

# TROPICAL FOREST DISTURBANCE & ITS REHABILITATION EFFORT

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DEPT. FOREST RESOURCES CONSERVATION & ECOTOURISM  
 FORESTRY FACULTY-BOGOR AGRICULTURAL UNIVERSITY

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# OUTLINE

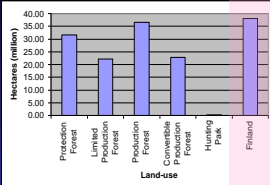
1. BRIEF ON INDONESIAN LAND-USE
2. DISTURBANCE NATURAL FOREST LANDSCAPE
  - a. Shifting Cultivation
  - b. Forest Plantation
  - c. Transmigration
  - d. Oil Palm/Plantation
  - e. Fire
  - f. Logging & Illegal Logging
  - g. Mining
3. ECOLOGICAL IMPLICATION
4. REHABILITATION & RESTORATION EFFORT

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## FOREST LAND-USE

(Consensus of Forest Land Use/ Tata Guna Hutan Kesepakatan)

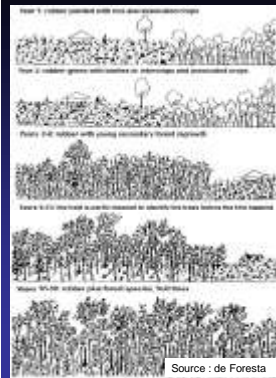


- Based on agreement of some agencies : Forestry, Agriculture, & Transmigration
- Established in 1982
- Total land of Indonesia 191 million ha
- Total Forest area : 133 million ha
- Drawn on map scale 1:250 000
- Abolished all traditional land-use system
- Land tenure conflict started
  - drawn on map/table
  - no terrestrial survey conducted
  - no consultation with people

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## 1a. SHIFTING CULTIVATION



**Complex Agro-forestry :**  
 Shifting cultivators is not similar with : Forest Squatters

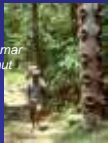
*Adaptation to low labor , low technology input, & secure income resource*

*Combination of food crops, cash crops, wood & non wood products (Latex Rubber, Damar)*

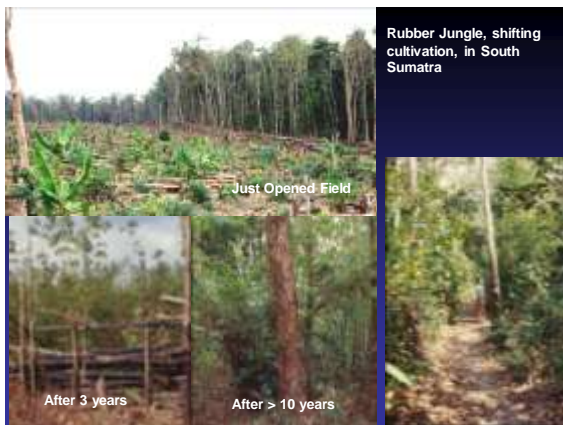
*With Long Fallow period Ecosystem will recover close to its initial stage in term of Biomass, Biodiversity, & Fertility*

*Done in many type of ecosystem from wetland - upland*

*Example : Rubber Jungle, Damar Krui (Shorea javanica), Coconut*



Pérez, Fernández, Sayer





**Problem threaten Sustainability :**

- Population pressure
- Limitation of land for new farm
  - Traditional system (i.e *marga*) was abolished
  - 1983 : National Forest Land, Land-use system implementation

**Impacts**

- Short Fallow (Very short Fallow)
  - Fertility decrease
  - Biodiversity decrease
  - Biomass decrease
    - Alang - alang grassland
- Farmer have no experience to intensive farming & need more production input
- In some areas (Peat) are not suitable for intensive farming

**1b. FOREST PLANTATION (since 1980s)**

- Since 1980s,
- Private & Government Company
- Build on critical or degraded forest (volume of commercial species with dbh <30 cm = < 20 m<sup>3</sup>/ha)
- Company may cut the remaining trees (after having permission/IPK)
- Company should plan and manage for 35 years + 1 rotation period
- Government subsidize the plantation establishment using Reforestation Fund

In December 2006 Government announced the plan :

- target in 2016 : 9 million ha
- 40% from Company & 60% from small holder
- Fund resource : Reforestation Fund
- Allocation : 8 billion USD

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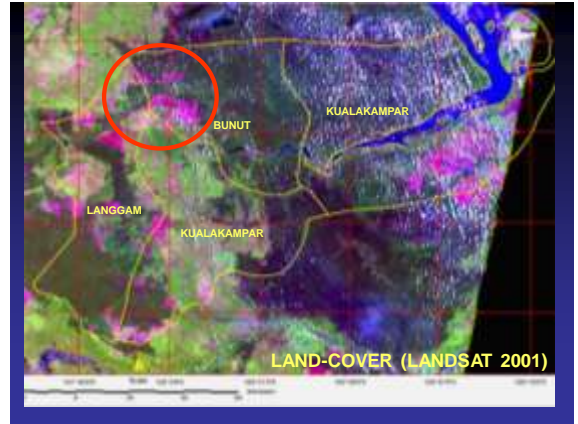
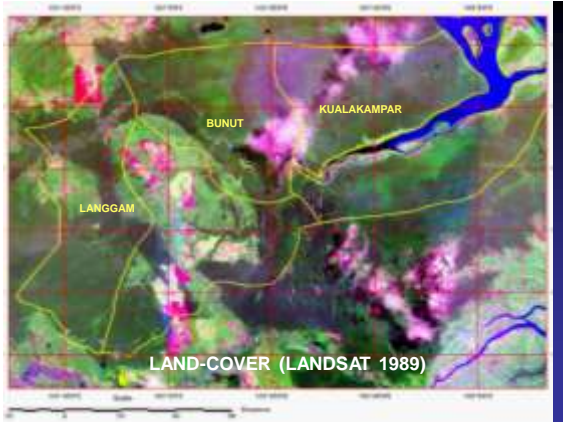
**Criticism :**

- Build on Virgin Forest
- Build on Fragile Ecosystem : Steep Slope/Peatland
- Some of them using fire for land clearing
- Some of them have not planted the plantation, (they just harvested the remaining trees + received subsidy)

South Sumatra, 1992

Acasia mangium





### 1c. TRANSMIGRASION

South Sumatra, 1992

Adhiati & Bobsie, 2001

- Started since Dutch Colonial period
- System :
  - Dutch : Labor force in outside Java
  - Settlement + 2 ha lands/family
- Type :
  - Food crops
  - Perennial crops (rubber/Oilpalm etc) (Nucleic Estate Crops)
  - Forestry Plantation
- Funding : World Bank/ADB  
Indonesia Government

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### Criticism

- Build on Natural virgin forest
- Some areas are not suitable for intensive cultivation, such as Peat land of Central Kalimantan
- Some areas are not well-prepared for settlement & cultivation (too far from water resources, incomplete irrigation system etc)
- Create urbanization in Town or Forest squatters

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### 1d. OIL PALM DEVELOPMENT

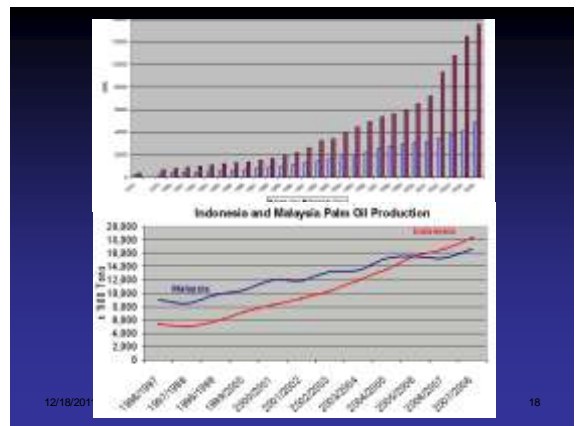
**Type of oil palm plantation**

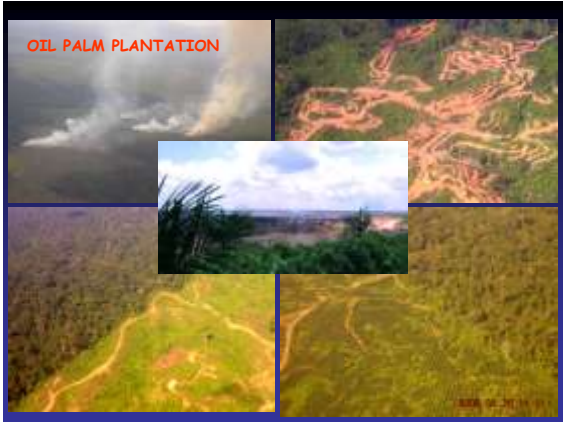
- Smallholders plantation
- Private plantation
- Government company plantation

**Private & Government Company : can be built on Convertible Forest Land**

**Private : Non Forest Land**

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### Criticism on Oil Palm development

- Build on inappropriate land (peat/steep slope)
- Use fire in land preparation
- Increase habitat isolation & fragmentation
  - Species extinction
- Neglected High Value Conservation Species
- Neglected community land (conflicts)
- Some companies, have not planted oil palm after harvesting timber

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### 1e. Illegal Logging Activities

- Shortage of wood supply
- inappropriate (too large) industrial capacity

Source: Z. Brown et al., ORRI

Kategori	Persentase
Industri perkapalan	100%
Industri lain	2,27%
Industri lain	1,04%
Industri lain	0,75%
Industri lain	0,17%
Industri lain	0,17%
Industri lain	0,17%

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### Final Cut

#### Documentation of Illegal Logging Activities

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### LEAD MINING, BANGKA - ISLAND

- Bangka island : Island of Lead
- Mining and Processing (Lead Smelter) held by Government Company
- After Decentralization : Mining & Processing are allowed conducted by private or individual

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### LEAD MINING, BANGKA ISLAND-INDONESIA

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Coal Mining at Sangata, East Kalimantan

# CLIPS OF LEAD MINING

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## ECOLOGICAL IMPACTS

- a. Habitat loss
- b. Fragmentation
- c. Species diversity loss/extinction
- d. Forest Degradation
- e. Land Degradation

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### CRITICAL AREA IN INDONESIA

PROVINCE	Ruang Lingkup Very Critical	Batas Critical	Agak Kritis Marginally Critical	Total
1. Aceh	2,207,241,111	143,000,000	237,342,770	1,867,583,881
2. Sumatera Utara	3,290,380,814	3,500,000,000	638,947,201	7,429,328,015
3. Riau	8,701,930,417	3,500,000,000	608,368,317	12,810,300,734
4. Jambi	—	—	—	—
5. Sumatera Barat	1,001,000,000	200,000,000	600,000,000	1,801,000,000
6. Bengkulu	3,000,000,000	800,000,000	8,700,000	3,808,700,000
7. Lampung	700,000,000	800,000,000	100,000,000	1,600,000,000
8. Kalimantan Utara	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
9. Kalimantan Tengah	400,000,000	200,000,000	100,000,000	700,000,000
10. Kalimantan Barat	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
11. Kalimantan Selatan	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
12. Irian Jaya	—	—	—	—
13. Papua Barat	100,000,000	100,000,000	100,000,000	300,000,000
14. Papua	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
15. Sulawesi Utara	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
16. Sulawesi Tengah	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
17. Sulawesi Selatan	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
18. Sulawesi Tenggara	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
19. Maluku Utara	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
20. Maluku	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
21. Nusa Tenggara Barat	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
22. Nusa Tenggara Timur	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
23. Bali	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
24. Jawa Barat	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
25. Jawa Tengah	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
26. Jawa Timur	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
27. DI Yogyakarta	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
28. DKI Jakarta	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
29. Banten	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
30. Aceh	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
31. Sumatera Utara	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
32. Riau	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
33. Jambi	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
34. Sumatera Barat	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
35. Bengkulu	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
36. Lampung	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
37. Kalimantan Utara	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
38. Kalimantan Tengah	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
39. Kalimantan Barat	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
40. Kalimantan Selatan	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
41. Irian Jaya	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
42. Papua Barat	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
43. Papua	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
44. Sulawesi Utara	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
45. Sulawesi Tengah	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
46. Sulawesi Selatan	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
47. Sulawesi Tenggara	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
48. Maluku Utara	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
49. Maluku	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
50. Nusa Tenggara Barat	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
51. Nusa Tenggara Timur	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
52. Bali	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
53. Jawa Barat	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
54. Jawa Tengah	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
55. Jawa Timur	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
56. DI Yogyakarta	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
57. DKI Jakarta	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
58. Banten	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
59. Aceh	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
60. Sumatera Utara	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
61. Riau	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
62. Jambi	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
63. Sumatera Barat	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
64. Bengkulu	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
65. Lampung	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
66. Kalimantan Utara	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
67. Kalimantan Tengah	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
68. Kalimantan Barat	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
69. Kalimantan Selatan	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
70. Irian Jaya	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
71. Papua Barat	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
72. Papua	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
73. Sulawesi Utara	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
74. Sulawesi Tengah	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
75. Sulawesi Selatan	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
76. Sulawesi Tenggara	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
77. Maluku Utara	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
78. Maluku	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
79. Nusa Tenggara Barat	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
80. Nusa Tenggara Timur	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
81. Bali	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
82. Jawa Barat	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
83. Jawa Tengah	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
84. Jawa Timur	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
85. DI Yogyakarta	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
86. DKI Jakarta	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
87. Banten	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
88. Aceh	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
89. Sumatera Utara	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
90. Riau	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
91. Jambi	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
92. Sumatera Barat	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
93. Bengkulu	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
94. Lampung	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
95. Kalimantan Utara	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
96. Kalimantan Tengah	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
97. Kalimantan Barat	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
98. Kalimantan Selatan	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
99. Irian Jaya	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
100. Papua Barat	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
101. Papua	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
102. Sulawesi Utara	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
103. Sulawesi Tengah	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
104. Sulawesi Selatan	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
105. Sulawesi Tenggara	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
106. Maluku Utara	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
107. Maluku	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
108. Nusa Tenggara Barat	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
109. Nusa Tenggara Timur	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
110. Bali	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
111. Jawa Barat	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
112. Jawa Tengah	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
113. Jawa Timur	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
114. DI Yogyakarta	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
115. DKI Jakarta	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
116. Banten	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
117. Aceh	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
118. Sumatera Utara	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
119. Riau	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
120. Jambi	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
121. Sumatera Barat	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
122. Bengkulu	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
123. Lampung	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
124. Kalimantan Utara	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
125. Kalimantan Tengah	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
126. Kalimantan Barat	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
127. Kalimantan Selatan	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
128. Irian Jaya	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
129. Papua Barat	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
130. Papua	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
131. Sulawesi Utara	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
132. Sulawesi Tengah	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
133. Sulawesi Selatan	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
134. Sulawesi Tenggara	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
135. Maluku Utara	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
136. Maluku	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
137. Nusa Tenggara Barat	1,000,000,000	1,000,000,000	1,000,000,000	3,000,000,000
138. Nusa Tenggara Timur	1,000,000,000	1,000,000,000	1,000,	

**EAST KALIMANTAN CASE  
(REHABILITATION/REHABILITASI,  
within National Park)**

Location : Kutai National Park  
 Area : 50 Ha  
 Species : Avicenia sp  
 Responsible Institution : National Park cooperation  
 with local government & Research center



## Critics on the movement :

- Lack of readily available good seedlings
- Lack of detailed maps for planting
- Only 2 years tending period, but should be till harvest
- Poor control and management of forest and land rehabilitation and lack of sanctions for violators.
- Late of implementation
- Target area is too small compare to deforestation rate
- Success rate is very small : 30%

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