

From Surveys to Satellites: Collecting Better Agricultural Data

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How do crop yield estimates from self-reported data compare with estimates from satellite imagery?

BACKGROUND

- Obtaining high quality data on crop yields and farm production is vital to agricultural impact evaluations¹
- Better quality data on agricultural outcomes -> Robust evidence -> Better informed and well-designed policies**
- Self-reported agricultural data is often prone to respondent, recall, and enumerator biases²; additionally, survey or diary-based methods do not give a sense of the **true values**³ of an indicator
- Various studies^{4 5} have demonstrated the potential of satellite-imagery based methods to objectively, and accurately estimate yields, and farm production

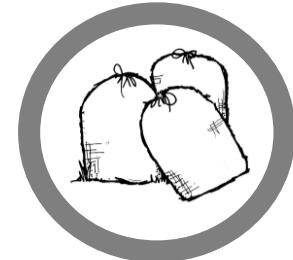
MATERIALS AND METHODS



Image Sources: Sentinel 1A, RISAT & MODIS



Image Analysis: Identification of Rice fields (Rule-based classification), Yield Estimation (including crop growth model) and Verification

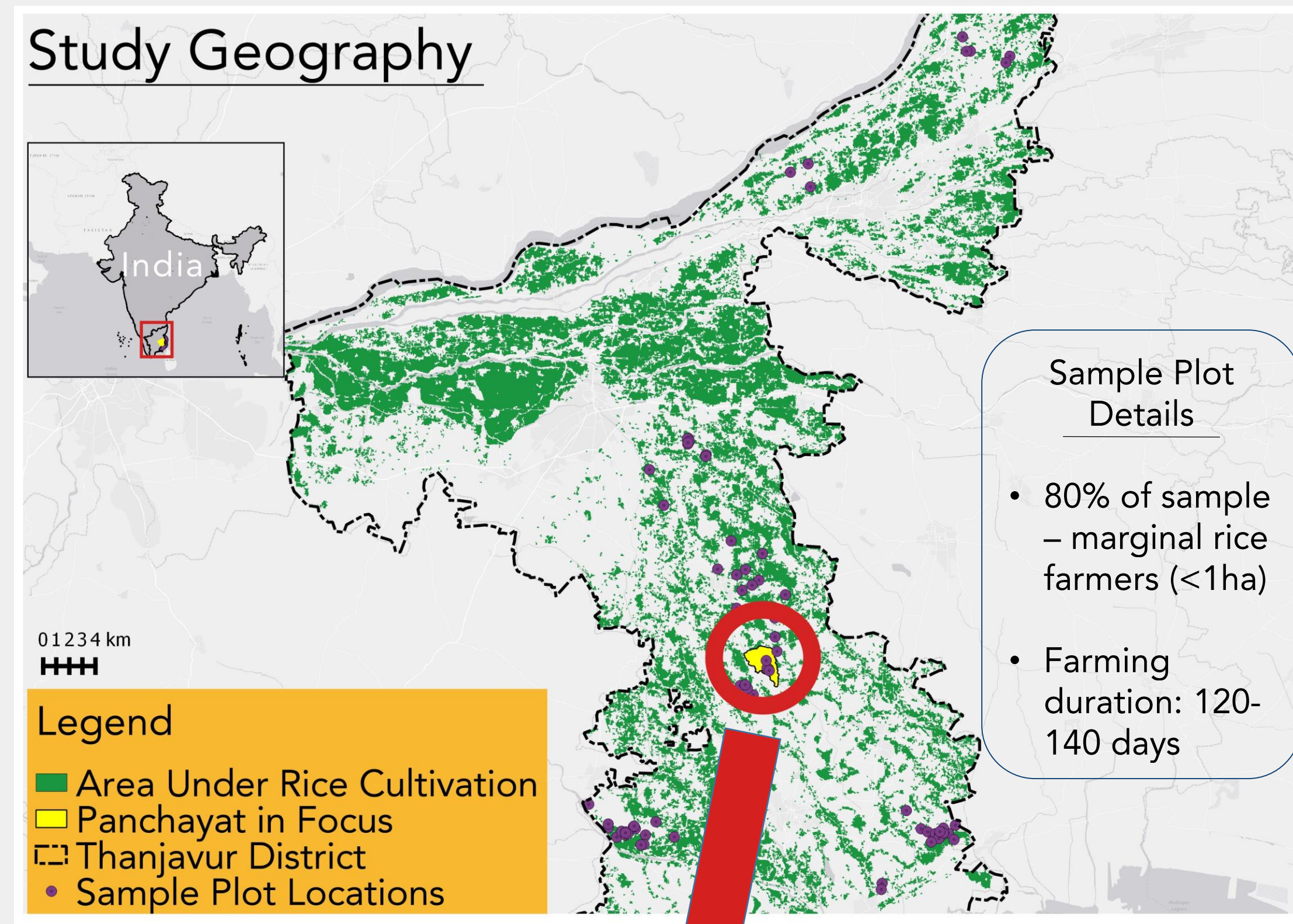


Collection of self-reported data – on production & input usage from an independent sample of rice farmers, plot area estimates and GPS measurements

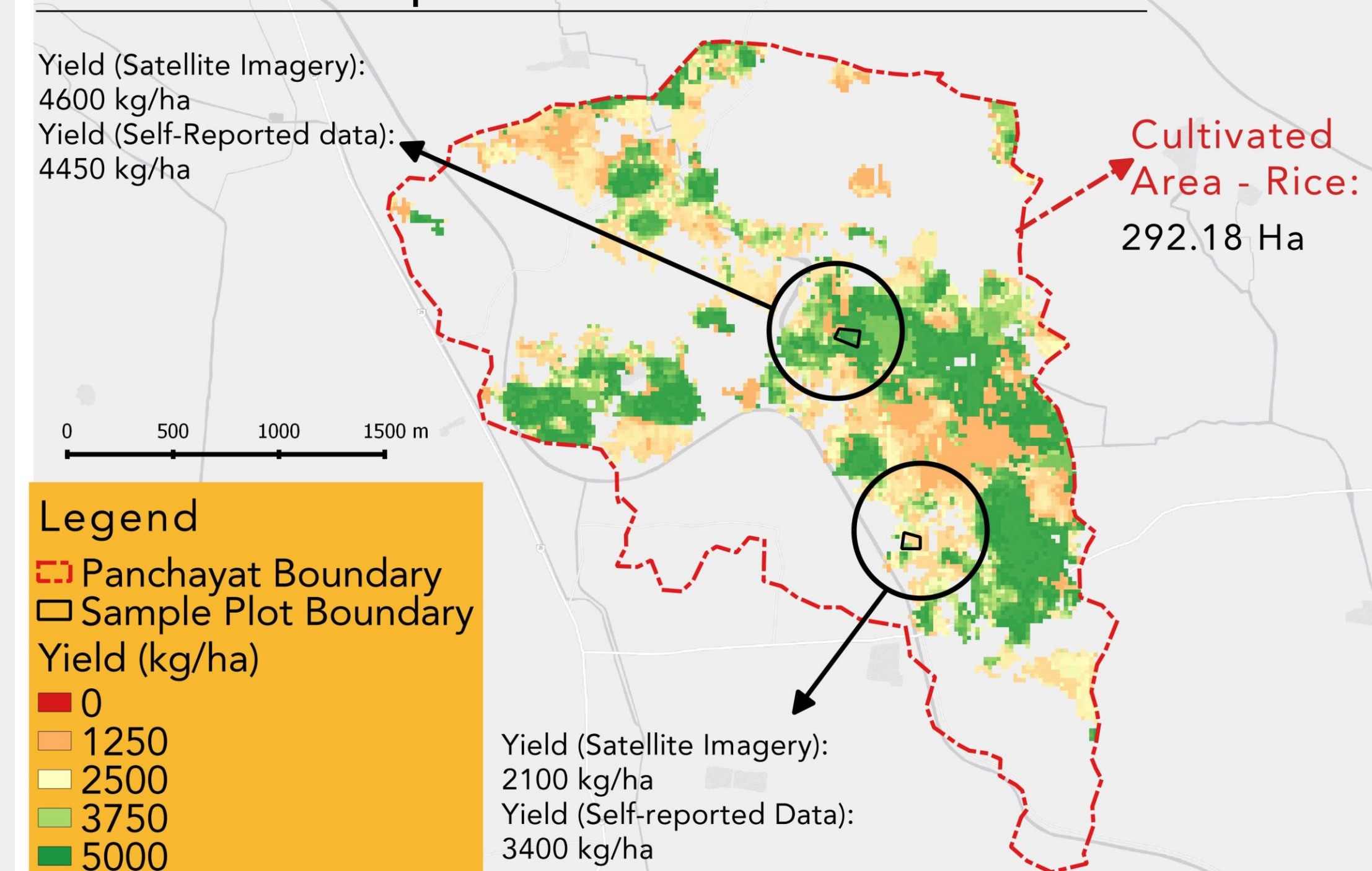


Calculation of yield from collected production and area data for sample plots, comparison with yield estimates derived from satellite imagery

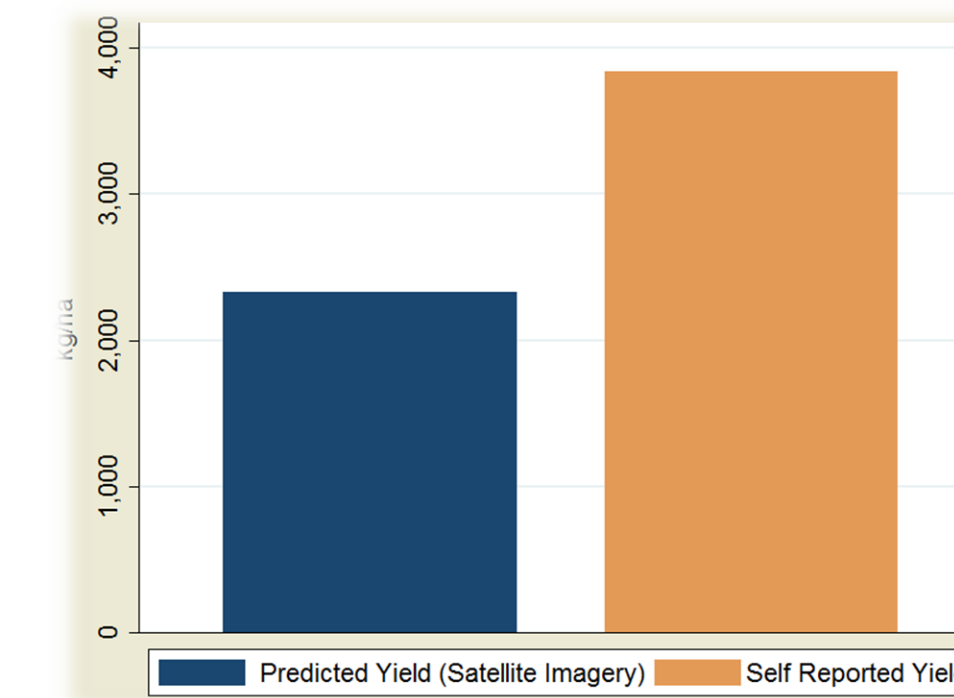
Study Geography



Rice Yield Map & Area Under Cultivation



PRELIMINARY FINDINGS



- On average, yield data calculated from farmers' estimates of production are **higher** than satellite imagery estimated yields
- Local units of measurement, imprecise conversion factors – a big driver of differences?
- Over-estimation of yields – consistent with the findings of other studies⁷ using self-reported production estimates

PROS & CONS – USING SATELLITE IMAGERY



- Low cost, can cover large sample sizes
- Ideal for longer term/ follow up studies
- Potential for retrospective analysis



- Farm identification errors persist
- Scope currently limited to yield and production data
- Requires good quality field data to 'ground-truth'

WHAT DO YOU THINK?

Please take one (Business Card Slot)

Please leave your contact here (Business Card Slot)

Please leave your comments here (Slots for Paper & Pen)

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References

1. World Bank, 2011. Policy Research Working Paper 5717.
2. Yield – defined as production per total area of cultivated land, and production are among the most common indicators in agricultural impact evaluations. IEG (Independent Evaluation Group), 2011.
3. Lobell, 2013. Field Crops Research 143: 56
4. Pazhanivelan et al, 2015. ISPRS S. XL-7/W3: 85
5. Reynolds et al 2015. International Conference of Agricultural Economists, Milan.
6. Sapkota et al, 2016, Chapter 8 in T.S. Rosenstock et al, (2016).