SDGs and Agriculture in the Developing World

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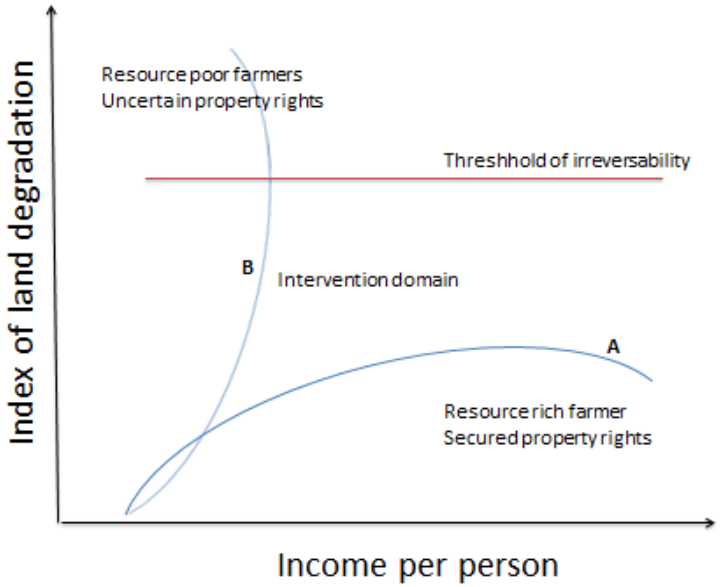
Agriculture and **SDGs**

- How to measure **agriculture sector** contribution to SDGs?
- A set of **232 indicators*** agreed upon to measure progress towards SDGs (March 2016)
- However
  - Baseline data not available for a sizeable number of UN member countries
  - Agriculture (in-) directly contributes to many of the indicators, particularly SDG's 1, 2, 3, 6, 13 & 15
- How to progress from tracking data to **calculating impact**?
- How to measure **return on investment**?

* United Nations Statistical Commission's Interagency and Expert Group on SDG Indicators
https://unstats.un.org/sdgs/indicators/indicators-list/

Land Degradation Neutrality (LDN) & SDG's

- Land degradation a major threat for many countries to meeting the SDG's*.
- Land Degradation Neutrality (LDN) concept is about maintaining/ enhancing land resource base.
- UNCCD has aligned its convention to SDG 15.3** with parties to set voluntary LDN targets (UNCCD 2015).
- Targets - land cover (metric: LCC), land productivity (metric: NPP), carbon stocks - above/below ground (metric: OC).
- Geospatial methods well suited to monitoring at local to national scales.



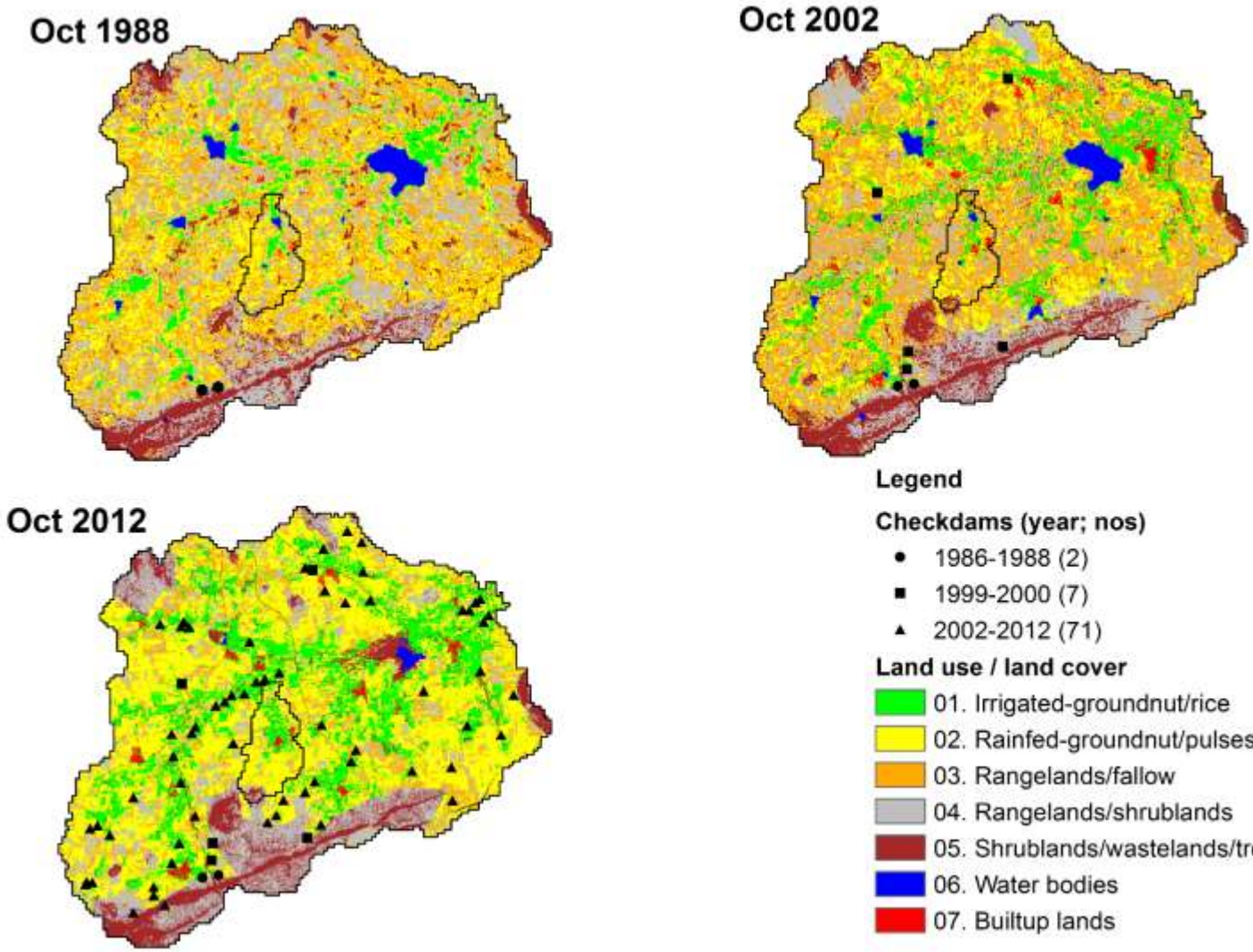
*__Whitbread__, A.M., et al. (2017). Strategies and Policies to reach a land-degradation neutral world. In **Vlek, P.L.G.**, et al. Land degradation and the Sustainable Development Goals: Threats and potential remedies. CIAT Publication No. 440. https://cgspace.cgiar.org/handle/10568/81313

** SDG 15.3 '…combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve land degradation neutral world.' https://unstats.un.org/sdgs/indicators/indicators-list/

Spatial information as input to realizing SDGs

Tracking progress in implementation

- Impact of natural resource interventions (e.g. water harvesting structures) in improving the ecosystem services*.
- Crop water productivity with declining water availability – integrating satellite imagery, spatial and temporal modelling to define better cropping patterns.
- Spread and impact of new varieties**

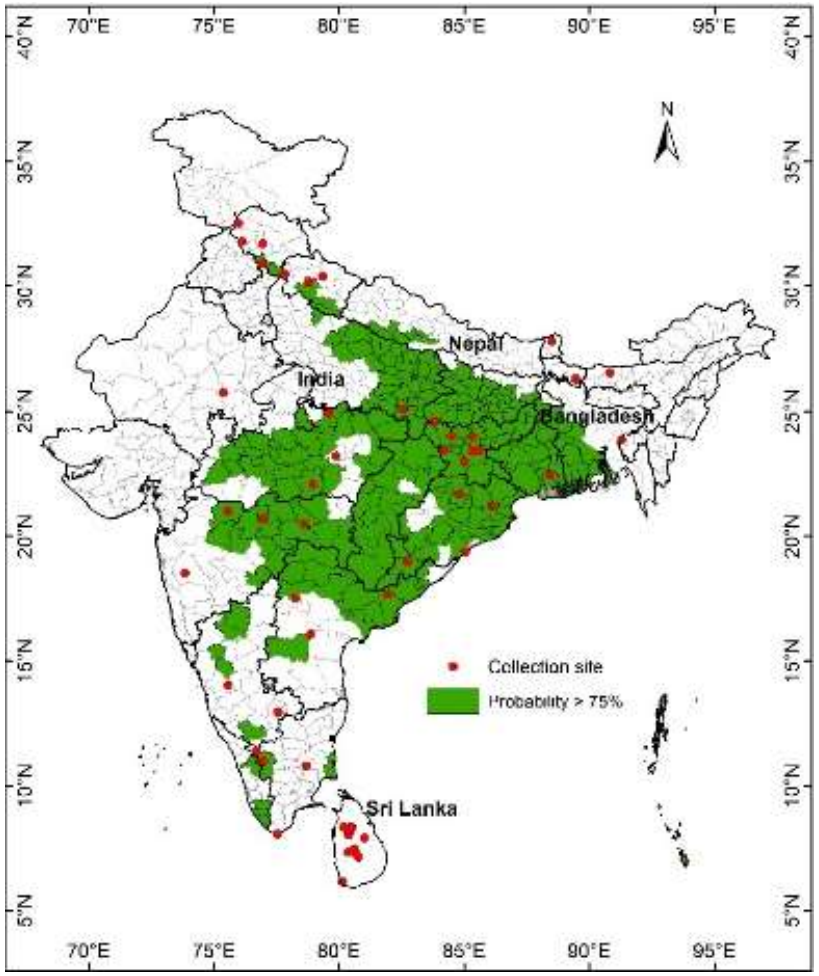


*Ahmed, MI. et al. 2016. "Land use and agricultural change dynamics in SAT watersheds of southern India." Current Science 110 (09):1704-9.
**Gumma et al., 2016. Satellite imagery and household survey for tracking chickpea adoption in Andhra Pradesh, India. Int'l Journal of Remote Sensing. 37(8):1955-1972.

Spatial information as input to realizing SDGs

Agro-biodiversity – adaptation

- Germplasm collections and its conservation *in-situ* and *ex-situ* to be used along with bioinformatics for crop improvement helps in providing farmers adapted and nutritious varieties – SDG 15
- Gap analysis using spatial analytics (passport data and evaluation data) for identifying geographical gaps in the existing collections for future exploration to ensure the availability of wide variability to researchers and stop genetic erosion. – SDG 15
- Integrating spatial analysis, crop modelling, historical and future climate analytics helping researchers to define target production environments (TPE's) for crop improvement (breeding),* Yield Gaps etc.
  SDG's 1, 2, 13, 15



Gaps in *Cajanus scarabaeoides* collections from India

*Hajjarpoor et al. 2018. Field Crops Research. Under review.

Spatial information as input to realizing SDGs

Managing climate and market risk

- Spatial data linked with big data platforms of Meteorology (weather prediction, climate change analysis) are used for farmer decision support – SDG 13 & 15
- Spatial analytics for crop insurance/yield forecasting using imagery from new satellite missions like Copernicus: Sentinel-1 (radar) which is weather proof, Sentinel-2 (optical) with high revisit frequency. – SDG13 & 15
- Bundling spatial data on soils, productivity, Earth Observation and land tenure with products like credit, insurance, inputs, contract selling. – SDG's 8, 9, 12

e.g. Industrialization of EO services - MANOBI *

*http://www.manobi.net/

Nurturing Africa's Digital Revolution for Agriculture

Sentinel1-2 time series

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Field prepared?

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If yes release 1st credit installment

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Crop response reflects claimed N application rate?

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If yes release 2d credit installment

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Crop failure emerging in season due to climate?

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If yes activate insurance payout

↓

Etc.

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Increased transparency, traceability

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Reduced agricultural investment risk

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Increased agricultural productivity

Future Challenges

- **Data access/governance** – policies to ensure availability, usability, integrity and security of data.
- **Data architecture** – Open data architecture to solve business problems.
- **Data sharing –** Models to incentivize companies to share data without compromising commercial competitiveness and for public research institutes to provide open access to data.
- **Personal Identification Information** – Manage exposure and risk of hacking to ensure no compromise of farmers' trust.
- **Pragmatic enabling policies** – Policy support for the above issues crucial to accelerate use of public datasets to monitor SDGs.

Thank You

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