



WAGENINGEN UNIVERSITY
ENVIRONMENTAL SCIENCES

K&C initiative, LULUCF Theme

Forest and Land Cover Change
Monitoring System for Indonesia

-- Operational Public Services --

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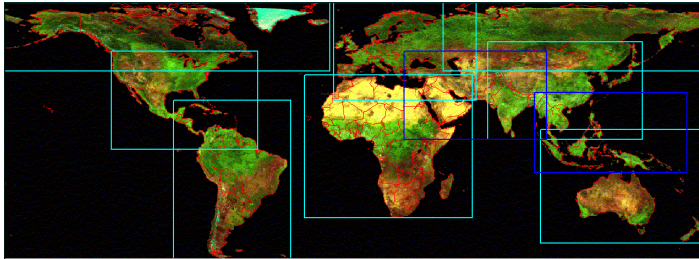
Jakarta, Tokyo, May 2003

Time series of observations by

- ✓ SPOT VEGETATION (since April 1998)
- ✓ ENVISAT GM radar (starting 2003)
- ✓ ADEOS GLI (starting 2003)
- ✓ ALOS PALSAR (starting 2004)

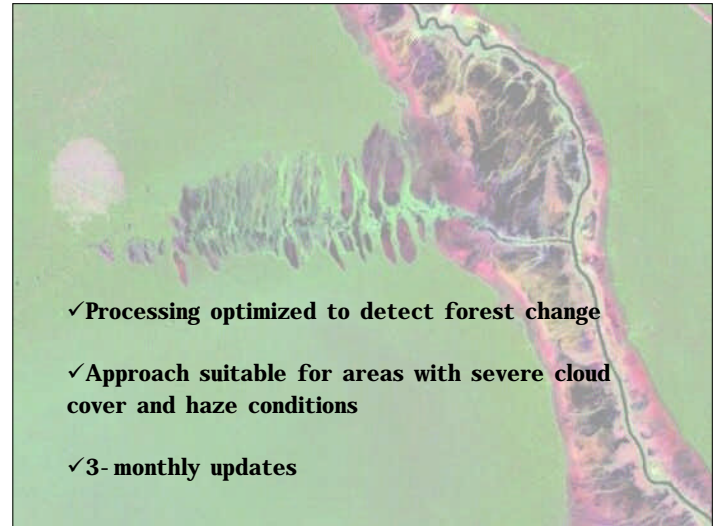
Requirements: total coverage, frequent observation, long observation period, fast delivery, cheap, long observation period, etc

Note: no sensor is ideal, combinations of sensors may be necessary

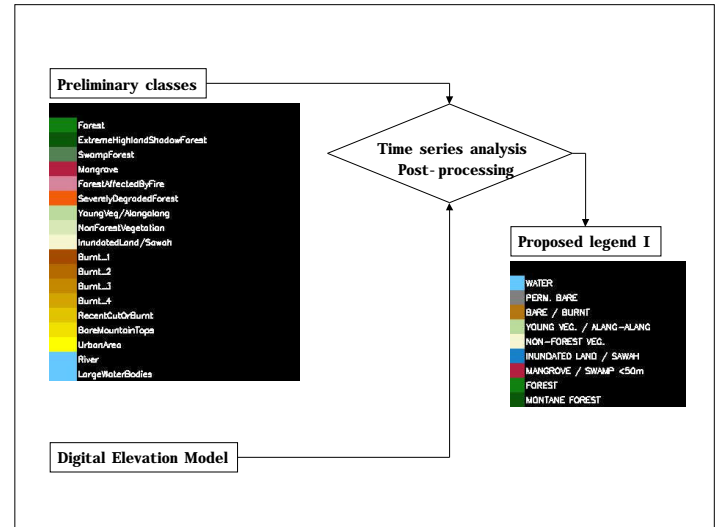
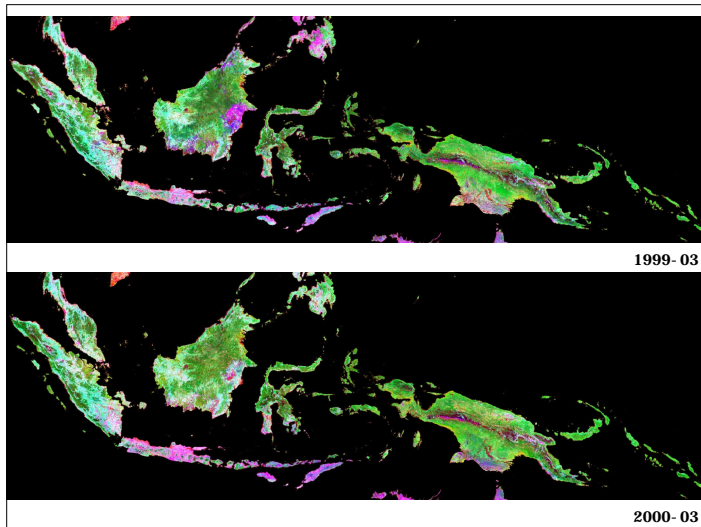


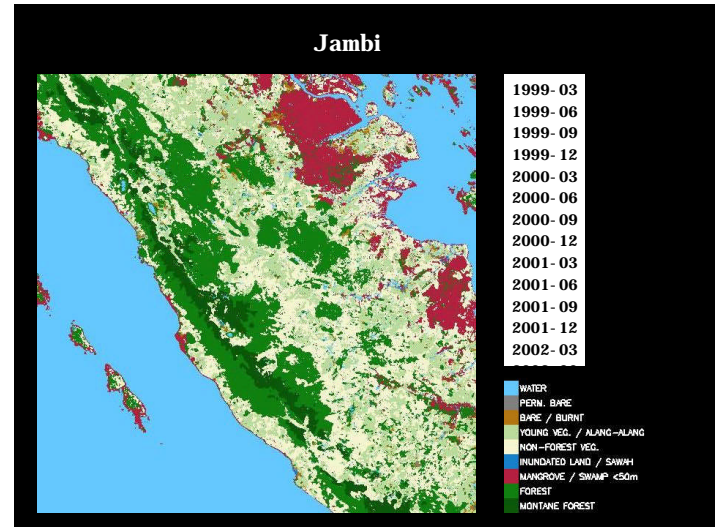
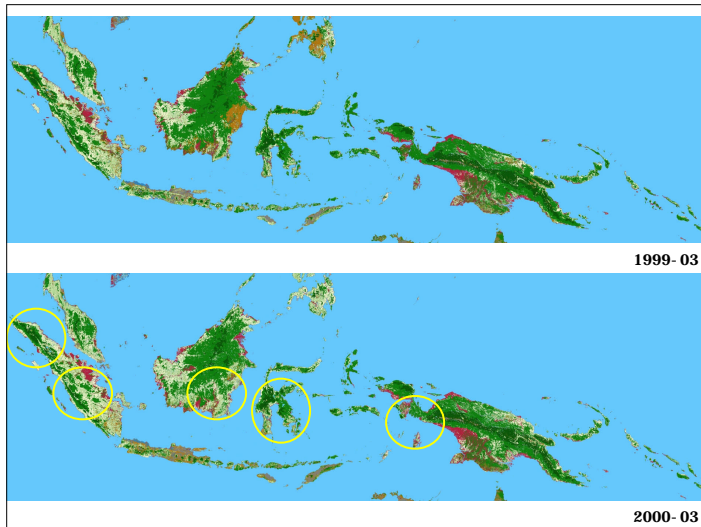
SPOT VEGETATION S10 products;

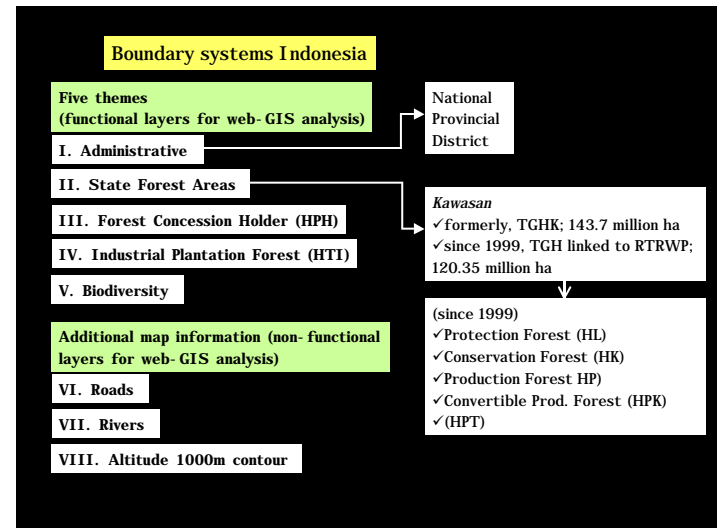
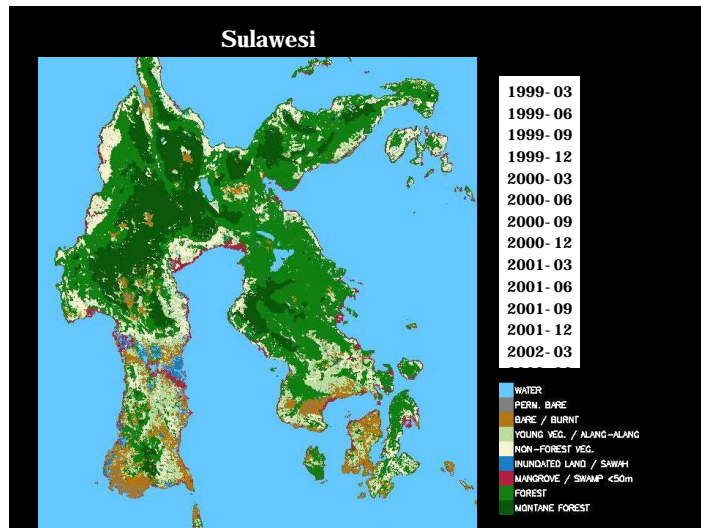
- pixel size ~ 1 km x1 km;
- max. 36 useful observations /year;
- 4 bands:
 - B0 (blue)
 - B2 (red)
 - B3 (near IR)
 - SWIR



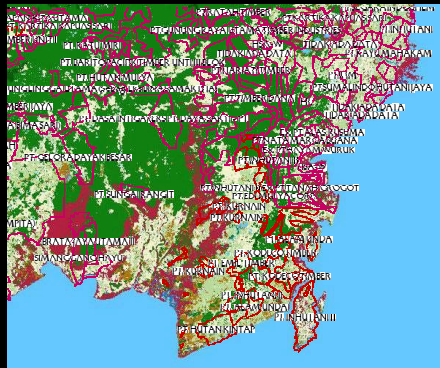
- ✓ Processing optimized to detect forest change
- ✓ Approach suitable for areas with severe cloud cover and haze conditions
- ✓ 3- monthly updates



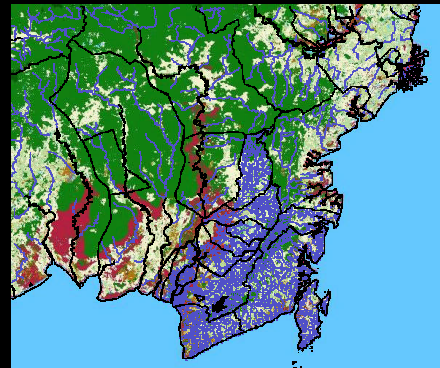


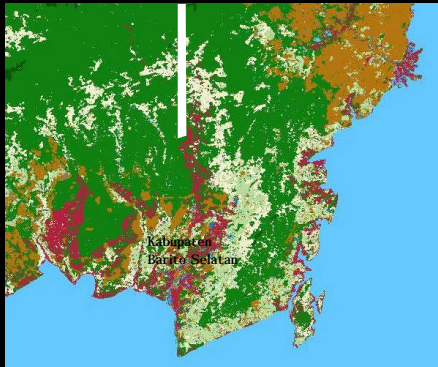


III. Forest Concession Holder (HPH)



I. Administrative

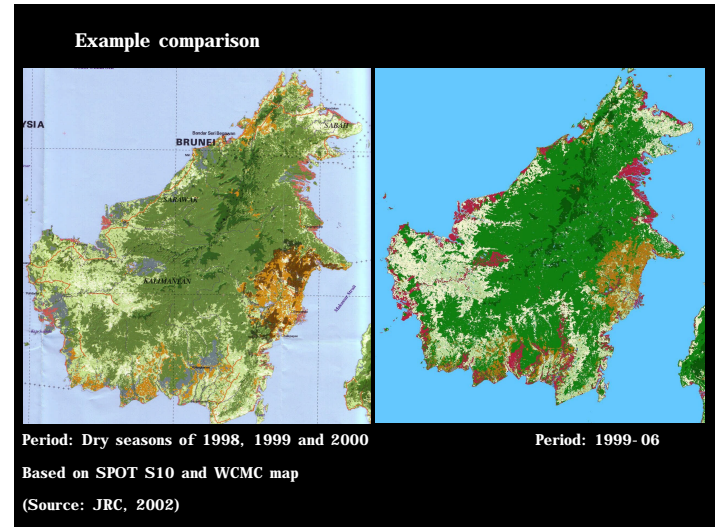
National
Provincial
District



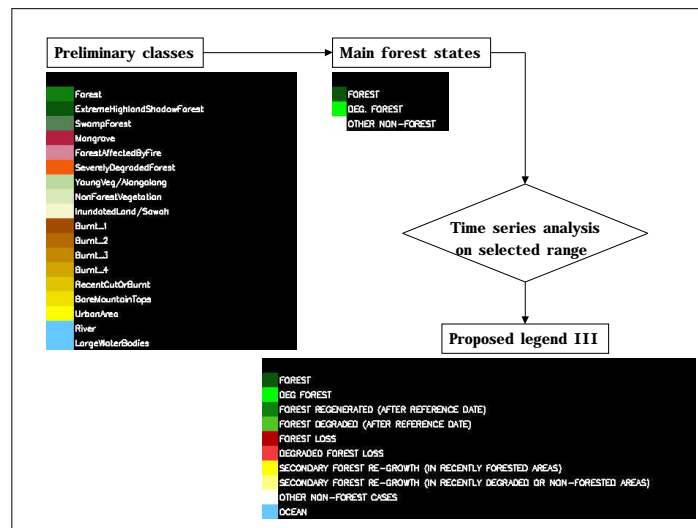
Examples WebGIS Analysis

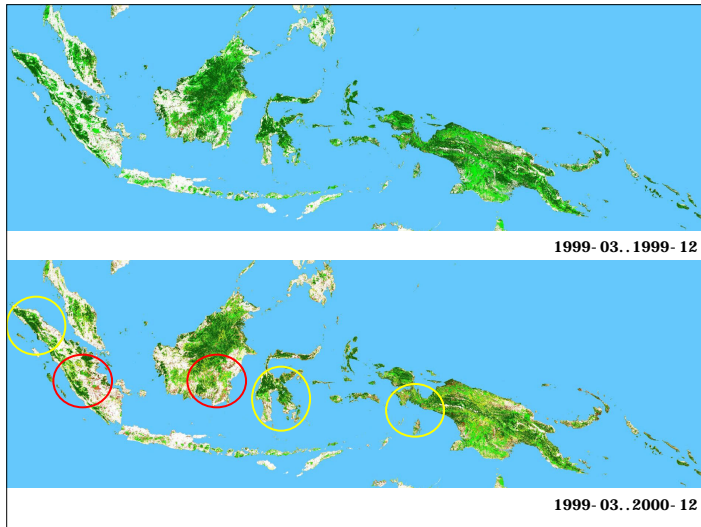
- ✓What is the total forest cover in Indonesian's State Forest Area in 2002?
- ✓What is the rate of deforestation in province X in the period 1999-2002?
- ✓What is the land cover change in the orangutan habitat areas in Sumatra?
- ✓What is the deforestation in the HPH's in kabupaten Y above 800 m altitude?
- ✓Is reforestation successful in South-Kalimantan?
- ✓What are the hot spot areas for indicator species biodiversity loss?
- ✓Etc....

Achievement example: Oil palm investment stopped



✓Other legends





Forest state and change Some example periods

99-03..99-12



99-03..00-12



99-03..01-12

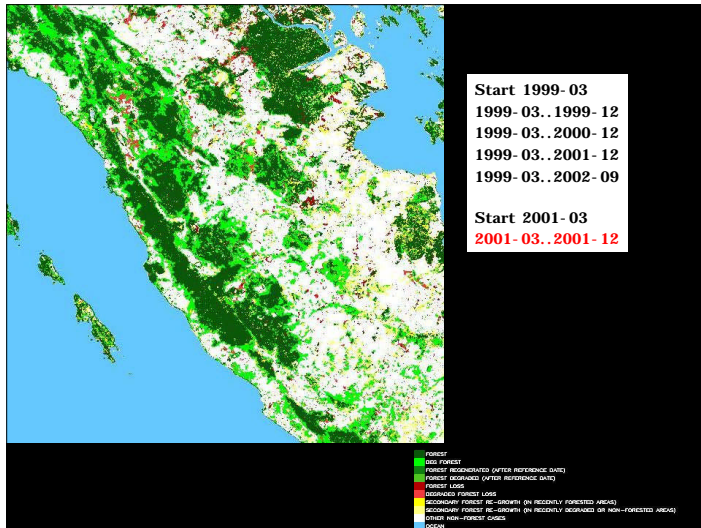


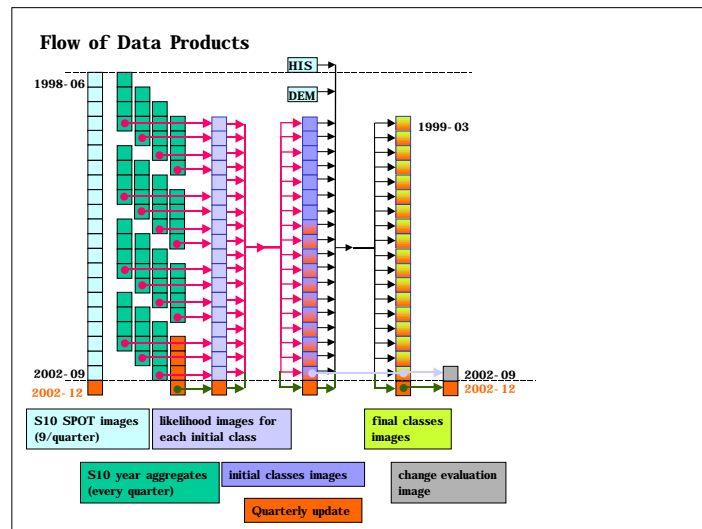
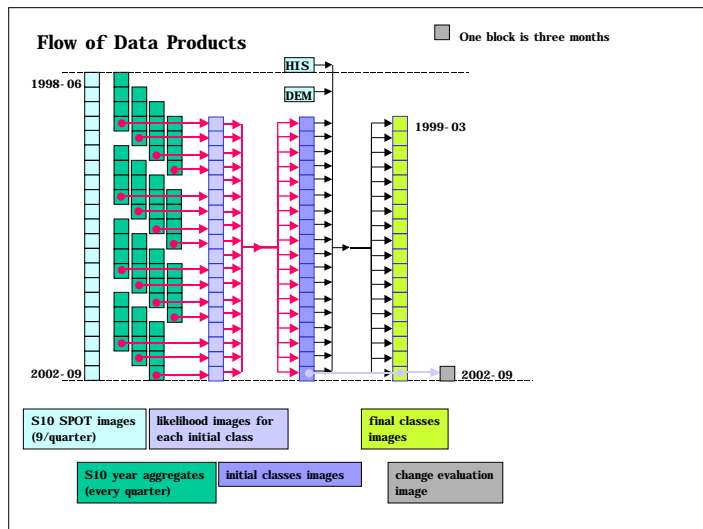
99-03..02-09

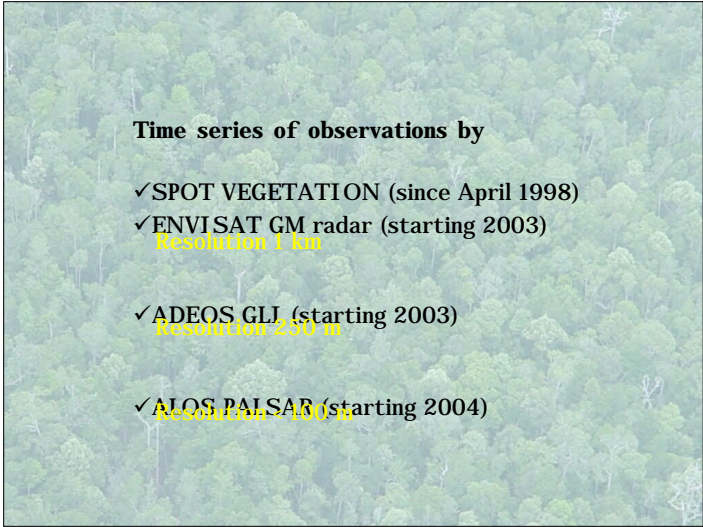


01-03..01-12









Time series of observations by

✓SPOT VEGETATION (since April 1998)

✓ENVISAT GM radar (starting 2003)

Resolution 1 km

✓ADEOS GLI (starting 2003)

Resolution 250 m

✓ALOS PALSAR (starting 2004)

Resolution 30 m

1. Peat forests in intended study area (Wetlands theme)

Contribute to inventory (global climate change science)

Contribute to environmental and biodiversity protection (operational)
(e.g. Mawas: 1 Million ton C credits / large wild orangutan population)

2. Mangroves in intended study area (Wetlands theme)

Contribute to environmental and biodiversity protection

Economic relevance: Fish nursery, coastal protection, shrimp/fish ponds

3. Land cover change monitoring Indonesia (LULUCF Theme)

Provide up-to-date information continuously (preferably as part of
larger framework)

3. Land cover change monitoring Indonesia

Objectives;

- Provide up-to-date information continuously to support **environmental protection**, including **law enforcement**, fast information for governments and donor organizations, carbon offset and biodiversity crediting, etc

- Provide **transparency** and free/easy access to data on internet

Approach;

- Monitoring with dual pol (HH/HV, 20 m) and GLI
- Orthorectification using SRTM data is necessary
- Integration with other (historical) observation series, such as from SPOT VEGETATION which are currently used
- Integration with Ministry of Forestry NFI databases (administrative boundaries, geology, soils, etc)
- What can be presented with reasonable accuracy? / WebGIS
- Service will be continued after lifetime ALOS

What are the consequences / advantages of using PALSAR/GLI?

Current system provides near time information (between 3-6 months ago, 3-monthly update) at 1 km resolution.

With **GLI** an enhancement of thematic detail, spatial detail (250 m) and accuracy can be expected. But also, due to higher cloud cover and haze problems and a slower data delivery, larger time lags may result.

With additional **PALSAR** data even more information could be provided, but these amounts may be too large to handle / distribute in a practical system. Also processing time may be prohibitive / excessive (for whole Indonesia, in a reasonably short time). Reducing spatial resolution to 100 m (or even 250 m) may be a solution.

Consequently the system splits in a fast branch with lower resolution and lower thematic detail and a slow branch which more detailed information.

K&C products could be the latter, to be provided yearly, 3 or 4 times, but with a considerable time lag (more than a year).

Funding / support



Confirmed:

BOSF: Remote sensing and GIS processing centre in Balikpapan (my part-time home base!);
+ Field station(s) in Mawas, Trikes, Field staff (botanists, land surveyers, etc),
other logistic support (also for guest researchers; You are welcome!)

Wageningen University, dept. Environmental Sciences: Expertise in Hydrology, Soil Physics, Watershed management, hosts Wetlands International, etc (my other part-time home base);

Ministry of Forestry: MoU with BOSF; NFI data;

T.b.d.:

Int'l donor organizations in Jakarta: Develop joint funding scheme this year?

NASA: All necessary SRTM data?

K&C Initiative: Mosaicking support?; Orthorectification support?

(Cooperation:)

JRC/MTV; JPL; GREM; ??