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EOCap4Africa

1 How to conduct a Remote Sensing case study

b) Selecting Data for a Remote Sensing case study



INES Ruhengeri
Institute of Applied Sciences



Learning Objectives



- 1) Understand why data selection is crucial for remote sensing studies
- 2) Differentiate between primary satellite data and ancillary data
- 3) Identify key sources for obtaining ancillary data



Why Data selection matters

A case study is only as good as the data behind it!

Selecting the right datasets impacts

- Accuracy—Poor-quality or missing data weakens results
- Interpretability – More context = better understanding
- Comparability – Allows for multi-source validation

For Example

- A Sentinel-2 NDVI map alone shows vegetation health.
- Adding land-use data reveals whether changes are due to agriculture, deforestation, or urban expansion



Primary vs. Ancillary Data

Primary Data (Satellite Imagery)

- The main remote sensing dataset (e.g., Sentinel-2, Landsat)
- Provides **spectral and spatial** information
- Useful for vegetation analysis, land cover change, and water monitoring

Ancillary Data (Supporting Data)

- Additional data **improving context and accuracy**
- Often **vector data (points, lines, polygons)** but can also include tabular or raster data
- Helps answer the **why** behind observed patterns

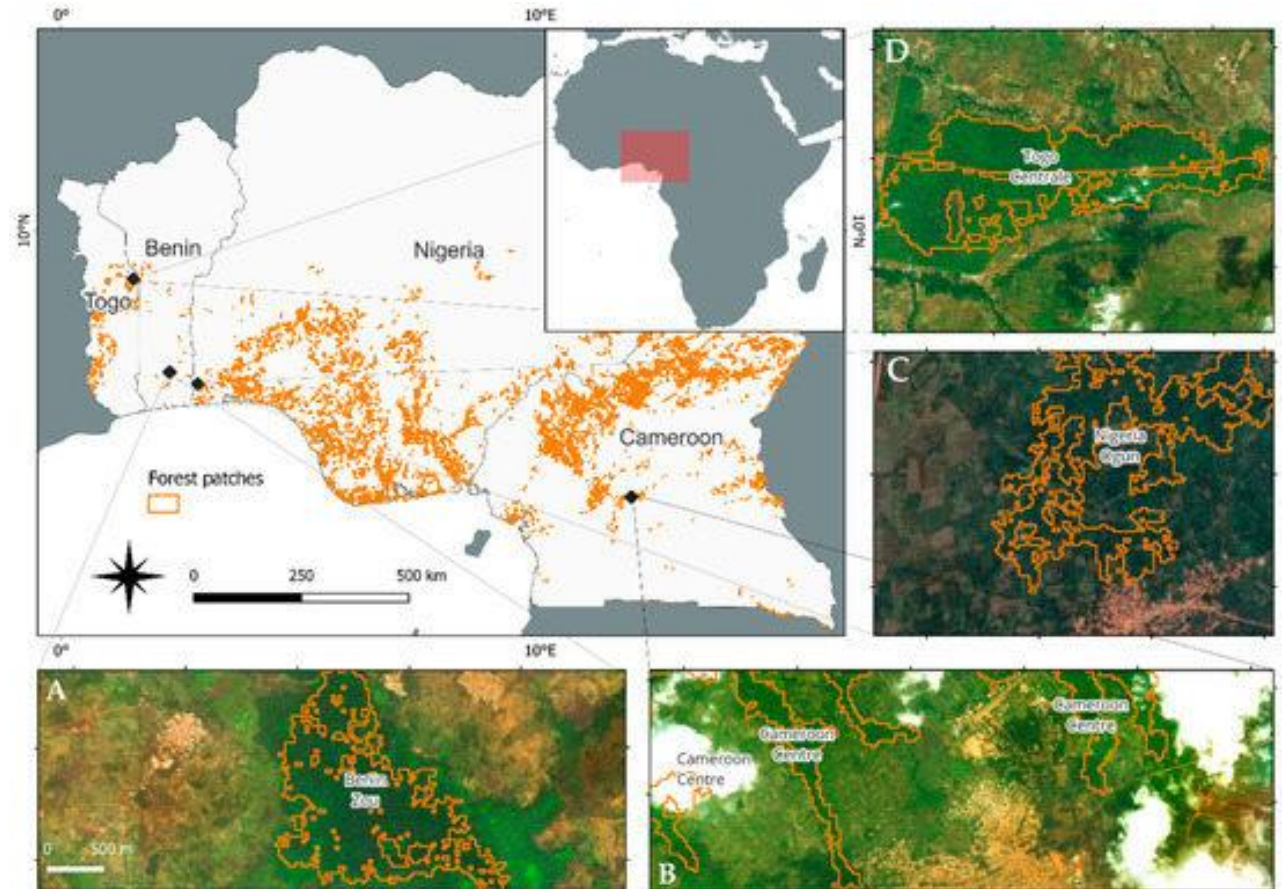
Example using Primary and Ancillary Data

Primary Data (Satellite Imagery)

- Provides the background of the image
- Visualises the study area (forest/no forest)

Ancillary Data (Supporting Data)

- Vector Data
 - Highlights where forest patches are located
 - Used for comprehensiveness
- (Wingate et al. 2022)





Key Types of Ancillary Data

1) Administrative Boundaries

- Used to define study areas and analyze changes at national, regional, or local scales
- **Source:** OpenStreetMap, GADM, UN datasets, <https://data.humdata.org/>

2) Land Use & Land Cover (LULC) Data

- Helps differentiate natural vegetation vs. agricultural fields vs. urban areas
- **Source:** ESA WorldCover, Copernicus Land Monitoring, MODIS LULC



Key Types of Ancillary Data

3) Infrastructure Data (Roads, Buildings, etc.)

- Essential for understanding urbanization, accessibility, and human impact
- **Source:** OpenStreetMap, Global Roads Inventory Project

4) Field & In Situ Data

- Ground-based measurements help validate satellite results
- Examples: GPS-based vegetation surveys, soil samples
- **Source:** Locally collected field data, scientific research initiatives



Key Challenges of Ancillary Data

1) Data Quality & Resolution Issues

- Low-resolution land cover maps may not align with high-resolution satellite data

2) Inconsistent or Outdated Data

- Administrative boundaries and infrastructure change over time.

3) Projection & Format Compatibility

- Data often comes in different coordinate systems (WGS84 vs. UTM)

4) Ethical and Privacy Concern

- Some datasets require permissions, payments or are only accessible for government bodies



Best Practices for Integrating Ancillary Data

Always check metadata

- Understand resolution, date, and projection

Align spatial projections

- Ensure all layers use the same coordinate system.

Cross-check multiple sources

- Avoid relying on a single dataset

Use authoritative data providers

- Prefer official datasets over crowd-sourced data (when possible)

Document data sources

- Helps ensure reproducibility in case studies



How can Ancillary Data enhance our Case Study?

Case Study from last Session: Monitoring Vegetation in East Africa

Ancillary Data

- Sentinel-2 NDVI maps show vegetation loss
- Adding land cover data differentiates natural forests from plantations
- Road network data helps identify areas of illegal logging
- Administrative boundaries allow impact assessment at national or district levels
- In situ field data validates accuracy of NDVI-based deforestation estimates

How can Ancillary Data enhance your Case Study?



Think of Examples of Ancillary Data that you can use to enhance your remote sensing case study idea from the last session!

Let's get started:

- Within the next 20 minutes, **find at least two different ancillary dataset** that you will integrate in your case study!
- Keywords for searching: [to be completed by students, afterwards they can start searching for data]



How can Ancillary Data enhance your Case Study?

Think of Examples of Ancillary Data that you can use to enhance your remote sensing case study idea from the last session!

Please present your ancillary datasets that you will use within your remote sensing case study on 1-3 slides in powerpoint.



Summary & Key Takeaways

Remote sensing case studies require **more than just satellite data!**

Ancillary data (especially vector data) **enhances analysis, validation, and interpretation**

Land-use, roads, elevation, and in situ data provide critical context

Data quality, resolution, and compatibility are key challenges to address

Using **multiple data sources** improves reliability and insights

Sources



Wingate, V. R., Akinyemi, F. O., Iheaturu, C. J., & Speranza, C. I. (2022). *A remote sensing-based inventory of West Africa tropical forest patches: A basis for enhancing their conservation and sustainable use. Remote Sensing*, 14(24), 6251. <https://doi.org/10.3390/rs14246251>

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Thank you for your attention!

Dr. Insa Otte, Hanna Schulten,
and colleague

insa.otte@uni-wuerzburg.de



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