
Vassar
LABS
WATER RESOURCES INFORMATION AND MANAGEMENT SYSTEM
EMPOWERING DECISIONS
“There is need for enabling Policy makers, Water managers and Water Users towards doing proper planning and management of water resources.”

ABOUT VASSAR LABS

We focus on delivering for last mile visibility and decision support solutions into Primary sectors like Water, Agriculture, Smart City and Education, leveraging a collection of emerging technologies.

2014
The establishment

200+
Employees

WATER & AGRICULTURE
The primary focus

CBIP- Best consultancy in water sector award 2020

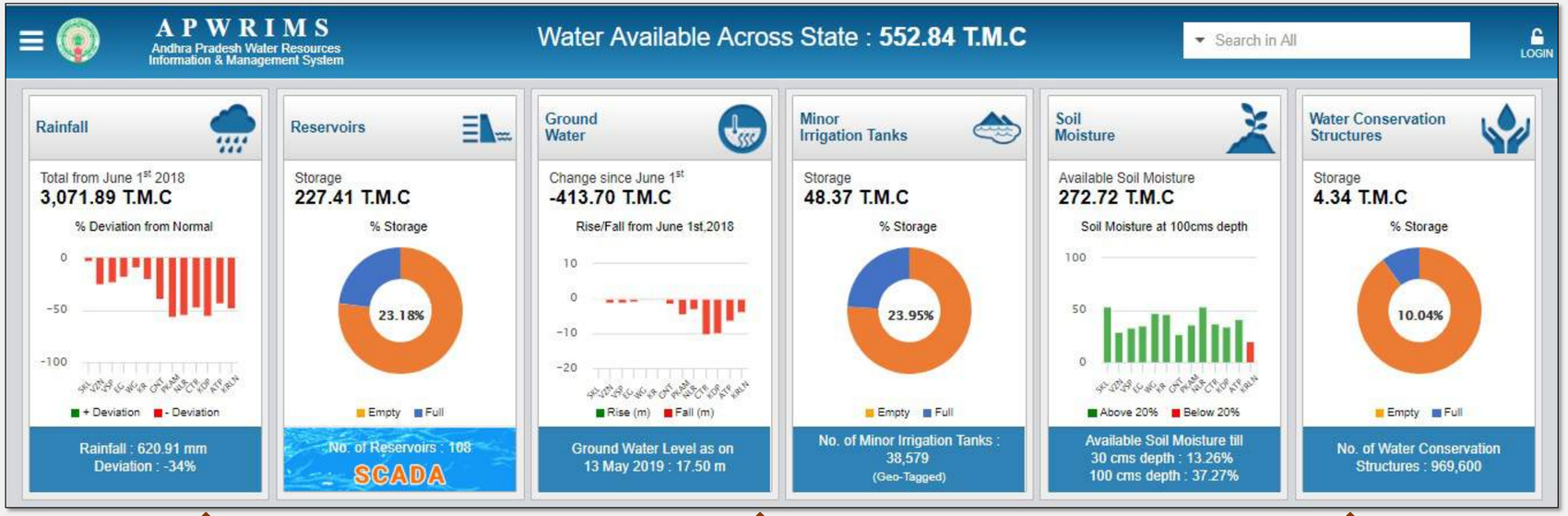
National Water Mission Award 2020

WATER SOLUTIONS

EVERY DROP COUNTS

WHERE IS THE WATER?

AND HOW MUCH OF IT



Field Sensors | **Satellite & GIS** | **Drone Surveys** | **Mobile App Survey** | **Predictive Models** | **Experimental Data** | **API Integrations**

NEAR REAL TIME DATA → **EMPOWER WATER RESOURCES** → **FASTER DECISIONS**

WATERSHED MANAGEMENT

OVERVIEW

Which Village is in deficit?

How much run-off is available?

Which region should I prioritize for water conservation activity?

How much additional water capacity do I build to mitigate the deficit?

Where to build Soil and Water conservation Structures?

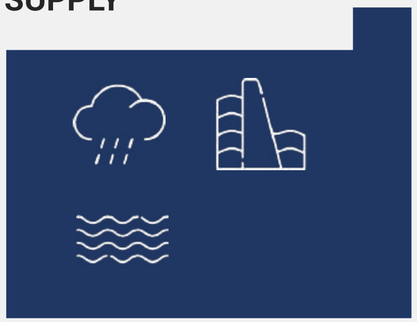
How can I enhance/reduce the time taken for DPR preparation?

Track and monitor the progress of sanctioned structure.

VILLAGE WATER BUDGET

UNDERSTANDING DEFICIT

SUPPLY



SUPPLY
Rainfall
Canals,
Ground Water Recharge
Etc.

DEMAND

DEMAND
Agriculture
Domestic
Livestock
Industry, etc.

OUTPUT

SURPLUS/DEFICIT

Supply Management

Demand Management

MANAGE DEFICIT EFFECTIVELY

WATERSHED MANAGEMENT

WATER CONSERVATION

Village Water Budget

INPUT

DEMAND
Agriculture
Domestic
Livestock
Industry, etc.

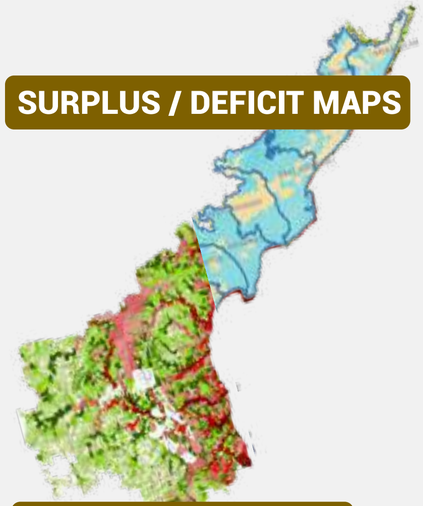
SUPPLY
Rainfall
Canals,
Ground Water Recharge
Etc.

OUTPUT

SURPLUS/DEFICIT

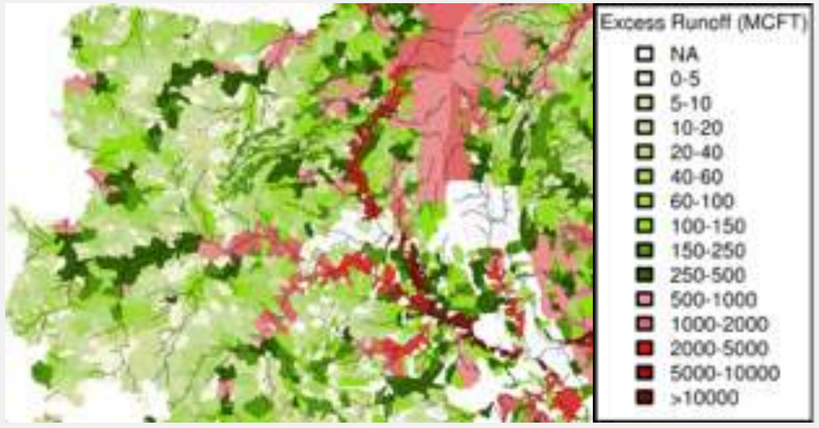
Supply Management

Demand Management



SURPLUS / DEFICIT MAPS

RUN-OFF HEAT MAPS



Available Run-off

Water Conservation Allocation

Leftover Run-off after conserving the allocated amount

DRAIN LINE AND AREA TREATMENT

USINE MNREGA RIGHT

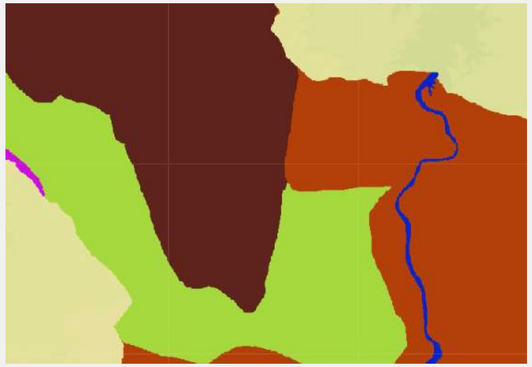
Drain Line Treatment

Drain Area Treatment

Prediction of WC structures for Drain line and Area treatment

- Water and soil conservation structures on non-crop streams for drain line treatment
- Farmponds and LBS on crop streams for drain area treatment

Potential Zones



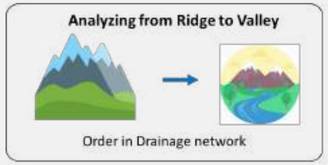
Based on the weighted overlay method

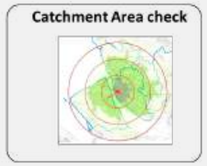
+

Stream order

Based on stream order rules

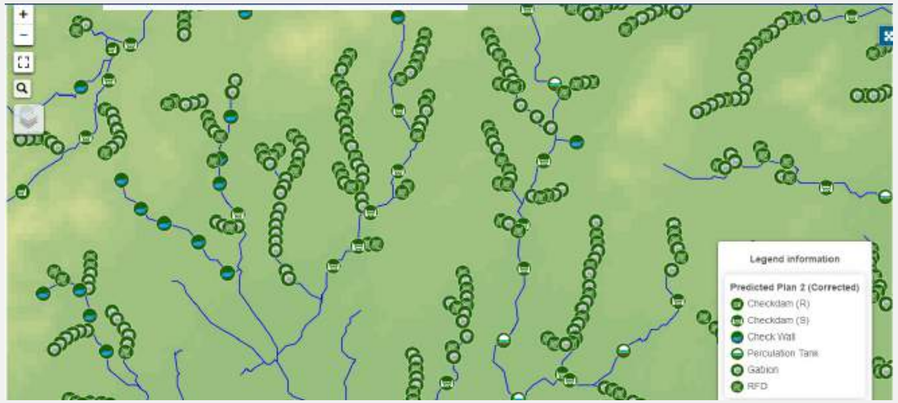
+





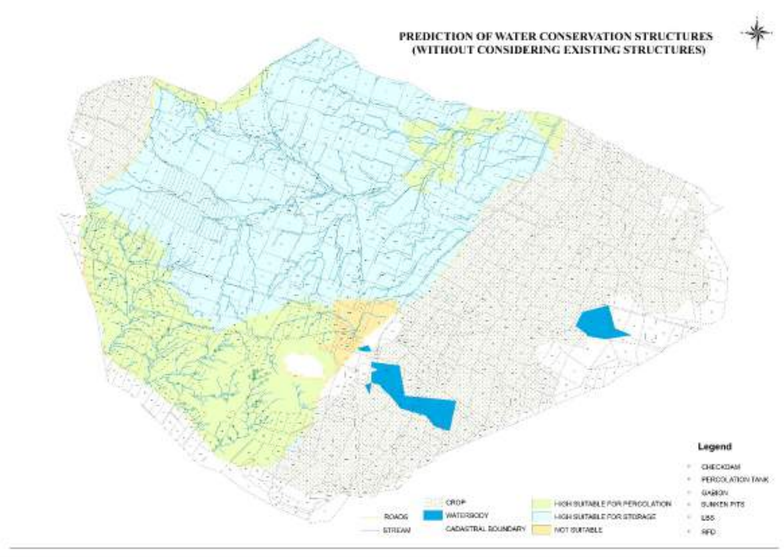
Structure Specific rules (catchment, runoff potential, distance etc.)

Newly proposed structures



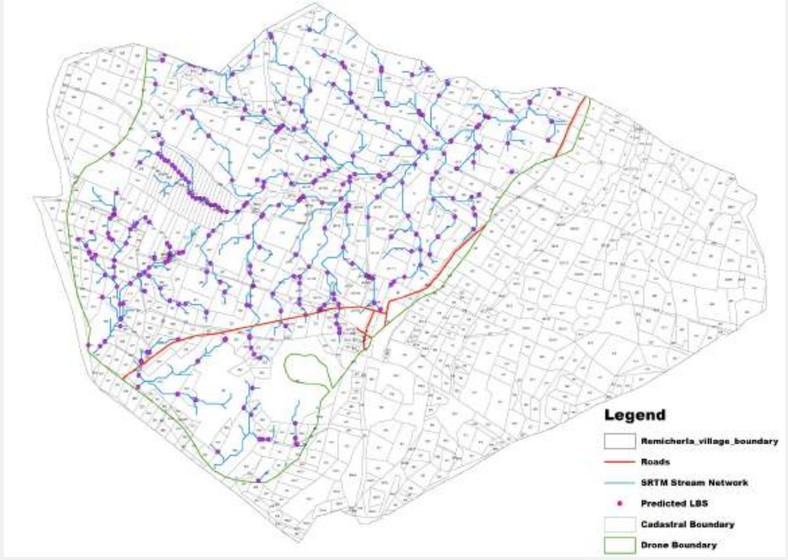
PREDICTION & TREATMENT

Predicted Structures



Based on hydrology models and AI, our solution predicts type of structure to be built along with exact latitude and longitude details

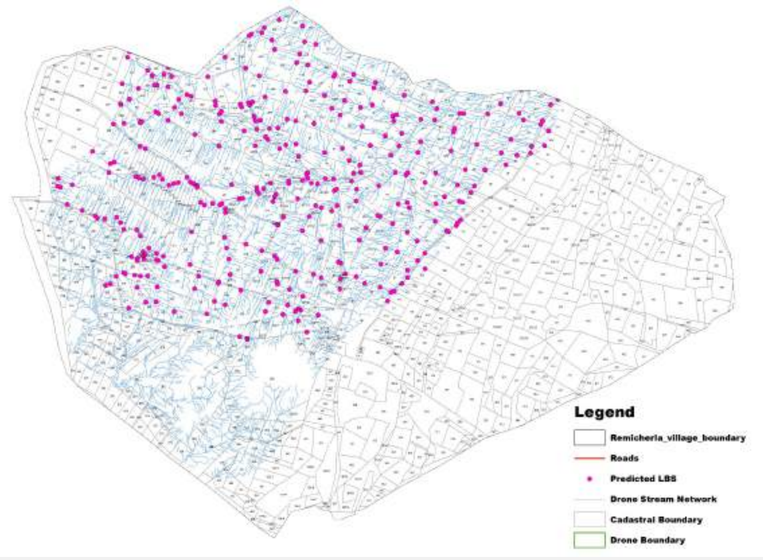
Drainage Area Treatment (SRTM)



Recommend location for Farmponds and LBS

- **Where the highest order drain is crossing the cadastral**
- **Maximum catchment area**
- **Lowest point**

Drainage Area Treatment (Drone)

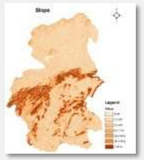


Recommend location for Farmponds and LBS

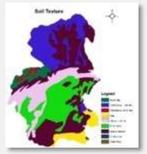
- **Where the highest order drain is crossing the cadastral**
- **Maximum catchment area**
- **Lowest point**

MASTER PLAN FOR DPR PHASE – VILLAGE / GP WISE

USINE MNREGA RIGHT


Slope


LULC


Soil Texture

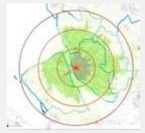

Geology


Geo-Morphology

Analyzing from Ridge to Valley

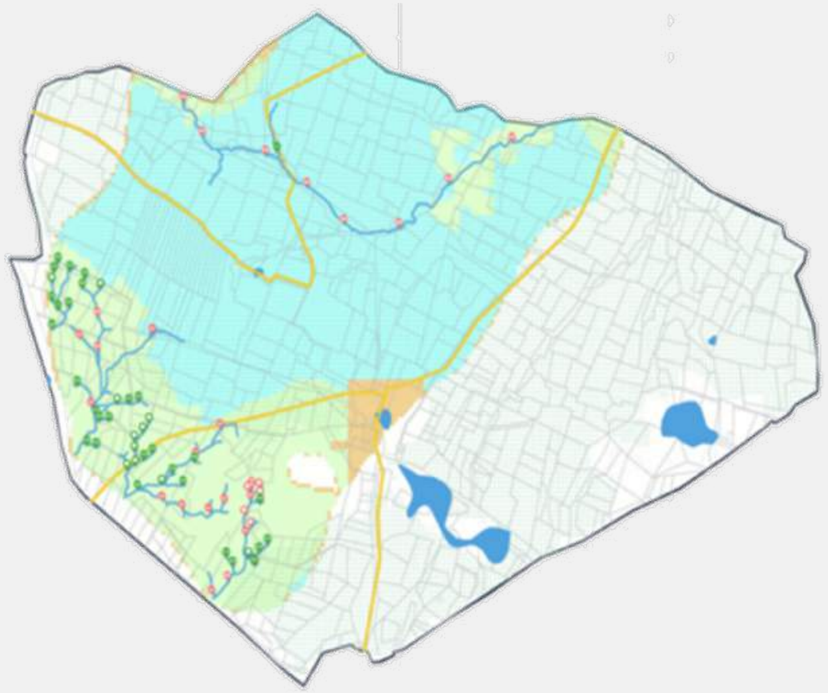
Order in Drainage network

Catchment Area check



Distance check

Using Geo-spatial layers and Machine Learning algorithms to predict potential locations for additional soil & water conservation structures to conserve excess run-off



One master plan for Village Water Security

Finance Requirement

Planning, Monitoring and Execution of building Water Structures

WORKFLOW & PRIORTIZATION

OPTIMIZE PERFORMANCE

Recommended | Optional

S.No.	Structure ID	Type Structure	Drain Name	Drain Id	Survey No	Status	Structure Possible	Changed Structure	Changed Location	Proposed Location Image	Changed Location Image	Reason	Remark	Year	Action
1	ad4a2b16-91db-4ba4-9a99-ca4f9e51167c	CHECKWALL	drain abc	7338ba13-e81f-44b7-9dee-75f494b0bc9e	461	V	YES	PERCOLATION_TANK	NO					select year	Accept
2	20af6c30-5259-4eb1-add3-5fb2269ad6a3	GABION/RFD		809bb953-1ac3-4e4d-9628-5048ca0fb168	683	P	YES	NO	NO					select year	
3	a5439d22-8e33-41f7-9d6a-cb99b244359f	GABION/RFD		d594e922-94cc-4248-b291-9b4f0860c4e0	475	P	YES	NO	NO					select year	
4	37cf85e6-4869-4624-99bd-1fffe130fdfb	GABION/RFD		cf37c9ef-4a48-4d33-bf55-81e963ac9e36	479	P	YES	NO	NO					select year	

Provides recommended and optional list of structures to validate through mobile app

- Helps in tracking validation process in real-time
- Custom workflow to accept validation from field staff, prioritise and sanction the WCS structures

MOBILE APP BASED VALIDATION

ASSURING PREDICTION

Login

Project Types

Validation Form

Geo-Tagged Picture

- Mobile app to validate the predicted proposed structure and its location
- Customised work-flows as per departmental needs for mobile app

AGRICULTURE

WHAT & WHEN TO SOW AND IRRIGATE

CROP PLANNING MODEL

- Moisture Adequacy
- Crop Phenology & Economic Value
- Soil Types
- Water Sources (Canal, GW, Rainfed)
- Current and Target MIP
- Socio - Impact
- Market Information

IDENTIFY RIGHT CORP

WHEN TO SOW

Water Requirement at Critical Stages

Weather Forecast Data

Soil Type

Soil Moisture

AI based Sowing Advisories Model for Ground Nut, Cotton, Maize, Pulses etc.

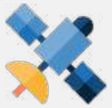
- Field Preparation Advisories
- Sowing Advisories
- Advisory Summary Reports

HOW MUCH TO WATER

Crop Acreage

Weather Forecast Data

Rainfall and Weather



Satellite Based

- Crop Water Need – Next 10 Days
- Identify Parts with Severe Dry Spell
- Amount of Water Required for Saving the Farm

FERTILIZE

Crop Sown Data

Fertilizer Consumption

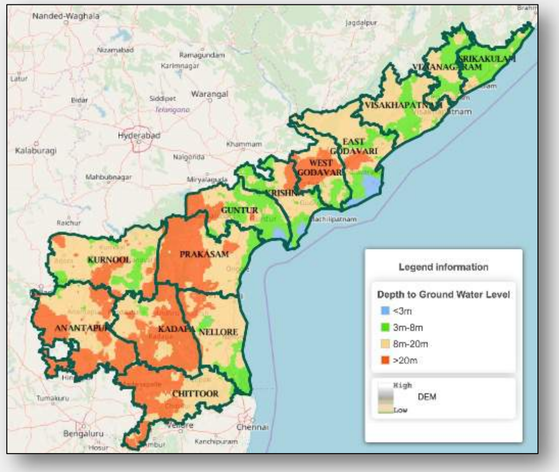
Soil Health Card Data

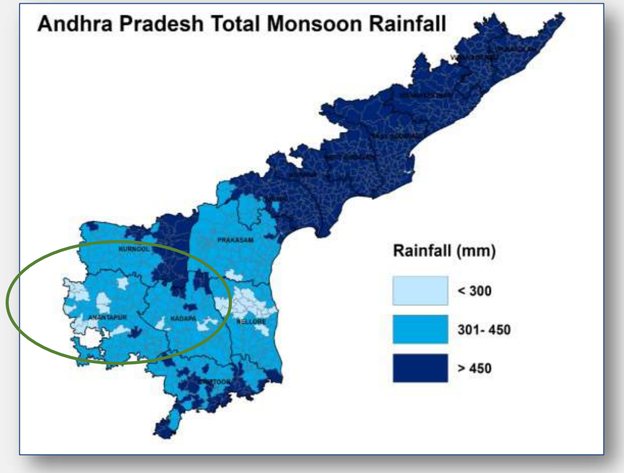
Yield Data

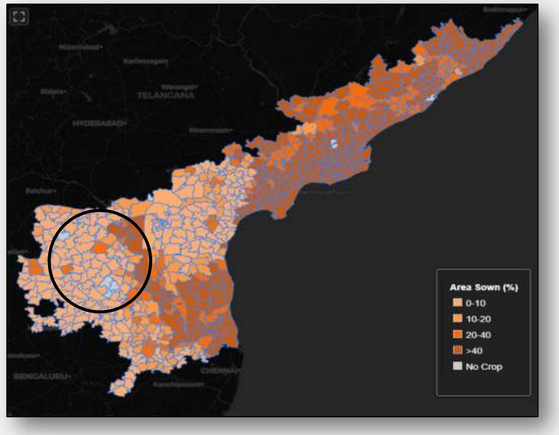
AI based fertilizer model to compute optimal fertilizer requirement

- Optimal Fertilizer
- Summary Reports
- Prediction of impact on Yields due to Over/Under usage of fertilizer

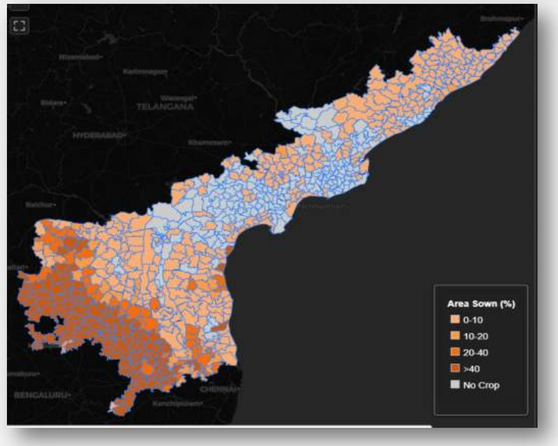
Agro-Climatic Crop Zone Plan (ACZ)



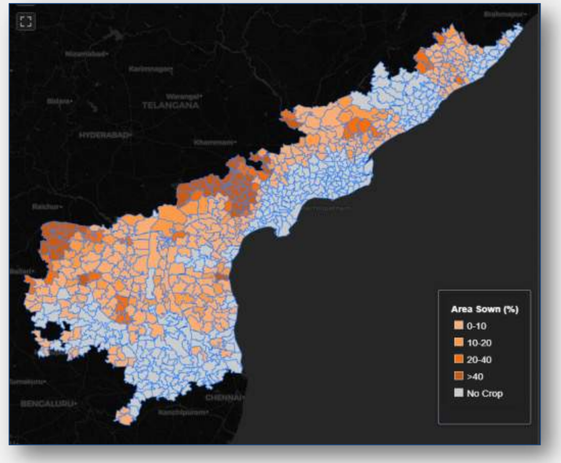




Paddy grown in areas with limited rainfall and depleting GW Levels



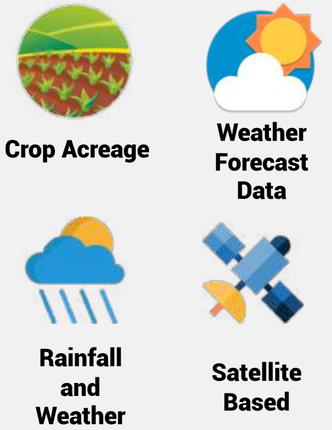
Groundnut grown in area with less than 300mm seasonal rainfall



Cotton gown in areas with low rainfall and light soils

IRRIGATION MANAGEMENT

INCREASING WATER USE EFFICIENCY

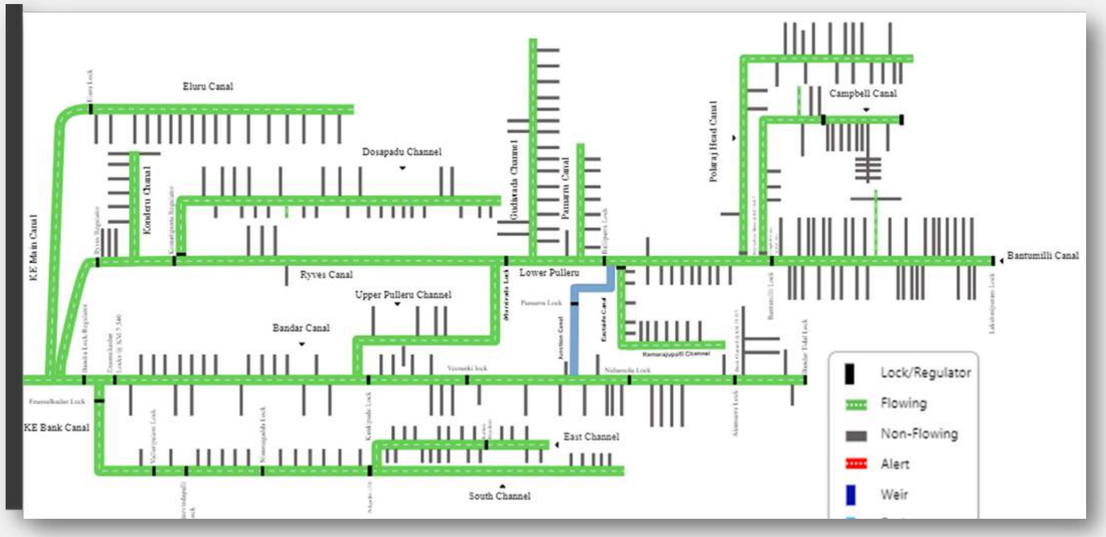


When should the irrigation be done

- Crop Water Need – Next 10 Days
- Identify Parts with Severe Dry Spell
- Amount of Water Required for Saving the Farm

IDENTIFY AND DECIDE

IRRIGATION

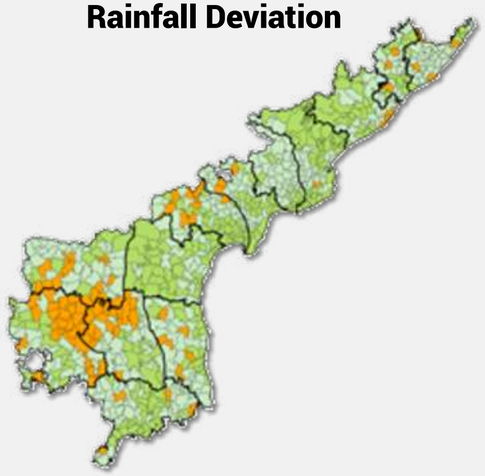


Visibility	Irrigation Schedule	Monitoring
• MIMIC • Amount of water getting released	• Command Area Irrigation Schedule • Improve Water use efficiency	• Tracking of water at each offtake point till Tail-End • Ensuring equitable distribution of water

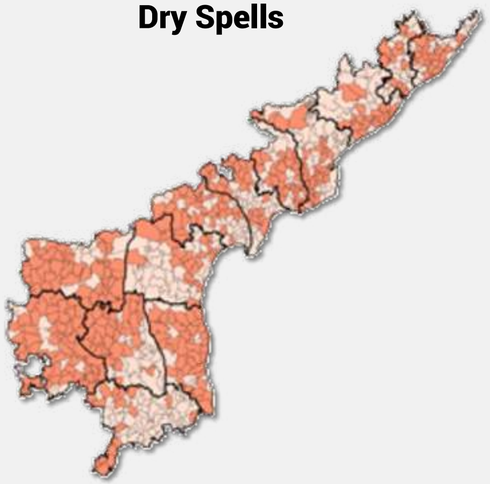
EARLY DROUGHT WARNING

UNDERSTANDING WHATS ABOUT TO COME

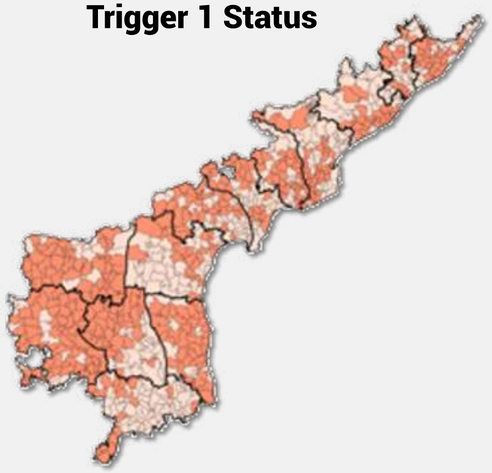
Rainfall Deviation



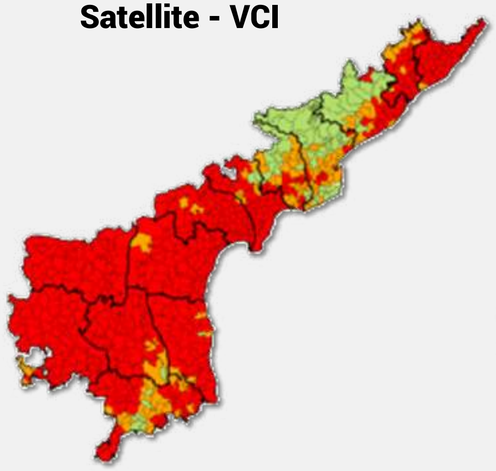
Dry Spells



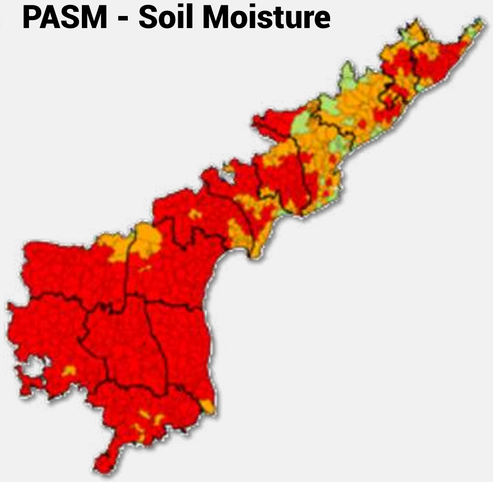
Trigger 1 Status



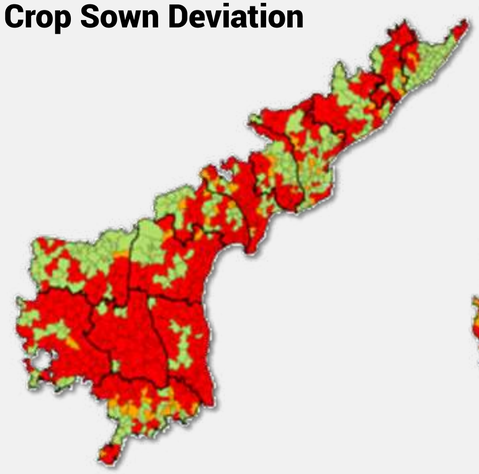
Satellite - VCI



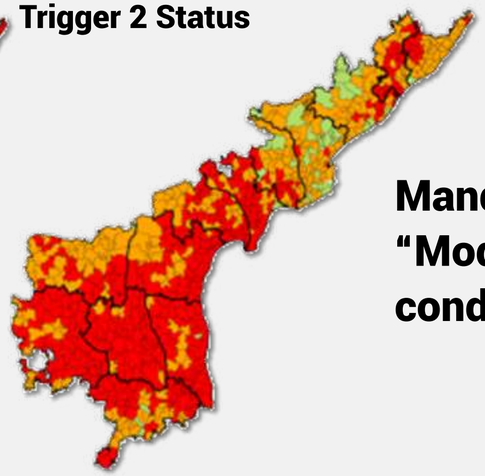
PASM - Soil Moisture



Crop Sown Deviation



Trigger 2 Status



Early Drought Warning System based on the following mandatory and impact parameters

- **Rainfall Deviation**
- **Dry Spell**
- **Vegetation Condition Index (VCI)**
- **Percent Available Soil Moisture (PASM)**
- **Area Sown**

Mandals in “Severe”, “Moderate” and “Normal” stress conditions are identified

AGRICULTURE

UNDERSTANDING PESTS, SOIL & YIELD

PEST & DISEASE


Date of Sowing of Crops


Weather Forecast Data


Congenial conditions for pests


ETL levels, if likely infestation

AI based Pest and Disease Models for Ground Nut, Cotton, Pulses, Rice and other major crops

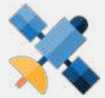
Predict the pests that are likely to infest - Next one week

Look at the field Economic Threshold Levels (ETL)

Is the intervention necessary? If yes, mitigation advisory

Decision Support System that will predict the pests and diseases that are most likely to attack a particular farm

CROP ACREAGE ESTIMATION


Crop Acreage from Satellite

Using both optical and microwave remote sensing

AI based Crop Acreage Estimation Model

Monthly Estimation of crops using Satellite Imagery

Help stakeholders with large land holdings to identify the exact crop acreages with minimal effort and resources

YIELD ESTIMATION


Crop Acreage from Satellite


Weather Forecast Data


Soil Map


Crop Cutting Experiment data

AI based Yield Estimation Models for Ground Nut, Cotton, Pulses, Rice etc.

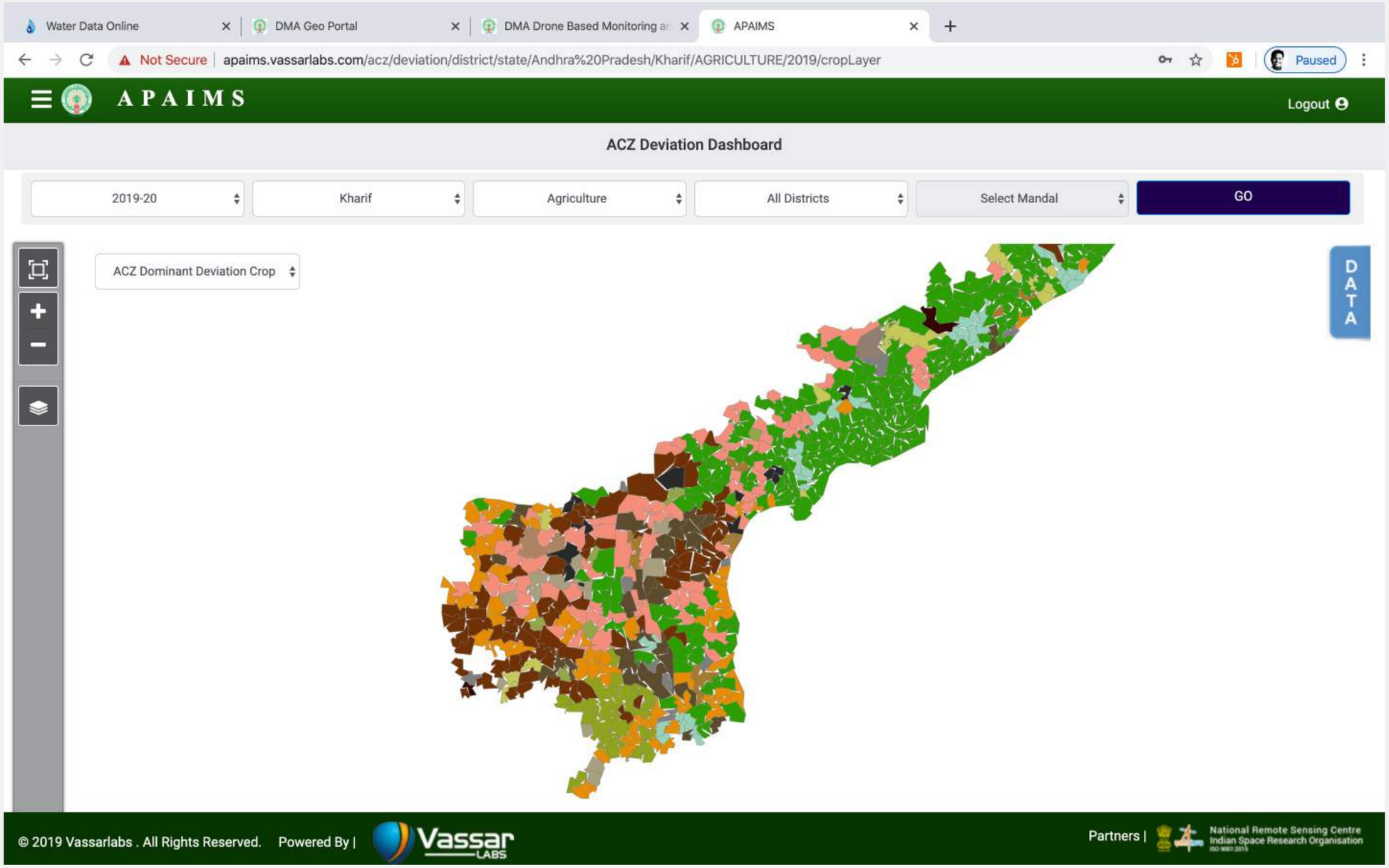
Estimated Yield of the Crop

Reduces Time and Manual efforts required to estimate yields

Crop Specific AI based Yield Estimation models that predicts based on forecast information

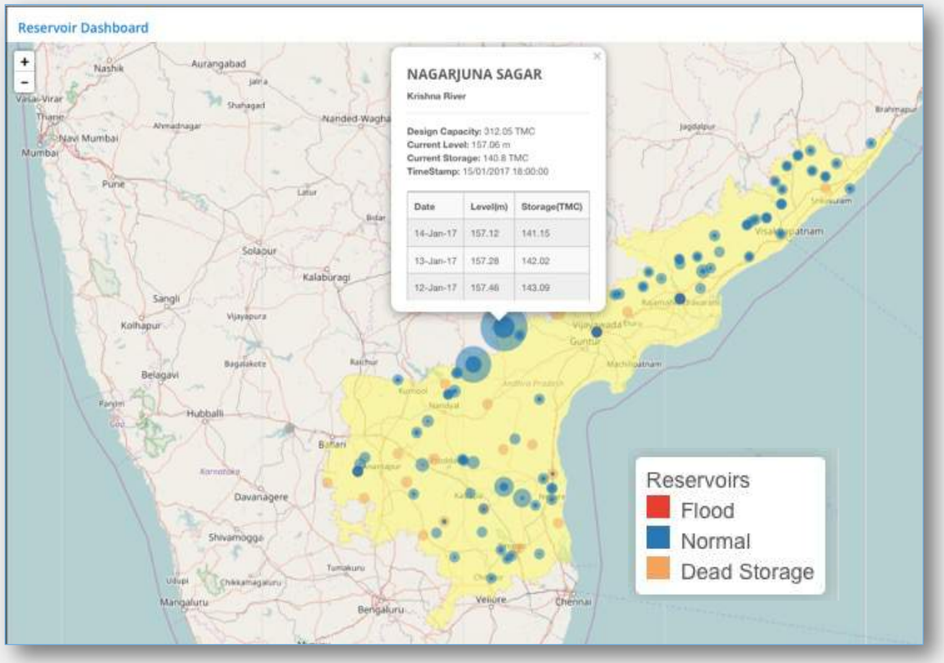
DASHBOARDS

UNDERSTANDING THE DATA



RESERVOIR MANAGEMENT

FORECAST AND MANAGE



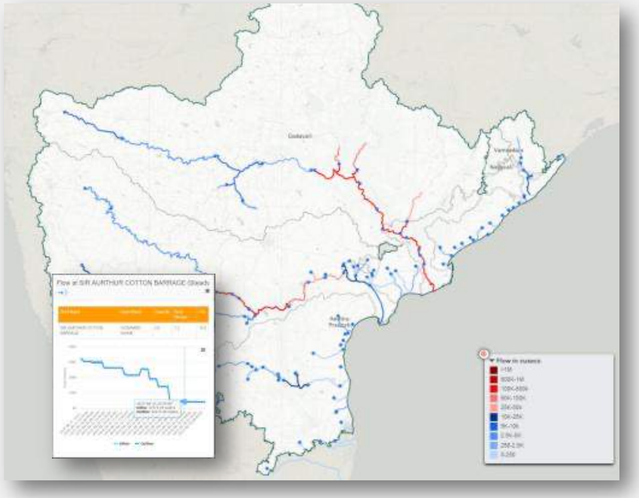
Real-time GIS dashboard view

- **One snap view of state reservoirs**

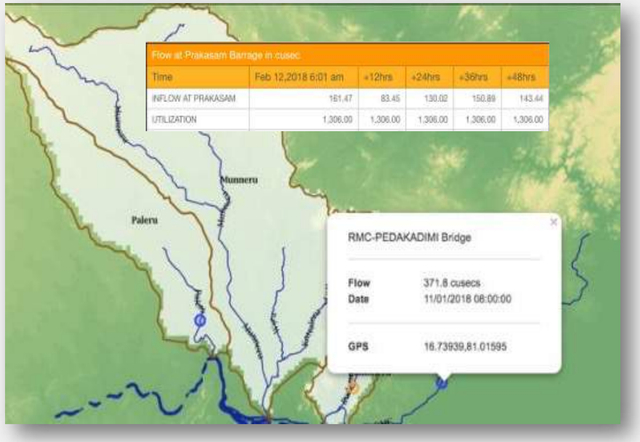
Real-time dashboard

- **River Basin view**
- **Reservoir type view**
- **Reservoir detail Table**
- **Storage, Inflow & Outflow**

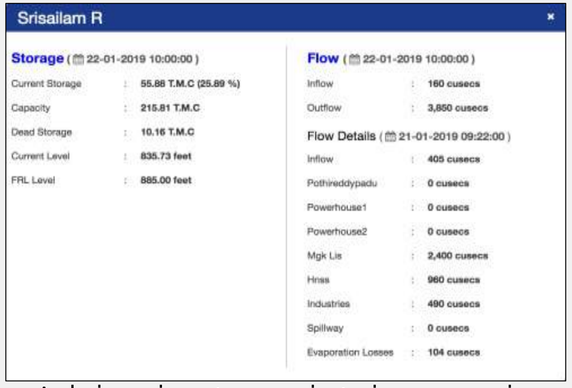
INFLOW FORECAST



RESERVOIR MANAGEMENT



LIFT SCHEME



Advisories to maintain pumping, step up, step down or shut down.

FILLING CASCADE OF MI TANKS

CASE STUDY : RESERVOIR MANAGEMENT

PRAKASAM BARRAGE & PATTISEEMA LIFT SCHEME

PROJECT IMPACT

4 hrs to 48 hrs lead time to act for safer dam operations

10% savings of pumping cost

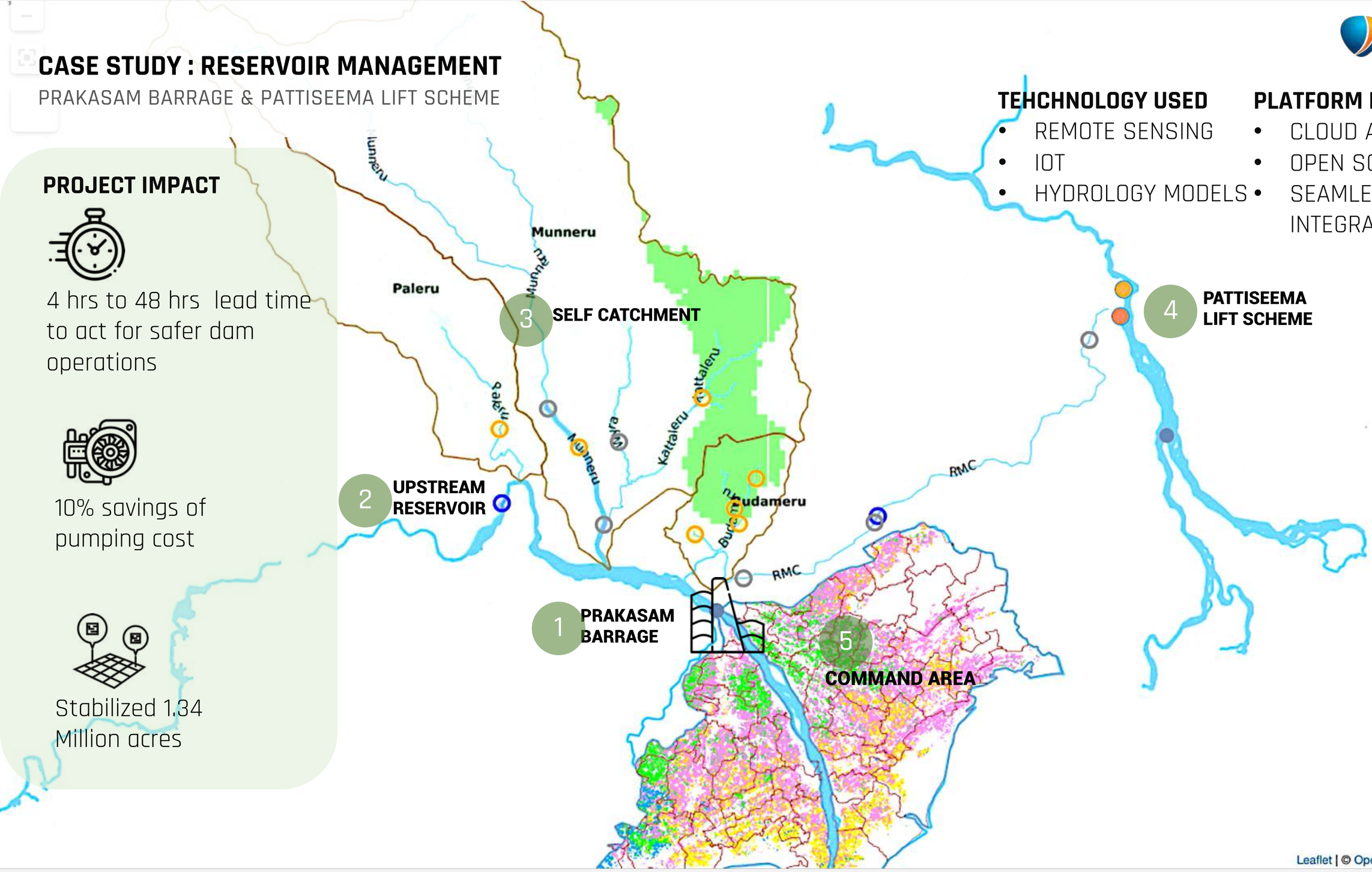
Stabilized 1.34 Million acres

TEHCHNOLOGY USED

- REMOTE SENSING
- IOT
- HYDROLOGY MODELS

PLATFORM FEATURES

- CLOUD APPLICATION
- OPEN SOURCE
- SEAMLESS DATA INTEGRATION



FLOOD FORECASTING

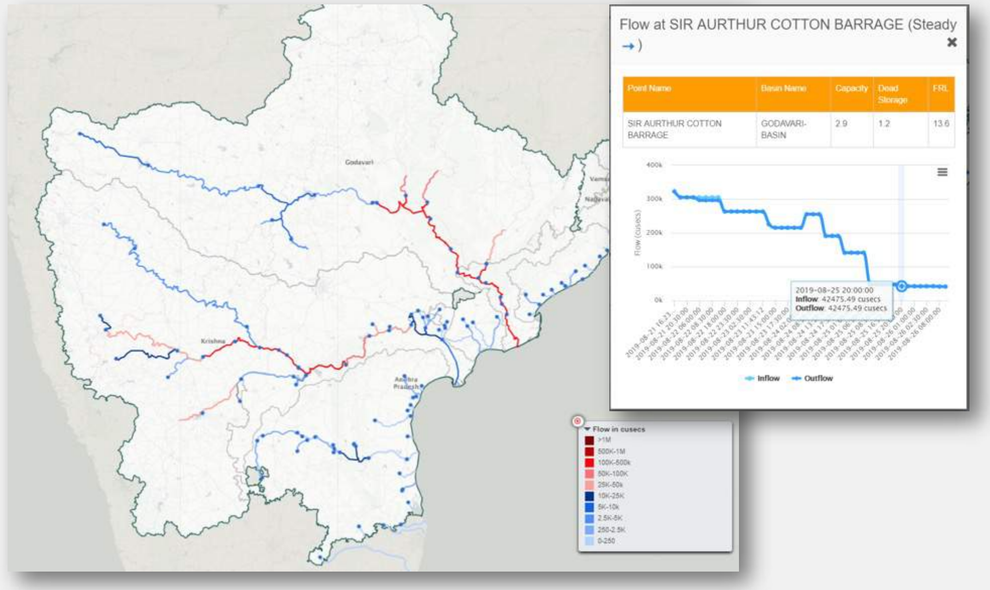
UNDERSTANDING FLOW TO FLOOD

Get to know about flood in advance and get advisories for reducing its impact

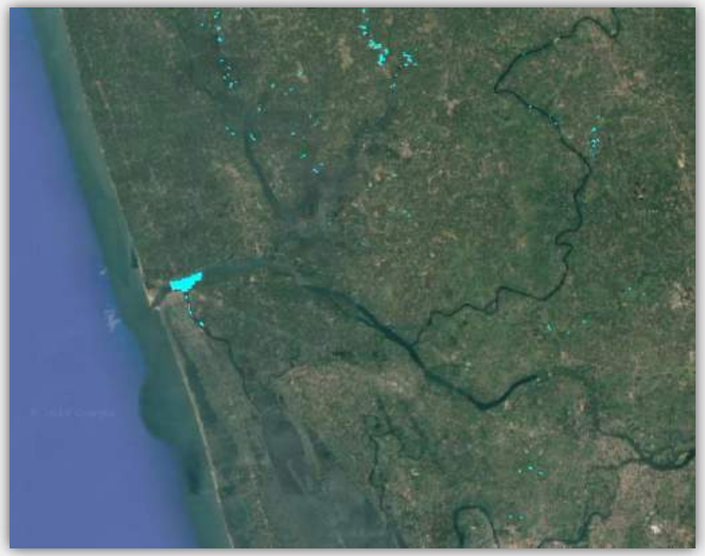
IoT based Model

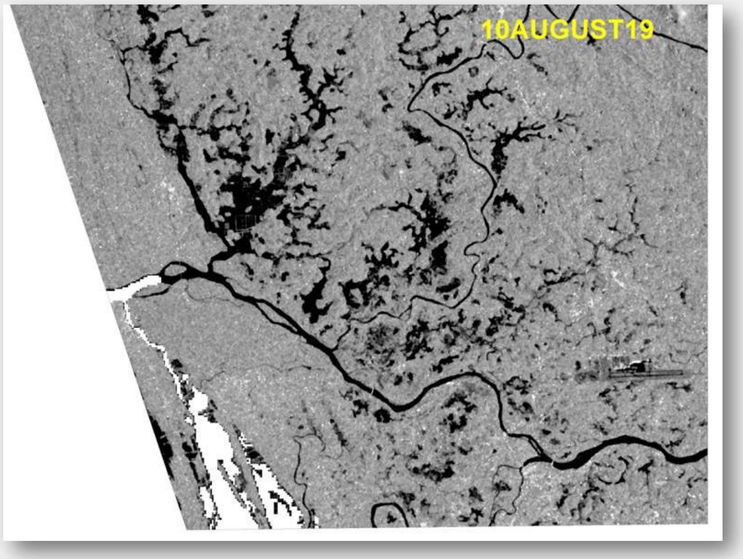
Hydrologic al Model

Machine Learning and AI based Model



KERALA FLOOD SIMULATION: PERIYAR BASIN





Short Range Forecast – Hours

Medium Range Forecast – 2 Weeks

Long Range Forecast – Month

AWARD WINNING SOLUTION

ANDHRA PRADESH WATER RESOURCE INFORMATION & MANAGEMENT SYSTEM (APWRIMS)

One Authoritative System for integrated water resource management

Integrated real-time visibility on 90% of the Water resource

Managing water resources remotely in near real-time

Empower farmers to make water smart decision

WON 1ST PRIZE AT NATIONAL WATER MISSION AWARD, MINISTRY OF WATER RESOURCES, INDIA

WON AWARD FOR, BEST CONSULTANCY IN WATER SECTOR FROM CENTRAL BOARD OF IRRIGATION & POWER

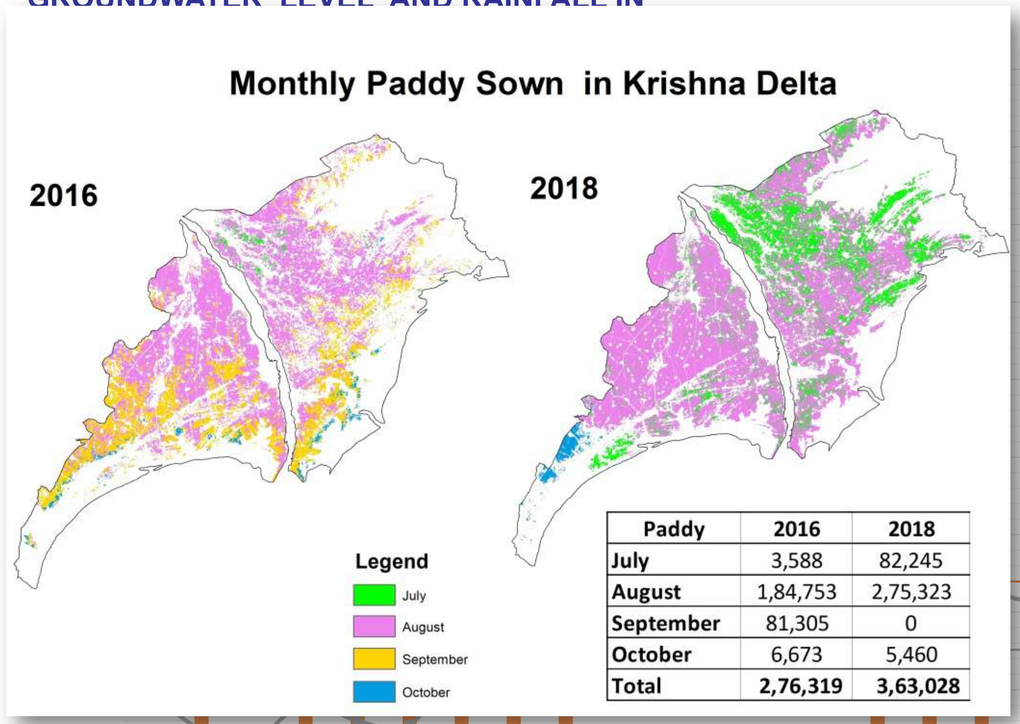
IMPACT

CHANGES WHICH ARE VISIBLE

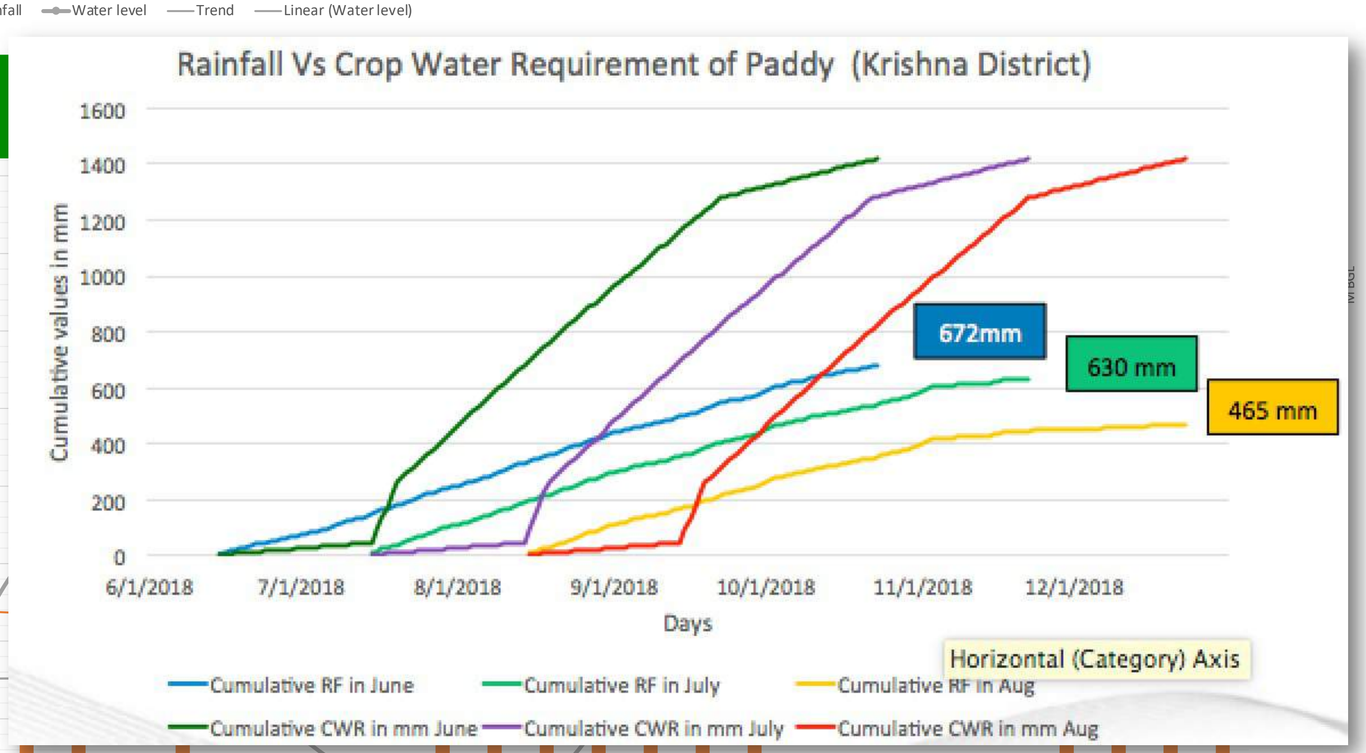
IMPACT

IMPROVE WATER USE EFFICIENCY ESPITE LOW RAINFALL

GROUNDWATER LEVEL AND RAINFALL IN



Paddy	2016	2018
July	3,588	82,245
August	1,84,753	2,75,323
September	81,305	0
October	6,673	5,460
Total	2,76,319	3,63,028



RAINFALL IN MM.

20.0
0.0
14.00
15.00
16.00

Nursery in June and Transplantation in July

Reduced Canal water requirement compared to August nurseries

24 TMC WATER SAVED

RAINFALL DEVIATION

-34%
-5%
-30%
-13%

IMPACTS

SECURING WATER FOR SUSTAINABLE FUTURE

01 RESERVOIR MANAGEMENT

- 10 Lakh inflow managed as 6-8 Lakh outflow
- Pattiseema LI Scheme Operation Managed by inflow forecast – 10 day savings in 2019-20 so far

02 2 METER INCREASE IN GROUNDWATER

- Groundwater levels improved by 2 m across the State, despite receiving 14% deficit Rainfall

03 INTERBASIN TRANSFER OPTIMIZATION

- Optimize inter-basin transfer of water that provided critical and necessary water to entire Krishna Delta region impacting 1.1 million acres.

04 SAVED 4850 MILLION RUPEES

- Saved 970 MW hour of energy for pumping the groundwater for irrigation purpose which costs about INR 4,850 millions.

IMPACTS

VISIBLE IMPACT ON AGRICULTURE

01 CROP & SOW PLANNING

- 18k Villages & 10 Million farms covered
- Groundnut sowing in Anantapur shifted from 2nd fortnight of June to 1st fortnight of July

02 PEST AND DISEASE

- 800k hectares alerted for Pest/Disease Infestation
- Prevented economic loss due to Pink Bollworm & Fall Army Worm

03 EARLY DROUGHT DETECTION

- 274 Mandals covered
- Early declaration of Drought Mandals and financial benefits to farmers

04 HORTICULTURE CROP

- Recommended to shift from the water-thirsty Agriculture crops to suitable Horticulture crops. This resulted in increase of about 1.85 L ha of Horticulture crops.

IMPACTS

VISIBLE IMPACT ON AGRICULTURE

05 | 7.5% DECREASE IN FERTILIZER

- 18k Villages & 670 Mandals covered
- Decrease of 7.5% of Fertilizer compared to 2017-18

06 | 23X INCREASE IN HORESEGRAM AREA

- Area of Horse Gram crop around 3,500 Ha increased to more than 81,485 Ha

07 | 43% INCREASE IN GVA

- State on an average had a GVA of INR 98,000 per ha &after the activity, the GVA forecasted was INR 1,40,000

08 | SOIL MOISTURE STRESS

- 100k+ ha reported for critical soil moisture stress
- Due to interventions, there were about 4,540 farmers benefitted

THANK YOU

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