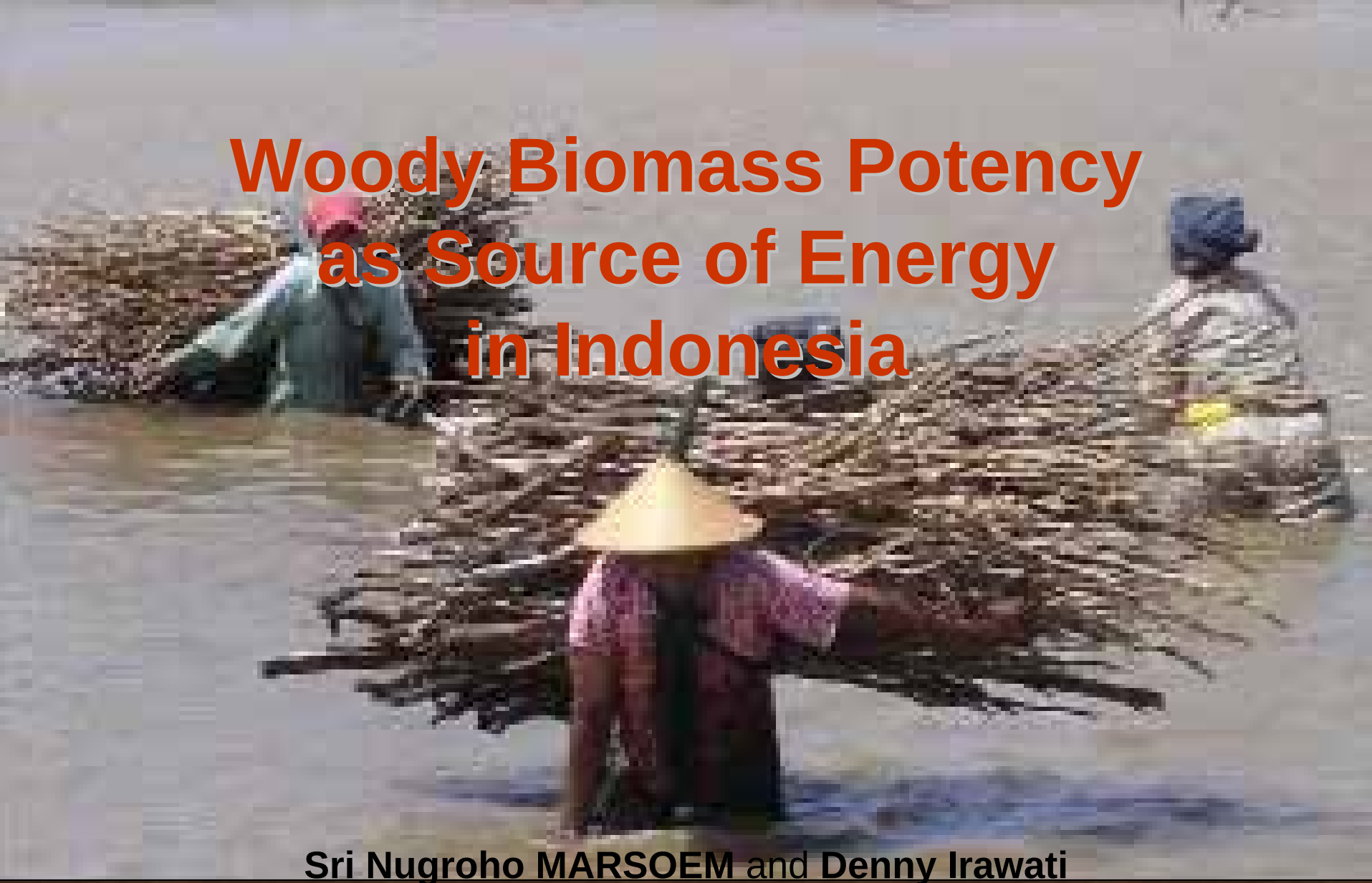


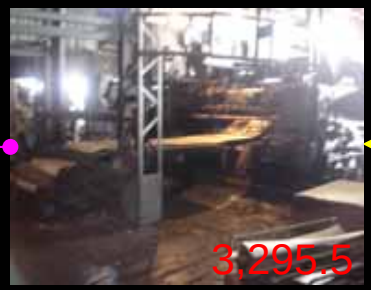
Woody Biomass Potency as Source of Energy in Indonesia

Sri Nugroho MARSOEM and **Denny Irawati**

Fac. of Forestry, Gadjah Mada University

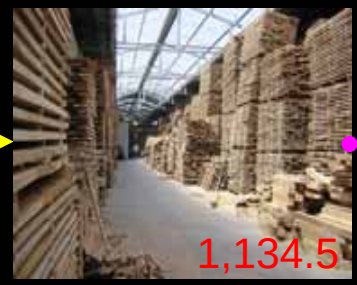
Bulaksumur, Jogjakarta 55281, INDONESIA

Utilization of Woody Biomass in Indonesia



Plywood

utilization



Sawmill

Forest biomass
Log production 10.09
(thousand m^3)

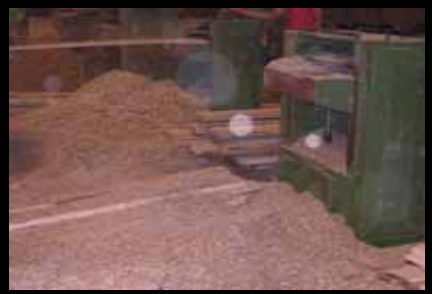
Pulp and Paper

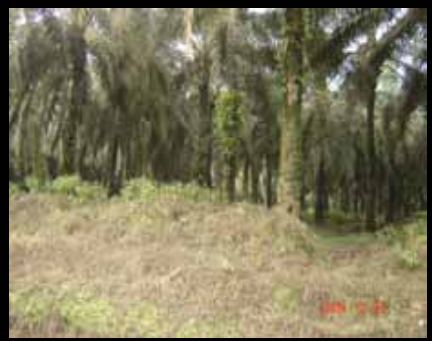
Woodworking

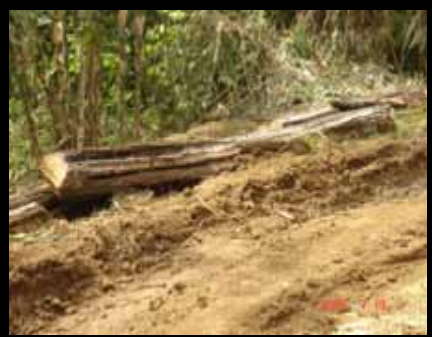
ENERGY

residue

residue







Woody Biomass Residue

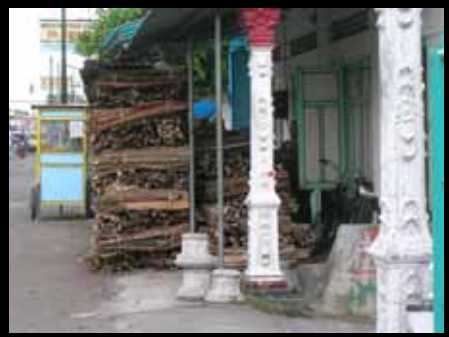
Source	Volume (million m^3)	%tage
Wood processing industries	11.57	21.1
Unproductive crop estate trees	13.44	24.6
Forest logging	29.70	54.3
Total	54.71	

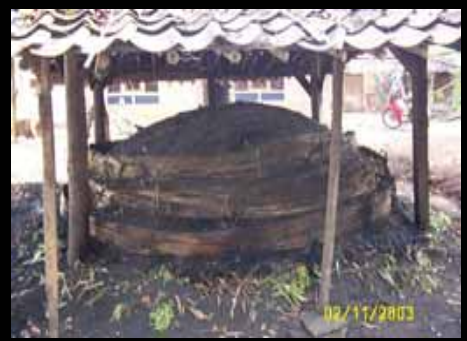
Biomass from Estates Residue

- Annual replanting of oil palm 120,000 ha (5,46%) and of rubber trees 117.500 ha (3,33%).
- Oil palm produce residue of 78 m3 per ha.
- Rubber trees produce wood residue of 35 m3 per ha.
- Leaves residue from destilation of cajuput oil : 250,000 tons per year.

Utilization of Woody Biomass for Energy

- Fuelwood
  - Source
  - Production
- Charcoal
  - Production
  - Processing
- Briquette





Year	Charcoal	
	Quantity (000 kg)	Value (000 US $)
2000	148,702.6	29,867.2
2001	135,414.8	20,490.7
2002	114,573.7	15,708.6
2003	110,339.2	17,568.4

The Potency of Lignin Residue in Indonesia

- Pulp Production in Indonesia during last 3 years:

Year	Production (000 tons) (yield 45-50%)	Lignin waste estimation (000 tons) (15-30% wood weight)
2001	702.1	210.6-412.2
2002	280.6	84.2-168.4
2003	1,373.5	412.1-824.1

- Lignin is also present in the bark as a waste of logging activity

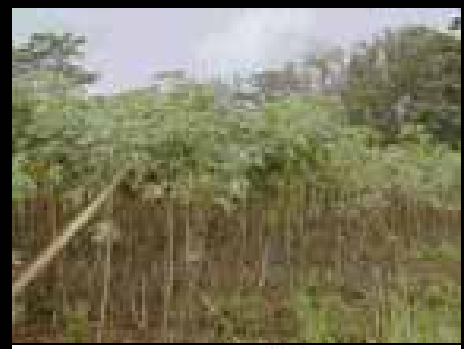
Non Woody Biomass as Source of Energy

- Vegetable oils : palm oil, castor oil.
- Waxes : damar, kopal, kemenyan.
- Natural rubber : hevea rubber.
- Tall oil
- Essential oils : cajuput oil, eucalyptus oil
- Resins : gum resin, turpentine.

Non Wood Biomass Production in Indonesia in the Last 5 Years

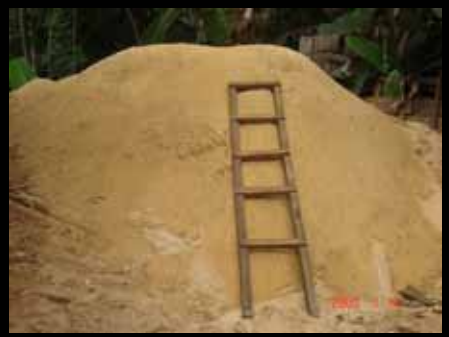
Years	Palm oil	Turpentine	Natural rubber	Cajuput oil (l)	Resin	Castor oil
2000	6,552.3	2.7	1,501.0	63.5	6.3	1.8
2001	7,817.1	3.6	2121.0	174.3	3.3	2.9
2002	9,699.4	4.1	1,630.0	157.4	2.9	2.2
2003	9,956.1	3.0	1,792.0	188.3	1.1	2.8
2004	10,276.8	11.5	1,851.0	202.8	2.8	2.9

Bio ethanol



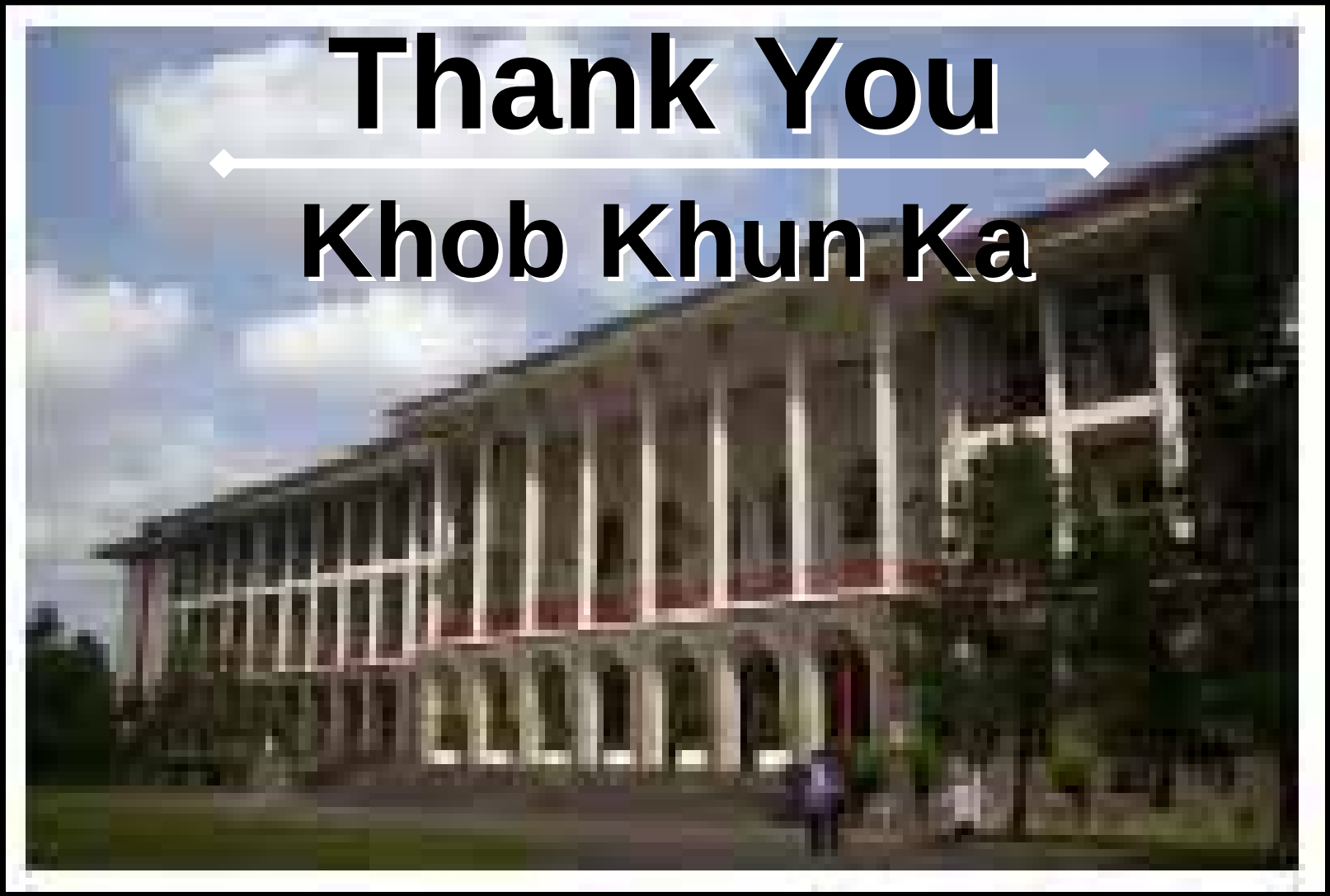
- Bio ethanol in Indonesia are mostly made from Cassava.
- Production in 2003 : 70,000 liter ethanol

- Lignocellullose material has not been utilized properly yet



Closing Remarks

- The peoples dependency to biomass fuel is quite big, and going to be bigger because of limited fossil fuel.
- There are many non wood biomass energy sources.
- Need technology improvement in order to be able to utilize biomass as a good energy


Thank You
Khob Khun Ka