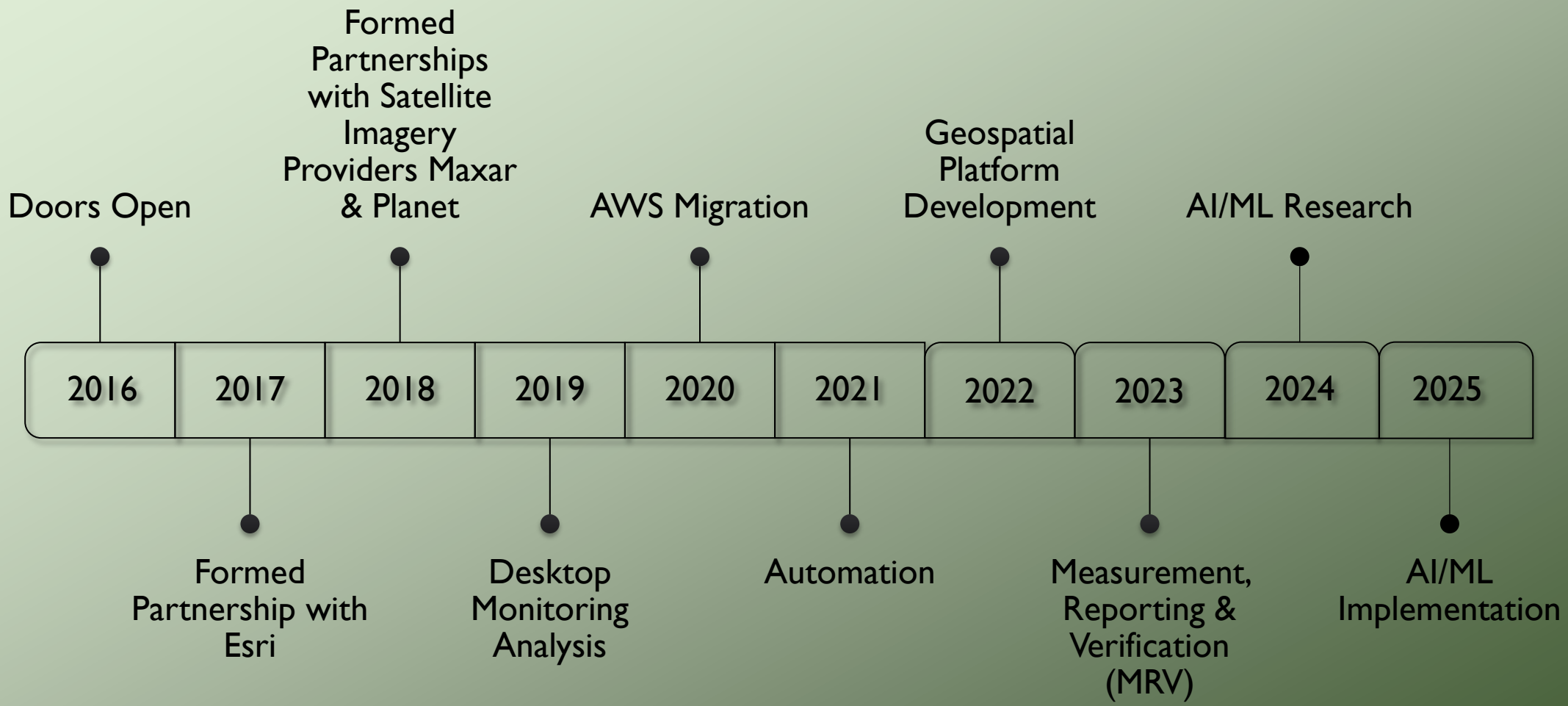
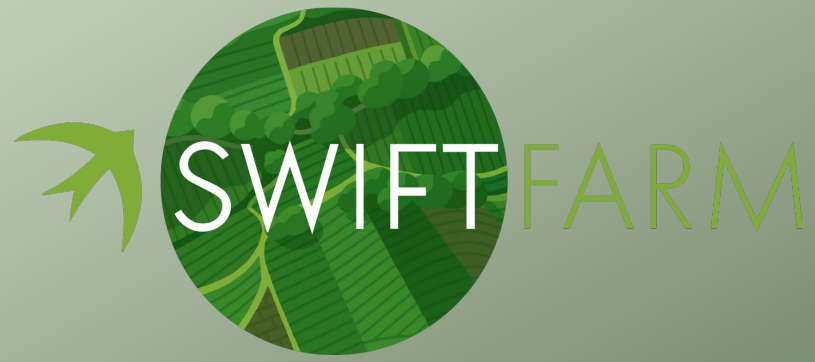
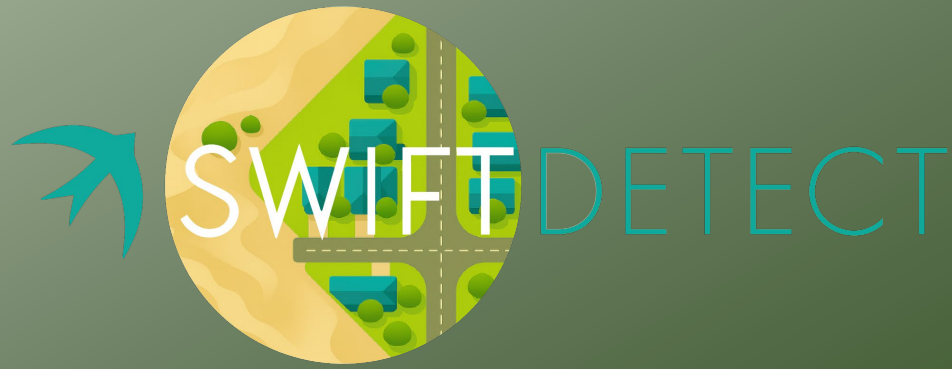

Geospatial Analysis
Powering Sustainable Decisions
Esri South Africa User Conference 2025

Swift Geospatial



Swift Geospatial





Swift Geospatial and Philip Morris International (PMI) Partnership

- Working together for the past 3 years on assisting PMI with the following sustainability requirements:
  - Site verification/cleaning
  - Deforestation monitoring
  - Landuse change analysis
  - Feedstock site analysis and delineation
  - Forest loss analysis
  - Proximity analysis for biodiversity
  - Online web-application/dashboard
    - i. Visualize all analysis and imagery
    - ii. Add secondary available datasets
      - 1. Crops
      - 2. IUCN Red List of Threatened Species
      - 3. World Database on Protected Areas
      - 4. Key Biodiversity Areas
  - Area of Interest (AOI)
    - 120,000,000 Ha Globally

Build a sustainability monitoring application to track commitments and provide insights

SWIFT GEOSPATIAL

PHILIP MORRIS INTERNATIONAL

The Modern Sustainability Challenge

Managing sustainability for a global enterprise like Philip Morris International presents a complex, multifaceted challenge across diverse geographies and contexts.

Cross-Regional Complexity

Operating across diverse geographies, each with unique environmental and socio-economic landscapes, creates varied sustainability challenges.

Vast Supply Chains

Overseeing complex supply chains that span multiple countries and regions requires coordinated sustainability management.

Environmental Impact

Mitigating environmental footprints while maintaining operational efficiency presents a delicate balancing act.

Social Responsibility

Upholding social standards and fostering positive community relations requires contextual understanding of local stakeholders.

Stakeholder Expectations

Meeting diverse expectations from investors, consumers, and regulators regarding sustainability performance.

Ethical Sourcing

Ensuring ethical practices across supply chains while minimizing ecological footprints requires careful management.

GIS

What is Geospatial Analysis?

Geospatial analysis is the process of collecting, displaying, and analyzing data linked to specific geographic locations, transforming geographic information into actionable insights.

Data Integration

Combines diverse datasets from various sources to create comprehensive views of geographic areas.

Visualization

Enables deeper understanding of environmental, social, and economic factors through mapping and visualization.

Pattern Recognition

Reveals patterns, relationships, and trends in geographic data that might otherwise go unnoticed.

Specialized Tools

Uses specialized software and tools to interpret geographic information effectively.

Data Collection
Gathering location-based data from various sources

→

Visualization
Creating maps and visual representations

→

Analysis
Interpreting patterns and relationships

→

Insights
Transforming data into actionable knowledge

esri™

Using Esri technology allowed for seamless integration from Swift Geospatial to PMI environment

Sources of Geospatial Information

Satellite Imagery

Provides broad-scale, regular monitoring of land use, deforestation, crop health, and environmental changes from space.

Drone Data

Offers high-resolution, localized imagery and data collection for detailed assessments of specific areas, such as farm plots or construction sites.

On-the-Ground GPS Sensors

Delivers precise location data and real-time environmental measurements (e.g., soil moisture, temperature) directly from the field.

Weather Data

Integrates meteorological information to understand climate patterns, predict extreme weather events, and assess their impact on operations and ecosystems.

Population Data

Incorporates demographic information to analyze social impacts, community engagement, and labor practices in specific geographic contexts.

Topographical Data

Provides elevation and terrain information crucial for water management, infrastructure planning, and understanding natural resource distribution.

Sustainable Agriculture Applications

Philip Morris International uses geospatial data to optimize tobacco crop management, enhance sustainability, and improve operational efficiency.

Crop Health Monitoring

Satellite imagery and drone data provide insights into crop health, enabling early detection of issues.

Vegetation Index Analysis

Monitoring NDVI to assess plant vigor and identify areas requiring specific nutrients.

Precision Irrigation

Optimizing irrigation schedules based on real-time conditions to reduce water waste.

Yield Prediction

Understanding crop health to predict yields accurately and ensure sustainable farming.

Water Resource Optimization

Geospatial analysis combined with weather and soil data enables efficient water management across agricultural operations.

Terrain Analysis

Understanding elevation and topography to optimize water distribution and infrastructure planning.

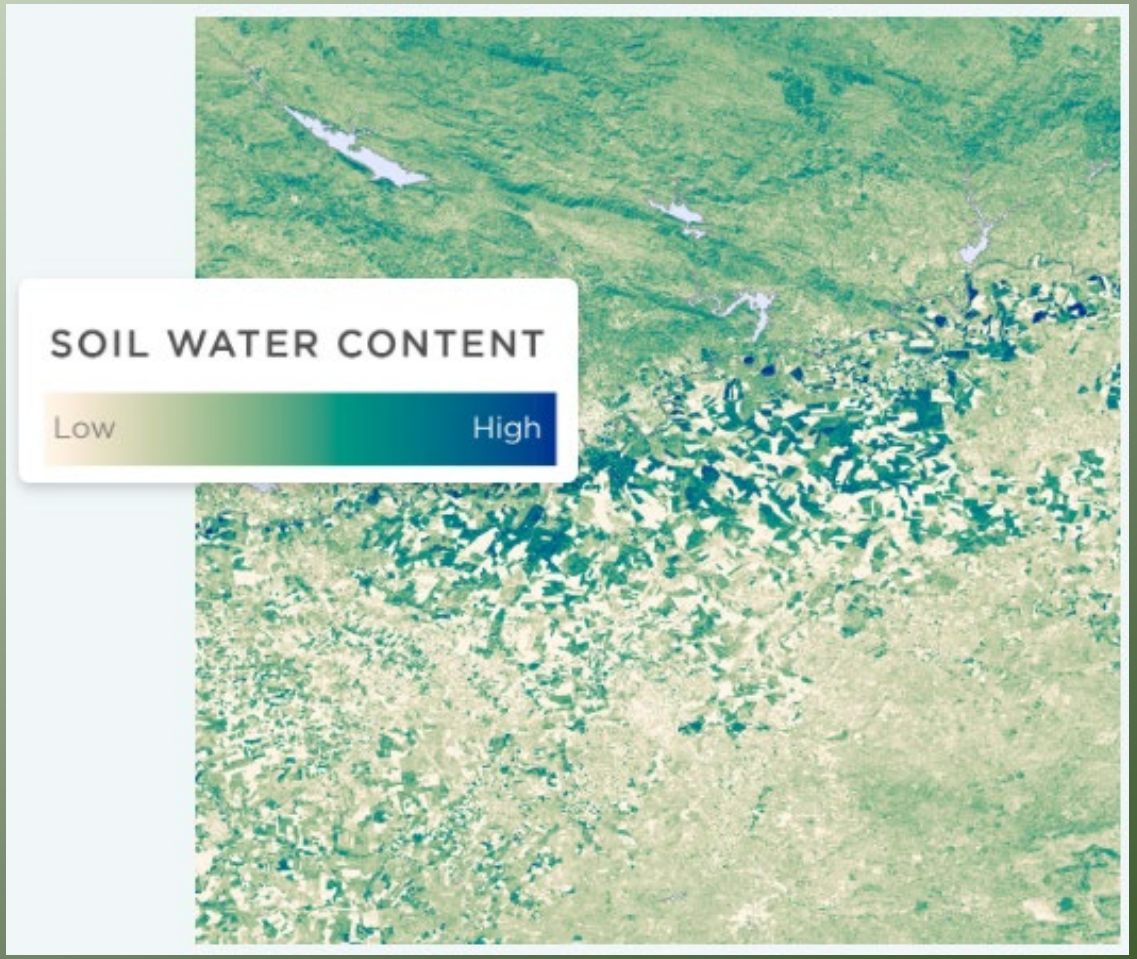
Soil Mapping

Creating detailed soil type maps to understand water retention and irrigation needs.

Climate Integration

Historical rainfall patterns and real-time weather forecasts inform optimal irrigation scheduling.

Key Outcome: Precise irrigation planning reduces water waste while maintaining optimal crop growth conditions.



Environmental Stewardship Through Mapping

Geospatial tools enable proactive environmental protection by mapping sensitive areas and monitoring land use over time.

Mapping "No-Go" Zones

Designating cultivation-prohibited areas to prevent expansion into natural habitats.

Continuous Monitoring

Using satellite imagery to track land-use changes and detect unauthorized deforestation.

Biodiversity Protection

Preserving ecosystems and supporting conservation through proactive monitoring.

Key Benefits

- Early detection of unauthorized deforestation
- Proactive protection of biodiversity hotspots
- Improved land-use planning

Environmental Stewardship Through Mapping - Deforestation

PHILIP MORRIS INTERNATIONAL
Delivering a Smoke-Free Future

TOBACCO GROWING AREAS (TGA) | PULP & PAPER FEEDSTOCKS (PPF) | PULP & PAPER MILLS (PPM) | MANUFACTURING FACILITIES (MNF) | SMOKE-FREE PRODUCTS (SFP)

Analysis Region: Asia

AOI: - All -

Supplier: - All -

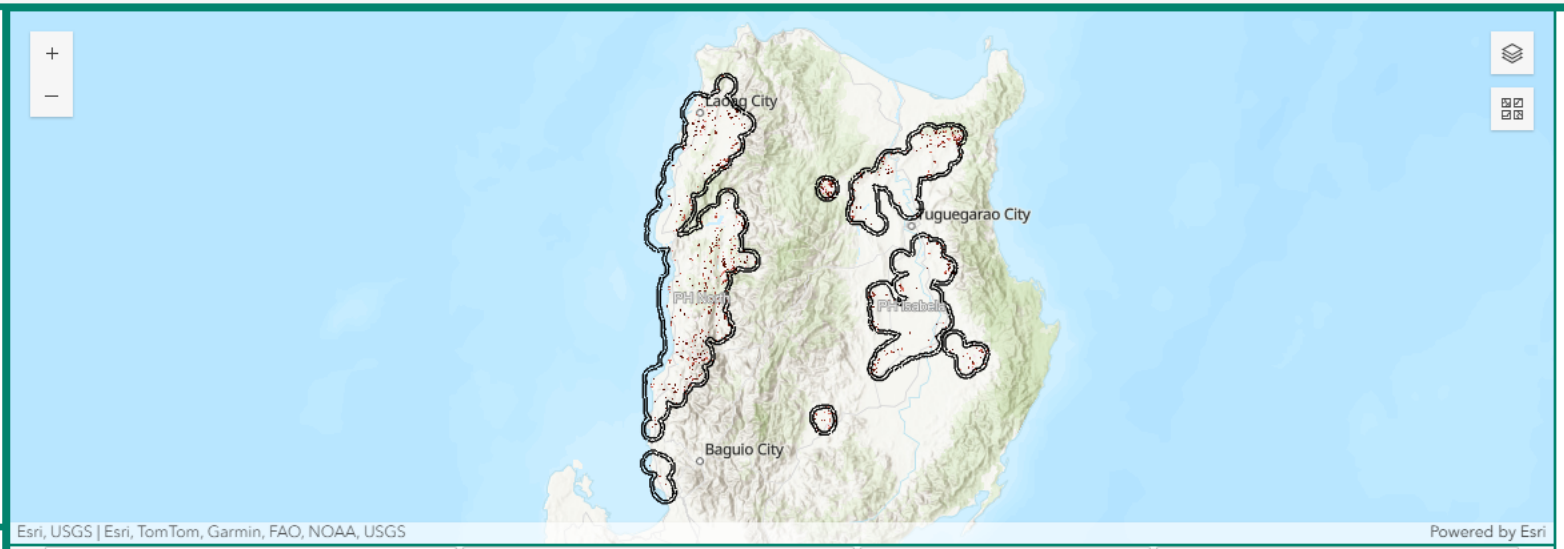
LULC Analysis

Natural vs Planted

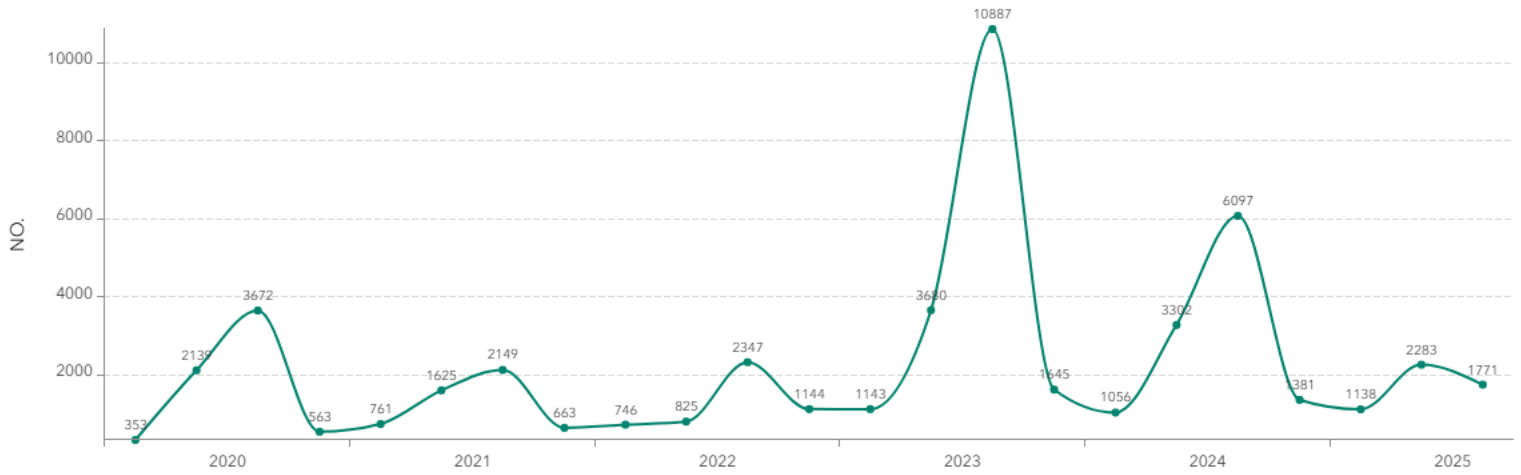
Proximity Analysis

Deforestation Analysis

Table Download



DEFORESTATION ALERTS (COUNT) | DEFORESTATION ALERTS (AREA) | FOREST LOSS (AREA) | EXTENDED DEFORESTATION



Site Characteristics

Reference Name	ID East Indonesia
SUID	TGA_0011
Type	TGA
Analysis Region	Asia
Analysis Quarter	Q1
CCROA Code	
Country	Indonesia
Supplier	TCF
AOI Area (ha)	240302.14 ha

Deforestation Statistics

EUDR Risk Level	Critical
EUDR Compliance	Non-compliant
Alerts Area	1,406.64 ha
Alerts Count	44038

Deforestation Alerts (Last 3 Months, 2025)

Date	Total Area (ha)
Aug 7, 2025	3.62 ha
Aug 6, 2025	0.69 ha
Aug 3, 2025	0.48 ha
Jul 31, 2025	2.51 ha
Jul 22, 2025	9.25 ha
Jul 21, 2025	0.76 ha
Jul 19, 2025	11.52 ha
Jul 14, 2025	2.72 ha
Jul 13, 2025	0.07 ha
Jul 10, 2025	14.93 ha
Jul 5, 2025	1.35 ha
Jun 28, 2025	3.02 ha
Jun 25, 2025	2.46 ha

Environmental Stewardship Through Mapping - Landcover

PHILIP MORRIS INTERNATIONAL — Delivering a Smoke-Free Future

TOBACCO GROWING AREAS (TGA) | PULP & PAPER FEEDSTOCKS (PPF) | PULP & PAPER MILLS (PPM) | MANUFACTURING FACILITIES (MNF) | SMOKE-FREE PRODUCTS (SFP)

Analysis Region: Asia

AOI: IN Gujarat

Supplier: - All -

LULC Analysis

Natural vs Planted

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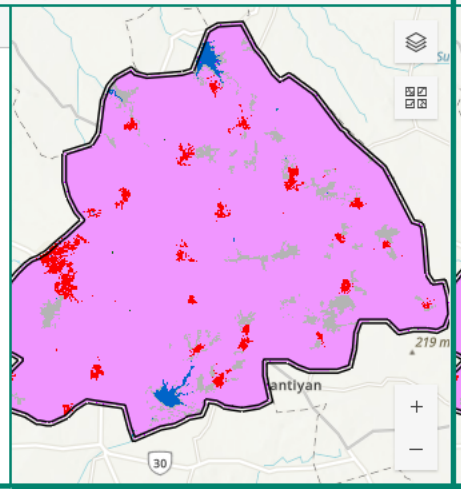
Deforestation Analysis

Table Download

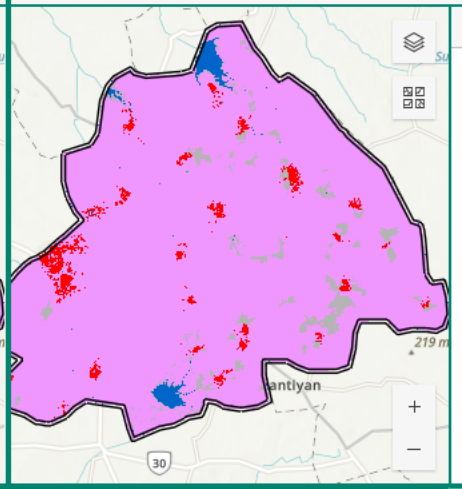
BASELINE (2024)

LULC 2024 | TREE COVER IN KBA OVERLAP

PROPORTION OF PIXELS (2024)



CURRENT (2025)



LULC 2025 | TREE COVER IN KBA OVERLAP

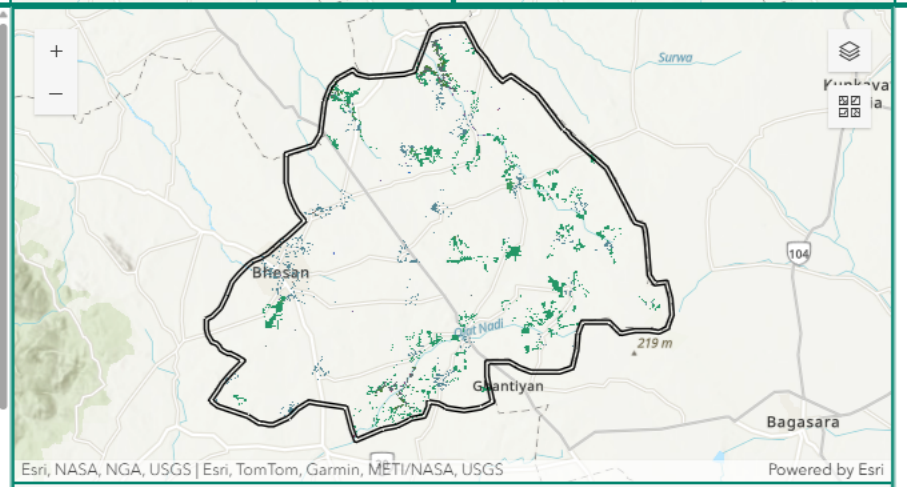
PROPORTION OF PIXELS (2025)

Site Characteristics

Reference Name	IN Gujarat
SUID	TGA_0039
Type	TGA
Analysis Region	Asia
Analysis Quarter	Q1
Country	India
Supplier	
AOI Area (ha)	165661.59 ha

Natural Land Cover Classes

Class Name	2024	2025	2024-2025
Tree Cover	0.16%	0.26%	+0.09%
Tree Cover in Overlapping KBA	0.43%	2.30%	+1.86%



CHANGE (2024-2025)

Natural to Non-Natural Land Cover Change

Class Name	Change (%)	Asia Average	Overall Average
Tree Cover to Bare/Sparse Vegetation	0.02%	+0.65%	+0.65%
Shrubland to Bare/Sparse Vegetation	0.00%	+2.47%	+2.47%
Grassland to Bare/Sparse Vegetation	0.00%	+0.86%	+0.86%
Mangrove to Bare/Sparse Vegetation	0.00%	+0.00%	+0.00%
Herbaceous Wetland to Bare/Sparse	0.00%	+0.01%	+0.01%

Environmental Stewardship Through Mapping – Planted vs Natural

PHILIP MORRIS INTERNATIONAL — Delivering a Smoke-Free Future

TOBACCO GROWING AREAS (TGA) | PULP & PAPER FEEDSTOCKS (PPF) | PULP & PAPER MILLS (PPM) | MANUFACTURING FACILITIES (MNF) | SMOKE-FREE PRODUCTS (SFP)

Analysis Region: Asia

AOI: CN Guizhou Zunyi

Supplier: - All -

LULC Analysis

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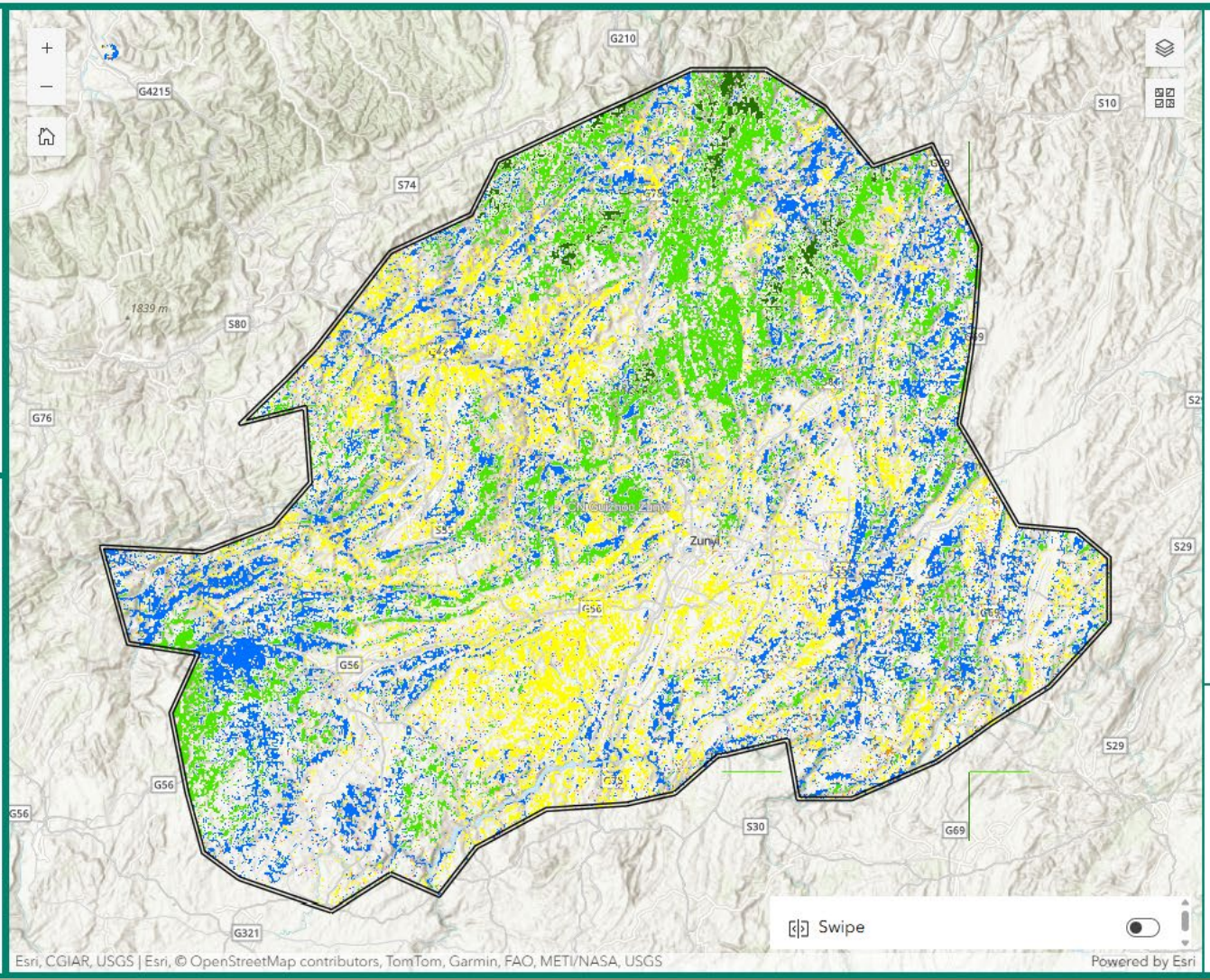


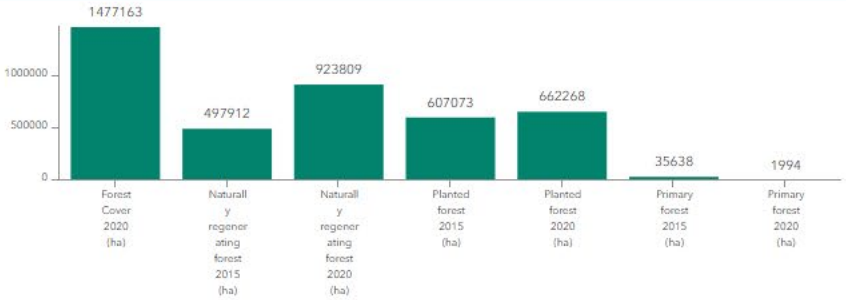
CCROA Code	
Country	Indonesia
Supplier	
AOI Area (ha)	240302.14 ha

Forest Area Statistics (2015-2020)

Class	2015	2020	2015-2020
Planted Forest	8,546.11 ha	4,939.56 ha	-3,606.55 ha
Primary Forest	19,292.91 ha	502.84 ha	-18,790.07 ha
Naturally Regenerating Forest	16,743.14 ha	68,445.20 ha	51,702.06 ha
Forest Cover (GFW)	-	61,193.93 ha	-

Forest Type Classes (2015)

Class	2015
Naturally Regenerating Forest with Signs of Forest Management	16,743.14 ha
Naturally Regenerating Forest including Primary Forest	19,292.91 ha
Oil Palm Plantation	150.46 ha
Planted Forest	0.00 ha
Plantation Forest	8,546.11 ha
Agroforestry	173,449.14 ha



Environmental Stewardship Through Mapping – Planted vs Natural

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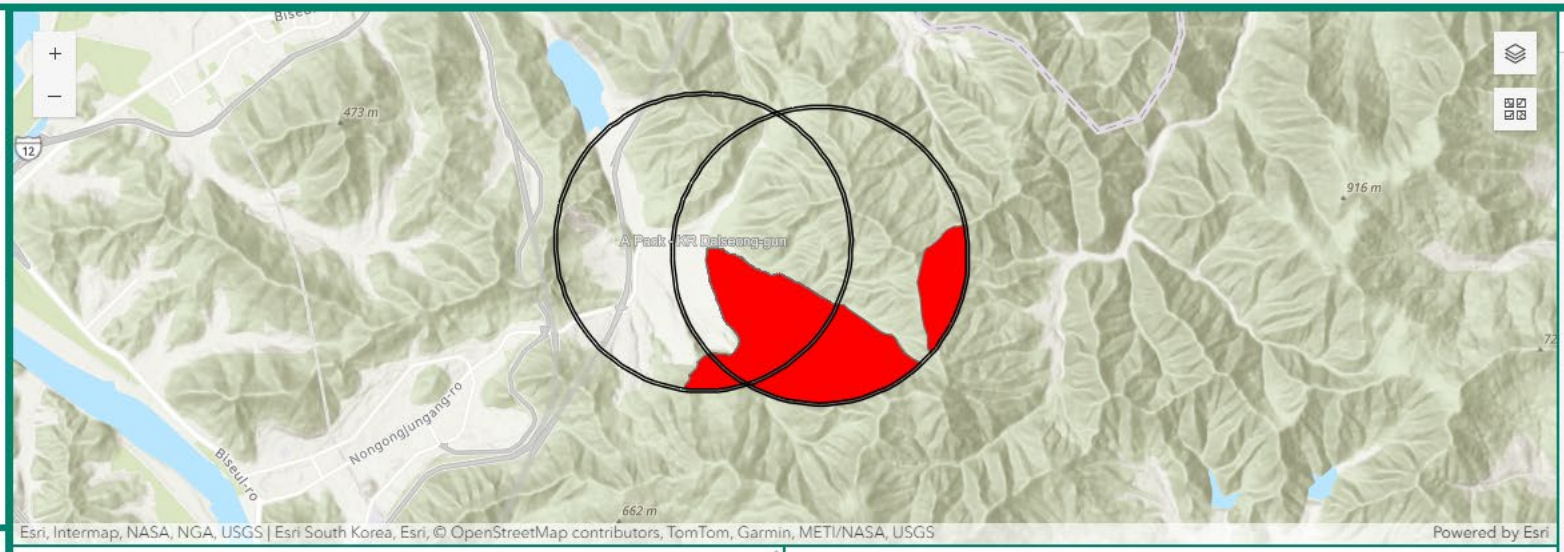
Analysis Region: Asia

AOI: - All -

Country: - All -



LULC Analysis

Natural vs Planted

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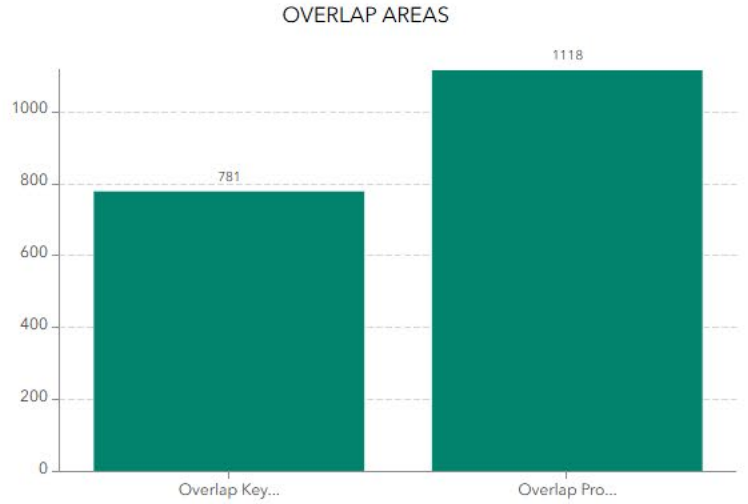
Table Download

Site Characteristics

Reference Name	A Pack - KR Dalseong-gun
SUID	PPM_001
Type	PPM
Analysis Region	Asia
Analysis Quarter	Q1
CCROA Code	
Country	South Korea
Supplier	A Pack - KR Dalseong-gun
AOI Area (ha)	1255.83 ha

Proximity Statistics

Matching WDPA Areas	2
Total WDPA Area	409.79 ha
Matching KBA Areas	0



WDPA List	KBA List
Biseulsan County Park Designation: County Park Designation Type: National IUCN Category: V Status: Designated Managing Authority: Local government (Daegu Metropolitan City Dalsung-gun)	**Biseulsan County Park** Designation: County Park Designation Type: National IUCN Category: V Status: Designated Managing Authority: Local government (Daegu Metropolitan City Dalsung-gun)
Kyushozan Designation: Prefectural Wildlife Protection Area Designation Type: National IUCN Category: IV Status: Designated Managing Authority: Tottori Prefecture	**Go gawa suikei** Designation: Prefectural Natural Park Designation Type: National IUCN Category: V Status: Designated Managing Authority: Shimane Prefecture
Common fishery right area(Hyogo) Designation: Common fishery right area Designation Type: National IUCN Category: VI Status: Designated Managing Authority: Ministry of Agriculture, Forestry and Fisheries	**Gachang Dam** Designation: Water Source Protection Area Designation Type: National IUCN Category: VI Status: Designated Managing Authority: Local government
Gyeongnam Yangsan Gyodong Designation: Wildlife Protection Area Designation Type: National IUCN Category: IV Status: Designated Managing Authority: Local Government(Yangsan-si)	**Catchment Reserve Protection Area** Designation: Catchment Reserve Protection Area Designation Type: National IUCN Category: IV Status: Designated Managing Authority: Korea Forest Service

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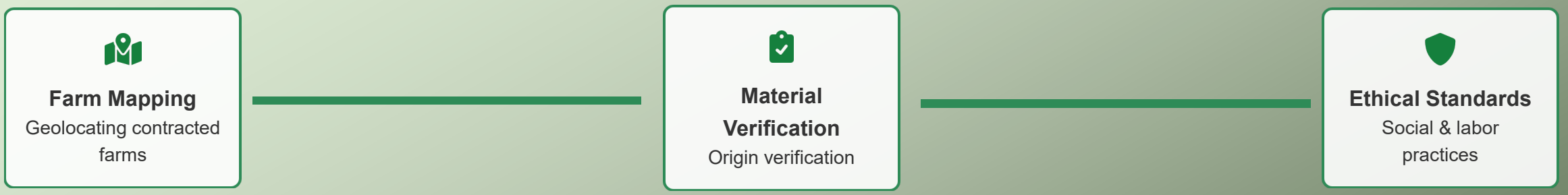
Supply Chain Transparency

Geospatial technology enhances supply chain transparency by mapping contracted farms, verifying material origins, and monitoring ethical standards.



Clear Supply Chain View

Visualizes the entire chain from farm to processing facility.

Risk Identification

Identifies potential risks in cultivation and processing.

Improved Accountability

Enhances traceability and responsibility.

Stakeholder Communication

Communicates sustainability efforts effectively.

Benefits of Geospatial Analysis

Geospatial analysis provides a comprehensive, location-aware understanding of environmental, social, and economic factors, delivering measurable value to sustainability initiatives.

Integrated Data View

Combines diverse datasets to provide a comprehensive understanding of an area or system, revealing patterns and relationships that would be missed in isolated analyses.

Precise Decision-Making

Enables informed decisions through visual representation of data in geographic context, allowing stakeholders to identify trends and patterns at a glance.

Risk Mitigation

Anticipates and addresses environmental and social risks through proactive monitoring and early detection of potential issues, reducing operational disruptions.

Operational Efficiency

Optimizes resource allocation and operational strategies by analyzing how geographic factors impact efficiency, reducing costs while maintaining sustainability goals.

Stakeholder Engagement

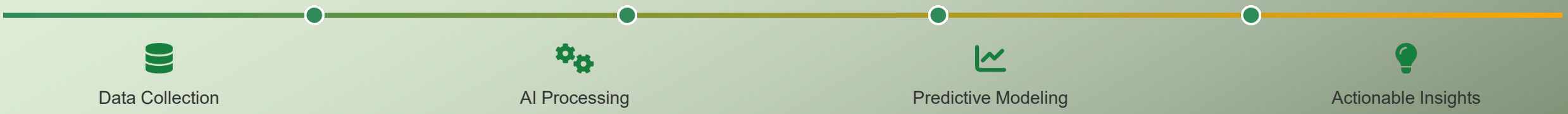
Creates meaningful visual narratives that help engage and communicate with stakeholders, improving transparency and trust in sustainability reporting.

Measurable Impact

Transforms abstract sustainability goals into tangible, measurable actions with geographic context, enabling tracking and demonstrating of progress.

The Future of Geospatial Analysis

Geospatial analysis is evolving rapidly with the integration of AI and ML, enhancing predictive capabilities for environmental management.



AI-Enhanced Analysis

AI can analyze vast satellite imagery datasets to identify subtle land use changes and predict environmental impacts with higher accuracy.

Cloud-Based Platforms

Scalable cloud infrastructure will enable real-time processing of global geospatial data, allowing for more dynamic environmental monitoring.

Integrated Modeling

Combining geospatial data with other datasets will create more sophisticated predictive models for environmental risk assessment.

Talent Development

Building skilled talent in geospatial science and data analytics is crucial for realizing the potential of advanced technologies.

⚠ Key Challenge

Data accessibility remains a hurdle, as integrating diverse data sources and ensuring quality can be complex. Addressing this requires standardized approaches.

Thank you

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