

CONVENTION ON INTERNATIONAL TRADE IN ENDANGERED SPECIES  
OF WILD FAUNA AND FLORA



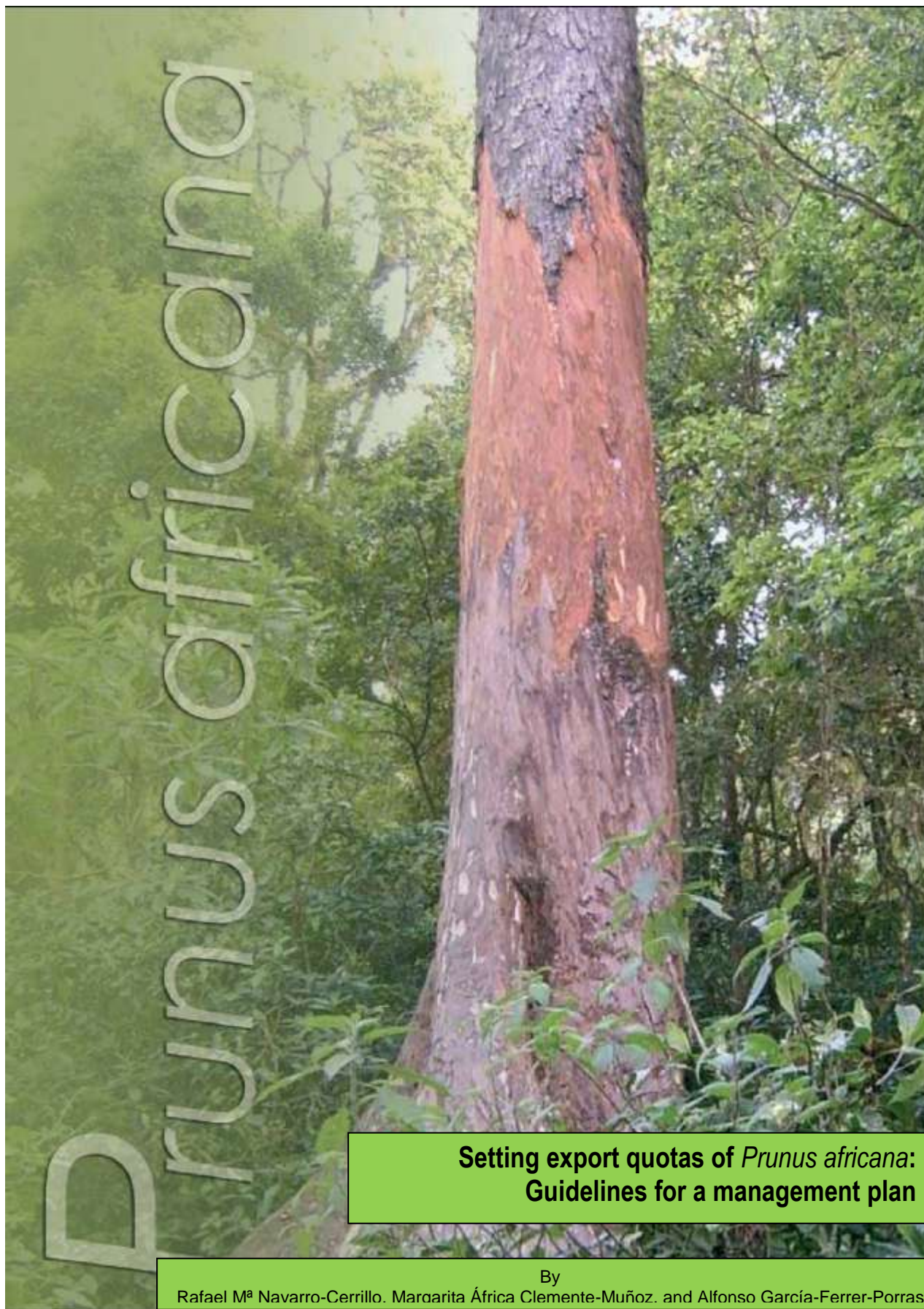
Eighteenth meeting of the Plants Committee  
Buenos Aires (Argentina), 17-21 March 2009

WORKSHOP ON IMPLEMENTATION OF REVIEW OF SIGNIFICANT TRADE (RST)  
RECOMMENDATIONS FOR *PRUNUS AFRICANA*

The attached information document has been submitted by the Chair of the Plants Committee\*.

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**Setting export quotas of *Prunus africana*: Guidelines for a Management Plan**

By Rafael M<sup>a</sup> Navarro-Cerrillo, Margarita África Clemente-Muñoz, and Alfonso García-Ferrer-Porras

## Setting export quotas of *Prunus africana*: Guidelines for a Management Plan

During the 16<sup>a</sup> meeting of the Plants Committee (Lima, July 2006), the Committee adopted the following general recommendations at international level to be implemented by the Range States with no time limit: “Effectively foster implementation of management plans in Range States; Coordinate complete studies of the populations of *Prunus africana* across the whole of its range; Coordinate the future studies in the range area with methods used on Bioko for evaluating *Prunus africana* production in natural ecosystems (document PC16 Doc. 10.2.1); Ensure the quality of studies and follow-up of management plans for the species; Encourage international cooperation projects that promote the use of *Prunus africana* in agroforestry systems and plantations, using proper genetic diversity and optimizing propagation and agroforestry cultivation techniques”.

A management model for **Non-Timber Forestry Resources** (NTFR) formed the basis for the proposed methodology, which was designed to prepare the necessary guidelines for implementation of a Management Plan for the species on Bioko (Equatorial Guinea).

The guidelines provided are the culmination of a series of stages in work oriented towards evaluating the forest resource: *Prunus africana* specimens and their current status following bark-harvesting activities.

In recent years, great effort has gone into proposals of management plans for sustainable use of *Prunus africana* in several Range States. However, integral methodology must be established to evaluate the current situation, to know whether bark harvest is suitable or whether it is affecting the conservation status of the species, and to propose corrective measures, as needed, to achieve sustainable use. The study was devised as a pilot project, covering a pre-selected area under 150,000 ha in Equatorial Guinea; it could give rise to a survey model and be applicable to other countries.

The general goal of the project was to determine the potential and current range of *Prunus africana* on Bioko. Based on this range data, stocks could be assessed, bark harvest evaluated, and proposals made with necessary recommendations to consider in drawing up a management plan for sustainable use of the species. The following specific objectives were established to achieve the general goal (Figure 1):

- ✓ Survey of the distribution of dominant types of vegetation by means of remote sensing
- ✓ Characterisation of the forests where *Prunus africana* occurs in current and potential harvest areas, in terms of their structure, species composition and diversity of tree species
- ✓ Estimate of bark yield, and
- ✓ Establishment of silvicultural criteria for sustainable use of *Prunus africana* forests

The practical case has been organized as a questionnaire following a methodology proposed by ISSC-MAP. The final objective of the exercise is to realize a gaps analysis to recommend future projects that should be put in force in every Range State in order to implement properly a Long Term Management Plan.

Figure 1 and 2 summarise a framework to establish national quota of *P. africana*. This outline is synoptic of the main results and conclusions of Equatorial Guinea project to guide possible improvements and final recommendations for consideration in designing a National Management Plan.

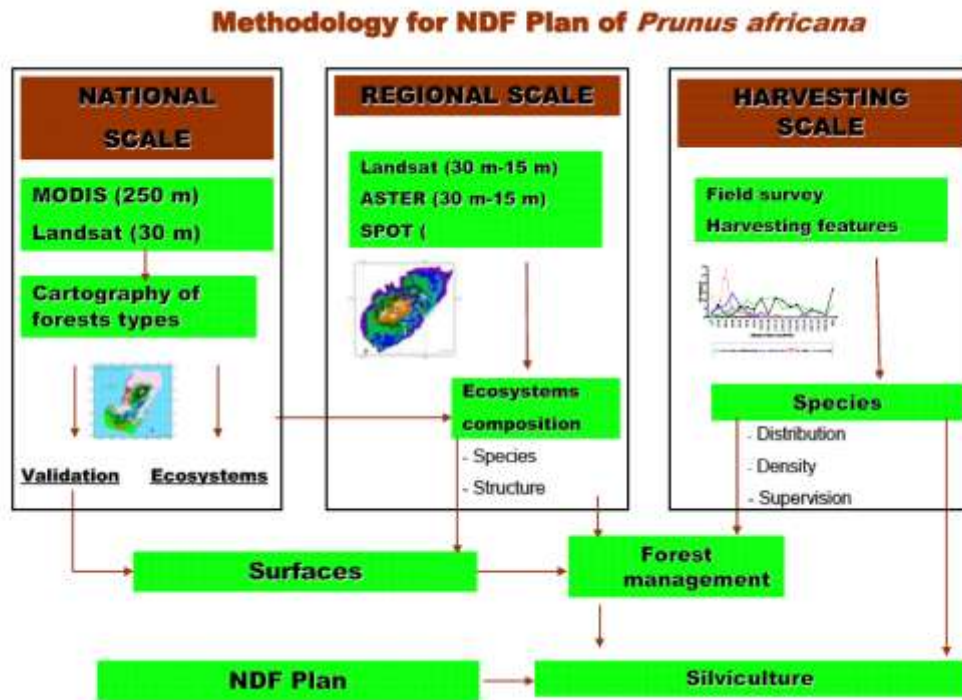


Figure 1 - Framework to establish national quota of *P. africana*

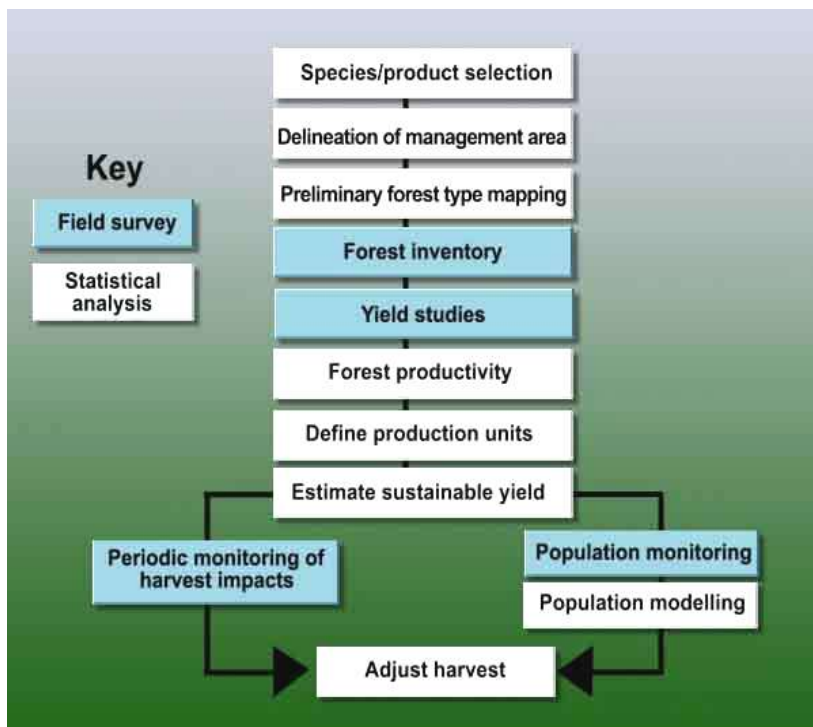
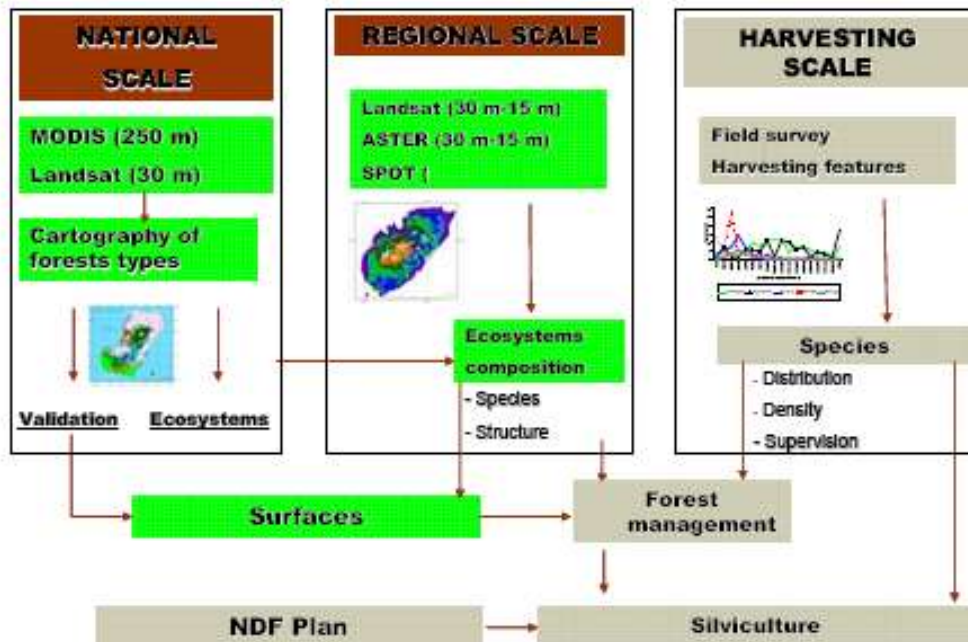


Figure 2 - Stages of a modular management strategy for sustainable harvest of non-timber forest products (adapted from Wong, 2000)

**STEP 1: DEFINITION AND PRELIMINARY MAPPING OF DISTRIBUTION AREAS**

**Methodology for NDF Plan of *Prunus africana***



**1.1 NATIONAL DISTRIBUTION OF THE SPECIE**

**Objective 1: National forest cartography**

Survey of the distribution of the dominant vegetation types at National level exists by means of remote sensing and additional sources

**QUESTIONS:**

Is there a Governmental Department in charge of Natural Resources Evaluation and cartography (Geographic Information System and Remote Sensing Laboratory)? [Example, Figure 3]

Is there a forest national cartography available? If yes, which is the map scale? Which is the data format (paper map, digital, etc.)? ? [Example, Figure 3, Figure 4]

Is this information accessible?

Is this cartography based on field surveys? Is it possible to access to a vegetation description of the forest types?

**Sources of information:**

Spatial data infrastructure ([www.gsdi.org](http://www.gsdi.org))

African cartography ([www.kew.org/giswww/website/mad/madveg](http://www.kew.org/giswww/website/mad/madveg))

African cartography ([www.africover.org/webmap](http://www.africover.org/webmap))

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CITES (2001). Development of a methodological framework, and practical guidelines for the estimation, implementation and monitoring of sustainable harvesting quotas for *Prunus africana* at a national scale. PC11 Inf. 10

Dawson, I K and R Rabevohitra. 1996. Status of *Prunus africana* in Madagascar. Unpublished report (10pp). Cited in Schippmann (2001).

DGEF. 2003. Plan d'action national pour la gestion durable du *Prunus africana*. Ministère de l'Environnement, des Eaux et Forêts. Direction Générale des Eaux et Forêts. Comité National *Prunus africana*. Décembre, 2003.

Green, G M and R W Sussmann. 1990. Deforestation history of the eastern rain forests of Madagascar from satellite imagery. *Science* 248:212-215.

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Letouzey, R. 1985. Notice de la carte phytogéographique du Cameroun. Toulouse: Institute de la Carte Internationale de la Vegetation.

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Neba, S A. 1982. *Modern Geography of the United Republic of Cameroon*. New York, Hamilton Printing Company.

ONADEF (1997) Rapport d'Inventaire d'Amenagement du Massif Forestier du Mont Cameroun (Government of Cameroon).

Quansah, N. 1999. *Prunus africana*: harvest and resource management in Madagascar. *Medicinal Plant Conservation* 5:18.

Walter, S and J.R. Rakotonirina. 1995. L'exploitation de *Prunus africanum* à Madagascar. PCDI Zahamena et la Direction des Eaux et Forets, Antananarivo, Madagascar.

White, F. (1983). The Vegetation of Africa. UNESCO Natural Resources Research, 20: 1-356.

### **Results of National distribution of the specie**

***Task 1 for working group: To fill Table 1, Range States of Prunus africana to summarize the available cartography, the source of information must be included as well as data format (paper, report, scientific paper, computer format).***

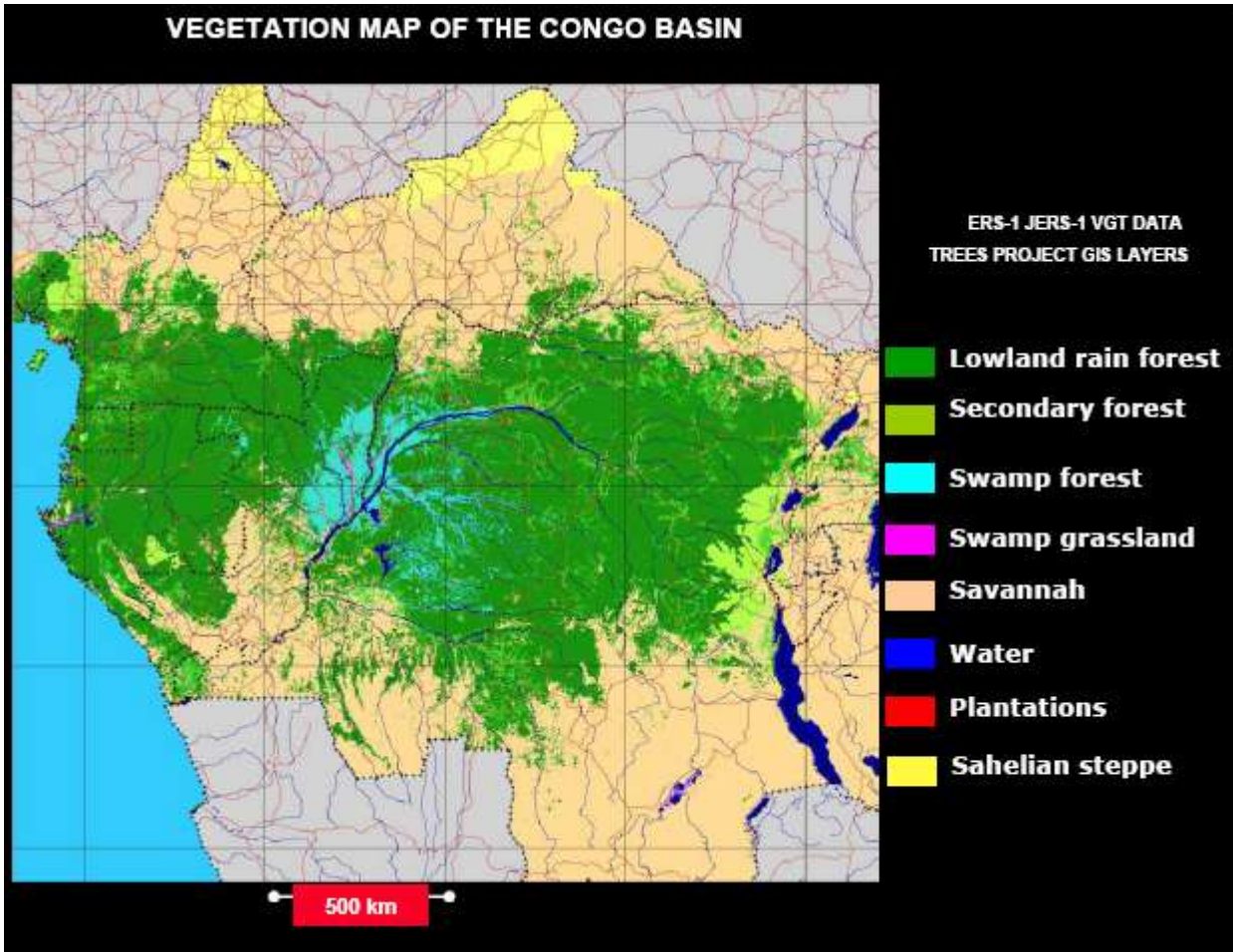


Figure 3 - Vegetation Map of Congo Basin.

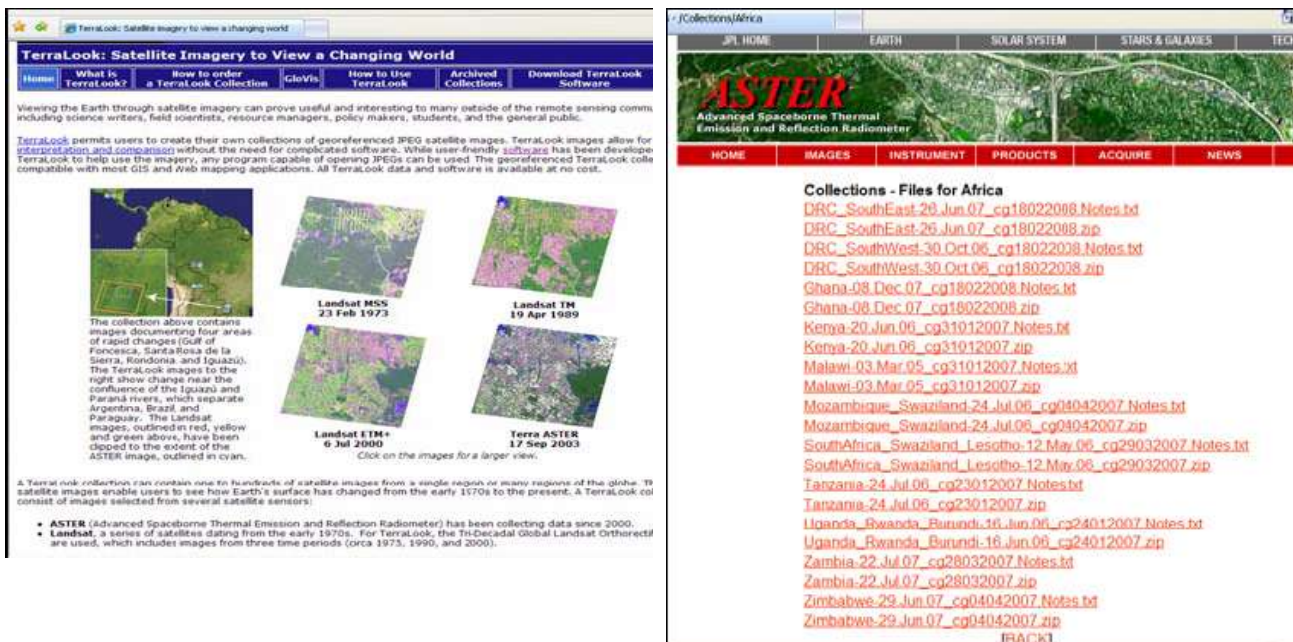


Figure 4 - TerraLook Satellite viewer software and imagines collection of Africa

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## 1.2 REGIONAL DISTRIBUTION OF THE SPECIE

### **Objective 2: National forest cartography**

Survey of the distribution of forest types where *Prunus africana* exists by means of remote sensing and additional sources

#### **QUESTIONS:**

Is there detail cartography of forests with current (or potential) distribution of *Prunus africana* forests? [Example: Figure 5, Figure 6]

If yes, what is the scale? How recent is this assessment?

Have the cartography been based on field populations assessments? (Field survey, botanical collection data, etc.)?

#### **Sources of information:**

ONADAF (2000) Rapport sur la détermination de dire de répartition du *Prunus africana*. (Pygeum) dans les province de l'Ouest, Littoral et du Nord-Ouest Cameroun.

Green, G M and R W Sussmann. 1990. Deforestation history of the eastern rain forests of Madagascar from satellite imagery. *Science* 248:212-215.

Hall, J.B. 1973. Vegetational zones on the southern slopes of Mount Cameroon. *Vegetatio* 27: 49-69.

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Thenkabail, P. S., Enclona, E. A., Ashton, M. S., Legg, C. and Jean De Dieu, M. (2004). Hyperion, IKONOS, ALI, and ETM+ Sensors in the Study of African Rainforests. *Remote Sensing of Environment* 90: 23-43.

### **Results of Forest type's distribution with presence of *Prunus africana***

**Task 2 for working group: To fill Table 1 with the forest types where *Prunus africana* exists, summarizing the available cartography. Source of information must be included as well as data format (paper, report, scientific paper, computer format).**



Table 1 – National cartography of distribution of forest types where *Prunus africana* exists or could be presented

Range State	Distribution in Range State (Cunningham, 2006).	New data on Distribution	Forest Cartography Source and scale	Type of cartography (paper, report, computer format)
Burundi	Montana forest, Albertine Rift, possibly from Mt. Heha/Ijenda, Mt. Bururi or Teza forest			
Cameroon	Bamenda highlands (Mt Kilum, Oku, Mt. Manenguba, Adamawa plateau and Mt. Cameroon			
DR Congo	Kivu region, Rwenzori and Virunga mountains, and within Kahuzi-Biega National Park, probably also on Itombwe massif.			
Equatorial Guinea	Pico Basilé and Grand Caldera de Luba on the island of Bioko			
Kenya	Mt. Kenya, Mt Elgon, Mau forests			
Madagascar	Patchy distribution in moist Montane forests (1000-2000m as) such as Zahamena Strict Nature Reserve, Mantadia, Antsevabe and Manakambahiny-Est.			
Tanzania	Moist evergreen forests in NE Tanzania, including Mt Kilimanjaro			

Example: Distribution of forest types where *Prunus africana* exists on Bioko (Equatorial Guinea). See table with forest types and surfaces (Figure 5).

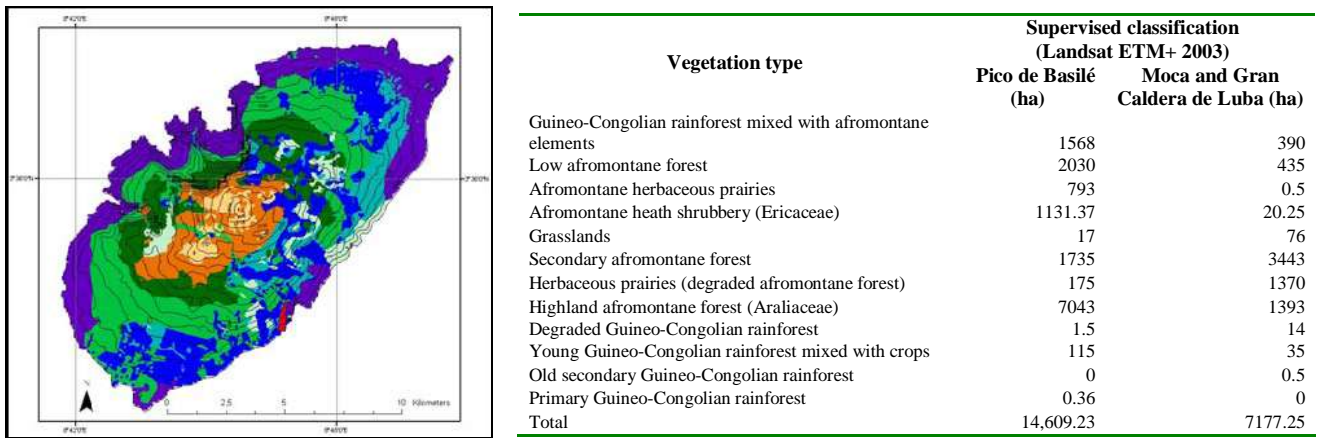


Figure 5 - Distribution of vegetation types in Pico Basilé at altitudes above 1400 m according to supervised classification (WGS 84; Zone 32 N) (Bioko-Equatorial Guinea) and surfaces for vegetation type by using a Landsat 7 ETM+ image (Clemente *et al.*, 2006).

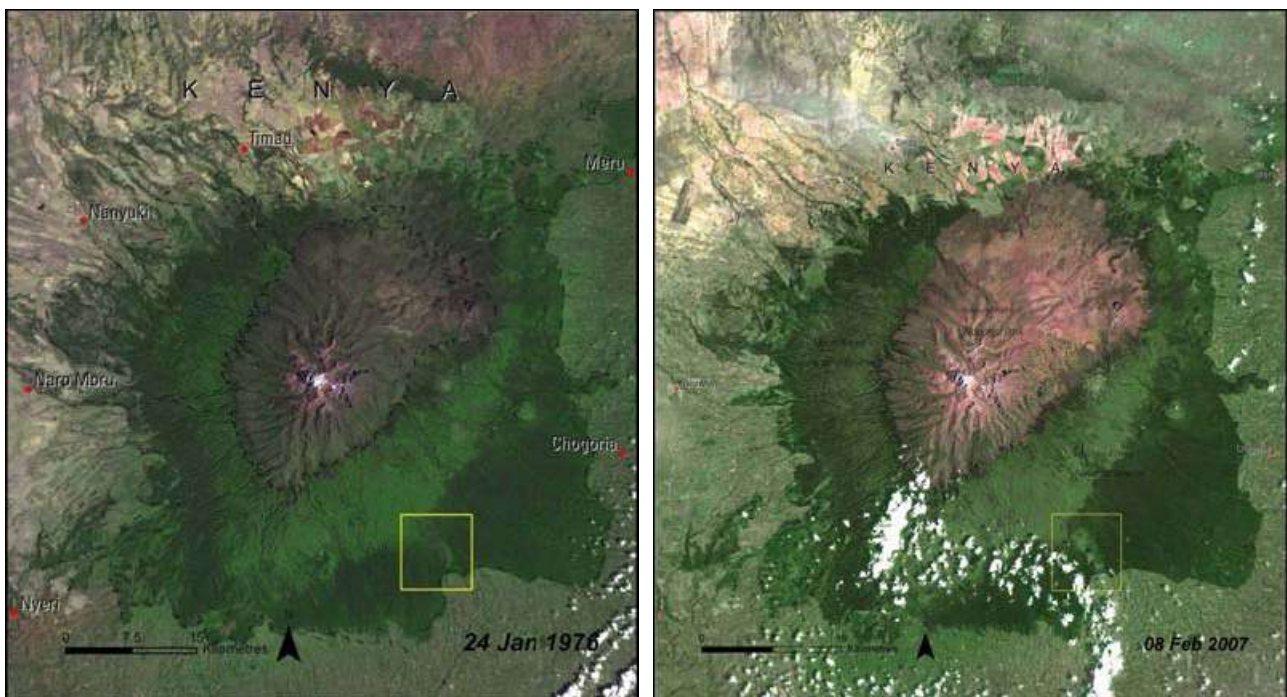
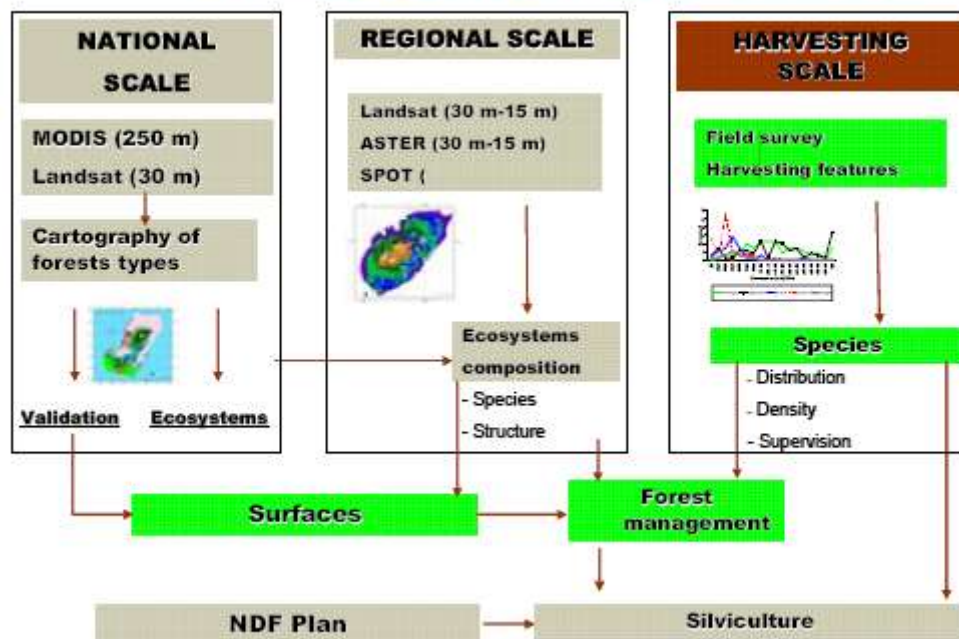


Figure 6 – Landsat MS (1976) and height resolution image (IKONOS) (2007) of Mont Kenya (Kenya).

**STEP 2: VEGETATION AND STRUCTURAL FEATURES OF *Prunus africana* FORESTS**

**Methodology for NDF Plan of *Prunus africana***



**2.1 SURVEY DESIGN AND ASSESSMENT**

**Objective 3: Inventory of the *Prunus africana* forest**

Survey of the species and structural features of the *Prunus africana* exists in the distribution area by means of field inventory and assessment

**QUESTIONS:**

Have any inventories or assessments of this species been conducted in the distribution area?

What is the survey design? [Example, Figure 7]

Have any ecological approach of this species been conducted in the distribution area?

Describe the resource inventory the density and silvicultural features for this species?

**Sources of information**

Acworth, J., Ndam, N., Tchouto, P., Edwards, I. and Proctor, J. (1996). Review of Past Inventories and Prospects for Long Term Monitoring for Forest Management and Biodiversity Conservation on Mt. Cameroon. Report on the Conference and Training Workshop on Growth Studies in Tropical Moist Forest in Africa. Centre for International Forestry Research (CIFOR). Kumasi. Ghana.

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Underwood F.M. and R.W. Burn (2000) Biometric aspects of sampling for the Cameroon inventory of *Prunus africana*. Mount Cameroon pilot phase. Interim report. Statistical Services Centre, Department of Applied Statistics, University of Reading. Unpublished.

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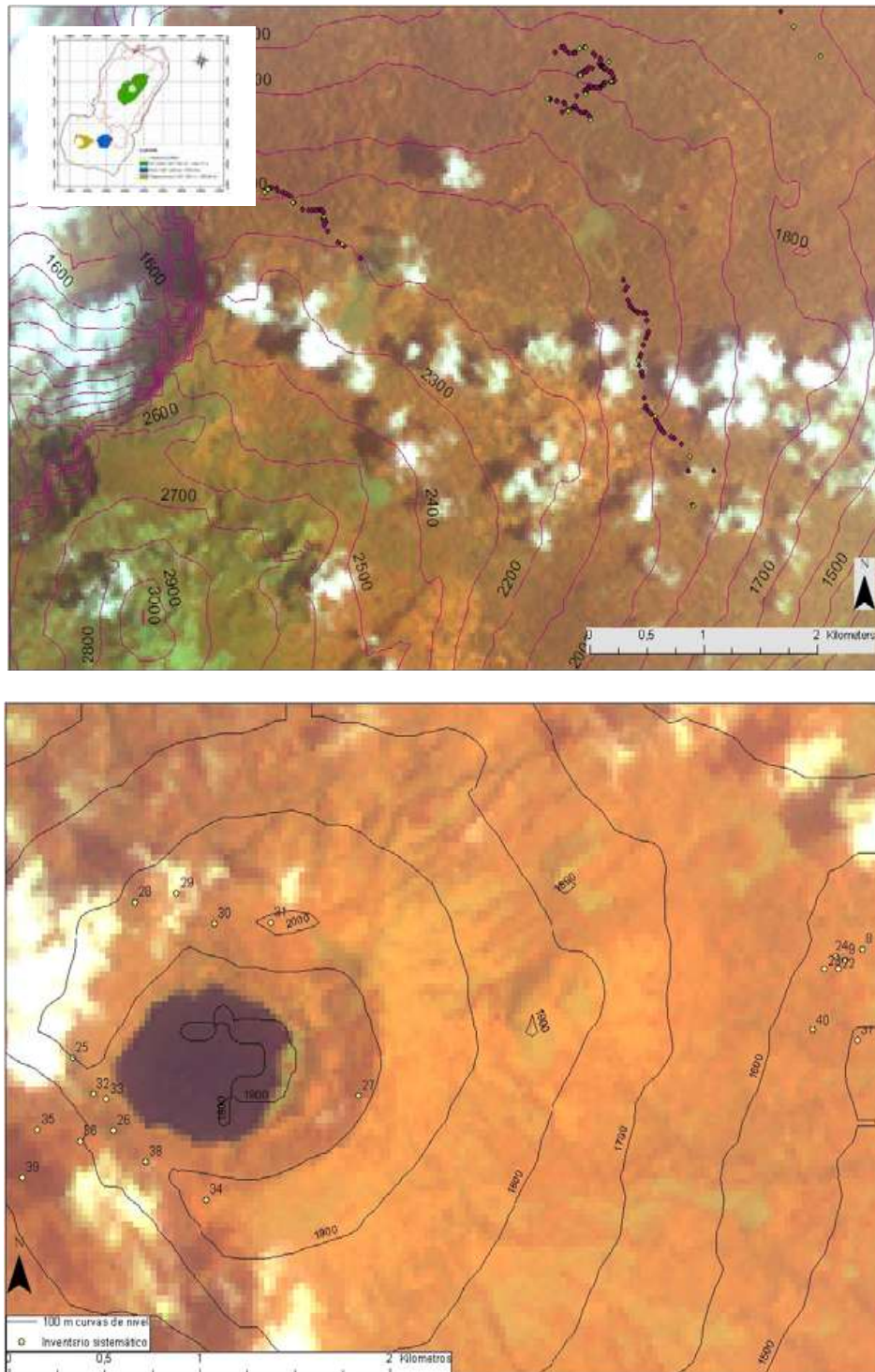


Figure 7 – Location of transects on Pico de Basilé and Moca-Lake Biaó: *P. africana* trees are marked with red dots and the systematic inventories are marked with yellow dots. (WGS 84; Zone 32 N).

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## Results of forest inventory of *Prunus africana*

**Task 3 for working group: To fill Table 2 on ecological studies conducted in the areas where *Prunus africana* exists. Source of information must be included.**

### 2.2. KEY STRUCTURAL FEATURE: NUMBER OF TREES PER HECTARE AND DIAMETRIC DISTRIBUTION

#### Objective 4: Population statistics

Determination of stocking levels and tree features of *Prunus africana* trees in the distribution area by means of field inventory.

#### QUESTIONS:

Is the population statistics of distribution areas known (e.g. density, tree size)? [Example, Figure 8]

Have any species regeneration assessments been conducted?

Have any long-term ecological monitoring assessments been conducted?

Taxa	Place	Density (trees/ha)	BA (m <sup>2</sup> /ha)
<i>Burkea abyssinica</i>	Moca	4.46	1.43
<i>Cratogeomachium mannii</i>	Baulé and Moca	0.39	0.31
<i>Ficus chlamydocarpa</i> var. <i>chlamydocarpa</i>	Moca	1.55	0.46
<i>Ficus</i> sp.	Baulé and Moca	2.72	1.04
<i>Ficus</i> sp.	Baulé	0.39	0.31
<i>Homalium</i> sp.	Moca	0.58	0.26
<i>Hypericum lanceolatum</i>	Baulé and Moca	0.39	0.31
<i>Macaranga spinosa</i>	Baulé	0.58	0.26
<i>Musa lanceolata</i>	Moca	4.08	1.21
<i>Neboutonia macrocalix</i>	Baulé	6.60	1.91
<i>Nictia congesta</i>	Baulé and Moca	4.27	1.29
<i>Oxyanthus</i> spp.	Moca	3.49	1.94
<i>Paluzias fulva</i>	Baulé and Moca	2.33	0.51
<i>Prunus africana</i>	Baulé and Moca	7.18	0.94
<i>Psychotria pedunculata</i>	Moca	0.78	0.37
<i>Psychotria</i> sp.	Moca	0.19	0.16
<i>Schefflera</i> spp. ( <i>S. bartari</i> , <i>S. mannii</i> )	Baulé and Moca	8.93	1.65
<i>Trema orientalis</i>	Baulé and Moca	0.97	0.40
<i>Trichilia pruriens</i>	Baulé	5.05	1.62
<i>Uragoga</i> sp.	Baulé and Moca	0.39	0.22
<i>Xyraloa monosperma</i>	Moca	2.33	0.87
<i>Zanthoxylum</i> sp.	Moca	0.39	0.22
Other unidentified species (Bubi names)	Baulé and Moca	11.05	5.64
<b>Total Figures</b>		<b>69.29</b>	<b>23.51</b>

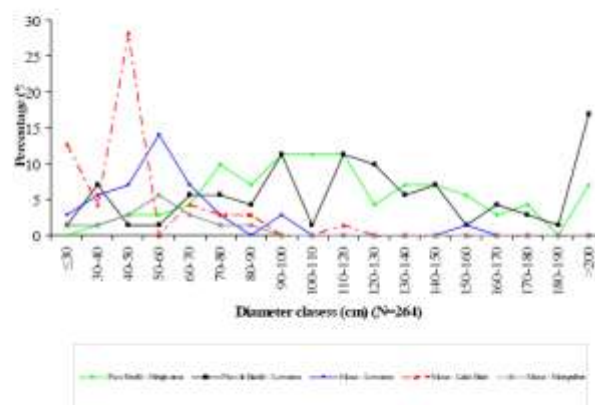


Figure 8 – Density and percentage distribution of *Prunus africana* individuals by diameter class in each of the harvest areas studied on Bioko

#### Sources of information

Geldenhuys, C. J. 1981. *Prunus africana* in the Bloukrans River Gorge, southern Cape. *South African Forestry Journal*, 118, 61-66.

Hall, J.B. 1973. Vegetational zones on the southern slopes of Mount Cameroon. *Vegetatio* 27: 49-69.

Hedberg, O. 1964. Features of Afroalpine plant ecology. *Acta Phytogeographica Sueca* 49:1- 144.

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Newbery, D.M., and J.S. Gartlan. 1996. A structural analysis of rain forest at Korup and Douala-Edea, Cameroon. *Proceedings of the Royal Society of Edinburgh Section B Biological Sciences* 104: 177-224.

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Terry C.H. Sunderland, James A. Comiskey, Simon Besong, Hyacinth Mboh, John Fonwebon and Mercy Abwe Dione Vegetation Assessment of Takamanda Forest Reserve, Cameroon SI/MAB Series #8, 2003, Pages 19 to 53

### **Results of forest inventory of *Prunus africana***

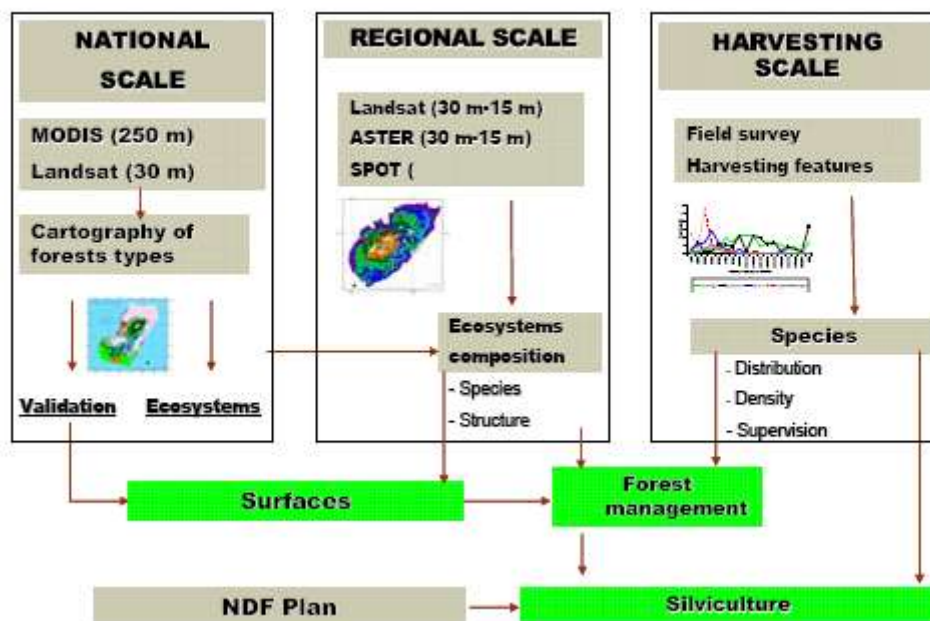
**Task 4 for working group: To fill Table 2 on *Prunus africana* population data: density, tree size. Source of information must be included.**

Table 2 – Forest types cartography of distribution of forest types where *Prunus africana* exists or could be presented.

Range State	Population distribution in Range State	Type of inventory/survey	Density (trees ha <sup>-1</sup> )	Tree size
Burundi				
Cameroon				
DR Congo				
Equatorial Guinea				
Kenya				
Madagascar				
Tanzania				

**STEP 3: SILVICULTURAL KNOWLEDGE OF *Prunus africana* FORESTS**

**Methodology for NDF Plan of *Prunus africana***



**3.1. BARK YIELD**

**Objective 5: Average bark yield and harvesting**

Calculation of tree features related to yield bark production: diameter, harvesting height, and bark thickness

**QUESTIONS:**

Are current collection based on quantitative bark estimation? [Example, Figure 9]

Is there any estimation of fresh bark weight/dry bark weight?

Are there debarking methods in place?

Has bark thickness been estimated in natural trees?

Has bark regeneration period been studied? [Example, Figure 10]

**Sources of information**

Acworth J.M., B.J. Ewusi and D. Ngatoum (1998) Sustainable Exploitation of *Prunus africana* on Mt. Cameroon. Paper distributed at the Symposium on the Conservation of Medicinal Plants in Trade in Europe. Royal Botanic Gardens Kew, London. 22 - 23 June 1998.

Cunningham A.B. & F.T. Mbenkum (1993) Sustainability of harvesting of *Prunus africana* bark in Cameroon. People and Plants working paper number 2. UNESCO.

Eben Ebai, S.; Ewusi, B. N.; Asanga, C. A.; Nkongo, J. B. N. 1992. An evaluation of the quantity and distribution of *Pygeum africanum* on the slopes of Mount Cameroon. Limbe, Cameroon.

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Divisional Service of Forestry. Fako Divisional Service of Forestry, United Republic of Cameroon. 1988. Annual Report 1987/88. Limbe, Divisional Delegation of Agriculture, Ministry of Agriculture.

Ewusi, B.N., Tanyi Charles, T., Nyambi, J. and Acworth, J. 1996. Bark extraction : current situation and sustainable cropping of *Prunus Africana* on Mount Cameroon. Unpublished paper, Mount Cameroon Project, Limbe, Cameroon.

Ndam N. and Tonye, M.M. 2004. *Prunus africana* on Mount Cameroon: A case study of the production-to consumption systems. In: Sunderland T. and Ndoye O. (Eds). Forest Products, Livelihoods and Conservation. Case studies of Non-Timber Forest Product Systems. Vol. 2 - Africa. Pp 37-52.

**Results of the average bark yield and harvesting for *Prunus africana***

**Task 5 for working group: To fill Table 3 on bark yield parameters: density, diameter, harvesting height, and bark thickness. Source of information must be included.**

Table 3 – Bark yield parameters

Range State	Distribution in Range State	Density (trees ha <sup>-1</sup> )	Diameters	Harvesting height	Bark thickness
Burundi					
Cameroon					
DR Congo					
Equatorial Guinea					
Kenya					
Madagascar					
Tanzania					



### Average yield of dry *Prunus africana* bark (kg ha<sup>-1</sup>) in the different harvest areas

(Hall *et al.*, 2000) 55 Kg. tree<sup>-1</sup>  
 (Ndam *et al.*, 2000) 85 Kg. Tree<sup>-1</sup>  
 (Walter y Rakotonirina, 1995) 50-200 Kg. Tree<sup>-1</sup>

Harvest Area	Yield of the average tree (kg tree <sup>-1</sup> )	Density (stems ha <sup>-1</sup> )	Average dry bark yield by diameter class (kg ha <sup>-1</sup> ) <sup>±</sup>
Pico de Basilé – high area	107.11	15.38	1647.35
Pico de Basilé – low area	115.92	2.65	307.19
Moca – low area	39.68	9.95	394.82
Moca – Monguibus	30.87	5.68	175.34
Moca – Biaó	35.04	6.37	223.21

Figure 9 – Bark yield related to density, diameter and harvesting height on Bioko (Equatorial Guinea) (Clemente *et al.*, 2006).

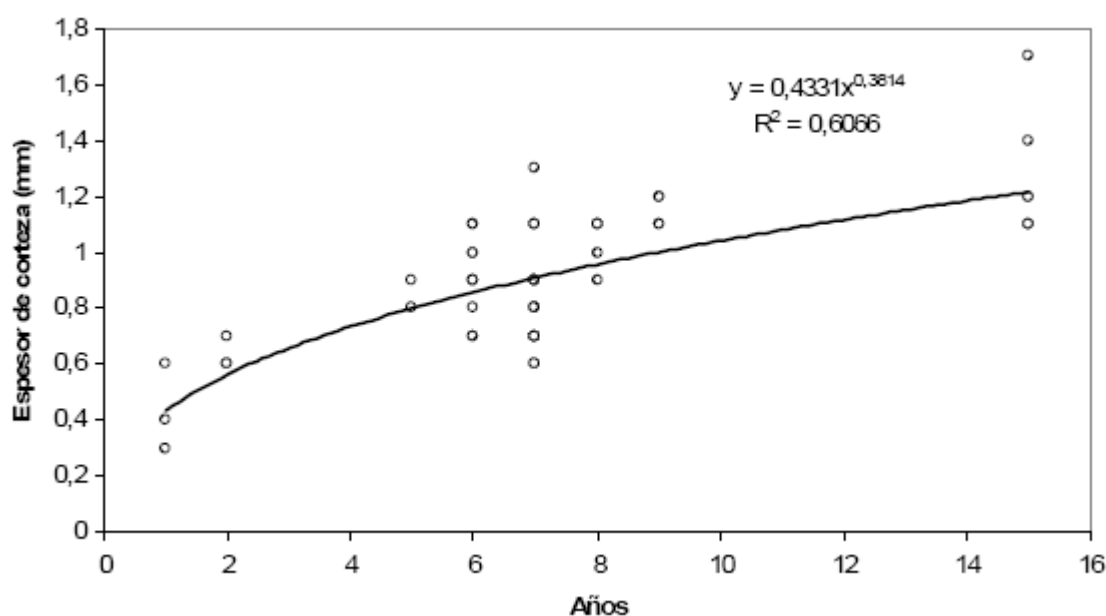


Figure 10 – Bark thickness by number of years since harvest on Pico de Basilé (Clemente *et al.*, 2006).

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### 3.2. REGENERATION MODELS

Although regeneration models are not part of the quotas assessment, several studies have demonstrated the impacts of bark harvest on *Prunus africana* populations in natural regeneration. Therefore, research on model population must be promoted following previous works (Stewart, 2001, 2003) to predict population decline.

#### Sources of information

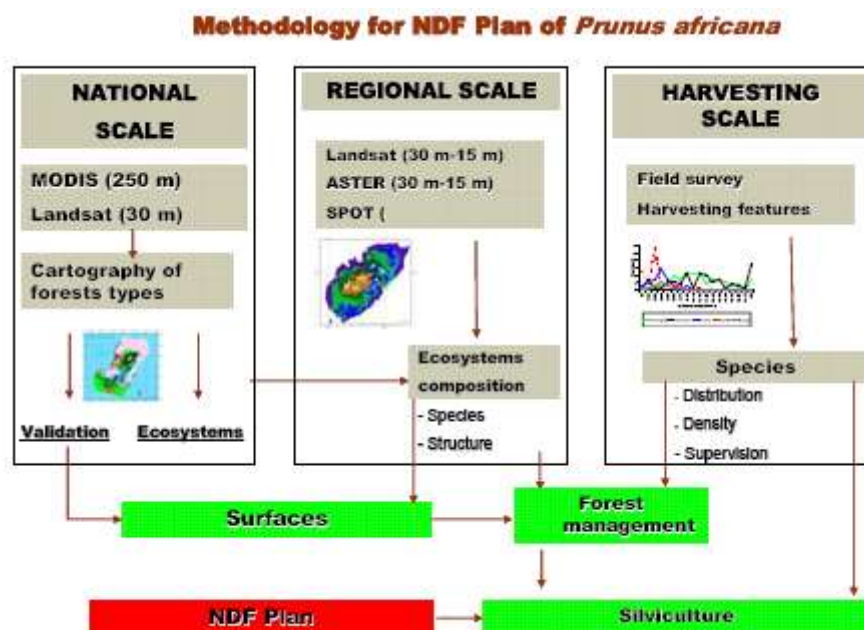
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### STEP 4: ASSESMENT OF EXPORT QUOTAS OF *Prunus africana*



### 4.1. MAXIMAL POTENTIAL BARK QUOTAS

#### Objective 6: Calculation of potential *Prunus africana* bark yield in harvest areas

A potential harvest quota should be determined for the accessible sites using Ondigui's proposed equation (2001), assuming an unharvested stand [Example, Table 4]:

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$$Q = [A \times P \times RME \times Y \times V] F^{-1}$$

Where: Q = annual quota per management unit (kg of dry material) A = harvest area (ha) P = proportion of area exploited (%) RME = minimum estimated density of *Prunus africana* in the harvest unit (trees ha<sup>-1</sup>) Y = estimated yield per tree per harvest (kg of dry material per tree) V = proportion of exploitable trees (%) (Alive and not over-exploited) F = return times (years)

Table 4 – Estimated potential annual dry bark yield for an unharvested stand, by surface area to be harvested, proportion of area exploited, *Prunus africana* density, estimated dry bark yield in current and new proposed harvest areas, proportion of trees exploited, and return times (F = 10 years and F = 8 years). Values for the new proposed harvest areas are shown in boldface type.

Working area	A Surface area harvested (ha)	P Proportion of area exploited (%)	RME <i>Prunus africana</i> density (stems ha <sup>-1</sup> )	Y Estimated yield per tree (kg tree <sup>-1</sup> )	RME x Y Estimated dry bark yield <sup>1</sup> (kg ha <sup>-1</sup> )	V Proportion of exploitable trees (%)	Estimated potential bark yield <sup>2</sup> (t year <sup>-1</sup> ) in unharvested condition, depending on F (N° of years between harvests)	
							F = 10 years	F = 8 years
Current areas							Current areas	Current areas
Pico de Basilé – high area	1622	80	15.38	107.11	1647.35	90	192.38	240.48
Pico de Basilé – low area	1119	80	2.65	115.92	307.19	90	24.74	30.93
Moca – low area	282	80	9.95	39.68	394.82	90	8.16	10.02
Moca – Monguibus	103	80	5.68	30.87	175.34	90	1.30	1.62
Moca – Lake Biaó	72	80	6.37	35.04	223.21	90	1.15	1.44
Total current areas <sup>3</sup>							227.73	284.49
New areas							New areas	New areas
Pico de Basilé – south area	1500 (estimated)	80	7.56 (estimated)	111.5 (estimated)	842.94 (estimated)	90	<b>91.03</b> (estimated)	<b>113.79</b> (estimated)
Pico de Basilé – east area	1000 (estimated)	80	7.56 (estimated)	111.5 (estimated)	842.94 (estimated)	90	<b>60.69</b> (estimated)	<b>75.86</b> (estimated)
Total with new areas <sup>4</sup>							<b>379.45</b>	<b>474.14</b>

<sup>1</sup> 50% estimated fresh bark-dry bark yield

<sup>2</sup> The average yield per hectare was calculated according to diameter class frequency in each harvest area.

<sup>3</sup> Values not including new potential harvest areas

<sup>4</sup> Values including new potential harvest areas

## QUESTIONS:

Is the potential bark yield calculated by the use of population and bark yield data?

Is the current bark extraction quota known in harvest areas?

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### **Results of calculation of potential *Prunus africana* bark yield in harvest areas**

**Task 6 for working group: To discuss the applicability of the Ondigui's equation to calculate bark yield quota at the National and local level (see Table 4).**

## **4.2. CURRENT AVAILABLE QUOTAS**

### **Objective 7: Calculation of current quotas of *Prunus africana* in harvest areas**

*The potential quota must be compared to the current extraction in harvest areas [Example, see Table 5].*

### **QUESTIONS:**

Is the current bark yield calculated by the use of population and bark yield data?

Is there any estimation of fresh bark weight/dry bark weight?

### **Sources of information**

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Table 5 – Current annual dry bark yield for an unharvested stand, by surface area to be harvested, proportion of area exploited, *Prunus africana* density, estimated dry bark yield in current and new proposed harvest areas, proportion of trees exploited, and return times (F = 10 years and F = 8 years). Values for the new proposed harvest areas are shown in boldface type

Harvest area	Estimated potential bark yield (t year <sup>-1</sup> ) in unharvested condition, depending on F (n° of years between harvests)		Recommended quota (t year <sup>-1</sup> ) for 2006 following analysis of status in current and new harvest areas	
	F = 10 yrs	F = 8 yrs	F = 10 yrs	F = 8 yrs
Current areas	Current areas	Current areas	Current areas	Current areas
Pico de Basilé highlands	192.38	240.48	0 (bark regeneration period)	0 (bark regeneration period)
Pico de Basilé lowlands	24.4	30.93	0 (bark regeneration period)	0 (bark regeneration period)
Moca lowlands	8.16	10.2	4.8 (2 <sup>nd</sup> harvest)	5.1 (2 <sup>nd</sup> harvest)
Moca Monguibus	1.30	1.62	1.30 (unharvested)	1.62 (unharvested)
Moca Lake Biaó	1.15	1.44	0.58 (2 <sup>nd</sup> harvest)	0.72 (2 <sup>nd</sup> harvest)
<b>Total current areas</b>	<b>227.73</b>	<b>284.49</b>	<b>5.96</b>	<b>7.35</b>
New areas	New areas	New areas	New areas	New areas
Pico de Basilé (south)	<b>91.03</b> (estimated)	<b>113.79</b> (estimated)	<b>91.03</b> (estimated)	<b>113.79</b> (estimated)
Pico de Basilé (east)	<b>60.69</b> (estimated)	<b>75.86</b> (estimated)	<b>60.69</b> (estimated)	<b>75.86</b> (estimated)
<b>Total with new areas</b>	<b>379.45</b>	<b>474.14</b>	<b>157.68</b>	<b>197</b>

### Results of calculation of current quotas for *Prunus africana*

**Task 7 for working group: To discuss the current national quotas with the estimated quotas using the Ondigui's equation and the recommended quota considering the status of the current harvest areas (see Table 5)**

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### 4.3. MONITORING SYSTEM

#### **Objective 8: Bark thickness by number of years since harvest and general monitoring**

As well as other aspects of harvesting, monitoring is not part of the quota estimation; but, is a necessary complement to quota data. Monitoring of population and harvest of *Prunus africana* bark are determinant in terms of sustainable exploitation. Following to ISSC-MAP:

1. Is there knowledge of the current situation of the debarking trees in previous periods?
2. Are the Management plans adapted depending of the situation observed through monitoring?
3. To describe how the management plans are reviewed
4. How do stakeholders participate in the day-to-day implementation of the management plan (need to find out specifically how affected communities, collectors, middlemen are involved)?
5. Is the collection of the species following specific volume and quality instructions from the buyer?
6. If not, how do collectors decide how much and what quality of material is required
7. Further questions you could ask:
  - 7.1. How is processing carried out by the harvesters before the material is sold?
  - 7.2. What is the quality sold by the collectors?
  - 7.3. Are there any problems with quality (e.g., insufficiently dried, dirty, includes taproots, confusion with other species during collection)?
  - 7.4. How these problems are currently dealt with?
8. Are the main stages in the commodity chain from harvesting to export or sale known and documented (e.g. harvesters in the communal areas sell to intermediate buyers, or sell to exporters directly)?
9. Identify the main actors in the commodity chain (e.g. harvesters in North West Province, harvesters sell to company X or company Y.)
10. Can the processed medicinal product in the market place be traced back to its point of collection?
11. Resource managers and collectors have adequate skills (training, supervision, experience) to implement the provisions of the management plan, and to comply with the requirements of this standard.
12. What are the strengths and weaknesses / gaps in the current knowledge and skills of resource managers (resources of the management authority, collection operation) in:
  - 12.1. Resource assessment and monitoring
  - 12.2. Adaptive management process
  - 12.3. Participatory processes (working with collectors to assess and monitor harvest impacts)

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