Remote Sensing Innovations and their Role in Shaping the Future of Evaluations

Wadi As-Sirhan Basin, Saudi Arabia

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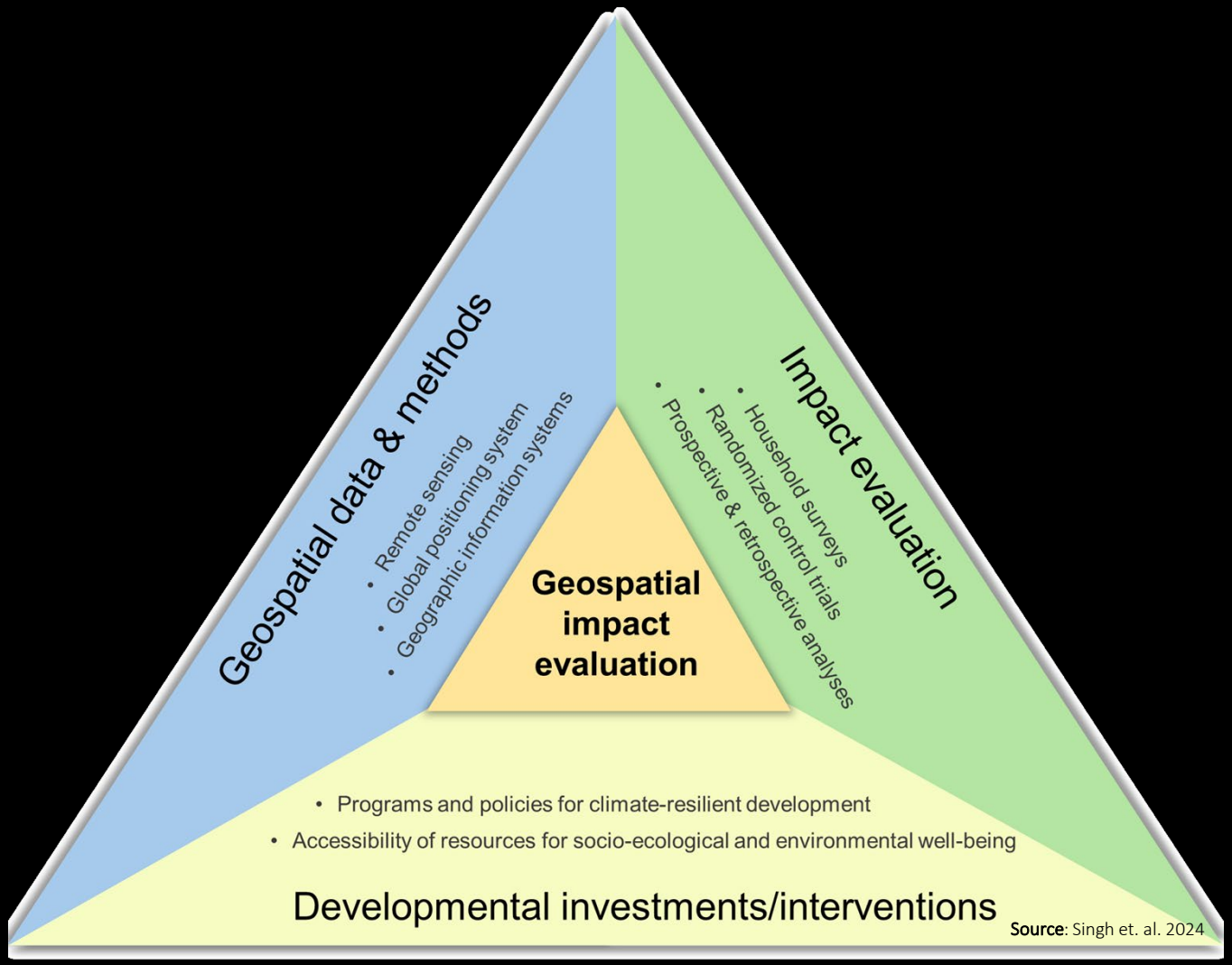
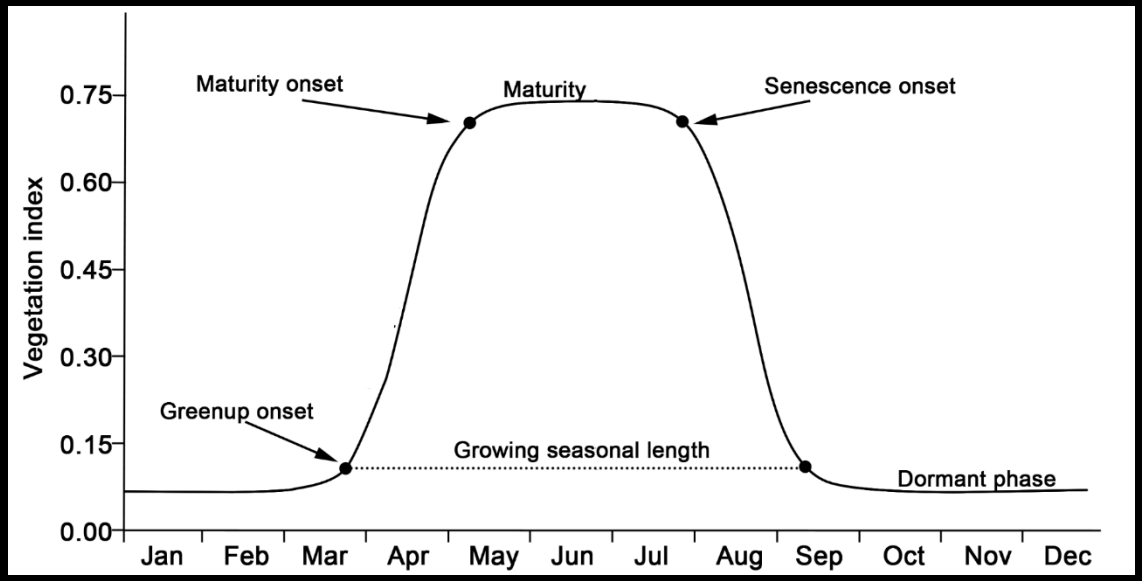
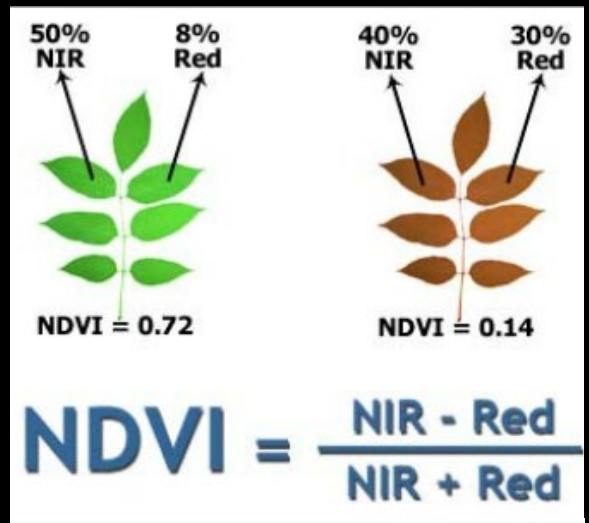
Geospatial Impact Evaluation



Source: Singh et. al. 2024

Remote Sensing of Plant Phenology

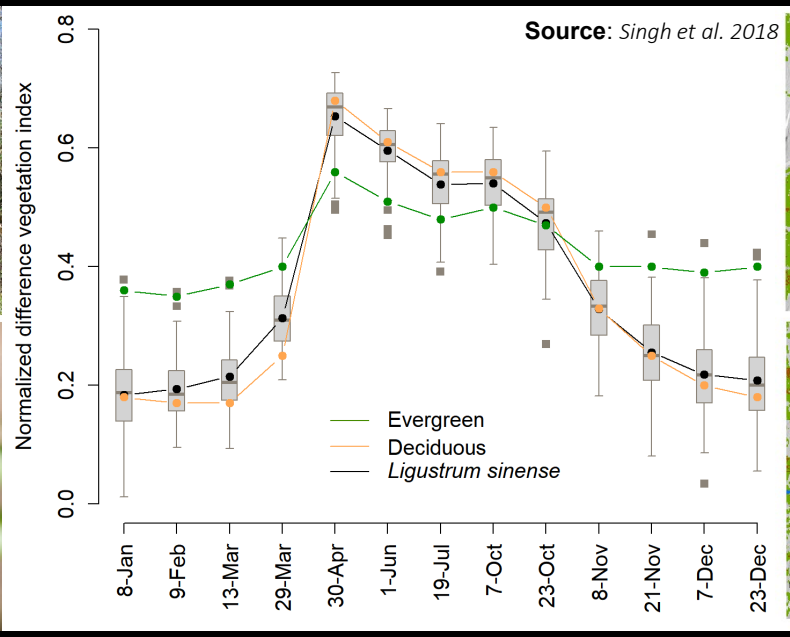




- **Time-series** remote sensing (e.g., normalized difference/enhanced vegetation indices – NDVI/EVI)
- Vegetation **phenology**

Remote Sensing of Plant Phenology

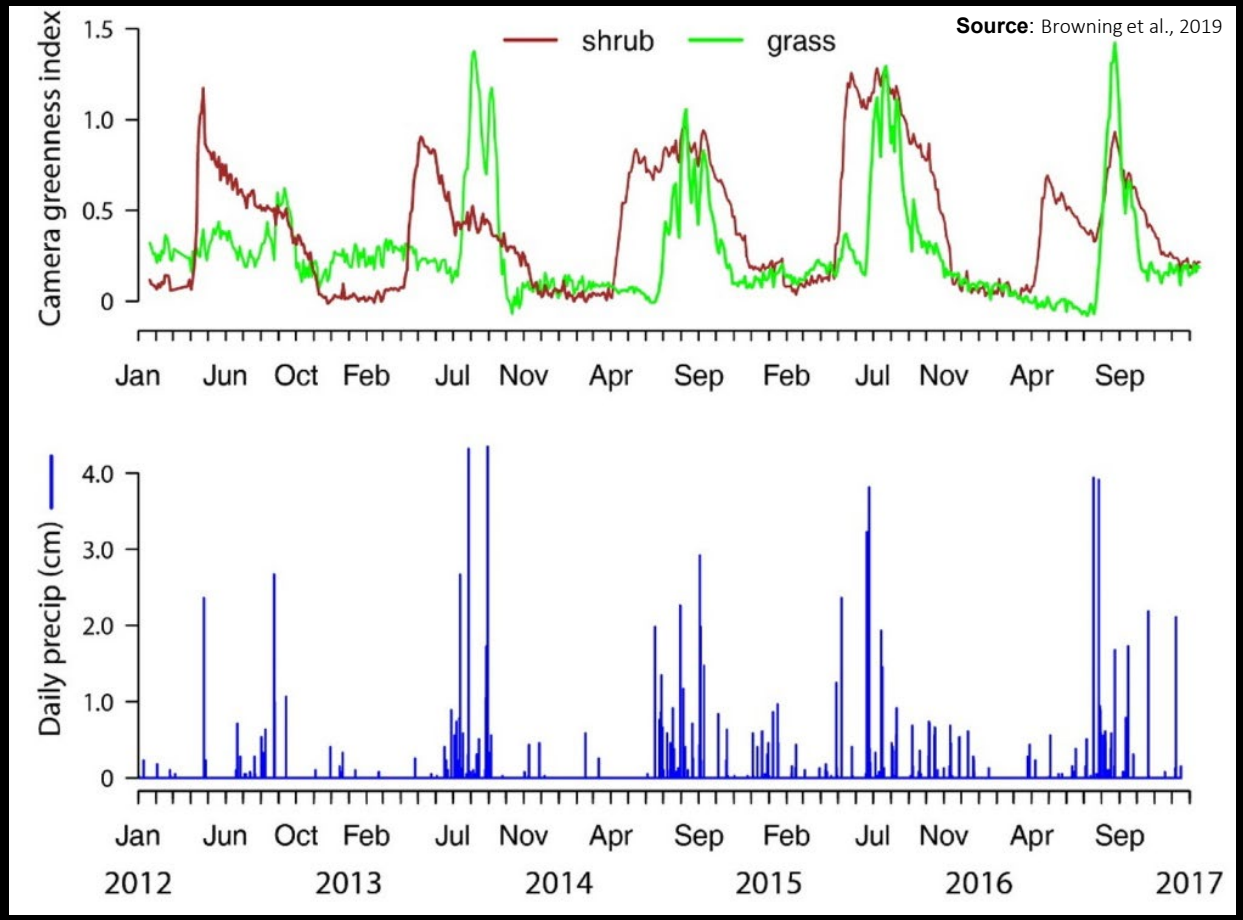
differentiate vegetation types



- **NDVI** from Landsat imagery
- The highest **phenology difference** during March

Remote Sensing of Plant Phenology

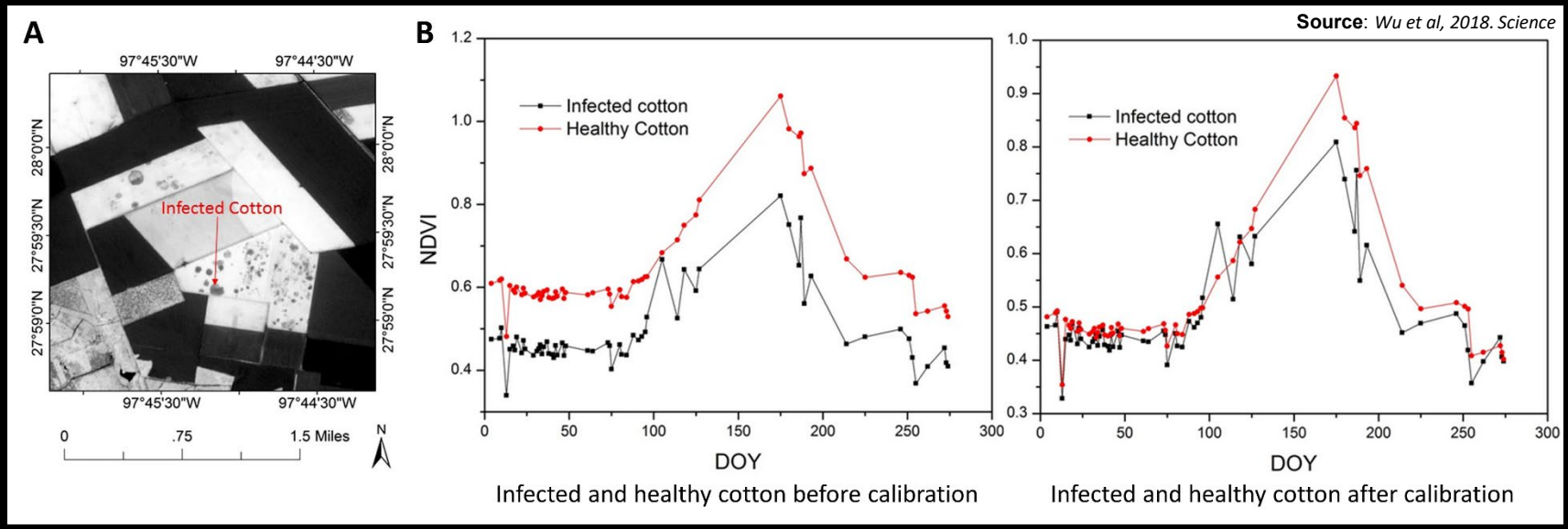
vegetation conditions



- Shrub vs. grass **greenness** from camera images
- Grass greenness **correlates with precipitation** in drylands

Remote Sensing of Crop Conditions

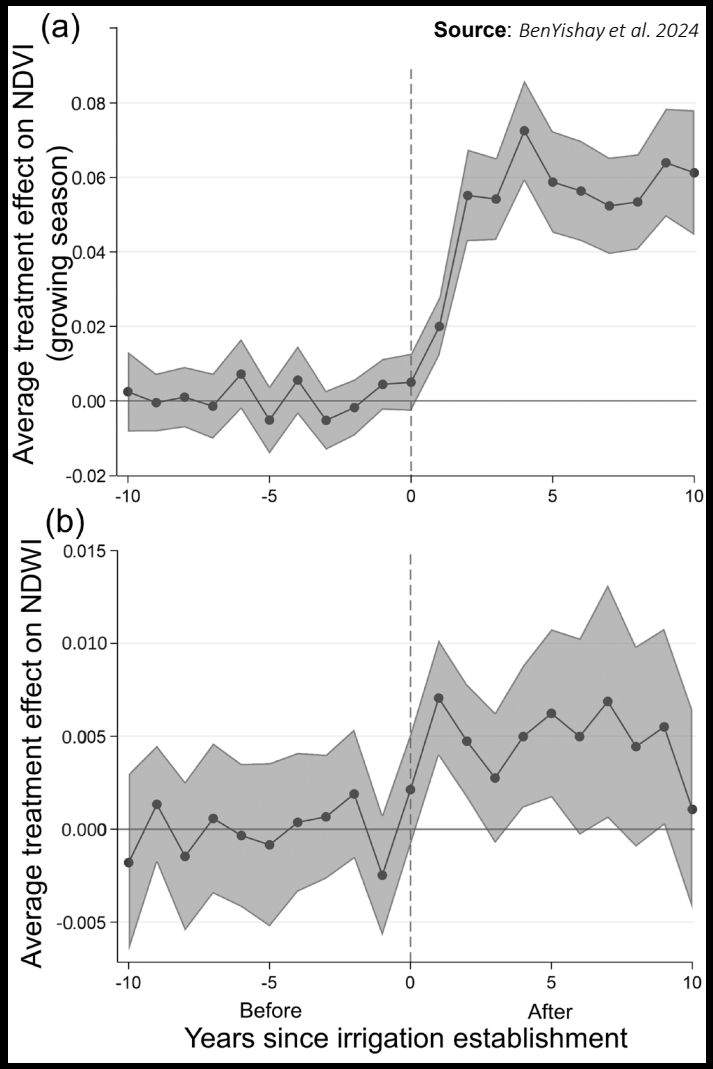
crop conditions



- **Time-series** remote sensing for detecting infected cotton
- Healthy cotton exhibits **greater vegetation greenness** than infected cotton

Remote Sensing of Crop Conditions

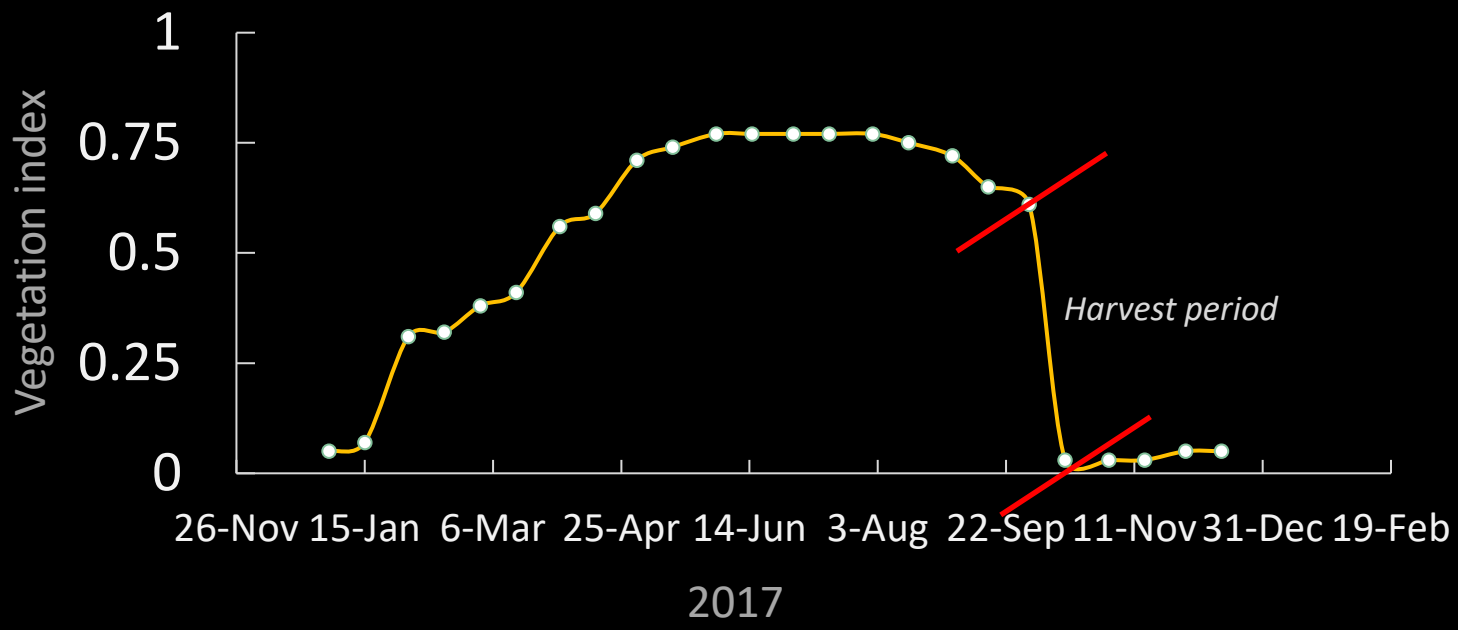
crop productivity



- **Increased NDVI** from the year after completion of irrigation projects
- **Improved water availability** d for crop production after completion of irrigation projects

Remote Sensing of Crop Conditions

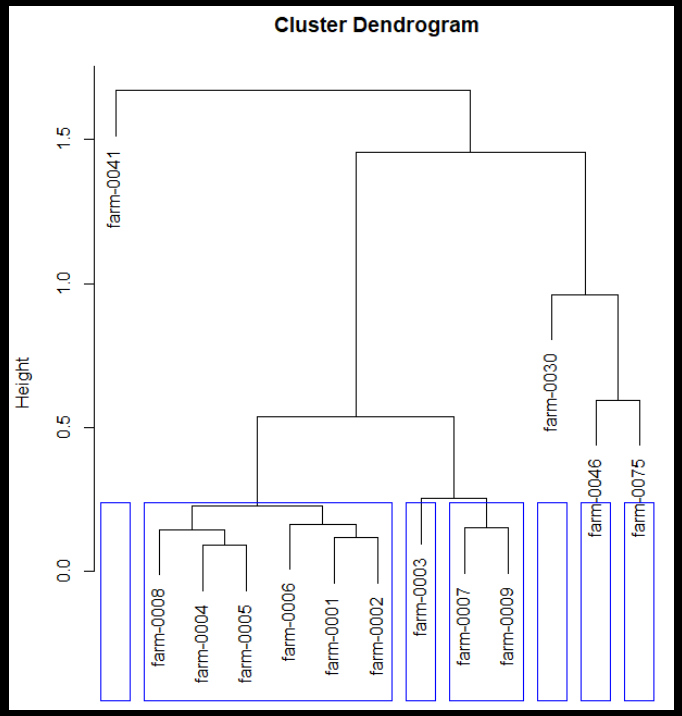
mapping crop types

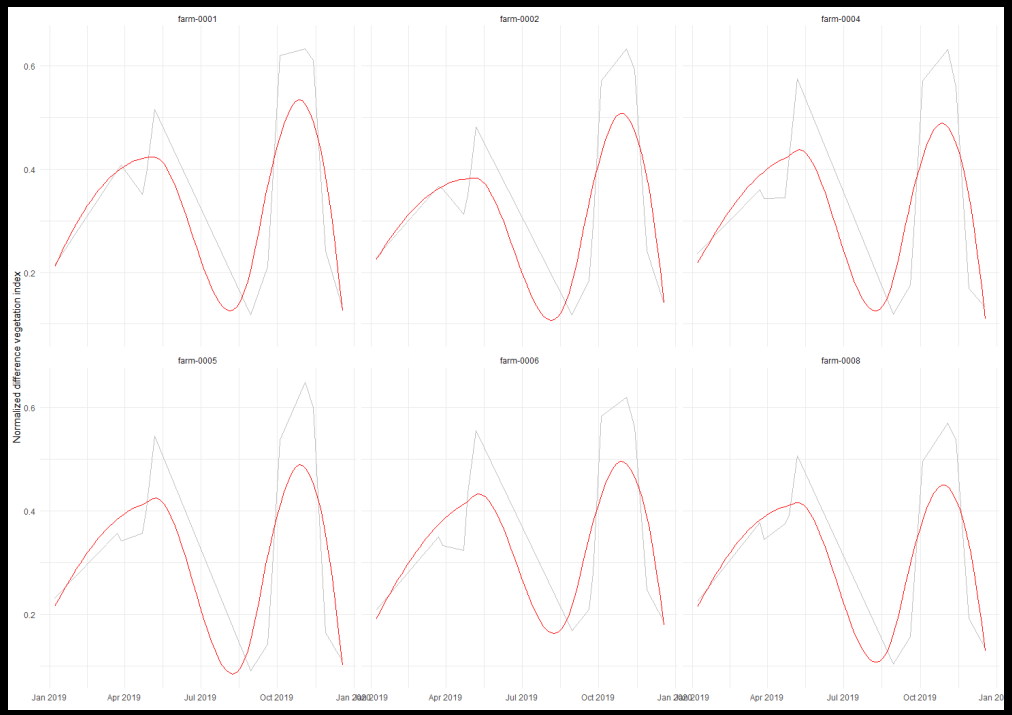


The first few months right after sowing, shows a gradual green-up and vegetative growth. The maturity phase is a bit longer and follows a sudden decline due to harvest.

Remote Sensing of Crop Conditions

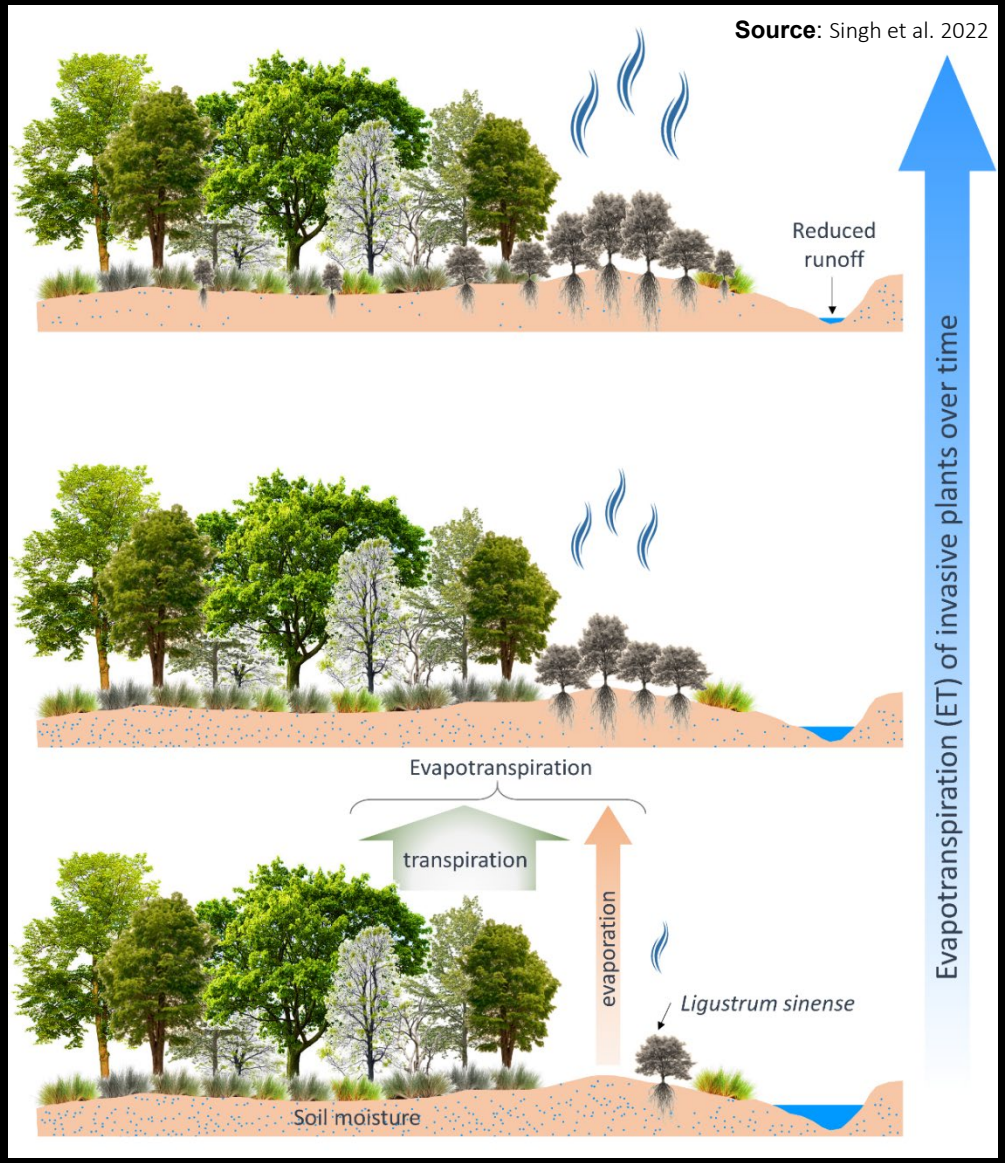
mapping crop types





- Limited ground observations hinder both **retrospective and prospective analyses**
- **Cluster analysis** groups similar data points together for analysis

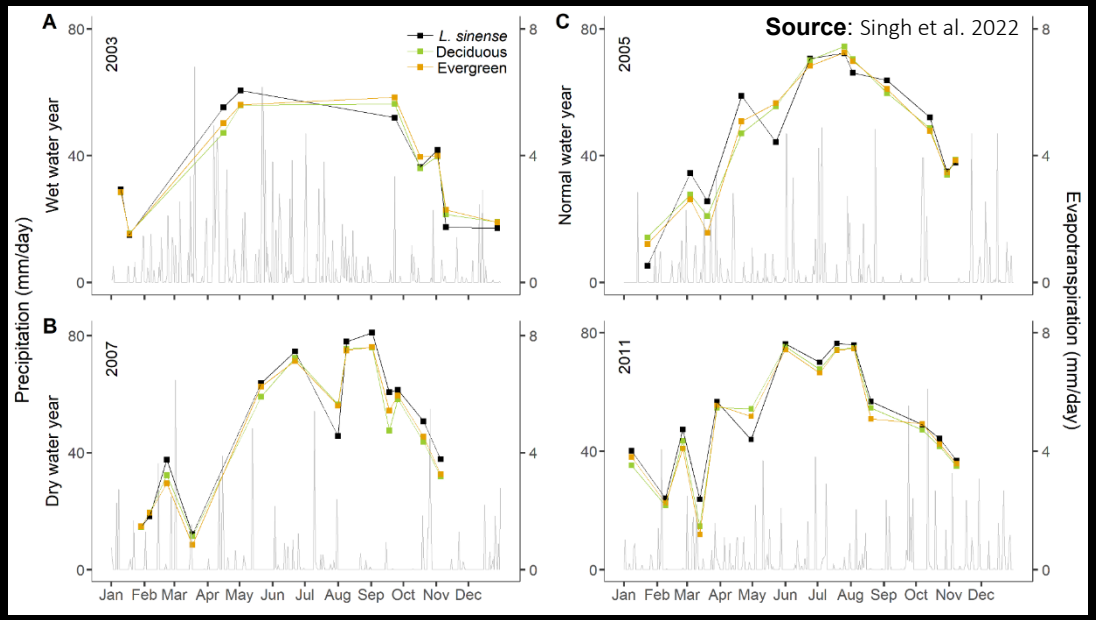
Remote Sensing of Evapotranspiration

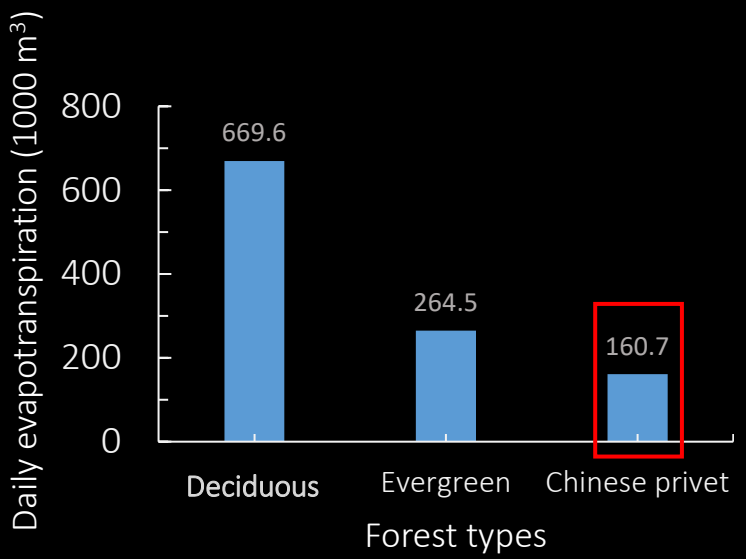


- **Surface-Energy-Balance** model using Landsat/Sentinel imagery
- **Hydrologic response** of vegetation types (e.g., reforested stands, crops)
- Estimate **evapotranspiration** for water savings

Remote Sensing of Evapotranspiration

environmental implications

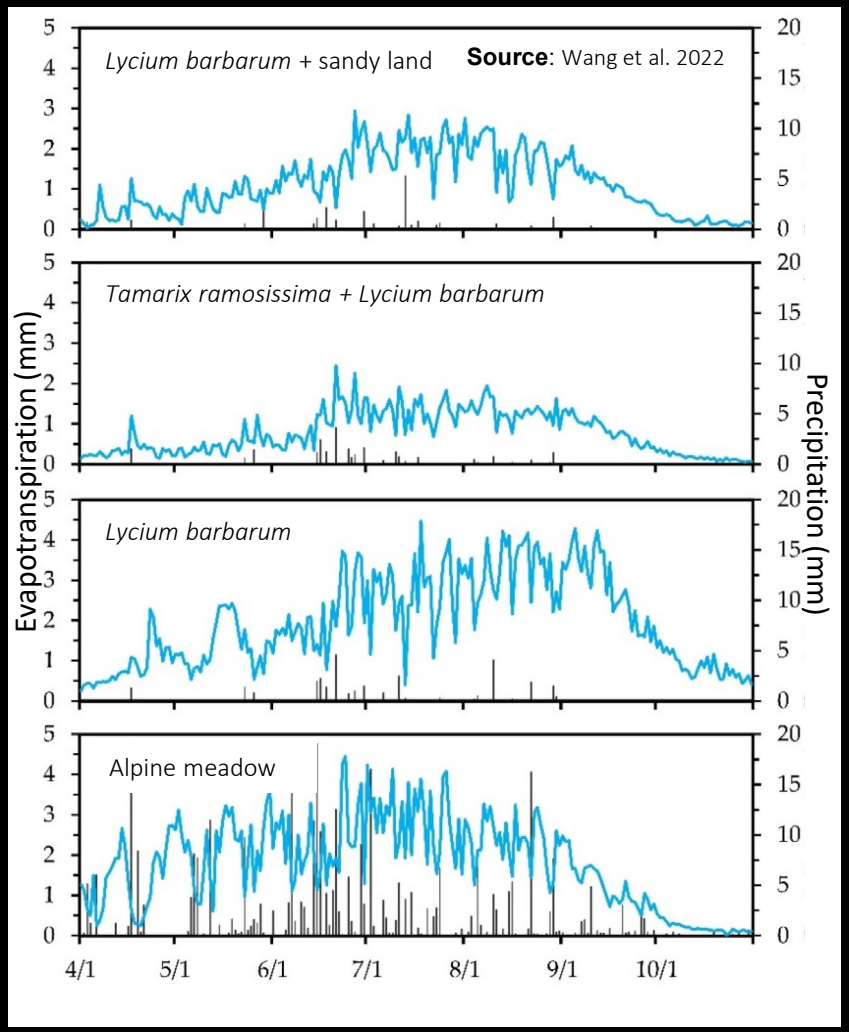




- **Daily average ET** and precipitation of forest types
- **Higher water demands** of invasive plants except during green up and post-high precipitation

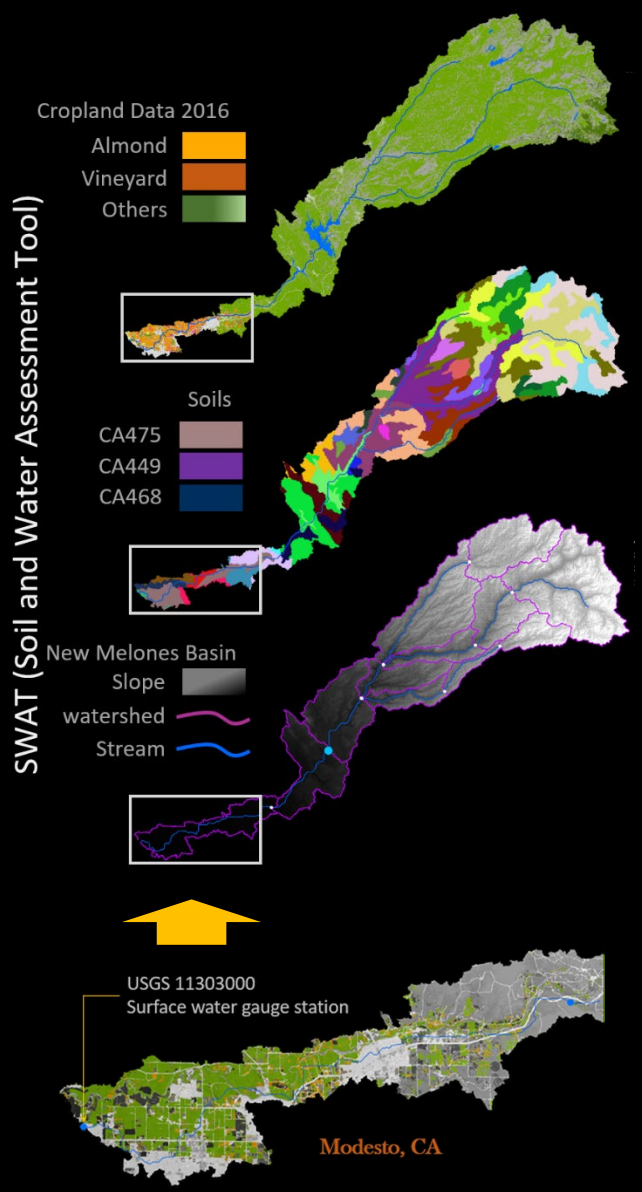
Remote Sensing of Evapotranspiration

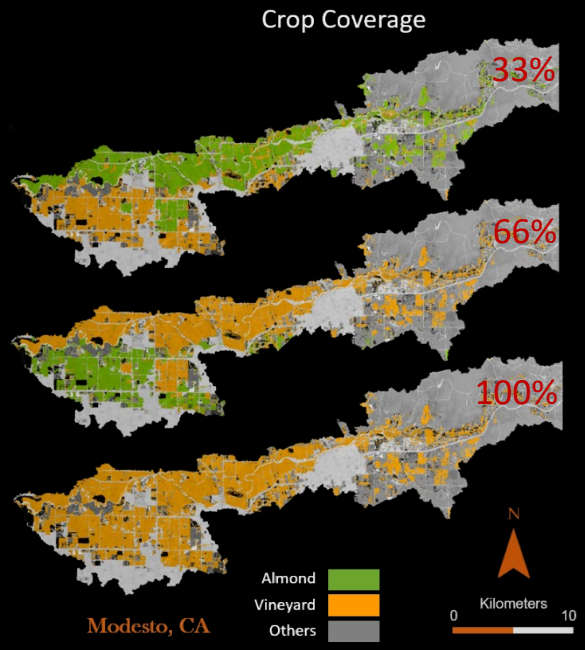
characteristics of crops

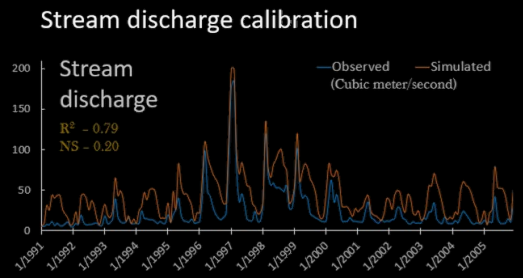


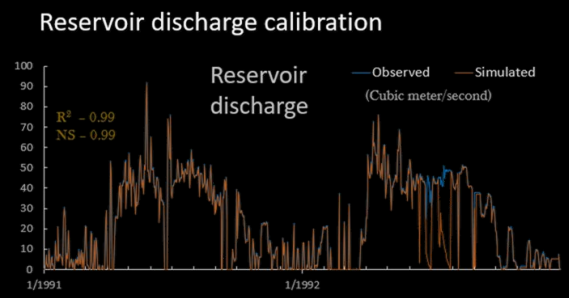
- Characteristics of evapotranspiration and **water consumption** of different underlying surfaces
- **Precipitation i**s the main factor affecting the water consumption of the different underlying surfaces

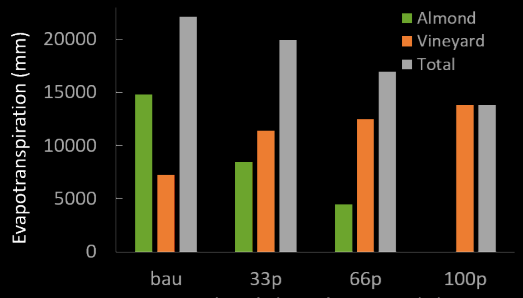
Ecohydrological Modeling

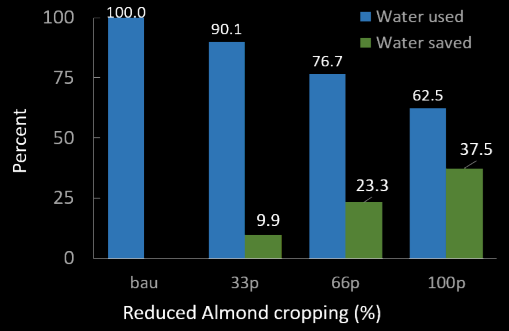






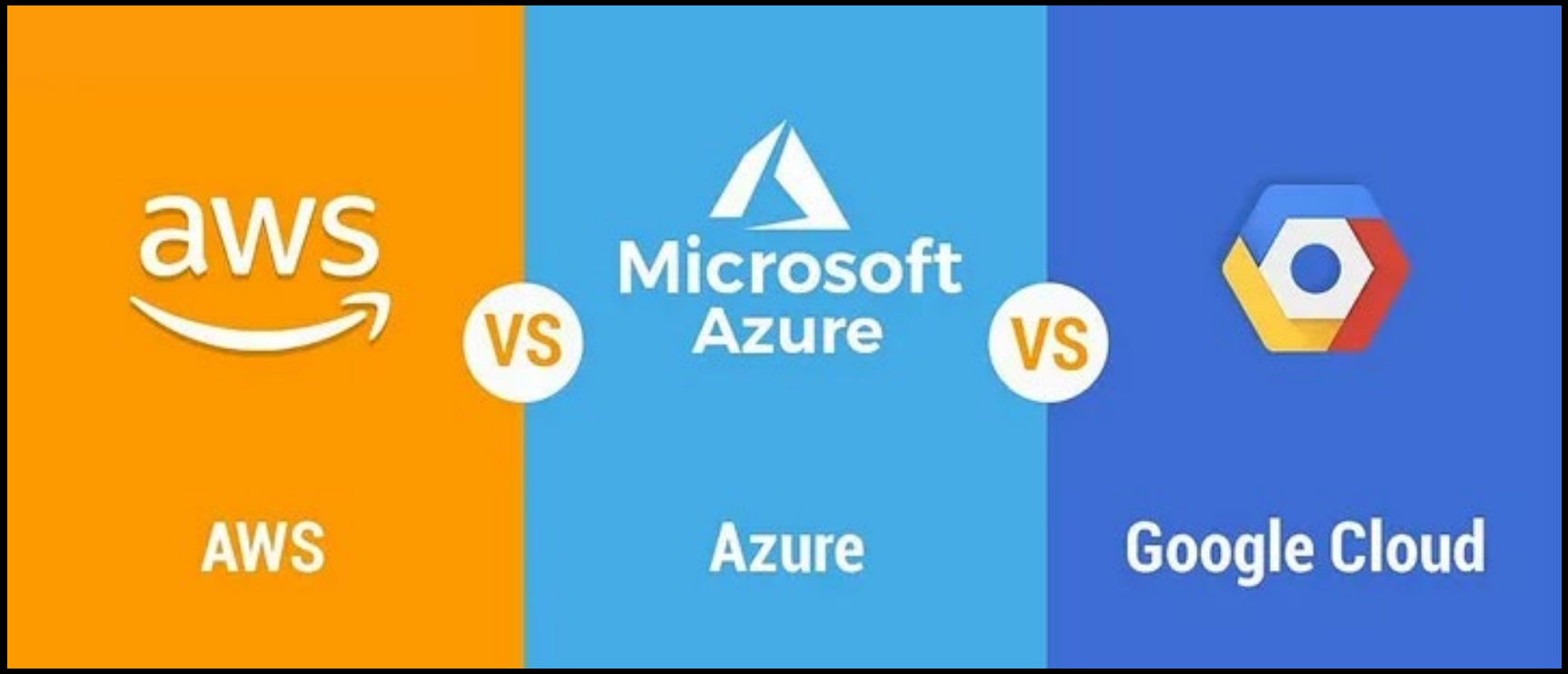






- Save **~38% water** by replacing almond w/ vineyard farms
- Sustainable farming solutions

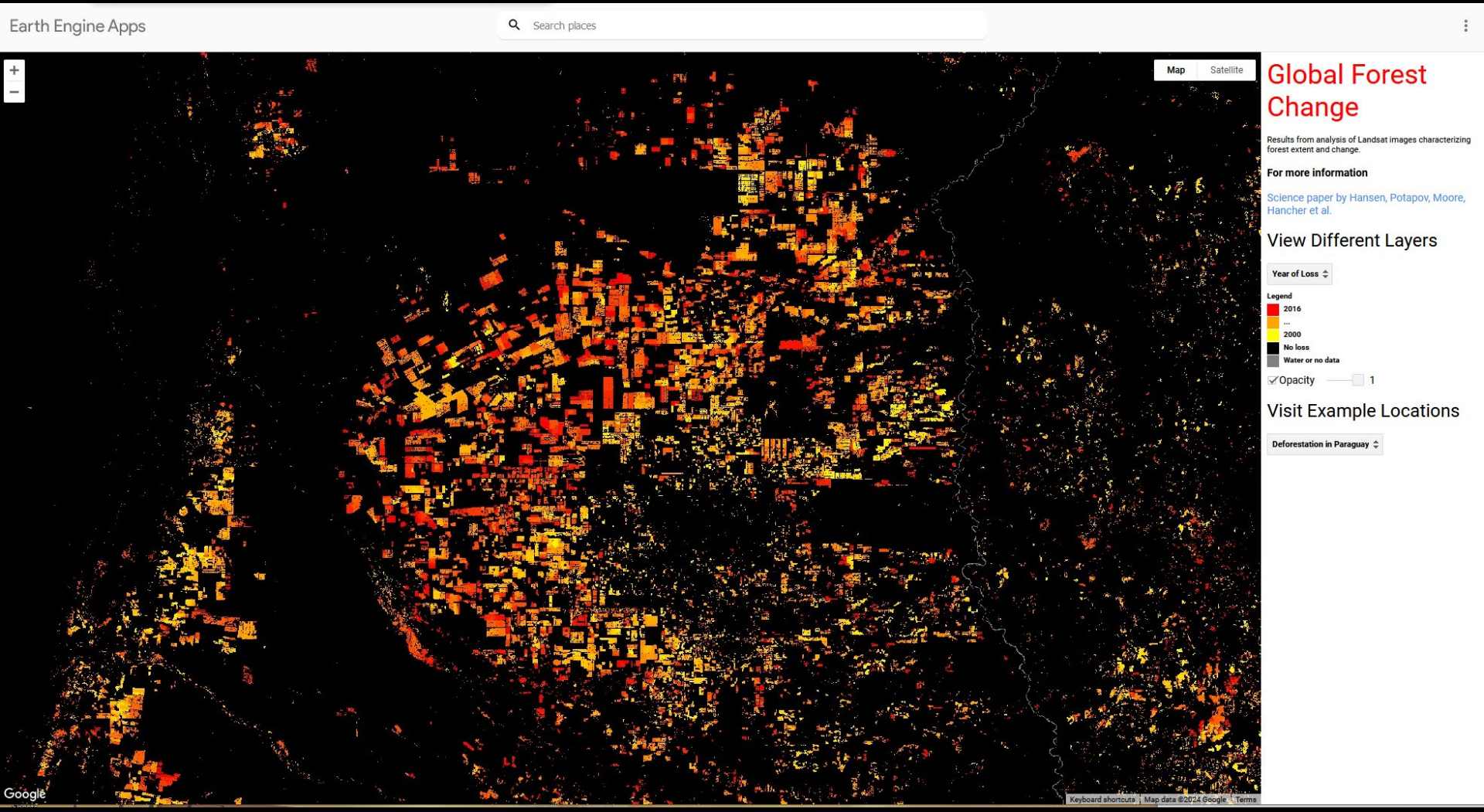
Remote Sensing & Cloud Computing



- Scalability
- Storage and handling of data
- Machine learning and AI capabilities
- Processing speed
- Cost efficiency
- Data security and compliance
- Integration capabilities
- Advanced analytics
- User-friendly interface
- Innovation and future readiness

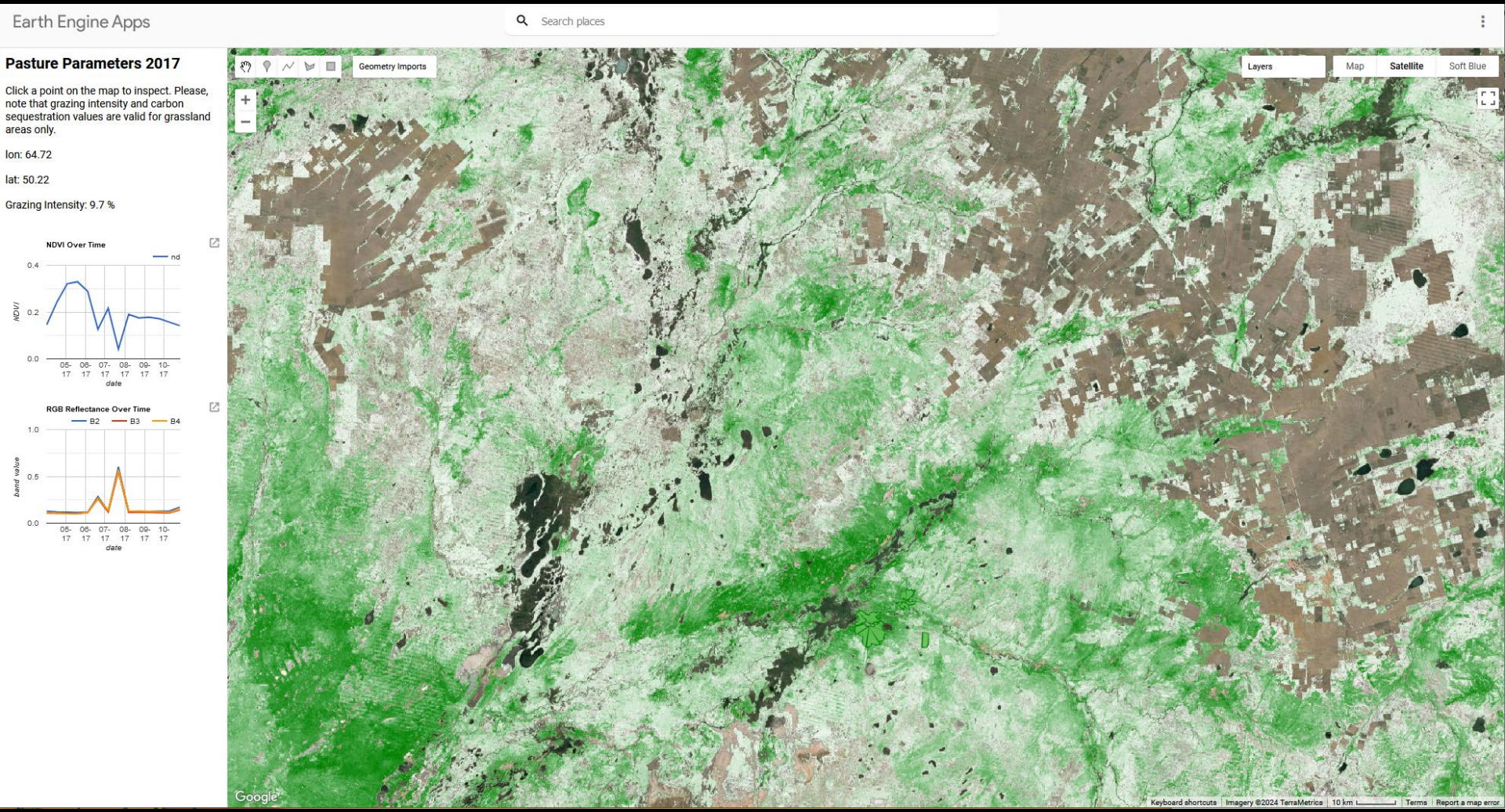
Earth Engine Apps

global forest change



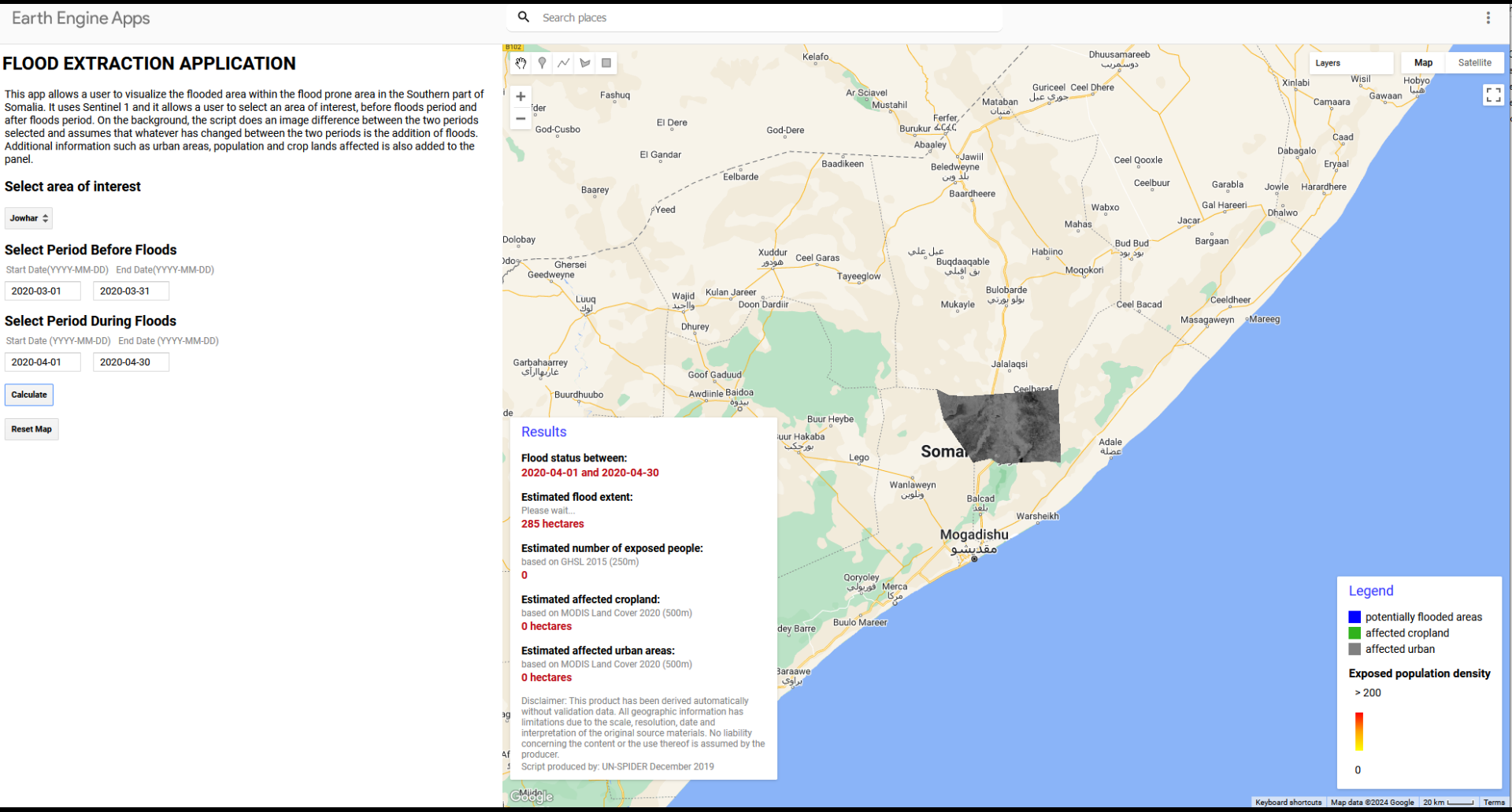
Earth Engine Apps

grazing intensity



Earth Engine Apps

flood mapping



Thank You!

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