REDD-ALERT: linking global climate arrangements to local land-use behaviour

Robin Matthews

The James Hutton Institute

EU-FP7 Project REDD-ALERT

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Reducing Emissions from Deforestation and Degradation through Alternative Landuses in Rainforests of the Tropics

- Macaulay Land Use Research Institute, United Kingdom
- Université Catholique de Louvain, Belgium
- Vrije Universiteit Amsterdam, Netherlands
- Georg August University of Göttingen, Germany
- World Agroforestry Centre, Kenya
- Centre for International Forestry Research, Indonesia
- International Institute of Tropical Agriculture, Nigeria
- Centro Internacional de Agricultura Tropical, Columbia
- Indonesian Soils Research Institute, Indonesia
- Research Centre for Forest Ecology and Environment, Vietnam
- Institut de Recherche Agricole pour le Développement, Cameroon
- Instituto Nacional de Investigacion y Extension Agraria, Peru

Linking global agreements to local action

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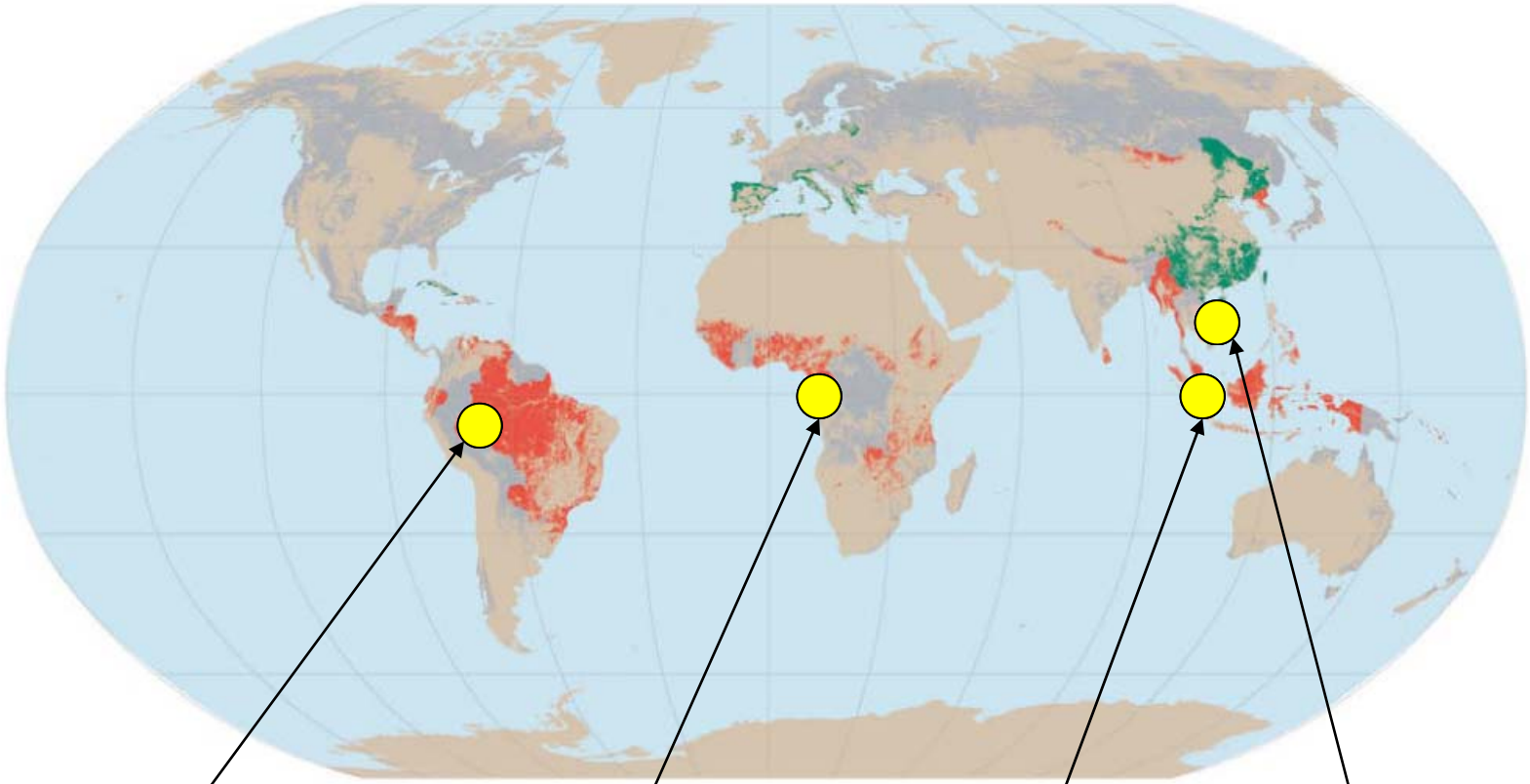
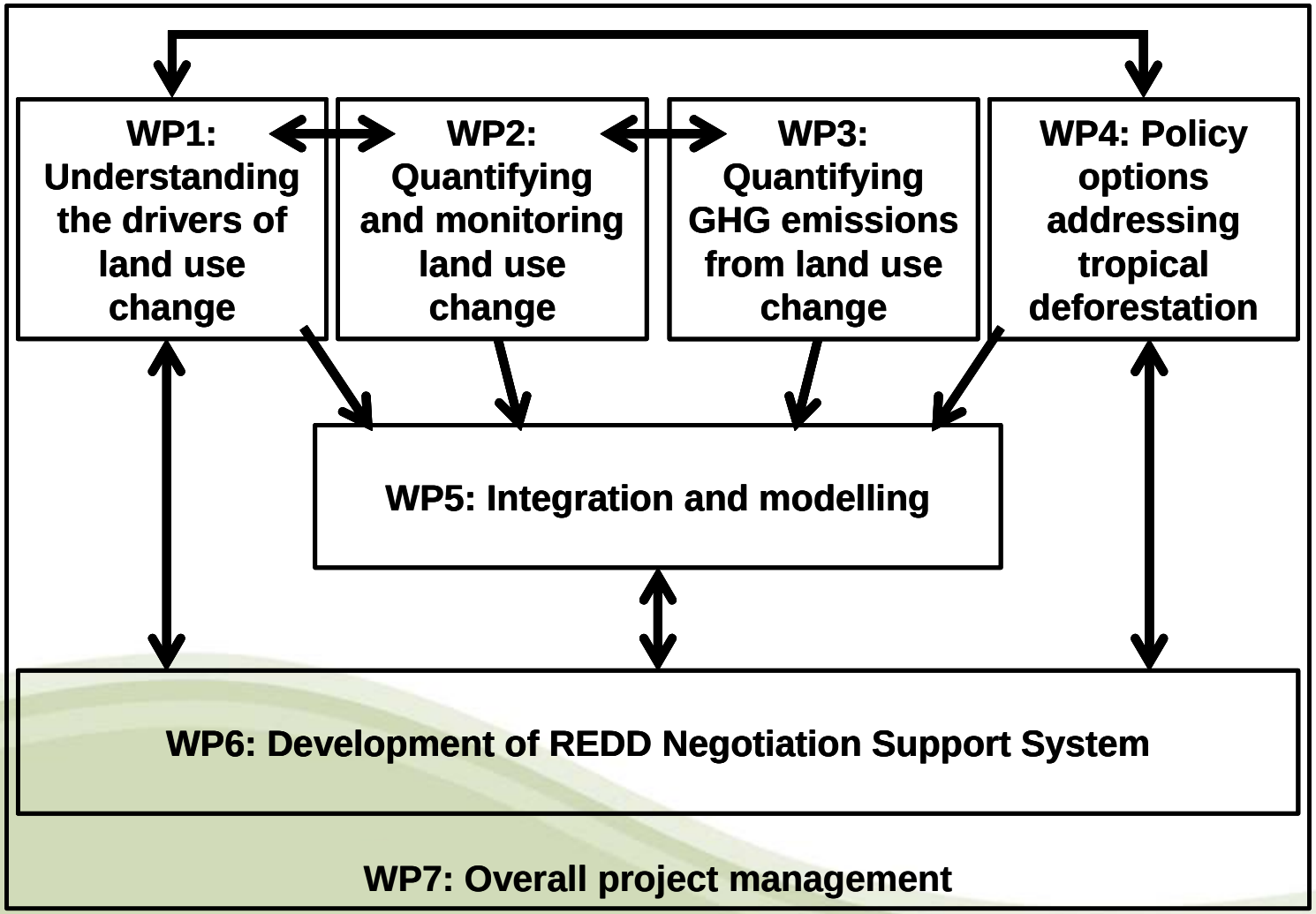
Site locations



Ucayali, Peru *Southern Cameroon* *Indonesia* *Vietnam*

Project components



WP1: Drivers of deforestation

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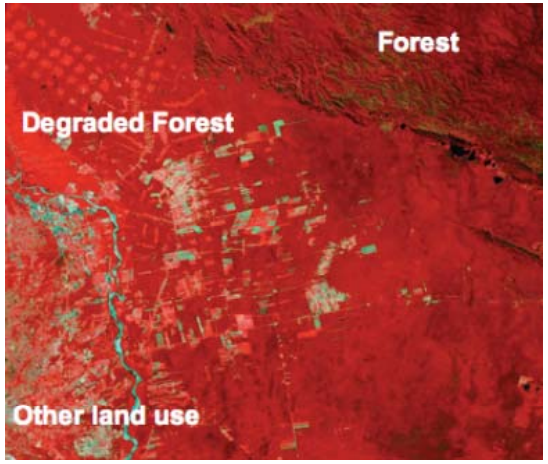
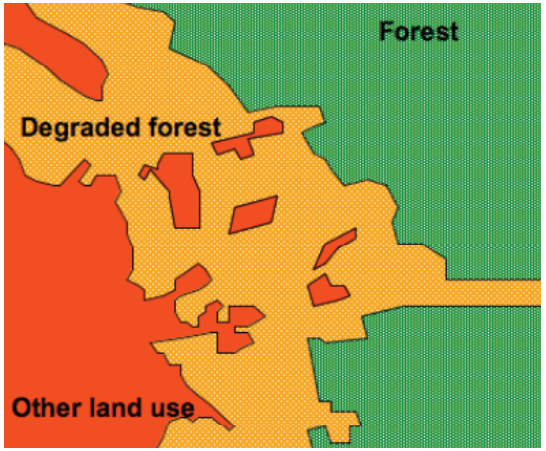
- Southeast Asia
  - timber concessions, plantations (paper, palm oil)
  - slash-and-burn agriculture
- Latin America
  - road building followed by migrant settlers practising slash-and-burn
  - pasture creation for cattle
- Africa (Congo Basin)
  - smallholder agriculture
  - commercial logging
  - fuelwood

(Geist & Lambin, 2002)

WP2: Carbon densities

- C densities – degradation more serious than deforestation?
  - Degradation: 300 to 50 t C ha^{-1} → 250 t C ha^{-1} lost
  - Deforestation: 50 to 0 t C ha^{-1} → 50 t C ha^{-1} lost
  - C density data for hierarchical categories → update databases
- Need to incorporate soil changes: time-averaged C stock
- Limiting factor is time series data rather than spatial resolution





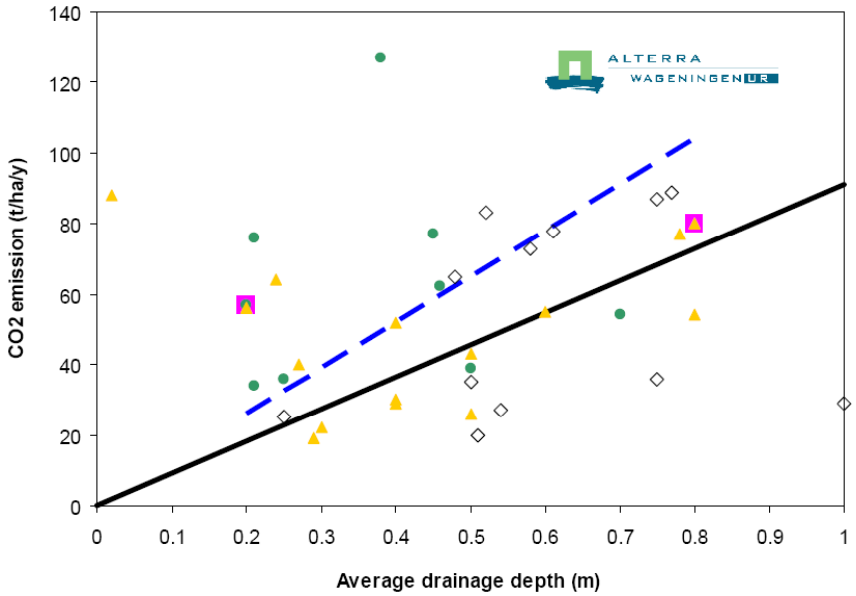
(from F. Achard, JRC)

WP3: GHG emissions from D&D

- Tier 1 focus on changes in C stocks in above-ground biomass – plan to quantify root biomass also (to 3 m)
- Soil C – most studies only in top 30 cm – plan to quantify to 3 m
- Significant CO_2 and N_2O released from soil following conversion of forest
  - Measurement and modelling of GHG emissions from 'hotspot' land use change – oil palm plantations, deforested peatlands
- Methodologies to extrapolate to larger spatial and temporal scales
  - Controlling variables: N availability, soil aeration status
  - Can proxy variables be used? e.g. C/N ratio of litter, $\delta^{15}N$ signatures of litter & soil
  - Large soil variability: infra-red spectral analyses of the soils as covariates in the model

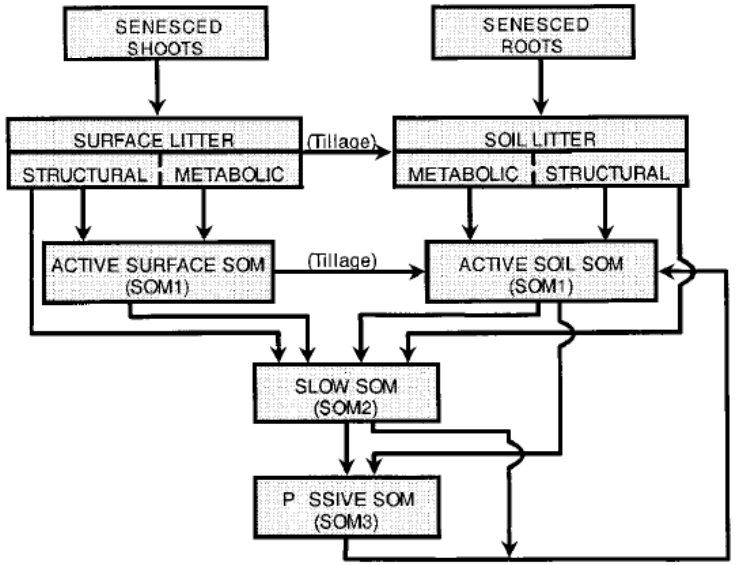
Emissions from peatlands

Hooijer, Silvius, Wösten & Page (2006):



- account for actual water depth instead of average water depth
- impacts of different vegetation cover, land management (mechanisation, fertiliser, etc.)
- separate emissions from root respiration and peat decomposition
- CH_4, N_2O emissions

Process-based model:



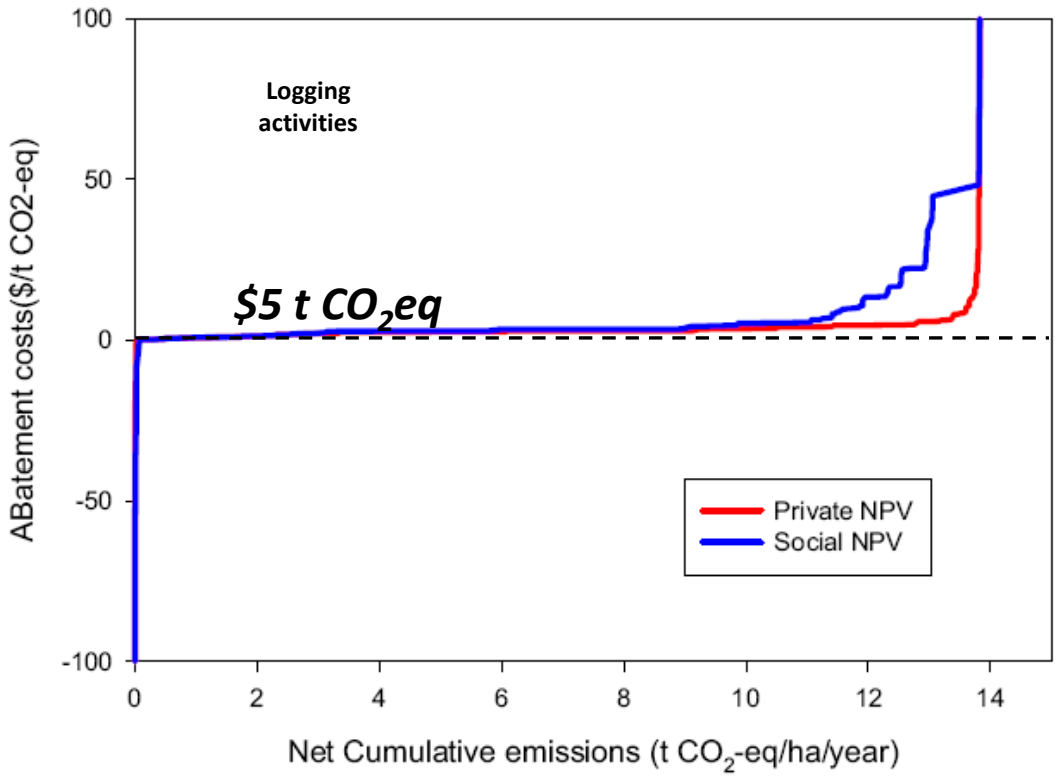
- Need to include aerobic, anaerobic conditions
- MERES, ECOSSE

WP4: Potential mechanisms

- Taxes
- Incentives
- Regulations – protected areas
- Agricultural intensification – reduce pressure on forests
- Alternative livelihood opportunities
- Establishment of new markets
- Use of idle land
- Land tenure reform
- Sustainable forest management practices

WP5: Marginal abatement cost curves

East Kalimantan



- Low returns, high emissions
  - high transportation costs
  - low market access
  - low population density
  - lack of economic opportunities
- Higher returns, high emissions
  - Forest to mixed agriculture
  - Forest to agroforest
  - Agroforestry to sugar cane
  - Agroforest to banana
- Other costs
  - Transaction, investment

(Swallow et al, 2007)

WP6: Participatory scenario analysis

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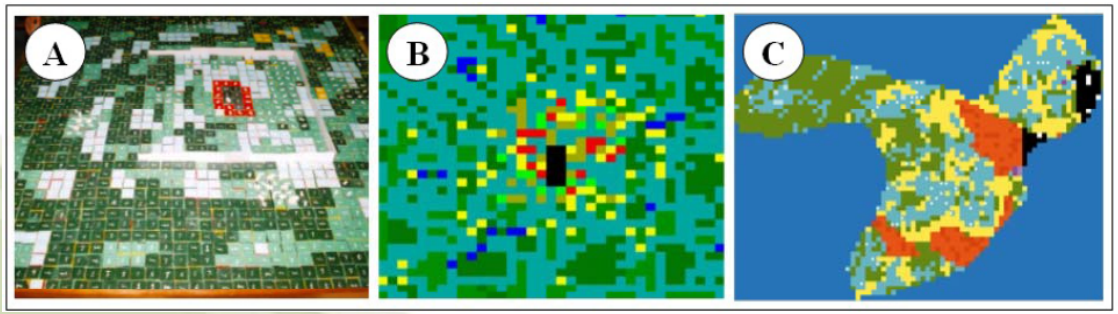
SAMBA-GIS (Vietnam)

- narrative conceptual model
- agent-based spatial computational model (ABM)
- role-playing game
- multiscale GIS

- Stakeholders exposed to other viewpoints of same problem

- 'Buy-in' and trust in models by participants more important than numerical accuracy

- Van den Belt (2004)



(Castella et al., 2005)

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