BAMBOO

What value chain opportunities exist within the

South African Market

Focus

- What are the opportunities in the bamboo industry?
- What are the current challenges on processing and manufacturing?
- What is the key selection criteria for products?
- What is the status of current local developments?

What makes bamboo appealing

- Bamboo is a grass
- Fast growing
- High in fibre
- Light
- Strong
- High in carbon
- Edible

Types of Bamboo

Bamboo can be divided into two categories

Temperate running bamboo

Tropical clumping bamboo

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Opportunities

Production

- Land
- Water
- Invasiveness

Processing

- Low barrier to entry
- Broad and deep utility potential

Challenges

- Feedstock
- Logistics

Key Selection Criteria

- Type of bamboo
- Characteristics
- Product specifications

Bamboo End-usage

No	Plant Code	Species name		Constr-uction	Pulp & Paper	bio-mass	Furni-ture	Land rehab	Erosion control	Shoots	Handi-craft	Orna-mental	Uten-sils	Ply-wood	Other
1	35	*Bambusa*	*balcooa*	V	V	VV		VV		V				V	Fodder, Implements
2	Be	*Bambusa*	*balcooa var.*		V	VV			V						
3	O	*Bambusa*	*bambos*	V	VV	VV	V	VV	V	V				V	Medicine, living fence (thorns), fodder
4	BL	*Bambusa*	*blumeana*	V	VV	VV	V	VV	V	V				V	Medicine, living fence (thorns), fodder
5	OB1	*Bambusa*	*glaucophylla*									V			fence
6	31	*Bambusa*	*multiplex - Alph. Karr yellow*		V						V	V			fishing poles, wind breaker
7	31/OB2	*Bambusa*	*multiplex - Alph. Karr green*		V						V	V			fishing poles, wind breaker
8	BA	*Bambusa*	*oldhamii*		V					VV					furniture
9	Vt	*Bambusa*	*tuldoides*		(V)			V	V	V	V	VV	V		hedges, medicine
10	K	*Bambusa*	*vulgaris vittata - yellow*	V	V		V	VV	V	V	V	V			props banana, fencing, medical, fodder
11	A1	*Bambusa*	*vulgaris vulgaris - green*	V	V		V	VV	V	V	V	V			props banana, fencing, medical, fodder
12	Wm	*Bambusa*	*vulgaris waminii - buddha*		V			V				VV			props banana, fencing, medical
13	OB3	*Bambusa*	.....									VV			
14	P	*Dendrocalamus*	*asper*	VV	V	VV	V		V	V	V			VV	Music instruments
15	PT	*Dendrocalamus*	*asper - Thai*	VV	V	V	V		V	VV	V			V	Music instruments
16	PHB	*Dendrocalamus*	*asper 'black'*	V			V		V	V	V	V		V	
17	11	*Dendrocalamus*	*giganteus*	V	V		V		V	V	V	V		V	bamboo boards
18	1k	*Dendrocalamus*	*hamiltonii*	V						VV			V		fodder
19	DL	*Dendrocalamus*	*latiflorus*	V	V					VV	V				
20	15K	*Dendrocalamus*	*membranaceus*	V	VV		V		V	V	V				Medicin , props for fruit, boards
21	126	*Guadua*	*amplexifolia*	V				V							(for dry area)
22	Ga	*Guadua*	*angustifolia*	V	V	V	V	V	V		V	V			
23	L	*Gigantochloa*	*atter*				V			V	V	V	V		props, music instrument
24	2	*Oxythenathera*	*abysinica*	V	V			V			V		V		
25	CL	*Phyllosthacys*	*aurea*				V	V	V			VV			fishing rods (Invasive!!).

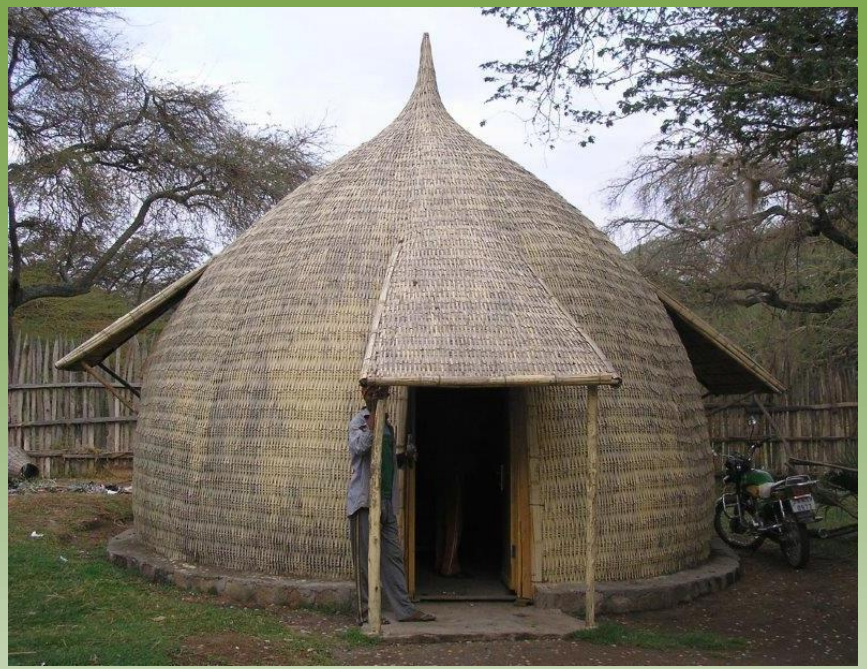
Plantation | Ornamental | Plantation & Ornamental

Inputs from PROSEA - Bamboo, unless otherwise

VV = very suited; V = suited; (V) could be suited

Bamboo alternative timber

- Once mature (5 to 7 yrs) you harvest 30% of the stand p.a.
- Shallow root system = impact on the water table
- Improved cash flow
- No clear cutting = less devastating to the environment
- Can be harvested and extracted by hand
- Only replant every 60 to 100 yrs = reduced est costs



Bamboo as an energy source

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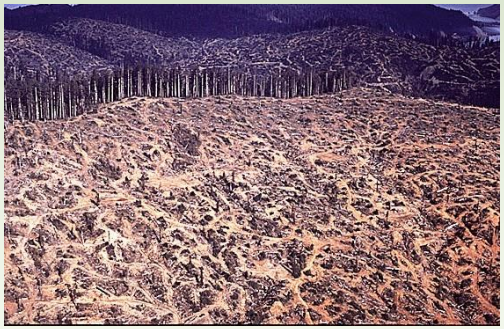
Co-firing with bamboo to produce power

Bamboo Plantations

	Est. Costs Per Ha	Bamboo	Higher	Eucalyptus
A	Plant Costs	1	x	4
B	Planting	1	x	5.12
C	Maintenance	1	x	5.12
D	Over 90 years **(all of the above, compounded)**	1	x	4.3
	Total = [(A+B+C) ÷ 3] x D	1	x	20



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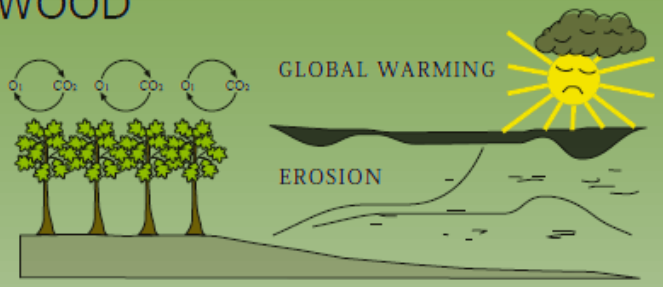
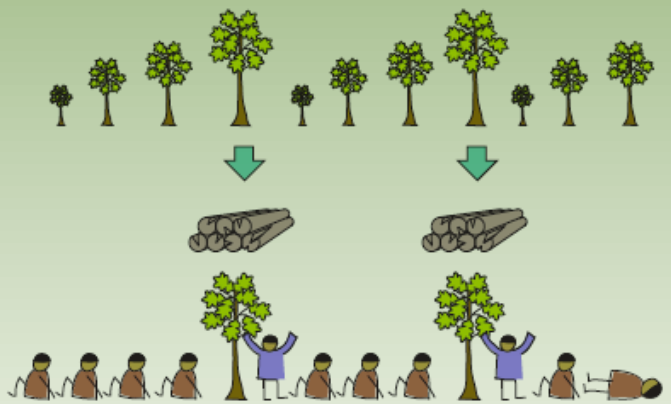
BAMBOO CONSERVATION - THE ENIBLE WAY

WOOD



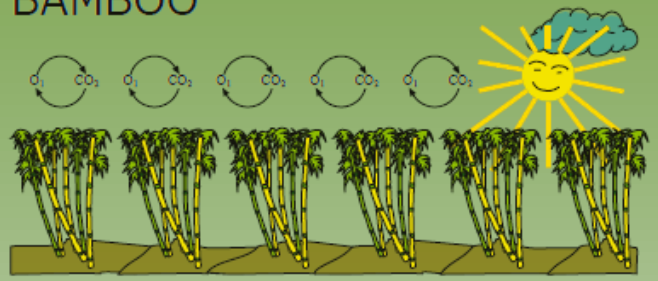
HARVEST ONCE EVERY TEN YEARS



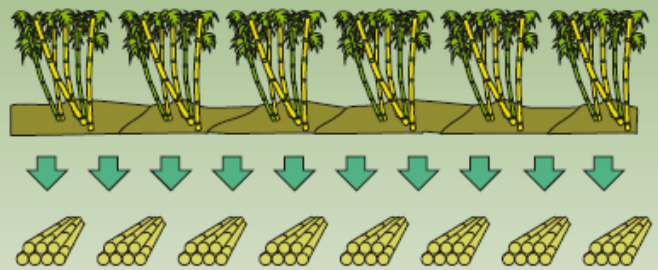
IRREGULAR EMPLOYMENT

IRREGULAR INCOME

BAMBOO



ANNUAL CROP



LABOR INTENSIVE

REGULAR INCOME

0 5 10 15 20 25 YEARS 0 5 10 15 20 25

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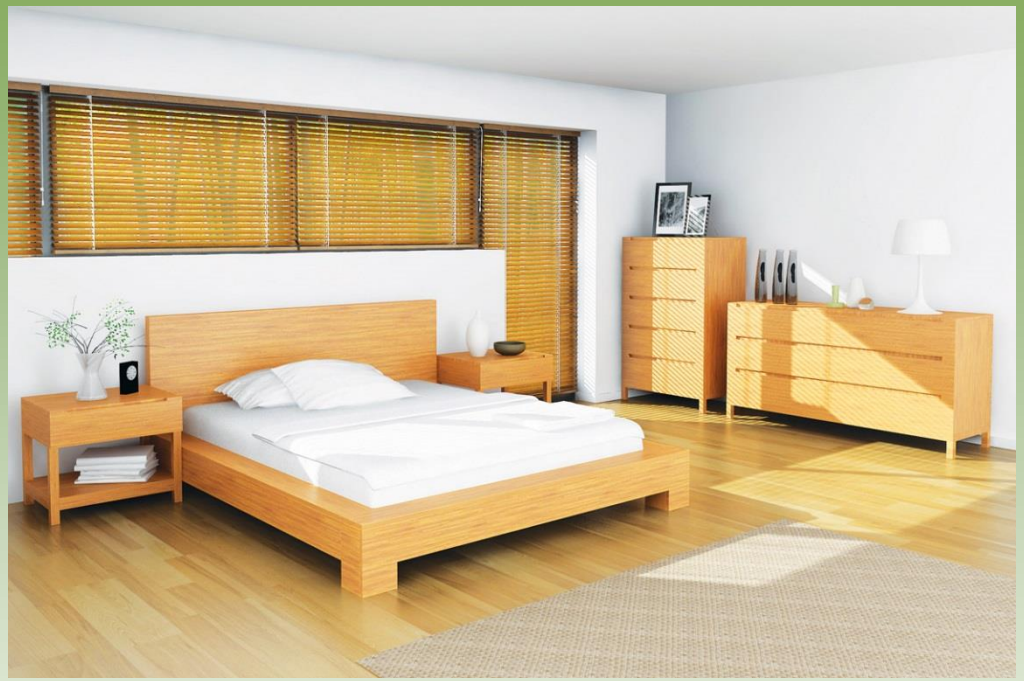
Bamboo Plantations



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Reinforced Concrete

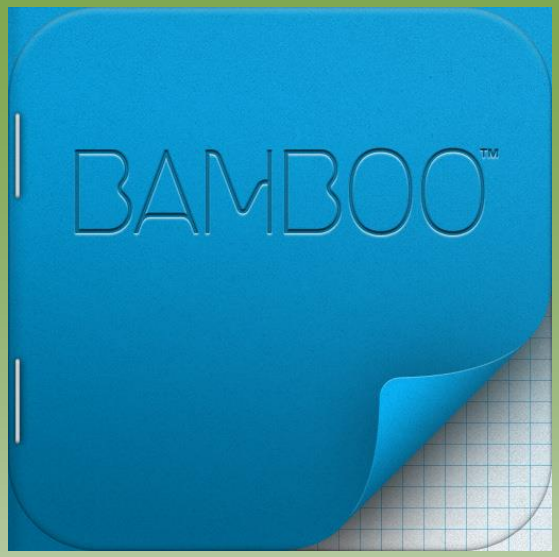
Properties

Differ with species, age, climatic factors, moisture content, and different heights of the culm.

CHARACTERISTICS	BAMBOO	STEEL
Tensile strength	1000-4000kg/cm^2	2300kg/cm^2
Comp. strength	250-1000kg/cm^2	1900kg/cm^2
Modulus of elasticity	0.3x 10^{6}kg/cm^2	2.1x10^{6}kg/cm^2

MECHANICAL PROPERTY	SYMBOL	VALUE (PSI)
Ultimate compressive strength		8,000
Allowable compressive stress	s	4,000
Ultimate tensile strength		18,000
Allowable tensile stress	s	4,000
Allowable bond stress	u	50
Modulus of elasticity	E	0.3x10^6

U. S. NAVAL CIVIL ENGINEERING LABAORATORY
Port Hueneme, California
By
Francis E. Brink and Paul J. Rush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TREES for the FUTURE
NATURAL · BIODEGRADABLE
BumBoosa
BAMBOO
BATHROOM TISSUE

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Bamboo shoots as a Functional Food and Nutraceutical

Bamboo shoots are ranked amongst the five most healthy food
(Institute of Geriatrics, World Health Organization)

Health Enhancing Properties of Bamboo Shoots

- → Rich in Nutrients
- → High content of bioactive compounds
- → Low in fat and calories
- → Free from residual toxicity

With their high nutritive value and bioactive compounds, bamboo shoots hold great promise for utilization as a functional food and nutraceuticals

Comparative account of various nutrients (g/100 g) present in fresh bamboo shoots and some common vegetables

Plant	Amino acids	Proteins	Carbohydrates	Fat	Vitamin C (mg/100 g)	Vitamin E (mg/100g)	Dietary Fibre
Bambusa tulda	3.65	3.69	6.92	0.48	1.42	0.61	3.97
D. asper	3.12	3.59	4.90	0.40	3.20	0.91	3.54
Dendrocalamus hamiltonii	3.18	3.72	5.5	0.41	2.45	0.71	3.90
SOME COMMON VEGETABLES							
Cauliflower	0.4	5.9	7.6	0.4	2.5	46.4	2.0
Cabbage	0.3	1.8	5.6	0.1	2.6	32.2	1.0
Carrot	0.2	0.9	10.6	0.2	1.2	3.0	1.2
Radish	0.1	0.7	3.4	0.1	1.6	15.0	0.6
Spinach	0.3	2.0	2.9	0.7	0.6	28.1	2.0
Potato	0.2	1.6	22.6	0.1	0.4	19.7	0.4

Functional Food Products

Current Status

- Guy Solomon
- Ecoplanet Bamboo
- Brightfiels Bamboo

Way forward