International Water Management Institute

Irrigation Modernisation to Build Resilience and Adapt to Climate Change

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Innovative water solutions for sustainable development

Food · Climate · Growth

Context Setting

- Over the past years, huge investments have been made in developing canal irrigation systems for water distribution.
- This has been instrumental in ensuring global food security and supporting Green Revolution
- Low overall efficiency of these ageing irrigation systems- conveyance, distribution and field application efficiencies
- Poor O&M, lack of efficient last mile connectivity and less to no focus on demand side management
- Poor or ineffective institutions, and governance and capacities are equally responsible for low efficiencies, and this is important
- Modernization of these systems including technological and institutional interventions targeted at higher attainable efficiency, is strongly needed for building resilience to climate change.

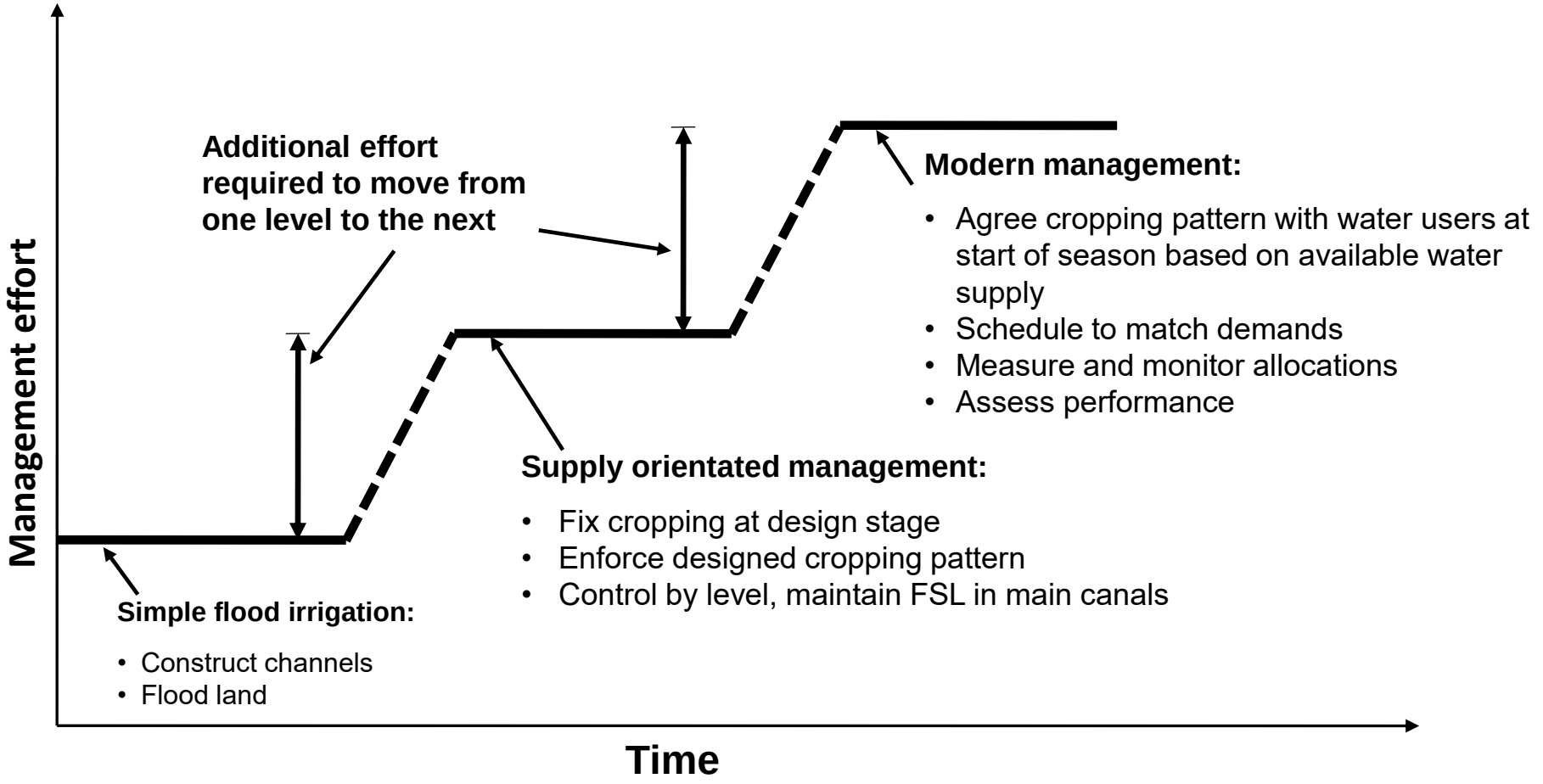
Some Measures to Close Efficiency Gap

- Use of space technology and ICT in irrigation operation, management & services delivery
- Bringing pressurized irrigation/ micro-irrigation as adjunct with canals- effective last mile connectivity
- Sensors and IoT enabled operations, AI/ML, automation
- Dialogic tools (based on DSS) for linking canal operation and on-farm water management
- Innovative ways of managing canal water through PPP, service providers, farmers' company, or federating WUAs into a Private Company
- Shift from PIM to PWM

Technology for system operation can:

- Provide real-time data
- Remote operations
- Improved access to information
- Offer new tools for manual system operations

Modernizing irrigation services



Burton, Martin. 2011. Water Management in India: Options for Change. Presentation at the 2011 FAO Investment Days Meeting, December 15-17.

Scope and Objective of the Session

Push for Modernization:

- The recent trends and initiatives in the modernization of irrigation systems, including more efficient irrigation systems, canal linings, micro-irrigation and role of IoTs/sensors.

- Emphasizing the integration of a pressurize piped irrigation network and smart on-farm irrigation for improved irrigation delivery and improving last mile coverage.

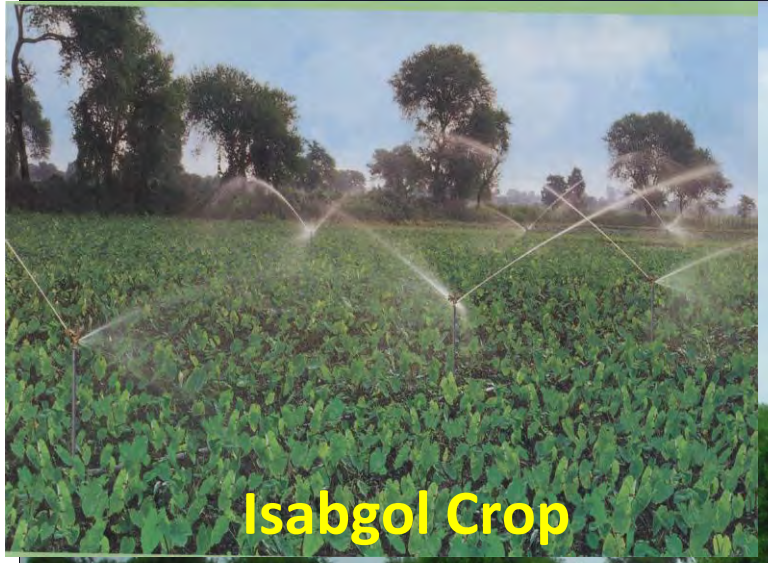
Comprehensive Modernization beyond Engineering:

- Need to move beyond conventional engineering solutions and delve into a comprehensive modernization approach.

- Discussion on the importance of better governance, the strengthening of Water User Associations (WUAs), and efficient delivery mechanisms in achieving equity in resource distribution and ensuring the sustainability of irrigation systems.

One of the first projects in India that used PINS as part of modernization in 2010.

Initially, the project was envisaged as conventional design with 135,000 ha CCA, and now serves CCA of 246,000 ha with PINS



Narmada Canal Project, Rajasthan: An Efficient Canal fed pressurized Irrigation System

POWER LINE

PUMP ROOM

SUMP WELL

DIGGI

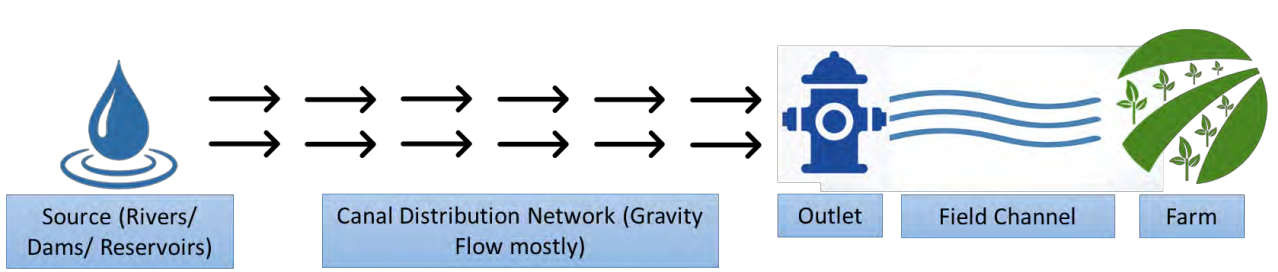
CANAL OUT LET

Water saving by 45-49%

An overall environmentally benign system of irrigation

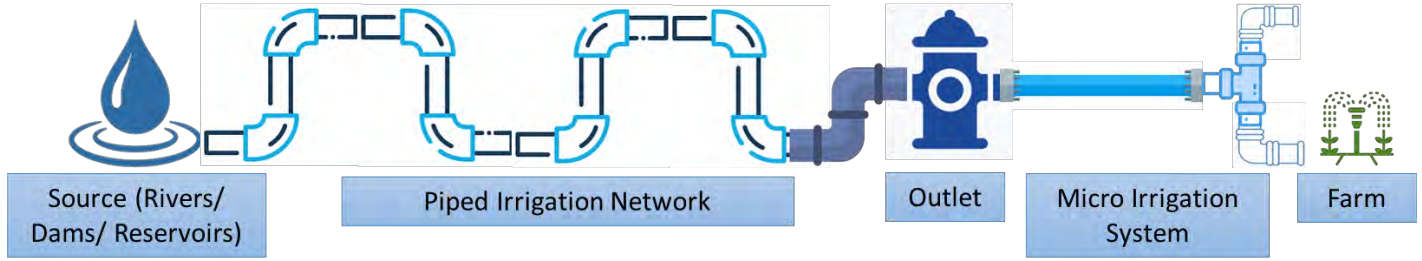
CANAL

Piped Canal Irrigation for Improving Irrigation Efficiency



Conventional system: overall efficiency achieved: 35-60%

Piped Irrigation overall efficiency achievable: 70-80%



Madhya Pradesh Irrigation Efficiency Improvement Program

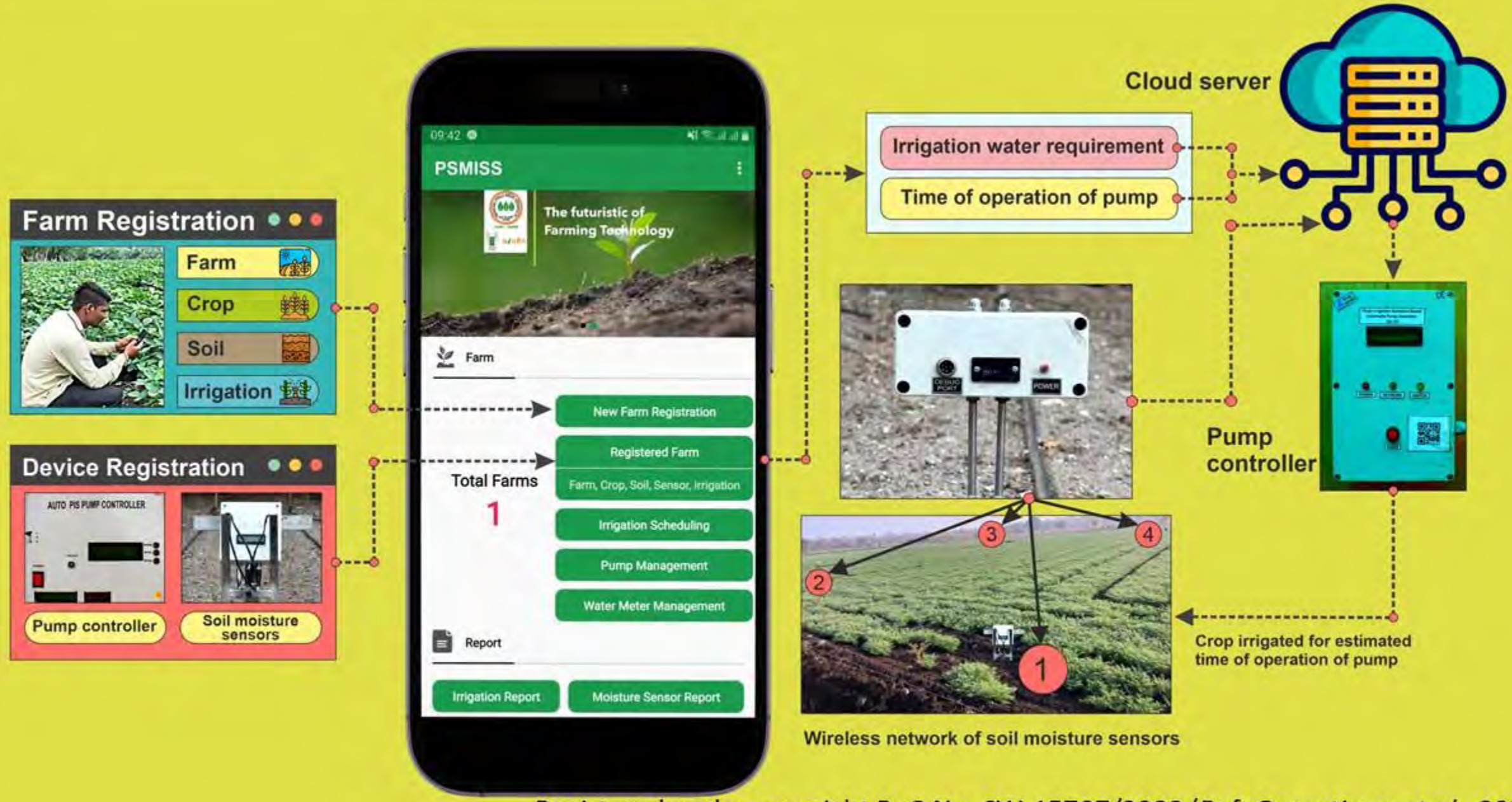
- Buried piped system connected to micro-irrigation system
- Irrigation efficiency of 80%
- 25% increase in wheat water productivity
- Increase in cropping intensity from 132% to 180%
- Crop yield gain: 10-50%

Narmada Canal Project, Rajasthan

- Canal water stored in diggies, lifted and conveyed to on-farm micro-irrigation systems through a buried pipe network
- 78% increase in CCA
- Drinking water facility in 1541 villages and 3 towns with same volume of water
- Increase in value of food production

Ramthal (Marol) Lift Irrigation Project Stage II

- 90% increase in area served
- Doubling of project beneficiary count
- Equitable distribution of water across command
- Improved water use efficiency by 20%
- 15% reduction in IPC-IPU gap



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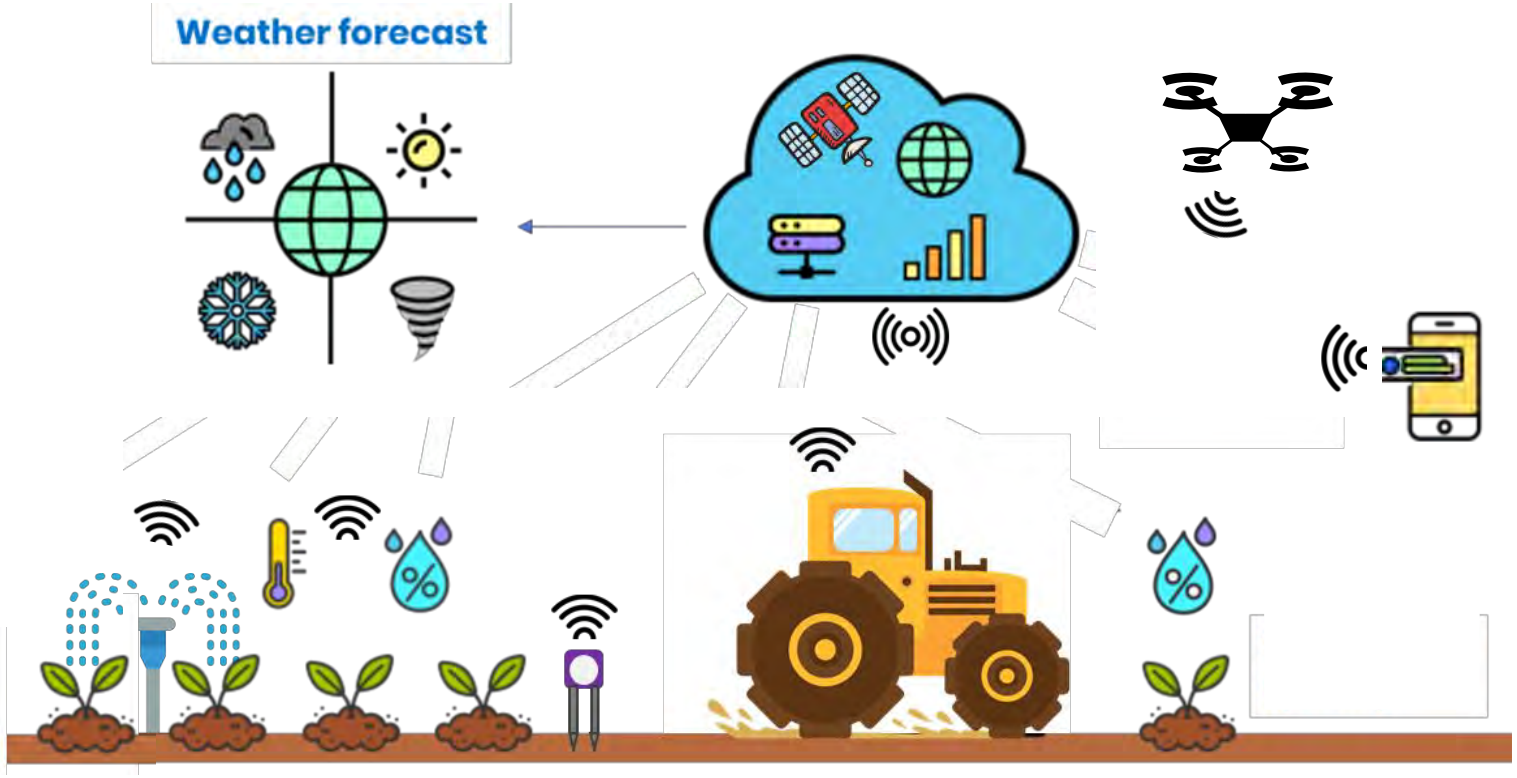
PSMISS Mobile Application

Multi-sensor AI/ML approach

Remote Sensing & forecasts: Satellite/Drone data, weather forecasts combined with analytics and AI/ML can reduce impact of out-of-the-blue meteorological changes

Ground Sensors:
Ground sensors can measure critical parameters like temperature, Soil moisture, humidity



Crop specific monitoring:
Crop specific smart automated systems support in increasing yield profits and reduce agricultural efforts

Irrigation:
Using the insights, optimization of water flow leading to cost reduction and improved results

Adopted from: Datum | Information Technology Company (solstium.net)

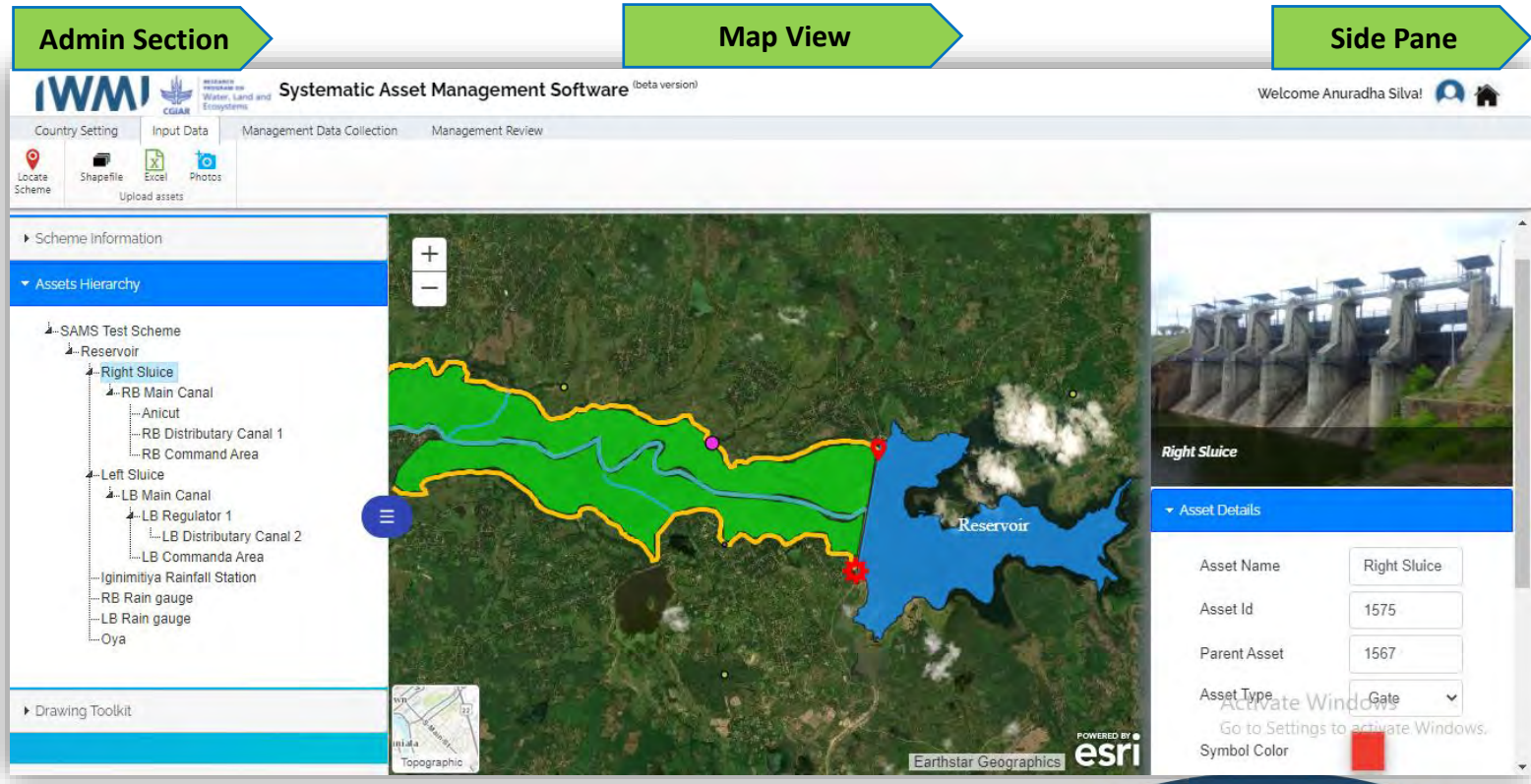
Irrigation Services Delivery and Asset Management-Targeting Investments in Irrigation Schemes

Around 40% worlds food produced using irrigation. Yet many irrigation schemes have performance issues.

Requires a focus towards viewing irrigation as a service, and to:

- *Understand where and how irrigation assets are witihn schemes, regions and countries*
- *How they are functioning*
- *How they relate to production and changing productivity in a systematic manner.*

Systematic Asset Management Software (SAMS): Overview



SAMS (Systematic Irrigation Asset Management Software 4 Irrigators)- an irrigation asset tool to aid in decision making

http://samsv2.iwmi.org

International Water Management Institute

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Thank you…

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