# Terra-i+: Satellite-based innovation to monitor agroforestry supply chain sustainability

*Minh Phuong Nguyen, Thibaud Vantalon, Phuong Luong Thi, Tiffany Talsma, Louis Reymondin, Giang Pham, Thuy Nguyen Thi Thu*

## INTRODUCTION

- Key commodity traders, including coffee, is facing growing pressure from regulatory bodies, such as EUDR, and environmental commitments to achieve carbon-neutral supply chains. Agribusinesses must now provide proof of deforestation-free practices and emission status, but many lack the in-house geospatial capacity to report on those. Existing Global Earth observation datasets often lack the local precision needed, risking the exclusion of vulnerable communities.

- A robust, locally accurate, and user-friendly monitoring system is needed to inform forest protection and GHG reduction targets, enabling agribusinesses to navigate their supply chains effectively.

## METHODS
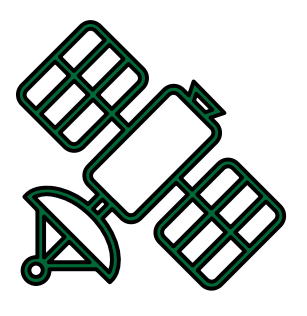
### Dataset creation: land cover mapping, shade tree mapping

- **Tree crop cover maps:** Deep learning model based on Sentinel 1 and 2 input data, combined with geo-located data from human interpretation of high-resolution imagery. Accuracy checks, optical checks, and validation rounds were performed.

- **Shade trees and visible soil maps:** Same input data and model as the land cover maps. Reference data was collected by automatically identifying shade trees within coffee systems from high-resolution imagery, with manual corrections by human experts

### Industry outreach and prototyping metrics

- Interviewing to **identify key users** from 12 Vietnam coffee companies.
- Applying **design principles** to shortlist metrics that most closely meet industry's needs
- Co-design shortlisted metrics through **iterative prototyping** with key users.

### Implementing webtool metrics at jurisdiction and farm level

- By **combining the Global Forest Change dataset with the relevant land cover and shade cover**, the system created metrics that analyze risks of non-compliance with EUDR; shade tree coverage; and carbon gain potential.

- These metrics were implemented into webtool to be analyzed at jurisdiction level, as well as at farm polygon level.

## DISCUSSION & CONCLUSION

- **Application:** Terra-i+ is currently in use by a global coffee trader, contributing to the global SGDs 12 and 15.

- **Current limitation:** Data is only available for some countries. There is needs for partnerships to develop a global high precision dataset, preventing the unjust exclusion of every vulnerable smallholder.
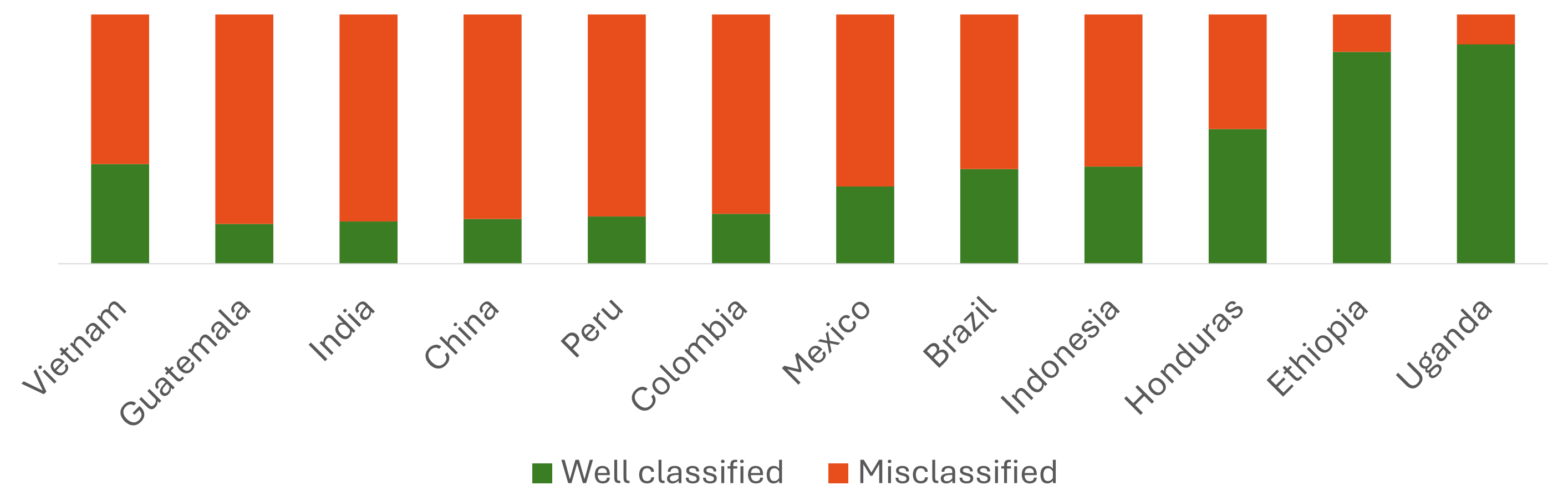
*EU's Global Forest Cover 2020 map may misclassify more than 50% of known coffee farms as forest in some countries, particularly those where smallholder farmers are predominant.*

## RESULTS

**Terra-i+ Datasets: Closing the geospatial data gap in the coffee industry by producing the high-resolution datasets**

➢ Land cover map with >82% accuracy for coffee, and agroforestry, tree crops, and forests
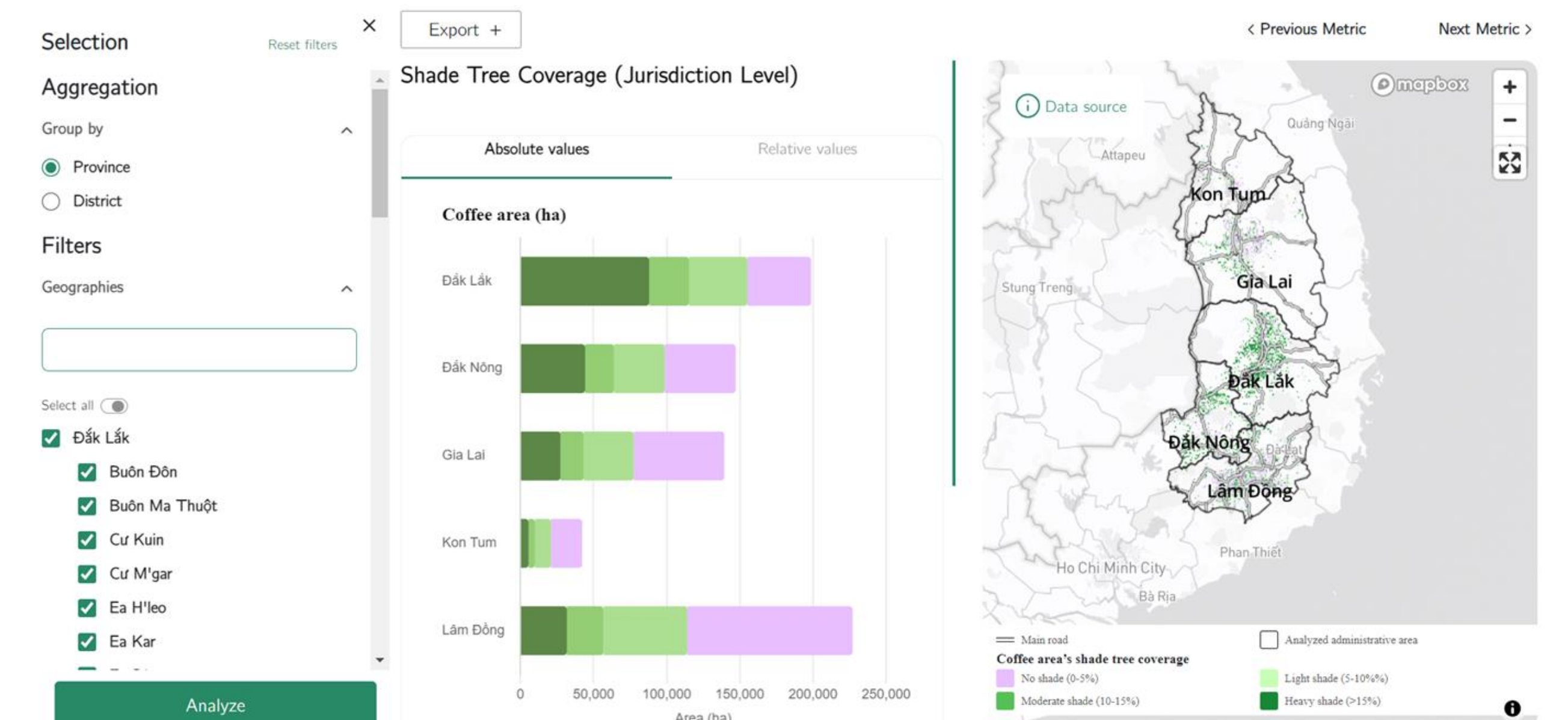➢ Shade trees and visible soil coverage in 2020

**Terra-i+ Webtool: Lowering the capacity gaps to access and use geospatial datasets**

Highlight risks of non-compliance with EUDR down to farm level
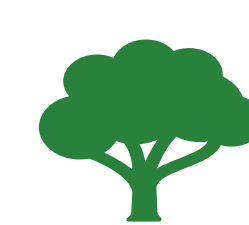


Identify opportunities for carbon sequestration by benchmarking coffee area under different shade levels



Export data in mutiple format to report on risks & opportunities