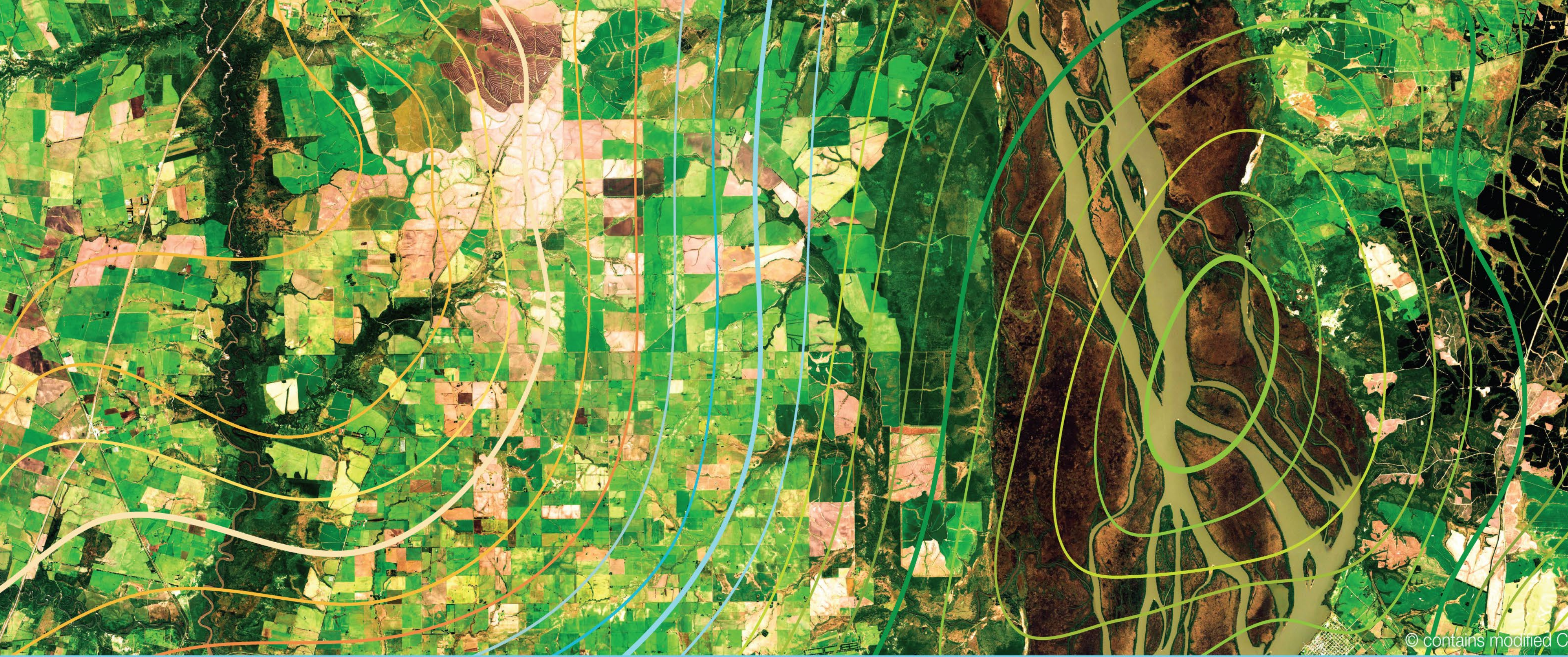

Using Earth Observation to make decisions and assess impact at IFAD

Living Planet Symposium 2022

Athur Mabiso (Senior Economist, IFAD)

Tuesday, May 24, 2022

IFAD

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Why does it matter?

- Improves rigour in our impact assessments (IAs)
  - Better methods, better estimates of treatment effects
- More data and analytic capabilities, improved accuracy at little or no cost to analysts (cost-effective)
- Enables sampling when census or listing exercise is not possible (e.g. COVID-19 restrictions)
- Possibility to assess impact of sustainable environmental interventions remotely (e.g. land reforestation efforts under the Great Green Wall initiative)
- More precise measurement and prediction of climatic shocks and geophysical variables (e.g. cyclones, floods, land area, distance to markets)

Application of GIS in IFAD impact assessments and M&E

Identification Strategy & Sample design:
Sampling frame listing, ex-ante matching & sampling (Treatment & Comparison)

Data Collection:
Logistics & fieldwork planning
Data quality assurance – monitoring enumerators

Reducing measurement error:
Reporting biases, precise scientific measurement (e.g. farm area, road length, climate shock exposure)

Statistical/ Econometric analysis:
Controlling for observables, Matching ex post, Diff-in-diff, Dynamic teffects/ event study

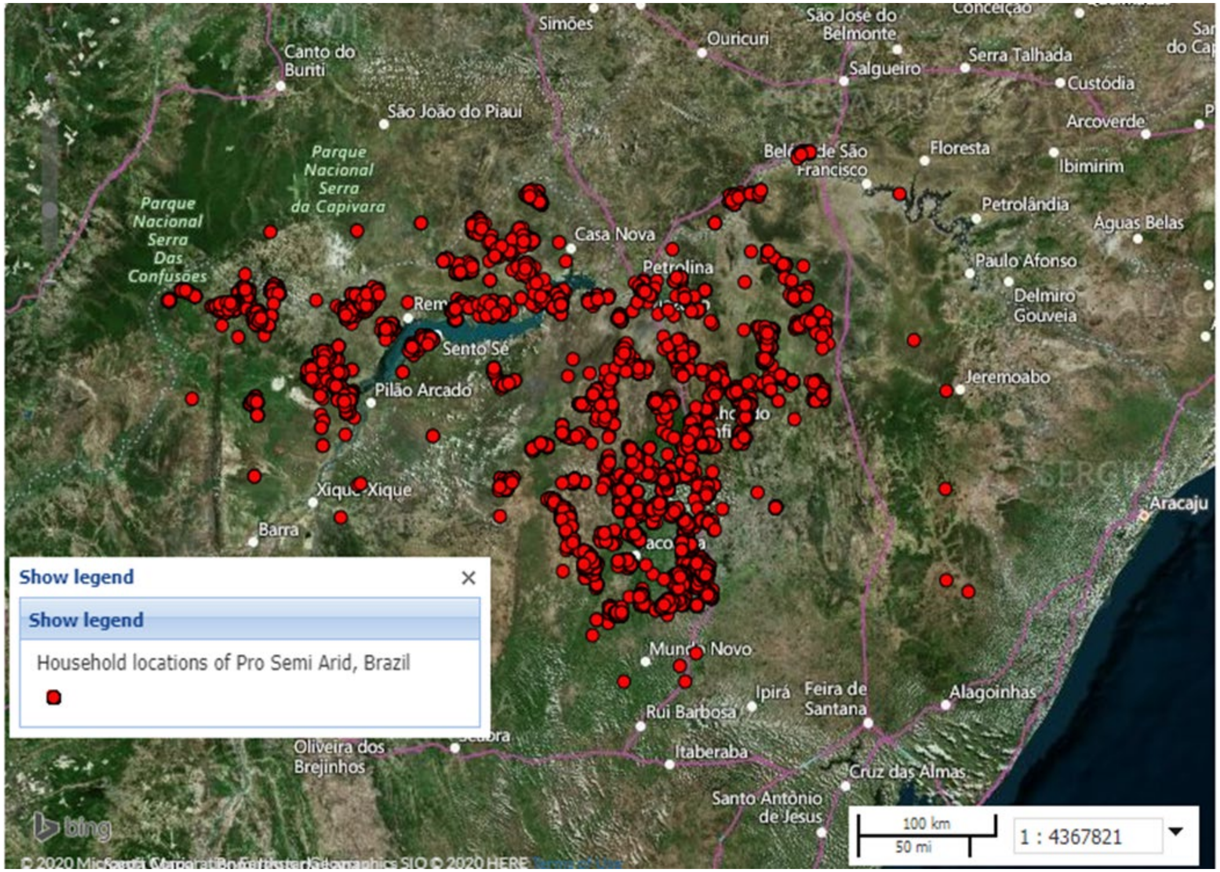
Assessing impact on sustainability:
especially for environmental outcomes and resilience to climate change

* Mostly ex-post non-experimental and quasi-experimental methods used. Not RCTs.

Example 1

PRO-Semi Arid
IFAD Project, Brasil

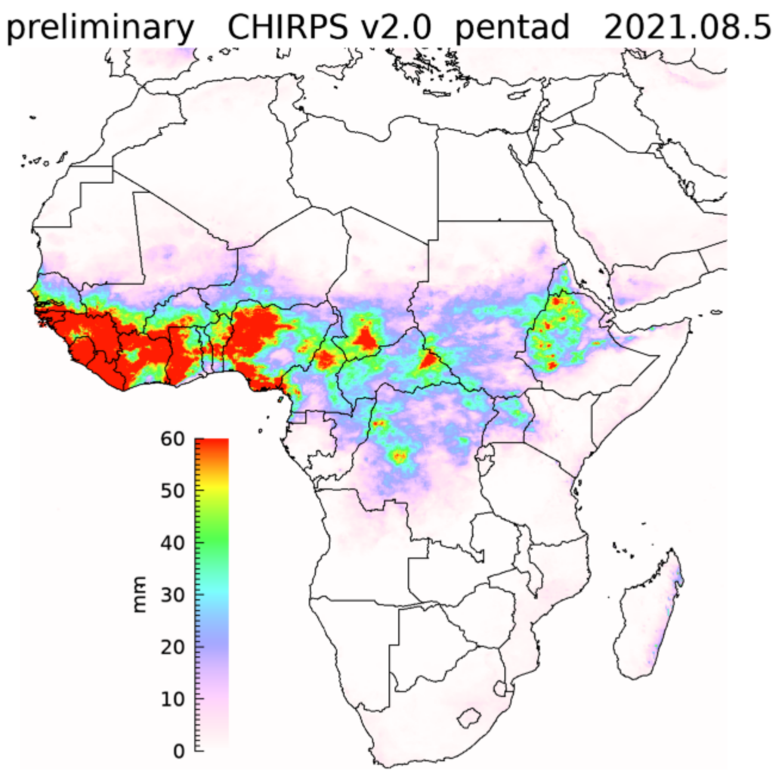
- On-site georeferencing is fundamental



Geographic distribution of household beneficiaries

Example 2

Use of remote sensing time series data in crop production analysis



Rainfall Estimate Variables	% HH Below	|% Diff. Below|, if Below	% HH Above	% Diff. Above, if Above
ARC2				
Rainy Season	8%	6%	92%	13%
Flowering Period	12%	33%	88%	21%
CHIRPS				
Rainy Season	54%	10%	46%	7%
Flowering Period	48%	30%	52%	23%
SPI				
Rainy Season	43%	9%	57%	9%
Flowering Period	23%	21%	77%	13%
SPEI				
Rainy Season	40%	5%	60%	6%
Flowering Period	19%	16%	81%	17%
NDVI-A				
Rainy Season	70%	7%	30%	6%
Flowering Period	65%	9%	35%	13%
NDVI-E				
Rainy Season	65%	7%	35%	6%
Flowering Period	53%	7%	47%	9%

McCarthy et al. 2021: Rwanda PRICE project study on climatic variables

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Example 3

- Ex-ante sampling of control households in Impact Assessment of Philippines CHARM2 IFAD project

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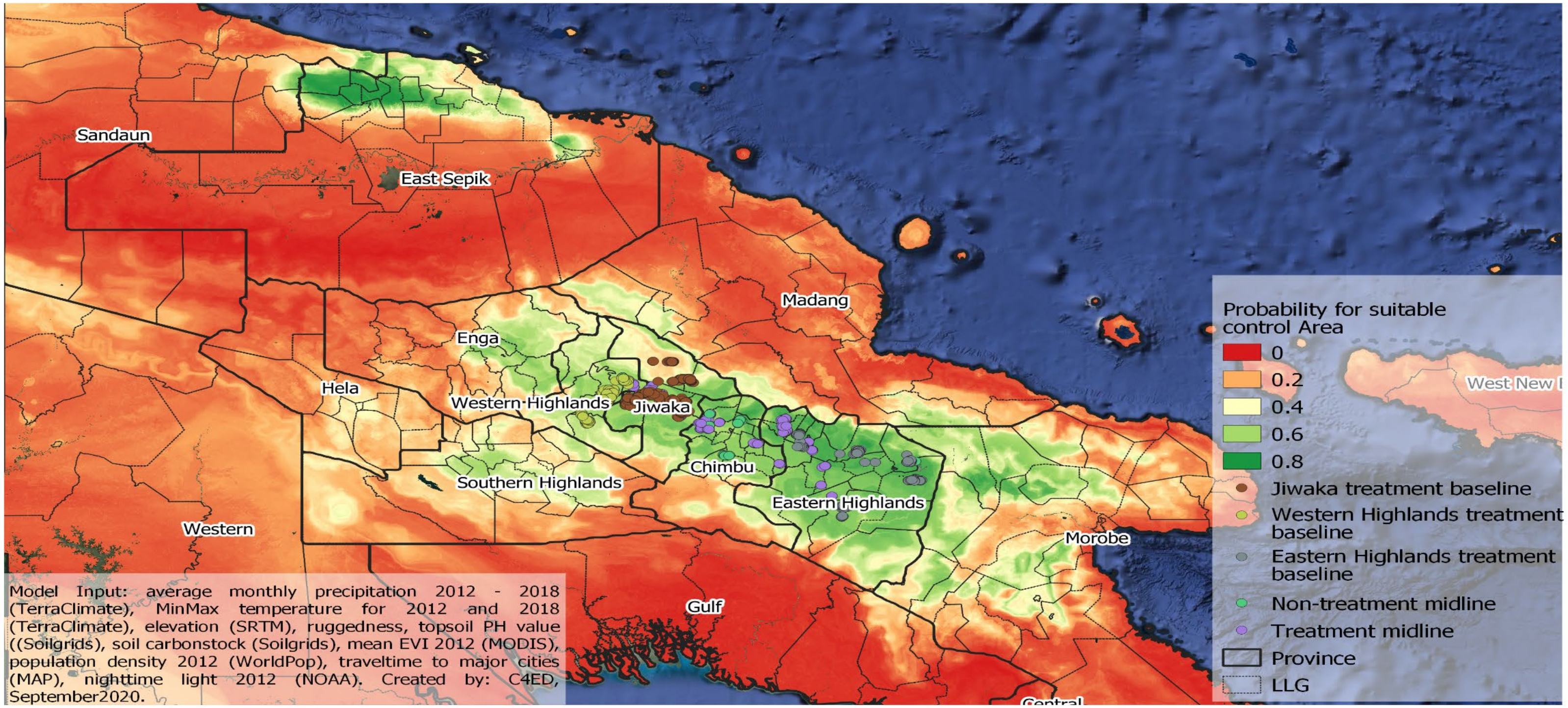
Example 4

Random forest predictions (machine learning) for suitable coffee control areas for Impact Assessment of PPAP project in PNG



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Key messages: opportunities and constraints

- GIS and Remote Sensing are complements to standard survey methodologies (**not a substitute**) in IAs
- Applicable to specific variables and methodological approaches
  - Climatic variables (precipitation, temperature, wind speed)
  - Travel time estimation, distance, land area measurement
  - Land cover, fires, and other environmental variables
  - Context matters, e.g. night lights data not applicable in rural areas
- Multiple data sources on same variables require careful selection considerations
- Multiple variable construction approaches on same variables – theoretical vs empirically based criteria