being critical, there are some areas that have been identified as important for the local communities for religious and/ or cultural purposes namely cemeteries and medicinal plant collection sites. These sites have been identified, described and management measures determined for them in annexes to the PRO 10 of SOP where their coordinates and location are clearly indicated.

These areas were identified and the management measures to be implemented determined in partnership/collaboration with the local communities who have a responsibility for their management using their cultural habits/tradition. NGR responsibility for the management of these areas is to ensure that the areas are clearly identified/visible on the ground, employees are aware of their existence and respect them. Additionally, NGR will ensure that the agreed buffers around these areas are respected and the fire breaks needed are also put in place and are well maintained. Figures G.1.8.1-3 below show the maps with the location of these areas/sites.

Figure G.1.8.1 - Location of the SSCI for Malulu Block

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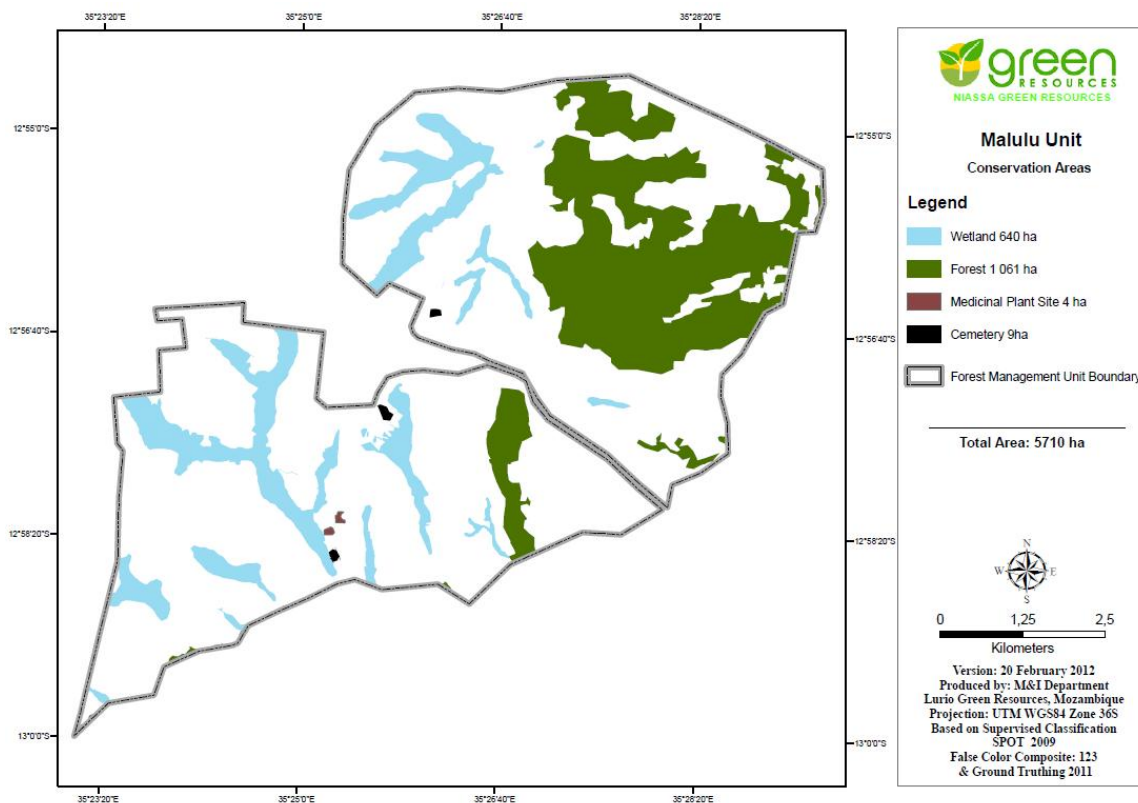
[7] Forest Management Certification Report, SGS Qualifo, Doc. Number: AD 36A-12, Doc Version Date: 21 Sept 2010

Figure G.1.8.2 - Location of the SSCI for Malica Block
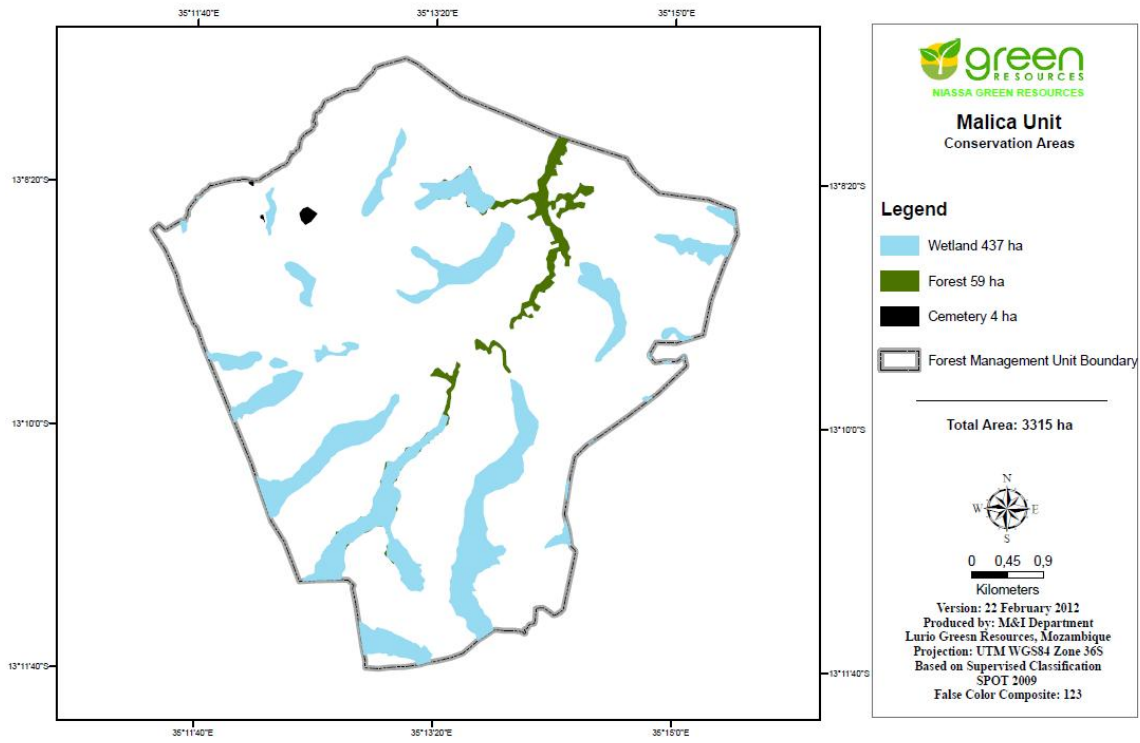
Figure G.1.8.3 - Location of the SSCI for Ntiuile/Luissa site
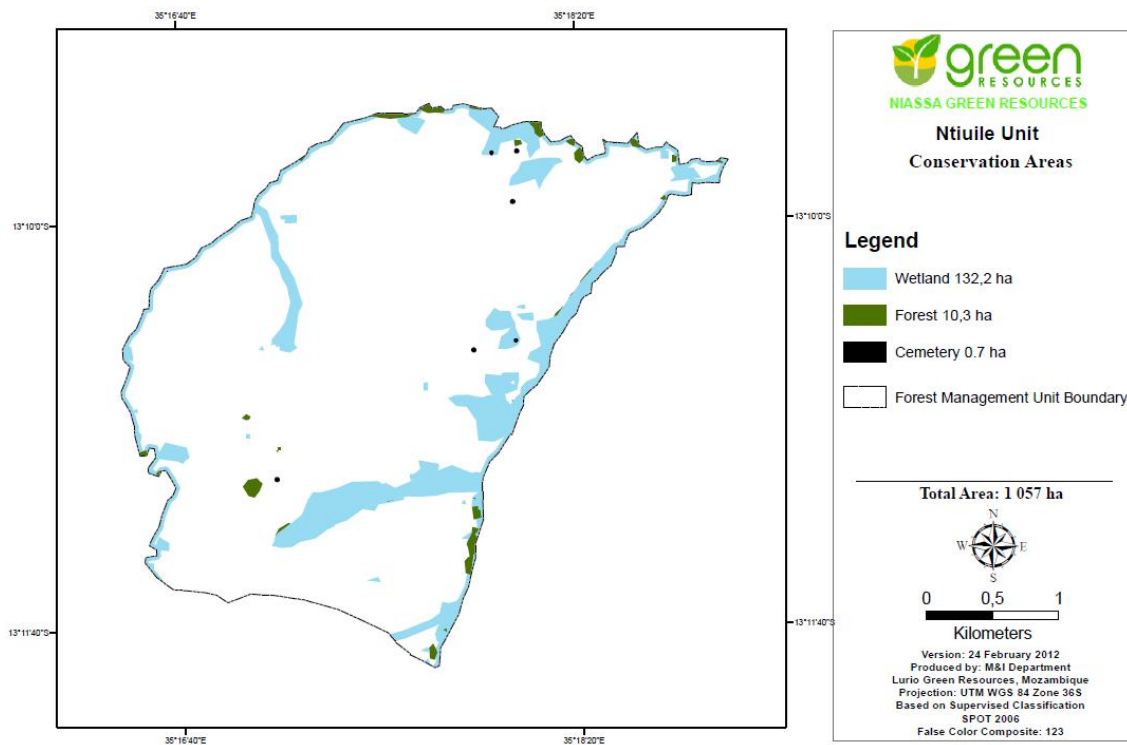
As can be seen in the maps, the SSCI areas are all located inside NGR project zone but outside the carbon project area.

Apart from the SSCI and existing wetlands identified in all the project areas, for the Malulu block an area of 1067ha has been set aside for conservation because it was the only area within NGR DUATs (inside the project zone) that still presents woodlands / high concentration of woody biomass and is therefore from the carbon perspective valuable – see conservation management plan in Annex 1.

Figure G 1.8 - Map of Malulu unit **conservation** area (forest in light green), Sanga, Niassa
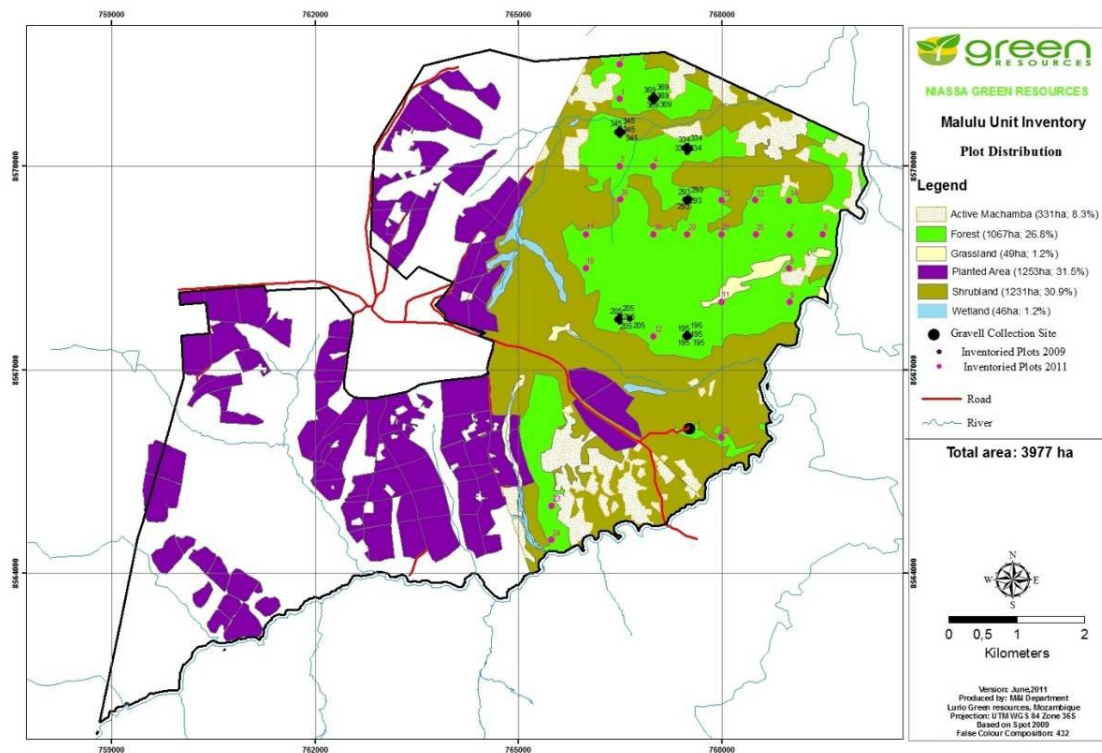
This area is now in the process of being sustainably managed; a forest inventory has been carried out for that area, the existing threats identified (charcoal production and poles collection for fencing houses, hospital, and others) and a draft management plan produced defining the Annual Allowable Cut (AAC) and the recommended management measures to be implemented. The management measures are to be discussed with the local communities using the area and the local Government to reach a consensus on what measures will be implemented, how and by whom they will be implemented. The initial draft of the management plan of this conservation area can be found in Annex 1.

G.1.8.1 Globally, regionally or nationally significant concentrations of biodiversity values; protected areas; threatened species; endemic species; areas that support significant concentrations of a species during any time in their lifecycle (e.g. migrations, feeding grounds, breeding areas)

Globally, regionally or nationally significant concentrations of biodiversity values such as:
  a. Protected areas
  b. Threatened species
  c. Endemic species
  d. Areas that support significant concentrations of a species breeding during any time in their lifecycle (e.g. migrations, feeding grounds, breeding areas).

None of the protected areas in Mozambique as defined by the CCBA standard and the IUCN[8] are found within the project zone.

In the ecological survey (2008), only *Khaya anthotheca* (African mahogany) was found, which is classified in the Mozambique Red List as "lower risk". No other species found in the area is considered rare, threatened or endangered (RTE).

Special conservation measures should be directed towards the stable ecosystems bearing high carbon content, particularly existing woodlands. Vegetation along water streams should be preserved as to protect the water courses of the area. Within riverine forests, special attention should be paid to *Khaya anthotheca* where special conservation measures can be put in place through assisted regeneration[9].

G.1.8.2 Globally, regionally or nationally significant large landscape-level areas where viable populations of most if not all naturally occurring species exist in natural patterns of distribution and abundance;

No globally, regionally or nationally significant large landscape-level areas where viable populations of most if not all naturally occurring species exist in natural patterns of distribution and abundance are found within the project zone.

G.1.8.3 Threatened or rare ecosystems;

The ecosystems found within the project zone, namely grassland, woodland and shrub savanna are not threatened or rare.

G.1.8.4 Areas that provide critical ecosystem services (e.g., hydrological services, erosion control, fire control);

The project zone includes water sources (rivers and wetlands) which provide ecosystem service to the surrounding communities. The hydrological services provide the local communities with water both for domestic and livestock use. However, these ecosystem services are not deemed critical and thus not classed as HCV.

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[8] http://data.iucn.org/dbtw-wpd/edocs/PAPS-016.pdf

[9] Ecological identification and characterization of the ecosystems of the Sanga area held by Malonda Tree Farms, by Almeida A. Sitoe, (2008) *Departamento de Engenharia Florestal, Universidade Eduardo Mondlane.*

> G.1.8.5 Areas that are fundamental for meeting the basic needs of local communities (e.g., for essential food, fuel, fodder, medicines or building materials without readily available alternatives);

As described in G.1.8.4, the project zone contains areas which the local communities use as watering points for domestic and livestock use. The rivers and wetlands play an important role in the more wide hydrological system too. These areas are being conserved by the project proponents with the local communities given access to use them for this purpose throughout the project lifetime. Buffer zones around all water sources found within the project zone are kept free from planting to protect the water level for both its function as a cattle watering point and also as water supply for domestic use.

> G.1.8.6 Areas that are critical for the traditional cultural identity of communities (e.g., areas of cultural, ecological, economic or religious significance identified in collaboration with the communities).

Though none of them qualify to be considered as HCV, existing Sites of Socio-Cultural and religious Interest (SSCI) for the local communities within NFP project areas were identified and will be set aside for conservation purposes. The identification of the SSCI was made in consultation with local communities who sometimes appointed a local member to walk around the area and show the location of such places to NGR team members. A few cemeteries (some in use and others not) and one medicinal plant collection site were identified. A brief description of each of them was obtained through conversations with the elderly people of the local communities.

The SSCI can be easily identified by the presence of big trees concentrated in one place. Additionally, to ensure the SSCI can be easily identified by supervisors, company staff as well as other subcontracted companies, and will not be affected by NGR operations, geographic coordinates were collected using a GPS, maps were produced showing their location and signs/marks are being posted.

The management measures as well as the permissions (e.g. access/prohibitions and rules for utilization) for each SSCI will depend on the management objectives set for the area as well as the main features that need to be conserved. The sites will be managed by the local communities through their customary rules; however, NGR will be responsible to ensure that maintenance activities such as weeding and opening of firebreaks are carried out around these areas.

> G2 Baseline Projections

> G.2.1 Describe the most likely land-use scenario in the absence of the project following IPCC 2006 GL for AFOLU or a more robust and detailed methodology, describing the range of potential land-use scenarios and the associated drivers of GHG emissions and justifying why the land-use scenario selected is most likely.

The "Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities, Version 01 (EB 35, Annex 19)" was applied to the project to demonstrate the baseline and additionality.

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

The project start date is the 15th January 2007. Since the A/R CDM project's start date is after the 31st December 1999 but before the date of its registration, evidence is provided to show:

- The start date of the A/R CDM project activity was after 31st December 1999; and
- The incentive from the planned sale of tCERs was seriously considered in the decision to proceed with the project activity.

The project start date is when the first planting began at the Malulu parcel of the project. This is substantiated through NGR's inventory and monitoring system, Microforest.

Evidence that the incentive from the planned sale of tCERs was seriously considered in the decision to proceed with the project activity is shown through the initial "Agreement between Fundação Malonda and Tree Farms AS[10]", which was entered into on the 8th May 2007. This legal document states that "TreeFarms shall develop a carbon offset program for the Company".

TreeFarms AS, later known as Green Resources AS, had had carbon finance at the core of its business since its inception back in 1996. This is documented in a number of different documents, including board minutes and annual reports[11]. In addition, TreeFarms AS' 2006 Annual Report[12] has a section on its carbon offset business, which was made available to third parties.

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

Sub-step 1a. Identify credible alternative land use scenarios to the proposed A/R CDM project activity

The most credible scenario is the continuation of the pre-project land use and further degradation of the grass and shrubland strata to cropland. However, A/R without CDM is also a credible alternative land use scenario that must be considered.

- Continuation of the pre-project land use – further degradation
- A/R without CDM

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

The identified realistic and credible land-use scenario of further degradation of the land due to conversion of the grass and shrubland to cropland can be considered to be valid because it is not against the applicable legislation. The country legislation does not forbid

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[10] Green Resources AS was formerly called TreeFarms AS
[11] TreeFarms AS, Board Meeting Minutes: January 1999, December 1999, March 2000
[12] TreeFarms AS, Green Resources, Annual Report 2006

the conversion of forest lands to agriculture or other land-uses. The only legal requirement in this respect is the request of a permit for vegetation clearing provided that this is not considered a pristine forest but, local communities do not apply to the government for agriculture lands therefore do not take this legal requirement into account during the land selection for agriculture purposes. Additionally, the GoM is currently implementing a strategy, "Revolução Verde" (Green Revolution), which aims at increasing the agriculture production and productivity to fight hunger and poverty[13]. In its programme, the Government emphasises the role that the family sector plays in the agriculture production, therefore the intensification of agriculture activities is a feasible option that is in line with the Government programs. Government policies also aim at achieving the sustainable use and preservation of the natural resources (lands, water, etc.)[14] However, in the way agriculture is currently being done (itinerant/shifting/extensive cultivation), it can be considered to be against the Government policies but, the GoM has limited capacity for the law enforcement and thus to avoid conversion of forest areas due to agriculture. Therefore the activity is likely to continue as it is.

In 1997, the Government has approved the forest and wildlife policy which defines as priority the promotion of A/R activities. In line with this policy, the GoM is promoting establishment of community A/R programs as well as A/R program for industrial and commercial purposes. Additionally, the forestry and wildlife law and its regulation also provide for the establishment of special incentives for the forest plantations which are still inexistent after over 10 years of the approval of the legislation. It is in this regard that the Malonda Foundation, in Partnership with the GoM, started the Program in Niassa for attracting investors for A/R projects, and NGR is a result of this program. Therefore the establishment of A/R programs is a feasible option in the area but this is only possible for large A/R companies which anticipate carbon funding to pay the upfront costs of the forest establishment or for companies that have low return requirements from their investments. In the absence of these conditions, the existing conditions in the project areas (e.g. deficient infrastructures such as communication, roads, railway, airports, inexistence of land use plans to guide the investor decision on where to plant and the long and expensive land acquisition process), mean it is not likely that other companies would be willing to carry out A/R projects in the area.

STEP 2. Barrier analysis

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

- Continuation of the pre-project land use
- A/R without CDM

In the current project scenario, natural regeneration is not expected to occur, because of the drivers of degradation still being present in the region (slash-and-burn agriculture), as well as the lands having poor soils and there being few seed sources. This results in tall grass out competing the young seedlings and prevents seeds from landing on the soil. This is demonstrated by the failure of tree-growth in the last decades in the area.

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[13] MINAG (2009). CONCEITO, PRINCÍPIOS E ESTRATÉGIA DE REVOLUÇÃO VERDE EM MOÇAMBIQUE. Maputo. 21Pp
[14] MINAG (2009). CONCEITO, PRINCÍPIOS E ESTRATÉGIA DE REVOLUÇÃO VERDE EM MOÇAMBIQUE. Maputo. 21Pp

The establishment of A/R programs is a feasible option in the area but this is only possible for large A/R companies that have low return requirements from their investments.

A/R from small scale companies is not feasible as the existing banks in the country do not provide loans or credits for forest plantations due to perceived risks associated to the activity. Additionally, local communities lack the technical expertise and knowledge for implementing A/R Projects. Therefore, this activity is not likely to occur.

A/R without CDM for private companies, identified in Step 1b, is prevented by an investment barrier - insufficient financial returns. However, following the combined tool to identify the baseline scenario and demonstrate additionality, this barrier must be demonstrated by carrying out investment analysis.

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

The following is a list of land use scenarios that are not prevented by any barrier:

1.   Continuation of the pre-project land use
2.   A/R without CDM

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

Following the decision tree from the tool, since forestation without being registered as an A/R CDM project activity is included in the list of land use scenarios that are not prevented by any barrier, and the list does not contain only one land use scenario, the tool must be continued with Step 3: Investment Analysis.

STEP 3. Investment analysis

Sub-step 3a. Determine appropriate analysis method

Benchmark analysis (Option III) is applied as the project generates revenues not just from the sale of tCERs – which rules out applying simple cost analysis. Investment comparison analysis is not applicable to the project since the alternative land use scenario requires no investment at all. Benchmark analysis is therefore the appropriate analysis.

Sub-step 3b. – Option III Apply benchmark analysis

The equity Internal Rate of Return (IRR) has been applied as the financial indicator for the A/R CDM project since there is only one potential project developer.

In line with the Additionality Tool, the benchmark is to represent standard returns in the market, considering the specific risk of the project type, but not linked to the subjective profitability expectation or risk profile of a particular project developer.

The benchmark has been derived from a company internal benchmark since there is only one potential project developer. This is based on GRAS' equity investors' requirements to proceed with investment in the NFP due to its potential to provide an expected total return

of 25% in the long term[15]. This benchmark has been consistently applied in the past to other projects developed by GRAS; for example, the A/R CDM Kachung Forest Project, which is registered under the CDM and the ARR VCS Bukaleba Forest Project which is registered under the VCS. The benchmark is further substantiated by the standard return on equity by IbbotsonAssociates' 2005 Cost of Capital Perspectives Report, which is in line with the second approach for deriving the benchmark.

The ideal method to obtain such a benchmark would be to analyze IRR expectations for private forestry operations in Mozambique. However, this was not possible due to the very limited development of the sector, particularly for private investments on a scale similar to that of the A/R CDM project.

Although data for required returns on capital was not available for forestry within Mozambique, it was possible to look more generally at equity investments within the country. IbbotsonAssociates (www.ibbotson.com), a leading provider of independent investment research in major international markets, annually determine the required return of capital for investments in 173 countries from the perspectives of foreign investors. The statistics represent the IRR-return that an investor would expect to receive if investing in a particular country. The report looks at perspectives from six different countries (UK, France, Germany, Canada, Japan and Australia) and applies both a linear and logarithmic scale of the Country Risk Rating Model to determine the according IRRs. In total, 12 IRR-values are provided covering all six countries and the two different model scales.

For 2005 investments in Mozambique, the analysis shows a range of required IRRs of 26.25 – 32.64 %, with an average of 30.14% for all country perspectives with both models (IbbotsonAssociates, 2005[16]).

Benchmark = 25%

Sub-step 3c. – Option III Apply benchmark analysis

The financial model to determine the IRR at the NRP was developed using justified plantation assumptions and costs – the majority of which were substantiated through the Niassa Business Plan Financial Model. The costs were on a per hectare basis and linked to the planting schedule which scaled the costs up to the total project area. Beating up (replanting) for 20% of the plantable areas was assumed to account for any mortality that may occur. Capital expenditure (Capex) is included in line with the Niassa Business Plan.

Table G.2.1.1 Cost input parameters

Parameter	Cost	Source
Land rent, DUAT	600 MZN per year authorization fee (1/2 of this once definite) 2 MZN per ha per year	Mozambican legislation
Seedlings	0.3 USD per seedling	Seedling receipts

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[15] Further evidence of the benchmark is provided by private equity investors – documentation available to DOE

[16] IbbotsonAssociates, 2005: International Cost of Capital Perspectives Report 2005. The report will be submitted to the DOE but cannot be published due to copyright constraints

Land preparation	4 – 5 mandays per activity	Management plan financial model
Crop management	6 – 18 mandays per ha	Management plan financial model
Chemical costs	Herbicide: USD 7 per L NPK: USD 2 per kg Pesticide: USD 75 per L	Management plan financial model
Fire protection	5 – 11 mandays per activity	Management plan financial model
Road costs	USD 3500 per km	Management plan financial model
Tax rate	32%	KPMG Corporate Tax Rate Survey
Exchange rate	25 MZN to 1 USD	www.onda.com

Revenues from each timber species and the sale of tCERs were accounted for in the model. Harvested timber volumes were inputted based on the merchantable timber yield models by Alder (2004) for pine and eucalyptus to determine the amount of timber that will be available at the planned commercial thinning and harvesting years. Although these yield models were developed in Uganda, they have been deemed suitable due to the lack of available yield tables and volume equations for these species in Mozambique. Site indexes have been selected for each species based on the expected volumes sustained in the Niassa business plan. Carbon revenues were modelled based on average prices of the "State and Trends of the Carbon market 2006".

Stumpage prices used in the Niassa business plan have been applied. Since the timber revenues are based on stumpage prices, no harvesting costs are factored into the model.

Table G.2.1.2. Assumed stumpage prices in IRR calculation

Species and timber type	Price USD
Pine	
First thinnings	40
Second thinnings	55
Third thinnings	100
Harvest	250
Eucalyptus	
First thinnings	40
Second thinnings	55
Third thinnings	100
Harvest	290

A corporate tax rate of 32% is assumed in the model, which is based on what the corporate tax rate was at the start of the project[17]. Figure B.5.1, shown below, outlines the structure of the financial model as presented in Excel. The timeframe of the model is from 2007 to 2040. This period is from first planting to final harvesting of the first rotation of pine – the longest rotation species (26 years) being planted at NFP. For investments that have

[17] See KPMG's Corporate Tax Survey 2006

deferred value outside of this time period, the revenues have been discounted and included as a cash inflow in the final year of the investment period – this includes the fair value of the plantation stands and the capex book value.

Figure B.5.1. Schematic of financial model components
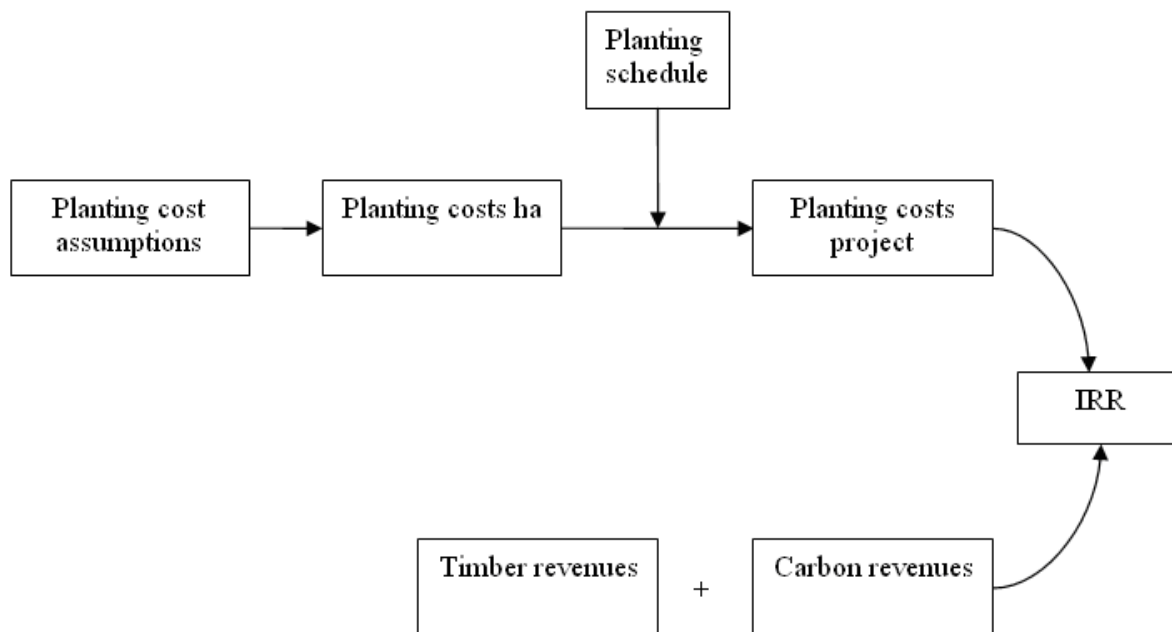
The IRR based on the above assumptions, without the sale of tCERs, has been calculated as 18.7% (table B.5.1. below). The A/R CDM project activity has a less favourable indicator than the benchmark of 25% and is therefore not considered financially attractive without the benefits from the sale of tCERs. The project would therefore not have been viable without the potential of carbon financing.

Table G.2.1.3 Project scenarios and respective IRR

Project scenario	IRR
Solely timber revenues	18.7%
Timber revenues + tCERs (price $7.04)	22.0%
Timber revenues + tCERs (price $11.56)	26.6%

Sub-step 3d - Sensitivity analysis

Sensitivity analysis was carried out to test whether the investment analysis was robust to reasonable variations in key parameters. The critical parameters were identified as timber prices, growth yield, and site index. A prince increase and decrease of 10% was assumed for each of these parameters and for the site indexes a site index of 12 for pine and 24 for eucalyptus was used.

Table G.2.1.4. Sensitivity analysis results

Parameter change	IRR without carbon	IRR with carbon (tCER = $7.04)	IRR with carbon (tCER = $11.56)
Standard assumptions	18.7 %	22.0 %	26.6 %
10% decrease in capex	18.8 %	22.2 %	26.9 %
10% increase in capex	18.5 %	21.7 %	26.3 %
10% decrease in stumpage	18.0 %	21.5 %	26.1 %
10% increase in stumpage	19.3 %	22.5%	27.0 %
10% decrease in yield	18.0 %	21.5 %	26.1 %
10% increase in yield	19.3 %	22.5 %	27.0 %
Site indexes increased	20.6 %	23.5 %	28.0 %

All assumptions, costs and revenues, are contained in the financial model and will be presented to the DOE during the validation of the A/R CDM project.

From applying the decision tree in the CDM tool for benchmark analysis, since the financial indicators of neither the A/R CDM project activity (without being registered as an A/R CDM project activity) nor the alternative scenario (continuation of the pre-project land use) meets the benchmark, the baseline scenario is the continuation of the pre-project land use.

STEP 4. Common practice analysis

The Niassa region has seen significant developments to its forestry sector over the last five years following prioritization of government polices to promote A/R activities. The Malonda Foundation's programme to facilitate private investment in the sector is aligned with such polices and has helped to start up a private sector forestry industry in the Niassa region. Including Green Resources, there are currently six private forestry companies operating in the Niassa region: Chickweti, Florestas de Niasa, New Forests, Niassa Green resources, Florestas de Massangulo and UPM. Most of the existing companies only started with initial assistance from the Malonda Foundation who streamlined the land acquisition process by applying for all DUATs collectively before transferring these to the companies respectively. Also the EIAs were paid by Malonda Foundation.

There are essential distinctions between Green Resources project and the other similar activities taking place in the region by the other private forestry companies. An Essential distinction is the scale of operations; when considering the scale of these projects, each company aims to plant more than double the planned plantation area for Green Resources (see table B.5.2 below), which is possible with lower rates of return. UPM, the largest company that is operating in the Niassa region is a publically listed company on the NASDAQ QMX Helsinki stock exchange and as such has the opportunity to raise finance from the capital markets at a lower rate than that of Green Resources. This means its return requirement profile does not have to be as high, which explains why Green Resources requires the additional revenue stream to make the project financially viable. In the case of Chickweti their main investor is the Global Solidarity Fund, which has a lower rate of return than Green Resources benchmark of 25%[21]. Another essential distinction is Green Resources compliance and certification to FSC. The Niassa Reforestation Project is the only FSC certified forest in the region and this has additional costs linked to it.

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[21] http://www.3ignet.org/resourcecenter/resourcePDFs/2007FebGSFFMemInv.pdf

Table G.2.1.5. Characterization of the companies engaging in forestry operations in Niassa (areas in ha)

	Active in Niassa	Initiated planting	Planned plantation area	Planted	Total project	FSC
GR	x	x	23,000	1,489	42,330	x
UPM	x	x	220,000	1,260	220,000	
Chikweti	x	x	68,500	14,250	140,000	
Florestas Massangulo	x	x	50,000	4,378	100,000	
New Forests	x	x	60,000	3,217	87,000	
Florestas de Niassa	x	x	120,000	3,426	210,000	

> G.2.2 Document that project benefits would not have occurred in the absence of the project, explaining how existing laws or regulations would likely affect land use and justifying that the benefits being claimed by the project are truly 'additional' and would be unlikely to occur without the project.

See section G.2.1 for additionality description.

> G.2.3a Calculate the estimated carbon stock changes associated with the 'without project' reference scenario described above. This requires estimation of carbon stocks for each of the land-use classes of concern and a definition of the carbon pools included, among the classes defined in the IPCC 2006 GL for AFOLU. The timeframe for this analysis can be either the project lifetime (see G3) or the project GHG accounting period, whichever is more appropriate.

Following "guidance on conditions under which the change in carbon stocks in existing live woody vegetation are insignificant" from the CDM EB (EB 46 Report, Annex 16), the project's baseline emission reductions are assumed to be zero. The procedure in the guidance is that the change in carbon stocks of existing woody vegetation sinks may be accounted as zero for an area of land within the project boundary if one of the conditions in the guidance is met.

Condition (v) in the guidance is: "harvesting/grazing of foliage, or harvesting/coppicing of live wood, commonly occurs at levels sufficient to result in static or declining biomass in the existing woody vegetation"

Condition (v) is met in the project areas as this has been the principle driver resulting in the successive land degradation that is shown in the time series. Furthermore, the Socio-economic assessment carried out clearly describes the on-going activities ("no-action alternative") as "cutting down of trees and wood plants in favour of crop cultivation, and use of wetlands during the dry season for cultivation of vegetables, rice and sweet potato ")This information is corroborated by the information collected in the leakage assessment[22].

Based on the satisfaction of condition (v), the baseline carbon stock changes/ removals are conservatively assumed to be zero.

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[22] See Page 9 of the leakage summary

G.2.3b Estimate the net change in the emissions of non-CO2 GHG emissions such as CH4 and N2O in the 'without project' scenario. Non-CO2 gases must be included if they are likely to account for more than 5% (in terms of CO2-equivalent) of the project's overall GHG impact over each monitoring period.

The CDM methodology applied does not require project proponents to estimate the net change in the emissions of non-CO2 GHG in the 'without project' scenario as, due to the degrading applicability condition of the methodology, NFP would have negative baseline net greenhouse gas removals and thus the baseline is conservatively assumed to be zero.

G.2.4 Describe how the 'without project' reference scenario would affect communities in the project zone, including the impact of likely changes in water, soil and other locally important ecosystem services.

Without the NGR project the current dependency on shifting agriculture and natural resource use would likely continue, with households living with high levels of poverty. With increasing population levels it seems likely that there would be increased pressure on the need for land for agriculture and for use of natural resources, like, water quality and quantity, which are already a challenge during the dry season for some communities and this will tend to aggravate. Communities already report a decrease in available natural resources, which increases dependency on subsistence agriculture. Furthermore, in the short term, there is no indication of increased government spending on social and commercial infrastructure in the local communities and given that current infrastructures and facilities are week, and few income activities exist, improving living conditions and poverty alleviation seem most unlikely.

G.2.5 Describe how the 'without project' reference scenario would affect biodiversity in the project zone (e.g., habitat availability, landscape connectivity and threatened species).

In the absence of the project, areas of significant biodiversity value would be expected to decline through the continuation of unsustainable use of the forest areas which will be conserved by the project

G3 Project Design & Goals

G.3.1 Provide a summary of the project's major climate, community and biodiversity objectives.

The overall objective of the A/R CDM activity is to contribute to mitigating climate change while meeting the growing demand for quality wood products from well managed plantation forests and contributing to sustainable environmental management, community development and poverty alleviation in Mozambique.

Specific objectives for the A/R CDM project activity:

- *Maximize returns through the sale of wood products* - NGR is planting eucalyptus and pine species. End products include poles, wood chips, and sawn timber. NGR will sell these products to domestic and international markets, including southern and east Africa.

- *To be a leading supplier of carbon offsets* - NGR will sequestrate carbon dioxide and seek approval as a CDM project defined by the UNFCCC mechanisms to combat climate change. All carbon offset revenues will be reinvested locally, and at least 10% of revenues will go to community development and environmental protection.

- *Maintain a strong focus on the environment conservation and social development* - NGR seeks to conserve natural forests and will only plant on land that has been adequately approved for planting, including land that has been abandon or degraded. NGR is following international standards for sustainable forestry and will pursue Forest Stewardship Council (FSC) certification. Furthermore, NGR aspires to contribute to the socio-economic development of local communities through direct investment, employment of local peoples, infrastructure improvement, and collaboration with and promotion of local small businesses.

These objectives comply with the National policies, laws and plans in areas of socio-economic development, conservation of environment, supply of wood products and revenue earnings to the country.

> G.3.2 Describe each project activity with expected climate, community and biodiversity impacts and its relevance to achieving the project's objectives.

NGR projects encompass a variety of activities/initiatives that will have positive impacts on the communities and biodiversity of the region. NFP project is being designed to achieve 3 main objectives namely: i) maximize returns from sales of wood products and carbon credits; ii) contribute to mitigating climate change iii) contribute to environment conservation and social development of its project areas through sustainable development. Below is a summary of the main activities, their impacts and contribution for the project objectives:

1. The plantation activities with exotics (pine and eucalyptus) will contribute to achieve all the 4 objectives of NFP through:
   - Production of raw wood materials (poles, wood chips, and sawn timber) for processing industry reducing thus the pressure on natural forests;
   - Contribute for carbon sequestration and climate change mitigation. The implementation of carbon projects from which 10% of the revenues will be directed to the local communities will also contribute for social development in those areas (objective 3)
   - Change land use in current degraded areas and ensure conservation of ecosystem services (e.g. soil fertility, erosion control);
   - Generate employment opportunities that will diversify the income generating option for the families and contribute for the socio-economic development of the project areas

2. Through the implementation of the Community development programs/initiatives (agriculture, health, education, income generation, etc.) NGR will contribute mainly for objective 3 which is to contribute for the social development of the project area. Specifically, the impacts from these initiatives include, among others, the following:

   - Development of a sustainable settled agriculture that will reduce the environmental degradation while contributing for income generation
   - Improvement in the communities livelihood through alternative income generating activities from allocation of community funds (acquisition of mills)
   - Establishment of socio-economic infrastructures (e.g. roads, schools, health facilities) that will improve the community wellbeing
   - Increase the Literacy level of the workers to empower them with writing, reading and calculation knowledge, as well as, understanding of paid work conditions, and health (STD, nutrition) and safety issues (fire fighting and prevention). All these will consequently contribute to improve the communities' livelihoods.
   - Reduce the existing pressure over natural areas for subsistence purposes (e.g. charcoal production) through introduction of alternatives for income generation;

3. Through implementing the plan for conservation and management of HVCs (e.g. water springs, wetlands significance at the landscape level and natural areas of forests) and SSCIs (e.g. medicinal plants collection sites, worship sites and graveyards), NGR will contribute for objective 3 related to environmental conservation.

G.3.3 Provide a map identifying the project location and boundaries of the project area(s), where the project activities will occur, of the project zone and of additional surrounding locations that are predicted to be impacted by project activities (e.g. through leakage).

The project location, boundaries of the project area, where the protect activities will occur, of the project zone and of additional surrounding locations that are predicted to be impacted by project activities are shown in sections G.1.1. and G1.3 of this PDD.

G.3.4 Define the project lifetime and GHG accounting period and explain and justify any differences between them. Define an implementation schedule, indicating key dates and milestones in the project's development.

As an A/R CDM project, the planned lifetime in terms of carbon financing is 60 years, covering three 20 year crediting periods. However, the project proponents envisage a timeframe spanning beyond this limited period due to the nature of the sustainable activities and expected renewal of the land permit from the government.

Figure G.3.4 Niassa Forest Project – Implementation Schedule
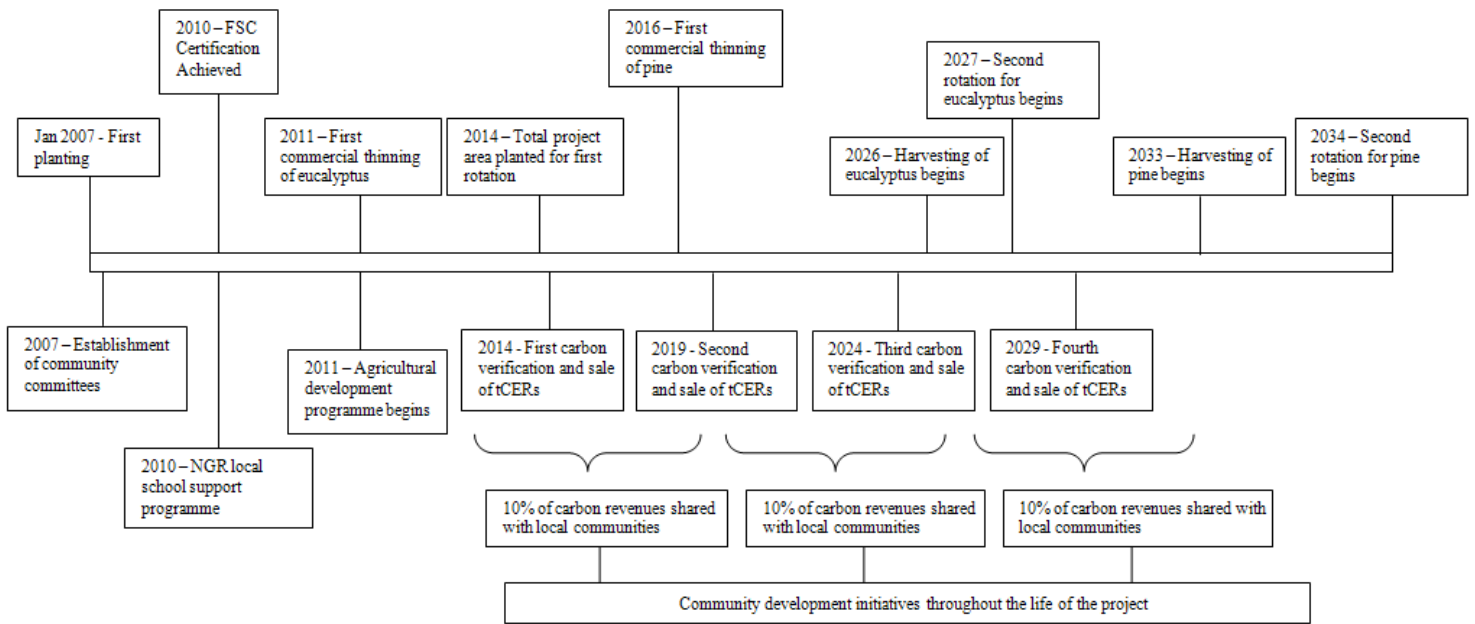
> G.3.5 Identify likely natural and human-induced risks to the expected climate, community and biodiversity benefits during the project lifetime and outline measures adopted to mitigate these risks.

The success of NFP implementation is somehow dependent on the reduction or suppression/control of some potential risks that have been identified –namely:

Fire

Forest fires are perhaps the biggest threat to forest plantations in the Niassa province and the country as a whole. These occur yearly during the dry season as result of the fire use for land preparation and hunting by local communities. As such, NGR regards the fire prevention as crucial for its project implementation and has developed strategies for fire prevention and suppression. These strategies include among others: development of a detailed fire management plan, establishment and maintenance of firebreaks (internal 5m and external 20-25m wide), setting up and marking the fire points for fire fighting activities, training of workers/patrol teams for fire prevention and fire fighting, establishment of fire detection systems (incl. fire towers/watch points and communication system), acquisition of fire fighting equipments and tools, and raise awareness amongst the local communities for the risks posed by uncontrolled fires as well as prevention measures.

To date, a weather station, a fire tower equipped with a communication system and patrol teams have been set up. Trainings have also been carried out for the fire fighting team and awareness campaigns have been carried out among local communities in Malulu unit (the oldest operation site). Furthermore, fire fighting equipments and tools have also been acquired. The local communities have been informed about the risks and normally inform NGR of their plans to use fire on their fields near the plantation areas.

Diseases out breaks

Plantations are vulnerable to a number of pests and diseases that may hinder their development. Pests and diseases may reduce the seedlings/plants growth and even cause their death prejudicing thus the plantation development.

The situations in which diseases outbreaks are likely to occur and against which foresters must be on guard are known and, NGR is paying close attention to them. Measures to reduce the plants' susceptibility to disease outbreaks include: proper site/species matching to avoid trees growing under stress, use of a genetic stock from wider genetic base, use of varied species, ensure an optimum stock level and tree vigour after intermediate cuttings, avoid fires to ensure strong trees at all times.

In regards to pests, the main threat that has been identified to date is the termite attack to eucalyptus seedlings. Termites attack root systems and stem bases of eucalyptus resulting in reduced performance and even mortality. Appropriate soil preparation techniques, chemical control at planting and subsequent applications are thus imperative and environmental friendly pesticides such as the Bandit (Imidaclorprid) approved by the FSC will be used in the first phases of the plantation establishment. In a rotation cycle, the pesticide will be applied on the first year and, in case of re-incidence of attack, on the second year. Research and development activities will also look at alternative methods aiming at reducing the use of chemical control in the long run.

Pests and diseases control require regular monitoring of diseases and pests in the plantations and seeking expert advice as soon as problems arise. As such, the monitoring plans will include activities related to patrolling the areas to check for pests and diseases during the normal or routine works. In case of an outbreak, the affected area will be mapped out and reported on by the inventory and mapping team. This will be used to help select the right approach to combating the disease.

Climate changes effects

Climate change effects are a risk to the implementation of NFP. NGR project is located in areas with prolonged drought season (between July and December every year) therefore, though unlikely, the event of more frequent and longer drought periods may be a problem for the plantations development as this reduces the plantation growth affecting the final volume of standing biomass and thus, the revenues from both the sale of timber and of tCERs. New plantations are more susceptible to this risk but as the plantation develops this susceptibility will reduce. Drought impacts are dependent on the droughts severity and frequency.

Conflicts with the local communities

NGR project is being implemented in areas where there are local communities surrounding the projects, therefore conflicts may arise due to different reasons and these cannot be neglected. The SEIA and EIA have alerted for the possibility of conflicts that should be properly resolved. Unresolved conflict may lead to sabotage of the project activities and thus failure to achieve the project objectives. NGR believes that this is key to success of its operations.

Conflict resolution processes aims to analyze, negotiate and ensure agreement of the parties involved, creating new rapprochement between them. Some communities already have traditional methods of conflict resolution. These methods can be applied in some cases of participatory management of resources but in others it will require new solving skills. As such, outside the existing local mechanisms for conflict resolution, NGR has developed internal mechanisms for disputes and conflict resolution procedure to guide the disputes and conflicts resolution with the various stakeholders. The procedure has been divided in 3 parts namely: i) conflicts with employees; ii) conflicts with local communities and others stakeholders and iii) conflicts that are specifically related to agriculture lands and other activities. As required by the CCBA rules, the existing conflict resolution mechanisms require the involvement of an independent third party that will serve as mediator in the conflict resolution. For the conflicts with employees, the Labour Department will serve as mediator while for the conflicts with local communities and other stakeholders, the District Services of Economic Activities (SDAE) or Other Government appointed representatives will serve as mediators.

Anyone inside or outside NGR can disagree and object to the actions, documents, certification processes, forest management, etc.. The objections, disputes, claims and / or complaints must be submitted in writing and addressed to LGR General Manager (GM) or deposited within the existing complaint boxes in Estate Forest that will be opened by the community officer every 15 days and solved using the most appropriate mechanisms.

> G.3.6 Demonstrate that the project design includes specific measures to ensure the maintenance or enhancement of the high conservation value attributes identified in G1 consistent with the precautionary principle.

No HCV areas have been identified. However, areas of SSCIs will be conserved as explained in section G1.8.

> G.3.7 Describe the measures that will be taken to maintain and enhance the climate, community and biodiversity benefits beyond the project lifetime.

Climate benefits will be enhanced beyond the project lifetime by the project proponent through helping the communities adapt to climate change – see section GL1. These benefits are expected to extend beyond the lifetime of the project through multiplier effects, which will show progressive socio-economic conditions in the region.

The longevity of community benefits will be enhanced through poverty alleviation from the development of alternative livelihood initiatives. NGR will provide local communities with seedlings and training on silvicultural management and other aspects of forestry so they

can successfully establish community woodlots. Training would occur as the communities' plantations develop and reach a new stage of development. The woodlots would be a source of high value timber and a supply of fuel-wood for the communities. NGR will help facilitate community tree growers into associations for the commercial harvesting. Community woodlots have been a great success at other locations of GRAS projects and the same is expected for the villages surrounding the A/R CDM project area. The profits derived from the sale of the timber would help raise the communities out of poverty and enable sustainable development.

The most significant measure which will enhance the biodiversity benefits beyond the lifetime of the project is the supply of wood products to a country where demand is rife and resulting in the degradation of natural forests. The supply of a sustainable timber source to meet this demand will reduce the pressure exerted on the natural forests, and thus conserve biodiversity.

G.3.8 Document and defend how communities and other stakeholders potentially affected by the project activities have been identified and have been involved in project design through effective consultation, particularly with a view to optimizing community and stakeholder benefits, respecting local customs and values and maintaining high conservation values. Project developers must document stakeholder dialogues and indicate if and how the project proposal was revised based on such input. A plan must be developed to continue communication and consultation between project managers and all community groups about the project and its impacts to facilitate adaptive management throughout the life of the project.

Considering the importance of the stakeholders' participation for the success of its project, GRAS puts all efforts to ensure their engagement on all the stages of its project development. As such, apart from the legally required community consultation processes that have been carried out as part of the land acquisition process and EIAs, a procedure for ongoing community consultations (Pro 02) has been put in place in NGR operations. This procedure defines the frequency for the community consultation meetings to take place and opens space for the different stakeholders to convene a meeting whenever that is regarded as important.

To date a set of community consultations has been carried out to fulfill the legal requirements and the company internal policies. Participants to the different meetings were identified as being those with a stake in the project and surrounding areas (Government and Non Government institutions, local communities, traditional leaders, other land user rights).

The first consultations took place during the land acquisition processes (first carried out by Malonda Foundation- for Malulu unit and then by NGR for the new areas namely Malica and Ntiuile). These consultations occurred after a set of conversations and engagement of the local communities had been carried out. As required by the Land Law, the following were involved in the land consultations: NGR representatives, the District Administrator or its representative, the cadastre Services, the local communities and the holders of land

user rights in the neighboring/limiting/adjacent areas. These consultations were carried out to get the positioning/ perception, view point/opinions of the local communities in relation to the project development/implementation and ended with the signature of a consultation minute. The land acquisition process only continues if the local communities have given the go ahead (if they are in favor) for the project implementation.

The second set of community consultations was carried for the Environmental and Social Impact assessment. These consultations are carried out to ensure the interested and affected parties (IAPs) were informed about the project and had an opportunity to comment and present their concerns in relation to the project implementation so that any potential impacts could be identified and mitigation measures determined. To ensure a wider participation, the meetings were also advertised in the media (Newspapers and Radio) and discussion papers based on the Non-Technical Summary of the Report of Environmental Impact Study were also distributed to them. A summary copy of the ESIA was also posted on the internet (at Impacto website) and at the Directorate for Coordination of Environmental Affairs.

For the design of a community development plan that will guide the company intervention in relation to the local communities, the first information about the community needs was extracted from the land consultation meeting minutes. There was a need to prioritize these needs and determine the company areas of intervention because it would not be possible to cover or meet all the needs/requests of the local communities. As such another set of community consultations also had to be carried out and these were followed by the consultations to the Government authorities and NGOs working in the area to ensure that the communities' priorities that had been selected by the company were in line with these organization plans.

To ensure that NGR is aware and respects all the local customs and values, few meetings and site visits were organised with the local communities for the identification of the Sites of Social and Cultural interest (SSCI) and discussion on potential HCVs.. The management prescriptions for these conservation areas has also been developed taking into account the community views collected during consultations meetings.

> G.3.9 Describe what specific steps have been taken, and communications methods used, to publicize the CCBA public comment period to communities and other stakeholders and to facilitate their submission of comments to CCBA. Project proponents must play an active role in distributing key project documents to affected communities and stakeholders and hold widely publicized information meetings in relevant local or regional languages.

The community development officer (CDO) will hold meetings with the leaders of the local communities to explain that the CCBA public comments period is about to commence and go through the final version of the CCBA PDD. Minutes will be taken from the meeting and any comments made to the CCBA will be submitted on their behalf by the CDO.

Also, the CDO will distribute simplified summaries of key documents such as CDM and CCBA PDD, management plan etc to stakeholders, in both English and the local language.

G.3.10 Formalize a clear process for handling unresolved conflicts and grievances that arise during project planning and implementation. The project design must include a process for hearing, responding to and resolving community and other stakeholder grievances within a reasonable time period. This grievance process must be publicized to communities and other stakeholders and must be managed by a third party or mediator to prevent any conflict of interest. Project management must attempt to resolve all reasonable grievances raised, and provide a written response to grievances within 30 days. Grievances and project responses must be documented.

NGR has developed Standard Operating Procedures (SOP) (Procedure - PRO 03) that clarifies how any grievances, complaints and conflicts raised by stakeholders shall be handled. The procedure describes the methods of possible complaint and conflict resolution, raised about the work or any activities conducted by NGR, so as to guarantee their resolution. According to this procedure, any person, inside or outside NGR, can make a complaint against the organization's actions, behavior, documents, certification process, forest management, and others. The complaints, disputes and issues of contention must be submitted in writing to the attention of the Managing Director, either at the reception of the company, by mail or via complaint boxes at the plantation projects which are emptied monthly and delivered to the head office by the Community Liaison Officer.

In line with this procedure, suggestion boxes have been installed at some places of the project implementation namely: the Nursery and the Village headquarters in Malulu so that anyone who wants to can give their feedback on the project – more suggestion boxes are scheduled to be installed. Taking into account the low literacy levels in NGR project areas, grievances and complaints can also be directed to the company management directly or through the workers union (for the employees grievances and disputes) or the Local community management committee (for the community disputes and grievances).

With this procedure, NGR believes it has put into place a transparent, timely and clear process for resolving any issues which arise. Project design is based on views from stakeholders. Stakeholders are communicated through meetings, semi-structured interviews, and focus group interviews to capture information pertaining to the project. Participatory Rural Appraisals are held in the villages to identify the problems, views and concerns for the local stakeholders and are to be incorporated in the management practices. All grievances raised by stakeholders shall be sorted out based on procedure 3 of the company Standard Operating Procedure. These shall be documented and the company shall let stakeholders know the output for their resolution.

If a complaint is made against the project, this should be directed to the Managing Director of NGR and a dossier for the case is opened. The Managing Director shall assign the issue to be solved by the relevant department, and the concerned person/s and/or organization/s shall be kept informed of the developments/progress or of potential extension of resolution, within 15 days. The resolution is registered and if the concerned person/s and/or organisation/s have any complaint on the result an appeal has to be

made. Depending on the disputes origin, workers or community related, the Labor Department and the District Services of economic Activities (SDAE) or other Government appointed institution will act as mediators for the conflict resolution.

> G.3.11 Demonstrate that financial mechanisms adopted, including projected revenues from emissions reductions and other sources, are likely to provide an adequate flow of funds for project implementation and to achieve the anticipated climate, community and biodiversity benefits.

The financial model for the project demonstrates that the project will be able to generate sufficient returns to meet the expected return on equity required by Green Resources' investors and thus implement the project:

Revenues for each of the key CCBS aspects are listed as follows:

Climate:
- GRAS financing – equity investment
- Timber revenues
- tCERs sales

Community:
- NGR direct investment
- 10% revenues from sale of tCERs
- NGR contribution through community development fund

Biodiversity:
- GRAS financing of staff salaries to ensure conservation management plan is implemented

Table G.3.11. Expected revenues from sales of tCERs for NGR and the local communities assuming a tCER price of USD 7.04

	1st Verification	2nd Verification	3rd Verification	4th Verification
tCERs	149,234	1,276,347	2,206,317	2,336,225
ER Revenues	1,050,605	8,985,480	15,532,473	16,447,025
Community Development Revenues (10%)	105,061	898,548	1,553,247	1,644,703
Net NGR Revenue	945,545	8,086,932	13,979,226	14,802,323

> G4 Management Capacity and Best Practices

> G.4.1 Identify a single project proponent, which is responsible for the project's design and implementation. If multiple organizations or individuals are involved in the project's development and implementation the governance structure, roles and responsibilities of each of the organizations or individuals involved must also be described.

NGR is single project proponent and will run all aspects of the project. To implement the proposed project NGR has put in place a management structure that comprises a multi

disciplinary team that has been assigned different responsibilities for the various aspects of the project implementation. The major departments include Inventory & Mapping, Afforestation (nursery, plantation, silviculture treatments, pest & disease and fire control), Certification, Community Development, Personnel & Administration, Finance, Planning, Monitoring & Evaluation (Organizational Chart below).
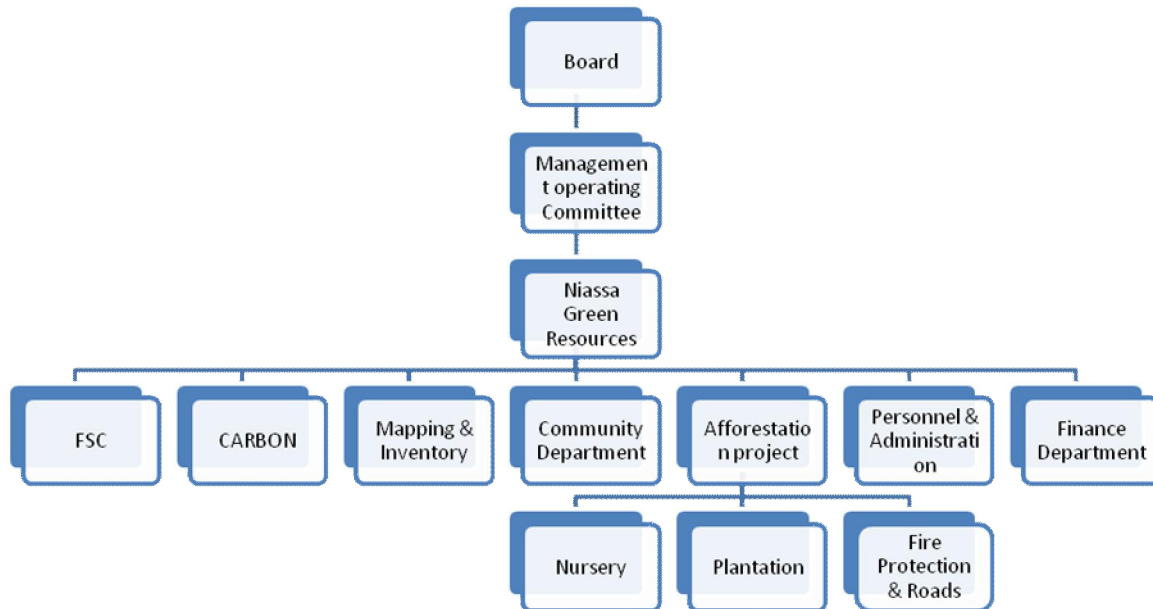
Additionally, NGR will, whenever deemed necessary, use personnel and management skills from Green Resources parent or sister companies. Within Mozambique, NGR will reply upon the support of LGR and GRM for the Mapping & inventory, Certification as well as Personnel and Administration.

G.4.2 Document key technical skills that will be required to implement the project successfully, including community engagement, biodiversity assessment and carbon measurement and monitoring skills. Document the management team's expertise and prior experience implementing land management projects at the scale of this project. If relevant experience is lacking, the proponents must either demonstrate how other organizations will be partnered with to support the project or have a recruitment strategy to fill the gaps.

Lichinga will serve as headquarters where overall plantation management and planning will be conducted. NGR Director will be held responsible for the project planning and execution/ implementation of all technical operations particularly the budgeting management, monitoring and control of the project activities. The upport functions will include the following departments : Inventory & Mapping, Forest Plantation Development (nursery, plantation, silviculture treatments, pest & disease and fire control), Certification (FSC and Carbon), Community Development, Personnel & Administration, Finance, Planning, Monitoring & Evaluation.

Apart from the Afforestation activities, the company will also deal/be involved in community development programs and for its implementation will require a multidisciplinary team of

socio-economists, agriculture and forestry experts and extensionists. Currently, the following staff has been assigned with responsibilities in the NGR A/R project:

Arlito Cuco, **Managing Director**. Joined GRAS in 2007. Mozambican. MSc Forestry from University of Helsinki, Finland, 1991 and BSc in Forestry Engineering from Eduardo Mondalane University (UEM), Mozambique. National Director of Forestry and Wildlife1998-2006, National Director Lands, Forests and Wildlife 2006-07, Chairman African Forestry and Wildlife Commission 2006-07. Previously, worked with IFLOMA and as a Lecturer at EMU.

Inocencio Elias Sotomane, **General Manager**. Joined NGR in 2010. Mozambican. Honors of Veterinary Science from Eduardo Mondlane University, Maputo, Mozambique. CEO of Malonda Foundation 2005-2010. Executive Director of Swedish Program Cooperation for Niassa Province, 1999-2005. Niassa Governor's Advisor, Niassa, 1999-2010. Niassa Provincial Director of Agriculture and Fisheries, Niassa, 1996-1999. Head of Provincial Livestock Services, Tete, 1989 - 1996.

Gracindo Vasco Sayal, **Plantation Manager**. Joined GRAS in 2007. Forest Diploma from Zimbabwe College of Forests, Mutare, Zimbabwe. Bachelors in Political History and Management from Pedagogic University, Niassa, Mozambique. Forest Unit Manager, IFLOMA, 1982-1985. Sales Manager, Commercial Department, IFLOMA, 1987-1992. Commercial Director, IFLOMA, 1992 – 1998. Forest Direction, IFLOMA, 1998 – 2004.

Gracete Júlia Nhamirre, **FSC Officer**. Joined GRAS in 2007. Honors in Forestry by Universidade Eduardo Mondlane, Maputo;

Nilza Puná, **Certification Manager**. Joined GRAS in 2008. Mozambican. MSc in Applied Science for Natural Resources Management, James Cook University (JCU), Australia, 2007. National Program Coordinator at the International Network for Bamboo and Rattan 2007-08. Planning officer, National Directorate of Forests and Wildlife, Ministry of Agriculture, 2003-06; Part-time Lecturer at Eduardo Mondalane University (UEM), 2004-05.

Nicholas Embden – **Carbon Manager**. Joined GRAS in 2009. Honors in Chemistry with Industrial Experience. University of Bristol; Masters in Environmental Technology, Specialising in Ecological Management, Imperial College London. Peruvian Amazon Research Institute (IIAP) 2009; Ecosecurities Forestry Team, 2008.

Zefanias Moisés Everaldo Mawawa, **Community Liaison Officer.** Joined GRAS in 2010. Born 1975, Mozambican. Bachelors of Administration, Planning and Management in Education from Pedagogic University, Niassa, Mozambique. Administration Assistant at Accord, 1998. Training Official at Accord, 1999-2002. Coach of Community Radios in Unesco Midia Development Project 2001-2003. HIV/AIDS officer, Accord, 2003-2004. Disctrict Programme Coordinator, Centro Cooperativo Sueco, 2005-2006. Climate Change Development Officer, centro Cooperativo sueco, 2007-2010.

Dominique Kwesha, **Mapping and Monitoring Manager**. Joined GRAS in 2009. Zimbabwean. MSc Geographic Information Systems (Forest Management), University of Greenwich, United Kingdom, 1996. Post-graduate Diploma Forest Survey, ITC, Netherlands in 1991 and received a Diploma in Forestry from Zimbabwe College of Forestry Zimbabwe in 1985. He was Director of Center of Geographic Information Catholic University of Mozambique from 2008 - 2009 and Biodiversity Office Co-ordinator/ advisor

to the Ministry of Environment and Tourism in Zimbabwe 2003-2007. Dominick was also Mapping and Inventory Officer for Zimbabwe Forestry Commission from 1995 – 2007 and was instrumental in the establishment in Zimbabwe of an operational Vegetation Resources Information Systems (VegRIS). He is a member of The Miombo Network.

Platiel Ernesto Chilaule, **Mapping and Inventory officer.** Joined GRAS in 2008. Mozambican. Bachelors of Agriculture Sciences from Catholic University Of Mozambique (Faculdade de Agricultura de Cuamba – FACAC). Cuamba, Moçambique. Lecturer at Universidade do Lurio (UNILURIO) 2010.

Andre Da Sila/Dercio Massango (Personnel & Administration)
Andre de Silva, **Corporate Lawyer**. Joined in 2009. Mozambican. LLB in Law from Eduardo Mondlane University (UEM), Mozambique. Finalising Research Report for a LLM Degree at Witwatersrand University, South Africa (2005-07). Secretary of National Council on Sustainable Development, 2002-08; Head of Legal Department at Ministry for the Co-ordination of Environmental Affairs, 1996-06. Until join Green Resources he was representing Mozambique, as member of the Steering Committee for the elaboration of the SADC Protocol on Environment, and he was Lecturer of Environmental Law at UEM.

Henrique Chissano, **Finance Manager.** Joined GRAS in 2007. Born 1973, Mozambican. BA Management from. Maharishi University of Management, IA USA. Financial Controller for National Directorate of Forestry and Wildlife 1998-04. IDEL Planning Technician 1998-98. Financial Controller for TFCA project 2005-08.

Paulo Cristiano Filipe John, **Finance Department/Accountant.** Joined GRAS in 2010. Mozambican. Bachelors of Accounting and Auditing from Institute Superior de Ciencias e Tecnologoas de Moçambique (ISCTEM). Moçambique. Teacher at Instituto Politecnico de Tecnologias e Empreendedorismo (IPETE). 2009. Price Waterhouse Coopers (PWC) 2009-2010.

The project will cooperate or partners, whenever needed, with a number of agencies, institutions and programs for advice pertaining to technical, ecological and social matters where necessary, including: Government (e.g. Labour Department, Agriculture Department) and Non-government Organizations (e.g. UCA, Swedish Cooperative Centre), private companies (e.g. New Forests Company, Floresta do Niassa, etc.), Research and Development Organizations (e.g. Universidade Lúrio (UNILURIO), Universidade Eduardo Mondlane (UEM) and Mozambique Agrarian Research Institute (IIAM)).

These partner organizations are able to assist NGR through provision of technical consultation and guidance as needed, including training courses, quality control and technical inputs for the preparation and implementation of the proposed activity. Project proponents will also seek advice from local, national and international forestry and sustainable forest management experts where required.

G.4.3 Include a plan to provide orientation and training for the project's employees and relevant people from the communities with an objective of building locally useful skills and knowledge to increase local participation in project implementation. These capacity building efforts should target a wide range of people in the communities, including minority and underrepresented groups. Identify how training will be passed on to new workers when there is staff turnover, so that local capacity will not be lost.

Green Resources' employee handbook, which is applicable to all of its subsidiaries and employees companywide, stipulates in section 3.6.7 that all new employees shall undergo orientation and induction training when they join the company. The orientation/ induction programme will cover:

a) Organisation set up and structure
b) Organisation vision, mission, values and objectives
c) Company handbook
d) Health & Safety Policy
e) Disciplinary and Grievance Procedures
f) Job Description
g) Diversity & Respect Programme
h) Anti-Bullying and Harassment Programme

NGR will hire local workers where possible but will, whenever needed, use personnel and management from parent company Green Resources. Skilled personnel will transfer knowledge and skills to local workers through formal training, on-the-job learning, and apprenticeships. Additionally, skilled labour will be sourced from local institutes and universities such as Universidade Eduardo Mondlane, Universidade de Lúrio, Universidade Católica (Cuamba) and Institutos Agrários de Lichinga, Chimoio, Boane. The company will also prepare a central training programme that will be designed for a five-year implementation. This plan will be implemented to improve the skills and knowledge of project staff and eventually enhance their work efficiency and enable them to adopt new and changing technology.

Furthermore, some divisions and specific operations may have their own mandatory training courses, such as Advanced Driving courses, Fire Prevention, First Aid etc.

As part of GRAS group, NGR policy is to develop and maintain a solid and well balanced organisation and management team capable of performing the duties of the Company properly. As such the training and development of Company employees is a key issue for the company that will, whenever possible, look for internal training opportunities for its employees and shall also, in appropriate cases, take advantage of courses organised by other agencies. Employees are also encouraged to pursue higher education to improve their skills and operational efficiency.

With regards to the training of local people, to ensure they can meet the organisation's long-term staffing requirements, NGR is currently developing a training strategy that will define the long term training needs for the company workers based on the staffing needed skills for the various operations to take place during the project life cycle. Trainings will allow the local communities and other NGR workers to improve their skills and enable them to achieve career advancement in the company.

Additionally, the company will give special attention to in-service training for short-term staff. In this type of training, the health and safety aspects will always be emphasized. Professional staff, especially the young university graduates, should undergo intensive on-the-job training and will have the opportunity to attent courses and seminars relevant to their jobs. On-the-job training will also be carried out at workplaces for supporting staff and casual workers to ensure that the project has a highly skilled and motivated workforce.

Training is also necessary for the prevention and reduction of the risk of accidents and work-related illnesses, which again will increase productivity. Training in certification (ISO, FSC, CCBA and CDM) will also be carried out. The Company encourages its employees to participate in professional courses, seminars and training when there will be a documented benefit from the activity in the form of increased knowledge or networking. To date the following courses have been carried out:

Table G.4.3. Courses and training carried out by NGR

Date	Course	Venue	Organized by	Duration	Students
12-Feb-07	Forest course	Mafinga	Green Resources	180 days	2
29-Jul-07	CDM / FSC / ISO	Mafinga	Green Resources	7 days	2
Aug-07	HIV	Lichinga	Malonda Foundation	3 days	5
11-Sep-07	First aid	Lichinga	Malonda Foundation	3 days	3
01-Nov-07	ISO 14001	Dar-es-salaam	Green Resources	3 days	2
May-08	Saw operator	Florestas do Niassa	Florestas do Niassa	10 days	2
May-08	Saw mechanic	Florestas do Niassa	Florestas do Niassa	10 days	1
23- Jun-08	Advanced fire fighting	Florestas do Niassa	Florestas do Niassa	3 days	3
27-Jun-08	Fire- crew leaders	Florestas do Niassa	Florestas do Niassa	6 days	1
06-Aug-08	HIV	Lichinga	O.T.M	2 days	1
29-Aug-08	Seed collection	Lichinga	Green Resources	7 days	4
Aug-08	Indigenous species	Lichinga	Green Resources	7 days	2
Sep-08	Radio and communication	Lichinga	Malonda Foundation	1 day	2
14-Sep-08	Basic Fire Fighting	Florestas do Niassa	Florestas do Niassa	6 days	10
May-09 – May-10	Inventory & PSPs establishment and monitoring	Tanzania	Green Resources	365 day	1
13-29-May-09	FSC – Part I	Sweden	SIDA/SSC Forestry	20 days	1
Jun-09	FSC basic notions	Pemba	SGS	2 days	1
Sep-09	Microforest operations	Mafinga	Green Resources	3 days	4
2009-2010	Inventory, mapping & PSPs establishment and monitoring	Mafinga	Green Resources	Months	1

Date	Course	Venue	Organized by	Duration	Students
10-29-May-2010	Forest Certification Course – Part I	Sweden	SIDA/SSC Forestry	19 days	1
Nov-2010	Forest Certification Course – Part III	Beira-Sofala	SIDA/SSC Forestry		2

> G.4.4 Show that people from the communities will be given an equal opportunity to fill all employment positions (including management) if the job requirements are met. Project proponents must explain how employees will be selected for positions and where relevant, must indicate how local community members, including women and other potentially underrepresented groups, will be given a fair chance to fill positions for which they can be trained.

The project offers employment to residents of the project zone. Community members will have a fair opportunity for working at NFP as outlined in the company's SOP 07, Employee Selection Procedure. Particular care is taken to ensure that selection criteria are not in any way directly or indirectly discriminatory on grounds of gender, race, disability, religion or belief. Local stakeholders with relevant skills are highly encouraged to fill higher positions; though there are many job opportunities for less skilled workers.

One of GRAS objectives is to become the favoured employer in the local community, attracting the best employees. As such, in line with Pro 07, whenever possible (if job conditions/requirements are met) preference is given to hiring local labour (people residing in or in the surroundings of the project areas).

To ensure that the contracts are awarded through a transparent process on the basis of clear criteria a clear and transparent recruitment system/policy has been developed (described in the company handbook). This policy is being followed and the documentation being properly filed.

During the recruitment process, Supervisors should use their intuition in a fair way, evaluating the requirements and qualifications required for the position advertised. Therefore, the process requires that each position and respective requirements are clearly defined (e.g. skills, qualification and knowledge required). Employee selection shall identify the candidate that is most qualified for the particular position advertised.

The job vacancies should be advertised internally and externally with indication of position, the work to be carried out, qualifications required, the application procedures as well as the contact details. After applications are received the interviews are carried out with those with relevant experience and qualifications for the job advertised.

For the seasonal labor (rural workers), who normally belong to the local communities, the vacancies should be advertised through the District Services of Economic Activities (SDAE) and/or a verbal information that is sent out for the local leaders that will then inform the local communities. For these vacancies, the supervisor receives the names of the applicants and selects the people based on the following criteria: place of residence,

experience and skills for the specific position, literacy level and age (above 18 years). Additionally, if the applicants feel that the selection process was not fair, the claims should be dealt with following Procedimento 3.2 "Resolução De Conflitos e outras Preocupações apresentadas pelas comunidades e outros intervenientes".

G.4.5 Submit a list of all relevant laws and regulations covering worker's rights in the host country. Describe how the project will inform workers about their rights. Provide assurance that the project meets or exceeds all applicable laws and/or regulations covering worker rights and, where relevant, demonstrate how compliance is achieved.

FSC™ Principle 1 and its associated criteria require that NGR abides by/respect all the country regulations including the international treaties and agreements to which Mozambique is signatory as well as follow all FSC Principles and Criteria. Therefore, by being FSC certified, NGR is in compliance with all these legislations including any legislation covering the workers' rights.

Within the country, the relevant legislation to be followed is the labor law (Lei de trabalho-2007) – labor law that concerns the rights and duties of workers, as well as questions of hygiene, health and safety at work.

Additionally, because Mozambique is Signatory of the International Labour Organisation (ILO) then these conventions and codes of practice should also be followed in particular:
- Code of Practice on Safety and Health in Forestry,
- Convention 87: Freedom of Association and Protection of the Right to Organise.
- Convention 98: Application of the Principles of the Right to Organise and Bargain Collectively.
- Convention 138: Minimum Age for Working
- Guidelines for worker's health surveillance
- Guidelines for Labour Inspection in Forestry 2005
- Guidelines for Occupational Health and Safety and
- Protection of Worker's personal data

To ensure that employees have access to the updated legislation and are aware of their rights, a copy (archive) of all legislation is kept in the main office for consultations from time to time. Additionally, as required in Pro 15 of the SOP, the company has subscribed to the ATNEIA database which provides full access to all legislation enacted in the country. The company legal adviser shall, whenever needed, inform the managers about any updates considered relevant to the company operations. Furthermore, the workers union that is related/connected/linked to the Labor department also helps in raising the employees' awareness about their rights and guides them in cases of disputes.

G.4.6 Comprehensively assess situations and occupations that pose a substantial risk to worker safety. A plan must be in place to inform workers of risks and to explain how to minimize such risks. Where worker safety cannot be

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> guaranteed, project proponents must show how the risks will be minimized using best work practices.

Niassa Green Resources has health and safety risk assessment guidelines in place which outline the procedure required to affectively carry out a risk assessment at project sites. The objectives of having a risk assessment in place are as follows:

1. Protect the safety and health of all stakeholders of NGR by preventing work related injuries, illness, diseases and incidents
2. Ensure that occupational health and safety (OHS) management system comply with relevant national laws and regulations
3. Ensure that all employees are encouraged to participate actively in all elements of the OHS management system; and continually improving the performance of OHS management system
4. Use of information, training and educational program to ensure that our employees are aware on their role and responsibility and appropriate skills and competences
5. Investigate all incidents and near misses at work that have or could have resulted in serious personal injury, accidental loss and/or property damage and take action to prevent recurrence.

As required by the company handbook and Environmental Management Plan (EMP), to ensure the implementation of the EMP and monitor the project impacts on the project and surrounding areas, NGR should appoint a Health and Safety officer that will be responsible for the development and implementation of the Health and safety programs within the company.

Additionally to ensure that all company employees are working on a healthy and safe environment reducing thus the incidence of accidents and diseases, Procedure 14 has been developed and is currently being implemented. Pro 14 is applicable to all company operations and activities at all levels including contractors. According to this Procedure, Supervisors are responsible to ensure people are following the safety procedures and the PPE usage. Employees should receive trainings in health and safety procedures and are responsible to make use of the PPE and report any work incidents and accidents.

A full risk assessment will be carried out at NGR plantation sites and, as required by the handbook, all staff will be informed of the risks involved in their activities during the orientation/induction programme.

Pro 14 also includes information about the need for 1st aiders, 1st aid trainings, 1st aid kits and communication and evacuation in cases of emergency. Furthermore, the procedure also includes: i) the description of the PPE that is required for different activities and, ii) the need to explain/make employees aware of the importance of wearing PPE and the sanctions that will be imposed on them for not wearing it.

> G.4.7 Document the financial health of the implementing organization(s) to demonstrate that financial resources budgeted will be adequate to implement the project.

As shown in section G.4.1, GRAS provides financing to Niassa Green Resources for implementation of the Niassa Forest Project. GRAS is financed through equity investment, with group shareholders' equity at NOK 340million (USD 49mn) at the end of 2008[23]. In 2010 Green Resources successfully raised a total of NOK 108 million (USD 20 million)[24]. The company is therefore sufficiently capitalized to implement the project.

G5 Legal Status and Property Rights

> G.5.1 Submit a list of all relevant national and local laws and regulations in the host country and all applicable international treaties and agreements. Provide assurance that the project will comply with these and, where relevant, demonstrate how compliance is achieved.

By being FSC certified, NGR is in compliance with all national and international legislation that is applicable for the activities in which it is involved. Following is presented a list of legislation that is applicable for all forest operations in Mozambique:

National Legislation
Environment Law (Law 20/97)
The Environment Law lays down the legal bases for the use and correct management of the environment to guarantee the sustainable development of the country. It is applicable to all activities, public and private, that might directly or indirectly affect the environment (both physical and socioeconomic). This law also deals with environment pollution, in Article 9, banning the deposition in the soil, sub-soil, water or air, of any toxic and polluting substances. Article 10 of the law mentions the need to establish legal standards for emissions into the environment, which are partly defined in Decree no 18/2004 (below).

Regulations on the Environmental Impact Assessment Process (Decree 45/2004)
The Environmental Impact Assessment processes in the country are regulated by Law 45/2004. Based on this regulation NGR project was classified as Category A activity, thus an Environmental Impact Study was required before the project implementation. As such an EIA was carried out for the project areas. Preceding the Environmental Impact Study, the Environmental Pre-Feasibility and Scoping Study and Terms of Reference (ToR) were also drawn up and public consultation meetings held as required by Articles 10, 11 and 14 of the regulation. After the EIA approval, the prescribed licensing fees were paid and the Environmental License issued (Article 25). The validity of the license is valid for 5 years (renewable for the same period, on request) as set up in Article 20 of the same regulation.

General Directive for Environmental Impact Studies (Ministerial Diploma no. 129/2006)
This Directive provides guidelines and parameters for undertaking the Environmental Impact Study (EIS). Its main objective is to standardise the procedures to be adopted and

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[23] As evidenced in the Annual Report 2008, *Equity financing,* p43

[24] As shown in the GR 2010 Director's Report

give the various stakeholders directives for carrying out the EIS. The EIA that was carried out for NGR operations followed these guidelines.

Land Law (Law no. 19/97) and Land Law Regulations (Decree no. 66/98)

A fundamental principle under the land legislation is that, in Mozambique, all land is owned by the State. The land Law and its Regulations lay down the terms under which the land user rights (DUAT) are constituted, exercised, modified, transmitted and cancelled. The land legislation provides the basis for the development of land administration systems that facilitate rural development and safeguard the rights and interests of the private sector, as well as of rural poor people.

The legislation also defines zones of partial (ZPP) and total (ZPT) protection, for purposes of nature conservation and defence and security of the State (articles 6, 7 and 8). According to this legislation, only under exceptional conditions can land use rights be acquired in these zones. As required by the legislation, NGR has acquired a 50 year DUAT (DUAT 881) for the Malulu parcel of land covering a total area of about 7880 ha of which 5710ha have been officially demarcated. For the other parcels of land included within the A/R CDM project, NGR has obtained approval from the local communities, through the legal required community consultation meetings, and, the process has been submitted for government approval and issuance of the DUAT following the processes laid by the legislation.

Regulations on Waste Management (Decree no. 13/2006)

This Regulation establishes rules on the production, disposal in the soil and subsoil, releasing into water or into the atmosphere, of any toxic and polluting substances, as well as polluting activities that accelerate degradation of the environment, to prevent or minimise their negative impacts on the health and the environment. The Regulation also indicates which bodies at the various levels (e.g. MICOA, and the municipalities) have powers in matters of dangerous and non dangerous waste management.

Forest and Wildlife law (law 10/99),

Approved in 1999 by parliament, this is the principal legislation controlling the forestry and wildlife sector. It defines two main functional categories: (i) protected areas, which include national parks and national reserves in which harvesting is not permitted, and (ii) sustainable utilisation areas that includes productive forests and multiple use forests that are set aside exclusively for management on a sustainable basis. This legislation provides opportunities for the development of forest plantations under the sustainable utilization areas.

Regulations of the Forestry and Wild Life Law (Decree 12/2002)

This Regulation is applicable to the protection, conservation, use, exploitation and production of flora and fauna resources. It covers all activities including sale, transport, storage and primary, artisanal or industrial transformation of these resources.

Water Law (Law no 16/91)

The water law lays down the bases for the management of water resources, based on the principle of "user pays" and "polluter pays", as well as the water concession and licensing regime. These factors were defined taking in the principles of environmental sustainability as the basis. Chapter IV of this Law refers to protecting the quality of water: contamination, protection, banned activities, prevention and control, etc. In this context, this Law also bans the direct or indirect contamination of water (Article 53).

Regulations on Environmental Quality Standards and Emissions of Effluents (Decree no. 18/2004)

This regulation establishes quality standards for the environment (air, water, soil, noise) and its appendices present these standards, namely: Appendix I – Air quality standards, Appendix II – Standards for emissions of gaseous effluent by industries, Appendix III – Standards for emissions of liquid effluent by industries, Appendix IV – Standards for emission of domestic liquid effluents, Appendix V – Standards of the receiving body (Sea/Ocean), and Appendix VI – Manual of Classification, Quantification and Interpretation of soil and water laboratory analyses.

Regulation on the Quality of Water for Human Consumption (Ministerial Diploma 180/2004)

This regulation establishes the parameters of the quality of water intended for human consumption and the forms of controlling it. The regulation is applicable, *inter alia*, to fresh ground water, intended for direct consumption or to produce water for human consumption. The parameters are laid down in Appendices to the Regulation.

Labour Law (Law no. 23/2007)

This law concerns the rights and duties of workers, as well as matters related to hygiene, health and safety at work. NGR project was developed and is being implemented in compliance with all the applicable legislation of the country and the internationally accepted best practices in relation to both forest and carbon credit certification. As such the company has been FSC certified and, to maintain the certificate, NGR will make sure that all its operations continue to abide by the legislation and the FSC requirements.

National policies

The most important policies that are related to the environment and to some extent to the forest plantation are: the Forest and wildlife policy and strategy (1997), Environmental Policy (1995) and the National Strategy and the Action Plan for Conservation of Biodiversity in Mozambique.

These set of policies and respective regulations regulate the access and correct use of the environment as well as the land and forest resources to achieve the sustainable development in country. Key actions under these Government policies are: i) creation of conditions to promote the growth of the industrial sector and increase the GIP, ii) contribution restoration of the food production and ensure food security, iii) help develop the smallholder farming system, iv) promote sustainable and profitable private investments without harnessing the local interests, v) promote the sustainable use[25] of lands and forest resources and vi) conserve areas with ecological interest, vii) modernization of the economy, and viii) job creation.

The Forest and Wildlife Policy and Strategy, in particular, defined the following objectives related to the A/R activities:

- Promote participation of local populations in refforestation programs
- Encourage the private initiatives of industrial and commercial plantations
- Incentive establishment of industrial plantations with rapid growth species to supply local industry, increase exports and reduce the pressure over native forests

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[25] Includes the exploitation, use, production, commercialization, storage as well as the artisan, industrial or primary processing of these resources

- Identification and demarcation of areas with potential for forestation and afforestation programs to guide investments in the sector

The National Strategy and Plan of Action for the Conservation of Biodiversity in Mozambique, drawn up by the Ministry for the Coordination of Environmental Action (MICOA), lays down directives and define priority actions to be implemented by the various sectors of the economy, to ensure sustainable development in the country. Amongst others, the areas of action identified in the Strategy are:
- Identification and analysis of the components of Biodiversity and their relations within ecosystems, processes and activities that can have an adverse impact on them;
- Determination of the conservation status of species in Mozambique, identification and implementation of appropriate conservation measures for threatened and endemic species
- Determination of the conservation status of ecosystems and habitats in Mozambique, identification and implementation of appropriate measures for conserving and managing the ecosystems, particularly the fragile ones.
- Limit the introduction and spread of species that cause any damage to native diversity and measures to control and eradicate exotic species which might affect the native ecosystems, habitats and species.

Though not directly related to the A/R project implementation, the **Tourism Policy and Implementation Strategy (Resolution no. 14, of 4 April 2003)** also has some environmental objectives that are worth mentioning namely:
- To ensure that tourism and the environment are integrated;
- To promote a pro-active approach from all those involved in tourism to develop and manage the sector in a responsible and integrated fashion;
- To give priority to the preservation, quality and sustainability of biodiversity;
- To contribute to the rehabilitation, conservation and protection of ecosystems that are part of the country's cultural heritage;
- To promote the development of natural resources, particularly those that have ecological or historical value, in a recreational, aesthetic and/or socio-cultural form;
- To make Mozambique a prominent actor in responsible environmental practices.

As can be seen above, the present A/R project is also in line with the country policies' and objectives lain down in the various policies.

International Conventions
Apart from the National policies and legal framework, the implementation of A/R projects in Mozambique should also abide by the international Conventions and Treaties that Mozambique is part of/has signed and ratified namely:
- Resolução nº 2/94, that ratifies the UN Convention On Biological Diversity, Rio de Janeiro, 1992, (BR 34, 1ª série, 3º suplemento de 24 de Agosto).
- Resolução nº 17/96, that ratifies the Convention for the protection, Management and Development of the Coastal and Marine region of Eastern Africa of 2nd June 1985 and its respective protocols
- Resolução nº 8/93, that ratifies to the Convention for the Protection of Ozone Layer and Montreal Protocol about the substances that destroy the Ozone layer (BR no 49, 1ª série, 2º suplemento de 8 de Dezembro)
- Resolução nº 17/82, that ratifies the Convention for the Protection of the World Cultural and Natural Heritage Paris, 1972; (BR nº 44, I série, de 13 de Novembro)

- Resolução nº 45/2003, that ratifies the Convention on Wetlands of International Importance, especially as Waterfowl Habitat (Ramsar Convention) Ramsar, 1971 ratified in 2003, (BR nº 45, I Serie de 5 de Novembro)
- Resolução nº 20/96, that ratifies the UN Convention of 7th June 1984, on the combat to desertification in countries affected by heavy droughts and/or desertification, particularly in Africa, (BR nº 47, 1ª série 5º suplemento de 28 de Novembro)
- Resolução nº 20/81, that ratifies the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES, or Washington Convention) Washington, DC., 1973 (BR nº 52, 1ª série de 30 de Dezembro);
- Resolução nº 9/2008, that ratifies the Convention on the Conservation of Migratory Species of Wild Animals, Bonn, 1979 and its respective amendments (BR nº38, I série, 5o Suplemento de 19 de Setembro)
- Resolução nº 18/96, that ratifies the Basel Convention on the Transboundary Movements of Hazardous Wastes and their Disposal Basel, 1989 (BR nº 47, 1ª serie, 5º suplemento de 26 de Novembro)
- Resolução nº 19/96, that ratifies the Bamako Convention on the Ban on the Import into Africa and the Control of Transboundary Movement of and Management of Hazardous Wastes in Africa, Bamako, 1991; (BR nº 47, 1ª série 5º suplemento de 26 de Novembro)
- Resolução nº 11/2001, that ratifies the Cartagena Protocol about the Bio-safety (BR nº 51, 1ª série, 6ª suplemento de 20 de Dezembro)
- Resolução nº 1/94, that ratifies the UN Convention on Climate Change, of June 1992 (BR nº 34, 1ª série, 2º suplemento de 24 de Agosto).
- Resolução nº 10/2004, that ratifies the Kyoto Protocol of the UN Convention on Climate Change (BR no 30, 1ª série suplemento, de 28 de Julho).

By being an FSC certified company, NGR and all its operations should respect and be in compliance with all the above mentioned legislation as required by the Principle 1.

> G.5.2 Document that the project has approval from the appropriate authorities, including the established formal and/or traditional authorities customarily required by the communities.

NGR A/R project has been approved, by the Centre for Investment Promotion (CPI) of the Ministry for Planning and Development, in August 2011 (authorization 141/11). Through this authorization, NGR has been granted a permission to carry out the A/R project in accordance with the investment law (Law 3/93).

Additionally, as part of the legal requirements for the land acquisition, formal consultation was carried out with the local communities to listen the community's perception, view point/opinions in relation to the NGR project in the selected areas. The consultation also aimed at harmonizing the rights and interests of the local communities with the A/R project interests/programs and to build trust allowing for the establishment of partnerships between them reducing thus the potential conflicts.
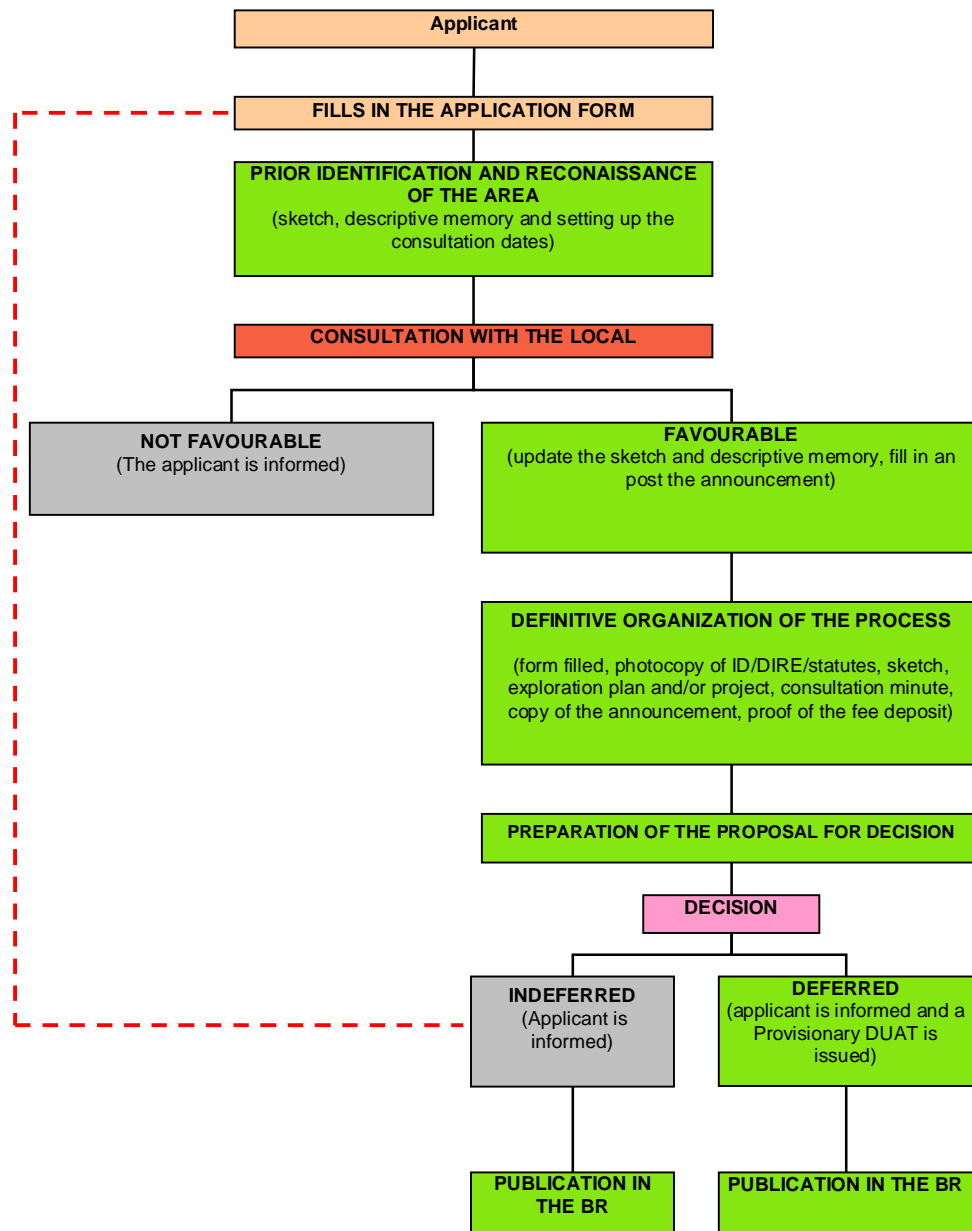
The land consultations meetings, that were leaded by the District Administrator with participation of the Provincial Cadastre Services and the project developer, were open to anyone from the local communities to attend. The meetings started with the presentation of the participants, the consultation objectives, the project presentation, auscultation and clarification of the community perceptions and concerns in relation to the project

implementation. The meetings were closed with the signature of the consultation minutes that show that the communities accepted the investment in their areas.

Other opportunities were also given to the local communities to express their views and opinions during the Consultations for the Environment and Social Impact Assessment (ESIA) and the land demarcation process.

> G.5.3 Demonstrate with documented consultations and agreements that the project will not encroach uninvited on private property, community property, or government property and has obtained the free, prior, and informed consent of those whose rights will be affected by the project.

As required by the country Legislation, NGR has acquired the title/ user rights for the parcels of land in which it is operating. Before the land was granted to NGR a process (figure below) was followed to ensure that there were no other land users for the area.

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  │                                       │ announcement)            │
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PRIOR IDENTIFICATION AND RECONAISSANCE OF THE AREA
(sketch, descriptive memory and setting up the consultation dates)

CONSULTATION WITH THE LOCAL

NOT FAVOURABLE
(The applicant is informed)

FAVOURABLE
(update the sketch and descriptive memory, fill in an post the announcement)

DEFINITIVE ORGANIZATION OF THE PROCESS

(form filled, photocopy of ID/DIRE/statutes, sketch, exploration plan and/or project, consultation minute, copy of the announcement, proof of the fee deposit)

PREPARATION OF THE PROPOSAL FOR DECISION

DECISION

INDEFERRED
(Applicant is informed)

DEFERRED
(applicant is informed and a Provisionary DUAT is issued)

PUBLICATION IN THE BR

PUBLICATION IN THE BR

As shown above, the land acquisition process involved consultations that provided an opportunity to hear the opinions/perceptions/views from the local communities, other land users in the area as well as other Government Institutions (District, Administrative Post, and Locality) that are responsible for the land titling regarding the project implementation in the selected areas. NGR has followed the legal process required for the land acquisition and as such no other land owners were found in the areas that it has been granted the DUAT for. To refer that the community consultation meetings are open to the public and, as such, people who are using the neighbouring areas also participate in it.

> G.5.4 Demonstrate that the project does not require the involuntary relocation of people or of the activities important for the livelihoods and culture of the communities. If any relocation of habitation or activities is undertaken within the terms of an agreement, the project proponents must demonstrate that the

> agreement was made with the free, prior, and informed consent of those concerned and includes provisions for just and fair compensation.

In line with its internal policies, NGR will not be involved in any type of involuntary resettlement of people or their activities. Additionally, apart from the voluntary resettlement of farmlands, there will be no resettlement of cattle or other animals. To ensure the smooth resettlement of farmlands, Pro 3.3 "Negotiation of voluntary resettlement/removal of farmlands from the project area" has been developed and integrated into the SOP. This procedure is being followed and provides guidance on how to carry out the machambas resettlement/relocation in NGR project areas.

The procedure emphasizes the need for strong articulation between the company and communities with involvement of the local Government and local authorities to harmonize the different interests and create conditions that allow the project development without prejudicing the agriculture production and food security.

The guiding principle for the farmland relocation is the compensation of farmers and support in form of land preparation, agriculture inputs and seeds as well as technical assistance. This is done to increase productivity and incentivise the use of improved cultivation techniques.

Pro 3.3 lays down the steps to be followed for the farmland relocation namely: i) survey of farmlands and negotiation with the owners to find if they are willing to leave the project area, ii) identification of new areas for the farm relocation in expansion zones, iii) support for the land preparation, and iv) acquisition and distribution of improved seeds and inputs. All this process is properly documented so that it is possible to prove that the farm relocation was not forced.

Additionally the Pro 3.3 determines that in cases of disputes over the land, the activities that caused it should be ceased until the conflict is resolved and both parties agree with the solution achieved. This will ensure that the project activities with potential to impact adversely on the local people's life will not be carried out without their consent.

> G.5.5 Identify any illegal activities that could affect the project's climate, community or biodiversity impacts (e.g., logging) taking place in the project zone and describe how the project will help to reduce these activities so that project benefits are not derived from illegal activities.

Within NGR project areas there are patches of remnant natural vegetation that are being set aside for conservation (NGR will plant in mosaic system leaving space for the wildlife corridors). However, although these areas are under NGR DUATs, the trees there are still not legally owned by the company and the management of these areas should be made by the Government who can issue the licenses for their exploitation.

Currently some illegal (non-licensed) charcoal production is taking place in some of these areas and this may threaten the conservation objectives that NGR wants to achieve. As such, NGR has begun a process of engaging with the Local Government and the charcoal producers to improve the management of those areas. A stock assessment/inventory has been carried out and a draft management plan developed for the area. The plan presents some ideas about the annual allowable cut but the options for the area management will be developed in collaboration with the Local Government and users of the area.

Additionally, NGR, together with the Local Government has identified the existing charcoal producers in the area and is now organising them into associations to ease the licensing process and improve the control of their activities. This is a process that is on its initial phases but it is being discussed the possibility of involving the charcoal producers in patrolling the area to help the law enforcement exercises for which the Government has limited capacity. Alternative income generating activities will also be sought to reduce the charcoal production incidence in the project area and ensure the resource sustainability.

> **G.5.6** Demonstrate that the project proponents have clear, uncontested title to the carbon rights, or provide legal documentation demonstrating that the project is undertaken on behalf of the carbon owners with their full consent. Where local or national conditions preclude clear title to the carbon rights at the time of validation against the Standards, the project proponents must provide evidence that their ownership of carbon rights is likely to be established before they enter into any transactions concerning the project's carbon assets.

All land in Mozambique belongs to the state. The area is leased from the government under the Direitos de Uso e Aproveitamento de Terra (DUAT) system. It is a land and benefit use approval from the Ministry of Agriculture. There is an important difference between the DUAT and a normal timber concession in the resource use under customary rights. Under the DUAT system these rights are negotiated and "signed off" by the local communities and a cadastre is surveyed out and allocated to the company leasing the land. A DUAT is a land use right on which the lease is based.

NGR has the right of land use and benefit for the Malulu parcel (7,880 ha). This was granted by the Government to the Malonda Foundation, which was streamlining the land acquisition process to encourage private investment in the forestry sector of Niassa by applying for all DUATs collectively and forming partnerships with the private sector.

The Malulu parcel, where the project started, has been granted DUAT 881, which covers a total surface of about 7,880 ha in this District. For the other parcels of land included within the A/R CDM project, NGR has been directly involved in the land acquisition process with the local communities and government. For these parcels of land NGR has obtained approval from the local communities, through the legal required community consultation meetings, and, the process has been submitted for government approval and issuance of the DUAT.

CL1 Net Positive Climate Impacts (Required)

Refer to section D of the A/R CDM PDD for further information.

> CL.1.1 Estimate the net change in carbon stocks due to the project activities using the methods of calculation, formulae and default values of the IPCC 2006 GL for AFOLU or using a more robust and detailed methodology. The net change is equal to carbon stock changes with the project minus carbon stock changes without the project (the latter having been estimated in G2). This estimate must be based on clearly defined and defendable assumptions about how project activities will alter GHG emissions or carbon stocks over the duration of the project or the project GHG accounting period.

Baseline net GHG removals by sinks

Following "guidance on conditions under which the change in carbon stocks in existing live woody vegetation are insignificant" from the CDM EB (EB 46 Report, Annex 16), the project's baseline emission reductions are assumed to be zero. The procedure in the guidance is that the change in carbon stocks of existing woody vegetation sinks may be accounted as zero for an area of land within the project boundary if one of the conditions in the guidance is met.

Condition (v) in the guidance is: "harvesting/grazing of foliage, or harvesting/coppicing of live wood, commonly occurs at levels sufficient to result in static or declining biomass in the existing woody vegetation"
Condition (v) is met at the NRP as this has been the principle driver resulting in the successive land degradation that is shown in the time series and maps shown in Figure B.2.3. Furthermore, the Socio-economic assessment carried out in the area clearly describes the on-going activities ("no-action alternative") as "cutting down of trees and wood plants in favour of crop cultivation, and use of wetlands during the dry season for cultivation of vegetables, rice and sweet potato"[30]). This information is backed up by the information collected in the leakage assessment[31].

According to the applicability conditions of the methodology, since the carbon stock in SOC is unlikely to increase in the baseline, the change in carbon stock in SOC is conservatively assumed to be zero for all strata in the baseline scenario.

Based on the above, the baseline carbon stock changes/ removals are conservatively assumed to be zero.

Actual net GHG removals by sinks

Actual net GHG removals by sinks shall be calculated following equation 3 from the methodology:

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[30] See page 42 of the Socio-economic assessment

[31] See Page 9 of the leakage summary

$$\Delta C_{ACTUAL,\,t} = \Delta C_P - GHG_{E,t} \qquad \text{Eq. 2}$$

Where:

ΔC_{ACTUAL} Actual net GHG removals by sinks in year t; t CO_2-e

$\Delta C_{P,t}$ Change in the carbon stocks in project occurring in the selected carbon pools, in year t; t CO_2-e

GHG_E Increase in non-CO_2 GHG emissions within the project boundary as a result of the implementation of the A/R CDM project activity, in year t; t CO_2-e

Changes in carbon stock in the selected carbon pools:

The *ex ante* change in carbon stock in the project scenario were calculated using equation 3 from the methodology.

$$\Delta C_{P,t} = \Delta C_{TREE\_PROJ,t} + \Delta C_{SHRUB\_PROJ,t} + \Delta C_{DW\_PROJ,t} + \Delta C_{LI\_PROJ,t} + \Delta SOC_{AL,t} \qquad \text{Eq. 3}$$

$\Delta C_{P,t}$ Change in the carbon stocks in project, occurring in the selected carbon pools, in year *t*; t CO_2-e

$\Delta C_{TREE\_PROJ,t}$ Change in carbon stock in tree biomass in project in year *t*, as estimated in the tool "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities"; t CO_2-e

$\Delta C_{SHRUB\_PROJ,t}$ Change in carbon stock in shrub biomass in project in year *t*, as estimated in the tool "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities"; t CO_2-e

$\Delta C_{DW\_PROJ,t}$ Change in carbon stock in dead wood in project in year *t*, as estimated in the tool "Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities"; t CO_2-e

$\Delta C_{DW\_PROJ,t}$ Change in carbon stock in litter in project in year *t*, as estimated in the tool "Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities"; t CO_2-e

$\Delta C_{DW\_PROJ,t}$ Change in carbon stock in SOC in project, in year *t*, in areas of land meeting the applicability conditions of the tool "Tool for estimation of change in soil organic carbon stocks due to the implementation of A/R CDM project activities", as estimated in the same tool; t CO_2-e

Since the project is only selecting the tree biomass carbon pool, equation 3 is simplified to the following:

$$\Delta C_{P,t} = \Delta C_{TREE\_PROJ,t}$$

Following the tool "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities", the stock change method was applied, as the project is implementing permanent sample plots and an estimation of tree biomass was calculated using the *BEF* method, equation 1, as follows:

$$B_{TREE,j,p,i,t} = V_{TREE,j,p,i,t} * D_j * BEF_{2,j} * (1 + R_j) \qquad \text{Eq. 1}$$

Where:

$B_{TREE,j,p,i,t}$ — Biomass of trees of species *j* in sample plot *p* of stratum *i* at a point of time in year *t*; t d.m.

$V_{TREE,j,p,i,t}$ — Stem volume of trees of species *j* in sample plot *p* of stratum *i* at a point of time in year *t*, estimated by using the tree dimension(s) as entry data into a volume table or volume equation; m^3

D_j — Basic wood density of tree species *j*; t d.m. m^{-3}

BEF_2 — Biomass expansion factor for conversion of stem biomass to above-ground tree biomass, for tree species *j*; dimensionless

R_j — Root-shoot ratio for tree species *j*; dimensionless

j — *1, 2, 3, … tree species in plot p*

p — *1, 2, 3, …sample plots in stratum i*

i — *1, 2, 3, …tree biomass estimation strata within the project boundary*

t — *1, 2, 3, …years counted from the start of the A/R CDM project activity*

To calculate the *ex ante* change in carbon stocks in tree biomass in the project, the PP has had to use growth data from Uganda due to the lack of available growth data from Mozambique. Site indexes have been selected which give the same volume as the estimated Mean Annual Increments in the business plan, which is based on expert opinions. Therefore the *ex ante* projections are deemed reliable.

The growth data from "*Yield of Eucalyptus and Caribbean pine in Uganda, D. Alder et al. 2003*" is used to project the merchantable timber volume and thus the biomass growth of the project. During *ex-post* calculations, the growth data (standing volume per hectare) will be collected and converted into biomass through Wood Density (WD) and Biomass Expansion Factors (BEF) and root-shoot ratio (R) using equations and steps described in the methodology.

In the absence of the project and regional specific parameters during PDD preparation for the biomass expansion factors (BEF), wood density (D), carbon fraction (CF) and root-to-shoot ratio, the project participants have used default values from the GPG LULUCF 2003 (Table 3A.1.10). The "Guidelines on conservative choice and application of default data in estimation of the net anthropogenic GHG removals by sinks, Version 2" have been followed in selecting the default values. The following is a summary of the sources and relevant procedure, in line with the guidance, for the conservative choice of default data.

Parameter	Source and conservative choice

Wood density:

Eucalyptus:	Species-specific (*Eucalyptus grandis*) data from a national forest inventory for the same ecological zone has been used since the methodology does not provide a default value nor are there local peer- reviewed studies. A conservative choice of default data is ensured by taking the mean value from the two different water content values provided – 50% and 12%.

Pine:	Species-specific (*Pinus caribaea*) data from a study carried out in Uganda is used.

Biomass Expansion Factor (BEF)

Eucalyptus:	No species-specific data was available thus data was taken from the IPCC GPG LULUCF literature for the same climatic zone. Since the data available was not from the same genus, its conservative value was determined by assuming the range represents the upper and lower 95% confidence limits of a normally distributed dataset. The conservative value was taken as the value which fell half way between the mean and the limit of the range.

Pine:	No species-specific data was available thus data was taken from the IPCC GPG LULUCF literature for the same genus. However, since the data was available for the same conditions that are similar to the project (ecological zone),its conservative value was determined by assuming the range represents the upper and lower 95% confidence limits of a normally distributed dataset. The conservative value was taken as the value which fell half way between the mean and the limit of the range.

Root-shoot ratio

Eucalyptus and Pine: According to the A/R Methodological Tool, "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities" R is calculated based on above-ground biomass:

$R = exp [-1.085 + 0.9256 * ln(A)] / A$, where A is above-ground biomass content (t d.m. ha^{-1}). A was calculated as the average above-ground biomass over the first rotation.

The resulting conservative default data is given in Table B.7.1.1:

Table B.7.1.1. Wood density, BEF and Root-Shoot ratio for species used

Tree species	Wood Density (tonnes d.m.m-3)	BEF	Root-Shoot ratio

| Eucalyptus | 0.526 | 2.70[32] | See carbon model |
| Pine | 0.51 | 1.25[33] | See carbon model |

The project participants consider that any changes due to thinning have been taken into consideration in the growth figures that were used; however, the trend shall be monitored. The impact of disturbances, e.g. losses from fire and pests, are considered to be small and are a result of natural events. Losses due to commercial harvests and thinnings during the crediting period shall be captured in the calculations using equation 21.

Stock change method

Tree biomass in sample plot *p* of stratum *i* is calculated as follows:

$$B_{TREE\,p,i,t} = \sum_J B_{TREE,j,p,i,t} \qquad \text{Eq. 5}$$

Where:

$B_{TREE\,p,i,t}$ Tree biomass in sample plot *p* in stratum *i* at a given point in time in year t; t d.m.

$B_{TREE\,j,p,i,t}$ Biomass of trees of species *j* in sample plot *p* in stratum *i* at a given point in time in year t; t d.m

j   1,2,3,... species in plot *p*

p   1,2,3,... sample plots in stratum *i*

i   1,2,3,... strata used for biomass estimation within the project boundary

t   1,2,3,... years counted from project start of the A/R CDM project activity

Tree biomass per hectare in plot *p* of stratum *i* is calculated as follows:

$$b_{TREE\,p,i,t} = \frac{B_{TREE,p,i,t}}{A_{p,i}} \qquad \text{Eq. 6}$$

Where:

$b_{TREE,p,i,t}$ Tree biomass per hectare in sample plot *p* in stratum *i* at a given point of time in year *t*; t d.m. ha^{-1}

$B_{TREE,p,i,t}$ Tree biomass in sample plot *p* in stratum *i* at a given point of time in year *t*; t d.m.

$A_{p,i}$ Area of sample plot *p* in stratum *i*; ha

p   1,2,3,... sample plots in stratum *i*

i   1,2,3,... strata used for biomass estimation within the project boundary

t   1,2,3,... years counted from project start of the A/R CDM project activity

Mean tree biomass per hectare in stratum i and the variance of tree biomass per hectare in the stratum are estimated as follows:

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[32] Taken from Table 3A.1.10 of the GPG LULUCF 2003, BEF_2 (overbark) for Tropical Broadleaf

[33] Taken from Table 3A.1.10 of the GPG LULUCF 2003, BEF_2 (overbark) for Pines

$$b_{TREE,i,t} = \frac{\sum\limits_{p=1}^{n_i} b_{TREE,p,i,t}}{n_i}$$ Eq. 7

$$s_i^2 = \frac{n_i \times \sum\limits_{p=1}^{n_i} b_{TREE,p,i,t}^2 - \left(\sum\limits_{p=1}^{n_i} b_{TREE,p,i,t} \right)^2}{n_i \times (n_i - 1)}$$ Eq. 8

Where:

$b_{TREE,i,t}$ Mean tree biomass per hectare in stratum i at a given point of time in year t; t d.m. ha^{-1}

$b_{TREE,p,i,t}$ Tree biomass per hectare in sample plot p in stratum i at a given point of time in year t; t d.m. ha^{-1}

n_i Number of sample plots in stratum i

s_i^2 Variance of tree biomass per hectare in stratum i at a given point of time in year t; (t d.m. ha^{-1})^2

p 1,2,3,... sample plots in stratum i

i 1,2,3,... strata used for biomass estimation within the project boundary

t 1,2,3,... years counted from project start of the A/R CDM project activity

Mean tree biomass per hectare within the project boundary and its variance are estimated as follows:

$$b_{TREE,t} = \sum\limits_{i=1}^{M} w_i \times b_{TREE,i,t}$$ Eq. 9

$$s_{bTREE,t}^2 = \sum\limits_{i=1}^{M} w_i^2 \times \frac{s_i^2}{n_i}$$ Eq. 10

Where:

$b_{TREE,,t}$ Mean tree biomass per hectare within the project boundary at a given point of time in year t; t d.m. ha^{-1}

w_i Ratio of the area of stratum i to the sum of areas of biomass estimation strata; dimensionless

$b_{TREE,i,t}$ Mean tree biomass per hectare in stratum i at a given point of time in year t; t d.m. ha^{-1}

$s_{bTREE,t}^2$ Variance of mean tree biomass per hectare the project boundary at a given point of time in year t; (t d.m. ha^{-1})^2

s_i^2 Variance of tree biomass per hectare in stratum i at a given point of time in year t; (t d.m. ha^{-1})^2

n_i Number of sample plots in stratum i

p 1,2,3,... sample plots in stratum i

i 1,2,3,... strata used for biomass estimation within the project boundary

t 1,2,3,... years counted from project start of the A/R CDM project activity

Uncertainty of the mean tree biomass per hectare within the project boundary is estimated as:

$$u_{bTREE,t} = \frac{t_{val} \times s_{bTREE,t}}{b_{TREE,t}}$$ Eq. 12

Where:

$u_{bTREE,t}$ Uncertainty of tree biomass per hectare within the project boundary at a given point of time in year t; %

t_{val} Two-sided Student's t-value for: (i) Degrees of freedom equal to n – M, where n is total number of sample plots within the project boundary, and M is the total number of tree biomass estimation strata; and (ii) a confidence level of 90%. For example two-sided Student's t-value for a probability value of 10% (which implies a 90% confidence level) and 45 degrees of freedom can be obtained in Excel spreadsheet as "=TINV(0.10,45)"1 which returns a value of 1.6794.

$b_{TREE,,t}$ Mean tree biomass per hectare within the project boundary at a given point of time in year t; t d.m. ha^{-1}

$s_{bTREE,t}$ Square root of the variance of mean tree biomass per hectare within project boundary at a given point of time in year t (i.e. the standard error of the mean); t d.m. ha^{-1}

Total tree biomass within the project boundary at a given point of time in year t is estimated as follows:

$$B_{TREE,t} = b_{TREE,t} \times A$$ Eq.12

Where:

$B_{TREE,t}$ Total tree biomass within the project boundary at a given point of time in year t; t d.m.

$b_{TREE,,t}$ Mean tree biomass per hectare within the project boundary at a given point of time in year t; t d.m. ha^{-1}

A Sum of areas of the biomass estimation strata within the project boundary; ha

t 1,2,3,... years counted from project start of the A/R CDM project activity

Carbon stock in tree biomass within the project boundary at a given point of time in year t is as follows:

$$C_{TREE,t} = \frac{44}{12} \times B_{TREE,t} \times CF_{TREE}$$ Eq. 13

Where:

$C_{TREE,t}$ Carbon stock in tree biomass within the project boundary at a given point of time in year t; t CO_2-e

$B_{TREE,t}$ Total tree biomass within the project boundary at a given point of time in year t; t d.m.

CF_{TREE} Carbon fraction of tree biomass; t C t d.m.$^{-1}$.
                 A default value of 0.47 is used unless transparent and verifiable information can be provided to justify a different value.

t 1,2,3,... years counted from project start of the A/R CDM project activity

Change in carbon stock in trees is calculated assuming that the rate of change of tree biomass over a period of time is calculated assuming a linear growth. Therefore, the rate of change in carbon stock in tree biomass over a period of time is calculated as follows:

$$dC_{TREE,(t_1,t_2)} = \frac{C_{TREE,t2} - C_{TREE,t1}}{T} \qquad \text{Eq. 14}$$

Where:

$dC_{TREE,(t1,t2)}$ Rate of change in carbon stock in tree biomass within the project boundary during the period between a point of time in year t1 and a point of time in year t2; t CO2-e yr^{-1}

$C_{TREE,t2}$ Carbon stock in tree biomass within the project boundary at a given point of time in year t_2; t CO_2-e

$C_{TREE,t1}$ Carbon stock in tree biomass within the project boundary at a given point of time in year t_1; t CO_2-e

T Time elapsed between two successive estimations (T = t_2 − t_1); yr

t 1,2,3,... years counted from project start of the A/R CDM project activity

For the first verification, the variable $C_{TREE,t1}$ in equation 14 is assigned the value of carbon stock in the tree biomass at the start of the A/R CDM project activity, that is: $C_{TREE,t1}$ = C_{TREE_BSL} for the first verification, where t_1 = 0 and t_2 = year of the first verification.

Since C_{TREE_BSL} = 0, equation 14 is simplified as follows:

$$dC_{TREE,(t_1,t_2)} = \frac{C_{TREE,t2}}{T}$$

Change in carbon stock in tree biomass within the project boundary in year t (t_1 ≤ t ≤ t_2) is calculated as follows:

$$\Delta C_{TREE,t} = dC_{TREE,(t1,t2)} \times 1 year \text{ for } t_1 ≤ t ≤ t_2 \qquad \text{Eq. 15}$$

Where:

$\Delta C_{TREE,t}$ Change in carbon stock in tree biomass within the project boundary in year t; t CO2-e

$dC_{TREE,(t1,t2)}$ Rate of change in carbon stock in tree biomass within the project boundary during the period between a point of time in year t1 and a point of time in year t2; t CO2-e yr^{-1}

t 1,2,3,... years counted from project start of the A/R CDM project activity

Non-CO$_2$ GHG emissions:

Removal of biomass in the process of land preparation does not have to be accounted for. The emissions from the use of fire in land preparation (A.4) can be assumed to be zero due to slash-and-burn being a common practice in the baseline – in line with Step 7(a) from the tool: "Estimation of non-CO$_2$ GHG emissions resulting from burning of biomass attributable to an A/R CDM project activity, Version 04.0.0".

Non-CO$_2$ GHG emissions from forest fires will be monitored throughout the project and accounted for following the above mentioned tool. In line with the applicability conditions, emissions resulting from any occurrence of fire within the project boundary shall be accounted for each incidence of fire which affects an area greater than the minimum threshold area reported by the host Party for the purposes of defining forest, provided that the accumulated area affected by such fires in a given year is $\geq$ 5% of the project area.

The non-CO$_2$ emissions from forest fires will be calculated following equation 7 of the tool:

$$GHG_{FF\_TREE,t} = 0.001 * \sum_{i=1}^{M} A_{BURN,i,t} * b_{TREE,i,t_L} * COMF_i * \left(EF_{CH4,i} * GWP_{CH4} + EF_{N2O,i} * GWP_{N2O} \right)$$

where:

$GHG_{FF\_TREE,t}$	Emission of non-CO_2 gases resulting from the loss of aboveground biomass of trees due to fire, in year t; t CO_2-e
$A_{BURN,i,t}$	Area burnt in stratum i in year t; ha
b_{TREE,i,t_L}	Mean aboveground tree biomass per hectare in stratum i in year t_L which is the year in which last verification was carried out before occurrence of the fire; t d.m. ha^{-1}
	Where aboveground biomass of living trees is not burnt by fire, b_{TREE,i,t_L} may be set equal to zero
$COMF_i$	Combustion factor for stratum i; dimensionless
$EF_{CH4,i}$	Emission factor for CH_4 in stratum i; g CH_4 (kg dry matter burnt)$^{-1}$
GWP_{CH4}	Global warming potential for CH_4; dimensionless. Default value of 21 is used
$EF_{N2O,i}$	Emission factor for N_2O in stratum i; g N_2O (kg dry matter burnt)$^{-1}$
GWP_{N2O}	Global warming potential for N_2O; dimensionless. Default value of 310 is used
I	1, 2, 3 ... M strata
T	1, 2, 3, ... years elapsed since the start of the project activity

Estimation of leakage

To determine the *ex ante* estimation of leakage, the CDM tool, "Estimation of the increase in GHG emissions attributable to displacement of pre-project agricultural activities in A/R CDM project activity, Version 01 (EB 51 Annex 15)" was applied.

The tool is applicable when:

1. The increases of GHG emissions from the displacement of activities cannot be considered insignificant – following the most recent: (i) "Guidelines on conditions under which increase in GHG emissions attributable to displacement of pre-project crop cultivation activities in A/R CDM project activity is insignificant, Version 01(EB 51 Annex 13)", (ii) "Guidelines on conditions under which increase in GHG emissions related to displacement of pre-project grazing activities in A/R CDM project activity is insignificant, Version 01 (EB 51, Annex 14)".

2. The displacement of agricultural activities attributable to the A/R CDM project activity is not expected to cause any drainage of wetlands or peatlands

Step 1 of the tool was carried out through Participatory Rural Appraisals (PRAs) with the local communities around the project area and through the application of remote sensing to create land-use maps of the pre-project area to estimate the area subject to pre-project agricultural activities. Specifically, PRAs were used to estimate the number of cattle grazing in the pre-project area and the maps to determine the area of land under crop cultivation that would likely be displaced.

The PRA summaries can be found in Annex 5. The results of the PRAs show that leakage due to displacement of grazing activities is insignificant. However, the displacement of agricultural activities is likely to lead to significant emissions. The following steps of the tool were therefore applied to the cropland areas that are expected to be displaced[34].

The following steps of the tool were then applied:

The fraction of the total area of A/R CDM project activity subject to displacement of agricultural activities in year t was calculated by applying the following equation:

$$D_{t^*} = \frac{\sum_{t=1}^{t^*} Ad_t}{A}$$

Where:

D_t Fraction of the total area of A/R CDM project activity subject to displacement of agricultural activities in year t; dimensionless

A Total area of A/R CDM project activity

Ad_t Area subject to pre-project agricultural activities that are displaced during year t since the start of the A/R project activity; ha

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

Step 2: Take ΔC_t – annual change in carbon stock in all selected carbon pools for year t; t C yr^{-1}, as calculated following requirements of the baseline and monitoring A/R CDM methodology within which this tool is used.

For the planned (*ex ante*) or actual (*ex post*) verifications calculate:

$$\Delta C_{t=t_{ver}} = \sum_{t=1}^{t_{ver}} \Delta C_t * 1 year$$

Where:

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[34] See NGR's procedure on voluntary resettlement (Procedure 3.3)

$\Delta C_{t=tver}$ Sum of annual changes in carbon stock in all selected carbon pools since the start of the A/R CDM project activity to the year of verification t_{ver}; tC

ΔC_t Annual change in carbon stock in all selected carbon pools for year t.

t_{ver} Year of verification event; yr

Step 3: For each year t take D_t and select t_{ver} which occurs immediately after the year t in order to calculate:

$$\Delta CD_{t^*} = D_{t^*} * \Delta C_{t=t_{ver}}$$

Where:

ΔCd_{t^*} Sum of annual changes in carbon stock in all selected carbon pools since the start of the A/R CDM project activity to the year of verification t_{ver} attributable to the area subject to pre-project agricultural activities that are displaced during year t^* since the start of the A/R project activity

$\Delta C_{t=tver}$ Sum of annual changes in the carbon stock in all selected carbon pools since the start of the A/R CDM project activity to the year of verification t_{ver}; t C

D_{t^*} Fraction of the total area of A/R CDM project activity subject to displacement of agricultural activities in year t^*; dimensionless

t_{ver} Year of verification event; yr

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

Step 4: Estimate the factor, f, as the fraction of land covered by forest (according to the national definition of forest) in region containing the A/R CDM project activity. The region shall be the smallest territorial administrative division/s encompassing all areas of land included in the A/R CDM project activity for which data on forest cover are publically available.

Step 5: Calculate average leakage due to displacement of agricultural activities in year t^*:

$$LK_{Agric,t^*} = \frac{44}{12} * \frac{f}{T_{cred}} * \Delta Cd_{t^*}$$

Baseline net GHG removals by sinks

As explained above in section B.7.1, the baseline carbon stock changes/ removals are conservatively assumed to be zero.

Actual net GHG removals by sinks

As shown above, ex ante calculations applied a yield model and the BEF method to obtain the tree biomass for each species; as such in year 1, the biomass per ha for eucalyptus and pine would be:

$B_{Eucalyptus}$ = 0.22 t/ha
B_{Pine} = 0.1 t/ha

The change in carbon stock in the project in year 2 would be:

ΔC_{ACTUAL} = 14 t CO_2-e

Leakage is covered in section CL.2.

> CL.1.2 Estimate the net change in the emissions of non-CO2 GHG emissions such as CH4 and N2O in the with and without project scenarios if those gases are likely to account for more than a 5% increase or decrease (in terms of CO2-equivalent) of the project's overall GHG emissions reductions or removals over each monitoring period.

Not applicable

> CL.1.3 Estimate any other GHG emissions resulting from project activities. Emissions sources include, but are not limited to, emissions from biomass burning during site preparation, emissions from fossil fuel combustion, direct emissions from the use of synthetic fertilizers, and emissions from the decomposition of N-fixing species.

Not applicable

> CL.1.4 Demonstrate that the net climate impact of the project is positive. The net climate impact of the project is the net change in carbon stocks plus net change in non-CO2 GHGs where appropriate minus any other GHG emissions resulting from project activities minus any likely project-related unmitigated negative offsite climate impacts (see CL2.3).

Table CL.1.4 shows the net climate impact of the project over the first crediting period of 20 years. This demonstrates that the net climate impact of the project will be positive.

Table CL.1.4 **Summary of ex ante estimates of GHG removals by sinks**

Year	**Baseline net GHG removals by sinks (tCO$_2$e)**	**Actual net GHG removals by sinks (tCO$_2$e)**	**Leakage (tCO$_2$e)**	**Net anthropogenic GHG removals by sinks (tCO$_2$e)**	**Cumulative net anthropogenic GHG removals by sinks (tCO$_2$e)**
Year 1	0	0	0	0	0
Year 2	0	14	0	14	14
Year 3	0	305	1	304	318
Year 4	0	808	1	807	1,125
Year 5	0	2,265	2	2,264	3,388
Year 6	0	6,025	11	6,014	9,402
Year 7	0	10,293	19	10,274	19,676
Year 8	0	21,132	25	21,107	40,783
Year 9	0	38,305	265	38,040	78,822
Year 10	0	62,250	265	61,985	140,807
Year 11	0	91,019	265	90,754	231,561
Year 12	0	97,259	265	96,995	328,556
Year 13	0	98,260	265	97,995	426,550
Year 14	0	96,490	528	95,963	522,513
Year 15	0	95,114	528	94,586	617,099
Year 16	0	89,136	528	88,608	705,707
Year 17	0	53,360	528	52,832	758,539
Year 18	0	90,679	528	90,151	848,690
Year 19	0	32,587	615	31,972	880,662
Year 20	0	11,012	615	10,396	891,058
Total	0	896,312	5,254	891,058	-
Total number of crediting years	20				
Annual average over the crediting period	0	44,816	263	44,553	-

> CL.1.5 Specify how double counting of GHG emissions reductions or removals will be avoided, particularly for offsets sold on the voluntary market and generated in a country with an emissions cap.

The NFP A/R CDM project is taking place in Mozambique, a non-Annex 1 country, which, by definition, does not have an emissions cap under the UNFCCC. Furthermore, the project is being developed as an A/R CDM project, and thus will be tradable in the compliance market.

> CL.2 Offsite Climate Impacts ("Leakage")

> CL.2.1 Determine the types of leakage that are expected and estimate potential offsite increases in GHGs (increases in emissions or decreases in sequestration) due to project activities. Where relevant, define and justify where leakage is most likely to take place.

To determine the *ex ante* estimation of leakage, the CDM tool, "Estimation of the increase in GHG emissions attributable to displacement of pre-project agricultural activities in A/R CDM project activity, Version 01 (EB 51 Annex 15)" was applied.

The tool is applicable when:

1. The increases of GHG emissions from the displacement of activities cannot be considered insignificant – following the most recent: (i) "Guidelines on conditions under which increase in GHG emissions attributable to displacement of pre-project crop cultivation activities in A/R CDM project activity is insignificant, Version 01(EB 51 Annex 13)", (ii) "Guidelines on conditions under which increase in GHG emissions related to displacement of pre-project grazing activities in A/R CDM project activity is insignificant, Version 01 (EB 51, Annex 14)".

2. The displacement of agricultural activities attributable to the A/R CDM project activity is not expected to cause any drainage of wetlands or peatlands

Step 1 of the tool was carried out through Participatory Rural Appraisals (PRAs) with the local communities around the project area and through the application of remote sensing to create land-use maps of the pre-project area to estimate the area subject to pre-project agricultural activities. Specifically, PRAs were used to estimate the number of cattle grazing in the pre-project area and the maps to determine the area of land under crop cultivation that would likely be displaced.
The PRA summaries can be found in Annex 5. The results of the PRAs show that leakage due to displacement of grazing activities is insignificant. However, the displacement of agricultural activities is likely to lead to significant emissions. The following steps of the tool were therefore applied to the cropland areas that are expected to be displaced[35].

The baseline classification maps from 2006 (see below CL.2.1.a e b) show the total area of land under cultivation and thus what would likely be displaced through implementation of the project. These areas are deemed to be conservative since it includes land which was used for agricultural purposes but which were left fallow. The total area of cropland

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[35] See NGR's procedure on voluntary resettlement (Procedure 3.3)

prior to project start over all three parcels of land that make up the A/R CDM project was 614 ha.

The following steps of the tool were then applied:

The fraction of the total area of A/R CDM project activity subject to displacement of agricultural activities in year t was calculated by applying the following equation:

$$D_{t^*} = \frac{\sum_{t=1}^{t^*} Ad_t}{A}$$

where:

D_t Fraction of the total area of A/R CDM project activity subject to displacement of agricultural activities in year t; dimensionless

A Total area of A/R CDM project activity

Ad_t Area subject to pre-project agricultural activities that are displaced during year t since the start of the A/R project activity; ha

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

This gave a total fraction of the total area of A/R CDM project activity subject to displacement of agricultural activities as follows:

t	2007	2008	2009	2010	2011	2012	2013	2014	....t
Ad_t	1.29	8.9	2.59	15.85	14.09	225.78	202.65	143.54	0
A	5,252								
D_t	0.000	0.002	0.002	0.005	0.008	0.051	0.090	0.117	0.017

Step 2: Take ΔC_t – annual change in carbon stock in all selected carbon pools for year t; t C yr^{-1}, as calculated following requirements of the baseline and monitoring A/R CDM methodology within which this tool is used.

For the planned (*ex ante*) or actual (*ex post*) verifications calculate:

$$\Delta C_{t=t_{ver}} = \sum_{t=1}^{t_{ver}} \Delta C_t * 1 year$$

where:

$\Delta C_{t=tver}$ Sum of annual changes in carbon stock in all selected carbon pools since the start of the A/R CDM project activity to the year of verification t_{ver}; tC

ΔC_t Annual change in carbon stock in all selected carbon pools for year t.

t_{ver} Year of verification event; yr

$\Delta C_{t=tver}$ has been calculated as 12,311 tC for the planned 2011 verification.

Step 3: For each year t take D_t and select t_{ver} which occurs immediately after the year t in order to calculate:

$$\Delta CD_{t^*} = D_{t^*} * \Delta C_{t=t_{ver}}$$

where:

ΔCd_{t^*} Sum of annual changes in carbon stock in all selected carbon pools since the start of the A/R CDM project activity to the year of verification t_{ver} attributable to the area subject to pre-project agricultural activities that are displaced during year t^* since the start of the A/R project activity

$\Delta C_{t=tver}$ Sum of annual changes in the carbon stock in all selected carbon pools since the start of the A/R CDM project activity to the year of verification t_{ver}; t C

D_{t^*} Fraction of the total area of A/R CDM project activity subject to displacement of agricultural activities in year t^*; dimensionless

t_{ver} Year of verification event; yr

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

Applying this equation, ΔCd_{t^*} was calculated as shown in Table 3.3.1. (this table just shows it for the first verification)

Table D.2.1. Sum of annual changes in carbon stocks for first verification

	2007	2008	2009	2010	2011	2012	2013	2014
ΔCd_t	20	155	195	437	651	4,094	7,183	9,372

Step 4: Estimate the factor, f, as the fraction of land covered by forest (according to the national definition of forest) in region containing the A/R CDM project activity. The region shall be the smallest territorial administrative division/s encompassing all areas of land included in the A/R CDM project activity for which data on forest cover are publically available.

Figure CL.2.1.a and b below, show land class classification of the two parishes which are contained within the A/R CDM project boundary. These are the parishes of Unango (for the Malulu parcel) and Chimbonila (for Malica and Ntiuile). The land class of each parish has been determined through a supervised classification of Landsat imagery from 2006. Since more than one territorial administrative division is involved then f has been calculated as a weighted average of the individual divisions' fraction of land covered by forest using area as a weight.

f was calculated as 0.087 based on the results shown in Figures CL.2.1.a and b.

Figure CL.2.1.a. Classification of Unango parish
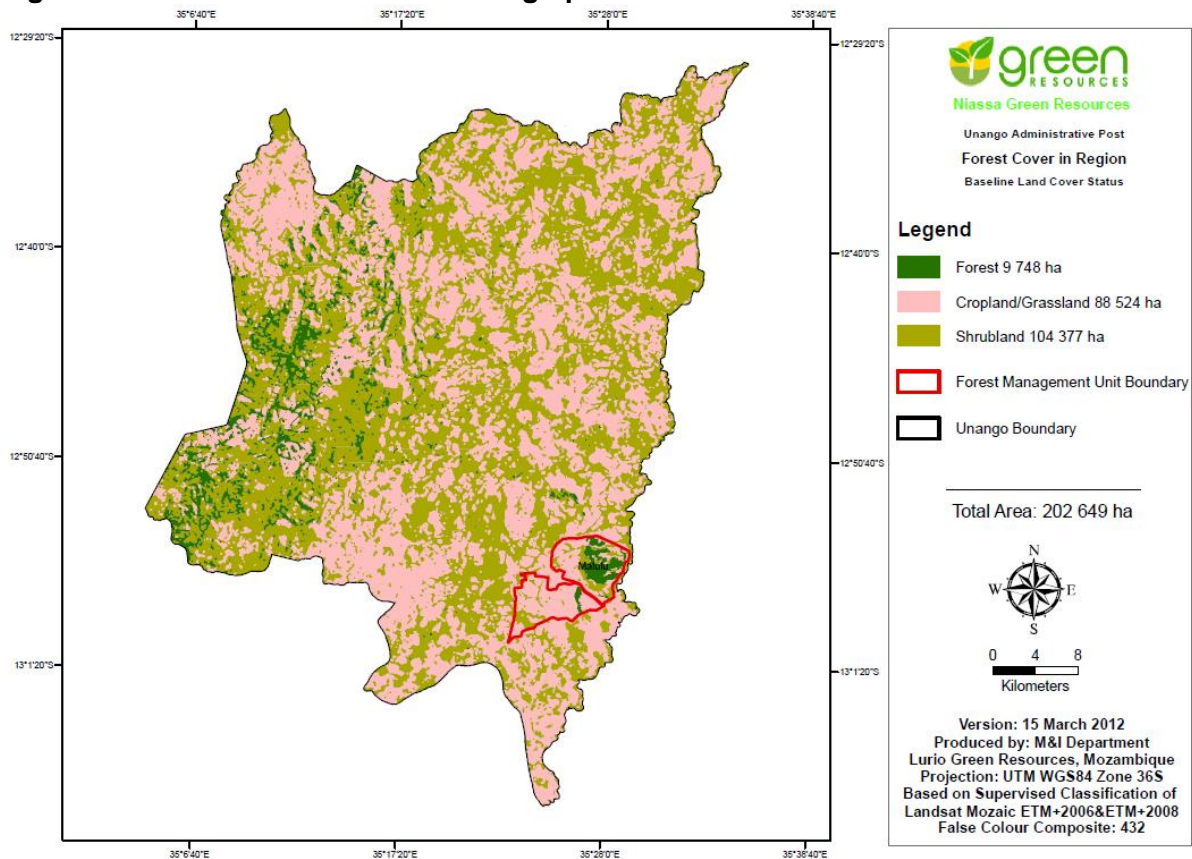
Figure CL.2.1.b. Classification of Chimbonila parish
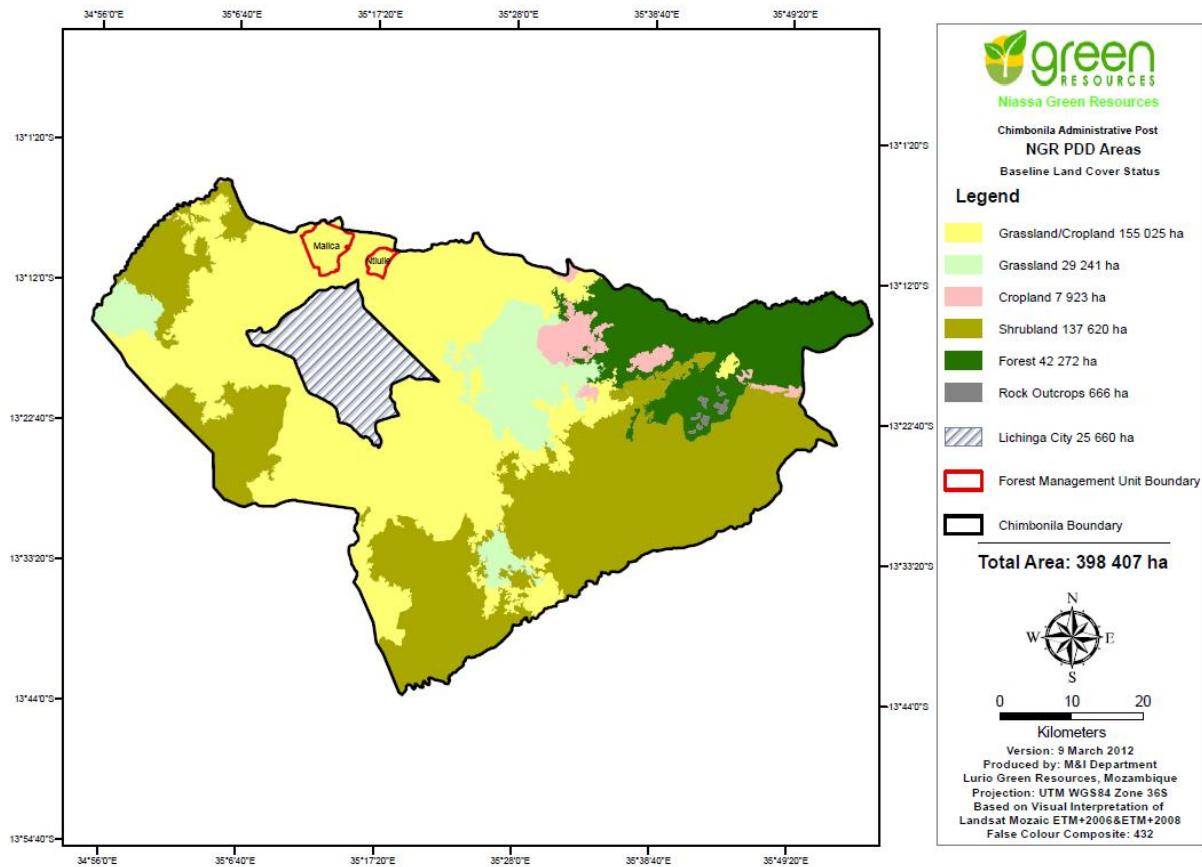
Step 5: Calculate average leakage due to displacement of agricultural activities in year t^*:

$$LK_{Agric,t^*} = \frac{44}{12} * \frac{f}{T_{cred}} * \Delta Cd_{t^*}$$

Applying the equation from step 5, leakage was calculated as follows for the first
verification:

Year	2007	2008	2009	2010	2011	2012	2013	2014
$LK_{Agric,t}$	0	1	1	2	3	22	38	50

CL.2.2 Document how any leakage will be mitigated and estimate the extent to which
such impacts will be reduced by these mitigation activities.

Leakage will be mitigated through the provision of support to farmers who decide to
voluntarily relocate their activities outside of the project area. Support from NGR will
include mechanised land preparation of the new machambas outside of the project area as
well as the supply of new seed. NGR will only be able to support new machambas that are

relocated to grassland or scrubland, thus incentivising communities to refrain from establishing new machambas in forested areas.

Other initiatives that NGR is implementing which will help mitigate leakage include an Agrciultural Development Programme, aiming to promote higher yields, as well as, the implementation of a forest conservation management plan, to promote the sustainable use of the natural forest resources. These initiatives will provide alternatives livelihoods and sustainable use of natural resources, thus reducing the likelihood of leakage.

> CL.2.3 Subtract any likely project-related unmitigated negative offsite climate impacts from the climate benefits being claimed by the project and demonstrate that this has been included in the evaluation of net climate impact of the project (as calculated in CL1.4).

See section CL.1.4.

> CL.2.4 Non-CO2 gases must be included if they are likely to account for more than a 5% increase or decrease (in terms of CO2-equivalent) of the net change calculations (above) of the project's overall off-site GHG emissions reductions or removals over each monitoring period.

Non-CO2 gases are not expected to account for more than a 5% increase or decrease of the net change calculations of the project's overall off-site GHG emissions reductions over each monitoring period; however, in line with the methodology, the PP will monitor any such emissions from forest fires in accordance with the applicable tool.

> CL.3 Climate Impact Monitoring

> CL.3.1a Develop an initial plan for selecting carbon pools and non-CO2 GHGs to be monitored, and determine the frequency of monitoring. Potential pools include aboveground biomass, litter, dead wood, belowground biomass, wood products, soil carbon and peat. Pools to monitor must include any pools expected to decrease as a result of project activities, including those in the region outside the project boundaries resulting from all types of leakage identified in CL2.

Please refer to section E of the A/R CDM PDD for the monitoring plan containing all parameters pertaining to the quantification of selected carbon pools and the frequency of monitoring.

The carbon pools and emission sources that will be monitored are shown below. This is following the A/R CDM methodology. The monitoring of the aboveground carbon stocks will take place every 5 years at verification. The belowground biomass will be calculated from the aboveground measurements.

Carbon pools	Accounted for	Justification/Explanation
Above-ground biomass	Yes	Major carbon pool subjected to project activity
Below-ground biomass	Yes	Below-ground biomass stock is expected to increase due to the implementation of the A/R CDM project activity
Dead wood	No	Under the applicability conditions of this methodology, carbon stock in this pool is likely to increase in project compared to the baseline. However, the methodology also provides the conservative choice of not accounting for changes in carbon stock in the pool
Litter	No	Under the applicability conditions of this methodology, carbon stock in this pool is likely to increase in project compared to the baseline. However, the methodology also provides the conservative choice of not accounting for changes in carbon stock in the pool
Soil organic carbon (SOC)	No	Under the applicability conditions of this methodology, carbon stock in this pool is likely to increase in project compared to the baseline. However, the methodology also provides the conservative choice of not accounting for changes in carbon stock in the pool

Sources	Gas	Included/ excluded	Justification/Explanation
Burning of woody biomass	CO_2	Excluded	Carbon stock decreases due to burning are accounted as a change in carbon stock
	CH_4	Included	Burning of woody biomass for the purpose of site preparation or as part of forest management can lead to significant levels of emissions of methane
	N_2O	Included	Burning of woody biomass for the purpose of site preparation or as part of forest management can lead to significant levels of emissions of nitrous oxide

CL.3.1b A plan must be in place to continue leakage monitoring for at least five years after all activity displacement or other leakage causing activity has taken place. Individual GHG sources may be considered 'insignificant' and do not

> have to be accounted for if together such omitted decreases in carbon pools and increases in GHG emissions amount to less than 5% of the total CO2-equivalent benefits generated by the project. Non-CO2 gases must be included if they are likely to account for more than 5% (in terms of CO2-equivalent) of the project's overall GHG impact over each monitoring period. Direct field measurements using scientifically robust sampling must be used to measure more significant elements of the project's carbon stocks. Other data must be suitable to the project site and specific forest type.

In line with AR-ACM0003 version 01.0.0, leakage will be monitored following the leakage section of the monitoring plan[36] for 5 years from the project start date.

> CL.3.2 Commit to developing a full monitoring plan within six months of the project start date or within twelve months of validation against the Standards and to disseminate this plan and the results of monitoring, ensuring that they are made publicly available on the internet and are communicated to the communities and other stakeholders..

The monitoring plan for climate objectives is contained in the applied CDM A/R methodology, available in the A/R CDM PDD of the NFP. This will be followed throughout the lifetime of the project. The monitoring plan will be made publically available by its inclusion in the A/R CDM PDD, which is posted on the UNFCCC CDM website. Results of monitoring will be made publically available at verification periods of the CDM cycle.

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[36] Management Plan for Niassa Forest Project 2008-2013. GRAS (Rev. June 2010).

IV. Community Section

CM1 Net Positive Community Impacts (Required)

CM.1.1 Use appropriate methodologies to estimate the impacts on communities, including all constituent socio-economic or cultural groups such as indigenous peoples (defined in G1), resulting from planned project activities. A credible estimate of impacts must include changes in community well-being due to project activities and an evaluation of the impacts by the affected groups. This estimate must be based on clearly defined and defendable assumptions about how project activities will alter social and economic well-being, including potential impacts of changes in natural resources and ecosystem services identified as important by the communities (including water and soil resources), over the duration of the project. The 'with project' scenario must then be compared with the 'without project' scenario of social and economic well-being in the absence of the project (completed in G2). The difference (i.e., the community benefit) must be positive for all community groups.

NGR commissioned a socio-economic study and Socio-economic Impact Assessments to assess the social and economic baseline conditions and, to identify, predict and evaluate foreseeable impacts, both positive and negative, that may arise from A/R project implementation on the local communities. These assessments used a range of different data collection techniques to obtain reliable information, including desktop literature reviews covering background and secondary baseline information for the project site and surrounding areas, analysis of the regulatory and institutional context, demographic data, project goals and benefits; field work, including line transects of the project area to elucidate the type and status of flora and fauna, and to identify sites of specific conservation importance for both biodiversity and communities; participatory approaches, including focus group discussions and community based meetings with all stakeholders affected by the project: local communities and resources users, local institutions and organisations, district authorities and NGOs. The ESIAs have identified positive and negative impacts that could arise from NGR project and recommended mitigation measures to deal with each of them.

"With project" scenario

In the project scenario the degraded lands will be reforested and some natural areas of significance at the landscape level such as the riverine, wetlands and areas of miombo forests will be set aside for conservation. To date only Malulu unit presents a natural forested area that has been set aside for conservation under Block J. A management plan has been drafted (see annex 1 for details) and NGR and the recommended implementation measure are currently being negotiated with the local communities that use the area.

Awareness of environment degradation, conservation and biodiversity protection will be raised within the local communities, including capacity building on recognizing rare and threatened and endangered species, as well as fire reduction and prevention. Additionally, the company fire controller officers will support communities during the fire incidents which will contribute to reduce the current levels of uncontrolled forest fires.

Sites of special significance to the local Communities (e.g. sacred sites, Cemeteries, medicinal plants collection sites) have been identified and are being conserved. Signage will be posted near these places and they will be managed by the local communities in line with their customs and NGR will ensure these are known and rules for their access are clear for all employees.

Additionally, as part of its social responsibility, NGR will implement a community development program that will include different components namely: support to health, education, community woodlots, agriculture and infrastructure development and establishment of community funds (with a yearly contribution of USD 1/ha based on the shareholders' agreement and a 10% of the carbon revenues for the Communities participating in the carbon projects[37]) for promotion of alternative income generating activities and other community support.

Through its education support (supply of materials such as school desks, books, computers, etc.) NGR will contribute to improve the literacy levels in the local communities and improve skills for other development initiatives.

The development of social infrastructure such as boreholes, millers, schools, health clinics, improved access roads and other infrastructures that facilitate the market access will significantly improve the well being of the local communities' which are living around the project areas. Additionally, the establishment of community woodlots will increase the supply of forestry resources (Establishment of community woodlots to supply materials to meet the local demand for forestry products (e.g. firewood, poles for fencing, charcoal, etc.) originated from plantations reducing thus the pressure over natural forests. This is expected to contribute for the company conservation efforts of achieving a long term conservation of the existing natural forest resources in the project areas.

The agriculture development program – NGRADO (see Annex 2) will be implemented to incentivise the establishment of settled agriculture as well as other income generation activities replacing some of the current unsustainable exploitation activities. The program is expected to contribute to food security, including the participation of 1500 smallholder farmers in the next 5 years with a production area that is equivalent to 2040ha. The production and productivity levels of the agriculture sector are expected to increase with the implementation of the agriculture development program that will facilitate the access to inputs, markets and provide extension services and technical support on improved production technologies. Therefore, with the implementation of NFP, it is expected that the land use will change to a mosaic of forest plantations that are intercalated with areas of natural vegetation (woodlands) and agriculture fields.

Apart from the above mentioned social development initiatives, it is expected that NFP will increase the employment opportunities (both direct and indirect, permanent and seasonal/temporary) within project areas which will help alleviate poverty in the region and build capacity through teaching of new skills to the company employees. The Project terms of authorization state that NFP shall employ a total of 1435 individuals from its 12th year being 115 employed in the first year of the project implementation. Multiplier effects are expected from the implementation of NFP A/R project. The increased employment levels are expected to contribute for the reduction of thefts in the villages as well as the diversification of the families' income generation sources. Increased incomes will also

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[37] The terms of participation on the carbon project and funds allocation are described in appendix 3

contribute to improve the living conditions of the earning wage households (e.g. housing made of conventional materials such as bricks, zincs, bicycles, utensils and clothes)

Based on the predicted impacts, the NGR A/R project could potentially bring some negative effects; however, these would not be expected to outweigh the project benefits. Among the potential negative impacts the most significant are[38]: loss of lands for farms and housing (reduction of existing cultivated areas and expansion areas), increase the distance or difficulty to access to natural resources (firewood, charcoal, construction material, medicinal plants), Socio-cultural conflicts due to increases in populations and increase in diseases such as HIV/Aids. To reduce the magnitude of such impacts, apart from respecting all the legal requirements (e.g. the provision for servitude contained in article 14, line b) of the Land Law Regulations - Decree no. 66/98), NGR is implementing the recommended mitigation measures that include, among others: the compensation of the affected farmers with lands inside the project areas (following PRO 3 that establishes the facilitation in opening of new farm areas and inputs provision); prioritization of local community members when hiring labour, provision of trainings to the local communities so that they can benefit from jobs; training of community health agents and education/awareness campaigns endemic diseases and STDs including HIV/AIDS among workers and local communities.

Apart from the negative impacts foreseen from the project implementation NGR is also working to ensure the people's negative perceptions and fears[39] (reduction of current farming expansion areas, loss of housing and farming areas due to Plantation establishment near the houses and, decreases in temperature due to plantation) over the project implementation are properly dealt with. As part of the project implementation strategy to avoid misunderstanding and ensure participation of the local communities and other stakeholders, NGR is establishing a constant dialogue with local structures and communities.

"Without project" scenario

Under the baseline scenario, local communities use the area for small holder subsistence farms through shifting cultivation practices. These occur mainly in the open areas, grasslands and shrublands under consociation cultivation system. Common crops produced are maize, sorghum, beans, peas, peanut, jugo beans, potatoes and sweet potatoes, cassava, and cucumber, among other food crops. The dambos and grasslands along the water streams are also occasionally cultivated for high water demanding crops such as vegetables (cabbage, tomatoes, sugar cane, bananas, covo/leaf cabbage, onions, garlic and pepper/capsicum sugarcane, among others).

The areas of grassland apart from being used for agriculture, resulting in land disturbance, are also used as source of thatching grass, medicinal plants, small animals such as rodents (e.g. cane rats, hares) and birds (e.g. francolin). Shrub savannah and woodland are used also for collecting medicinal plants, wood (poles, firewood, utensils) and non wood products (honey, wild fruits such as those of Uapaca, Strychnos, Vangueria, and Tamarindus) for own consumption as well as for marketing in tows. Wild animals living in these ecosystems, such as wild pigs, antelopes, among others are hunted using snares and traps, direct chasing, and fire.

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[38] Management Plan for Niassa Forest Project 2008-2013. GRAS (Rev. June 2010).

[39] Socio-economic Study of the action area of the Malonda Tree Farms, SA by Malonda Foundation April 2009

Although not widespread in the area, there are signs of charcoal burning within the miombo woodlands. The woodlands are also source of timber. Visual observation and field data for Malulu unit revealed occurrence of highly valuable timber species such as *Diospyros kirkii*, *Swartzia madagascariensis* (pau-rosa), *Pterocarpus angolensis* (umbila), and *Khaya anthotheca* (umbaua). Although the forest regulation list of commercial timber species is huge, including *Brachystegia* (second class timber category) and several others as third class (e.g. *Syzygium guinense*), and fourth class (e.g. *Acacia karoo*), they are rarely marketed as timber.

Some illegal harvesting have been reported in the area, but it is important to note that the commercial volumes of the valuable timber species appear to be very reduced in the area, and represented by small size trees with DBH below the minimum allowed cut established by the Forest Regulation (40 cm). Further work will be carried out at each plantation unit to identify the products, species and locate the collection sites of the products used by local communities.

Without the NGR intervention, there would probably be a trend to maintain the current existing social patterns (including existing activities).
- Reduction of the quality of the livelihoods for the families employed in the company and increased levels of unemployment;
- Increased extensive use of lands particularly for the agriculture production;
- The probability of establishment of some social and commercial infrastructures in the area would still be small unless there was an increase in the population density.
- Increased over exploitation of natural resources used for income generation and family subsistence;

Additionally, in the absence of NGR project, there would probably be a trend of exacerbating environmental problems associated with their current patterns of usage. The most common problems are the uncontrolled fires which result from fire use in farming areas for the purpose of cleaning, weeding and burning of weeding products or residues during the post-harvest season, which are not controlled regularly causing soils impoverishment and erosion and destruction of regeneration species.

The itinerant agricultural activity associated to tree felling for charcoal production, firewood and poles collection are other factors contributing for the deforestation. Therefore, the introduction of conservation agricultural practices and adoption of technologies for improved production, with intensive agricultural system are some alternatives in course to alleviate the current exercised pressure in the forest.

In summary, in the 'without' project scenario the land would continue to be degraded, with further loss of vegetation overtime. This would occur as a result of continued pressure to cultivate crops on the lands from communities which is practised on a shifting cultivation basis.

Difference between the "with project" and "without project" scenario

Based on the above mentioned, the implementation of NFP project is expected to bring net positive benefits to the communities surrounding the project areas.

Overall, the impacts of NGR project are: Economic growth of the district, province & country, Social development and livelihoods improvements and Environmental conservation

Project component	Positive Impacts	Negative Impacts	Mitigation / incremental measures
Commercial plantation established in a mosaic system	Reduction of environmental problems (land degradation, conservation needs and sustainable management measures for biodiversity protection, deforestation, RTE identification, uncontrolled fires, GHG emissions and climate change effects, improve species regeneration)	Increase land degradation (forest fires) if not well planned/ implemented or due to human sabotage	Build capacity through teaching of new skills (awareness programs)
	Reduction of illegal and unsustainable exploitation activities and conservation of HCVs (riverine areas, wetlands through buffer zones with no plantings) and areas of natural and miombo (e.g. block J) and improve the carbon storages		• Build capacity of communities to ensure law enforcement including their rights • Direct participation on decision making processes about plantations management: closely working with committees and local authorities, hold regular meetings with the whole population to hear their ideas and opinions
	Improve degraded lands/reduce land degradation problems (e.g. reduce soil erosion and impoverishment)		• Provide regular information on the annual plantation plan (plantation site, species, and the role of households in relation to farms in proximity of the plantation area) • Involve the communities in the plantation monitoring; • Ensure benefit sharing, as a result of plantation process; • Build communities' capacity in law enforcement • Establish partnership agreements within the plantation areas for agriculture support (e.g. supply of inputs and technical assistance) and promotion of small business (income generating activities)
	Contribute to poverty alleviation through increased employment opportunities, strengthening of household buying capacity and improved living conditions particularly of those with at least one member working in the company (improved housing made of conventional materials such as bricks, zincs, bicycles, utensils and clothes)	Population increases due to migration in search of employment opportunities leading to higher demand for land, Socio-cultural conflicts (alcoholism, debits of staff in commercial establishments/ market stands and stalls)	• Set up new companies and plantation areas • Prioritize women to ensure gender balance • Establish more investments and involvement of local labour in training activities for increased professional skills • Prioritise hiring labour and training for the local

Project component	Positive Impacts	Negative Impacts	Mitigation / incremental measures
			communities members • Provide trainings to local communities so that they can benefit from jobs
		Creation of jobs expectation	• Dialogue and permanent negotiation • Give realistic explanations to the communities about the type of work, wages, and duration of contracts
		Increase in diseases particularly HIV-AIDS	• Carry out awareness campaigns about the endemic diseases and STDs including HIV/AIDS among workers and local communities • Set up counselling and disease control centres, health posts and centres • Train community health agents • Distribute condoms
		Difficulty/ restriction to access or increased distance for accessing natural resources (firewood, charcoal, construction materials, medicinal plants), sacred/holy places and holding traditional ceremonies	• Respect the provision for servitude contained in article 14, line b) of the Land Law Regulations (Decree no. 66/98) • Ensure constant dialogue with local structures and communities • Identify, post signage and Preserve places where medicinal plants are collected and sites of special cultural importance - SSCI to the local Communities (e.g. sacred sites, Cemeteries, medicinal plants collection sites) • Ensure SSCI are known, rules for their access are clear for all employees and communities have permanent access to these areas • Manage the SSCI in line with local customs • Guarantee access of the local communities to these areas • Establish and implement a conflict management mechanism • In cases where cemeteries are no longer in use, forms of transferring them to other places to be indicated by the community should be negotiated with costs related with

Project component	Positive Impacts	Negative Impacts	Mitigation / incremental measures
			traditional ceremonies and transfer of sacred places borne by proponent
		Reduction of existing cultivated areas and expansion areas (e.g. areas for farming, livestock, housing, etc.) and/or difficulty in access to them	• Establishment of participatory management boards and ensure direct participation (work with committees and local authorities, hold regular meetings with the whole population to hear their ideas and opinions on decision making processes about plantations management); • Provide regular information on the annual plantation plan (plantation site, species, and the role of households in relation to farms in proximity of the plantation area). • Involve local people in the communities in the monitoring of plantation activity • Respect the legal provisions for servitude contained in article 14, line b) of the Land Law Regulations (Decree no. 66/98) • Agreement on forestry and agricultural production (midterm) so that farmers can continue working in the farms for more time until the land becomes exhausted • Delimitation of community lands • Avoid whenever possible agriculture areas • Mapping of existing farms within the authorized areas for plantation • Develop and agree on a compensation plan with the affected communities • Enter into agreements for compensating the farmers for the loss of land (e.g. allocation of new land) • Establishment of partnership agreements within the plantation areas for agriculture support • Enter into an agreement allowing the circulation of the population/crossing the plantation in some/specific places so that they can access their fields • Liaise with communities in relation to the project impacts • Establishment and operation of conflict management

Project component	Positive Impacts	Negative Impacts	Mitigation / incremental measures
			mechanism
		Increase in socio-cultural conflicts (alcoholism, debits of staff in commercial establishments - market stands and stalls)	• Ensure permanent dialogue with local Administrative structures and workers so that these situations area voided • Ensure a open and transparent process for hiring workers (avoiding nepotism and providing equal opportunities to men and women)
		Reduction of water in the wells and rivers for the local population	• Establish a buffer zone of 100m around wells • Regular monitoring of water levels in the wells • If there are impacts on water levels, help the affected population to improve the conditions of their wells
Creation and management of: community funds, Community development program and sharing of 10% of carbon revenues	Local development through loan/support for associations and business promotion Reduction of thefts in villages due to increased employment opportunities for young people Increased incomes, strengthening of household buying capacity and increased livelihoods and well being of local communities Increase of forestry resources for future Support to education (supply of materials such as school desks, books, computers, etc.) and improve literacy levels Support to health (supply of health materials)		• Direct and active participation to ensure effectiveness and understanding of the problems faced by local communities in project areas • Establishment of participatory management boards • Establishment of partnership agreements within the plantation areas for agriculture support (e.g. supply of inputs and technical assistance) and promotion of small business (income generating activities)
	Support community infrastructures (e.g. establishment of mills, boreholes, schools, health clinics, improved access roads or other infrastructures, facilitate the market access)		• Ensure these are long lasting through properly usage and proper maintenance system • Make these infrastructures more accessible to the households
Support to community settled agriculture and livestock (e.g. supplies, technical	Sustainable use of land resources/ Reduced land degradation Reduction in unsustainable exploitation activities Increased income generation		Agreement on forestry and agricultural production (midterm) so that farmers can continue working in the farms for more time until the land becomes exhausted

Project component	Positive Impacts	Negative Impacts	Mitigation / incremental measures
assistance)	Build capacity through teaching of new skills		
	Creation of employment opportunities		
	Resource for local construction materials and Support on construction of improved housing		
	Contribution for Food security and nutrition		
	Increased productivity of land		
Establishment of community woodlots	Increased supply materials to meet the local demand for forestry products (e.g. firewood, poles for fencing, charcoal, etc) originated from plantations	Decrease in temperature (too cold) due to eucalyptus plantation of likely negative impacts for Forestry Plantations	• Establishment of written and formal agreements between local communities and the company, with rights and duties for each of the parts • Dialogue and permanent negotiation
	Reduced pressure over natural forests leading to long term conservation of the existing natural forests		
	Reduced environmental problems (land degradation, uncontrolled fires, GHG emissions and climate change effects)		
	Delimitation of community lands		

CM.1.2 Demonstrate that no High Conservation Values identified in G1.8.4-6 will be negatively affected by the project.

As shown in section G.1.8.1-3, there are no HCVs identified in the project areas however, some Sites of Socio-cultural Interest (SSCI) have been identified and these will be respected and managed to ensure their attributes are conserved.

Additionally, the wetland areas within the project zone are used by the local communities as water points for their cattle and for production of water demanding crops. Therefore, they will be protected through a 30m buffer zone where no planting will take place. Local communities will be able to access the watering points throughout the lifetime of the project. The wetlands of significance at the landscape level and which are currently not in use will be set aside for conservation

Within NGR DUAT, other site of special interest from the carbon storage perspective is the woodland located in Malulu unit (Block J). As such, this area has also been set aside for conservation and management measures are currently being implemented to ensure its value is maintained. To date a forest inventory has been carried out and a draft management plan (annex 1) produced for the area. Three issues have been identified as posing a threat to the resource in the area namely: opening of new farms, charcoal production and poles collection. As such, management measures have been listed. These and others will be discussed and agreed with the local communities as well as the implementation of the management plan.

CM2. Offsite Stakeholder Impacts

CM.2.1 Identify any potential negative offsite stakeholder impacts that the project activities are likely to cause.

The EIA carried out for Malonda Foundation included a section on potential impacts of plantations in the communities and their livelihoods. The impacts mentioned in the EIA (2007) are[40]:

- Loss of lands for farms and housing, population increase and higher demand for land
- Reduction of existing cultivated areas and expansion areas
- Increase in distance for access to natural resources (firewood, charcoal, construction material, medicinal plants)
- Restrictions on the access to sacred areas
- Socio-cultural conflicts;
- Reduction in the water level in rivers
- Difficulty to access natural resources
- Difficulty in holding traditional ceremonies
- Increase in diseases such as HIV/Aids

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[40] Management Plan for Niassa Forest Project 2008-2013. GRAS (Rev. June 2010).

- Restriction in access to traditional medicine
- Difficulty in accessing fields for agriculture
- Loss of agricultural land
- Increase in social conflicts
- Reduction of water in wells for local populations

Potential negative impacts from the forestry plantations addressed by the stakeholders for Malulu block[41]:
- Plantation taking place in the proximity of housing and farming areas
- Loss of land
- Reduction of current farming areas and expansion areas
- Fear of loss of housing areas
- Increase distance for the access of natural resources (firewood, charcoal, construction materials, medicinal plantations)
- Restriction for the access of holy places and HCV areas (wetlands, other water points etc)
- Socio-cultural conflicts (alcoholism, debits of staff in commercial establishments – market stands and stalls)
- Reduction of the level of rivers

> **CM.2.2 Describe how the project plans to mitigate these negative offsite social and economic impacts.**

Information on the mitigation measures that will be implemented to tackle the potential negative offsite social impacts is described in section CM1.1.a above. However, Priority Actions identified specifically for the alternative for land conflict mitigation are[42]:

- Delimitation of community lands
- Mapping of existing farms within the authorized areas for plantation
- Establishment of written and formal agreements between local communities and the company, with rights and duties for each of the parts
- Agreement on forestry and agricultural production (midterm) so that farmers can continue working in the farms for more time until the land becomes exhausted
- Dialogue and permanent negotiation
- Facilitation for Community and Sustainable Management of Natural Resources
- Establishment of participatory management boards, and
- Establishment and operation of conflict management mechanism
- Communities are integral part of the reforestation process. The success of the project depends on the involvement of these communities therefore, NGR should ensure involvement of local Communities in the management of the reforestation processes and management partnerships between NGR and the local communities:

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[41] Socio-economic Study of the action area of the Malonda Tree Farms, SA by Malonda Foundation April 2009

[42] Socio-economic Study of the action area of the Malonda Tree Farms, SA by Malonda Foundation April 2009

- o Direct participation on decision making processes about plantations management: closely working with committees and local authorities, hold regular meetings with the whole population to hear their ideas and opinions;
- o Provide regular information on the annual plantation plan (plantation site, species, and the role of households in relation to farms in proximity of the plantation area).
- o Involve the communities in the monitoring of plantation activity;
- o Ensure benefit sharing, as a result of plantation process;
- o Build capacity of communities to ensure law enforcement including their rights
- o Establishment of partnership agreements within the plantation areas for agriculture support (e.g. supply of inputs and technical assistance) and promotion of small business (income generating activities) [43].

Conflict resolution mechanism

To ensure a good relationship with the local communities, outside the existing local mechanisms for conflict resolution, NGR has developed internal mechanisms for disputes and conflict resolution (procedure 3) to ensure the interests of both parts are safeguarded. This procedure is divided in 3 parts: i) the first deals with conflicts between the company and the employees, ii) the second part deals with conflicts between the company and other stakeholders and iii) the third deals specifically with conflicts related to farms inside the NGR area and the steps for negotiation of their transference to other areas.

For this purpose it was created a Natural Resources Management Council that in its composition includes elements that represent communities of several villages around the plantation, representing the district government and relevant actors, civil society, NGOs and the community authority (figure CM.2.2-1 below).
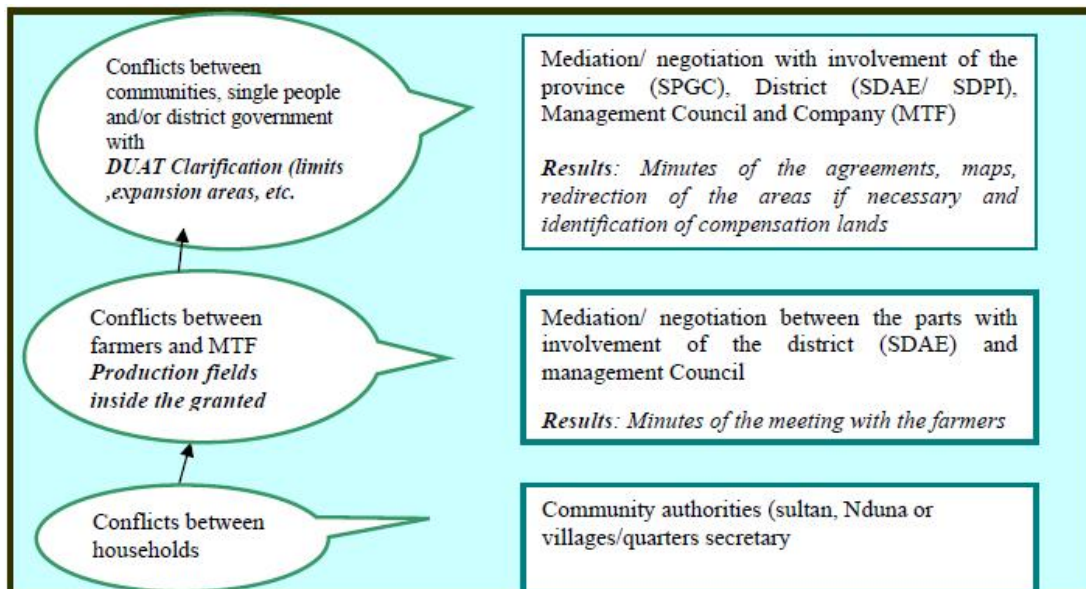
Figure CM.2.2-1: Conflict management model within the plantation area. *Source: Malulu socio-economic study 2009*.

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[43] Socio-economic Study of the action area of the Malonda Tree Farms, SA by Malonda Foundation April 2009

To assure the land ownership for agriculture and livestock, NGR is discussing with the communities the idea for identification and delimitation and certification of land on behalf of farmers. The majority of Malulu population undertakes its agricultural activities in Mochelo area, close to the Unango Mountain and this is seen as an alternative area in relation to future development for the Unango Village[44].

CM.2.3 Demonstrate that the project is not likely to result in net negative impacts on the well-being of other stakeholder groups.

As shown above, NGR is not likely to have any unmitigated impacts on the local communities or any other stakeholders group. Additionally, considering that the project will have positive impacts to the area where it will be implemented, then it is expected that the project will positively influence the well being of the local communities and other stakeholders' groups.

CM3 Community Impact Monitoring

CM.3.1 Develop an initial plan for selecting community variables to be monitored and the frequency of monitoring and reporting to ensure that monitoring variables are directly linked to the project's community development objectives and to anticipated impacts (positive and negative).

The impacts of NGR projects activities to the local communities will be monitored and the recommendations of the EMP to avoid or mitigate negative impacts should be adhered to by the company. The results of the socio-economic assessments will be used to set up the baseline scenario that will be used to monitor changes that occur at the community level.

An annual evaluation of the activities undertaken to reduce negative impacts of the project on local communities shall be carried out and a report prepared by the community officer responsible for the associated communities for each respective plantation area. The report (details in management plan[45]) will be used to evaluate the efficacy of activities undertaken to mitigate foreseen negative impacts of project implementation, identify any unforeseen negative impacts and to propose appropriate follow up remedial actions.

GRAS has developed a companywide community monitoring plan, which will be transferable to each of its individual forestry projects[46]. The plan was developed and tested at one of the company's Tanzanian projects and, will be implemented at other project sites. The plan is generic and easy to tailor to different project environments. The objective is to monitor changes in livelihood and well-being overtime in communities impacted by GRAS' projects.

Some of the key variables that the monitoring plan covers are:

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[44] Socio-economic Study of the action area of the Malonda Tree Farms, SA by Malonda Foundation April 2009

[45] Management Plan for Niassa Forest Project 2008-2013. GRAS (Rev. June 2010)

[46] Community Monitoring Guide For Green Resources' Forest Plantation Projects

- Employment
- Income
- Demographic and welfare aspects
- Infrastructure and service provision
- Health aspects/ profile
- Cultural profile
- Education profile
- Housing profile
- Food security/ nutrition

The generic monitoring plan and guidance includes among others:
- Appropriate indicators for the communities' livelihoods, and the questions that should be monitored and which can be compared inside and outside project area, over time
- Identification of sampling techniques for monitoring the selected indicators
- Advice and training on execution and note taking during surveying
- Appropriate methods for analysis, quantification and interpretation of data collected

It is envisaged that monitoring and reporting for the community monitoring plan will take place every three - five years, though this will be confirmed once the final plan is developed.

The monitoring of community impacts will also cover the monitoring of the Community development plan implementation. An annual monitoring exercise will be carried out and a prepared by the community officer responsible for its implementation in the associated communities of each respective plantation area. The report will be used to review the efficacy of the programmes implementation and to re-evaluate the programmes objectives in the light of evolving community needs. Details on the contents of the monitoring report can be found in the management plan.

CM.3.2 Develop an initial plan for how they will assess the effectiveness of measures used to maintain or enhance High Conservation Values related to community well-being (G1.8.4-6) present in the project zone.

The above sections mentioned that there were no HCVFs identified in the area therefore, there will be no need to assess the effectiveness of management measures on HCVFs. However, to ensure the effectiveness of measures used to maintain or enhance the SSCI, NGR will follow the monitoring procedures determined for each specific SSCI. Details on how NGR should carry out the assessments on the SSCI identified in the project zone are presented in annex 10 of PRO 10 of SOP.

CM.3.3 Commit to developing a full monitoring plan within six months of the project start date or within twelve months of validation against the Standards and to disseminate this plan and the results of monitoring, ensuring that they are made publicly available on the internet and are communicated to the communities and other stakeholders.

The project proponents hereby commit to developing a full monitoring plan within twelve months of validation against the Standards and to disseminate this plan and the results of

monitoring, ensuring that they are made publically available on the internet and are communicated to the communities and other stakeholders.

The initial plan will be shared with the DOE during the validation stage.

V. Biodiversity Section

B1. Net Positive Biodiversity Impacts (Required)

B.1.1 Use appropriate methodologies to estimate changes in biodiversity as a result of the project in the project zone and in the project lifetime. This estimate must be based on clearly defined and defendable assumptions. The 'with project' scenario should then be compared with the baseline 'without project' biodiversity scenario completed in G2. The difference (i.e., the net biodiversity benefit) must be positive.

NGR has engaged external consultants to carry out ecological assessments for the NFP areas. For Malulu unit the ecological assessment was carried out by a recognised senior lecturer from Eduardo Mondlane University. And for the Ntiuile/Luissa and Malica/Nconda areas, the study was carried out by -IMPACTO. The studies aimed at identifying the current status of biodiversity in the project areas. The studies used internationally accepted methodologies that combined mapping of the existing ecosystems using satellite images with field observations. Field observations/ground truthings were carried out using sample plots that were established in transects to validate the remote sensing results.

Apart from the ecological assessments, EIAs have also been carried out in the project areas to identify the potential impacts the project would have on the socio-economic and biophysical environments as well as to determine the mitigation measures to reduce (negative impacts) or increment (positive impacts) such impacts.

These studies revealed that the area is not particularly rich in biodiversity due to the past agriculture practices and the land cover changes that the project areas has been subject to through unsustainable shifting cultivation practices. Some wild animals, though not sighted or signs observed in these studies, have been mentioned by the local community members as being present in small numbers in the project areas namely: hyenas, leopards, monkeys, antelopes, hares, wild pigs, cane rats, and pythons[47]. To refer that the local residents mention the existence of these animals in the woodlands of high areas near the Unango mountain (approx. 6km from Malulu unit). Except for the pythons, that are protected in the country and which hunting is not permitted by law[48], none of the other mentioned animals are nationally protected, endangered or part of the IUCN Red List. The natural vegetation is now reduced to grass and shrublands although some remnants of forests can be found outside the carbon project area.

"With project" scenario

NFP will plant mixed exotic species namely of pine and eucalyptus which have been used in the region prior to project start. To refer that in the past the Government has

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[47] Ecological assessment, 2008
[48] Forest and wildlife Regulations (decree 12/ 2002)

established pine (e.g. Namaacha area in Maputo, Penhalonga in Manica province and Chiconono in Niassa province) and eucalyptus plantations (e.g. the Maputo, Sofala and Nampula provinces) in different parts of the country. The exotic plantations will serve multiple purposes as they are intended for the production of sawn timber, poles and wood chips.

Apart from the commercial forests, under the Company social responsibility NGR will engage the local communities in the establishment and management of community woodlots to supply fuelwoods, building/construction materials (e.g. poles for fencing of houses) and other wooden products demanded by the communities living nearby the project areas. By providing these wood products, NFP plantations and community woodlots will contribute to reduce the pressure over the native forests and as a consequence reduce the deforestation that is caused by the increasing demand for wood products. The increasing demand for fuelwood and building materials by urban and rural populations particularly in poor countries is the main cause of deforestation of natural forests in the tropics and sub-tropics. This demand is increasing all over the world and the forest plantations may represent a considerable contribute to meet this demand hence, relieving the pressure that would be put on natural forests (Campinhos 1999[49]; Nambiar 1999[50]; Sedjo 1999[51]; Jacovelli 2009[52]). Forest plantations can supply raw materials in short term compared to the natural forests as they normally use improved varieties with a shorter growing period.

Besides producing the targeted commercial products, NFP plantations will also supply non-wood forest products and provide a variety of social services; NFP forest plantations will also be managed to enhance their biodiversity protection functions providing ecosystem services such as maintenance of the soil nutrient levels, watershed protection, reduction of erosion through soils' stabilization, improvement in soil's structure as well as carbon storage. NFP project is being implemented in marginal lands that were previously used for shifting agriculture and which unsustainable practices lead to land degradation. Therefore, NFP plantations will contribute to improve soil fertility and protect against erosion. NFP plantations are also expected to significantly increase the organic carbon content. This has been seen in Brazil where increased organic carbon contents have been recorded in soils when pastures were converted to *Eucalyptus* plantations (Lima et al., 2009[53]). Planted forests are also being used in the tropics as a form of protective reclamation on degraded or sensitive sites, for example after mining operations or in degraded upland areas which were previously forested (Evans & Turnbull 2004[7]).

NGR is also implementing an agriculture development programme aimed at changing agricultural practises and incentivising the settled agriculture. Therefore NFP is expected to contribute to reduction of the land cover changes and contribute for the native forests

49 Campinhos, E (1999) Sustainable plantations of high-yield Eucalyptus tree for production of fiber: the Aracruz case. New Forests 17: 129-143.

50 Nambiar E.K.S (1999). Pursuit of sustainable plantation forestry. Southern African Forestry Journal 184: 45-62

51 Sedjo R.A (1999). The potential of high-yield plantation forestry for meeting timber needs. New Forests 17: 339 – 359

52 Jacovelli P (2009) Uganda's sawlog production grant scheme: a success story from Africa. International Forestry Review 11: 117-122

53 Lima A.M.N, Silva I.R, Neves J.C.L, Novais R.F, Barros N.F, Mendonca E.S, Smyth T.J, Moreira M.S and Leite F.P (2006). Soil organic carbon dynamics following afforestation of degraded pastures with eucalyptus in southeastern Brazil. Forest Ecology and Management 235: 219 – 231

conservation. Furthermore, the existing patches of natural forests (riverine forests and woodlands) and wetlands of significance at the landscape level within the NFP project areas will not be harvested commercially and will be sustainably managed to continue providing services to local communities (see annex 1. The biodiversity levels in NFP areas are low therefore, by protecting these natural areas NFP will contribute to enhance the remaining biodiversity within its project areas.

Without project scenario

The results of the ecological survey and EIA have shown that the biodiversity of the project area is not particularly rich. There are no endemic species or other important biodiversity values of importance in the project areas. this is not surprising taking into account the current degradation patterns of the lands which were and are being caused by the shifting cultivation practices and other unsustainable land-use practices. Therefore, without the project, the natural forest areas would continue to degrade as result of the current practices (shifting cultivation, fuelwood and charcoal production), potentially at a faster rate, and thus biodiversity would be lost.

Difference between with project and without project scenario

The NFP plantations are, therefore, expected to bring net positive biodiversity benefits through conservation of native forests and wetlands as well as improving the soil fertility. These activities will positively impact biodiversity in the project zone; conversely, in the absence of the project further degradation would be witnessed.

B.1.2 Demonstrate that no High Conservation Values identified in G1.8.1-3 will be negatively affected by the project.

As stated in section G.1.8.1-3, no HCV areas have been identified inside the carbon project area and thus no HCV areas will be negatively affected by the project. However, the existing SSCI and conservation areas will be managed so as to ensure their conservation value are not adversely affected by NGR A/R project actions/activities.

B.1.3 Identify all species to be used by the project and show that no known invasive species will be introduced into any area affected by the project and that the population of any invasive species will not increase as a result of the project.

Species to be planted in the A/R project include pine species*: Pinus oocarpa, Pinus caribaea, Pinus kesya, Pinus patula, Pinus edlliotii, Pinus taeda*, as well as eucalyptus species namely: *Eucalyptus calmadulensis, Eucalyptus tereticornis, Eucalyptus urograndis* and *Eucalyptus grandis*. These species have been screened against the global database of invasive species and are not invasive in Mozambique[54]. The NRP will manage planted

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[54] Selected species were assessed against the invasive species lists on 22/09/11 on the websites: http://www.issg.org/database/species/search.asp?sts=sss&st=sss&fr=1&sn=&rn=mozambique&hci=-1&ei=173&lang=EN and:

eucalyptus in recommended ways. The available forest management plan for the NRP lays out how the spread of the Eucalyptus into other areas will be prevented and the fact that NRP is certified under the Forest Stewardship Council™ (FSC™) confirms these practices.

Table B.1.3-1: Species to be planted in the A/R CDM project

Plant/Species selected	Type	Common name	Uses
Pinus Kesiya	Exotic softwood	Khasi/benguet pine	construction, poles and paper pulp
Pinus Patula	Exotic softwood	Mexican weeping pine	fuel, fibre, timber, gum or resin, medicine
Pinus caribaea	Exotic softwood	Caribbean pine	fuel, fibre, timber, gum or resin, tannin or dyes, medicine
Pinus maximinoi	Exotic softwood	Thinleaf Pine	fibre, timber, paper, firewood, resin extracts,
Pinus oocarpa	Exotic softwood	Mexican yellow pine, Hazelnut pine	construction, poles, fuel, gum or resin, medicine
Eucalyptus grandis	Exotic hardwood	Flooded gum	apiculture, fuel, fibre, timber
Eucalyptus saligna	Exotic hardwood	Blue gum	apiculture, fuel, fibre, timber, essential oils
Eucalyptus calmadulensis	Exotic hardwood	Forest/River Red Gum	apiculture, fuel, fibre, timber, tannin or dyes, medicine
Eucalyptus tereticornis	Exotic hardwood	Blue gum	apiculture, fuel, fibre, timber, tannin or dyestuff, essential oils
Eucalyptus urograndis	Exotic hardwood		

Apart from the exotic species mentioned in the above table, few indigenous species are also currently being experimented and being planted for trial research purposes such as *Kaya anthoteca* and *Afzelia quanzensis*. These indigenous species will be used to expand conservation areas, and on areas that have undergone deforestation post 1990. The carbon benefit of these indigenous trees will not be included in the carbon accounting.

> B.1.4 Describe possible adverse effects of non-native species used by the project on the region's environment, including impacts on native species and disease introduction or facilitation. Project proponents must justify any use of non-native species over native species.

The project proponents are planting both pine and eucalyptus species which are exotic to Mozambique. The planted species are obtained from high quality stock generated from genetically superior seeds that are well adapted to the prevailing site conditions and

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http://www.issg.org/database/species/search.asp?st=sss&sn=&rn=Mozambique&ri=19365&hci=-1&ei=-1&fr=1&sts=&lang=EN

broadened within and between species so as to ensure sustainability of the plantations against pests, diseases and climate fluctuations.

The ESIA carried out for the A/R project has identified the potential impacts that could arise from the use of exotic species. These have been summarised in the Environmental management plan and mitigation measures defined to ensure for each impact. The identified possible adverse effects of the planted tree species include, among others, the suppression of the grass and shrub as a result of canopy closure. This will, however, provide suitable habitats for shade tolerant plant species as well as other taxa not facilitated by fire. Tree species planted are not invasive and therefore do not pose a threat to indigenous eco-systems in and around the project site. No disease introduction is expected as a result of exotic tree planting as those species have been in use in the region for decades without any serious disease or pest incidences.

The ESIA has also identified a potential impact the alteration of the quality and quantity of the surface waters and reductions in the flows of the hydrographic basin. Mitigation measures were also identified and these include, among others, the establishment of buffer zones where no plantings of trees will take place and avoid plantings in wetlands. NGR is not planting in the wetlands and buffers are left around these areas that will still be accessible to the local communities. A list of such buffers is provided below:

Table B.1.4 - Buffers in use at NGR operations

Area	Buffers size (m)
Riverine area	250
Water spring	100
Navigable rivers, streams and lakes measured from the water high tides	50
Bore holes	100
Human settlements	2000**
Coast line, bays and estuaries	100
Dams/water reservoirs/lakes/plane reservoirs of water that occupies 10% of the riverine areas	250
Terrestrial boundary	2000
Railways	50
Highways, energy lines, telecommunications and pipelines for fuel, water and gas	50
Primary roads	30
Secondary and tertiary roads	15
Airports	100
Military bases	100
Other wet areas (bogs, swamps) not specified in the legislation	30

** or less, depends on the negotiation with the local communities

It is important to refer that there are controversies and critiques from the public against the planting of exotic species with deep root systems. The major argument is that these species (pine and eucalyptus) growth demands lots of water which may lead to decreasing water levels from underground reserves and streams over time. However, it is also known that the roots hold soil and prevent erosion while creating air pockets that lead

to increased soil permeability and thus reducing the amount of water that is lost through run off. Additionally, a study carried out in Tanzania, by Munishi in 2007[55], showed that eucalyptus trees do not degrade water resources because various species have various water requirements. Excessive water uptake is therefore a function of species type and environmental conditions. Like most other plants, eucalyptus species adjust their water uptake to the available soil water; reducing their water uptake as the soil dries and controlling water loss by regulating stomata opening. Thus, a high water table would allow a fast depletion, but as the water level falls, water uptake decreases concurrently. This is supported by FAO[56] (Davidson 1993), which compares the Eucalyptus with a range of crops. Moreover, it is evident that eucalyptus can achieve a high biomass production on a low nutrient uptake (as little as one-half to one-tenth that of most agricultural and estate tree crops). The same study also reveals that Eucalyptus appears to use less water per unit weight of biomass produced than other kinds of trees and many agricultural crops. Water consumption per unit area of land by eucalyptus is reduced by planting trees further apart or by thinning existing plantations.

In relation to the concerns regarding pine intake of water, a global study on the effects of both pine and eucalyptus afforestation on water yield[57], depicted that when shrub lands and grasslands were afforested with eucalyptus and pine trees, annual run off was reduced by 75% and 40%, respectively (Farley *et al* 2005). There is lots of literature available on the impacts of eucalyptus and pine trees in the water table but these are not conclusive. The above citations show that recent studies tend to believe that the amount of water consumed per biomass weight unit is less than many of the agriculture crops. Therefore, considering the project is being implemented on degraded lands that were once agriculture fields, the project proponents believe that the planting of eucalyptus and pine in the A/R project will not result into water and soil degradation in the area.

Another potential adverse effect mentioned in the ESIA is related to the spread of diseases and exotic species that escaped from the plantation blocks. To avoid and/or mitigate this impact, management measures will be implemented in the non planted areas with regular monitoring taking place in such areas to check if there are any diseases signals or if some trees have "escaped" from the plantation blocks. Sick trees will be dealt with adequately and, in case there are trees that escaped, these will be removed from these natural vegetation areas.

Apart from the environmental benefits mentioned above (improve/reduce soil erosion and increased water drainage), the use of non-native species which are fast growing compared to the natives can be further justified as follows: the forest resources in Mozambique provide firewood and charcoal which comprise 85% of the total energy consumption in the country. It is estimated that 16 million m^3 of wood are annually used

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[55] The Eucalyptus Controversy in Tanzania. Munishi (2007)
[56] Ecological Aspects of Eucalyptus Plantations. Davidson (1993) FAO
http://www.fao.org/docrep/005/ac777e/ac777e06.htm
[57] Effects of grassland and shrub land Afforestation with Pines and Eucalyptus on water yield: a Global Synthesis with Implications for policy. Farley et al (2005). Global Change Biology

for energy purposes, 70 % being from rural areas. Additionally, inappropriate harvesting practices are leading to over-exploitation of the forest resources and contributing to damage the natural forest, conservation areas, loss of ecosystem services and desertification[58]. To counter this, sources of sustainable wood products must be developed to substitute natural forest being lost through deforestation. Mozambique is deficient of a sustainable timber supply which can meet the demand driving such deforestation and the present A/R project may help remedy this problem. Non native species are the most effective to use in this case, due to their faster growth. Furthermore, silvicultural knowledge and experience with native species is limited in the country and in Niassa region and, as such, the information/regarding this is very little/scarce making the use of such trees/species more risky due to information gaps and difficulty in yields prediction. The use of exotic species has a history that dates back to the 1920s with the aim to reduce pressure on the forest resources[59]. The Mozambique government and Malonda Foundation both promote the establishment of planting of exotic species.

B.1.5 Guarantee that no GMOs will be used to generate GHG emissions reductions or removals.

NGR has no intention of using GMOs in its project operations, as such, no GMOs will be used by the project to generate GHG emissions reductions or removals.

B2. Offsite Biodiversity Impacts

B.2.1 Identify potential negative offsite biodiversity impacts that the project is likely to cause.

The ESIA carried out for NGR project areas has indicated that there may be direct impacts of the project implementation on the biodiversity in the project areas and surrounding areas. These impacts include among others: i) Alteration and/or loss of natural habitats by clearing vegetation for: planting, installation of infrastructures (e.g. roads, buildings), ii) spread of invasive species, iii) fauna disturbance and, iv) increases in poaching. Mitigation measures were defined and are being implemented by NGR (table B.2.1.1. below).

Table B.2.1- 1: Potential negative impacts to the Biodiversity (direct) as stated in the ESIA 2007:

Potential Impact	Mitigation measure
Alteration and/or loss of natural habitats by clearing vegetation for:	• Conserve the ecologically sensitive areas (e.g. vegetation associated with the rivers and wetlands); ensure the maintenance of ecosystem processes and conservation of high biodiversity areas • Conserve areas with closed forests due to their biological value

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[58] State of Forest and Tree genetic Resources in Mozambique. Issufo, Alima A.K. 2002, FAO. http://www.fao.org/DOCREP/005/AC499E/AC499E00.HTM
[59] State of Forest and Tree genetic Resources in Mozambique. Issufo, Alima A.K. 2002, FAO. http://www.fao.org/DOCREP/005/AC499E/AC499E00.HTM

planting, installation of infrastructures (e.g. roads, buildings)	and/or ecological importance; do not use them for planting exotic forests
	• Plantation areas and those with mosaic of agriculture and grassland should be left undisturbed for new forest establishment
	• Ensure that a sample of natural vegetation is conserved and mapped to work as a monitoring area for potential impacts on the natural ecosystems. Conserve at least 10% of each vegetation coverage type.
	• Chose carefully the place for construction of infrastructure to minimise possible interference with the land and natural habitats:
	  o Chose places that minimise the potential for ecological impacts and whenever possible, use "disturbed" lands
	  o Avoid building on area: with intact vegetation, special sensitivity (wetlands, riverine zones and intact forests) and, within the 50m buffer zone beside any water course
	• During the clearing of vegetation to build roads, the crown of the trees should cover the roads to ensure continuity of habitats

Spread of invasive species	• Carry out regular monitoring of the non-planted natural areas to check whether some trees have "escaped" from the plantation blocks • In the event of species which have "escaped" from the plantation blocks, remove them promptly and manually (and not with pesticides).
Disturbance of the fauna	• Apply the mitigation measures described for the potential impacts on the vegetation and natural habitats on which the fauna depends • Link the portions of intact natural vegetation through corridors to allow the migration of the biota throughout the area
Increase poaching due to the inflow and concentration of people from other districts and provinces	• Guarantee limiting the opening of access to the natural habitats and that the use of this access be restricted • Ban poaching and/or the pursuit of wild animals by the workers. Workers who break this rule should be subject to disciplinary action. • Work in coordination with the appropriate provincial and district authorities on these potential impacts, so that they can strengthen their activities to implement the law.

Another impact that has been identified by the ESIA is the loss of agriculture field. This impact was mainly analysed from the socio-economic point of view however it may also result in biodiversity changes if farmlands are relocated to areas of natural forests (leakages). NGR doesn't envisage a significant leakage from the NFP project implementation however, some displacement of farmlands will take place and, to avoid this impact NGR is, in collaboration with the SDAE/ Agriculture Services, identifying areas for the farmlands relocation. For cultural reasons the peasants normally prefer to choose the new areas on their own but NGR is, whenever possible, following up where the new farms are established through its compensation program that determines that NGR will support the land preparation of an area of equal size to the relocated farmland as long as the farmer ensures that the area is free of stumps that would otherwise obstruct the mechanized land preparation. Taking into account that most of the surrounding areas of NFP project, that could accommodate the displaced activities, are also degraded then NFP impacts in this regard can be negligible. Additionally, although the areas of grasslands around the project areas could potentially become more degraded from the re-

establishment of these activities - this has been assumed and accounted for in the leakage estimations.

Furthermore, NGR is also implementing, under the company social responsibility, an agriculture program that intends to provide farmers with alternative income generation from the soy plantation while incentivising settled agriculture. Therefore, it is envisaged that the farmers will demand less areas for the agriculture activities.

Apart from the direct impacts described above, the ESIA has also identified impacts that, may indirectly impact on the animals and therefore on the biodiversity (Table B.2.1- 2). Mitigation measures for these impacts have been defined as follows:

Table B.2.1- 2 - Potential negative impacts to the Biodiversity (indirect) as stated in the ESIA 2007:

Impacts	Mitigation Measures
Deterioration of quality /Pollution of water and soil caused by: i) Use of dangerous wastes due to use and storage of fuel and other chemicals (e.g. fertilisers, herbicides and pesticides) in the workshops and yards and, ii) increase in nutrients and sedimentation	- Ensure that all activities involving transfer, storage and potential for contamination are confined to duly placed areas: - Locate all storage areas (incl. for fuels and other chemical substances) in areas that are not ecologically sensitive. - Signpost and built these areas on impermeable cemented basins to contain possible spills. - Provide instructions and PPE to all the workers involved in the use of these materials - To avoid possible spills: - The fixed fuel deposit should not be located anywhere outside the areas approved for undertaking the work and building the camps - Fuel deposits with a capacity in excess of 500 litres should be located on flat or slightly inclined ground. There should be a paved area around this zone, with the capacity to contain at least 125% of the total volume of the deposits. The paved area and the floor of the deposits should be made from impermeable material or be sheathed so as to guarantee that petroleum products cannot escape. - All the fixed deposit areas should be isolated by a security fence, with a gate that can be locked. Place symbolic signs with words such as "No Smoking", "Do not strike matches" and "danger", in line with recognised standards. The use of local languages, as well as Portuguese, is recommended. - Store the fuels and undertake the maintenance or resupply of vehicles or equipment at a distance not less than 50 metres from any housing area, water course or wetlands, or where there is a potential for spills of fuel to contaminate the water course or the ground water. The fixed fuel deposit should always be located within the limits of the workshop. - Maintain vehicles and machinery regularly. This should only be done in the workshops. No maintenance should be allowed outside of the designated area. If it is not possible to take the vehicle to the workshop, maintenance may be allowed as long as the following recommendations are complied with: - Cover the floor beneath the machinery with a sheet of

	- plastic to collect any spill; - Avoid any spills of oil of fuel into the soil or rivers; - In the event of contamination of soil, it should be immediately removed and treated in the main camp; - The procedures for cleaning up and collecting spills should be followed; - Clean up and rehabilitate areas affected or contaminated with oils, fuel or other dangerous or semi-dangerous substances - Keep used oils in sealed drums and do not mix them with other substances, such as petrol, solvents and anti-freeze. The used oil can be returned to the supplying company, for later recycling. However, the contractor may supply the used oil to the local population, if they request it.
Erosion and accumulation of sediments during the logging phase and the construction and operation of access roads	- Establish a riverine buffer zone where native vegetation is conserved to protect the rivers from run-offs of sediments - Ensure that any mechanical cultivation of soils is done by strips and that sediment barriers are created with vegetation where accelerated soil erosion proves to be inevitable - Pay special attention to the location, construction and maintenance of plantation roads/paths since these are the primary source of sediment - Minimise the length, width and density of roads - The construction of roads should consider the type and intensity of traffic anticipated in the long term (in terms of width); - Maximise the use of temporary roads - Minimise the number of roads and paths in the buffer zone - Minimise the number of river crossings and choose, as far as possible, crossing places where the material of the river bed is more solid (such as rocks), and where the banks are low - Locate roads in areas with good drainage - Avoid the building of roads on sharply sloping hillsides and very low valleys - Build drainage channels along the roads at strategic points to drain water from the roads. Their capacity should be in line with local rainfall and runoff - The surface of the roads should be convex, so as to allow the water to run into the drainage channels - Release the water from the drainage channels regularly into the vegetation, and not directly into the water courses - Carry out logging operations in such a way to minimise accelerated soil erosion, taking into account that the bare soil after logging is very susceptible to run-off and thus to transport of sediment - Restore the forest coverage rapidly after logging - Depending on the season and on conditions on the ground, the plantation blocks for logging should be minimal in extent (the IFC recommendation is to keep the blocks in areas typically less than 50 ha) to reduce the areas exposed to wind and rain; - Avoid the forestry exploitation in the rainy season, and exceptionally humid periods, when the soils are saturated with water, which encourages more surface run-off and mudslides;

	• Choose the logging machinery to minimise effects on the soils • In areas with slopes steeper than 30%, extraction systems with cables should be used to minimise the use of vehicles on slopes susceptible to erosion
Contamination of soil and ground water by the waste waters from the workers' camps	• All waste waters from domestic use should be treated in septic tanks of appropriate size in accordance with the number of workers involved in the project, before being released into the surrounding environment. • The position of the septic tanks should be carefully planned and they should never be located at a distance less than 50 metres from any well or other source of drinking water
Fires in the plantations	• Establish and maintain fire breaks around the plantation blocks • Regularly remove combustible material, especially high and dry grass beside the access roads • Keep the areas below the coverage of the tree canopy free of easily inflammable vegetation • Undertake awareness campaigns about uncontrolled bush fires to the local peasants • Take measures to manage and control fires, and to fight against uncontrolled bush fires; • Have a fire fighting plan.
Increase in Dust and Noise	To minimise dust: • Respect speed limit on public roads, • Ensure the use of water trucks near the houses for sprinkling water on dirt roads opened by the project • Cover the most used roads with gravel For noise: • Select equipment with lower noise levels • Install silencers in fans and equipments to suppress the noise from exhaust tubes and compressors • Limit the hours of operation for certain equipment and operations, particularly mobile sources of noise that operate near the communities • Reduce as much as possible traffic in areas near the communities • Develop mechanisms to record and respond to complaints • Limit work to the number of working hours established by law, thus preventing work from continuing at weekends, on public holidays and during specific traditional ceremonies
Changes (reduction and/or increase) in the water flow	• Respect the recommended buffer zones during the plantation phase

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B.2.2 Document how the project plans to mitigate these negative offsite biodiversity impacts.

Besides identifying the potential impacts that the project could have, the ESIA also identified mitigation measures that were summarised in tables B.2.1-1 and B.2.1-2 above.

To mitigate the negative impacts that may arise from the farmlands relocation, NGR has developed and is implementing a SOP (PRO 3.3) that deals specifically with this issue. PRO 3.3 determines that NGR should assure that displaced farmers can continue to produce the goods they need for ensuring the food security. Displaced farmers should also benefit from compensation and support in form of land preparation, agriculture inputs (e.g. improved seeds and fertilizers) as well as technical assistance. The compensation is done to incentivise the use of improved cultivation techniques that increase the productivity reducing the need for extensive lands. The support will only be given to farmers who opt to leave the project area and open new areas in lands that are not classified as forests because the company is not willing to incentivise the devastation of native forests. Additionally, to avoid perverse incentives, i.e., incentives for the establishment of new farms in its project areas, the compensation will only be given to individuals that had already established their farms before the DUAT acquisition by the company. The farmer is responsible to do the land clearing and de-stumping of the area to allow for the tractor to enter the area and do the mechanical land preparation. All this process will be accompanied by the local authorities and other basis structures such as the régulos, Community management committee and other organizations that, may contribute for a better usage of the existing natural resources and improved productivity. In case of disputes from this process, Pro 3.2. regarding the conflict resolution with local communities and other stakeholders should apply and the District Services of economic Activities (SDAE) or other Government appointed should serve as mediator whenever needed.

NGR is also implementing an agriculture program to promote/incentivise settled agriculture which will reduce the amount of areas that would, otherwise, be required for the agriculture developments. The program includes provision of inputs and technical assistance to the targeted beneficiary farmers who are living in the NFP project zone and other areas. The community woodlots and outgrowers scheme will also contribute for the diversification of the income generation sources and reduction of the current unsustainable practices.

B.2.3 Evaluate likely unmitigated negative offsite biodiversity impacts against the biodiversity benefits of the project within the project boundaries. Justify and demonstrate that the net effect of the project on biodiversity is positive.

It is not envisaged that NGR will have negative impacts that cannot be mitigated (unmitigated). As shown above, all predicted impacts can be mitigated and NGR will ensure they are properly managed. Additionally, the ESIA has identified the "Sequestration of atmospheric carbon by the forestry plantations" as a positive impact that will contribute to reduce the greenhouse gases. Though not identified in the EIA, the potential reduction of erosion and the land degradation pattern are also positive impacts that may arise from the implementation of the A/R project. NGR will make sure that these are incremented whenever possible therefore the net effect of the project on biodiversity is considered to be positive.

B3 Biodiversity Impact Monitoring

B.3.1 Develop an initial plan for selecting biodiversity variables to be monitored and the frequency of monitoring and reporting to ensure that monitoring variables are directly linked to the project's biodiversity objectives and to anticipated impacts (positive and negative).

Biodiversity monitoring shall be conducted to verify and secure ecological sustainable forest management. The FSC and CCBA certification programmes and their standards and requirements for biodiversity monitoring will set the frame for how NGR will carry out the monitoring.

A biodiversity monitoring plan has been developed based on the EMP and the ecological assessment results to monitor the biodiversity impacts. The monitoring plan seeks to quantitatively and objectively monitor the biodiversity changes in a comprehensive manner, within and outside the influence of the project. Variables to monitor include, species abundance and its richness, species diversity, species composition in a given strata, effects of reforestation to their habitats and focusing on those species with a high risk of being negatively impacted by the project.

The biodiversity monitoring plan will keep track of changes in these attributes as the project goes on and is compared with the baseline scenario. The monitoring scheme shall ensure that any changes identified are registered, quantified and rectified. The biodiversity monitoring shall be conducted consistent with the CDM monitoring plan. Monitoring scheme will assess changes in biodiversity and monitoring reports will be prepared. As required by the FSC, summary of the monitoring results will be made available for the public.

Coverage:

All the main strata (vegetation types) in the project shall be monitored, though with different effort, depending on the status of the habitat. Areas of main interest shall be wetlands, High Conservation Value Forest (HCVF) and other areas containing species of special interest. Species recognized as rare, threatened or endangered by IUCN shall also be given attention in the monitoring plan.

All fieldwork shall be performed by NGR personnel and, whenever needed, additional assistance to help out with identification will be sought. Local knowledge and participation in the monitoring work is important and must not be underestimated. Collected data shall, as soon as possible, be typed and stored electronically and sent to the one responsible for biodiversity monitoring in the company.

The plan

The monitoring plan and guidance will include among others:

- Biodiversity indicators to be monitored and which can be compared inside and outside the project area, and over time to include selected flora and fauna

- Identification of sampling technique for monitoring the selected indicators

- Appropriate methods for analysis, quantification and interpretation of data collected

- A tool on how to select key indicators for the generic monitoring guidance document

- Development of data entry sheets, and analysis and recommendations

The approach to be used will involve:

- Identification of biodiversity indicators that can demonstrate changes in biodiversity.
- Assessment of area specific conditions and review of project documents
- Second discussions with relevant staff and other stakeholders for review and refinement of selected indicators for appropriateness and acceptability
- Development of a monitoring plan to be implemented.

The initial plan will be shared with the DOE during the validation stage.

Environmental monitoring

The Environmental Monitoring Plan (EMP) that resulted from the EIA will be implemented as part of the monitoring plan. The EMP demands the monitoring of changes in the vegetation, soil nutrients and socio-economic aspects etc. as well as the mitigation measures implemented.

NGR management will be responsible to ensure that the means (tools & equipments) and resources needed to carry out the monitoring processes is available on time and the monitoring responsible should ensure that the budgets for these processes is included in the annual planning activities.

B.3.2 Develop an initial plan for assessing the effectiveness of measures used to maintain or enhance High Conservation Values related to globally, regionally or nationally significant biodiversity (G1.8.1-3) present in the project zone.

No HCV areas have been identified in the project zone and therefore no specific plan will be in place to assess the effectiveness of such measures.

B.3.3 Commit to developing a full monitoring plan within six months of the project start date or within twelve months of validation against the Standards and to disseminate this plan and the results of monitoring, ensuring that they are made publicly available on the internet and are communicated to the communities and other stakeholders.

The project proponents hereby commit to developing a full monitoring plan within twelve months of validation against the Standards and to disseminate this plan and the results of monitoring, ensuring that they are made publically available on the internet and are communicated to the communities and other stakeholders.

VI. Gold Level Section

GL1. Climate Change Adaptation Benefits

GL.1.1. Identify likely regional climate change and climate variability scenarios and impacts, using available studies, and identify potential changes in the local land-use scenario due to these climate change scenarios in the absence of the project.

GL.1.2. Identify any risks to the project's climate, community and biodiversity benefits resulting from likely climate change and climate variability impacts and explain how these risks will be mitigated.

GL.1.3. Demonstrate that current or anticipated climate changes are having or are likely to have an impact on the well-being of communities and/or the conservation status of biodiversity in the project zone and surrounding regions.

GL.1.4. Demonstrate that the project activities will assist communities and/or biodiversity to adapt to the probable impacts of climate change.

GL2. Exceptional Community Benefits

GL.2.1. Demonstrate that the project zone is in a low human development country *or* in an administrative area of a medium or high human development country in which at least 50% of the population of that area is below the national poverty line.

GL.2.2. Demonstrate that at least 50% of households within the lowest category of well-being (e.g. poorest quartile) of the community are likely to benefit substantially from the project.

GL.2.3. Demonstrate that any barriers or risks that might prevent benefits going to poorer households have been identified and addressed in order to increase the probable flow of benefits to poorer households.

GL.2.4. Demonstrate that measures have been taken to identify any poorer and more vulnerable households and individuals whose well-being or poverty may be negatively affected by the project, and that the project design includes measures to

avoid any such impacts. Where negative impacts are unavoidable, demonstrate that they will be effectively mitigated.

GL.2.5. Demonstrate that community impact monitoring will be able to identify positive and negative impacts on poorer and more vulnerable groups. The social impact monitoring must take a differentiated approach that can identify positive and negative impacts on poorer households and individuals and other disadvantaged groups, including women.

GL3. Exceptional Biodiversity Benefits

GL.3.1 <u>Vulnerability:</u>
Regular occurrence of a globally threatened species (according to the IUCN Red List) at the site:

GL.3.1.1. Critically Endangered (CR) and Endangered (EN) species - presence of at least a single individual; or

GL.3.1.2. Vulnerable species (VU) - presence of at least 30 individuals or 10 pairs.

Or,

GL.3.2 <u>Irreplaceability:</u>
A minimum proportion of a species` global population present at the site at any stage of the species` lifecycle to the following thresholds:

GL.3.2.1. Restricted-range species – species with global range less than 50,000 km^2 *and* 5 % of global population at the site; or

GL.3.2.2. Species with large but clumped distributions – 5 % of the global population at the site; or

GL.3.2.3. Globally significant congregations – 1 % of the global population seasonally at the site; or

GL.3.2.4. Globally significant source populations – 1 % of the global population at the site;

Malulu Conservation Area Management Plan

NIASSA GREEN RESOURCES SA MOZAMBIQUE

First edition

Lichinga, June 2011

Summary

The natural forest in Malulu unit, NGR, comprises an area of 1067 hectares miombo woodland. Main tree species is *Brachystegia* spp, *Uapaca* spp and *Diplorhynchus condylocarpon.* The forest also serves as a key habitat for several animal species of antelopes, monkeys, birds and snakes.

The natural forest provides important ecosystem services for the local community. Several medicinal plants are found in the area, fruit, berries and honey is collected here, and hunting and trapping are common activities. Not at least are timber resources important to the local community. Construction material, firewood, and wood for charcoal production are all found in the forest.

The forest carries sign of utilization and exploitation long back in time. The forest is young, and few very big trees are registered. Frequent fires takes place, both as a natural feature and as method of catching animals during hunting. All this mechanisms are part of the history and the dynamic of the forest.

Establishment of forest plantations are taking place around and in between the natural forested areas. This activity will unquestionably have an impact on the area, the use of forest products and demand for its services. A management plan for the natural forest is therefore needed, as a tool for proper forest management, sustainable harvesting, ecosystem maintenance and economic benefits for the local community.

An inventory survey was conducted May-June 2011, to find the volumes, species distribution and regeneration rates. The estimated current volume is totally 47.7 m3/ha. Of this, 21.3 m3/ha is regarded to be of commercial value. The mentioned *Brachystegia* spp was by far the most abundant genus, and was also what proved to regenerate with highest numbers.

Growth models and annual yield tables need to be put in place as soon as possible. It was not possible to do reliable estimates with the present data. A new inventory with additional parameters will give this information.

1. Company identification

Niassa Green Resources SA (NGR), a partnership between Green Resources AS (80% ownership of which 79% belong to Green Resources AS and 1% Green Resources Mozambique SA) and Malonda Foundation (20% ownership), was legally registered in 09/07/2007 and its object is the management, transformation and commercialization of forest products. NGR is a private, profit oriented, vertically integrated, forest products and carbon offset company, that plans to develop a long-term investment with a 50 year horizon in forest plantations in Niassa province of Mozambique.

2. Basic information

2.1 Location and boundaries of the area

Malulu unit is located in Sanga district, within 75 km from the city of Lichinga, and covers a surface of about 5.838,3 ha that have been demarcated by the cadastre. The unit is divided into two sub-units, both along Miala – Muembe road, just east of the village of Miala, between Chidindime and Luchimua rivers, both tributaries of the Lucheringo River. The area is limited on the south-east side by the Luchimua river, and on the east by the Lucheringo river. Malulu is the closest village to the project.

The areas of natural forest comprises an area of 1067 hectares, and are scattered around in the Malulu unit, with the largest parts concentrated around Mount Maze (1310 meters a.s.l.) in the northern part of Malulu. In the east, the area borders to Luchimua River, while it is surrounded by the company`s other areas for the rest (Fig. 1&6)
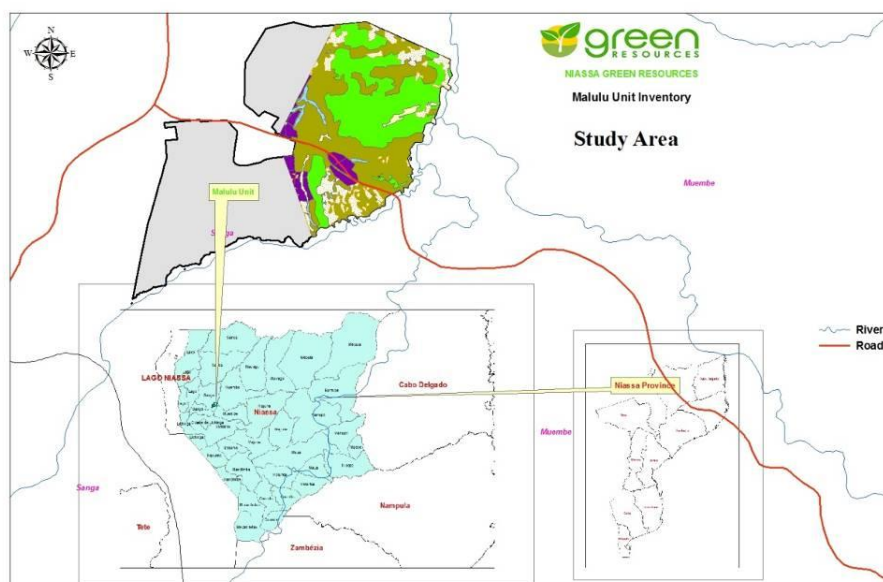
Figure 1. Map of Malulu unit, NGR

2.1.1 Licences and approvals

Malonda Foundation ordered an Environmental Impact Assessment (EIA) of a reforestation project in the areas for which DUATs were granted. The EIA was concluded in September 2007[62]. NGR areas where DUATs have been granted by Malonda Foundation are already included in this assessment and recommendations made by the EIA are being followed. The legal land use title (DUAT) for the Malulu unit was signed 14th April 2006, for the total area of 7880 ha in Sanga District, with process number 7552/881.

2.2 Climate

There is no exact climatic data for the entire project area. Hence, data cited normally refers to Lichinga city where a weather station can be found.

The project area has a temperate monsoon climate that is strongly influenced by altitude. Mean annual temperature is 19.1°C varying between 24.3°C maximum and 13.9°C minimum. Temperature ranges by season with a mean temperature in July of 9°C whilst a mean of 28°C in October (figure 7 below). The minimum monthly average observed was in July 1978 (8.3°C) and the monthly maximum in November 1996 (29.7°C).

2.3 Topography

Malulu unit area is mostly flat or with a slight gradient (1000-1200 m above sea level). Average altitude of this area is 1,100 m above sea level although two peaks exhibit higher altitudes, Zuvi, in the southern block with an altitude of 1,185 m and Maze, in the northern block with an altitude of 1,310 m.

2.4 Access roads

The road network in the project area consists of a mesh of primary, secondary, tertiary, local and unclassified roads. NGR interest areas are served by the road that links Lichinga city to the district of Lago in Niassa province. These areas link to the rest of the region through a national Road EN537 (Fig.1) and a network of tertiary roads. Besides the EN537, Muembe district also links with other districts of the country through national road EN13 and other vicinal roads. Except from the road that links to Sanga district, most of the roads that give access to the selected project areas are dirt roads and transit ability along them, particularly during the rainy season, is very problematic.

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[62] Niassa province reforestation project. Impacto. September 2007

2.5 Flora

A wide range of plant species are registered in the area. As for all typical miombo forest, *Brachystegia* spp are the dominant tree species (Fig. 2), together with *Diplorhynchus condylocarpon* and *Uapaca* spp (See Annex 1 for full list of trees).

Typical herbs and grasses found in the forest are; *Themeda triandra, Andropogon gayanos, Panicum maximum, Eragrostis aspera, Hyparrhenia filipendula, Acristashia leucotris, Tristashia leucotrix*, and *Hyperthelia dissolute* (Sitoe 2007). There are no invasive species in the area.

2.6 Fauna

For the Malulu unit, only few signs of animals were observed. However, although not observed, local residents declare occurrence of hyenas, leopards, monkeys, antelopes, hares, wild pigs, cane rats, and snakes. Pythons are also a potential for the area. The Forest Regulation indicates all species of pythons as protected species. Local residents indicate the peaks of Maze mountain as the habitat of these snakes. Therefore, if woodlands are to be protected, the python's habitat will be therefore protected. However, as a protection measure, the food source for these snakes should be evaluated in view to consider them as a protection measure.

According to the EIA (2007), the miombo woodlands serve as habitat for species of small antelopes, such as common duiker *(Sylvicapra grimmia)*, suni (*Neotragus moschatus*), klipspringer (*Oreotragus oreotragus*), and from time to time bushbuck (*Tragelapus scriptus)*

2.7 Socio-economic Characteristics

The administration structure of the area is the same as for Sanga District, described in the NGR Management Plan. In addition, possibly a new forest management council will be created, to run the management of the forest areas.

There are no persons living permanently in the area in question. Though, there are some machambas scattered around, with seasonal/temporarily settlement.

As the area surrounding the forest is being planted, a risk of more intensive exploitation of the forested area is highly present. Also, an increase in migration due to work opportunities in the plantation can lead to increased demand for forest product and services.

2.8 Forest Industry

The woodland provides numerous resources and services for the local community (EIA 2007).

Charcoal: trees used for charcoal production is mainly; *Combretum molle, Brachystegia* spp, *Afzelia quanzensis, Khaya anthotheca, Pericopsis angolensis* and *Schotia brachypetala* (EIA 2007). Charcoal is mainly produced for sale. Average price for one sack of charcoal is about 60 meticais (from personal interview 2011), this is the equivalent of about USD2.00.

Image 1. Wood stacked and covered with clay. A typical local charcoal kiln. From Malulu unit, NGR

Image 2. Charcoal in production. From Malulu unit, NGR

Firewood: Trees preferred as firewood are; Protea spp, Brachystegia spp, Pilostigma thonningii, Combretum molle, Schotia brachypetala, Mangifera indica, Uapaca nitida, Pericopsis angolensis, Parinari curatellifolia, Swartzia madagascariensis and others (EIA 2007)

Image 3. Women collecting wood. From Malulu unit, NGR

2.9 Significant environmental impacts

Deforestation/forest degradation/soil erosion

Wild and Fernandes (1967) characterizes woodland and shrub savanna to be the dominant and original vegetation type in the area. The land use change has had several phases and intensities, influenced by governmental decisions, civil war and migration of people. The forested area around Mt. Maze has never been cleared, and represent a fairly intact, native ecosystem. Yet, the area has through decades served the local inhabitants with forest products, and also some small areas have been cleared for agricultural purposes (personal interview found in Sitoe 2009).

Soil erosion happens everywhere forest is being cleared, so also in Malulu unit. Information about this problem should be addressed to the local community, to raise awareness and implement measures to minimize the effect of forest harvesting.

Image 4. Beginning sign of soil erosion, with roots being unmasked. From Malulu unit, NGR

Extraction of soil for construction

Several spots showing soil collection have been identified and mapped out. Soil is collected to be used in house construction. The full extent of this activity in the current area is yet not known.

Fire effects

Fire scars were observed on woodland tree stems, and local residents confirmed annual occurrence of fire in the grasslands as well as within the woodlands, particularly in miombo woodlands (SES 2009) Sitoe (2007) argues for fire as a common and important feature in the miombo woodland, and not to be looked upon as a negative factor.

3. Forest Resources
3.1 Capacity training

Necessary capacity training will be given by technicians and foresters at NGR, or according to any other agreement between the NGR and the local authorities.

3.2 Species

All together 88 different species were identified (with scientific and/or local name) in the natural forest in Malulu during the inventory 2011. Full species list is found in Appendix 1.
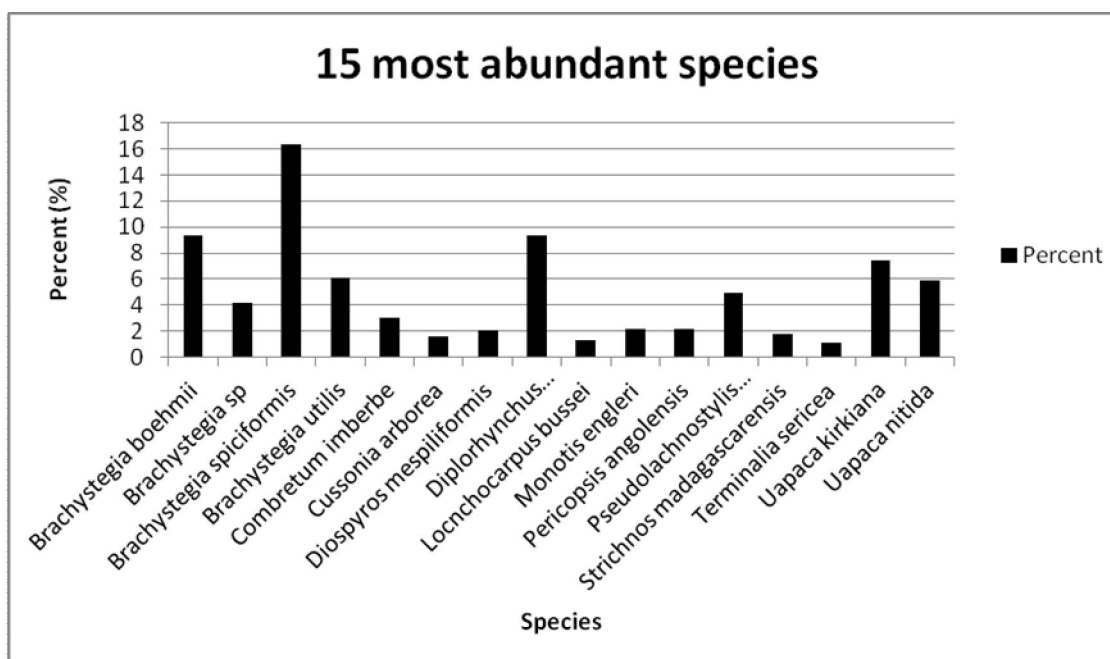
Figure 2. Percentual distribution of the 15 most common tree species in Malulu unit, NGR.

3.3 Commercial timber

The average estimated timber volume in the natural forest in Malulu is 47.7 m3/ha. Volumes regarded to be of commercial value, is estimated to be 21.3 m3/ha.

The commercial timber was divided in four classes of quality; 1) Straight, 2) Moderately bent, 3) Extremely bent, 4) Useless. The average quality among the commercial timber registered had a value of 2.2.
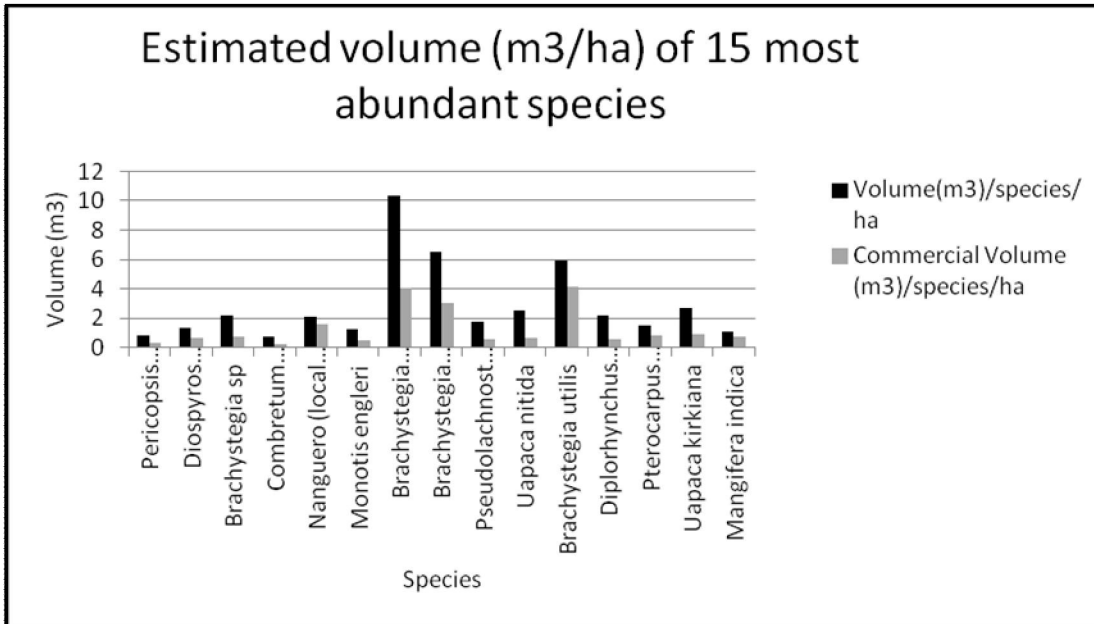
Figure 3. Total and commercial volume of the 15 most common species in Malulu unit, NGR.

3.4 Diameter distribution

The DBH data shows a typical reversed- J distribution for a natural forest. There is a general absence of very large trees, which suggests that some kind of management already exits, and that they have been harvested.
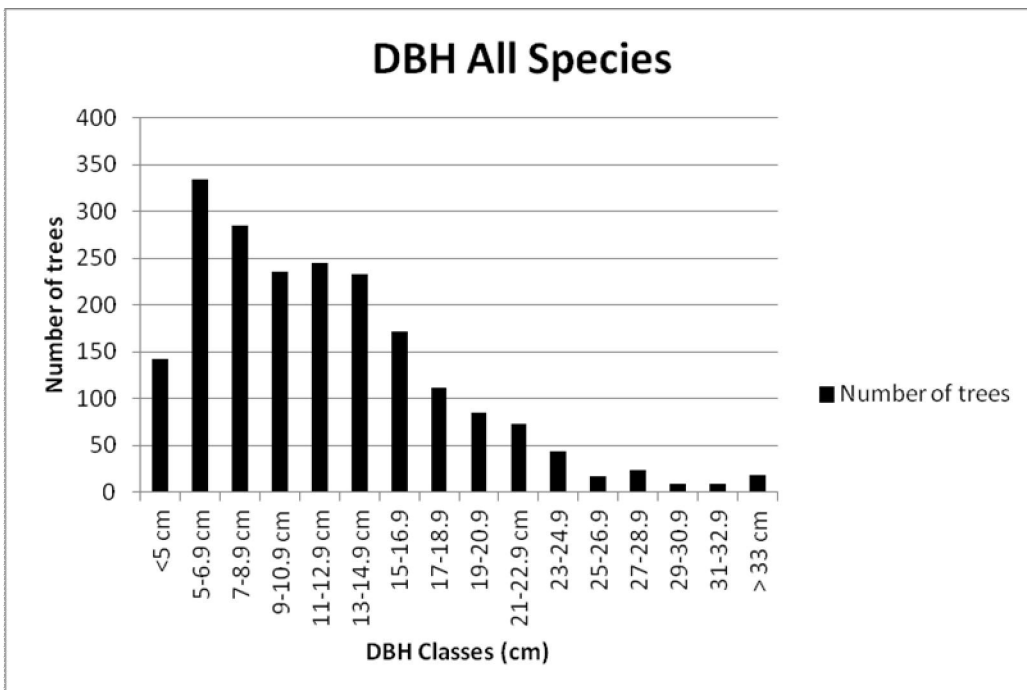

Figure 4. Distribution of Diameter Breast Height (DBH) of all trees surveyed (2024) in Malulu unit, NGR.

3.5 Natural regeneration

The natural regeneration recorded, reflects the species distribution with a high number of *Barchystegia* spp. <u>Full species list in Appendix 2</u>
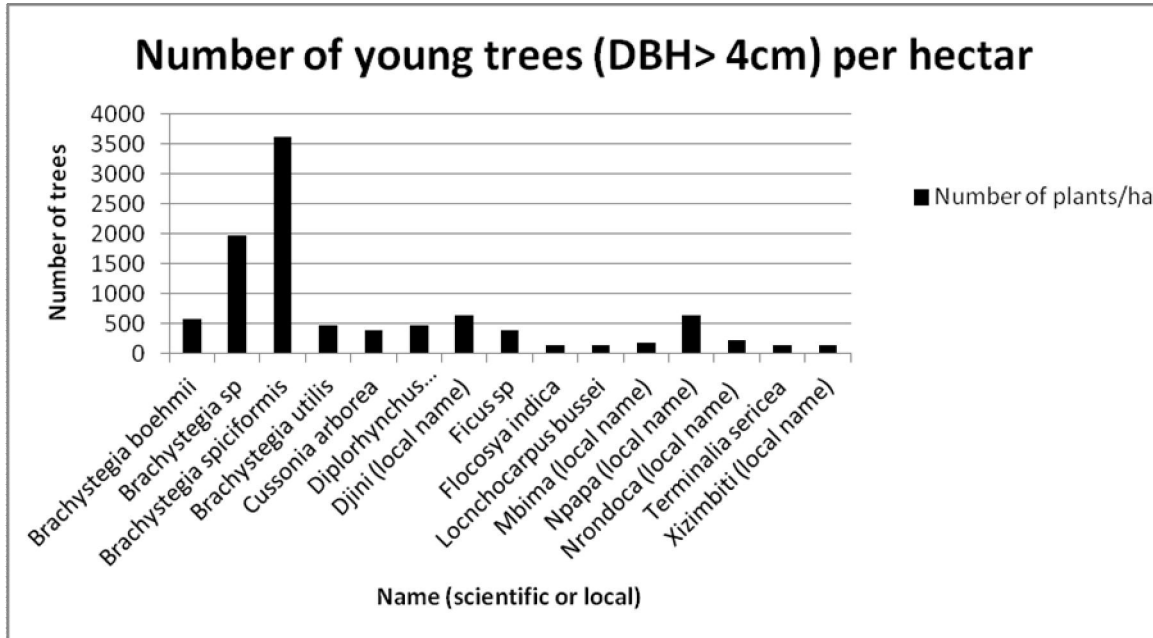
Figure 5. Regeneration of 10 most abundant species in Malulu unit, NGR.

3.6 Non-Timber Forest Products

The forest area provides several non-timber products, like fruits, honey, bark, mushroom and wildlife/hunting.

Wild fruit: *Uapaca*, *Strychnos*, *Vangueria*, and *Tamarindus*. several other plants are edible such as the mobola plum (*Parinari curatellifolia*), African mangosteen (*Garcinia livingstonei*), fig (*Ficus sycomorus*), wild custard apple (*Annona senegalensis*), and wild date palm (*Phoenix reclinata*) (SES 2009).

Honey: The extent of honey collection in the area is not investigated, but through interviews, we have information that this activity takes place.

Hunting/wildlife: Wild pigs, antelopes and smaller mammals are hunted in the area, using traps, snares, chasing and fire (EIA 2007).

Recreation: The area has several spots with beautiful scenery along rivers and streams in pristine forest. Some of these areas also have fairly good accessibility, and are possible areas to develop recreational facilities.

<u>See Appendix 3 for list of use of forest products</u>

4. Objectives

The main objective of this management plan is to; i) show the resources of both timber and non-timber products in the natural forest in Malulu unit, NGR, and ii) have a guideline and prescriptions for managing these areas.

Optimal use of the resources is important. According to the EIA (2007), utilization of first class species (*Afzelia quanzensis, Khaya anthotheca, Pericopsis angolensis*) for charcoal production takes place. The need for a proper management plan and the implementation of it, is highly needed for the area.

This management will be supervised by NGR, but conducted by inhabitants of the local villages in the area. The implementation will be co-operating project between NGR and representatives appointed by the local authority in Malulu.

5. Components of management plan
5.1 Organization of the concession

According to DUAT, signed 14th April 2006, the purpose of use of the area is forestry (see Management Plan NGR)

5.1.1 Zoning of the concession area
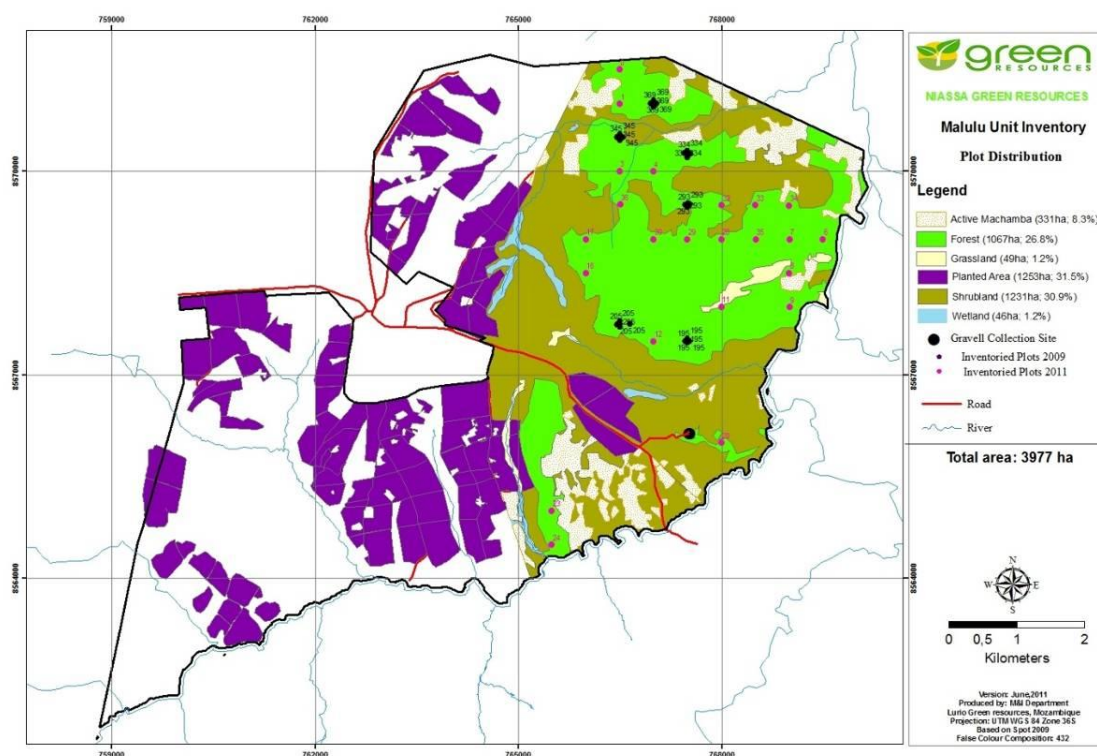
Figure 6. Map of Malulu unit, Sanga, Niassa

5.2 Silvicultural Operations

Silvicultural operations will, on the whole, take place with what is available locally. This is in regards of both equipment and tools, manpower and knowledge. It is in everyone`s interest and benefit that harvesting operation are done in a safe and sustainable way.

Training in efficient and safe harvesting techniques, together with insight in resources available and a realistic harvesting plan, will be important measures to assure this.
A training program and cutting cycle will be made with background on growth measurements and in cooperation between NGR and representatives from the local community.

Image 5. Example of how harvesting can be improved, by not leaving 1meter stumps.

Enrichment planting is also planned for the natural forested areas. *Khaya anthotica* and *Afzelia quanzensis*, which is found on the IUCN Red List (Least concern) is thought to be planted in a wildlife corridor.

1.2.1 Operations before harvesting

Before logging starts, the harvesters shall register their activities at the local authority. The information recorded will be: Name of the harvester, the area of

interest, and the quantity/volume of trees expected to be harvested. Permission will be granted or refused based on the set allowable annual cut.

5.2.2 Operations during harvesting

Supervision and guidance during the harvesting shall take place to ensure an optimal sustainable operation, both in ecological and economic terms. This supervision will be after agreement between the local representatives and NGR. All appropriate safety concerns are to be adequately addressed.

5.2.3 Operations Post harvesting

As a part of monitoring plan, and to cover the succession of the forest, the area shall undergo a post harvesting assessment, in co-operation with NGR. The results of this assessment will form the basis for appropriate and necessary changes to the management plan over time.

5.3. Forest production

A good and reliable growth model is important to estimate the forest growth and sustainable harvest rate. An applicable growth model is found (MYRLIN), but current data set lack certain information to achieve reliable growth models. Inventory with increased emphasis on all the required information will take place over time, to do the estimates and fill in this important data to the management plan.

5.3.1. Volume distribution

Timber volumes are unevenly distributed in the area, as shown in the Figure 7 and 8. It may be inferred from this information that the current management plan may not have well set objectives and has been haphazard in its implementation.
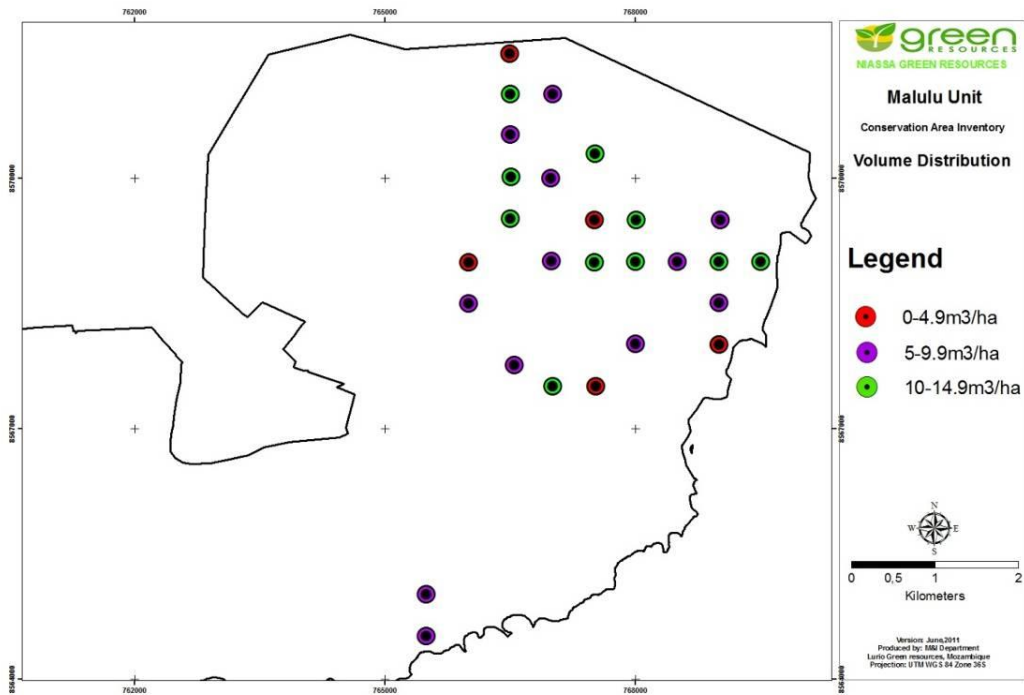
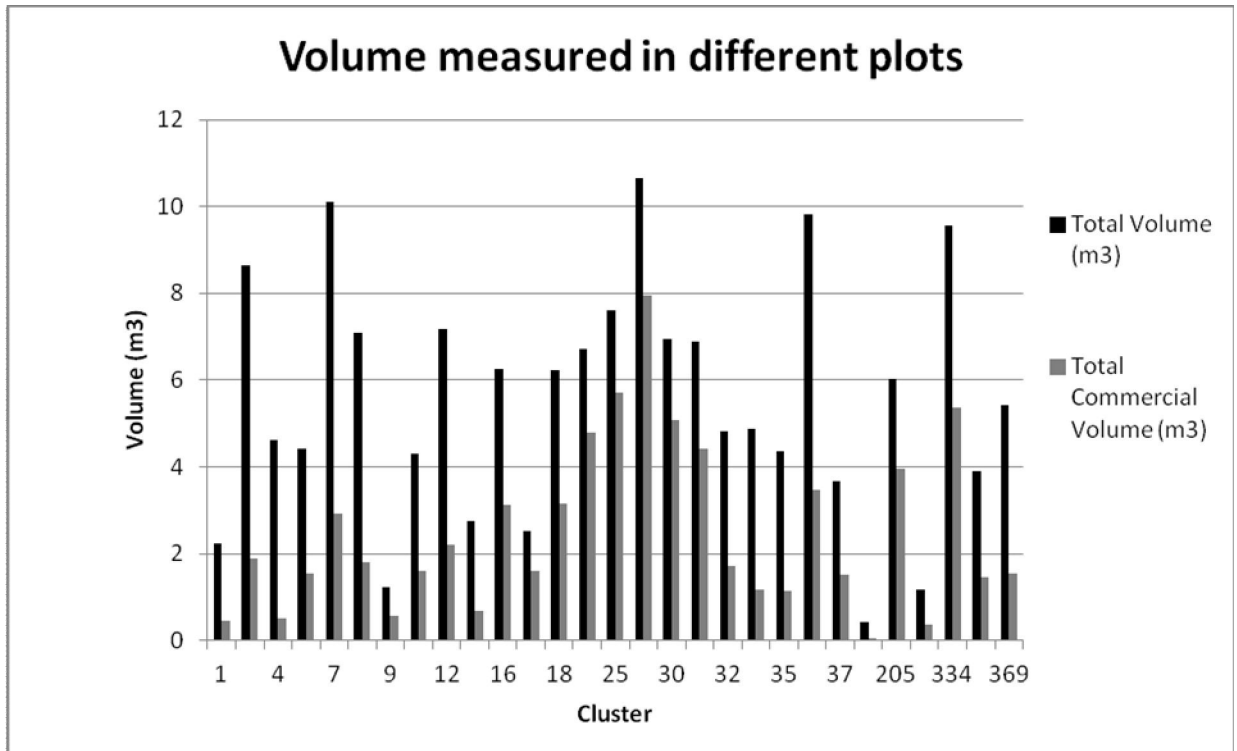Figure 7. Timber volumes (per ha) estimated in the various plots

Figure 8. Estimated volume in the different plots

5.3.2. Forestry logging

All operations in the area are done manually. Tree felling is done with axes or machetes, so is the de-branching and cross cutting. Transport of wood from the forest to the utilisation site is manual. Further processing is carried out near the felling site, for example charcoal production. This is due to the low economic value of the timber products that are made.

Image 6. Cross-cutting done with axe. From Malulu unit, NGR

5.3.3 .Target/ limit of log production

A sustainable annual harvest target/limit is not yet known as there is insufficient data to arrive at a conclusive limit. For now an arbitrary limit has been set at 2m^3 per ha per annum. Future data will make base for improving growth models and cutting cycles (See 5.3).

5.4 Production of non-timber forest products

The forest provides several services for local inhabitants, and much of this is non-timber forest products. This ranges from different types of medicines and objects used in ceremonies, to fruits, honey and soil for house constructions.

A list of the application of different species are found in Appendix 3.

5.5 Protection Activities

5.5.1 Protection against fires

The miombo woodland area carries sign of fire, and as fire is a part of the natural dynamic of miombo woodlands and the traditional management of it, seasonal fires

will take place. Anyhow, it is in the company`s interest to take an active part of the fire management, to minimize the risk of spreading fire in to its plantations. A specific fire management plan for the will be made with background in NGR`s own fire management plan, and in cooperation with locally appointed personnel.

5.5.2 Access Control and Protection against illegal logging

The areas covered under the present MP are part of the Malonda Foundation DUAT[63] granted for the establishment of Plantations and, as such, NGR does not have any legal title to the existing resources in the native forests area[64]. To refer that, the Forest and wildlife Legislation and regulations (law 10/99 and Decree 12/2002) determine that the forest resources exploration should be controlled by the Ministry of Agriculture (MINAG). These two acts, are the main laws governing the forest and Wildlife resources use and are applicable to all activities of conservation, protection, use, exploitation and production of forest and wildlife resources and encompasses the commercialization, storage as well as the artisan, industrial or primary processing of these resources. The implementation of any activity mentioned before should therefore, be approved by the forest department who also controls and supervises the implementation of the forest activities.

The legislation defines that the exploration of resources from natural forests for commercial purposes can be done in two regimes namely: i) the simple licence and, ii) the forest concession contract. The simple licence regime is subject to limited quantities (up to 500m3/year) and deadlines (yearly) and is exercised, exclusively, by national operators and local communities in the productive and multiple use forests, for commercial, industrial and energy purposes, observing a previously approved management plan. The concession regime is the one that is carried out by individuals, companies or the local communities, in productive or multiple use forests, to supply the processing or energy industry, in compliance with the management plan previously approved by the sector. The concession holder should guarantee the processing of the obtained forest products, under the terms set forth by the regulations. The concession contracts are subject to the maximum deadline of 50 years that can be extended for equal periods upon the request by the applicant.

Apart from these regimes there is also a 3rd form of resources extraction that is allowed by law, the *Self consumption* which is the non-profitable exploration of fauna and forests by the local communities to meet their needs in terms of consumption and production of handicrafts. This extraction can be carried out at any time in the year without payment of any fees however the products extracted under this system scan only circulate within the community influence area and cannot be carried out outside the Administrative post (article 15 of Forest Regulation). Additionally, despite not

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[63] DUAT number 881 approved in 2006
[64] Article 9 of the Forest Law (Holders of land tenure), the holders of land tenure, both acquired through occupation or by authorisation, should acquire licences for the exploration of the natural forest and fauna resources found in their areas, unless if it is for their own consumption.

requiring any licensing process, this exploration should be done in accordance with the customary norms and practices of the respective communities.

Based on the above statements, any commercial extraction of resources should only be carried out with a proper license issued by a responsible Government authority. Any extractive activities carried out without the license issued by the responsible Government authority should therefore be deemed as illegal and as such suppressed. However, considering that most of the population in the country still can't meet their basic needs and about 2/3 of them is living under absolute poverty[65], which leads to a high dependency upon the forest resources any containment measure should be implemented carefully to avoid negative impacts on the local communities lives and livelihoods.

Without alternative income generation activities, it is not easy to contain the illegal exploitation of forest resources and, that is why all over the country there are signs of forest degradation that are in many cases caused by wrong management practices (e.g. overexploitation of certain species that are demanded by the market, marginalization of local communities). This is aggravated by the country size associated to Government limited resources which leads to problems such as the uncontrolled burning and poaching[66].

Having recognized these deficiencies, the Government has introduced the concepts of Power delegation and Community Based Natural Resources Management (CBNRM) which allow the community to manage certain areas provided that they are authorized to do so by the Government and following a management plan that has been developed for the areas. Even in such cases the Government is still responsible to do the follow up and ensure the implementation of the management plan and the responsible use of the resources by the community.

Taking all this into account and the NGR objective of contributing for the responsible use, conservation of the environment and biodiversity, in the areas where it is operating, the company has decided to support/provide technical assistance for the development of the current management plan that may be used by the local communities and the Government to guide the licensing process and ensure the sustainability of the forests in the areas covered in the plan.

 NGR is not interested in the extraction of the natural forests products, and therefore, is not willing to get a concession holders right for this area. Thus, the implementation of this plan should be carried out by the Local Government and/or the local communities.

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[65] DNFFB (1997). Política e Estratégia de Florestas e Fauna Bravia. Ministério da Agricultura. Maputo
[66] DNFFB (1997). Política e Estratégia de Florestas e Fauna Bravia. Ministério da Agricultura. Maputo

5.6 Local Communities

5.6.1 Indigenous Rights

Article 18 of the forest law (Rights of the third Parties) states that the Forest and fauna exploration for commercial, industrial or energy purposes, shall safeguard all interests of the third parties from the exploration area, as well as the local communities free access to the same, including the right to use natural resources that they need for their subsistence. This means that the simple license and even concession holders should allow the access of local communities for the extraction of resources they need for their subsistence provided that this does not prejudice the conservation norms and therefore attention should be taken in regards to extraction of flora and fauna species prohibited by law, use of means and tools allowed by law, and extraction of resources under the limits of the forest regulation (Article 9 of the forest regulation).

5.6.2 Benefits to local communities

First of all, the community will have better control of their own resources, and awareness of the values in the forest. Increased knowledge can also lead to higher participation among more of the inhabitants. Miombo woodland serves as "insurance" for many living in cash-poor communities (Campbell et al). A community based management of the forest resources in Malulu can bring positive impacts both on the utilisation and conservation of the area.

5.6.3 Partnerships and agreements

The foundation of management of the area is built upon agreements between NGR and the local community, mutual trust and a common goal of objectives to achieve.

5.6.4 Conflicts resolution mechanisms

To ensure a good relationship with the local communities, outside the existing local mechanisms for conflict resolution, NGR has developed internal mechanisms for disputes and conflict resolution (procedure 3) to ensure the interests of both parts are safeguarded. This procedure is divided in 3 parts: i) the first (Procedure 3.1.) deals with conflicts between the company and the employees, ii) the second part (Procedure 3.2) deals with conflicts between the company and other stakeholders and iii) the third (Procedure 3.3) deals specifically with conflicts related to farms inside the NGR area and the steps for negotiation of their transference to other areas.

For this purpose, in Malulu unit, was created a Natural[67] Resources Management Council that in its composition includes elements that represent communities of

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[67] Chadjla Cheto Management Comittee

several villages around the plantation, representing the district government and relevant actors, civil society, NGOs and the community authority (figure 11 below).
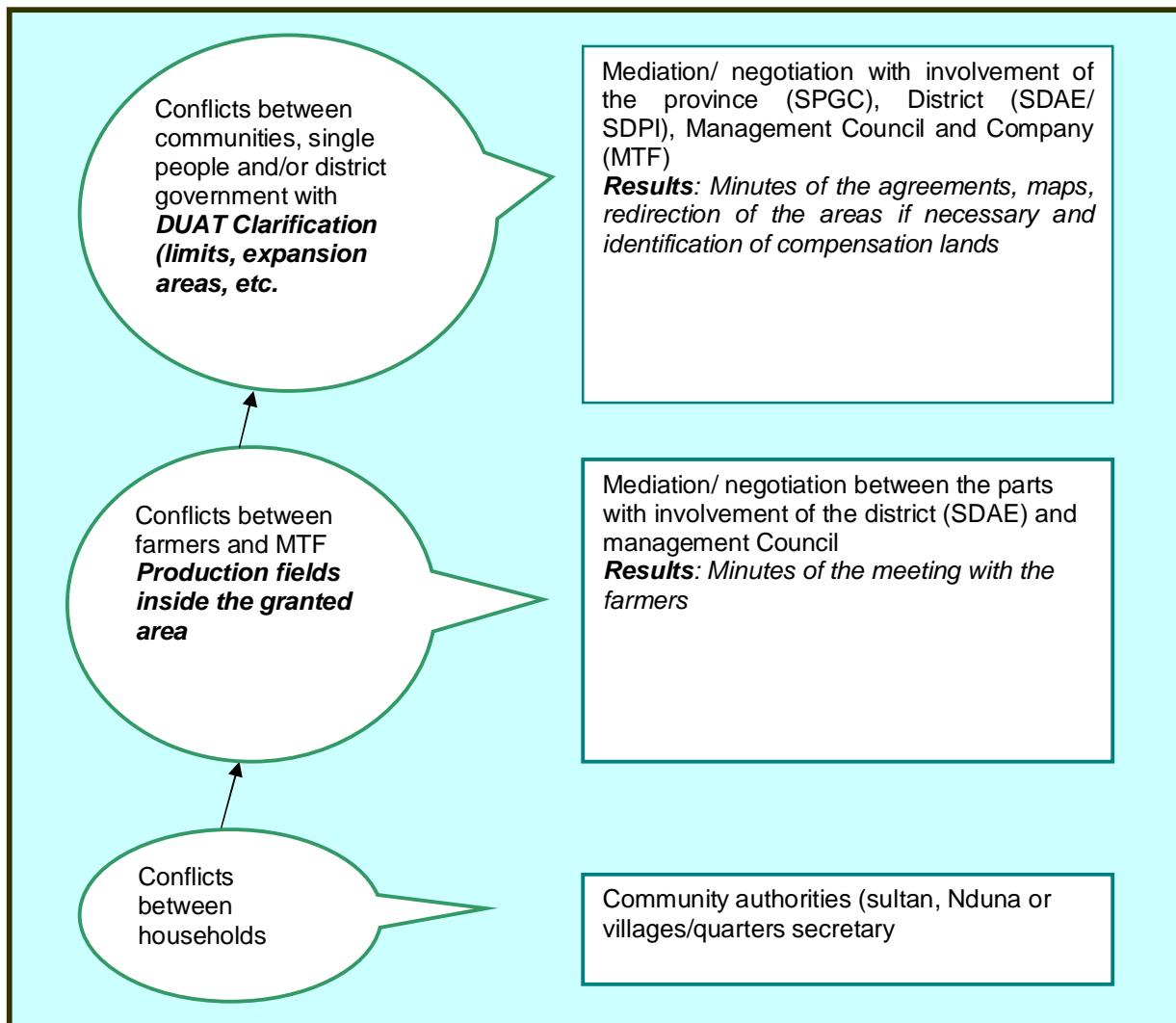

Figure 11 – Conflict Management Model within the Plantation Areas between NGR and Partners (Enosse *et al*, 2009).

5.7 Environmental and Social Impacts

5.7.1 Environmental Impacts

The main environmental impact will be sustainable management of the area, leading to the same access and opportunities to resources for the next generation as it is today. There is a risk that increased focus on the area will lead to increased exploitation of its resources. This is a probable scenario especially the first 5 years. Mitigating measures must be in place from the start, and involvement of the local community is crucial for success.

5.8.2 Social impacts

Increased awareness and sense of management responsibility among local inhabitants. Also it may help to secure and increase income throughout the year. Not at least we will have a local management and responsibility of sites of interest (medicinal sites, cemeteries etc.).

5.8 Research and monitoring

5.8.1 Inventory Program

Permanent Sample Plots (PSP) will be established according to Standard Operating Procedure No. 17, and GRAS Inventory Guideline. The result from this monitoring will be presented in the reviewed management plan.

5.8.2 Studies about Forest logging

Studies about forest logging in the area are of particular interest to avoid negative environmental impacts. Also socio-economic surveys are of interest, to measure the impact of a community based natural resource management. Such studies will preferably be done in co-operation with adequate research institutions (see 5.9.4)

5.8.3 Cooperation with research institutions

One of the principles under the forest and Wildlife Law is the principle of study and research which states "promotion of research on the native species so that all users and stakeholders involved in the conservation, management and use of these resources collect data and undertake measurements to be subsequently processed by the competent entities" (Article 3 of the Forest and Wildlife law).

As part of its programs and management plans, NGR also recognizes the need to interact and create relations with Research and Development institutions to improve

the management practices, techniques' and technologies that will maximize future returns. As such, NGR envisages the development and expansion of a Research and Development Programme that will be implemented in collaboration with the relevant organizations and research institutions both internal and external level. Research work will cover different areas and include among others Agro forestry (e.g. growing of trees together with agricultural crops) and the optimal silvicultural regimes for the species planted. Other results expected from the R&D program will be increased use of good forestry practices, information dissemination and the promotion of activities geared to the mitigation of greenhouse gases. Species trials will also be done to see how certain species, native and non-native perform in the plantation environment.

On assuming the responsibility to assist the sustainable management of the natural forest resources within its project areas, NGR will extend the research program to these areas. Currently, for the plantations there are partnerships established with local Universities (UNILURIO & Universidade Eduardo Mondlane) and Research Institutes (IIAM) but in future the R & D program will also cooperate with other institutions National and International level.

5.8.4 Audit and external inspection

The area will be undergoing an external FSC audit annually. The local administration will be a natural part of this audit, and must therefore be included in the communication and planning around the audits.

5.9 Organization and administration

5.9.1 Administrative structure

The area is a part of NGR`s concession area. The natural forest will be managed and under supervision of local authority, with necessary help and guidance from NGR, after agreement.

5.9.2 Staff and Responsibilities

Suggestion: The local administration appoints a committee who is in charge of the forest management, and who will be the contact unit with the company. Likewise, the company will have one person especially appointed for this task.

5.9.3 Training and workmanship qualification

Training will be given by NGR after further agreement. This training will include silvicultural aspects, environmental knowledge and FSC awareness.

5:10 Registration and revision of management plan of 5 years

5.10.1 Periodical report templates for each logging year

The base line volume for the natural forest in Malulu unit is estimated to be in total 47.7 m3/ha, while the commercial volume is estimated to be 21.3 m3/ha. See Annex for species distribution.

Currently, neither the annual harvest rate which takes place, nor the growth is known. Therefore, an utilisation study to estimate the use and demand of different species, and to which rate these are harvested today. Likewise, the inventory results will provide data for growth model analyses.

5.10.2 Data Information System of monitoring.

Monitoring results are found in an own section in NGR`s Microforest database.

5.10.3 Updating of management plan

Update of Management Plan is a continuous task, which responsibility rests at the Conservation and Environment Officer or any other appointed employee in NGR. The update of the management plan is done in cooperation with the local administration of the natural forest.

5.10.4 Registration and data file
The Conservation and Environmental Officer, or any other appointed employee, is responsible for safe and accessible storage of the relevant data and information.

6. Findings and recommendations
The area has a high potential to be included as a carbon project. This will generate both environmental awareness in the community and financial support.

7. Limitations of management plan
This plan only comprises the natural forest of Malulu unit, NGR. The basis of the plan is from an inventory in 2011, and needs to be periodically updated with growth models and cutting cycles as soon as background data for this is available .

8. References

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Enosse, C. et.al (2009) SOCIO- ECONOMIC ESTUDY OF THE ACTION AREA OF MALONDA TREE FARMS, SA.

Campbell, B.M. et.al (unknown) Miombo woodlands – opportunities and barriers to sustainable forest management. (Found on internet June 2011

Alder, D, Baker, N, Wright, HL (2002) *MYRLIN: Methods of Yield Regulation with Limited Information.* University of Oxford, Oxford Forestry Institute. http://www.myrlin.org.

9. Attachments

Appendix 1. Tree species registered in Natural Forest, Malulu unit, NGR

Local Name	Scientific name	Total Volume (m3)/ha	Commercial Volume (m3)/ha
Baja	*Acacia nigrescens*	1.06	0.00
Chanfuta/ncocomo	*Afzelia quanzensis*	2.36	1.49
Chingile	*Ficus sp*	3.01	1.97
Chinungo	*Ozoroa obovata*	3.06	0.77
Coconowerimba/cungumatsouni	*Adenia gummifera*	0.49	0.05
Landjani	*Dicoma sessiliflora*	0.42	0.25
Mbacata/mbangala	*Cleome gynandra*	1.81	0.48
Mbanga	*Pericopsis angolensis*	71.73	27.97
Mbuo	*Syzygium guineense*	0.63	0.00
Mbuti	*Cussonia arborea*	22.15	7.45
Mpaca	*Unknown*	10.24	1.46
Mpapa/Npapa/papa	*Diospyros mespiliformis*	114.40	52.31
Mpava/Mpawa	*Brachystegia sp*	181.84	62.68
Mpembo/mpembu	*Parinari curatelifolia*	29.35	13.56
Mpindji/Npinge	*Locnchocarpus bussei*	7.91	2.96

Mpolongolo	*Unknown*	0.43	0.28
Munangar/mulangari/Xsimbite/Xizimbite/muzimbite/Munangar/mulangari/Xsimbite/Xizimbite/muzimbite/xizimbiti	*Combretum imberbe*	62.69	21.06
Mushunguno/mussungunu	*Bridelia micrantha*	0.06	0.00
N´yepe/Mpoza/mporhe	*Annona senegalensis*	1.78	0.23
Nanguero	*Nanguero (local name)*	174.27	130.95
Ncacatu/Nkakato/Cacato/Kakato/Kakatu	*Monotis engleri*	100.67	39.32
Ncalateho	*Unknown*	1.18	0.51
Ncolowanga	*Unknown*	0.15	0.04
Ncondetehau	*Zimenio cafra/Zumeria*	1.03	0.29
Ntchenga	*Brachystegia spiciformis*	868.35	342.32
Nculungulo/Nthonga	*Strychnos madagascarensis*	15.43	2.41
Ncunanguluvi	*Unknown*	0.99	0.66
Ncundengulo	*Unknown*	2.31	0.47
Ndhindhimila	*Unknown*	1.57	0.51
Ndjombo	*Brachystegia boehmii*	546.82	252.37
Ndjudju	*Unknown*	4.50	1.49
Ndzolo/Nrolo/Rholo/Rolo/Isolo	*Pseudolachnostylis maprouneifolia*	149.93	48.17
Nhungwe/Nhungue	*Unknown*	48.63	31.83
Nkalati/nkalate/Ncalate/kalate	*Unknown*	25.08	10.94
Nkodowanga/Ntoto	*Uapaca nitida*	214.25	54.16
Nkulungulo	*Unknown*	6.61	3.94
Nkundanguluve	*Unknown*	2.78	1.02
Npanga	*Unknown*	0.24	0.13
Npora	*Unknown*	4.75	1.04
Nrashe	*Unknown*	1.66	0.63
Nrolola/Nacal/Mpindimbe/Mpindimbi	*Terminalia sericea*	16.35	4.13
Nrondjerondje	*Unknown*	1.53	0.47
Nrondo	*Unknown*	0.86	0.29
Nrondoca	*Unknown*	3.65	0.78
Nsejela/nzechelah	*Ficus sp*	27.71	16.43
Nsenjete	*Unknown*	0.12	0.06

Ntacata	*Brachystegia utilis*	498.98	346.48
Ntantadia	*Unknown*	2.54	1.27
Ntava	*Flocosya indica*	1.29	0.35
Ntchongue	*Unknown*	4.65	0.00
Ntewelewe	*Cassia floribunda*	0.32	0.17
Ntimbe	*Unknown*	0.09	0.00
Ntintimbi	*Unknown*	3.66	0.72
Ntolo	*Unknown*	0.54	0.13
Ntomoni	*Diplorhynchus condylocarpon*	179.33	43.44
Ntopentope	*Unknown*	0.31	0.10
Ntumbate/Ntumbati/umbila/mbila/tumbate	*Pterocarpus angolensis*	123.02	66.75
Ntxongue	*Unknown*	22.37	11.85
Nzuco/massuco/nruku/rhuco/massuco/nruku/rhuco/Nzunga/Nvuco/Nundo/Nretchela	*Uapaca kirkiana*	225.76	76.66
Nxingiri	*Vangueria fausta*	0.08	0.06
Nzalanhama	*Unknown*	0.36	0.03
Nzimbiti	*Unknown*	30.96	9.36
Pau Rosa/Msossola	*Berchemia zeyheri*	0.68	0.00
Xipissawago/Xipirauago/chipissanango/Mnhenhe/xinhenhe/pau ferro	*Swartzia madagascariensis*	6.59	4.03
Tatadika	*Unknown*	15.62	7.91
Tchimbirawago	*Unknown*	0.52	0.00
Tehinhenhe	*Unknown*	0.81	0.05
Tevedeve	*Unknown*	0.34	0.20
Txembe/ntxembe/mangueira	*Mangifera indica*	89.04	63.07
Txindjisse/protea	*Protea sp*	0.62	0.11
Umbawa/Mbaua	*Kaya nyasica*	11.22	3.58
Xicongo	*Unknown*	0.12	0.05
Xiculiungo	*Unknown*	33.16	8.95
Xicundagulue/kundagluwe	*Ochna arborea*	0.18	0.05
Xicundaguluve	*Protea sp*	0.48	0.14
Xihumbo	*Unknown*	1.43	0.84
Ximbacassa/ximbacasse	*Unknown*	0.53	0.21
Xinhenhe	*Unknown*	2.49	0.37
Xitimbe	*Piliostigma thonningii*	3.10	0.34

Xitonha/Xitunia/nhonha/Ntonha	Acacia sp	6.73	3.66
Xiunganinga	Unknown	0.11	0.02
Xivira	Unknown	0.71	0.21
Xtongarile	Acacia sp	0.21	0.13
Zanhame	Unknown	0.09	0.03
Unknown	Diclorintus	2.24	0.22
Unknown	Lonchocarpus capassa	0.28	0.17
Unknown	Pylostigma	0.34	0.10
Unknown	Stonya	0.71	0.18

*Appendix 2. Regeneration (plants with DBH >4 cm) in Natural Forest, Malulu unit, NGR*

Scientific name	Local name	Total	Number of plants/ha
Brachystegia boehmii	Ndjombo	51	563.67
Brachystegia spp	Mpava	178	1967.33
Brachystegia spiciformis	Ntchenga	327	3614.14
Brachystegia utilis	Ntacata	10	475.25
Cussonia arborea	Mbuti	5	375.78
Diplorhynchus condylocarpon	Ntomoni	43	475.25
Unknown	Djini	3	629.99
Ficus sp	Nretchela	34	375.78
Flocosya indica	Nruco/Ntawa	7	143.68
Locnchocarpus bussei	Npinge	6	132.63
Unknown	Mbima	16	176.84
Monotis engleri	Ncacato	11	3.82
Unknown	Mpulucututu	3	1.04
Unknown	Nanguero	6	2.08
Unknown	Ncalati	10	3.47
Unknown	Ncundanculuve	4	1.39
Unknown	Ndima	7	2.43
Unknown	Ndjudjo	2	0.69
Unknown	Ngini	3	1.04
Unknown	Nhungue	2	0.69
Unknown	N'nonhela	10	3.47
Unknown	Npapa	57	629.99
Unknown	Nrondoca	20	221.05
Unknown	Ntchingire	1	0.35
Unknown	Nuntho	7	2.43
Unknown	Nzolanhama	3	1.04
Pericopsis angolensis	Mbanga	2	0.69
Pseudolachnostylis maprouneifolia	Nrolo	2	0.69
Swartzia madagascariensis	Xipirauago/Xiviravago	10	3.47
Terminalia sericea	Nrorola	13	143.68
Unknown	Tizimbite	3	1.04
Unknown	Xiculiungo	1	0.35
Unknown	Xinguize	2	0.69
Unknown	Xizimbiti	12	132.63
Unknown	Zondoca	7	2.43

Appendix 3. Utilization of different tree species in Malulu unit, NGR
(From SOCIO- ECONOMIC STUDY OF THE ACTION AREA OF MALONDA TREE FARMS, SA, 2009)

| Local Name(Yao)	Scientific name	Application
Chibissavago/Xipsavago	Swartzia madagascariensis	Firewood, charcoal, medicine, flu and ringworm
Chizimbite/Txizimbite	Combretum imberbe	Firewood, charcoal
Chiguluka	Securidaca longipedunculata	Medicinal Plant
Chicolola/xicolola	Unknown	Fencing (fence), firewood, rubane
Massuco	Uapaca kriquiana	Fruit, charcoal, firewood, construction material
Mbanga	Pericopsis angolensis	Sculptures, stakes, charcoal, firewood,medicine
Mbudi	Cussonia spicata	Marimba, firewood
Mpolopolo	Unknown	Firewood, medicine
Mtumbati	Pterocarpus angolensis	Wood, construction material, medicine
Mpembo	Parinari curatellifolia	Fruit, mortar, charcoal, firewood,stakes and construction material
Natchasse	Unknown	Wood, mortar, construction material,charcoal, firewood
N'jombo	Brachystegia boehmii	Cord, construction material, charcoal,firewood, medicine
Ncongomue	Afzelia quanzensis	Constriction material, wood, mortar, firewood, charcoal
Nkulakula	Unknown	Fruit, medicine
Nsalanhama	Unknown	Firewood, medicine
Ntchenga	Brachystegia spiciformis	Cord, construction material, charcoal,firewood
Nthacata	Brachystegia utilis/B.allennii	Swarm, firewood, cords, construction material, charcoal
Ntonga	Euphorbia matabelensis sp/Strychnos spinosa	Fruit
Nzolo	Unknown	Firewood
Nzozola	Unknown	Wood, construction material, charcoal,firewood
Umbava	Khaya niasica	Wood, construction material, firewood
Umbu	Unknown	Fruit, firewood
Xindjisse	Protea sp	Firewood

Location of study area and main access routes

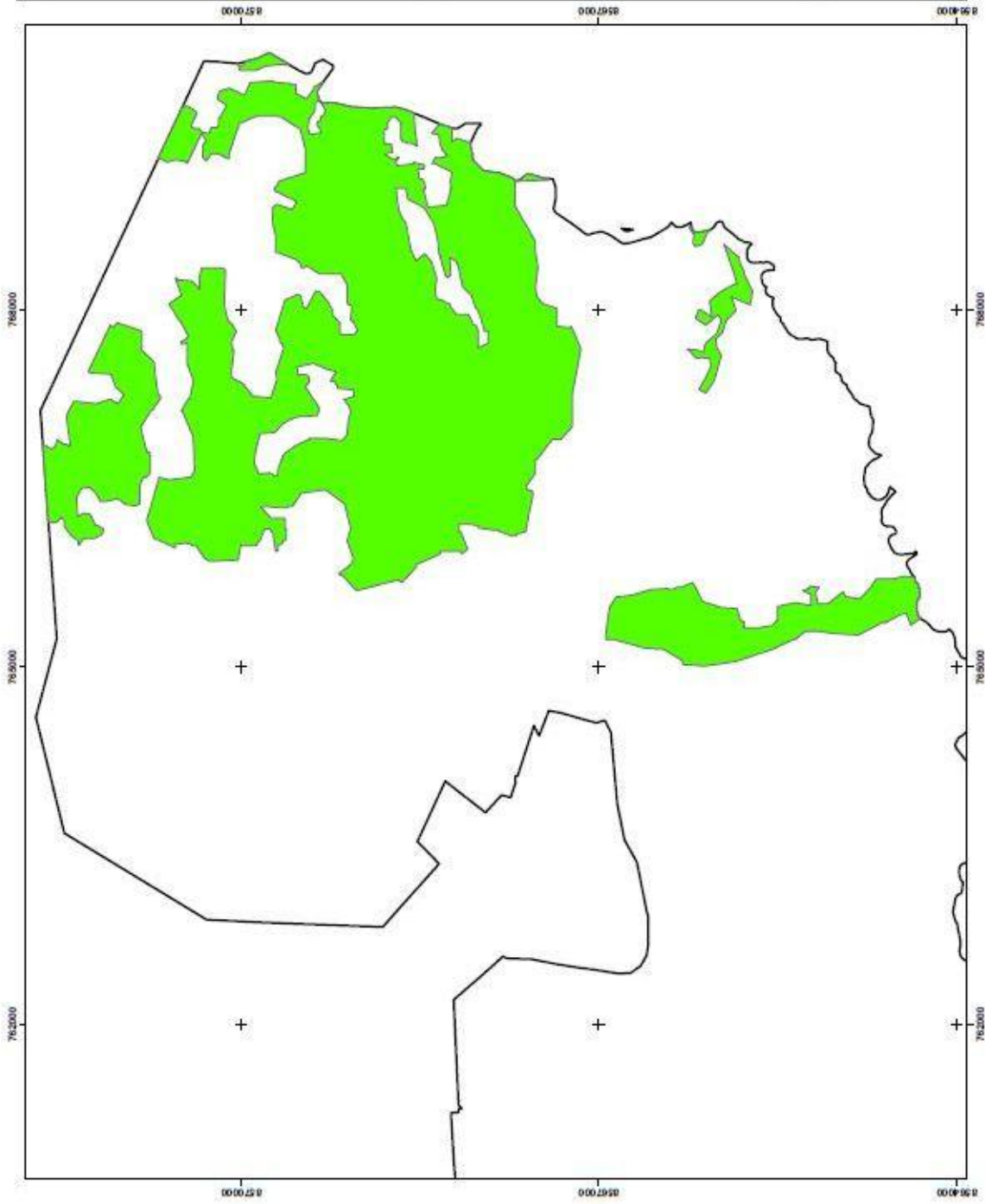# Forested area in Malulu unit, NGR
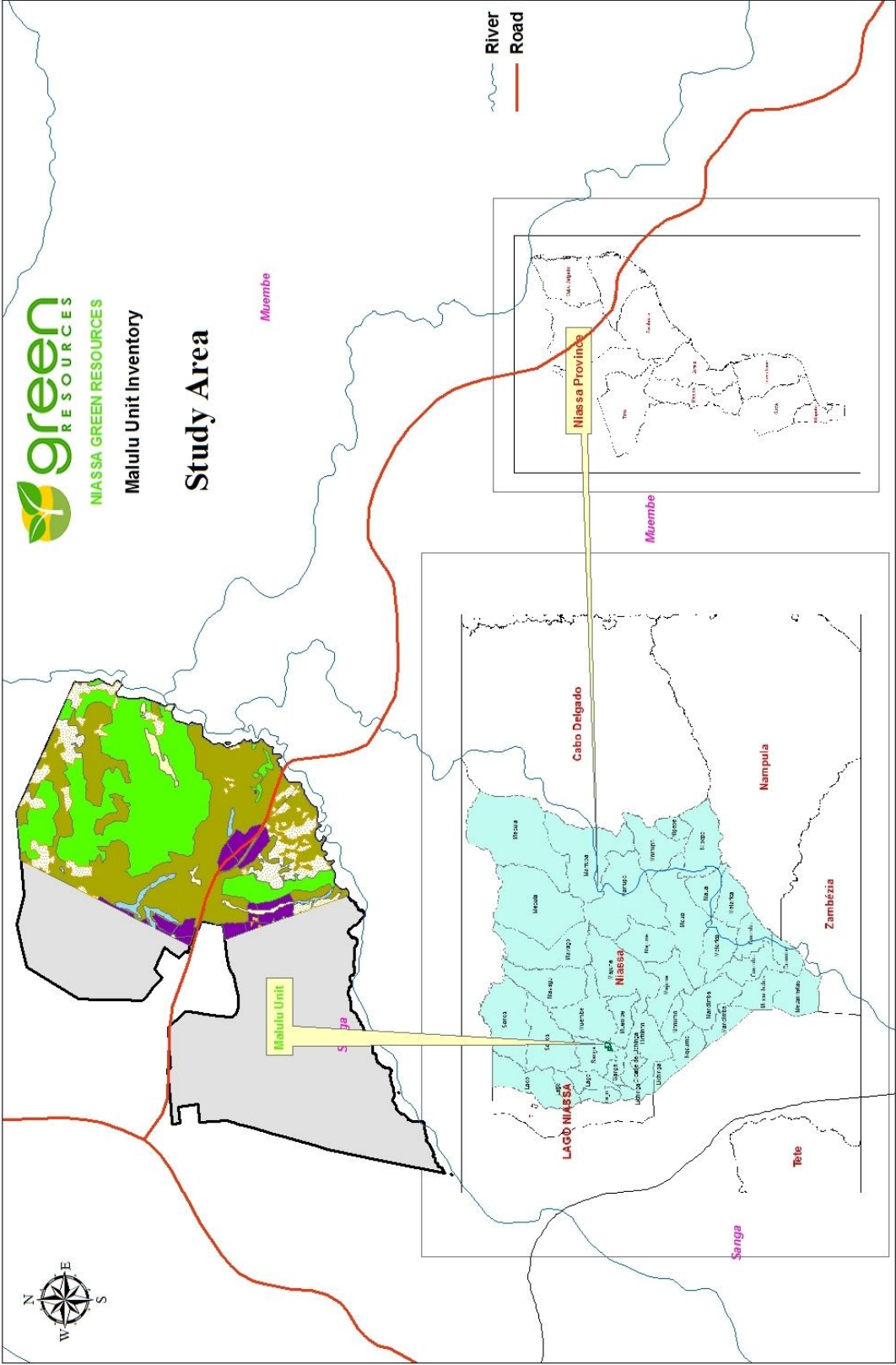
NIASSA GREEN RESOURCES

Malulu Unit

Conservation Area Inventory
Forest Stratification

Legend

Forest (1087ha; 38.8%)

Kilometers
0   0,5   1   2

Version: June,2011
Produced by: M&I Department
Lurio Green resources, Mozambique
Projection: UTM WGS 84 Zone 265
Based on Spot 2008
False Colour Composition: 432

Annex 2

Agricultural Development Programme

Introduction

Niassa Green Resources Agriculture Development Opportunity (NGRADO) is an investment opportunity that would allow GRAS to develop the first agro-forestry village in Mozambique. By uplifting poverty in GRAS' plantation communities, NGRADO will support GRAS' Corporate Social Responsibility (CSR) goal of ensuring that its forestry plantations are being developed sustainably.

An Agro-Forestry Village is an integrated approach to rural development with a full range of socio-economic benefits, including the promotion of jobs, increased household incomes, improved farming practices, expanded markets, and enhanced social facilities and services.

NGRADO will establish 500 ha of own commercial production, 1,600+ outgrowers and an oil extraction & feed production facility. There could be an opportunity to expand the project further by substantially growing own commercial production and outgrowers, and by increasing processing capacity.

The proposed project will operate across four strategic pillars:

1) Outgrower promotion - NGRADO will facilitate market access for 500 smallholders and small-medium enterprises ("SMEs") in the 2011/2012 season up to 1,600+ by the sixth season. In addition to guaranteeing a market at fair prices, NGRADO will provide extension services such as access to inputs, mechanization, agronomic training, and crop financing.

2) Own Commercial Production - NGRADO will initially build a 500 ha soya and sunflower farm with mechanization and partial irrigation to guarantee supply to its processing facility. Provided that the market grows as it is expected and the infrastructure in Niassa improves, there is an opportunity to expand the farm to 3,000+ ha within ten years during Phase II of the project.

3) Industrial Processing - NGRADO will build the first oil extraction, refining, and feed production plant in Niassa. The processing capabilities will produce higher margin products that will sustain the business financially.

4) Community Orientation - Once GRAS recovers its initial investment, 50% of all future profits will be invested back into the communities and for additional agro-forestry activities. NGRADO will not only impact the communities living close to NGR's plantations, but also the entire consumer markit in Niassa.

Due to the long-term nature of forestry investments, GRAS recognizes the importance of building strong relationships within the generally very poor rural communities they operate in. Promoting additional income opportunities for the communities living in NGR's plantation areas is a way to build good relationships and at the same time contribute to the economic development of the people. GRAS generally uses second grade land for its plantation forestry activities and encourages the communities to carry out agricultural activities on the first grade land.

NGRADO will be the first agro-forestry company in Mozambique to combine forestry plantations with agriculture promotion. NGRADO believes that there's an opportunity to break the cycle of poverty in Niassa's rural communities by a) diversifying away from the traditional maize and cassava, and farm higher value crops such as oilseeds to serve the increasing demand for animal

feed, and by b) developing a commercial industry around poultry production, leveraging incomes from forestry and from the cultivation of higher value crops.

Livestock sector in Mozambique - opportunity

The potential value of the livestock sector in Mozambique is substantial, primarily because the country has good conditions not only for crop, but also livestock production in the ten agro-ecological zones. There is room for expansion of the sector to meet local demand: current demand for livestock products significantly exceeds supply resulting in imports from South Africa, Swaziland, Zimbabwe, and Malawi for products such as meat (31.7%), milk (83.1%), and eggs (74.2%).[68] The local demand for livestock products is expected to increase in Mozambique due to a fast growing population and a high rate of urbanization.

Areas that may hamper livestock development mostly relate to input supplies. Most of the animal feeds, concentrates, medicines, vaccines, veterinary instruments, and other equipment have to be imported. Although availability of these products throughout the country is improving, most of the providers are still located in main cities such as Maputo, Beira, and Nampula. Improving livestock production and productivity constitutes one of the main opportunities that the country has for poverty alleviation. Smallholder farmers can keep animals to not only generate additional incomes and food from meat, milk, and eggs, but also manure and animal draught power to till their land and transport crop produce to markets. The livestock sector therefore provides a good entry point to strengthen the agricultural sector, stimulate the socioeconomic growth of rural farming communities and significantly contribute to poverty alleviation.

Feed is by far the largest cost in raising a chicken, accounting for ~60% of the total cost. Soy and Maize are the main components of feed: feed is comprised of 67% maize and 26% soy by volume and 41% maize and 51% soy by value. The rest is split between fish/full fat, lime, and premix. While Mozambique has an abundance of maize, soy market is still new and the demand for soy surpasses Mazambique's current production resulting in a deficit of 19k tons annually. Domestic production, dominated by smallholders meets a little more than 25% of demand. Mozambique currently imports over 70% of its soy in the form of soy cake, mostly from Argentina, but also from Malawi (informal market) and South Africa.

Niassa poultry industry

The primary market for NGRADO will be the Niassa poultry industry, consisting of 80+ poultry farmers, producing over 500k chickens per year. These poultry farmers currently require ~1.6k tons of feed per year. This figure is expected to reach ~3.6k tons per year by 2018. Niassa's poultry producers currently import most of their feed requirements from Nampula where there are two large poultry companies. With virtually no local competition in Niassa, NGRADO will have a first mover advantage to serve this growing market.

NGRADO believes there is an opportunity to substitute the expensive imports and drive the development of a Niassa soy-to-feed value chain. Niassa not only boasts 1.2m ha of highly arable land, but also has an abundance of maize, which accounts for roughly two-thirds of feed based on volume. By establishing a processing facility in Lichinga, NGRADO will provide an alternative distribution model that eliminates the high cost of transportation from Nampula and removes the middle traders. NGRADO's vertical integration and close proximity to demand and supply will create a more efficient supply chain. The business will eventually help reduce Niassa's frozen and live chicken prices, which are currently ~50% higher than Maputo or Nampula.

Own Commercial Production

For Phase I of the implementation, NGRADO will build a 500 ha commercial farm by Year 2 (300 in Year 1 ramping up to 500 ha in Year 2) in Malica under NGR's DUATs. The farm will be fully mechanized and be ~30% irrigated. The mechanization equipment will also be used to support the

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[68] Hele 2009

surrounding outgrowers, in particular the SMEs. NGRADO plans to cultivate 75% soya and 25% sunflower in the summer rainfed non-irrigated season and 100% soya under both summer and winter irrigation.

Furthermore, NGRADO plans to perform its own seed multiplication and provide seeds for both own commercial production and outgrowers. The venture will begin with 27 ha of seed multiplication in the Matama region, located ~15 km east of the city of Lichinga. The seed multiplication will scale according to own commercial production and outgrower requirements. By Year 6, NGRADO expects to have ~70 ha of seed multiplication.

Outgrower Promotion

NGRADO will be the first agro-forestry company in Mozambique to combine forestry plantations with agriculture promotion. An agro-forestry village is an integrated approach to rural development by engaging different stakeholders. NGRADO will be the first large-scale promoter of soya and establish the first processing facility in Niassa. This unique business model will completely change the current agriculture landscape in Niassa, composed primarily of smallholder farmers cultivating maize and cassava for personal consumption. The business will directly introduce the following key novel elements to the Niassa region:

- Establish an integrated soy-to-feed business;
- Produce an in-province supply of vegetable oils and feed for local consumption;
- Guarantee a market for soy, sunflower, and maize production at fair prices;
- Provide smallholders with access to inputs, mechanization, and improved agronomic practices that will improve yields;
- Provide smallholders with access to storage facilities that will reduce losses and offset fluctuations in seasonal crop pricing;
- Provide smallholders with access to rural financing;
- Provide smallholders with ICT (Information, Communications Technology) devices and services enabling them to receive timely market information;
- Optimize land planning by allocating first grade land to agriculture and second grade to forestry;
- Benefit local communities beyond GRAS forestry plantations;
- Invest excess profits back into the communities or to expand the business.

NGRADO will facilitate market access to 500 smallholders and small-medium enterprises in the 2011/2012 season up to 1,600+ by the sixth season. Outgrower promotion will begin initially in NGR's DUAT areas and filter out based on distance to the own commercial production.

At the beginning of each planting season, NGRADO will provide seeds to all outgrowers and recover the investment in the form of crop or cash at the end of the season. Furthermore, NGRADO will provide various mechanization services such as land preparation, planting, spraying, fertilizing, and harvesting to small-medium enterprises. Smallholders typically do not require mechanization and less cost effective due to smaller plot sizes. NGRADO expects ~300 ha of SME land will be mechanized by Year 6. At the end of each season, NGRADO will transport the grain from each outgrower to a main storage silo at the own commercial production farm.

Community Impact

NGRADO will benefit poor rural people by creating jobs, generating cash incomes and provide opportunities to women and youths.

Directly create 89 full-time and 200+ part-time/seasonal jobs:

Hire 30 full-time staff to manage all farming activities including irrigation, agronomics, drivers etc. NGRADO will also hire a large number of seasonal workers to fulfill field duties such as land clearing, land preparation, planting, and harvesting.

Hire 18 full-time staff to provide agronomic training and mechanization services to outgrowers.

Hire 41 full-time staff to manage industrial processing, supply chain, quality/lab, warehouse, and sales & marketing.

The average salary of NGRADO's employees is ~$340 per month (including part-time).

Directly create 89 full-time and 200+ part-time/seasonal jobs: there will be a need to hire staff for the various farming and industry activities, such as, farm managers, industrial processing, supply chain, quality/lab, warehouse, and sales & marketing staff and also a large number of seasonal workers to fulfill field duties such as land clearing, land preparation, planting, and harvesting and staff to provide agronomic training and mechanization services to outgrowers.

Directly benefit ~8,000 smallholder / SME outgrowers and their families:

NGRADO's activities will benefit 500 outgrowers in the 2011/2012 season up to 1,600+ outgrowers by Year 6. Assuming five people per household, the business will directly impact ~8,000 people.

By cultivating soy, the average smallholder can generate annual cash incomes of $386 by Year 6. These new incomes will enable the outgrowers to provide a range of social benefits to their families such as improved living conditions, food security, better diets, access to healthcare, and access to education. Soy crop is also regarded as an organic fertilizer; crop rotation will improve soil fertility resulting in improved yields of other crops such as maize.

To ensure the long-term success of the outgrowers, NGRADO will not only provide a market to purchase the crops at fair prices, but also provide technical assistance in the form of mechanization, storage facilities, and availability of good inputs. NGRADO will also provide agronomic education, teaching better farming practices. Furthermore, NGRADO will provide outgrowers with ICT devices enabling smallholders to have access to real-time market information such as crop prices, input costs, and weather patterns.

NGRADO will not only finance a portion of the input costs but will also build a database of production performance including volumes and yields that could be shared with rural financing organizations.

Indirectly benefit other smallholders in the region:

In addition to the outgrowers directly promoted by NGRADO, farmers outside of the network may realize the potential for farming oilseeds and may want to produce soy independently and sell to NGRADO at fair prices.

The availability of cost competitive feed in Niassa will enable some smallholders to raise chickens as an alternative income stream. Under good management conditions, a smallholder with 800 birds per batch can expect an annual net profit after capital recovery of $1,600 to $2,100.

Promote opportunities for youths and women:

The average age of NGR's employees is 27 and 80% are under the age of 35. NGRADO will directly hire youths and encourage them to participate in the outgrower program. Furthermore, NGRADO will establish partnerships with local universities to provide internship opportunities for students.

GRAS has a corporate standard that at least 30% of all employees are female. NGRADO will promote gender equality across all operations. Among other policies, NGRADO will ensure that they pay fair and comparable wages for all employees, eliminate all forms of discrimination, and proactively recruit and appoint women to managerial positions.

Furthermore, NGRADO will drive the development of market linkages and directly create wider systemic changes in agriculture production, forestry, poultry, and the overall business environment.

Improve the overall business environment:

NGRADO will help make the business case for infrastructure investments as well as positive regulatory changes such as import/export policies and financing for smallholders.

Furthermore, NGRADO will help to improve the overall technical, business, and management competencies of the local population.

Environmental Impact

In October 2011, NGR became the first plantation forestry company to acquire FSC (Forestry Stewardship Council) certification in Mozambique, a significant milestone for the company and a clear testimony of the commitment of GRAS to responsibly manage its forests. Obtaining FSC certification required that GRAS meet the following major principles:

Compliance with all applicable laws and international treaties;

Encourage the efficient use of the forest's multiple products and services to ensure economic viability and a wide range of environmental and social benefits;

Conserve biological diversity and its associated values and culture, water resources, soils, and unique and fragile ecosystems and landscapes;

Complement management of, reduce pressures on and promote the restoration and conservation of natural forests.

Additionally, the agro-forestry concept itself has positive effects on the environment. By combining trees and shrubs with crops, agro-forestry is an integrated approach that creates more diverse, productive, profitable, healthy and sustainable land-use systems. Agro-forestry systems can be advantageous over conventional agricultural and forest production methods through increased productivity, biodiversity, economic benefits, social outcomes, and the ecological goods and services provided.

Annex 3

Sharing of 10% of revenues from tCERs

**Procedure for the Disbursement of NGR Carbon Funds to the Villages**

The carbon funds granted by NGR will be used for community development projects (social infrastructure development and environmental protection) in each village. The Community Development Department will liaise and follow up with the local communities regarding the carbon project development and key milestones. This will ensure that NGR can manage expectations and keep the communities in the picture. Additionally, NGR should ensure that the local communities are informed/aware of the risks involved in the project development and understand that the money is not guaranteed/certain, meaning communities should know that the money is dependent on the success of the plantation as well as finding carbon buyers. Furthermore, the communities should be updated on the status of the project development.

Upon receipt of the payment from the sales of the first carbon credits generated the process for the sharing of the 10% of the carbon revenues will be initiated. This document outlines a detailed plan for how this sharing mechanism will work.

The allocation of funds to each village will be based proportionally on the amount of carbon credits issued from each project site and the contribution of land that each village gave to that particular project site. As such, communities who have given more land for the carbon project will get a higher contribution from the project revenues. In case of fire or any disturbance to the plantation growth that affects the carbon revenues, the amount of funds allocated will also be reduced accordingly since less carbon credits would be issued in such a scenario.

Mechanisms for funds allocation

Below is represented the mechanisms for the funds allocation:
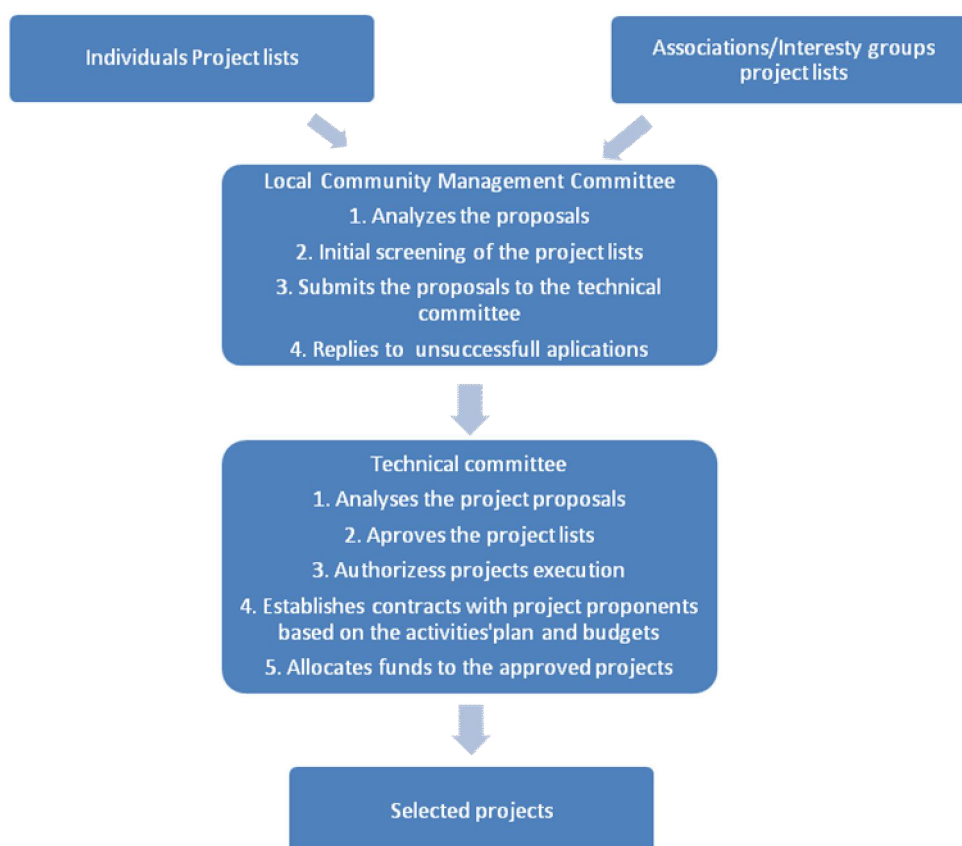
1. Local Community Management Committees that will be established in each project implementation area will be part of the decision process about funds allocation in each village. These committees are elected by the local communities to represent them. and include representatives of: the Investor, the Local management committee, the District Government, the District consultative Committee and local leaders

2. On receipt of funds from sale of carbon, NGR will organize meetings with the Local management committees of each village to inform them about the amount of money that each village will receive from the sale of carbon credits from the corresponding verification. The meeting will also serve to determine the expected timelines for the project idea lists from the villages to be discussed and agreed

3. The project lists can be submitted by individuals or associations/ interest groups to the Local community Management Committee. The first project list should be formulated through stakeholder meetings with as wider representation from the village as possible

4. NGR's Community Development Manager will communicate with the village representatives/ leaders about the estimated time for the submission of projects so that meetings can be organized for the decision about the projects to be funded

5. On receiving the project idea lists from the villages, NGR in cooperation with each management committee, will decide on which projects to be funded from the existing list, including management arrangements - either party has the right to veto projects from the

list. The Local governments will help screening and deciding about the projects based on the list of Government development priorities for the region

6. To avoid having many different mechanisms for the funds allocation to the local communities, the 10% of the carbon revenue funds will be transferred to separate bank account of each of the local communities' villages (agreed with the local communities /endorsed by the community management committee representatives)

7. The funds will be allocated to specific projects (e.g. development/restoration of social infrastructure, income generating activities, food production, etc.) in line with the rules that will be set up for the community development fund (e.g. minimum number of signatories, maximum amount to be funded, etc.)

8. NGR will provide its own quantity surveyor to provide a cost estimate of the top three projects which both parties agree on. The cost estimate will also consider maintenance and management costs. The village will be provided with the cost estimates to confirm which projects should be selected – final confirmation must be agreed by both the local communities' representatives and NGR

9. NGR will verify, through the technical committee, the activities implementation and approve the beneficiaries' regular accounting reports.