GIS Techniques for Screening High Conservation Value Areas

The Case of Indonesia

Gary Paoli, PhD
gary.paoli@daemeter.org
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

Identification

Management

Monitoring

Is an HCV present and where is it found?

What management can be applied to maintain the value?

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
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
Things we’d like to screen for...

➢ ...but can’t
➢ ...and can (at least sort of)
➢ ...and can but requires much work
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
Describing Social Context Requires Field Work
Mapping village locations or counting village numbers required field work.
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 1 – Protected, Threatened or Endemic species
Things we’d like to screen for...

➢ ...but can’t
➢ ...and can (at least sort of)
➢ ...and can but requires much work
Land cover

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

Peat land

Parks & Protected Areas

Fires
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
Land cover
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)
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

Daemeter Aerial Imagery - Landak West Kalimantan

Aerial Imagery - Natural forest
MODIS vs aerial
Resolution 250m vs <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

Maps and Atlas of Peatlands Distribution

Wetland International

RePPProT
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...

➢ ...but can’t
➢ ...and can (at least sort of)
➢ ...and can but requires much work
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*
Thank You

www.daemeter.org