

REMOTE SENSING & AI

A tool to combat climate change

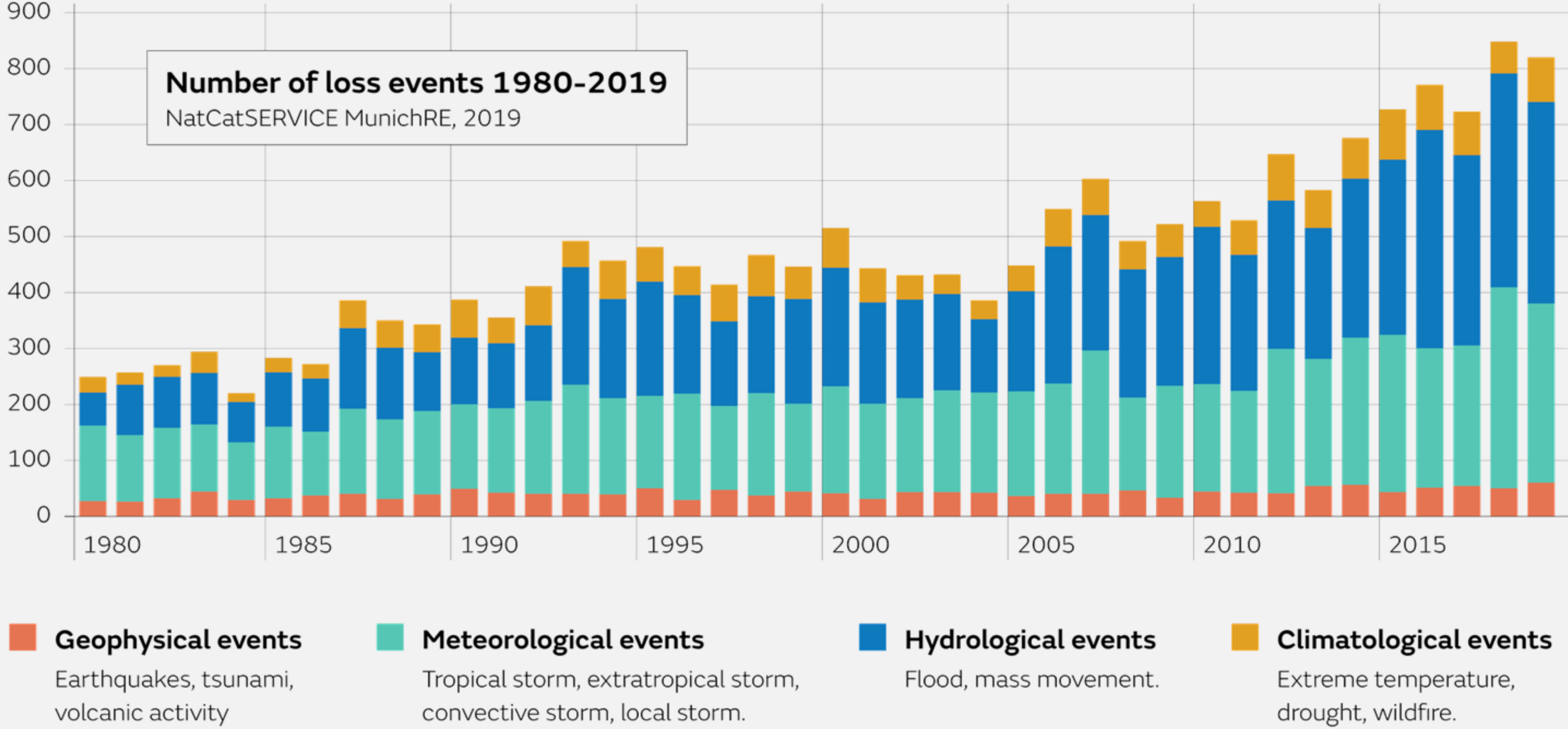
Amit Kumar Mishra
Vice President – Marketing
Vassar Labs
amit@vassarlabs.com



Vassar Labs, is a Technology company **building products** and solution for global problem of **Climate Change** impact on vulnerable sectors like Water, Cities, and Agriculture, by making use of latest technologies like **IoT, AI/ML, GIS, Cloud computing, Remote Sensing, Big Data** etc

IMPACT OF CLIMATE CHANGE – A RISE IN LOSS EVENTS

 **Met Office** Are extremes becoming more frequent?

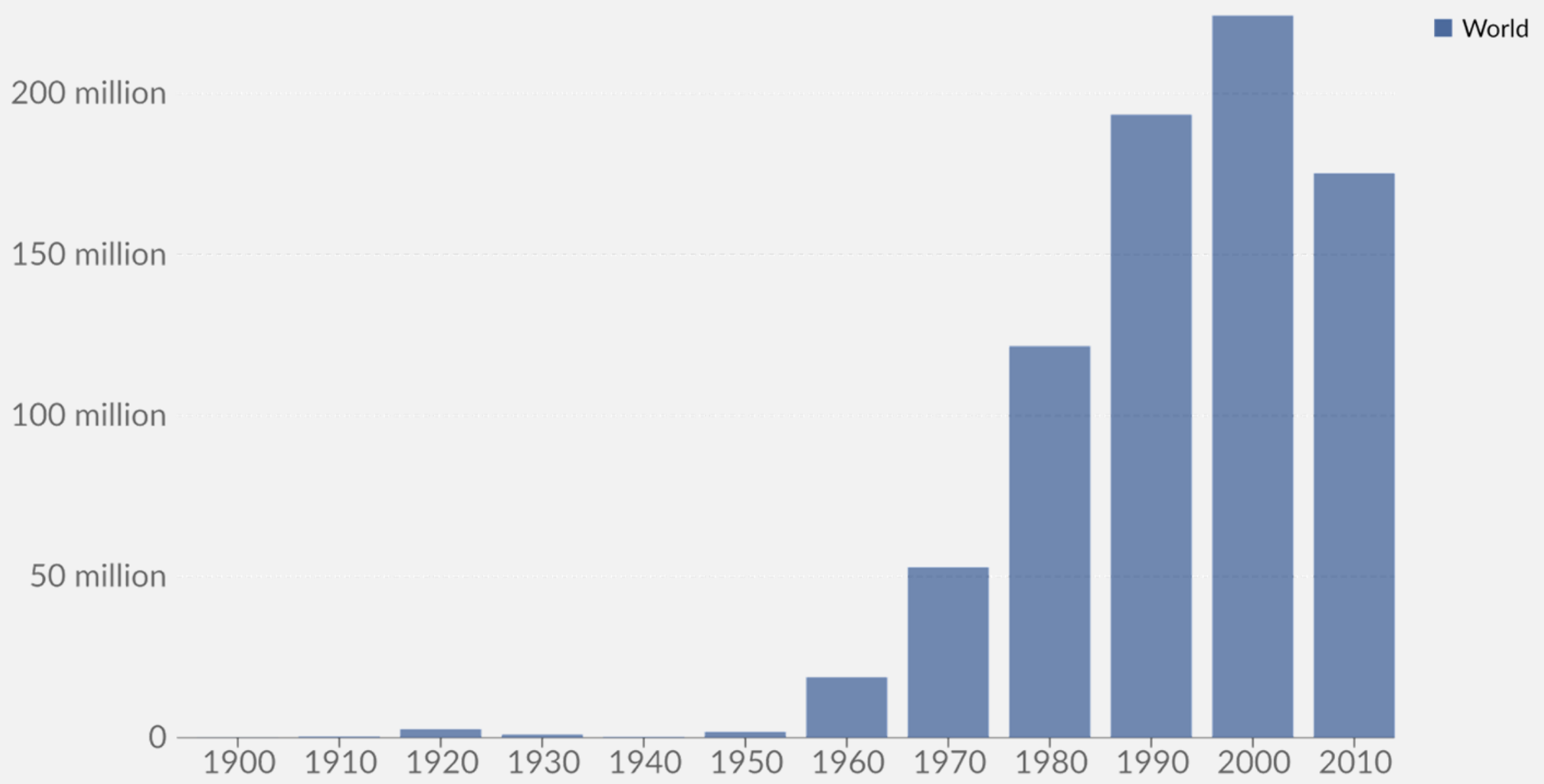


This graph from [Munich RE](#) shows events causing loss are becoming more frequent.

NUMBER OF PEOPLE AFFECTED VS COVERAGE

Decadal average: Number of people affected by disasters

Decadal figures are measured as the annual average over the subsequent ten-year period. Disasters include all geophysical, meteorological and climate events including earthquakes, volcanic activity, landslides, drought, wildfires, storms, and flooding. People affected are those requiring immediate assistance during an emergency situation.

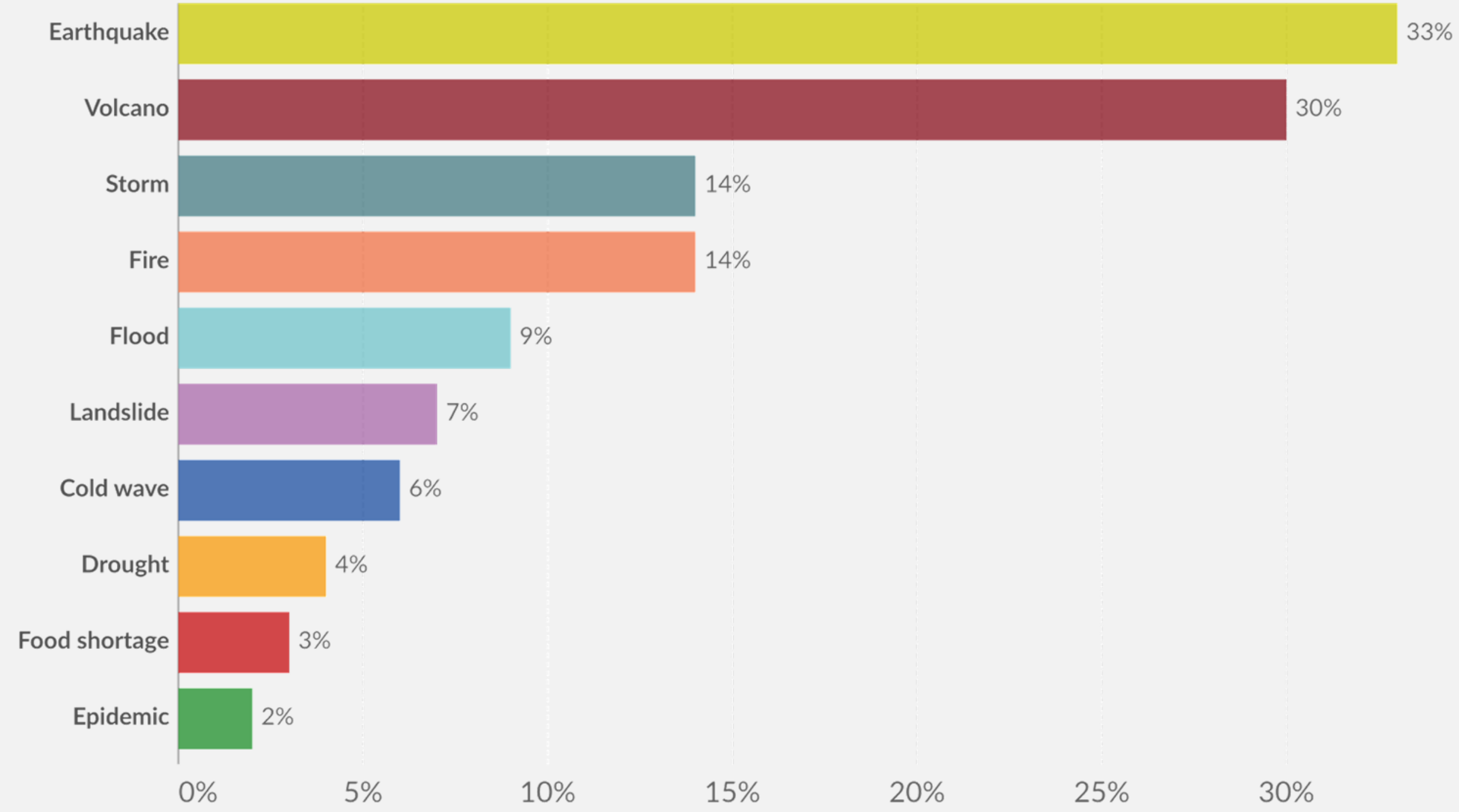


Source: Our World in Data based on EM-DAT, CRED / UCLouvain, Brussels, Belgium – www.emdat.be (D. Guha-Sapir)
 Note: Decadal figures are measured as the annual average over the subsequent ten-year period. This means figures for '1900' represent the average from 1900 to 1909; '1910' is the average from 1910 to 1919 etc.



News coverage of disasters

The data considers disasters occurring between 1968-2002 and their corresponding coverage in major US networks. It is evident that "spectacular" disasters receive more coverage.

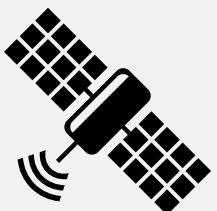


Source: Eisensee and Strömberg (2007)



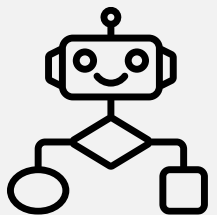
OurWorldInData.org/how-many-deaths-make-a-natural-disaster-newsworthy/ • CC BY

TECHNOLOGY TO MONITOR AND MITIGATE CLIMATE CHANGE IMPACT



Satellite Data

Leveraging open source and commercially available satellite imagery, which now provides higher frequency and resolution

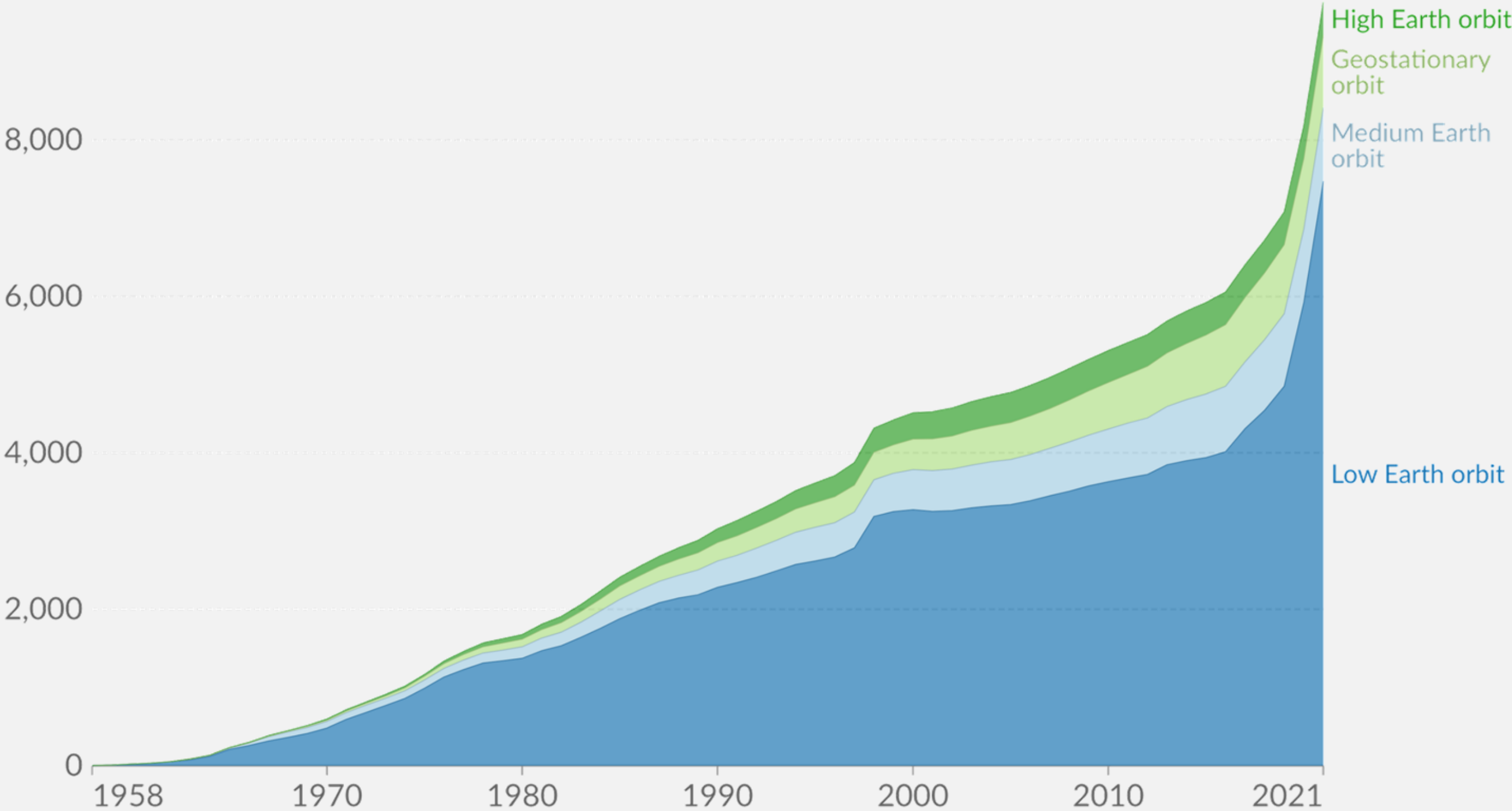


Artificial Intelligence

Achieving anonymous operations using AI on remote sensing data for least manual interventions and faster results

Number of payloads and rocket bodies in space, by orbit

Debris from launches or collisions is not counted. Objects are subtracted from the time series after they have reentered the Earth's atmosphere.



Source: United States Space Force (2022)

OurWorldInData.org/space-exploration-satellites • CC BY

Note: Low Earth orbit is defined by a point of closest approach to Earth below 2,000 kilometers; medium Earth orbit between 2,000 and 35,586 kilometers; geostationary orbit between 35,586 and 35,986 kilometers; high Earth orbit above 35,986 kilometers.

Water Resources

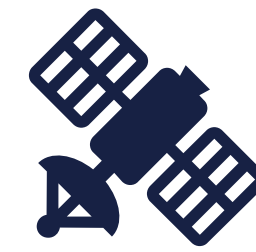
Creating digital twin for water systems replicating hydrological, hydrodynamic and conveyances to manage entire lifecycle of water

Land Use Pattern

Identify trends of land usages to understand urbanization, city infrastructure, encroachment, water bodies, forests, natural resources and track illegal activities

Environmental Monitoring

Continuously monitor natural resources and sensitive areas. The AI with remote sensing helps monitoring GHG emission and identify ways to limit emissions and sequesterate carbon



Leveraging Remote Sensing for sustainable future

Precision Farming

Remote sensing based indexes like NDVI, NDWI, VCI in conjunction with weather observed and forecast data will enable to raise farm specific advisories for field preparation, sowing, pests, irrigation, crop health, yield and harvesting

Green & Renewable Energy

Improve hydropower efficiency with digital twin and dynamic water flow management. Leverage remote sensing to understand solar farm potentials and current installed capacity along with wind energy farm monitoring & planning.

Disaster Risk Management

Identify various climate risk scenarios and simulate the real world behavior and enables post event assessment using open source satellite data.

TOWARDS SUSTAINABILITY





SUSTAINABLE VILLAGES STRENGTHENING RURAL ECONOMY

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

- Using remote sensing and geo-intelligent mobile data
- Hydrological assessment in no time without subject matter expertise
- Making villages water independent

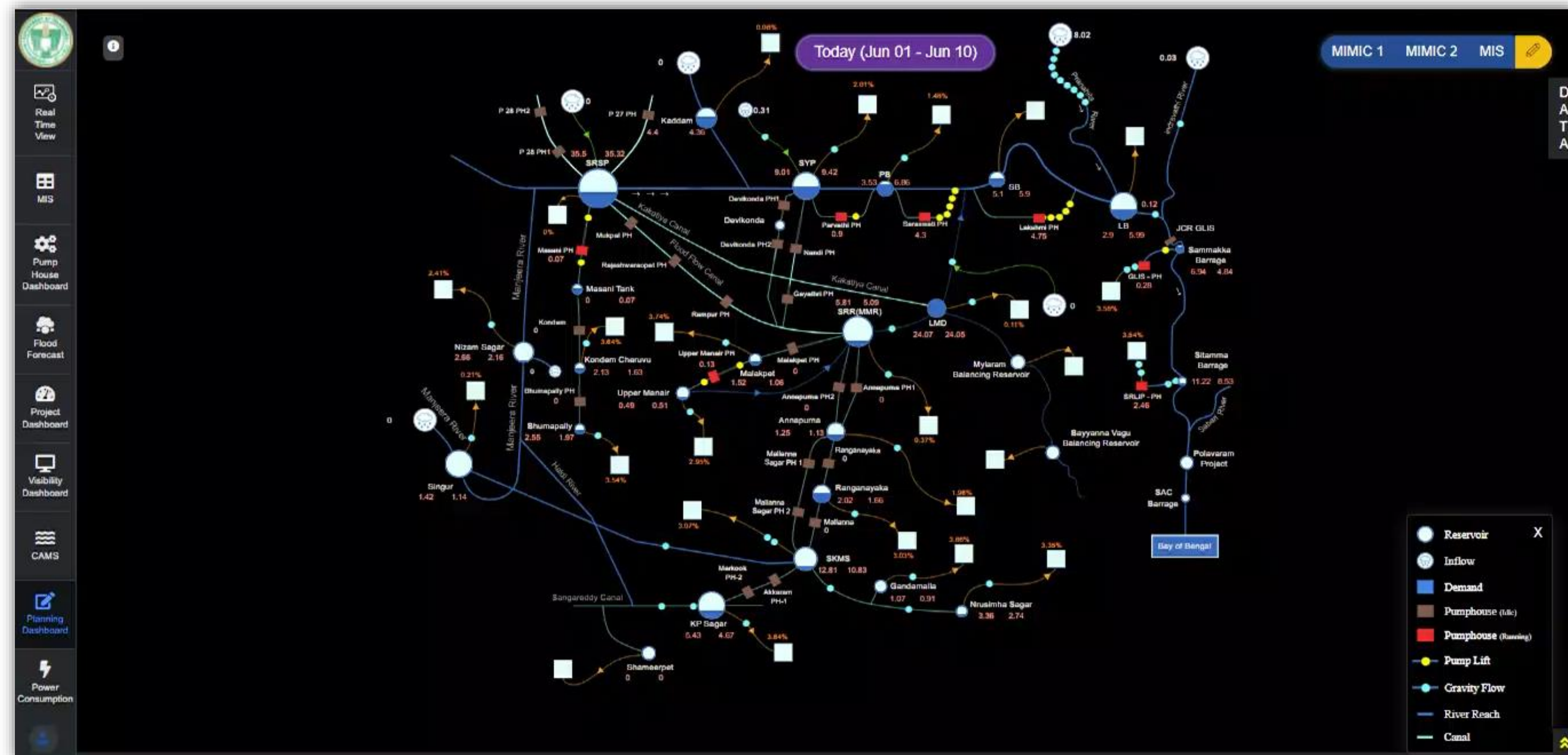




TRANSFORMING DROUGHT PRONE REGION FOR CULTIVATION

Decision support system for world's biggest lift scheming lifting 240 TMC water annually

- Near real time supply & demand visibility
- Remote sensing bases crop area and crop water demand assessment
- Planning lift/pump operations
- What if Scenario simulations

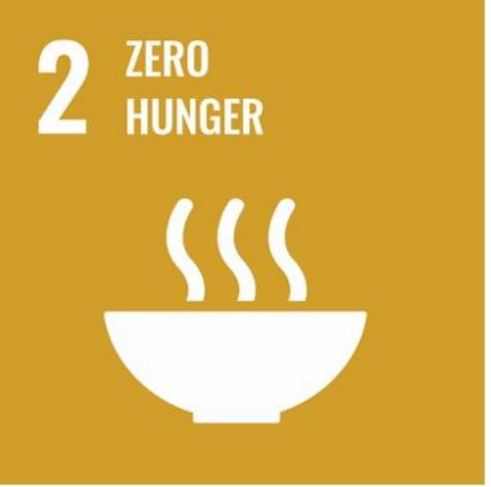




TRANSFORMING DROUGHT PRONE REGION FOR CULTIVATION

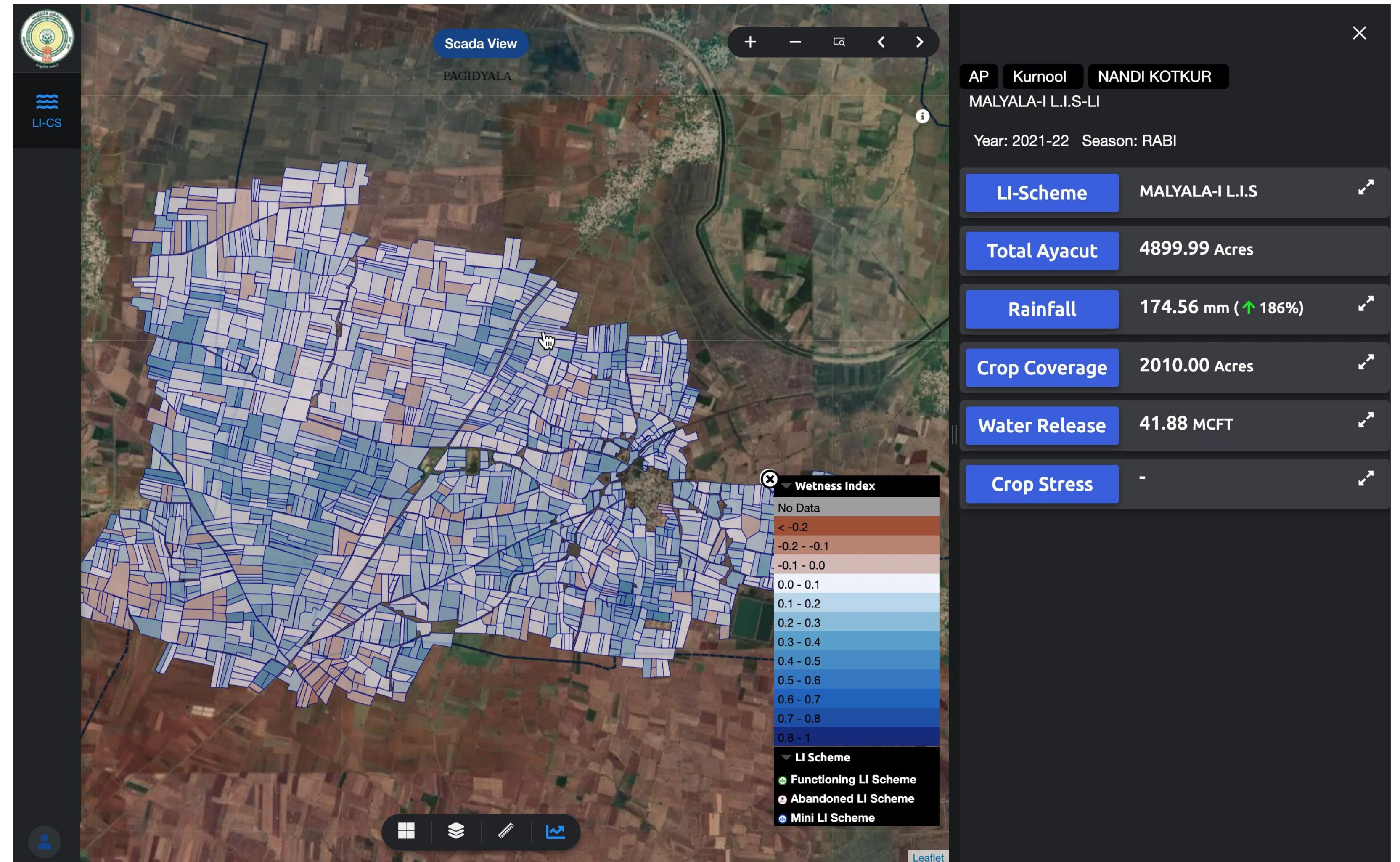
Near realtime monitoring of crop health using remote sensing indices like NDVI





TRANSFORMING DROUGHT PRONE REGION FOR CULTIVATION

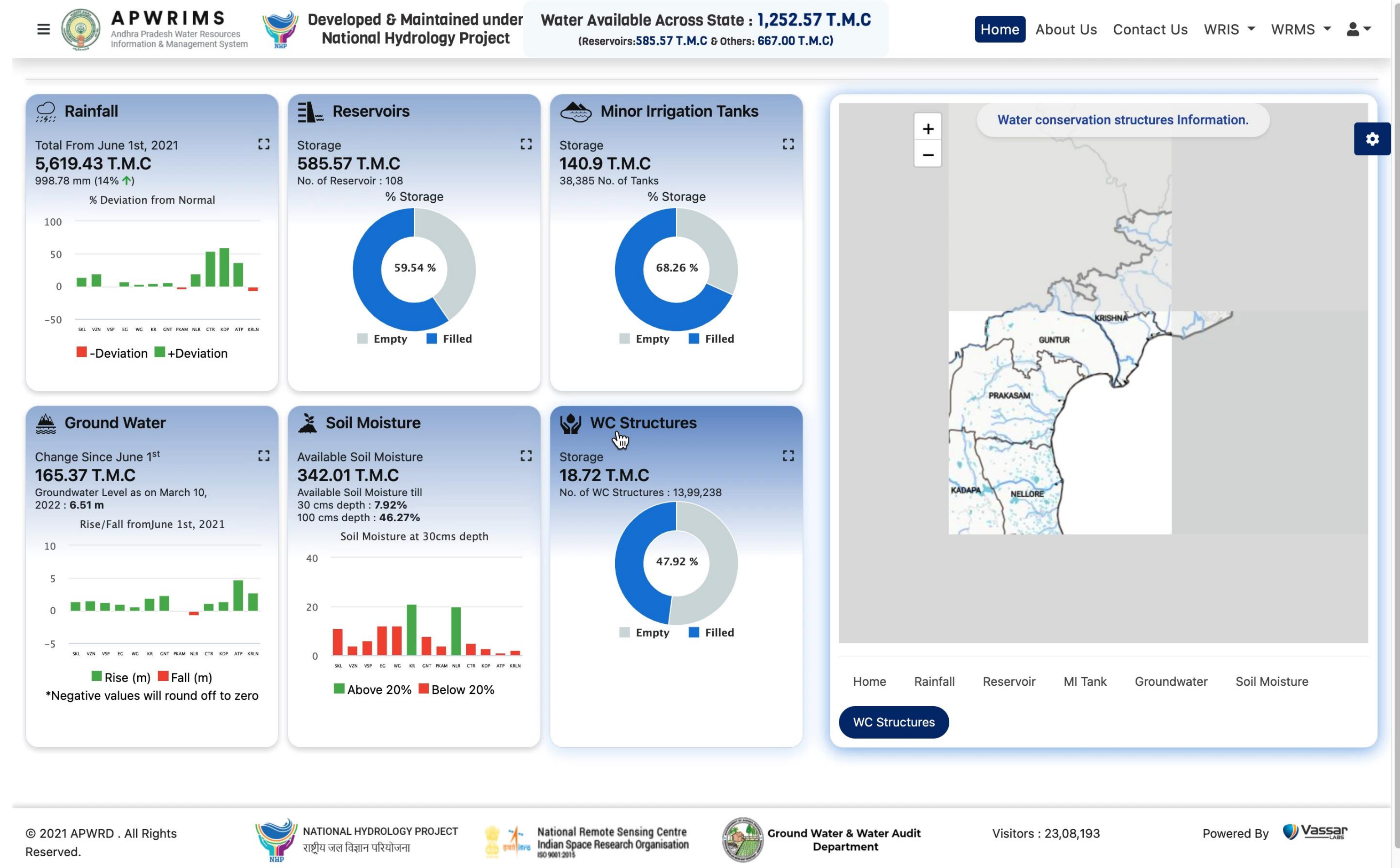
Assesing irrigation performance in near real-time using wetness index derived from satellite data



WATER GOVERNANCE MADE EASY WITH DIGITAL WATER JOURNEY

Near realtime visibility of entire water resource in the state of Andhra Pradesh enabling

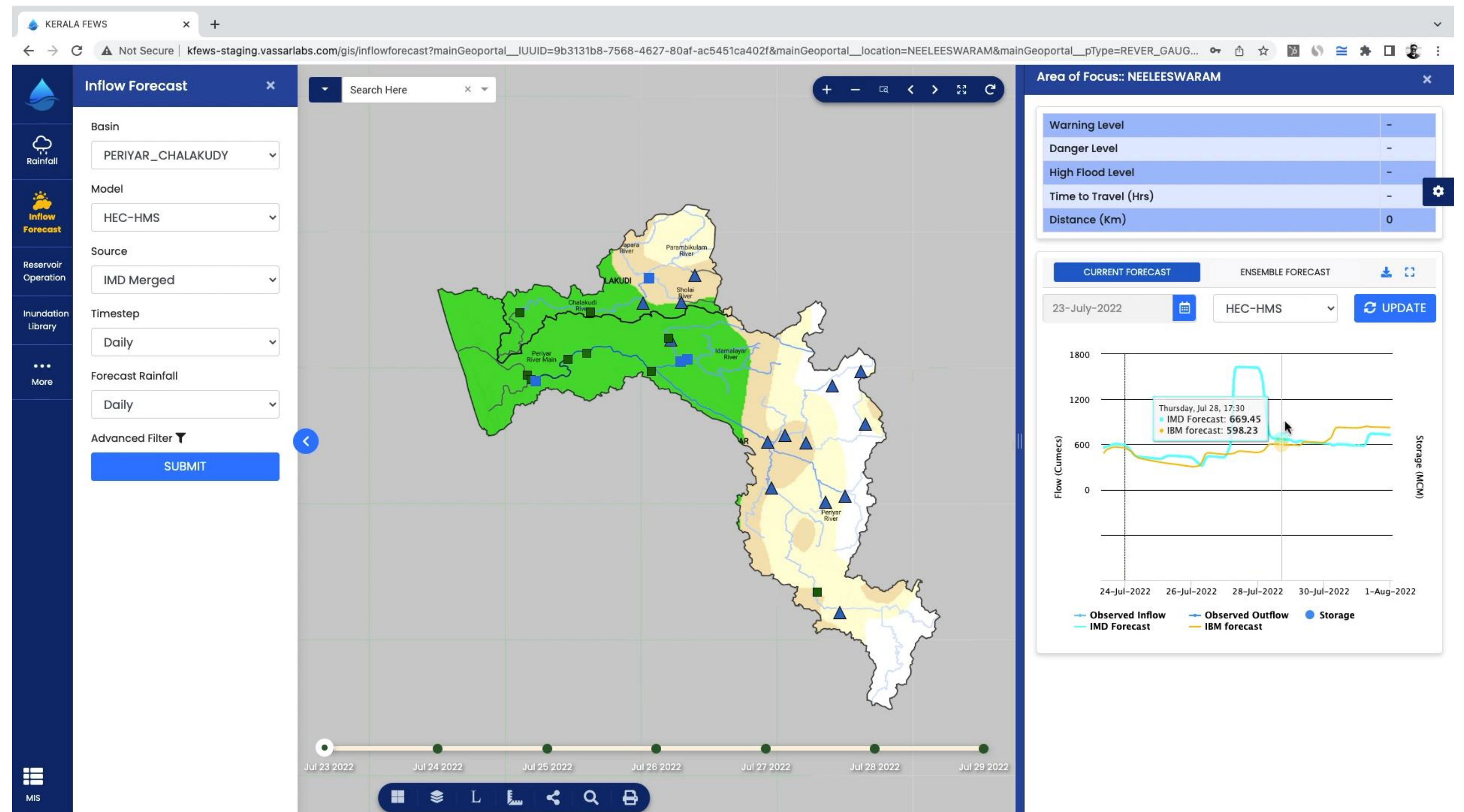
- Remote management of water resources
- Empowering farmers to make water smart decisions
- Forecasting inflows for flood warnings

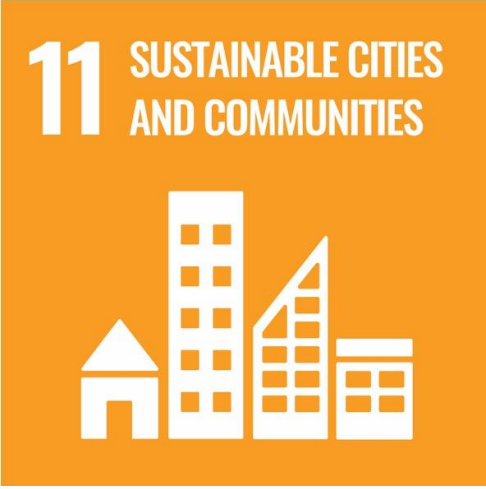


HYDROPOWER OPTIMIZATION FOR CLEAN ENERGY

Moderating reservoir flows for optimum hydropower productivity while meeting its key demands

- Near real time visibility of inflows with an outlook for 5 days to plan turbine operations
- Catchment yield analysis
- Extreme event warnings

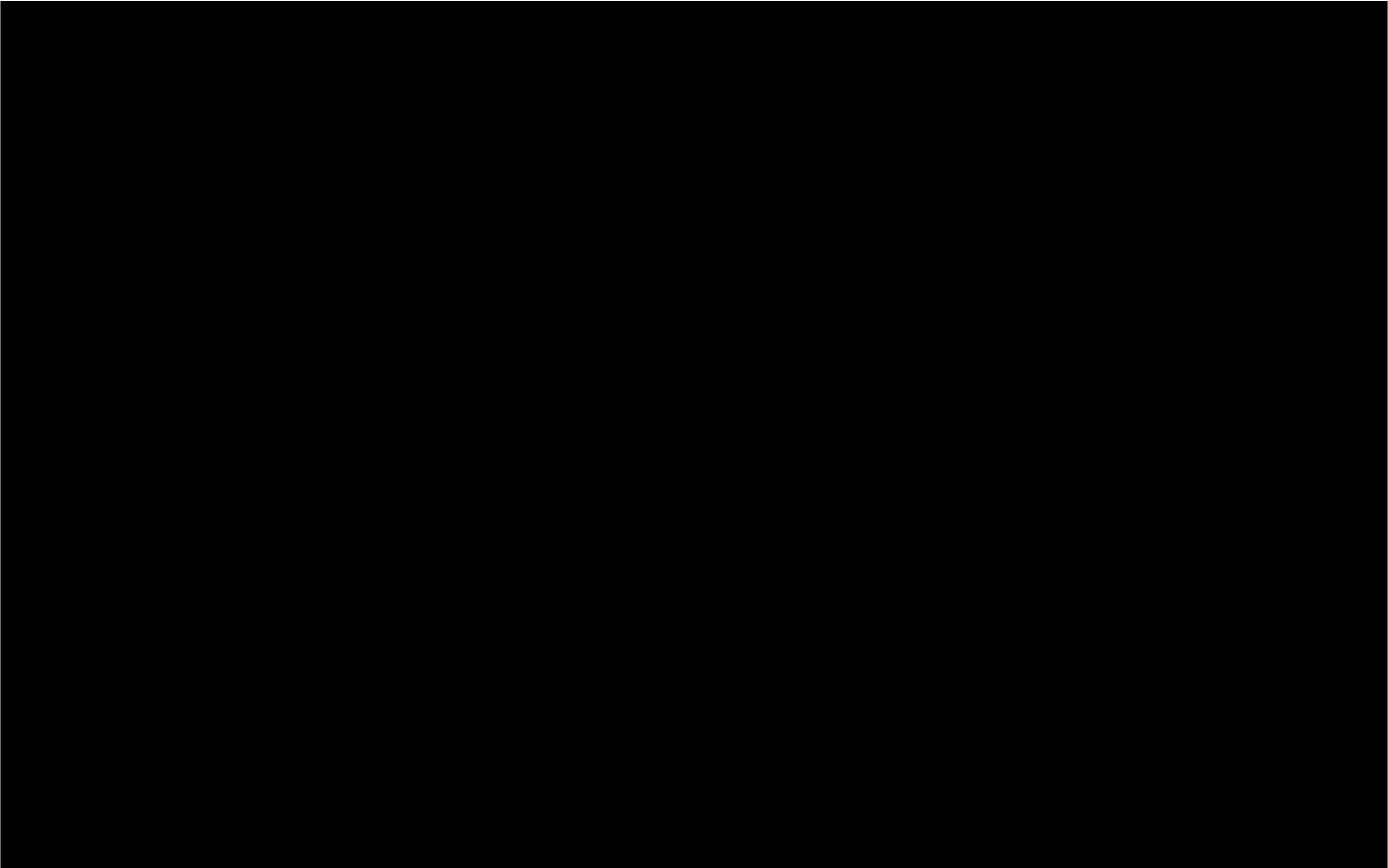




MONITORING CITY HEALTH FOR SUSTAINABILITY

City health and Infrastructure

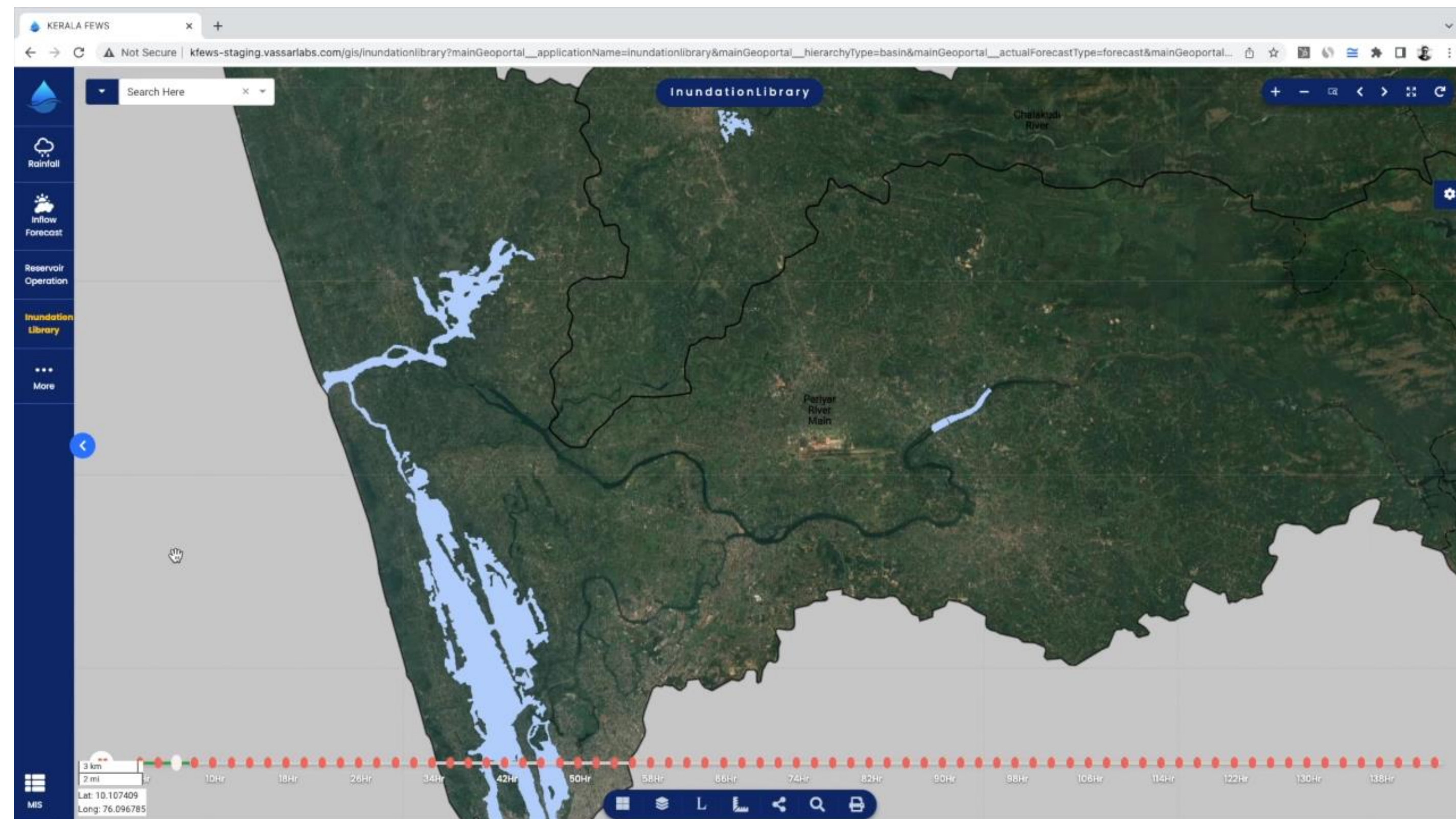
Automatically identify changes for city health indicators like green cover, garbage points, water bodies, public lands, construction progress etc.



ASSESSING RISKS TO PREPARE FOR CLIMATE CHANGE

WEB BASED FLOOD RISK ASSESMENT

The web GIS platform will allow users to navigate areas of interest and assess flood risks with respect to return periods, rainfall data or inundation heights. In addition, detailed loss prevention recommendations. This happens using high resolution satellite data with AI.





MONITORING EARTH SURFACE FOR CHANGES

SURFACE WATER BODIES

All Weather Tracking

Continuous all weather monitoring using Sentinel-1

Near Real-time Analysis

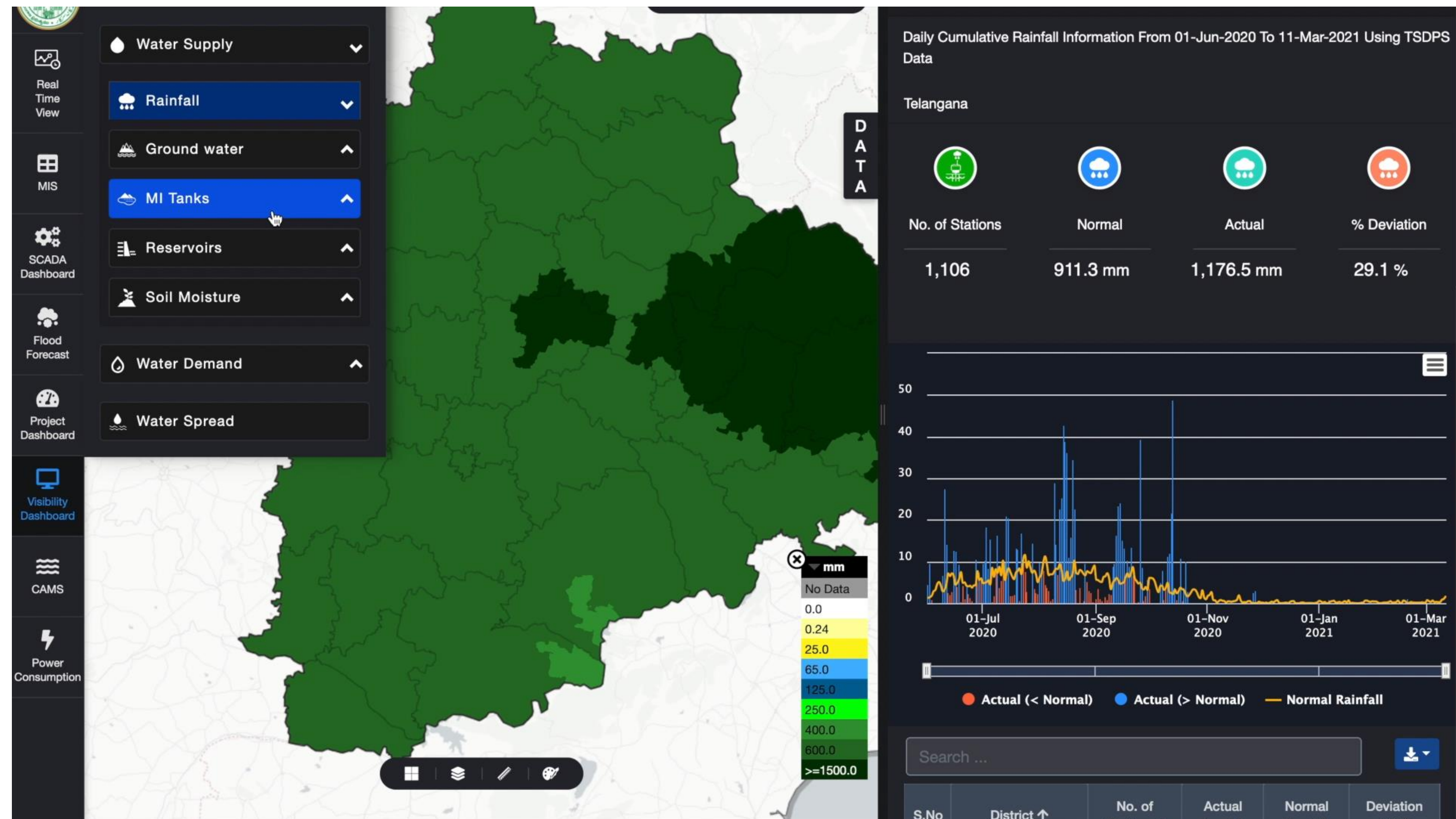
Monitoring of water bodies based against their storage on every 5 day interval

Intelligent Analytics

Actionable Insights on irrigation potential and health assessments

Alerts and Advisories

Timely alerts on storage, encroachment monitoring to facilitate protection





MONITORING EARTH SURFACE FOR CHANGES

LAND USE INTELLIGENCE

Autonomous change detection

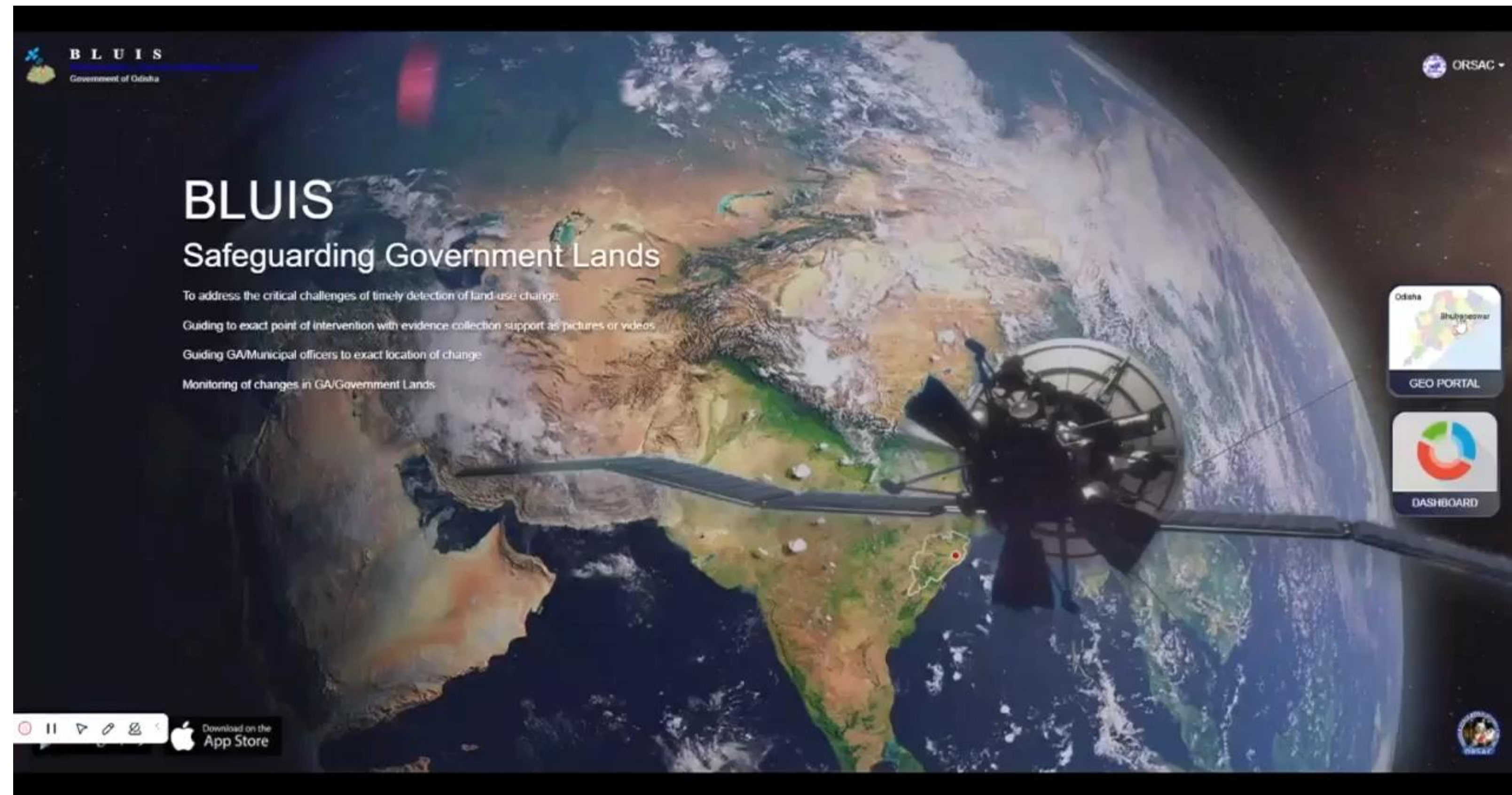
Automatically identify changes monthly, so that they don't go unnoticed saving from revenue loss

Near real-time action

Early identification of changes reduces resource requirement which results in financial saving

Powerful Workflow

Powerful workflow so that changes are verified and resolved in SLA limits



—• COMPLETED •—

THANKS FOR WATCHING

Additional Slides ahead for our Projects

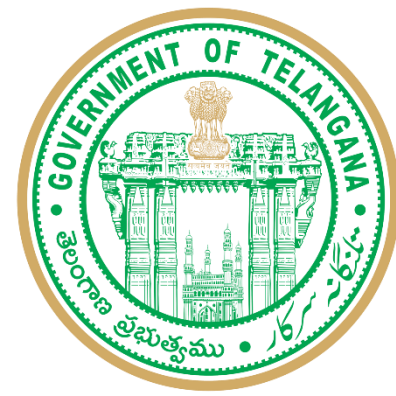


amit@vassarlabs.com

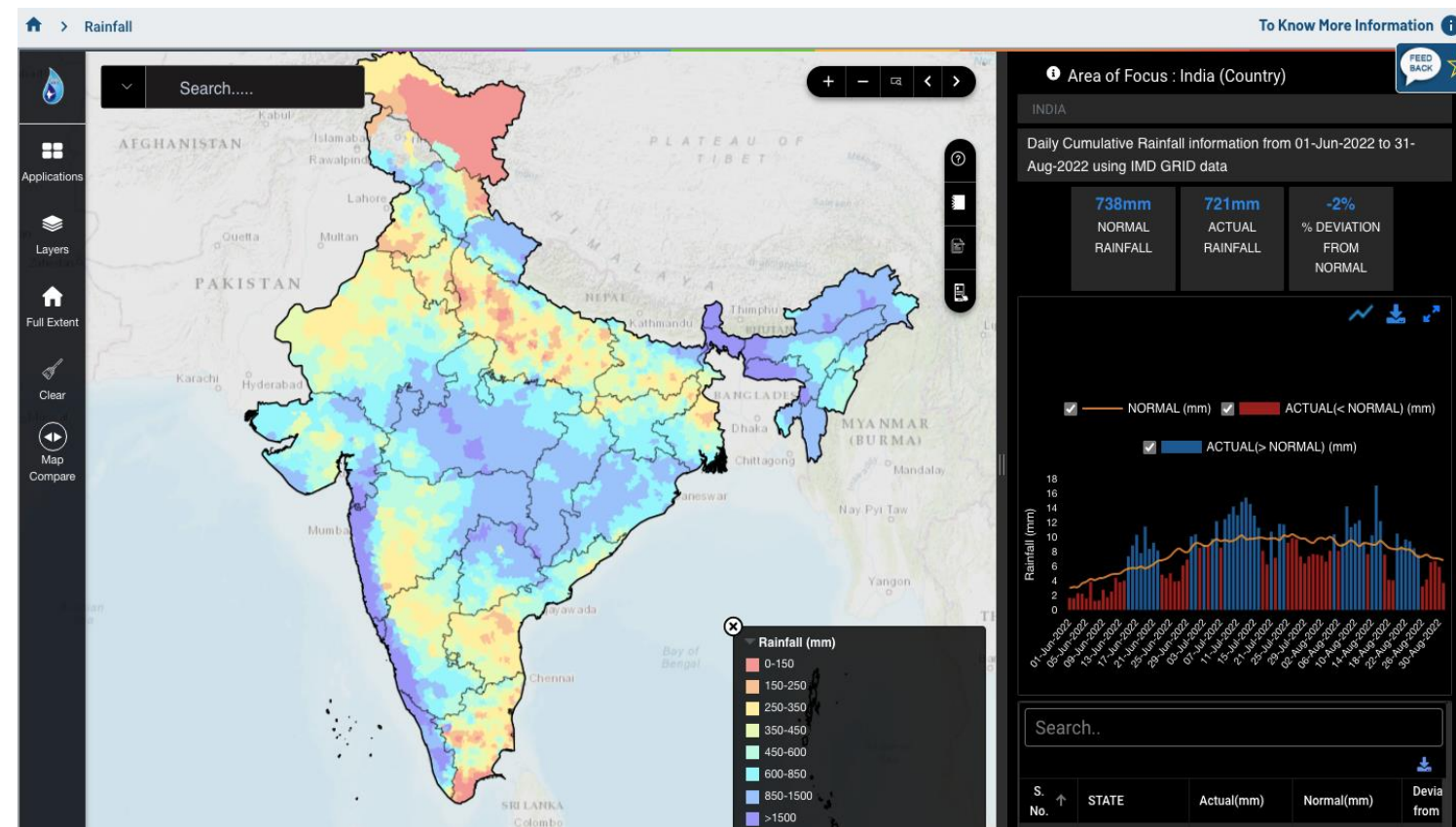
PROJECT HIGHLIGHTS



CLIENT'S

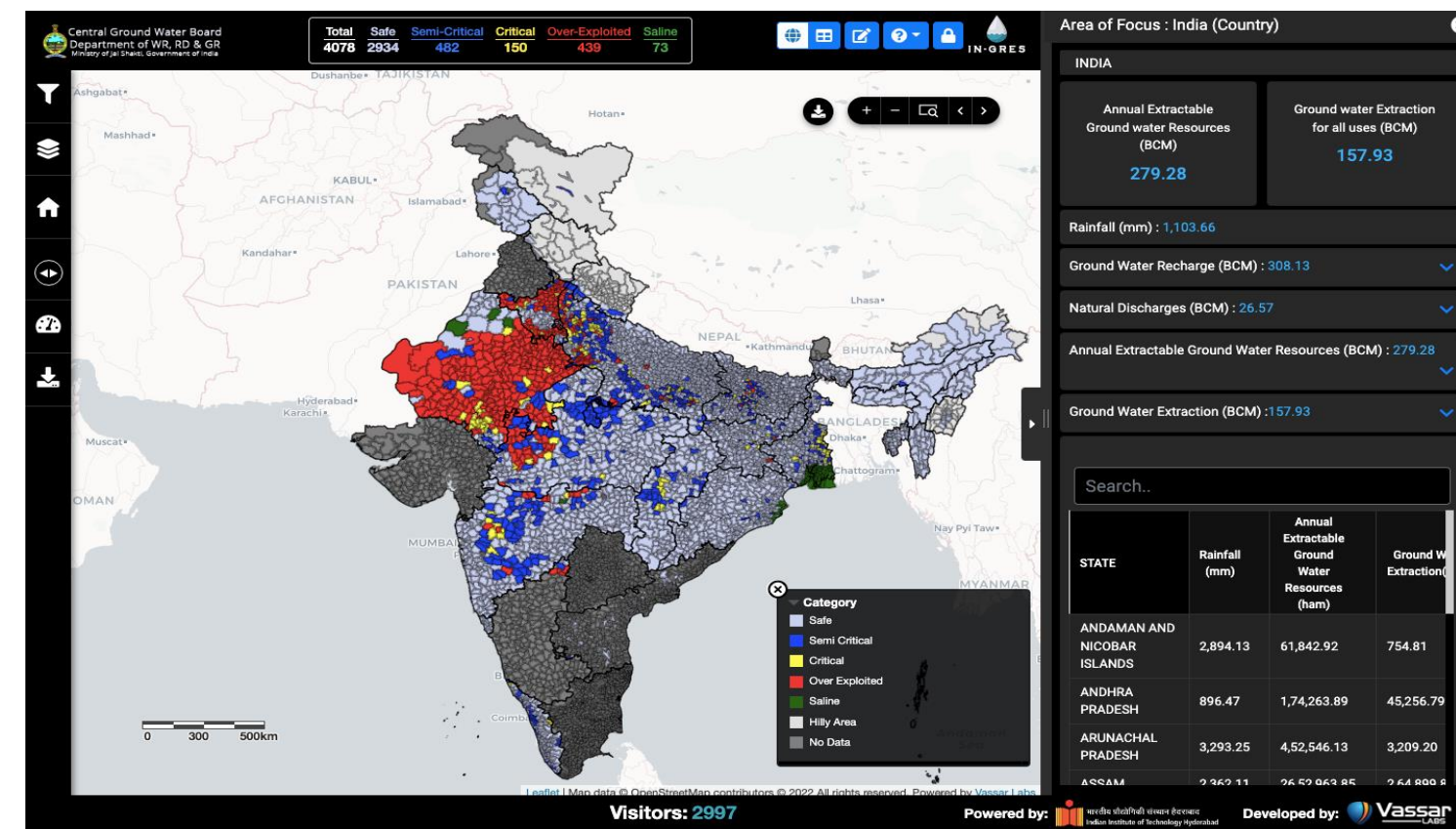


WATER



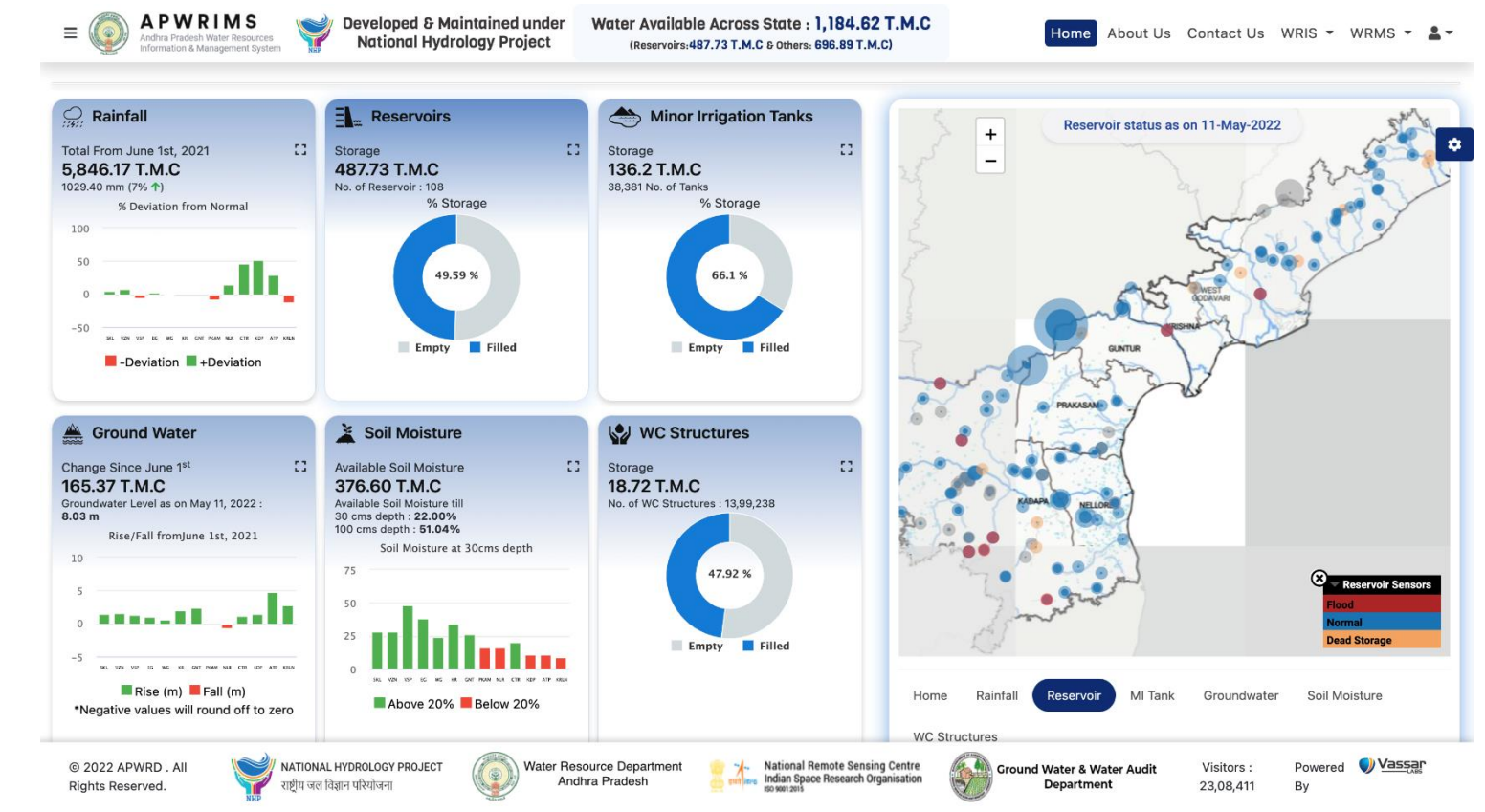
INDIA WRIS

Visualizing different water resource information at country level on a single window.



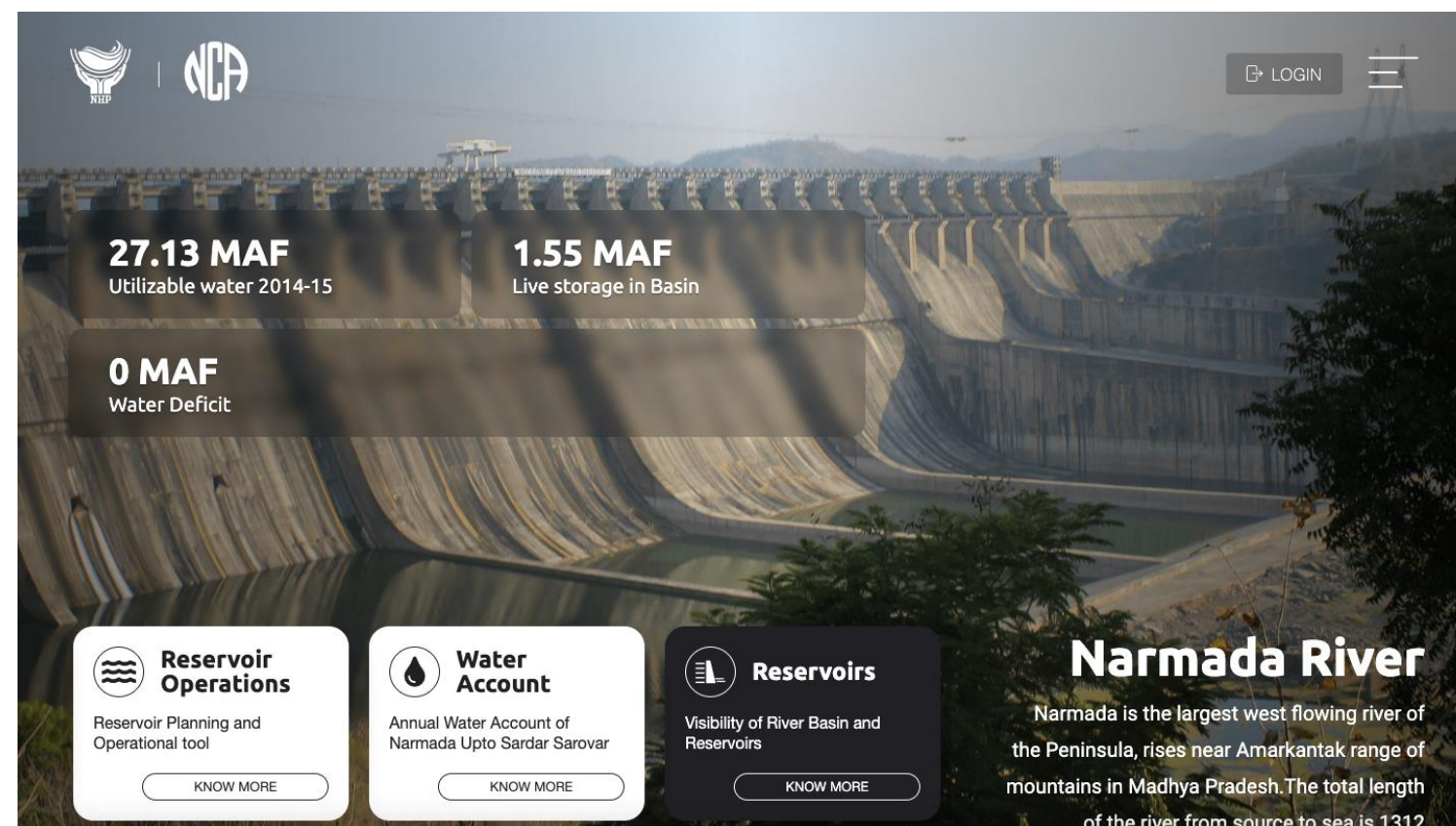
INDIA GEC

Automation of estimation of dynamic ground water resources, which include web-based application.



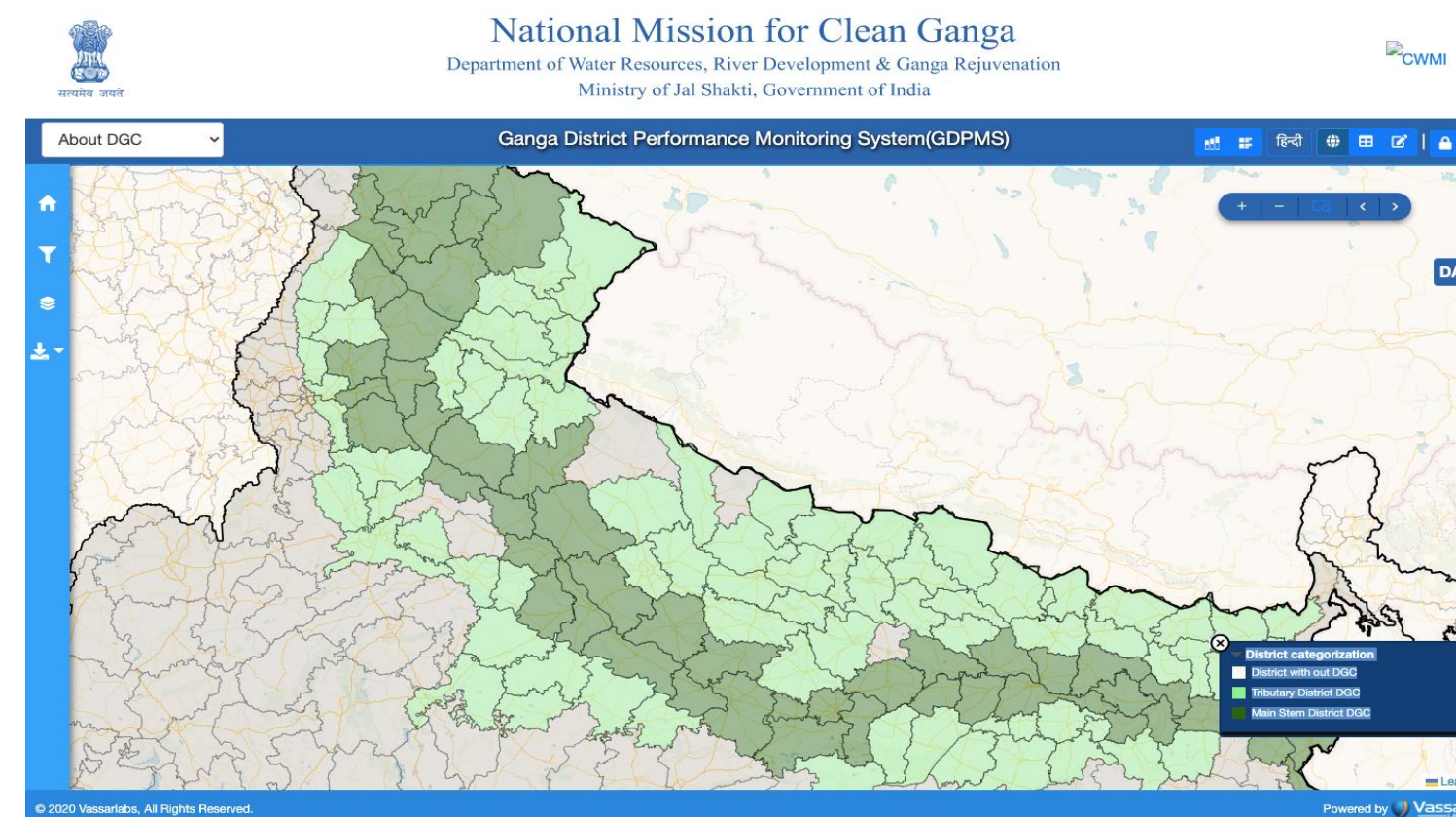
APWRIMS

An integrated water resource management system based on hydrological modeling to provide real time visibility on water resources.



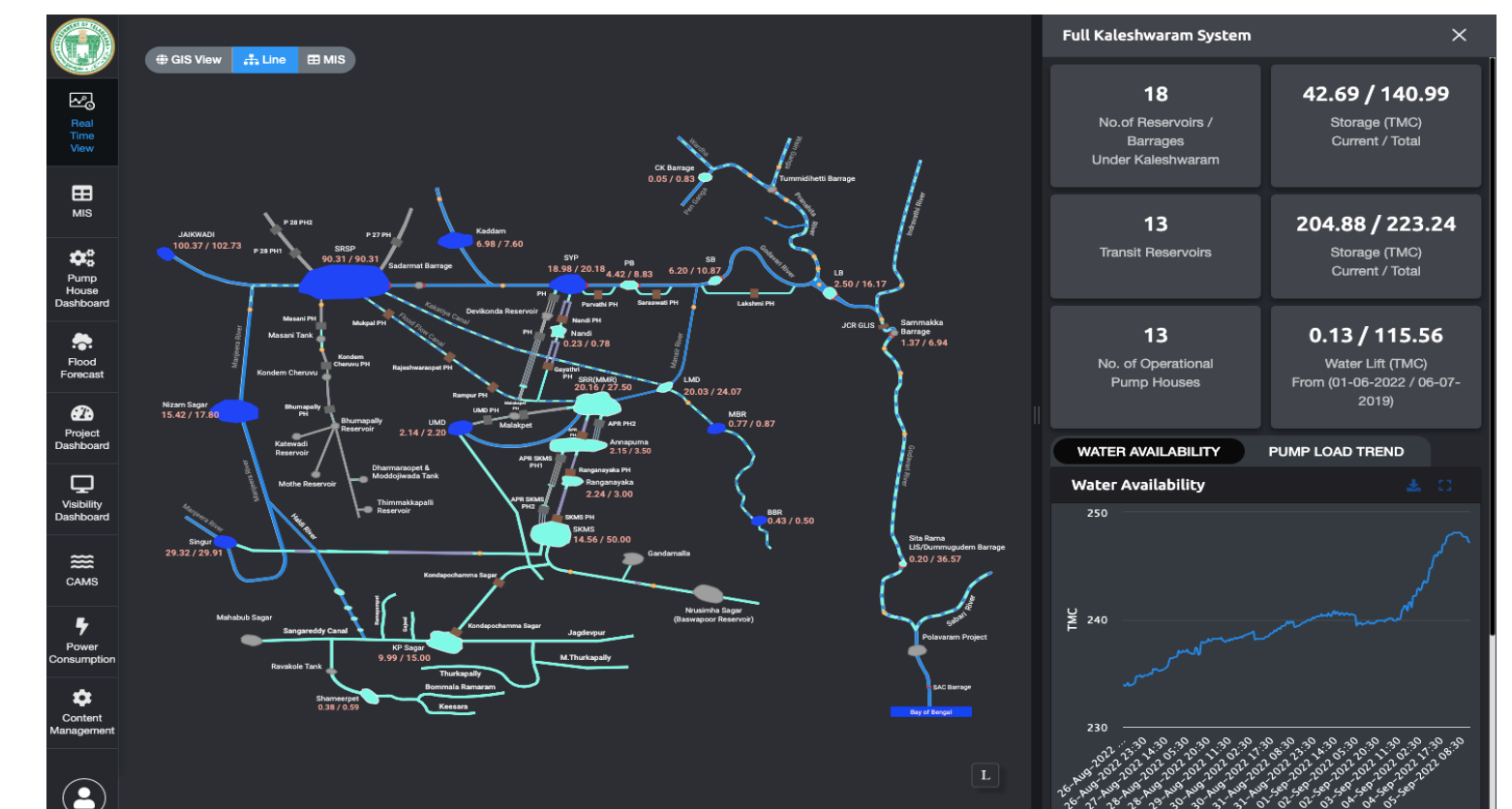
NARMADA CONTROL AUTHORITY

A water accounting model which can be used as both a planning and a low flow season operation.



GANGA DISTT PERFORMANCE

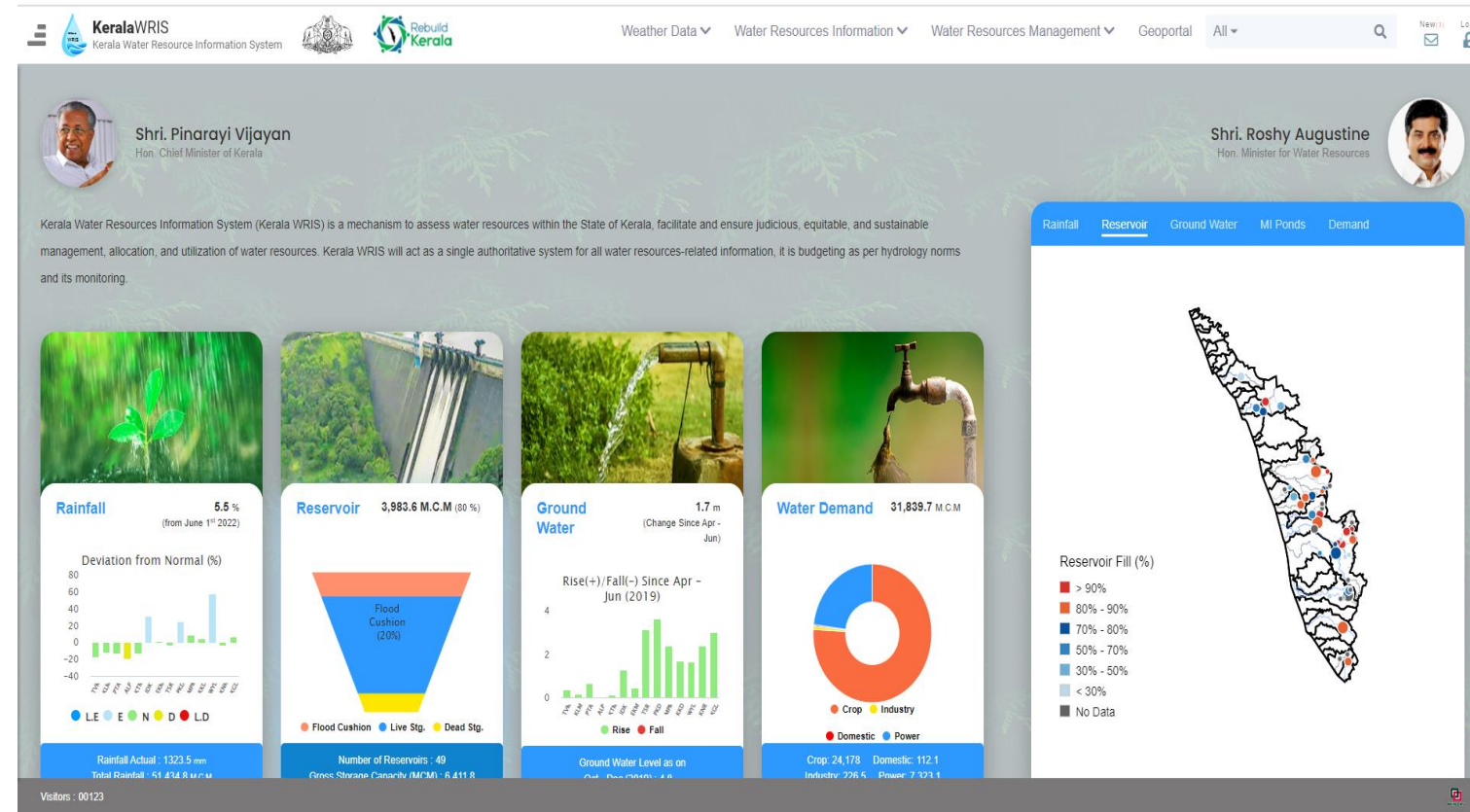
GDPMS will give the districts' ranking along with producing the GIS-MIS Reports



KLIP

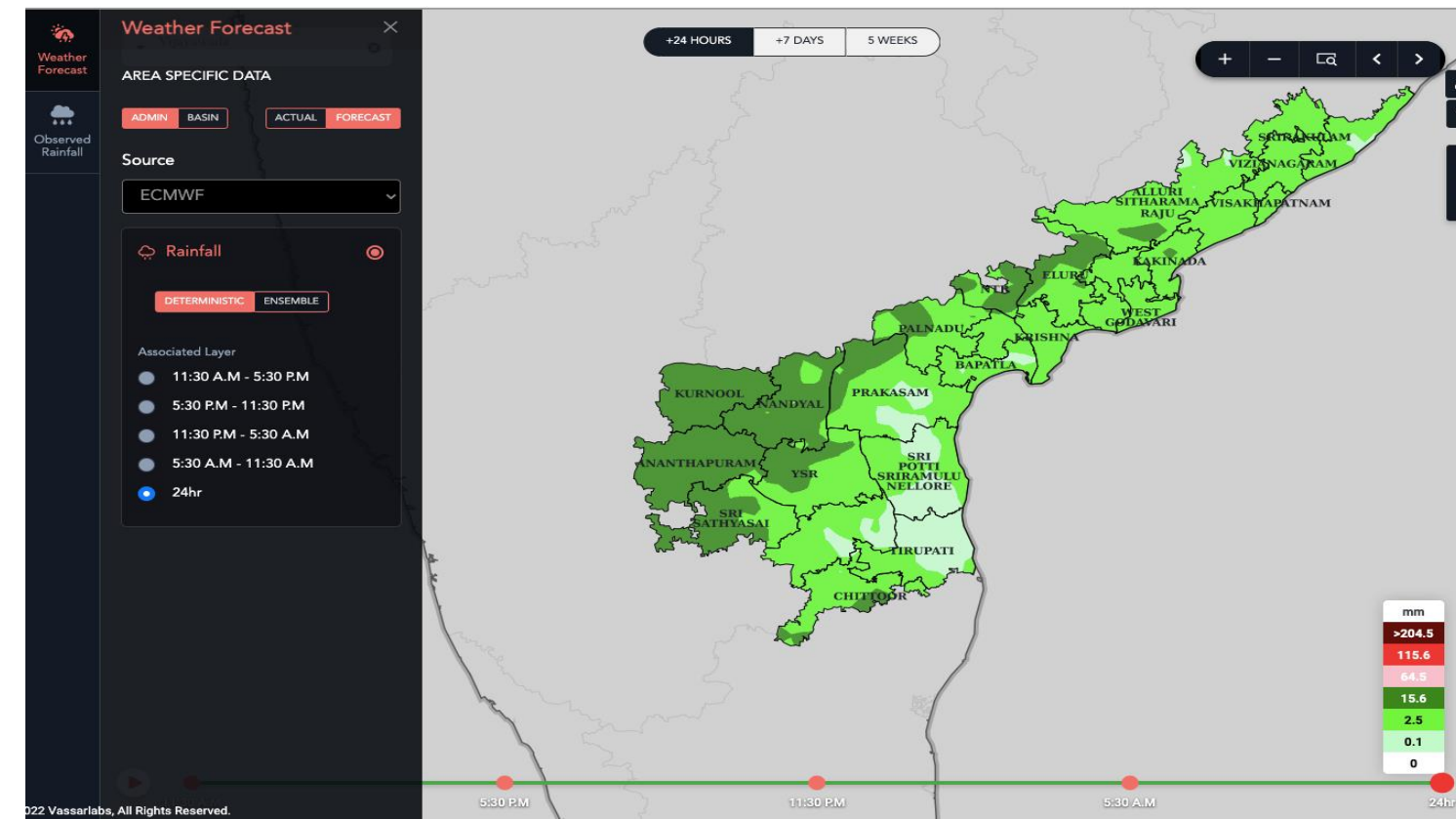
The system integrated near real time data leverages AI/ML module for planning lift operations.

WATER ...



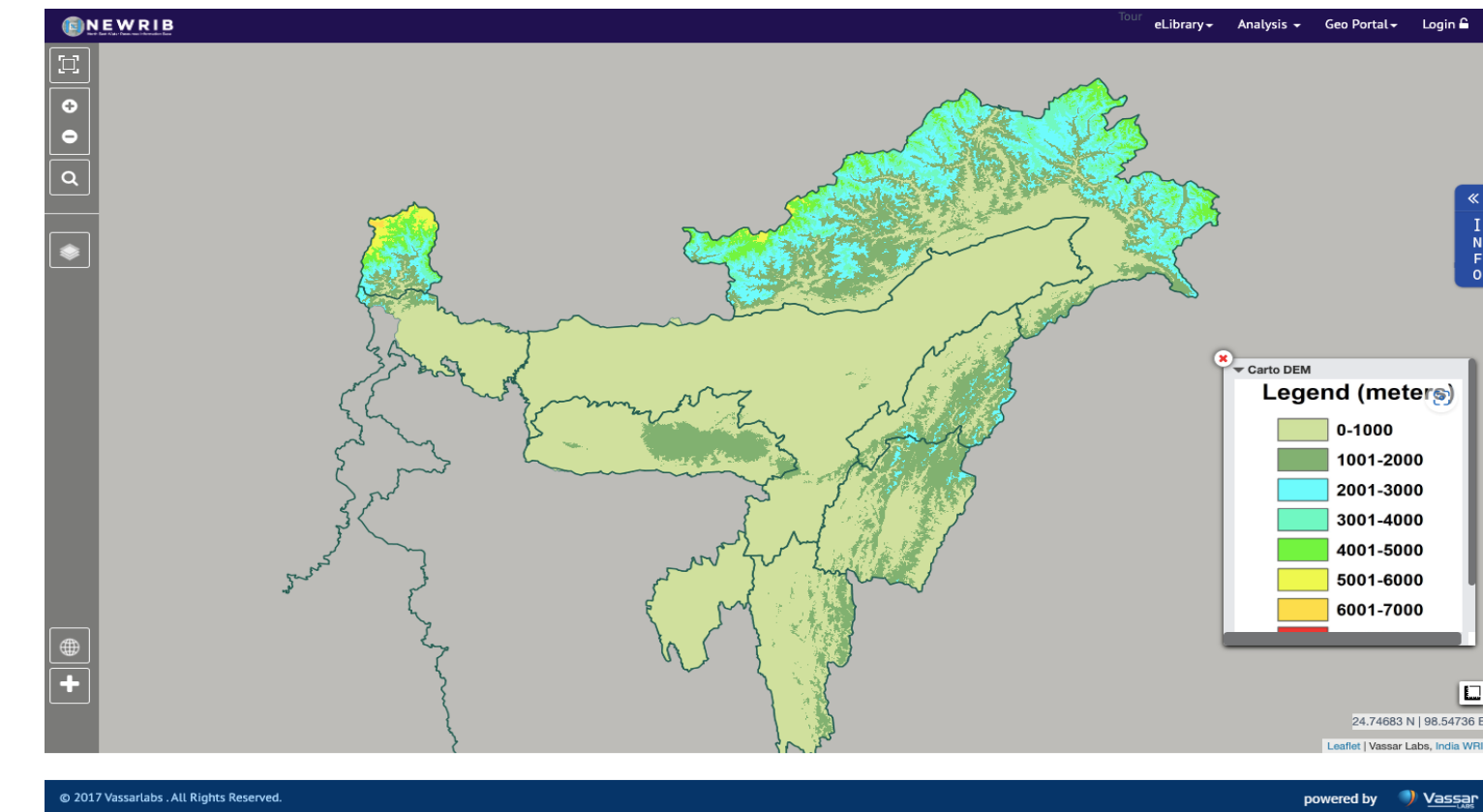
Kerala WRIS

Integrate all water resources information on an integrated platform, which can be used to make key decisions.



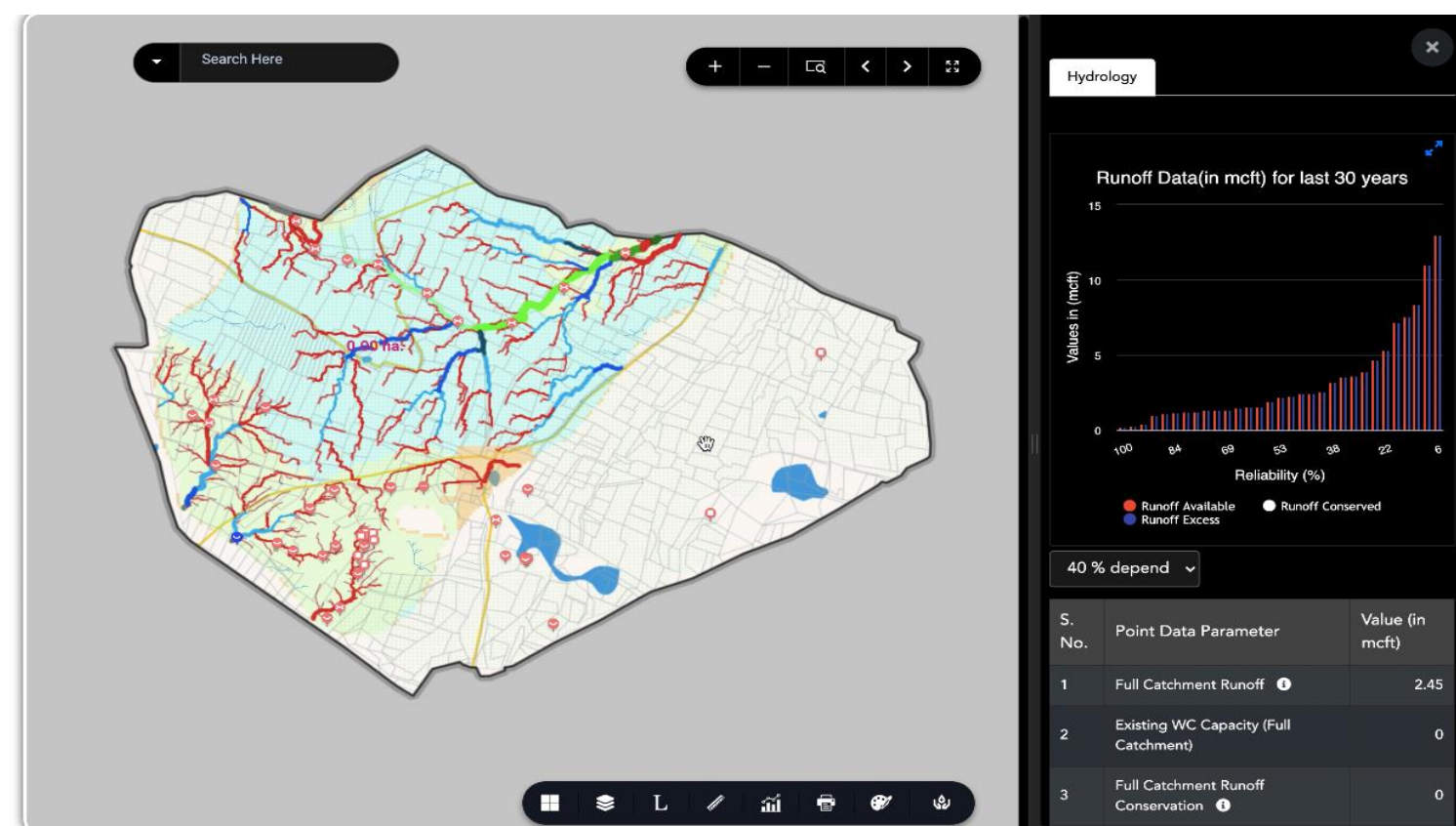
APPRRD

Integrated Water Shed Management system at gram panchayat level using ICT, GIS and smart phone solution.



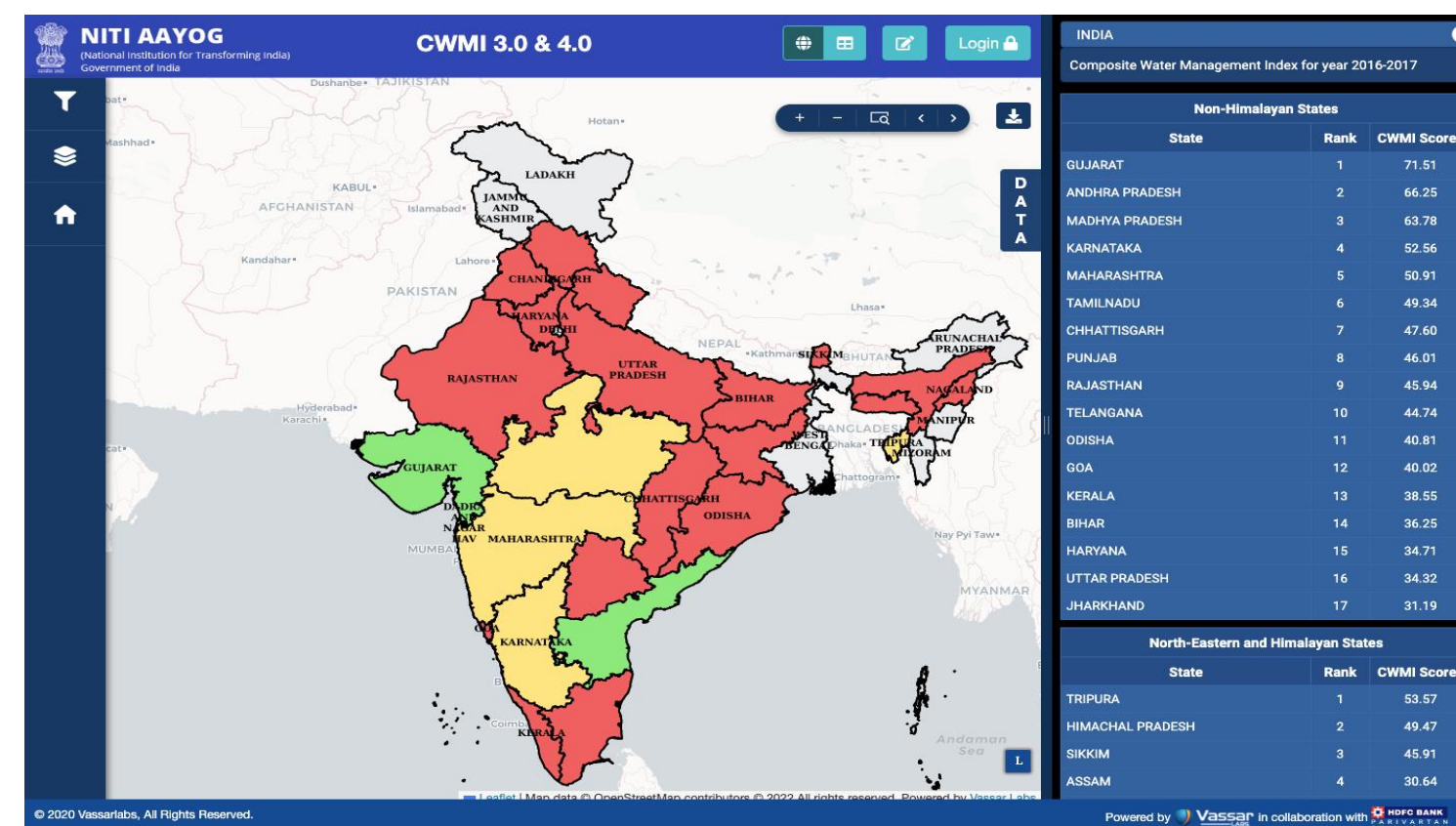
NEWRIB

GIS visualization of various static, spatial and temporal data related to water, along with various satellite-based layers added into it.



Watershed planning and Management

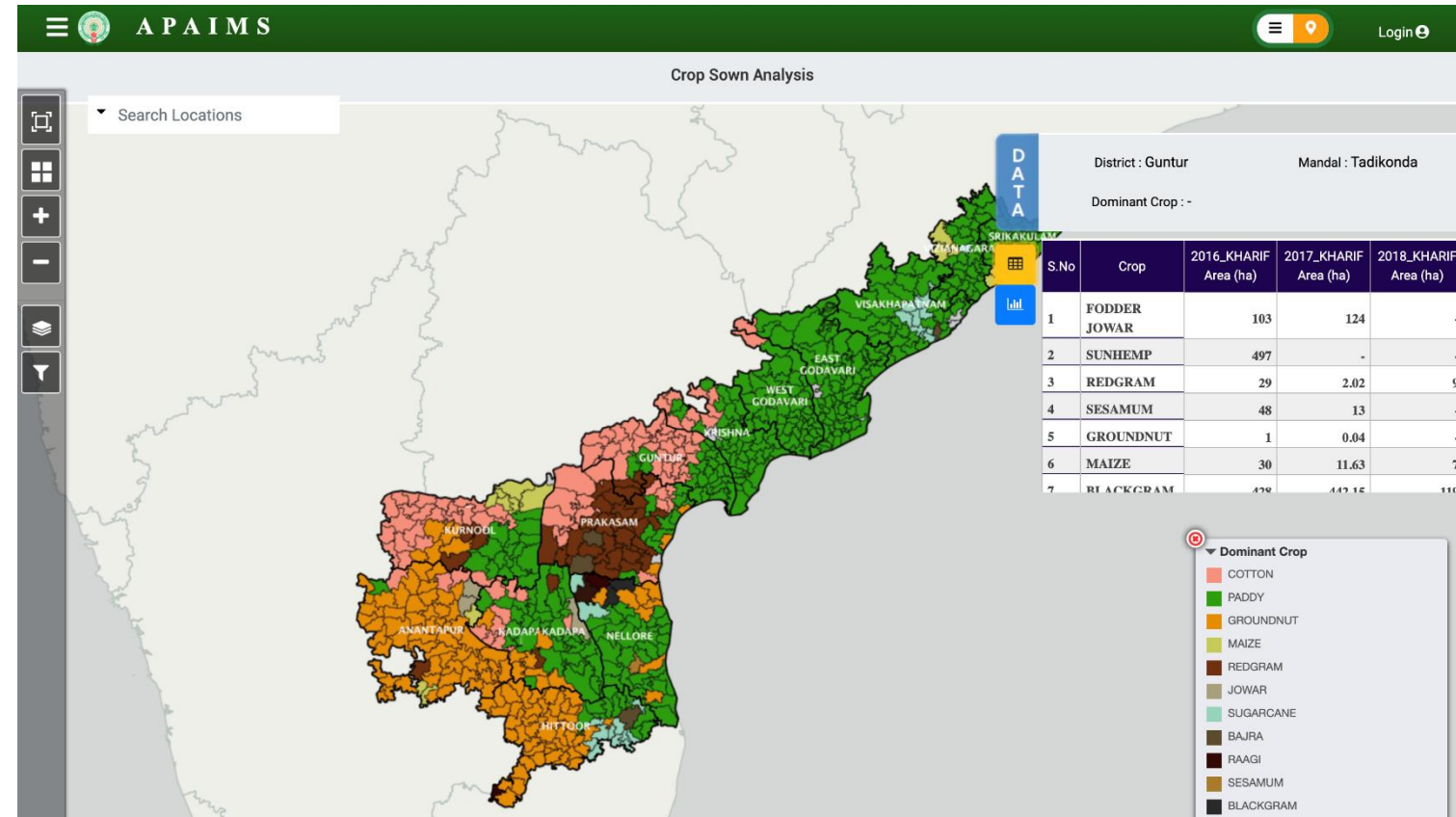
GIS based decision support system which streamlines processes of planning, prioritizing and sanctioning construction of water and soil.



CWMI 3.0

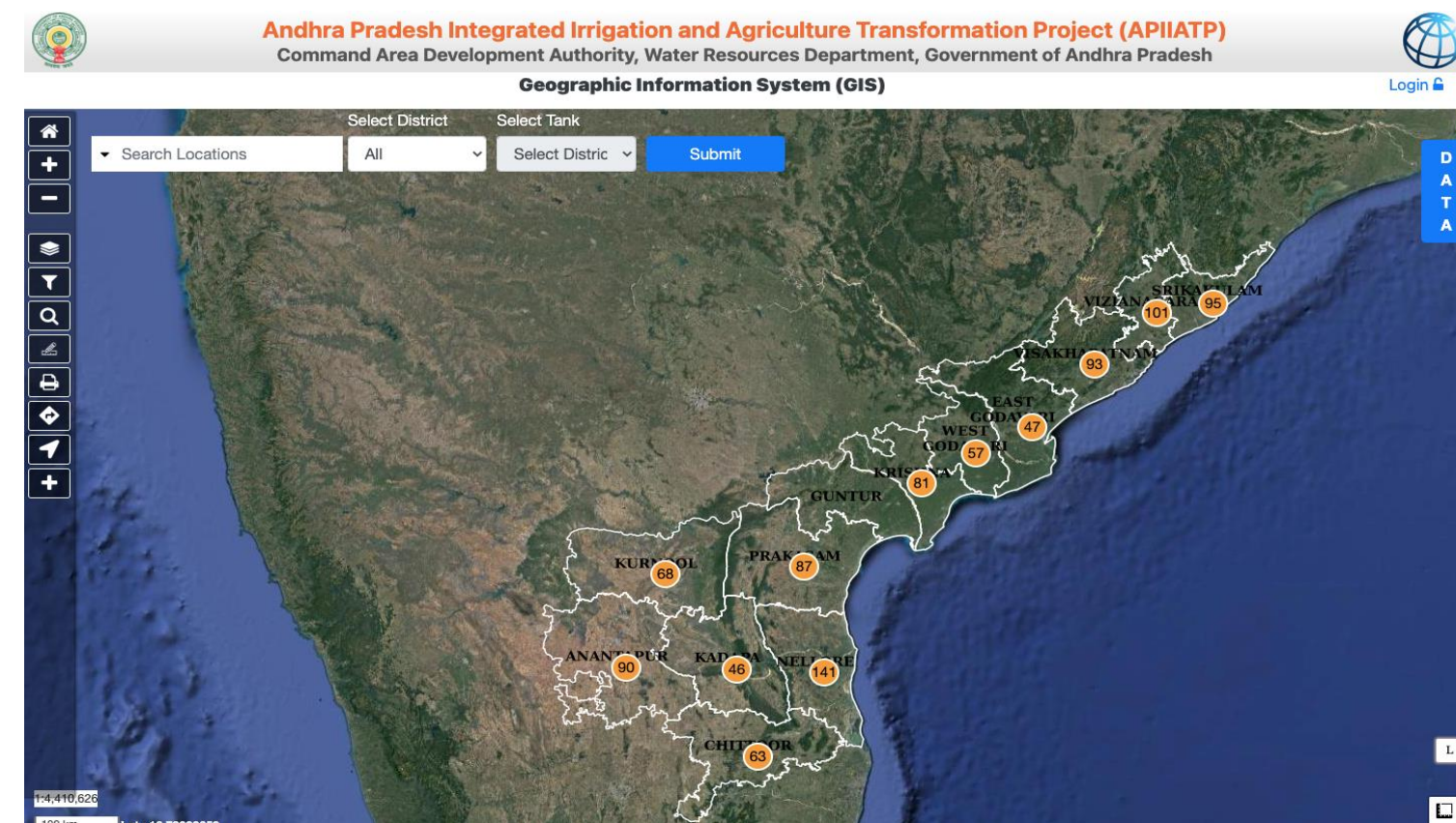
A system to ingest data from various sources and calculate the rankings, providing interactive reports in both GIS and MIS.

AGRICULTURE



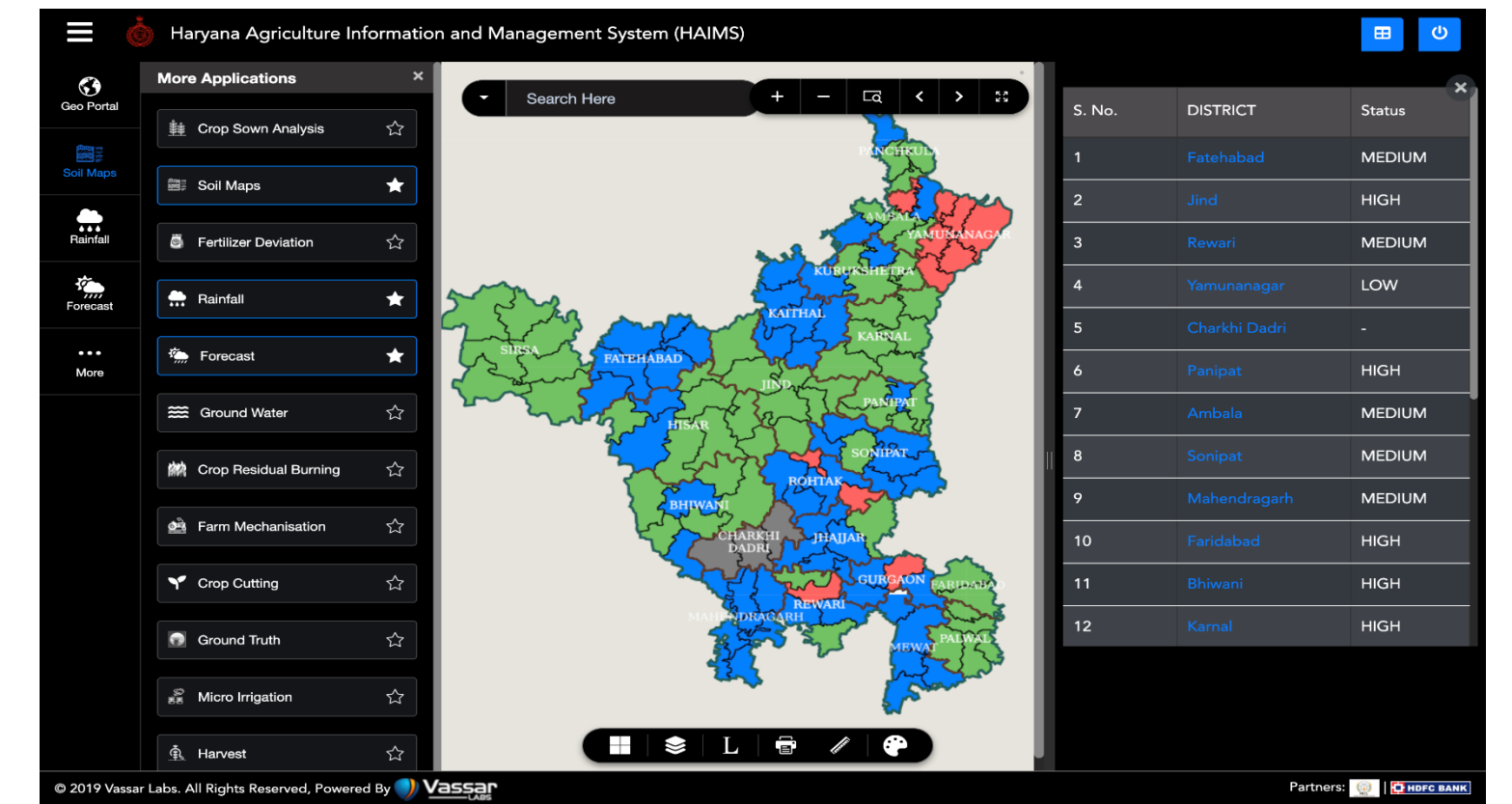
APAIMS

Comprehensive agriculture information and management system which eliminates silos and unifies the workflows.



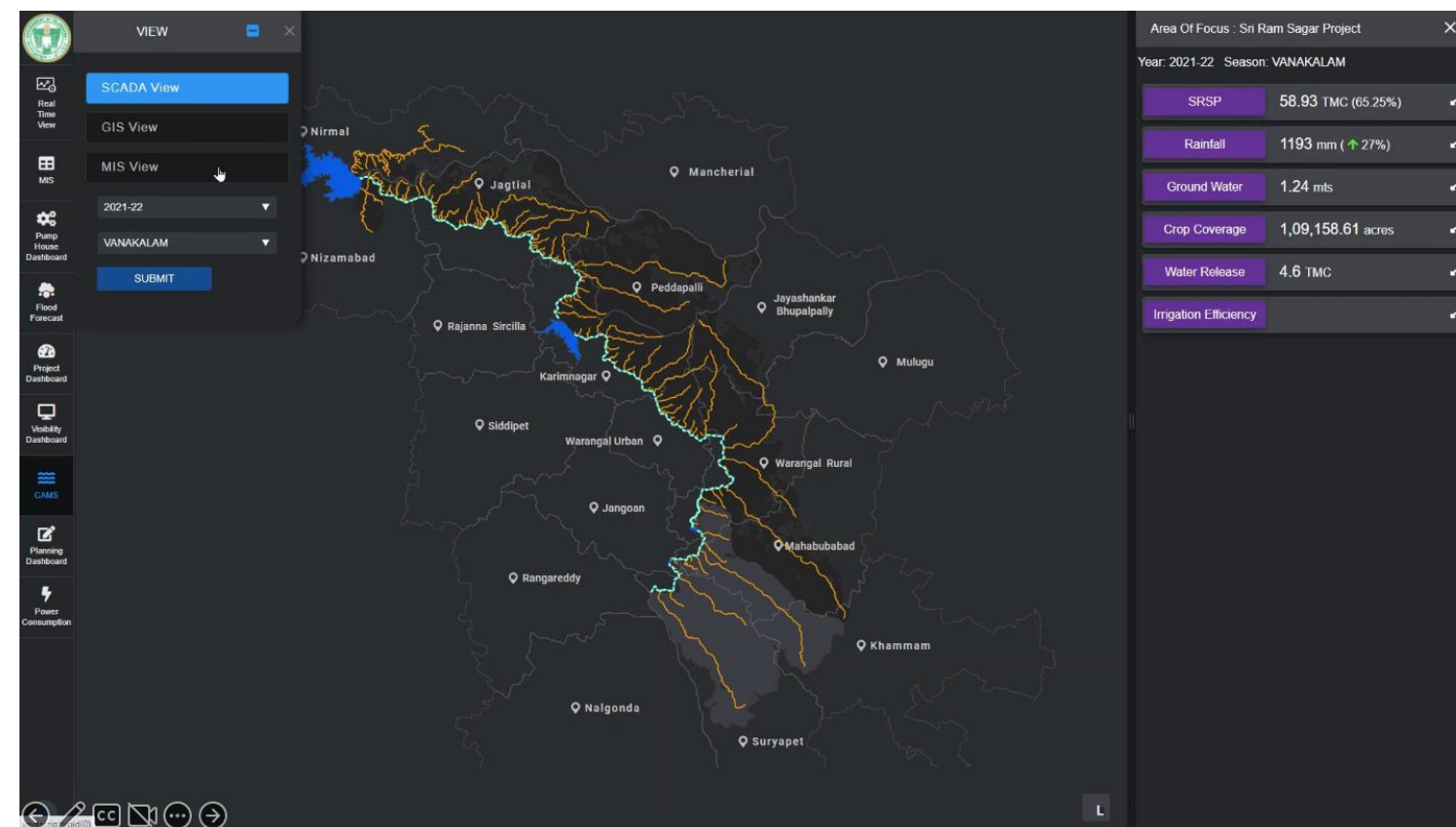
APIIATP

To collect and store data, monitor and track all the activities under APIIATP as per World Bank norms.



HAIMS

A Comprehensive Farmer Database, implementation of scientific crop planning and harvesting assessment.



CAMS

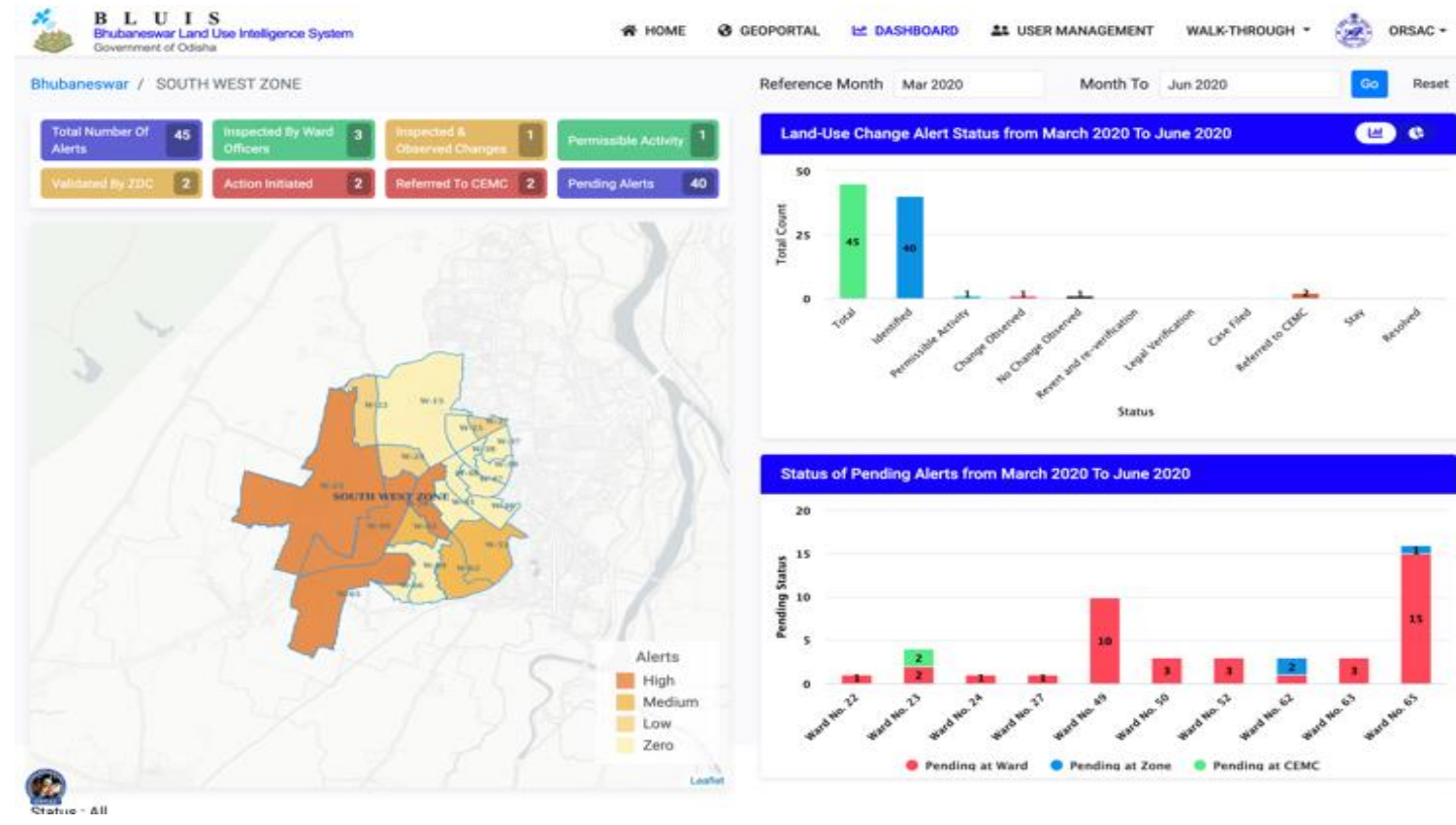
Visualize information at multiple canal hierarchy level in an interactive way.

SMART CITY



APDMA

Bringing together GIS data to provide property tax assessment and Improve municipal administration.



BLUIS

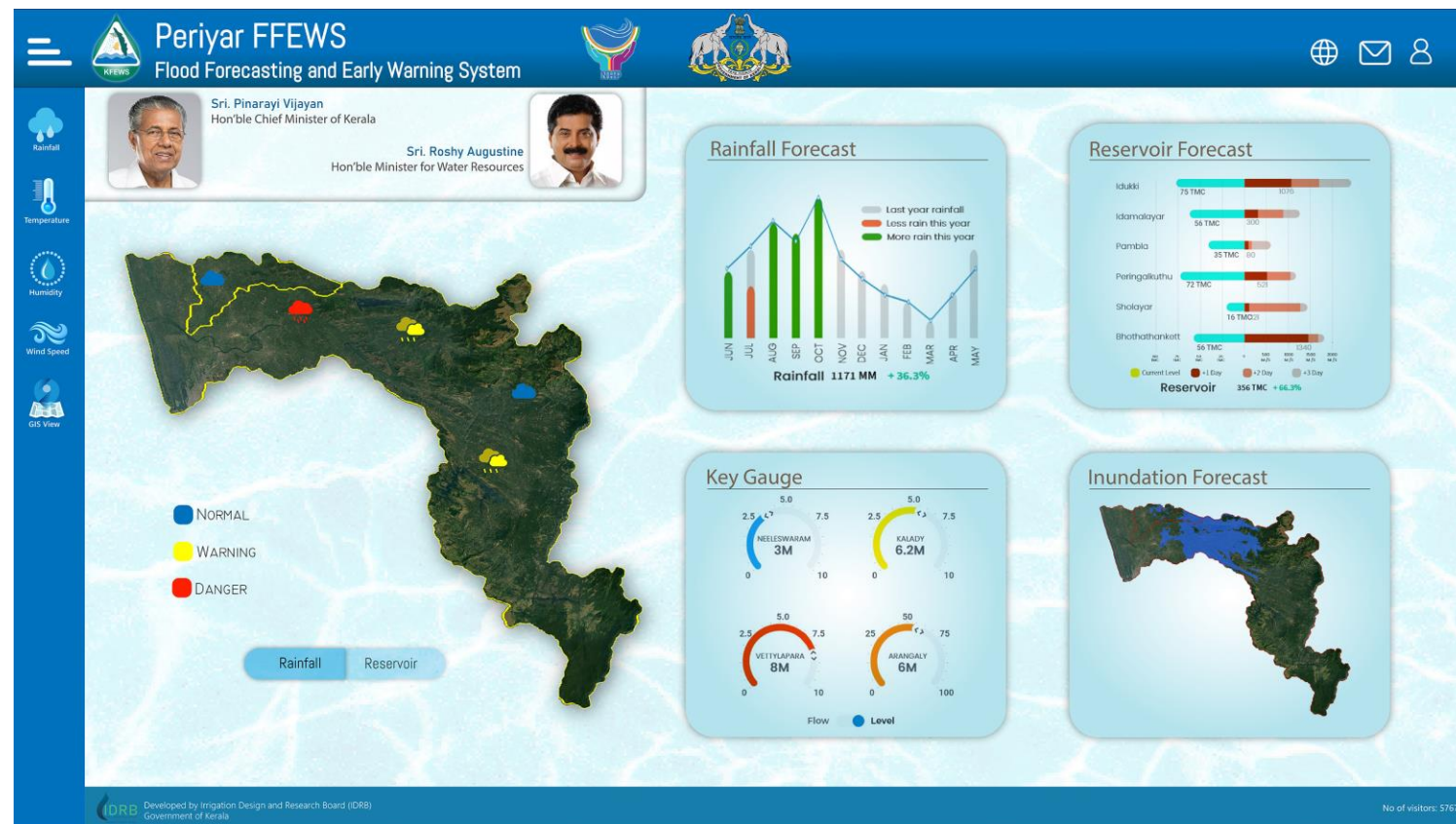
Authorized system developed using AI and ML for identifying encroachments on government lands and taking corrective actions



WB AMRUT

Near real-time monitoring of city infrastructures (like SWM, greenspace, etc.) for smarter governance

DISASTER



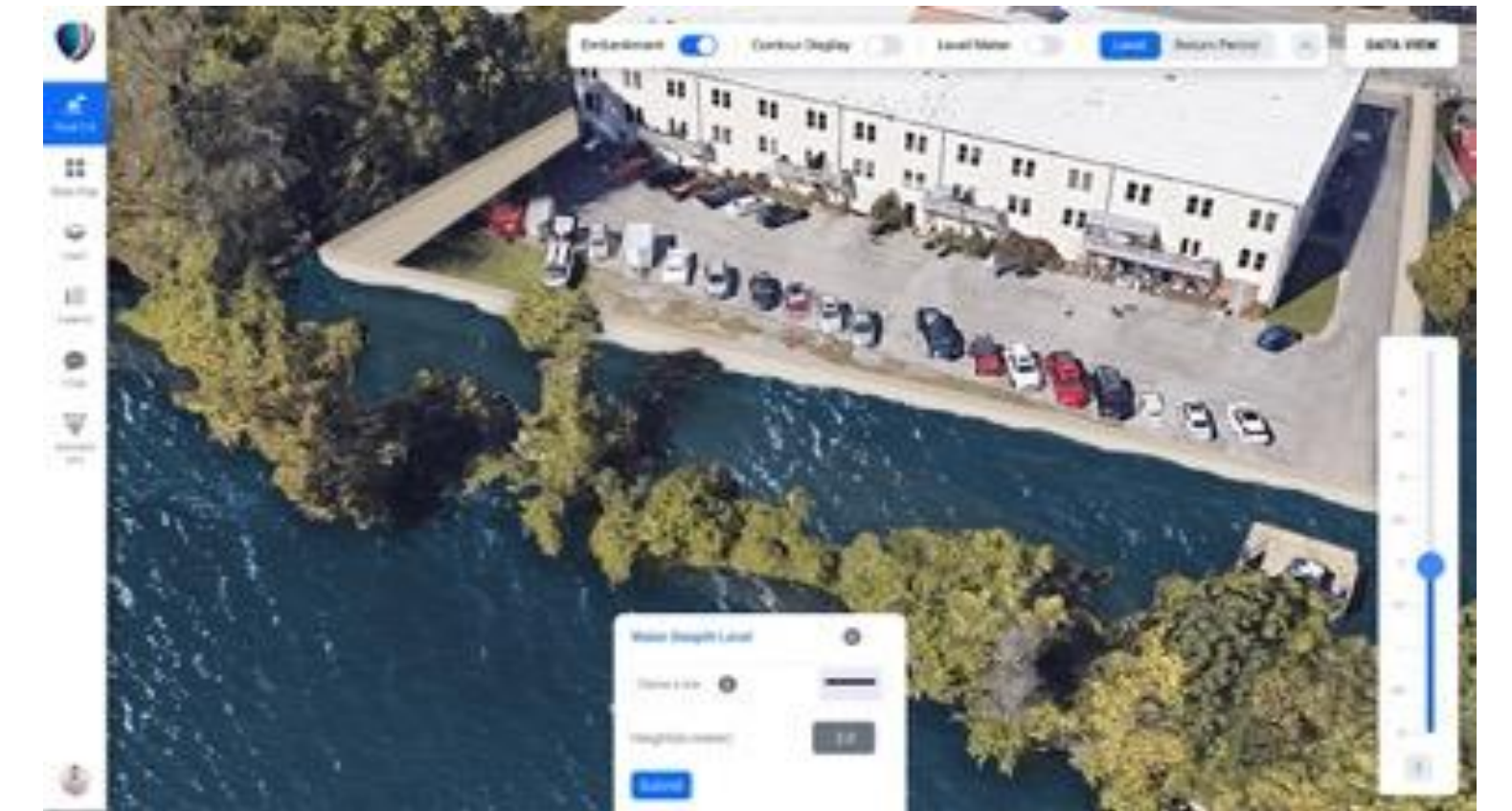
KFEWS

A comprehensive platform that generates flow forecasts and resulting inundation at various control locations identified across the Periyar river basin.



APDIMS

Data Integration with weather forecast systems, becomes available to create extreme weather dashboard and generate automatic advisories.



FLOOD RISK MANAGEMENT

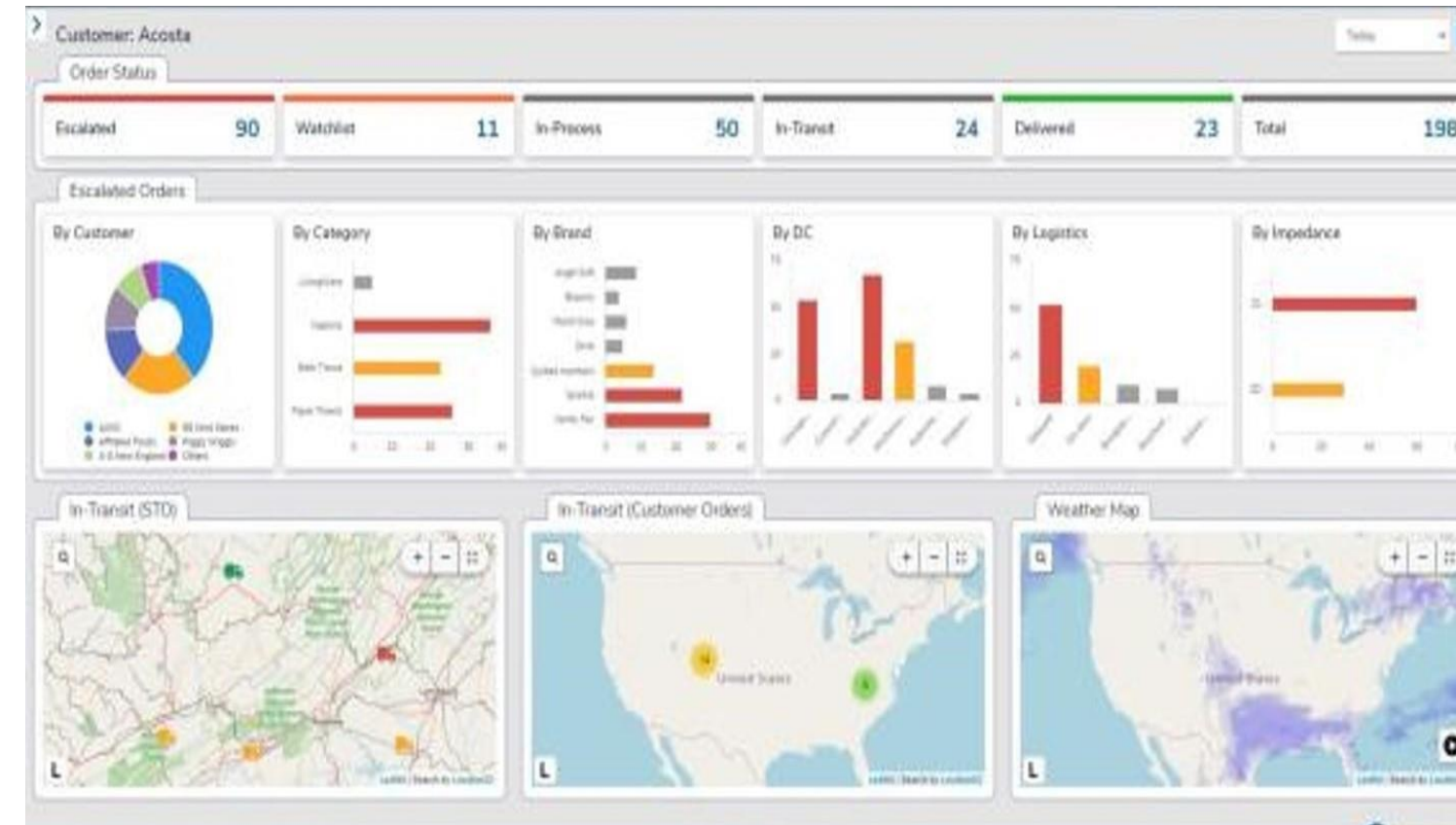
Web based flood risk information, visualization and management platform with what if scenarios, and collaborations on flood protection measures

DIGITAL TRANSFORMATION



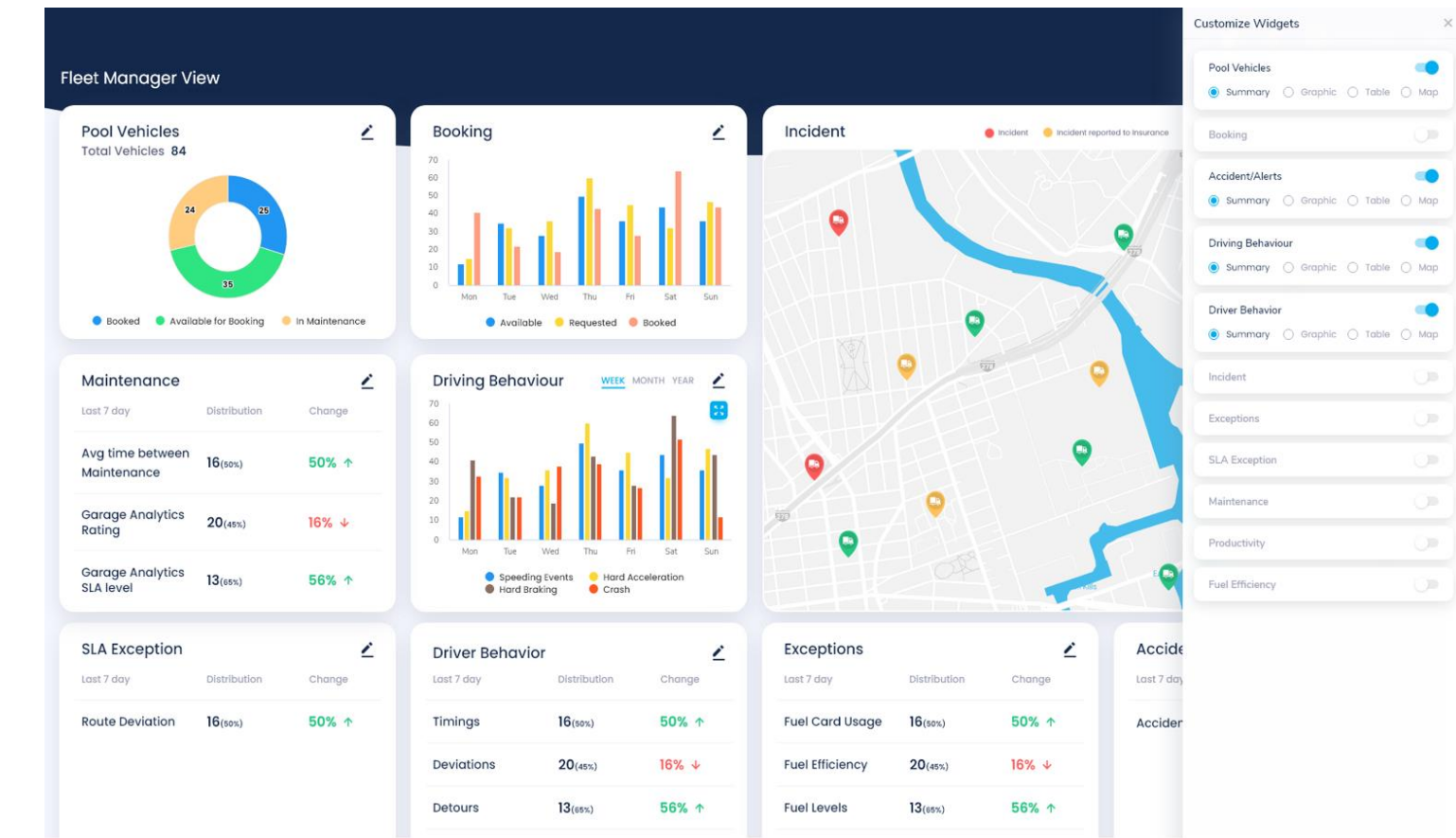
OIL & GAS SERVICES

A real-time solution based on synthesizing IoT data and building AI/ML models that provides insights on different assets.



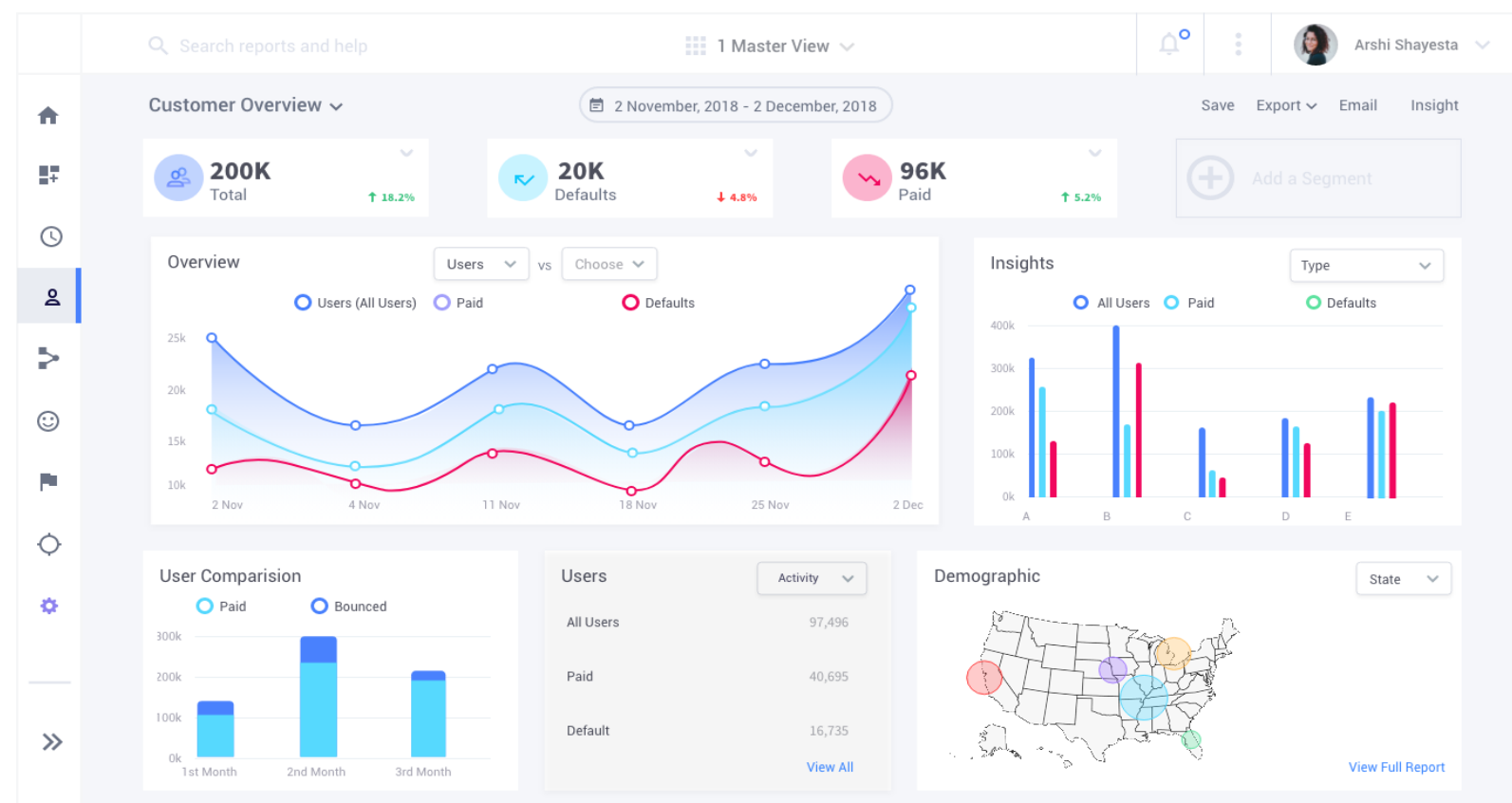
PULP & PAPER CLIENT (F500)

AI-based order fulfillment built on the capabilities of Augmented Customer Experience maximized fulfillment of KPIs.



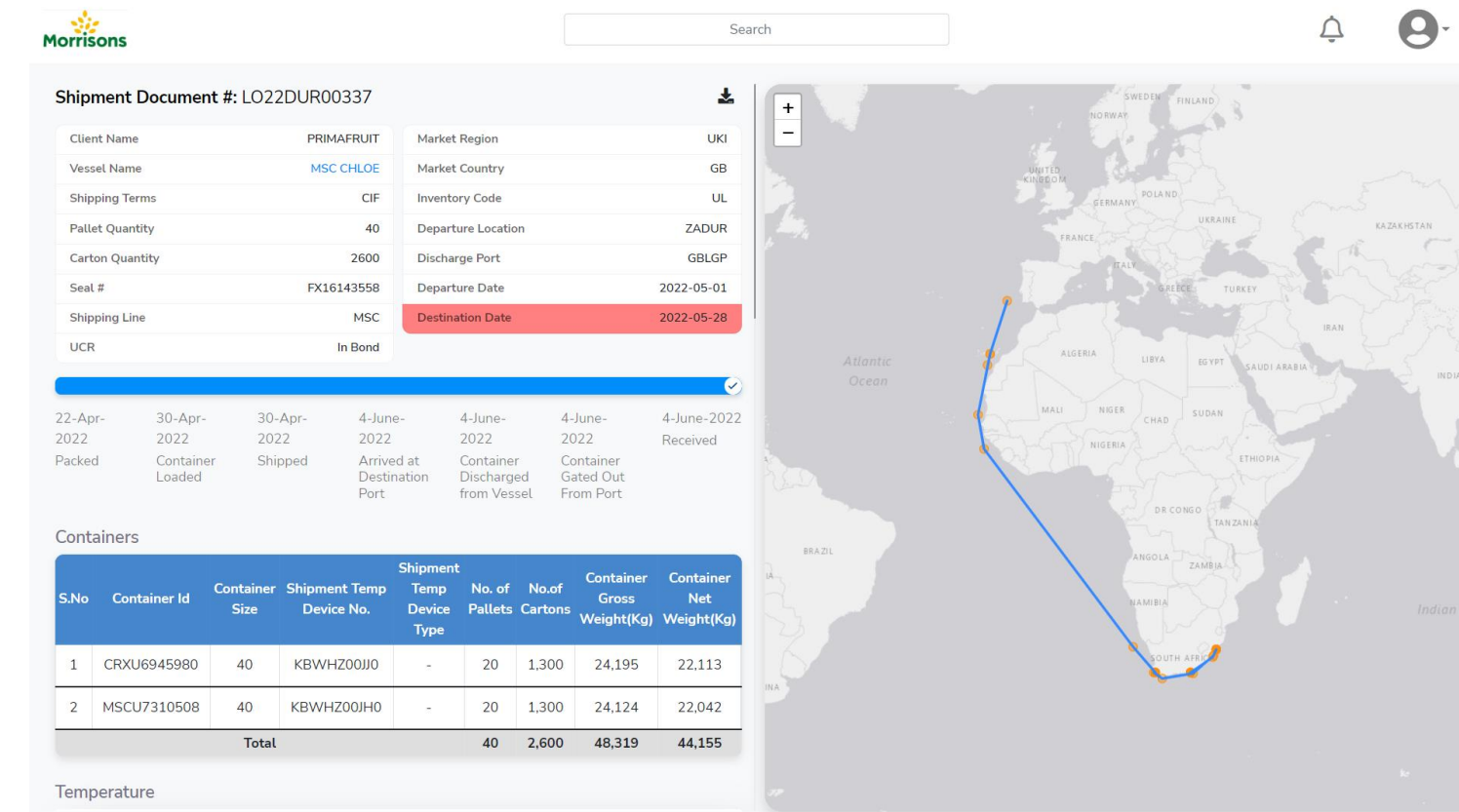
LOGISTICS CLIENT (EU)

Built a platform solution leveraging on-board IoT devices and digitized end-to-end fleet operations which improved utilization rate.



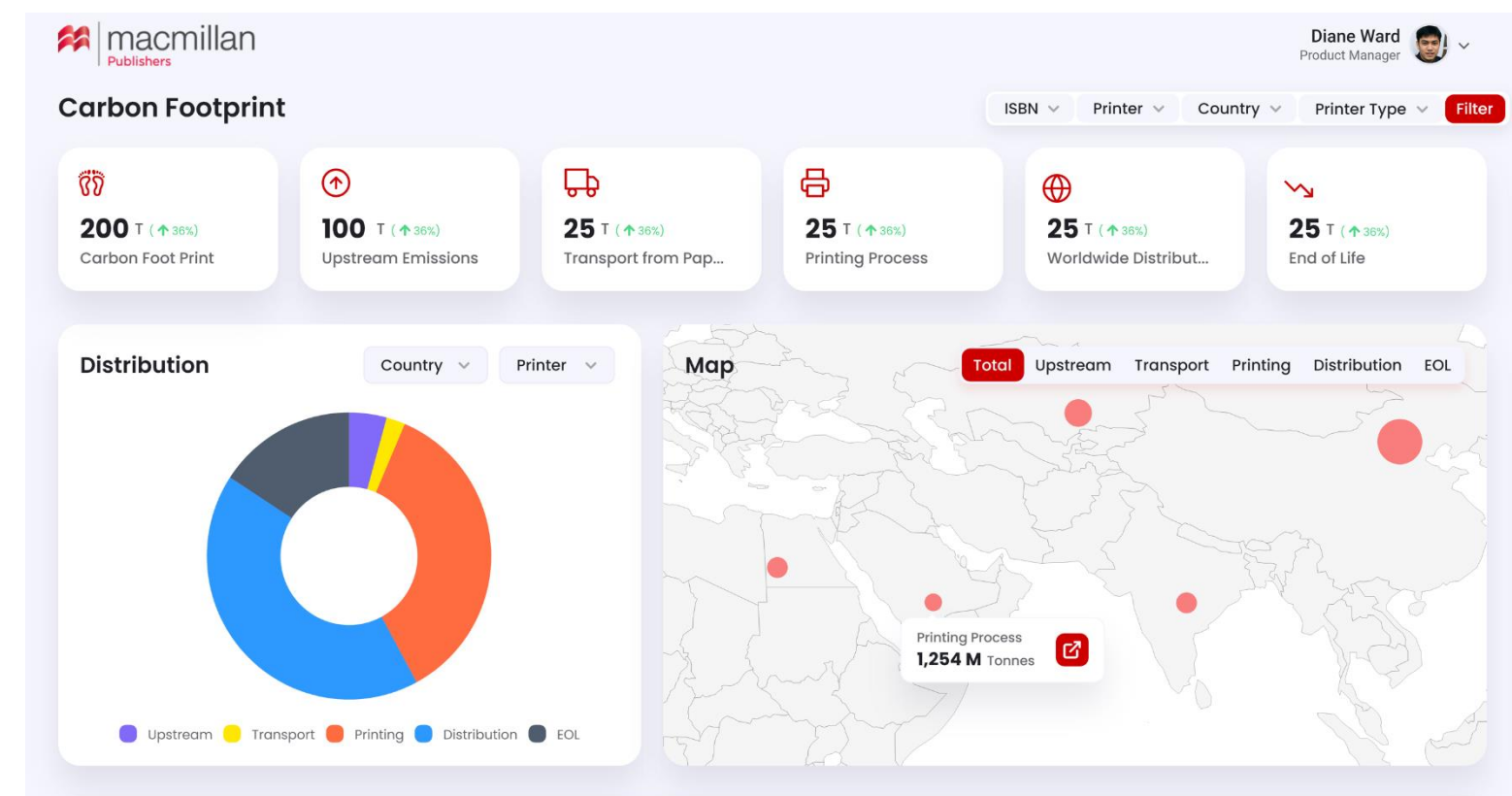
TELECOMMUNICATION CLIENT

Developed a solution that clustered customer personas based on AI algorithms and recommended customer engagement mechanisms.



LOGISTICS SERVICES CLIENT

Developed a product passport that automated recording the compliance process and provided a unified tracking mechanism of goods.



MACMILLAN

The platform tracks the amount of paper being used across distribution channels and its quality.

aquaWISE™ PLATFORM

DATA COLLECTION

- Field Sensors
- Satellite & GIS
- Drone Surveys
- Predictive Models
- Experimental Data
- API Integrations
- Mobile App Survey
- Existing Databases
- PLC & SCADA Integration

INDEX

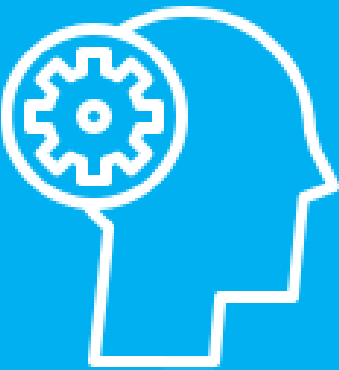
- Reservoirs
- MI Tanks
- Ground Water
- Soil & Moisture
- Rainfall
- Rivers & Canal
- Forecast
- Losses
- Crop Planning
- Industrial
- Residential
- Soil Type
- Forests
- Wetlands
- Sewage
- Flora & Fauna
- Pollution
- Distribution

NEAR REAL-TIME DIGITAL TWIN

CENTRAL COMMAND & CONTROL CENTER

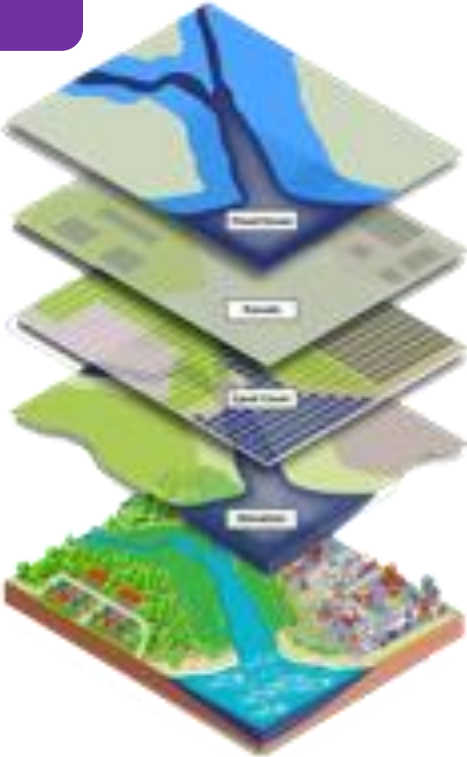
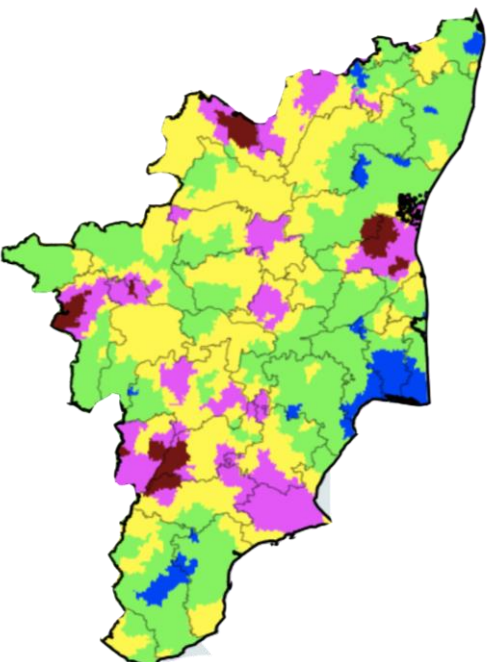
ASSET MONITORING WITH PREVENTIVE AND PREDICTIVE MAINTAINANCE

AI MODELS



- WATER BUDGET & AUDIT
- WATER CONSERVATION MGMT
- GROUNDWATER MANAGEMENT
- RESERVOIRS & CANALS
- WATER DISTRIBUTION
- MI TANK MONITORING
- INTERBASIN TRANSFER

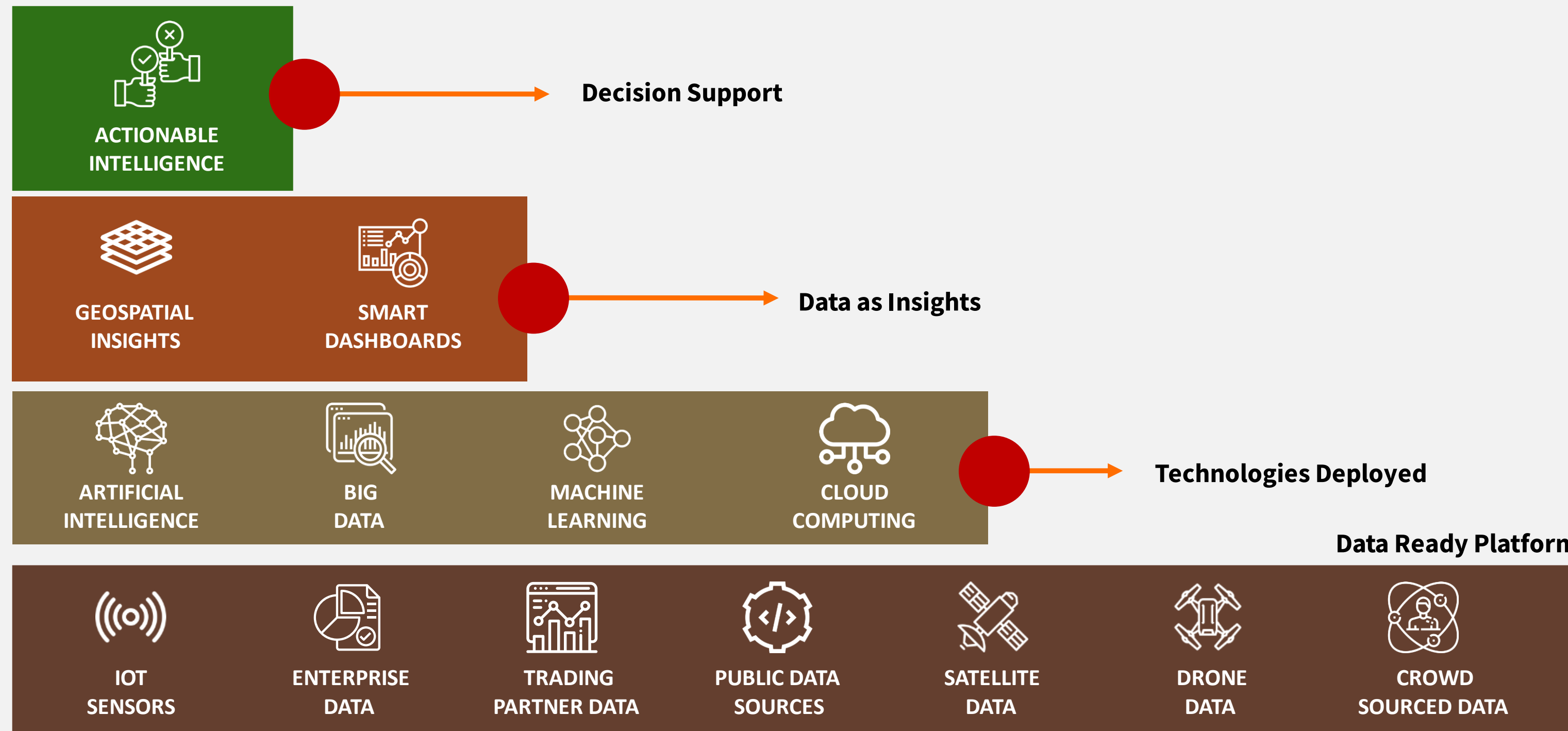
- AGRO-CLIMATIC ZONES
- AGRI ADVISORIES
- HYDROPOWER
- FLOOD & DROUGHT
- CASCADE OF MI TANKS
- LIFT SCHEME OPTIMIZATION
- WATER USE EFFICIENCY



Water ERP Geoportal

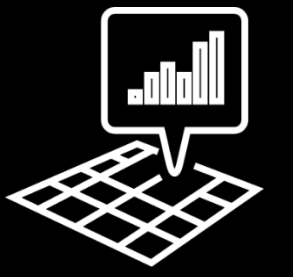
WISE™ PLATFORM

Enabling Digital Transformation

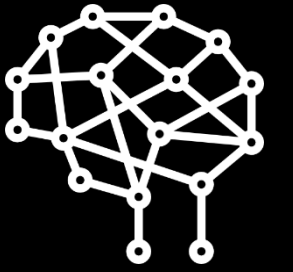


Center of Excellence >

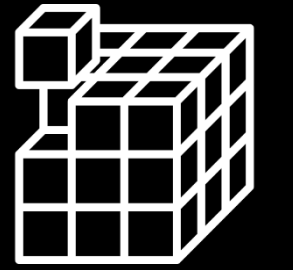
- ✓ Enable high performing business processes through actionable intelligence
- ✓ User centric smart dashboards that provide multi level business insights
- ✓ Deep expertise in the application of data science and big data modelling
- ✓ Able to ingest data from different sensors, machine and business systems



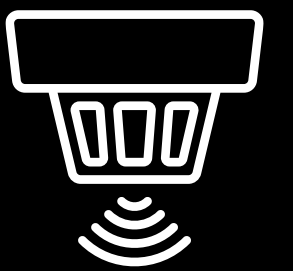
GEOSPATIAL DSS



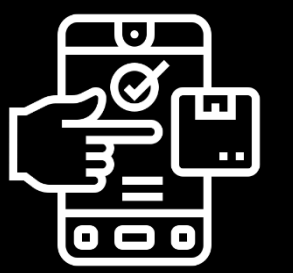
AI & ML MODELLING



BIG DATA SOLUTIONS



IOT SYSTEMS



MOBILITY SOLUTIONS

—• COMPLETED •—

THANKS FOR WATCHING

Lets Discuss Way Forward



amit@vassarlabs.com