

This is not an ADB material. The views expressed in this document are the views of the author/s and/or their organizations and do not necessarily reflect the views or policies of the Asian Development Bank, or its Board of Governors, or the governments they represent. ADB does not guarantee the accuracy and/or completeness of the material's contents, and accepts no responsibility for any direct or indirect consequence of their use or reliance, whether wholly or partially. Please feel free to contact the authors directly should you have queries.

Asia Water Forum 2022

8–11 August 2022 • Online

Focus Area: 3. Productive Water in Agriculture and the Economy

Session Title: 3A. Enhancing the Economic value of Water

Schedule: 09 August 2022 (Tuesday) | 11.00 AM (GMT+08)

MADHYA PRADESH IRRIGATION EFFICIENCY IMPROVEMENT PROJECT
SMART & PRECISION IRRIGATION SYSTEM
FOR KUNDALIA LEFT & RIGHT BANK IRRIGATION SCHEME
WATER RESOURCES DEPARTMENT



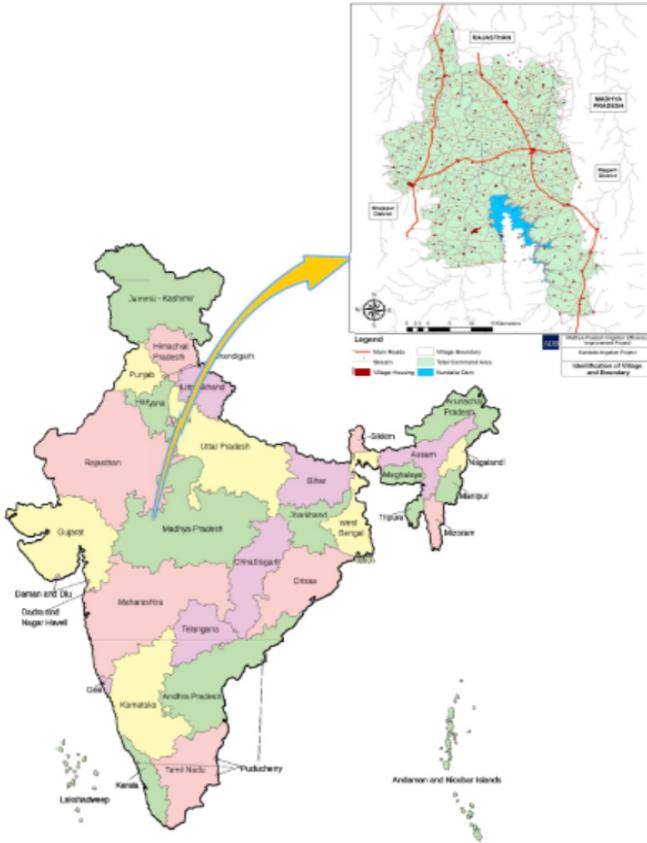
A K UPMANYU



ADB



About



EMPLOYER

FINANCER

CONTRACTOR

TECHNOLOGY

Location of Project:

**Rajgarh and Agar Malwa Districts
Madhya Pradesh, India**

Source of water:

Kundalia Dam across the Kalisindh River

Cultivable Command Area (CCA)

130,639 Ha

(LBC - 63,548 Ha + RBC- 67,091 Ha)

Beneficiary Villages

354 (LBC 146 Nos. and RBC 208 Nos.)





Increasing the Economic Value of Water

- **Leverage private sector expertise**
 - **Design-Build-Operate modality**
 - **Expert domain sub-contractor/ suppliers viz. SCADA, Automation & DSS, Pumps, Agriculture**
- **Improve water use efficiency**
 - **Buried piped network upto field (1 ha)**
 - **Measured supply**
- **Improve irrigation supply service**
 - **Minimum 20 mwc residual head at field i.e. micro-irrigation-ready**
 - **Pressure and flow controls at chak/sub-chak/field levels**
- **Improve water quality**
 - **Pre-filtration at pump-station (200 microns)**
 - **Secondary filtration at OMS/ 30 ha (150 micron)**
- **Improve energy use efficiency**
 - **Centralized pumping (1.5 to 2 times efficient than decentralized)**
 - **Provision of VFD, SCADA based pump operations etc.**





Performance Guarantees

- **General Performance (0.45 l/s/ha discharge, min. 20 mwc pressure at outlets etc.)**
- **Maximum leakage (1%)**
- **Max. power requirement (30 MW LBC & 40 MW RBC)**
- **SCADA requirements (Pressure and Discharge measurements with accuracy 99%)**
- **Max Electricity Consumption (per cum of water pumped, 0.25 kWhr/m³ LBC, 0.35 kWhr/m³ RBC)**
- **Guaranteed Plant Availability (not less than 98%)**
- **Implementation of High Performance Irrigation (During operations period)**



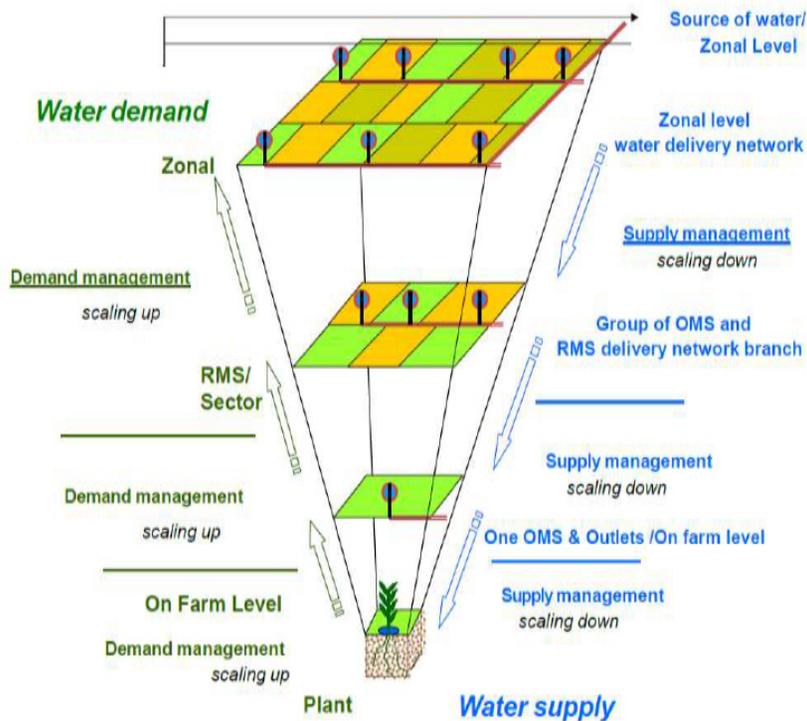
Implementation & Operations Support

- **Farmer Field Schools (FFS) in 1% of the irrigated area**
- **Establishing Farmer Support Centers (FSC)**
- **Facilitate the quick adoption of micro irrigation**
- **Participatory multi-faceted farmers' training**
- **Collaborating with Krishi Vigyan Kendra (KVK)**
- **Demonstrations and field trials**
(e.g., irrigation scheduling, new seed varieties, disease control methods, etc.)
arranged in coordination with the FFS groups
- **Assistance with the identification and establishment of contacts with potential external service providers such as research stations, farm input suppliers and agro-processing companies**
- **Support farmers in obtaining grants/loans from financing institutions/programs for financing micro-irrigation equipment**





Decision Support System (DSS) Framework



- A Decision Support System (DSS) is an interactive software-based system
- Help decision-makers compile useful information from a combination of raw data, documents and personal knowledge to identify and solve problems; and to make an optimized decision
- Achieve effective Irrigation to enhance crop productions by supplying water accurately, taking into account its availability, crop requirement and land size, irrigation systems, and crop productivity and feasibility.
- DSS is a farm management tool, supporting irrigation and farm managers in making decisions about irrigation whether to irrigate and, if so, which field with how much water.
- DSS ensures Right Amount of Irrigation water of Right Quality at Right Time



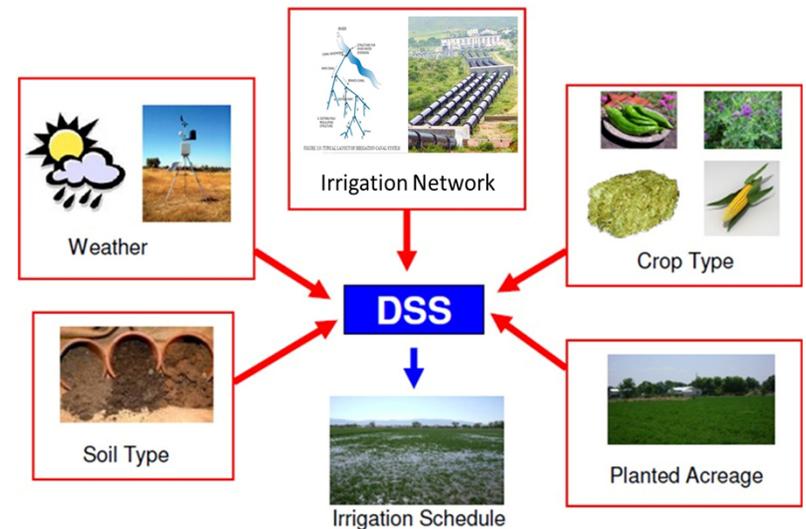


Decision Support System For Micro Irrigation Project

The Decision Support System has following features:

1. Database Management
2. Water Supply Network
3. Irrigation water demand in a structured and efficient way
4. Irrigation Scheduling
5. Synchronization with Pumping station
6. Alternative Solutions in a Structured Manners and Indicate relative sensitivities of various parameters.

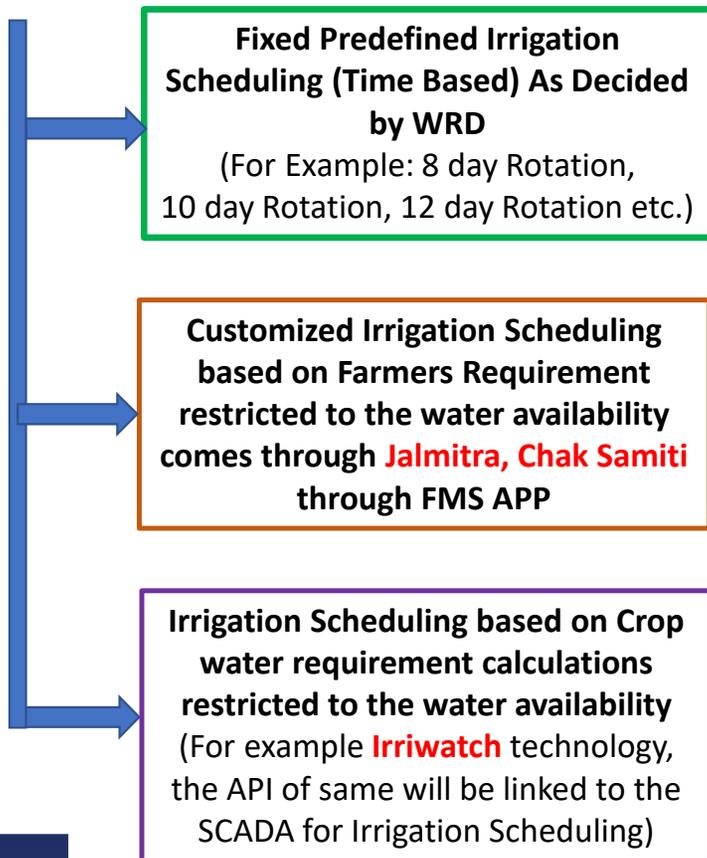
Parameters affecting the operation



- Weather condition (Rainfall Etc.)
- Soil Type, Crop Type
- Stages of Crops
- Command area in operation
- Variation in water level at the intake.



Features Of DSS for Kundalia Project



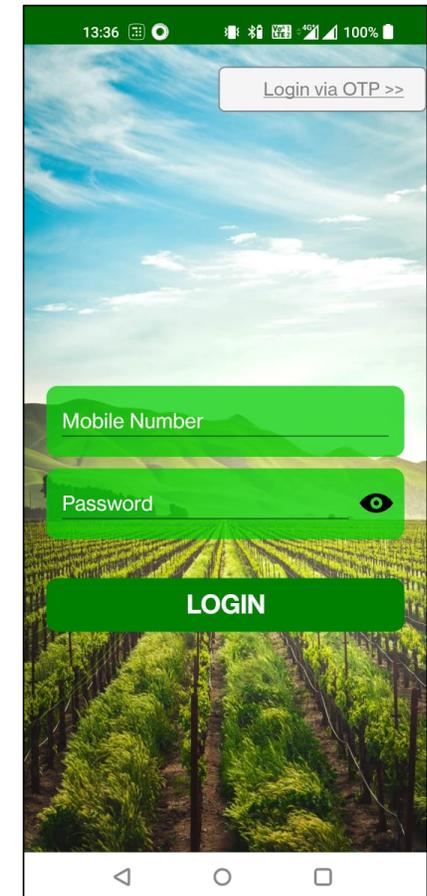
- Irrigation water demand module calculates crop water requirements based on data inputs.
- Deliver Right Quantity of Water of Right Quality at Right time
- Flow and Pressure Control and Monitoring at different stages like peak water demand etc.
- Energy efficient operation during the irrigation season (0.25 KWH/ Cum. of Water)
- Automated Control @ every 5 Ha Sub-chak and manual control at 1Ha for equitable delivery of water to each Farm
- Remote management system (RMS) at as per the hydraulic design of the pipe network for better operation and maintenance
- The water distribution is controlled by the flow and pressure set-point
- Remote Operation for variation in flow without visiting the field



Farm Management System App

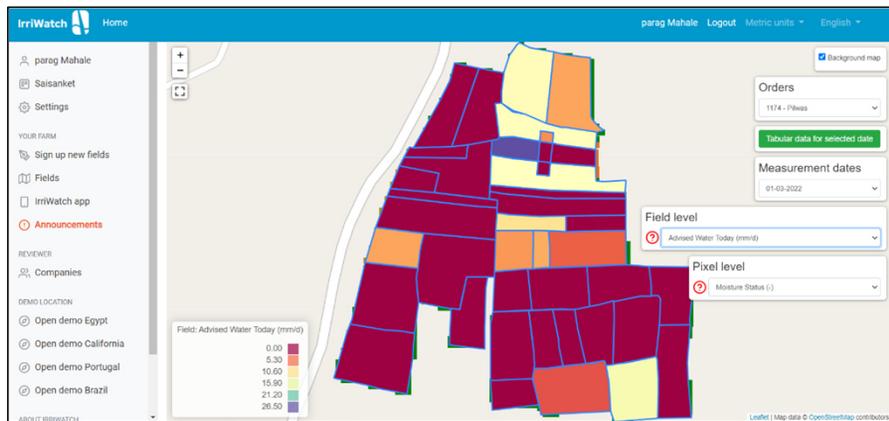
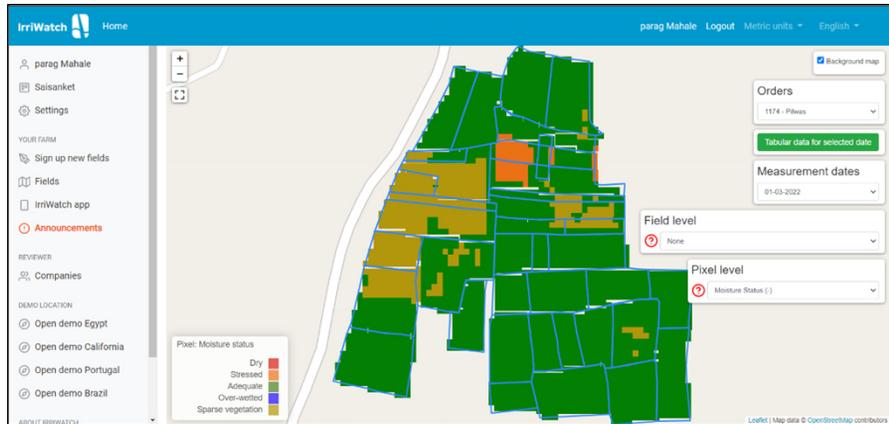
Advantages of FMS App:

- Mobile App and web based on-line tool
- Separate Access for Use of App / Web login as per authority (i.e. FRO, Project Manager, Admin etc.)
- Digital Collection of Agronomic/Social/Economic data of Farmers with photographs.
- Crop water requirement, Crop advisory, Crop economics, Training modules, Geospatial mapping, Irrigation advice, SCADA Integration
- Navigation to Individual Khasra number
- Tracking of FRO





Leveraging Satellite Imageries



- ADB supported Irriwatch (the Netherlands) partnership
- Thermal imageries
- Accurately measure the irrigation requirement at each field
- Plug in with DSS/ FMS app



MKMPU, MPWRD



☄ Few Site Photographs





Conclusions

- **Enhancing the economic value of irrigation water through project delivery requires an amalgamation of various aspects**
- **A good quality delivery infrastructure**
- **which is efficient in water use**
- **and in energy use,**
- **that balances demand with supply in real or near-real time,**
- **through informed (smart) decisions based on reliable data,**
- **so as to meet the farmers' aspirations for high value crops**
- **and that encourages them to adopt high performance irrigation viz. micro-irrigation**
- **without the need for additional energy at farm level**

