

A Retrospect of Studies on Mangrove Growth, Management and Community Perspectives at PT BUMWI Site in 1998 and 2004



25 years of Mangrove Forest Management by PT BUMWI
And its Implication to the Sustainability of Mangrove Ecosystem
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Contents

- Objective
- Technical Cooperation between Republic of Indonesia Ministry of Forestry and JICA : Mangrove Project 1997-1999 and sampling & study in PT BUMWI site (1998)
- Comparison visit to Matang Mangrove forests with PT BUMWI foresters (1999)
- Community perspectives on projects in their forest areas (2004)
- Conclusion
- Acknowledgement

Objectives

- Share some of my past studies conducted in PT BUMWI to develop sustainable mangrove forest management models

Ministry of Forestry of Indonesia-JICA Technical Cooperation Project on Mangrove (deployed 1997 ~ 1999)

- **The Development of Sustainable Mangrove Forest Management Project (1992-1999)**

<4 Components>

- (a) Nursery
- (b) Silviculture
- (c) Ecosystem
- (d) **Forest Management**

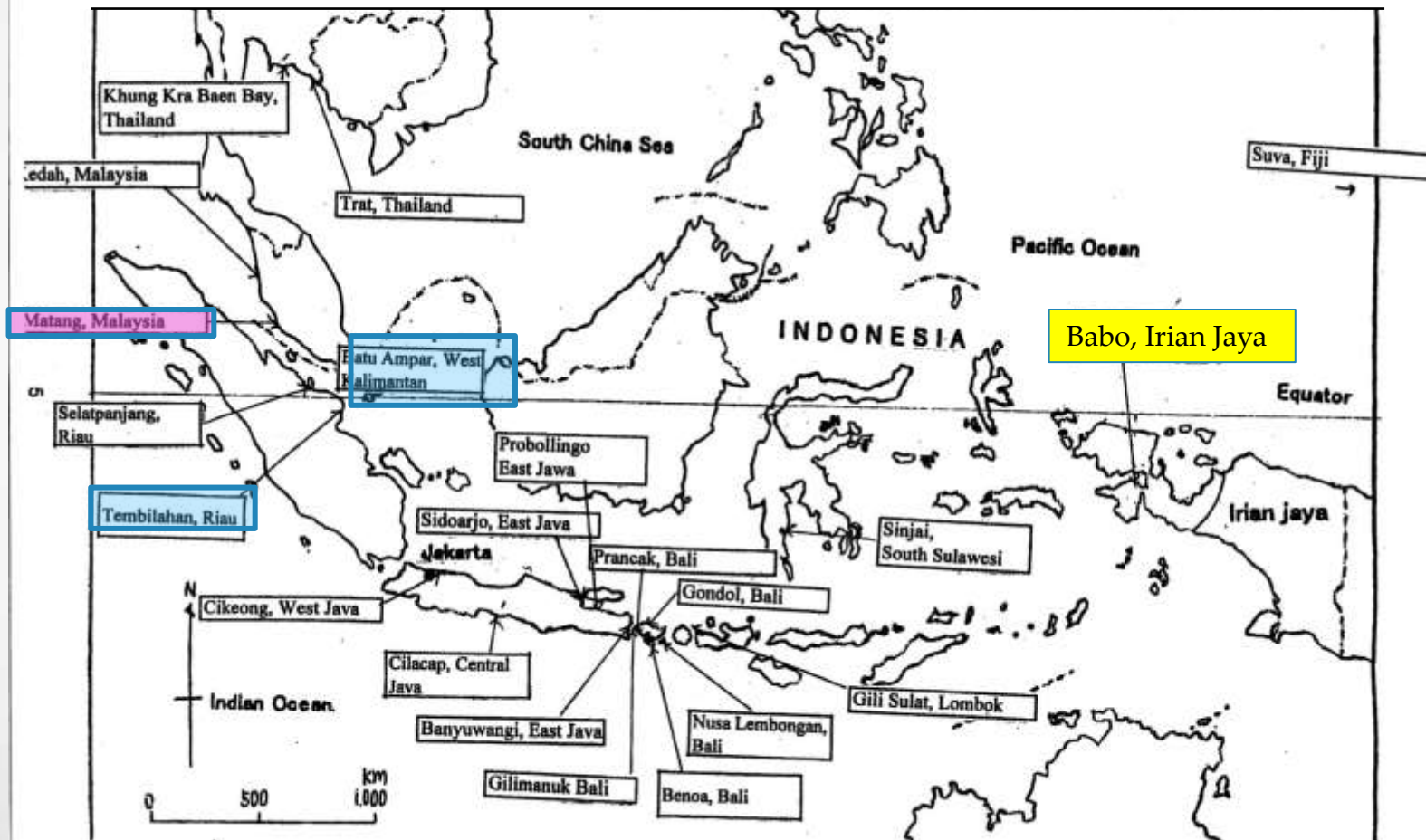


- **Forest Management Component**

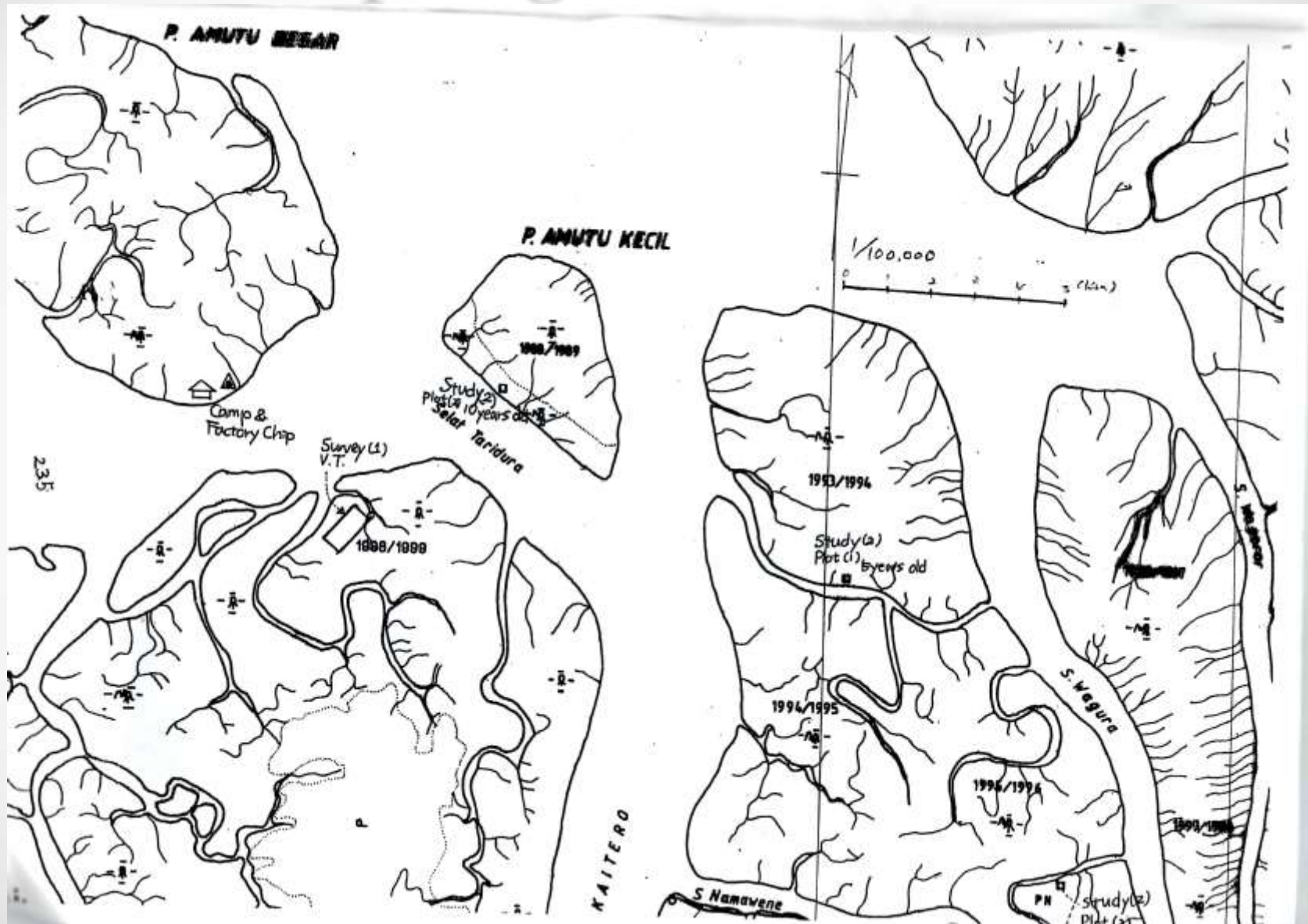
- (1) Volume Table: find co-relation between volume & DBH, height of 2 mangrove species
- (2) Yield Prediction Table: analyse growth trend of 2 mangrove species
- (3) Forest Management Models: develop financially, legally & technically feasible 4 models

Studied location 1997-99

Location Map of Main Study Area - Forest Management Component



Sampling sites location



In 1998

- March 1998: 1st meeting with PT BUMWI office in Jl. Pasar Minggu
- 1st plan of visit Bintuni: 14 May 1998 – couldn't make it ---
“All foreigners have to evacuate out from Indonesia”
- 2nd plan: Rescheduled to from 9 to 23 July 1998
“Turmoil in Jayapura, Manukwali, Sorong, Biak” News
- 3 July phone call to PT BUMWI – “Change to Riau?”
- 6 July a fax from PT BUMWI with a title:
“SCHEDULE FOR IRIAN JAYA NOT FOR SUMATRA”
- 22 Hours, 500km ship trip from Sorong to camp
- With kambing (goats), food, water, goods etc.
- Jumping ayam (chicken) & soup



Ants, Agas, Awas! Sampling at PT BUMWI site in July 1998

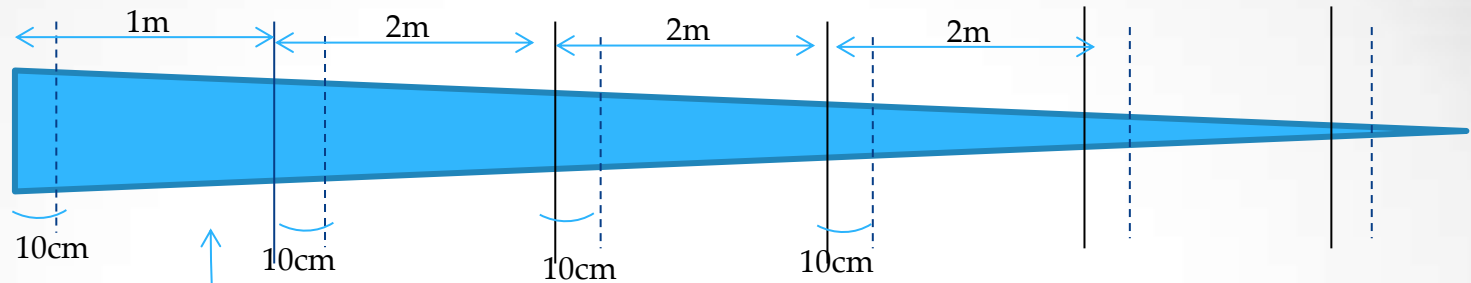
<Objective>

- (1) Volume Table: 100 mangrove trees sampling
(*Rhizophora apiculata* & *Bruguiera gymnorhiza*)
- (2) Yield Prediction Analysis: Plot surveys at the sites in
5 years after logging (1993 logged over area), 10 years
after logging (1988 logged over area) & protected
area (*prasma nutfa*)
- (3) Model: Forest management by PT BUMWI

Volume Table Analysis in 1998

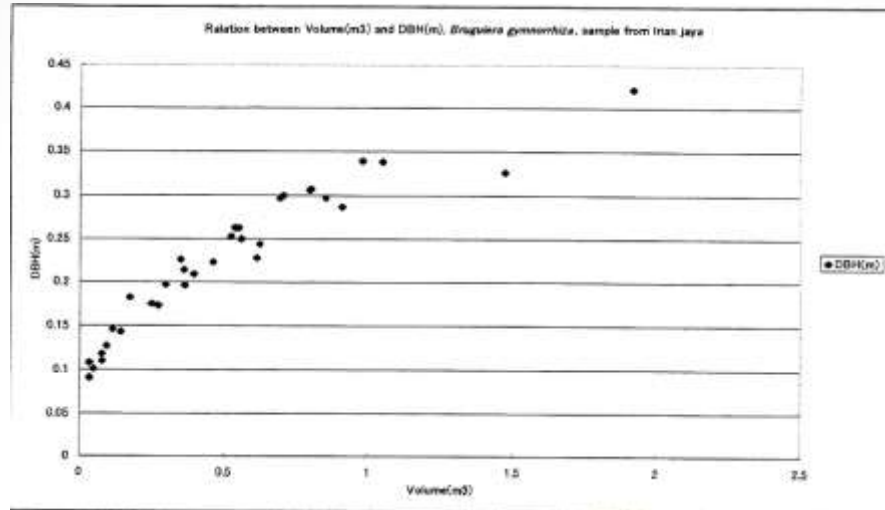
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Discs sampling from 100 trees *R.a*, *B.g* for V.T. Analysis



3 ton of discs x 2
brought to Bali
Mangrove Centre
for analysis

Volume Table Analysis for *R.a*, *B.g*



		DBH (cm)										
樹	Height(m)	4	8	12	16	20	24	28	32	36	38	42
		0.0020	0.0077									
	8	0.0043	0.0167	0.0366	0.0638							
	12			0.0576	0.1005	0.1547						
	16			0.0795	0.1388	0.2137	0.3040					
	20			0.1021	0.1782	0.2744	0.3905	0.5262				
	24					0.3367	0.4790	0.6455	0.8358			
	28						0.5695	0.7673	0.9935	1.2478	1.3854	
	32						0.6615	0.8913	1.1540	1.3987	1.6092	
	36							1.0171	1.3170	1.6540	1.8364	2.2287
	40								1.4822	1.8615	2.0667	2.5283

Volume (m³)

(Reference) Y. Iiyama (Inoue) et al. (1999) Yield Prediction and Estimation of Site-Class for a Mangrove Species: *Rhizophora apiculata*. JICA. Jakarta & Tokyo

Yield Prediction Table Analysis in 1998 and 2004

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Production of Yield Prediction Table by Mangrove Growth Analysis

Plot survey: 5 years after logging
(1993 logged over area)



57,500 trees/ha (counted 2,300 trees per 0.04ha)
Average Diameter: 3cm, height: 6.2m



**In 2004, 10
years after
logging**

DBH: 7.04cm,
height: 14.5m

Plot survey: 10 years after logging (1988 logged over area)



17,600 trees/ha (counted 704 trees per 0.04ha)
Average DBH 6.6cm, height 12.8m



**In 2004, 15
years after
logging**

DBH: 10.3cm,
height: 16m
Number:
4000/ha

Plot survey: Climax Forest



1,875 trees/ha (counted 75 trees per 0.04ha)
Average DBH: 30.5cm, height: 34.6m

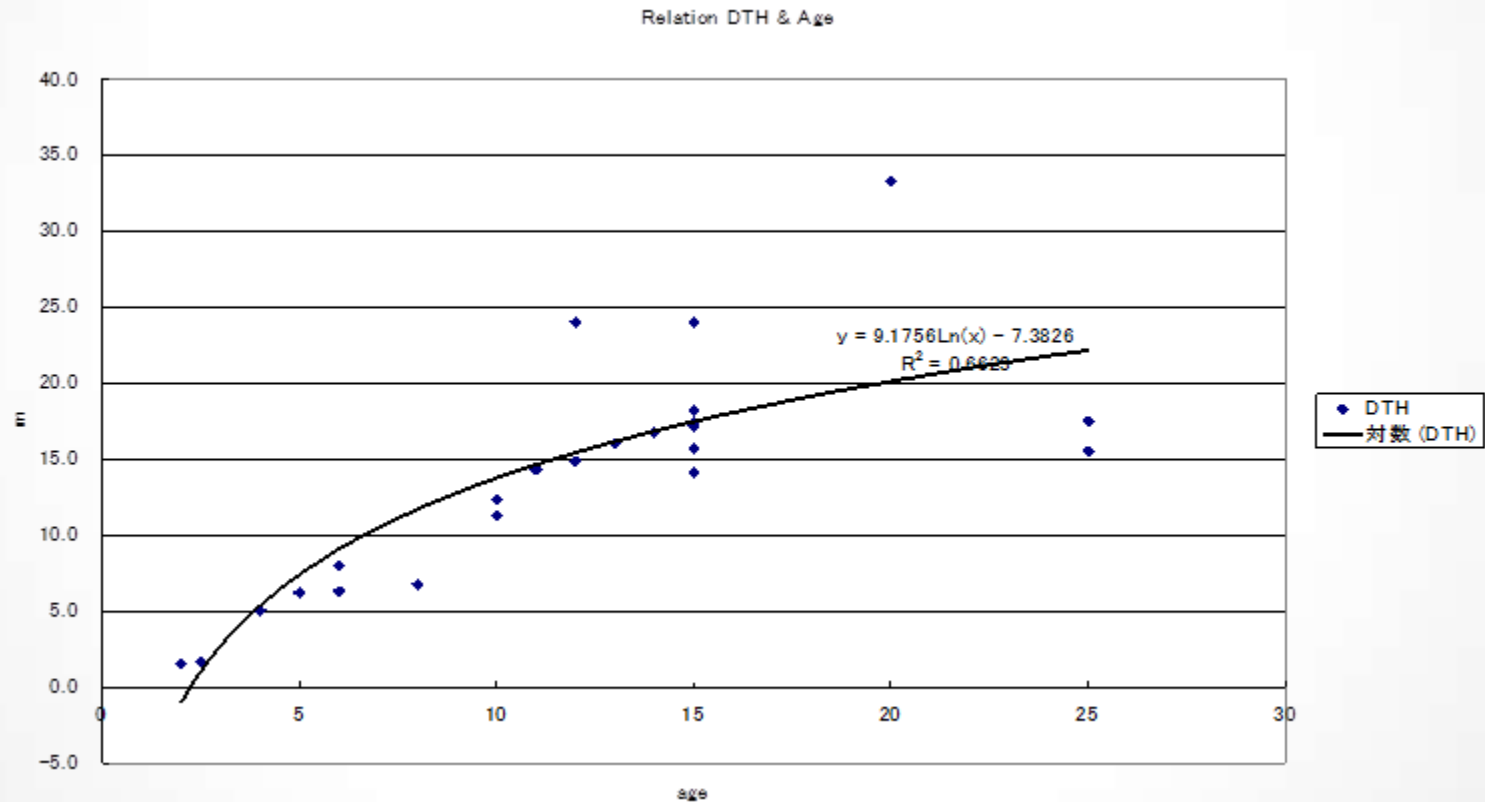
In 1998



Almost same

In 2004

Revised growth analysis after revisiting Bintuni in 2004



Feasible and sustainable management for Chip Production at High Growth Site

- 30 years rotation, 5% or 10% IRR, approximately require 30,000hs for sustainable management
- Various obligations & costs for concessionaires under law of Indonesia
- Bina Desa Hutan (community support) --- couldn't conduct full survey in 1998 (ex. In Mozambique gov responsibility.)



Loading yard



Nursery

Mangrove Growth & Financial analysis

Case	Case a	Case b	Case c	Case d 20years rotation	Case e With- thinning
Rotation Period (Thinning age)	30	30	30	20	30 (12)
Chip Factory	1	1	1	1	1
Annual Chip Production	182,400	182,400	182,400	182,400	182,400
Annual Production for charcoal industry (by thinning)					26,190
Annual Mangrove Consumption	160,000	160,000	160,000	160,000	160,000
Annual Mangrove Consumption (by thinning)					31,432
Mangrove Yield at Harvest	165	165	165	102	165
Mangrove Yield at Harvest (by thinning)					32
Annual Logging Area (ha/year)	970	970	970	1,565	970
Total Logging Area (ha/30year)	29,103	29,103	29,103	31,305	29,103
Total Minimum Management Area	29,603	29,603	29,603	31,805	29,603
Total Plantation Area (ha/30year)	5,821	5,821	5,821	6,261	5,821
Initial Investment Cost for Silviculture (US\$)	6,750	6,750	6,750	9,793	6,750
Annual Silviculture Cost (US\$)	20,632	20,632	20,632	33,290	20,632
Annual Royalty and Reforestation Fund (US\$/year)	408,000	408,000	408,000	408,000	408,000
Price Escalation (%/year)	5	10	10	5	5
Exchange Rate Depreciation (%/year)	5	5	0	5	5
Net Cash Flow (US\$)	Year				
	0	(6,098,523)	(6,098,523)	(6,098,523)	(6,098,523)
	1	4,265,106	4,103,407	3,738,607	3,735,039
	2	4,469,104	4,120,547	3,772,707	3,906,854
	3	4,684,137	4,120,726	2,970,694	4,088,607
	4	4,918,344	4,110,497	2,538,163	4,293,037
	5	5,164,261	4,078,130	2,062,380	4,507,689
	6	5,420,074	4,017,183	1,535,845	4,730,674
	7	5,693,598	3,933,524	963,319	4,969,727
	8	5,978,277	3,813,566	330,051	5,218,213
	9	6,277,191	3,655,947		5,479,124
	10	6,591,051	3,455,617		5,753,080
	Total	47,362,620	33,310,620		40,561,503
	IRR	74%	67%	47%	65%
	NPV at 20%	12,327,376	8,987,537	3,325,924	10,107,444

Study visit to Matang Mangrove Forest, Malaysia with PT BUMWI foresters in 1999

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Comparison study visit with PT BUMWI foresters to Matang Mangrove Forest, Malaysia in February 1999

Differences by Law

	Indonesia (since 1978~)	Malaysia (since 1905~)
Rotation Period	30 years for Charcoal (20 years for Chip)	30 years
Production Purpose	Chip Charcoal	Charcoal (final), Pole (Thining)
Logging System	40 mother trees/ha remained, Selective cutting	Clear cutting
Width of Green Belt	50m: Small rivers 100m: large rivers 130times wide length of the difference between low tide and high tide from the lowest tide line to landward. (182m-1118m)	3m: under 50m width river 5m: 50-60m width river 6m: 60-70m width river 10m: 70-100m with river 20m: 100m width mouth of river 200m: face of strait/sea
Planting Method	2,500 trees/ha (2m x 2m)	1.2m x 1.2m (R. apiculata): 6972 trees/ha 1.8m x 1.8m (R.mucronata): 3800 trees/ha
Thinning	One time only for tending purpose	2 times for commercial purpose 1 st : qt 15 years old by 1.2m stick method 2 nd : at 20 years old by 1.8m stick method
Logging Contract	HPH: 20 or 35 years contract HPHH: 1 year contract	Annual allocation (bid) 10 year plan

Study on community perspectives on social impact in 2004

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Revisit to PT BUMWI site in 2004

- Group interviews in Warganusa I village and Irarutu III village

Interviewee distribution (45 people in total) (not including key informant interviews)

(1) Kampung Irarutu III (17 people) / total population: about 200 (interviewee: 5.7%)

	Age under 40	Age over 40
Male	9	6
Female	8	5

(2) Kampung Warganusa (28 people) / total population: about 90 (interviewee: 31%)

	Age under 40	Age over 40
Male	0	13
Female	0	4



Villagers of
Warganusa I,
Bintuni

- Growth survey in each plot set & measured in 1998: 15 years old plot is already full matured mangrove forest

Community perspectives

	<i>PT BUMWI (1988-)</i>
<i>How do villagers understand the objective of aid programs?</i>	-Mangrove forest exploitation concessionaire. -Help and care, compensation.
<i>What do villagers receive from program?</i>	-PMDH: (Rp.1,000/m3/year) and Compensation fees: (Rp.1,000/m3/year). -Infrastructures, Scholarships for children, Transportation and medical care helps for the sick, Food aids for the starving, Employment, Selling market for villagers. Benefits were for 10 villages.
<i>Participation rate</i>	N/A
<i>How were the Socialization processes?</i>	-All villagers know and understand about funds.
<i>How to prioritize the villagers who are poorer than others?</i>	-Helps people in difficulty but doesn't help if people just drink and ask for money.
<i>Do women villagers participate in decision making process?</i>	-No
<i>Which gender receives more benefits from funds?</i>	-Men and women are equally benefited
<i>How do funds/programs impact on adat?</i>	-PT BUMWI respects adat. Top of the company come to each village to talk before starting operation. So feel rapat.
<i>What are the positive impacts of the programs/funds?</i>	-Children of villagers can go to schools; come to wear clothes; villagers have cash incomes; food, employment, and medical treatment. One of employee of PT BUMWI was pushed to DPR-D Bintuni election by the villagers and won a seat.
<i>What are the negative impacts of the program/funds?</i>	-No negative impacts.

Final remarks

- Sustainability is proved – even under the difficult time of holistic change - 1998, 1999, 2000 -
 - structural reform by IMF operation, currency devaluation, privatization, decentralization
- Further continuous studies on mangrove growth and on community perspectives about forest, land and resources....etc to be continued (in 2014?) are my wish.
- Expect further publishing and diffusion of the expertise, spirits & data to promote sustainable management of the PT BUMWI to lead and facilitate sustainable mangrove forest management in Indonesia and the world.

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