DEVELOPMENT WORKSHOP
Desenvolvimento Comunitário
Human Settlements & Development

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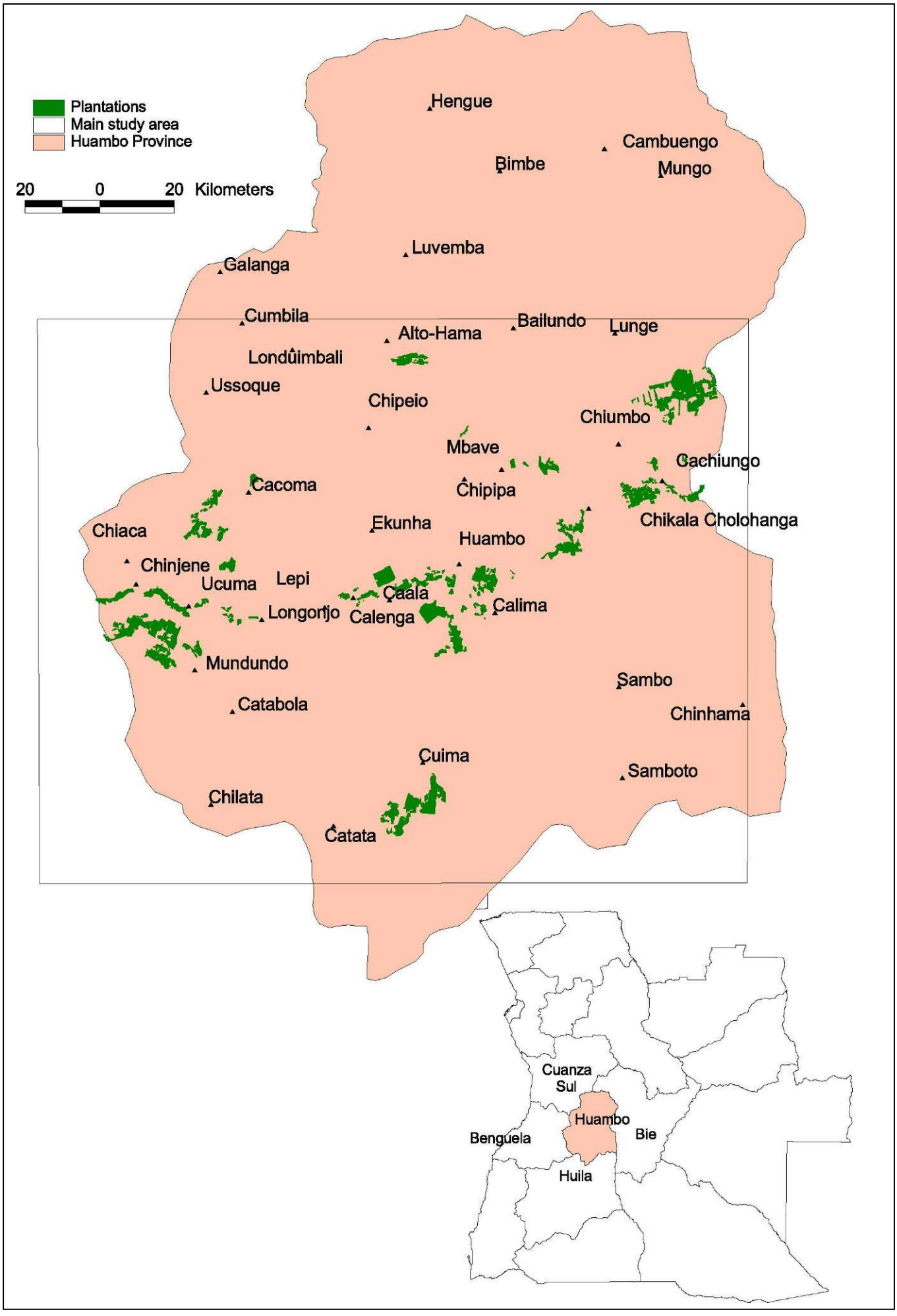
HabiTec
SOCIAL ENTERPRISE

Forests & Biomass inventory for the Provinces of Benguela and Huambo

Development Workshop Huambo
January 2012


Plantations
Main study area
Huambo Province
20 0 20 Kilometers
Hengue
Cambuengo
Bimbe
Mungo
Luvemba
Galanga
Cumbila
Bailundo
Lunge
Alto-Hama
Londûimbali
Ussoque
Chipeio
Chiumbo
Mbave
Cachiungo
Cacoma
Chipipa
Chikala Cholohanga
Chiaca
Ekunha
Huambo
Chinjene
Ucuma
Lepi
Çaala
Calima
Longonjo
Calenga
Mundundo
Sambo
Catabola
Chinhama
Çuima
Samboto
Chilata
Catata
Cuanza Sul
Huambo
Benguela
Bie
Huila

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SOCIAL ENTERPRISE

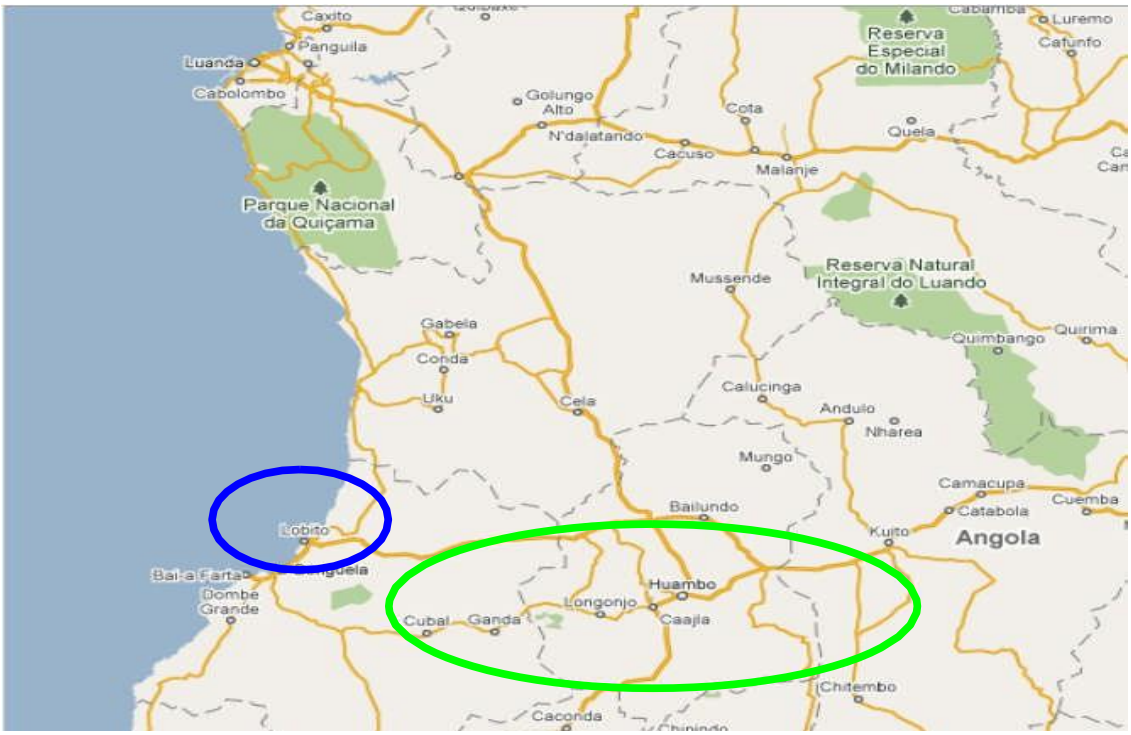
Table of Contents

1 Introduction

The purpose of this project is to research on a plantation asset for potential REDD+ activities. This project is a feasibility study project.

a. Overview of the plantation

A. The plantation was developed between 1969 and 1974.
B. 8 plantation areas, total 65,000ha.
C. Tree species are eucalyptus and pine.
D. There was no management for 30 years due to a civil war.
E. As a result, most of the areas (about 60%) were lost because of anti-government power activities, fire and agriculture by community residents caused by the civil.
F. Most of the relevant documents were also lost.

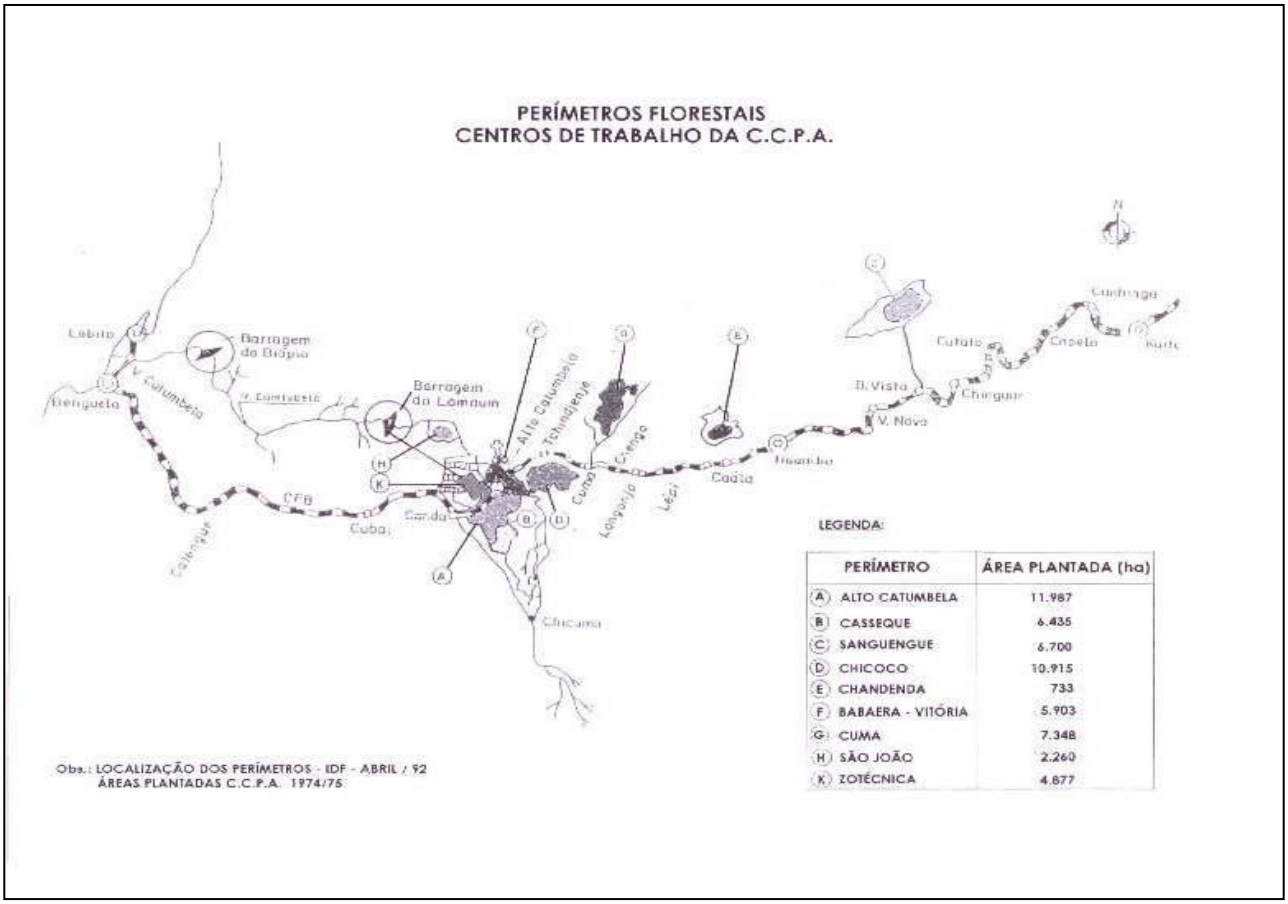


b. Location

Angola: The plantation area is about 200 to 600 km Eastern from Lobito port.

The plantation area is along with CFB train line and about 70% is in Alto Catumbela. This project supports research on the forest plantations (vegetation, land use, soil and water environment) and zoning will be conducted based on analysis and evaluation of the satellite images.

This report of the covers the field work undertaken in October and November 2011.Generally, the research has allowed to know the reality of the forest perimeter looking for knowledge of how you measure, determine, calculate the areas and volumes of trees.



PERÍMETRO	ÁREA PLANTADA (ha)
(A) ALTO CATUMBELA	11.987
(B) CASSEQUE	6.435
(C) SANGUENGUE	6.700
(D) CHICOCO	10.915
(E) CHANDENDA	733
(F) BABAERA - VITÓRIA	5.903
(G) CUMA	7.348
(H) SÃO JOÃO	2.260
(K) ZOTÉCNICA	4.877

The study addresses the situation and social cause of the communities in order to help them take a more critical attitude toward environmental problems. He also served to strengthen the partnerships and sharing of experience among the various partners who work with forests. Reinforced the idea that has come to draw to carry out a program of planting trees in order to secure a sustainable use of the environment.

The research had two different phases. The first was the design of a proposal submitted to the Japanese embassy. The second phase was the field work that was divided and two phases. This was the character of training identification of various forest perimeters, meetings with local administrators, interviews of people living near the forests. The training took a moment in its theoretical and other practical. The training lasted for five days where were visited the areas of Chadenda, Ganga, Alto Catumbela, Babayera,

and Cacoma. These visits have resulted in the marking and determination of 12 points of 20 m² and 24 simple points.

Research subjects

1: Vegetation, land use, soil and water environment.

2: Measurement of forest assets (Tree species and its provenance, diameter breast height - tree height, forest reserve per hectare, survival rate, type of plantation (coppicing or re-planting)).

3. Expected sample amount: 250 to 375 sample trees per location for a sample area of 0.25ha.

Calendars of the tasks performed

The calendar of activities was completed according to the plan. Although we had some time impediments to access the forest as was the case of the farm Ganga problems that form quickly resolved, the degradation of tracks made the work which provided 10 days took us 14 days. But the support that we receive from various institutions, such as the Hello, those responsible and fiscal Pulp, local administrations contribueram to the success of our work. To them our thanks for their support.

Table 1- Calendar of activity

Grounds for calculation of the minimum number of survey plots

Time	1st day		2nd day		3rd day		4th day (occasional)	5th day	6th day	7th day	8th day
	Forest	Sociality		Sociality Forest	Forest	Sociality					
7	moves	moves	moves	moves	Moves	Moves	Moves	moves	moves	moves	moves
8					Visit AND	VISIT AND					
					Setup Plots (E)						
9	Visit D	Visit D	Visit B	Visit B	E1-1,2-1				B1-1	The1-3	
	Setup Plots (D)	Sands District and Rhodes Canyon Archaeological Site	Setup Plots (A)	Top Catumbela	and2-1,2-2		Setup Plots (D)	D1-2	B2-1	The2-3	
10				Ganga		Moves		D2-2	B1-2	The2-4	G1-1
			moves					D1-3	B2-2	The2-5	G2-1
11					moves	Lunch	D2-1	D2-3	B2-3	F2-1	G1-2
						Moves	Setup Plots (D)	D1-4	B2-4	moves	G2-2
12	moves	moves			lunch		Moves	D2-4	B2-5		Lunch
	Lunch	Lunch	Lunch	Lunch	moves	Visit C	Lunch	Lunch	Lunch	Lunch	
13			moves	moves		Moves	Moves			moves	occasional
	moves	Moves						D2-5	A1-1		Time
14	Setup Plots (D)	Macro Servise	Setup Plots (B)		Setup Plots (G)		Work	D2-6	A2-1	and2-3	
								D2-7	A1-2	moves	
15			Setup Plots (F)		move		meeting with DW	D2-8	A2-2		moves
	moves	moves	moves	moves				moves	Moves		
16						Moves					
17											
18					Meeting with DW （ decides the number of plots ）						
	District		District		District		District	District	District	District	District

Visited Areas

In a general way some are better conservation conditions especially those who have companies that assume their exploitation. Many of the companies have in their projects strategies for reforestation and/or planting of new areas. But this is still very limited in almost all areas that our team visited.

The communities that live together these forests makes their livelihoods from cutting down trees to sell, producing honey and charcoal.

Table 2 - Distribution of forests per area

No	Forest	Locality	Ca	Ha	Year of planting	Holding
1	Cangola camboca	Alto Catumbela	Ganda-Benguela	12,446	1957-1959	Pulp/pop
2	Democratic Republic of Sao Tome and Principe	Ganda	Benguela	6,683	1969	Pulp/pop
3	Sanguengue	Kachingo	District	11,390		
4	Ganga Crooked	Mundundu-Ukuma	District	11,892		Macro service
5	Chandenda	Severn Road Bridge	District	1,641		Pulp/pop
6	Babayera Regis-	Alto Catumbela	Ganda-Benguela	5,944		Monopatapalo
7	Cuma-cacoma	Sands District and Rhodes Canyon Archaeological Site	District	7,423		Pulp/pop
8	Saint John archaeological - Epanga	Ganda	Benguela	2,260		Wood-brava
9	Zootecnica	Alto Catumbela	Benguela	3,877		Pulp/pop

The team selected these forests:

i. Chandenda

The forest is east of the city of the Severn Road Bridge with plantations like eucalyptus, pine and an area of native planting which is on the edge of forest.

It is between the forest visited on that man's actions this destroying on a mass scale. The few tax are not able to control the fury of the man in the slaughtering discriminated against the trees. It is the urgent intervention of the competent bodies to avoid the worst for this feature so necessary for human life.

ii. Ganga

This forest is located south of the city of Sands District and Rhodes Canyon Archaeological Site in the commune of Mundundu. Contains eucalyptus, pine and many native trees. It is operated by the company Macro Service, is between the visited the that best conditions presents both at the point of view of conservation, profitability, with a clear project of reforestation. But also suffers from burned that according to its officers is a problem that is out of your control. The company believes in the coming days to strengthen the security system to minimize the burning of the forest.

The sale of timber is made for anyone since that meet conditions of buy 60 cubic meters. The people around have several benefits. The company supports all deaths, not them, denied access to forest, and may even kill a flying or more without problems.

But you cannot see the program this business education the population which aim to protect, forest conservation and sustainable exploitation. There is a program of involvement of communities in the planting of new areas in exchange for a monetary reward. This company has created several jobs for the community and expects to increase this work force in the coming days.

iii. Cacoma- Independencia

This forest is located to the north of the municipality of Independencia. It is composed of pine and eucalyptus plantations, their exploitation is done by people living around the same. Access is very difficult. But it is those forest that runs the risk of disappearing if not thinking with urgency in the education of the populations in policies to begin to plant new trees in order to refit this tissue. It is those forest that is affected by the few resources that have the pulp to make stage the extent of forests that it controls.

iv. Alto Catumbela/Babayera

It is the forests from the point of view of proximity of management that should be more conserved and protected. The nearby areas of the commune the slaughter of trees is discriminated against as you progress to the interior is already seeing a forest compresses. The school is an example, your forest this compact is not being exploited. We can indicate several factors, access, plenty of sticks preferably native populations should be the reason for their conservation.

In spite of the forest, being close to the management does not see any action that demonstrates politicas of reforestation nor a program of education of the communities for the purpose. There exists a potential very large because the population considers a big loss this well because according to them it was since the time going to a source of employment for families

9 Results achieved

The project envisaged in the short term the range of expected results. These results are connected the immediate goals of the activity that would take place over the 10 days. To achieve these results it was necessary to the achievement of:

- ✓ A meeting of planning between the Japanese team and DW which resulted in the review and planning of activities;
- ✓ Two meetings with local authorities in the municipality of Sands District and Rhodes Canyon Archaeological Site and the administration of Babayara;
- ✓ A meeting with the Director of pulp that allowed their involvement in all phases of activities;
- ✓ A meeting with the general direction of the Forest of Mundundu represented by the company Macro Service;

These meetings resulted in:

- ✓ In the visit in Babayera a point and taken their measures and volume, geographic coordinates;
- ✓ The High Mississippi were visited and measured the areas, five points of which three of 20 m² and five simple points. Other points in area B where 2 are 20 m², and five simple.
- ✓ In the Sands District and Rhodes Canyon Archaeological Site in the commune of Mundundu area D were made three points of 20 m² and 8 simple points. Even in the municipality of Independencia in the area of Cacoma in G were made 2 points of 20 m².
- ✓ Already in the municipality of Severn Road Bridge area F were made 2 points of 20 m² and a simple.

Table 3- points measured

Plantations	Every tree measurement :1	Simplified volume determination :2	（Out of Plantation）
The	3	5	1
B	2	5	1
D	3	8	2
And	2	3	
F	0	1	
G	2	2	1
SUM	**12**	**24**	**5**

10 Conclusions and recommendations

The research conducted had a focus on a study more technical. More despite this observation, the spontaneous interviews with employees responsible for pulp, and residents around these forests leads us to conclude and recommend the following.

Exploitation, protection and conservation

Environmental issues are in the world today the theme that affects the budgets of the governments. All forests are being exploited one way or another. A by companies licensed, others by the population. It was apparent that those who are being exploited by companies are better able to conservation. But it is important that the undertakings licensed:

- ✓ Whatsoever within their programs to educate and involve communities in environmental issues;
- ✓ Their projects must bring a commitment of reflostamento involving local communities also creating partnerships with the Pulp, IDF and universities;
- ✓ The projects must have a social component pointing to the growth of the actions of communities, promoting support in construction of schools medical posts, bridges and other structures regard.
- ✓ Should Promote training to small carpentry places so ensure an improvement of local furniture giving access to employment to many families;
- ✓ The pulp through the IDF must ensure that companies licensed do not seek only profits that bring sustainable strategies for the forest areas at the same time that should encourage companies to apply to the exploitation of forests by requiring the social component, and reforestation.

Reforestation

In a general way is not visible program of reflostação. The pulp has stated that it is a requirement for all the planting of new trees. But the same time they know that even this far from being a practical action for people including some companies licensed for exploitation of certain perimeters. That is why it is important:

- ✓ The pulp was to create a network of medium-sized enterprises or small, people, who deal with timber through, the local authorities so that these companies assume and adopt policies of reforestation;

- ✓ The Pulp should have a program to raise awareness of the dealing with the traditional leaders so that they understand the benefits and losses that the killing of trees can cause to the environment.

Biomass

- ✓ The government should support with urgency the biomass in human and material resources so that their supervisory action becomes effective and operational;
- ✓ A fulltime job involving police, fiscal, environmental, community and businesses can be a sure path to the proper functioning of the pulp that has made a great effort to maintain the forests that controls;
- ✓ The Biomass has a potential to become a sustainable company more for that to happen, it is urgent that she receives financial support have created partnerships with financial institutions interested companies in the exploitation of timber.

Communities around the forests

The idea of a holding and possession of nature as a means of livelihood these natural families is dominant in these communities. There is little education about the other benefits that forests play in human life, coupled with little knowledge of environmental problems. That is why it is important:

- ✓ The disclosure of the environmental problems that are caused by the slaughter described the trees without your refitting through lectures in local communities;
- ✓ The government, companies that work directly with this feature should involve these communities in designing their programs of exploitation of forests by promoting actions of environmental education;
- ✓ The actions of the reforestation can be seen as a port of entry by creating financial incentives for people who participate in the planting of new areas.

Annexs

A. Terms of Reference

B. Project Proposal

C. Survey Field Data

A1-Alto-Catumbela – 8 pages
B1-Alto-Catumbela – 7 pages
D – Project – 9 pages
E – Project - 1 page
F1- Babayera – 1 page
G – Project – 4 pages

D. Photos

Annex A

Terms of Reference

ToR - Project summary

1. What the project is about (including location, aim, etc)

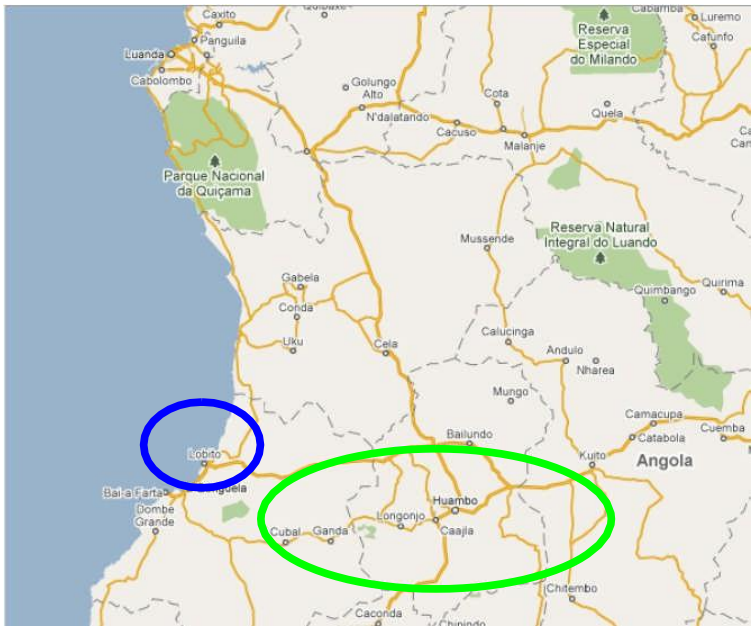
The purpose of this project is to research on a plantation asset for potential REDD+ activities. Out client is going to apply for a subsidy by Ministry of Economy, Trade and Industry with this project as a feasibility study project.

Overview of the plantation

- The plantation was developed between 1969 and 1974.
- 8 plantation areas, total 65,000ha.
- Tree species are eucalyptus and pine.
- There was no management for 30 years due to a civil war. As a result, most of the areas (about 60%) were lost because of anti-government power activities, fire and agriculture by community residents caused by the civil.
- Most of the relevant documents were also lost.

Location

- Angola: The plantation area is about 200 to 600 km Eastern from Lobito port.
- The plantation area is along with CFB train line and about 70% is in Alto Catumbela.



2. What is required from the supplier

A. Satellite image (purchasing price)
B. Forest stand research
C. Plantation asset map and inventory map by image analysis

Details::

A. Satellite image (Image price is requested)

4 slots in total: Latest image + 3 past images (Post civil war, during the civil war, pre plantation)

A-1 Latest image

- Scope: All the plantation area.
- Quality: Request for estimation cost by qualities
  - High
  - Intermediate
  - Low resolutions (cf. Landsat/ SPOT/ ALOS level)

* Required quality for satellite images: To be able to use for research *C. Plantation asset map and inventory map image analysis*), which requires the recognition of vegetation, land use, soil and water environment, as well as for zoning of plantation, non-plantation (applicable for REDD+ activities) and non-plantation (not applicable for REDD+) area.

A-2 Past images to understand the transitions of the plantations

- Scope: All the plantation area. 3 slots from the period between 1965 and 2005.
- Quality: Request for estimation cost by qualities
  - Low resolutions (cf. Landsat/ SPOT/ ALOS level)

* Required quality for satellite images: To be able to use for setting a baseline scenario for REDD+ which requires understanding of the plantation transitions.

*We would appreciate your proposal if there are other ways to satisfy our required quality.

B. Forest stand research

Research to support image analysis in research *C. Plantation asset map and inventory map by image analysis*.

- This is a support research as recognition of the plantations (vegetation, land use, soil and water environment) and zoning will be conducted based on analysis and evaluation of the satellite images in research C.
- Expected about 5 days work
- Field survey by sampling
  - 10 samples: Main plantation areas
  - 5 samples: Non plantation areas (REDD+ potential areas)
- Research subjects
  - 1: Vegetation, land use, soil and water environment.
  - 2: Measurement of forest assets (Tree species and its provenance, diameter breast height - tree height, forest reserve per hectare, survival rate, type of plantation (coppicing or re-planting)).
    - 10 to 15 locations in 5 days
    - Expected sample amount: 250 to 375 sample trees per location for a sample area of 0.25ha.
    - We would appreciate your proposal of the efficient way to implement the research and the required cost framework. For example, if the research is implemented by a team which is composed by a supervisor and some staff, the required cost framework would be the cost of each personnel.

C. Plantation asset map and inventory map by image analysis

C-1. Plantation asset map
A map which shows current and transitions of vegetation, land use, soil and water environment.

C-2. Inventory map
A map which shows current and transitions of forest inventory data.

C-3. Plantation-non plantation zoning
Based on the plantation asset map and the inventory map, zone plantation, non-plantation (applicable for REDD+ activities) and non-plantation (not applicable for REDD+) area.

3. Timeframe

A. Satellite image:
Mid June to the end of July

B. Forest stand research:
August to mid September (Earlier than August is also acceptable)

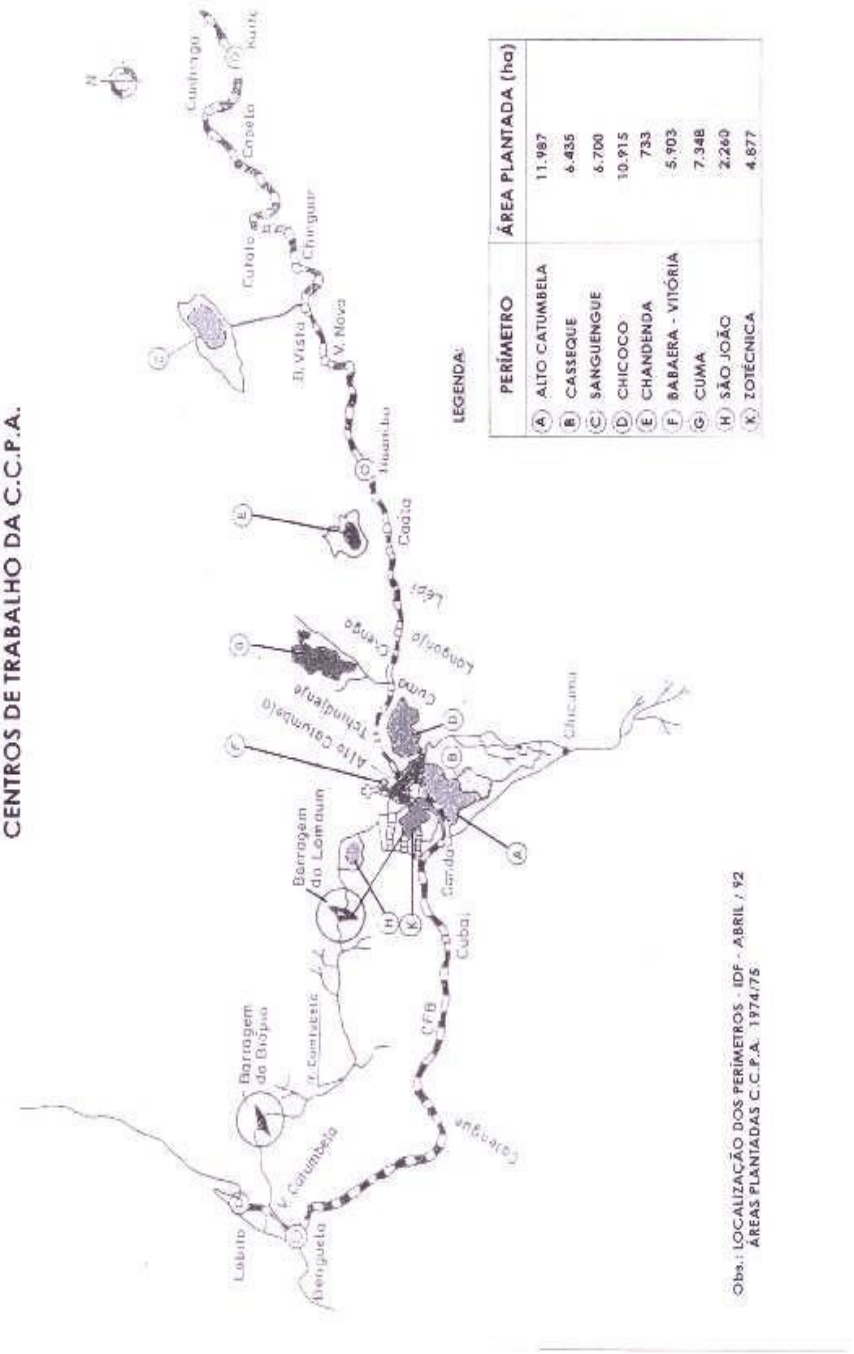
C. Plantation asset map and inventory map by image analysis:
September to the end of October (Delivery of products earlier than the end of October is also acceptable)

4. What is expected in terms of proposal

An estimation letter (s) inclusive of the following information. We would appreciate if you could provide us with the letter(s) by the end of March, 2011 to submit it to the Government with our proposal.

- Estimated price with comments such as research overviews and conditions, etc.
- Team structure and personnel's capability (positions, expertise, background, English skills, etc.)
- Similar project/research experiences

Fig. : Plantation Sites Location



Annex B

Project Proposal

DEVELOPMENT WORKSHOP
Human Settlements and Development

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29 September 2011

Confirmation of order for implementation of Field Assessment of the distribution and biomass of plantations of exotic trees in central Angola

As requested, this letter sets out the details about the project scope and the fee estimation for the required involvement.

Our understanding of the scope of work, period of work/timing and deliverables set out below are based on the project summary sent to us on 27 September 2011.

1) Scope of Work

Every tree measurement survey
(Survey plots) 50m×50m
(Survey contents)

- To acquire coordinate data of survey plots by using GPS.
- To measure a height and diameter of breast height (DBH) for every tree.
- To identify tree species. (To determine Eucalyptus or not.)
- To take photos.

Simplified volume determination survey by the Bitterlich method.
(Survey plots)

- An area between a center of survey plot countable by using a simplified relascope and the farthest tree from the center of survey plot.

(Survey contents)

- To acquire coordinate data of a center of each survey plot by using GPS.
- To measure an average tree height.
- To conduct surveys by the Bitterlich method.
- To count the number of trees by using a simplified relascope.
- To measure DBH of the counted trees.
- To take photos

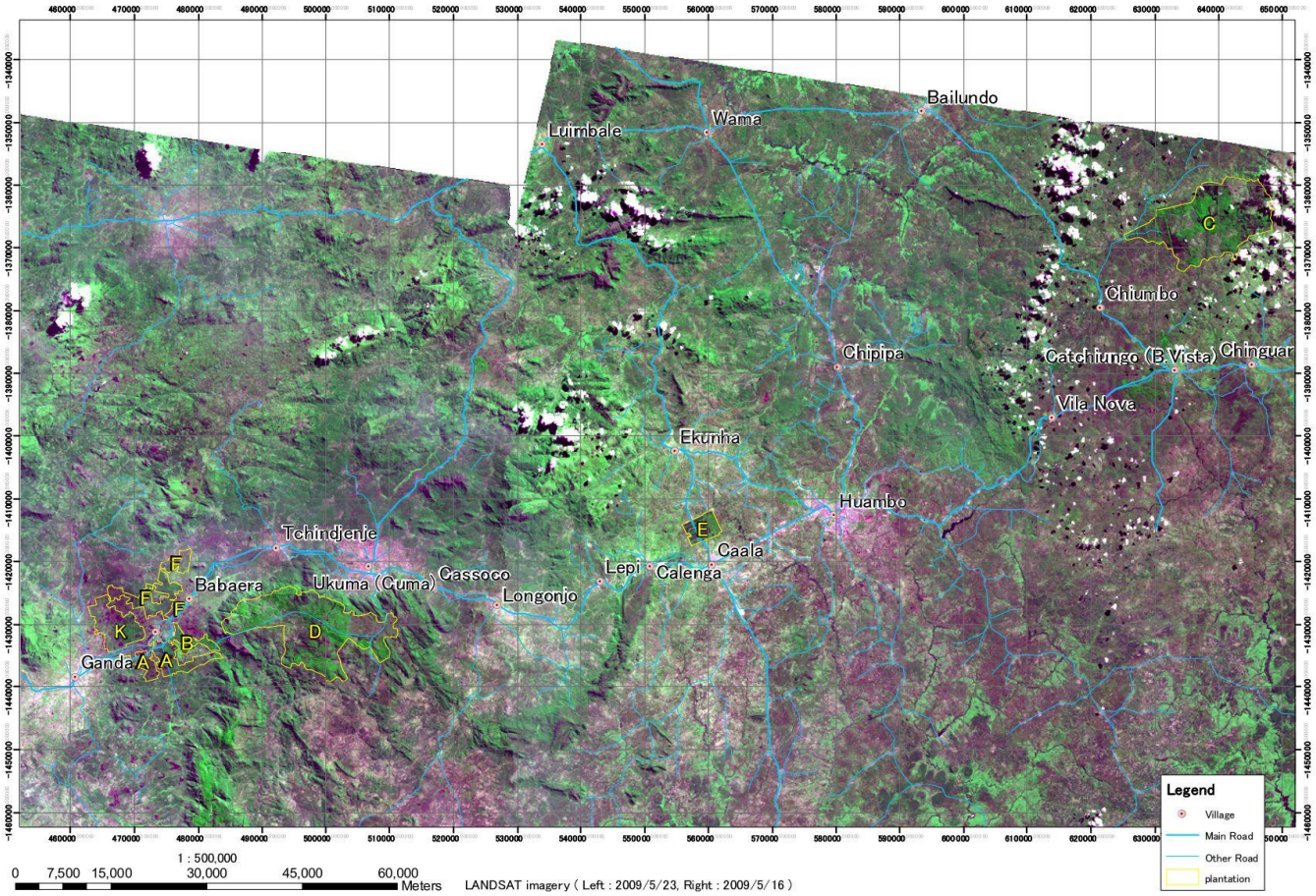
2) Target Area

Eucalyptus plantations (A～F, K) around Huambo (Figure 1).

3) Work Schedule

10 days starting from October 18th, 2011.

- ❖ Traveling days between Luanda and Huambo are included.
- ❖ Holidays are not included.



4) The Number of Survey Plots

➢ The minimum number of survey plots

Table 1. The minimum number of survey plots

Plantations	Every Tree Measurement	Simplified Volume Determination
A	2	3
B	2	3
C	2	5
D	3	7
E	1	2
F	1	1
K	1	1
SUM	**12**	**22**

※If every tree measurement survey cannot be implemented due to a risk of mines, simplified volume determination survey can be substituted for the every tree measurement survey.

➢ Criteria to select survey plots and order of priority

An order of priority was defined based on a below selection criteria (Table 2).

- Completeness: To implement field survey in all plantations.
- Rate for the areas of remaining planted trees: To distribute the number of survey plots based on the areas of remaining planted trees.
- Avoidance of risk: To avoid survey plots that have a high risk of mines.

➢ Grounds for calculation of the minimum number of survey plots

A tentative schedule (Table 2) was developed as grounds for calculation of the minimum number of survey plots under below conditions.

- The number of trees measured by every tree measurement survey: average 150 trees per survey plot

- Time required to conduct every tree measurement survey: 1.5 hours
- Time required to conduct simplified volume determination survey: 0.5 hours
- Traveling speed by car: 50km/h

Table 2. Grounds for calculation of the minimum number of survey plots

Time	1st day	2nd day	3rd day	4th day	5th day	6th day	7th day	8th day
7	move	move	move	move	move	move	move	move
8		practice						
9	practice	E1-1	F1-1	C1-1	D1-2	D2-4	A1-2	B1-2
10	D1-1	E2-1				D2-5		
11	D2-1	E2-2 move	F2-1 move	C2-1 C2-3 C2-4	D2-2 move	D2-6 D2-7 move	A2-2 A2-3	B2-2 B2-3
12	move lunch	lunch	lunch	move lunch	lunch	lunch	move lunch	move lunch
13	move	move	move survey plots (A	move	move D1-3	move	move	move
14	set up survey plots (D)			C1-2		A1-1	B1-1	K1-1
15	move	set up survey plots (C)	move	C2-2	D2-3 move	A2-1	B2-1	K2-1
16		move		C2-5 move		move	move	move
17								
18	stay Huambo	stay Huambo	stay Huambo	stay Huambo	stay Huambo	stay Huambo	stay Huambo	stay Huambo

3. Deliverables

1. A book of records for every tree measurement survey (each survey plot, electronic files) 1 set
2. A book of records for simplified volume determination survey (each survey plot, electronic files), 1 set
3. All electronic data, including coordinate and photos, gathered by this survey, 1 set
4. Submission Date: November 20th, 2011

Yours Sincerely,

Allan Cain
Director
Developmet Workshop

Annex C

Survey Field Data

A1 - Alto-Catumbela – 8 pages

B1 - Alto-Catumbela – 7 pages

D – Project – 9 pages

E – Project - 1 page

F1 - Babayera – 1 page

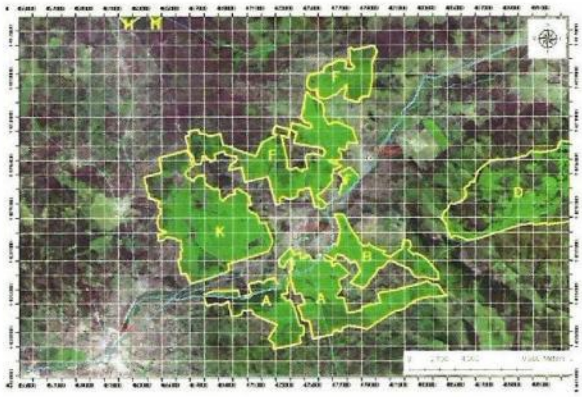
G – Project – 4 pages

A1 - Alto Catumbela

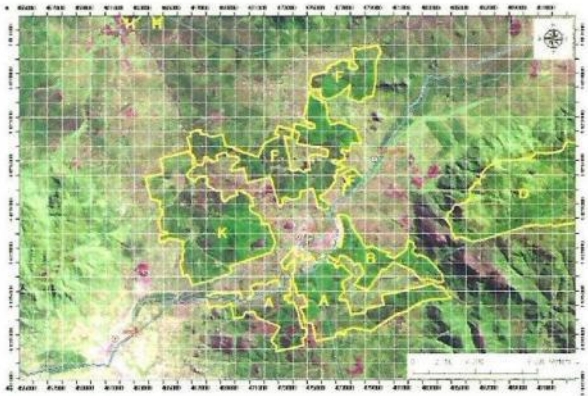
Biomass Survey Note (Every Tree)

Plot ID	Plantation ID	Date	Starting Time	Ending Time	Surveyers
1	A	2011-10-31	9H31 Min	9H 47Min	Júlio, Carmelo [illegible] Generosa

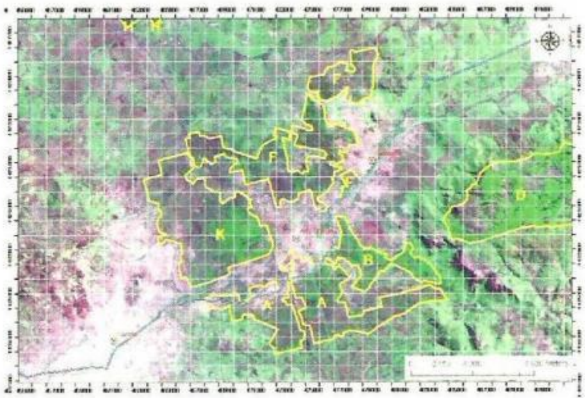
Location Information					
	UTM_X	UTM_Y		UTM_X	UTM_Y
NW Corner 542	0474500	8566110	NE Corner 544	0474514	8566137
SW Corner 543	0474497	8566134	SE Corner 545	0474519	8566122
Topography	(Flat) · Moderate Slope · Rapid Slope				



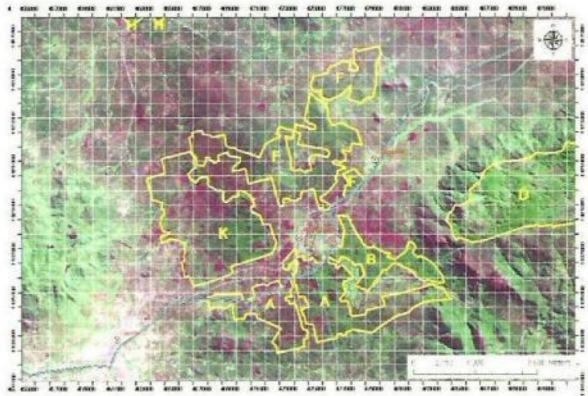
1975/8/28



1990/5/28



2002/8/9



2009/5/16

Every Tree Measurement

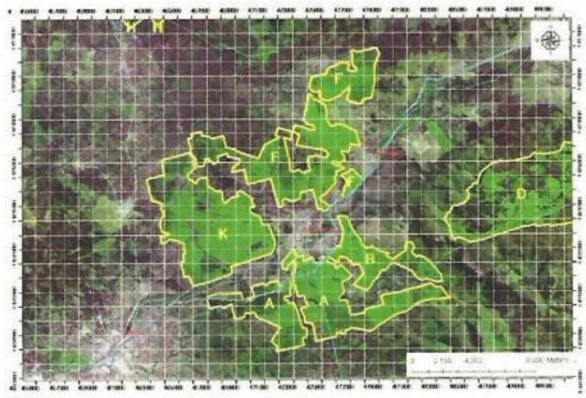
No.	Height (m)	DBH (cm)	Species	Memo	No.	Height (m)	DBH (cm)	Species	Memo
1	[illegible]	39.3	(Eucalyptus) · Other					Eucalyptus · Other	
2	40.	55.6	(Eucalyptus) · Other					Eucalyptus · Other	
3	41.2	41.8	(Eucalyptus) · Other					Eucalyptus · Other	
4	40	42.1	(Eucalyptus) · Other					Eucalyptus · Other	
5	41.5	44.9	(Eucalyptus) · Other					Eucalyptus · Other	
6	40.2	35.1	(Eucalyptus) · Other					Eucalyptus · Other	
7	41.3	35.4	(Eucalyptus) · Other					Eucalyptus · Other	
8	41.2	50.9	(Eucalyptus) · Other					Eucalyptus · Other	
9	40.2	37.6	(Eucalyptus) · Other					Eucalyptus · Other	
10			Eucalyptus · Other					Eucalyptus · Other	
			Eucalyptus · Other					Eucalyptus · Other	
			Eucalyptus · Other					Eucalyptus · Other	
			Eucalyptus · Other					Eucalyptus · Other	
			Eucalyptus · Other					Eucalyptus · Other	
			Eucalyptus · Other					Eucalyptus · Other	
			Eucalyptus · Other					Eucalyptus · Other	

N	S	C	W	U	P
275	280	281	282	283	284

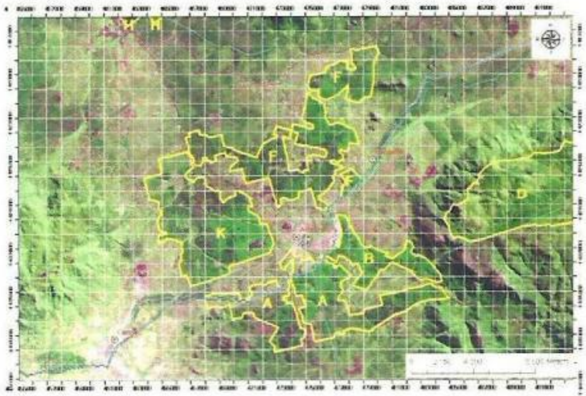
Biomass Survey Note (Simple Timber Volume)

General Information					
Plot ID	Plantation ID	Date	Starting Time	Ending Time	Surveyers
1	A	2011-10-31	9 H 48 Min	10 h 3 m	Julio, Armelanda, Generosa

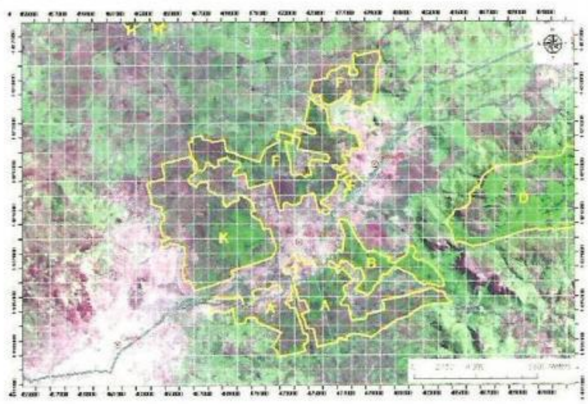
Location Information			
UTM_X 549	0474504	UTM_Y	8566121
Topography	(Flat) · Moderate Slope · Rapid Slope		
Average Height of Upper Story (m)			



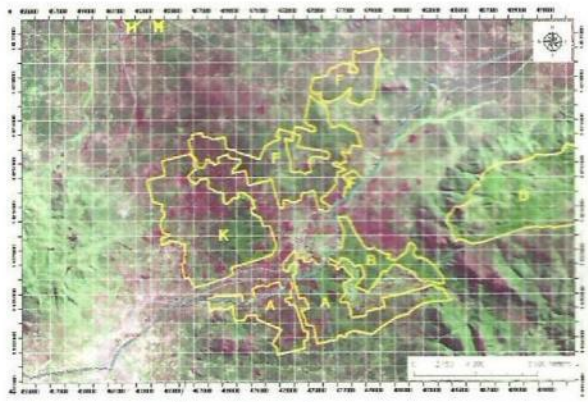
1975/8/28



1990/5/28



2002/8/9



2009/5/16

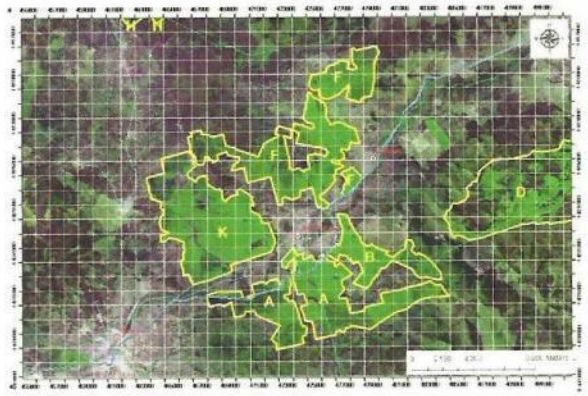
Bitterlich Method Measurement			
Basal Area Constant (k)		Number of Counted Trees	

No.	DBH (cm)	Count	No.	DBH (cm)	Count	No.	DBH (cm)	Count	No.	DBH (cm)	Count
1	50.9	1	17	39.3	1						
2	80.3	1	18	35.1	1						
3	34.5	05	19	35.4	1						
4	40	0.5	20	45.8	1						
5	37.6	1									
6	31	0.5									
7	52.3	1									
8	76.9	0.5									
9	55.6	1									
10	56.6	1									
11	47.8	1									
12	50.2	1									
13	57.7	0,5									
14	42.1	1									
15	54.1	1									
16	44.9	1									

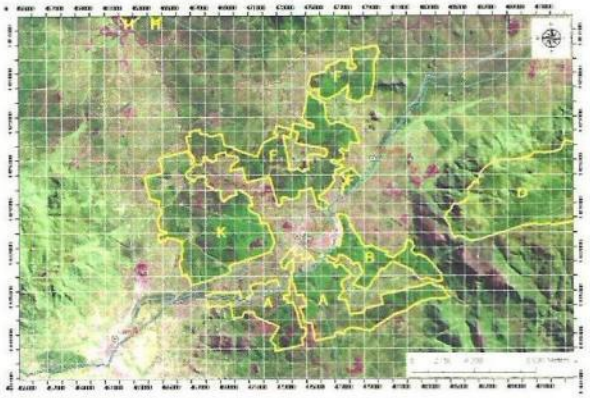
Biomass Survey Note (Simple Timber Volume)

General Information					
Plot ID	Plantation ID	Date	Starting Time	Ending Time	Surveyers
2	A	2011-10-31	10h11	10h24m	Julio, Emilinea, Generosa

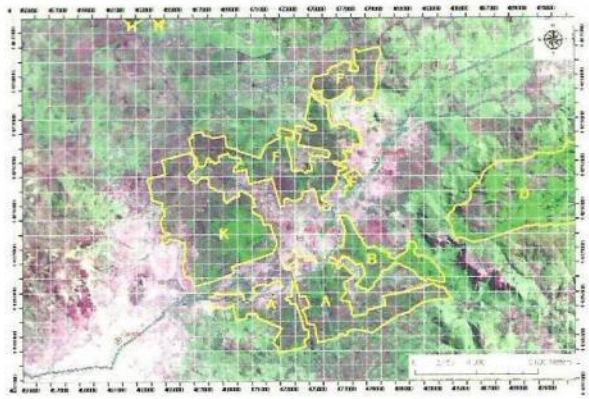
Location Information			
550 UTM_X 047U689		UTM_Y	8565871
Topography	(Flat) · Moderate Slope · Rapid Slope		
Average Height of Upper Story (m)			



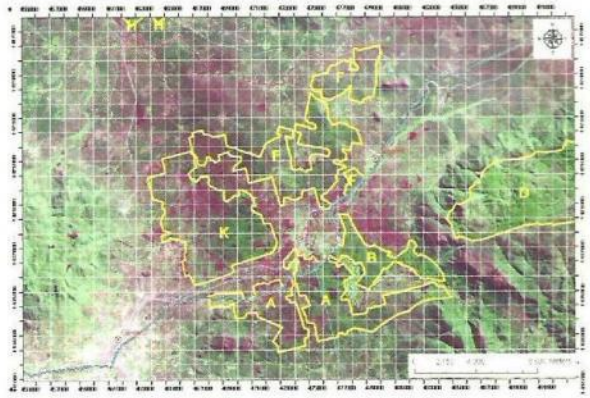
1975/8/28



1990/5/28



2002/8/9



2009/5/16

Bitterlich Method Measurement			
Basal Area Constant (k)		Number of Counted Trees	

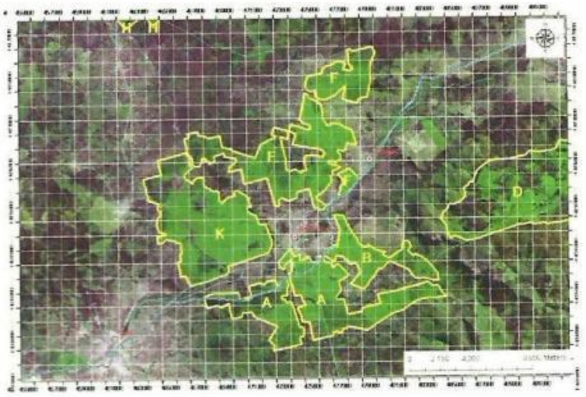
No.	DBH (cm)	Count	No.	DBH (cm)	Count	No.	DBH (cm)	Count	No.	DBH (cm)	Count
1	59.1	1	11	43.1	1						
2	36.2	0.5	18	34	0.5						
3	35.4	1	19	43.6	0.5						
4	35.4	1	20	65.2	1						
5	47.2	0.5	21	30.8	0.5						
6	40.9	1									
7	43.3	1									
8	39.2	1									
9	44.5	1									
10	37.1	1									
11	40.5	1									
12	57.4	1									
13	52.7	1									
14	58.2	1									
15	59.1	1									
16	42.6	1									

N 285 | S 286 | E 287 | W 288 | U 289 | P 290

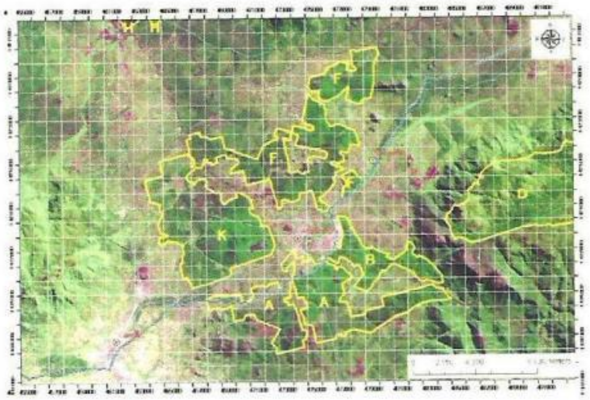
Biomass Survey Note (Simple Timber Volume)

General Information					
Plot ID	Plantation ID	Date	Starting Time	Ending Time	Surveyers
3	A	2011-10-31	11 H00S	11 H 13 mn	Julia, Emilanea, Generosa

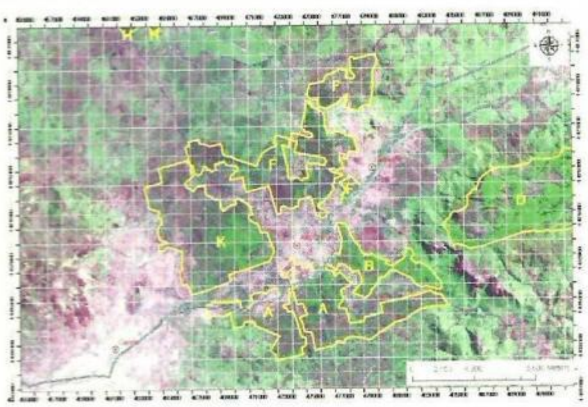
Location Information			
UTM_X 555	0474861	UTM_Y	8565164
Topography	(Flat) · Moderate Slope · Rapid Slope		
Average Height of Upper Story (m)			



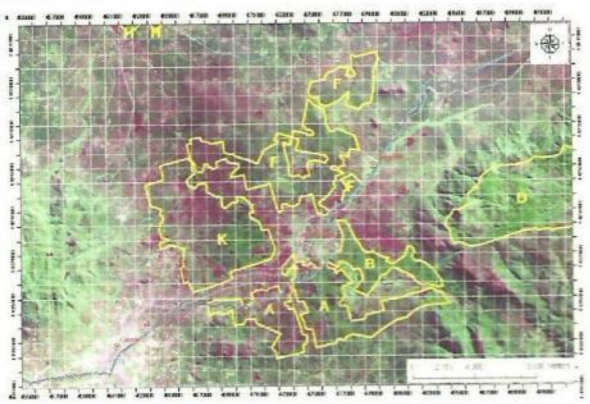
1975/8/28



1990/5/28



2002/8/9



2009/5/16

Bitterlich Method Measurement			
Basal Area Constant (*k*)		Number of Counted Trees	

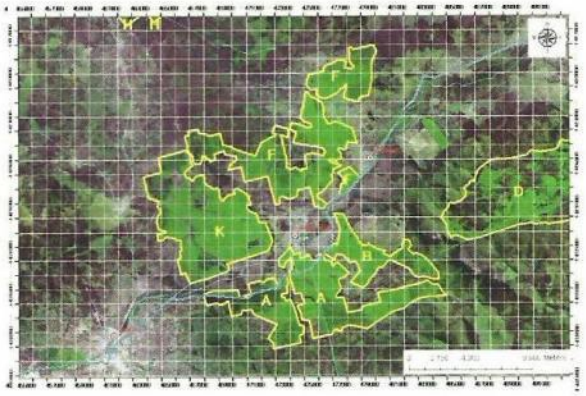
No.	DBH (cm)	Count	No.	DBH (cm)	Count	No.	DBH (cm)	Count	No.	DBH (cm)	Count
1	52.6	1	17	42.4	1						
2	48.5	1	18	71.3	0.5						
3	36.1	0.5	19	55.9	1						
4	46.8	1	20	46.2	1						
5	62.3	1	21	48.3	1						
6	50.5	1									
7	54.1	1									
8	50	1									
9	49.5	1									
10	41.2	1									
11	35.9	1									
12	64.1	1									
13	33.5	05									
14	44.1	1									
15	51.4	1									
16	38.1	1									

Biomass Survey Note (Every Tree)

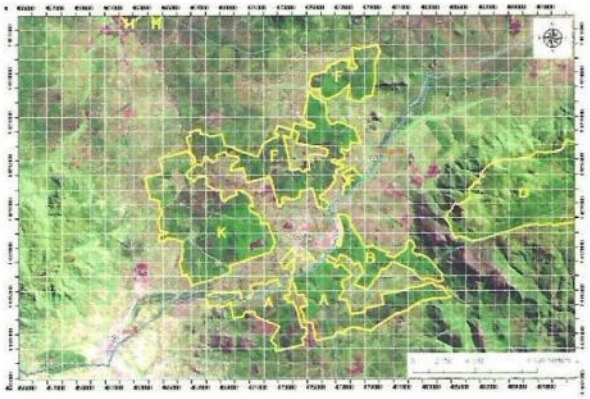
Plot ID	Plantation ID	Date	Starting Time	Ending Time	Surveyers
3	A	2011-10-31	10H 41min	10H 57min	Julio, Generosa, Esmeralda

Location Information

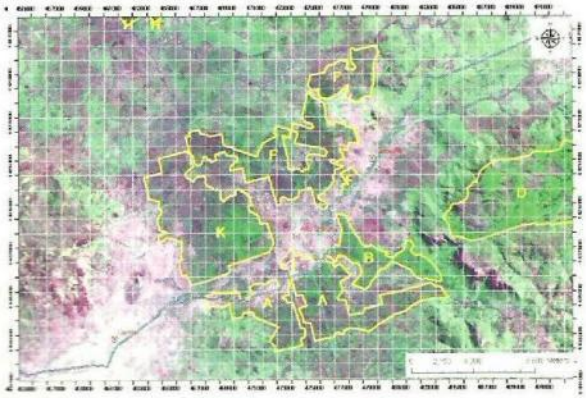
	UTM_X	UTM_Y		UTM_X	UTM_Y
NW Corner551	0474866	8565176	NE Corner553	0474863	8565156
SW Corner552	0474883	8565164	SE Corner554	0474857	8565173
Topography	(Flat) · Moderate Slope · Rapid Slope				



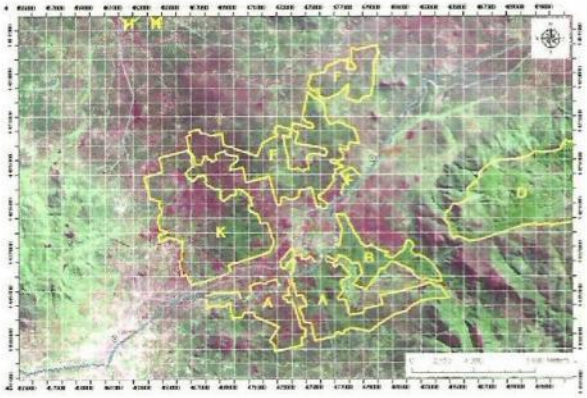
1975/8/28



1990/5/28



2002/8/9



2009/5/16

Every Tree Measurement

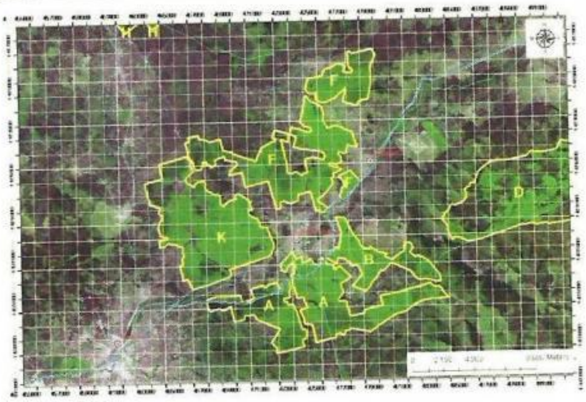
No.	Height (m)	DBH (cm)	Species	Memo	No.	Height (m)	DBH (cm)	Species	Memo
1	36	46.2	(Eucalyptus) · Other					Eucalyptus · Other	
2		51.5	(Eucalyptus) · Other					Eucalyptus · Other	
3	32	62.3	(Eucalyptus) · Other					Eucalyptus · Other	
4	27	39.9	(Eucalyptus) · Other					Eucalyptus · Other	
5	29	54.1	(Eucalyptus) · Other					Eucalyptus · Other	
6	30	43.8	(Eucalyptus) · Other					Eucalyptus · Other	
7	32	41.2	(Eucalyptus) · Other					Eucalyptus · Other	
8	26	35.9	(Eucalyptus) · Other					Eucalyptus · Other	
9	30	64.7	(Eucalyptus) · Other					Eucalyptus · Other	
10	29	42.4	(Eucalyptus) · Other					Eucalyptus · Other	
11	36	31.3	(Eucalyptus) · Other					Eucalyptus · Other	
12	30	51.4	Eucalyptus · Other					Eucalyptus · Other	Broken
13	28	47.6	Eucalyptus · Other					Eucalyptus · Other	
14	30	72.	Eucalyptus · Other					Eucalyptus · Other	
15	35	46.8	Eucalyptus · Other					Eucalyptus · Other	
			Eucalyptus · Other					Eucalyptus · Other	

N	S	E	W	U	P
291	292	293	294	295	296

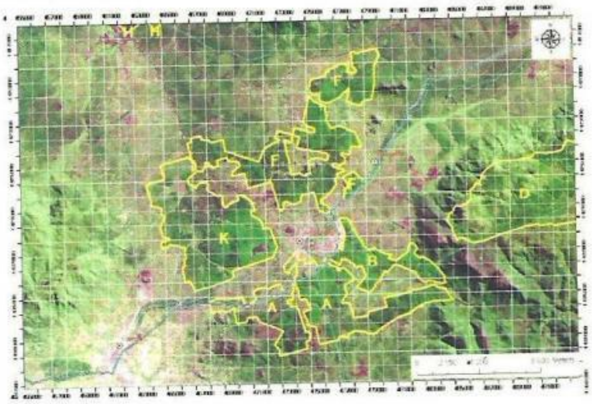
Biomass Survey Note (Simple Timber Volume)

General Information					
Plot ID	Plantation ID	Date	Starting Time	Ending Time	Surveyers
A	A	2011-10-31	11.25 Hm	11. 41 Hm.	[illegible]

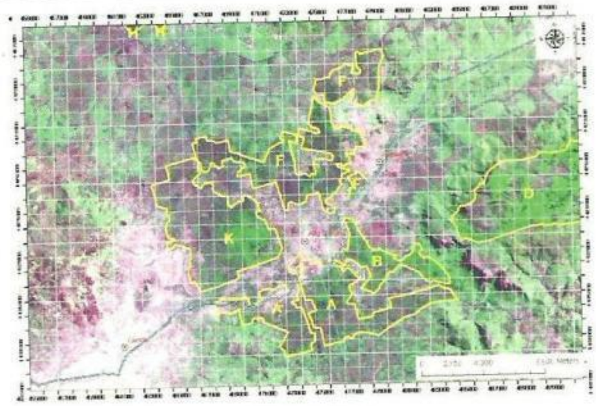
Location Information			
UTM_X 556	047 49 96	UTM_Y	8564385
Topography	(Flat) · Moderate Slope · Rapid Slope		
Average Height of Upper Story (m)			



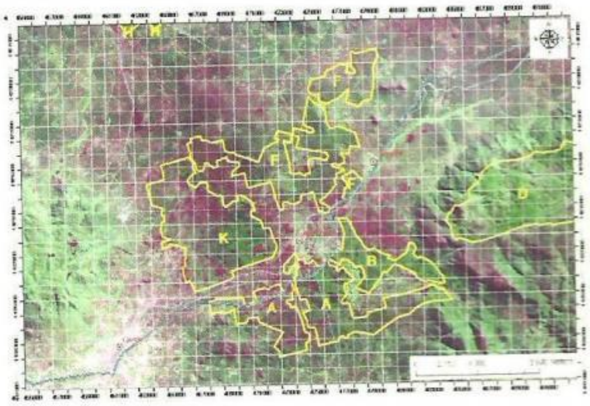
1975/8/28



1990/5/28



2002/8/9



2009/5/16

Bitterlich Method Measurement			
Basal Area Constant (k)		Number of Counted Trees	

No.	DBH (cm)	Count	No.	DBH (cm)	Count	No.	DBH (cm)	Count	No.	DBH (cm)	Count
1	39.6	1	17	40.9	0.5						
2	51.1	1	18	74.2	1						
3	46.6	0.5	19	53.2	1						
4	44.5	1	20	49.2	1						
5	35.6	0.5	21	39	0.5						
6	52.1	1	22	53.7	1						
7	46.1	1	23	57.2	1						
8	62.3	1	24	41.5	1						
9	51.1	1	25	64.3	1						
10	35.4	0.5									
11	36.4	1									
12	48.	1									
13	49.6	0.5									
14	41	1									
15	72.1	1									
16	42.2	1									

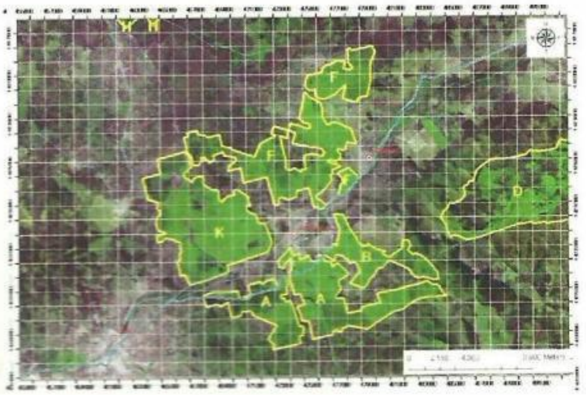
N S E W U P

[illegible] 299 299 300 301 302

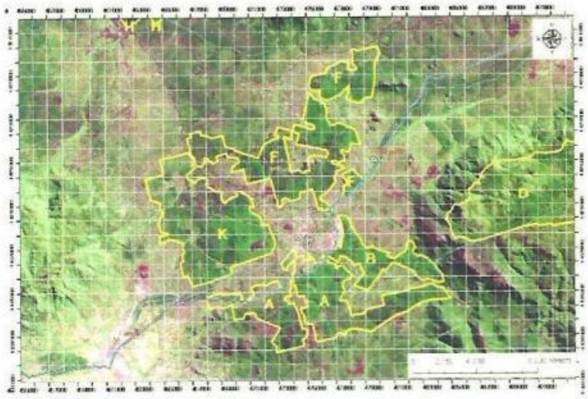
Biomass Survey Note (Simple Timber Volume)

General Information					
Plot ID	Plantation ID	Date	Starting Time	Ending Time	Surveyers
5	A	2011-10-31	12H27	12H35m	Julio, Armelanca, Generosa

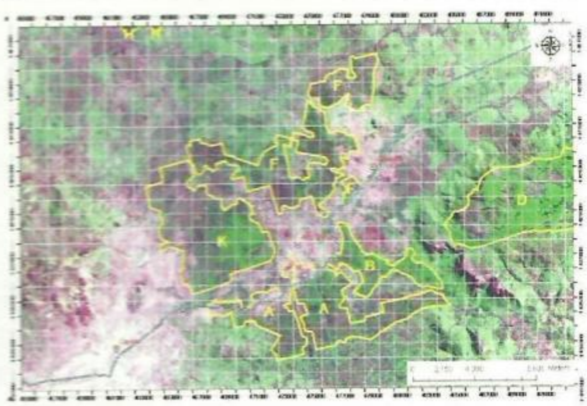
Location Information			
UTM_X	561 0475827	UTM_Y	8561394
Topography	Flat · Moderate Slope · (Rapid Slope)		
Average Height of Upper Story (m)			



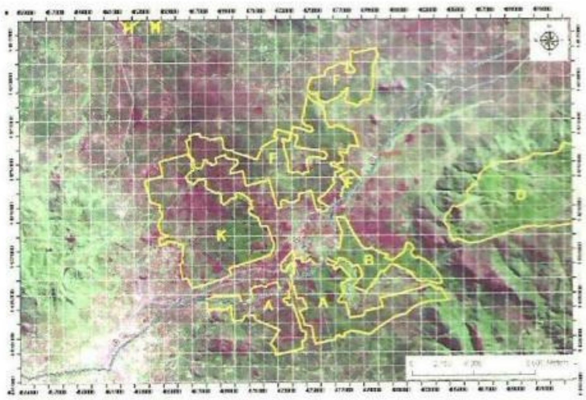
1975/8/28



1990/5/28



2002/8/9



2009/5/16

Bitterlich Method Measurement

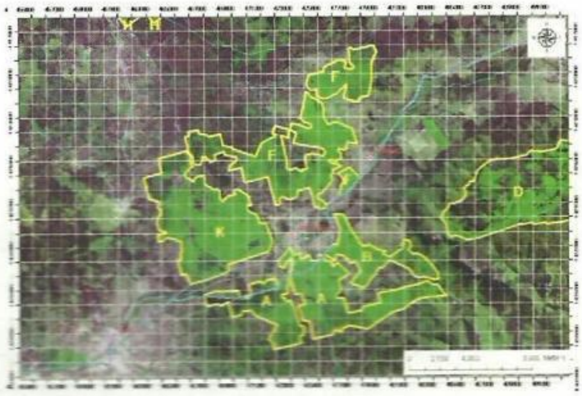
Basal Area Constant (k)		Number of Counted Trees	

No.	DBH (cm)	Count	No.	DBH (cm)	Count	No.	DBH (cm)	Count	No.	DBH (cm)	Count
	~~7.7~~		12	11.3	1						
	~~18.9~~		13	12.9	0,5						
	~~12.8~~		14	7.5	1						
	~~8.7~~		15	13.2	1						
	~~8.6~~		16	15.6	1						
1	17.3	1	~~14.6~~	14.6	1						
2	82	0.5	18	12.3	1						
3	7.1	0,5	19	17.5	1						
4	18	1	20	15.3	1						
5	19.5	1	21	15.2	1						
6	12.9	1	22	18.3	1						
7	14	0.5	23	13.4	1						
8	15.7	1	24	11.6	1						
9	10.4	1									
10	23.2	1									
11	10.6	1									

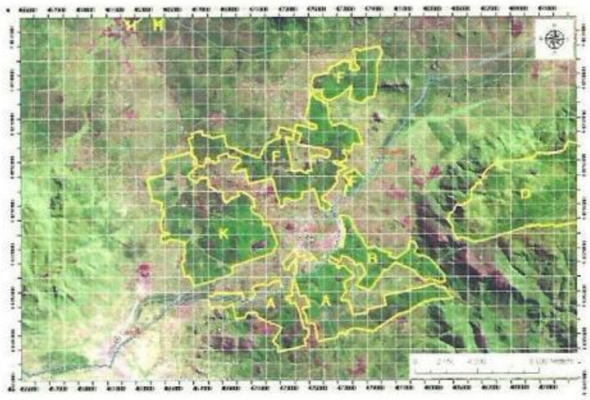
Biomass Survey Note (Every Tree)

Plot ID	Plantation ID	Date	Starting Time	Ending Time	Surveyers
5	A	2011-10-31	11 h 50	13.22	Julio, Ermelinda, Genitora

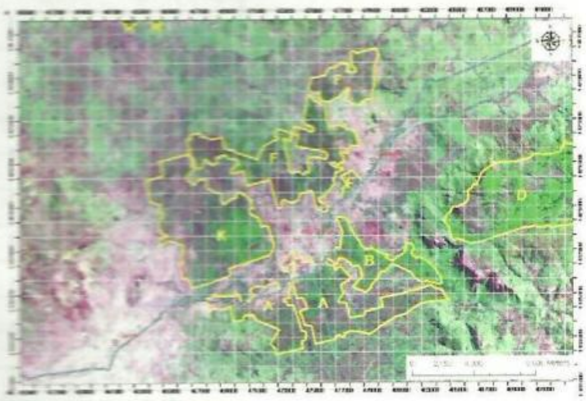
Location Information	UTM_X	UTM_Y		UTM_X	UTM_Y
NW Corner 557	0475842	8561383	NE Corner 559	0475825	8561401
SW Corner 558	0475841	8561403	SE Corner 560	~~8561388~~ 0475822	8561388
Topography	Flat · Moderate Slope · **(Rapid Slope)**				



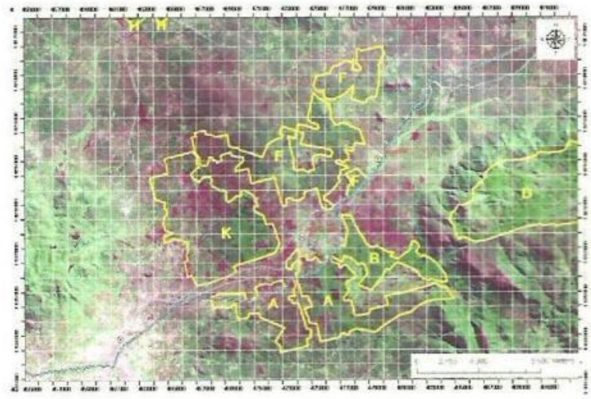
1975/8/28



1990/5/28



2002/8/9



2009/5/16

Every Tree Measurement

No.	Height (m)	DBH (cm)	Species	Memo	No.	Height (m)	DBH (cm)	Species	Memo
1	8	11.13	Eucalyptus · (Other)		17	9	8.4	Eucalyptus · Other	
2	6	5.6	Eucalyptus · (Other)		18	8	15	Eucalyptus · Other	
3	7	5.6	Eucalyptus · (Other)		19	6	13.3	Eucalyptus · Other	
4	8	10.4	Eucalyptus · (Other)		20	7	7.6	Eucalyptus · Other	
5	9	11.4	Eucalyptus · (Other)		21	8	19.2	Eucalyptus · Other	
6	7	12.6	Eucalyptus · (Other)		22	6	19.6	Eucalyptus · Other	
7	6	9.2	Eucalyptus · (Other)		23	5	15.5	Eucalyptus · Other	
8	5	7.4	Eucalyptus · (Other)		24	4	8.5	Eucalyptus · Other	
9	8	12.2	Eucalyptus · (Other)		25	6	7.1	Eucalyptus · Other	
10	7	9.8	Eucalyptus · (Other)		26	7	5.7	Eucalyptus · Other	
11	6	17.7	Eucalyptus · (Other)		27	8	6.2	Eucalyptus · Other	
12	9	14	Eucalyptus · (Other)		28	9	8.2	Eucalyptus · Other	
13	8	11	Eucalyptus · (Other)		29	6	14.9	Eucalyptus · Other	
14	7	14.4	Eucalyptus · (Other)		30	7	18.3	Eucalyptus · Other	
15	6	9.6	Eucalyptus · (Other)		31	8	16.8	Eucalyptus · Other	
16	7	15.8	Eucalyptus · (Other)		32	5	7.7	Eucalyptus · Other	

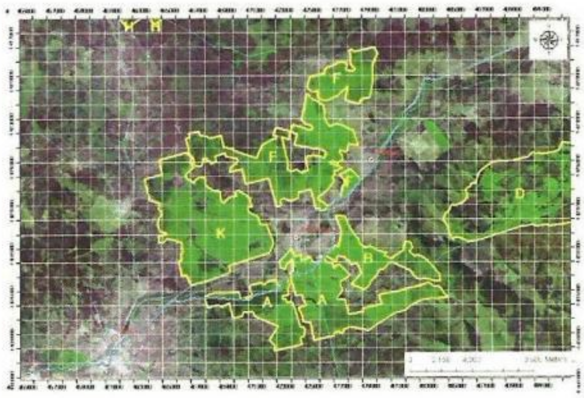
N	S	E	W	U	P
303	304	305	306	307	308

B1 - Alto Catumbela

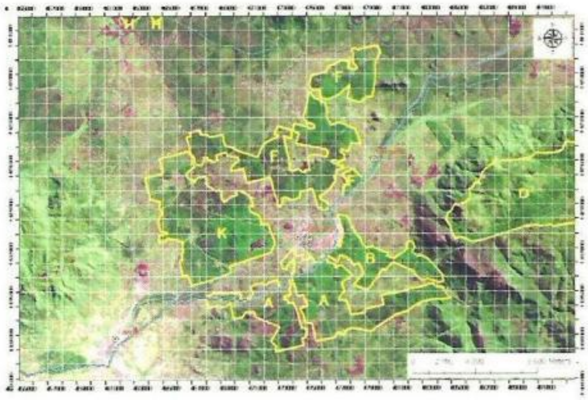
Biomass Survey Note (Every Tree)

Plot ID	Plantation ID	Date	Starting Time	Ending Time	Surveyers
1	B	2011-10-31	13h-13	13h33	Benefora, Julai, Esmelancia

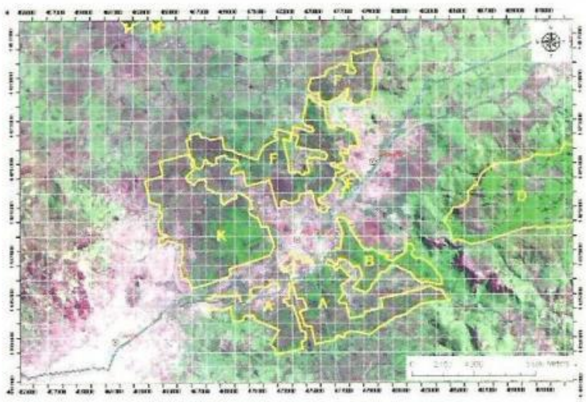
Location Information					
	UTM_X	UTM_Y		UTM_X	UTM_Y
NW Corner 562	047 63 80	85 68 015	NE Corner 564	047 6404	856804
SW Corner 563	04763 86	8568040	SE Corner 565	0476412	8568016
Topography	Flat (circled) · Moderate Slope · Rapid Slope				



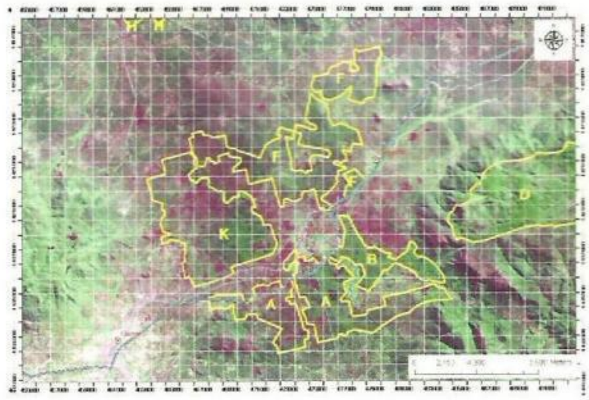
1975/8/28



1990/5/28



2002/8/9



2009/5/16

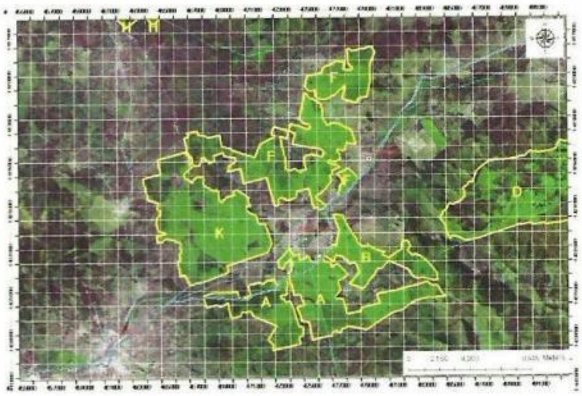
Every Tree Measurement									
No.	Height (m)	DBH (cm)	Species	Memo	No.	Height (m)	DBH (cm)	Species	Memo
1	35	45	Eucalyptus (circled) · Other					Eucalyptus · Other	
2	36	46	Eucalyptus (circled) · Other					Eucalyptus · Other	
3	35	54.5	Eucalyptus (circled) · Other					Eucalyptus · Other	
4	33	44.5	Eucalyptus (circled) · Other					Eucalyptus · Other	
5	35	61,4	Eucalyptus (circled) · Other					Eucalyptus · Other	
6	33	51.2	Eucalyptus (circled) · Other					Eucalyptus · Other	
7			Eucalyptus · Other					Eucalyptus · Other	
			Eucalyptus · Other					Eucalyptus · Other	
			Eucalyptus · Other					Eucalyptus · Other	
			Eucalyptus · Other					Eucalyptus · Other	
			Eucalyptus · Other					Eucalyptus · Other	
			Eucalyptus · Other					Eucalyptus · Other	
			Eucalyptus · Other					Eucalyptus · Other	
			Eucalyptus · Other					Eucalyptus · Other	
			Eucalyptus · Other					Eucalyptus · Other	
			Eucalyptus · Other					Eucalyptus · Other	

N	S	E	W	U	P
309	310	311	312	313	314

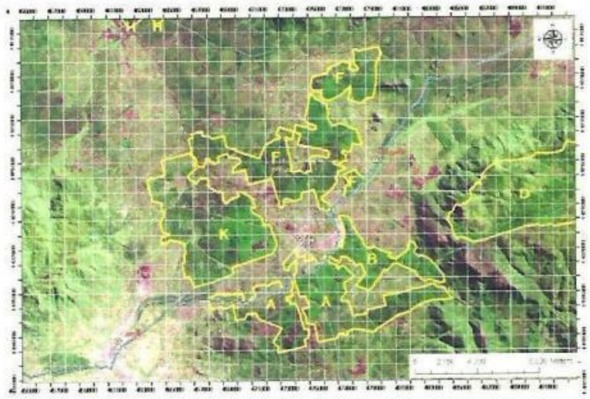
Biomass Survey Note (Simple Timber Volume)

General Information					
Plot ID	Plantation ID	Date	Starting Time	Ending Time	Surveyers
1	B	2011-10-31	13H24 min	13H39m	Julio, Emelâneia, Generosa

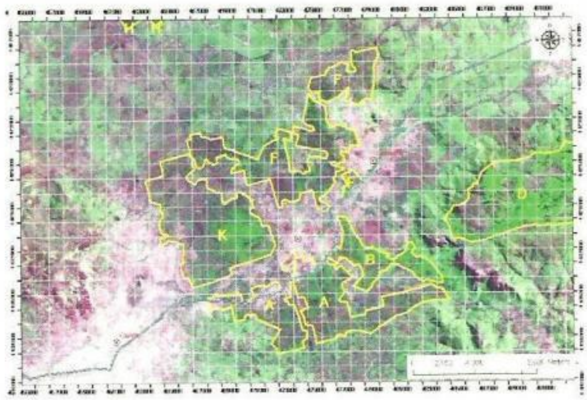
Location Information			
UTM_X 566	047 63 91	UTM_Y	8568 031
Topography	(Flat) · Moderate Slope · Rapid Slope		
Average Height of Upper Story (m)			



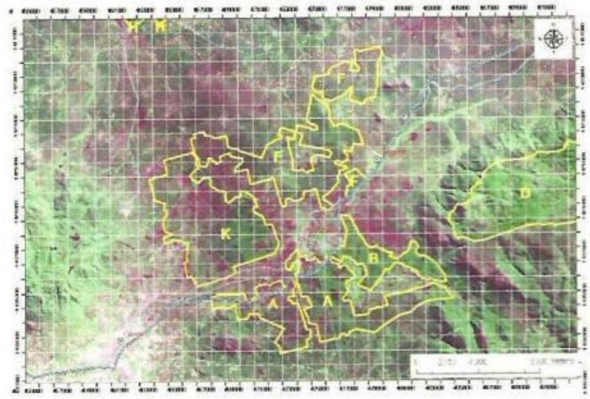
1975/8/28



1990/5/28



2002/8/9



2009/5/16

Bitterlich Method Measurement

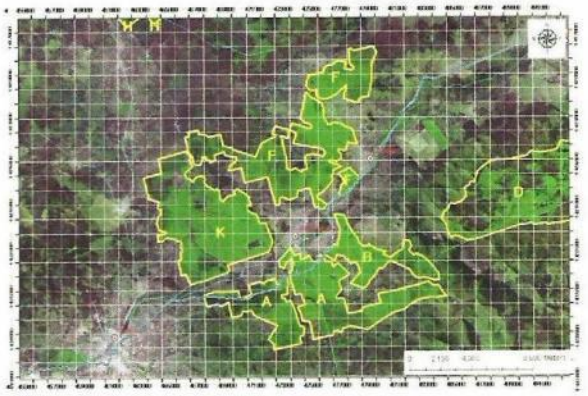
Basal Area Constant (*k*)		Number of Counted Trees	

No.	DBH (cm)	Count	No.	DBH (cm)	Count	No.	DBH (cm)	Count	No.	DBH (cm)	Count
1	41.1	1	17	51.6	1						
2	38.1	0,5	18	56	0,5						
3	41.5	1	19	54.5	1						
4	59.1	1	20	54.2	1						
5	42.1	0,5	21	46	1						
6	52.2	1	22	41.5	1						
7	44.1	1	23	44.1	1						
8	55	1	24	44.5	1						
9	56.6	1	25	61 4	1						
10	42.4	0,5	26	51.2	1						
11	53.9	1									
12	50	1									
13	49.1	1									
14	43.8	1									
15	42.5	0,5									
16	60	1									

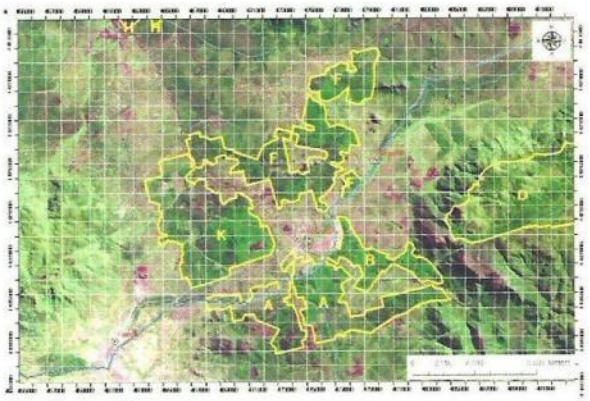
Biomass Survey Note (Simple Timber Volume)

General Information					
Plot ID	Plantation ID	Date	Starting Time	Ending Time	Surveyers
2	B	2011-10-31	13H52	14H5m	Julio, Emelaeus

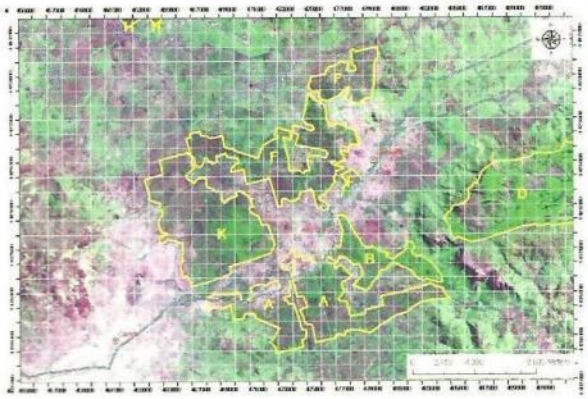
Location Information			
UTM_X 567	047 77 98	UTM_Y	85 67 641
Topography	(Flat) · Moderate Slope · Rapid Slope		
Average Height of Upper Story (m)			



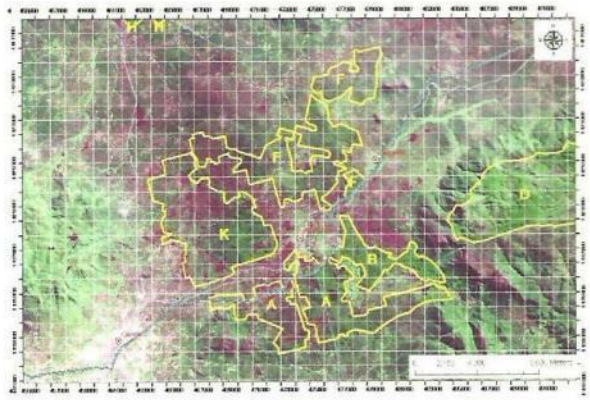
1975/8/28



1990/5/28



2002/8/9



2009/5/16

Bitterlich Method Measurement			
Basal Area Constant (k)		Number of Counted Trees	

No.	DBH (cm)	Count	No.	DBH (cm)	Count	No.	DBH (cm)	Count	No.	DBH (cm)	Count
1	42	1	17	36.4	1						
2	42	0.5									
3	32.4	0.5									
4	45.1	1									
5	28.2	0.5									
6	49.5	1									
7	41.5	1									
8	41.1	1									
9	57.3	1									
10	61	1									
11	65.1	1									
12	56.3	1									
13	41.2	1									
14	46	1									
15	85.2	1									
16	32.8	0.5									

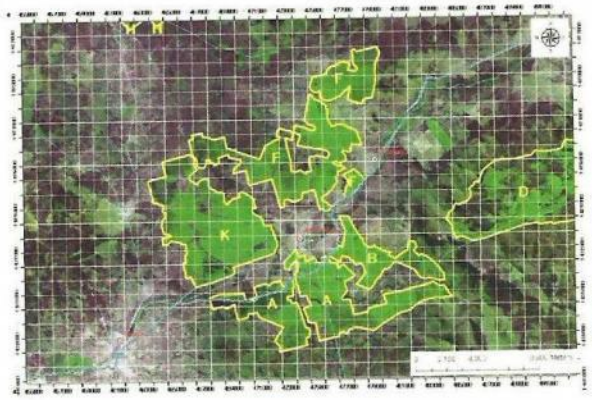
P 31.5 | S 3.16 | G 317 | W 318 | V 360 | P 321

Biomass Survey Note (Every Tree)

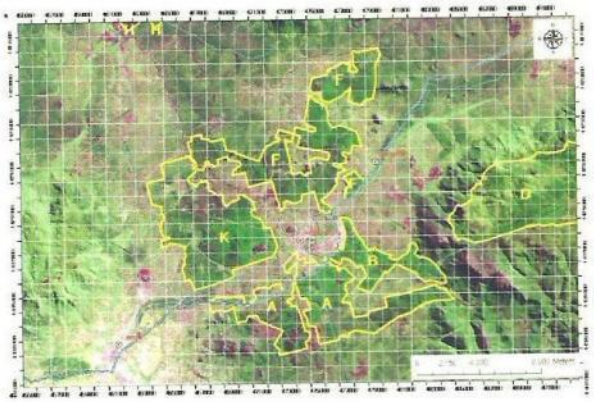
Plot ID	Plantation ID	Date	Starting Time	Ending Time	Surveyers
3	B	2011-10-31	14H10 Min	14H 24min	Julia, Gemma, Estelle

Location Information

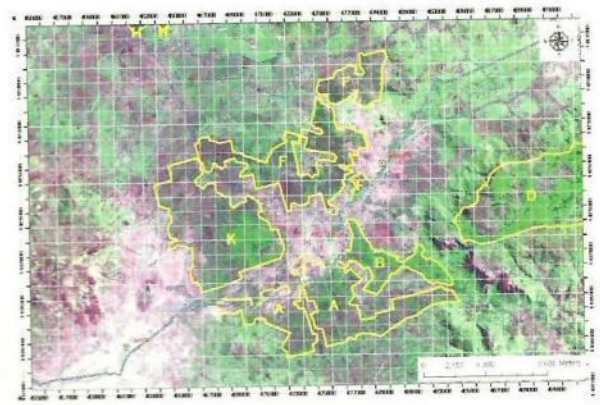
	UTM_X	UTM_Y		UTM_X	UTM_Y
NW Corner568	047 8508	8567370	NE Corner570	0478487	8567394
SW Corner569	0478497	8567366	SE Corner571	0478505	8567396
Topography	(Flat) · Moderate Slope · Rapid Slope				



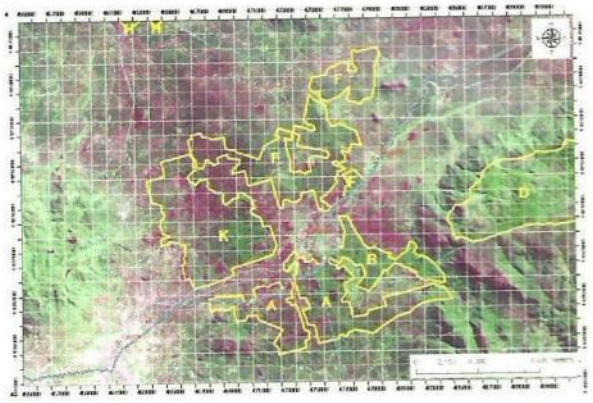
1975/8/28



1990/5/28



2002/8/9



2009/5/16

Every Tree Measurement

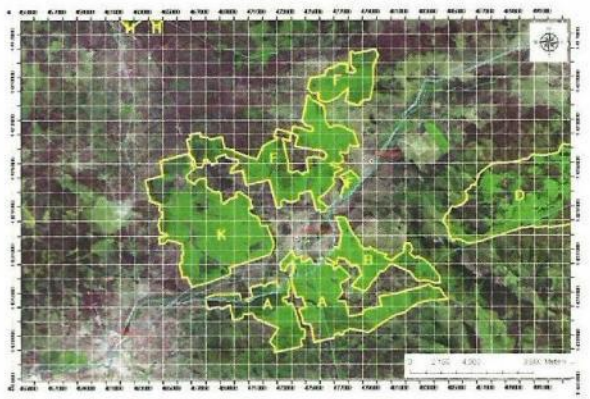
No.	Height (m)	DBH (cm)	Species	Memo	No.	Height (m)	DBH (cm)	Species	Memo
1	39.1	42.1	(Eucalyptus) · Other					Eucalyptus · Other	
2	40	34.5	(Eucalyptus) · Other					Eucalyptus · Other	
3	41	35.4	(Eucalyptus) · Other					Eucalyptus · Other	
4	39	39.8	(Eucalyptus) · Other					Eucalyptus · Other	
5	33	26.9	(Eucalyptus) · Other					Eucalyptus · Other	
6	30	27.9	(Eucalyptus) · Other					Eucalyptus · Other	
7	40.1	69.1	(Eucalyptus) · Other					Eucalyptus · Other	
8	39	44.7	(Eucalyptus) · Other					Eucalyptus · Other	
9	33	44.2	(Eucalyptus) · Other					Eucalyptus · Other	
10	37	36.6	(Eucalyptus) · Other					Eucalyptus · Other	
11	39	28.2	(Eucalyptus) · Other					Eucalyptus · Other	
12	35	33.9	(Eucalyptus) · Other					Eucalyptus · Other	
13	17	21.1	(Eucalyptus) · Other					Eucalyptus · Other	
14	40	37.6	(Eucalyptus) · Other					Eucalyptus · Other	
15			Eucalyptus · Other					Eucalyptus · Other	
16			Eucalyptus · Other					Eucalyptus · Other	

N	S	E	W	O	P
382	383	324	325	326	327

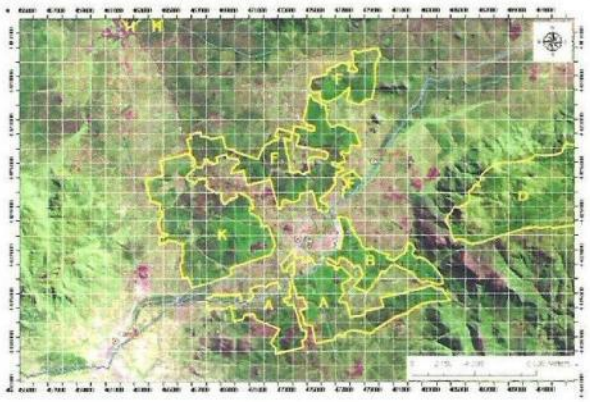
Biomass Survey Note (Simple Timber Volume)

General Information					
Plot ID	Plantation ID	Date	Starting Time	Ending Time	Surveyers
3	B	2011-10-31	14H27min	14H41min	Julia, [illegible]

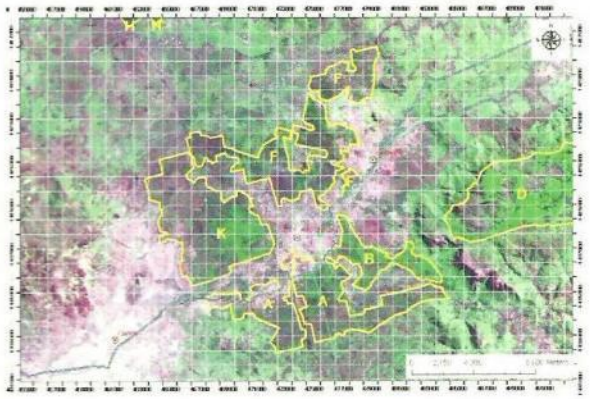
Location Information			
UTM_X 572	0478508	UTM_Y	8567370
Topography	(Flat) · Moderate Slope · Rapid Slope		
Average Height of Upper Story (m)			



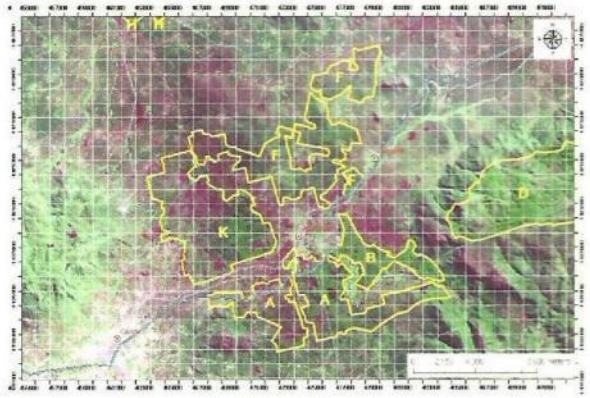
1975/8/28



1990/5/28



2002/8/9



2009/5/16

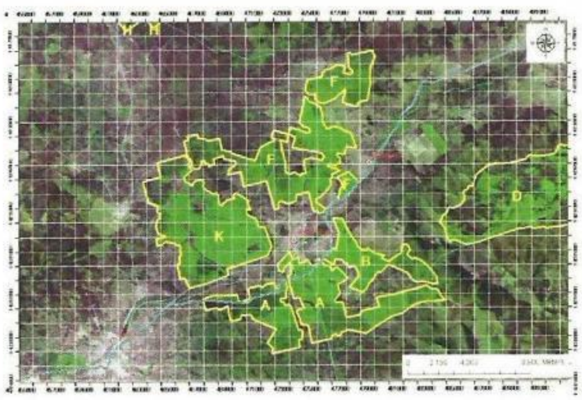
Bitterlich Method Measurement			
Basal Area Constant (k)		Number of Counted Trees	

No.	DBH (cm)	Count	No.	DBH (cm)	Count	No.	DBH (cm)	Count	No.	DBH (cm)	Count
1	65.2	1	17	26.8	1						
2	29.8	1	18	27.5	1						
3	32.1	1	19	62.1	1						
4	45.2	1	20	44.2	1						
5	40.8	1	21	24.2	0.5						
6	34.5	1	22	72.2	0.5						
7	28.3	0.5	23	28.9	0.5						
8	31.1	0.5	24	57.2	1						
9	39.1	1									
10	35.1	1									
11	23	0.5									
12	40.3	1									
13	40	0.5									
14	39.8	1									
15	65.9	1									
16	78.6	0.5									

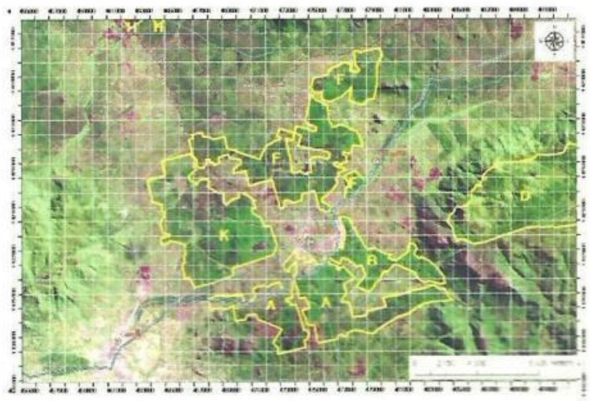
Biomass Survey Note (Simple Timber Volume)

General Information					
Plot ID	Plantation ID	Date	Starting Time	Ending Time	Surveyers
1	B	2011-10-31	14H48	15H00	Julio, Simelanas, ...

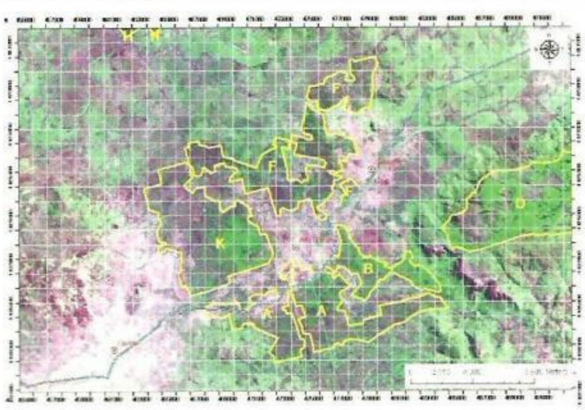
Location Information			
UTM_X 573	047 95 34	UTM_Y	8567015
Topography	(Flat) · Moderate Slope · Rapid Slope		
Average Height of Upper Story (m)			



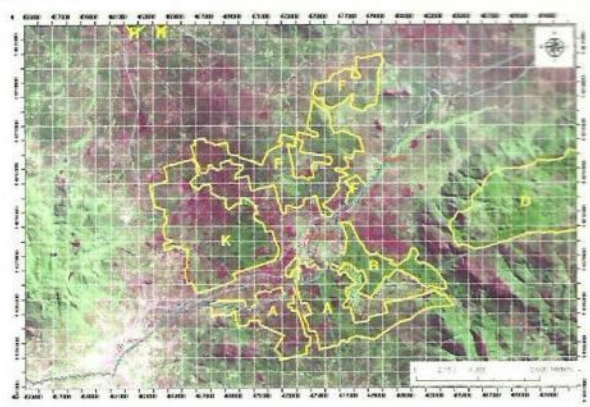
1975/8/28



1990/5/28



2002/8/9



2009/5/16

Bitterlich Method Measurement			
Basal Area Constant (k)		Number of Counted Trees	

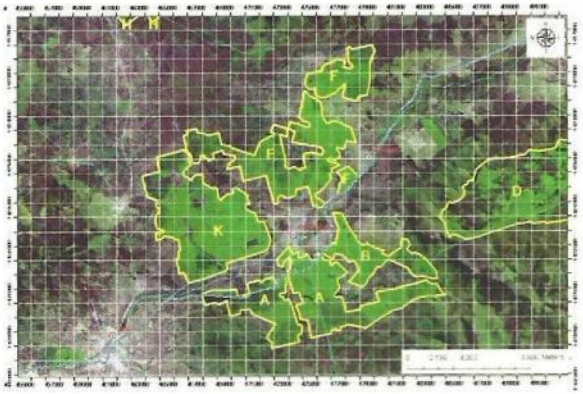
No.	DBH (cm)	Count	No.	DBH (cm)	Count	No.	DBH (cm)	Count	No.	DBH (cm)	Count
1	40.3	1	17	33.5	0.5						
2	52.9	1	18	37.1	1						
3	65.2	1	19	42.6	1						
4	48.5	1	20	42.3	1						
5	66.2	1	21	47.3	1						
6	43.1	1	22	41.1	1						
7	46.3	1									
8	26.8	1									
9	44.5	1									
10	74.1	1									
11	55.2	1									
12	56.3	1									
13	45.2	1									
14	44.8	1									
15	48.3	1									
16	77.1	1									

N 328 | S 329 | E 330 | W 331 | U 332 | T 333

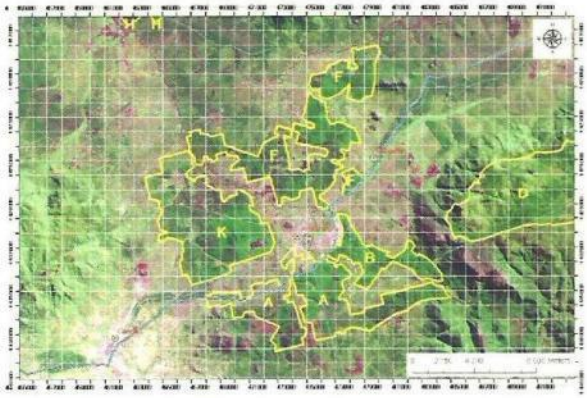
Biomass Survey Note (Simple Timber Volume)

General Information					
Plot ID	Plantation ID	Date	Starting Time	Ending Time	Surveyers
5	B	2011-10-31	15時7分	15時49分	Jiro, [illegible]

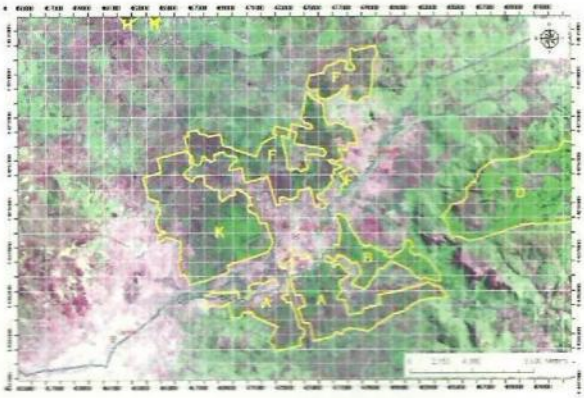
Location Information			
UTM_X 574	0480005	UTM_Y	8566980
Topography	(Flat) · Moderate Slope · Rapid Slope		
Average Height of Upper Story (m)			



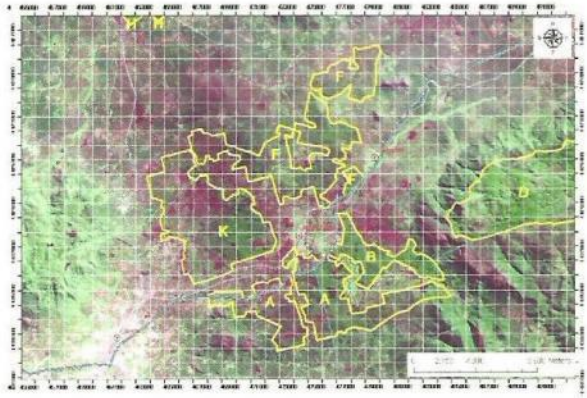
1975/8/28



1990/5/28



2002/8/9



2009/5/16

Bitterlich Method Measurement			
Basal Area Constant (k)		Number of Counted Trees	

No.	DBH (cm)	Count	No.	DBH (cm)	Count	No.	DBH (cm)	Count	No.	DBH (cm)	Count
1	11.2	1	17	17.8	1						
2	11.1	1	18	18.2	1						
3	8.6	0.5	19	13.1	0.5						
4	17.8	1	20	32.6	1						
5	11.6	1	21	16.6	1						
6	11.7	1	22	17.7	1						
7	9.5	0.5	23	7	0.5						
8	8.2	0.5	24	9	0.5						
9	11.1	1									
10	13.4	1									
11	21.1	1									
12	14.4	1									
13	11.2	0.5									
14	28.2	1									
15	17	1									
16	19	1									

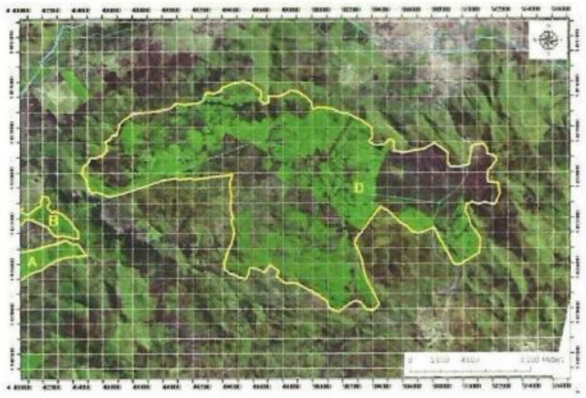
N	S	E	W	O	P
334	335	336	337	338	339

D - Project

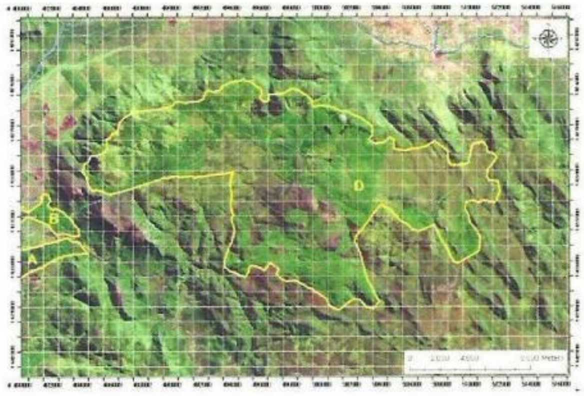
Biomass Survey Note (Simple Timber Volume)

General Information					
Plot ID	Plantation ID	Date	Starting Time	Ending Time	Surveyers
6	D	2011-10-1	12.H 9	12.H 17	Julio, Ermelinda, Gimeno

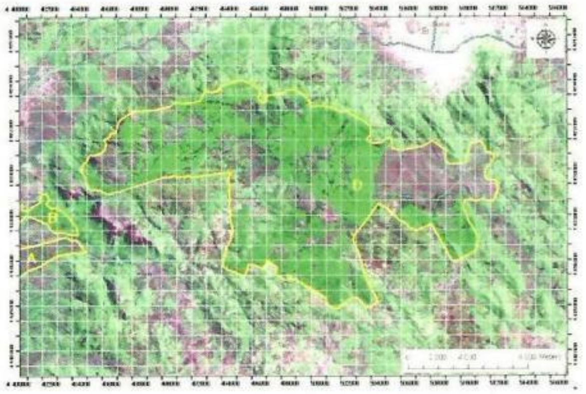
Location Information			
UTM_X 593	0494330	UTM_Y	8571819
Topography	Flat ・ (Moderate Slope) ・ Rapid Slope		
Average Height of Upper Story (m)			



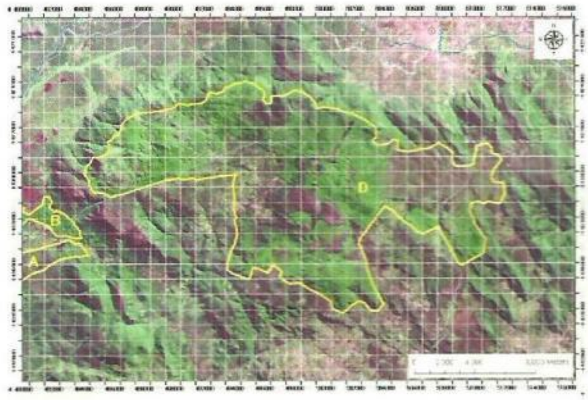
1975/8/28



1990/5/28



2002/8/9



2009/5/16

Bitterlich Method Measurement

Basal Area Constant (*k*)		Number of Counted Trees	

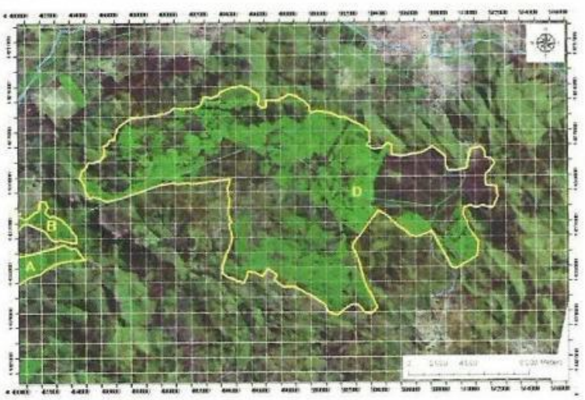
No.	DBH (cm)	Count	No.	DBH (cm)	Count	No.	DBH (cm)	Count	No.	DBH (cm)	Count
1	16.2	1	17	13.4	1						
2	10.4	1	18	8.5	0,5						
3	10.5	1	19	11.6	1						
4	10.9	1	20	8.9	1						
5	11	1	21	11.2	2						
6	9.4	1	22	12.8	1						
7	10.9	1	23	13	1						
8	12	1	24	10.3	1						
9	11.2	1	25	6.6	0.5						
10	9.2	1	26	11.2	1						
11	11.4	1									
12	13.1	1									
13	9	0,5									
14	10.6	0,5									
15	9.5	1									
16	12.1	1									

N E S W U P

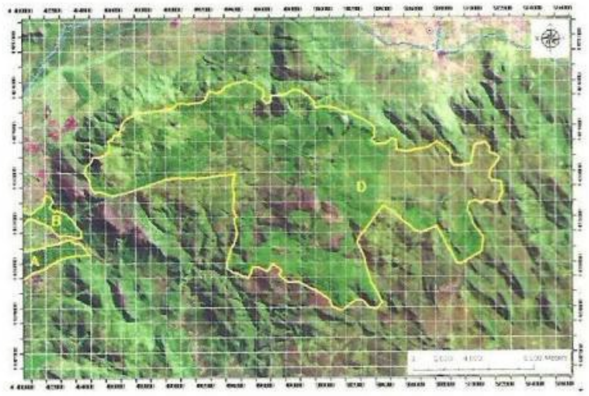
Biomass Survey Note (Every Tree)

General Information					
Plot ID	Plantation ID	Date	Starting Time	Ending Time	Surveyers
6	D	2011-11-1	11H50	12H8	Julio, Ameldonica, Generosa

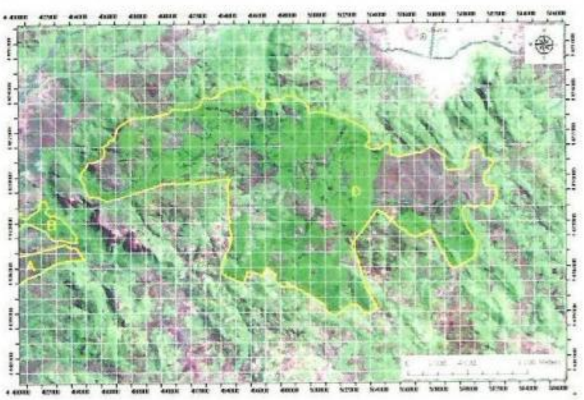
Location Information					
	UTM_X	UTM_Y		UTM_X	UTM_Y
NW Corner 529	0494327	8571829	NE Corner 531	0494349	8571826
SW Corner 530	0494343	8571840	SE Corner 532	0494335	8571819
Topography 530	Flat · (Moderate Slope) · Rapid Slope				



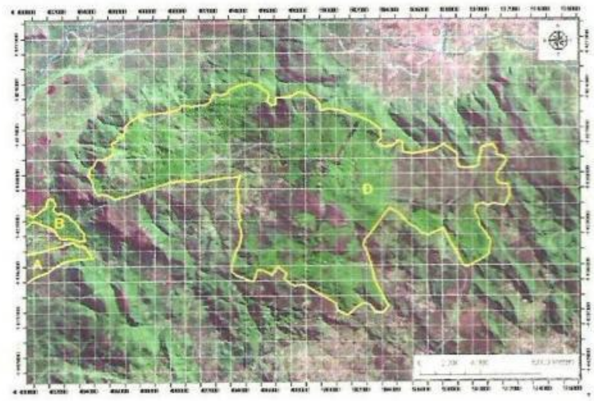
1975/8/28



1990/5/28



2002/8/9



2009/5/16

Every Tree Measurement

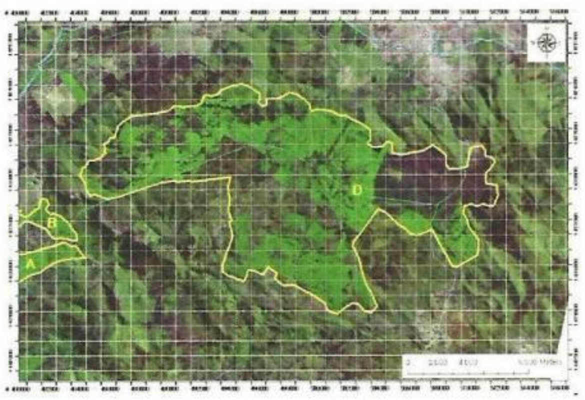
No.	Height (m)	DBH (cm)	Species	Memo	No.	Height (m)	DBH (cm)	Species	Memo
1	6	10.4	Eucalyptus · (Other)		17	6	9.5	Eucalyptus · (Other)	
2	6	16	Eucalyptus · (Other)		18	7	13.5	Eucalyptus · (Other)	
3	6	9.3	Eucalyptus · (Other)		19	5	8	Eucalyptus · (Other)	
4	7	12.2	Eucalyptus · (Other)		20	6	11.7	Eucalyptus · (Other)	
5	5	7.2	Eucalyptus · (Other)		21	5	8	Eucalyptus · (Other)	
6	6	11	Eucalyptus · (Other)		22	6	12	Eucalyptus · (Other)	
7	3	5	Eucalyptus · (Other)		23	6	9.1	Eucalyptus · (Other)	
8	7	12.6	Eucalyptus · (Other)		24	7	9	Eucalyptus · (Other)	
9	7	12.6	Eucalyptus · (Other)		25	7	10.5	Eucalyptus · (Other)	
10	6	10	Eucalyptus · (Other)		26	7	8	Eucalyptus · (Other)	
11	6	9	Eucalyptus · (Other)		27	5	14	Eucalyptus · (Other)	
12	7	13	Eucalyptus · (Other)		28	4	5.3	Eucalyptus · (Other)	
13	6	15	Eucalyptus · (Other)		29	6	5.8	Eucalyptus · (Other)	
14	7	15.2	Eucalyptus · (Other)		30	7	10.7	Eucalyptus · (Other)	
15	6	13.4	Eucalyptus · (Other)		31	7	12.2	Eucalyptus · (Other)	
16	7	8	Eucalyptus · (Other)		32	6	10.6	Eucalyptus · (Other)	

N	E	S	W	U	P
370	371	372	373	25 ~~374~~	26 ~~375~~

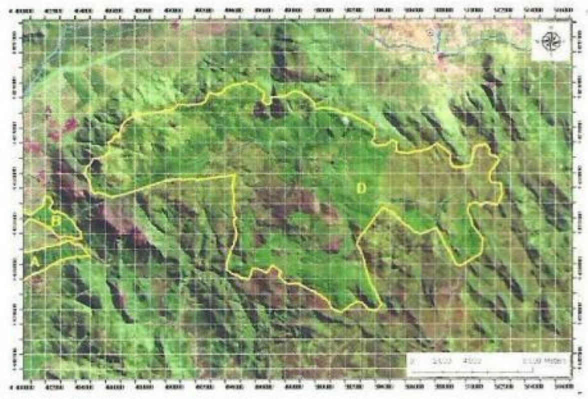
Biomass Survey Note (Simple Timber Volume)

General Information					
Plot ID	Plantation ID	Date	Starting Time	Ending Time	Surveyers
5	D	2011-11-1	11:33 Min	11:44 Min	Julio, Bennon, Ermelanci

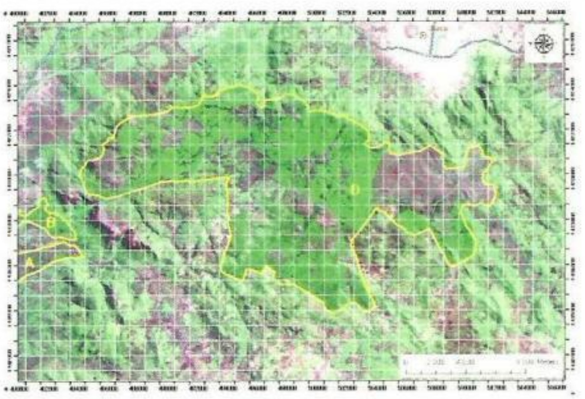
Location Information			
UTM_X 588	0495265	UTM_Y	8573003
Topography	Flat · (Moderate Slope) · Rapid Slope		
Average Height of Upper Story (m)			



1975/8/28



1990/5/28



2002/8/9

2009/5/16

Bitterlich Method Measurement			
Basal Area Constant (*k*)		Number of Counted Trees	

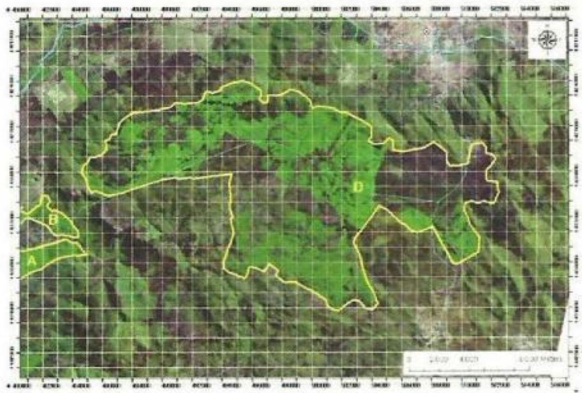
No.	DBH (cm)	Count	No.	DBH (cm)	Count	No.	DBH (cm)	Count	No.	DBH (cm)	Count
1	35.8	1	17	67	1						
2	23	0,5	18	39.5	1						
3	45	1	19	26.3	0,5						
4	43	1	20	28.2	1						
5	28	1	21	39.3	1						
6	23	1	22	44	1						
7	30.8	1	23	54	1						
8	42	1	24	66	1						
9	27.5	1									
10	39.8	1									
11	26	0,5									
12	25,5	0,5									
13	20	1									
14	35	1									
15	30	1									
16	22.5	1									

N	E	S	W	U	P
364	365	366	367	368	369

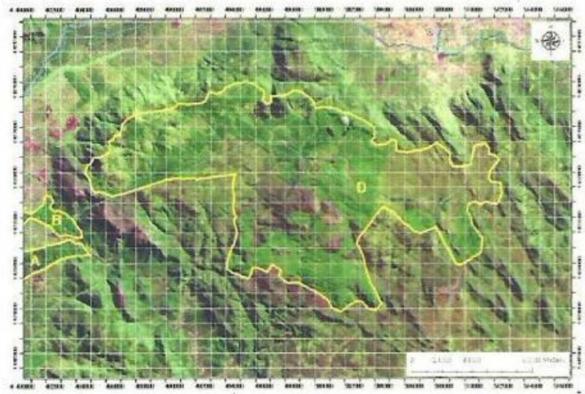
Biomass Survey Note (Simple Timber Volume)

General Information					
Plot ID	Plantation ID	Date	Starting Time	Ending Time	Surveyers
3	D	2011-10-1	10 35 Min	10.43	Julio, Generosa, Emilia Blanca

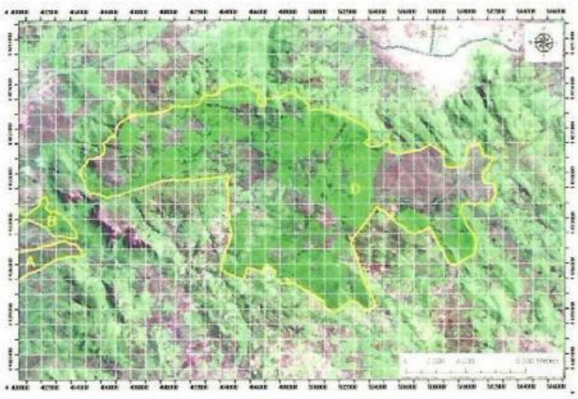
Location Information			
UTM_X 582	0497462	UTM_Y	8571632
Topography	Flat · (Moderate Slope) · Rapid Slope		
Average Height of Upper Story (m)			



1975/8/28



1990/5/28



2002/8/9

2009/5/16

Bitterlich Method Measurement			
Basal Area Constant (k)		Number of Counted Trees	

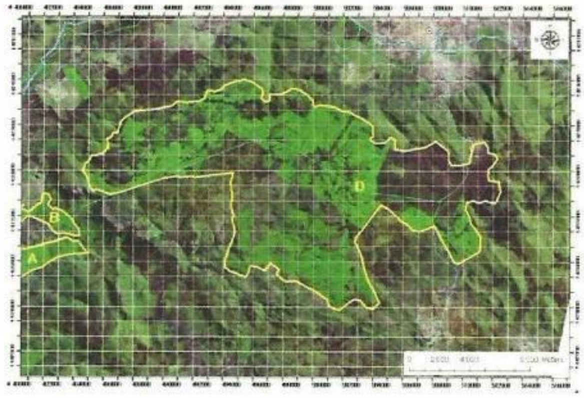
No.	DBH (cm)	Count	No.	DBH (cm)	Count	No.	DBH (cm)	Count	No.	DBH (cm)	Count
1	16	0,5	17	24	1						
2	36.6	1	18	31	1						
3	35	1	19	26.8	1						
4	23	0,5	20	26	1						
5	37,3	1	21	29	1						
6	13,6	0,5	22	22	0,5						
7	19,8	1									
8	25	1									
9	19	1									
10	25.3	1									
11	35.3	1									
12	30	1									
13	20	0,5									
14	24	1									
15	29	1									
16	28	1									

N	E	S	W	U	P

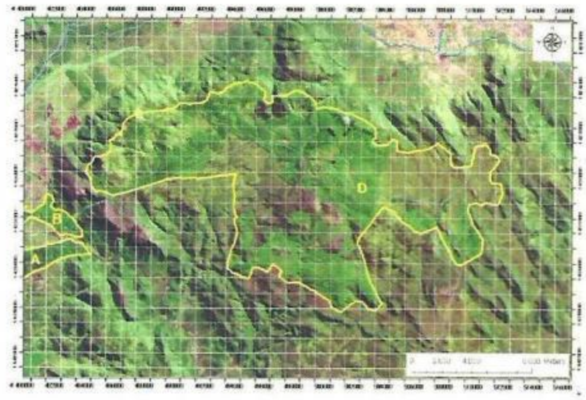
Biomass Survey Note (Simple Timber Volume)

General Information					
Plot ID	Plantation ID	Date	Starting Time	Ending Time	Surveyers
4	D	2011-11-1	11. 12 Min		[illegible]

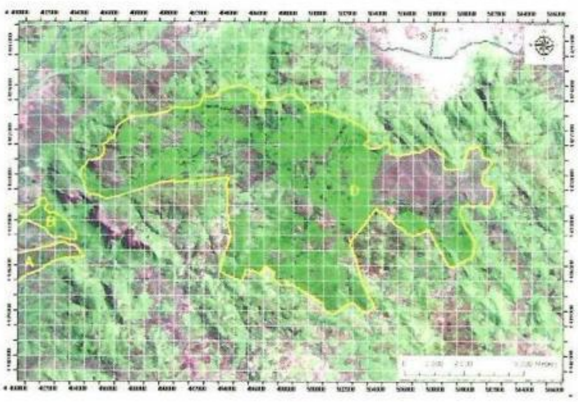
Location Information			
UTM_X 587	049 63 59	UTM_Y	8571913
Topography	Flat · (Moderate Slope) · Rapid Slope		
Average Height of Upper Story (m)			



1975/8/28



1990/5/28



2002/8/9

2009/5/16

Bitterlich Method Measurement			
Basal Area Constant (k)		Number of Counted Trees	

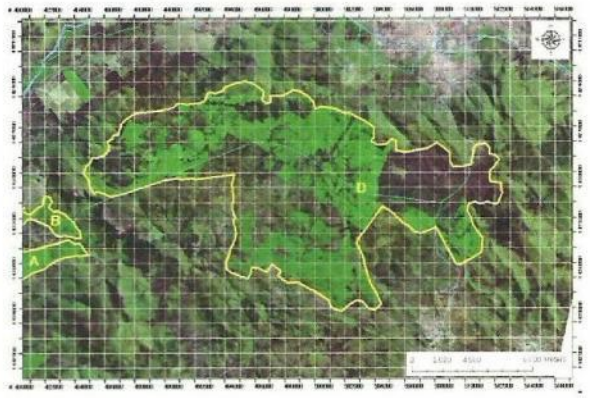
No.	DBH (cm)	Count	No.	DBH (cm)	Count	No.	DBH (cm)	Count	No.	DBH (cm)	Count
1	36	1	17	54	1						
2	22	0,5	18	28	0,5						
3	27,3	1	19	50	1						
4	58.2	1	20	539	1						
5	33	1	21	61	1						
6	36	1	22	40.5	1						
7	51	1	23	50.2	1						
8	71	1									
9	42	1									
10	60.8	1									
11	55.2	1									
12	46.2	1									
13	35.2	1									
14	25	0,5									
15	23	0,5									
16	25	1									

N	E	S	W	U	P

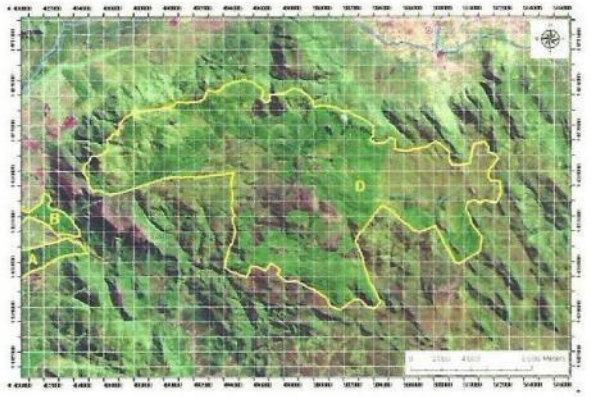
Biomass Survey Note (Every Tree)

General Information					
Plot ID	Plantation ID	Date	Starting Time	Ending Time	Surveyers
4	D	2011-11-1	11:01	11:10	Geneva, Esmeralda, Julio

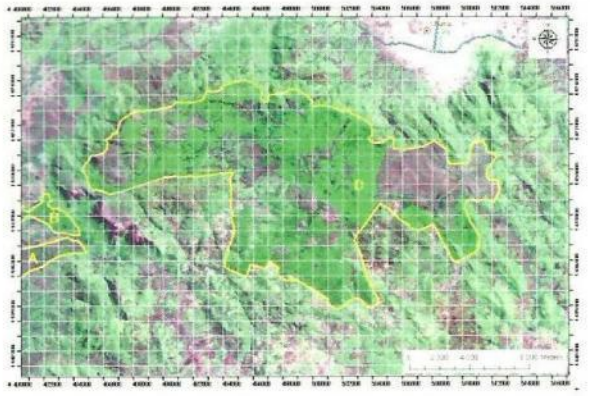
Location Information					
	UTM_X	UTM_Y		UTM_X	UTM_Y
NW Corner 583	0496341	8571919	NE Corner 585	0496360	8571900
SW Corner 584	0496342	8571904	SE Corner 586	0496364	8571917
Topography ~~585~~	~~0496360~~	Flat · Moderate Slope · Rapid Slope			



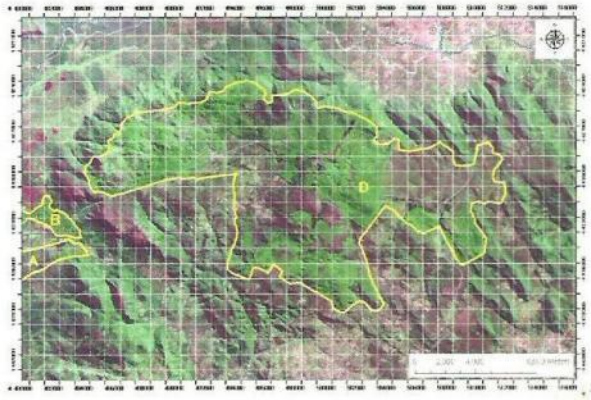
1975/8/28



1990/5/28



2002/8/9



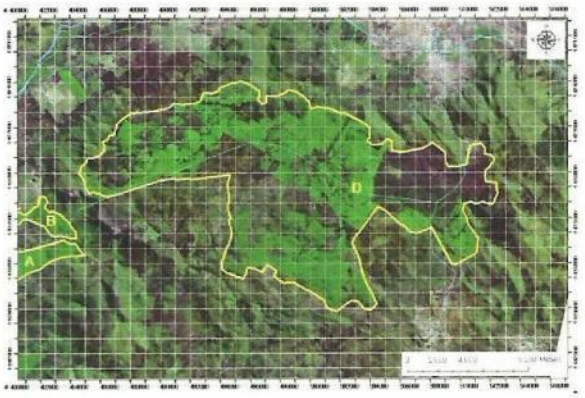
2009/5/16

Every Tree Measurement									
No.	Height (m)	DBH (cm)	Species	Memo	No.	Height (m)	DBH (cm)	Species	Memo
1	34	33.5	Eucalyptus · Other		17	19	12	Eucalyptus · Other	
2	35	25	Eucalyptus · Other		18	40	61	Eucalyptus · Other	
3	40	24.8	Eucalyptus · Other		19	30	27.5	Eucalyptus · Other	
4	37	25.2	Eucalyptus · Other		20	35	30.9	Eucalyptus · Other	
5	23	17.3	Eucalyptus · Other		21	40	66	Eucalyptus · Other	
6	38	33.6	Eucalyptus · Other		22	39	464	Eucalyptus · Other	
7	27	25.7	Eucalyptus · Other		23	38	24	Eucalyptus · Other	
8	40	31.5	Eucalyptus · Other		24	39	54	Eucalyptus · Other	
9	30	14	Eucalyptus · Other		25	39	51	Eucalyptus · Other	
10	14	16.7	Eucalyptus · Other					Eucalyptus · Other	
11	40	50.5	Eucalyptus · Other					Eucalyptus · Other	
12	40	40	Eucalyptus · Other					Eucalyptus · Other	
13	40.1	54	Eucalyptus · Other					Eucalyptus · Other	
14	39	15.5	Eucalyptus · Other					Eucalyptus · Other	
15	38	23	Eucalyptus · Other					Eucalyptus · Other	
16	30	19	Eucalyptus · Other					Eucalyptus · Other	
N		E	S	W		V	P		
358		359	360	361		362	363		

Biomass Survey Note (Every Tree)

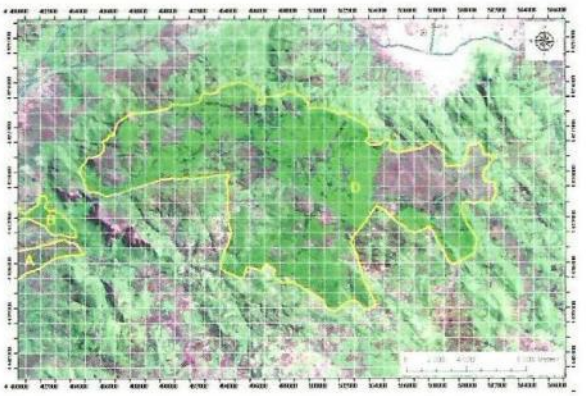
General Information					
Plot ID	Plantation ID	Date	Starting Time	Ending Time	Surveyers
3	D	2011	10H30	10H	Julio, Gerardo, Estefanía

Location Information					
	UTM_X	UTM_Y		UTM_X	UTM_Y
NW Corner (530)	0497163	8571649	NE Corner (529)	0497470	8571614
SW Corner (532)	0497173	8571650	SE Corner (531)	0497453	8571615
Topography	Flat · (Moderate Slope) · Rapid Slope				

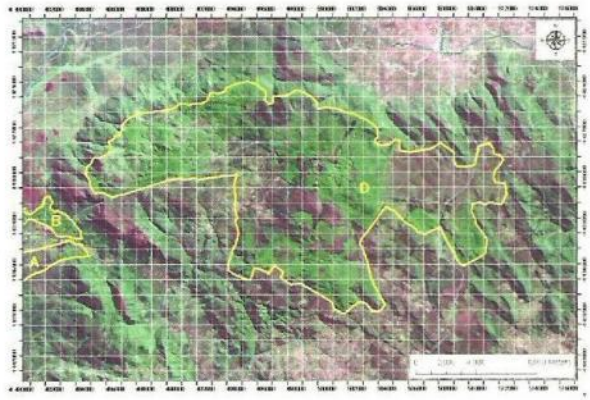


1975/8/28

1990/5/28



2002/8/9



2009/5/16

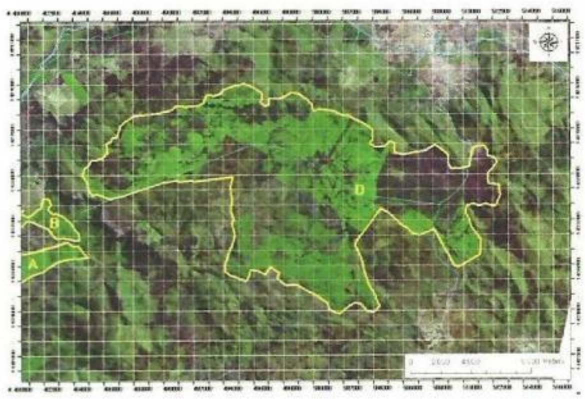
Every Tree Measurement									
No.	Height (m)	DBH (cm)	Species	Memo	No.	Height (m)	DBH (cm)	Species	Memo
1	37.	35.3	(Eucalyptus) · Other		17	19.5	20.8	(Eucalyptus) · Other	
2	25	16.7	(Eucalyptus) · Other		18		15	(Eucalyptus) · Other	
3	30	34	(Eucalyptus) · Other		19		12.5	(Eucalyptus) · Other	
4	30.1	28	(Eucalyptus) · Other		20		35.5	(Eucalyptus) · Other	
5	29.8	28.6	(Eucalyptus) · Other		21		31	(Eucalyptus) · Other	
6	27.9	27.2	(Eucalyptus) · Other		22		25.5	(Eucalyptus) · Other	
7	28.2	28.1	(Eucalyptus) · Other		23		26.	(Eucalyptus) · Other	
8		20.5	(Eucalyptus) · Other		24		29.5	(Eucalyptus) · Other	
9		13.1	(Eucalyptus) · Other		25		16.3	(Eucalyptus) · Other	
10		15.8	(Eucalyptus) · Other		26		30.5	(Eucalyptus) · Other	
11		21	(Eucalyptus) · Other		27		39.1	(Eucalyptus) · Other	
12		37.2	(Eucalyptus) · Other		28		29	(Eucalyptus) · Other	
13		24.2	(Eucalyptus) · Other		29		23.5	(Eucalyptus) · Other	
14		23.1	(Eucalyptus) · Other		30		28.8	(Eucalyptus) · Other	
15		22.4	(Eucalyptus) · Other		31		28	(Eucalyptus) · Other	
16		15	(Eucalyptus) · Other		32		21	(Eucalyptus) · Other	

N	E	S	W	U	P
352	354	353	355	356	357

Biomass Survey Note (Simple Timber Volume)

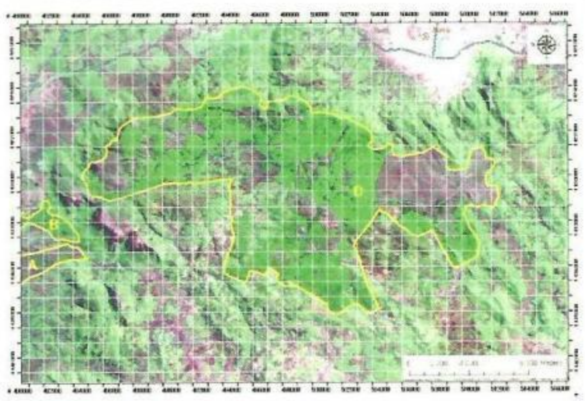
General Information					
Plot ID	Plantation ID	Date	Starting Time	Ending Time	Surveyers
2	1	2011-10-11	9H48 min	10H00	Julio, Ermelanda, [illegible]

Location Information			
UTM_X	576 0500 286	UTM_Y	8565922
Topography	(Flat) · Moderate Slope · Rapid Slope		
Average Height of Upper Story (m)			

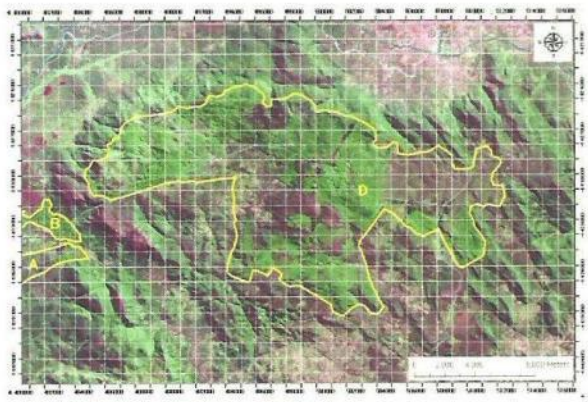


1975/8/28

1990/5/28



2002/8/9



2009/5/16

Bitterlich Method Measurement			
Basal Area Constant (k)		Number of Counted Trees	

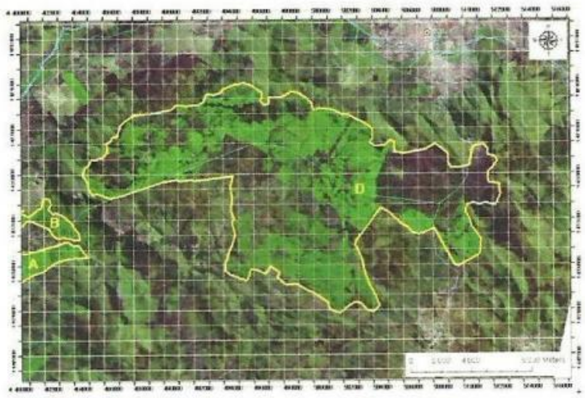
No.	DBH (cm)	Count	No.	DBH (cm)	Count	No.	DBH (cm)	Count	No.	DBH (cm)	Count
1	51	1	17	38.7	1						
2	37.2	1	18	32	1						
3	32.4	1	19	46.2	1						
4	27.6	0.5	20	38	1						
5	33.2	1	21								
6	46.3	1									
7	30	0.5									
8	23	0.5									
9	22	0.5									
10	35.9	1									
11	48.2	1									
12	39	1									
13	52.1	1									
14	42.3	1									
15	35.5	1									
16	30.3	1									

N	E	S	W	V	P
341	347	348	349	350	351

Biomass Survey Note (Simple Timber Volume)

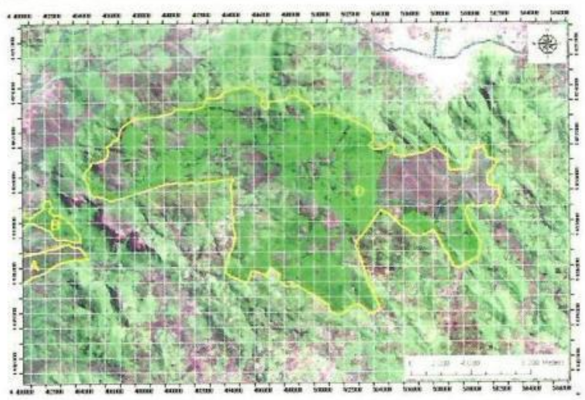
General Information					
Plot ID	Plantation ID	Date	Starting Time	Ending Time	Surveyers
1	D	2011-10-1	8.50	9H9MN	Júlio, Emiliano, Tinerosa

Location Information			
UTM_X	575 0508408	UTM_Y	8573157
Topography	Flat · Moderate Slope · (Rapid Slope)		
Average Height of Upper Story (m)			



1975/8/28

1990/5/28



2002/8/9

2009/5/16

Bitterlich Method Measurement			
Basal Area Constant (k)		Number of Counted Trees	

No.	DBH (cm)	Count	No.	DBH (cm)	Count	No.	DBH (cm)	Count	No.	DBH (cm)	Count
1	12,9	1	17	7.3	1						
2	9,8	0,5	18	7.2	0,5						
3	7.3	1	19	6.2	0,5						
4	6.6	1	20	7.7	1						
5	12.9	1	21	7.1	1						
6	7.1	0,5	22	12.6	1						
7	6.4	0,5	23	9.3	1						
8	8.5	1	24	8.8	1						
9	5.8	0,5	25	6	0,5						
10	9.1	1	26	7.1	1						
11	7.8	0,5									
12	7.1	1									
13	6.7	0,5									
14	5.6	1									
15	8	1									
16	7.8	1									

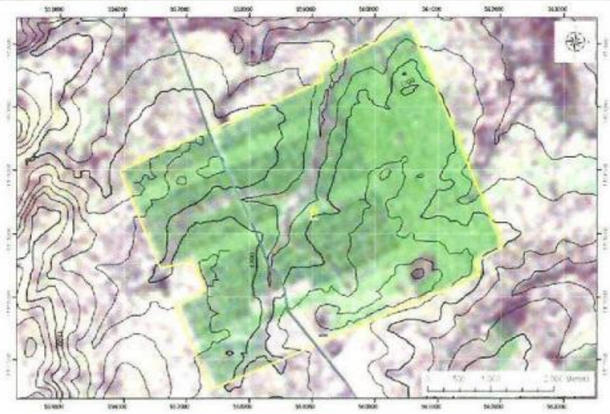
N	E	S	W	U	P
340	341	342	343	344	345

E - Project

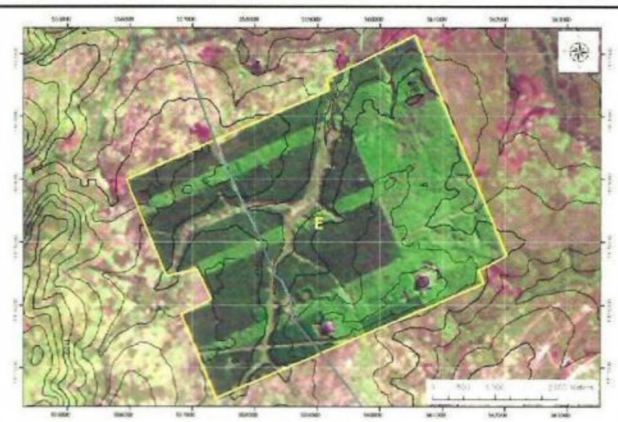
Biomass Survey Note (Simple Timber Volume)

General Information					
Plot ID	Plantation ID	Date	Starting Time	Ending Time	Surveyers
3	E	2011-11-02	7H06	7H 26mn.	Júlio, Emelânia, Generoso

Location Information			
UTM_X 604	0558168	UTM_Y	8584933
Topography	(Flat) · Moderate Slope · Rapid Slope		
Average Height of Upper Story (m)			



1975/8/28



1990/5/28

2002/8/9

2009/5/16

Bitterlich Method Measurement			
Basal Area Constant (*k*)		Number of Counted Trees	

No.	DBH (cm)	Count	No.	DBH (cm)	Count	No.	DBH (cm)	Count	No.	DBH (cm)	Count
1	54.1	1	17	36	0,5						
2	67.5	1	18	51.3	1						
3	62.6	1	19	55.2	1						
4	64.7	1	20	73.7	1						
5	44.1	1	21	57.7	1						
6	54.2	1	22	45.2	1						
7	53.6	1	23	68.3	1						
8	46	1	24	55.3	1						
9	68.8	1	25	35.3	0,5						
10	49.6	1									
11	47.2	1									
12	61.5	1									
13	47.1	0,5									
14	48.5	1									
15	60	1									
16	56.6	1									

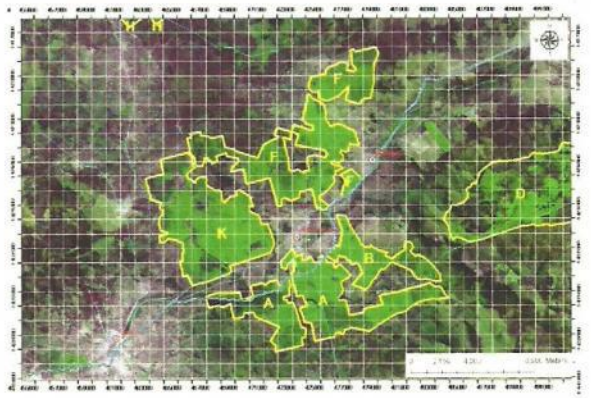
N	E	S	W	U	P
654	655	656	657	658	659

F - Babayera

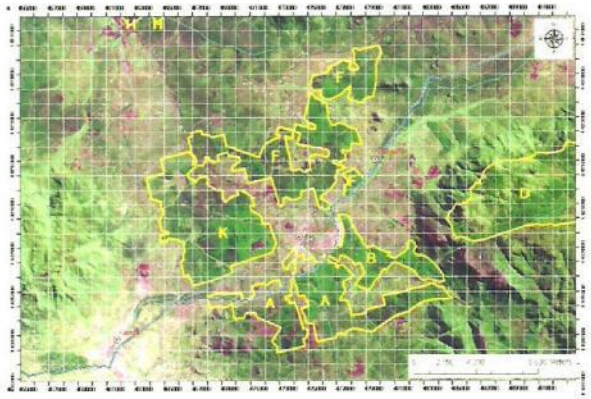
Biomass Survey Note (Simple Timber Volume)

General Information					
Plot ID	Plantation ID	Date	Starting Time	Ending Time	Surveyers
12	F	2011-10-3[illegible]	8h 25m	8H 40Min.	Julio, [illegible] Genaro

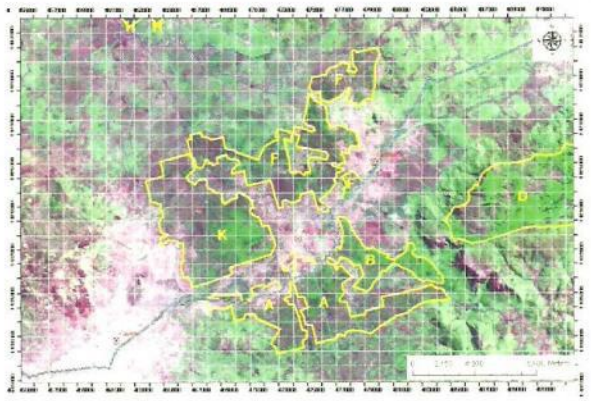
Location Information			
UTM_X 53[illegible]	0579916	UTM_Y	8585670
Topography	(Flat) · Moderate Slope · Rapid Slope		
Average Height of Upper Story (m)			



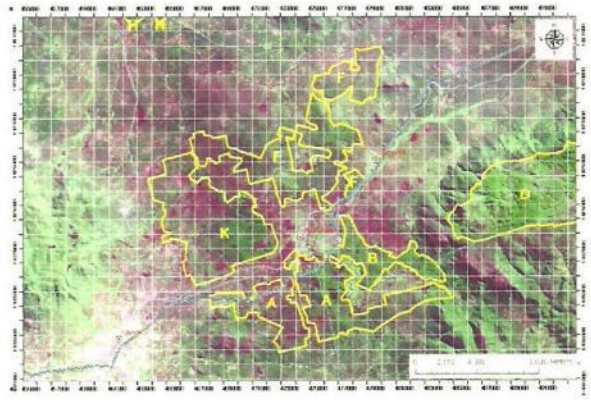
1975/8/28



1990/5/28



2002/8/9



2009/5/16

Bitterlich Method Measurement			
Basal Area Constant (k)		Number of Counted Trees	

No.	DBH (cm)	Count	No.	DBH (cm)	Count	No.	DBH (cm)	Count	No.	DBH (cm)	Count
1	55.1	1	17	44.2	1						
2	35.6	0.5	18	50.1	1						
3	33.9	0.5	19	43.2	1						
4	31	1	20	31.6	1						
5	37.4	1	21	43.6	1						
6	37.4	1	22	29.5	1						
7	43.5	1									
8	41.4	1									
9	32.8	0.5									
10	26.4	0.5									
11	51.9	1									
12	40.7	1									
13	39.6	1									
14	40.6	1									
15	27.5	0.5									
16	66.1	1									

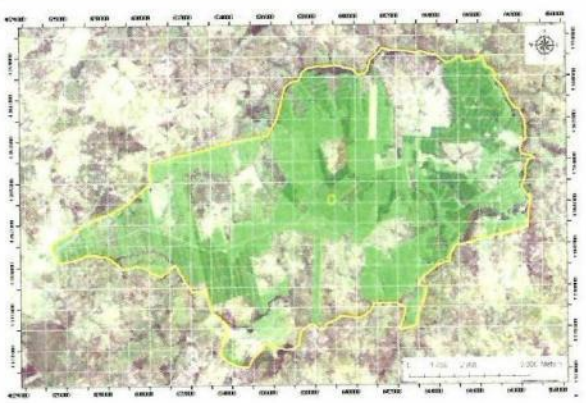
N	S	E	W	V	P
273	274	275	276	277	278

G - Project

Biomass Survey Note (Simple Timber Volume)

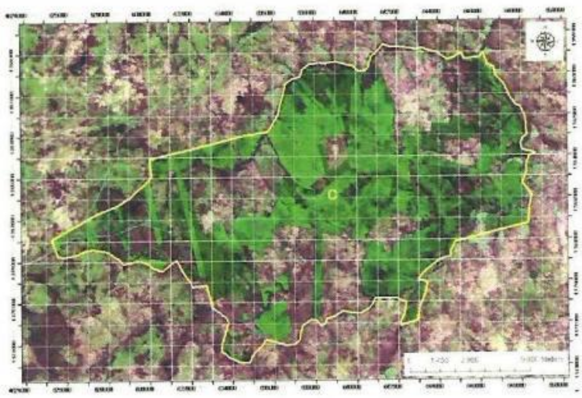
General Information					
Plot ID	Plantation ID	Date	Starting Time	Ending Time	Surveyers
1	G	2011-11-1	14H 28	14H38	[illegible]

Location Information			
UTM_X	0505924	UTM_Y	8596015
Topography	Flat · Moderate Slope · (Rapid Slope)		
Average Height of Upper Story (m)			

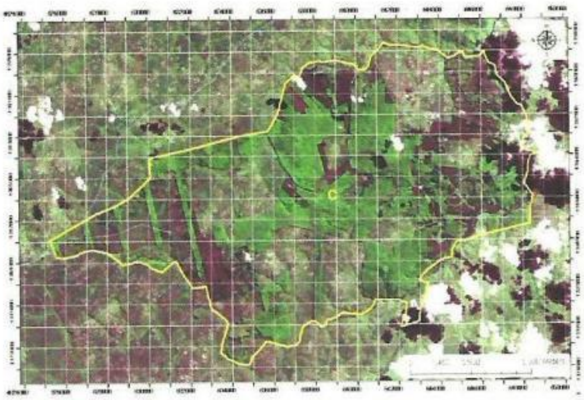


1975/8/28

1990/5/28



2002/8/9



2009/5/16

Bitterlich Method Measurement			
Basal Area Constant (*k*)		Number of Counted Trees	

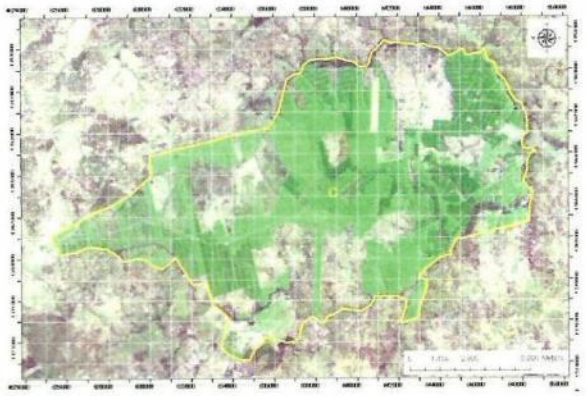
No.	DBH (cm)	Count	No.	DBH (cm)	Count	No.	DBH (cm)	Count	No.	DBH (cm)	Count
1	44.2	1	17	17	0,5						
2	45	1	18	25.5	1						
3	32	1	19	38.5	1						
4	30	1	20	23	0,5						
5		1	21	44	1						
6	27.1	0,5	22	49	1						
7	40.6	1									
8	41	1									
9	42.3	1									
10	50	1									
11	33	1									
12	47	1									
13	37.2	1									
14	33.5	1									
15	51.2	1									
16	43.6	1									

Biomass Survey Note (Every Tree)

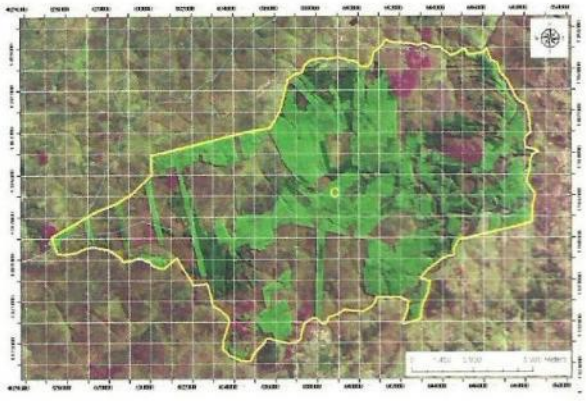
Plot ID	Plantation ID	Date	Starting Time	Ending Time	Surveyers
1	G	2011-11-1	14 H 15	14 H 26	Tidia Generosa, [illegible]

Location Information

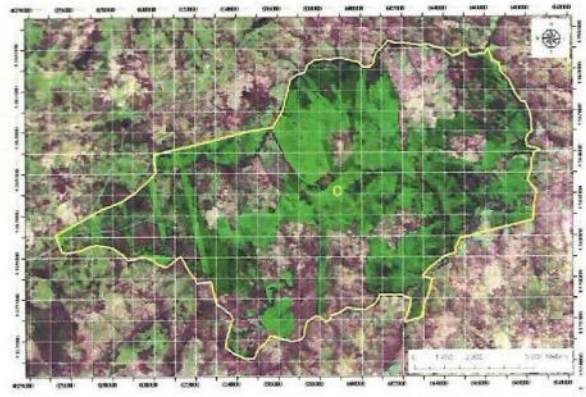
	UTM_X	UTM_Y		UTM_X	UTM_Y
NW Corner 594	0505911	8596009	NE Corner 596	0505930	8596025
SW Corner 595	0505921	8596007	SE Corner 597	0505941	8596021
Topography	Flat · Moderate Slope · (Rapid Slope)				



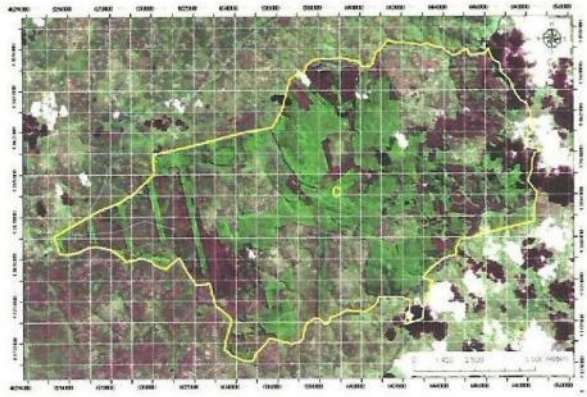
1975/8/28



1990/5/28



2002/8/9



2009/5/16

Every Tree Measurement

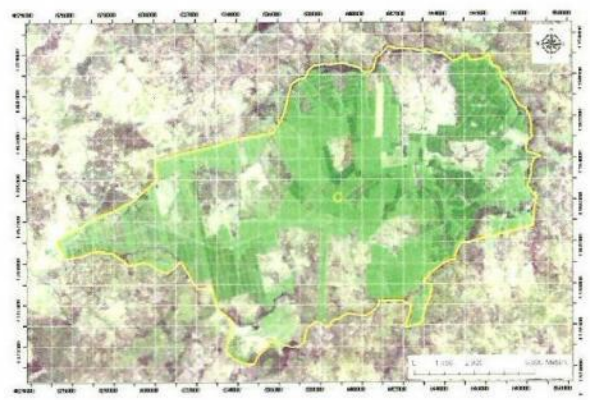
No.	Height (m)	DBH (cm)	Species	Memo	No.	Height (m)	DBH (cm)	Species	Memo
1	34	46.4	(Eucalyptus) · Other		17			Eucalyptus · Other	
2	27	17.3	(Eucalyptus) · Other		18			Eucalyptus · Other	
3	35	39	(Eucalyptus) · Other		19			Eucalyptus · Other	
4	33	35.4	(Eucalyptus) · Other		20			Eucalyptus · Other	
5	35	41.2	(Eucalyptus) · Other		21			Eucalyptus · Other	
6	22	17.2	Eucalyptus · (Other)		22			Eucalyptus · Other	
7	30	33.6	(Eucalyptus) · Other		23			Eucalyptus · Other	
8	32	37.2	(Eucalyptus) · Other					Eucalyptus · Other	
9	35	47.7	(Eucalyptus) · Other					Eucalyptus · Other	
10	33	37	Eucalyptus · Other					Eucalyptus · Other	
11			Eucalyptus · Other					Eucalyptus · Other	
12			Eucalyptus · Other					Eucalyptus · Other	
13			Eucalyptus · Other					Eucalyptus · Other	
14			Eucalyptus · Other					Eucalyptus · Other	
15			Eucalyptus · Other					Eucalyptus · Other	
16			Eucalyptus · Other					Eucalyptus · Other	

N	E	S	W	U	P
27	28	29	30	31	32

Biomass Survey Note (Simple Timber Volume)

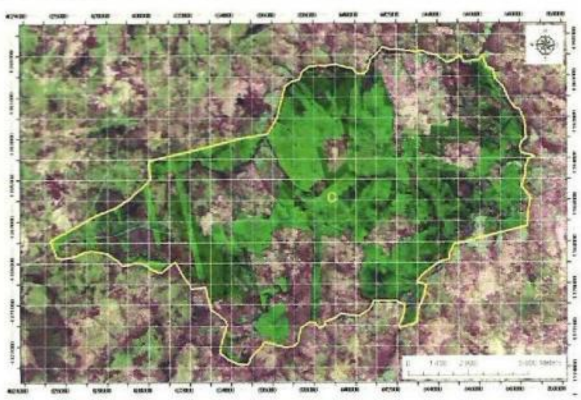
General Information					
Plot ID	Plantation ID	Date	Starting Time	Ending Time	Surveyers
2	6	2011-11-1	15h04M	15H25min	Julia, Generosa, Ermelânaia

Location Information			
UTM_X	603 050547	UTM_Y	8595131
Topography	Flat · (Moderate Slope) · Rapid Slope		
Average Height of Upper Story (m)			

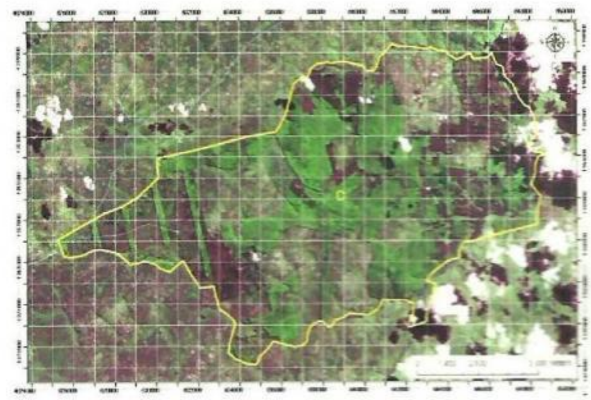


1975/8/28

1990/5/28



2002/8/9



2009/5/16

Bitterlich Method Measurement			
Basal Area Constant (k)		Number of Counted Trees	

No.	DBH (cm)	Count	No.	DBH (cm)	Count	No.	DBH (cm)	Count	No.	DBH (cm)	Count
1	16.7	1	17	14.5	1						
2	16.5	1	18	11.7	1						
3	12.7	1	19	17	1						
4	14.9	1	20	11.8	0,5						
5	10	0,5	21	11.7	0,5						
6	14.6	1	22	15.8	1						
7	15	1	23	15	1						
8	16.5	1	24	16.7	0,5						
9	17	1	25	19	1						
10	12.5	0,5	26	12	1						
11	18	1	27	12.5	1						
12	19	1	28	16.4	1						
13	17.9	1	29	16.5	1						
14	11	0,5	30	25.7	1						
15	8	0,5	31	11.9	1						
16	14.4	1	32	17.5	1						

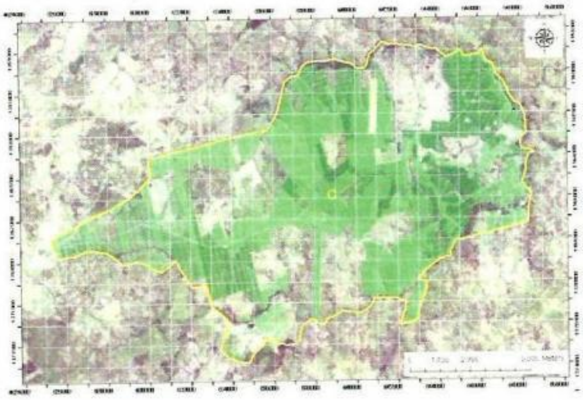
N	E	S	W	V	P

Biomass Survey Note (Every Tree)

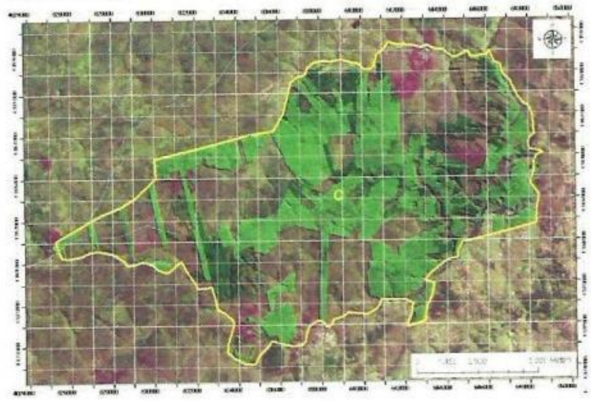
Plot ID	Plantation ID	Date	Starting Time	Ending Time	Surveyers
2	G	2011-11-1	14 H 48 Min	15 H 02 Min	Julio, Generosa, Ermelancio

Location Information

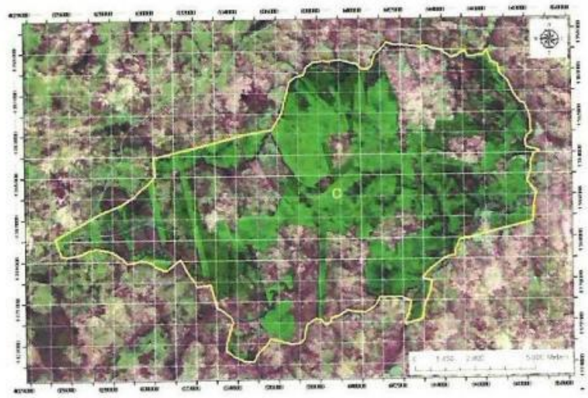
	UTM_X	UTM_Y		UTM_X	UTM_Y
NW Corner 599	0505156	8595118	NE Corner 601	0505134	8595127
SW Corner 600	0505146	8595115	SE Corner 602	0505140	8595131
Topography	Flat · (Moderate Slope) · Rapid Slope				



1975/8/28



1990/5/28



2002/8/9

2009/5/16

Every Tree Measurement

No.	Height (m)	DBH (cm)	Species	Memo	No.	Height (m)	DBH (cm)	Species	Memo
1	6	13	Eucalyptus · (Other)		17	6	14.5	Eucalyptus · (Other)	
2	5	13.1	Eucalyptus · (Other)		18	7.2	15.3	Eucalyptus · (Other)	
3	6	14	Eucalyptus · (Other)		19	4	10	Eucalyptus · (Other)	
4	7.3	14.6	Eucalyptus · (Other)		20	6	18	Eucalyptus · (Other)	
5	7	16.7	Eucalyptus · (Other)		21	7	12.4	Eucalyptus · (Other)	
6	6	16.6	Eucalyptus · (Other)		22	7	15.3	Eucalyptus · (Other)	
7	5	17.1	Eucalyptus · (Other)		23	6.5	18	Eucalyptus · (Other)	
8	6	15.9	Eucalyptus · (Other)		24	7.2	19.5	Eucalyptus · (Other)	
9	7.6	15	Eucalyptus · (Other)		25	6	12.3	Eucalyptus · (Other)	
10	5	14.1	Eucalyptus · (Other)		26	7	17.3	Eucalyptus · (Other)	
11	4	14.7	Eucalyptus · (Other)		27	5	11.4	Eucalyptus · (Other)	
12	6	10	Eucalyptus · (Other)		28	6	11.9	Eucalyptus · (Other)	
13	3	11.3	Eucalyptus · (Other)		29	4.5	5.5	Eucalyptus · (Other)	
14	6	8	Eucalyptus · (Other)		30	7	15.6	Eucalyptus · (Other)	
15	5	6	Eucalyptus · (Other)		31	4	8	Eucalyptus · (Other)	
16	3	6.9	Eucalyptus · (Other)		32	7	15.3	Eucalyptus · (Other)	

N	E	S	W	U	P
33	34	35	36	37	38

Annex D

Photographs

Field Survey Team

A1-Alto-Catumbela

B1-Alto-Catumbela

D-Projecto

E-Projecto

F1-Babayera

G-Projecto