Smart Irrigation from the Ground Up:
Data and Community Governance

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THE IRRIGATION TRANSFORMATION



The Core Challenge: Decoupled Interventions

Hydrological Uncertainty

Conveyance Losses

Equity Gap

Core Thesis

Pressurized Pipe Irrigation Systems (PPIS)

Performance Gain

Land Recovery

Tailender Equity



Physical Modernization: Open Canals to PPIS

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However, top-down technological interventions often fail to achieve long-term sustainability and yield limited gains if decoupled from local governance.

How do we make the participatory governance integral, owned and sustained?

Top-Down Tech Approach

- Focus on control room engineering and central dashboards.
- Treats farmers and Water User Associations (WUAs) as passive end-users.
- Ignores local water-sharing rules, crop calendars, and field governance realities.
- High risk of abandonment once capital project funding ends.

Bottom-Up Community Lens

- Positions WUAs as the primary managers and operational custodians of water.
- Integrates real-time data directly into traditional village decision-making.
- Combines modern telemetry with generational farmer wisdom and crop planning.
- Ensures long-term climate resilience and local ownership at the farm gate.



Community-level Decision Support System (DSS)

DATA CONVERGENCE: COMMUNITY DECISION SUPPORT SYSTEM (DSS)

1. Supply Telemetry

IoT flow sensors monitor canal discharge, pipe pressure, and sump storage levels in real time across the command area.

2. Demand Intelligence

In-field soil moisture probes, weather telemetry, and crop evapotranspiration models track actual soil thirst.

3. Actionable Analytics

Unified DSS generates precise water schedules, alerting WUAs to exact release volumes needed before crop stress occurs.

Supply Side IoT
Pipe Pressure | Flow Meter | Storage Level | Discharge Volume

Demand Side IoT
Soil Moisture | Micro Weather Data | ET models | Crop Sown Date

Community DSS Engines
Deficit Calculation
Volumetric Allocation
Irrigation Schedule

WUS Governance Action
Volumetric Fee Metering
Dynamic Valve Operations
Demand Driven Scheduling



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PILLARS OF COMMUNITY IMPACT

Demand Driven & Dynamic Allocation

Static schedule (Warabandi) is replaced with real time need based, demand driven irrigation

Total Transparency & Dispute Resolution

Building community trust through objective, fair and equitable water distribution

Proactive Climate Risk Defense

Weather linked predictive alerts, irrigation preparedness and targeted advisories

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ENABLING POLICY ENVIRONMENT – WUS as LOCAL UTILITIES

1	2	3	4
Hardware	**Digitization**	**Capacity**	**Governance**
PPS and related infrastructure	IoT Sensors and data dashboards	Training youth as local digital "Jal Sevaks".	Data-driven water budgeting & user fees

1. Mandate PPIS as Default Infrastructure
2. Standardize Open-Access DSS Protocols
3. Institutional Capacity Building
4. Applied Behavioural Science for participatory irrigation



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Irrigation builds the infrastructure. Data drives the decisions. Community ownership secures the legacy. Three together, makes transformation a reality

Thank you

