For the sake of the establishment of reliable forest carbon monitoring system

信頼できる森林炭素モニタリングシステムを構築するために

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Recalling REDD(-plus)…

Forest degradation

Positive incentive

Deforestation

Conservation

MRV

RL/REL

Safeguards

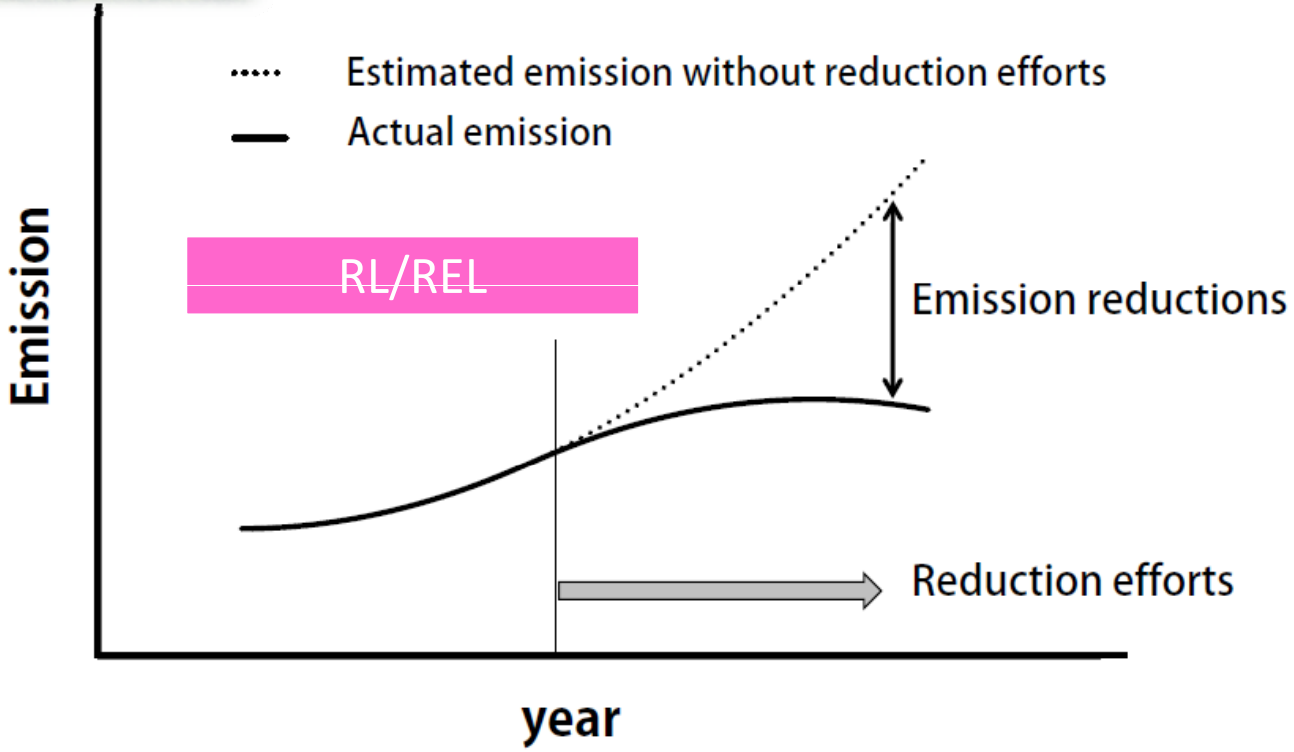
Phased approach

Enhancement

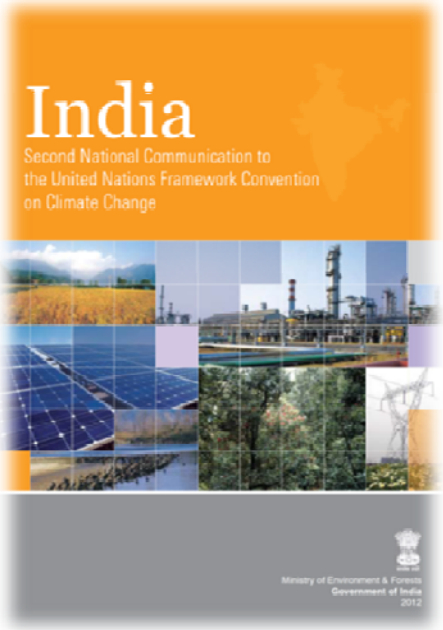
Sustainable management

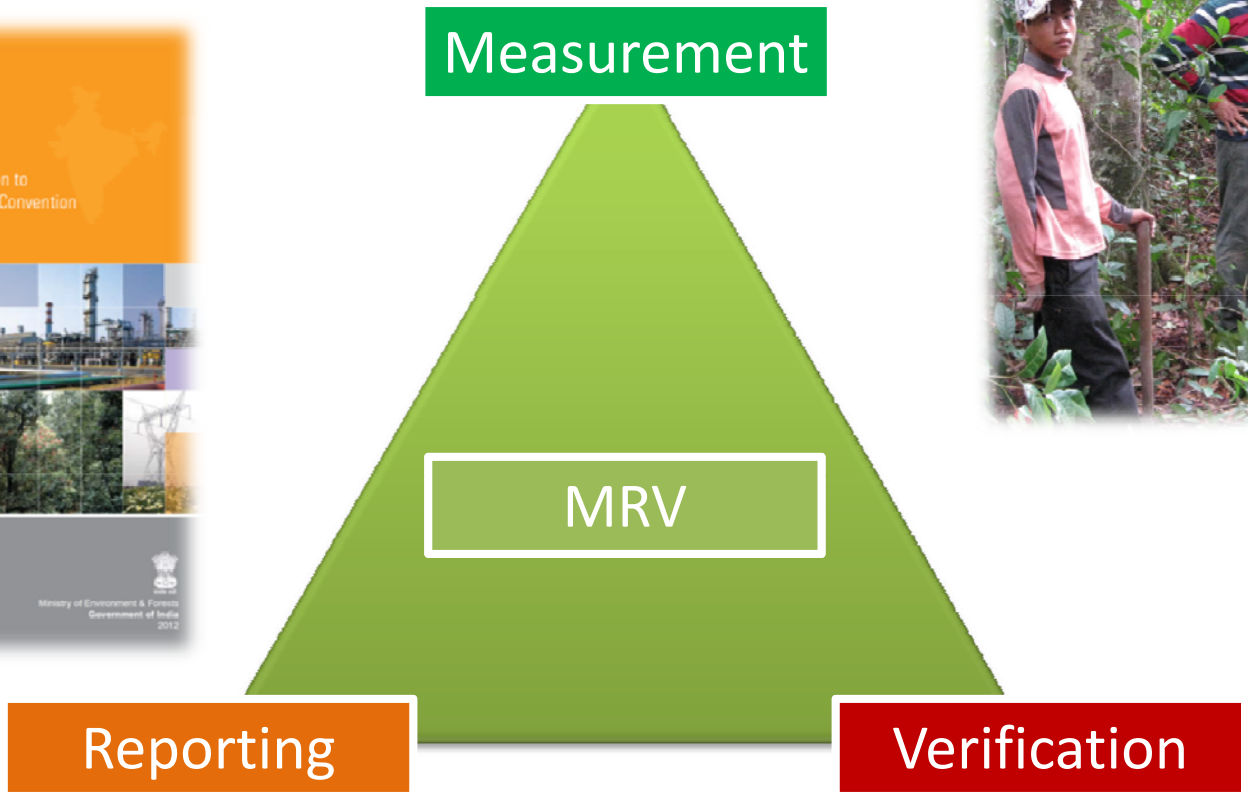
Recalling REDD(-plus)…

Positive incentive



MRV of Forest Monitoring





MRV of Forest Monitoring

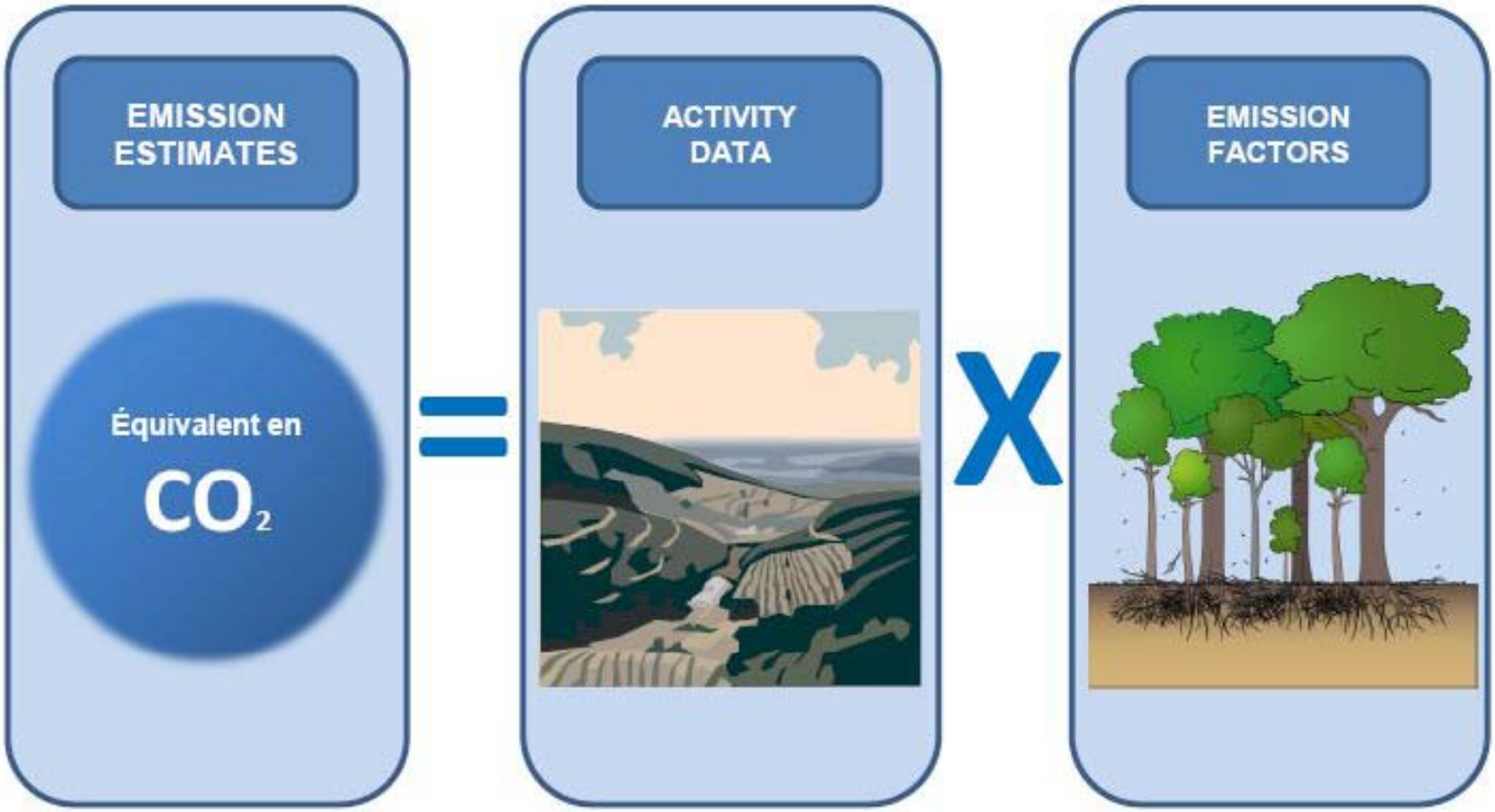
Measurement

(d) To establish, according to national circumstances and capabilities, robust and transparent national forest monitoring systems and, if appropriate, sub-national systems as part of national monitoring systems that:

(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;

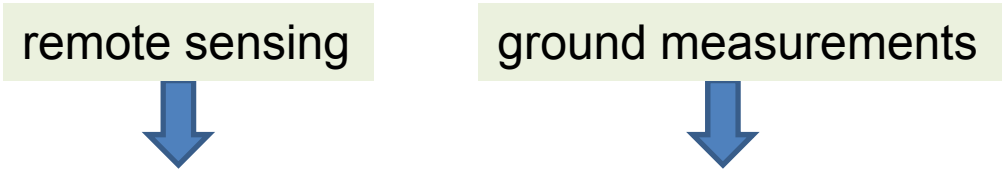
FCCC/CP/2009/11/Add.1

IPCC method to estimate GHG gas emissions from activities related with LULUCF sector



Danilo Mollicone, FAO

Forest carbon stock estimation by combination of remote sensing and ground measurements



Total carbon stock = Σ (Forest area$_i$ x Averaged carbon stock$_i$)

Forest area$_i$: forest area of forest type *i*
Averaged carbon stock$_i$: average d carbon stock in forest type *i*

- The method is the calculation of carbon stock by monitoring forest land and summing up the forest area and its averaged carbon stock for important forest types.

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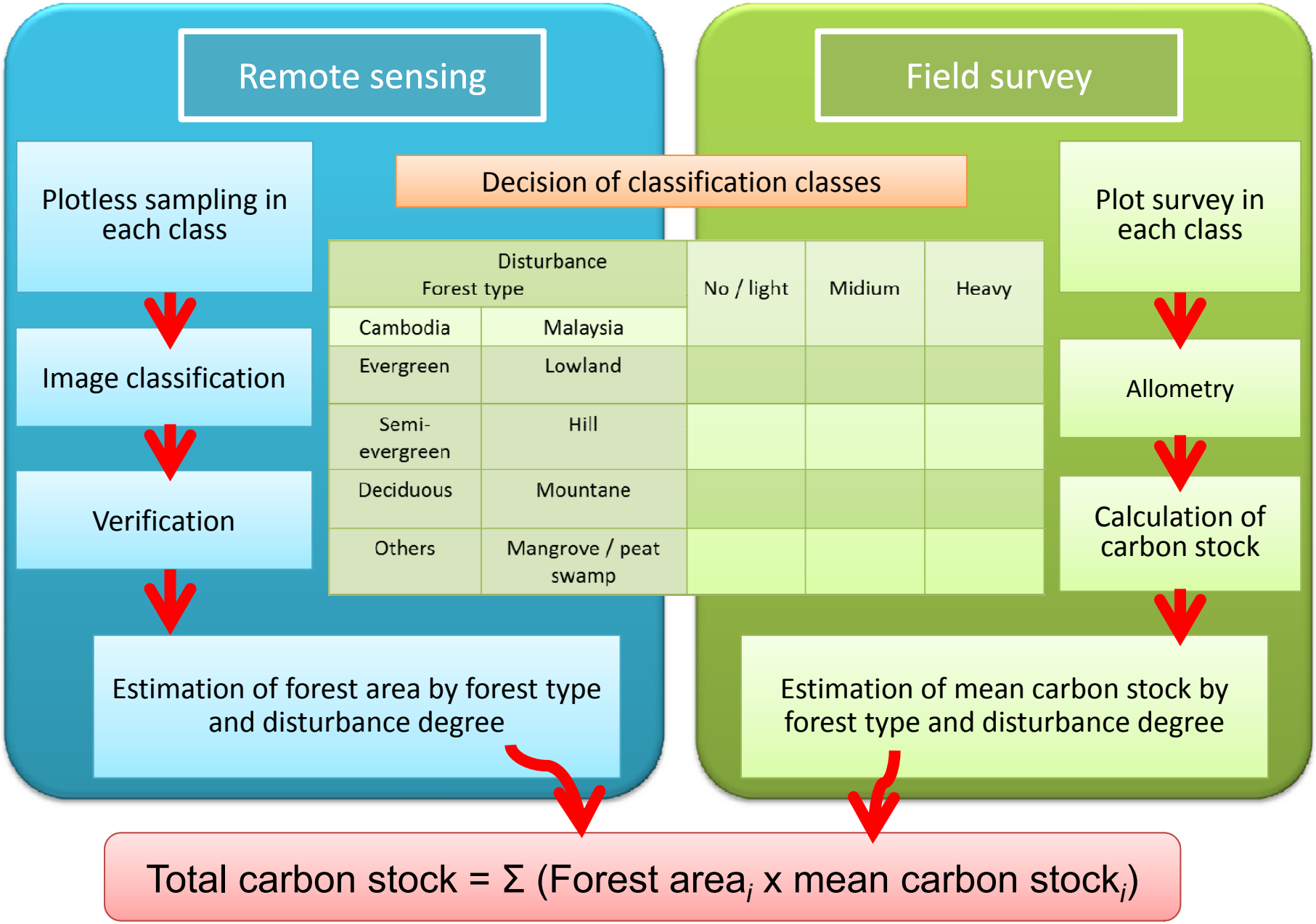
Remote sensing
Field survey
Plotless sampling in each class
Image classification
Verification
Estimation of forest area by forest type and disturbance degree
Decision of classification classes
Disturbance
Forest type
No / light
Midium
Heavy
Cambodia
Malaysia
Evergreen
Lowland
Semi-evergreen
Hill
Deciduous
Mountane
Others
Mangrove / peat swamp
Plot survey in each class
Allometry
Calculation of carbon stock
Estimation of mean carbon stock by forest type and disturbance degree
Total carbon stock = Σ (Forest area$_i$ x mean carbon stock$_i$)

On the road to phase 2

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Different Methods, Different Accuracy

- Printout vs. On screen
- Interpretation vs. Semi-automatic
- accumulation of practices and know-how

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Area Estimation

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Data collection

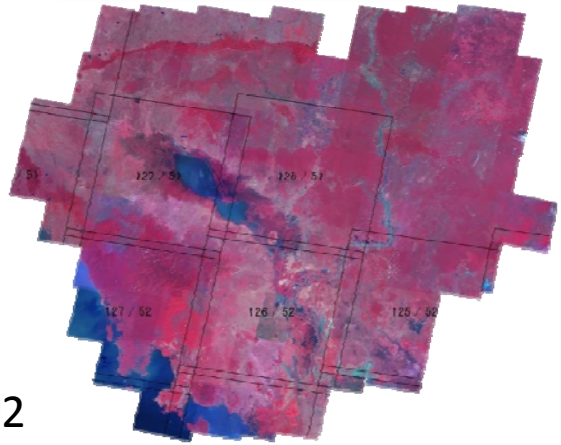
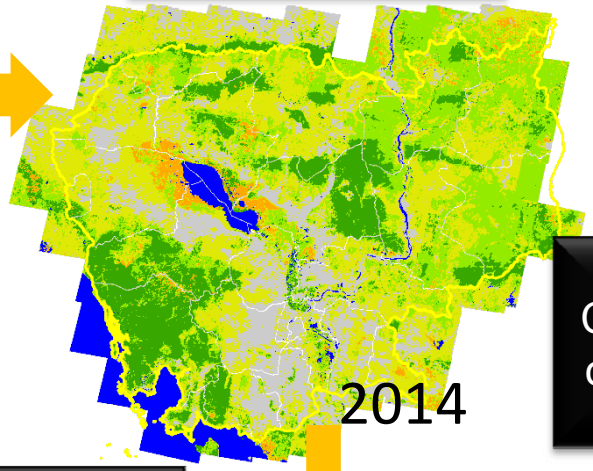


Image analysis



Confirmation and verification of land-caver by field survey

2014

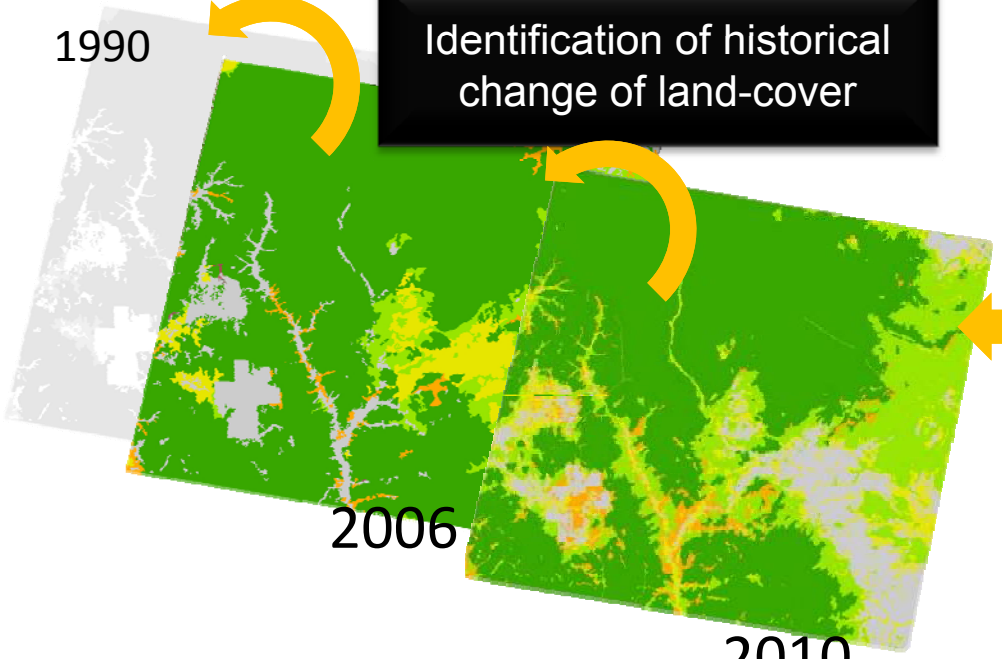
Producing a base map

2002

…

1990

Identification of historical change of land-cover



2006

2010

Monitoring of area change by forest type

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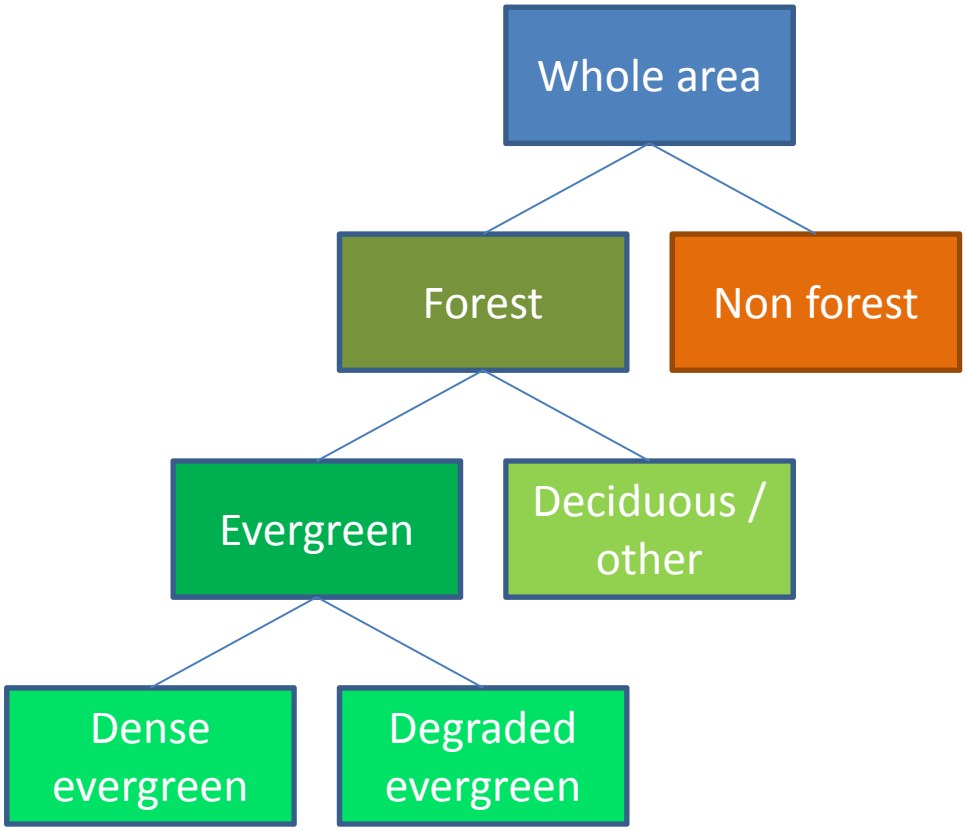
Classification of objects into forest types



- Generated objects in 1st step are classified into forest types.
- Classification tree is one option to get high quality results.
- Experiences of experts, including interpretation of satellite data and field conditions, are needed.

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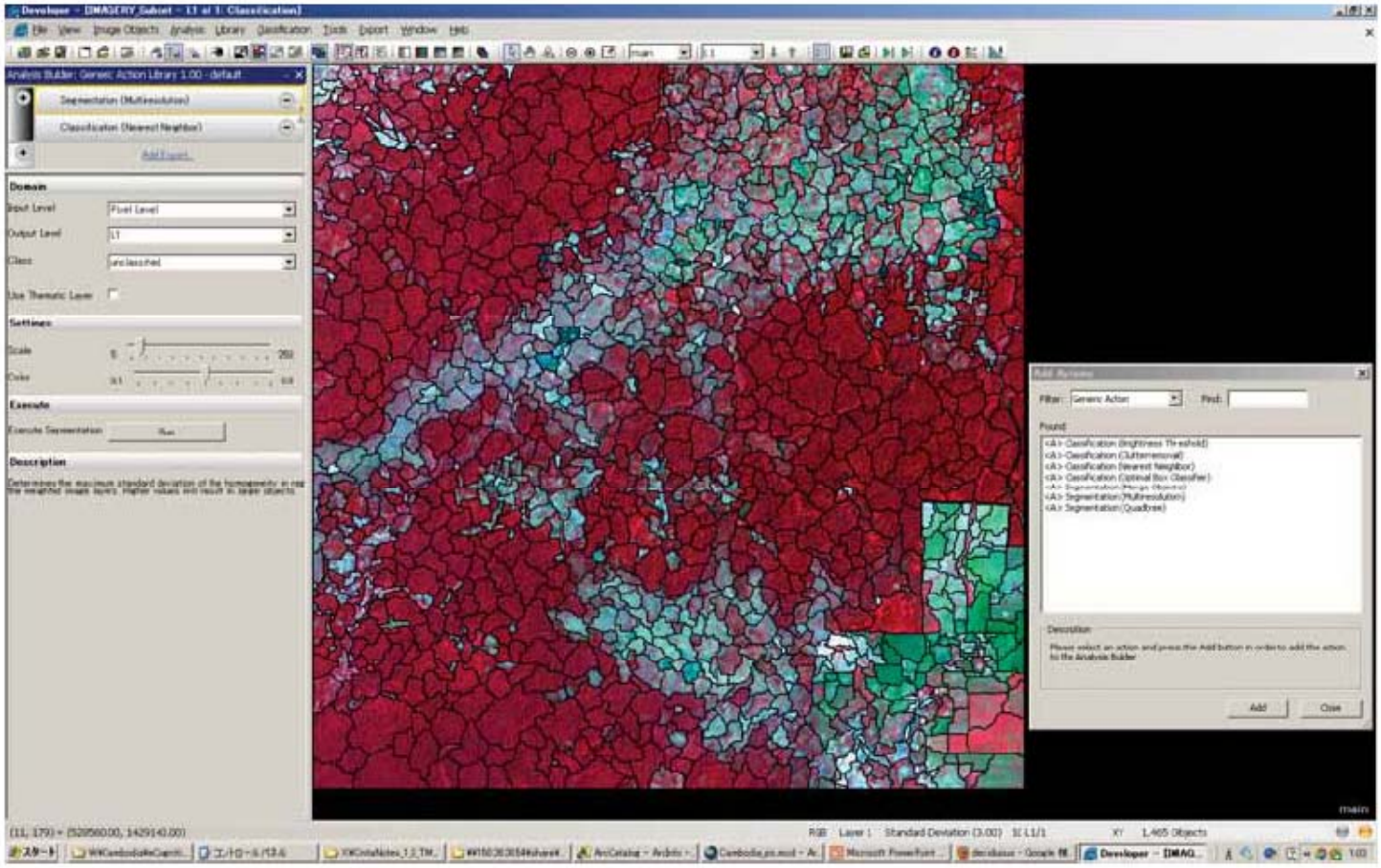
Segmentation → Classification



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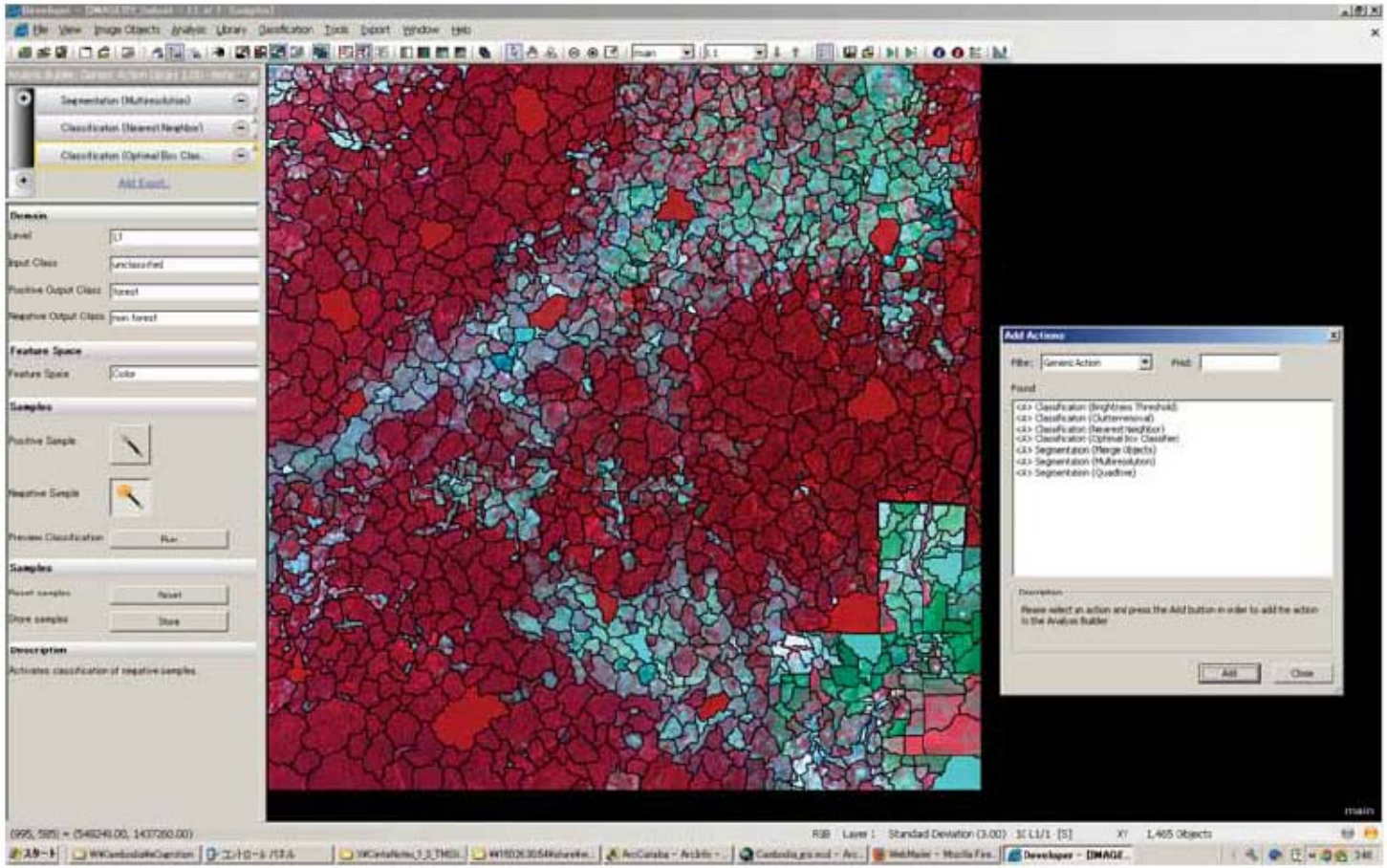
Sampling (forest / non forest)



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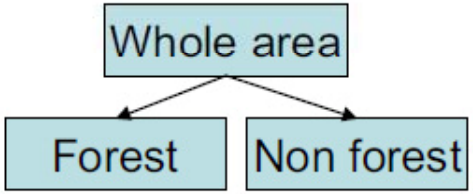
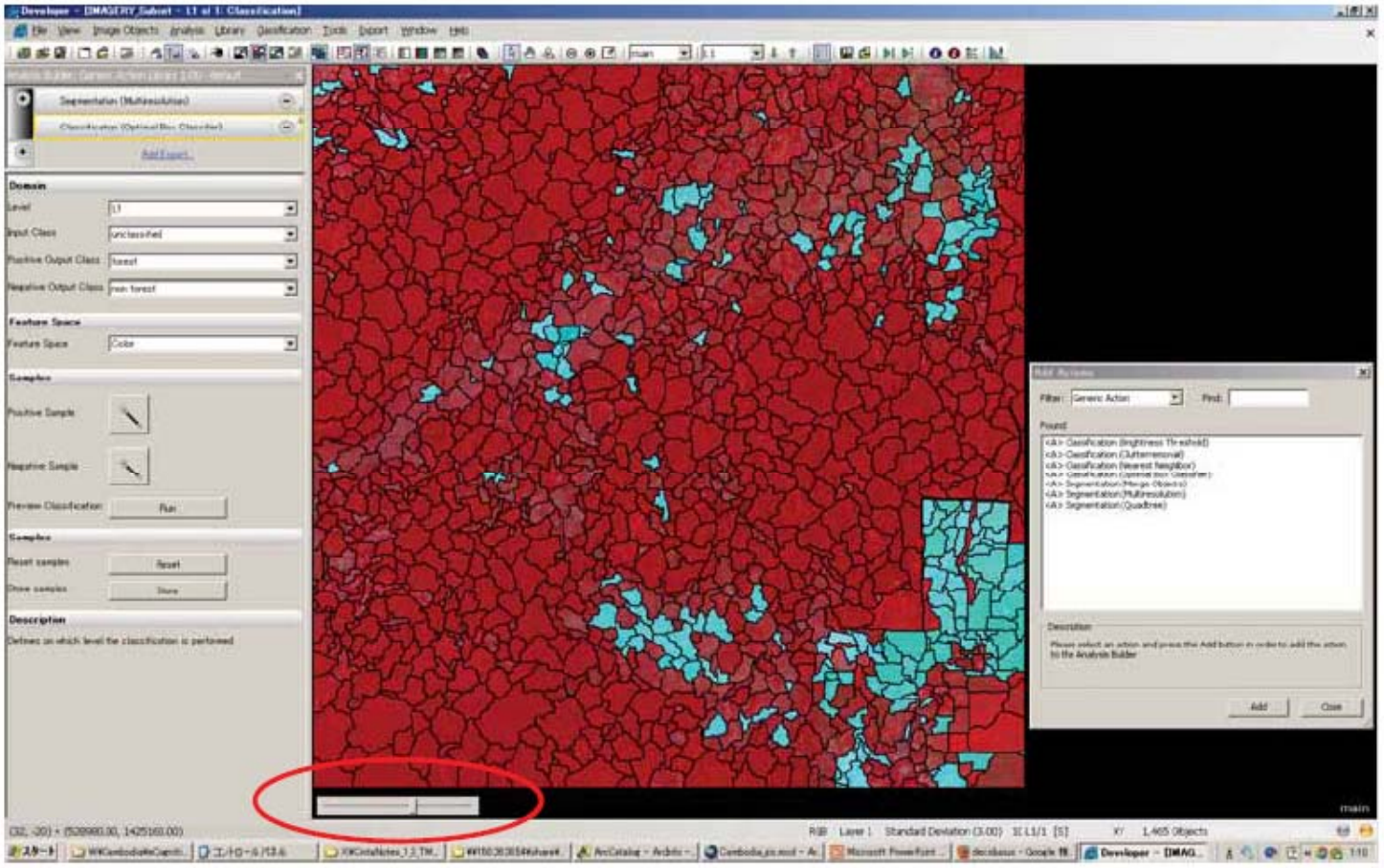
Whole image
→ forest / non forest





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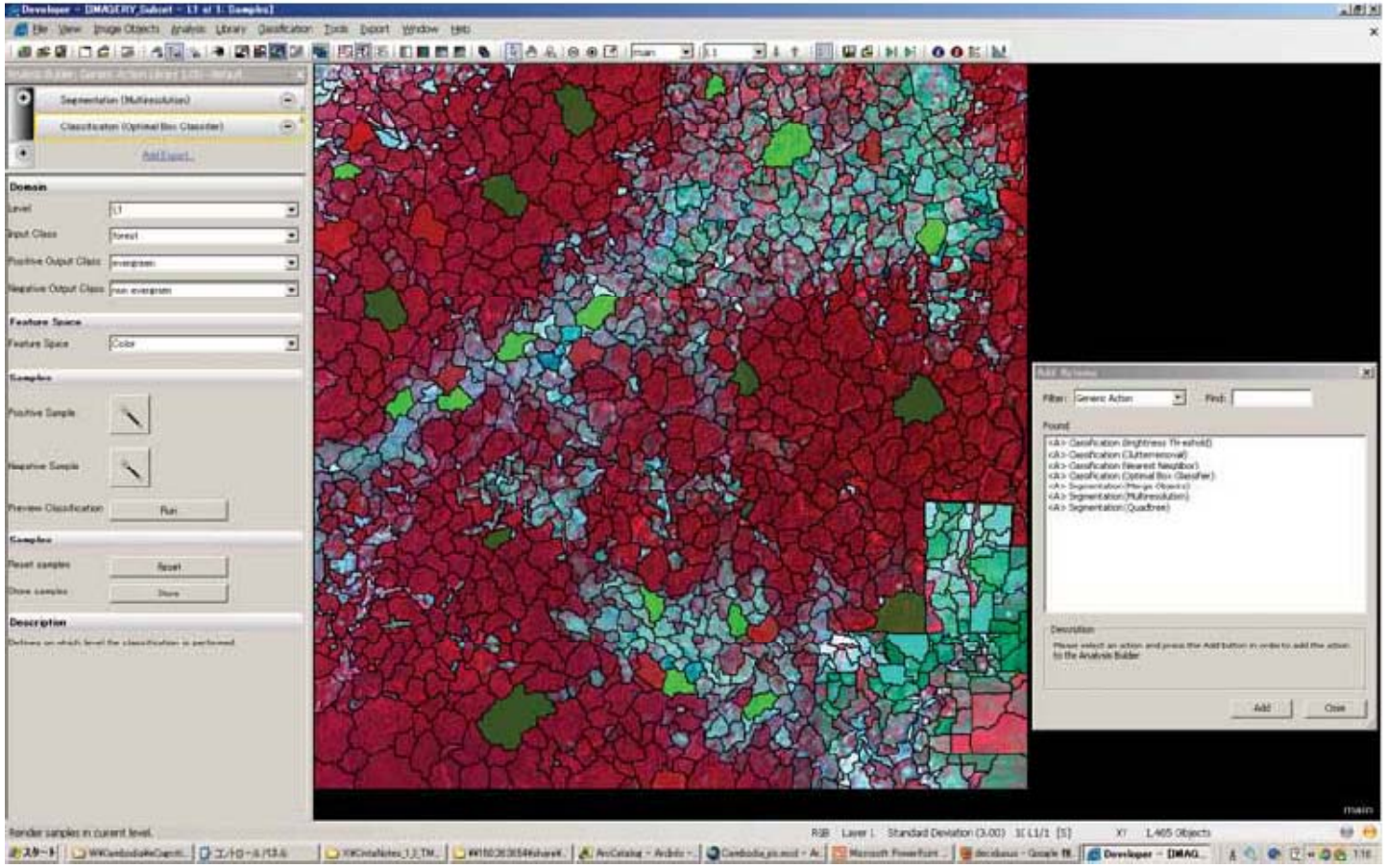
Sampling (Evergreen / Deciduous, other)



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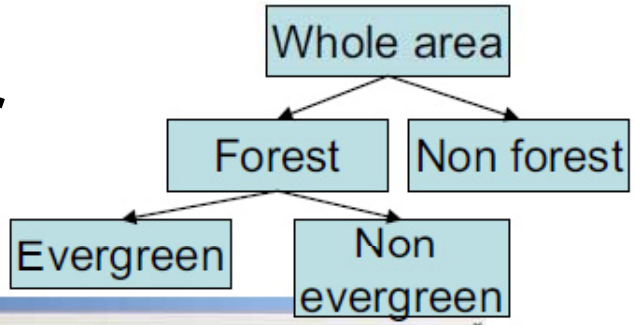
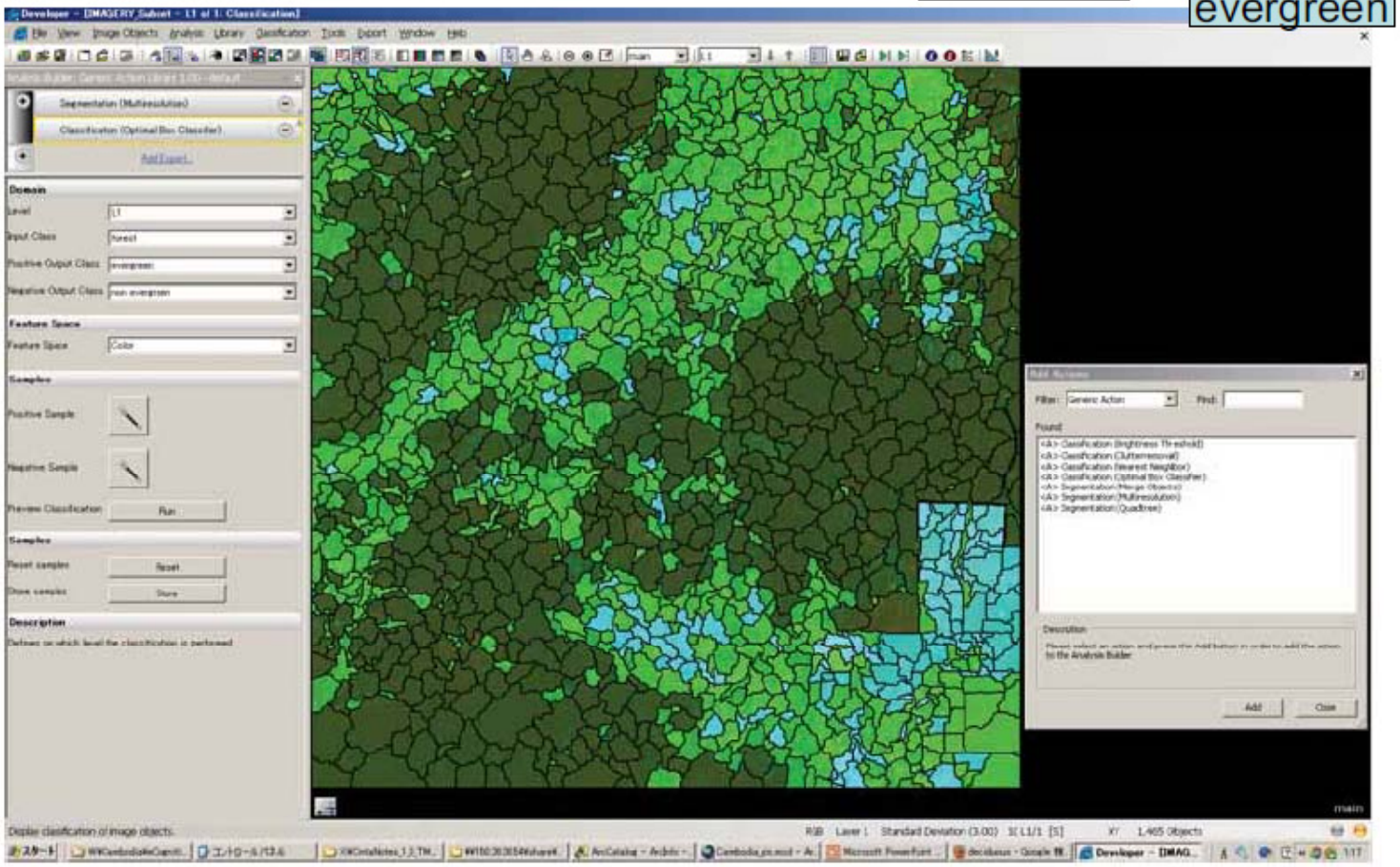
Forest
→ evergreen / deciduous, other





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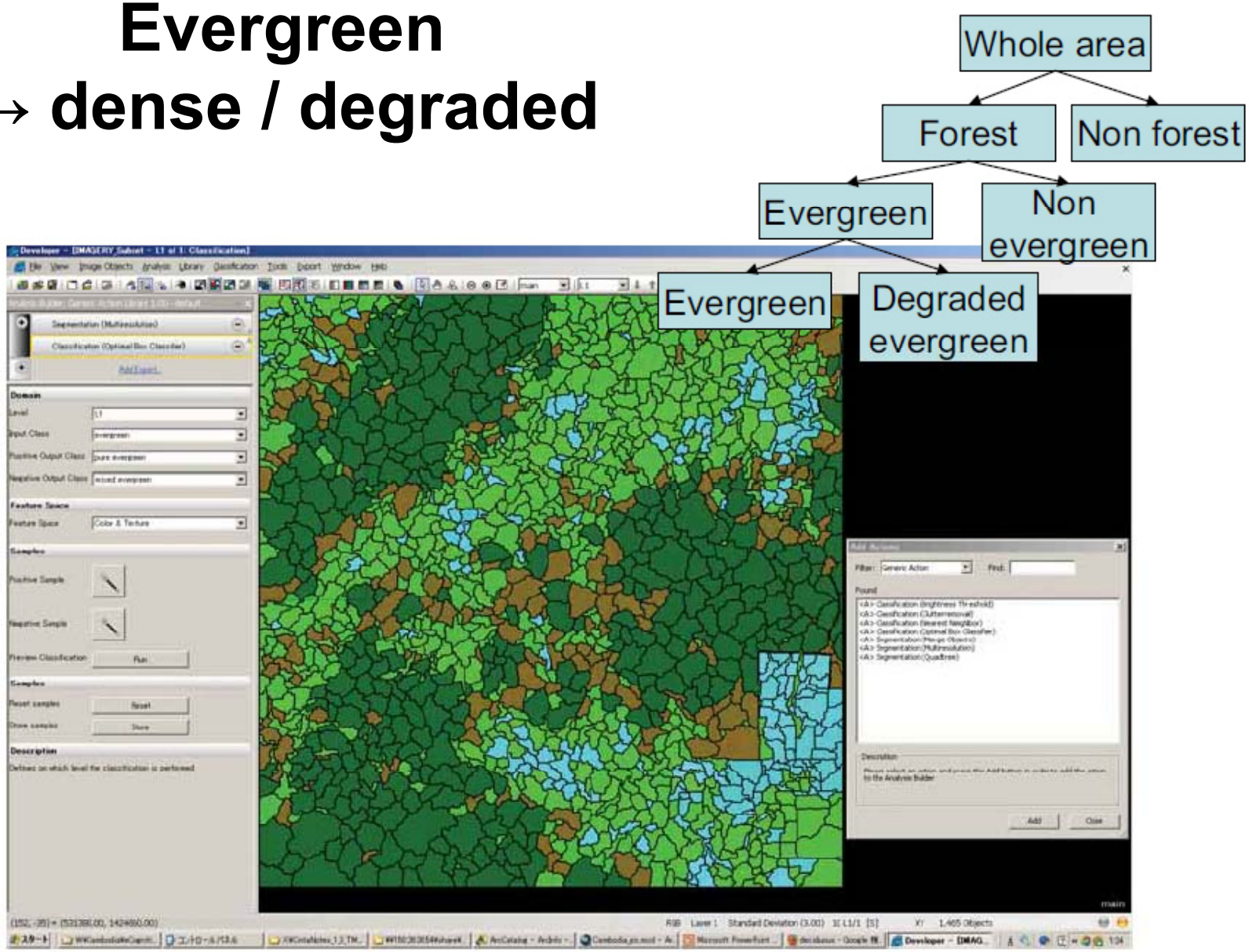
Evergreen
→ dense / degraded



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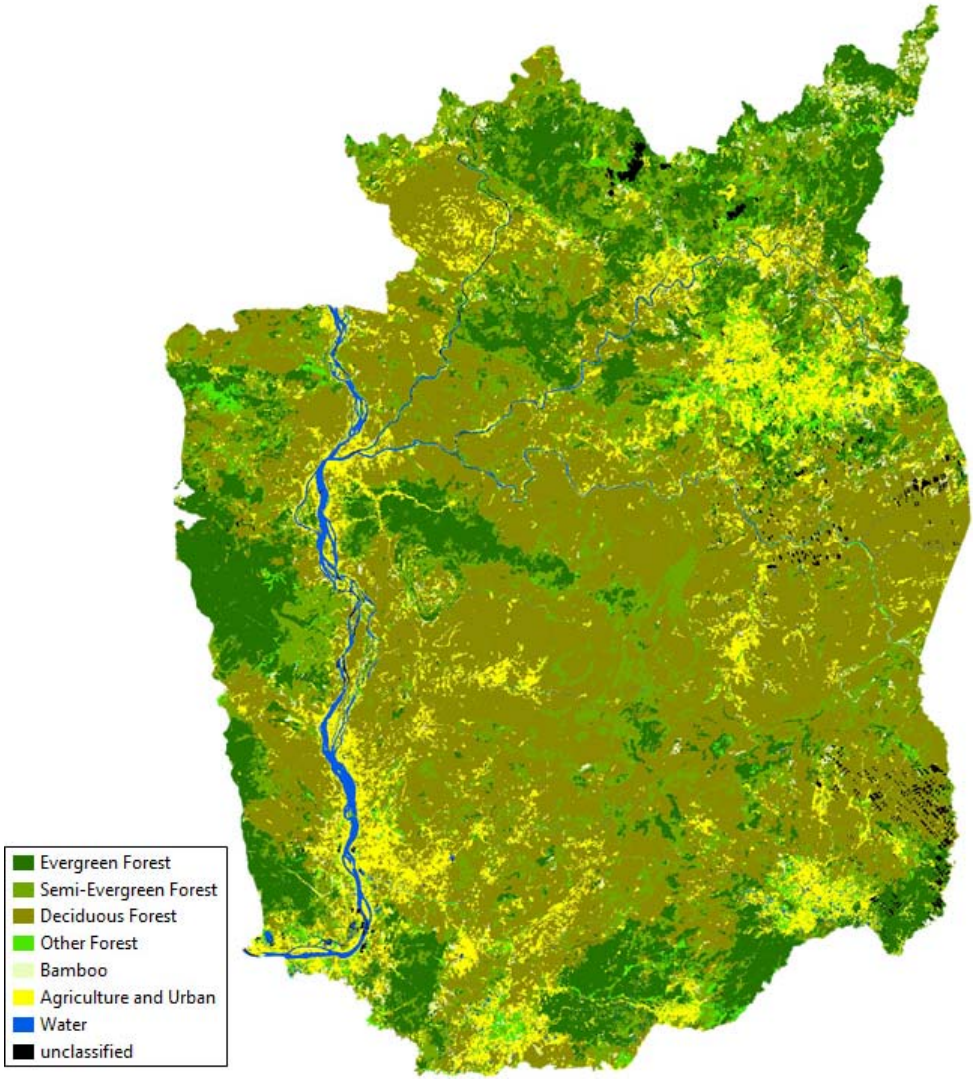
Result of forest type mapping by object-oriented classification



Seasonality

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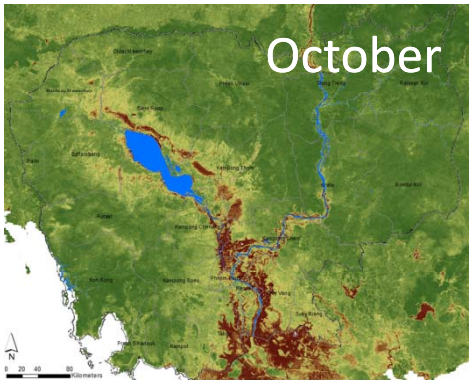
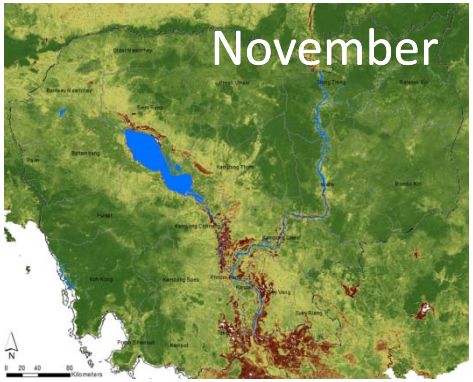
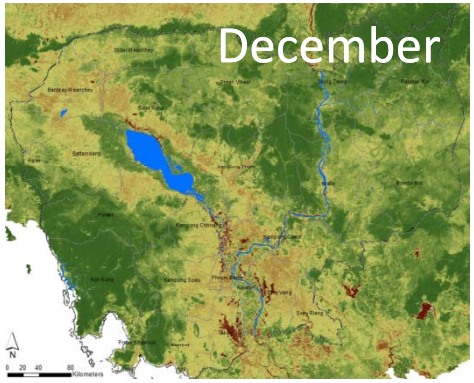
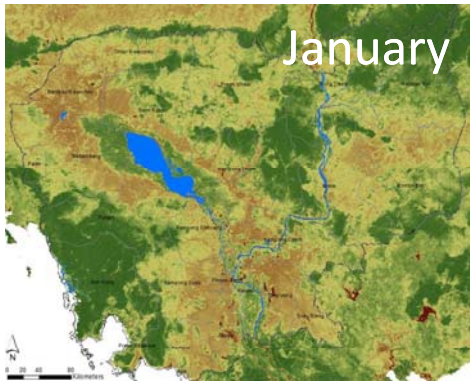
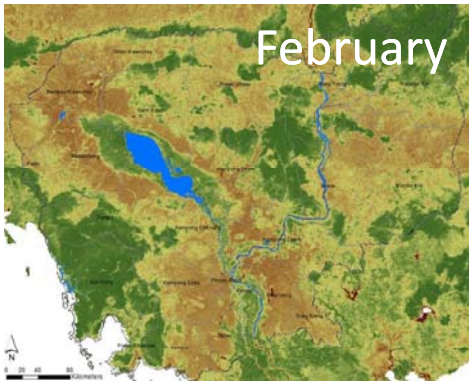
Issue of seasonality

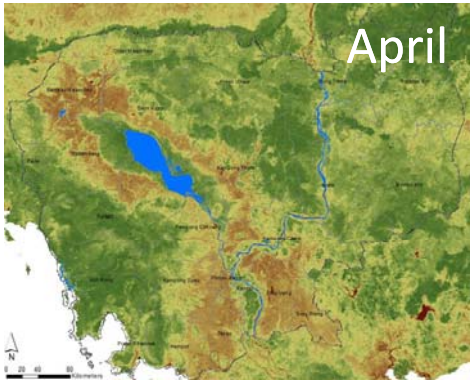












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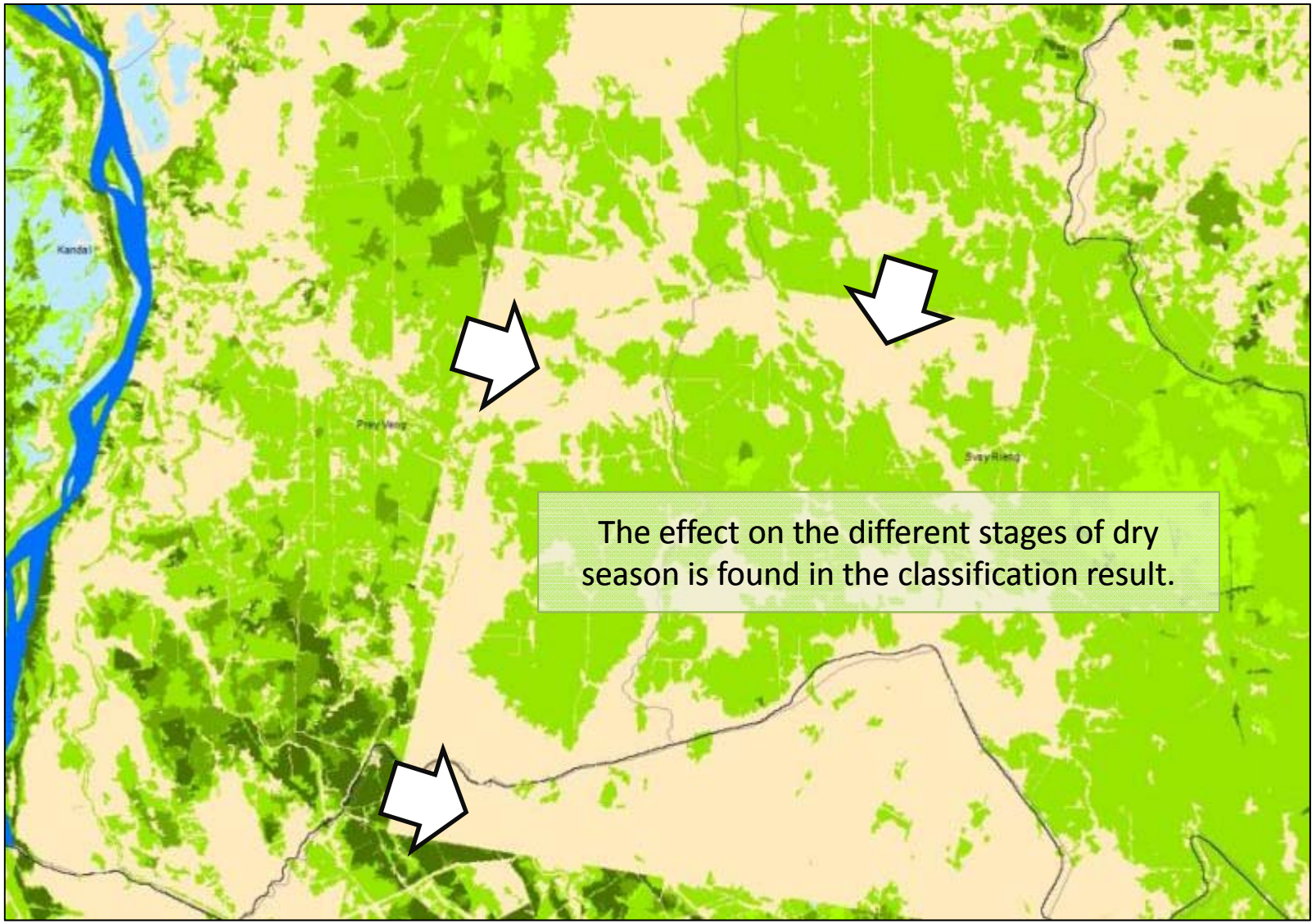
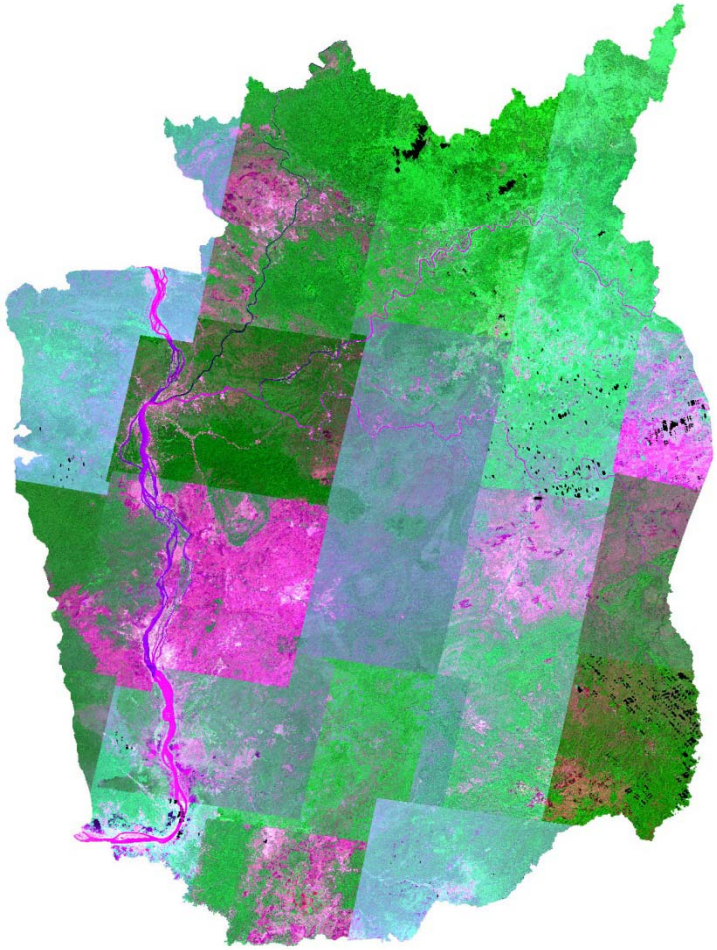
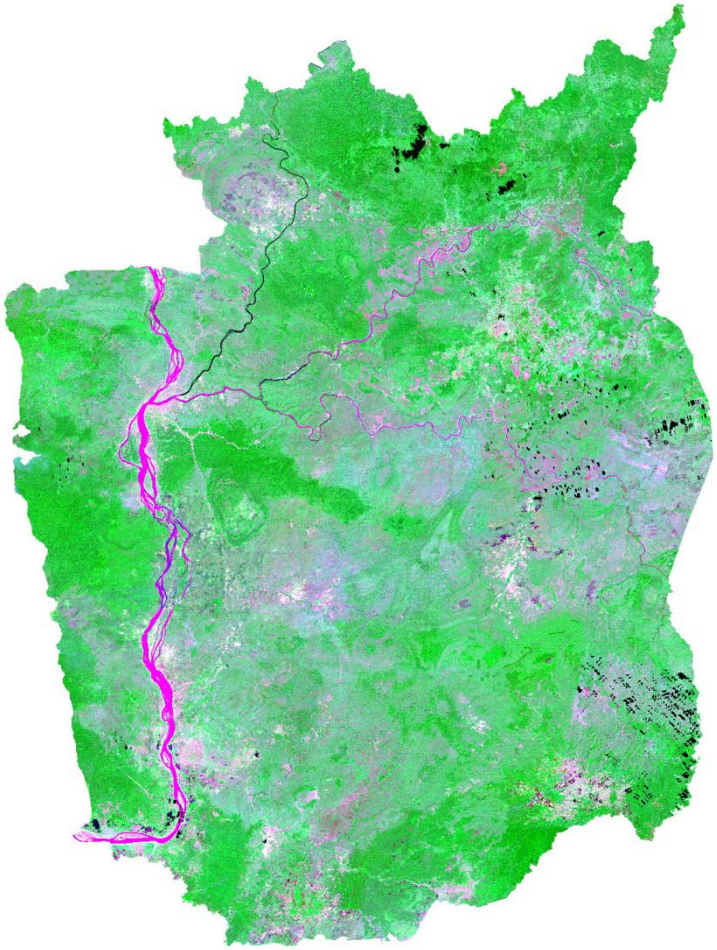
Effects of seasonality in automatic classification



Standardization of images with algorithm for reducing the effect of seasonality



SPOT images (upper: the end of dry season, lower: the beginning of dry season)



Reduction of effect of seasonality by standardizing images with developed algorithm.

Clouds

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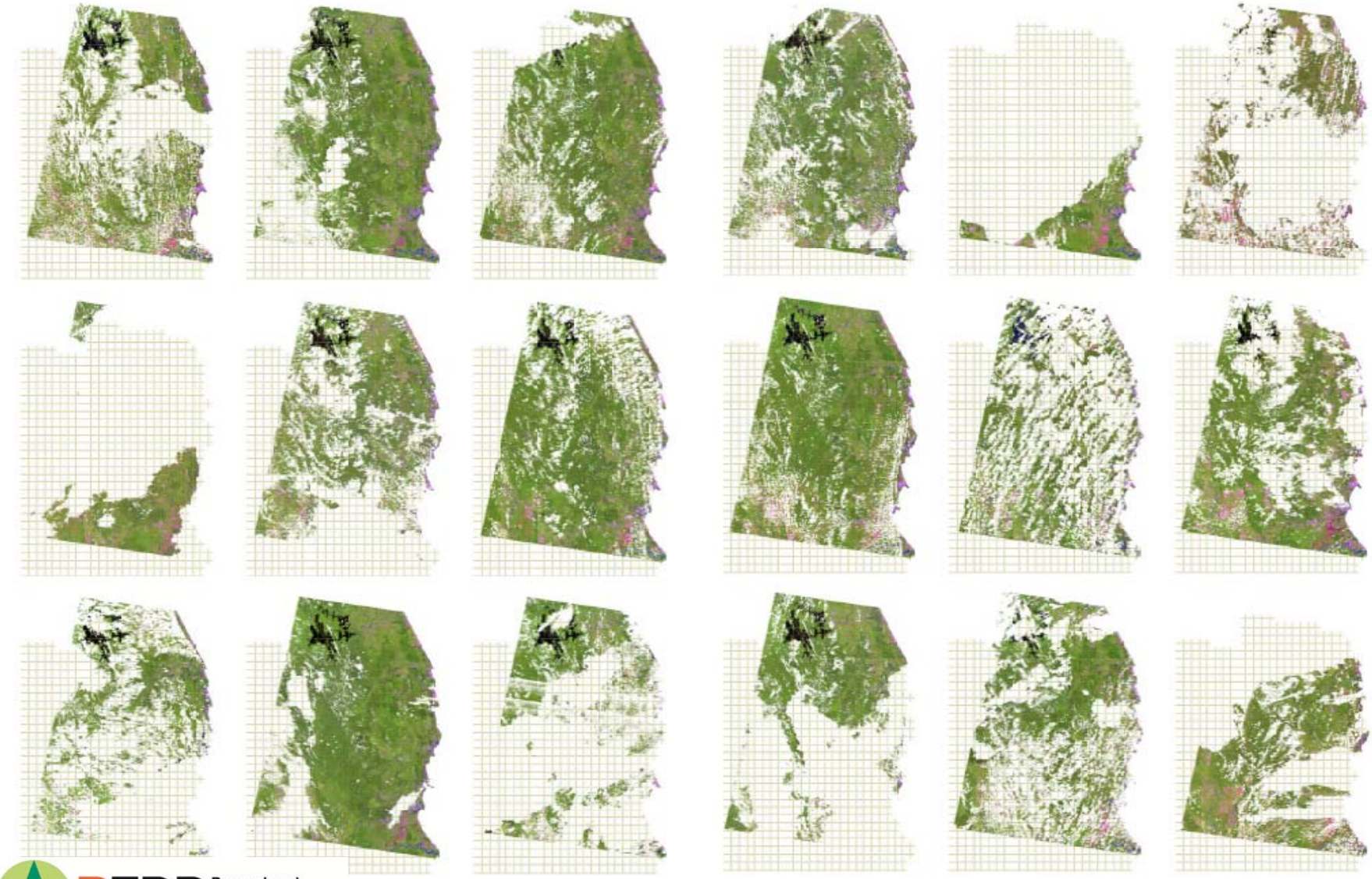
Destiny of cloud effects on satellite images



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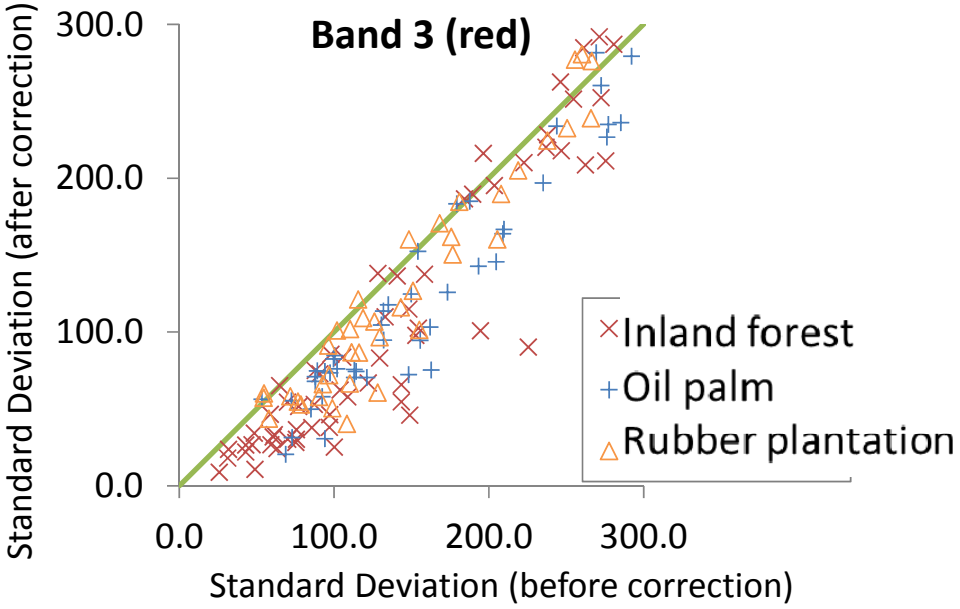
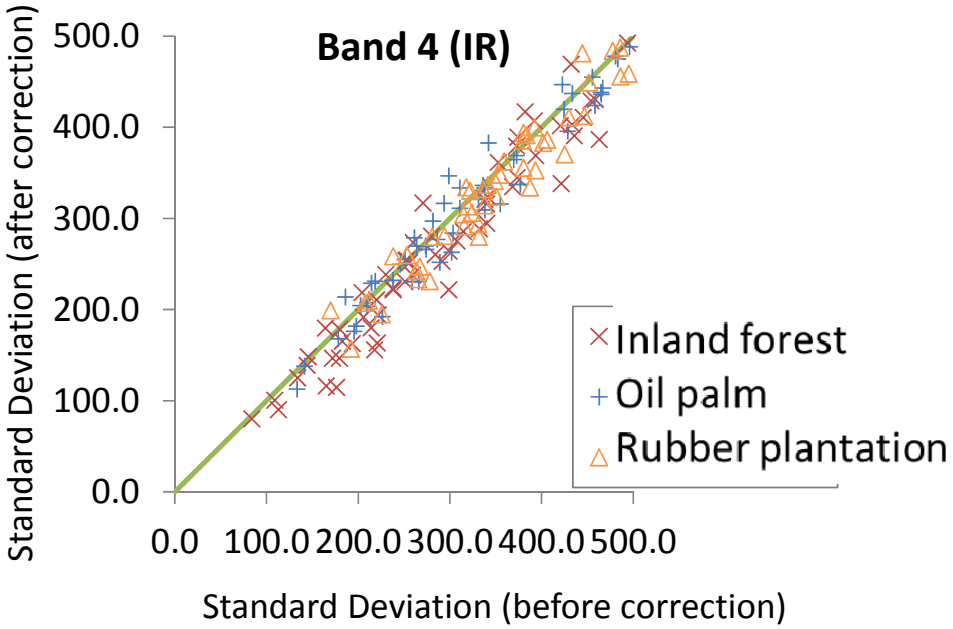
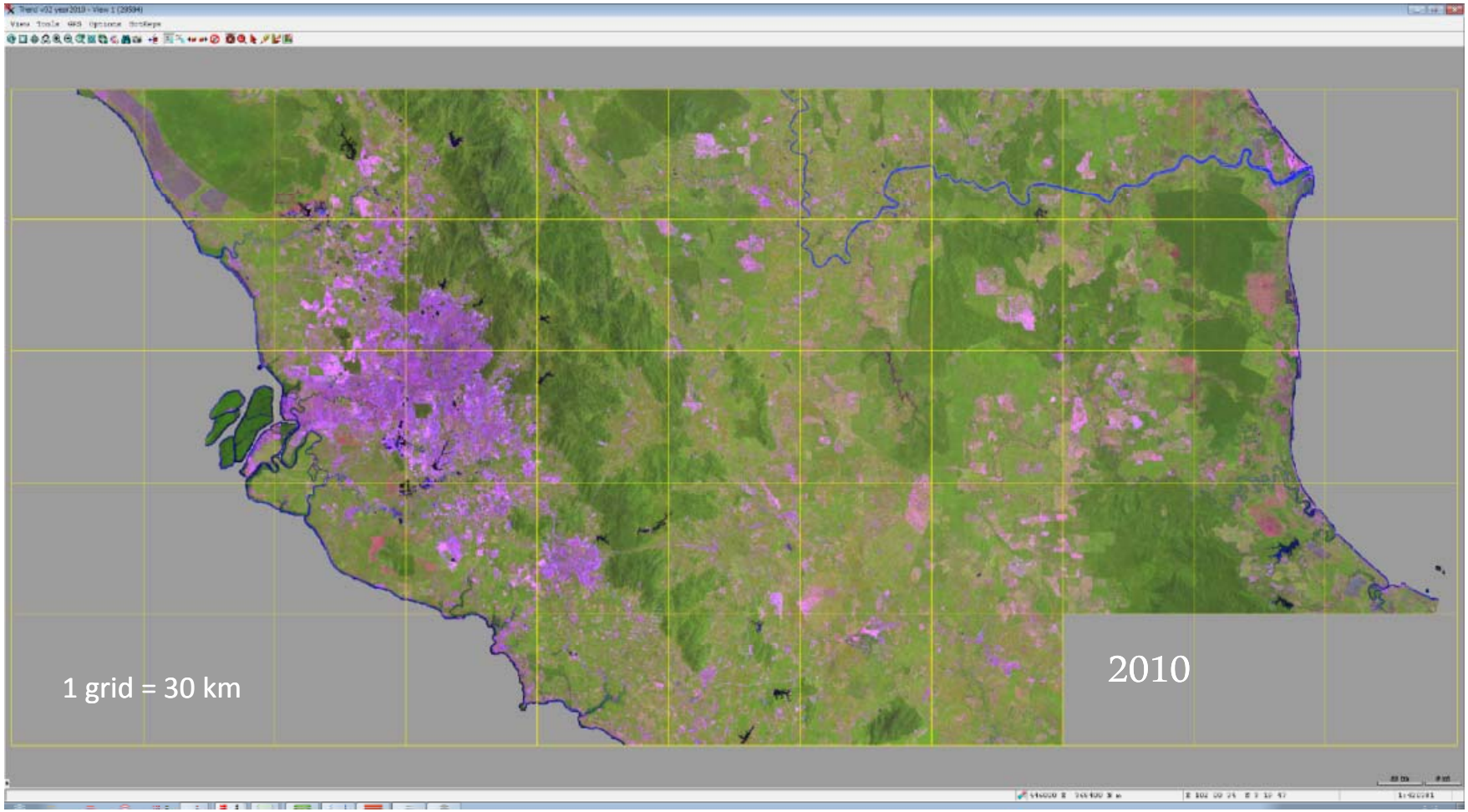
Correction & Data mosaic

- Masking of clouds and their shadows
- Topographic correction
- Atmospheric correction
- Mosaic processing





Preparation of cloud-free data



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Two types of data from field survey

- For area estimation
  - Training data for image classification
  - Verification data for the result of classification
- For estimation of carbon stock per unit area as emission factor
  - Tree census data

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Field survey for estimating carbon stock

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Problems in field survey

- Ownership
- Accessibility and road condition
- Weather
- Topography (steep slope, stream, etc)
- Dangerous animals, insects, and plants
- Illegal logger

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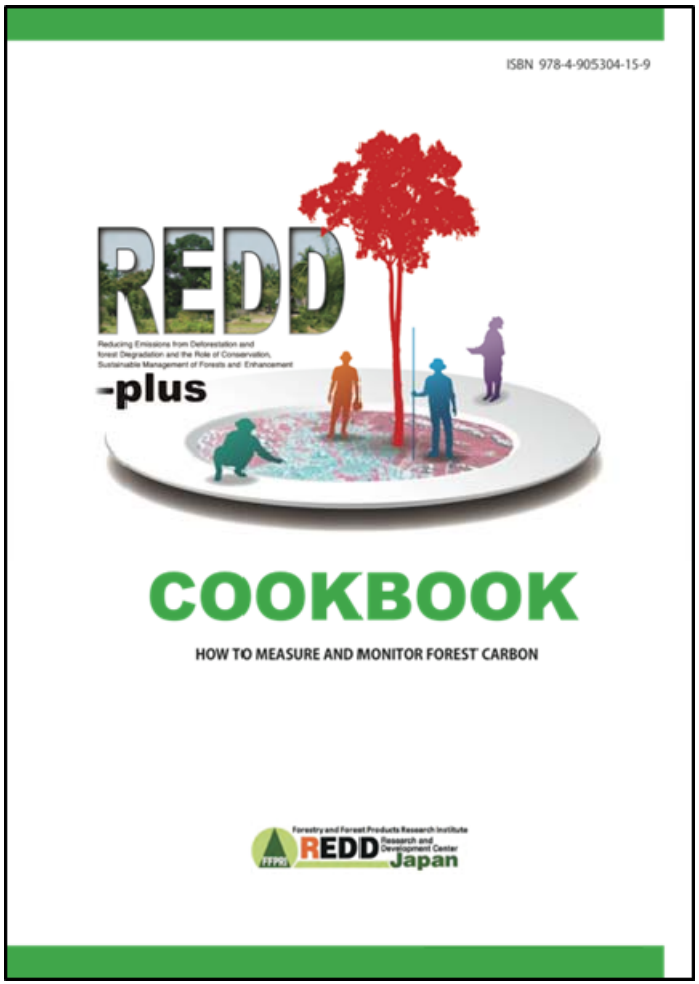
ប្រយ័ត្នគ្រាប់មីន!!
Danger!! Mines!!
2014/01/23 13:33

Publication of REDD-plus Cookbook



- Hands-on manual on REDD-plus for policymakers, government officials and practicioners
- Based on the UNFCCC decisions and the IPCC guidelines/guidance
- English, Japanese and Spanish
- 151 pages with 36 units of items
- National/subnational level
- Reference guide


Thank you for your attention!
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