



SILVICULTURE and FOREST MANAGEMENT in SURINAME

History & State-of-the-Art with focus on CMS



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Forestry Fact Sheet

SURINAME: Democratic republic since 1975; before colony of Holland (Dutch Guiana)

Territory:	16.4 million ha
Population:	< 500,000
Forest estate:	14.8 million ha
Protected areas:	2.1 million ha
Production forest:	2.5 million ha
Annual round wood production:	ca. 200,000 m ³
Contribution to GDP	< 3%

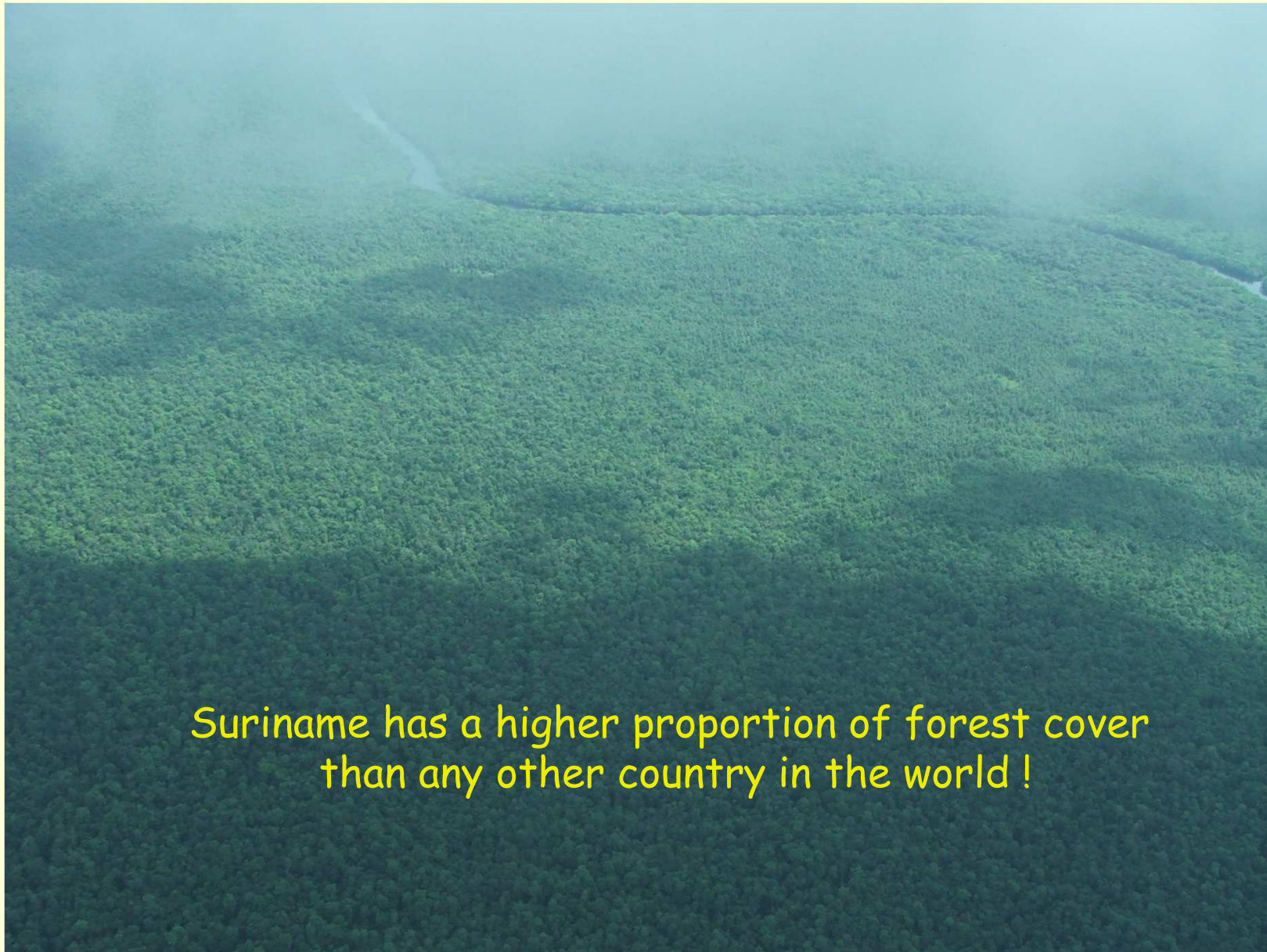


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CENTRE FOR AGRICULTURAL RESEARCH IN SURINAME

... promoting applied Technological Research !

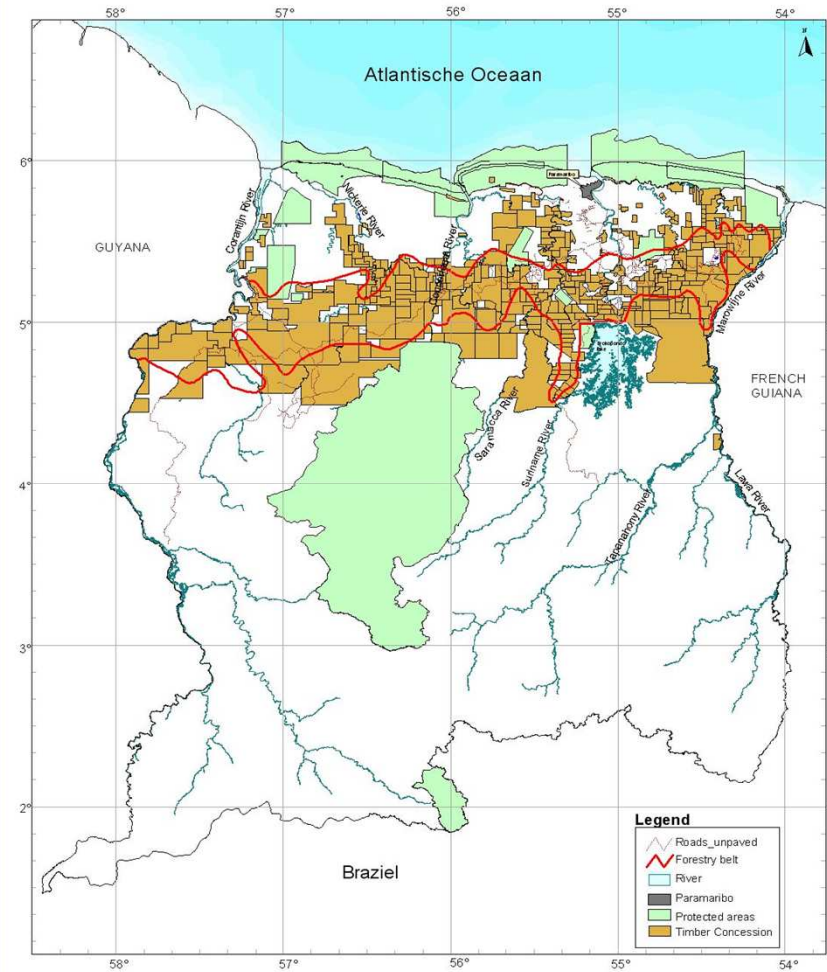




Suriname has a higher proportion of forest cover than any other country in the world !



Timber Concessions Suriname (2010)



CELOS/NARENA 2011



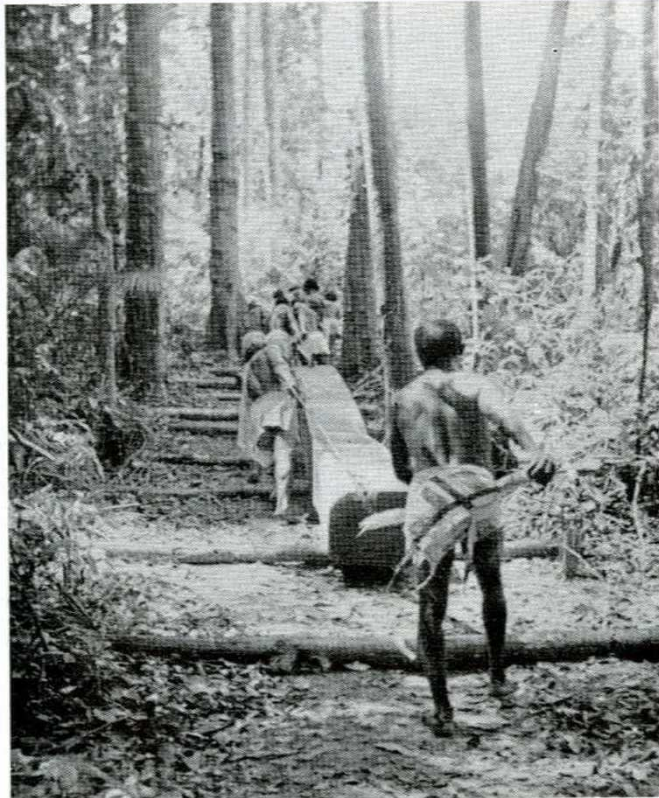
History and Silviculture

First Forest Service established in 1904.

Before, timber production in timber estates. Human labor and river transportation of square logs of prime species (< 10m³ per ha)

First silvicultural attempts; ring-barking large unwanted trees after selective logging and test planting of indigenous hardwood spp.

Introduction of planned logging by FS, using animal traction and transport by train. But logging was still uneconomical → closure of FS in 1925.



Pl. 46. Houtslepen door Bosnegers in de buurt van Kabelstation, over knuppelweg, door altijd groen seizoenbos. (Bush Negroes hauling timber over a hauling road through evergreen seasonal forest in the neighbourhood of Kabelstation.)

Hauling out squarely hewn logs by manual labor.



Pl. 56. Houtvlot op de Suriname-rivier bij Berg en Dal op weg naar Paramaribo, met hut voor de vlotvoerders. (Raft on the Surinam river near Berg en Dal on its way to Paramaribo. On the raft a hut for the raftsmen.)

River transportation of logs to Paramaribo



History and Silviculture

In 1947 establishment of new FS (LBB) and first Timber Law. Concession system introduced (BSH special concession). Suriname major supplier of sawn timber and plywood for the Caribbean.

Communal forest were granted to tribal communities living in the forest, for subsistence resource use.

Second attempt to plant trees, now with fast growing indigenous and exotic species e.g. *Virola*, *Simarouba*, *Ocoumea*, and *Pinus*)



History and Silviculture

Silvicultural and Ecological research started to gain insight in germination conditions and growth performance of commercial species.

Research → natural increment comm. spp. after selective logging very low; 0.2 m³/ha/yr.

Start of artificial forest regeneration on practical scale.



Artificial Forest Regeneration

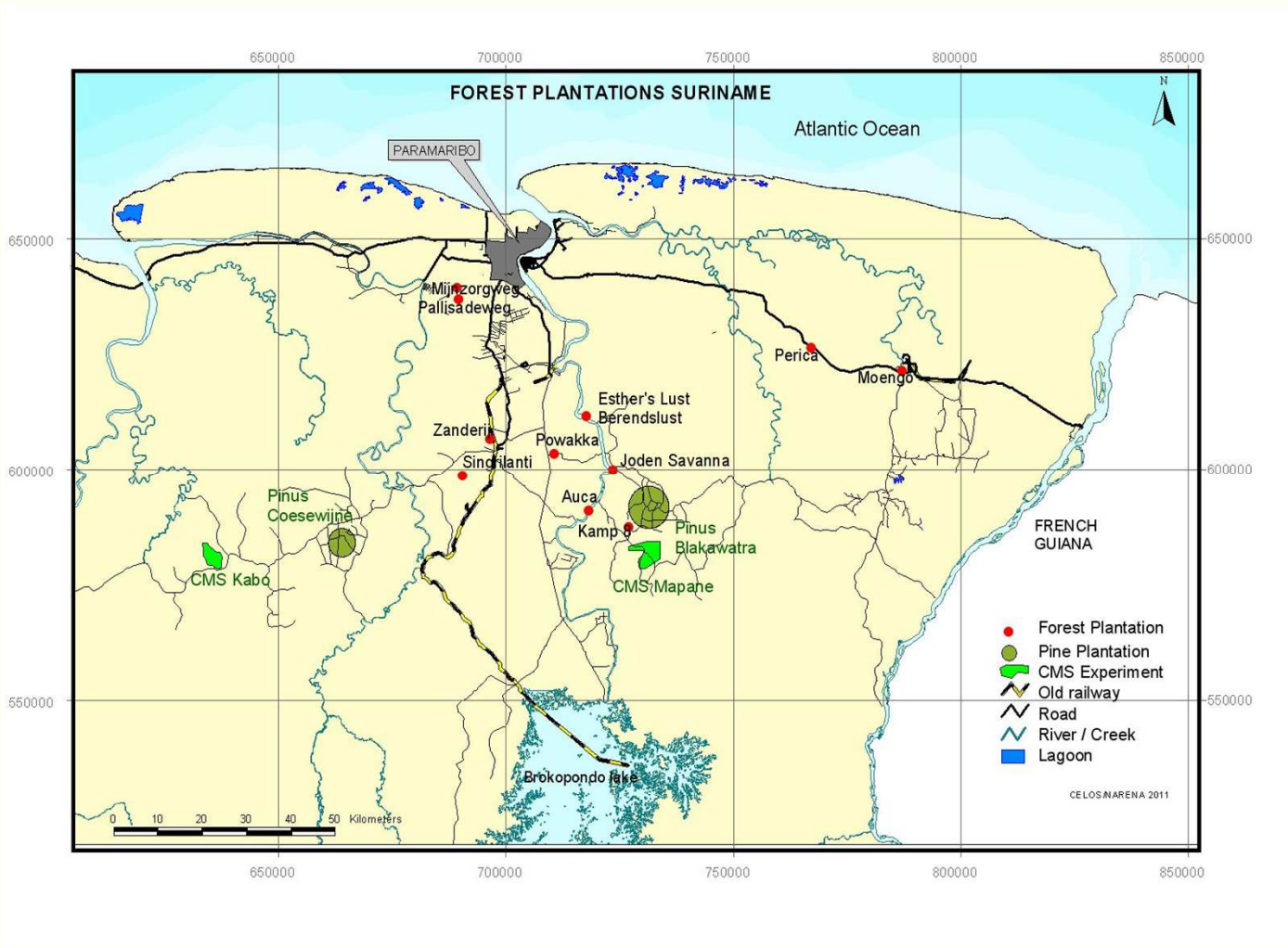
Artificial forest regeneration in Suriname 3 systems

- a) enrichment planting in lines;
- b) enrichment plantings in spots, and;
- c) establishment of uniform plantations after clearing.

Especially uniform plantations with *Pinus caribaea* expanded: financing was guaranteed.

After initial promising growth, steady decline and paper company abandoned project in 1962.

Project continued by Gov't (LBB) until the 1970s oil crisis.





Approx. 50 year old pine plantation at Blakawatra



Artificial Forest Regeneration

1980: military coup d' état → internal war

Unsafe situation in forest; LBB flees, leaving all behind.

Assessment after 1992 peace-agreement:

Forest infrastructure completely destroyed.

But also the plantations had suffered from neglect.





Artificial Forest Regeneration

Lessons learned

Large scale forest plantations; esp. monocultures with exotic spp. very susceptible to neglect.

Large scale plantations should be preceded by full-scale pilot/research project to guide mgt, silvicultural treatment & maintenance.

Tree plantations to be located with long-term vision → future land-use near urban areas.



Natural Forest Regeneration

3 periods of research into guided natural regeneration

1955- 1965: Experiments with monocyclic system (MUS).

Heavy refinement after selective logging; killing all non-commercial trees >10cm dbh.

Results: growth of comm. spp is stimulated but frequent tending/liberation necessary → Costs too high.



Natural Forest Regeneration

1965-1975: New research by CELOS (De Graaf, Boerboom).
Focus on making system cheaper.

Treatment now includes also mature, half-ripe PCTs.

Forest can be harvested in short cycles instead of one
single cut; monocyclic → polycyclic system



Natural Forest Regeneration

1975-1985: Research done in collective project by UvS and LH

More comprehensive research approach with emphasis on sustainable productivity of forest ecosystem

Silviculturists assisted by soil scientists, ecologists, hydrologists, etc. to fully test CSS

Also improved logging technique (CHS) developed in this period

CELOS Management System formulated with provisional manual



CELOS Management System

A silvicultural system for sustainable production of high quality timber in high dryland forest on relatively flat terrain

2 Components:

CHS: controlled harvesting (RIL) for efficiency and reduced damage.

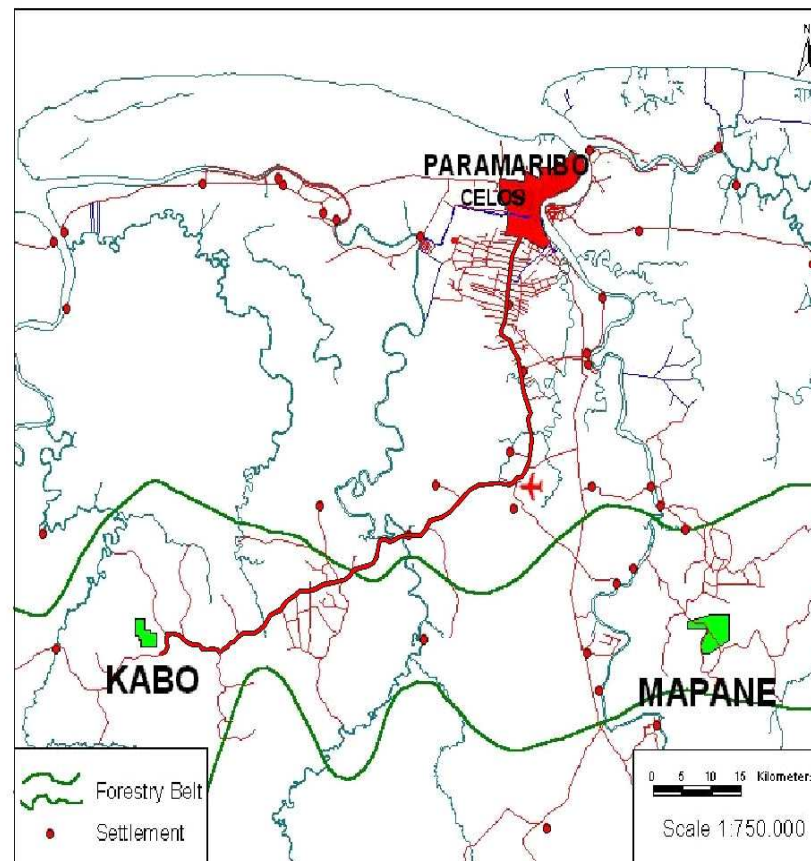
CSS: elimination of hindering, non-commercial trees so growth is stimulated and 20m³ can be harvested every 20-25 years.



CELOS Management System

Experimental plots

CELOS FORESTRY FIELDSTATIONS





MAPANEBRUG

1 0	2 20 + A3	3 40 + 0	4 V	5 20 + S3
6 V	7 40 + 0	8 0	9 20 + D3	10 40 + D5
11 20 + D5	12 V	13 40 + D3	14 20 + 0	15 0
16 20 + S5	17 0	18 40 + A3	19 20 + 0	20 20 + A5
21 40 + A5	22 20 + D8	23 40 + D8	24 0	25 V



Expt 67/9a Mapane
25 one ha plots with following treatments:

0 = control

20 = refinement with diam. limit 20cm dbh

40 = refinement with diam. limit 40cm dbh

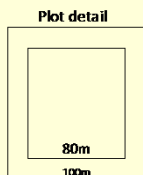
V = liberation of individual PCTs

S = liberation in 2m wide lines 12,5 m apart

A = liberation of leading PCT in 5m x 5m

D = poison-girdling competing non-commercial trees > 3 cm dbh to liberate PCTs > 3 cm dbh

3, 5, 8 = years after first intervention



100m x 100m treatment plots
80m x 80m measurement plots

Treatment codes

0 = Control

20 = Refinement with diameter limit of 20cm dbh

40 = Refinement with diameter limit of 40cm dbh

V = Liberation of individual trees > 15cm dbh

S = Liberation in 2m wide lines, line distance 12.5m

A = Liberation of leading desirable tree in 5m x 5m

D = Poison girdling of competing non-commercial trees > 3cm dbh

3, 5, 8 = years after first intervention

Expt. 67/9b

After 1975 evaluation, most promising treatment schedule, 20 + D5, carried out in 25 ha plot adjacent to Expt 67/9a



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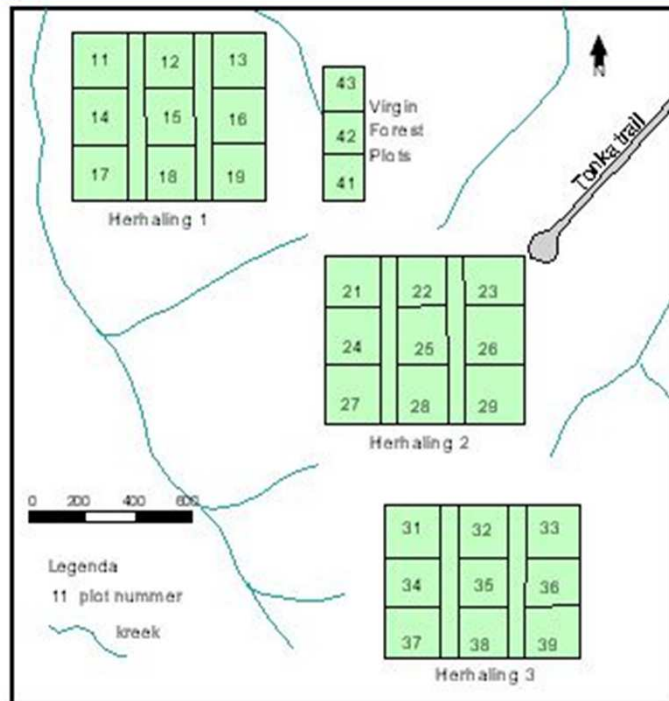
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CELOS Management System

Main conclusions from Expt 67/9a and 67/9b

- selective silvicultural treatments promoted timber production considerably;
- recruitment was not plentiful, but satisfactory;
- treatments were cheap and easy to apply;
- treatments increased mortality, but this was more than compensated by increased volume increment;
- volume production and costs indicate that the system is feasible, and more than 20 m³/ha additional gross standing volume is available in a 20 year cycle.



CMS experiment Kabo

HARVEST : 3 Levels of selective logging

E15: Removal of 1 m² of Basal Area/ha: 15 m³/ha.

E23: Removal of 2 m² of Basal Area/ha: 23 m³/ha.

E46: Removal of 4 m² of Basal Area/ha: 46 m³/ha.

REFINEMENT : 3 Levels of Silvicultural treatment

SO : Control

SR18: Refinement with 30 cm dbh limit.

SR14: Refinement with 20 cm dbh limit.



CELOS Management System

Main conclusions from Kabo experiment

- refinement with diameter limit of ca. 20 cm is too drastic in poorly stocked stands;
- refinement using 2 diameter limits 40/20-10. 20cm limit within 10m radius of PCTs and 40 cm elsewhere is more appropriate;
- a second refinement best scheduled 10 years after harvesting
- possible to log the stand again, 20 years after first harvest, but, preferable to make allowances and plan 25 years cycle.



Developments in Forest Management since the 1990s

After peace-agreement 1992 various attempts to re-animate the forest service failed-weakness and lack of funds.

1994: SE-Asian logging companies - 1 million ha concessions but according 1992 FMA max concession area 150.000 ha.

1999: reorganization of FS with assistance of FAO.

SBB took over management and inspection tasks of LBB and promotes SFM and certification.

Increase timber royalty \$0,50 - \$6.00/m³

2002: formulation of NFP.

In progress: revision FMA and drafting CoP with FAO & ITTO.



Conclusions

Silviculture in Suriname → 100 years of experimentation.
Although very feasible NR system developed no adoption or implementation.

No legal obligation for post-harvest measures in logged-over forests and no incentives for SFM and certification.

But, forestry in Suriname advancing to reform and restructure forest policy, legislation and institutions to meet modern standards of SFM and biodiversity conservation.



Questions or comments ?



Muito obrigado !