Progress of MRV System in Indonesia

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Ministry of Forestry

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Outline

- MRV Concept and Principles
- Indonesia's Commitment on Reducing Emission
- Existing Policy, Regulation, and Institution Capacity
- Existing Measurement / Monitoring Activity (MRV)→ include MRV roadmap part two
- Development (Gaps & Contraint)
- Next Steps

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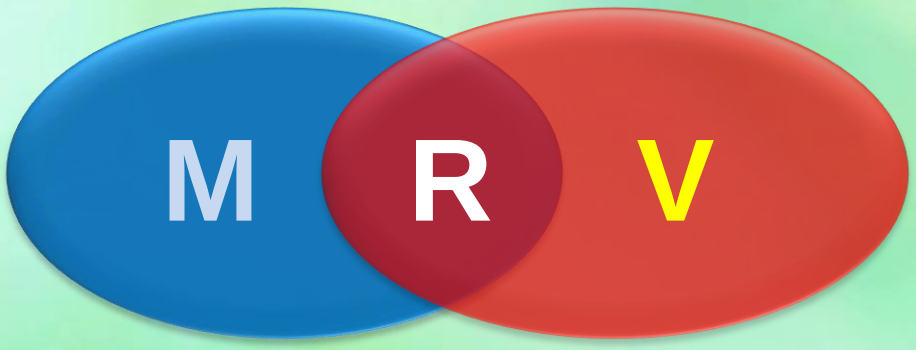

Measurable ,Reportable , and Verifiable

Country level

Monitoring systems at national level (forest inventories)

International reporting

Reported in a standardized way to an independent body

External Independent Verification

- Monitoring systems to be designed to facilitate the reporting and verification
- Guidelines for monitoring are being indicated in COP decisions (2/CP.13 and 4/CP.15), may need additions but probably good enough to start developing monitoring systems
- Guidelines and modalities for reporting and verification still to be developed by the COP

United Nations Framework Convention on Climate Change

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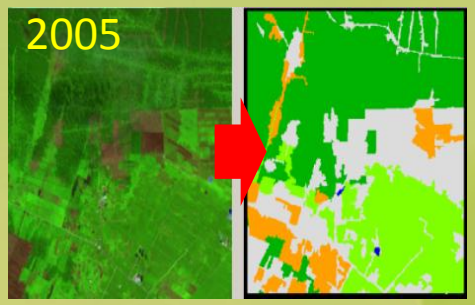
MRV

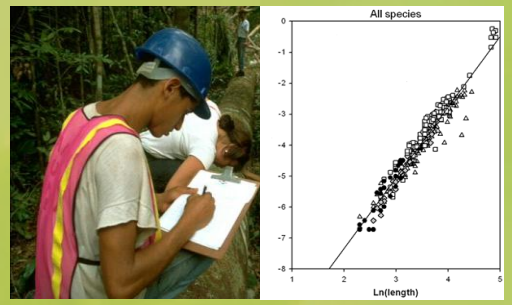
M

ACTIVITY DATA
Satellite Land Representation System (SLRS)

x

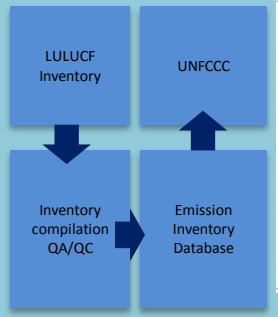
EMISSION FACTOR
National Forest Inventory





R

= **REDD+ GHG Inventory**



V

Indepedent verification

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MRV

UN Doc FCCC/CP/2009/11/Add.1 (COP 15 Copenhagen, December 2009) 4/CP.15 Methodological guidance for activities REDD+: Para 1. (d), point (i).

"Use a combination of remote sensing and ground-based forest carbon inventory approaches for estimating, as appropriate, anthropogenic forest-related greenhouse gas emissions by sources and removals by sinks, forest carbon stocks and forest area changes"

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Reference Emission Level

UN Doc FCCC/SBSTA/2008/6 (SB 28 Bonn, June 2008) Annex III Main methodological issues:

- **Reference emissions levels:**
  "Means to establish reference emission levels, based on historical data, taking into account, inter alia, trends, starting dates and the length of the reference period, availability and reliability of historical data, and other specific national circumstances."

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Reference Emission Level

REDD-UNFCCC Expert Meeting on "Methodological Issues relating to Reference Emission Levels" (Bonn, 23-24 March 2009):

"The reference emissions level (REL) is the amount of gross emissions from a geographical area estimated within a reference time period (REDD)."

"The reference level (RL) is the amount of net/ gross emissions and removals from a geographical area estimated within a reference time period (Conservation, SMF, EFCS)."

Indonesia's Program on Reducing Emission

The Central Government Program on Emission Reduction

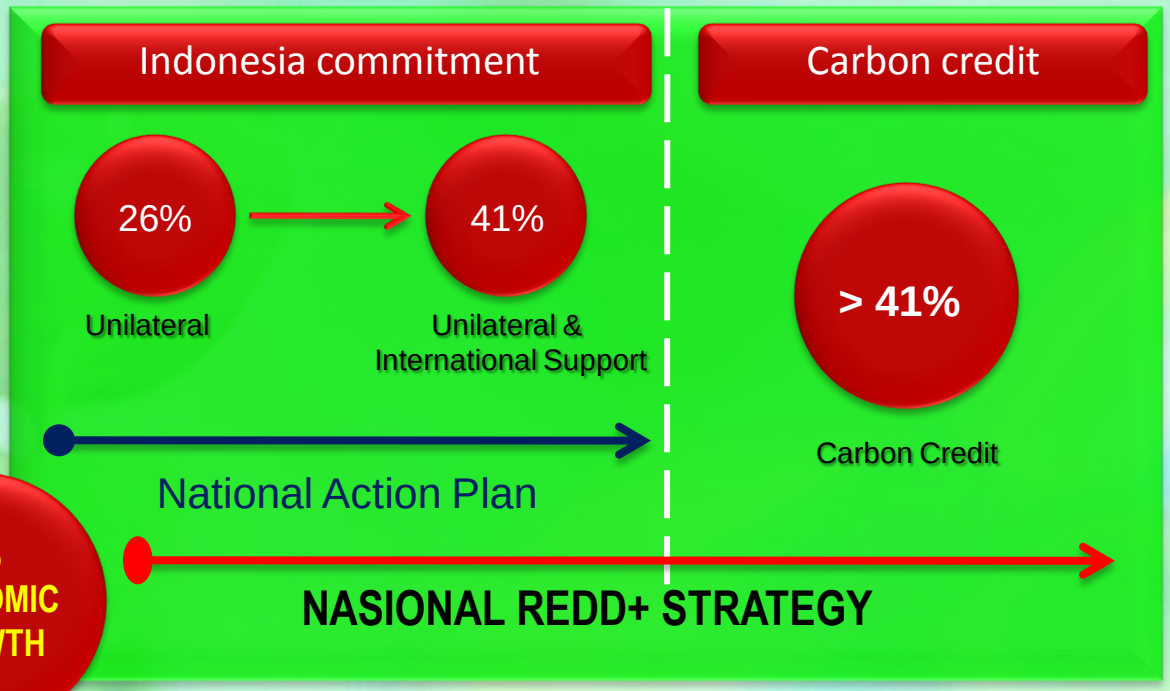
Indonesia has committed to 26-41 percent CO2 emission reduction target by 2020

President Susilo Bambang Yudhoyono committed Indonesia to a 26% emission reduction target by 2020.

The Presiden speech at G20 Pittsburgh dan COP 15 Copenhagen

In association with Copenhagen Accord

"We are devising an energy mix policy including LULUCF (Land Use, Land Use Change, and Forestry)) that will reduce our emissions by 26 percent by 2020 from BAU (Business As Usual). With International support we are confident that we can reduce emissions by as much as 41 percent."



7% ECONOMIC GROWTH

Existing Policy, Regulation, and Institution Capacity

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President Regulations on Emission Reduction

- President Regulation on National Climate Change Council (46/2008)
- President Decree on REDD+ Task Force (25/2011)
- President Regulation on National Action Plan for Green House Gas Reduction (61/2011).
- President Regulation on National Action Plan for Green House Gas Inventory (71/2011).
- President Instruction on Moratorium for Issuing Forest Concession permits (10 /2011)

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REDD+ Task Force

- **The Presidential Decree 25/2011.**
- **Mandate: institutional arrangements by end 2012, including:**
  - Prepare the establishment of REDD+ Institution Coordinate the development of REDD+ National Strategy;
  - Prepare the instruments and funding mechanisms of REDD+;
  - Prepare the establishment of credible and reliable MRV Institution;
  - Implement REDD+ in the first pilot province and develop criteria for the second pilot project;
  - Monitor the implementation of the moratorium of new license on natural forest and peatland (Presidential Instruction 10/2011)

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Ministry of Forestry Guideline on MRV

- Forestry Ministerial Decree on procedures to develop REDD demonstration activities (P 68/2008).
- Forestry Ministerial Decree on guidance to implement REDD + initiative (30/Menhut-II/2009).
- Forestry Ministerial Decree on licensing of REDD activities in production and protection forests (P.36/2009)
- Guidance for carbon measurement to support REDD+ implementation in Indonesia (FORDA).
- Guidelines (Peraturan Dirjen Bina Produksi) for carbon stock inventory in Timber Plantations, Natural Forest and Ecosystem Restoration.

Current National MRV Status for REDD+ Readiness

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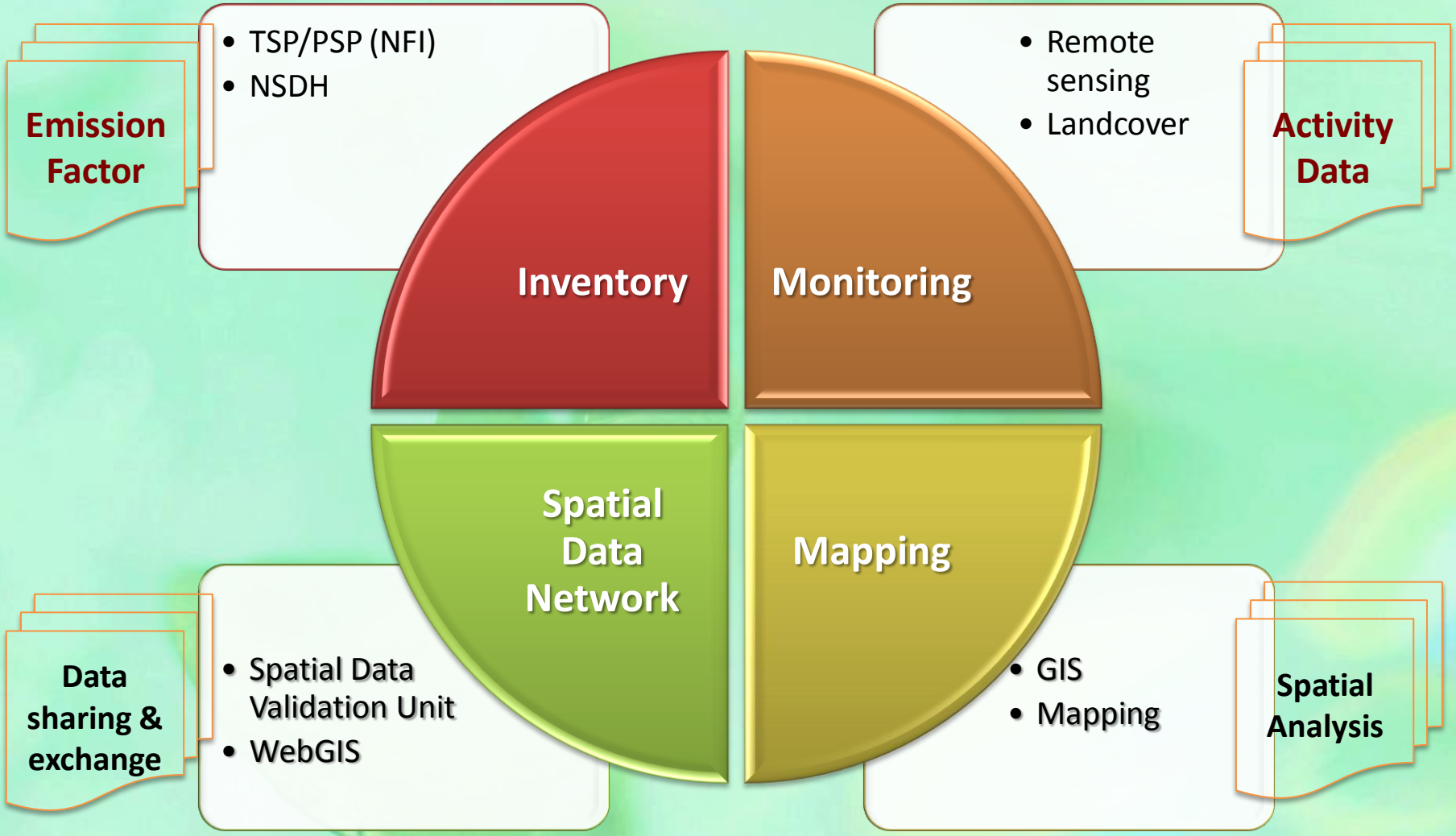
Existing MRV Activities

within DG of Forestry Planning, Dit. IPSDH



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Progress Activities

- **Ministry of Forestry Activities → DitjenPlan**
  - ✓Wall to wall mapping
  - ✓Land cover clasification
  - ✓land-cover changes
  - ✓Deforestation rate
  - ✓Degradation rate
  - ✓National sample plot (National Forest Inventory)
  - ✓Timber volume estimation
  - ✓Biomass
  - ✓Forest carbon estimation based on NFI
  - ✓REL / RL
  - ✓Target reducing (NAP, SNAP)
  - ✓Spatial Data Base (Vegetation, Fisic, management)

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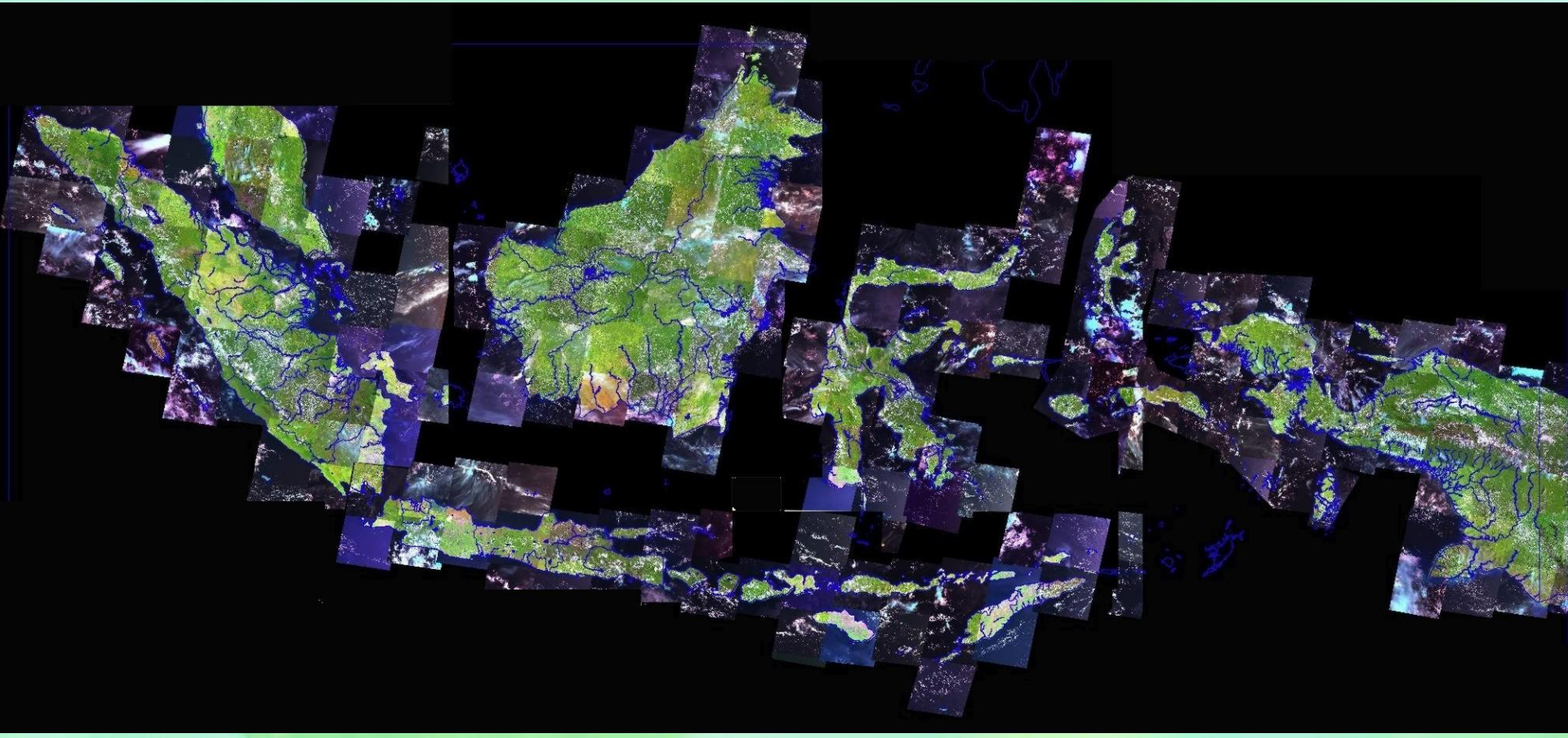
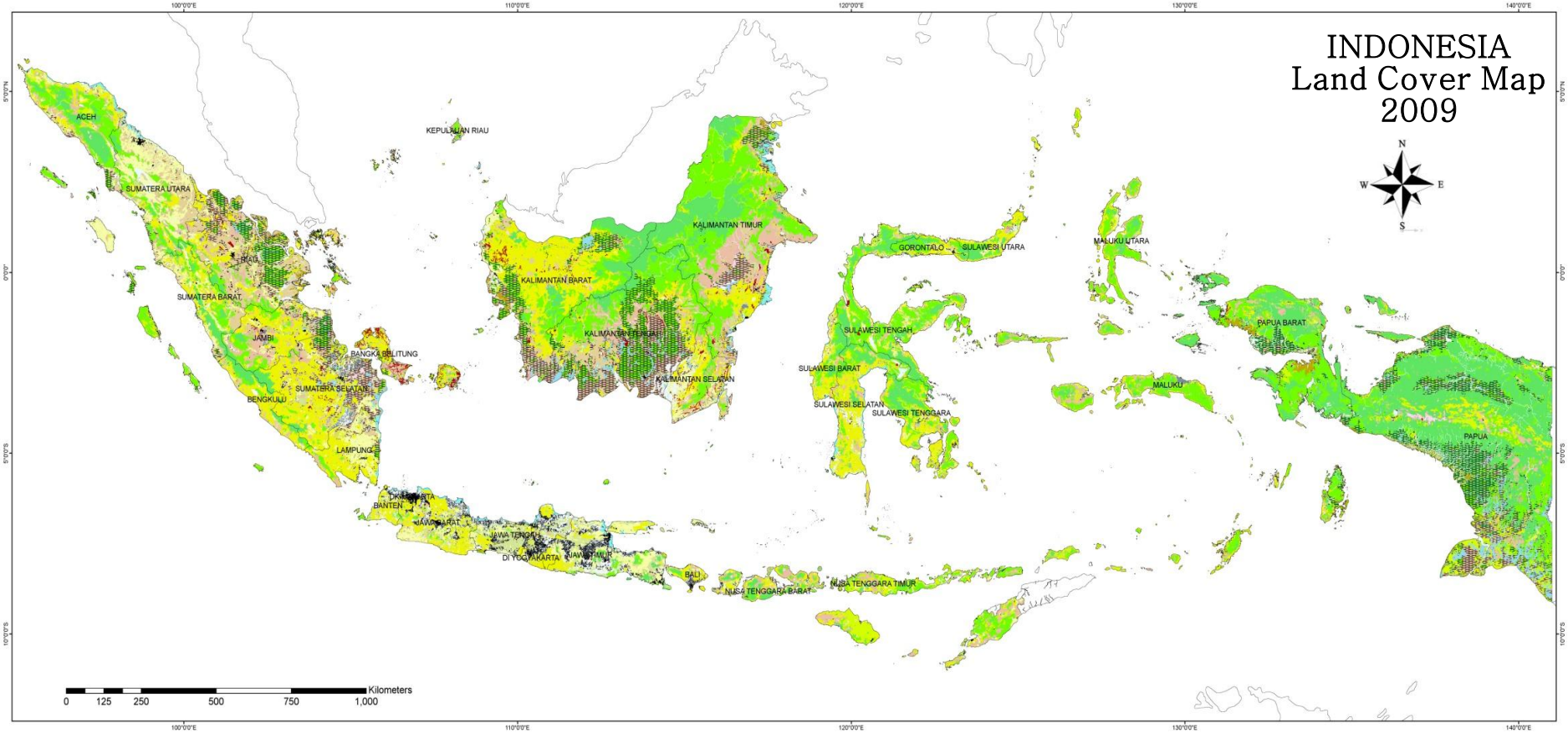
Satellite Images Mosaic of Indonesia



Remark: Landsat 7 ETM+ coverage for the whole Indonesia (217 scene)

Satellite Images Interpretation (Land Cover Map) of Indonesia



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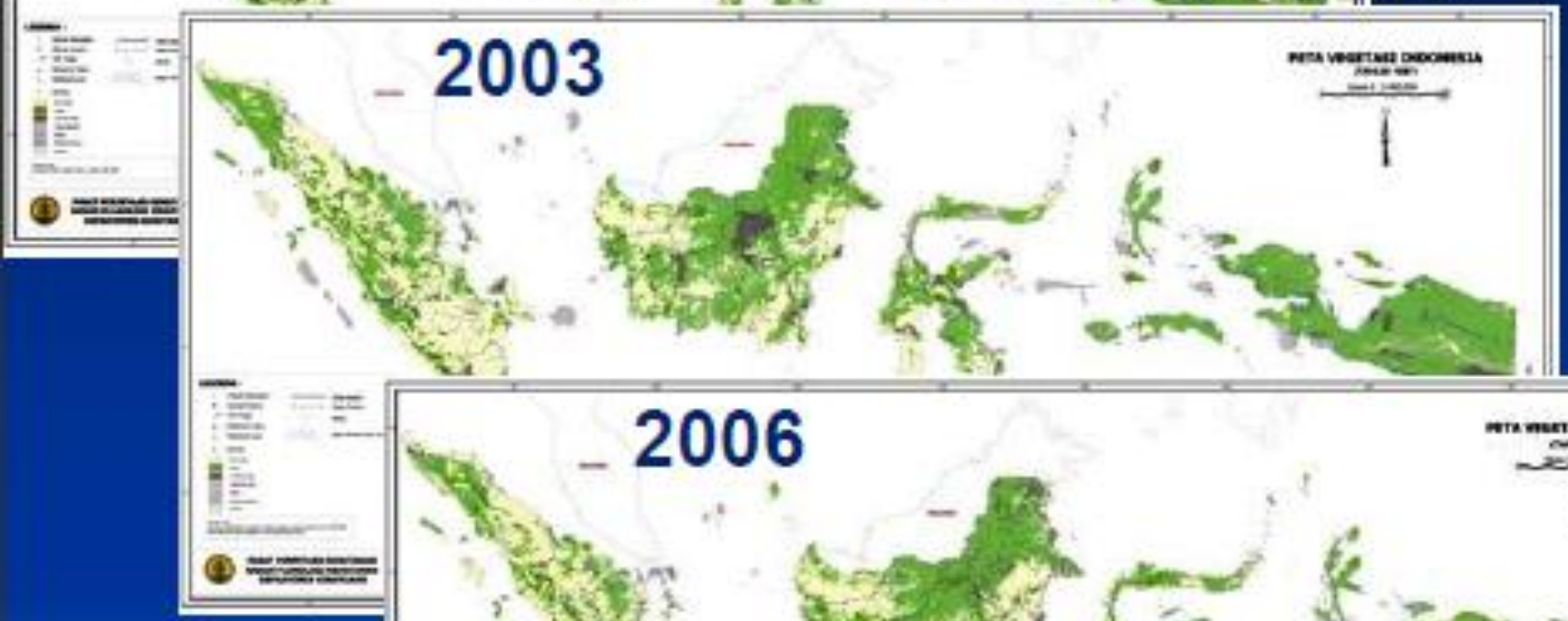
Land Cover Calculation

Unit: million hectare

LAND COVER	FOREST AREA		NON-FOREST AREA		TOTAL	
	Area (ha)	%	Area (ha)	%	Area (ha)	%
FORESTED	91,132 (Primer=41,954, LOA=49,179)	48%	7,465	4%	100,740	52%
NON FORESTED	42,381	23%	46,692	25%	87,047	48%
TOTAL	133,514	71%	54,157	29%	187,787	100%

Source: **Satellite Images of Landsat 7 ETM+ year 2009/2010 (217 scenes)**
Interpretation on 2009/2010, Published on 2011

FOREST COVER CHANGE BASED ON LANDSAT IMAGES



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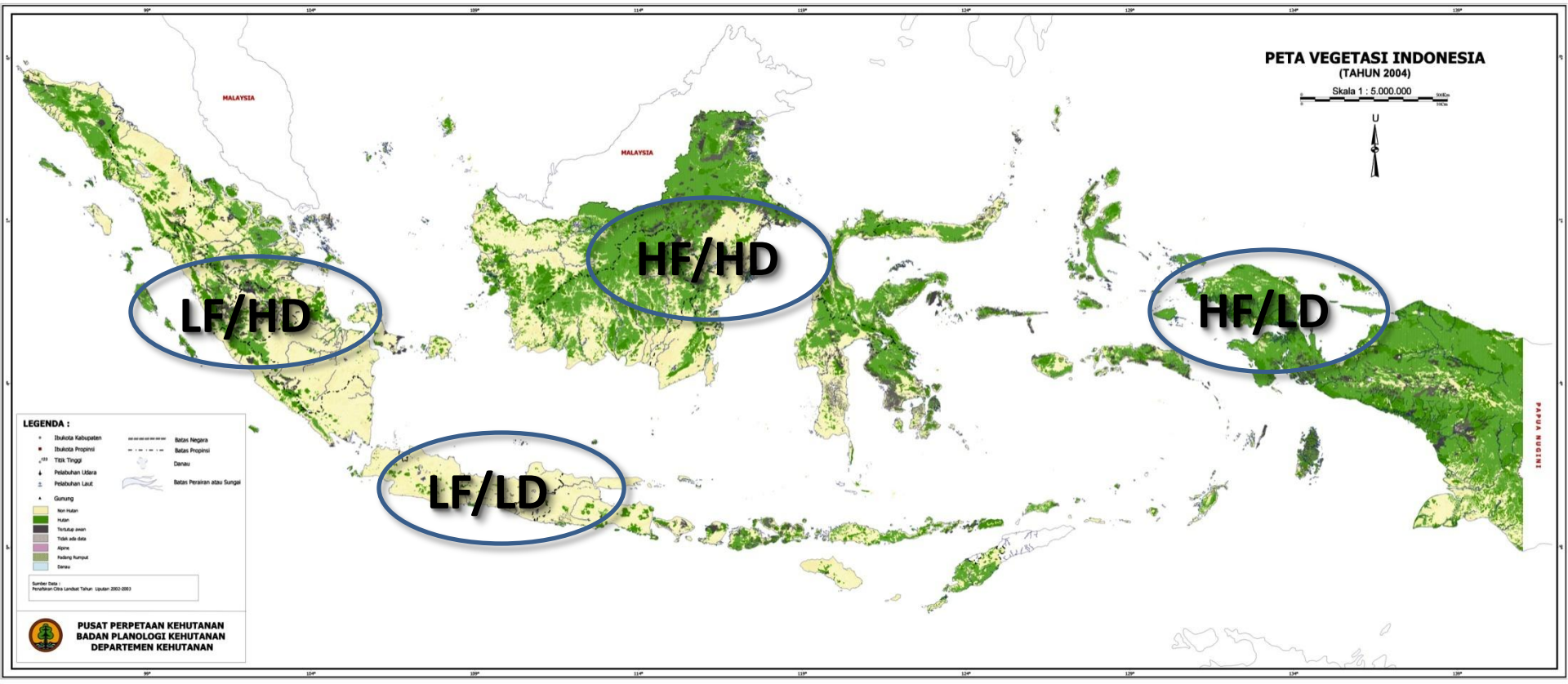
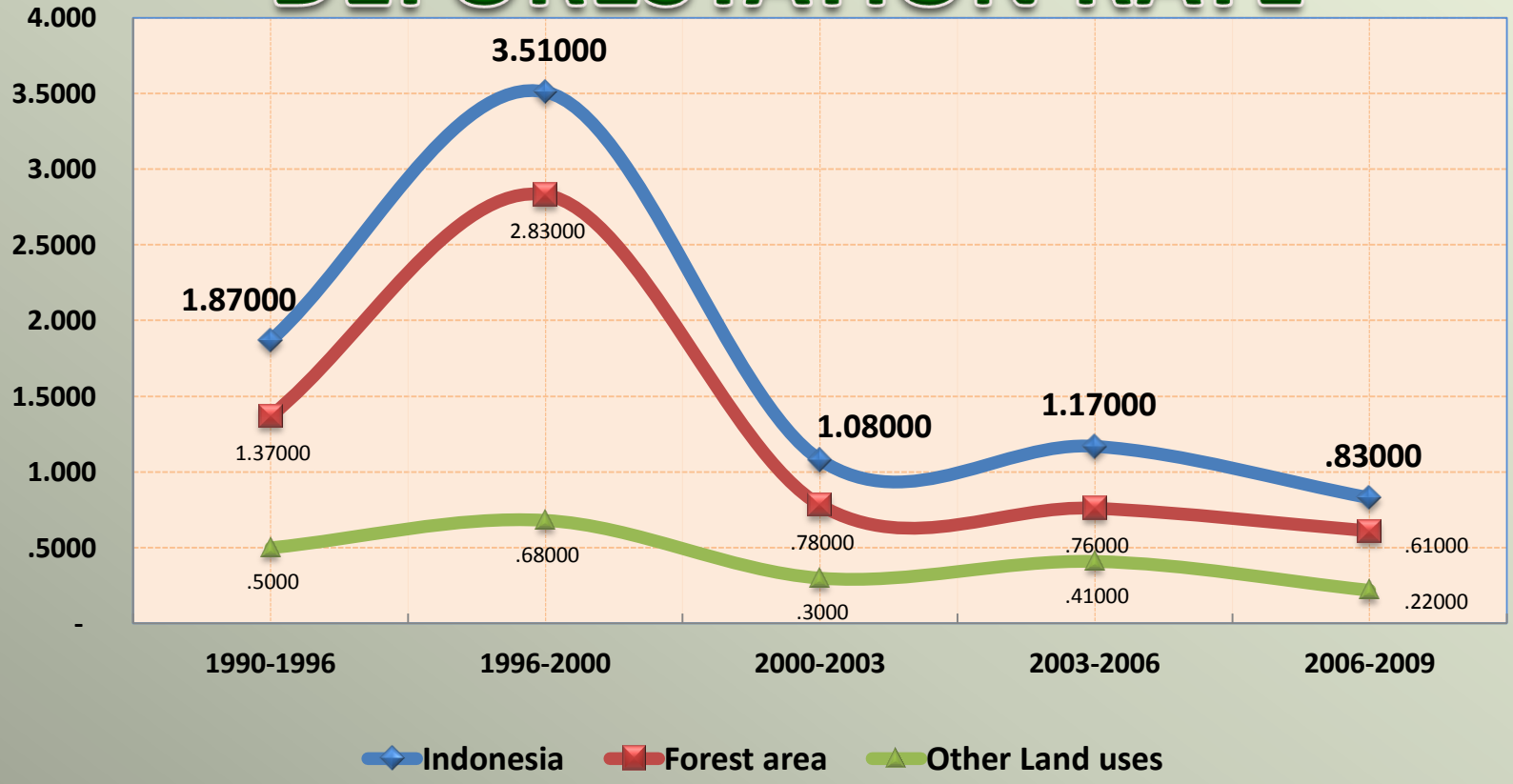
Cluster of Forest Cover and Deforestation Rate



Note:
Low-High Forest-Deforestation

DEFORESTATION RATE



million ha/ year	1990-1996	1996-2000	2000-2003	2003-2006	2006-2009
Indonesia	1,87	3,51	1,08	1,17	0,83
Forest Land	1,37	2,83	0,78	0,76	0,61
Non Forest Land	0,50	0,68	0,30	0,41	0,22

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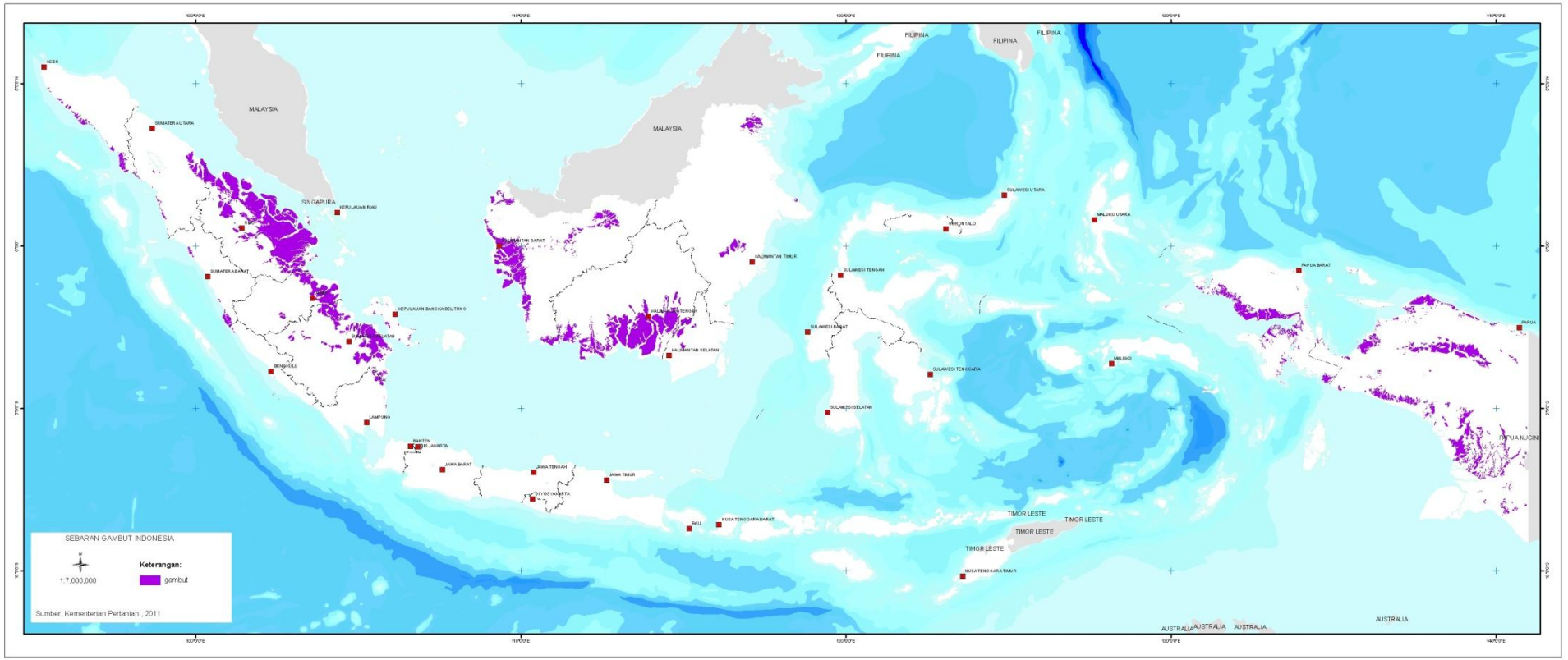
Distribution of Peat land in Indonesia



AREA (Ha)			
SUMATERA	KALIMANTAN	PAPUA	TOTAL
6,480,163	4,779,036	3,919,671	15,178,870

Source: **Ministry of Agriculture** (2011)

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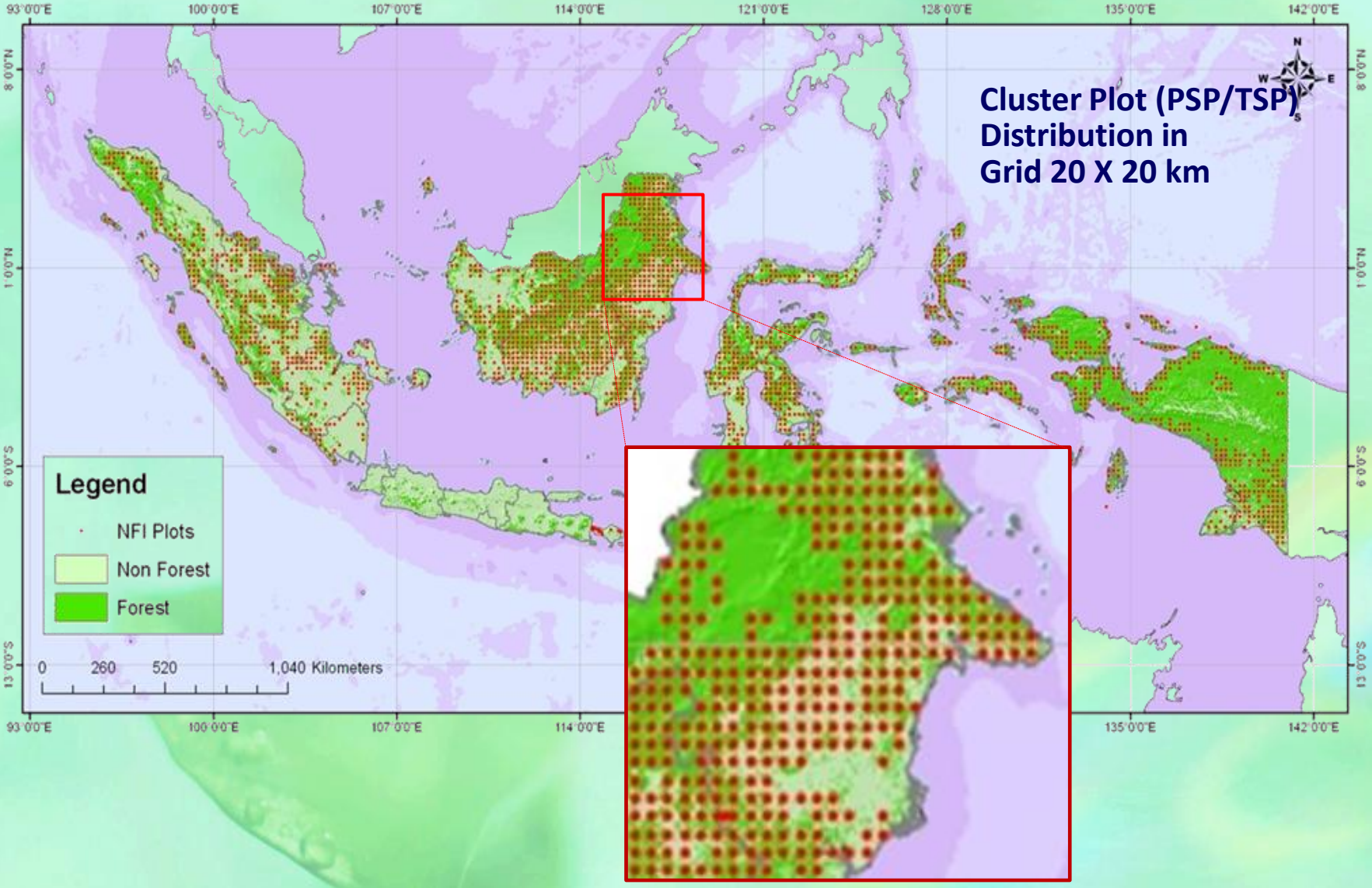
NFI-Cluster Plot Distribution



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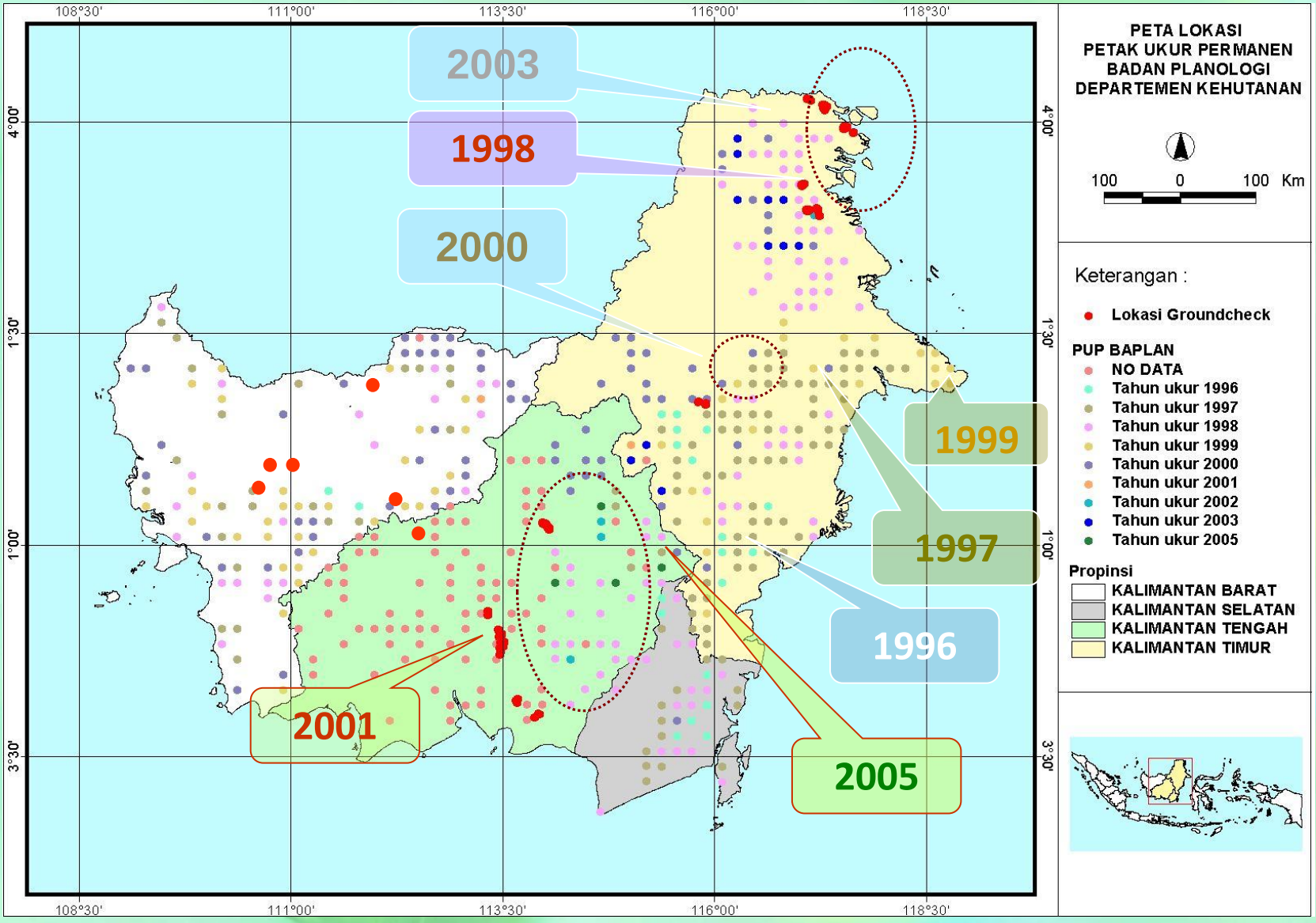
TSP/PSP Distribution in Kalimantan



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Defining National REL

Emission/Removal Factor:

National Forest Inventory (NFI) Sample Plots

- 1990-1996 (2.735 cluster plots)
- 1996-2000 (1.145 cluster plots)
- 2000-2006 (485 cluster plots)
- 2006-2011 (>3.000 cluster plots)

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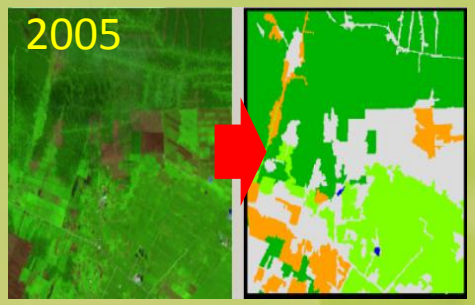
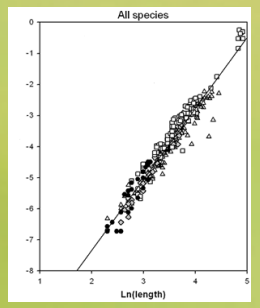
Defining National REL

ACTIVITY DATA
Satellite Land Representation System (SLRS)

x

EMISSION FACTOR
National Forest Inventory





Indonesian National Standard :

- Carbon calculation
- Allometric model
- classification land covers

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Above Ground Biomass in Forest Land

Forest	Mean of AGB (ton/Ha)	Mean of Carbon AGB (ton/Ha)	Mean of CO2e (ton/Ha)
Primer (p)	390,7	195,4	716,9
Sekunder (s)	339,2	169,6	622,4
KSA/ Conservation Forest	434,2	217,1	796,7
KSAp	456,9	228,5	838,5
KSAs	388,7	194,3	713,2
HL/ Protection Forest	378,1	189,0	693,7
HLp	407,5	203,8	747,8
HLs	355,3	177,7	652,0
HPK/ Converted Production Forest	331,7	165,8	608,6
HPKp	332,7	166,4	610,6
HPKs	316,4	158,2	580,6
HP/ Production Forest	312,1	156,1	572,7
HPp	367,7	183,9	674,8
HPs	323,1	161,5	592,8
HPT/ Limited Production Forest	371,2	185,6	681,1
HPTp	394,7	197,4	724,3
HPTs	366,5	183,3	672,6
APL/ Non Forest Area	271,9	136,0	499,0
APLp	293,1	146,6	537,9
APLs	271,8	135,9	498,8

No	Province	CO2eq Stock 2000	CO2eq Stock 2003	CO2eq Stock 2006	CO2eq Stock 2009	CO2eq Stock 2011	
1	Aceh	812.818.264	812.861.604	809.771.049	797.902.442	795.184.991	
2	Sumatera Utara	668.732.205	667.719.637	657.996.223	656.059.467	651.872.261	
3	Sumatera Barat	528.604.403	526.996.769	520.775.041	508.401.047	505.208.370	
4	Riau	1.025.563.299	988.650.446	922.878.246	868.674.169	853.213.332	
5	Jambi	543.988.451	516.461.488	466.328.317	498.552.955	492.041.522	
6	Sumatera Selatan	623.109.690	619.210.569	607.683.542	593.412.652	606.442.015	
7	Bengkulu	237.786.814	235.297.669	232.391.557	231.011.245	226.251.963	
8	Bangka Belitung	135.574.960	134.972.473	133.414.275	129.343.420	129.343.420	
9	Kepulauan Riau	84.461.558	84.421.763	84.374.593	82.336.679	82.336.679	
10	Lampung	212.850.536	213.026.292	212.671.289	211.996.856	210.565.714	
	Pulau Sumatera	**4.873.490.181**	**4.799.618.711**	**4.648.284.130**	**4.577.690.932**	**4.552.460.266**	
		3	3	3	3	2	
		1.624.496.727	**1.599.872.904**	**1.549.428.043**	**1.525.896.977**	**2.276.230.133**	CO2/thn
11	Banten	47.753.921	46.370.840	48.222.047	46.952.637	46.937.274	
12	DKI Jakarta	541.470	497.779	497.529	497.529	497.529	
13	Jawa Barat	183.992.827	174.622.233	187.585.152	185.805.698	177.388.090	
14	Jawa Tengah	441.076.148	438.175.430	437.662.769	435.664.772	334.744.776	
15	DI Yogyakarta	13.898.366	13.616.583	13.531.552	13.515.490	13.513.451	
16	Jawa Timur	202.088.173	197.887.668	203.221.003	201.185.801	201.818.196	
	Pulau Jawa	**889.350.905**	**871.170.533**	**890.720.052**	**883.621.928**	**774.899.316**	
		3	3	3	3	2	
		296.450.302	**290.390.178**	**296.906.684**	**294.540.643**	**387.449.658**	CO2/thn
17	Kalimantan Barat	1.820.407.291	1.813.294.258	1.763.254.792	1.713.275.540	1.610.949.251	
18	Kalimantan Tengah	2.210.105.325	2.187.796.174	2.156.729.404	2.102.322.779	2.065.891.942	
19	Kalimantan Selatan	332.462.628	321.566.520	311.623.822	306.506.983	305.837.429	
20	Kalimantan Timur	3.473.308.782	3.415.075.471	3.340.575.647	3.249.416.077	3.237.452.133	
	Pulau Kalimantan	**7.836.284.027**	**7.737.732.422**	**7.572.183.665**	**7.371.521.379**	**7.220.130.756**	
		3	3	3	3	2	
		2.612.094.676	**2.579.244.141**	**2.524.061.222**	**2.457.173.793**	**3.610.065.378**	CO2/thn
21	Bali	45.441.369	44.734.365	44.621.858	40.539.197	40.539.197	
22	Nusa Tenggara Timur	515.601.797	515.265.258	516.446.018	517.118.682	516.046.418	
23	Nusa Tenggara Barat	266.301.711	263.247.490	261.791.258	256.074.051	256.048.934	
	Bali dan Nusa Tenggara	**827.344.877**	**823.247.113**	**822.859.134**	**813.731.930**	**812.634.549**	
		3	3	3	3	2	
		275.781.626	**274.415.704**	**274.286.378**	**271.243.977**	**406.317.274**	CO2/thn
24	Sulawesi Utara	176.988.971	170.896.066	164.585.234	161.770.454	160.994.339	
25	Gorontalo	184.476.024	179.891.534	174.980.395	173.010.703	172.783.244	
26	Sulawesi Tengah	1.116.169.499	1.107.234.575	1.010.152.341	1.001.352.844	993.739.930	
27	Sulawesi Barat	226.490.812	222.769.750	217.909.883	216.455.388	216.469.502	
28	Sulawesi Selatan	438.205.133	426.863.466	423.991.974	421.309.234	421.329.451	
29	Sulawesi Tenggara	512.897.527	513.137.601	504.474.843	502.258.348	502.144.987	
	Pulau Sulawesi	**2.655.227.966**	**2.620.792.991**	**2.496.094.670**	**2.476.156.972**	**2.467.461.453**	
		3	3	3	3	2	
		885.075.989	**873.597.664**	**832.031.557**	**825.385.657**	**1.233.730.727**	CO2/thn
30	Maluku Utara	479.532.299	477.508.028	475.622.072	473.964.126	470.098.753	
31	Maluku	686.910.079	685.874.526	684.719.043	683.784.112	683.631.591	
	Kepulauan Maluku	**1.166.442.379**	**1.163.382.555**	**1.160.341.115**	**1.157.748.238**	**1.153.730.344**	
		3	3	3	3	2	
		388.814.126	**387.794.185**	**386.780.372**	**385.916.079**	**576.865.172**	CO2/thn
32	Papua Barat	2.080.516.539	2.056.720.904	2.049.478.702	2.041.073.309	2.040.457.555	
33	Papua	6.290.305.656	6.257.445.079	6.189.839.738	6.120.030.132	6.109.673.833	
	Pulau Irian	**8.370.822.195**	**8.314.165.982**	**8.239.318.440**	**8.161.103.441**	**8.150.131.388**	
		3	3	3	3	2	
		2.790.274.065	**2.771.388.661**	**2.746.439.480**	**2.720.367.814**	**4.075.065.694**	CO2/thn
	Grand Total	**26.618.962.530**	**26.330.110.309**	**25.829.801.207**	**25.441.574.820**	**25.131.448.071**	

No	Provinces	Emission 2000-2003	Emission 2003-2006	Emission 2006-2009	
1	Aceh	455.217	4.073.881	12.064.897	
2	Sumatera Utara	1.051.865	10.340.891	32.891.909	
3	Sumatera Barat	1.686.736	6.901.163	12.513.366	
4	Riau	44.376.026	81.311.646	74.397.350	
5	Jambi	29.265.438	61.516.964	28.101.049	
6	Sumatera Selatan	4.345.202	14.421.172	15.261.579	
7	Bengkulu	2.602.336	2.948.896	1.380.312	
8	Bangka Belitung	707.737	1.788.247	4.096.401	
9	Kepulauan Riau	39.794	47.388	2.163.509	
10	Lampung	305.946	377.209	850.357	
	Pulau Sumatera	**84.836.297**	**183.727.455**	**183.720.730**	
		3	3	3	
		28.278.766	**61.242.485**	**61.240.243**	CO2/thn
11	Banten	1.395.194	147.270	1.302.308	
12	DKI Jakarta	45.681	250	-	
13	Jawa Barat	9.469.311	4.332.466	2.058.436	
14	Jawa Tengah	2.971.516	6.581.993	2.328.656	
15	DI Yogyakarta	282.571	373.577	21.872	
16	Jawa Timur	4.406.898	528.003	2.039.544	
	Pulau Jawa	**18.571.171**	**11.963.558**	**7.750.816**	
		3	3	3	
		6.190.390	**3.987.853**	**2.583.605**	CO2/thn
17	Kalimantan Barat	7.998.452	55.547.526	54.697.534	
18	Kalimantan Tengah	24.560.637	52.735.418	58.975.711	
19	Kalimantan Selatan	12.204.980	10.749.265	7.013.547	
20	Kalimantan Timur	60.484.603	77.683.227	94.595.002	
	Pulau Kalimantan	**105.248.671**	**196.715.435**	**215.281.793**	
		3	3	3	
		35.082.890	**65.571.812**	**71.760.598**	CO2/thn
21	Bali	707.404	183.269	6.589.991	
22	Nusa Tenggara Timur	341.441	3.891.990	3.454.215	
23	Nusa Tenggara Barat	3.054.221	1.473.527	9.198.619	
	Bali dan Nusa Tenggara	**4.103.066**	**5.548.785**	**19.242.825**	
		3	3	3	
		1.367.689	**1.849.595**	**6.414.275**	CO2/thn
24	Sulawesi Utara	7.812.287	6.365.742	2.849.496	
25	Gorontalo	4.614.151	5.013.303	2.551.608	
26	Sulawesi Tengah	8.935.824	97.343.708	8.813.242	
27	Sulawesi Barat	3.843.494	5.261.743	2.243.961	
28	Sulawesi Selatan	11.401.739	2.878.222	2.772.794	
29	Sulawesi Tenggara	1.060.582	8.743.707	2.242.352	
	Pulau Sulawesi	**37.668.077**	**125.606.425**	**21.473.453**	
		3	3	3	
		12.556.026	**41.868.808**	**7.157.818**	CO2/thn
30	Maluku Utara	2.025.725	1.947.702	1.682.669	
31	Maluku	1.040.494	1.518.966	3.644.453	
	Kepulauan Maluku	**3.066.219**	**3.466.667**	**5.327.122**	
		3	3	3	
		1.022.073	**1.155.556**	**1.775.707**	CO2/thn
32	Papua Barat	23.795.635	7.382.511	8.432.494	
33	Papua	35.005.986	68.573.702	71.576.132	
	Pulau Irian	**58.801.621**	**75.956.213**	**80.008.626**	
		3	3	3	
		19.600.540	**25.318.738**	**26.669.542**	CO2/thn
	Grand Total	**312.295.123**	**602.984.540**	**532.805.365**	

No	Province	Squestration 2000-2003	Squestration 2003-2006	Squestration 2006-2009	Squestration 2009-2011
1	Aceh	19.655.284	19.867.634	18.863.514	12.923.585
2	Sumatera Utara	27.248.387	27.535.493	53.165.199	18.585.804
3	Sumatera Barat	12.276.574	12.551.322	12.118.108	8.380.625
4	Riau	57.766.131	63.515.530	69.223.619	39.495.250
5	Jambi	22.626.373	30.960.106	78.918.401	16.066.152
6	Sumatera Selatan	34.843.656	36.305.670	35.078.067	41.346.536
7	Bengkulu	5.102.267	5.005.595	5.013.879	3.262.380
8	Bangka Belitung	6.466.172	6.550.784	6.223.106	4.272.544
9	Kepulauan Riau	4.485.814	4.484.375	4.510.034	2.962.244
10	Lampung	7.962.887	7.633.355	7.759.361	5.224.743
	Pulau Sumatera	**198.433.544**	**214.409.864**	**290.873.287**	**152.519.863**
		3	3	3	2
		66.144.515	**71.469.955**	**96.957.762**	**76.259.932** CO 2/t hn
11	Banten	5.245.144	6.148.270	4.767.057	3.174.551
12	DKI Jakarta	10.691	9.351	9.351	6.234
13	Jawa Barat	23.516.281	32.709.942	24.004.957	16.126.157
14	Jawa Tengah	50.017.102	53.846.781	50.982.441	34.749.665
15	DI Yogyakarta	2.041.800	1.887.063	1.884.009	1.252.132
16	Jawa Timur	49.239.781	50.413.365	48.418.155	33.180.652
	Pulau Jawa	**130.070.799**	**145.014.773**	**130.065.969**	**88.489.391**
		3	3	3	2
		43.356.933	**48.338.258**	**43.355.323**	**44.244.696** CO 2/t hn
17	Kalimantan Barat	40.831.883	43.517.268	42.768.021	26.359.994
18	Kalimantan Tengah	68.644.750	85.769.391	73.096.048	58.427.639
19	Kalimantan Selatan	18.160.840	17.547.619	18.423.670	11.666.510
20	Kalimantan Timur	77.002.479	77.458.184	85.791.148	63.997.754
	Pulau Kalimantan	**204.639.952**	**224.292.463**	**220.078.887**	**160.451.897**
		3	3	3	2
		68.213.317	**74.764.154**	**73.359.629**	**80.225.949** CO 2/t hn
21	Bali	1.212.882	1.317.596	3.232.444	763.320
22	Nusa Tenggara Timur	15.091.230	19.465.795	18.908.753	10.019.742
23	Nusa Tenggara Barat	5.709.569	5.934.172	9.206.637	4.162.357
	Bali dan Nusa Tenggara	**22.013.681**	**26.717.563**	**31.347.834**	**14.945.419**
		3	3	3	2
		7.337.894	**8.905.854**	**10.449.278**	**7.472.709** CO 2/t hn
24	Sulawesi Utara	3.866.657	2.234.767	2.246.126	1.528.168
25	Gorontalo	2.870.873	2.968.612	3.543.628	2.135.500
26	Sulawesi Tengah	9.567.554	10.019.594	17.008.624	11.475.716
27	Sulawesi Barat	4.570.966	4.692.074	5.152.210	2.970.261
28	Sulawesi Selatan	9.868.302	10.295.119	10.431.156	7.079.855
29	Sulawesi Tenggara	12.151.144	10.760.091	10.970.753	7.496.312
	Pulau Sulawesi	**42.895.496**	**40.970.257**	**49.352.497**	**32.685.812**
		3	3	3	2
		14.298.499	**13.656.752**	**16.450.832**	**16.342.906** CO 2/t hn
30	Maluku Utara	11.968.890	12.103.056	12.089.076	8.162.109

Squestration Calculation for Forest Plantation base on Harvested Cycle

No	Tahun	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
1	Luas penanaman RHL per tahun (2010-2014)(Ha)	0	872.727	872.727	872.727	872.727	872.727	-	-	-	-	-	-	-
	Luas penanaman pada Siklus Tebangan 15 tahun (Ha)	0	872.727	1.745.455	2.618.182	3.490.909	4.363.636	4.363.636	4.363.636	4.363.636	4.363.636	4.363.636	4.363.636	4.363.636
	Kandungan Biomasa per kelas umur (ton/ha)			(50+10)/2	(50+10)/2	(50+10)/2	(50+10)/2	(50+10)/2	(50+10)/2	(50+10)/2	(50+10)/2	(50+10)/2	(50+10)/2	(50+10)/2
	Kandungan Biomasa Rata-rata (ton/ha)	0	30	30	30	30	30	30	30	30	30	30	30	30
	Kandungan Biomasa (ton)		26.181.818	52.363.636	78.545.455	104.727.273	130.909.091	130.909.091	130.909.091	130.909.091	130.909.091	130.909.091	130.909.091	130.909.091
	Serapan (Ton CO2e)	0	48.043.636	96.087.273	144.130.909	192.174.545	240.218.182	240.218.182	240.218.182	240.218.182	240.218.182	240.218.182	240.218.182	240.218.182
2	Luas penanaman RHL per tahun(2015-2020) (Ha)	0	0	0	0	0	0	872.727	872.727	872.727	872.727	872.727	872.727	872.727
	Luas penanaman pada Siklus Tebangan 15 tahun (Ha)	0	0	0	0	0	0	872.727	1.745.455	2.618.182	3.490.909	4.363.636	5.236.364	6.109.091
	Kandungan Biomasa per kelas umur (ton/ha)	0	0	0	0	0	0	(60+10)/2	(60+10)/2	(60+10)/2	(60+10)/2	(60+10)/2	(60+10)/2	(60+10)/2
	Kandungan Biomasa Rata-rata (ton/ha)	0	0	0	0	0	0	35	35	35	35	35	35	35
	Kandungan Biomasa (ton)							30.545.455	61.090.909	91.636.364	122.181.818	152.727.273	183.272.727	213.818.182
	Serapan (Ton CO2e)	0	0	0	0	0	0	56.050.909	112.101.818	168.152.727	224.203.636	280.254.545	336.305.455	392.356.364
3	Luas penanaman HTI per tahun (2010-2014)(Ha)	0	527.273	527.273	527.273	527.273	527.273	-	-	-	-	-	-	-
	Luas penanaman pada Siklus Tebangan 6 tahun (Ha)	0	527.273	1.054.545	1.581.818	2.109.091	2.636.364	2.109.091	2.109.091	2.109.091	2.109.091	2.109.091	2.109.091	2.109.091
	Kandungan Biomasa per kelas umur (ton/ha)		(100+20)/2	(100+20)/2	(100+20)/2	(100+20)/2	(100+20)/2	(100+20)/2	(100+20)/2	(100+20)/2	(100+20)/2	(100+20)/2	(100+20)/2	(100+20)/2
	Kandungan Biomasa Rata-rata (ton/ha)	0	60	60	60	60	60	60	60	60	60	60	60	60
	Kandungan Biomasa (ton)		31.636.364	63.272.727	94.909.091	126.545.455	158.181.818	126.545.455	126.545.455	126.545.455	126.545.455	126.545.455	126.545.455	126.545.455
	Serapan (Ton CO2e)	0	58.052.727	116.105.455	174.158.182	232.210.909	290.263.636	232.210.909	232.210.909	232.210.909	232.210.909	232.210.909	232.210.909	232.210.909
4	Luas penanaman HTI per tahun(2015-2020) (Ha)	0	0	0	0	0	0	527.273	527.273	527.273	527.273	527.273	527.273	527.273
	Luas penanaman pada Siklus Tebangan 6 tahun (Ha)	0	0	0	0	0	0	527.273	1.054.545	1.581.818	2.109.091	2.636.364	3.163.636	2.636.364
	Kandungan Biomasa per kelas umur (ton/ha)	0	0	0	0	0	0	(120+40)/2	(120+40)/2	(120+40)/2	(120+40)/2	(120+40)/2	(120+40)/2	(120+40)/2
	Kandungan Biomasa Rata-rata (ton/ha)	0	0	0	0	0	0	80	80	80	80	80	80	80
	Kandungan Biomasa (ton)							42.181.818	84.363.636	126.545.455	168.727.273	210.909.091	253.090.909	210.909.091
	Serapan (Ton CO2e)	0	0	0	0	0	0	77.403.636	154.807.273	232.210.909	309.614.545	387.018.182	464.421.818	387.018.182
5	Luas penanaman per tahun pada lahan yang belum ditanami (Ha) seluas 2,3jt Ha	0	200.000	300.000	400.000	400.000	500.000	500.000						
	Penanaman pada areal lama yang masih kosong (BAU kosong) (Ha)	0	200.000	500.000	900.000	1.300.000	1.800.000	2.300.000	1.900.000	1.900.000	1.900.000	1.900.000	1.900.000	1.900.000
	Kandungan Biomasa rata-rata (ton/ha)	0	20	20	20	20	20	20	20	20	20	20	20	20
	Kandungan Biomasa (ton)		4.000.000	10.000.000	18.000.000	26.000.000	36.000.000	46.000.000	38.000.000	38.000.000	38.000.000	38.000.000	38.000.000	38.000.000
	Serapan (Ton CO2e)	0	7.340.000	18.350.000	33.030.000	47.710.000	66.060.000	84.410.000	69.730.000	69.730.000	69.730.000	69.730.000	69.730.000	69.730.000
6	Stock tanaman lama yang sudah ada (BAU)(Ha)	2.800.000	2.800.000	2.800.000	2.800.000	2.800.000	2.800.000	2.800.000	2.800.000	2.800.000	2.800.000	2.800.000	2.800.000	2.800.000
	Kandungan Biomasa (ton/ha)	-	-	-	-	-	-	-	-	-	-	-	-	
	Serapan (Ton CO2e)	-	-	-	-	-	-	-	-	-	-	-	-	
	Serapan (Ton CO2e)	-	-	-	-	-	-	-	-	-	-	-	-	
7	Luas tanaman jati di P.Jawa (Ha)	1.700.000	1.700.000	1.700.000	1.700.000	1.700.000	1.700.000	1.700.000	1.700.000	1.700.000	1.700.000	1.700.000	1.700.000	1.700.000
	Biomass increment Jati dikurangi pemanenan (ton biomasa)	-	8.560.000	8.560.000	8.560.000	8.560.000	8.560.000	8.560.000	8.560.000	8.560.000	8.560.000	8.560.000	8.560.000	8.560.000
	Serapan (Ton CO2e)	-	15.707.600	15.707.600	15.707.600	15.707.600	15.707.600	15.707.600	15.707.600	15.707.600	15.707.600	15.707.600	15.707.600	15.707.600
	Serapan (Ton CO2e)	-	15.707.600	31.415.200	47.122.800	62.830.400	78.538.000	94.245.600	109.953.200	125.660.800	141.368.400	157.076.000	172.783.600	188.491.200
	Jumlah Serapan (Ton CO2e/Tahun)		71.091.236	145.852.473	224.283.709	302.714.945	384.816.182	474.924.691	532.003.200	603.761.709	675.520.218	747.278.727	819.037.236	890.795.745

No	Activities
1	Plantation per year for Rhab.(2010-2014) (Ha)
	Com. area of Plantation cycle 15 years (Ha)
	Biomass Carbon per stratrum (ton/ha)
	Average Biomas Carbon (ton/ha)
	Biomasa Carbon (ton)
	Squestration (Ton CO2e)
2	Luas penanaman RHL per tahun(2015-2020) (Ha)
	Luas penanaman pada Siklus Tebangan 15 tahun (Ha)
	Kandungan Biomasa per kelas umur (ton/ha)
	Kandungan Biomasa Rata-rata (ton/ha)
	Kandungan Biomasa (ton)
	Serapan (Ton CO2e)
3	Luas penanaman HTI per tahun (2010-2014)(Ha)
	Luas penanaman pada Siklus Tebangan 6 tahun (Ha)
	Kandungan Biomasa per kelas umur (ton/ha)
	Kandungan Biomasa Rata-rata (ton/ha)
	Kandungan Biomasa (ton)
	Serapan (Ton CO2e)

4	Luas penanaman HTI per tahun(2015-2020) (Ha)
	Luas penanaman pada Siklus Tebangan 6 tahun (Ha)
	Kandungan Biomasa per kelas umur (ton/ha)
	Kandungan Biomasa Rata-rata (ton/ha)
	Kandungan Biomasa (ton)
	Serapan (Ton CO2e)
5	Luas penanaman per tahun pada lahan yang belum ditanami (Ha) seluas 2,3jt Ha
	Penanaman pada areal lama yang masih kosong (BAU kosong) (Ha)
	Kandungan Biomasa rata-rata (ton/ha)
	Kandungan Biomasa (ton)
	Serapan (Ton CO2e)
6	Stock tanaman lama yang sudah ada (BAU)(Ha)
	Kandungan Biomasa (ton/ha)
	Serapan (Ton CO2e)
	Serapan (Ton CO2e)
7	Luas tanaman jati di P.Jawa (Ha)
	Biomass increment Jati dikurangi pemanenan (ton biomasa)
	Serapan (Ton CO2e)
	Serapan (Ton CO2e)
	Jumlah Serapan (Ton CO2e/Tahun)

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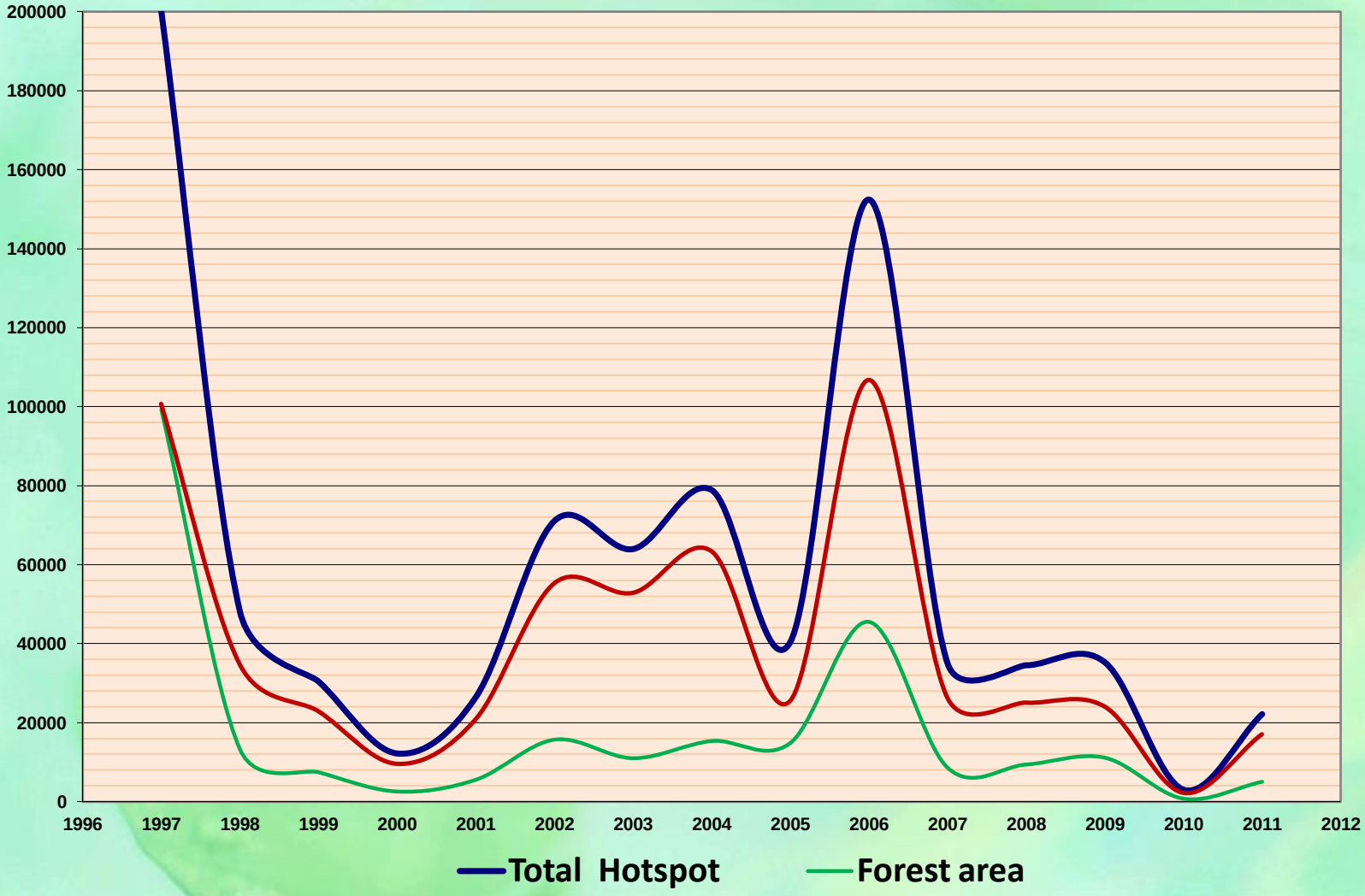
Forest Fires 1997-2011



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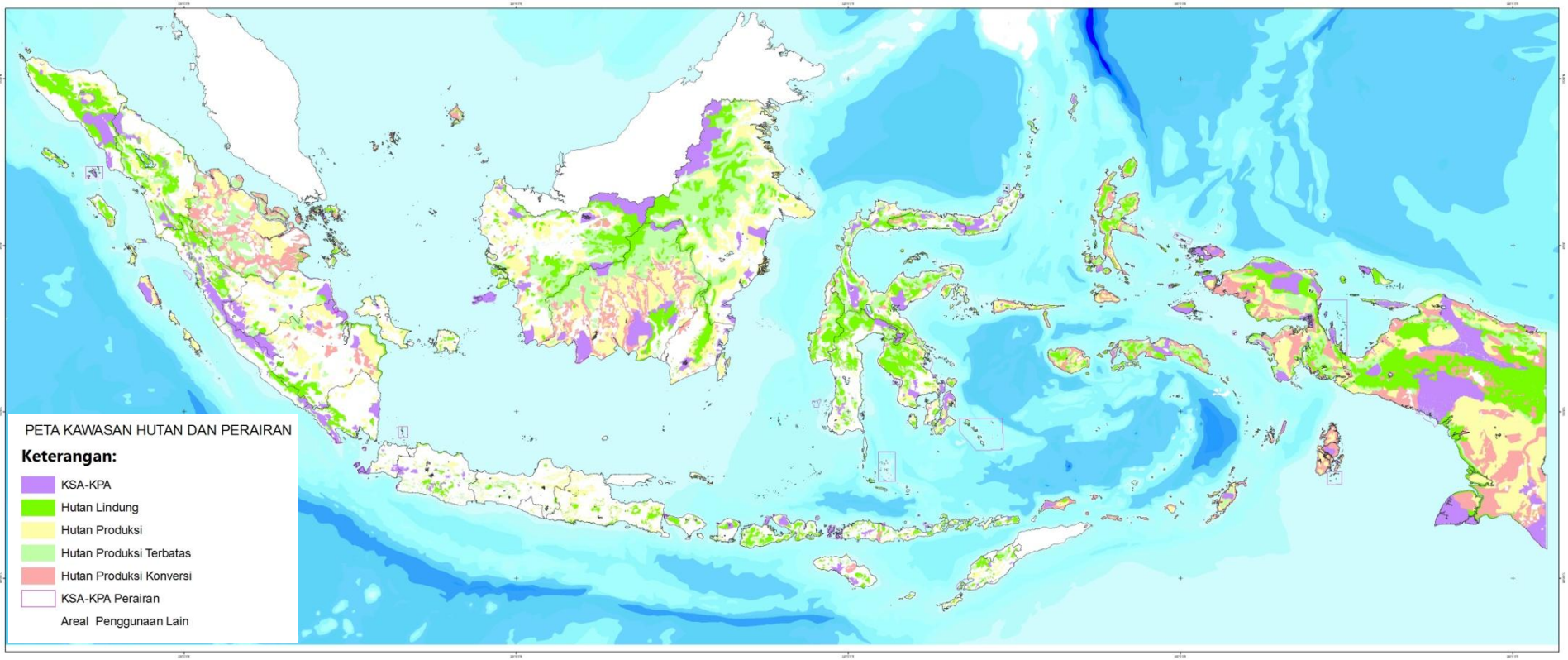
Calculations and Assumptions in Defining REL

- Deforestation rate (BAU): based on average rate 1990-2009 → 1,125 million ha/year
- Future Deforestation: Flat (until 2020)
- Biomass Conversion and Expansion Factors/BCEF) = 1,67 (IPCC, 2006)
- Biomass growth average in natural forest = 2,9 ton/ha or 5,32 ton/ha CO_2e (NFI, from 2 measurement period)
- Biomass growth average in plantation forest 20,0 ton/ha or 36,7 ton/ha CO_2e (IPCC, 2006)

Forest Function



Prod. Forest		Natural Forest							Plantation		Non Forested		Total Squestr.	Total Emissi+ Squestrat.
				Primer		LOA								
Tahun	Forest Area (Ha)	Nat. Forst area (Ha)	Emiss (CO2e) (Ton)	Area . (Ha)	Stock (CO2e) (Ton)	Area . (Ha)	Stock (CO2e) (Ton)	Squst. (CO2e) (Ton)	Area .. (Ha)	Squst. CO2e (Ton)	Area .. (Ha)	Squst CO2e (Ton)	(CO2e) (Ton)	(CO2e) (Ton)
1990	29.586	28.567		10.097	6.813.301	18.471	10.949.969	-98.263	1.019	-15.281	5.746	-5.746	-119.290	-119.290
1996	27.039	25.664	277.146	9.812	6.620.863	15.852	9.397.739	-186.684	1.375	-112.312	8.293	-8.293	-307.289	-275.216
2000	23.093	21.594	388.447	9.526	6.428.424	12.068	7.154.244	-135.303	1.499	-83.605	12.239	-12.239	-231.146	-183.037
2003	22.592	20.826	73.364	8.203	5.535.406	12.623	7.483.142	-83.426	1.767	-72.343	13.115	-13.115	-168.884	128.789
2006	22.080	19.822	95.799	7.815	5.273.795	12.007	7.117.991	-89.654	2.258	-79.713	13.627	-13.627	-182.994	-117.591
2010	20.223	18.487	127.472	6.675	4.504.043	11.812	7.002.540	-116.206	2.642	-100.751	14.579	-14.579	-231.536	-77.585
2015	17.902	16.965	145.229	5.249	3.541.852	11.716	6.945.871	-144.471	3.122	-123.229	15.620	-15.620	-283.320	-90.882
2020	15.581	14.636	222.336	3.823	2.579.661	10.813	6.410.306	-148.768	3.601	-130.426	17.470	-17.470	-296.664	-104.226
2025	13.260	13.114	145.229	2.397	1.617.470	10.717	6.353.637	-144.471	4.081	-137.623	18.511	-18.511	-300.606	-108.167
2030	10.939	10.785	222.336	971	655.279	9.814	5.818.072	-148.768	4.561	-144.820	20.361	-20.361	-313.950	-121.512

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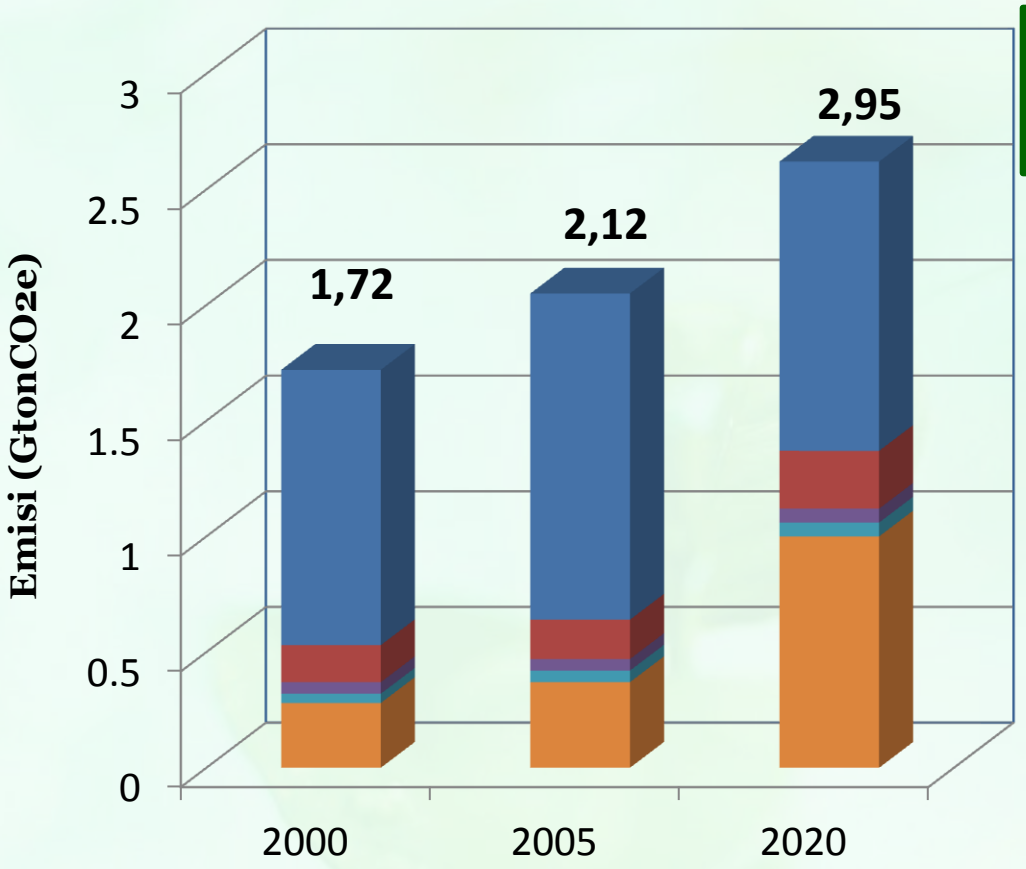
National Emission Reduction

Target Emission Reduction = 26%

LUCF= 60% (~15,50%)



Forest and Peatland

= 60,00% x 2,95
= 1,76 Gt CO_2e

Waste

Agriculture

Industry

Energy and transportation

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President Decree (61/2011) on National Action Plan for GHG Emission Reduction

Sectors	Emission Reduction Plan (Giga ton CO_2e)				Total	Percentage
	26%	Percentage	+15% (Total 41%)	Percentage		
Forestry and Peatland	**0,672**	**87,6%**	0,367	87,0%	1,039	87,4%
Waste	0,048	6,3%	0,030	7,1%	0,078	6,6%
Agriculture	0,008	1,0%	0,003	0,7%	0,011	0,9%
Industry	0,001	0,1%	0,004	0,9%	0,005	0,4%
Energy and Transportation	0,038	5,0%	0,018	4,3%	0,056	4,7%
Total	**0,767**	**100,0%**	**0,422**	**100,0%**	**1,189**	**100,0%**

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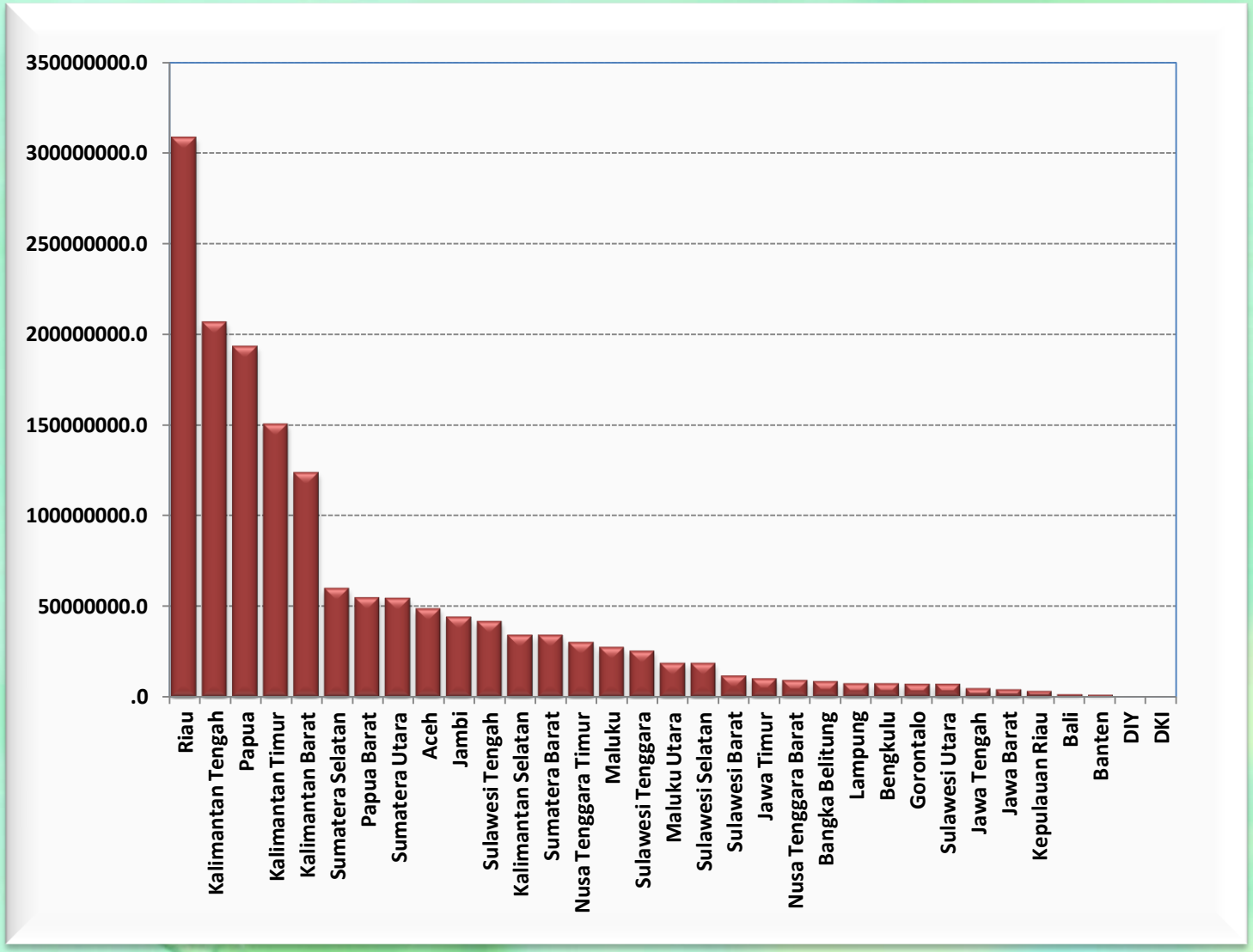
Province Emission Reduction



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Forestry MRV Roadmap Outputs

- Existing Activities
- Ideal
- Filling the gaps
- List of activities--→ M R V
- Institution involved
- Time frame
- budgeting

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Forestry MRV Roadmap Outputs

No	Milestones	Targeted Time
1	Formulated national standards: measurement, and reporting	January 2012
2	Availability of validation mechanism on carbon calculation at all levels	July 2012
3	Spatial and non-spatial data are well managed (well structured, transparent, integrated with national network) to provide the ease data exchange and distribution among government institution and also between government institution and community.	March 2012
4	Established mechanism to do administration of reporting, assessment of compliance and credited forest carbon in a fair, fast, transparent, and low transaction cost.	December 2012
5	Established in country verification of carbon measurement by sub-national and its payment mechanism to include social and environment safeguards principles.	December 2012
6	Implementor of REDD+ Readiness at sub-national levels.	December 2012
7	Established a media for professionals on carbon verification at national and its competency standards	December 2012
8	Established MRV REDD+ coordination at sub-national	December 2012

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Activities for the Forestry MRV Roadmap

No.	Activities	M	R	V
1	Re-desain field data system NFI	V		
2	Comparing measurement method	V		
3	Synergizing results of PSP	V		
4	Develop new allometric equations	V		
5	Readjust land cover classification	V		
6	Increase frequency/period of monitoring		V	
7	Establish institution for verification for sub-national reports			V
8	Comparing verification method for sub-national reports			V
9	Develop a verification standard for sub-national reports			V
10	Institution and provide human resource	V		
11	Develop Norm, standards, procedures and Criteria	V		

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Who do What in the Forestry MRV Roadmap

No.	Activities	Main Actor	Support Actors
1	Re-desain field data system NFI	DJ Plan	Bakosurtanal, LPT, Wetlands, Pustanling
2	Comparing measurement method	DJ Plan	DA (Demonstration Activity) managers, universitas, lembaga penelitian, Pustanling
3	Synergizing results of PSPs	DJ Plan	DJ BUK, Litbanghut, universitas, Pustanling
4	Develop new allometric equations	Litbanghut	DA managers, universitas, Pustanling
5	Readjust land cover classification	DJ Plan	Bakosurtanal, universitas, Pustanling
6	Increase frequency/period of monitoring	DJ Plan	Litbanghut, universitas, Pustanling
7	Establish institution for verification for sub-national reports	Pustanling	Universitas, LEI, APHI
8	Comaring verivication method for sub-national reports	DJ Plan	Universitas, Litbanghut
9	Develop a verification standard for sub-national reports	Pustanling	Universitas, Litbanghut
10	Institution and human resources	Pustanling	Universitas, Litbanghut
11	Develop norm, standards, procedures and criteria	Pustanling	DJ Plan, KLH, universitas, Litbanghut
12	Inter-operability or compatibility [hardware,software]	DJ Plan	Litbanghut, universitas

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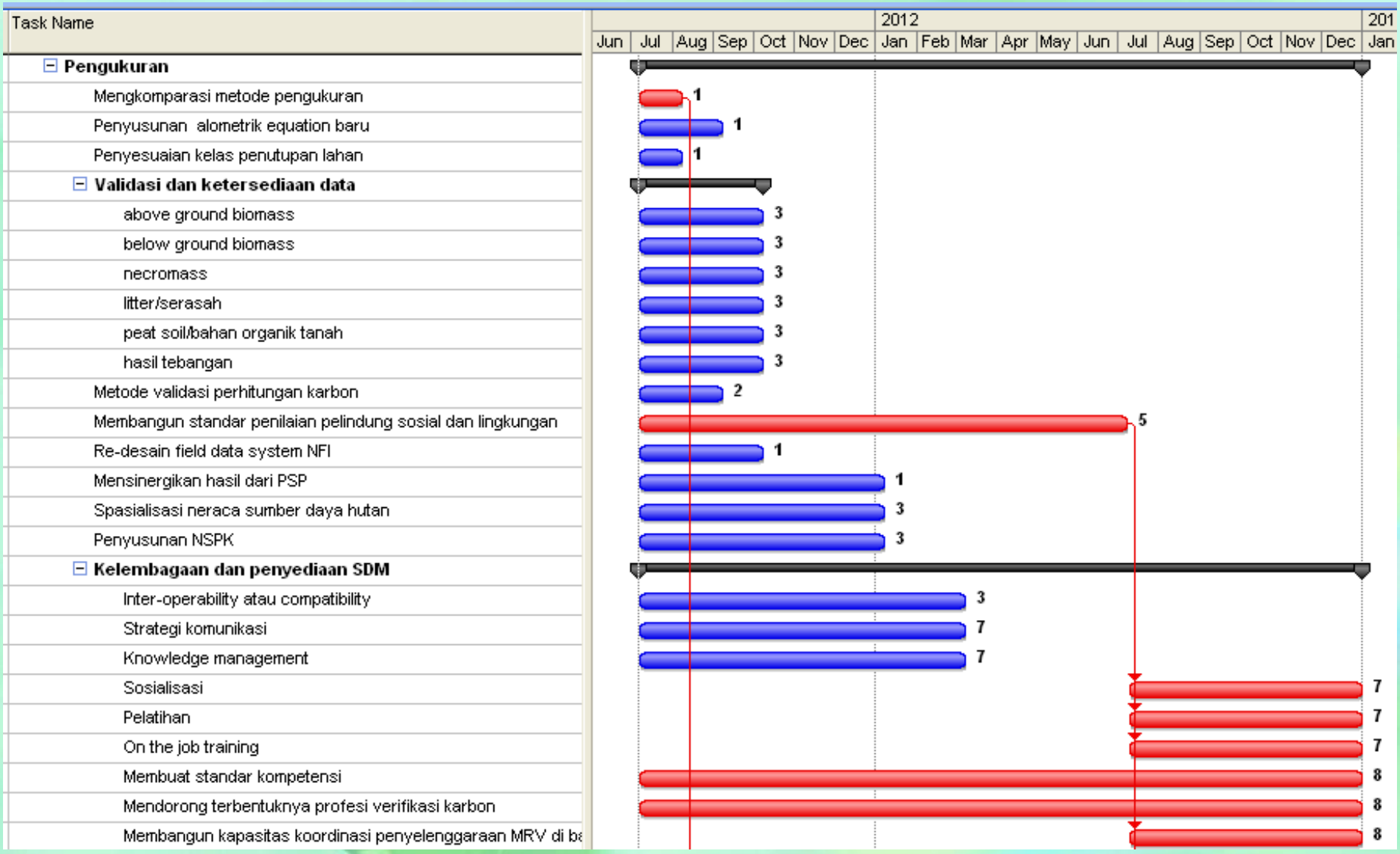
Time Arrangement for Measurement Aspects of the Forestry MRV Road Map



REDD+ DEMONSTRATION ACTIVITIES

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Next Steps

1. **implementation of the MRV road map** .
2. **Synergizin**g the Forestry MRV Road Map h the National MRV plan.
3. **Strengthening the SLRS and the DA Monitoring System.**
4. **Prepare for the establishment of the MRV system**

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Thank you

Raja Ampat, Papua, Indonesia