GIS Techniques for Screening High Conservation Value Areas

The Case of Indonesia

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Overview

- Background to HCV
- Why Do Screening?
- Examples of HCV screening
- On the Horizon

Things we'd like to screen for…

- …but can't
- …and can (at least sort of)
- …and can but requires much work

Origins of the Concept

Forest Stewardship Council (1999)

Principle 9 of standard
for Certified Responsible Forestry

↓

Draw special attention to areas with exceptional biological, social or cultural attributes

The Six High Conservation Values

HCV 1 Areas with important levels of biodiversity

HCV 2 Large intact natural landscapes

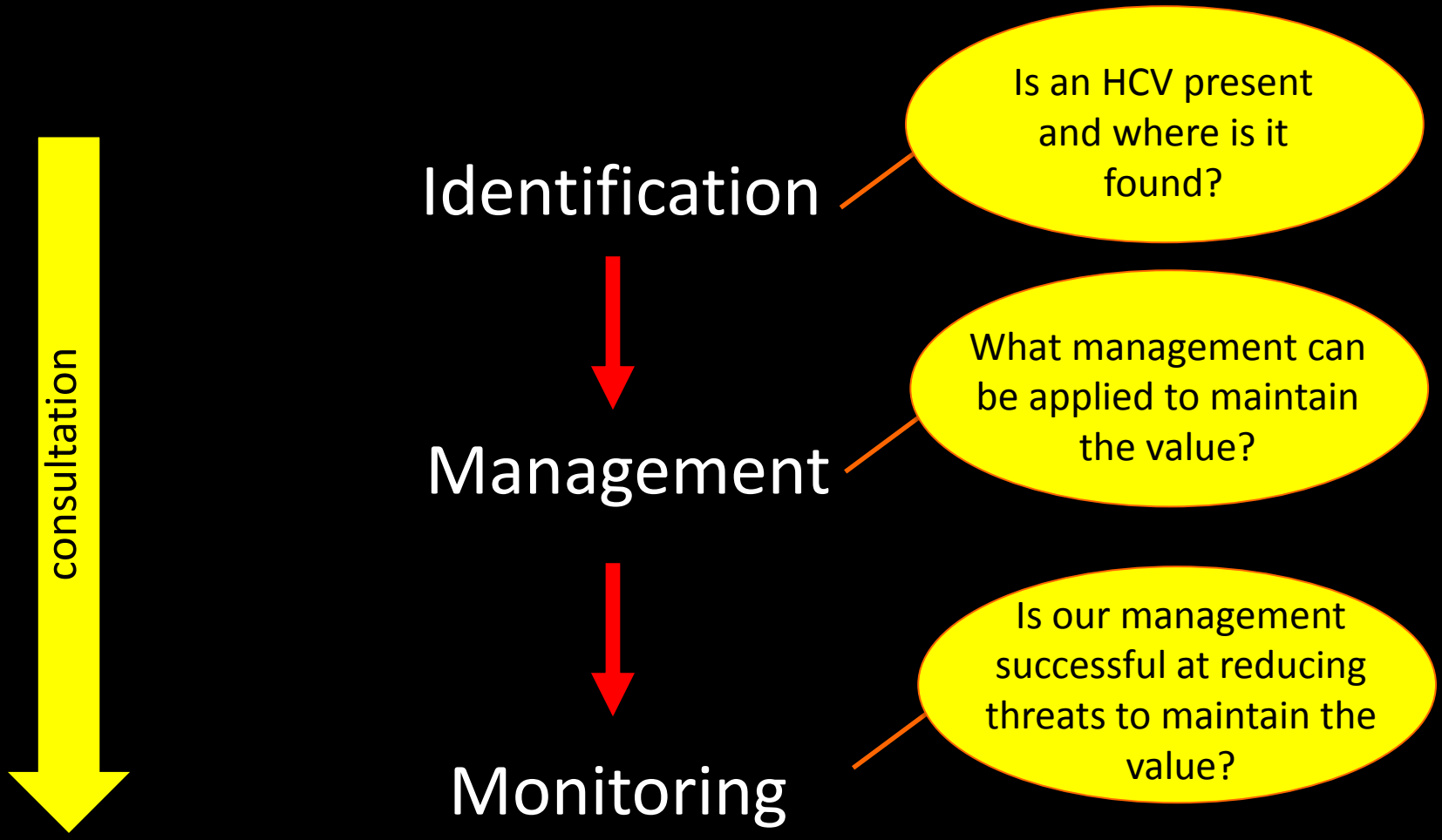
HCV 3 Areas with rare or endangered ecosystems

HCV 4 Critical environmental services of nature

HCV 5 Basic needs of local communities

HCV 6 Cultural identity of local communities

HCV Process


consultation
Identification
Is an HCV present and where is it found?
Management
What management can be applied to maintain the value?
Monitoring
Is our management successful at reducing threats to maintain the value?

Why perform HCV screening ?

- Forestry and Agri-business companies
  - Due diligence
  - Preparation for HCV full assessment
- Banks, investors and financial institutions
  - Due diligence
  - Compliance with internal standards
- Advocacy groups

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Where is HCV carried out ?

- Global in Scope
- Regional Centers of Activity
  - Indonesia
  - Malaysia
  - West Africa
  - South America (Brazil, Columbia)
- Growing in Europe and NA

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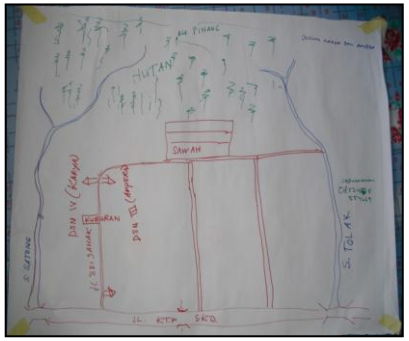
Describing Social Context Requires Field Work






Kuburan Tok Bongkok di Riam Berasap



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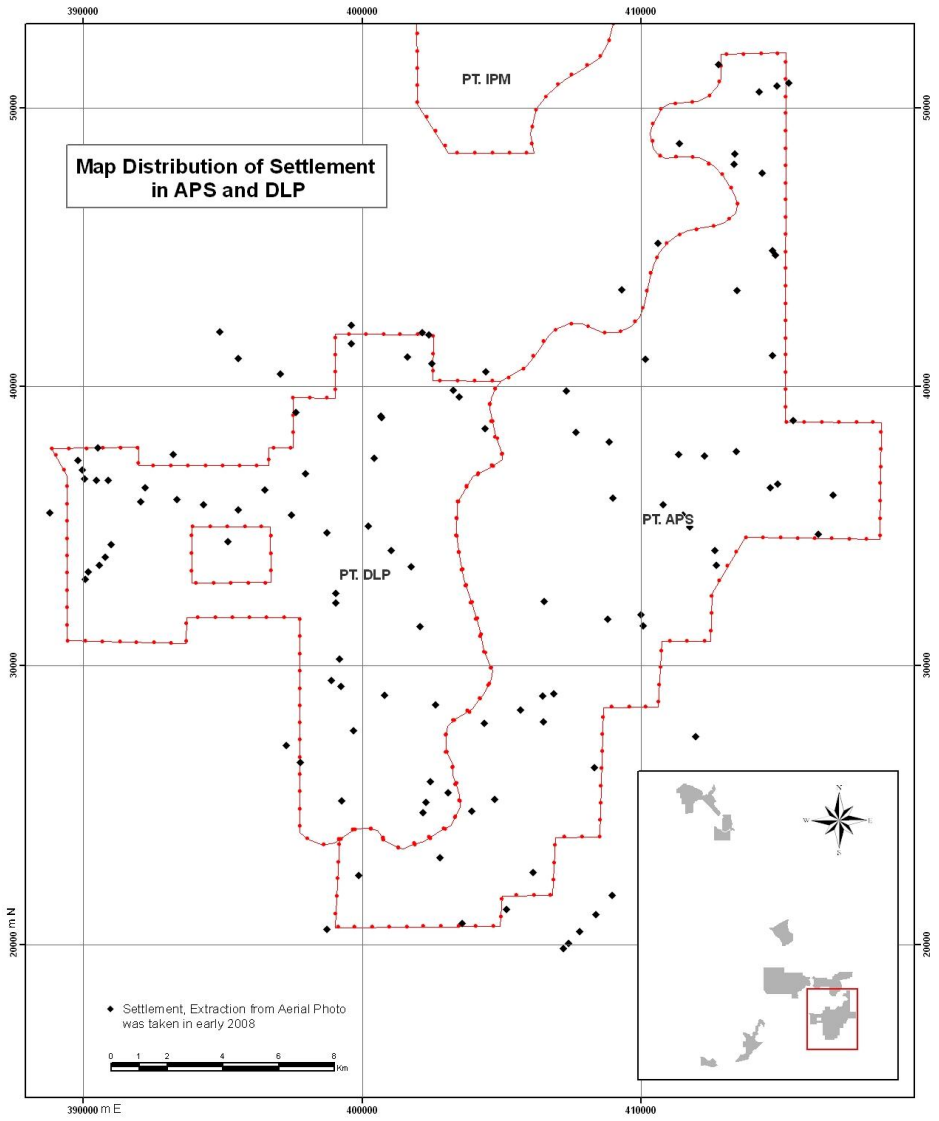

Mapping village locations or counting village numbers required field work

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The Six High Conservation Values

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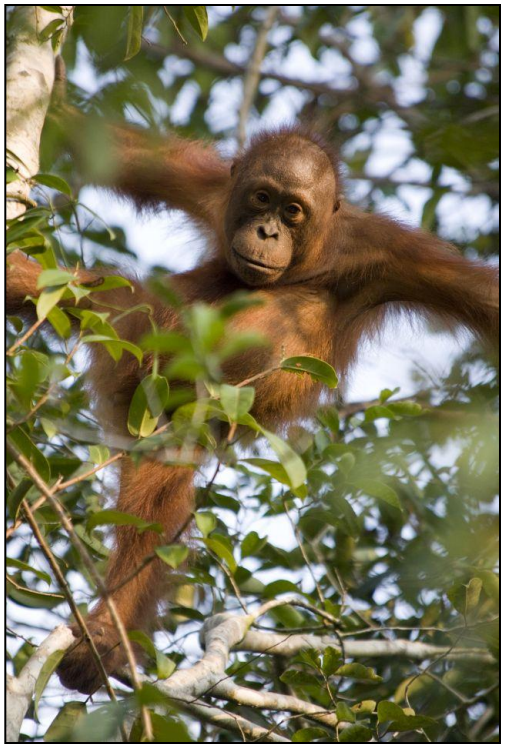
HCV 1 – Protected, Threatened or Endemic species



Things we'd like to screen for…

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Land cover

- Presence of forest & natural ecosystems
- First approximation of biodiversity
- Landscape context

Peat land

Parks & Protected Areas

Fires

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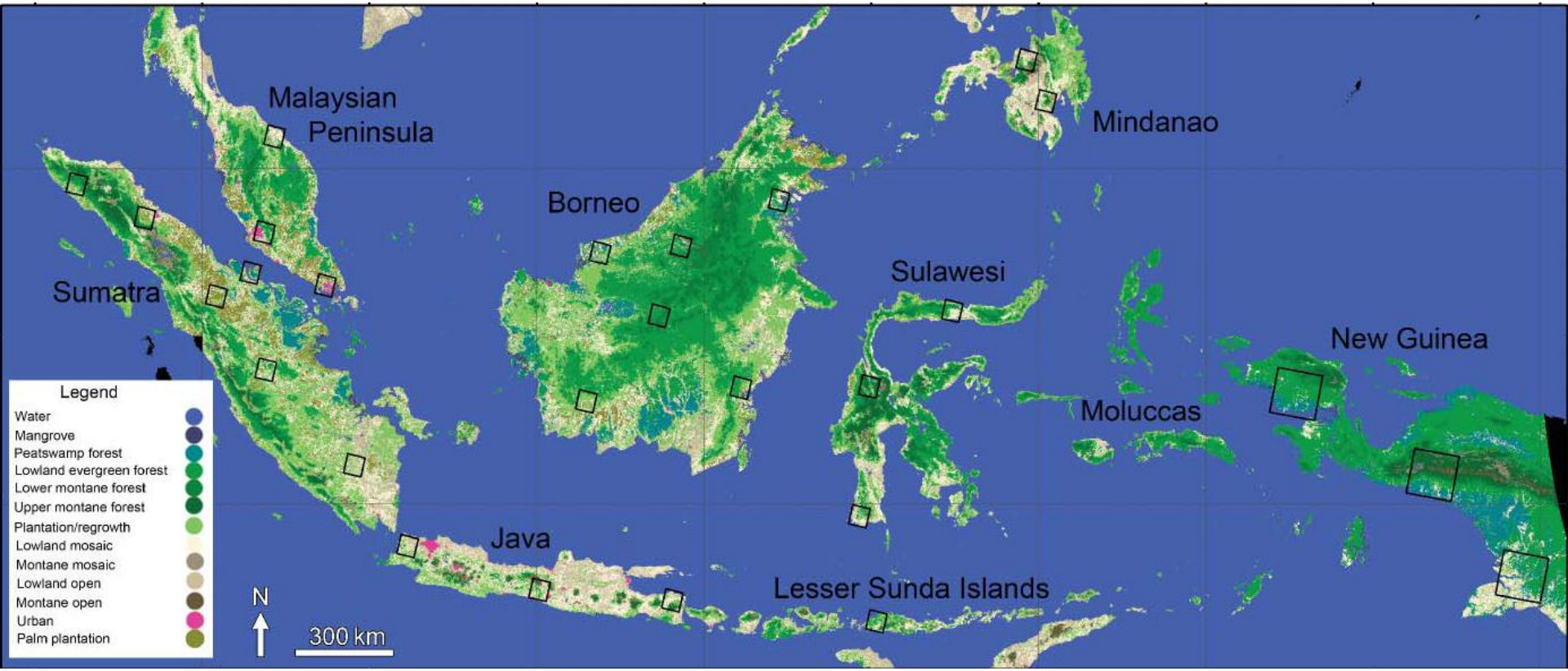
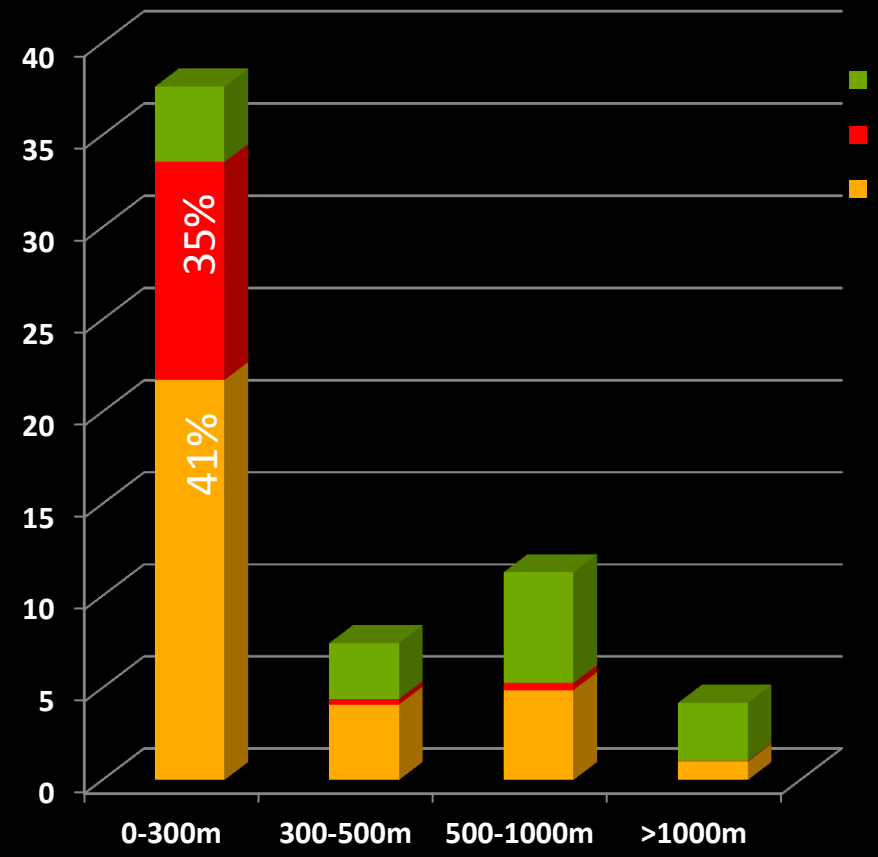
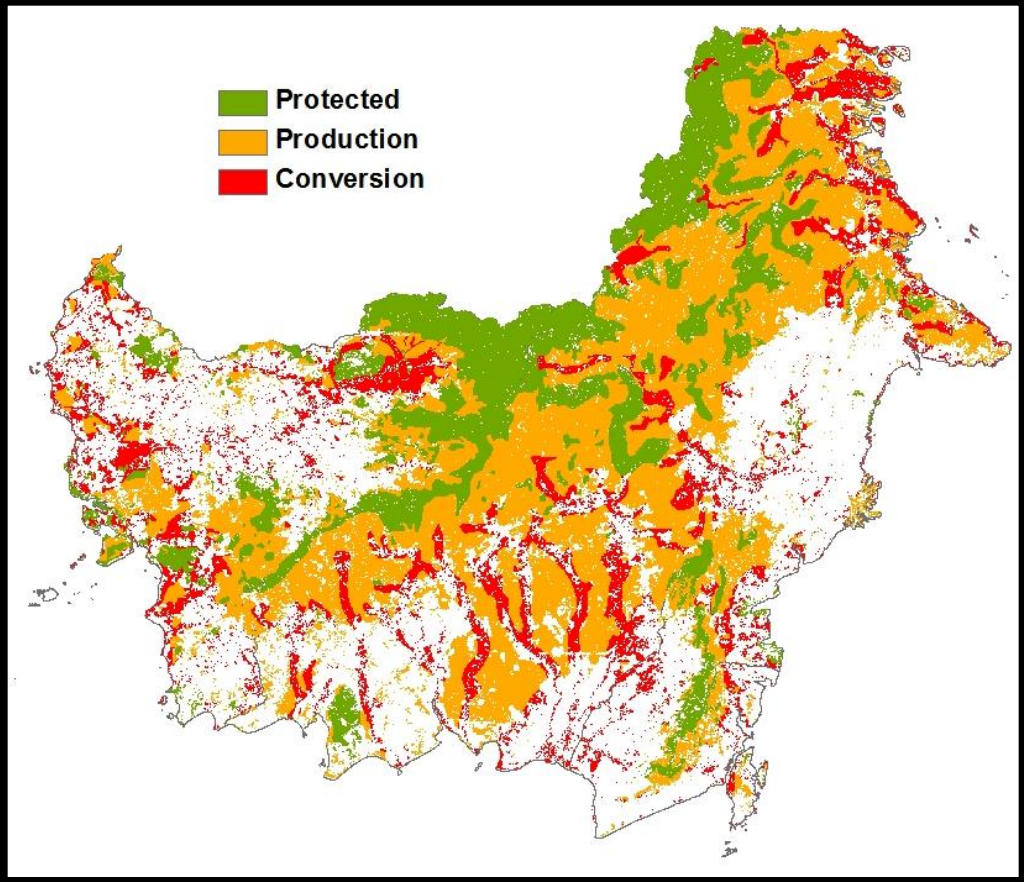
Land cover


Malaysian Peninsula
Borneo
Mindanao
Sumatra
Sulawesi
New Guinea
Moluccas
Java
Lesser Sunda Islands
Legend
Water
Mangrove
Peatswamp forest
Lowland evergreen forest
Lower montane forest
Upper montane forest
Plantation/regrowth
Lowland mosaic
Montane mosaic
Lowland open
Montane open
Urban
Palm plantation
N
300 km

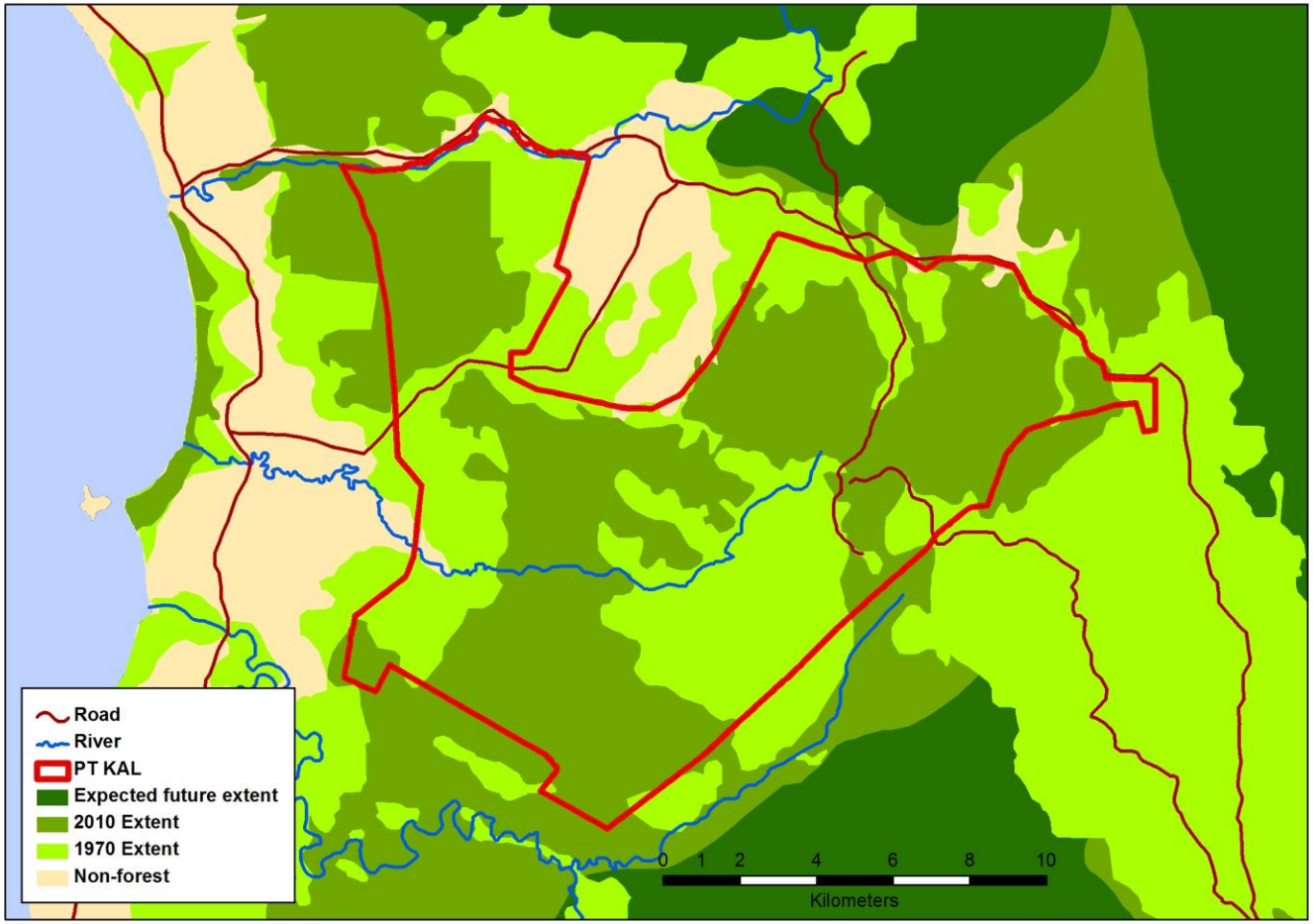
Forest Areas at Risk of Conversion





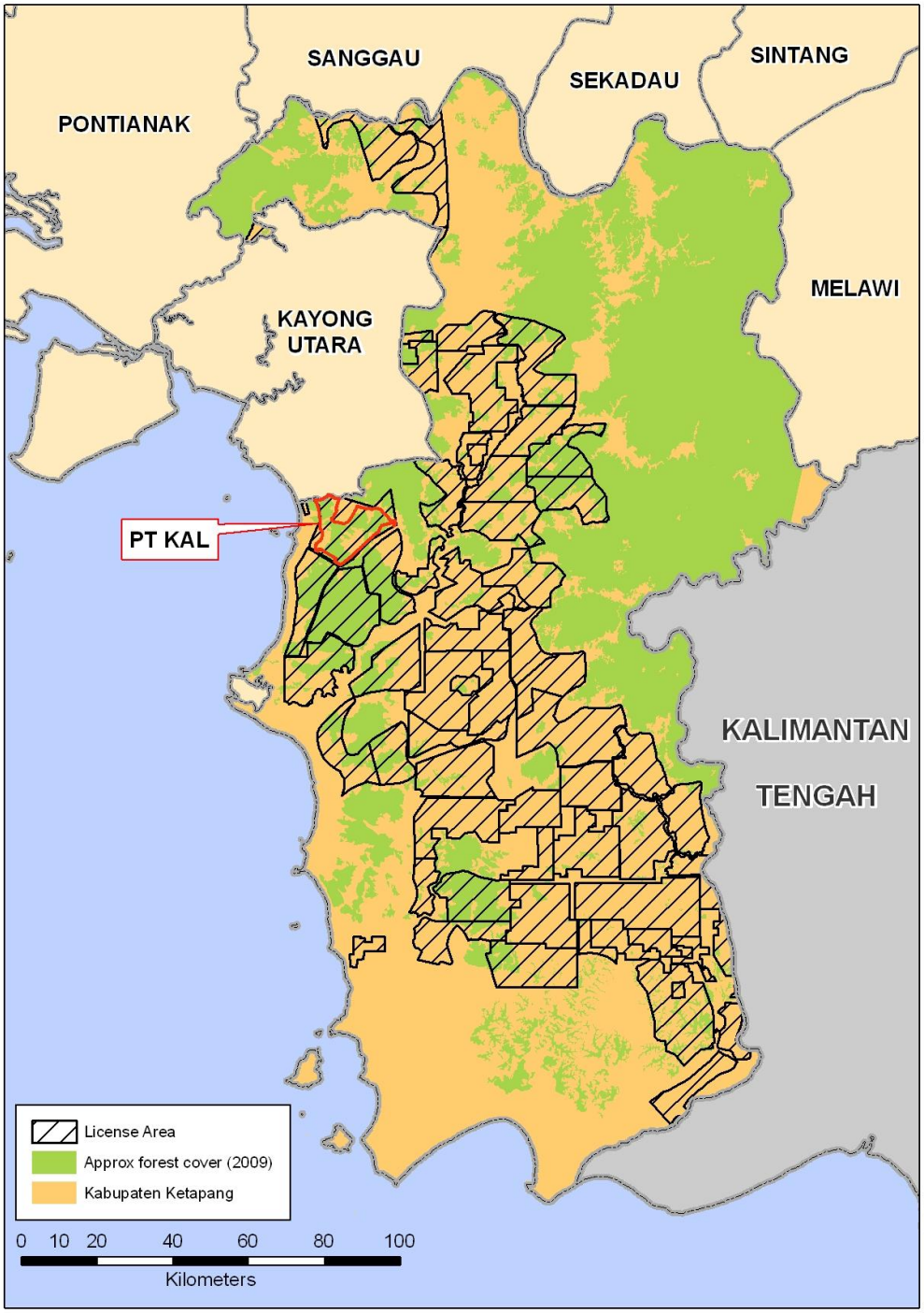
Source: SPOT Veg 2008 – SARvision

Land cover – based on Landsat 7



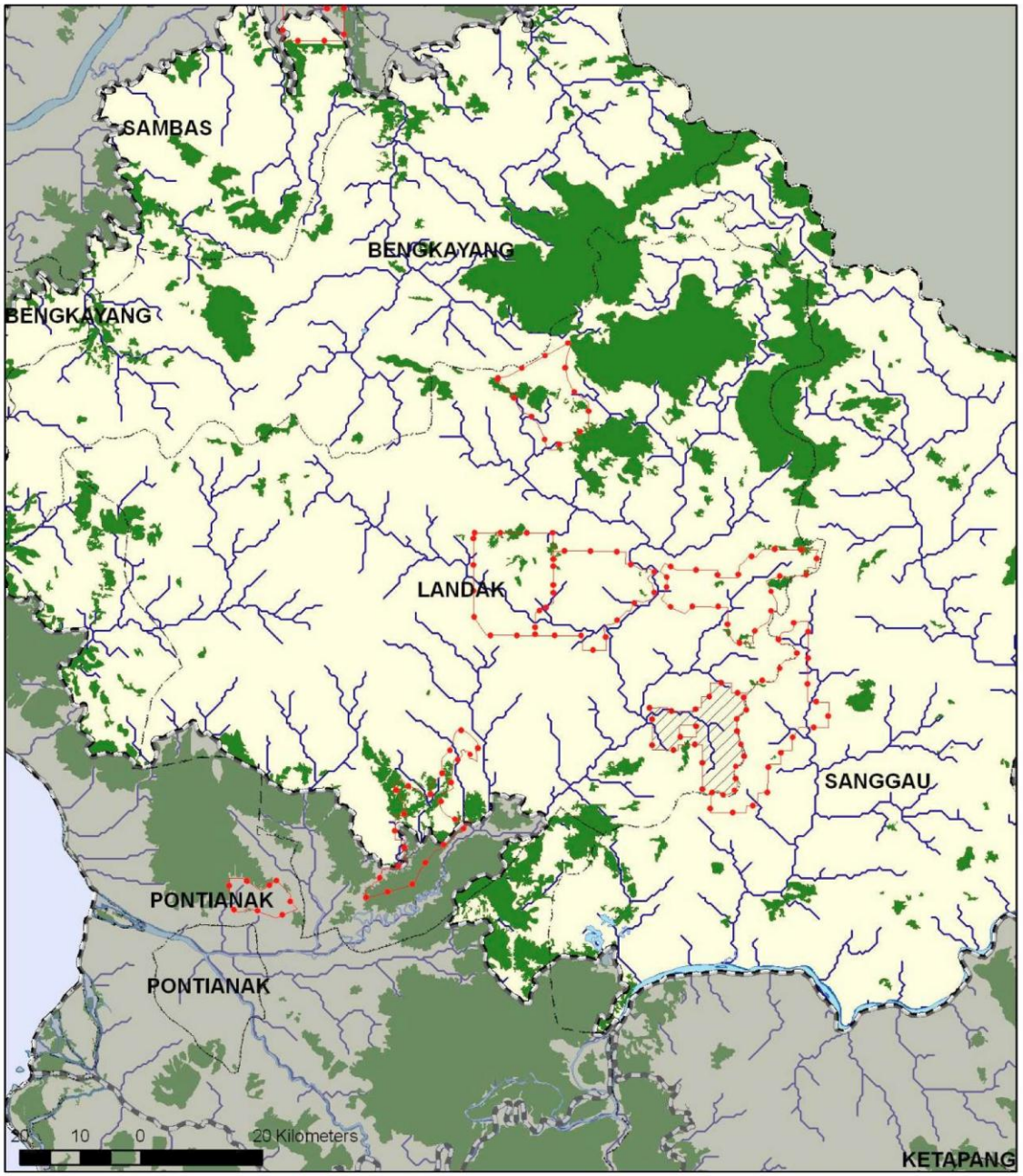
Landscape Connectivity – Beyond the License Borders

High Risk
for HCV



Landscape Connectivity – Beyond the License Borders

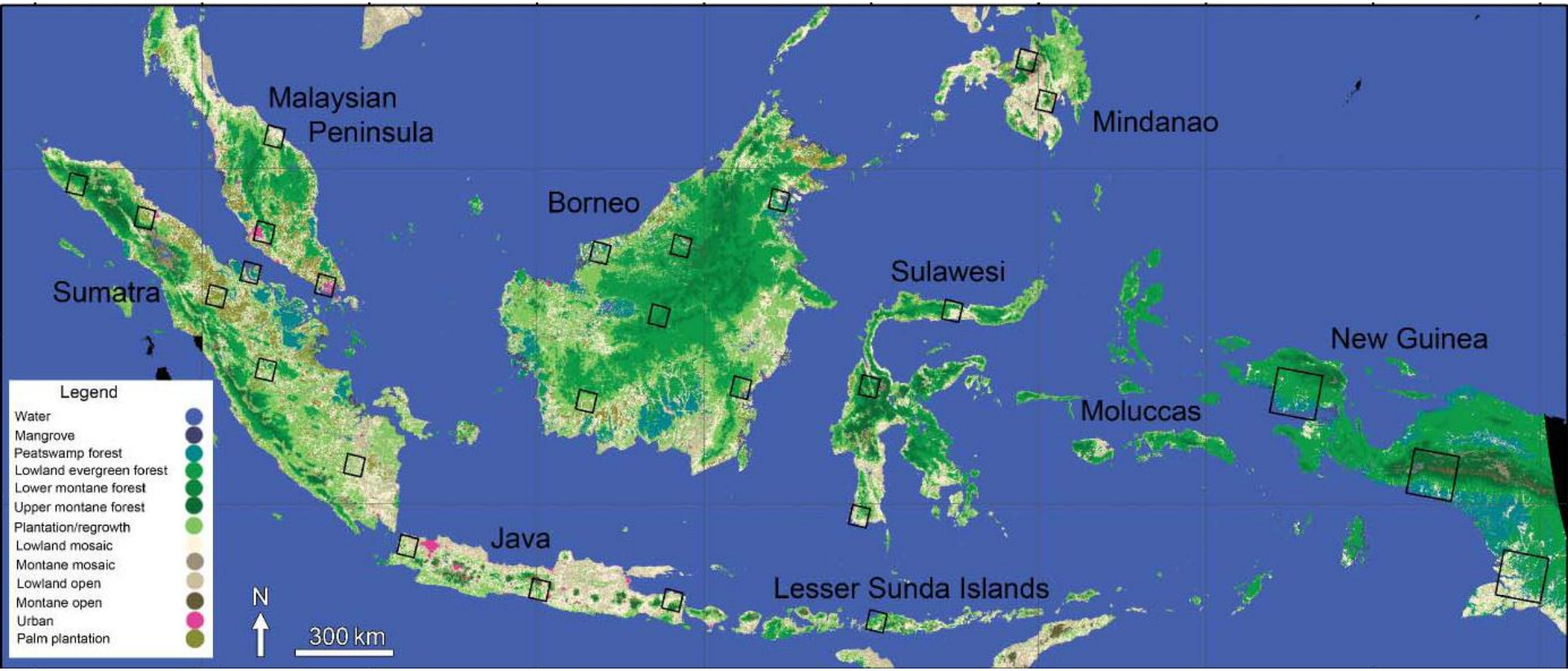
Even Higher Risk for HCV



Landscape Connectivity – Beyond the License Borders

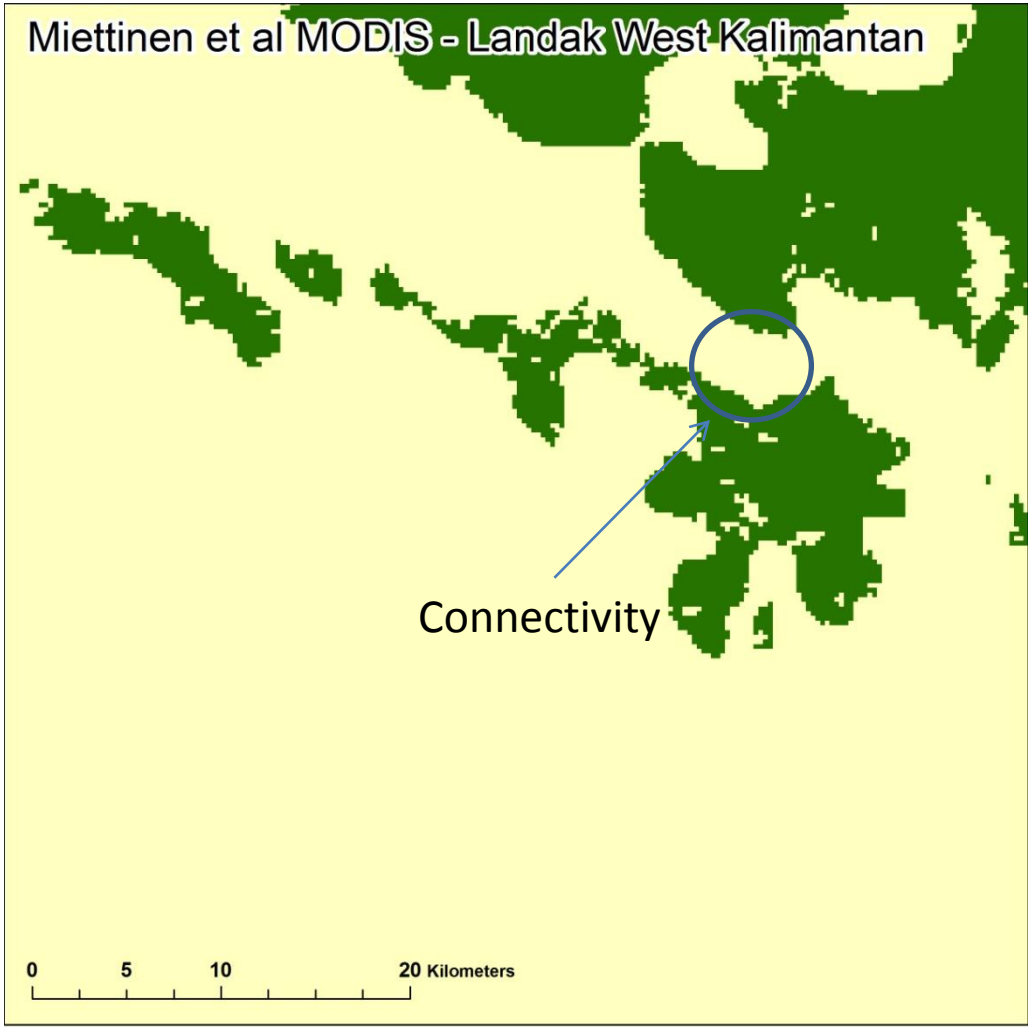
Low Risk for HCV

Forest Cover Comparison - Platforms



Miettinen et al. 2010 - Enhanced MODIS (ALOS + Landsat)

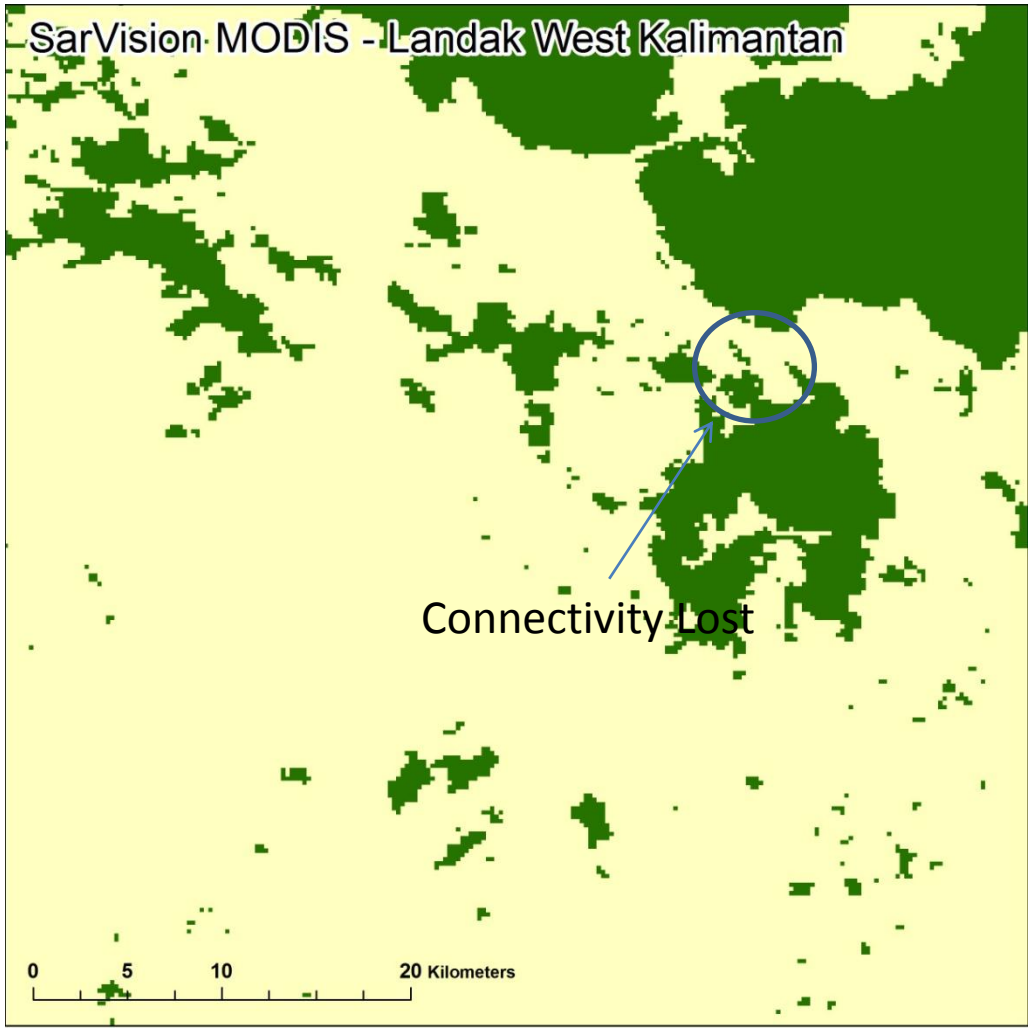
Forest Cover Comparison - Platforms



MODIS

- Good spectral range
- Strong signature for natural mature forest.
- Cloud free images created from multiple images after cloud removal.
- Available 15-30d intervals, free & downloadable
- Resolution 250-1000m

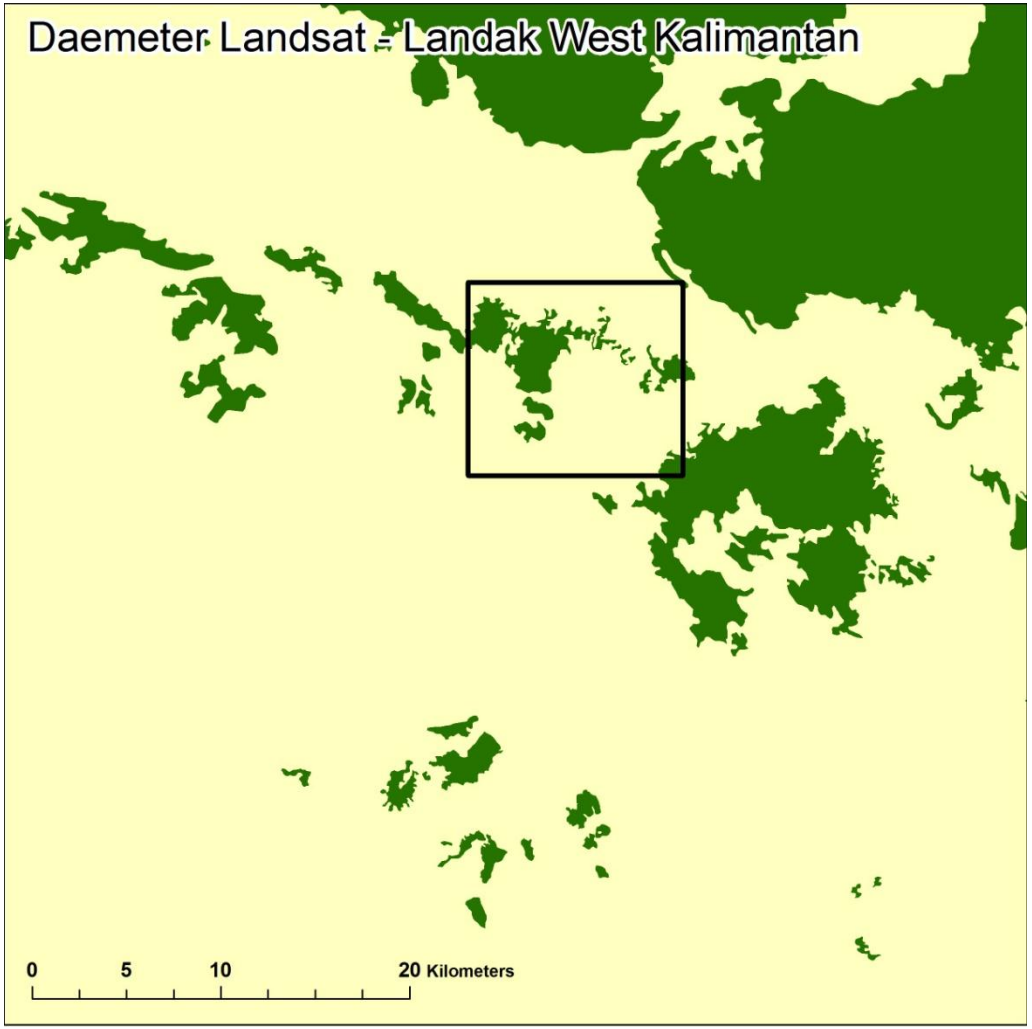
Forest Cover Comparison - Platforms



MODIS

- Different algorithms will produce different results for ‘natural forest’.

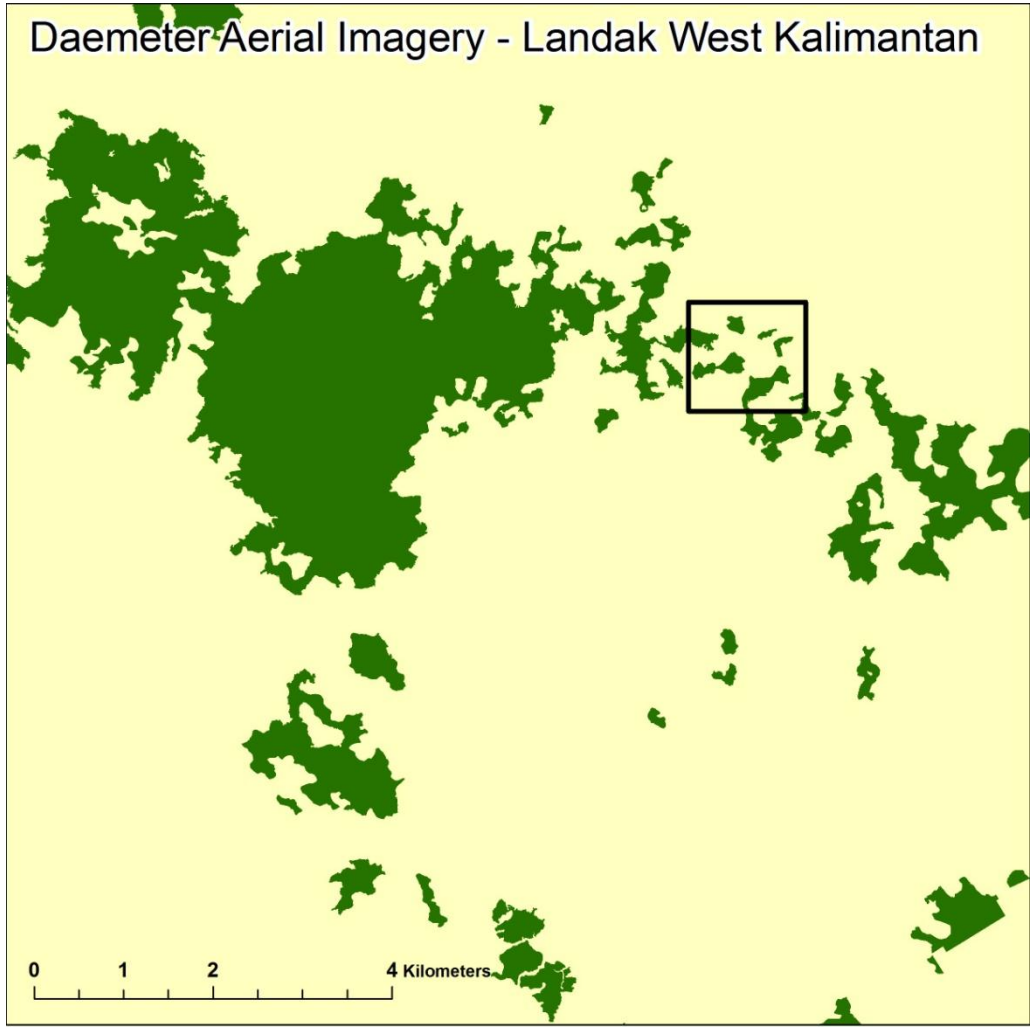
Forest Cover Comparison - Platforms



Landsat

- Good spectral range, can distinguish natural old growth forest from degraded forest or other types.
- High resolution 30m, but cloud free images hard to generate.
- Frequency not reliable

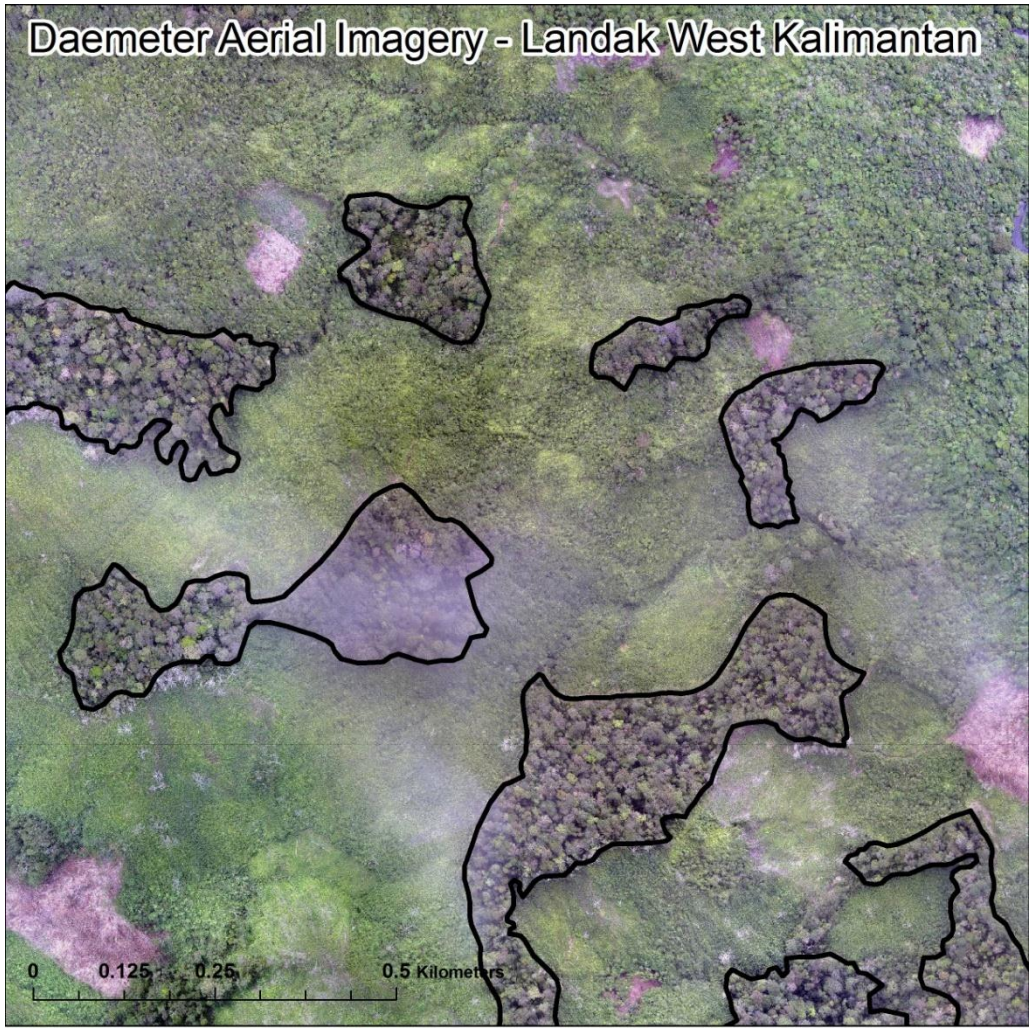
Forest Cover Comparison - Platforms



Aerial Imagery

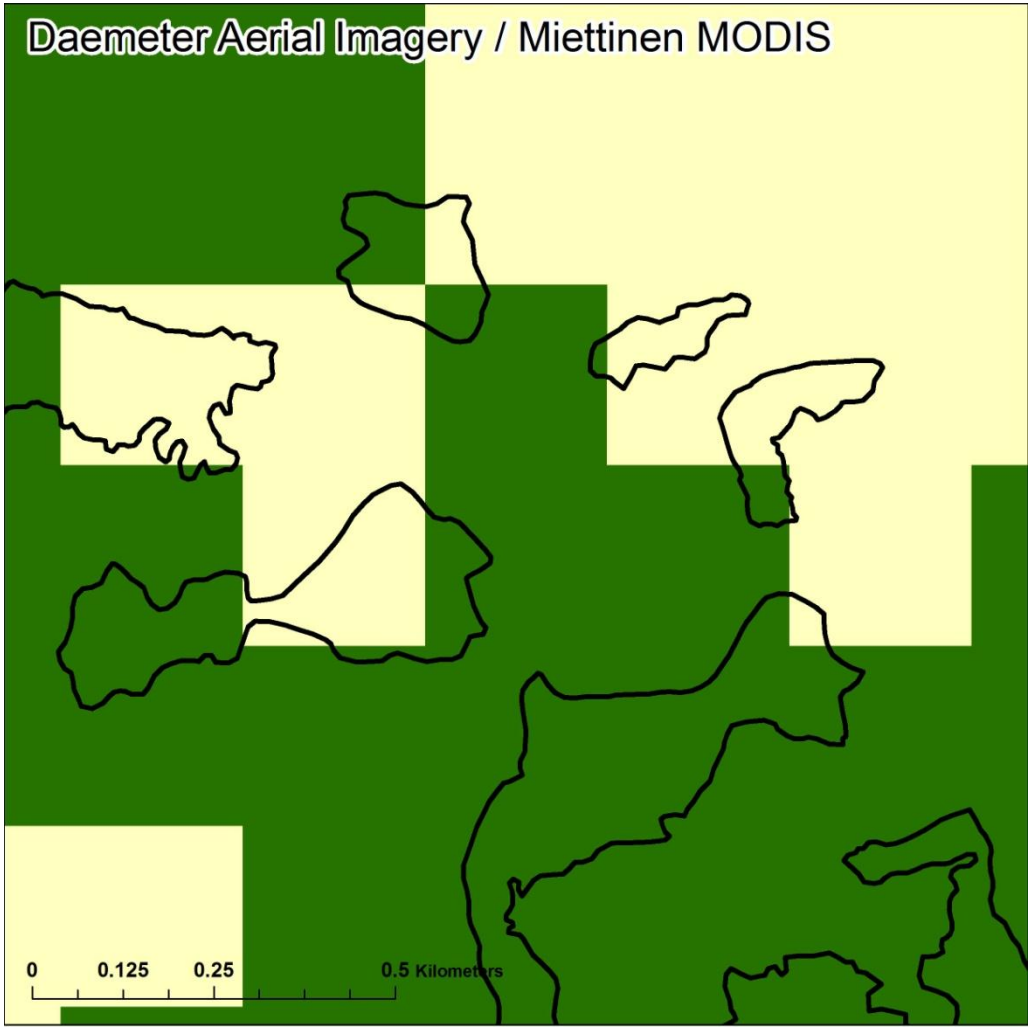
- Sub-metre resolution provides ultimate resolution on land cover mapping
- Very expensive

Forest Cover Comparison - Platforms



Aerial Imagery - Natural forest

Forest Cover Comparison - Platforms



- MODIS vs aerial
- Resolution 250m v <1m
- Different resolutions will provide different results where spatial pattern and connectivity are important.

Land cover

- Presence of forest & natural ecosystems
- First approximation of biodiversity
- Landscape context

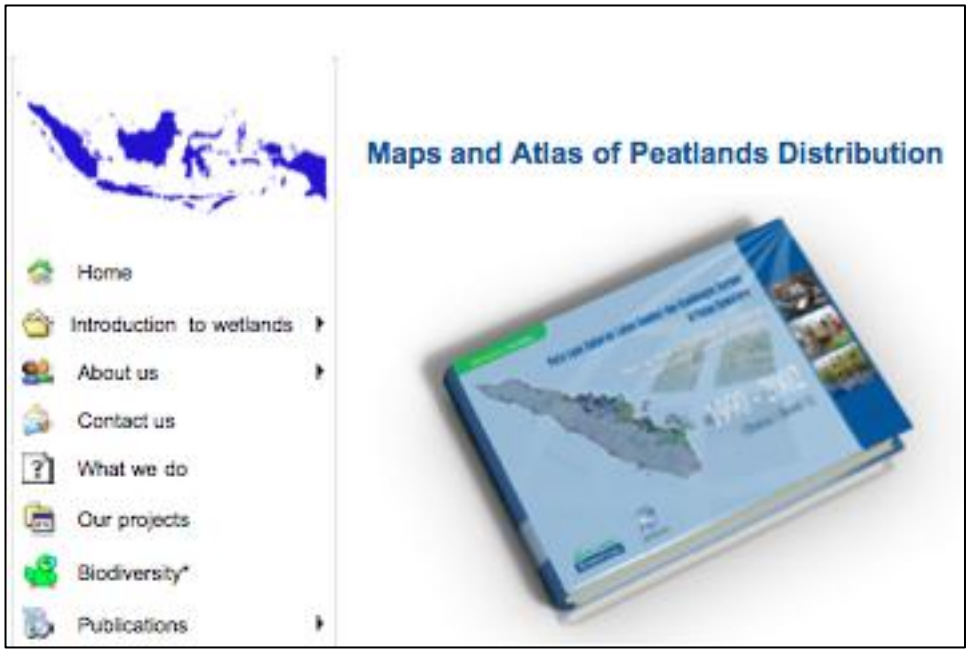
Peat land

Parks & Protected Areas

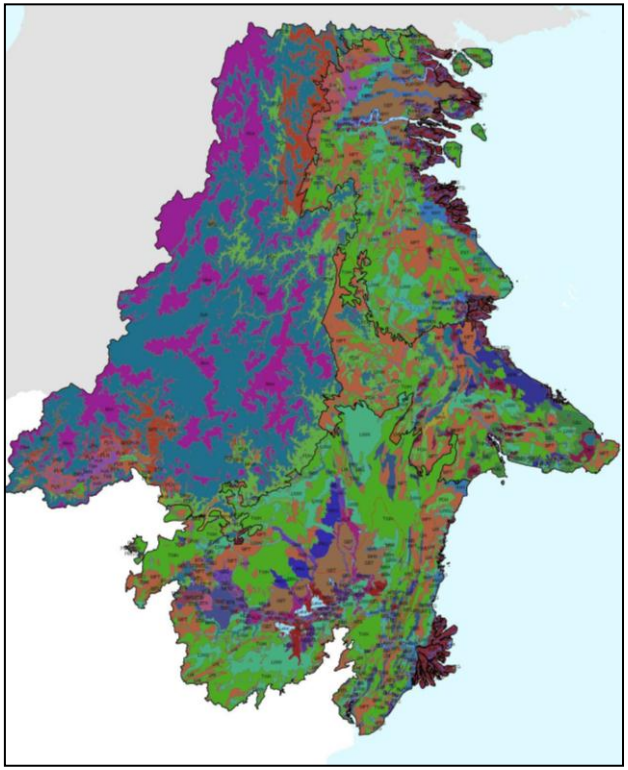
Fires

Presence of Peat

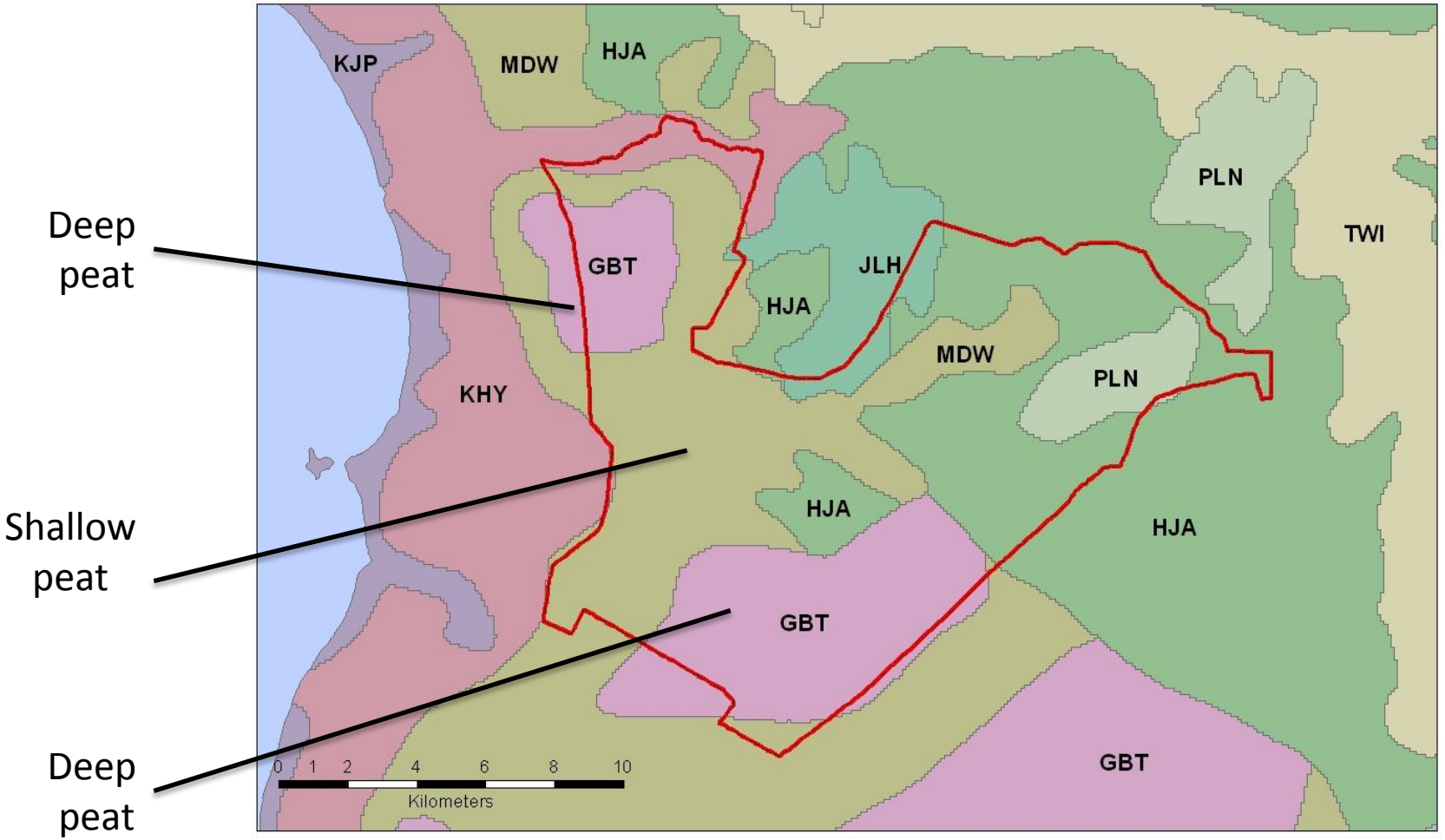
Peat lands mapping

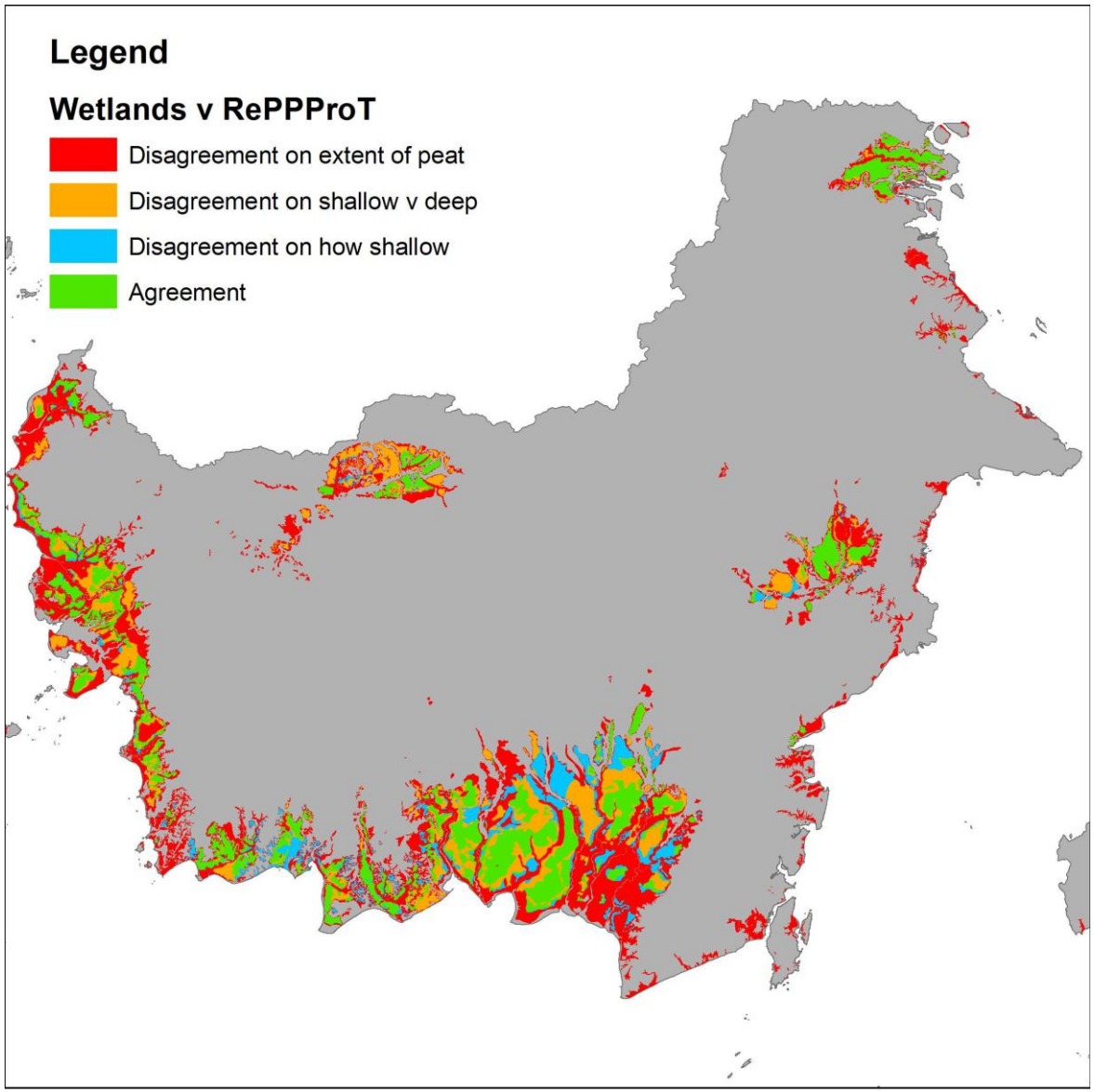


Wetland International



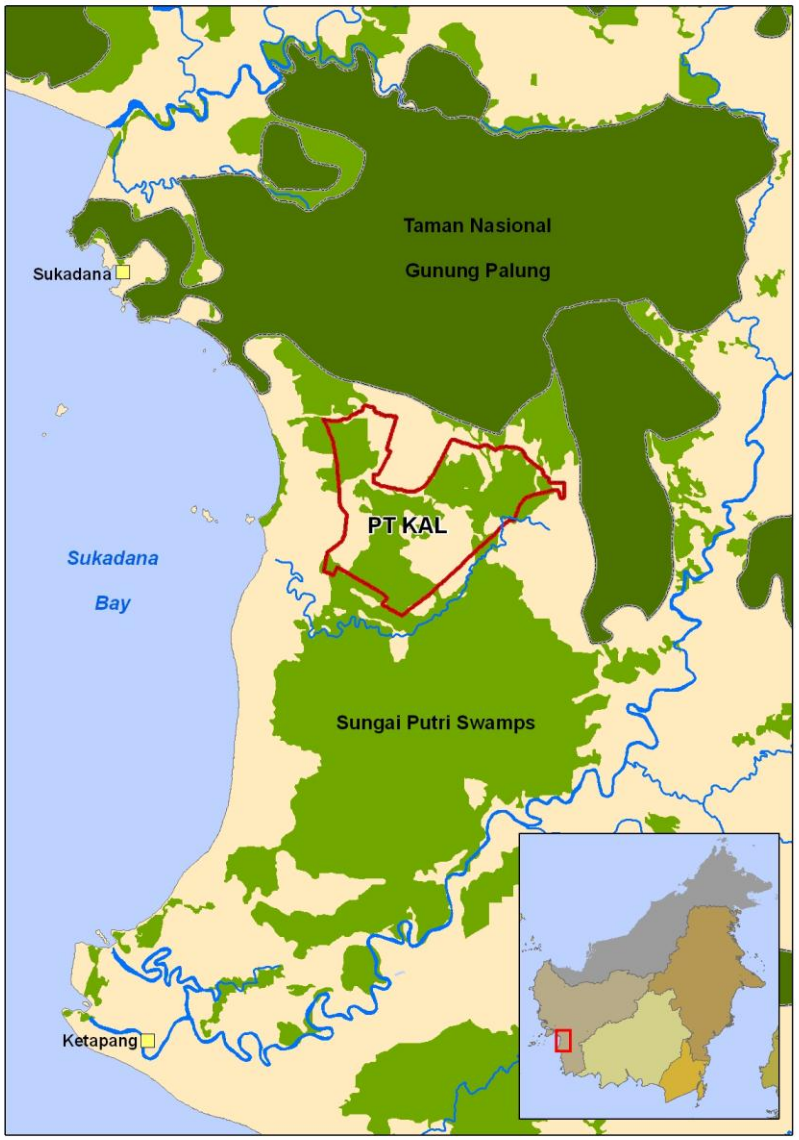
RePPProT


Deep peat
Shallow peat
Deep peat
KJP
MDW
HJA
PLN
TWI
GBT
JLH
HJA
MDW
PLN
KHY
HJA
HJA
GBT
GBT
0 1 2 4 6 8 10
Kilometers



Disagreement between data sets

Parks & Protected Areas



Parks & Protected Areas

Boundary Version 1

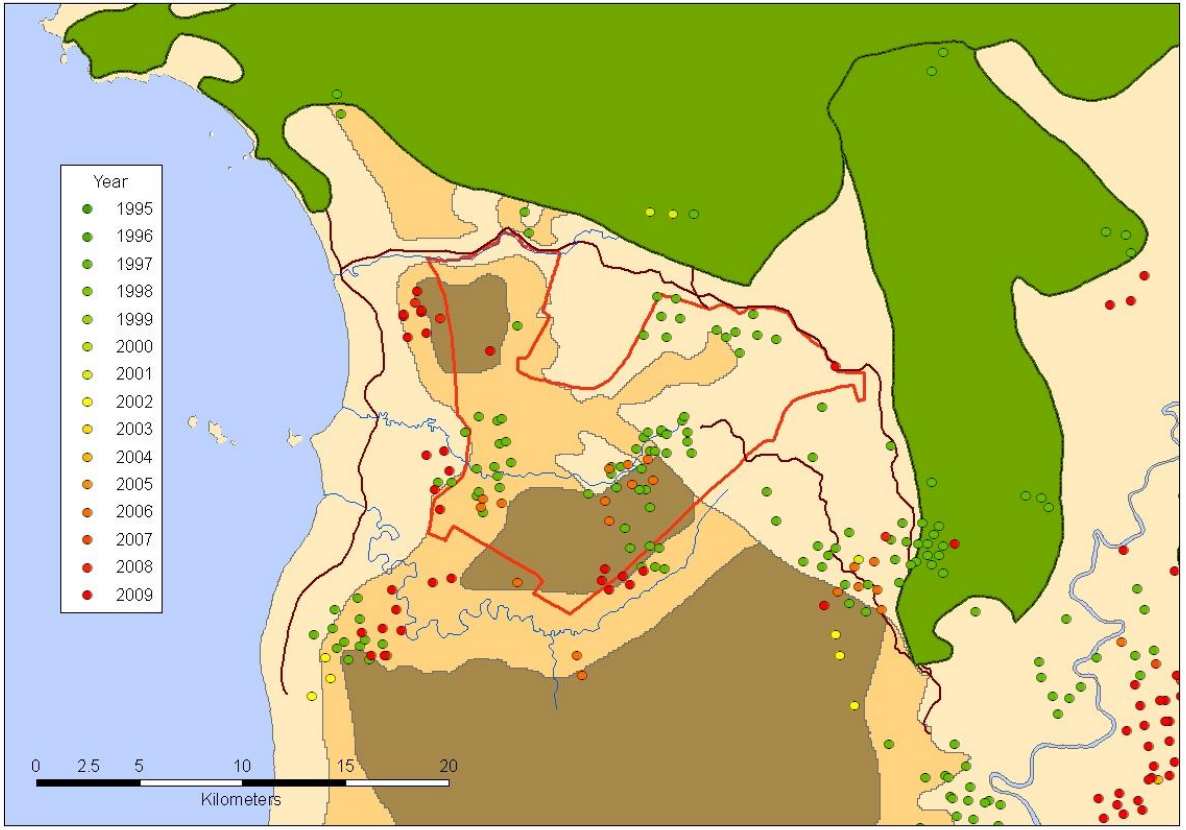
Parks & Protected Areas

Boundary Version 2

Parks & Protected Areas

Boundary Version 3

History of Fire



On-line
Hotspot data
-
ATSR
AVHRR

Things we'd like to screen for…

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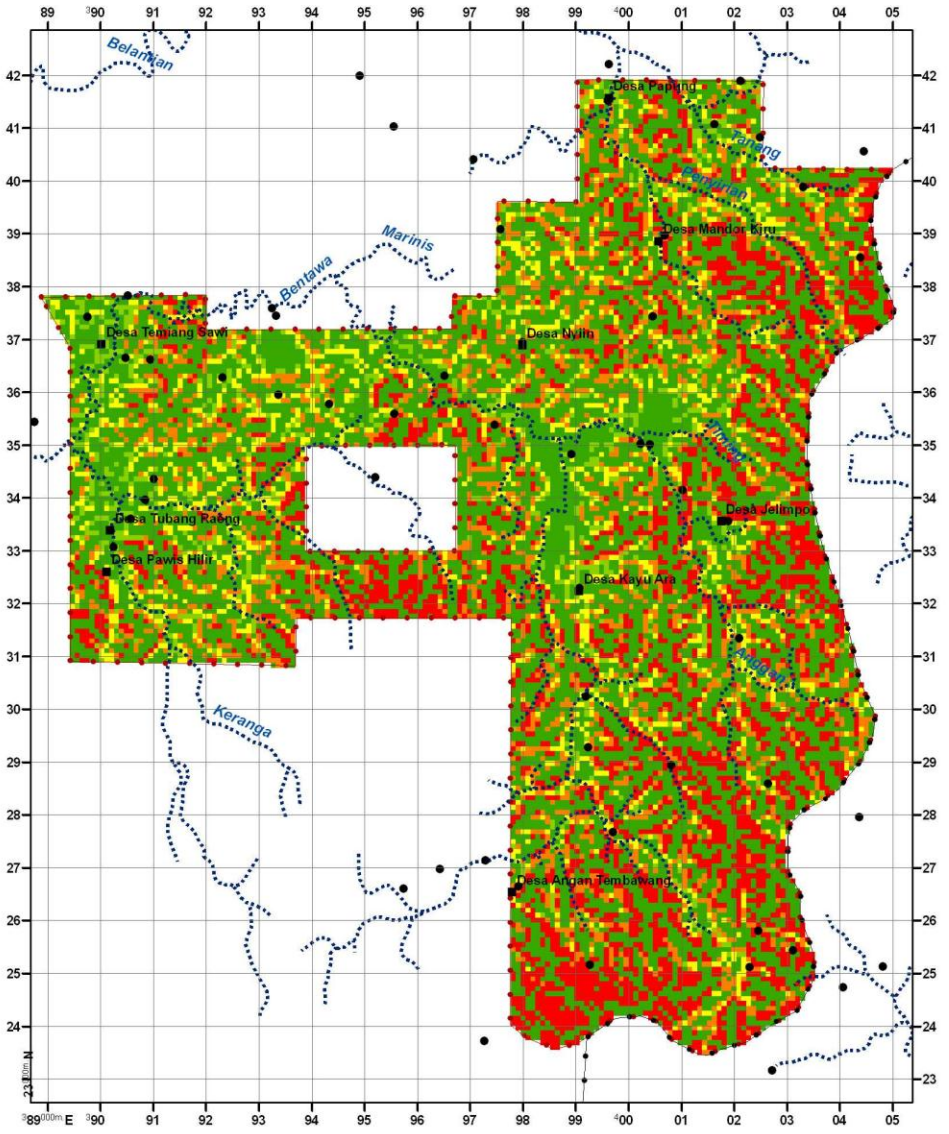
Erosion Risk

Combining data on

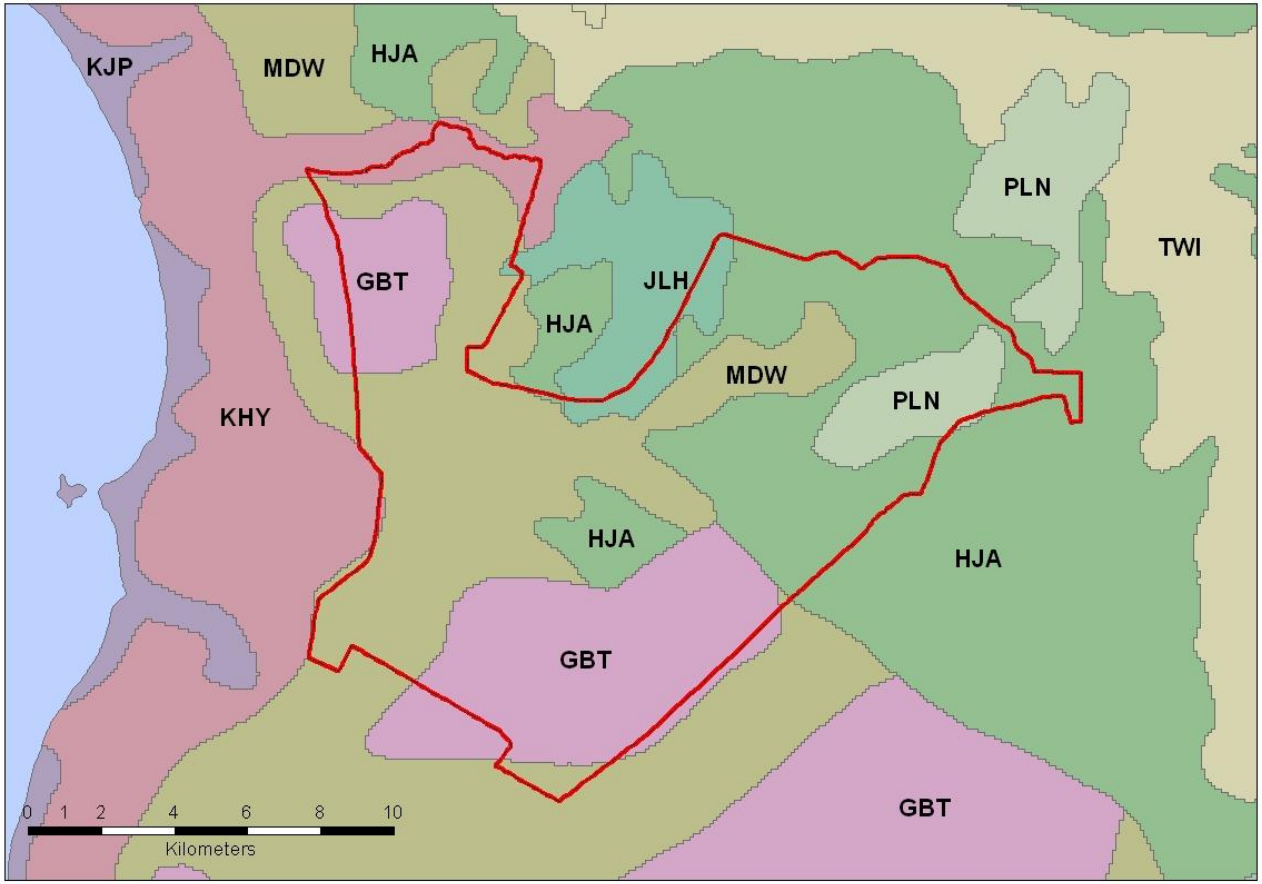
-Slope
-Slope length
-Soil texture
-Rainfall



Rare or Endangered Ecosystems – HCV 3

Combining data on

-Ecosystem extent
-Past forest
-Present forest
-Future expected forest



Endangered ecosystem

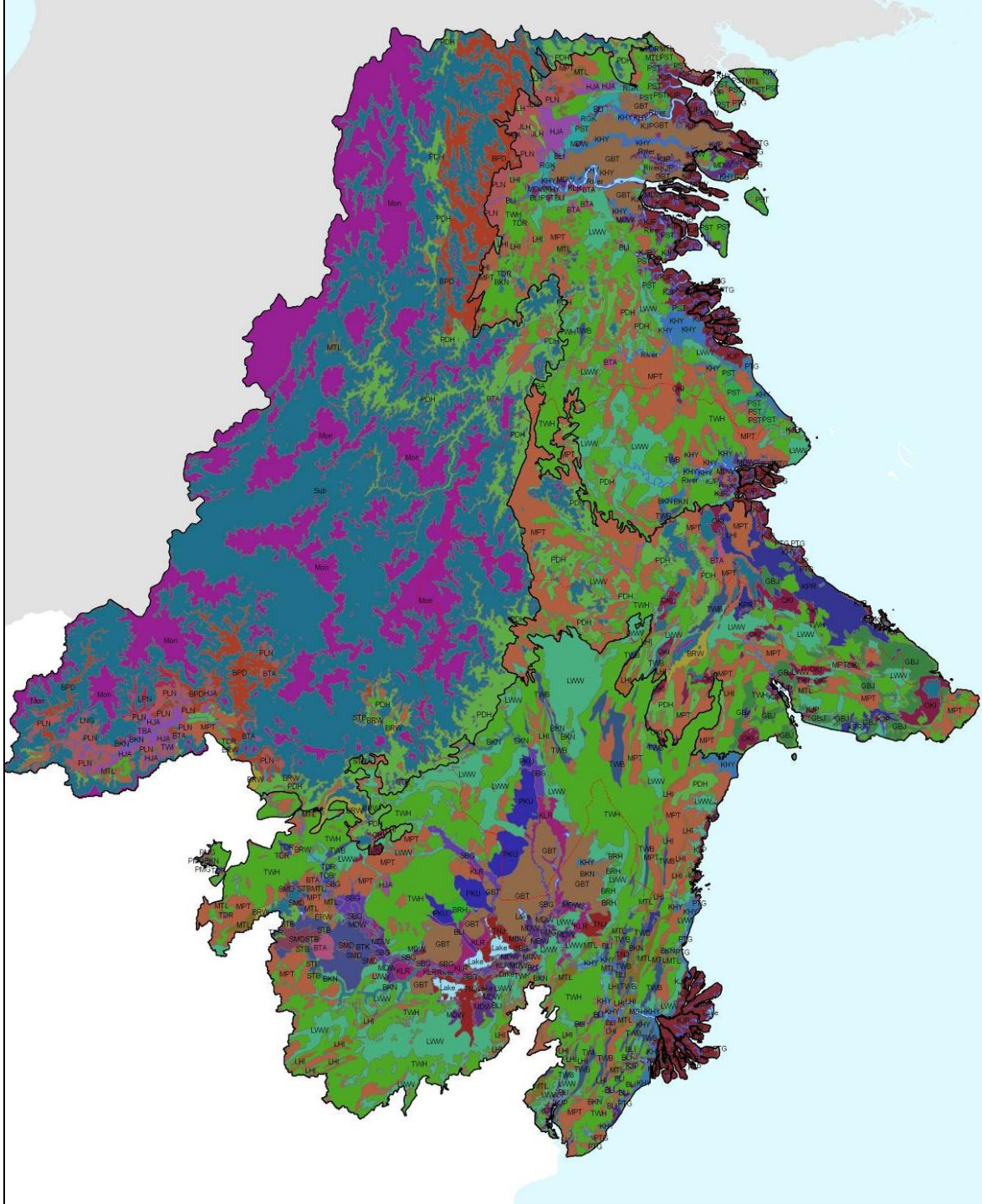
1. Has declined by 50% compared to past extent
2. Will decline by 75% given current land use planning

Rare ecosystem

'Original' (past) extent covered <1%

NOTE: Analysis is contextualized

Ecosystem mapping

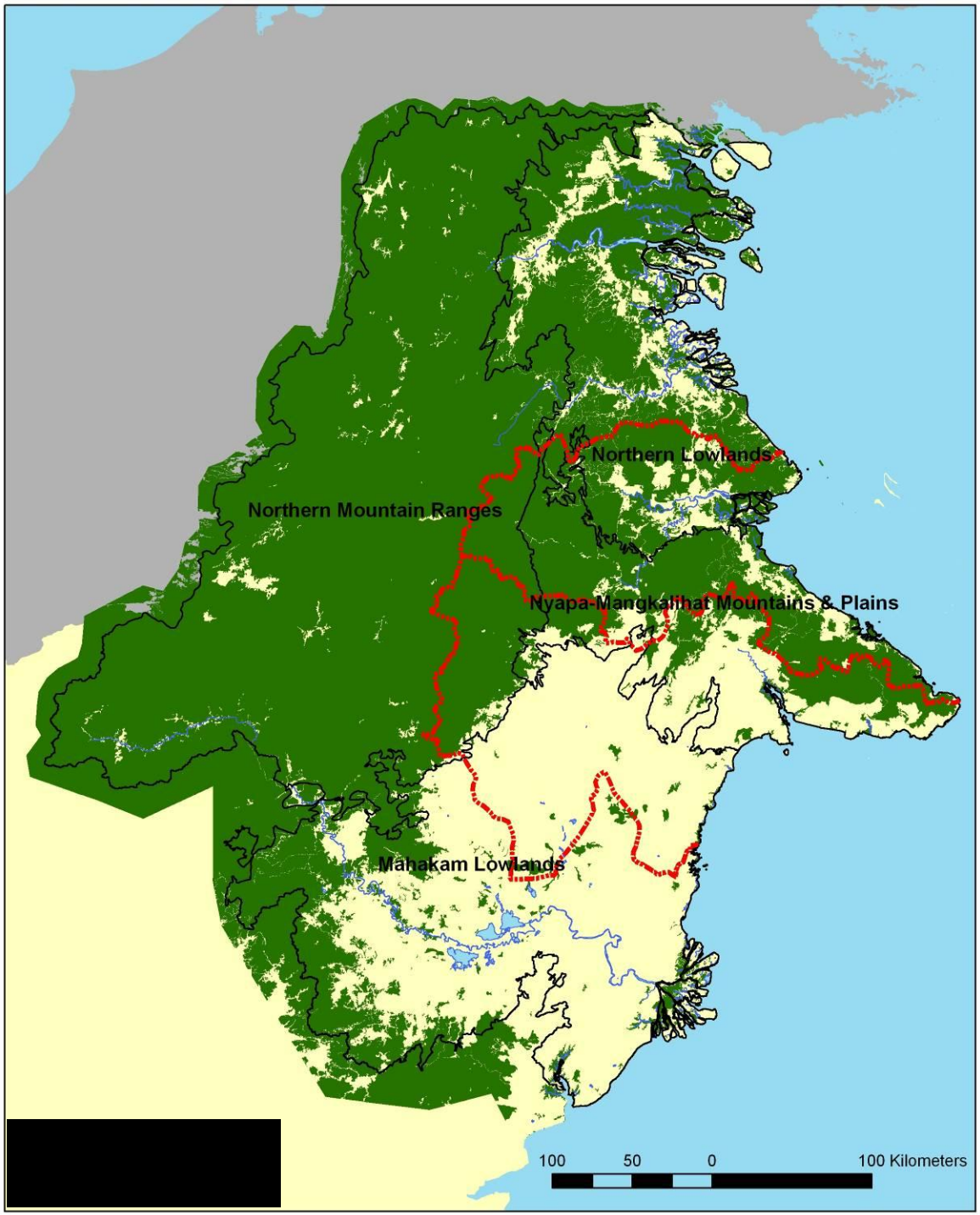


Past
Forest Cover

c.1975

Present Forest Cover

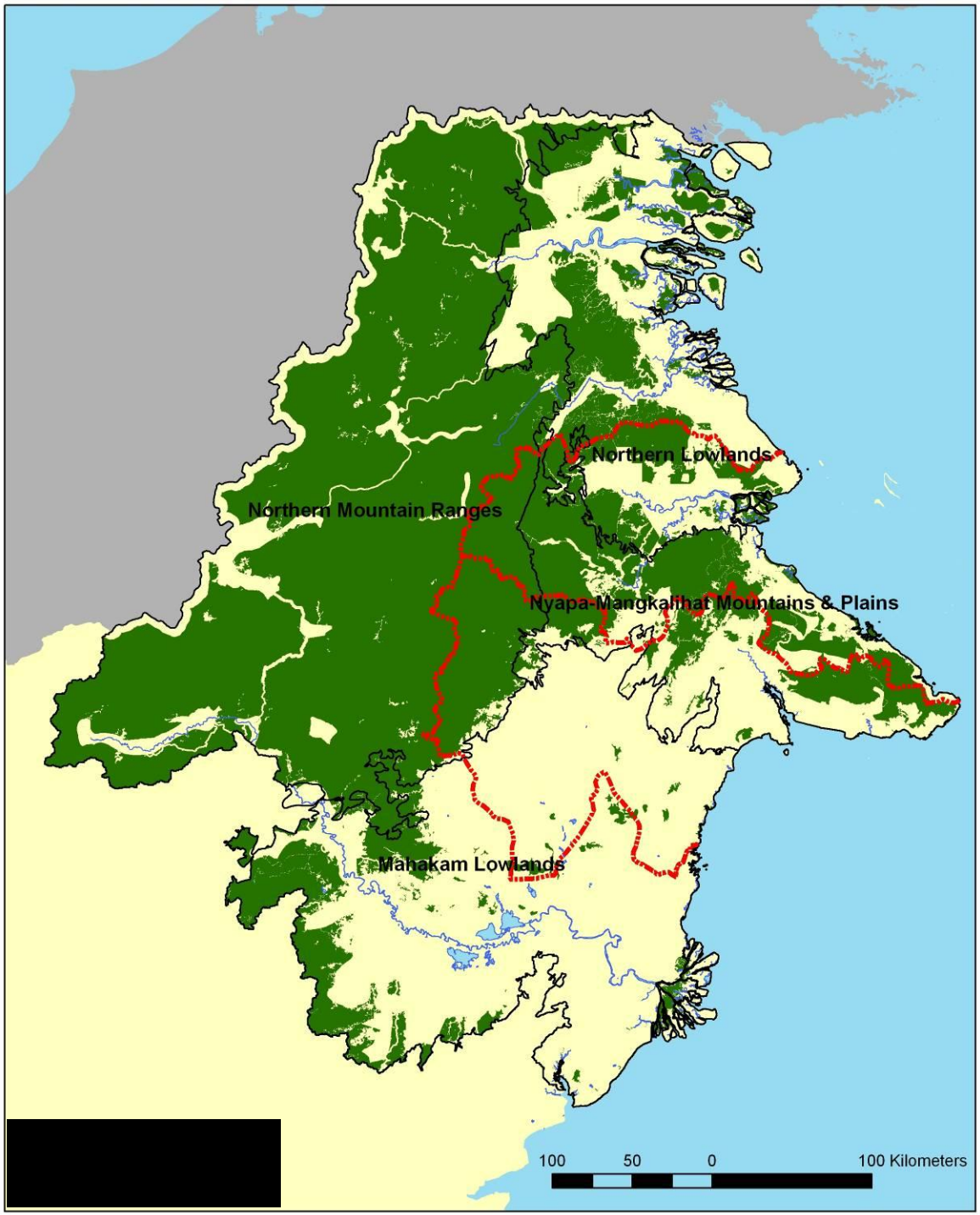
2009



Expected Forest Cover

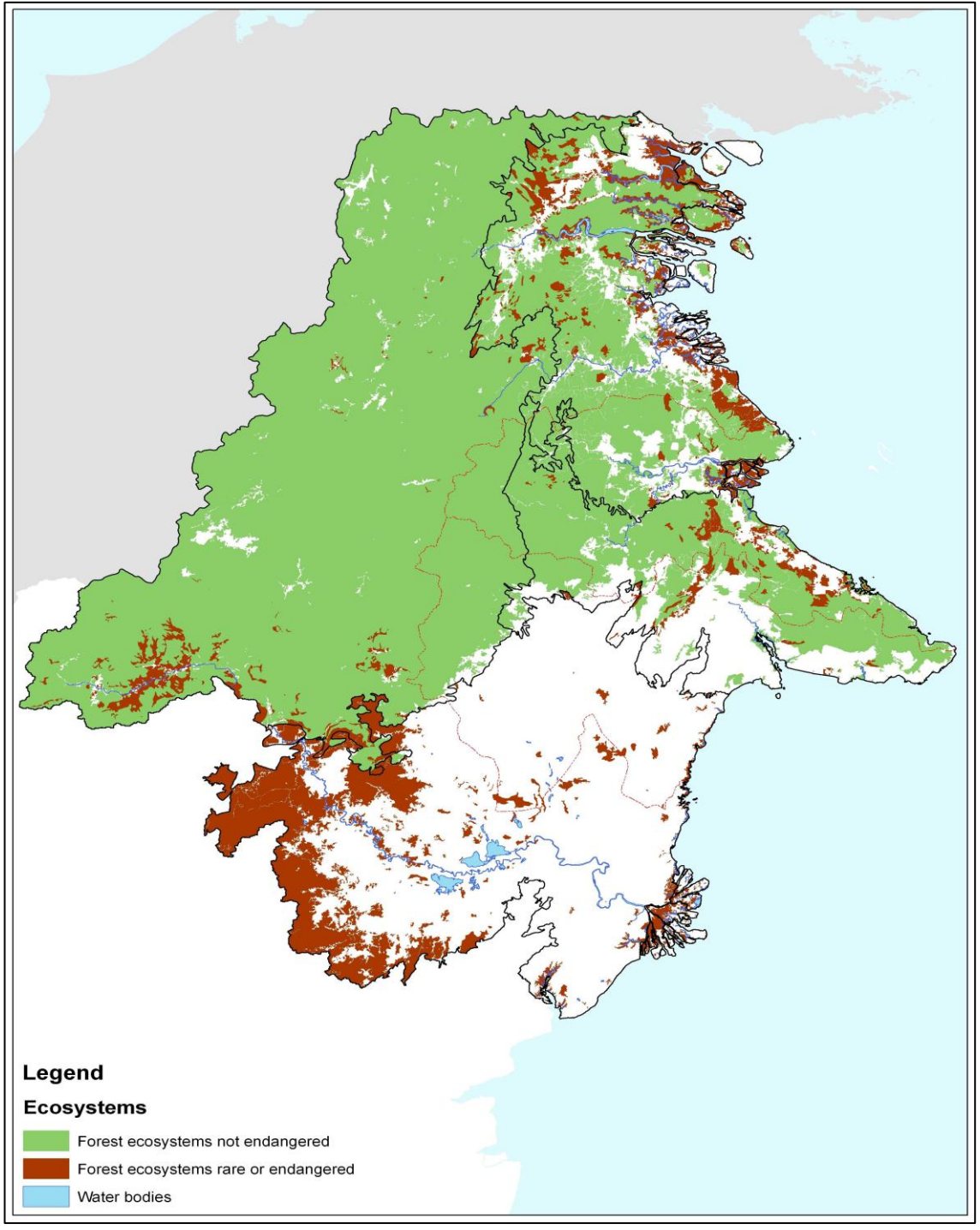
-

Land use plans



HCV 3

Rare or Endangered Ecosystems



Conclusion

GIS & RS are extremely important tools for HCV

There are limitations & trade-offs

Take full advantage of this power requires care – *be cautious about need for ground survey, expert knowledge*

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Thank You
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