

Government of Andhra Pradesh
Water Resources Department

Leveraging Real-Time Data and Telemetry for Water Resources Governance

The Andhra Pradesh experience — three decades of measurement, a decade of analytics, and a state-wide system that now turns water data into decisions.

One Nation · One Data | ***One State · One Database***

K.S.Sastry,
Director,
Ground Water and Water Audit Department

Key challenges in the water sector

500–1,200 mm
Annual rainfall
Uneven in time and space — drought and flood in the same year

5 + 35
River basins
Five major, 35 medium — availability still highly uncertain.

~2,500 TMC
Godavari surplus
Reaches the sea each year while other basins run short.

80%
Hard-rock terrain
Only the other 20% yields groundwater dependably

10 M acres
Irrigated area
Of 20 M cultivable acres — the rest stays rainfed

3
Competing demands
Irrigation, industry and drinking — all to be assured

Water is available — but not where, when, or in the form it is needed.

An agrarian economy directly exposed to climate shifts. Half the geographical area is cultivable, only half of that is irrigated.

1997 → 2026

Three decades of building the data backbone

1 Hydrology Project Phase I & II
Foundation

- First piezometer and AWLR in the country installed in AP under HP-I, 1997–98
- About 400 piezometers constructed by 2000
- Drought through 2000–04 exposed how little was actually measured
- Neeru–Meeru launched in 2000 on a visionary Chief Minister's decision
- Composite hydrograph made drought and surplus years visible for the first time

2 National Hydrology Project
Expansion

- Network widened to rainfall, groundwater, soil moisture and river flows
- APWRIMS and APGRACE (IN-GRES) established as the state's water systems
- Immersive telepresence for Polavaram monitoring and review
- DWLRs and telemetry carried real-time data to the Chief Minister's dashboard
- Real-time data began to be used, not merely collected

3 Present
Intelligence

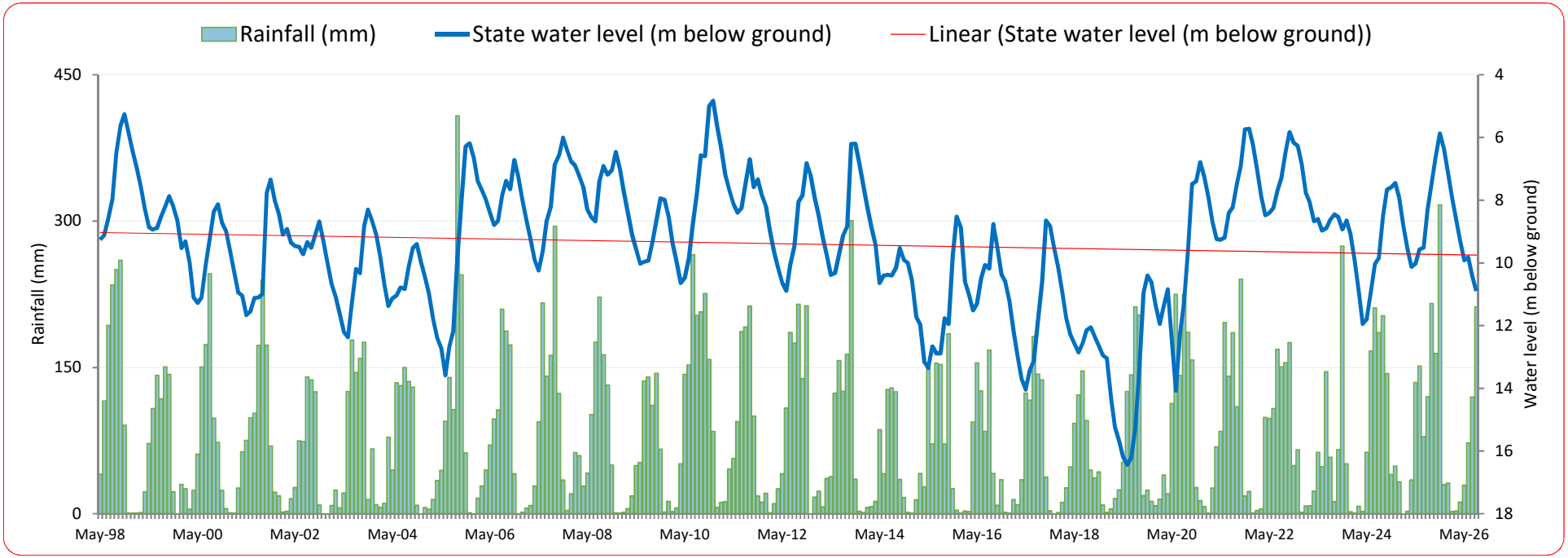
- Swarnandhra Vision 2047 sets the long-range water mandate
- The Data – Technology – Governance nexus becomes explicit policy
- APWRIMS 2.0 — predictive analytics and AI integration
- AWARE and RTGS carry alerts to every line department
- Releases, tank filling and drought response now decided on live data

Every layer was built on the one before it. The analytics of 2026 are only credible because the measurement started in 1997.

THE EVIDENCE

Twenty-eight years of groundwater response to rainfall

Average state groundwater level and rainfall, May 1998 – August 2026, from the piezometer network



The groundwater level fall and recovery. every monsoon lifts it, every dry run pulls it down. The 2000–04 and 2018–19 troughs are droughts; the recoveries after each are what measurement plus intervention looks like.

Andhra Pradesh Water Vision 2047

ANDHAR PRADESH AT A GLANCE



7th
Largest state in India

28 Districts
Spread across 4 regions

975 km
Coastline · 2nd longest

40 Rivers
5 –Major & 35 Minor Rivers

19 lakh
Agriculture bore wells

108
Reservoirs

17,000
Piezometers - Telemetry

38,600
Minor irrigation sources

Four pillars that turn the state's water data into long-range policy

1 Long-term sustainability

Plan supply and demand across 25+ years so drinking, domestic, irrigation and industrial needs are met equitably in every region.

2 Predictive management

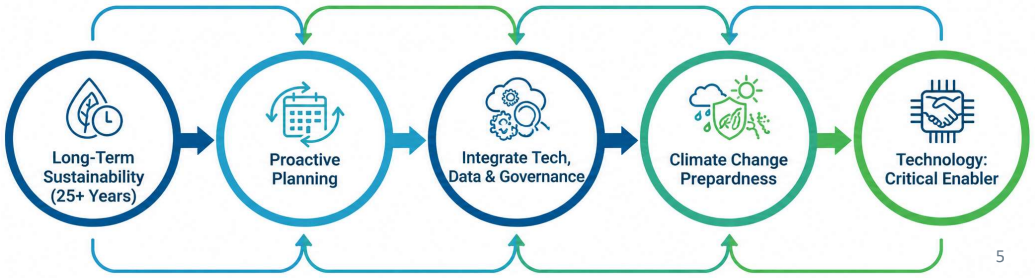
Move from reactive response to proactive action, with forecasts and alerts reaching the field before an event rather than after it.

3 Integrated governance

Connect technology, data and decision-making so one authoritative set of numbers drives every department.

4 Climate resilience

A state that is drought-proof and flood-ready, with reliable carry-over storage and early warning at all levels.



From field sensors to cabinet decisions

APWRIMS

AP Water Resources Information & Management System

A single-window GIS + MIS view of water supply, demand and consumption for the whole state — reservoirs, tanks, canals, groundwater and crops on one map.

www.apwrims.ap.gov.in

AWARE

Analytics and early-warning layer

Turns the streams into warnings: Caution → Alert → Danger at tank level, with district and mandal hotspot heatmaps and forecasts.

www.aware.ap.gov.in

RTGS

Real Time Governance Society, Government of AP

Publishes curated water indicators and alerts to the state's real-time governance platform, alongside feeds from every other line department.

www.rtgs.ap.gov.in

What the architecture guarantees

One number

Every department reads the same figure for the same reservoir on the same day.

One pipeline

Observation, nowcast, forecast and alert are stitched into a single continuous series.

One destination

The alert reaches the officer who can act on it, not a report that is filed.

WHAT FEEDS IT

One database, every water variable

The inputs behind APWRIMS — state-owned assets, national feeds and field reporting in one schema

113+
Reservoirs
Storage, inflow, outflow and levels

2,000+
Rain gauges
Real-time rainfall, 10-minutely

1,800
Piezometers
Groundwater levels, real time

38,599
MI tanks
Storage and water spread

5
Radar stations
IMD radar, satellite CTT and ECMWF

20+ yrs
Satellite & GIS
Soil moisture, crops, terrain, drainage

e-Crop
Canals & crops
Releases, command area and crop stage

18,395
Field reporters
Mobile, geotagged works and photos

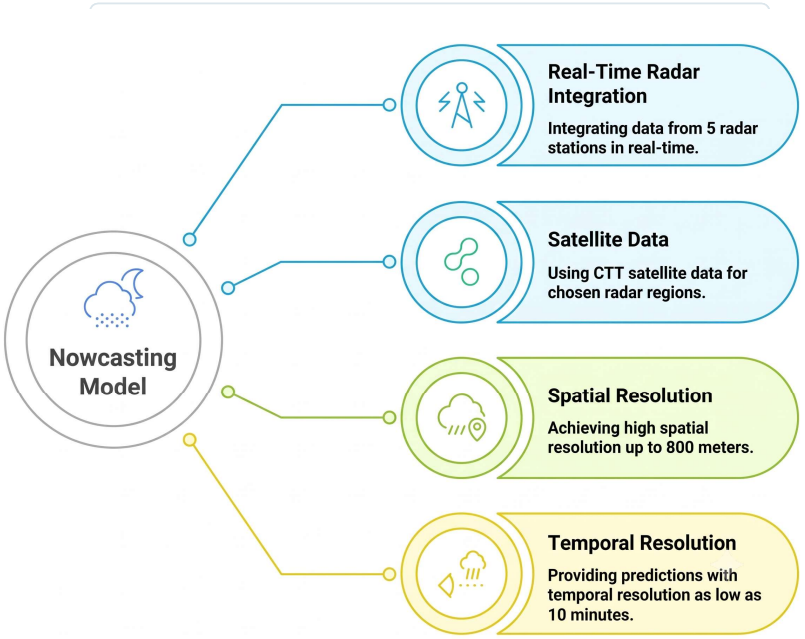
Derived streams published to every department

10-minutely observed rainfall · hourly nowcast · daily 3-day forecast · soil-moisture, crop-stage and reservoir-inflow models · tank-level warning thresholds · groundwater level and recharge estimates

These are not eight systems. They are eight inputs to one database — which is the entire argument of this presentation.

RAINFALL

Nowcast and forecast — seamless, statewide, 10-minutely



Nowcasting model — five IMD radar stations integrated in real time, CTT satellite data for the chosen radar regions, spatial resolution to 800 m and temporal resolution as low as 10 minutes.

1 **Real-time early warning**

10-minutely rainfall updates plus hourly nowcast from IMD radar.

2 **Three-day preparedness**

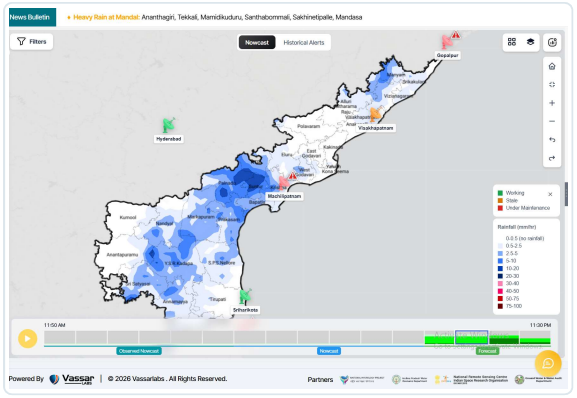
Daily 3-day forecasts let tanks and catchments be planned in advance.

3 **Tank-level risk management**

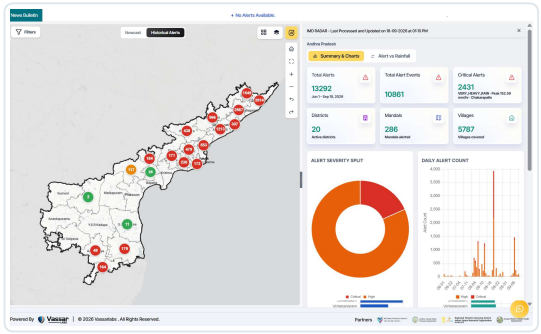
Caution → Alert → Danger thresholds set from predicted rainfall and tank inflows.

4 **Seamless statewide coverage**

Observed, nowcast and forecast rainfall stitched into one continuous series for every district and catchment.



Real-time rainfall monitoring



Real-time alerts monitoring

EXAMPLES

Real-time data in real decisions

Four occasions in the last two years when the system, not a field report, set the decision

OCTOBER 2025

Cyclone Montha

1,377 real-time alerts and 4,789 forecast-based tank alerts allowed continuous monitoring of MI tanks through the event, with warnings issued before the rainfall arrived rather than after the breach.

6,166 alerts issued

RELEASE DECISIONS

Krishna and Godavari Reservoirs

Release decisions taken against live inflow, storage and downstream demand instead of the calendar — water moved when the data said the system could carry it.

Releases on live data

EL NIÑO YEAR

Nellore model

Water use planned district-wide through a deficit year using forecast inflows and measured demand, now cited as the template for managing an El Niño season.

Deficit year managed

100-DAY DRIVE, 2026

Jaladhara–Jalaharathi

Every tank, feeder channel and work selected from APWRIMS data rather than the conventional — the subject of the next three slides.

60.01 TMC added

The test of a monitoring network is not how much it records. ***It is how often it changes what someone decides to do that morning.***

SURFACE WATER

Reservoir and minor irrigation tank planning



Current state storage: 558.52 TMC across 113 reservoirs · 44.6 TMC across 38,625 MI tanks

PLAN

Filling plans for all 113+ reservoirs and 38,000+ MI tanks, built from live storage and forecast inflow.

SIMULATE

Scenario simulation against standard operating procedures before a release is authorised.

FLAG

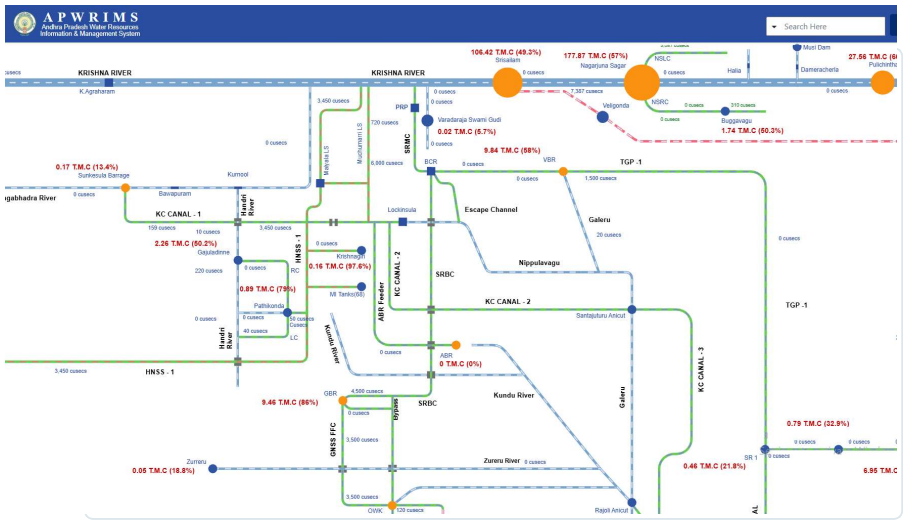
Exception reports surface deviations from plan while they can still be corrected.

SUSTAIN

Infrastructure tracked so storage and distribution hold up through periods of scarcity.

DISTRIBUTION

The water grid — and filling the tanks at the end of it



Live water grid — reservoirs, canals and transfer links with current storage and flow



MI tank filling and connectivity — APWRIMS 2.0

Objective

Build an efficient plan for filling MI tanks by combining canals, reservoirs, rainfall, inflows and water demand — maximum tank filling with minimum losses, ready in time for the season.

10,813
MI tanks in plan

683
Connected to source

61.12%
Fill percentage

Smart water body monitoring — every tank, every season

AI-powered satellite monitoring of MI tank health and capacity, statewide

Multi-sensor imagery

20+ years of Sentinel, Landsat and MODIS with AI/ML analysis of surface water dynamics.

Complete water body analysis

Occurrence, change intensity, seasonality and annual recurrence for all 38,624 water bodies.

Vegetation & quality

VV, VH, NDVI, NDWI and NDMI indices assess catchment health, weed growth and quality proxies.

Year-on-year change

Multi-temporal comparison flags tanks that are quietly losing capacity to silt and encroachment.



38,624
Water bodies analysed

20+ yrs
Satellite record

3
Sensor families

5
Spectral indices

Operational Benefits

19.15 lakh
man-hours saved annually

70%
less routine field monitoring

38,000+
MI tanks under live watch

6 lakh
farmers served

GROUNDWATER

A world-class groundwater monitoring network

Andhra Pradesh installed India's first piezometer and DWLR in 1997–98 — and has been measuring ever since

1997–98

First piezometer and first DWLR in the country installed in Andhra Pradesh.

1,800

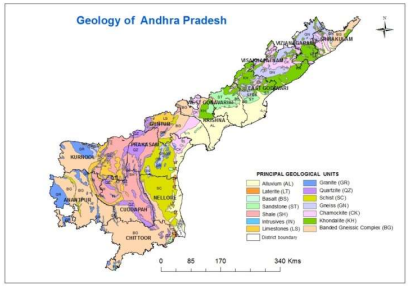
Piezometers now reporting groundwater levels on a real-time basis.

80%

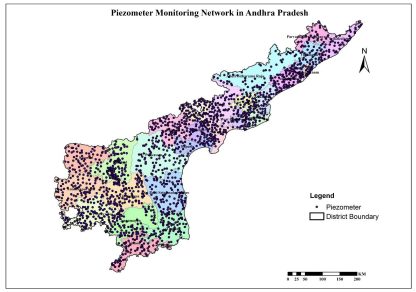
Of the state is hard-rock terrain — heterogeneous, low-yielding, and only manageable with dense measurement.

Priority

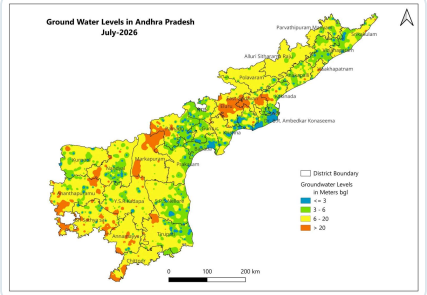
Groundwater recharge is a top state priority, with stress areas identified analytically rather than anecdotally.



Geology of Andhra Pradesh



Piezometer monitoring network



Groundwater levels, July 2026



A piezometer in the field — Krishna district

Why the density matters

In hard rock, two wells a kilometre apart can behave nothing alike. A sparse network produces a state average that is true of nowhere. Eighteen hundred piezometers, read in real time, is what makes a village-level recharge plan defensible.

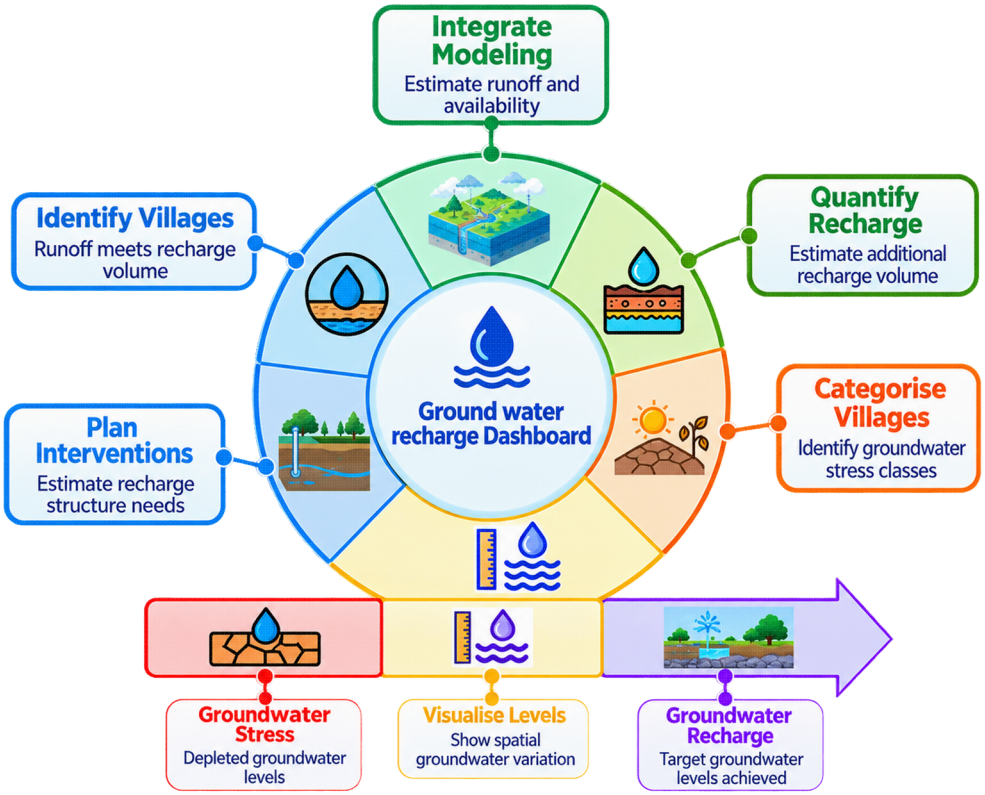
Ground Water Recharge Planning – Leveraging Technology

OBJECTIVE

To maintain Ground water at sustianable level of 3m below ground level during Post-monsoon period & above 8m in Pre-monsoon, by enhancing groundwater recharge through data-driven planning and targeted interventions.

- Reliable carry-over storage
- Reduced groundwater stress
- Long-term water security

FROM GROUNDWATER STRESS TO TARGETED RECHARGE



KEY BENEFITS

- **Sustainable Groundwater levels**
  Achieve target levels (8 m pre-monsoon / 3 m post-monsoon)
- **Optimised Recharge Planning**
  Right interventions at the right places
- **Data-Driven Decision Making**
  Village-level insights for effective implementation
- **Sustainable Water Security**
  Enhanced recharge, reliable storage and long-term resilience

Recharge Today for a Secure Tomorrow

Sustainable Groundwater for a Water Secure Andhra Pradesh

CONSERVATION

Jaladhara – Jalaharathi

Technology-driven, community-participated water conservation — a 100-day state-wide drive

> ***"Every drop conserved, every acre irrigated, every farmer secured."***
>
> — Hon'ble Chief Minister · mission directive for the 100-day special drive

THE PROBLEM

Water stress is rising

- 41% of AP has groundwater below safe levels (>8 m)
- 5,697 stressed villages identified
- Tanks dried, feeder channels silted, demand outpacing recharge

THE DRIVE

100-day mission mode

- 6 April → 14 July 2026, across all 28 districts
- Convergence of MGNREGS/VB-GRAMG, WRD, DWMA, GWD, PR&RD, Agriculture and Forest
- Led by District Collectors, executed with WUAs and Engineering Assistants

THE GOAL

Measurable water security

- Restore feeder channels, MI tanks and water conservation structures; fill every MI tank
- Increase surface storage and groundwater recharge
- Hold 3 m post-monsoon and 6 m pre-monsoon; average +1 m rise in every district

Annamayya district — the proof of concept that seeded the state campaign, with no new major irrigation project

+8.7 m
Groundwater rise, against a 3.6 m regional average

20,000+
Borewells revived across the districts

30–40%
Less energy used for agricultural pumping

₹1,100–1,170 cr
Estimated economic gain

RESULTS

Jaladhara – Jalaharathi: the measurable results

Four months, 28 districts, every work selected from APWRIMS data

10,965
Tanks restored

47,595 km
Feeder channels restored

1.40 TMC
New storage created

60.01 TMC
Additional storage

22.59 TMC
Expected GW recharge



NATIONAL RECOGNITION

Mann Ki Baat, 136th episode, 26 July 2026

The Hon'ble Prime Minister cited Nandyal, where every gram panchayat took part and old ponds were made functional again, and Vizianagaram among urban centres showing encouraging results in rainfall conservation — recognising Jaladhara–Jalaharathi as a grassroots effort of national significance.



Community participation — tank desilting under the 100-day drive

Every work geotagged, photographed and reconciled against the plan — which is why these figures can be stated at a national forum.

WHAT IS NEXT

Jaladhara Phase II — from tanks to connected systems

Directed by the Hon'ble Chief Minister as a statewide continuation of the 100-day drive

1. **Connect the tank cascades**

   Strengthen linkage between tanks and natural drainage so water can move across surplus and deficit basins, sub-basins and micro-basins.

2. **Restore complete chain-linked systems**

   Prioritise whole cascades — feeder channels and inter-tank connectivity — rather than individual tanks.

3. **Identify water-transfer opportunities**

   Use cascade data to link water-surplus and water-deficit areas at every scale.

4. **Assess utilisation and conservation efficiency**

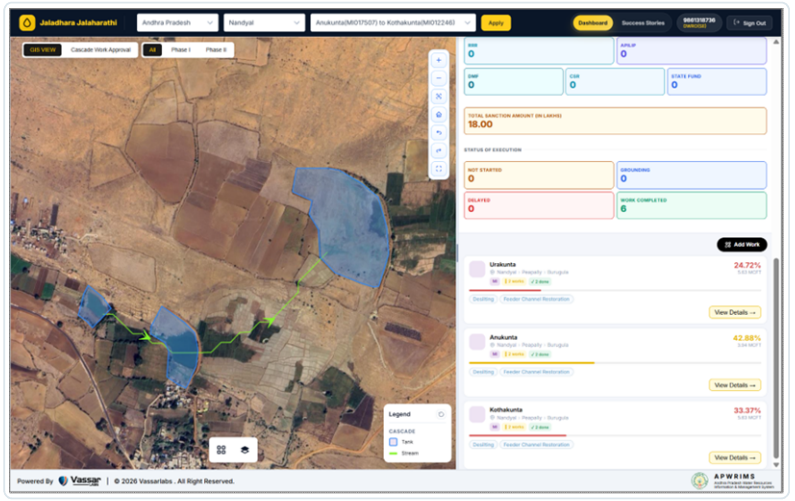
   Measure how effectively rainfall is conserved; flag high runoff loss and low recharge.

5. **Conduct a district-wise conservation audit**

   Score every district on rainfall received, water stored, recharge achieved and runoff lost.

3,792
cascades identified and digitised

10,000
tanks under cascade mapping



Live cascade view — Anukunta → Kothakunta chain, Nandyal district

THE WAY FORWARD

One Nation · One Monitoring Network · One Database

Everything in this presentation was possible because one state stopped keeping water data in separate departmental silos. The same logic, applied nationally, is the next step.

1

One monitoring network

A common standard for rainfall, groundwater, storage and flow measurement across states.

2

One database

NWIC and the state water informatics centres reading and writing one authoritative record.

3

Unified decision-making

Interlinking of rivers, basins and micro-basins planned on shared, current numbers.

4

Unified water governance

A drought-proof, flood-ready country — the goal of Vision 2047.

The goal is Water Vision 2047 — Swarna Andhra, Viksit Bharat.

Thank you · www.apwrims.ap.gov.in · www.aware.ap.gov.in · www.rtgs.ap.gov.in