IMPACT OF UNCONTROLLED BARK HARVESTING ON THE RESOURCE BASE: information from a resource inventory in Umzimkulu forests

Coert J Geldenhuys
Dept of Forest Science, University of Stellenbosch
c/o Forestwood cc, Pretoria, South Africa
cgelden@mweb.co.za

Outline

- General background
- The Bark Problem
- Study design & results
  - Resource condition & management
- Lessons learned

Background

- Observations in many areas of natural forest & woodland
  - Uncontrolled, unsustainable resource harvesting practices & rates
  - In spite of National Forests Act 1998 & Provincial Ordinances
- Bark use for traditional medicine impact on species, ecosystems & future business
- NEED: Integrated action plan for sustainable business development through adaptive management research
- We can look at impact from two sides, using
  - Resource inventory in forest (Umzimkulu)
  - Market information in urban areas (Johannesburg)

CP Wild study on Bark for Traditional Medicine

- 4 species selected from natural forest:
  - *Ocotea bullata, Curtisia dentata, Rapanea melanophloeos & Prunus africana*

- 4 main study components
  - Resource management studies
  - Laboratory studies on genetics & chemistry
  - Development of alternative resources
  - Trade chains & business development

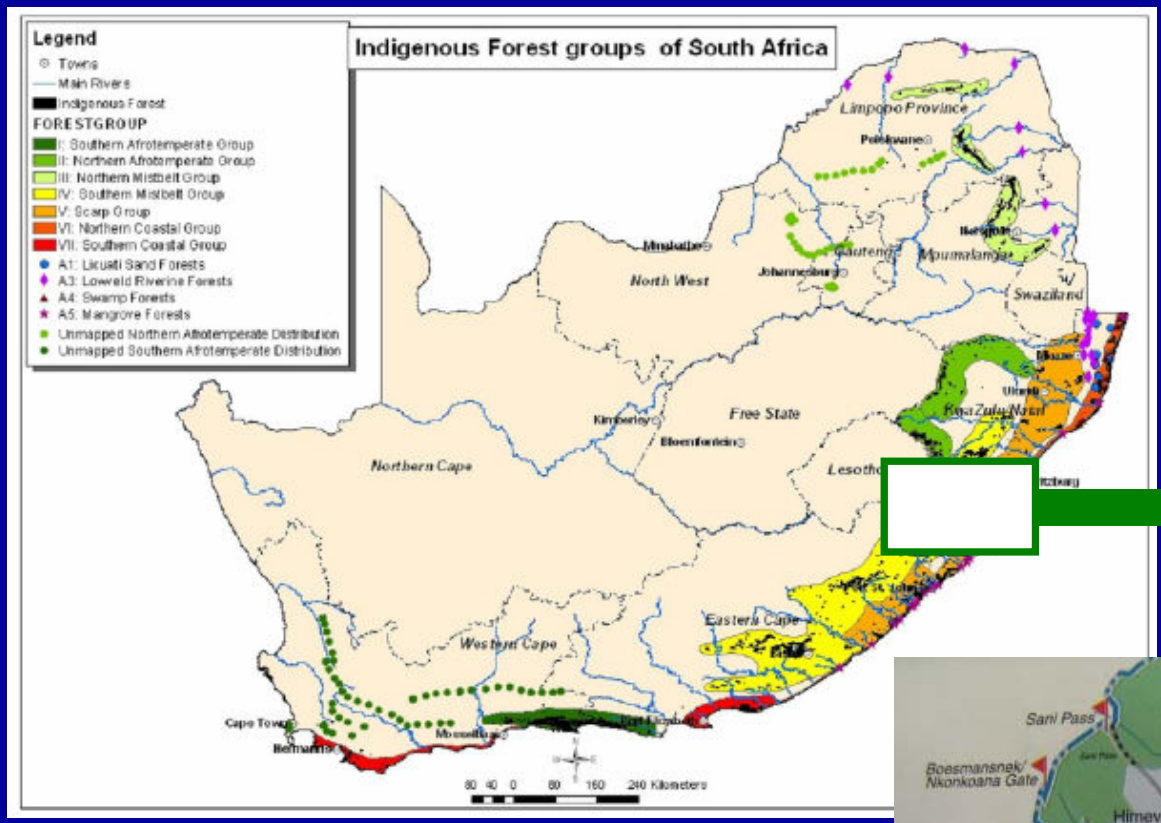
- Focus of this presentation: Resource management
  - Reconnaissance of harvesting impacts in resource areas
  - Inventory design, implementation & results

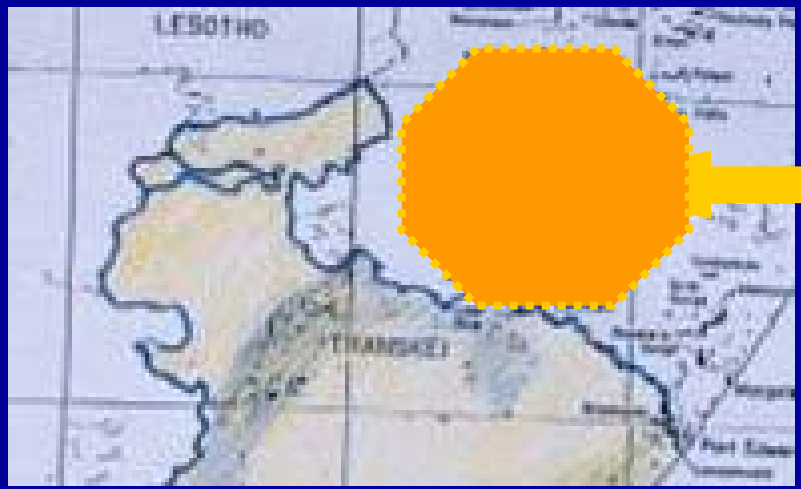
Observations during Reconnaissance survey

Degrading forest

Flourishing Market

Declining protected species:
Ocotea bullata & Prunus africana


Legend
Towns
Main Rivers
Indigenous Forest
FORESTGROUP
I: Southern Afrotemperate Group
II: Northern Afrotemperate Group
III: Northern Mistbelt Group
IV: Southern Mistbelt Group
V: Scarp Group
VI: Northern Coastal Group
VII: Southern Coastal Group
A1: Licuati Sand Forests
A3: Lowveld Riverine Forests
A4: Swamp Forests
A5: Mangrove Forests
Unmapped Northern Afrotemperate Distribution
Unmapped Southern Afrotemperate Distribution
Indigenous Forest groups of South Africa
Limpopo Province
North West
Gauteng
Mpumalanga
Swaziland
Free State
KwaZulu-Natal
Northern Cape
Eastern Cape
Western Cape
Johannesburg
Kimberley
Bloemfontein
Cape Town
Mossel Bay
Port Elizabeth
80 40 0 80 160 240 Kilometers


LESOTHO

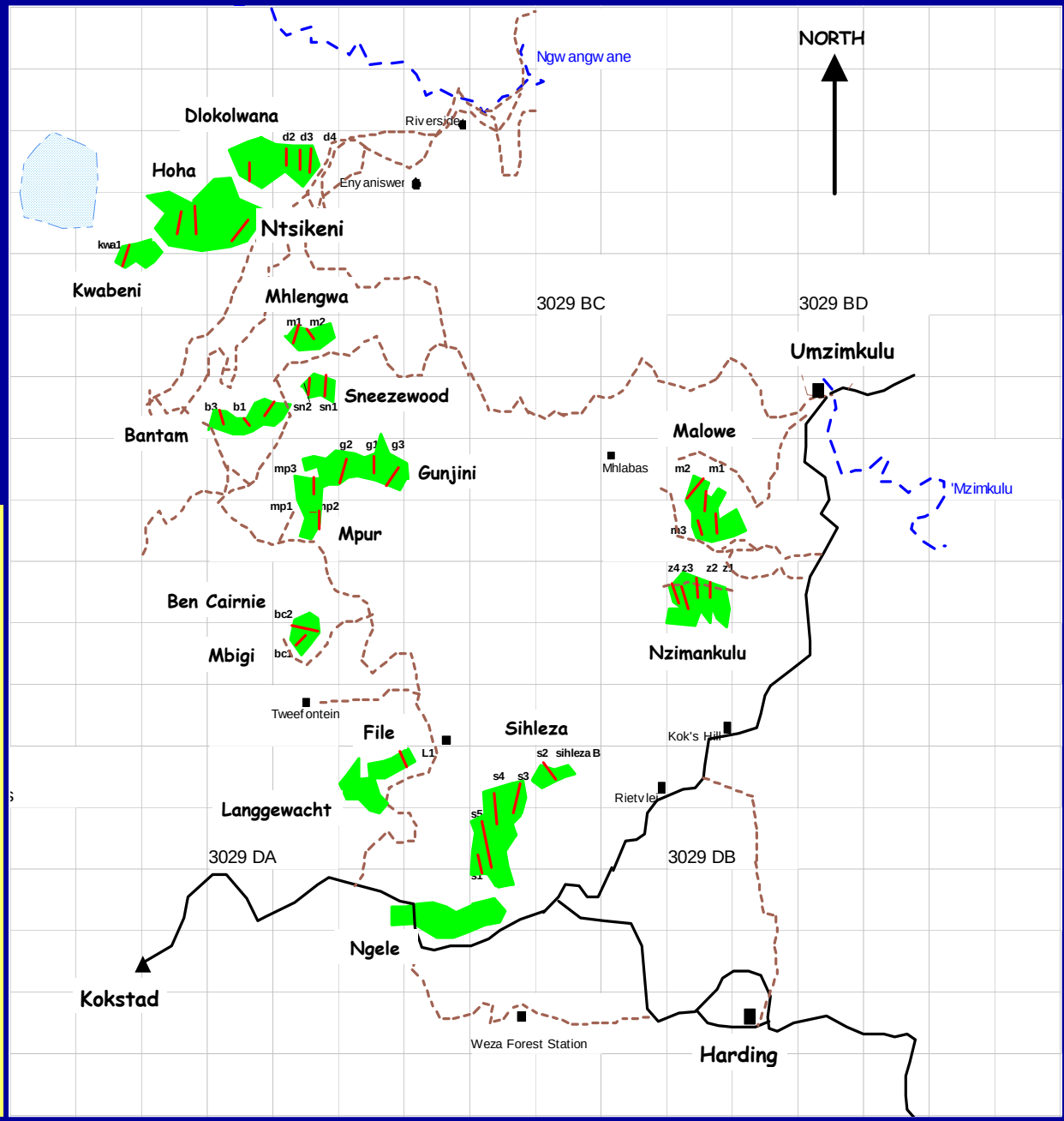

Howick
Wartburg
Tongaat
Sani Pass
PIETERMARITZBURG
Boesmansnek/
Nkonkoana Gate
Boston
Cato Ridge
Verulam
Himeville
Thornville
Camperdown
Pinetown
Underberg
Donnybrook
Richmond
Queensburgh
DURBAN
R617
Creighton
Mid Illovo
Kingscote
R56
Amanzimtoti
Ixopo
Illovo Beach
Umkomaas
Highflats
Matatiele
Cedarville
Scottburgh
Park Rynie
Umzinto
Pennington
Kokstad
Sezela
Harding
Weza
Hibberdene
Melville
TO
EAST
LONDON
Umtentweni
Port Shepstone
Shelly Beach
Uvongo
Margate
EASTERN CAPE

Resource inventory: to develop basis for improved resource management

13 forests
in Umzimkulu District

37 transects
389 plots of 0,04 ha

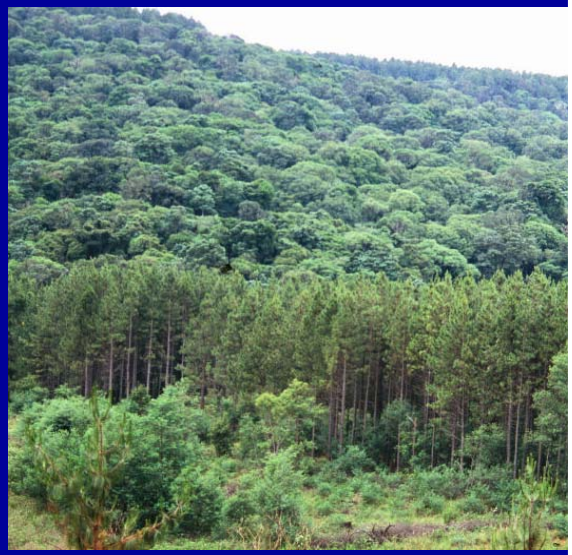
6 weeks



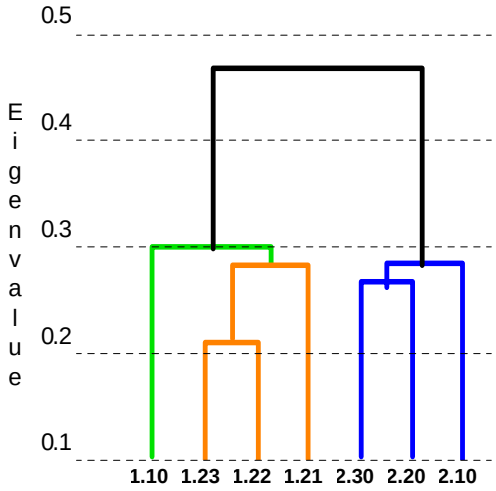
Information recorded

- Species & DBH
- For bark-stripped species
  - Transect slope
  - Bole length
  - Crown health condition
  - Size of bark wound
  - % bark removed round stem

Forests sampled and Forest types

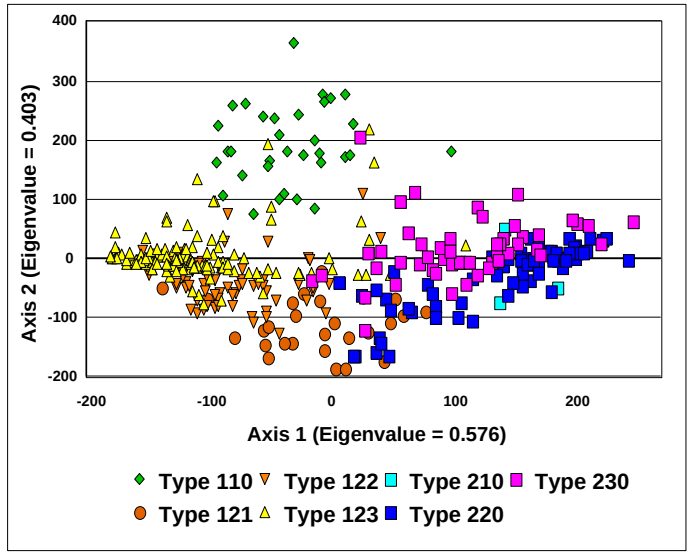


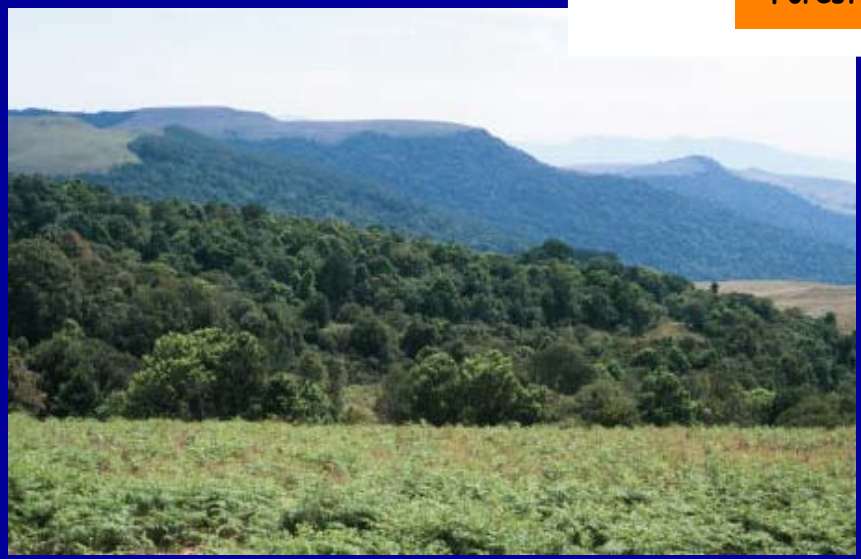
a. TWINSPAN classification



Forest Associations

b. DCA Ordination (CANOCC



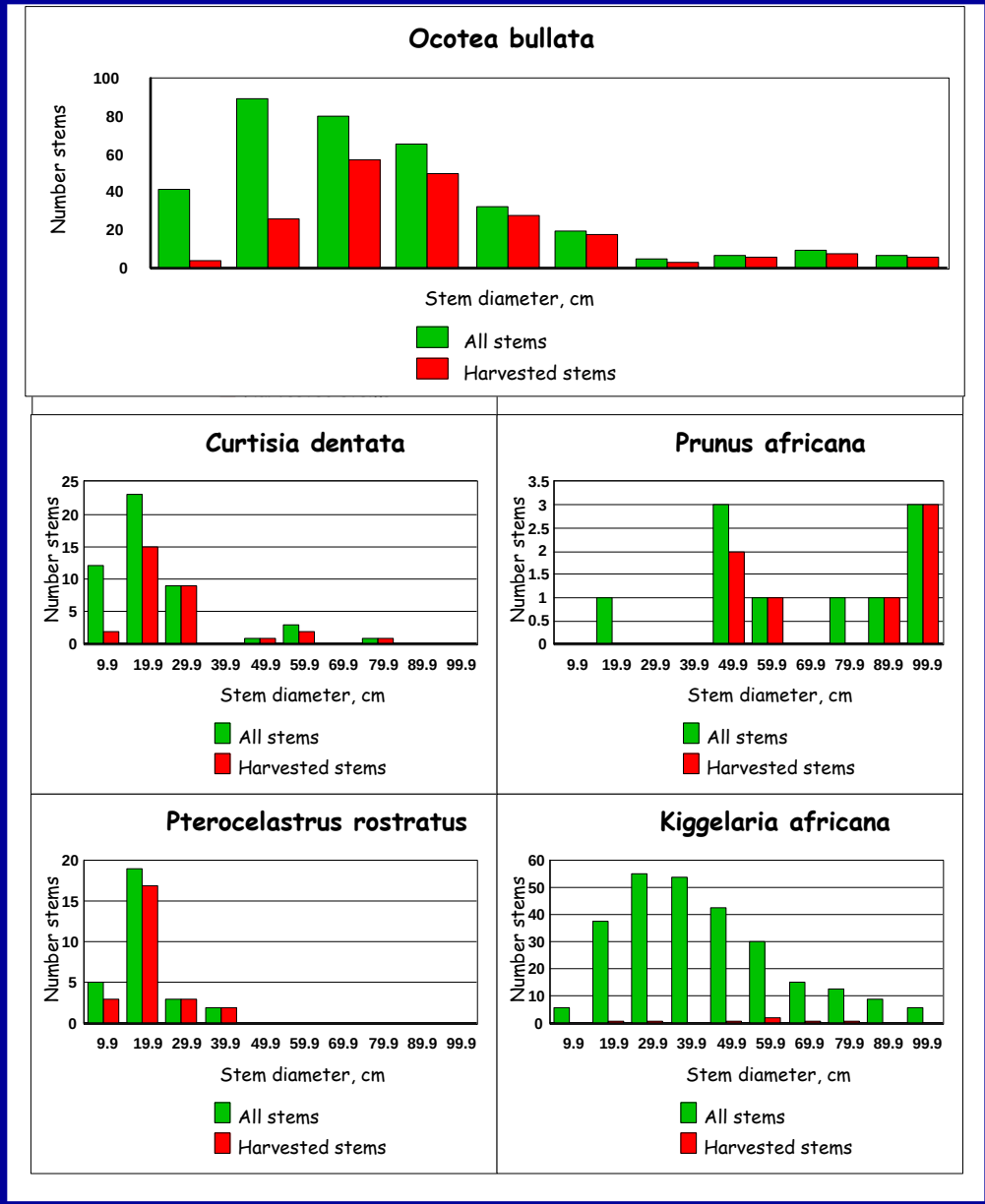


95 species recorded, 36 species harvested
7281 stems recorded, 6.1% harvested

Allophylus dregeanus	148	8.1
Apodytes dimidiata	22	9.1
Bersama swinnyi	11	18.2
Buddleja saligna	30	3.3
Burchellia bubalina	6	16.7
Calodendrum capense	187	2.7
Canthium mundianum	30	3.3
Cassipourea gummiflua	7	14.3
Cassine papilosa	8	25.0
Celtis africana	267	4.5
Cryptocarya myrtifolia	33	15.2
Cryptocarya woodii	118	16.1
Dovyalis lucida	6	16.7
Ekebergia capensis	11	18.2
Euclea natalensis	12	8.3
Heywoodia lucens	55	3.6
Kiggelaria africana	273	2.6
Maytenus peduncularis	15	6.7
Ochna holstii	4	25.0
Olinia emarginata	7	14.3
Podocarpus falcatus	81	3.7
Ptaeroxylon obliquum	387	1.8
Rhus chirindensis	43	16.3
Scolopia mundii	64	7.8
Syzygium gerrardii	29	3.4
Trichocladus ellipticus	240	5.8
Xymalos monospora	1646	0.2
Zanthoxylum davyi	215	1.9
Casearia gladiiformis	6	50.0
Chionanthus peglerae	11	36.4
Curtisia dentata	50	60.0
Ocotea bullata	359	57.4
Pittosporum viridiflorum	2	100.0
Prunus africana	10	70.0
Pterocelastrus rostratus	29	86.2
Rapanea melanophloeos	124	38.7

Population status of key bark-stripped species

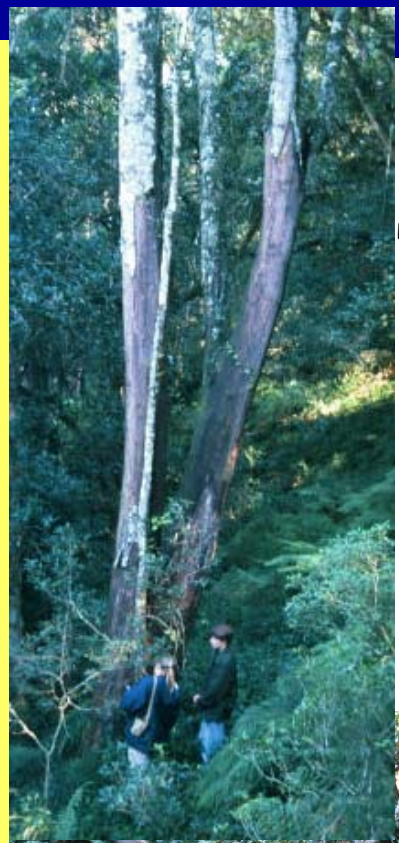
- *Affected species have bell-shaped DBH curves*
- *Few species severely impacted*
- *Only smaller trees not harvested*
- *O. bullata* has no single stems <15 cm DBH, only coppice stems on stumps
- *P. africana* has no young stems – only few seedlings underneath parent trees

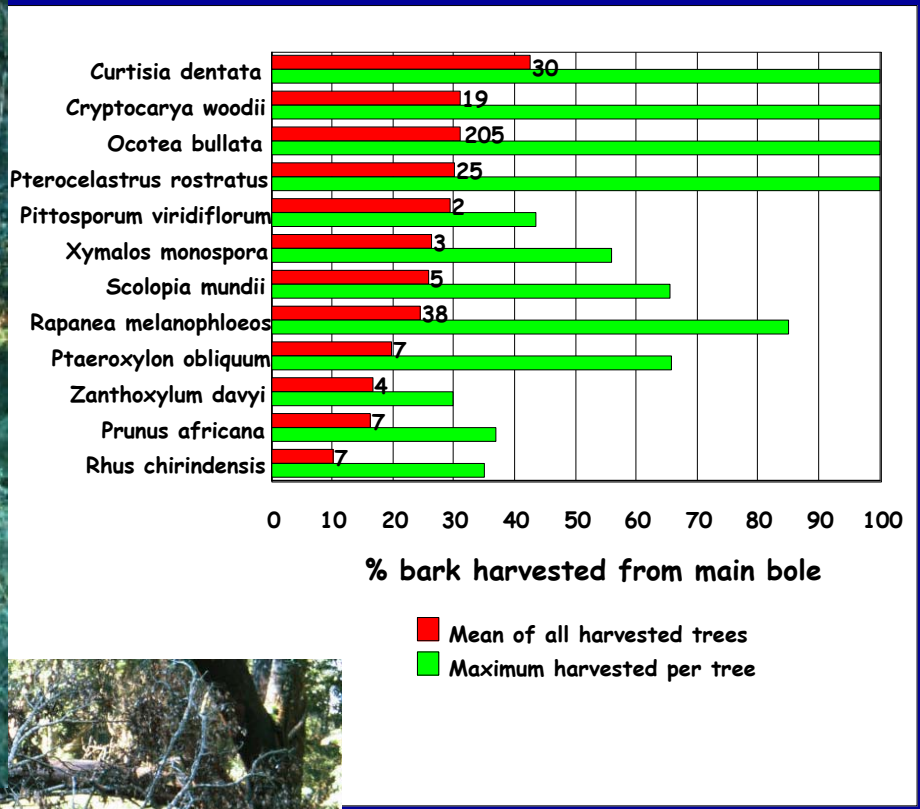


SPECIES DO NOT REGENERATE IN UNDISTURBED FOREST!

Intensity of bark harvesting

- Important tree species intensely harvested
- Bark removal
  - often totally around stem
  - Generally to 2-3 m height
  - often to 10 m
  - occasionally total bole
- Sometimes trees are cut



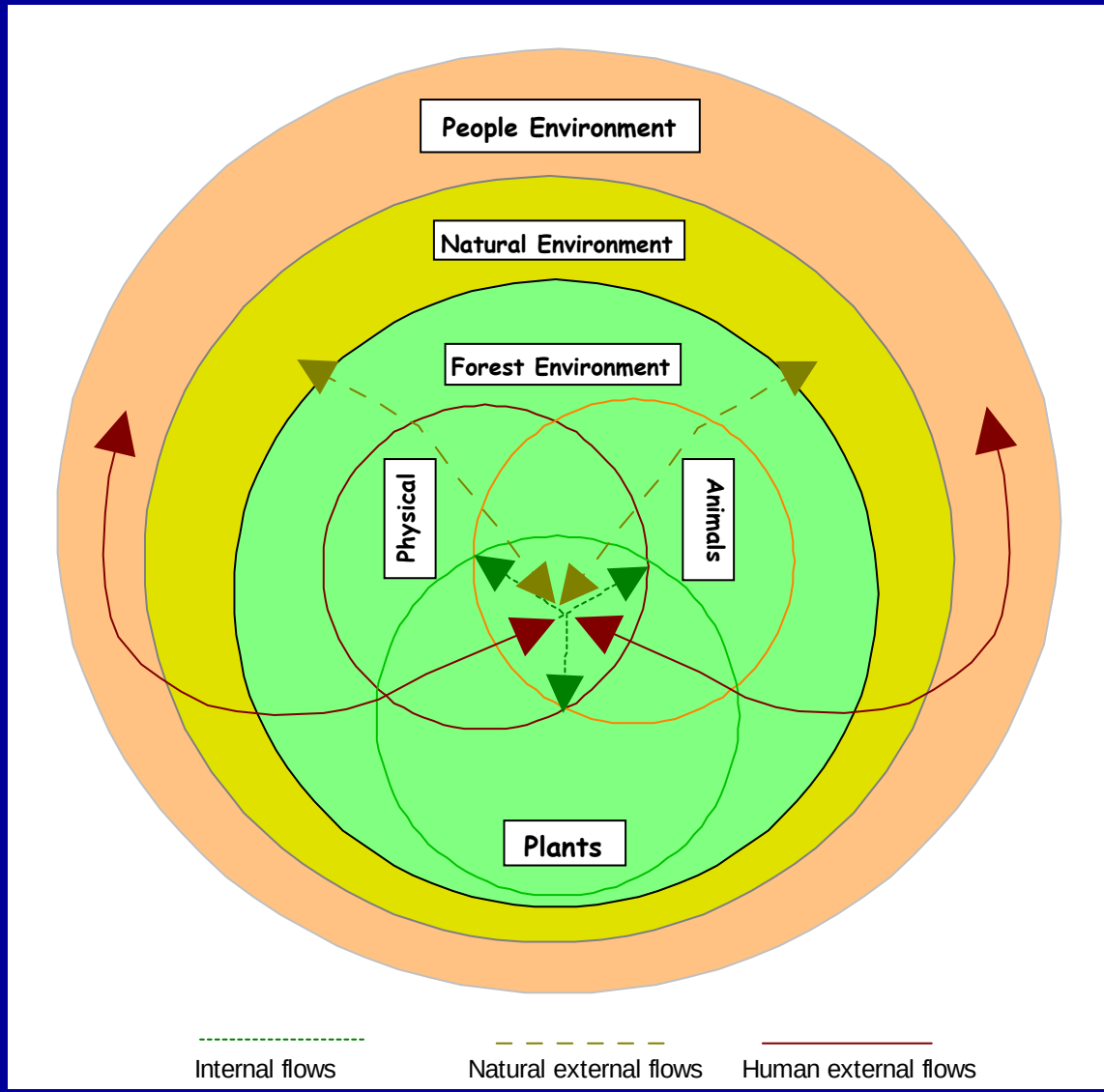


Internal & external flows of Natural capital

Capital = Biophysical system

Flows of capital = Value to

- Environment
- Society
- Individuals



Costs & benefits

Potential value of Forest Capital

Forest area = 1114 ha

4 species (*O bullata, P africana, R. melanophloes, C myrtifolia*)

Timber volume = 57 957 m^3

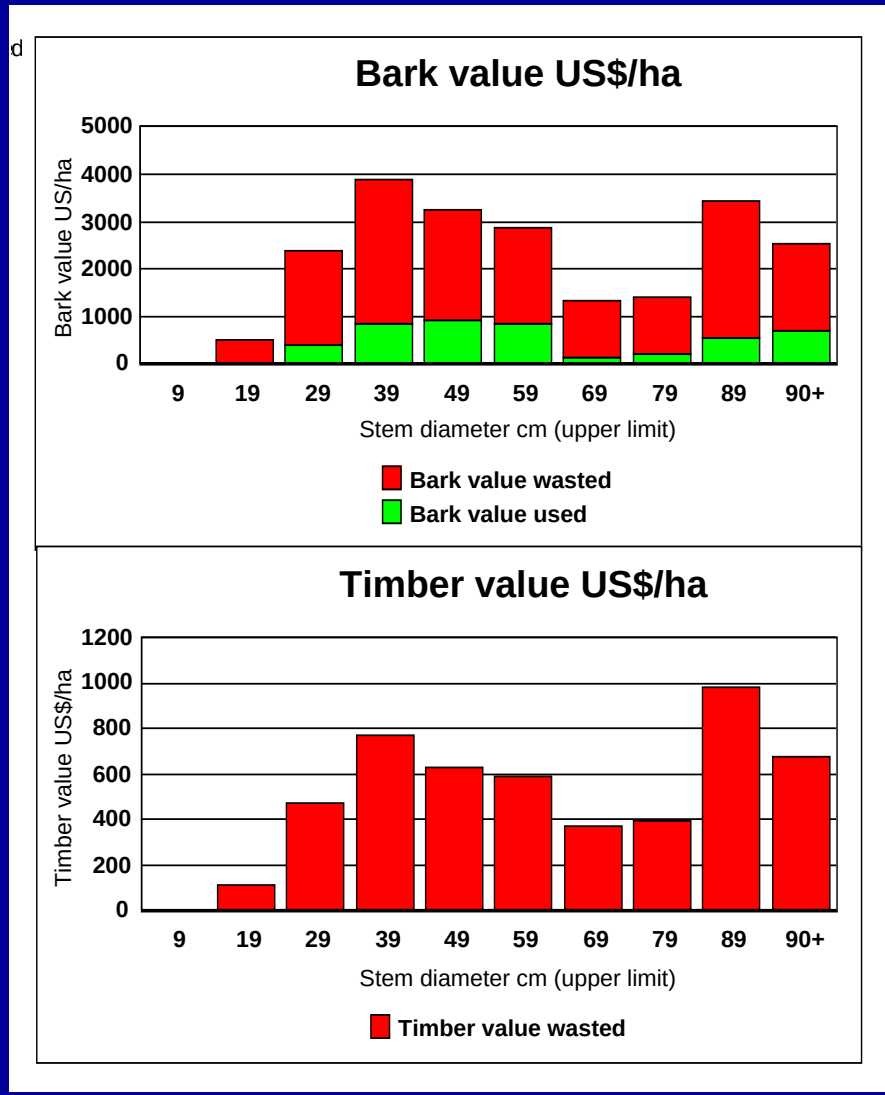
Timber value = US$15.2 million

Actually used = Zero

Bark volume = 8.91 million kg

Bark value = US$30.5 million

Actually used = US$7.6 million (25%)



Dead trees = LOST VALUE (ecologically & economically)

Harvest method affects tree survival

- **Decline in crown condition:**
  - -Not related to amount harvested as % of total
  - -Decline serious if debarking is >80% of circumference (ring-barking)

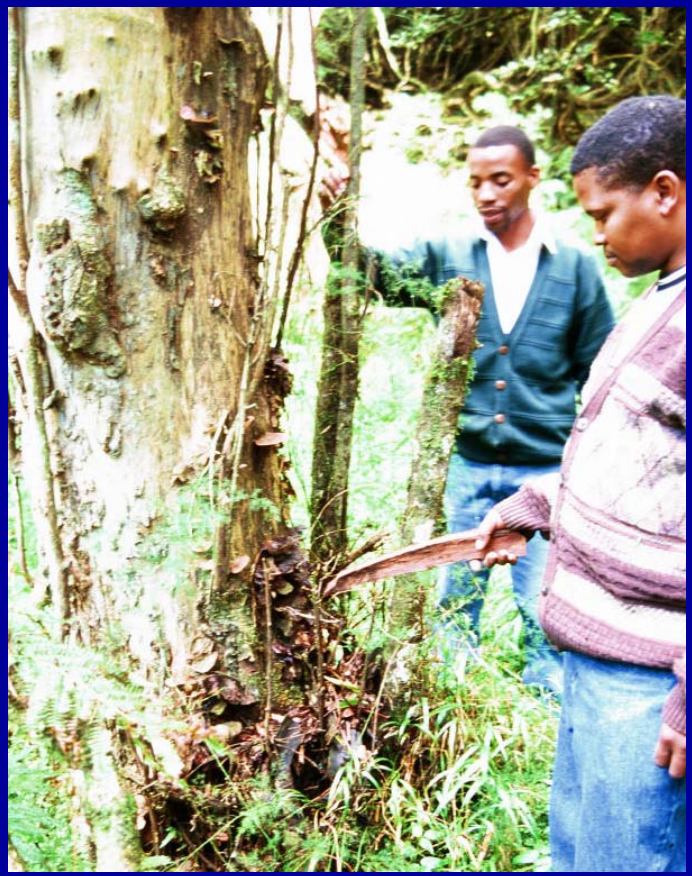
Implement sustainable harvesting practices

Experiment implemented in George-Tsitsikamma forests to assess harvest & recovery rates

Method *O. bullata* *C. dentata* *R.melanophloeos*

Controlled harvesting: 1 m long vertical strips of 5 cm width

Tree response observed during inventory
Basis for improved resource management



Coppice develops, but browsed; if tree dies, coppice also dies

Tree cutting stimulates coppice regrowth

Coppice grows 3 – 4,5 m in 18 months & offers: Tree survival, Rotational harvesting, Use of leaves

Fell dying trees to stimulate coppice growth (+ protection), to use all bark (additional 60-80%) & timber, in rotation

Results from Re-survey in 2004

- *P. africana:*
  - 9 trees harvested, 1 died with no coppice regrowth.
- *O. bullata:*
  - 126 trees recorded
  - Few cut
  - 80 harvested standing (63.5%)
    - 66 dead (82.5%)
      - 34 (51%) showed some sign of sprouting.
  - 50% of trees of protected species lost from system.

Discussion: Is the impact so devastating?

- Much devastation occurred
  - NO CONTROL!
  - Loss of trees of protected species
  - Lost value of bark & timber
- Forest not a museum piece – A DYNAMIC SYSTEM!!

Discussion: What to do?

- Understand species requirements & responses
  - Target species require more light (disturbance) for seedling establishment:
    - Disturbance necessary?
    - CITES regulations?
  - Species differ in bark recovery & coppicing ability

- Adapt management system to species characteristics
  - Cut dying trees to ensure survival via Coppice management
  - Harvest more bark (on average 70% of *Ocotea*)
  - Utilize timber

- Focus of FRP-DFID study
  - Natural evergreen forests (South Africa & Malawi)
  - Miombo woodlands (Malawi & Zambia)

THANKS FOR YOUR ATTENTION