Participatory MRV: Remote sensing and GIS study

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Outline

- Objectives and activities
- Methods
- Preliminary analysis
- Field work experience
- Future plans

RS/GIS Objective

To find a simple and cost effective method, based on satellite imagery to verify the credibility and validity of participatory measurements. (Land use and land cover change (LULCC), forest degradation, carbon stock)

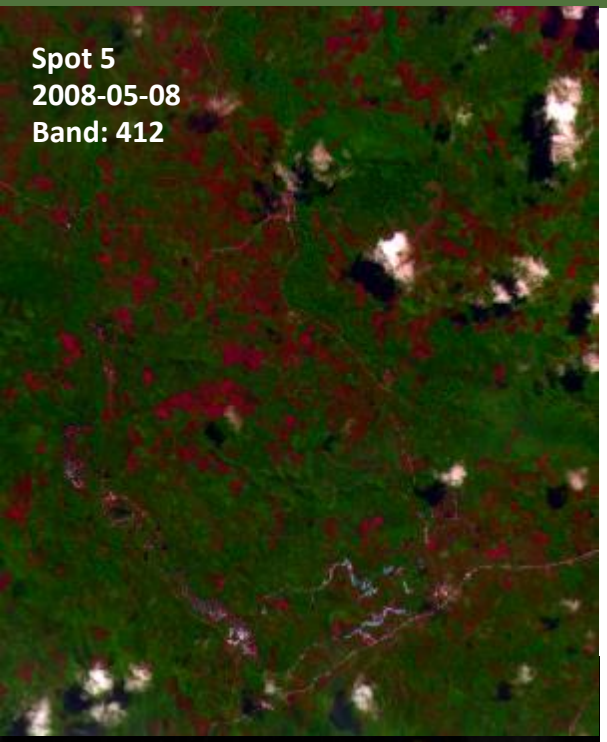
RS/GIS Activities

Satellite image analysis, ground check (pixels, measurements), linking remote sensing to social survey

When are **ground checks** necessary? How can we detect inconsistencies between participatory measurements and remote sensing?

Remote sensing data

- **Landsat 5:** 1991, 1994, 1997, 2000, 2005
  - Resolution: 30 m multispectral
- **Landsat 8:** 2013
  - Resolution: 30m multispectral, 15m panchromatic
- **Spot 1:** 2001
  - Resolution: 20m multispectral, 10m panchromatic
- **Spot 5:** 2008, 2011
  - Resolution: 10m multisectral, 5m panchromatic
- **RapidEye:** 2010, 2011, 2012
  - Resolution: 5m multispectral
- **ALOS Palsar:** 2010
  - Resolution: 12.5m



Data analysis: Landsat and Spot

(1) Pre processing

Landsat

Spot

Geometric correction
Cloud/shadow removing
Haze reduction
Noise reduction
Histogram matching

(2) TOA Radiance and Reflectance

Landsat

Radiance and reflectance conversion

(3) Normalized Difference Vegetation Index

NDVI

NDVI = (NIR-VIS) / (NIR+VIS)

NIR: Near Infrared
VIS: Visible red

(4) Supervised classification

Training samples

Open land
Settlement
Dense vegetation
Medium vegetation
Sparse vegetation
Water body/River

Classified images

(5) Change analysis

Landsat: 1991 ; 1994 ; 1997 ; 2000 ; 2005

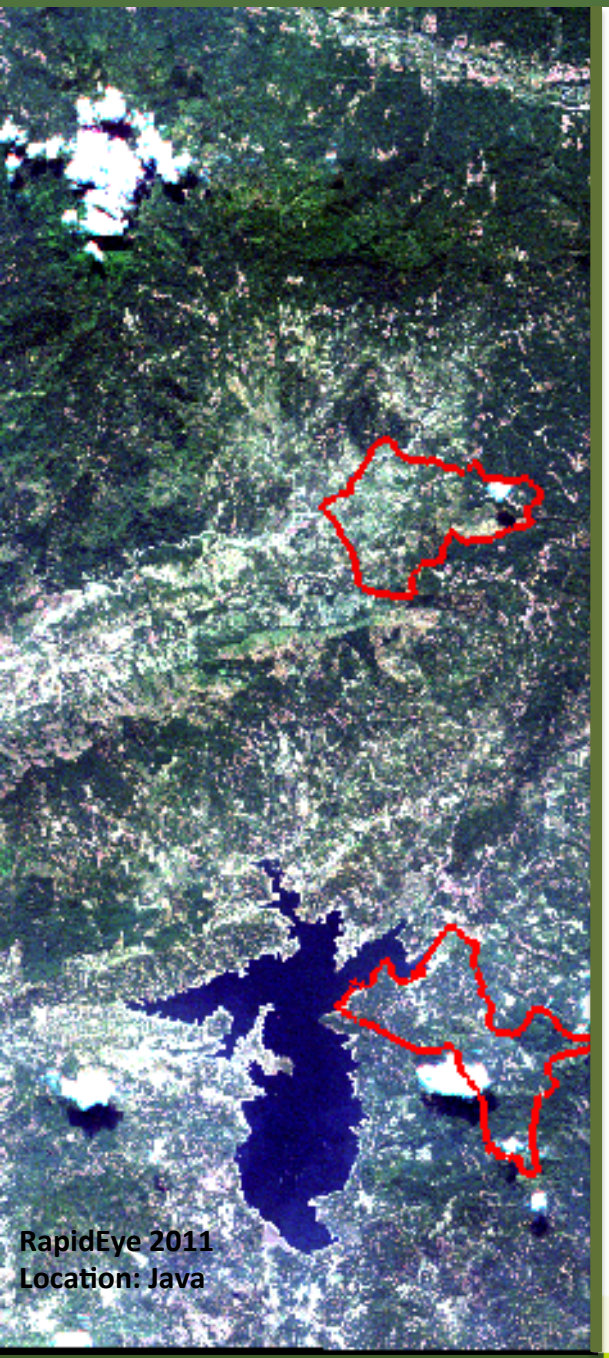
Spot: 2001 ; 2011

(6) Validation

Ground check: Stratified random sampling

Participatory mapping

CIFOR

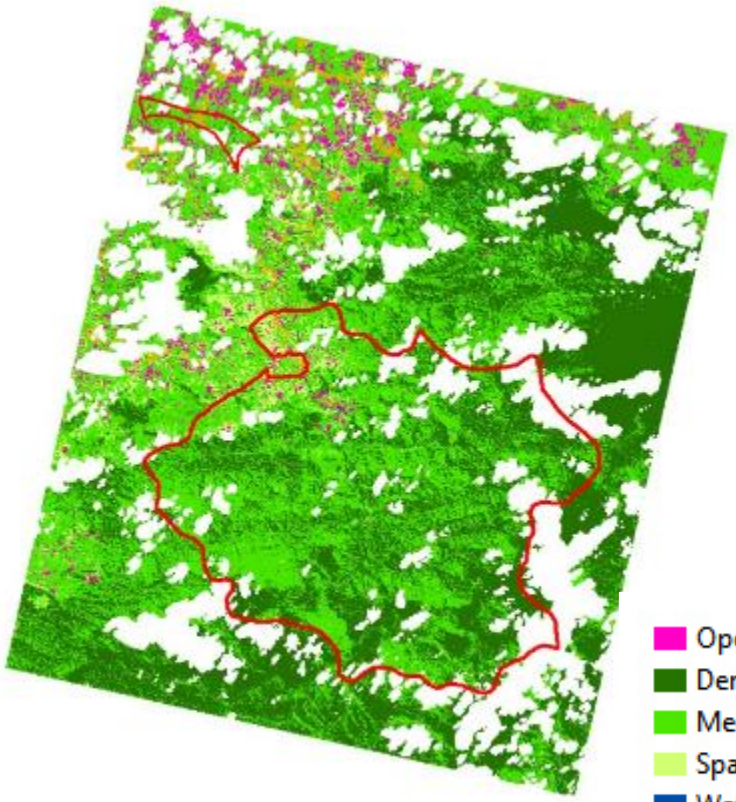


Data analysis: RapidEye

- Atmospheric correction and haze reduction
- Unsupervised classification
- Supervised classification
- Object based classification
- NDVI
- Biomass estimation

Land cover change based on Spot data in Kapuas Hulu (West Kalimantan)

2001



2011

- Open land
- Dense vegetation
- Medium vegetation
- Sparse vegetation
- Water body/River
- Settlement

Land cover change based on Landsat data in Kapuas Hulu (West Kalimantan)

1991

1994

1997

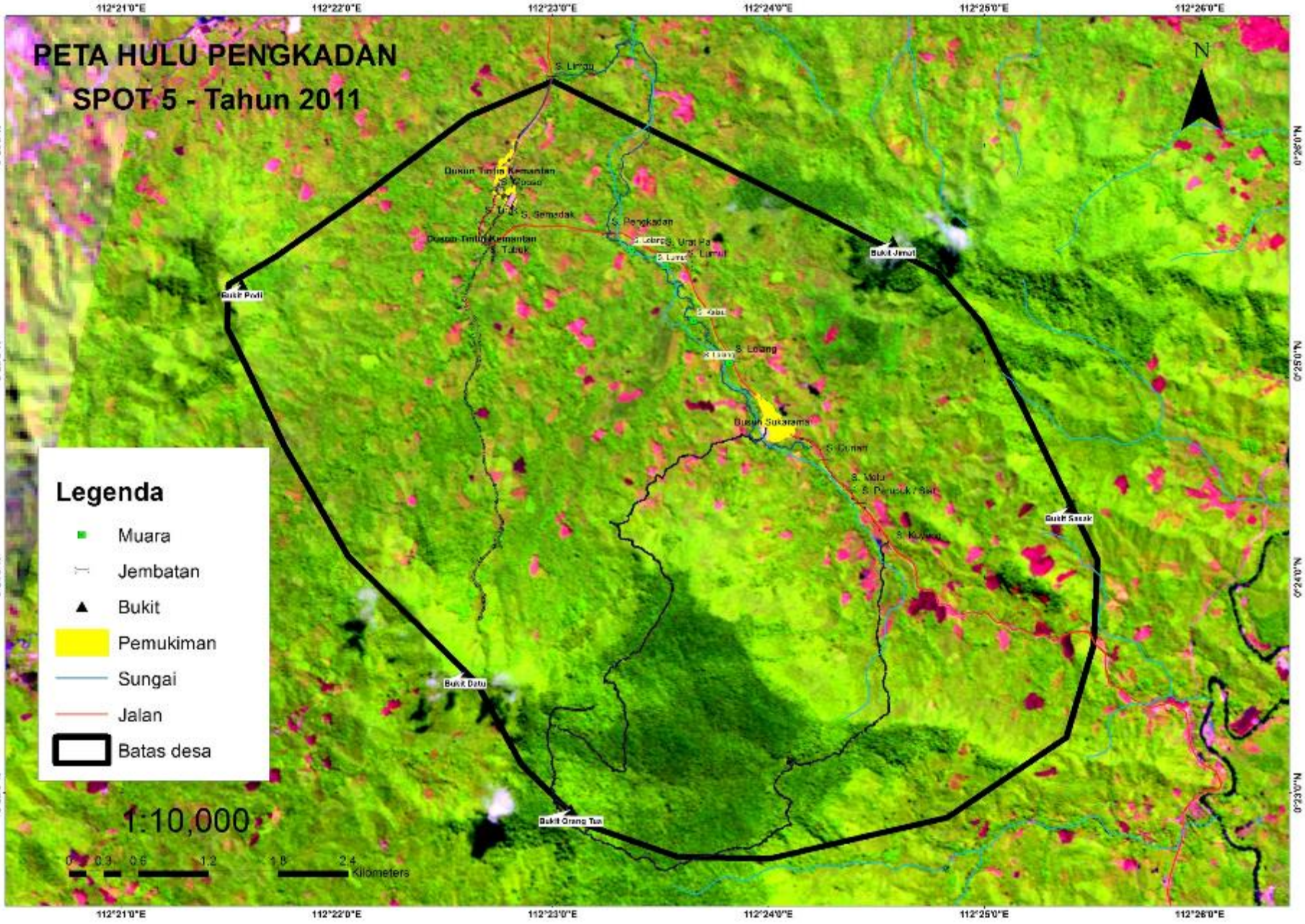
2000

2005

- Open land
- Dense vegetation
- Medium vegetation
- Sparse vegetation
- Water body/River

Fieldwork experience

- Over **400** ground control points have been collected
- Village boundaries have been setup with the assistance of key people in three villages, i.e. Hulu Pengkadan, Sri Wangi and Nanga Jemah
- The social team have been supported with the interviewing of key stakeholders for participatory mapping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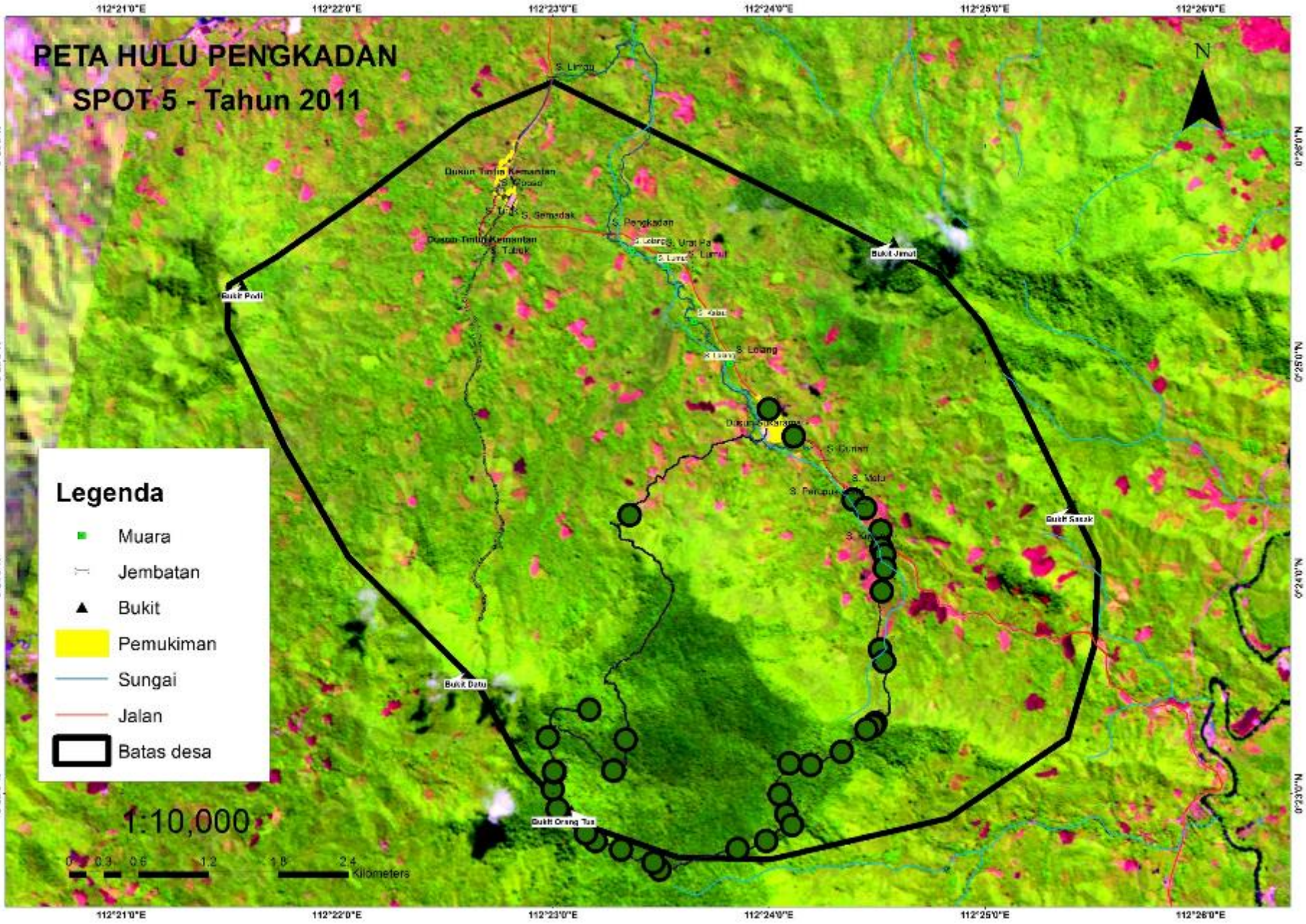
Dusun Tintin Kemantan
S. Tubuk
S. Urat Pa
S. Lumut
Bukit Jimat
Bukit Podi
S. Lolang
Dusun Sukarama
S. Curian
S. Melu
S. Penuduk / Seit
S. Kuyang
Bukit Sasak
Bukit Datu
Bukit Orang Tua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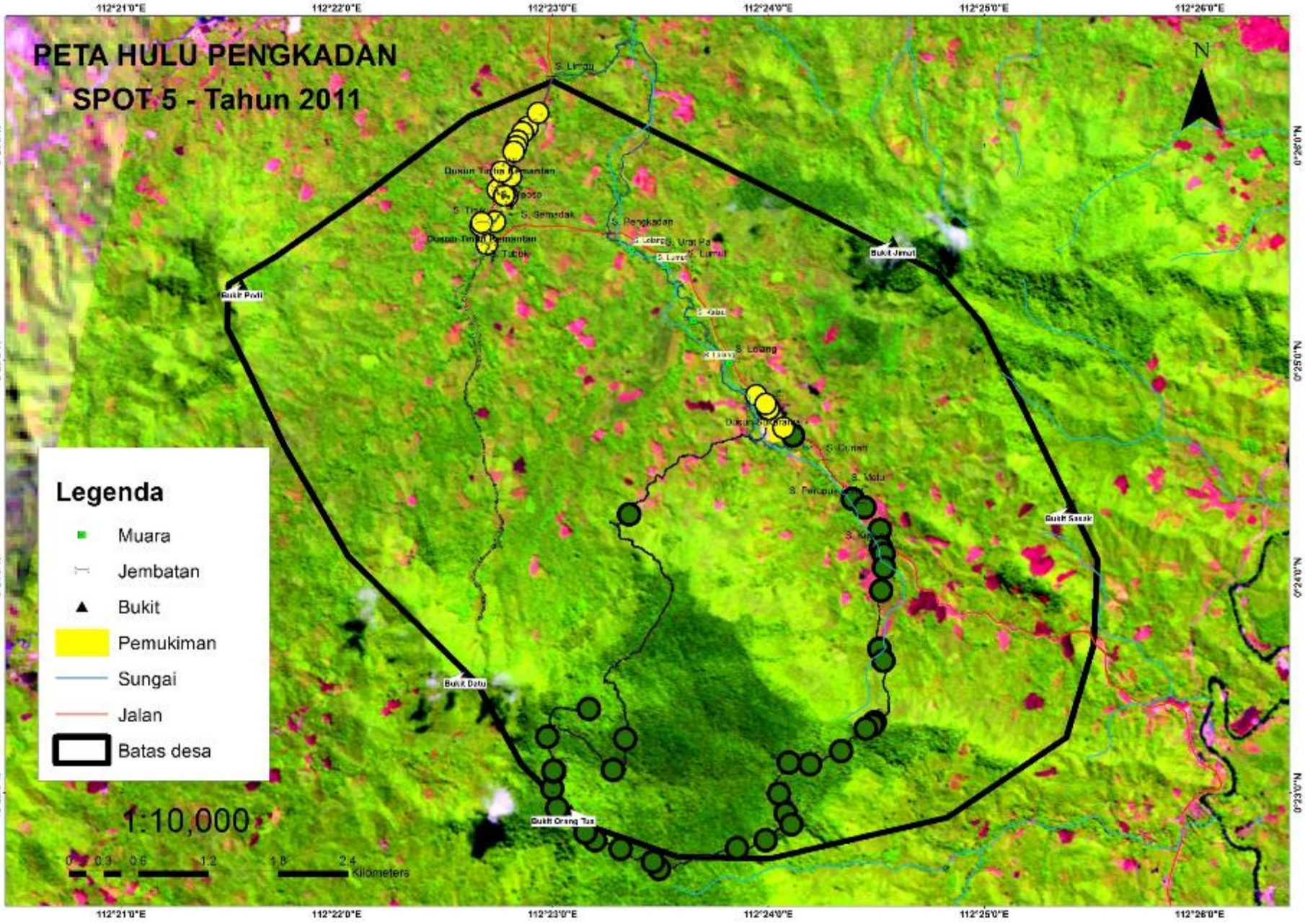
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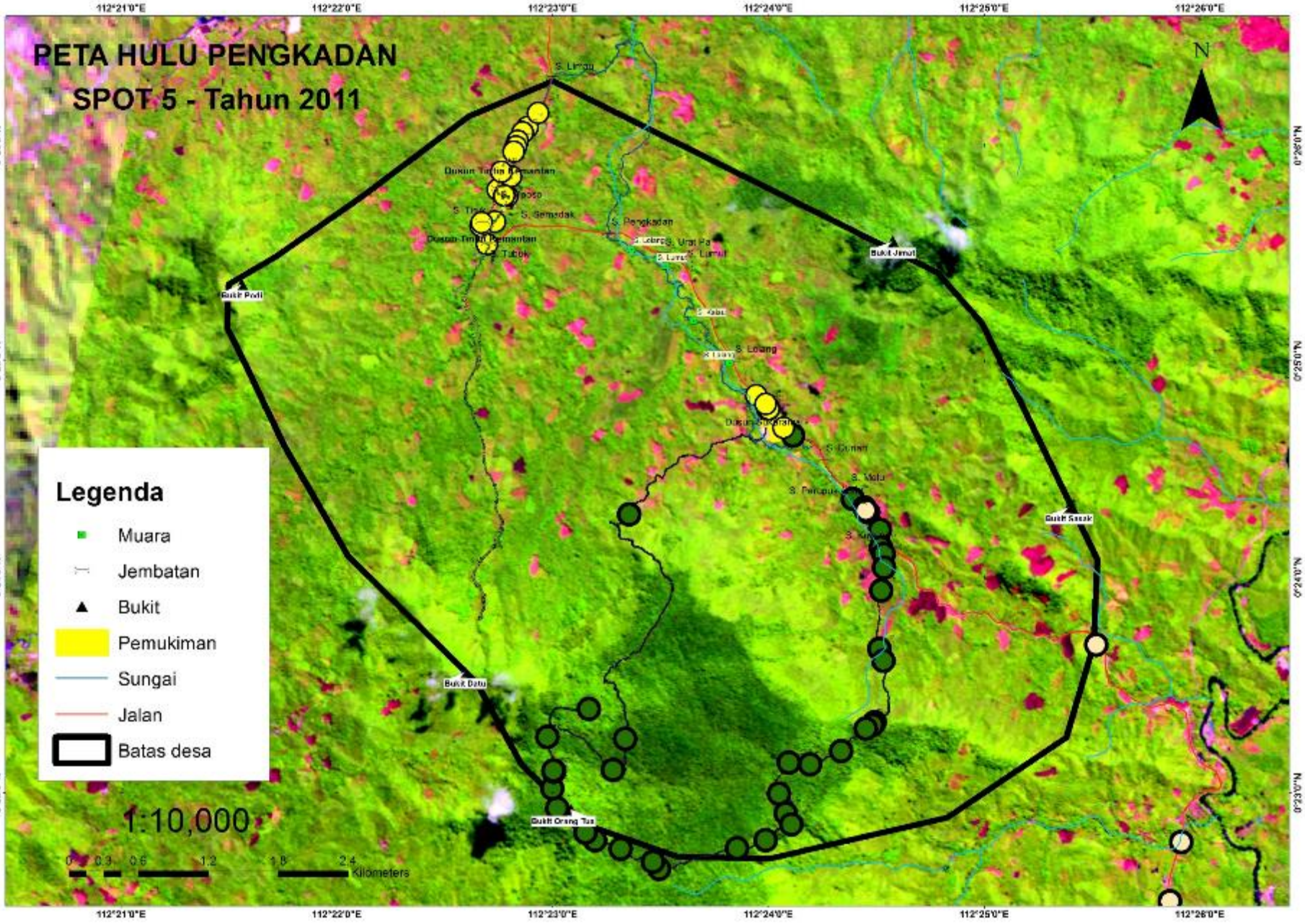
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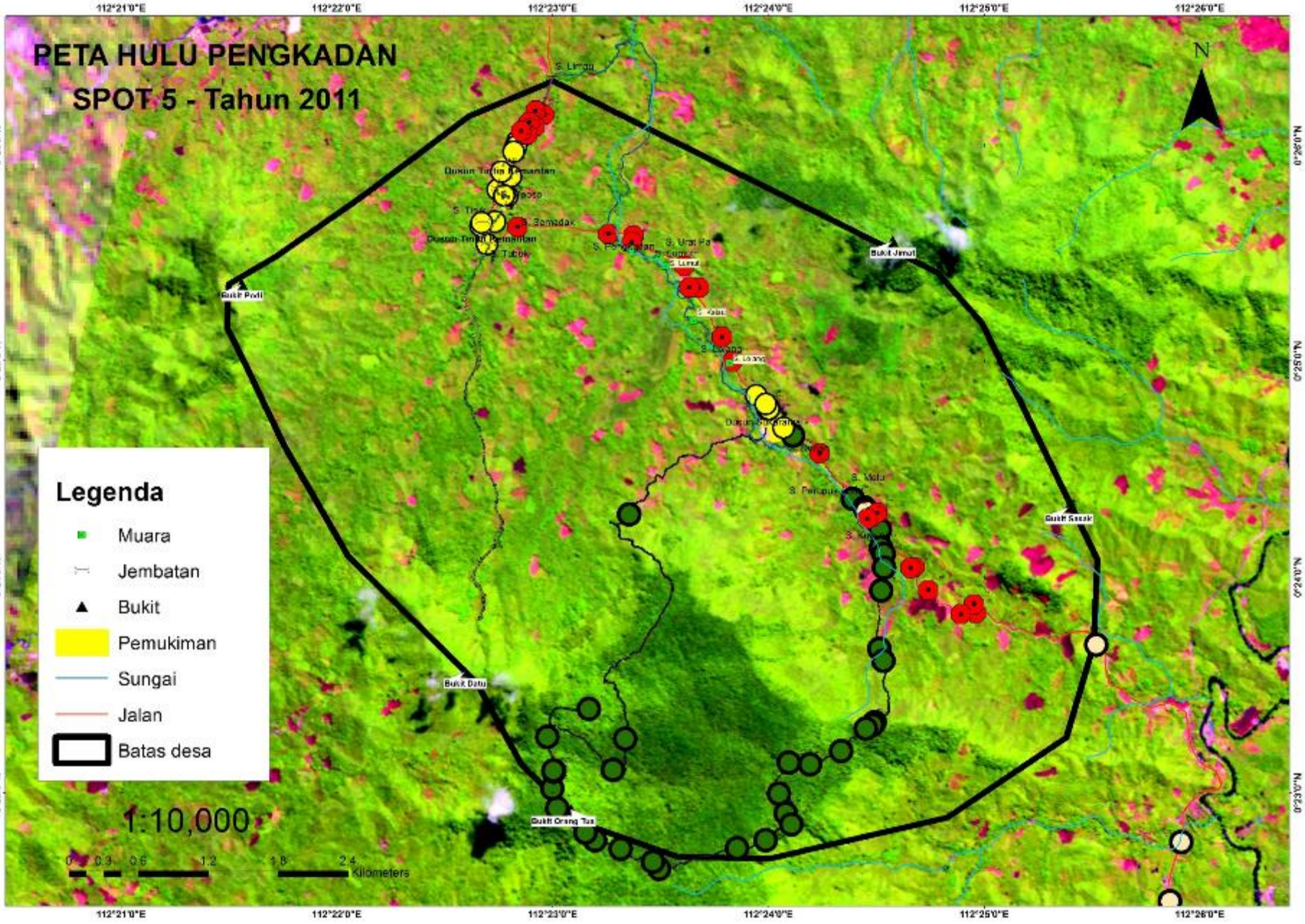
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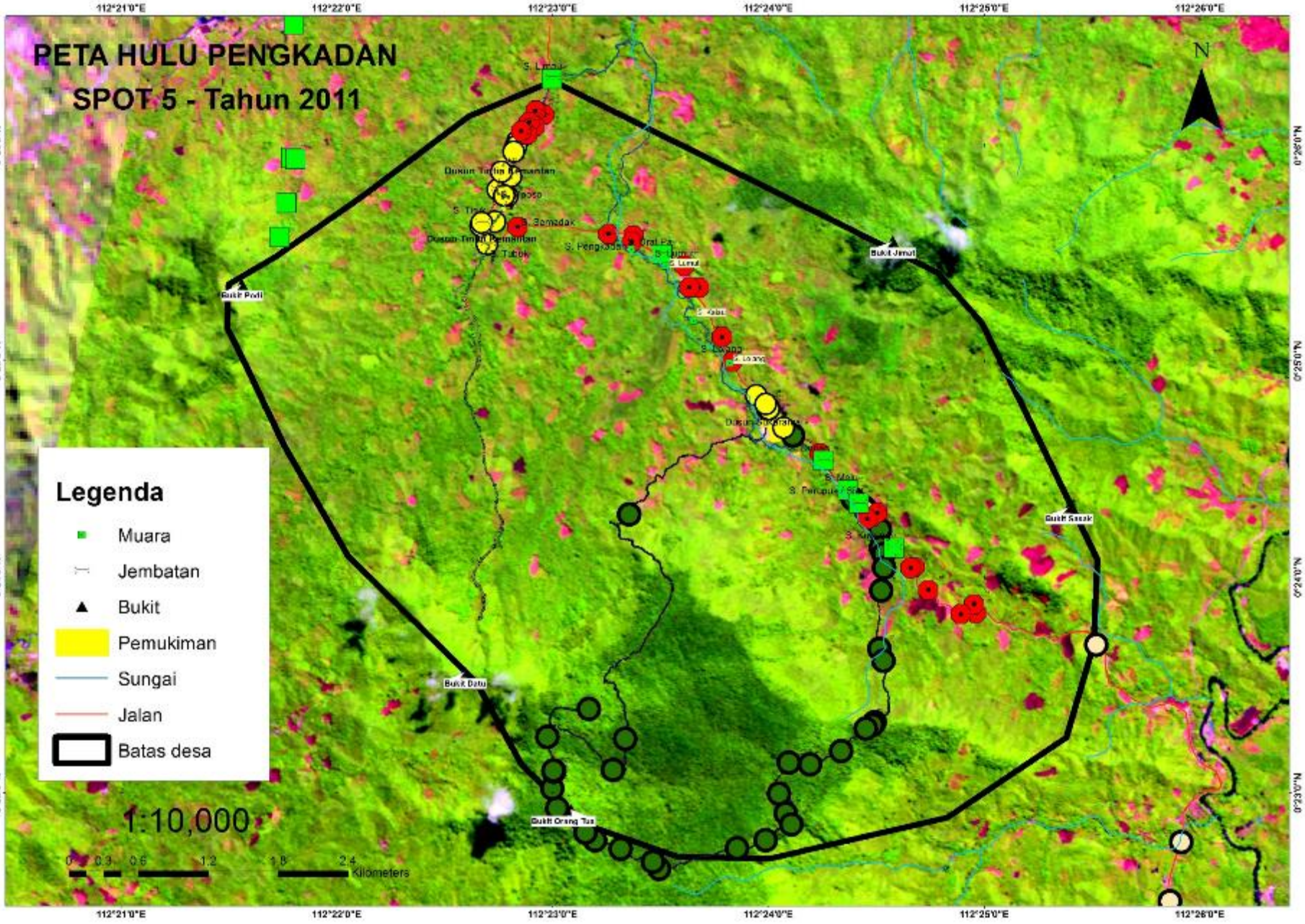
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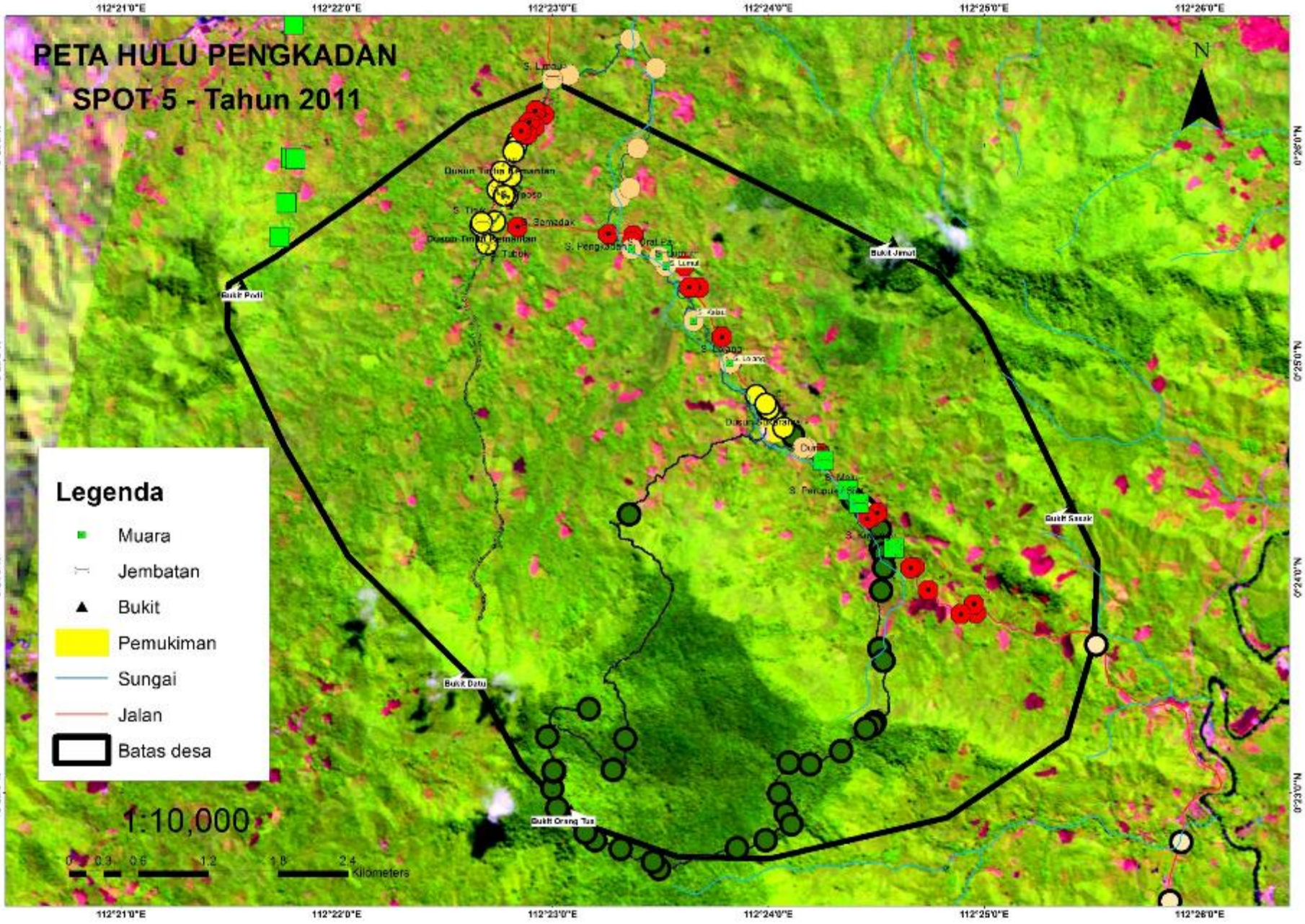
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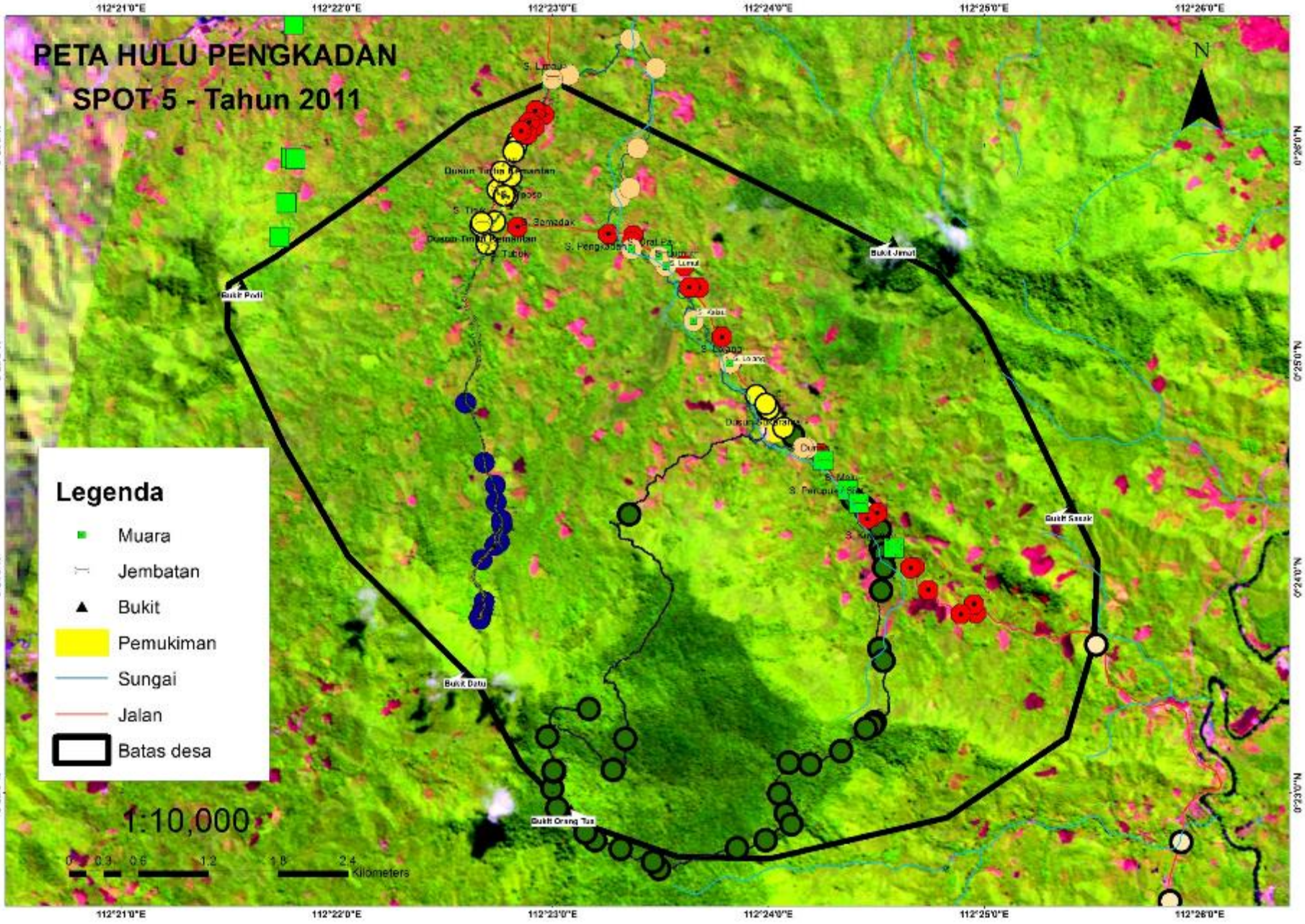
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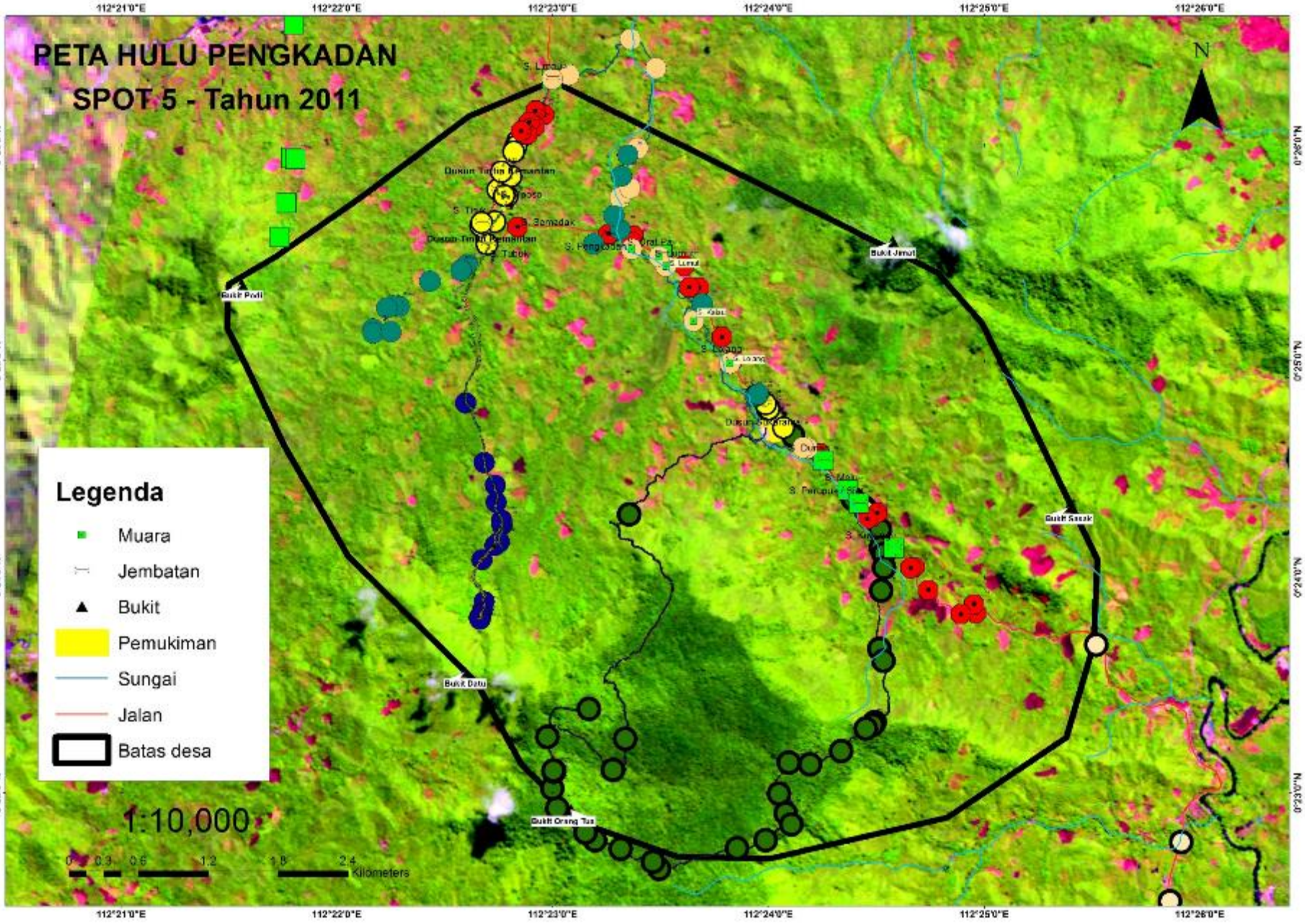
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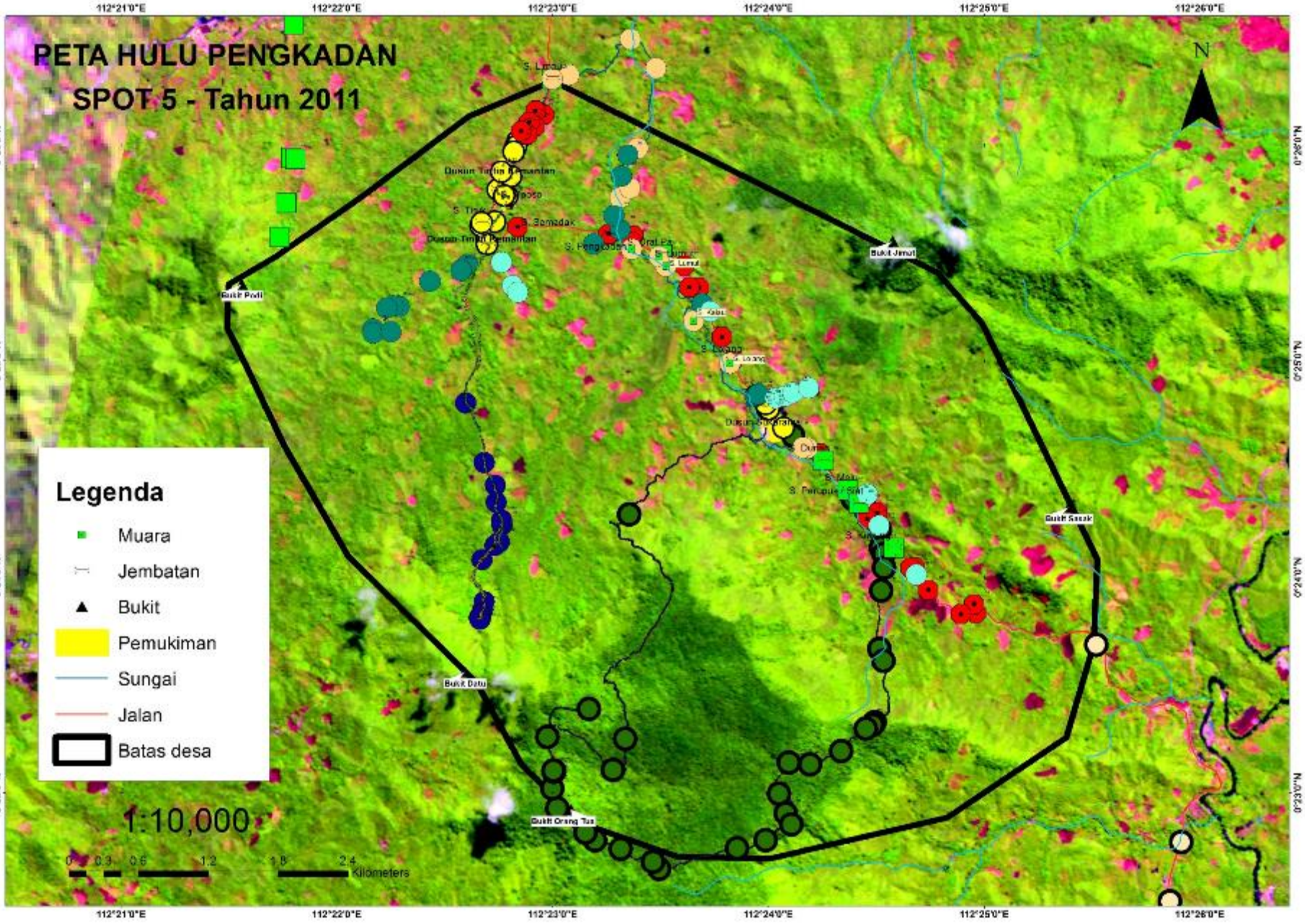
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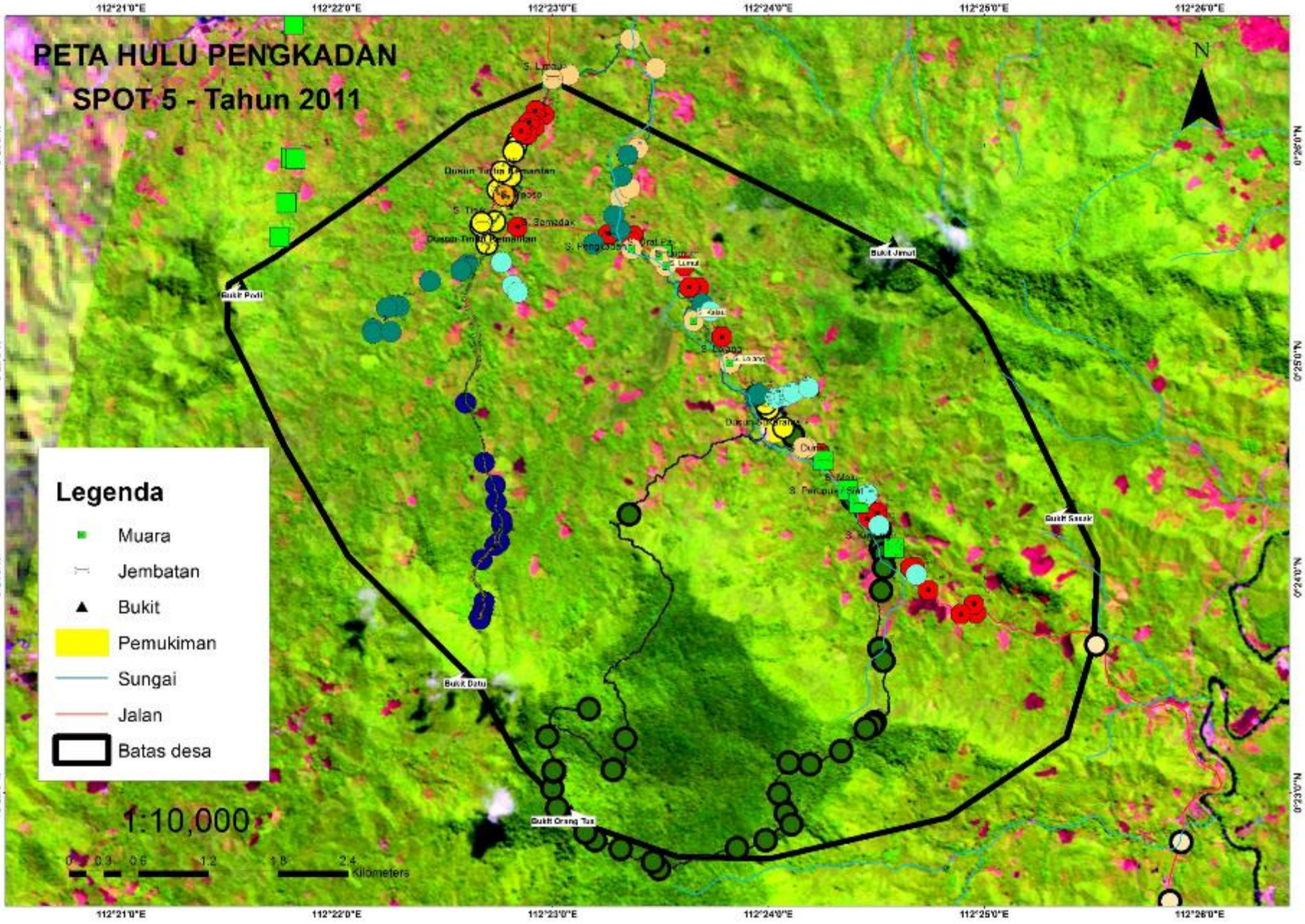
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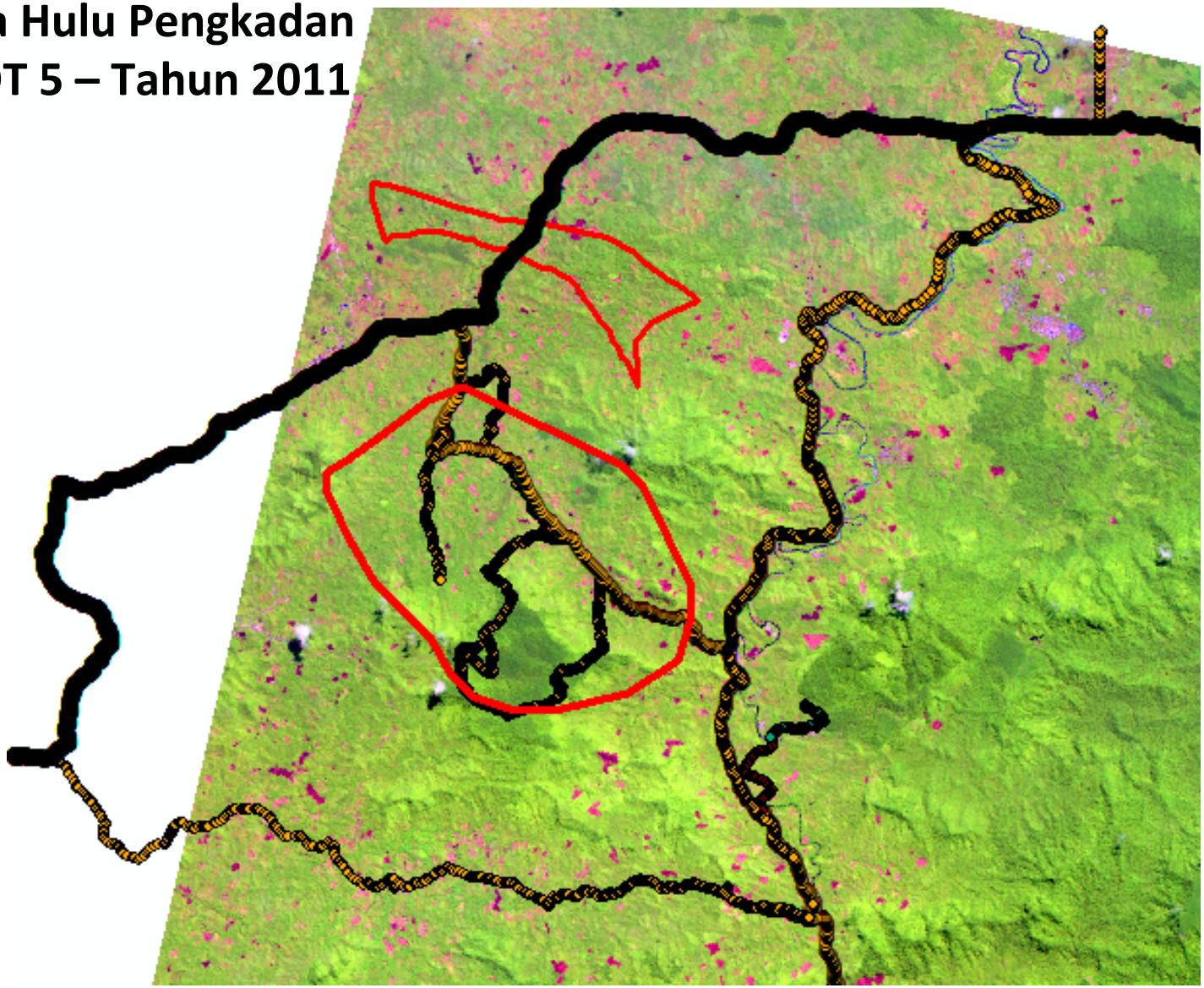
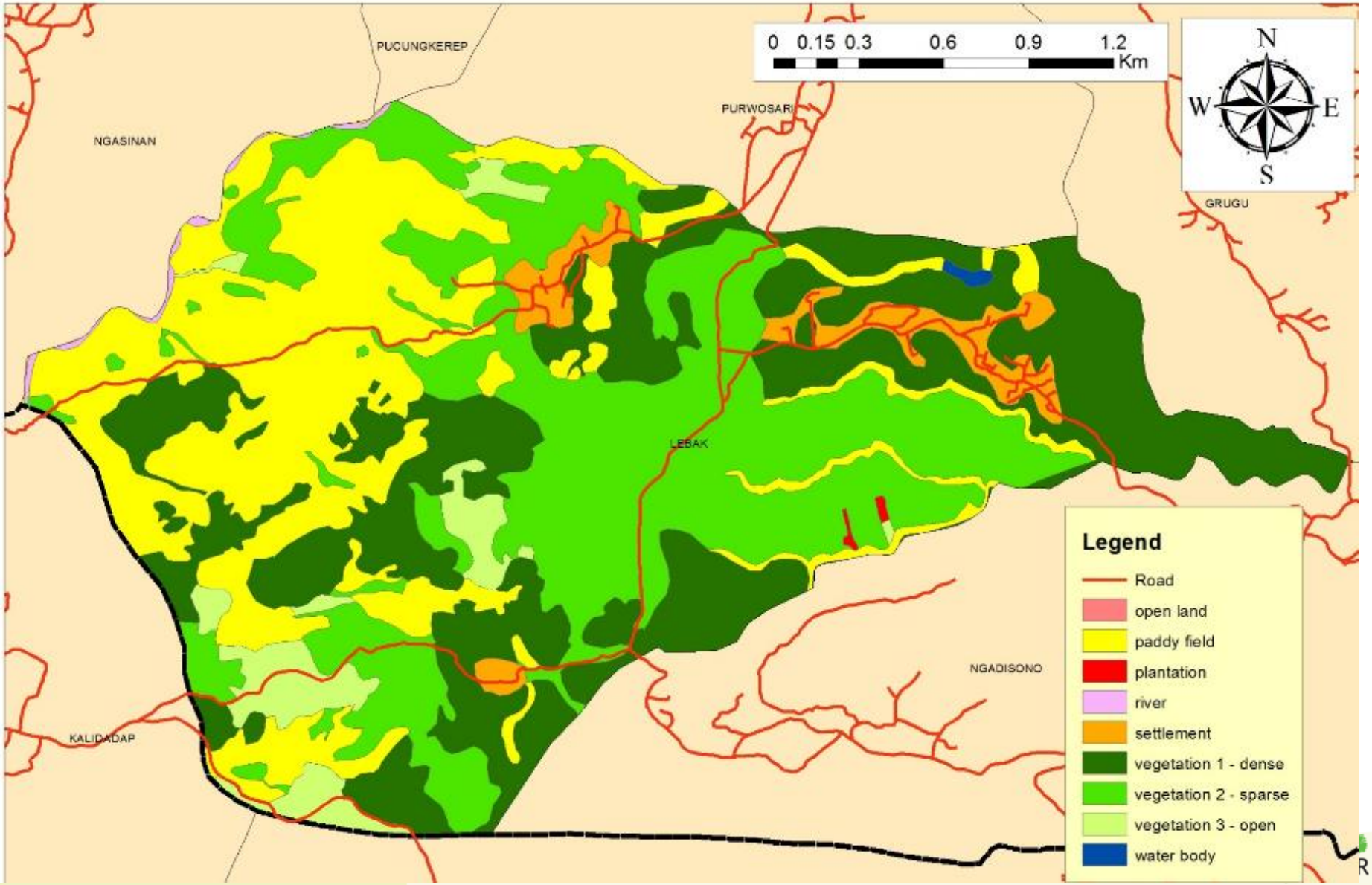
Ground Check

Peta Hulu Pengkadan
SPOT 5 – Tahun 2011

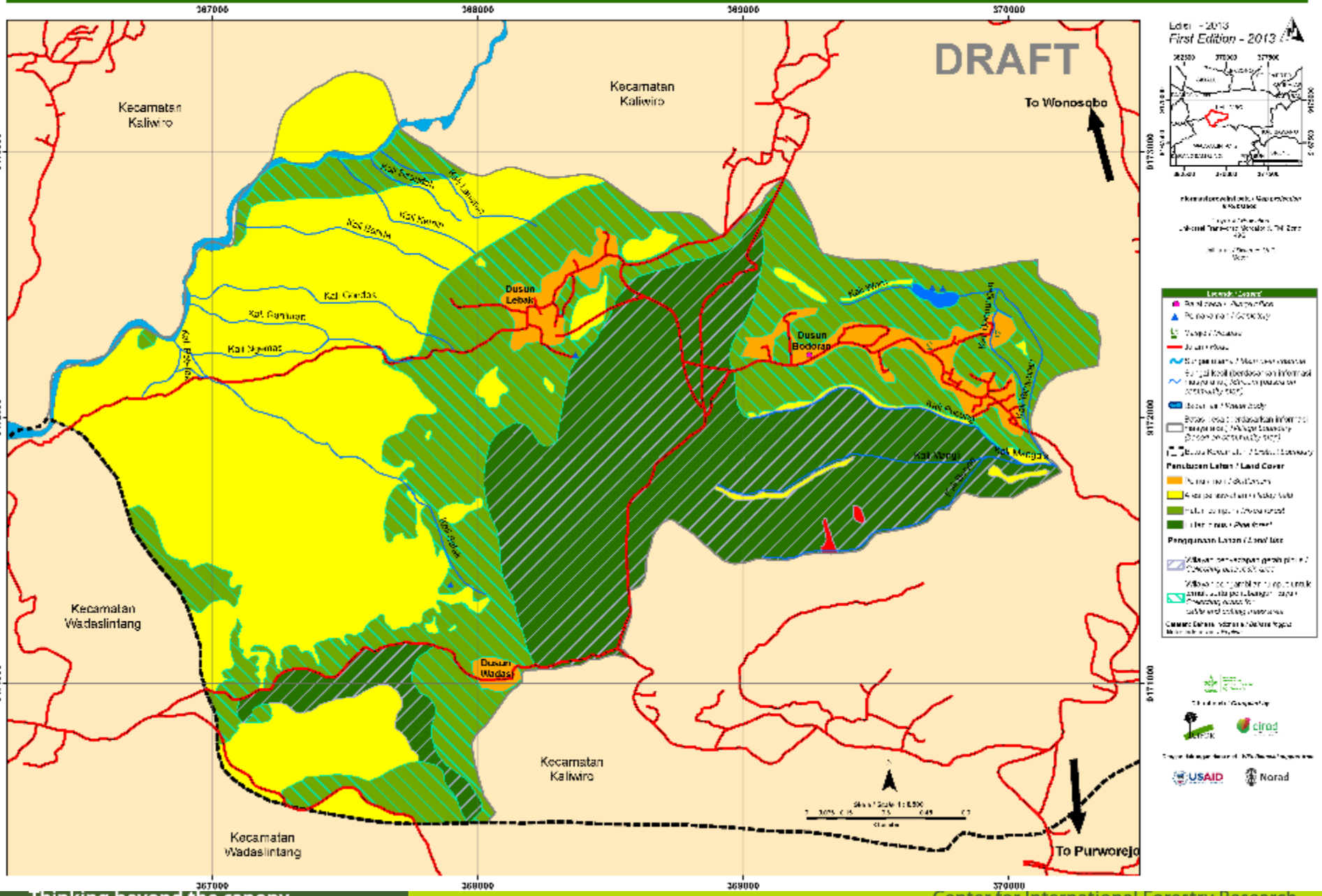


Land cover map – Lebak village (derived from **Google Earth Pro**)



Peta Partisipatif Penggunaan Lahan dan Penutupan Lahan Saat ini di Desa Lebak, Wonosobo

Participatory Map of Current Land Use and Land Cover in Lebak Village, Wonosobo



Difficulties and limitations

- **Different Village Boundaries**
  (National data and villagers' perception)
  - Mapping the new boundary based on the villagers' perceptions (required too much time)
- **Random Samplings**
  - Most areas have no access
  - Solution: decrease the number of points from each class and map transcects points instead

Future plans

- Improve the land cover classification based on the ground checks
- Conduct more analysis based on RapidEye and ALOS data (biomass)
- Analyze deforestation and forest degradation
- Conduct a second round of field work (Dec. 2013)

Thank you