



Why Historical Satellite Imagery Is Becoming Critical for Land Change Detection and Legal Proof

THE FOUNDATION OF TRUTH.
THE STANDARD OF EVIDENCE.



HISTORICAL CONTEXT
MATTERS



DETECT CHANGE
WITH CONFIDENCE



STRENGTHEN
LEGAL
EVIDENCE

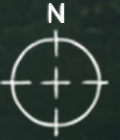


AI-POWERED
INSIGHTS



Rotten Grapes
— Pvt. Ltd. —

Historical Imagery. Verified Change. Defensible Evidence.



23° 45' 12.45" N
90° 24' 18.30" E

WGS 84

0 250 900 790 1000m
8 250 900 790 1000m



PARCEL ID: 24-74-091

AREA: 38.42 HA



STATUS: UNDER REVIEW



The Growing Challenge of Land Change Detection

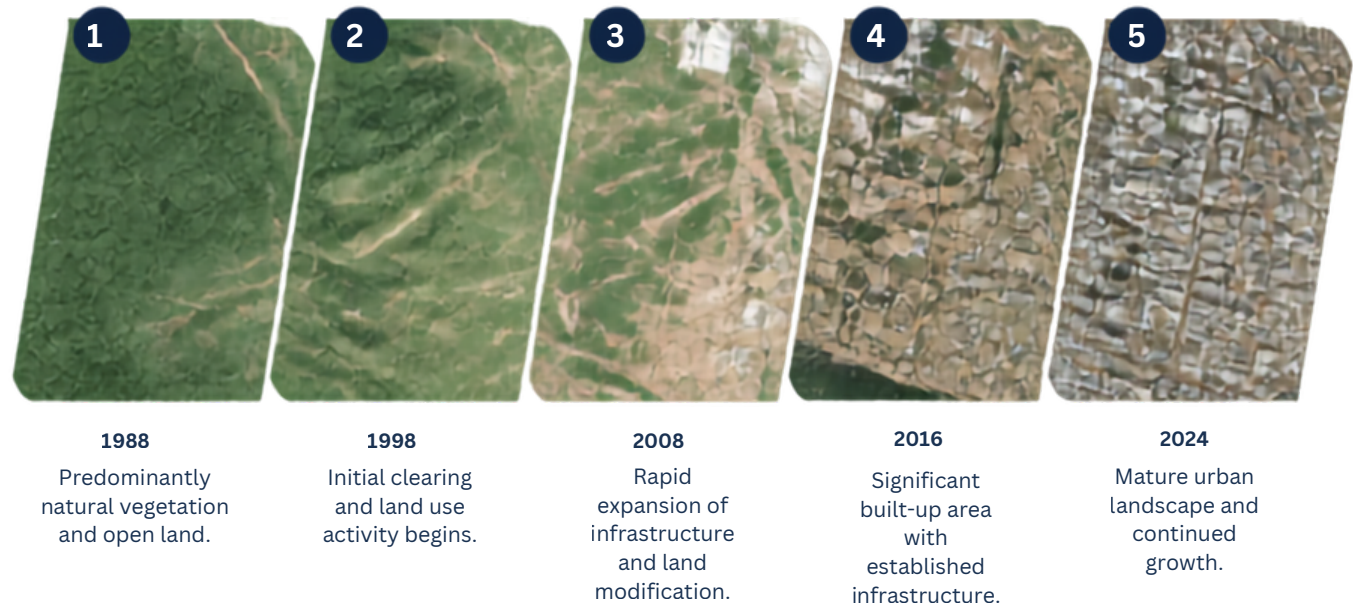
Land is one of the most valuable assets for governments, businesses, and individuals. However, monitoring land continuously is extremely difficult. Unauthorized construction, illegal occupation, land-use violations, and boundary changes often occur gradually and remain unnoticed until they develop into expensive legal disputes.

Traditional land administration systems rely heavily on field inspections and paper records. In many regions, these records are outdated, inconsistent, or difficult to verify (World Bank, 2015)¹. Ownership documents may not accurately reflect the current condition of the land, while physical surveys only capture the situation at the time of inspection rather than showing how the land changed over time.

The consequences extend far beyond individual property owners.

“Delayed land issues can disrupt infrastructure projects, while vast public assets remain difficult to monitor. Private owners may discover encroachment years later, when recovery becomes harder. These delays increase legal costs, prolong disputes, and create uncertainty for all stakeholders involved (World Bank, 2015)¹. ”

ILLUSTRATIVE EXAMPLE OF LANDSCAPE CHANGE



STAKEHOLDER IMPACT

Table 1. Impact of Undetected Land Changes

Stakeholder	Typical Challenge	Consequence
Government agencies	Encroachment on public land	Litigation and delayed enforcement
Infrastructure authorities	Illegal occupation along project corridors	Project delays and cost overruns
Private landowners	Boundary disputes and illegal construction	Property loss and legal expenses
Businesses & developers	Unverified land history	Investment risks and due diligence failures





Why Traditional Evidence Often Falls Short

Resolving land disputes depends on proving **what existed, where it existed, and when it changed**. This is where conventional evidence often becomes insufficient.

“

When years matter, evidence from the past becomes the foundation of truth in the present.

	 FIELD INSPECTION	 REVENUE RECORDS	 WITNESS TESTIMONY	HISTORICAL SATELLITE IMAGERY
 OBJECTIVITY	Subject to Inspector bias and on-site conditions	Often outdated or administratively erroneous	Memory-dependent and inherently subjective	Independently captured, time-stamped observation
 TEMPORAL COVERAGE	Single point in time ("now")	Irregular updates, years or decades apart	Vague timelines and inconsistent recall	Consistent, multi-year archive from decades past
 VERIFIABILITY	Cannot be re-verified retrospectively	Difficult to cross-verify historical accuracy	Cannot be independently corroborated	Independently verifiable and reproducible
 ADMISSIBILITY	Limited weight without supporting records	Accepted, but may lack spatial precision	Weak in court without corroboration	Stronger evidentiary reliability with documented provenance
 COST & EFFORT	High: travel, logistics, manpower	High: record retrieval, digitization, delays	High coordination, follow-ups, contradiction	Low: remote access, scalable, efficient
 OVERALL VALUE	★★☆☆☆ Limited	★★★★☆ Moderate	★☆☆☆☆ Low	★★★★★ Highest

Historical satellite imagery strengthens the evidence base by adding a **time-stamped, independently captured** record of **physical change** (Bruijn, 2020; Chemudupati and Chaturvedi, 2022)².

² Bruijn, M.-C. (2020) 'The use of Remote Sensing Data as Legal Evidence for Environmental Protection across Europe', Space Generation Advisory Council. Available at: [SGAC article](#)

² Chemudupati, P. and Chaturvedi, K. (2022) 'Admissibility of Satellite Images/Earth Observations as Evidence in Court: A Global Perspective', Mondaq, 9 December. Available at: [Mondaq article](#)



Historical Satellite Imagery: Building a Timeline of Change

Historical satellite imagery addresses a critical gap in land dispute resolution by creating an objective, chronological record of how land evolves over time. Unlike field inspections, which capture only the present condition of a property, archived satellite imagery preserves historical observations that can be revisited whenever a dispute arises.

Modern Earth observation satellites continuously image the Earth's surface, creating archives that span **several decades** (U.S. Geological Survey, 2012)³. Each image is recorded with a **precise capture date, geographic location, and technical metadata** (U.S. Geological Survey, 2000)⁴. When these images are viewed sequentially, they create a visual timeline that documents the progression of physical changes across a property.

CASE AT A GLANCE



FOCUS

Land Change Detection
& Legal Evidence



Data Sources

Multi-temporal Satellite
Archive



Technology

AI / Deep Learning
Geopolstal Analytics



Outcome

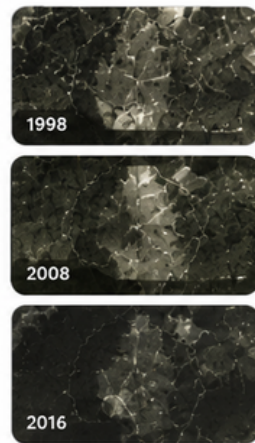
Actionable Insights
Defensible Evidence

1 ORIGINAL LAND CONDITION



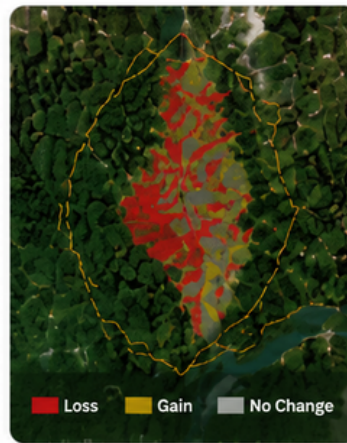
Establish the baseline

2 ARCHIVED SATELLITE IMAGES



Retrieve historical
observations

3 AI-BASED CHANGE DETECTION



Detect and classify
physical changes

4 HISTORICAL TIMELINE



Reconstruct when and
how the land changed

5 EVIDENCE FOR INVESTIGATION



EVIDENCE PACKAGE

Before & After Imaging
Change Maps & Analytics
Area & Impact Metrics
Metadata & Provenance
Exported Reports

³ U.S. Geological Survey (2012) Landsat: A Global Land-Imaging Mission. Fact Sheet 2012-3072. Reston, VA: U.S. Geological Survey. Available at: [USGS Landsat report](#)

⁴ U.S. Geological Survey (2000) Land Satellite (LANDSAT) Multispectral Scanner (MSS): Metadata. Sioux Falls, SD: U.S. Geological Survey. Available at: [USGS Landsat metadata](#)



From Monitoring to Evidence

Satellite-based monitoring follows a structured workflow that transforms raw imagery into actionable evidence.

Table 3. Typical Satellite Monitoring Workflow

Stage	Purpose
1. Baseline mapping	Identify the parcel and existing land condition
2. Scheduled image acquisition	Capture images at regular intervals
3. AI-assisted change detection	Detect new construction, excavation, roads or vegetation loss
4. Alert generation	Flag suspicious changes with location and timestamps
5. Field verification	Confirm changes through on-ground inspection

Instead of discovering encroachments years later, authorities can investigate them **shortly after they occur**. This shifts land governance from a reactive process to a **proactive one**.

INDIA IS ALREADY MOVING TOWARD PROACTIVE LAND MONITORING

The Bhubaneswar Land Use Intelligence System (BLUIS) uses high-resolution satellite imagery for regular government-land monitoring, while AI-assisted defense-estate monitoring has identified more than a thousand unauthorized changes across multiple cantonments (Government of Odisha, n.d. ; Press Information Bureau, 2022)⁵.

⁵ Government of Odisha (n.d.) Bhubaneswar Land Use Intelligence System (BLUIS). Odisha: General Administration & Public Grievance Department / Odisha Space Applications Centre. Available at: [BLUIS official website](#)

⁵ Press Information Bureau (2022) 'DGDE develops AI-based software to detect unauthorised constructions & encroachments on defence land'. Government of India, 5 July 2022. Available at: [PIB release](#)

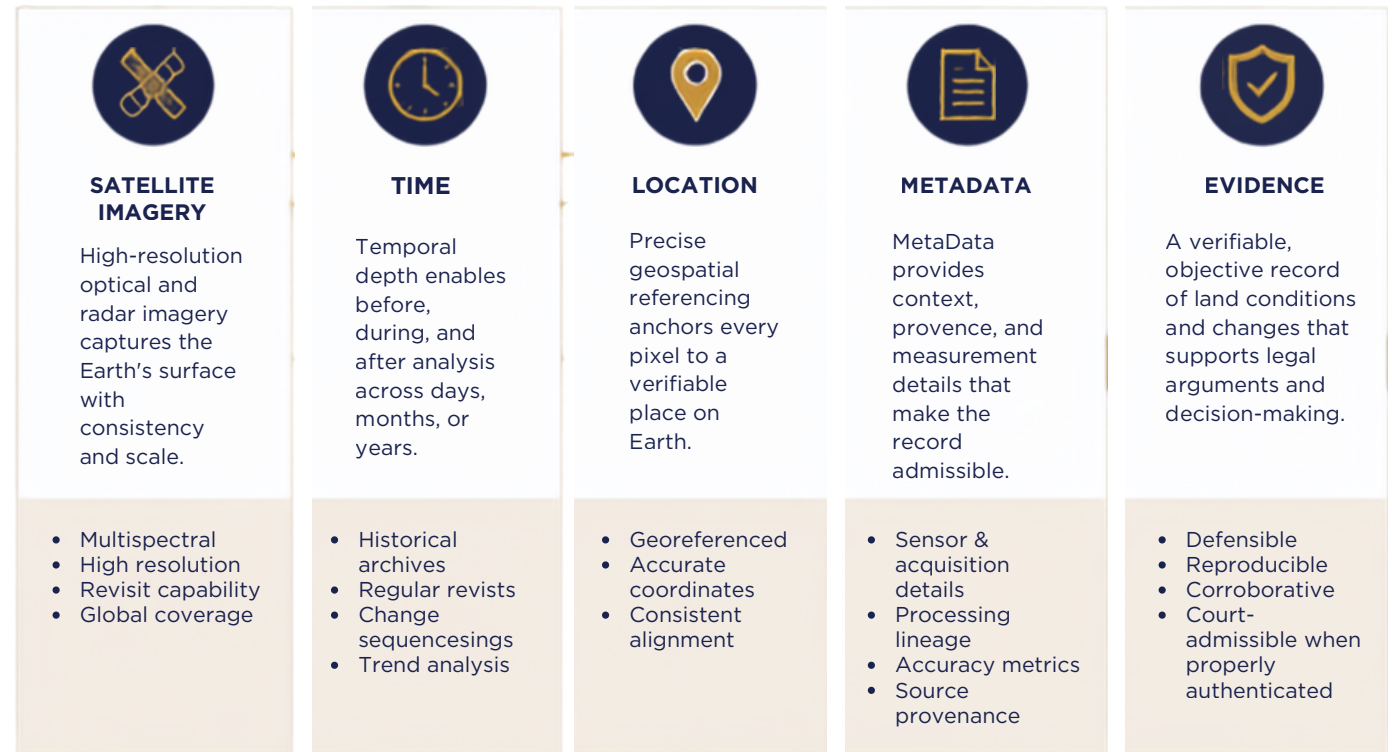


Why Satellite Imagery Strengthens Legal Cases

Historical satellite imagery offers one major advantage over conventional evidence, it is objective.

Unlike witness statements or manually prepared maps, satellite images are captured independently and automatically. Every image contains information about when it was acquired, where it was captured, and which satellite recorded it. This makes it provide an independent record that can help corroborate the existence and timing of visible land changes.

THE EVIDENCE FRAMEWORK: FROM OBSERVATION TO PROOF



Together, these elements create an unbroken chain of information, transforming raw imagery into credible, time-bound evidence that stands up to legal scrutiny.



OBJECTIVE. CORROBORATIVE. NOT A REPLACEMENT.

However, satellite imagery should not be viewed as a replacement for traditional evidence. Courts generally consider it corroborative evidence, meaning it strengthens other forms of documentation rather than acting as the sole basis for legal decisions. When combined with land records, surveys, and expert testimony, it provides a much clearer reconstruction of historical events (Chemudupati and Chaturvedi, 2022)².



VERIFIABLE. TRACEABLE. DEFENSIBLE.



Where Historical Evidence Creates Value.

One Technology. Many Applications.

A unified geospatial intelligence platform that empowers diverse stakeholders to detect, verify, and act.

Backed by historical truth and defensible evidence.



Government & Public Estates

Protect public land, detect encroachments, manage assets, and support policy with verifiable historical intelligence (Siegel, 2021)⁶.



Land records • Encroachment • Compliance Asset management • Policy planning



Railways & Infrastructure

Monitor corridor safety, track land use change, prevent intrusions, and plan expansions with confidence.



Right of way • Asset protection • Intrusions Project planning • Risk mitigation



Defence

Monitor strategic land, detect unauthorized occupation and strengthen situational awareness.



Border monitoring • Site intelligence • Change detection Threat assessment • Strategic planning



Builders & Developers

Validate land, de-risk acquisitions, and streamline approvals with historical evidence and clarity.



Land validation • Due diligence • Approvals Project feasibility • Dispute avoidance



Companies

Ensure ESG compliance, manage risks, and make data-backed decisions with trusted geospatial insights.



ESG & Sustainability • Risk management Supply chain visibility • Compliance

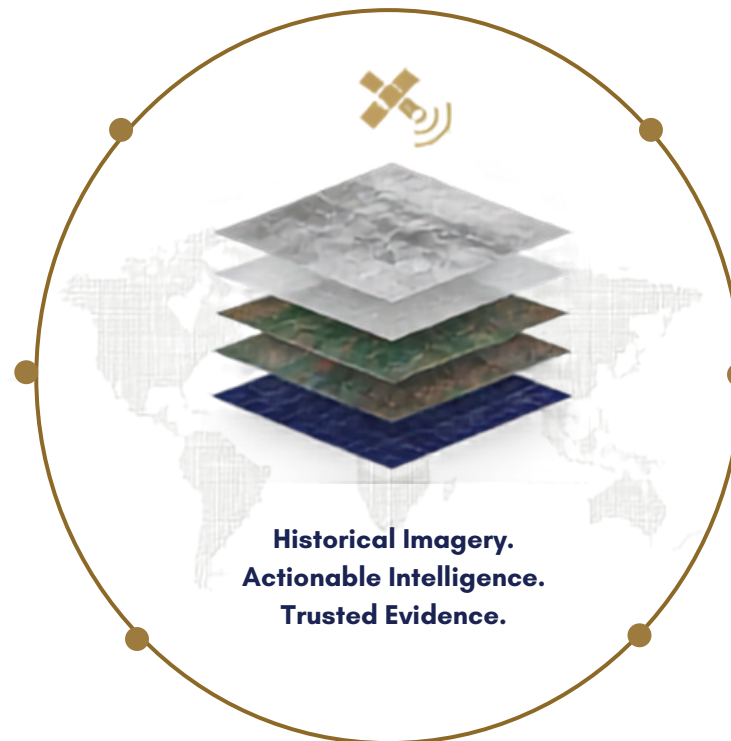


Individual Landowners

Secure your land rights with historical proof, resolve disputes, and protect your legacy with confidence (Tremark, 2025; Grain Data Solutions, n.d.)⁷.



Ownership proof • Boundary disputes • Encroachments Legal support • Peace of mind



⁶ Siegel, S. (2021) 'Using Satellite Data to Spot Early Signs of Unauthorized Government Land Use and Encroachment in India', Planet Labs Pulse, 2 September. Available at: [Planet article](#)

⁷ Tremark (2025) 'Case Study: How Open-Source Data Helped Resolve a Land Dispute', 18 February. Available at: [Tremark case study](#)

⁷ Grain Data Solutions (n.d.) 'How to Use Historical Satellite Imagery for Court Cases and Insurance Claims'. Available at: [Grain Data Solutions article](#)



Preserving Trust

Evidence Preservation and Chain of Custody

For satellite imagery to hold weight in legal proceedings, it must be preserved with the same rigour applied to any physical evidence. The **chain of custody** must remain unbroken from the moment of acquisition through to courtroom presentation. Any gap in provenance or unexplained alteration can weaken the reliability and evidentiary value of the record.

Essential Evidence Preservation Elements

LEGAL FRAMEWORK

Under the **Bharatiya Sakshya Adhiniyam, 2023**, electronic records are subject to requirements governing their use as evidence. Maintaining appropriate metadata, documentation and electronic evidence certifications can strengthen the integrity and evidentiary reliability of satellite imagery. Admissibility ultimately depends on the circumstances of each case (Government of India, 2023) ⁸.

COMPONENT	PURPOSE	EVIDENCE RECORD
◆ Image source	Establish provenance of the imagery	Source/provider identification and acquisition details
◆ Capture date and time	Fix the historical timeline	Time-stamped acquisition record
◆ Spatial resolution	Explain the level of observable detail	Sensor/resolution specification
◆ Metadata	Verify acquisition and technical details	Original metadata retained with the imagery
◆ Processing records	Document all analytical steps	Processing history and analysis record
◆ Secure storage	Preserve integrity of original files	Preserved original/master file
◆ Access logs	Record who accessed or processed the data	User and activity log
◆ Digital signatures / hashes	Detect unauthorized alterations	Recorded hash value or digital signature

⁸ Government of India (2023) The Bharatiya Sakshya Adhiniyam, 2023 (Act No. 47 of 2023). New Delhi: Ministry of Law and Justice. Available at: [India Code – Bharatiya Sakshya Adhiniyam, 2023](#)



From Challenge to Innovation

Continuous Intelligence for Proactive Land Governance

Land disputes rarely emerge overnight. They develop gradually through unauthorized construction, shifted boundaries, and incremental encroachment, changes that are difficult to detect in real time and even harder to prove after the fact.

"What if land could be monitored continuously instead of investigated retrospectively?"

WatchMyPlots was built to answer exactly that question. Instead of treating satellite imagery as evidence collected after a dispute has already emerged, the platform reimagines it as a continuous monitoring system. Once a property is registered and its boundary is mapped, the land is periodically observed using satellite imagery. AI analyses successive observations to identify meaningful changes, such as new construction, excavation, vegetation loss, road development, or other physical alterations, and transforms them into a chronological record of how the property evolves over time.

Rather than requiring property owners to repeatedly visit their land or discover changes through complaints, WatchMyPlots delivers timely intelligence as changes occur. Each monitoring cycle contributes to a continuously growing historical record, supported by before-and-after,

ILLUSTRATIVE PLATFORM VIEW



time-stamped observations, and periodic reports. This enables landowners, businesses, and public authorities to detect changes earlier, preserve objective evidence over time, and make informed decisions before isolated incidents develop into prolonged legal disputes.

In essence, WatchMyPlots extends the value of historical satellite imagery beyond retrospective analysis. It transforms archived observations into an active land intelligence system, one that not only helps reconstruct the past but also enables continuous protection of the future. By shifting land monitoring from reactive investigation to proactive surveillance, the platform reflects the next evolution of evidence-driven land governance.

From retrospective investigation to continuous land intelligence.



References

Selected sources supporting the case study

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