

The Hydrological FICO Standard

Title: The Universal Water-Risk Index for Agricultural Assets

1. Executive Summary

The Hydrological FICO Score is a standardized, 300–850 metric that quantifies the water-security and structural integrity of a specific land parcel. By converting satellite-verified physics into a financial risk score, FarmSense allows lenders, insurers, and buyers to value "Hydrological Resilience" as a tangible asset.

2. The Scoring Matrix (The Weighted Logic)

The score is calculated using a rolling 36-month baseline to account for seasonal volatility:

- **I. Mass Stability Score (30%) - [Gravimetric Truth]**
 - *Metric:* Delta between regional drawdown (GRACE-FO) and parcel-level retention.
 - *Logic:* High scores are awarded to parcels that maintain "Mass-to-Pressure" resonance, indicating the aquifer container is not shrinking.
- **II. Operational Efficiency Score (30%) - [Physiological Truth]**
 - *Metric:* The "Yield-per-Drop" ratio.
 - *Logic:* Comparing ET_actual (OpenET) vs. Applied_Water (Pump Telemetry). A score of 800+ indicates < 5% "Deep Percolation Loss."
- **III. Structural Foundation Score (20%) - [Structural Truth]**
 - *Metric:* Millimeter-scale subsidence (Sentinel-1 InSAR).
 - *Logic:* Any subsidence > 2mm/year triggers an automatic score ceiling of 600, as the land's permanent storage capacity is being destroyed.
- **IV. Chemical Stewardship Score (20%) - [Chemical Truth]**
 - *Metric:* Nitrogen Volatilization Index (Sentinel-5P).
 - *Logic:* Tracks the "Atmospheric Tax." High scores indicate timing applications to the plant's metabolic "Pulse," minimizing environmental leaching.

3. Financial Impact & Utility

- **For Lenders:** A score > 750 qualifies the grower for "Resilience-Based Interest Rates" (typically 25–50 bps reduction).
- **For Insurers:** High scores trigger lower premiums on parametric drought policies, as the "Flash-Drought" early warning system is active.
- **For Land Valuations:** Provides a "Hydrological Audit" during land sales. A 700-score farm is valued as a "Premium Asset" compared to a 400-score farm in the same district.

4. The "Sovereign" Audit Trail

Every score is backed by the **Forensic Ledger**. This is a tamper-proof record of the satellite

observations and machine logs used to generate the score. If a regulator challenges a farmer's water use, the Hydrological FICO provides the audited proof of efficiency required for **Adversarial Protection**.