

WP2 Update October 2010:

Land cover change ~ C accounting

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Co-funding/Building blocks
Globally: OpCost (FCPF)

Indonesia: Allreddi+ Realu+
various site-level studies

Vietnam: Realu

Cameroon: Realu

Peru: Realu

REDD-ALERT

WP4.

International
forest-related
policy

WP1. Forest Transition & Emissions Embedded in Trade (EET) in Ag and Forestry products

WP2. Demography vs
change in tree cover type

WP5. Livelihood transition
and land use change choices

WP6. Negotiation
support systems

WP3. GHG emissions
factors, belowground C
stock change

Impact targets:

International

Emission displacement
& leakage

Tier 1, 2 and 3
accounting systems

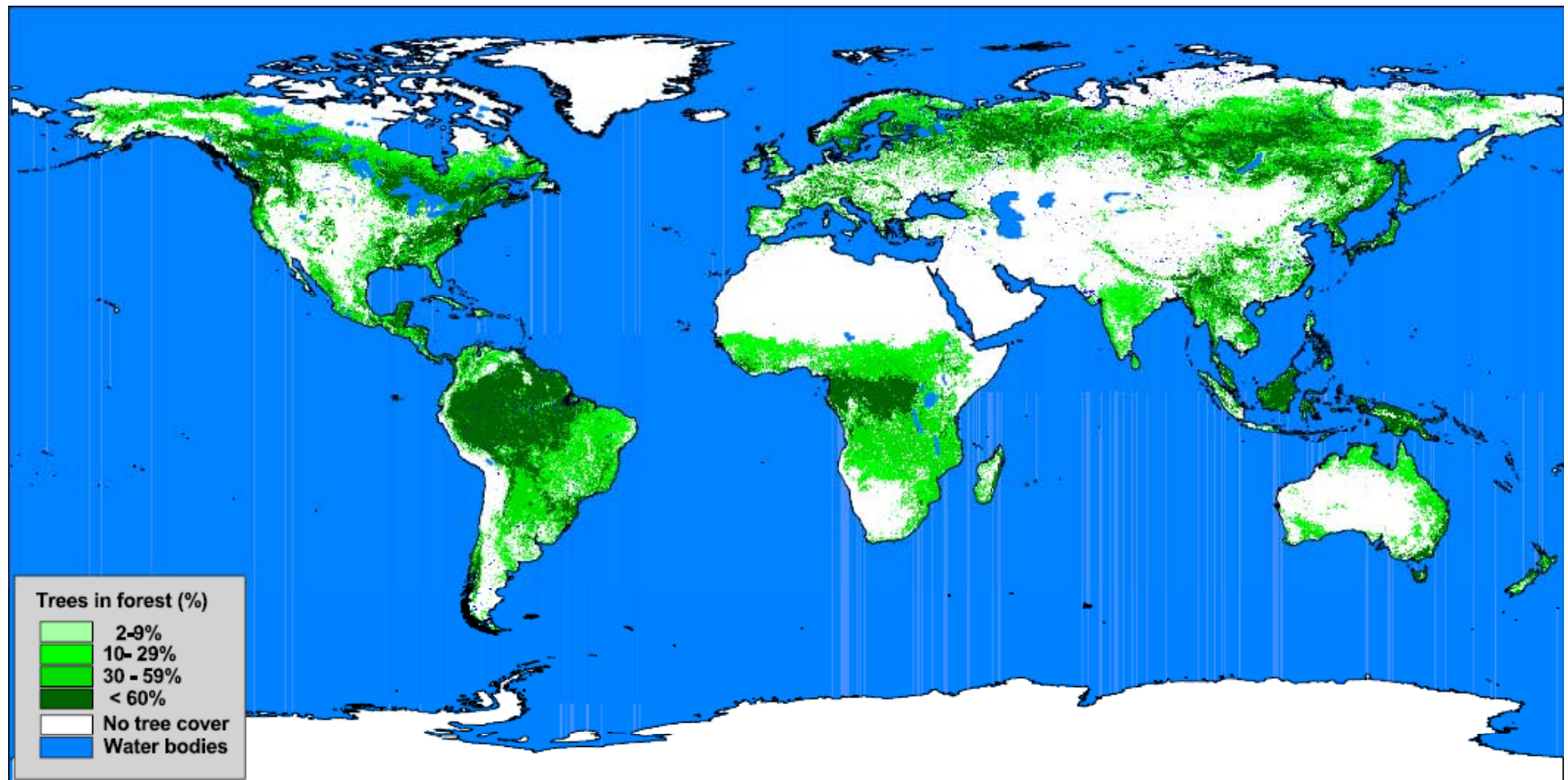
National

NAMA/REDD+ rules

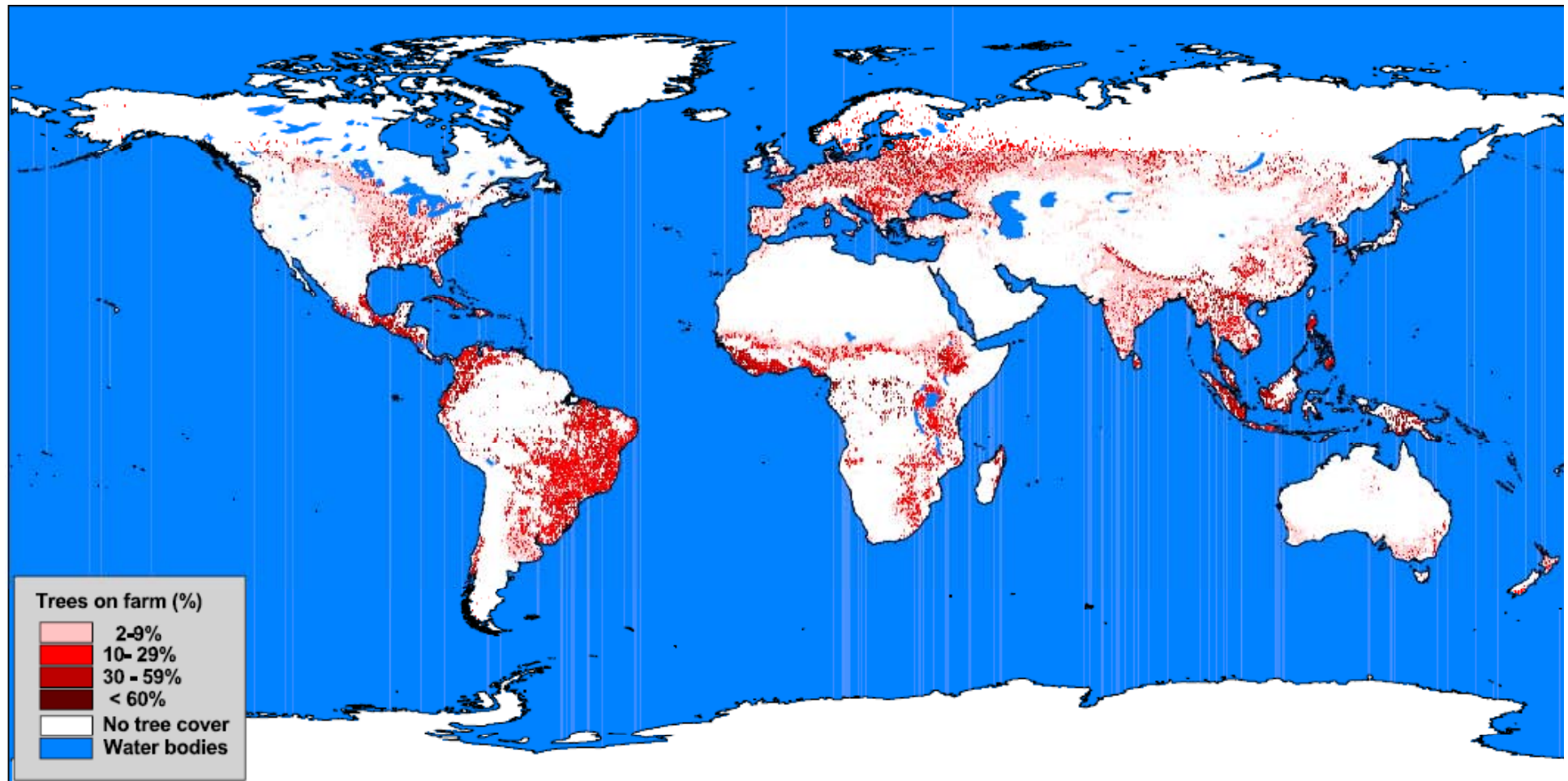
Local

LAAMA planning

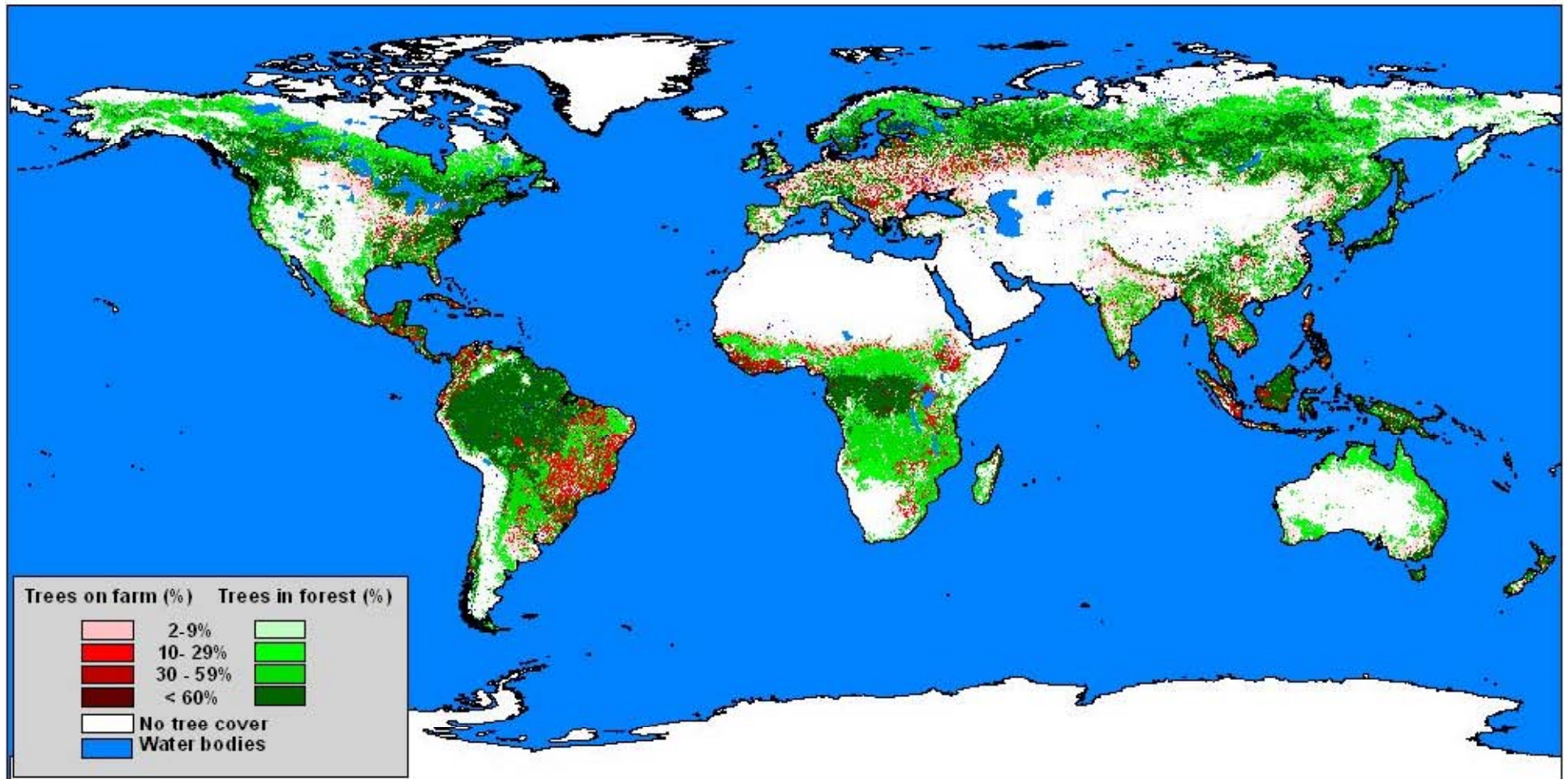




The foresters' view of the world



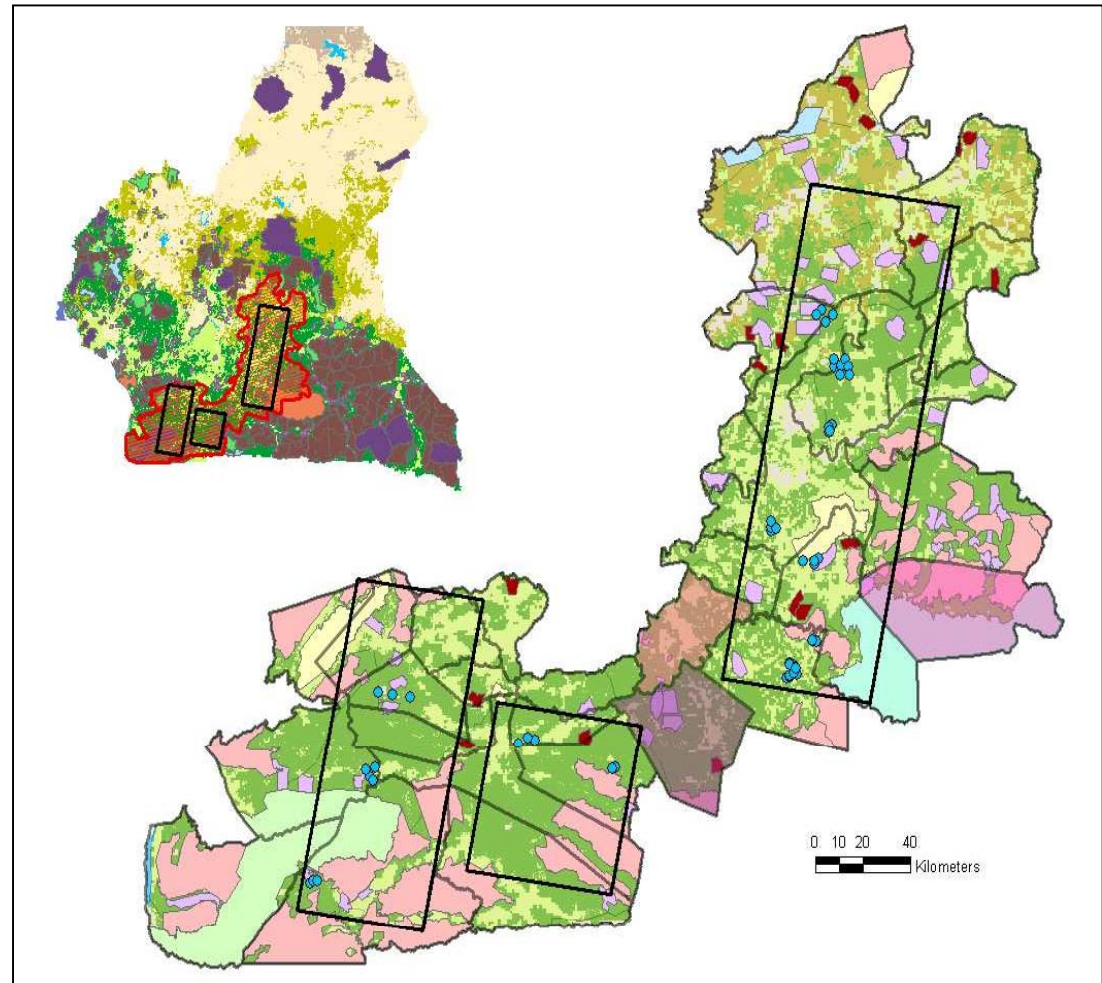
The agroforesters' view of the world



The Redd-alert view of the world

Site selection

- 1) Stepwise identification of study areas :3 areas of particular interest for the study – South/Centre/East
IITA, IRAD, ASB global, MLURI, UCL;
- 2) Based on spatial data and selected criteria 2 priority study areas and 12 clusters of villages for activities in WP1/WP2/WP5.
IITA, IRAD, ASB global;
- 3) Rapid reconnaissance survey on the ground
IRAD;



Working document in preparation:

“Report on site selection for ASB – REDD ALERT sites” by Martin Tchienkoua, Robiglio et al.

Fieldwork for Land Use data collection in the Humid Forest Zone*

- Data Base of land uses in the 2 selected study area over a total of 950 GCPs along 65 transects 4 - 8 km;
- Protocol for data collection
- Training of 8 technicians of the Ministry of Forestry

The screenshot shows a web application titled "GROUND TRUTHING FOR LULC CHANGE MAPPING". It features logos for IITA and ASB, along with the text "Partnership for the Tropical Forest Margins". The interface includes a navigation bar with tabs: "Generalites", "Sol", "Historique", "Description de P", "Description du point", "Description de la Gestion du sol", and "Culture Pérennes". Below the navigation bar, there are several input fields and dropdown menus. The "Classification Local" section includes a "Nom" field with the value "village cacaoyer (afub keka)". The "Forêt" section includes fields for "Origine", "Structure", "Gestion observable", "Bois d'oeuvre", "Pratique sylvoicole", "Notes", and "Technologie d'exploitation". The "Droit d'accès à la terre/sol" section includes fields for "Unité de gestion forestière", "Quand a commencé exploitation?", and "Quand s'est arrêtée exploitation?". The bottom of the interface shows a status bar with the text "on: 11 11 11" and "Cerca".

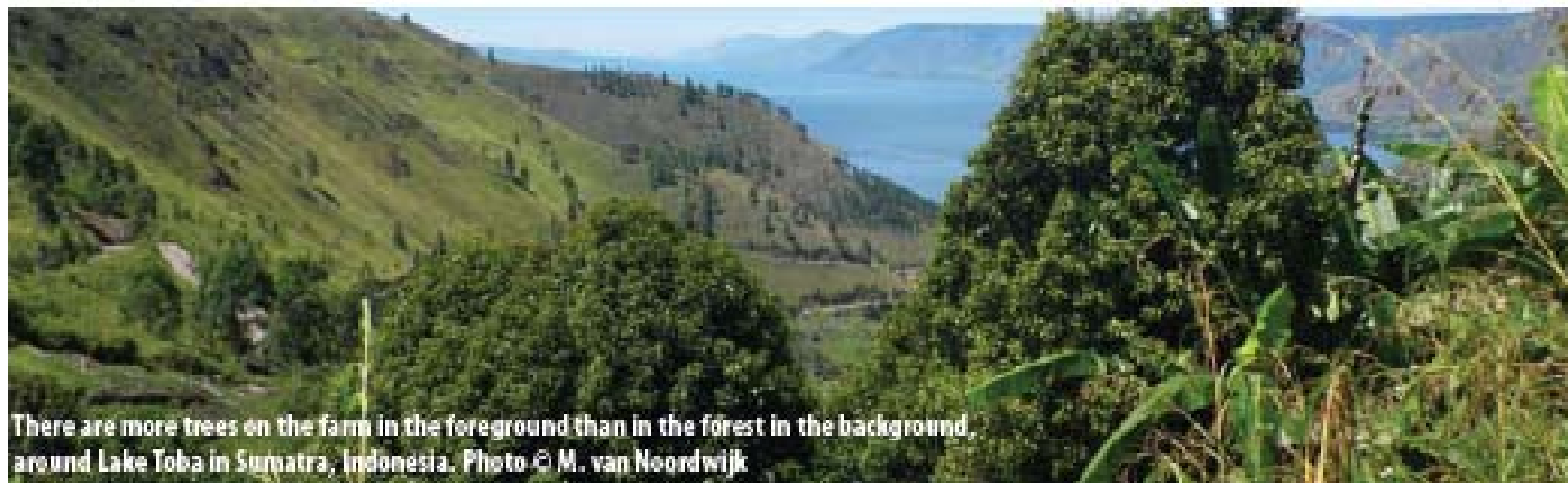


* ASB, IITA, REALU project funded by Norad

Focus Group interviews in 12 selected villages

- Questionnaire for the identification of drivers, land use change, intensification, demographical dynamics and preliminary op-cost analysis – farmgate prices for commodities (WP1/WP5);
- ongoing 6 over 12 villages are completed;





There are more trees on the farm in the foreground than in the forest in the background, around Lake Toba in Sumatra, Indonesia. Photo © M. van Noordwijk

REDD+

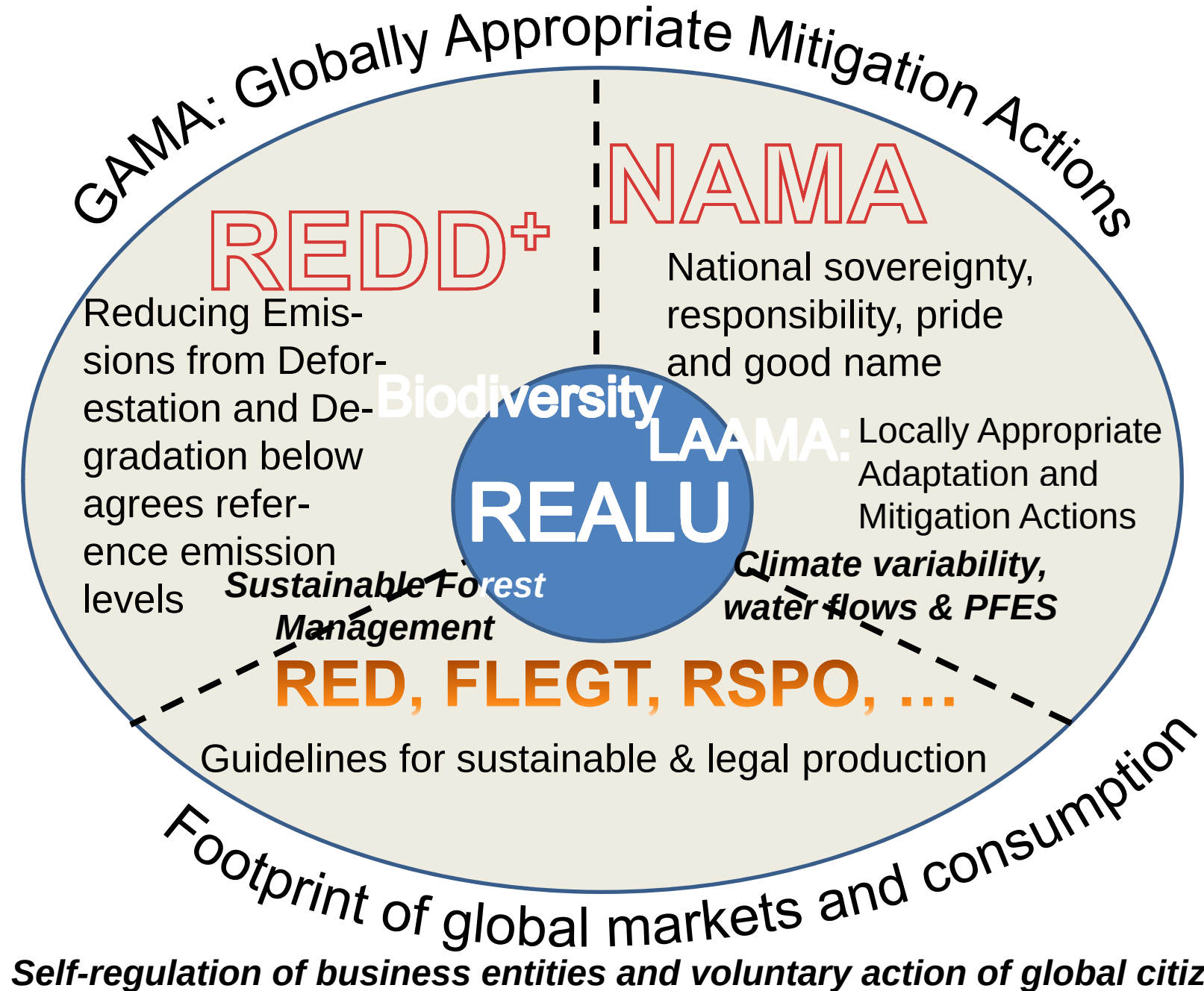
NAMA

Emission reduction
Efficiency Fairness
Sustainable Agriculture

World Market



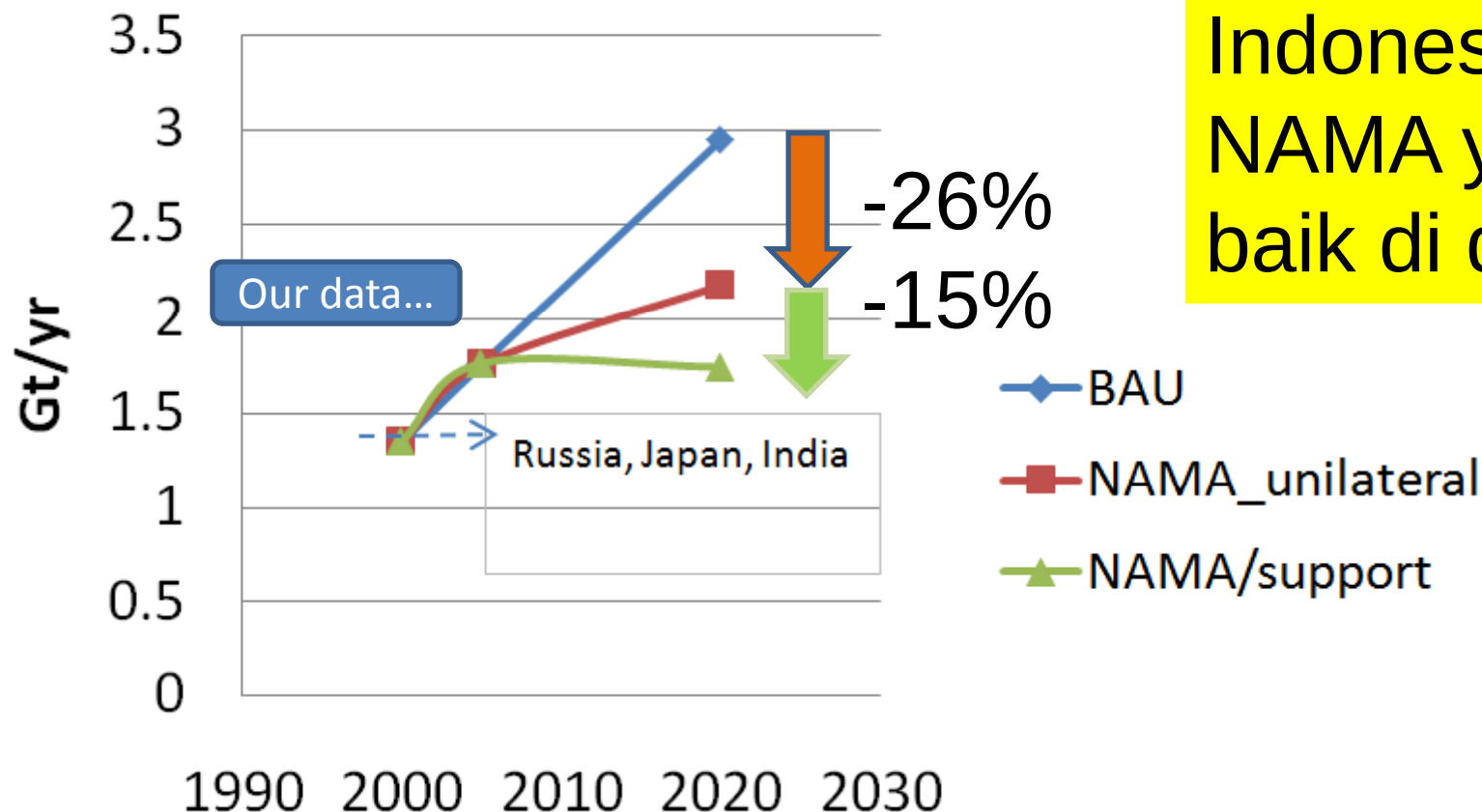
Agreements between all countries of the world, seeking consensus



NAMA

- Nationally Appropriate Mitigation Actions (2007 Bali Roadmap UNFCCC)

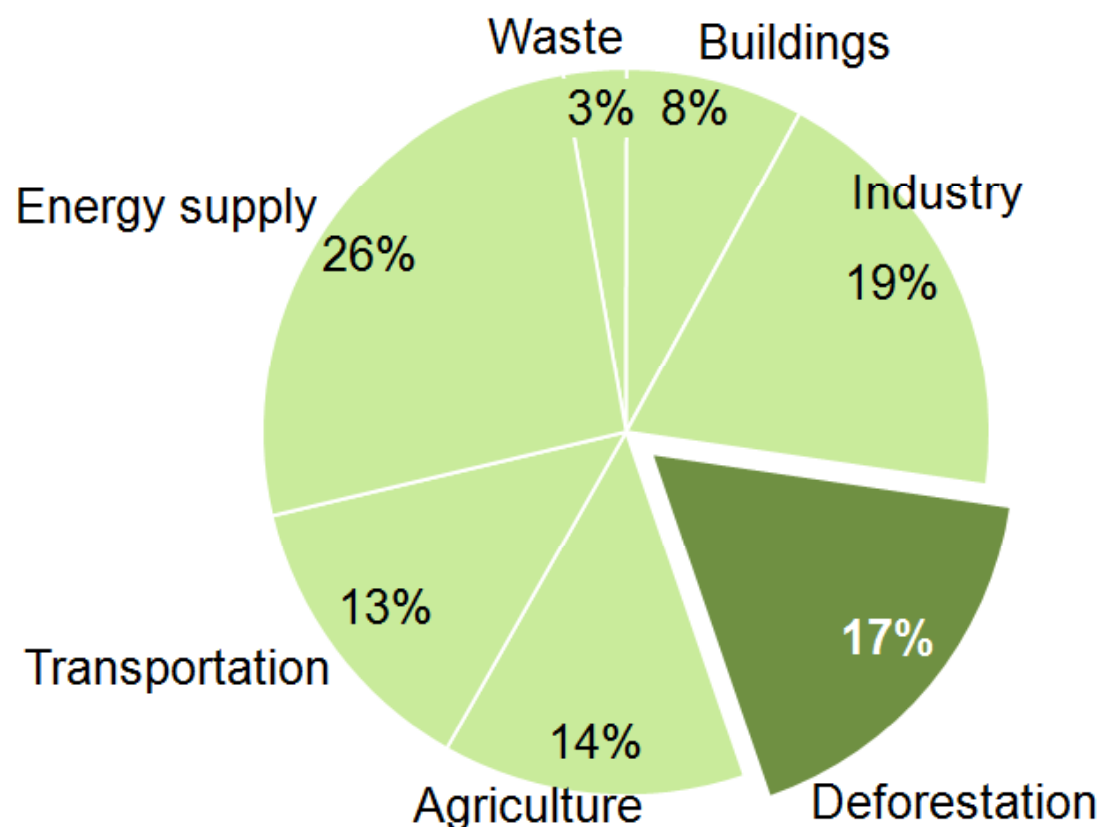
Expected net emissions from Indonesia



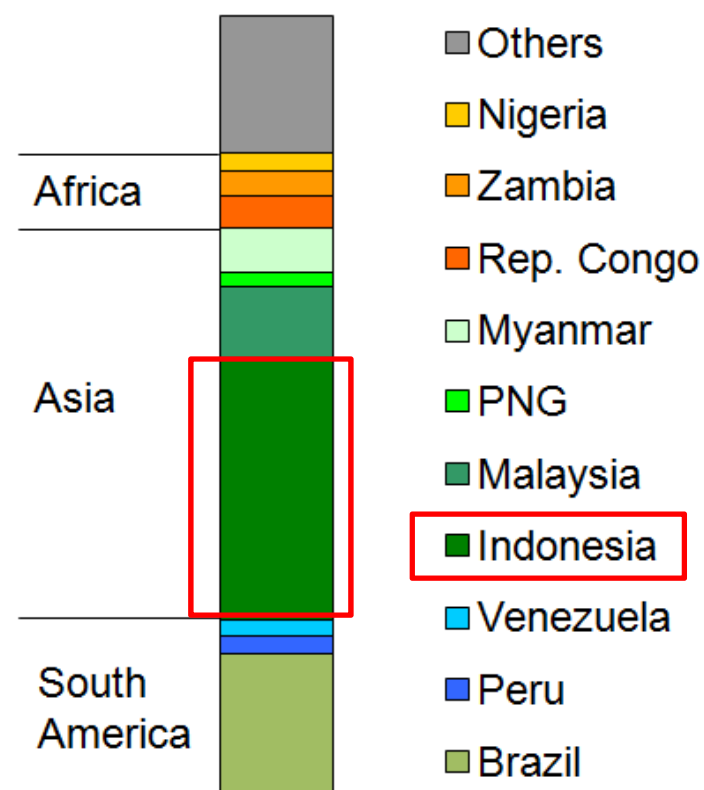
Indonesia cari
NAMA yang
baik di dunia

IPCC estimates that deforestation contributes about 17 % of GHG emissions

Emission of greenhouse gasses from different sources
100% = ~50 GtCO₂e in 2004



Bulk of emissions from deforestation and degradation emanate from a limited number of countries



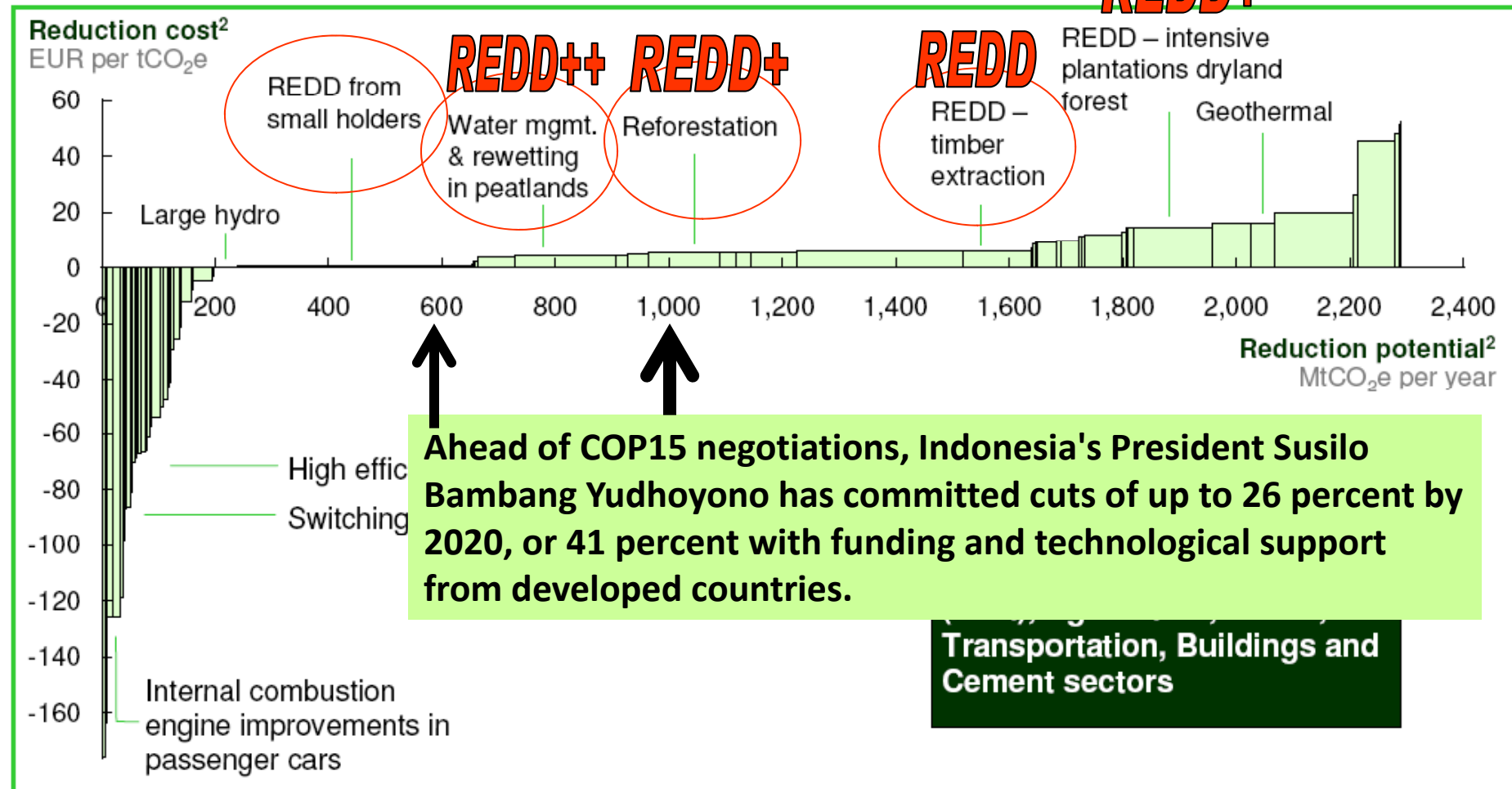
Indonesia forest ~5.4% of global total emissions

Indonesia has the potential to reduce CO₂ emissions by up to 2.3 Gt per year by 2030

Societal perspective¹, 2030

REDD++ = REALU

REDD+

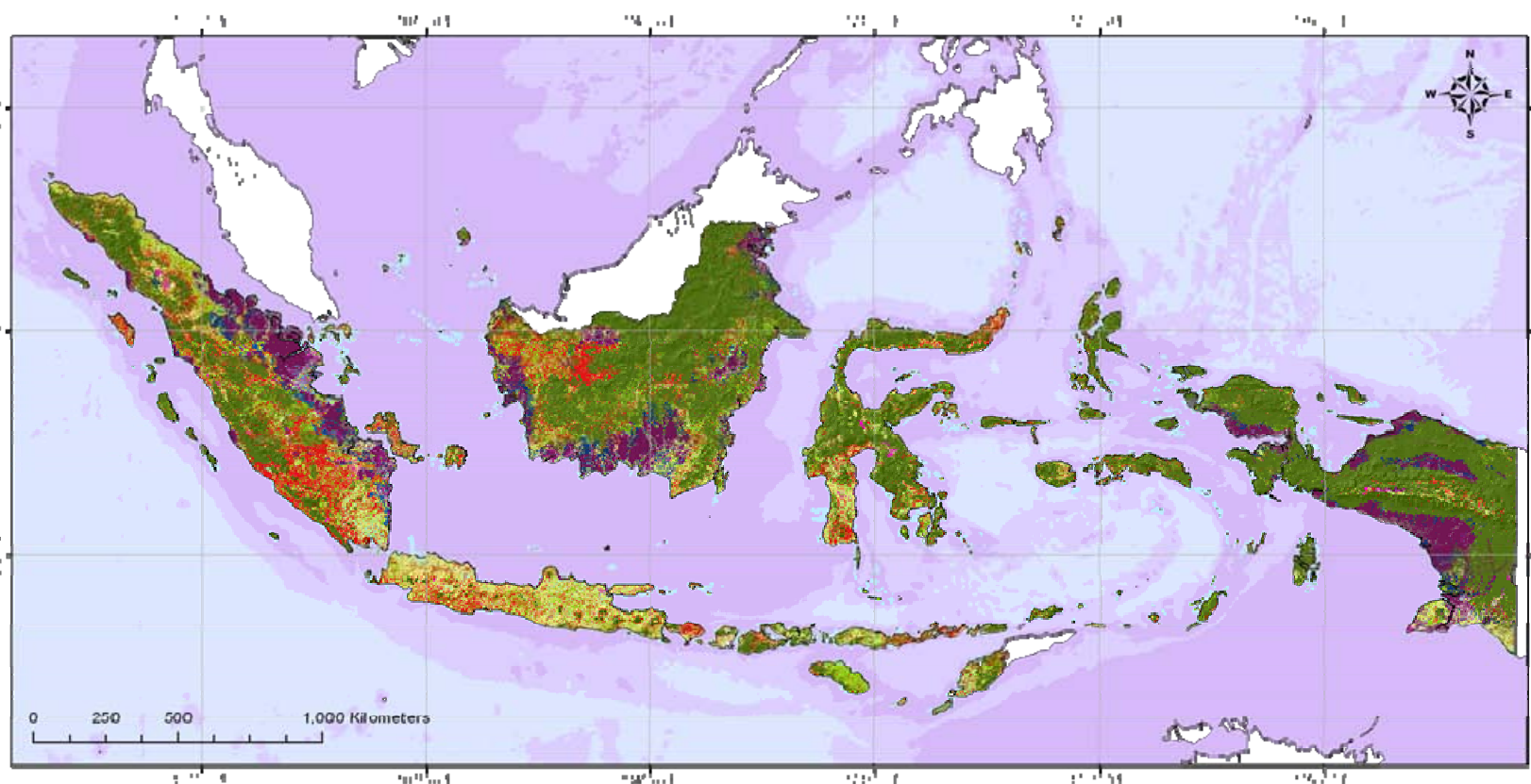


1 Societal perspective implies utilizing a 4% discount rate

2. The width of each bar represents the volume of potential reduction. The height of each bar represents the cost to capture each reduction initiative

SOURCE: Indonesia GHG Abatement Cost Curve

LAND COVER MAP OF INDONESIA IN 1990

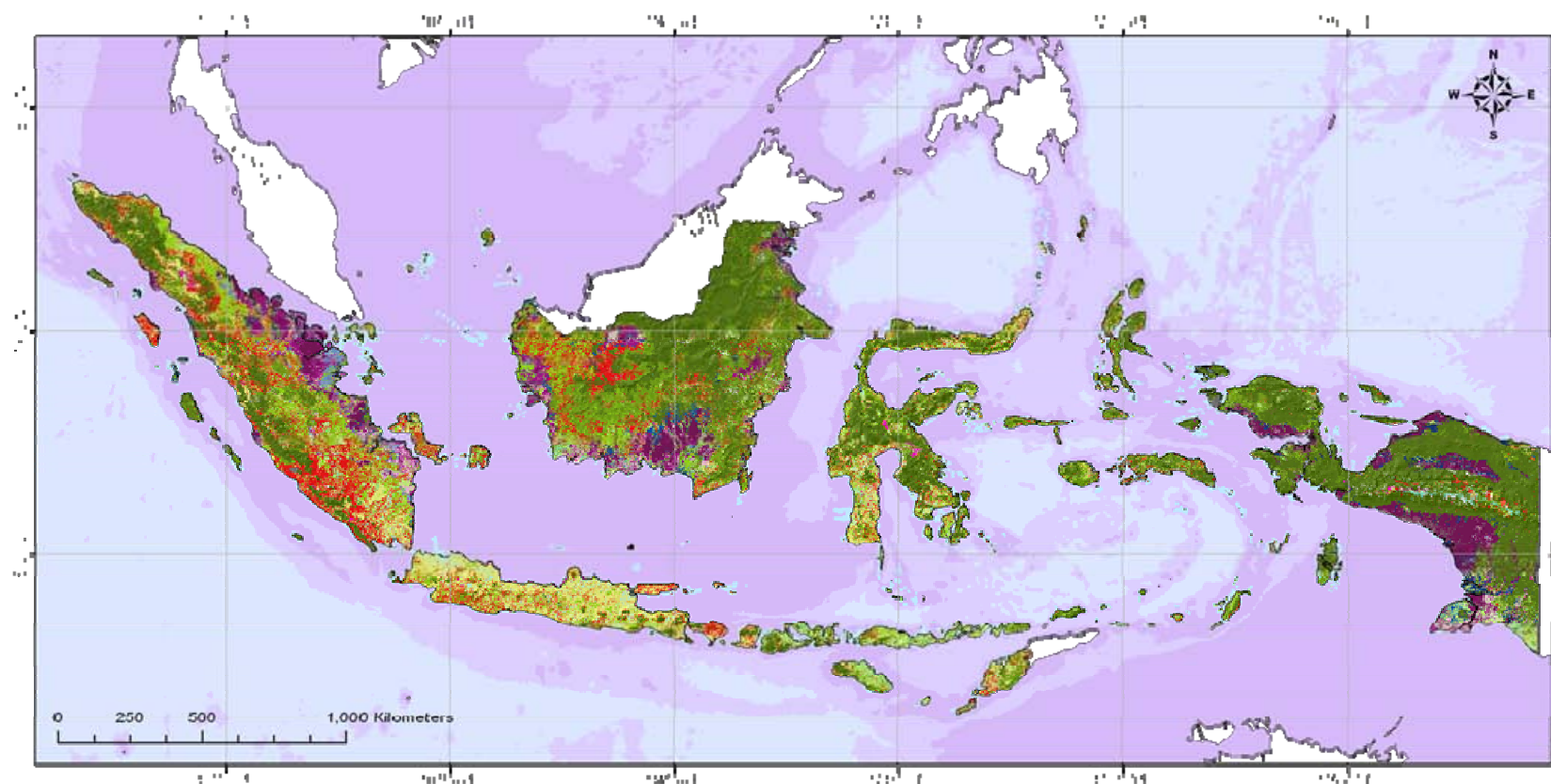


Legend

Agroforest	Cropland on peat	Logged over forest-low density	Shrub	Undisturbed swamp forest
Agroforest on peat	Estate	Logged over mangrove	Shrub on peat	Undisturbed swamp forest on peat
Cleared land	Estate on peat	Logged over swamp forest	Timber plantation	Wetbody
Cleared land on peat	Grass	Logged over swamp forest on peat	Timber plantation on peat	
Cloud and shadow	Grass on peat	Settlement	Undisturbed for	
Cropland	Logged over forest-high density	Settlement on peat	Undisturbed ma	



LAND COVER MAP OF INDONESIA IN 2000

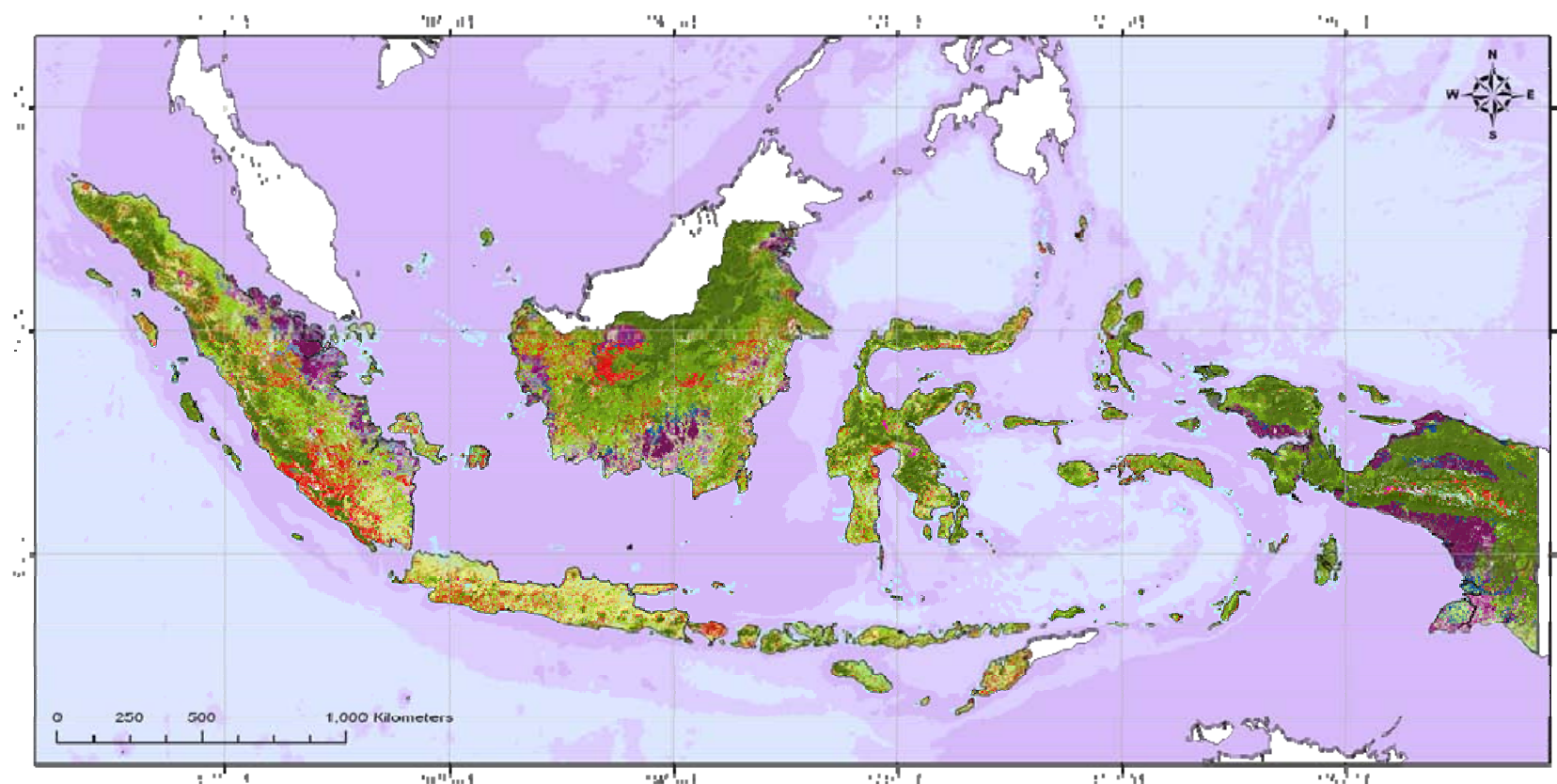


Legend

Agroforest	Cropland on peat	Logged over forest-low density	Shrub	Undisturbed swamp forest
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Cloud and shadow	Grass on peat	Settlement	Undisturbed forest	
Cropland	Logged over forest-high density	Settlement on peat	Undisturbed mangrove	



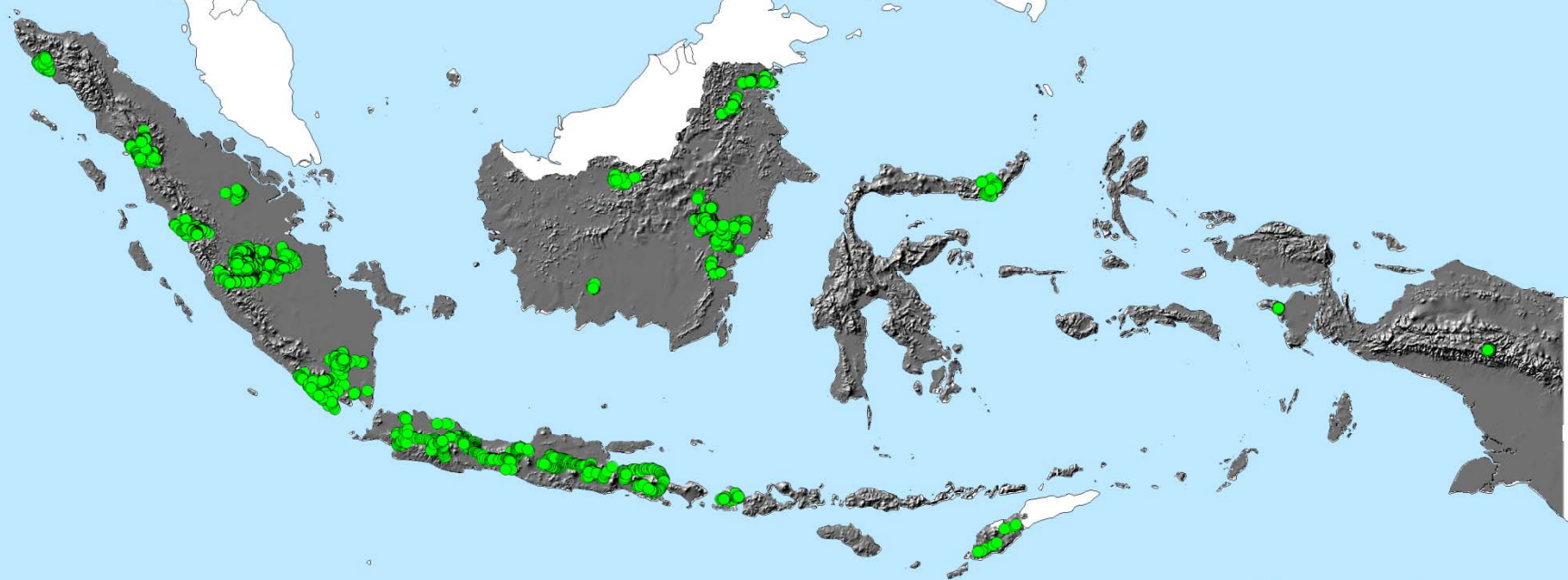
LAND COVER MAP OF INDONESIA IN 2005



Legend

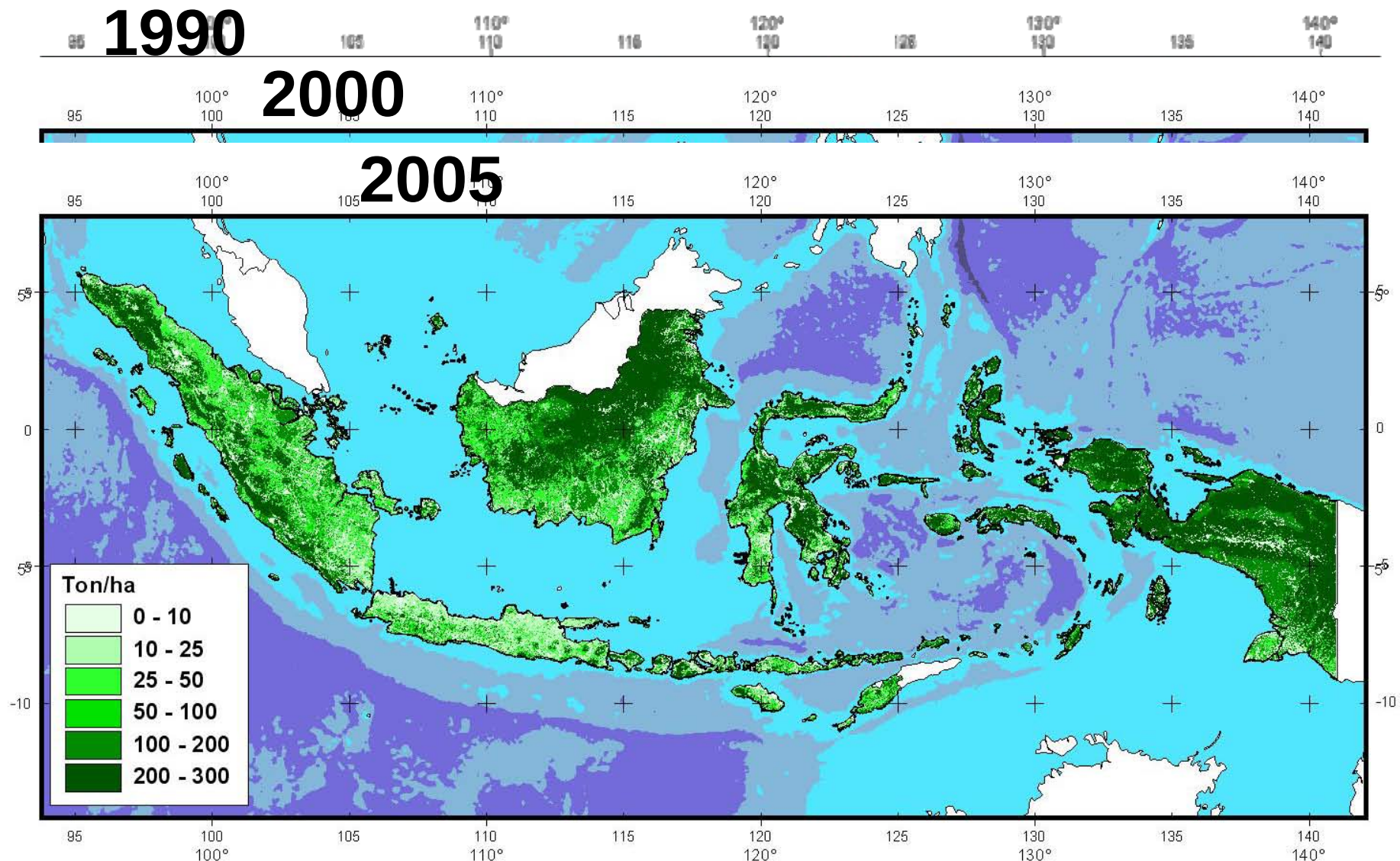
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GPS Points for Accuracy Assessment



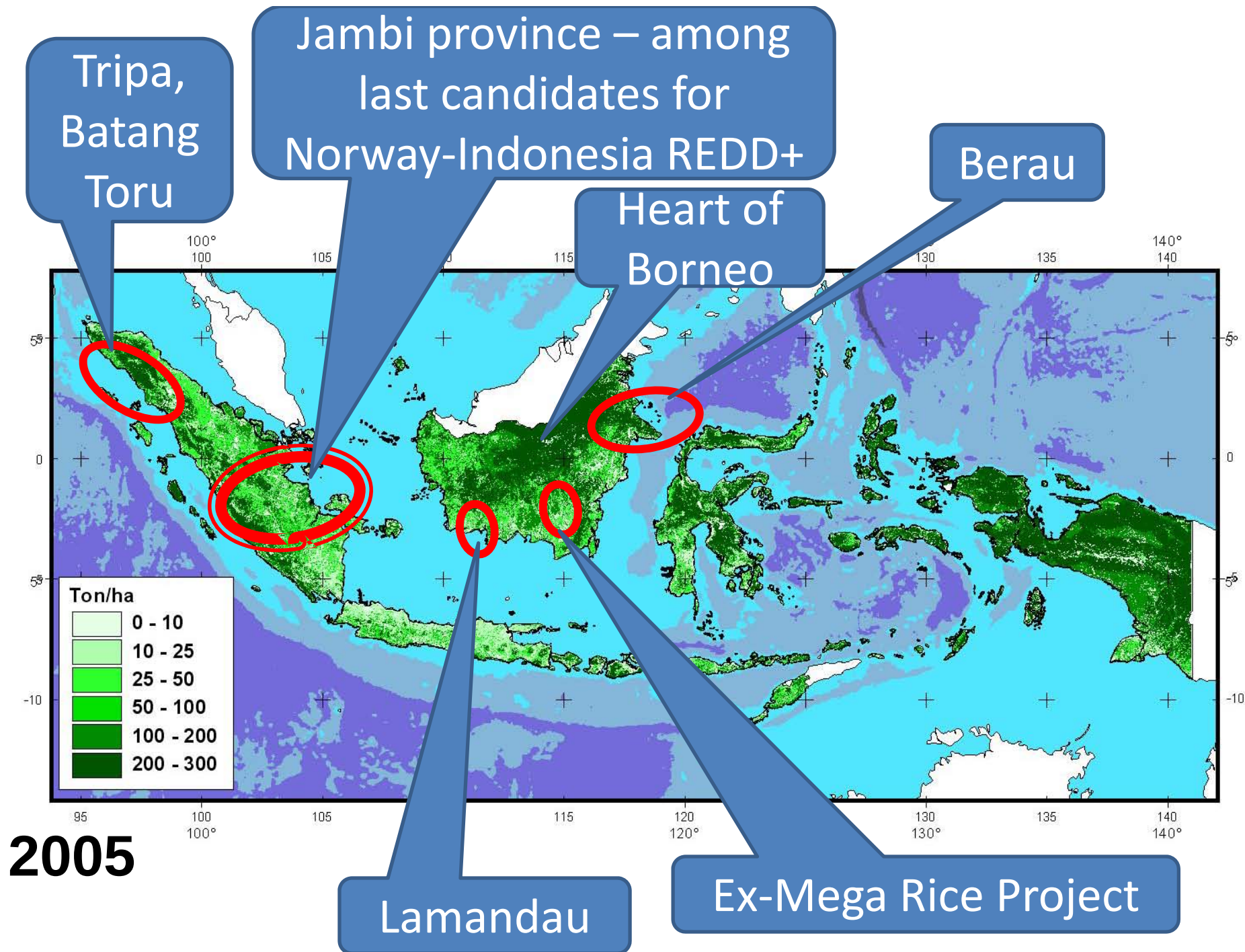
- 7155 GPS points collected from previous ICRAF activities
- 23 of 28 classes analyzed

86% accuracy at pixel level

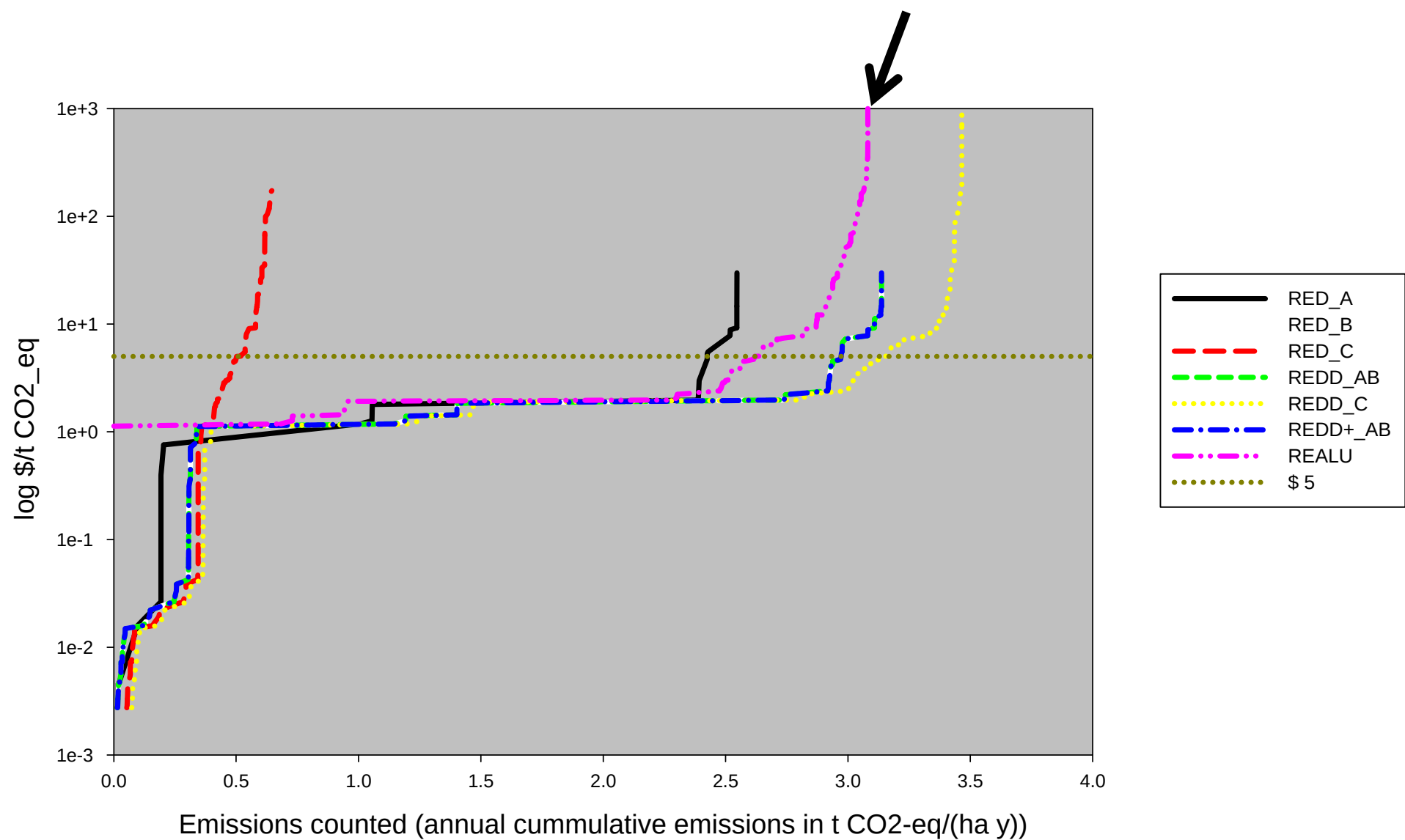


**Results of ALLREDDI
analysis**

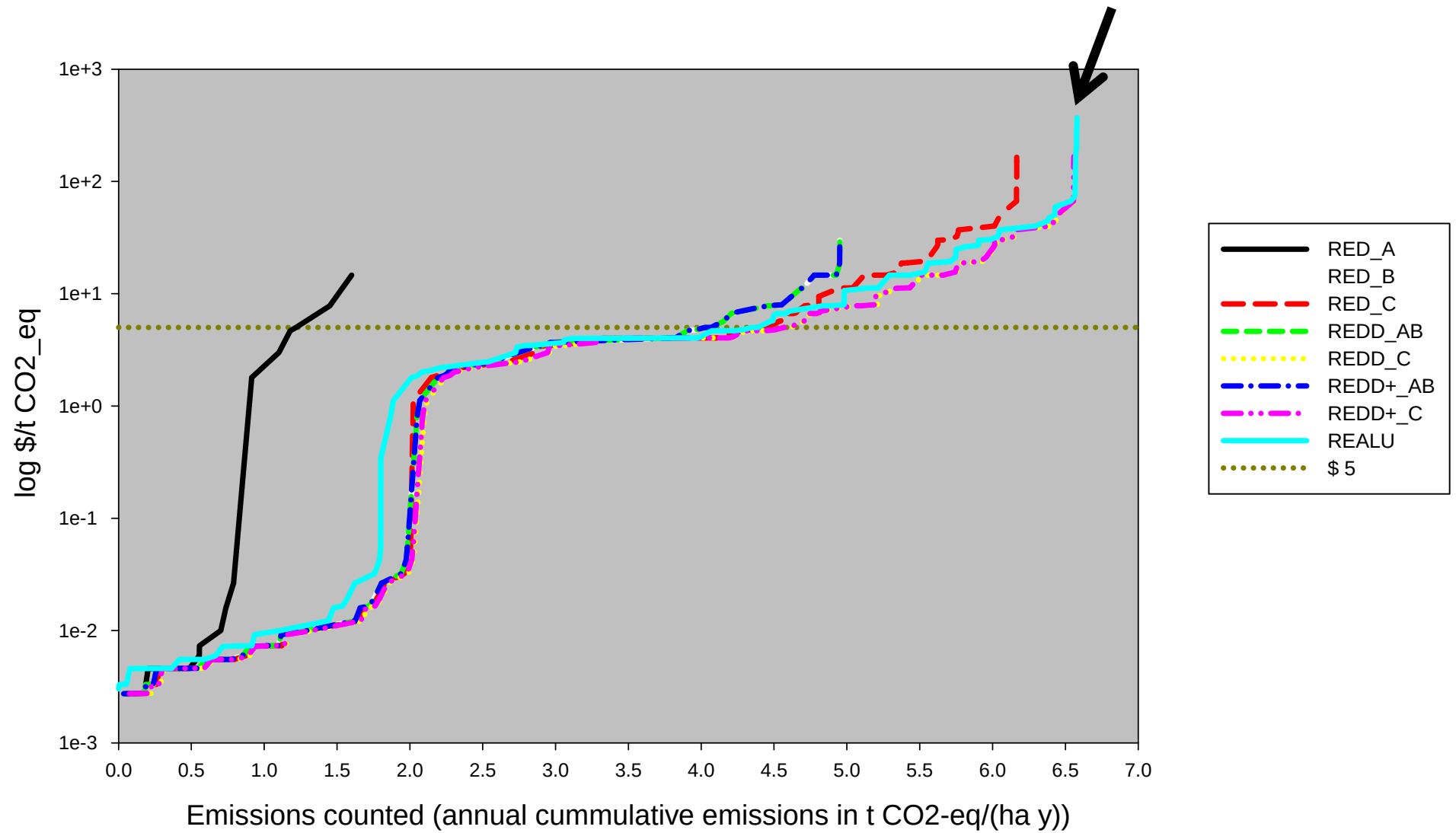
**Net Emissions:
0.6 Gt year⁻¹**



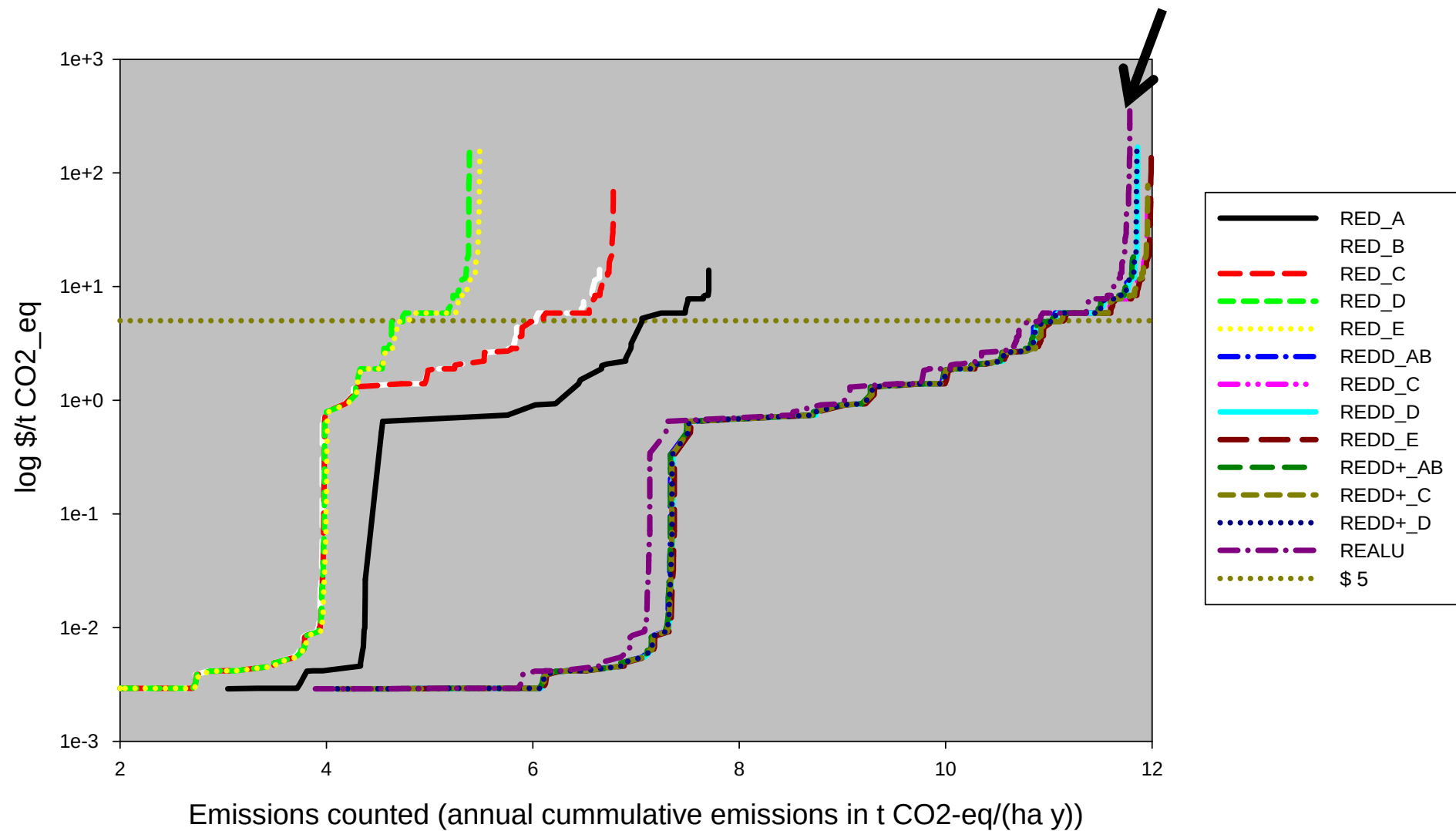
Lampung



Jambi



Kalimantan Timur



- Institutional forest vs 'Other Land Use'

Area	2/3	1/3 of Indonesia
Emission	2/3	1/3
C-stock	4/5	1/5



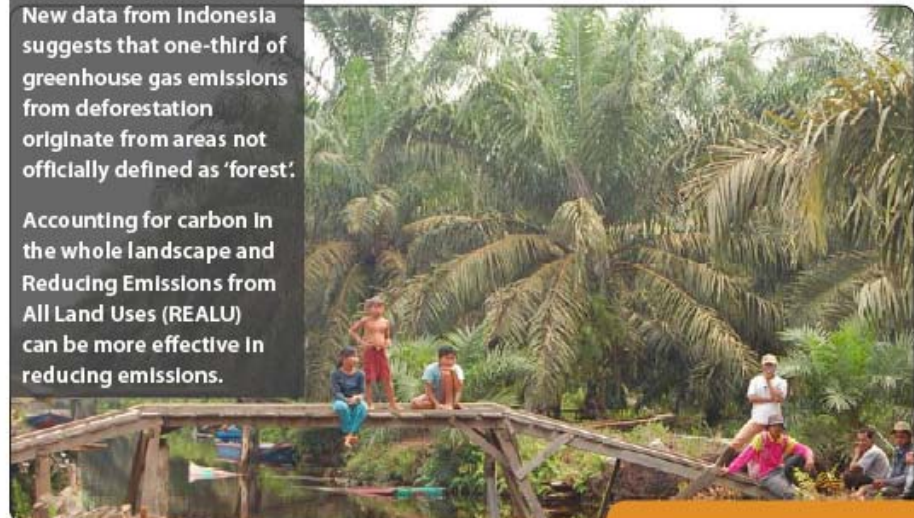
Policybriefs

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Reducing emissions from deforestation, inside and outside the 'forest'

New data from Indonesia suggests that one-third of greenhouse gas emissions from deforestation originate from areas not officially defined as 'forest'.

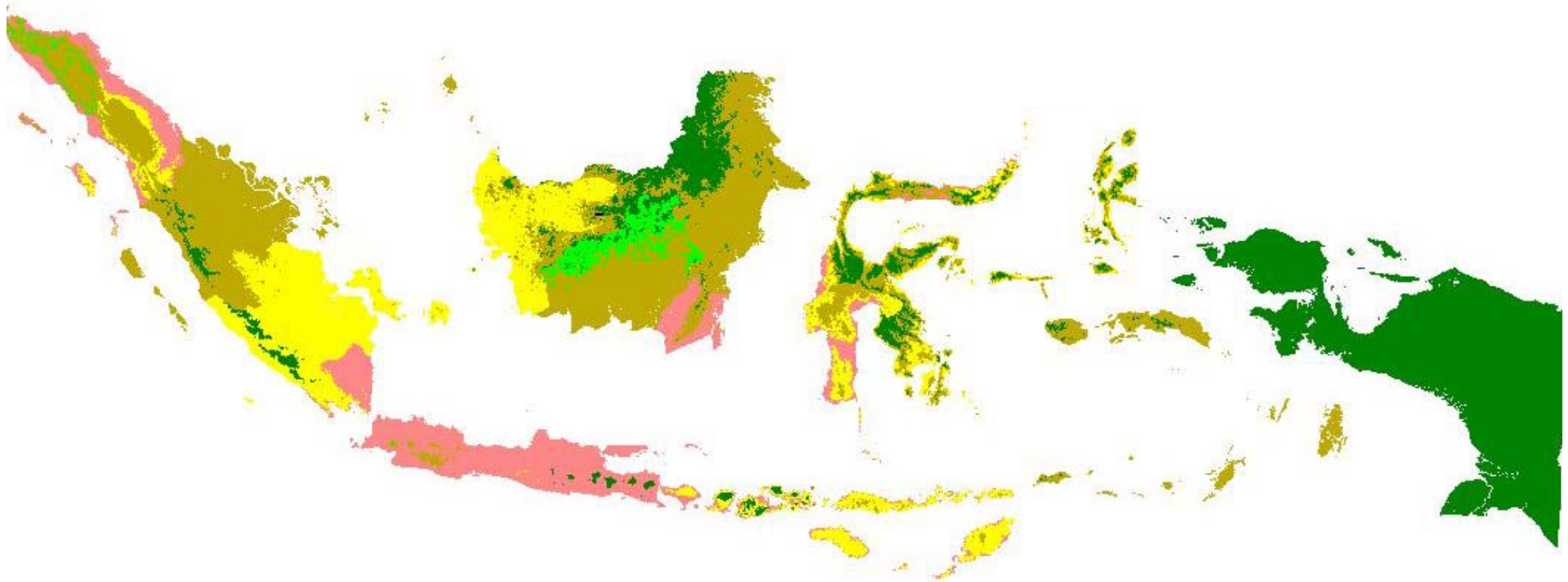
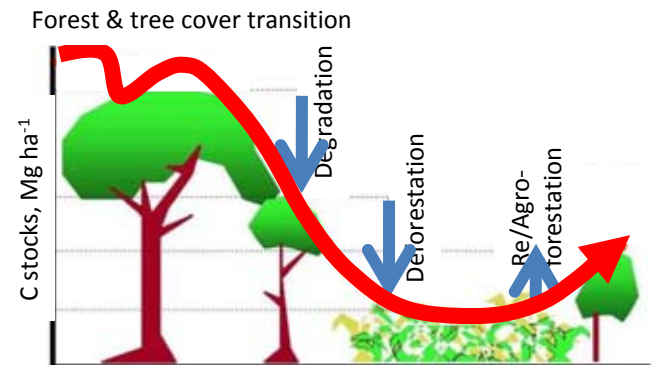
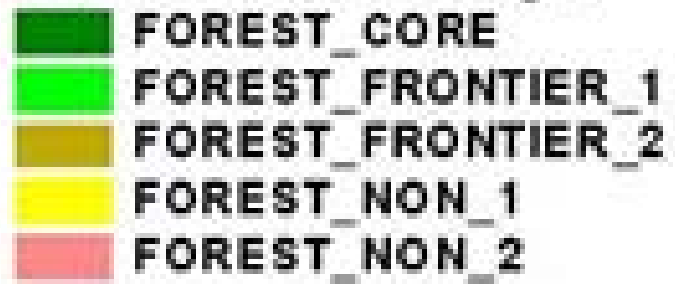
Accounting for carbon in the whole landscape and Reducing Emissions from All Land Uses (REALU) can be more effective in reducing emissions.

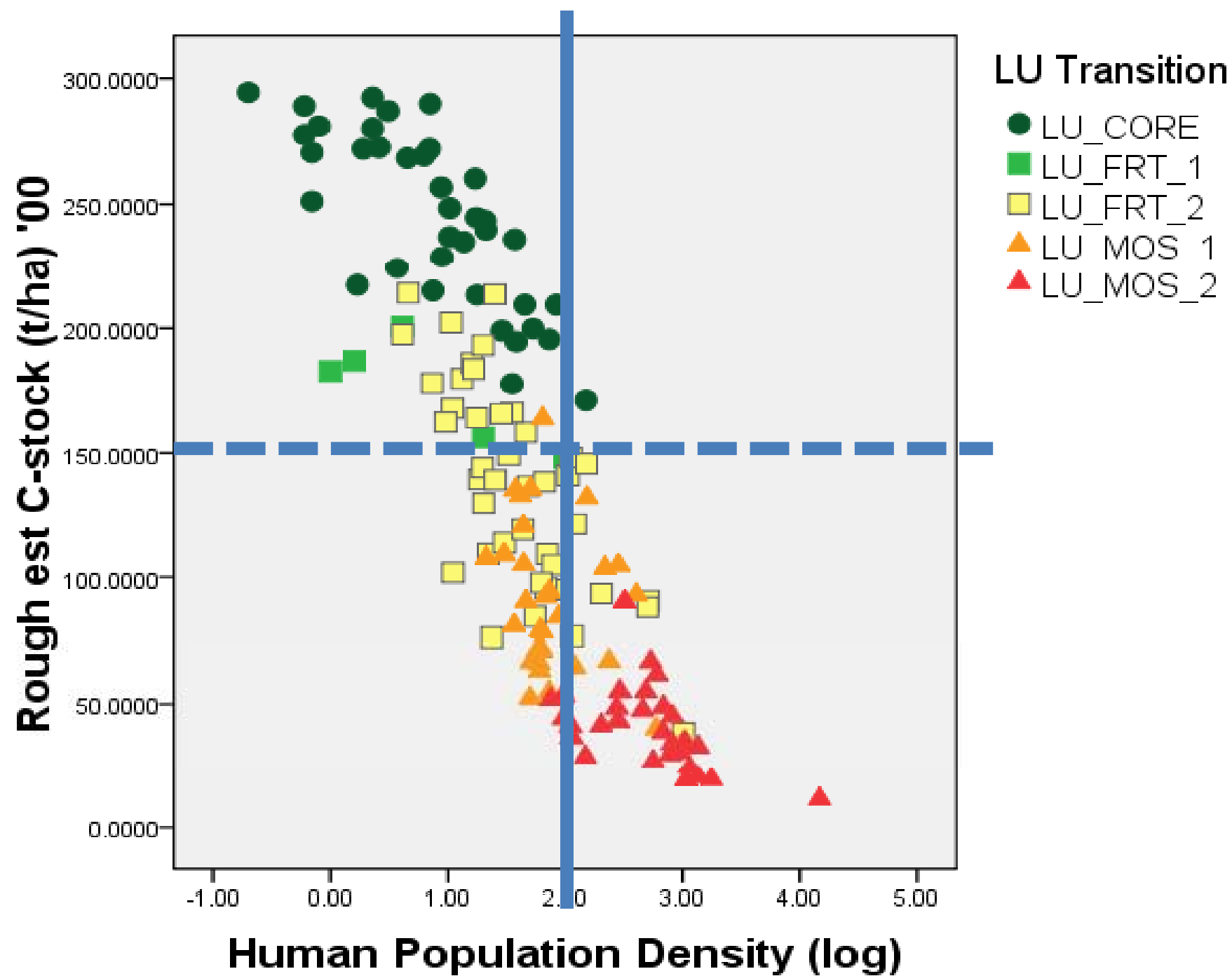


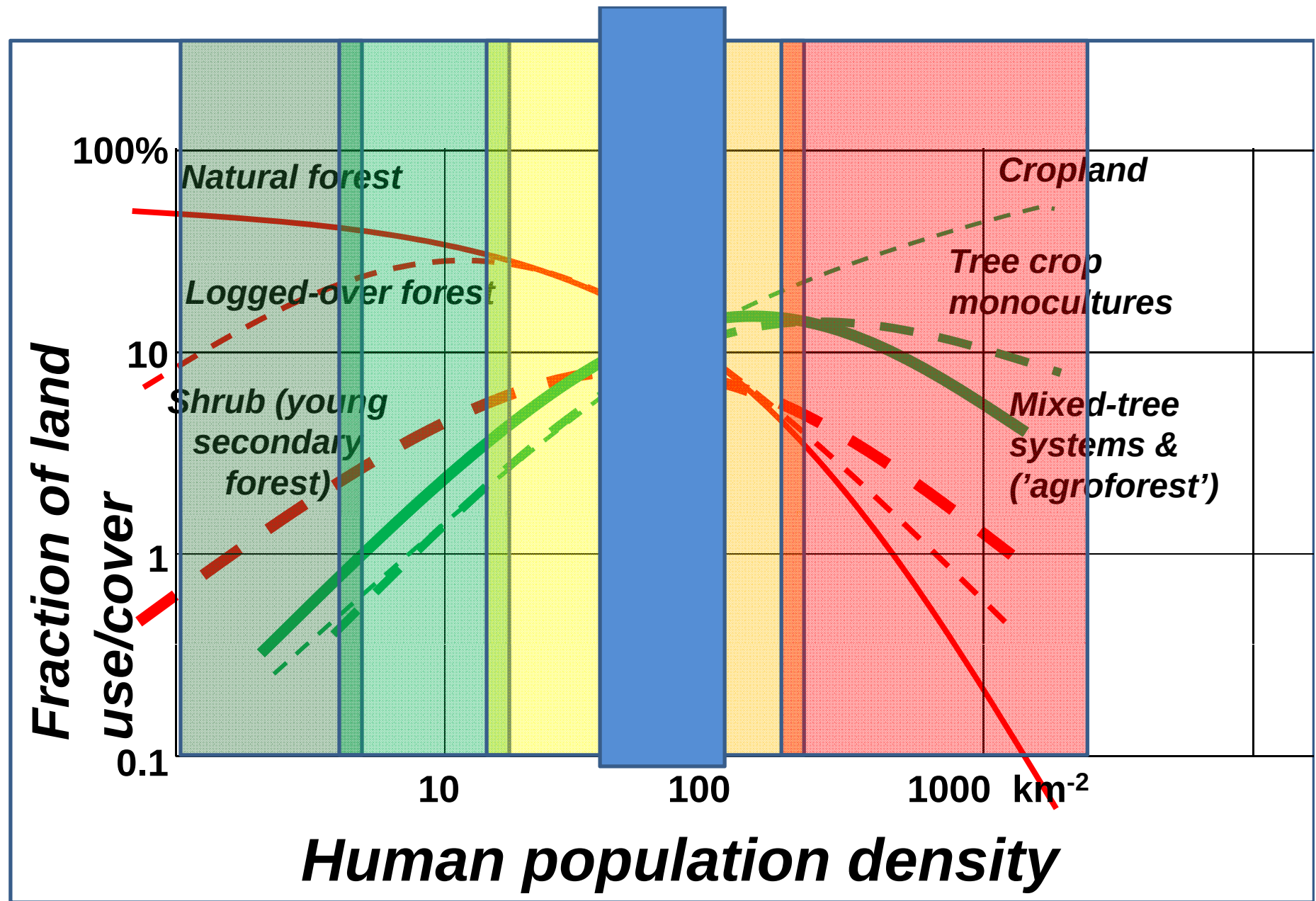
Main findings

Implications

Forest Transition Stages







Globally Appropriate Mitigation Actions (GAMA)
does sum of NAMA's

add up to GAMA?

Nationally Appropriate Mitigation Actions (NAMA)

*are NAMA's based
on LAAMA's?*

Locally Appropriate Adaptation & Mitigation Actions
(LAAMA)

**Landscape
approaches to
adaptation +
mitigation**

Rough est of ratio loss C-stock from
total

60.0000
40.0000
20.0000
0.0000

-1.00

0.00

1.00

2.00

3.00

4.00

Human Population Density (log)

EFFICIENT

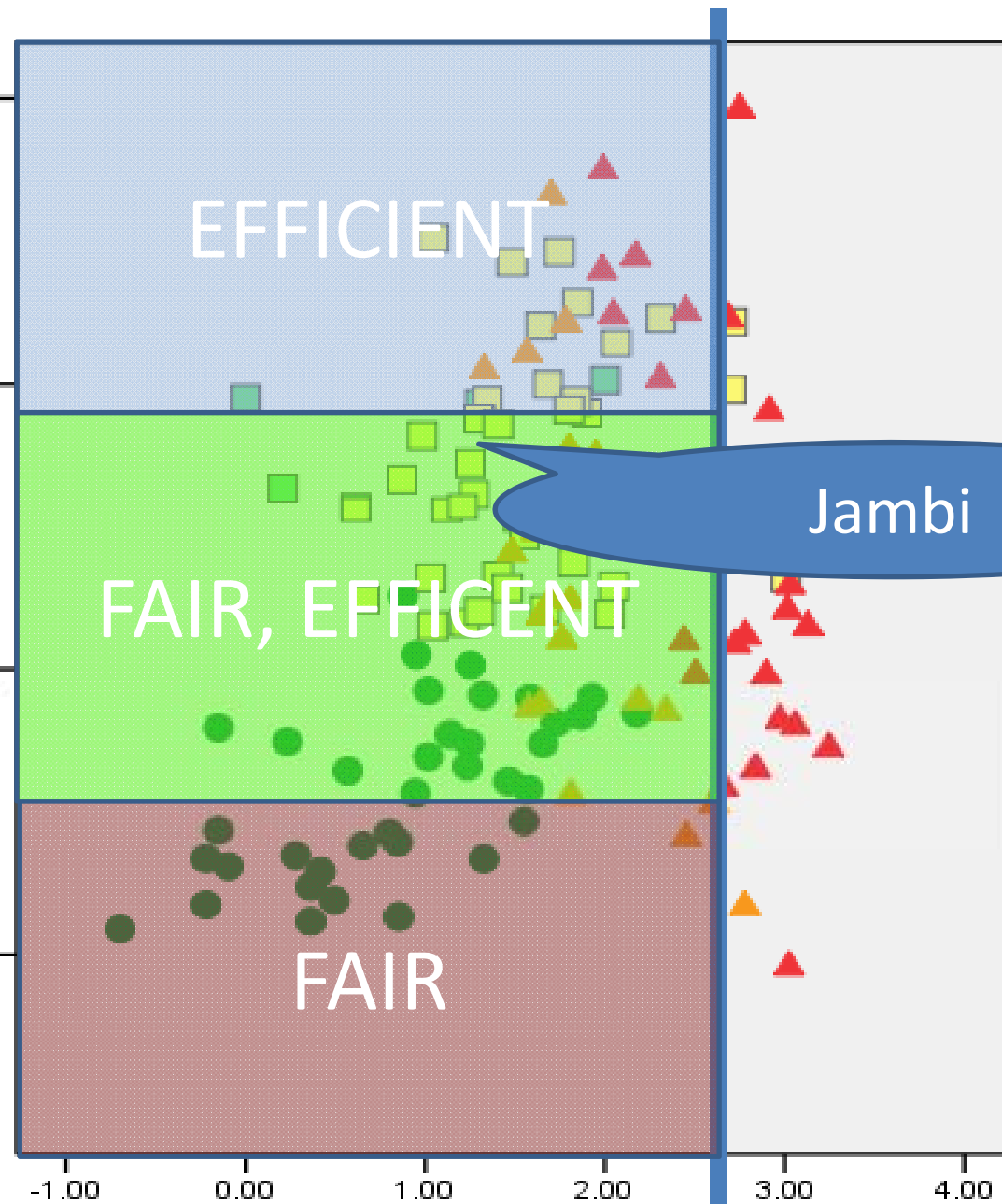
FAIR, EFFICIENT

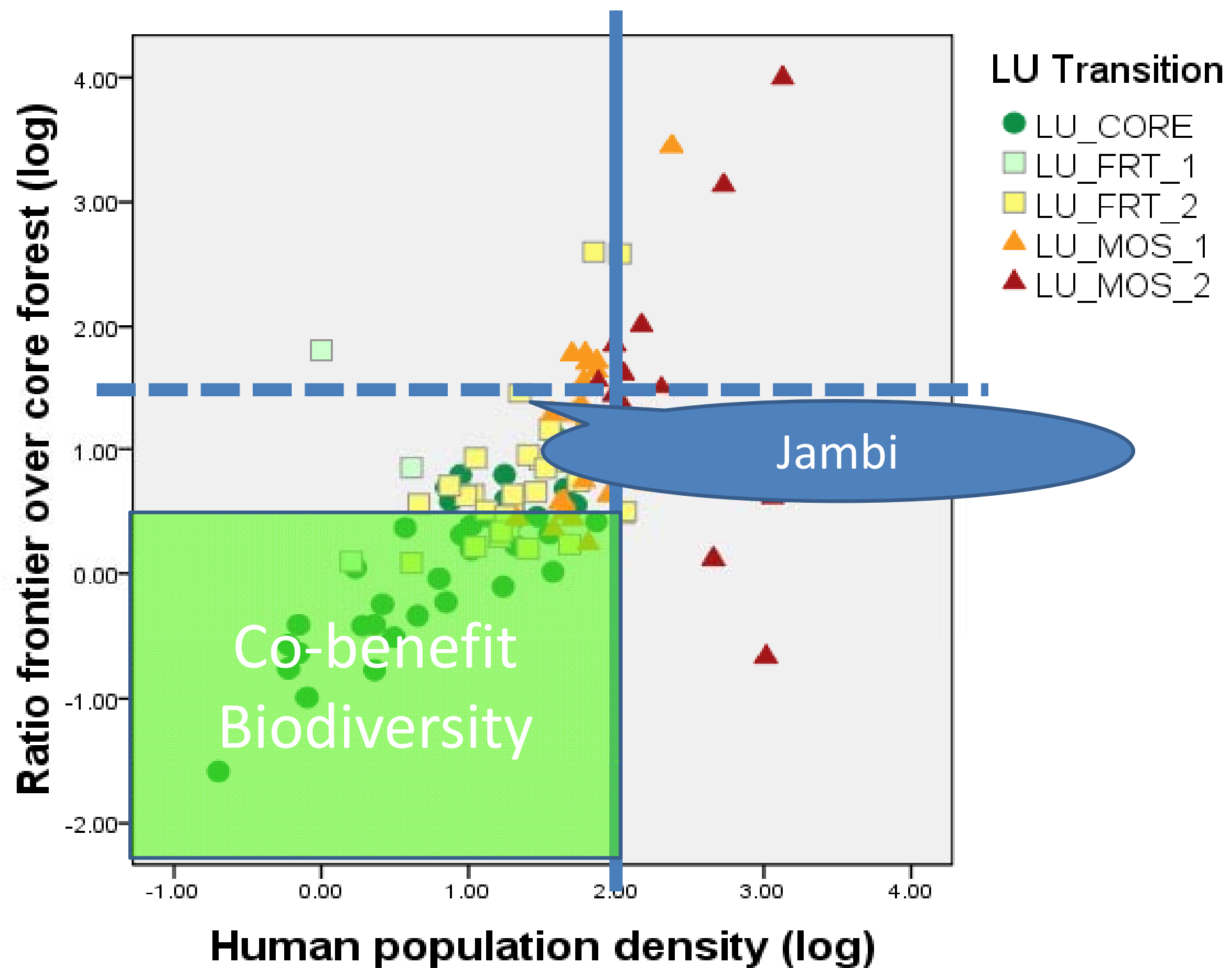
FAIR

LU Transition

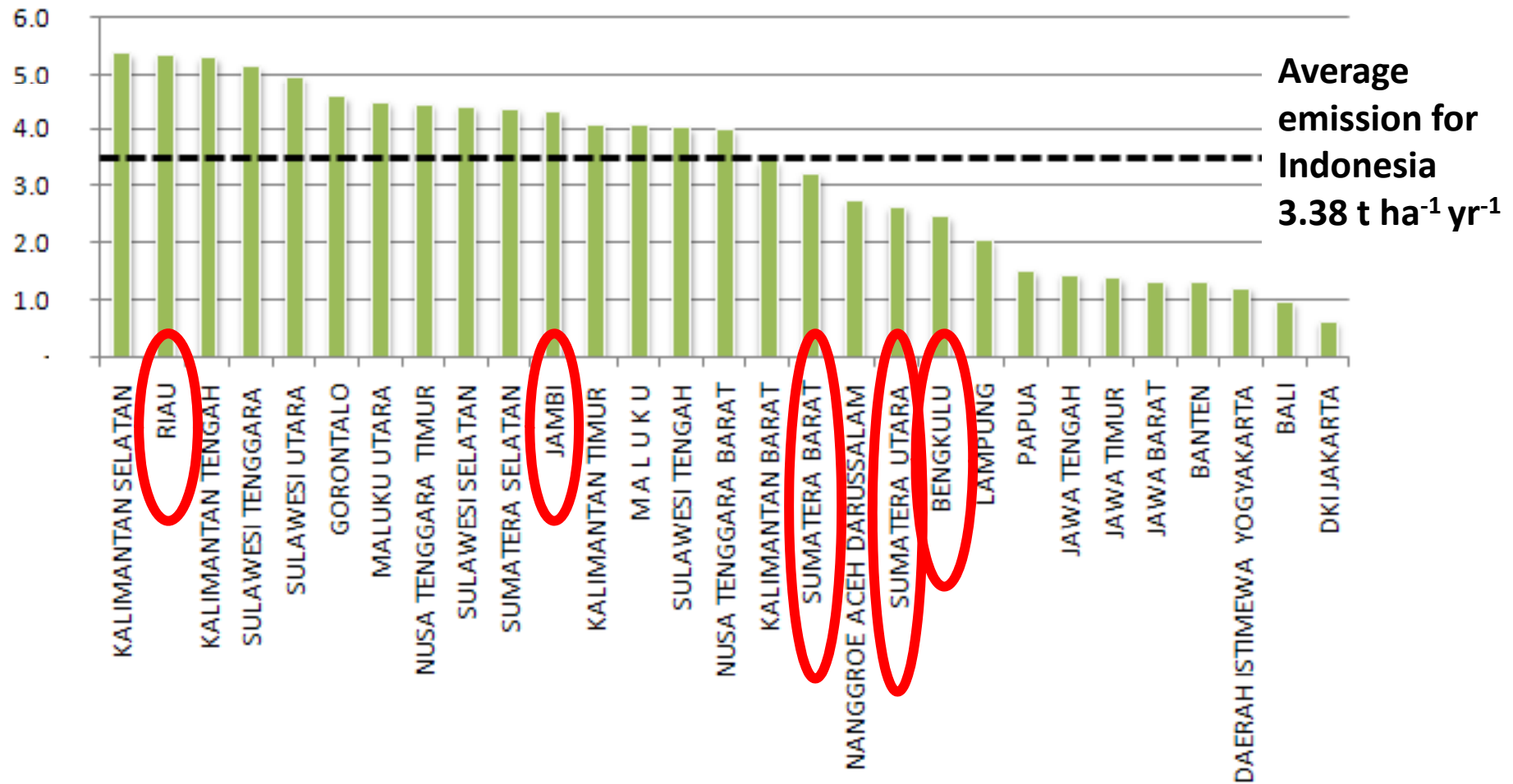
- LU_CORE
- LU_FRT_1
- LU_FRT_2
- ▲ LU_MOS_1
- ▲ LU_MOS_2

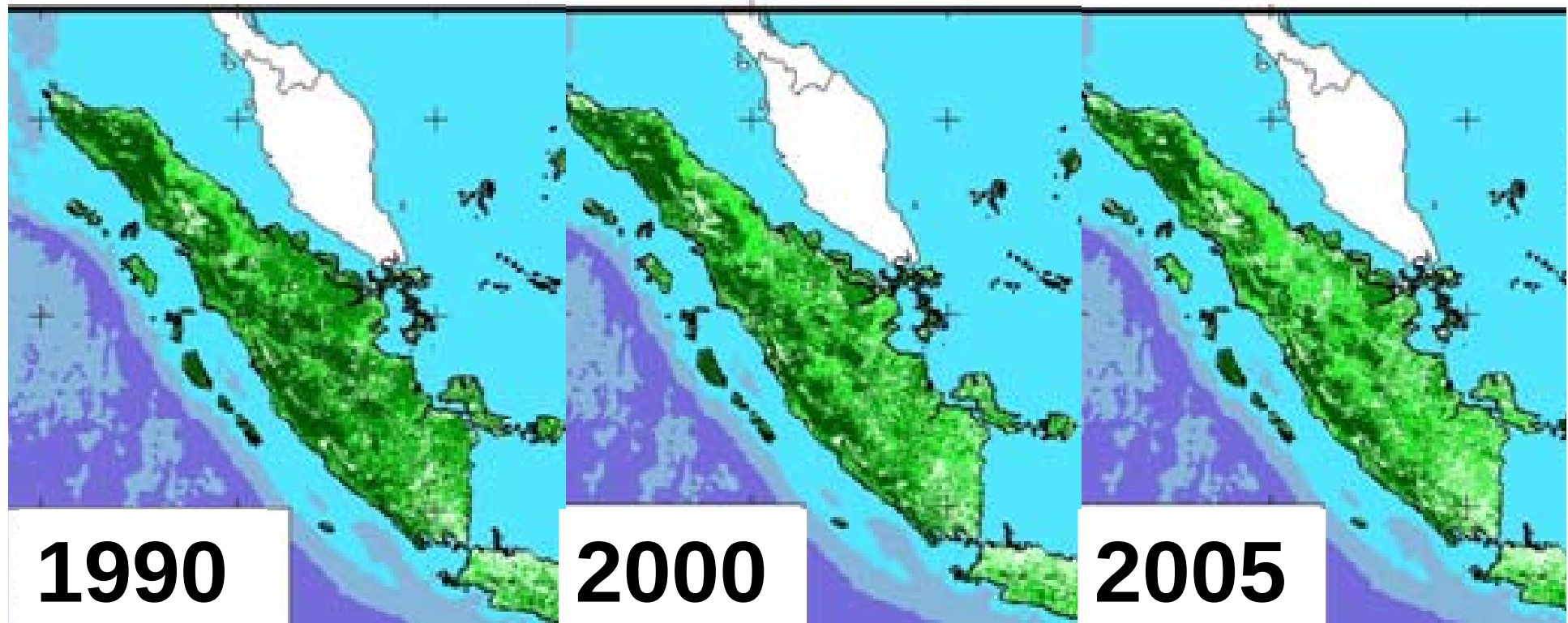
Jambi





Emission factor (ton/ha.yr) of Provinces in Indonesia 2000-2005



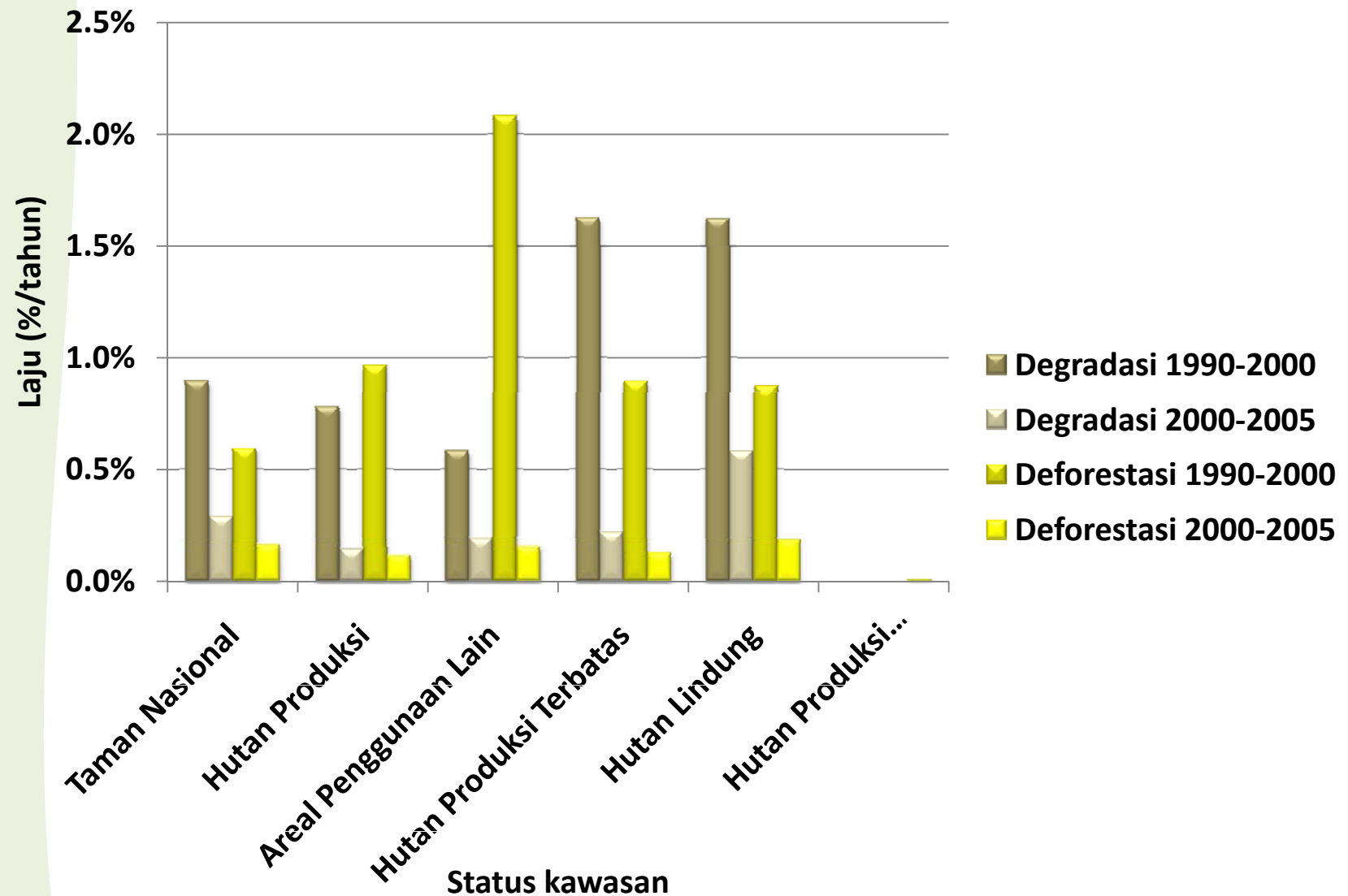


**Aboveground C-stock
maps of Indonesia in
1990, 2000 & 2005**

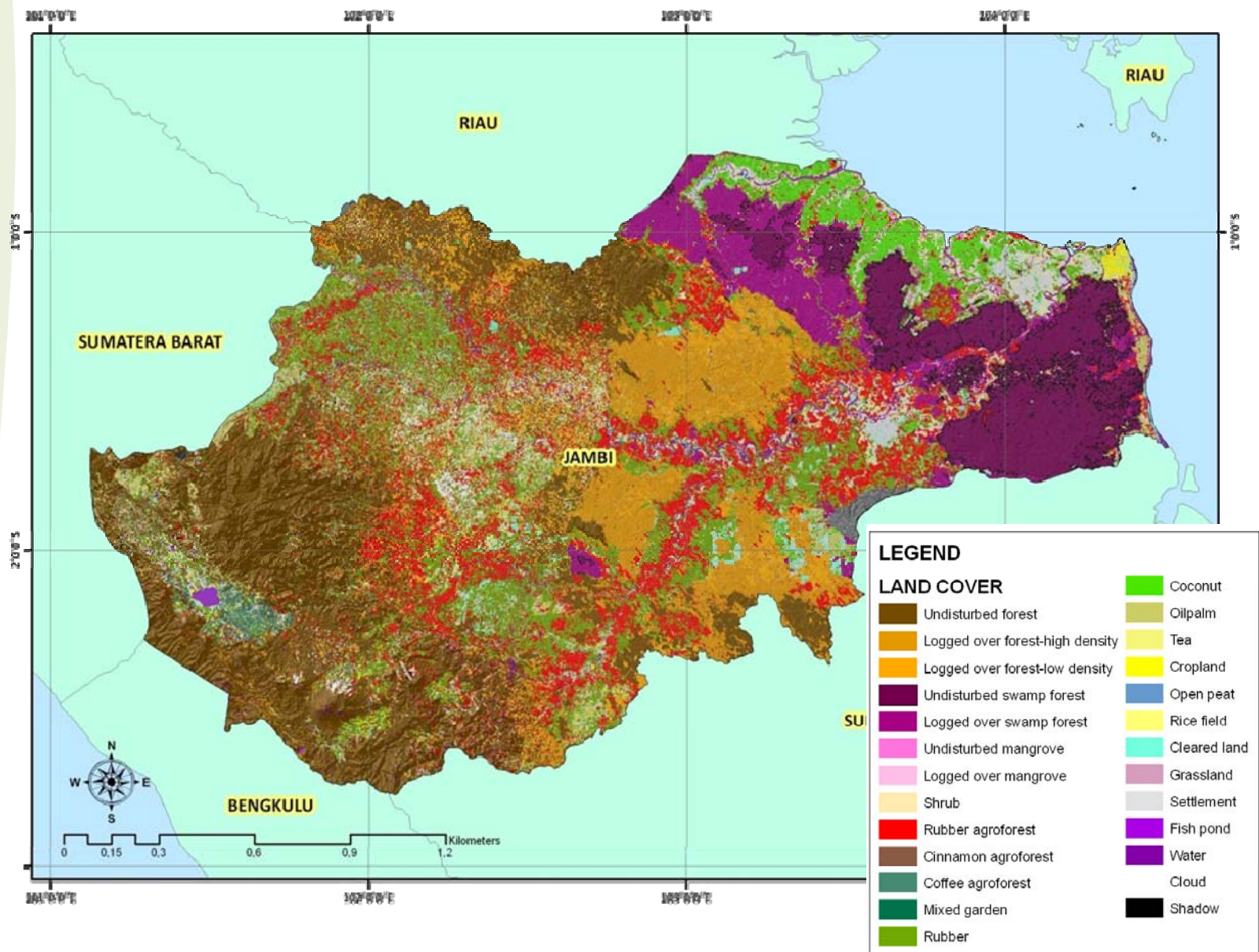
**Results of ALLREDDI
analysis**

Net Emissions: 0.6 Gt year⁻¹

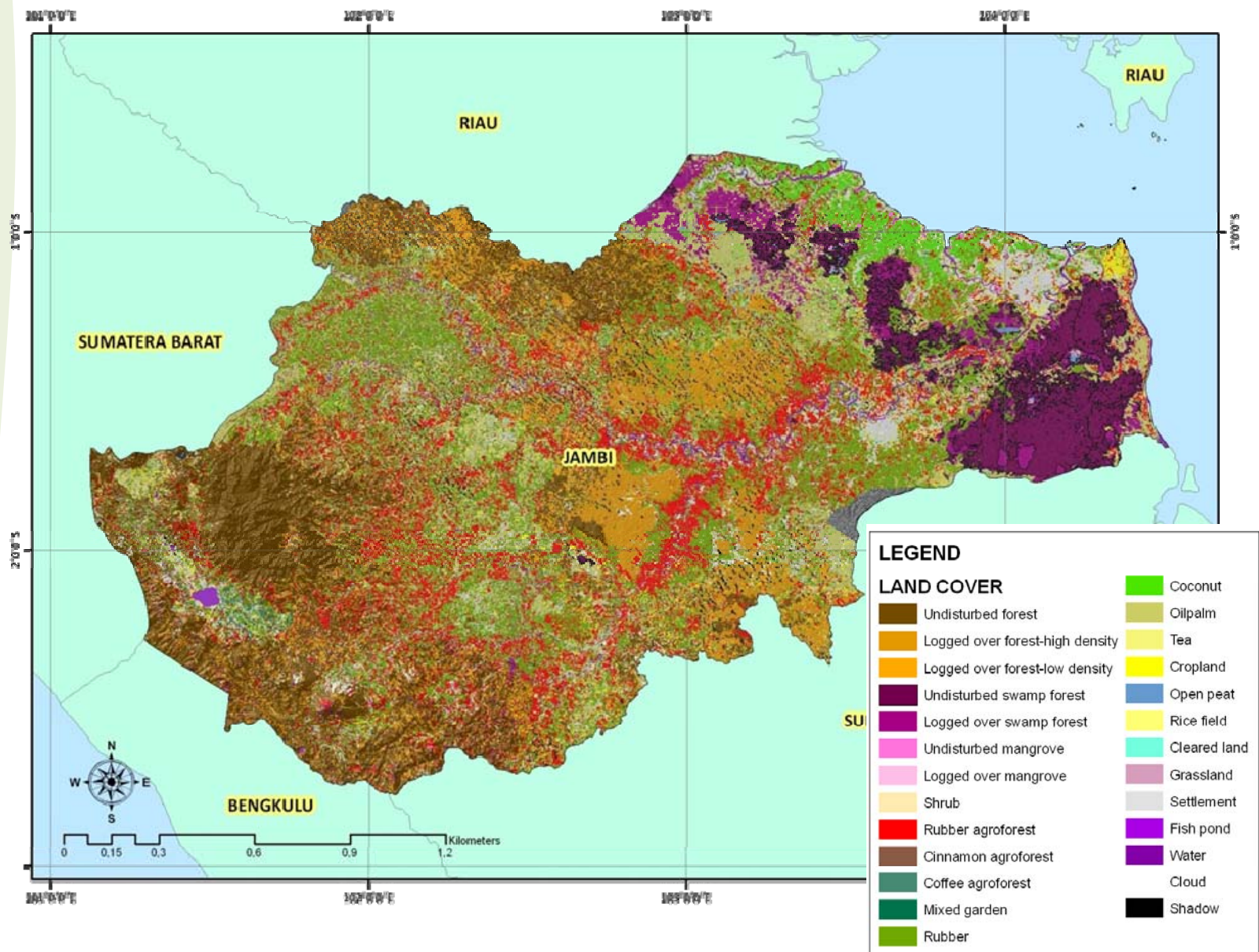
FOREST COVER CHANGE VS FOREST ALLOCATION



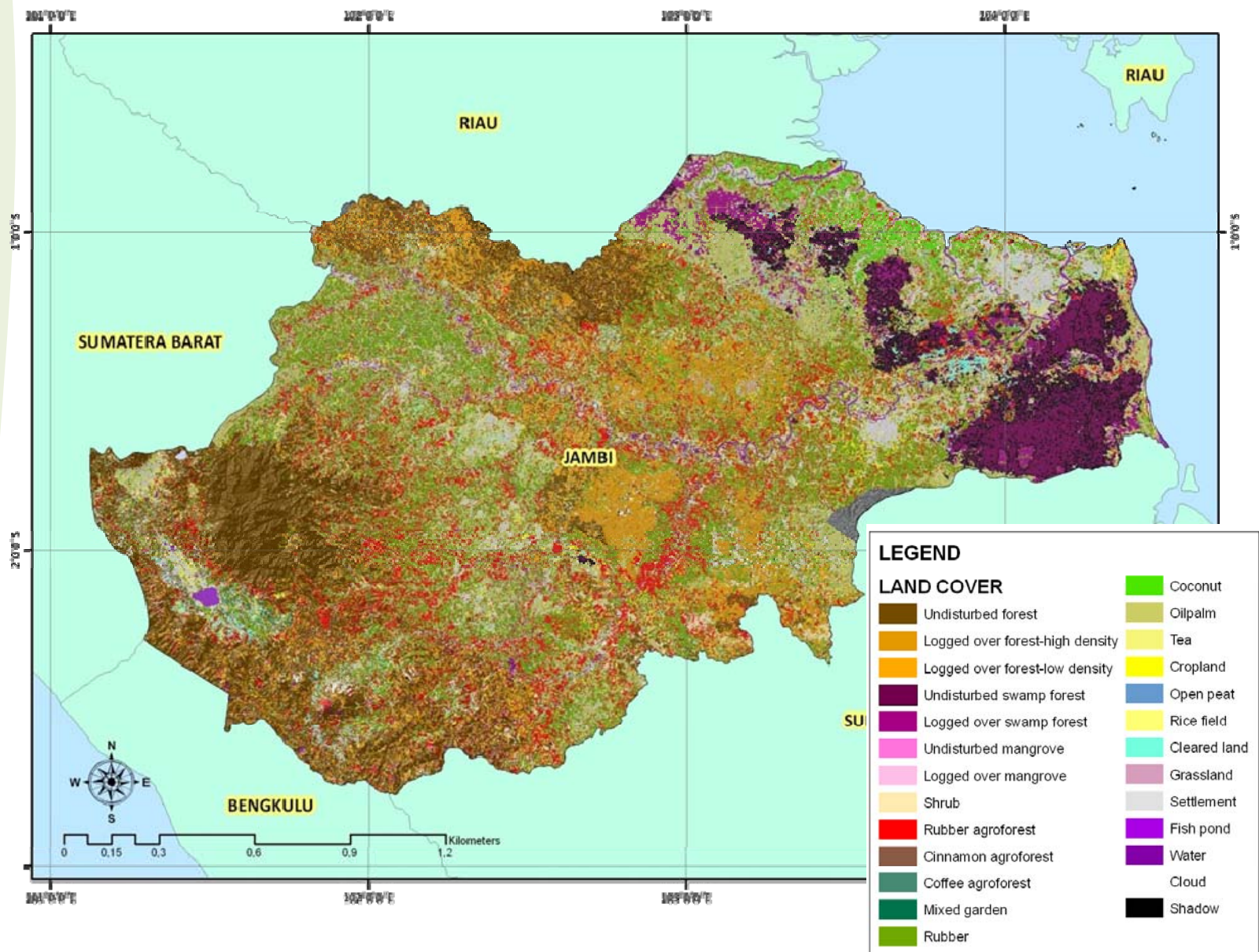
JAMBI LAND COVER MAP 1990s



JAMBI LAND COVER MAP 2000s

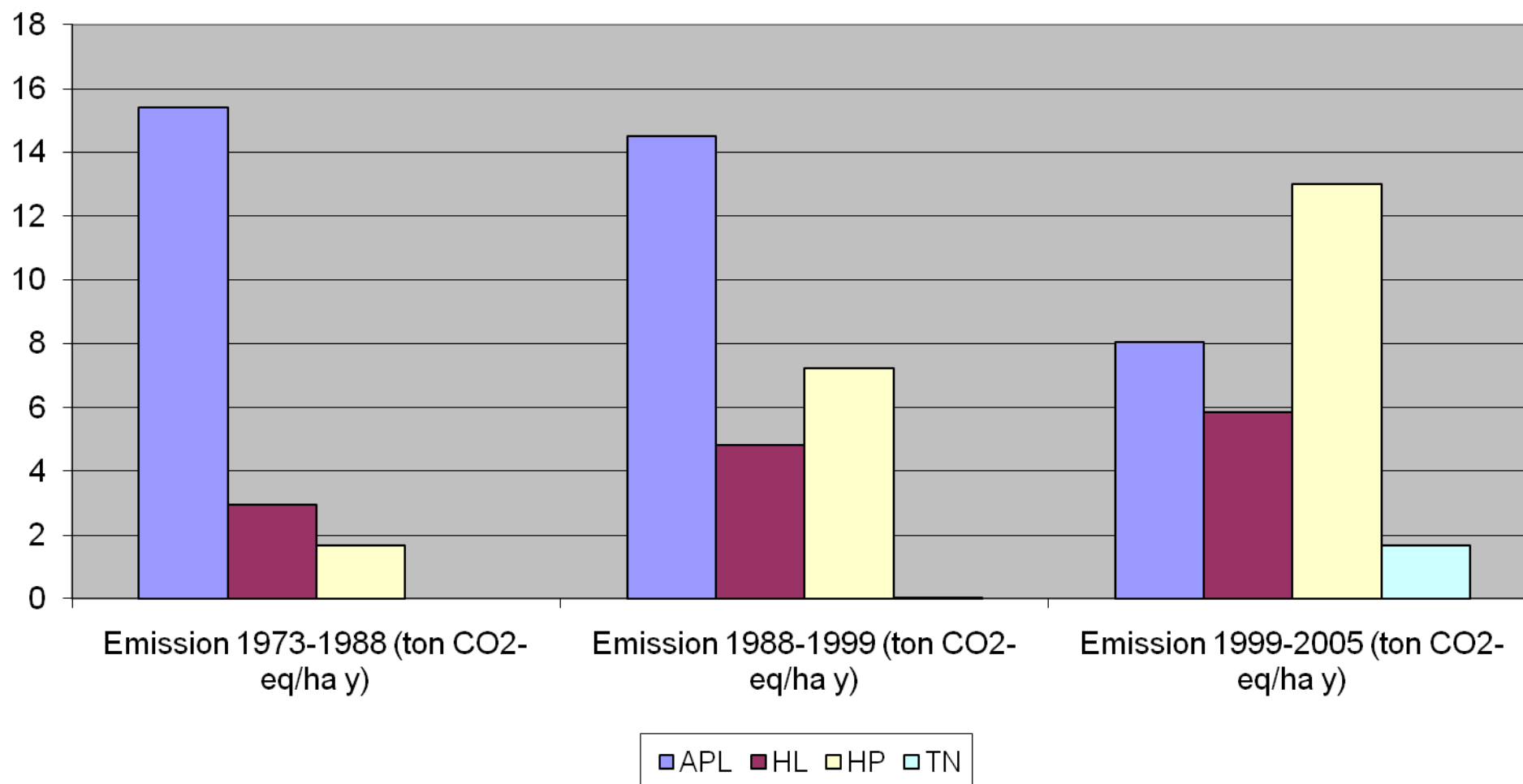


JAMBI LAND COVER MAP 2005

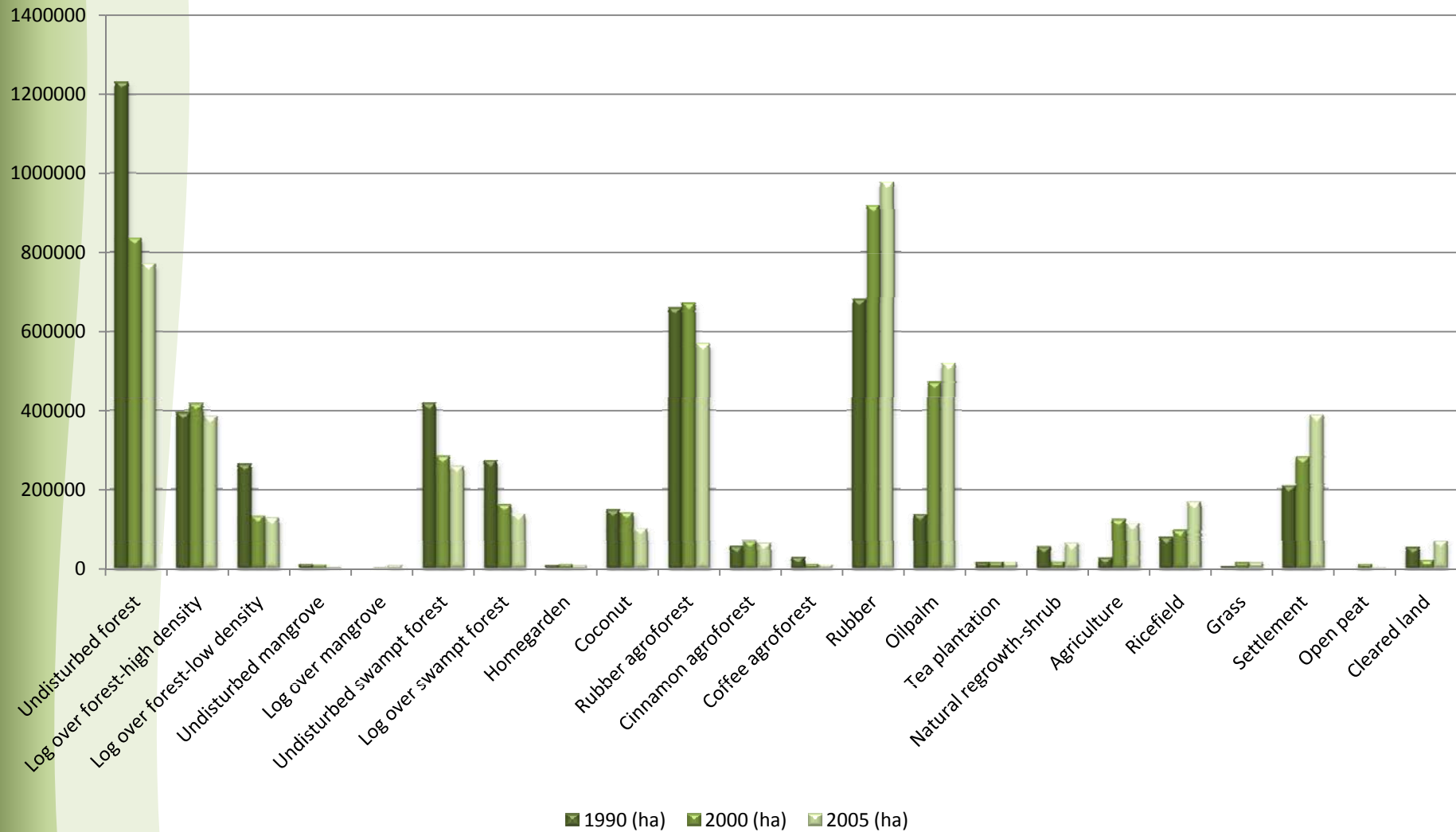


Annual emissions per ha within each land use allocation across 3 periods

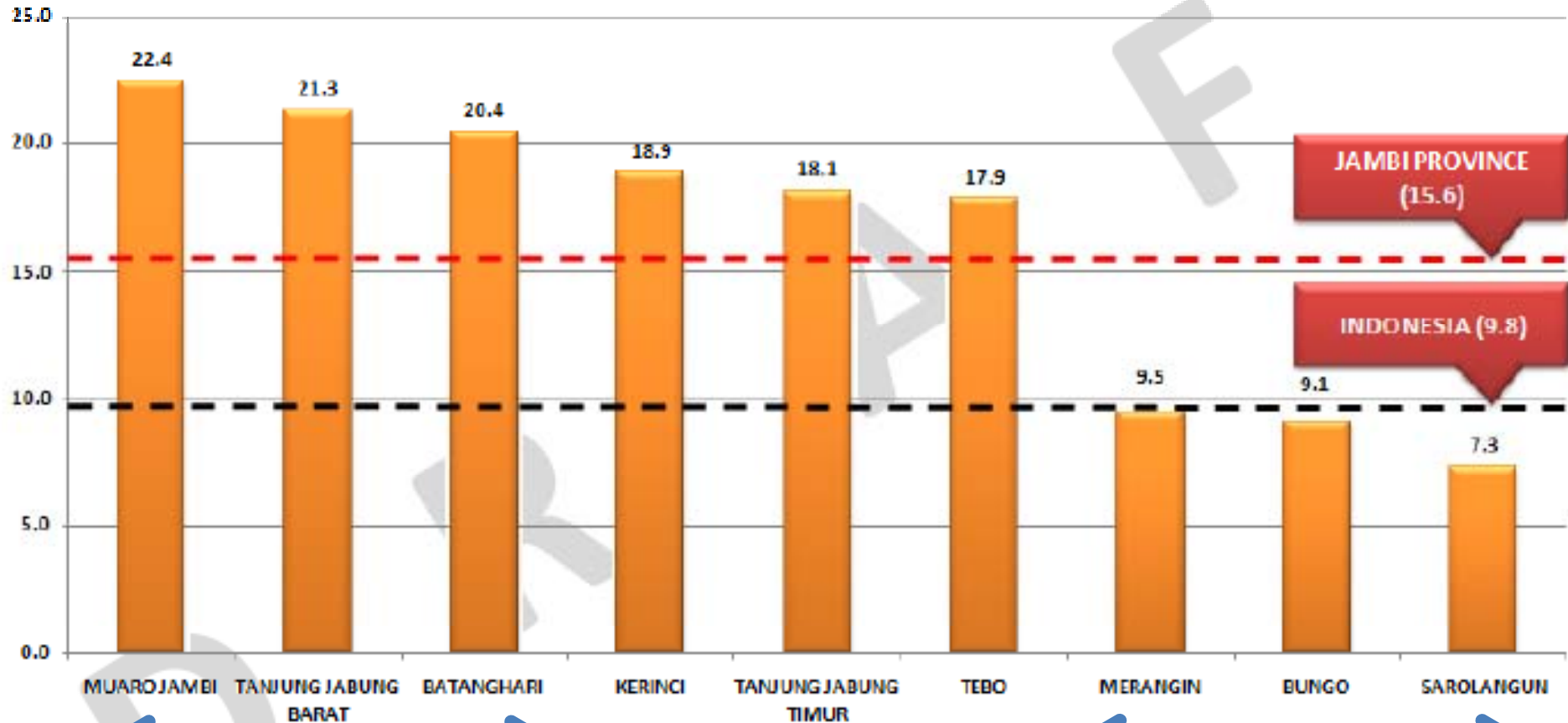
Annual emissions (ton CO₂-eq/ha)



JAMBI LAND COVER CHANGE 1990-2005



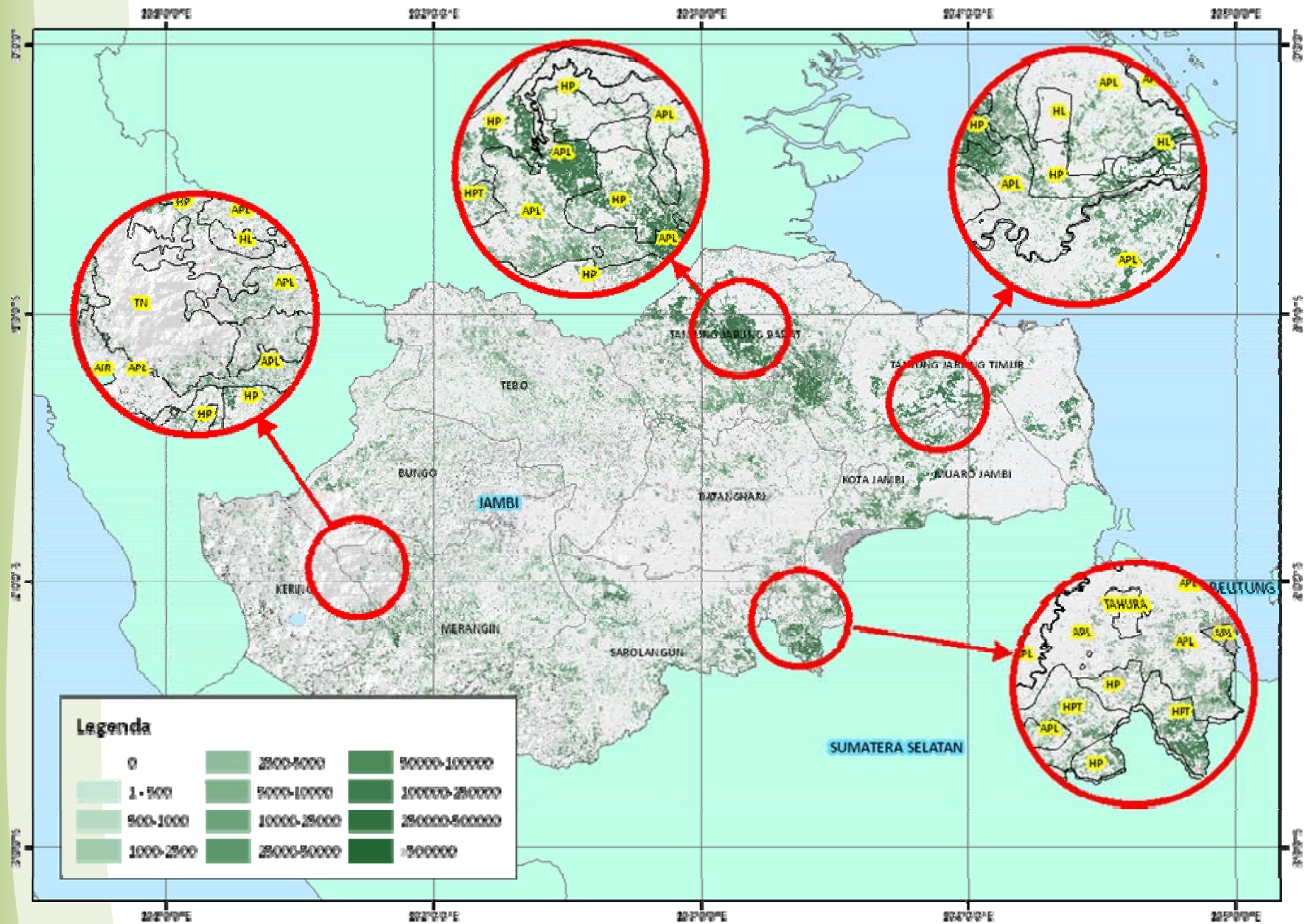
Net Annual emission 2000-2005 (ton CO₂ eq/(ha.yr)) of Districts in Jambi



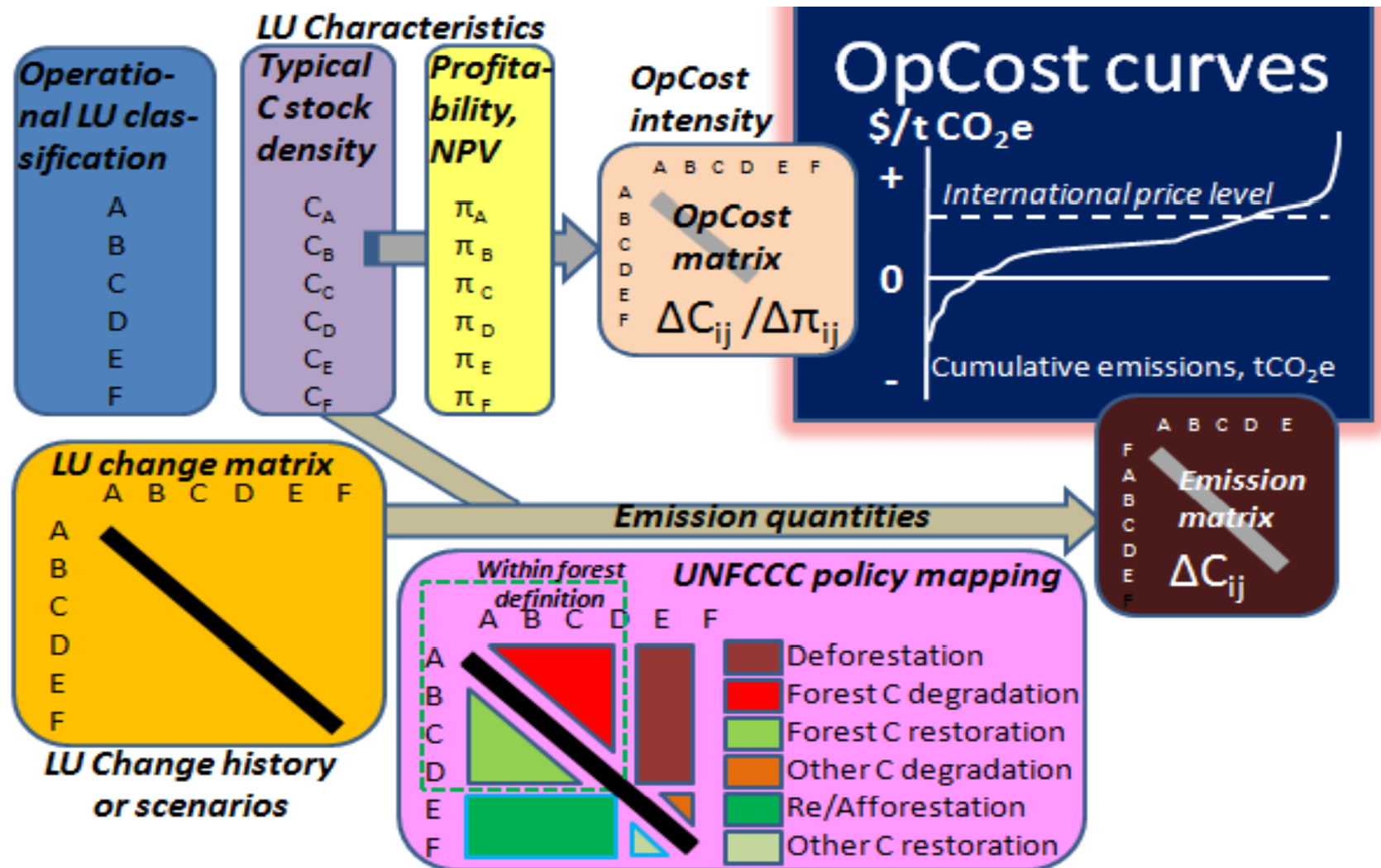
← Muarojambi.
Tanjung Jabung Barat
Batanghari →

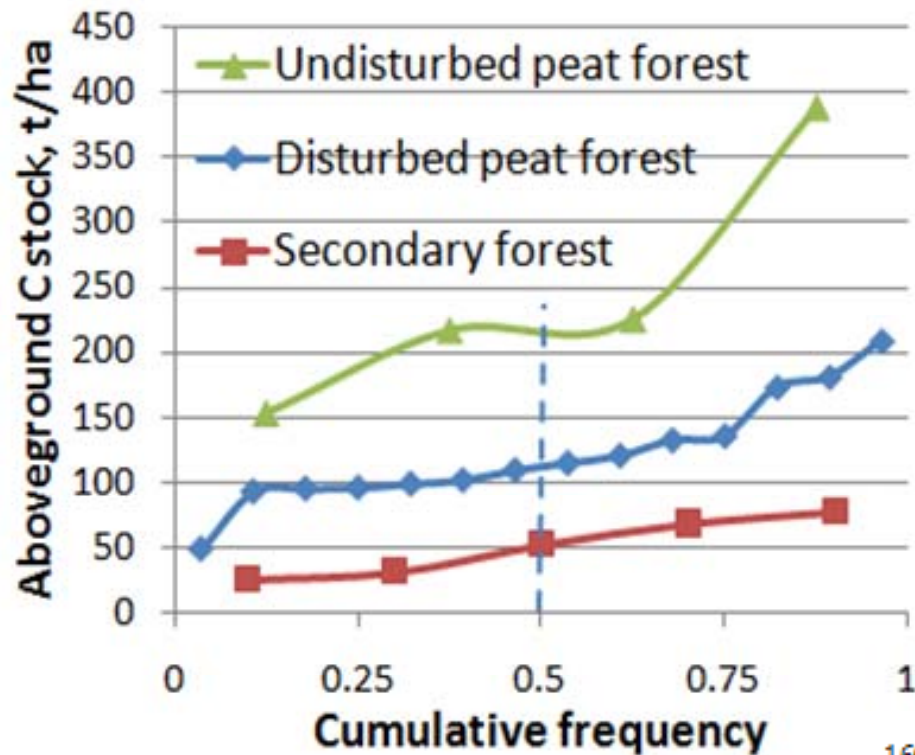
← Merangin,
Bungo,
Sarolangun →

WHERE WERE THE EMISSION HAPPENED?



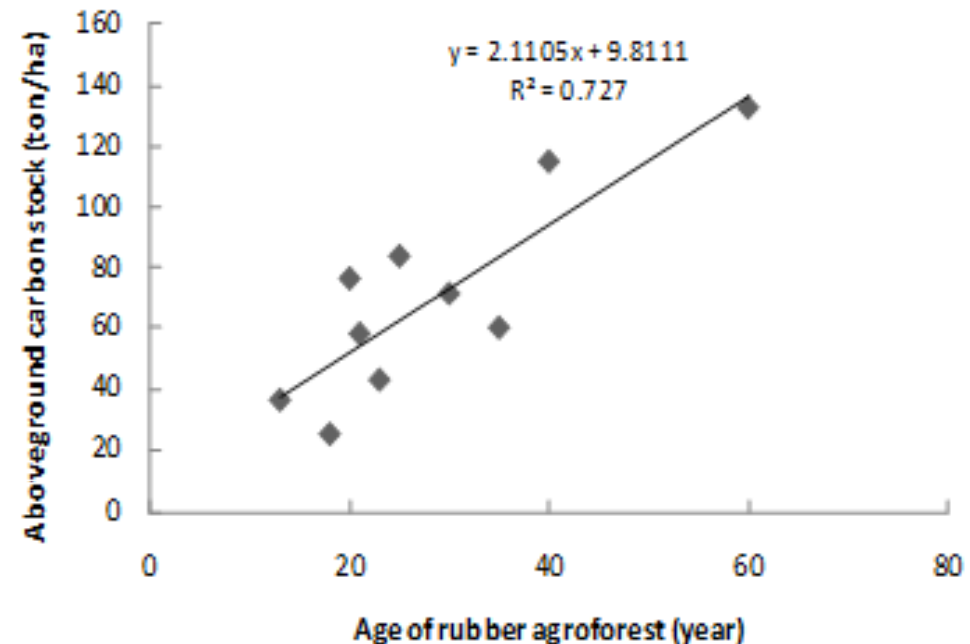
Opportunity cost analysis



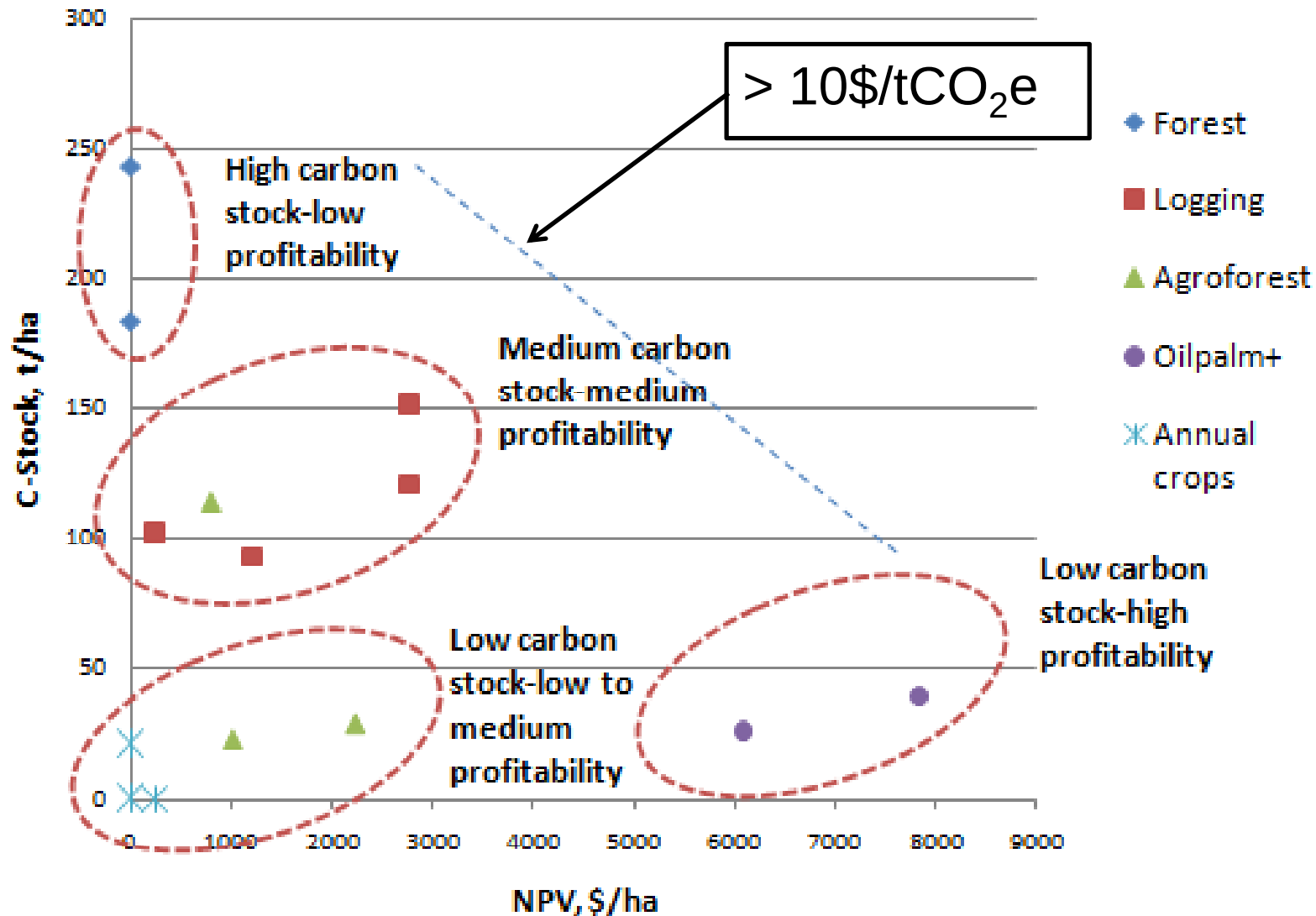


Fine-tuning terminology between 'ground truth' and remote sensing interpretation

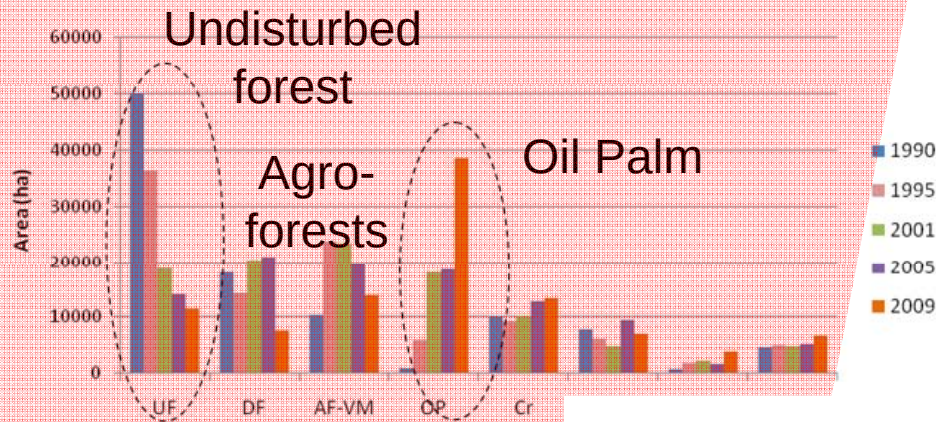
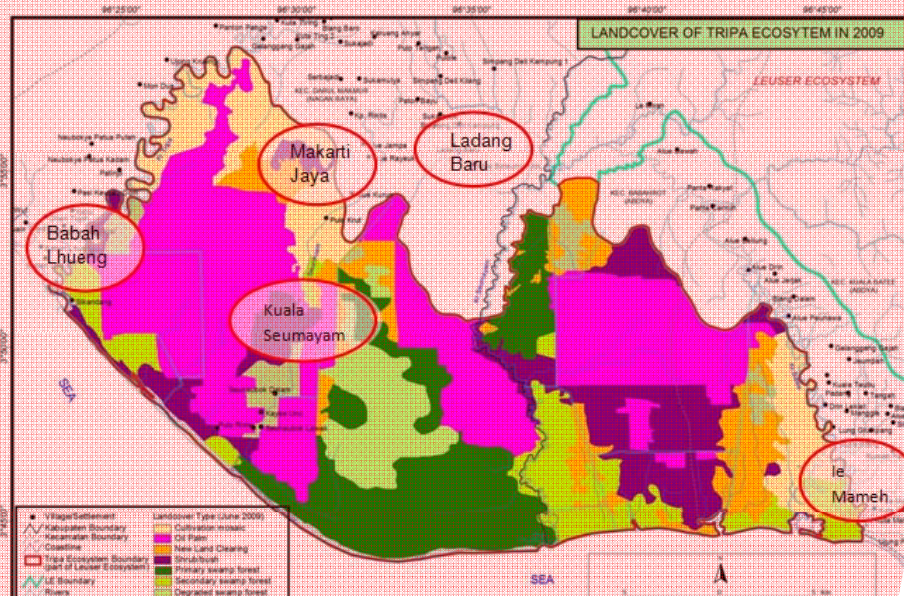
Accounting for age:



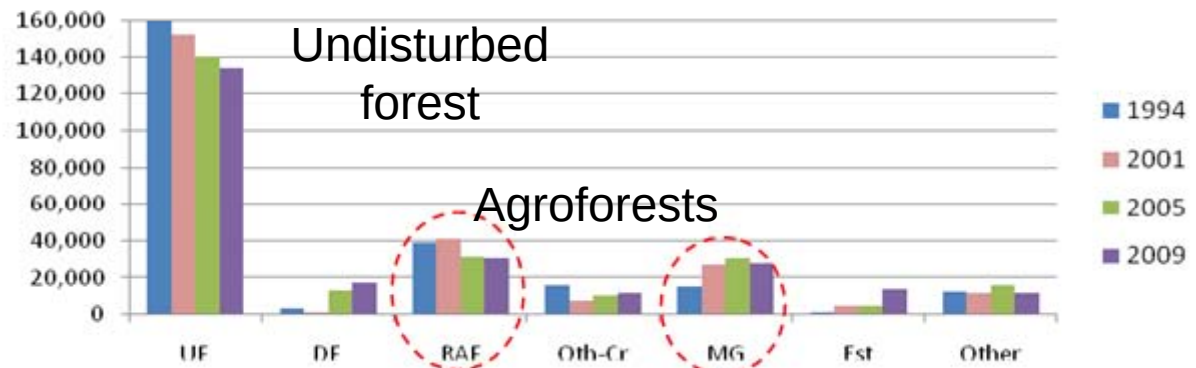
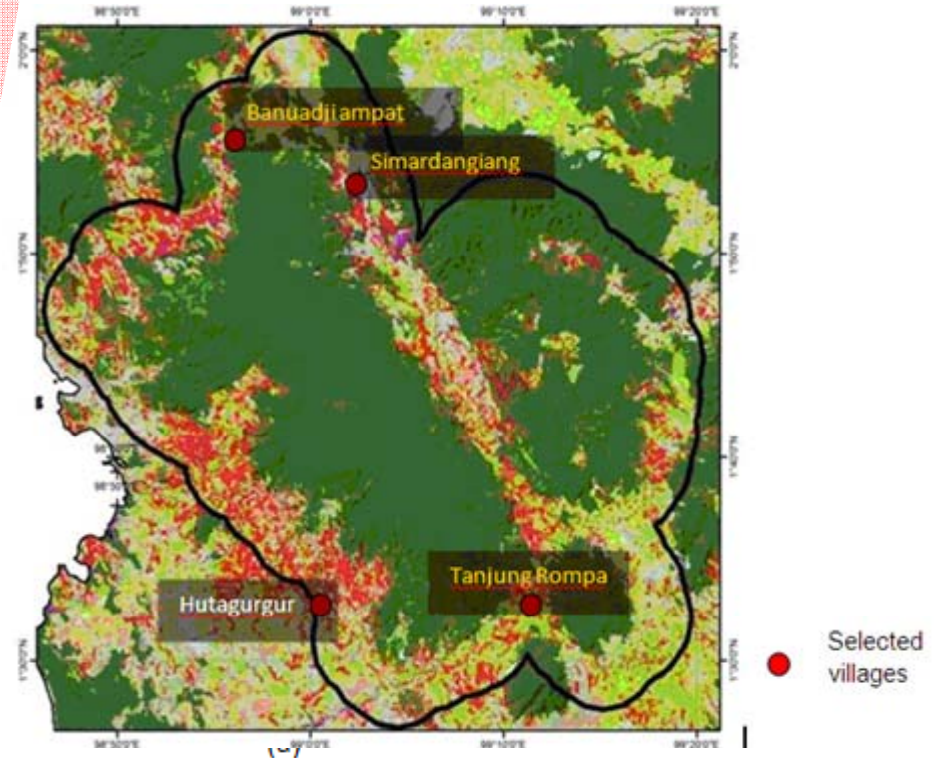
Tradeoff between profitability and C-stock



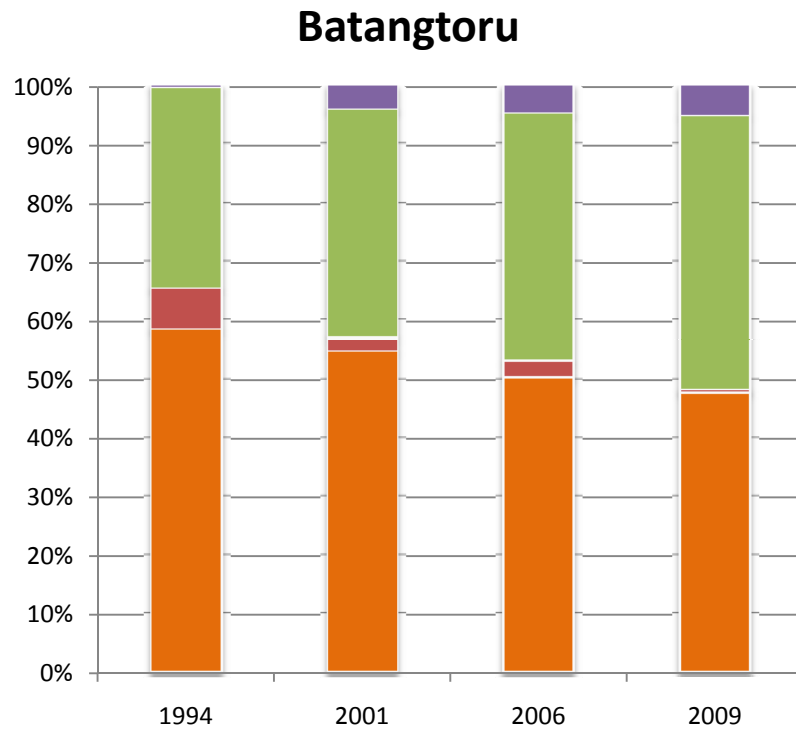
Stable landscape in Batang Toru



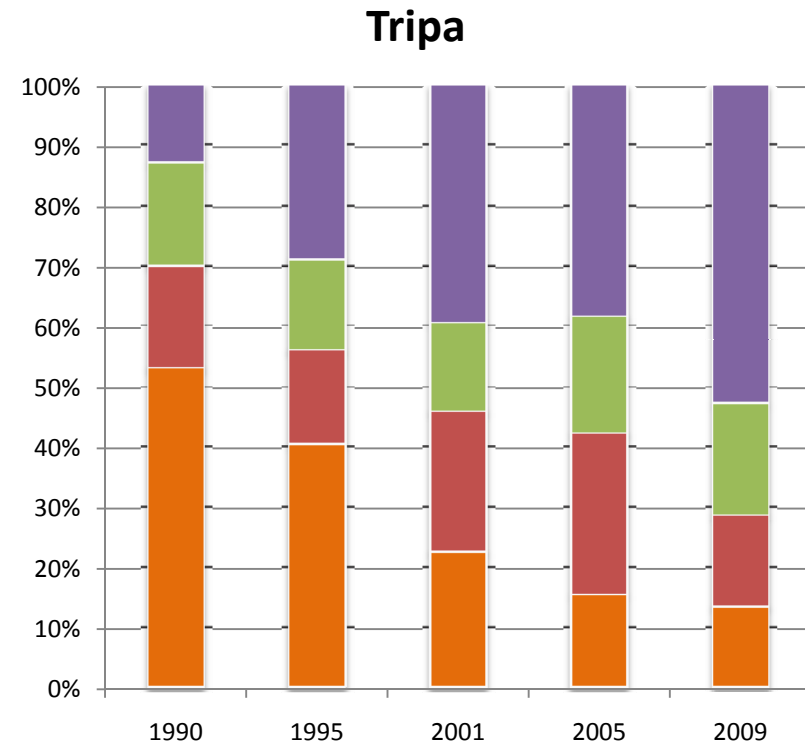
Dramatic change in Tripa



Land use change in economic and carbon stock perspective

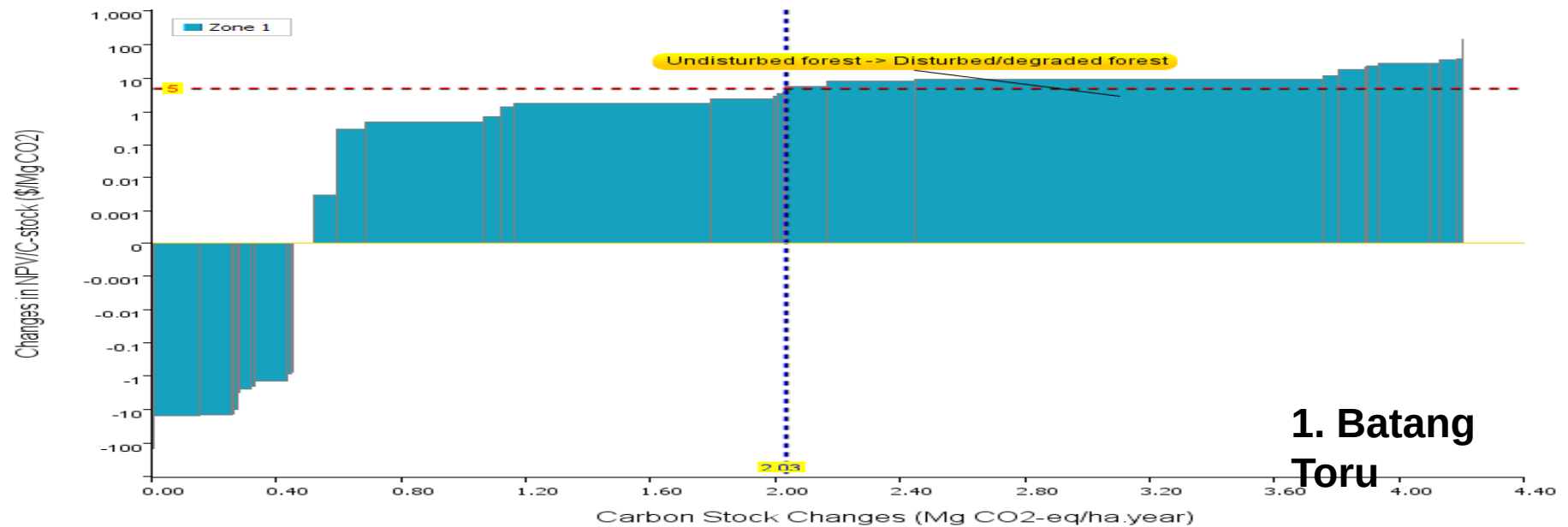


- High carbon-low profitability
- High carbon-medium profitability
- Low carbon-low profitability
- Medium carbon-high profitability

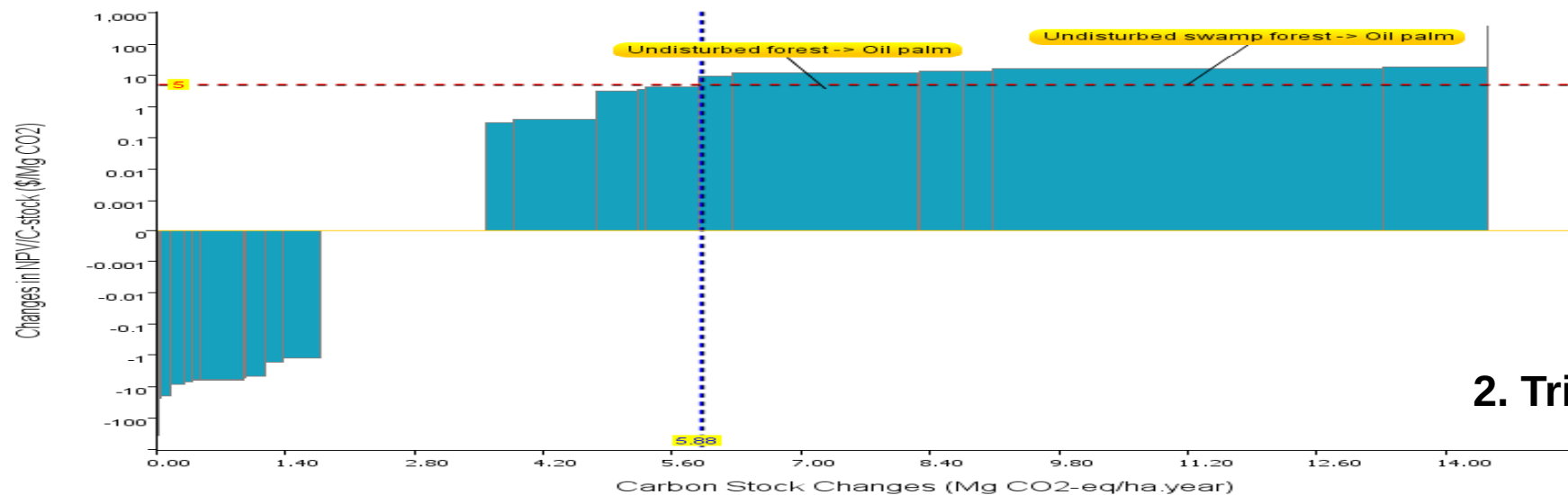


- High carbon-low profitability
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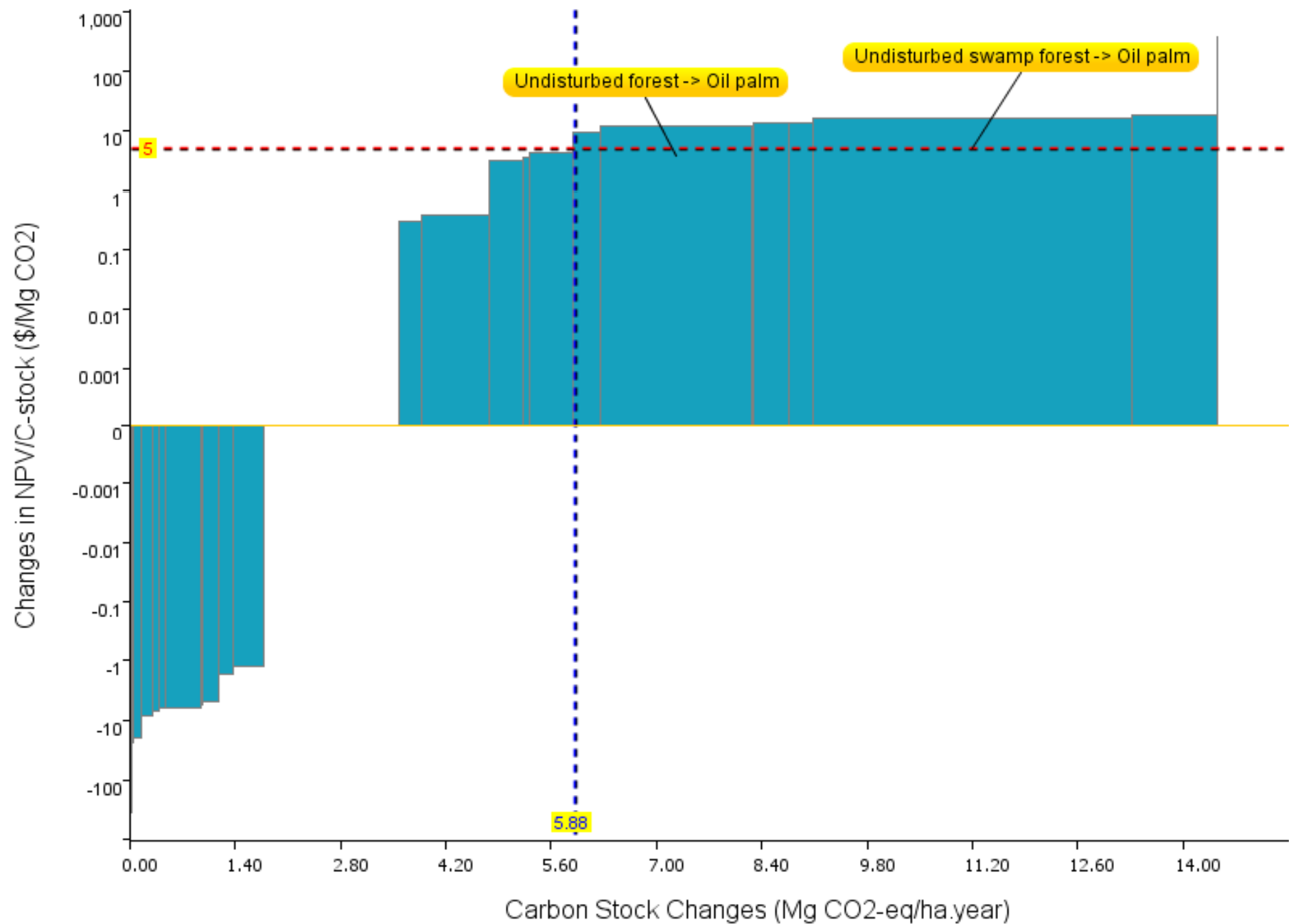
Abatement cost curve

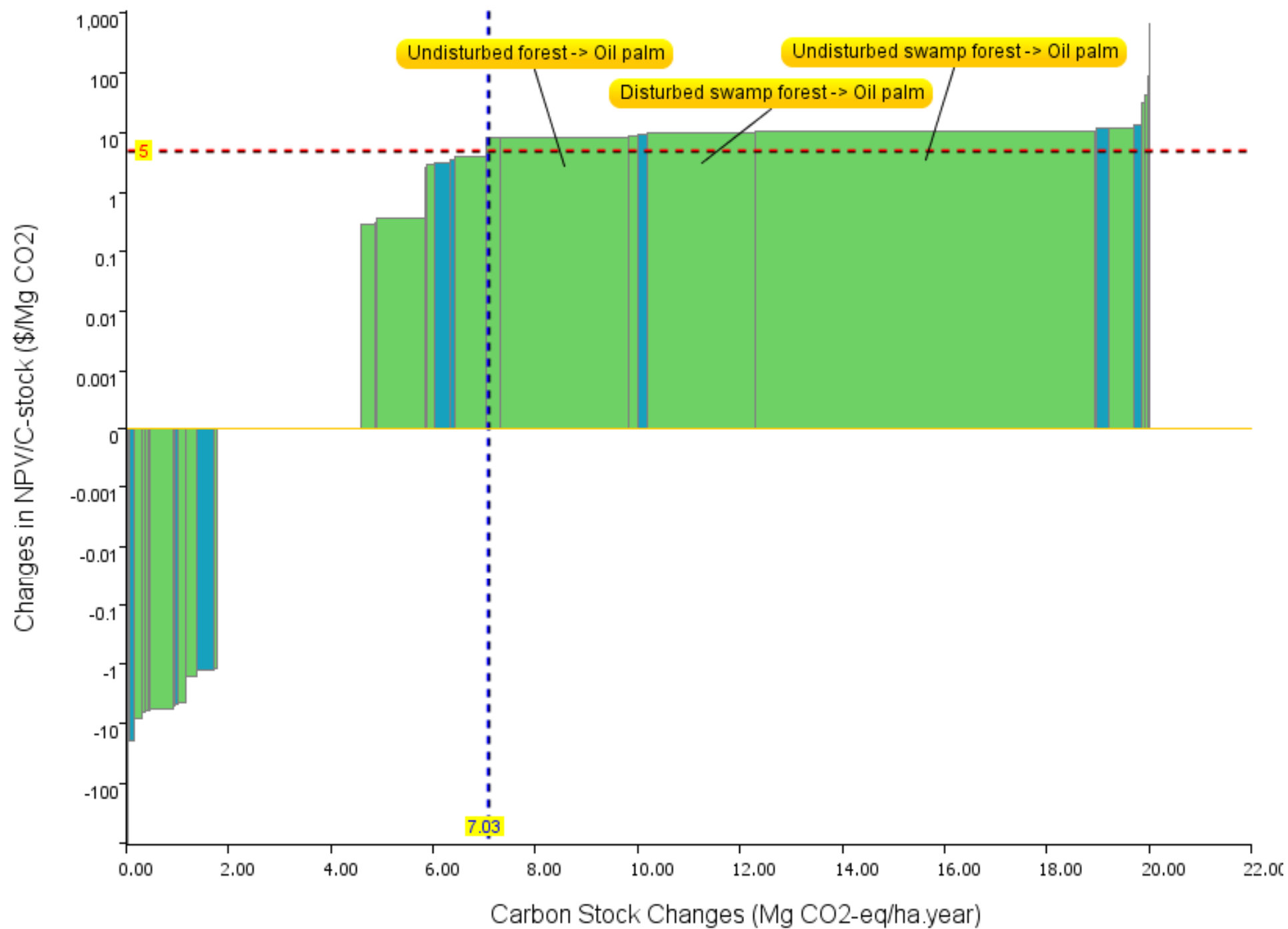


1. Batang
Toru

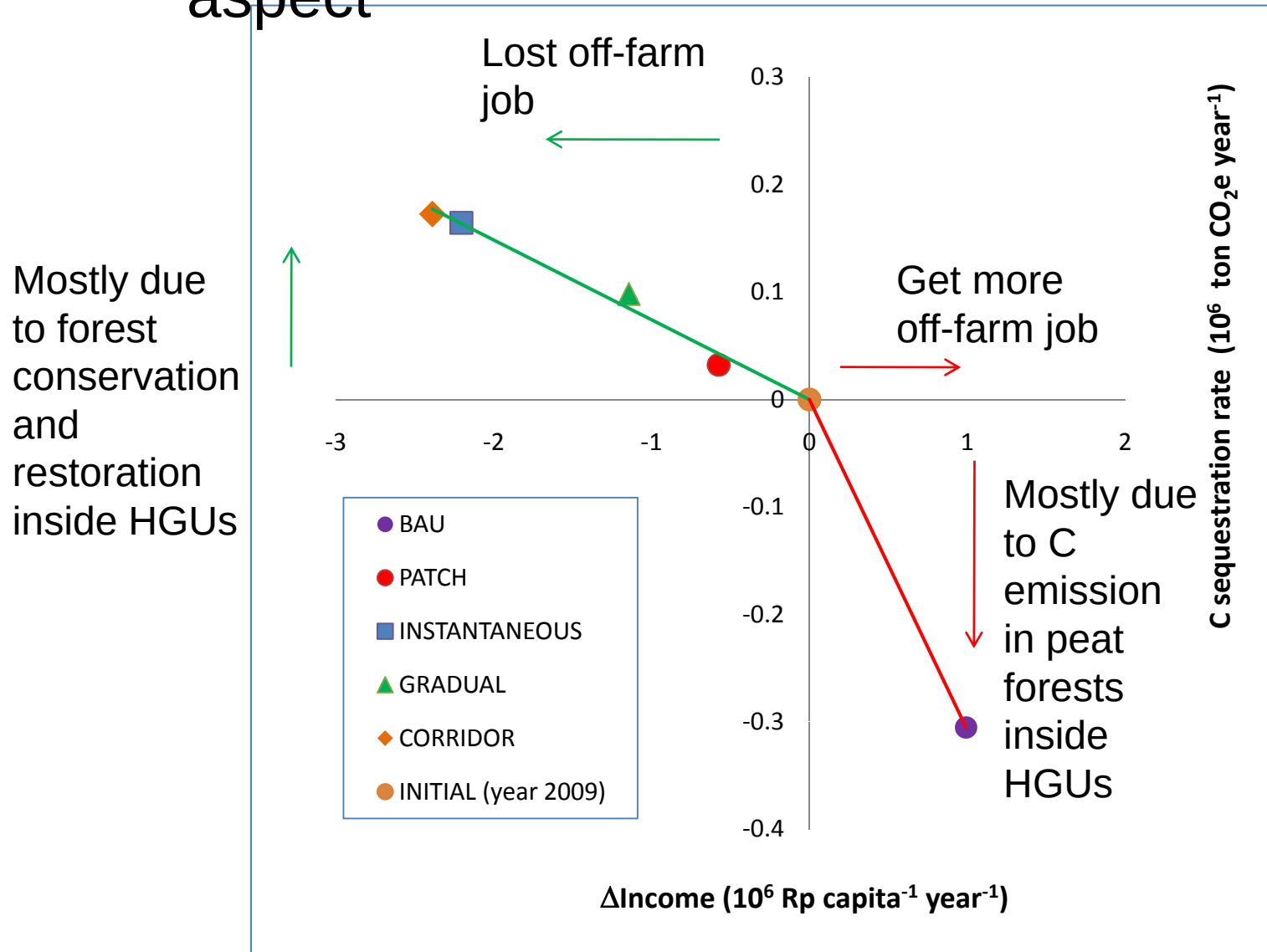


2. Tripa



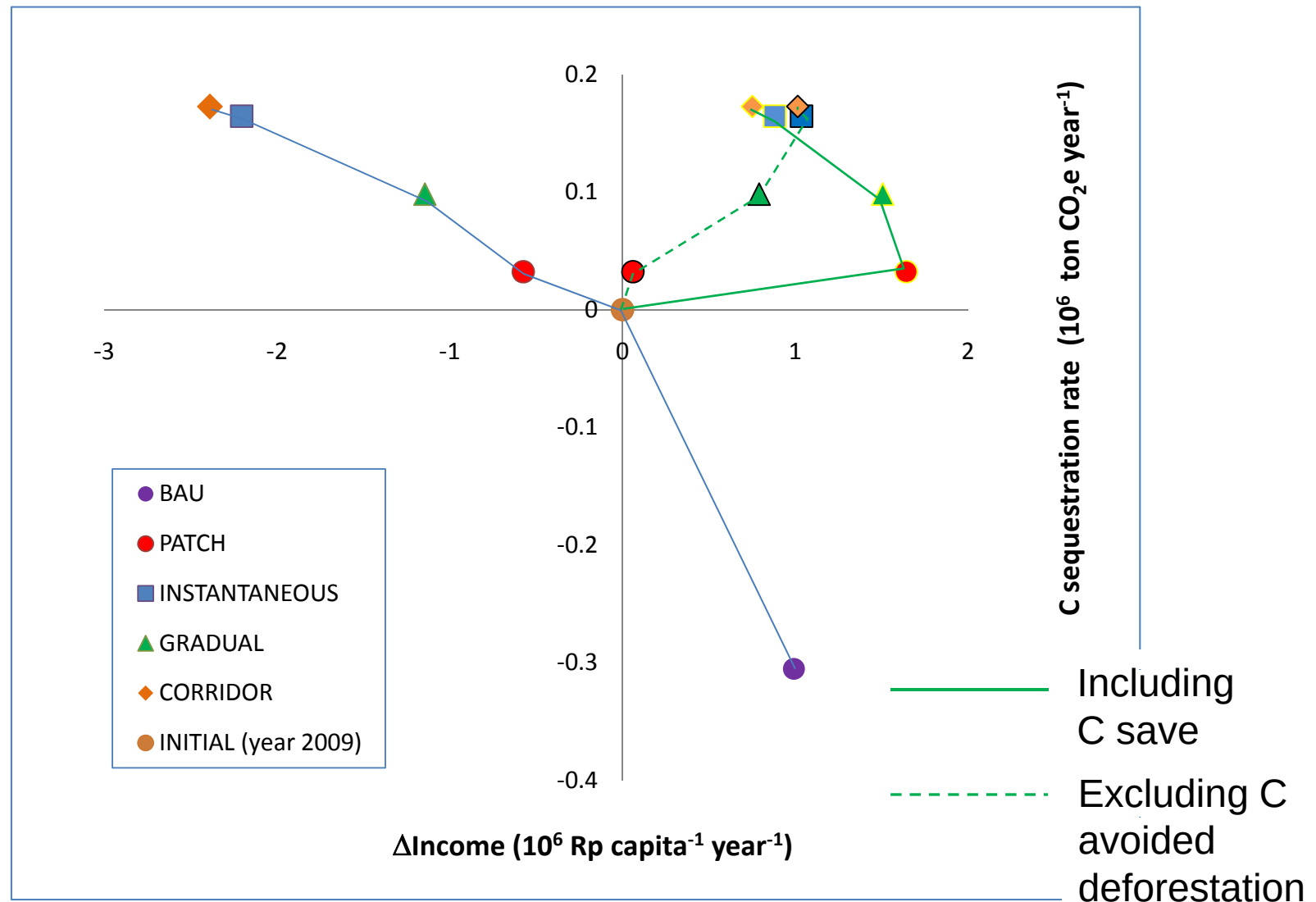


Tradeoff between ecology and economy aspect

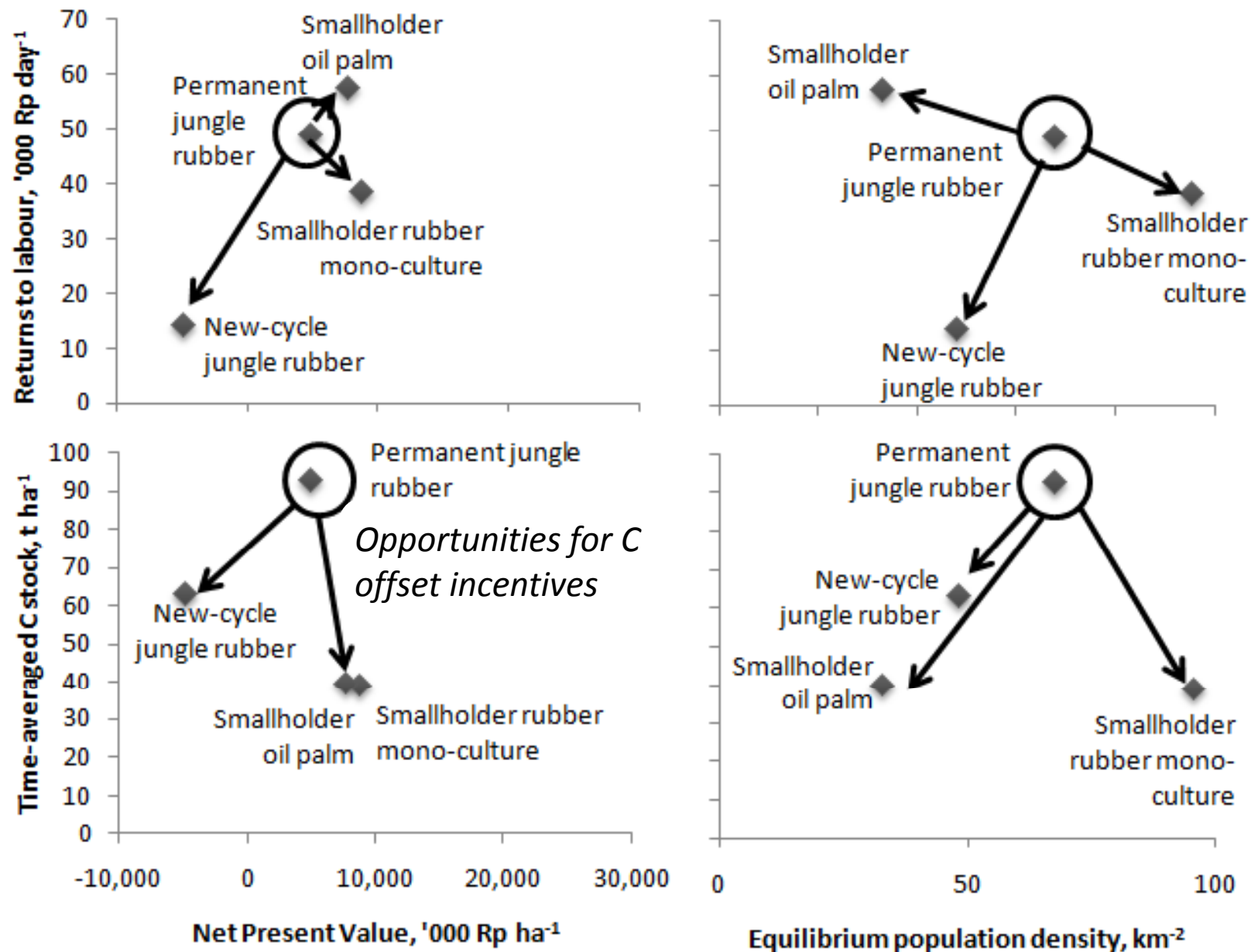


ACHIEVING 'GREEN DEVELOPMENT'

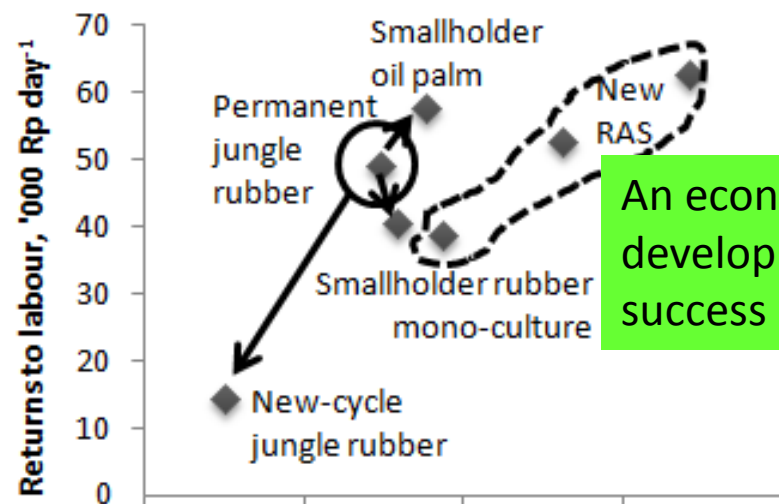
Positive change both in economic and ecological aspect



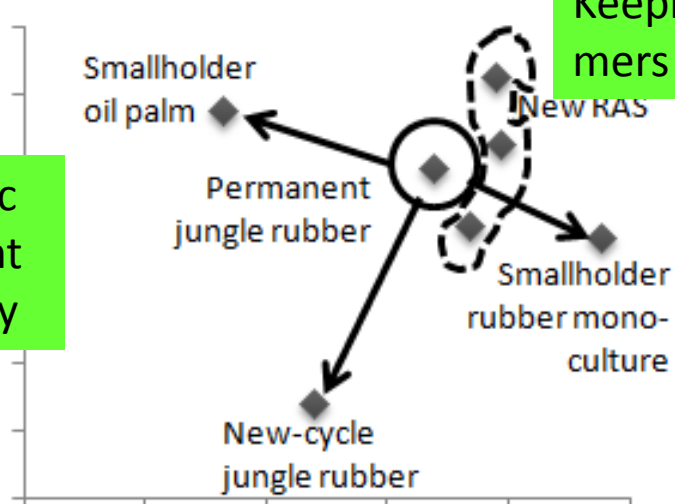
Tradeoffs in lowland Sumatra/Kalimantan without 'intermediate intensity rubber agroforestry'



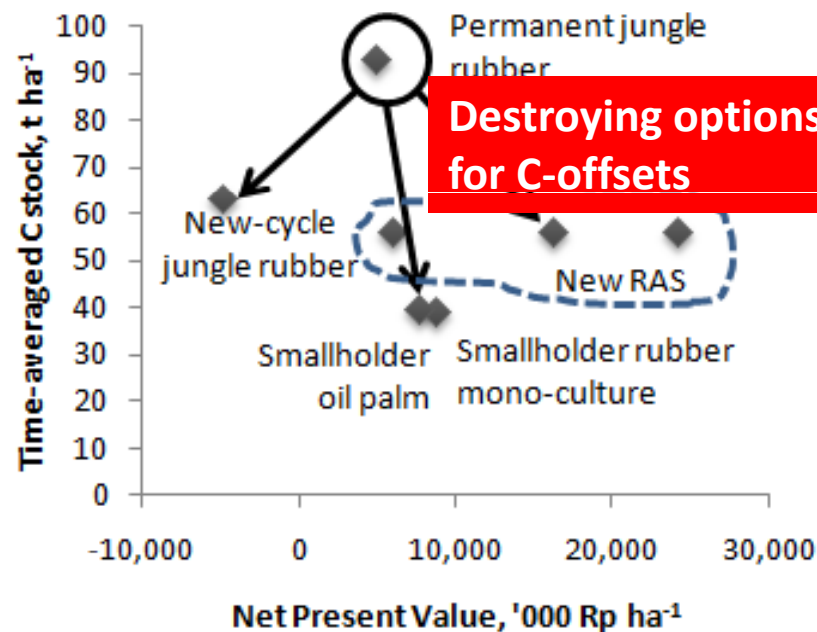
Tradeoffs in lowland Sumatra/Kalimantan with *new* 'intermediate intensity' rubber agroforestry



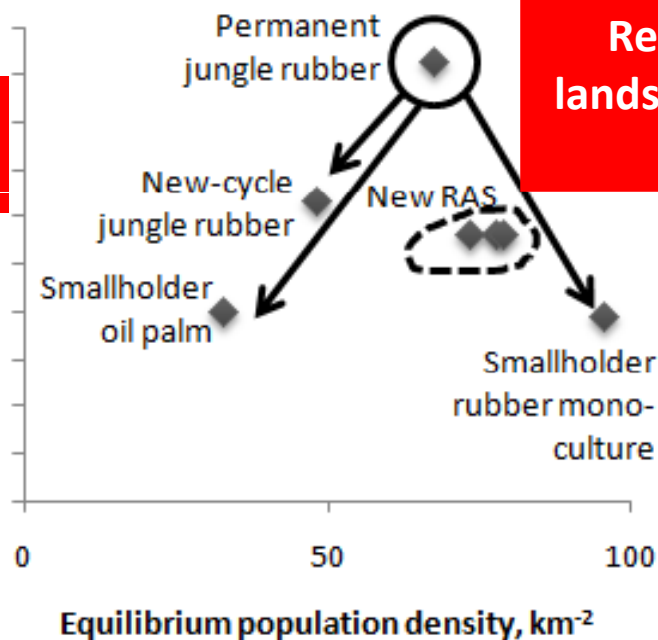
An economic development success story



Keeping farmers on-site



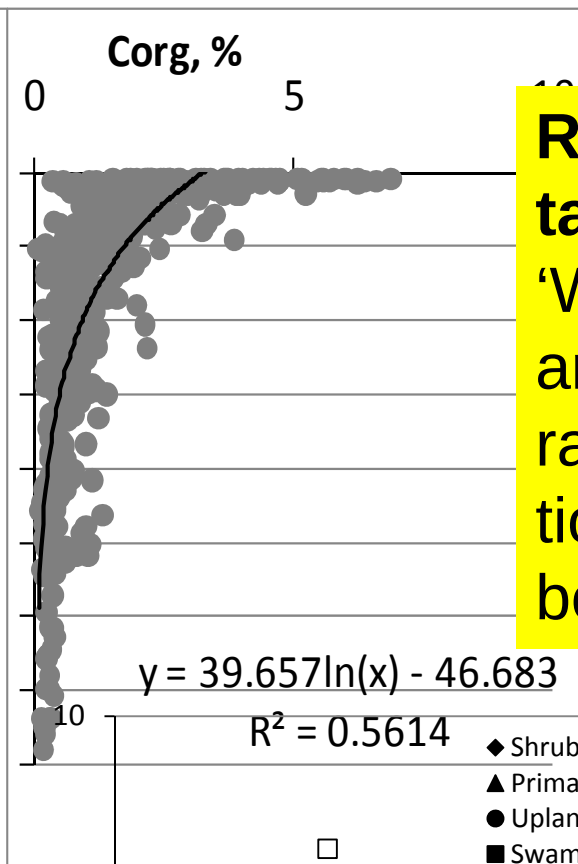
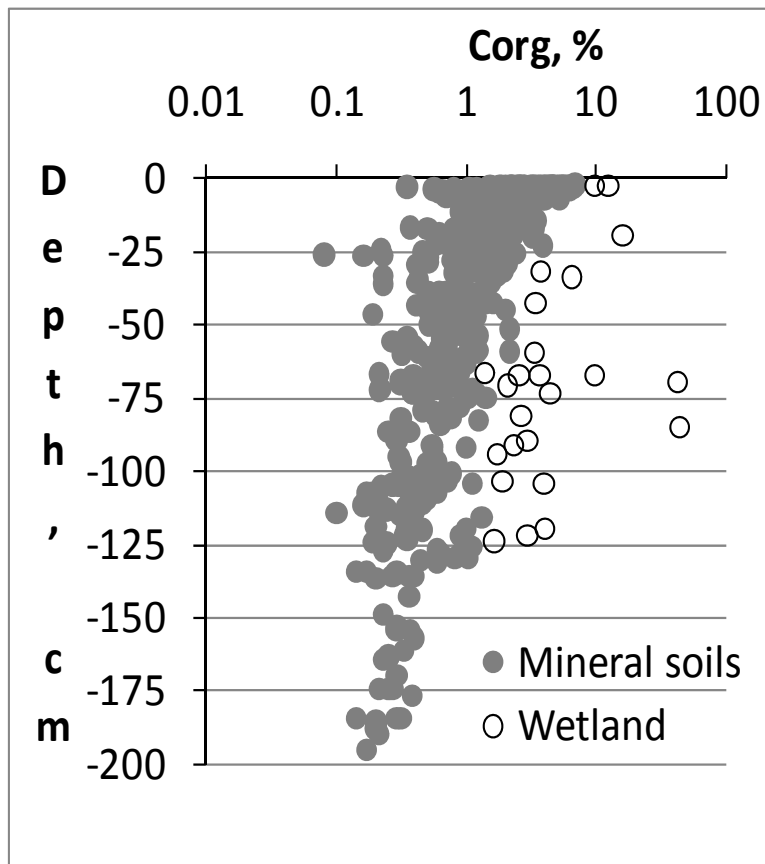
Destroying options for C-offsets



Reducing landscape C stocks

Cref_LU Equation:

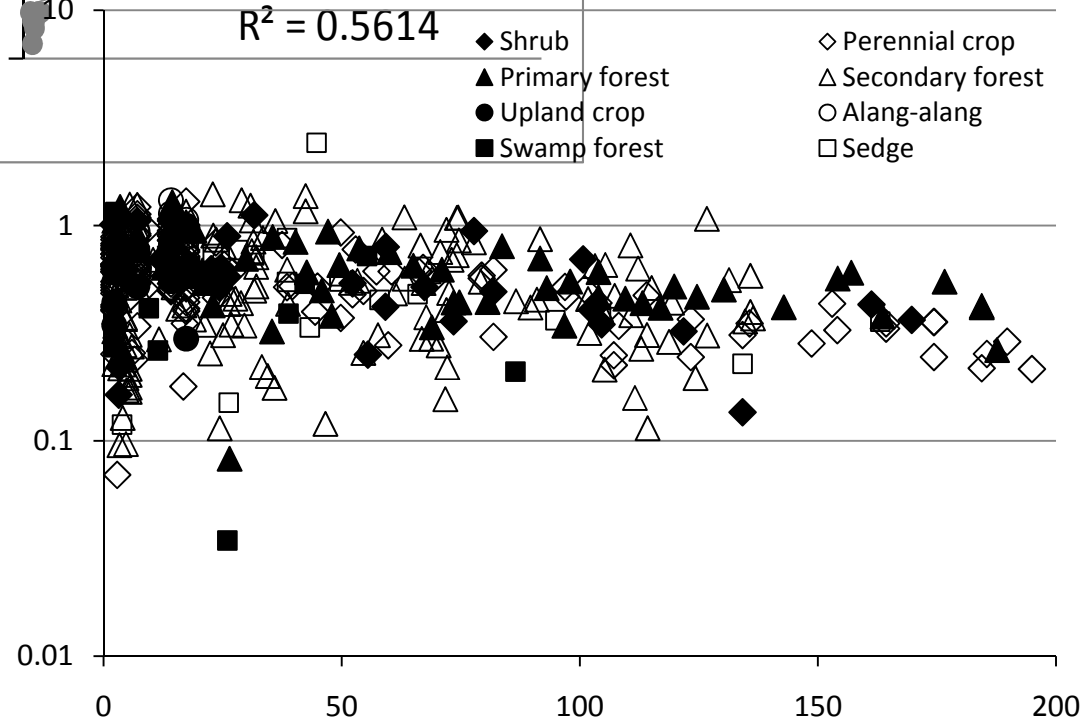
$$\begin{aligned} \log C_{\text{org}} = & 1.333 - 0.014 \text{ depth} + \\ & 0.00994^{***} \text{ Clay\%} + 0.00699^{**} \text{ Silt\%} - 0.156^{**} \\ & \text{pH} + 0.000427^{*} \text{ Altitude} - 0.00264^{**} \text{ Slope} + \\ & 0 \text{ (if soil is Oxi- or Ultisol)} + 0.011^{\text{NS}} \text{ (if soil is Inceptisol)} + \\ & 0.834^{**} \text{ (if soil is Andisol)} + \\ & 0.363^{**} \text{ (if soil is fluvic or Aquic suborder)} + 0 \text{ (if LU is Swamp} \\ & \text{forest)} - 0.335^{*} \text{ (if LU is Sedge)} - 0.433^{*} \text{ (if LU is Sawah)} + \\ & -0.077^{\text{NS}} \text{ (if LU is Primary forest)} - 0.082^{\text{NS}} \text{ (if LU is Secondary} \\ & \text{forest)} - 0.288^{*} \text{ (if LU is Shrub)} - 0.267^{*} \text{ (if LU is Perennial} \\ & \text{crops)} - 0.169^{\text{NS}} \text{ (if LU is Upland crop)} - 0.245^{*} \text{ (if LU is Alang-} \\ & \text{alang)} \end{aligned}$$

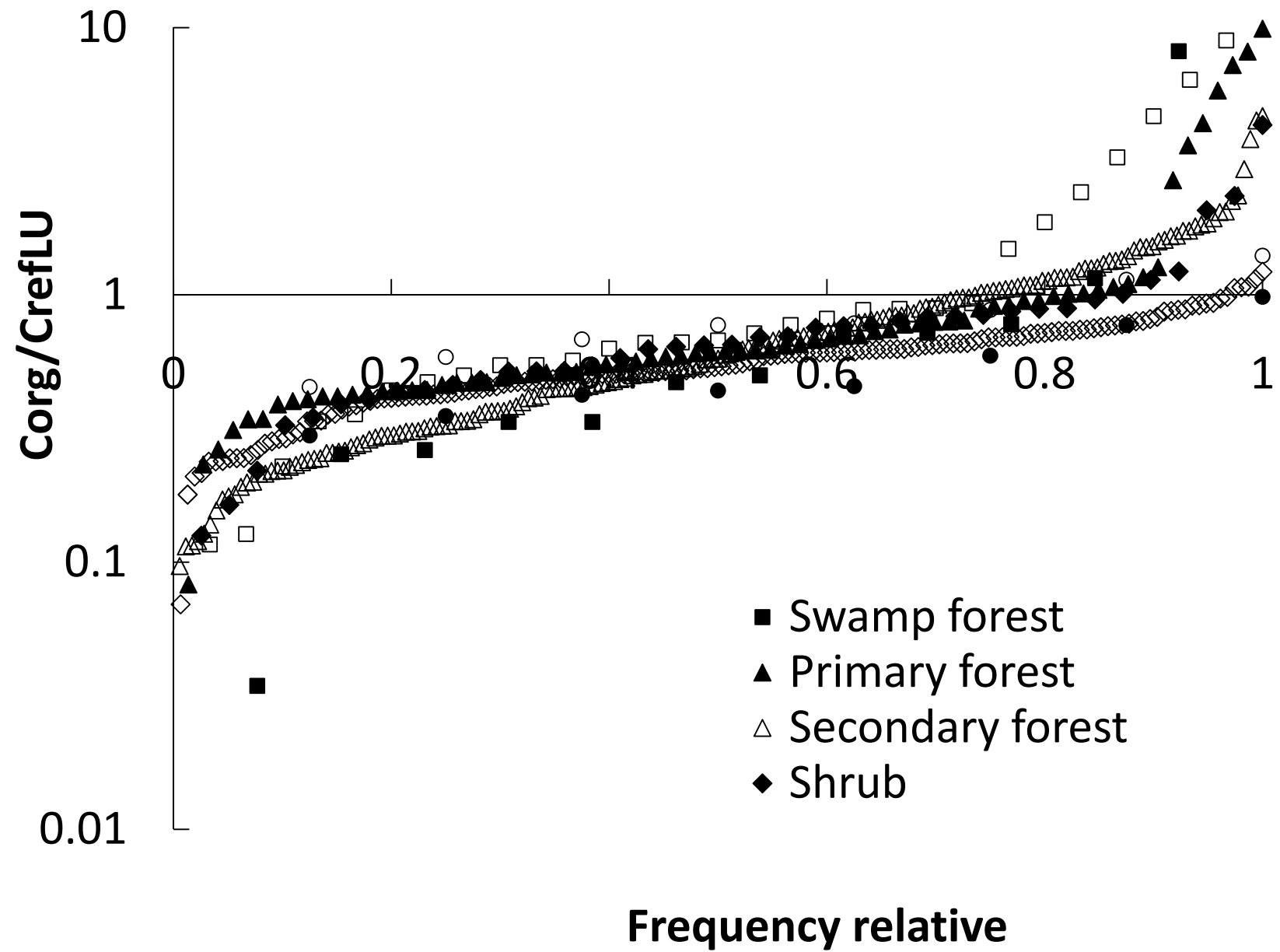


Remaining uncertainty:
 'Wetland' vs 'normal' and 'peat' vs 'mineral' soil classifications have fuzzy boundaries

Jambi soil data:

We updated the depth factor in Cref and found no evidence that LU-impacts on soil C depend on depth





REDD-ALERT

Impact targets:

International

Emission displacement & leakage

Tier 1, 2 and 3 accounting systems

National

NAMA/REDD+ rules

Local

LAAMA planning

WP4.

International forest-related policy

WP1. Forest Transition & Emissions Embedded in Trade (EET) in Ag and Forestry products

WP2. Demography vs change in tree cover type

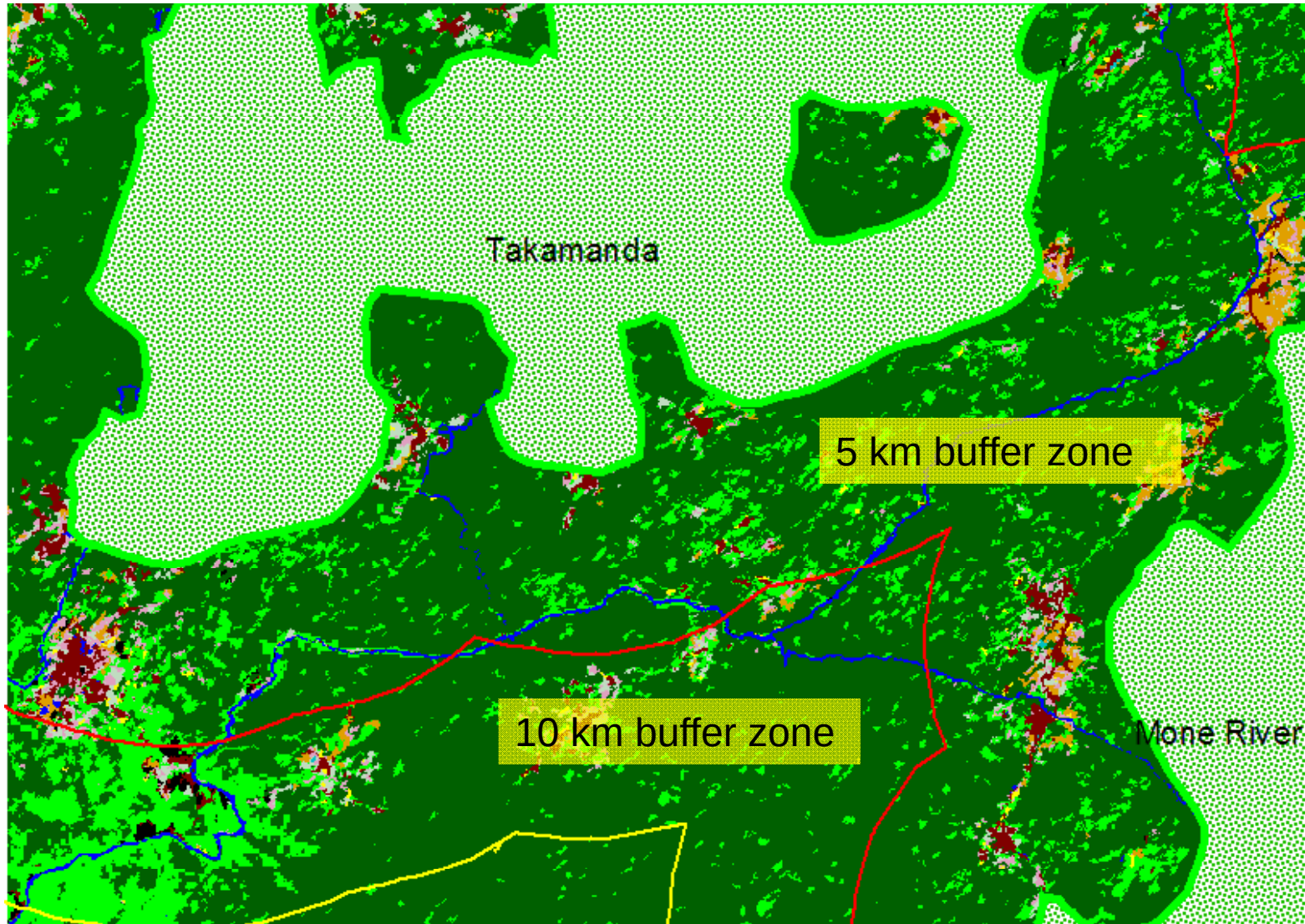
WP3. GHG emissions factors, belowground C stock change

WP5. Livelihood transition and land use change choices

WP6. Negotiation support systems



Cameroon site - Protected Areas



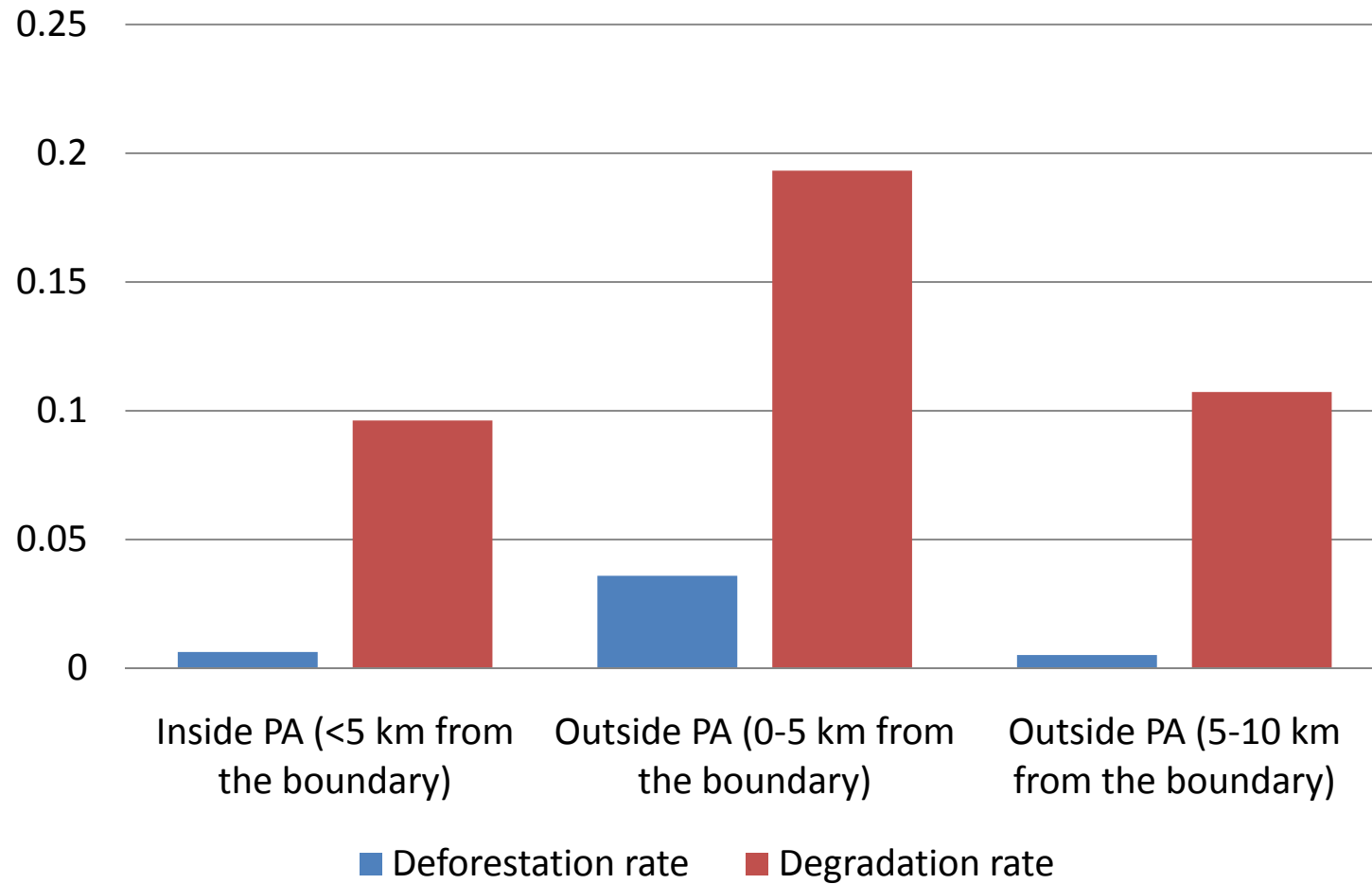
Cameroon

(Deforestation and degradation in and out of PA)

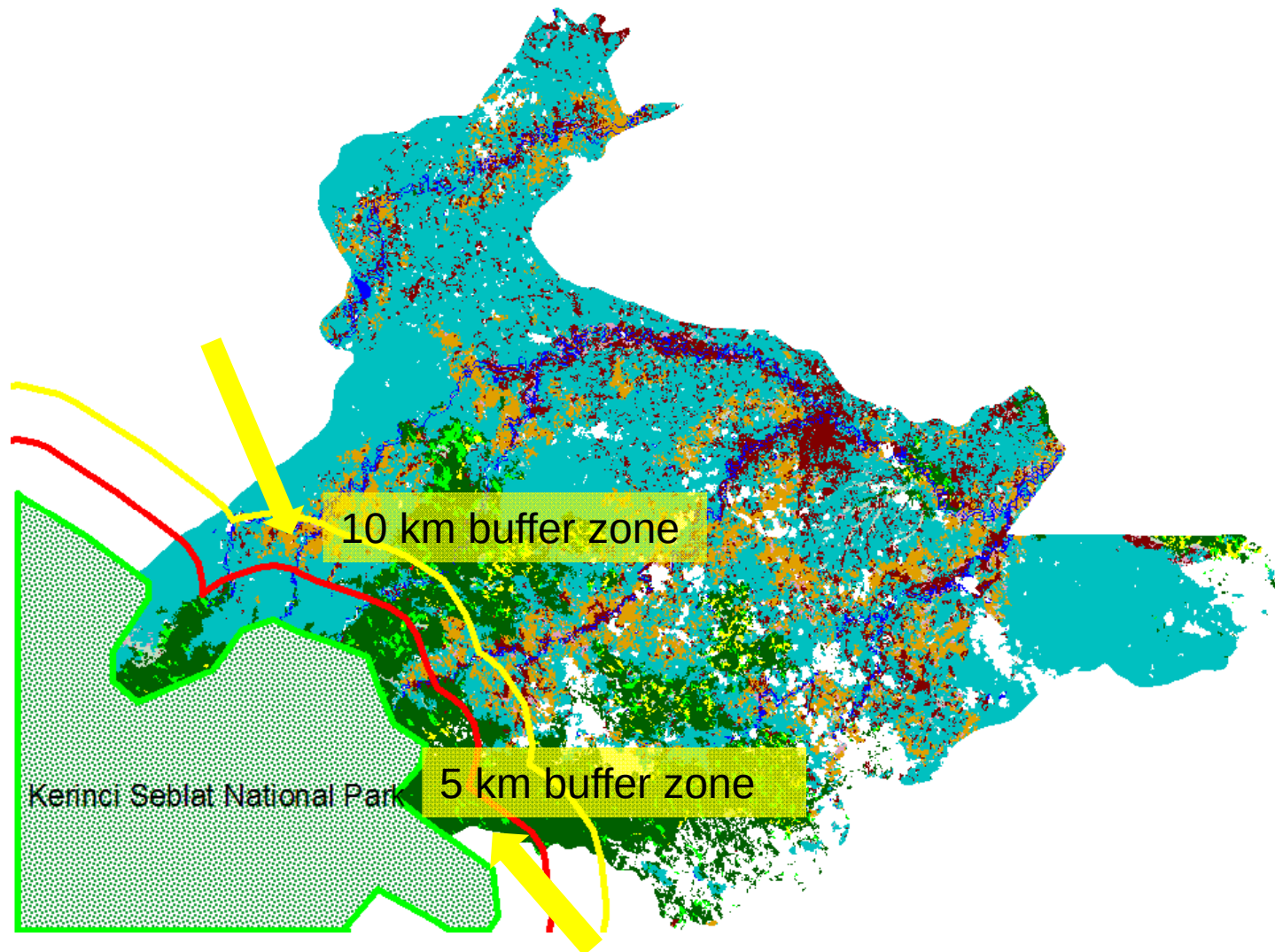
	Annual Deforestation_ Total	Annual Deforestation_ Inside	Annual Degradation_ Total	Annual Degradation_ Inside	Forest area_ Total	Forest area_ Inside
86-'89	136.6667	11	44.66667	3	101873	28693
89-'01	393	6	4875.5	1572	101329	35069
01-'02	847	61	302	22	90792	31913
02-'04	354	32	979	101.5	89643	31830
04-'05	137	22	1152	32	86977	31563

Cameroon

(Deforestation and degradation rate from 1986-2005
within buffer zones)



Indonesia site - Protected Area



Indonesia

(Deforestation and degradation in and out of PA)

	Annual Deforestation_Tot ion_Total	Annual Degradation_Tot on_Total	Annual_D eforestati on_Inside	Annual Degradati on_Inside	Total Forest	Forest_Ins ide
73-'88	6311.333	822.6	0	5.333333	354667	70332
88-'93	10444.2	624.8	270.4	12.6	247658	70252
93-'99	3761.833	1436.167	112.5	276.5	192313	68837
99-'02	5205.667	0	229.3333	0	161125	66503
02-'05	52.33333	166.6667	8	20	145508	65815

Indonesia (1973-2005)

