

# COCONUT WOOD HIGH QUALITY FLOORING *A NEW POTENTIAL INDUSTRY FOR THE PACIFIC*

## AN INTRODUCTION

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# WHY COCONUT?

- WE HAVE LIVED WITH COCONUTS FOR A LONG TIME
- ENTWINED WITH OUR EVERYDAY LIFE
- REDUCED IMPORTANCE GAUGED BY ONE PRODUCT ONLY
- EXISTING RESOURCE READY TO BE TAPPED
- POTENTIAL TO PROVIDE RURAL LIVELIHOODS





# DIVERSIFICATION & VALUE ADDING



# CONSTRAINT BUT IMPORTANT RESOURCE





## EXTENT OF RESOURCE

- PACIFIC – 0.5 MILLION HECTARES
- SAMOA 93,000 HA(16% SENILITY)
- FIJI 60,000 HA (60% SENILITY)
  - i.e. 3.6m stems
  - total log volume of 3.5 m m<sup>3</sup>
  - potential millable volume of 1.0 m m<sup>3</sup>
  - high density sawn timber volume 0.3 m m<sup>3</sup>
  - estimated sawn timber value \$F210 m
  - high quality flooring valued at \$F600 m
  - issues relating to inventory, ownership, accessibility
  - component of any coconut replanting program
  - potential to source from other Pacific countries



## ORIGIN OF PROJECT

- 2004 REGIONAL WORKSHOP
- REVIEW OF POTENTIAL END USES
- HIGH QUALITY FLOORING
- APPROVED BY ACIAR IN 2007 (FIJI & SAMOA)
- PARTNERS – QLD DEEDI, SPC LRD, FIJI & SAMOA FD, CIDA FIJI, SSTT, PALMWOOD, STRICKLAND BROTHERS SAMOA



# OBJECTIVES OF PROJECT



TEAM MEMBERS ARE NOW GOING TO PRESENT  
THE MAIN RESULTS OF WORK DONE INCLUDING THEIR  
PRACTICAL IMPLICATIONS







# Technical properties of coconut wood

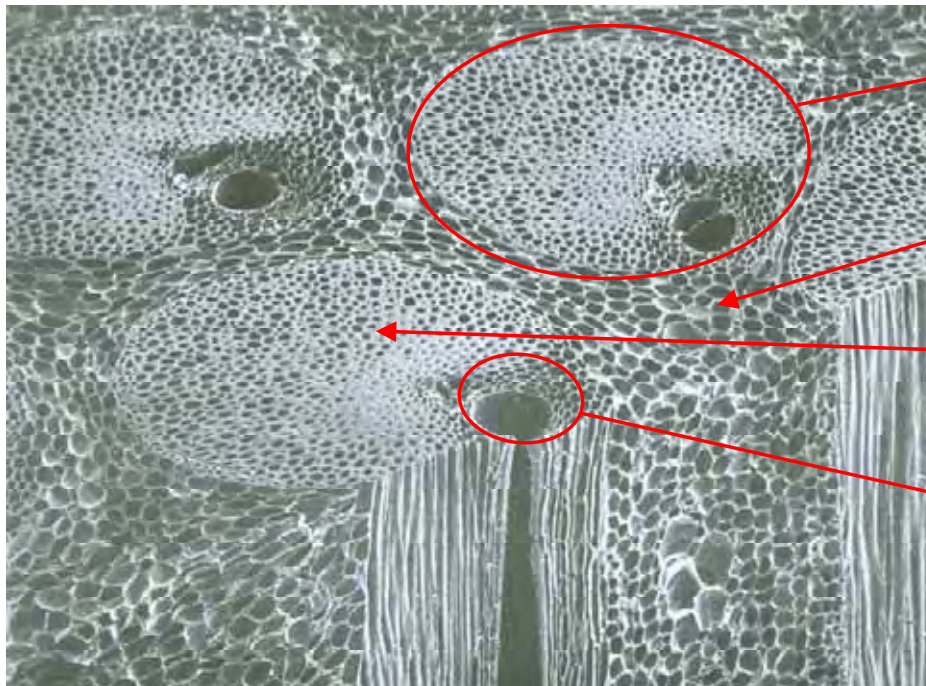
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# Coconut wood is not wood... it is an herb



Cocowood



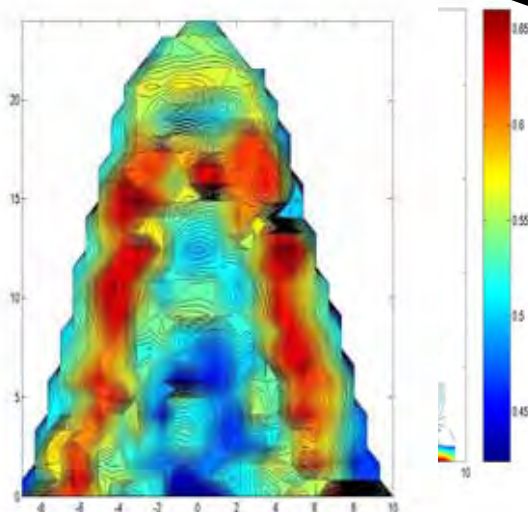
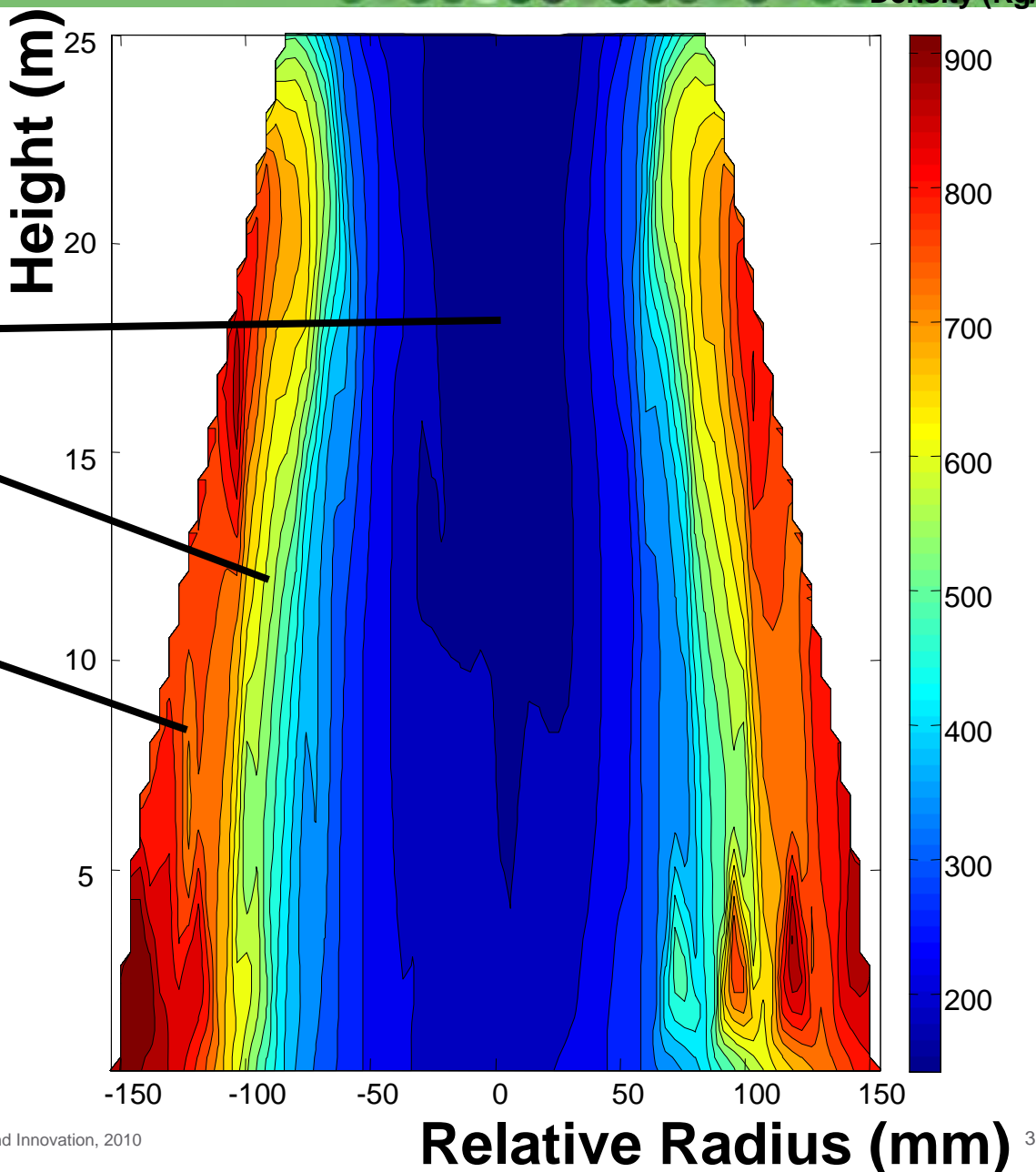
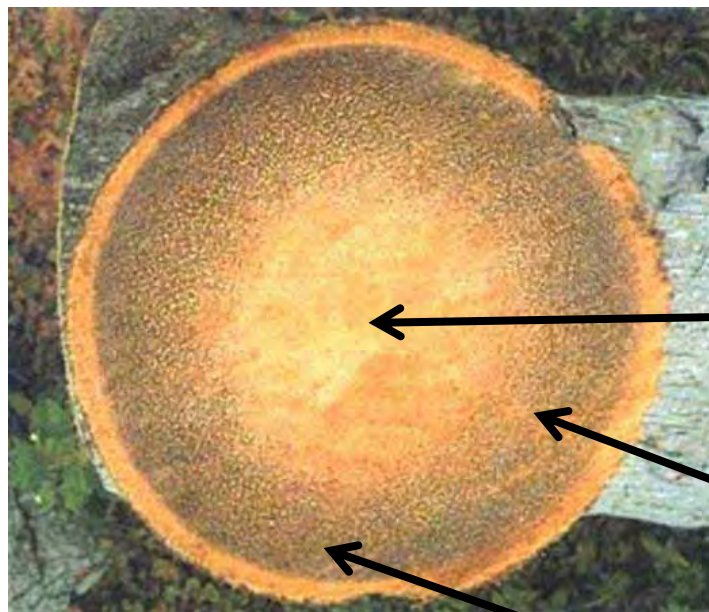
Fibrovascular bundle

Parenchymatous ground tissue

Sclerenchyma fibres

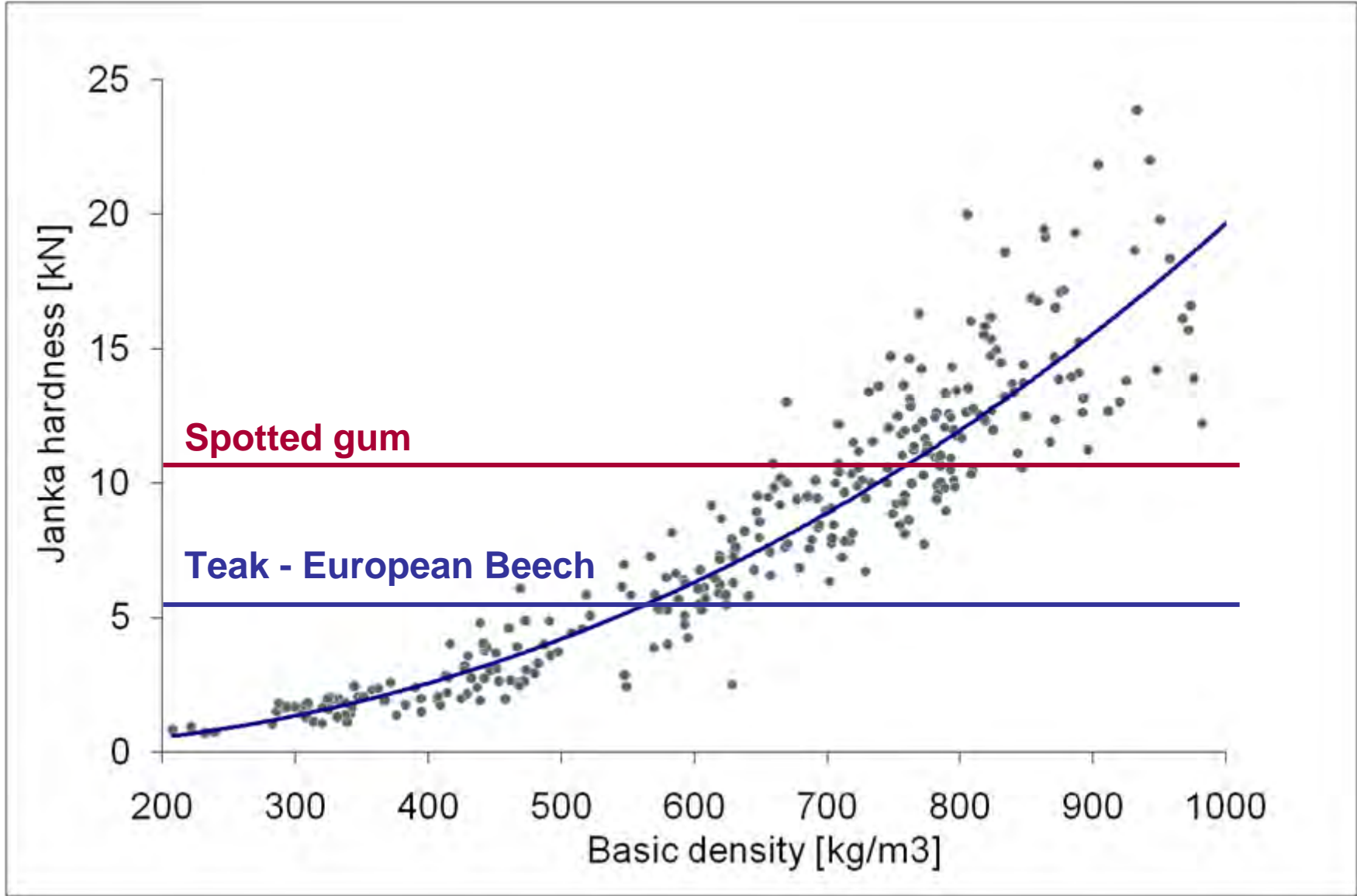
Vascular tissue (Xylem and Phloem)



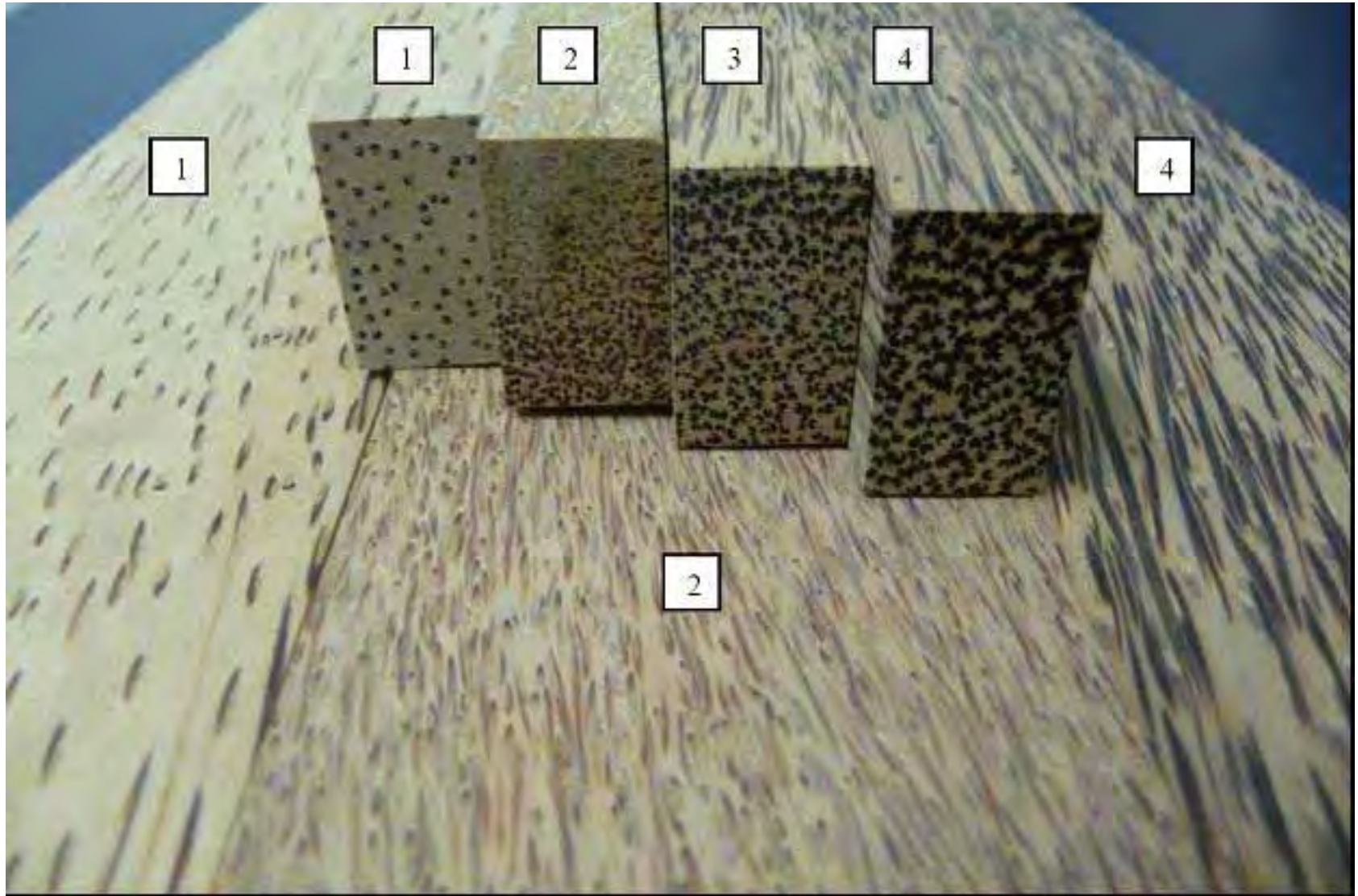






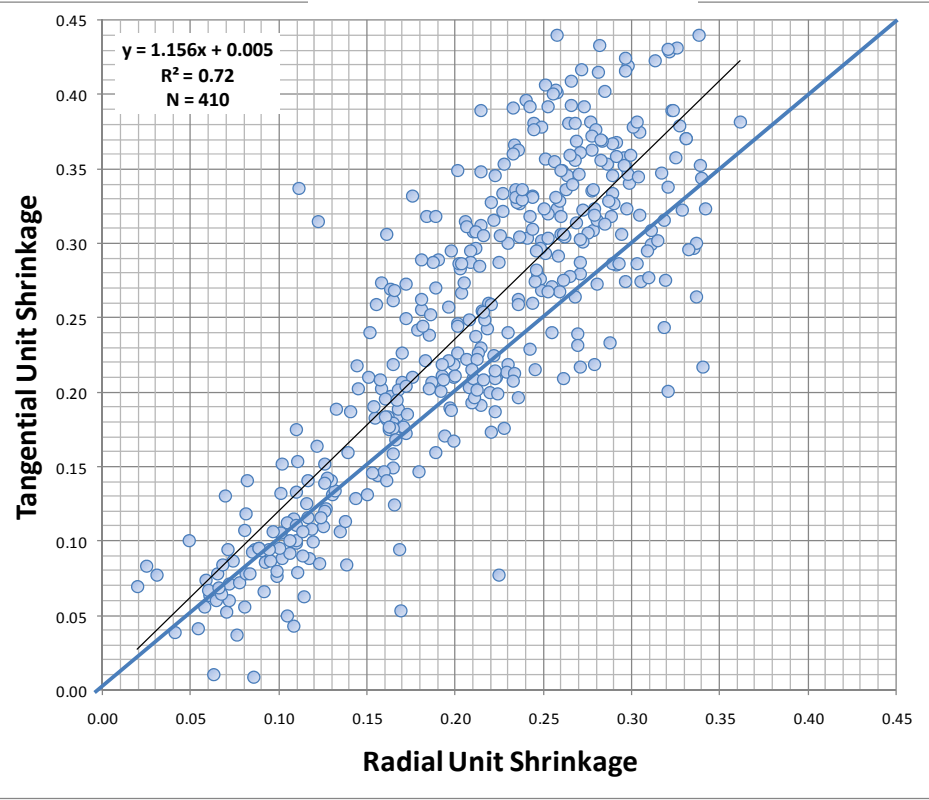




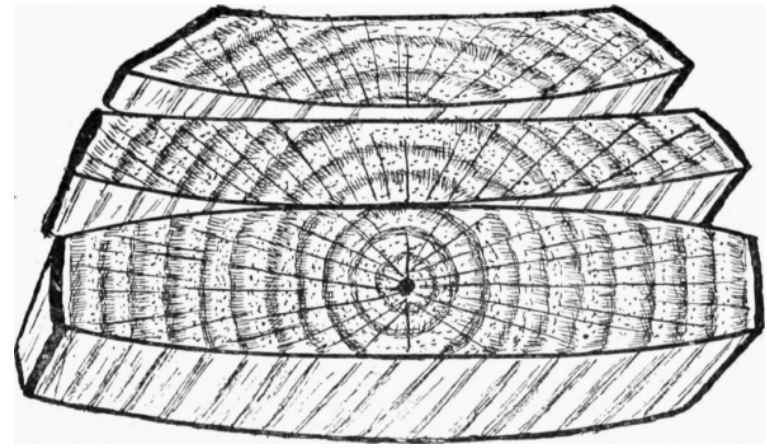




# Cocowood

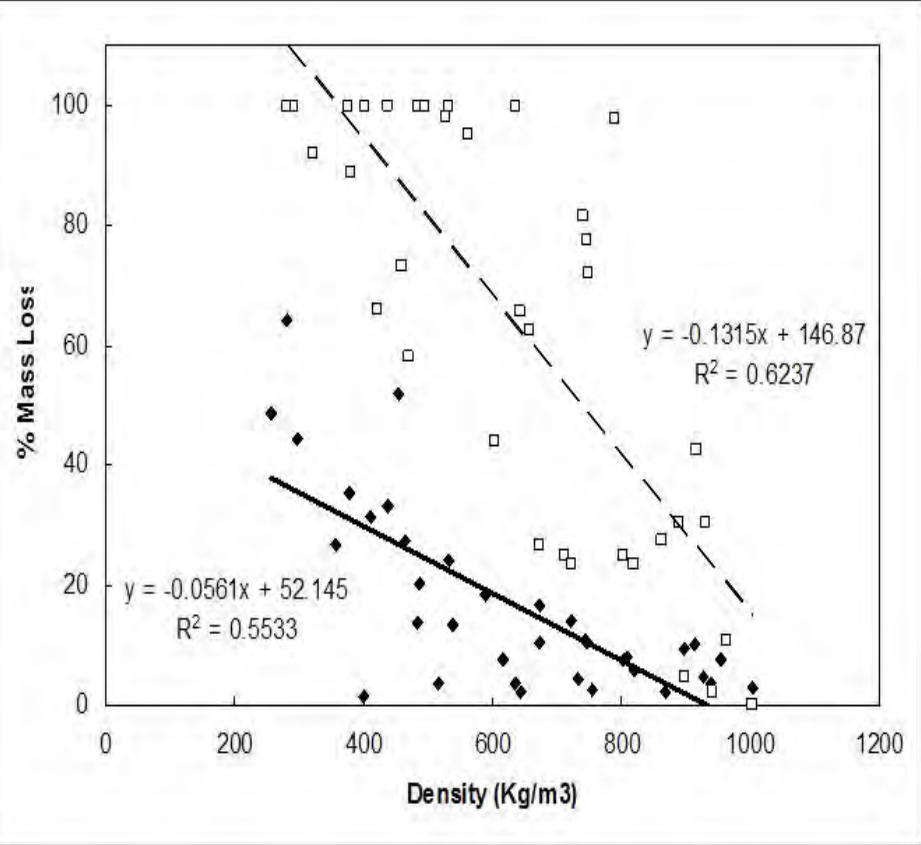


# Wood



# Durability

*Cocowood shed  
More than 5 years old*



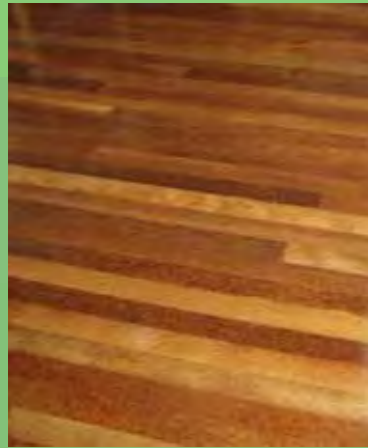
*Termites*



# Be aware, Cocowood... is not wood!







# COCONUT WOOD HIGH QUALITY FLOORING

## LOGGING, LOG SELECTION AND MILLING

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# Outline

- Coconut Logging
  - Fiji
  - Samoa
- Palm and Log Selection
  - Palm selection
  - Log selection
- Milling Process
  - Sawing
  - Treatment
  - Stacking and drying



## Coconut Logging - Samoa



- Coconut logging in Upolu (Mulifanua & Samatau) and Savaii (Salalevalu) – Wood properties trial.

## Coconut Logging - Fiji



Coconut Logging in Savusavu (Nagigi) and Taveuni (Vunivasa estate) – For the wood properties trial.



# Palm Selection



- Age of trees
- Trees not bearing nuts

- Height
- Absence of bark scars (fallen branch)

# Log Selection



- High density wood – darker part of the stem
- Straightness



# Milling Process - Sawing



- Bandsaw cutting – Forestry Band sawmill ( Suva)
- Circular saw cutting – Strickland Bro. Portable mill (Apia, Samoa)

# Milling Process

## Preservative treatment



- Susceptible to stain, mould and insect damage
- Old treatments not safe
- New treatments found to protect cocowood



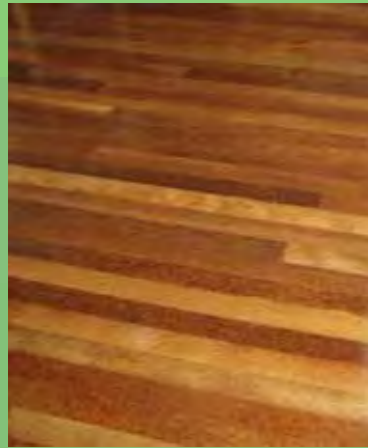
# Milling Process - Stacking & Drying



- Stacking by grade - high, medium and low dense
- Packet to be filleted before drying
- Cocowood stacks to be dried under cover.







## Secondary processing and products

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## Secondary processing

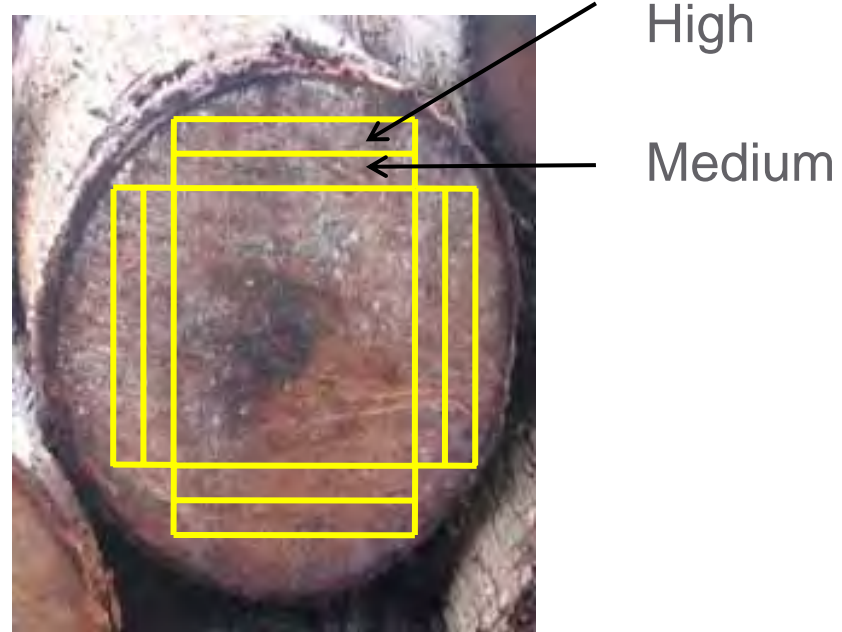
- grading
- drying
- machining





# Grading

- boards sorted by hardness
- high and medium hardness required for flooring



# Drying

- Improves
  - stability
  - hardness
  - transport costs
  - strength and stiffness
  - resistance to pests





# Kiln drying

- essential to reach target moisture content for export
- high energy costs offset by faster throughput
- complete control over drying conditions and quality





10 m<sup>3</sup> gas-assisted solar kiln was installed at Forestry Department to run research trials (\$100,000 FJD).





# Machining

- Compared with most hardwoods, cocowood machines require:
  - sharper tool edges
  - more frequent maintenance
  - slower feed speeds
- Optimised feed speeds are now known for planing, moulding and sanding to produce excellent quality



# Products

- Engineered flooring
  - Laminated pancake construction
  - Re-sawn
  - Glued to plywood
  - 133 mm x 15 mm





## Products

- Flooring
- Furniture
- Columns
- Laminated bench tops
- Step treads

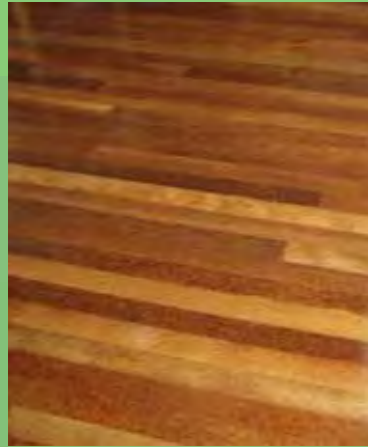


## Secondary products

- Plant growing media and mulch
  - properties within suitable range (water retention, pH, etc)
- Ethanol
  - lower starch content than anticipated
  - probably not feasible
- Coreplate, blockboard
  - cocowood has suitable properties
  - competition from existing products







## Economic analysis

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# Shanghai Expo 2010 case study

## Project team economic research and analysis



# China Expo case study

- Pacific Pavilion, Shanghai 2010



## Architect specification

- Fiji joinery and flooring
- 5 containers of mahogany joinery
- 1 container of cocowood T&G flooring
- Signed agreement for flooring order
  - $26 \text{ m}^3 \times \$1,700 = \mathbf{\$44,200}$



- Sawmill costs
  - Log purchases
    - 680 logs @ \$8 = \$5,504
  - Milling costs
    - \$70/m<sup>3</sup> log input = \$7,210
  - Shipping Savusavu to Suva
    - \$35/m<sup>3</sup> x 35 m<sup>3</sup> = \$1,225

**Total sawmill costs = \$13,939**

- Sawmill sale to Woodworks
  - $\$700/\text{m}^3 = \$24,500$


**Total sawmill net profit before tax**  
**\$10,561**

## Woodworks downstream processing

- Kiln drying
- Machining
- Grading
- Docking
- Packing

**35 m<sup>3</sup> @ \$300 = \$10,500**



- 
- Woodworks processing costs + green, sawn purchase
    - $\$10,500 + \$24,500 = \$35,000$
  
  - Woodworks sells FOB Suva
    - $26 \text{ m}^3 @ \$1,700 = \$44,200$
  
  - Less local costs (shipping, fumigation, container moving, licenses, etc) \$1,000
    - Net revenue for one container = \$43,200
  
  - Less sawmill supplier's invoice = \$24,500
  
  - Less Woodwork's cost \$10,500

Net profit export \$8,200

- Additional revenue
  - Local sales net profit  $9 \text{ m}^3 - 2 \text{ m}^3$  (waste)
  - $7 \text{ m}^3 @ \$500 = \$3,500$

**Total net profit Woodworks before tax**  
**\$11,700**

## The result

- Joinery supplied and installed
- Unable to secure supply of green boards for flooring order
- Cocowood had to be supplied by Philippines company



# Project economic analysis

- Scenario-
  - Fiji processing facility, 2,500 stems per annum
  - 9 m<sup>2</sup> per stem
  - Annual output 22,500 m<sup>2</sup> per annum
  - Conservative retail price \$40/m<sup>2</sup>

# Assumptions

- Capital costs \$550,000; depreciation schedule 10 years
  - Sawing plant
  - Kiln drying
  - Drymill plant
- Labour costs \$176,000
  - Management and engineering
  - Administration
  - Labour

# Assumptions

- Profit \$106,036, break even retail price \$30/m<sup>2</sup>
- Sensitivity analysis
  - Not sensitive to
    - capital cost
    - labour costs
    - interest rates
  - Highly sensitive to
    - throughput per annum
    - stem conversion ratio





# COCONUT WOOD HIGH QUALITY FLOORING – A NEW POTENTIAL INDUSTRY FOR THE PACIFIC

Samoa Market Potential

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# Market Potential for Samoa

- Flooring
- Furniture
- Handicrafts
- Round columns
- Laminated surface

# Local market





# Local market



# Issues – future developments

- Market access – marketing strategies (Ex. European market)
- Drying systems through adapted technologies (power mills, solar, bioenergy...)
- Utilisation of low density material
- Activated charcoal





# COCONUT WOOD HIGH QUALITY FLOORING – A NEW POTENTIAL INDUSTRY FOR THE PACIFIC

Fiji Market Potential

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## Market potential Fiji

- Industry perspective: Sustainable Forest Industries, Fiji
- Cocowood flooring product: easy marketing
  - Excellent environmental credentials
    - Very eco-friendly product
    - Old palms unproductive = agricultural waste
    - Removal = income for farmers and allows replanting
  - Favourable properties
    - Density, hardness (similar to vesi)



## Market potential Fiji

- Cocowood flooring product: easy marketing
  - Competitive cost
    - Vesi ~ \$2,500 fjd / m<sup>3</sup> : Cocowood ~ \$1,800 fjd /m<sup>3</sup>
    - Maximise use of high-density cocowood
      - Compared with high-end furniture
      - For cost of table can supply flooring for two rooms



## Market potential Fiji

- Established local market
  - Currently can produce tongue & groove flooring
    - 75 x 75 x 700 mm, end matched
  - Demand currently exceeds supply
- Local exports
  - high-end residential flooring New Zealand
  - Tahiti, New Caledonia, Fiji resorts
    - 20 bures x 1.5m<sup>3</sup> flooring each, on bearers (can't use tiles)
    - Plus lobby etc = total 50m<sup>3</sup>



## Market potential Fiji

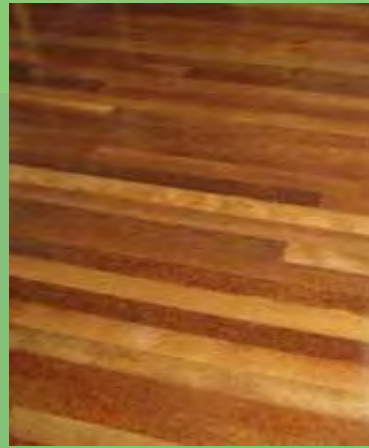
- Exports worldwide
  - Specialised orders
    - E.g. China: Shanghai expo
  - Europe flooring market
    - Ready to be established
    - Demand can't be met
    - Henri will describe



# Benefits to Fiji

- Regional employment
  - Palms in regions and outer islands
  - Minimal capital investment for primary processing
- Local raw material, local employment
  - Hard cash return
- Environment
  - Senile palms = agricultural waste
  - Allow replanting, re-use of valuable agricultural land
- Develop export income stream





# Market potential

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# Export market: European market













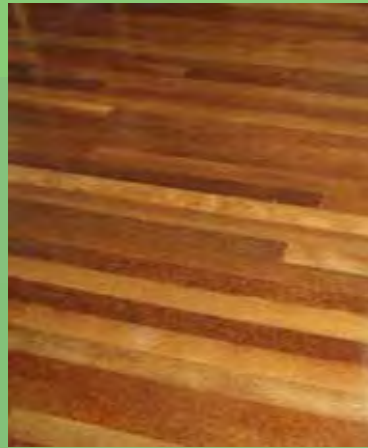


***Sustainable Development of  
the coconut palm***

***[www.planetcoconut.fr](http://www.planetcoconut.fr)***







## Cocowood website

Bringing cocowood production and markets together

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### Latest News

April10 Cocowood properties - technical fact sheet available. [More](#)

June09 Coconut projects for Pacific countries - roundtable meeting in Fiji. [More](#)

Jan09 Cocowood - the new timber. [More](#)

[Register](#) [Login](#)

## Welcome to cocowood

The cocowood project is helping cocowood enter the Australian and international flooring market.

The ACIAR project 'Improving the value and marketability of coconut wood' is providing the science to underpin coconut wood production, engineering and marketing initiatives and address gaps in our understanding of cocowood properties and suitable processing technologies.

### Cocowood properties and processing facts

This technical fact sheet provides information about properties as well as processing cocowood with particular reference to flooring products. [Download](#)



### Coconut palms – the timber of the future

We see them along our beachfronts and in many streets and gardens, but the iconic palm tree may soon have a new place in the Queensland lifestyle as a high quality timber product. [Read more.](#)



### Precision drying technology for cocowood processors

Forestry and timber specialists from Fiji and Samoa learned how to dry coconut stem 'wood' to produce high value 'timber' products in Brisbane, recently [Read more.](#)



### Project Partners



Australian Government  
Australian Centre for  
International Agricultural Research



Queensland  
Government  
Department of  
Primary Industries  
and Fisheries



SPC  
Secretariat  
of the Pacific

## Why use a website?

- **Communicate** with a very broad audience - producers, processors and markets.
- **News and information** about cocowood
- Putting people and businesses in **contact**





### Jan-May 2010:

- 794 visitors
- 68 different countries
- 160 returning visitors
- 5 page views each visit
- 4 minutes each visit



## Stimulate interest in the cocowood industry – registered users

- Registered members – 111
- Countries represented – 28
- Businesses represented:  
  - processors
  - growers
  - retailers
  - builder
  - importer
  - consultant
  - plantation owner
  - engineer
  - company director





# Discussion forum and cocowood mailbox

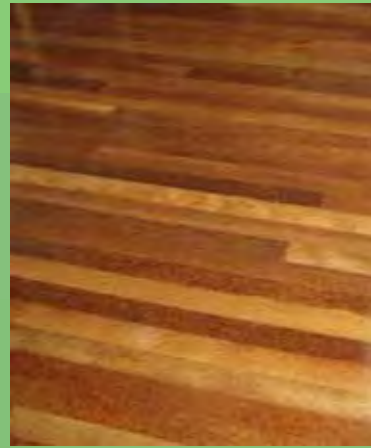
- **importing** cocowood products
- acquiring engineered **boards**
- contact with **sawmillers**
- advice about kiln **drying**
- cocowood natural **durability**
- **market potential** of cocowood
- developing the plantation **resource**



# Future

- Established:
  - cocowood project outcomes
  - technical knowledge
  - Attracted membership & interest in the industry
- Can be transferred immediately for industry use:
  - short term: maintained by project staff
  - model
    - retain hosting - long term
    - new administration
  - Implement the changeover - 2010





# Next steps

# Possible ways forward

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# Veneer based products















