WATER CONVENTION

Global Workshop on
Water, Agriculture and Climate Change

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Smart Water Management for Enhancing Resilience at Multiple Scales

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IWMI International Water Management Institute

CGIAR NEXUS Gains: Realizing Multiple Benefits Across Water, Energy, Food and Ecosystems

Ministry of Infrastructure and Water Management

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ADAPTATION FUND

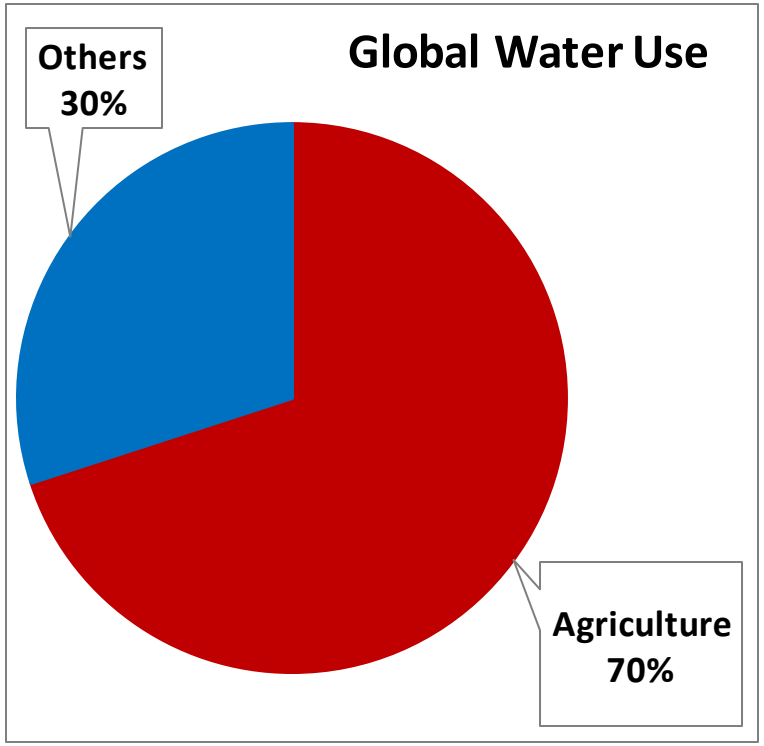
FAO FIAT PANIS

INTERNATIONAL NETWORK OF BASIN ORGANIZATIONS

IWMI International Water Management Institute

Water in agriculture

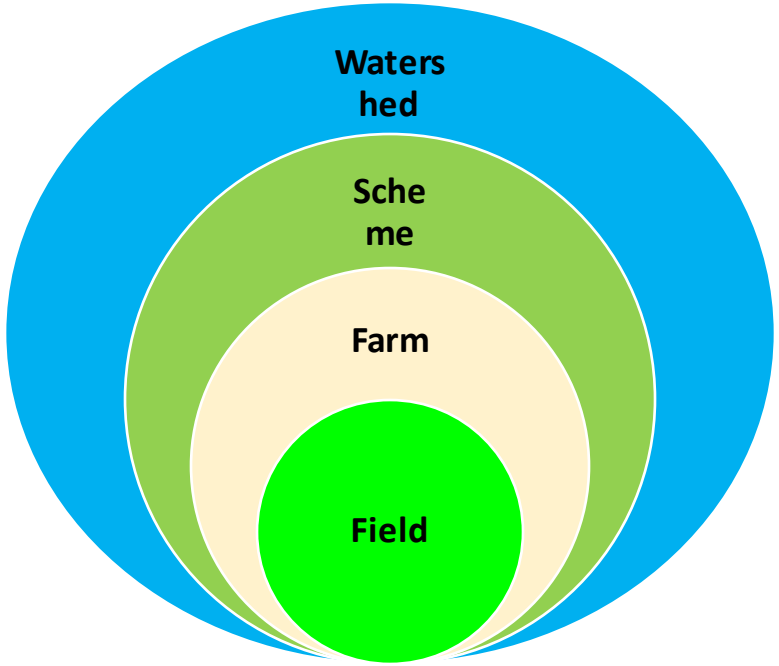
❑ Scale-based AWM is misleading, e.g., field or farm or scheme-based improved WUE or WP leads to land expansion and shift to water-intensive high value crops.



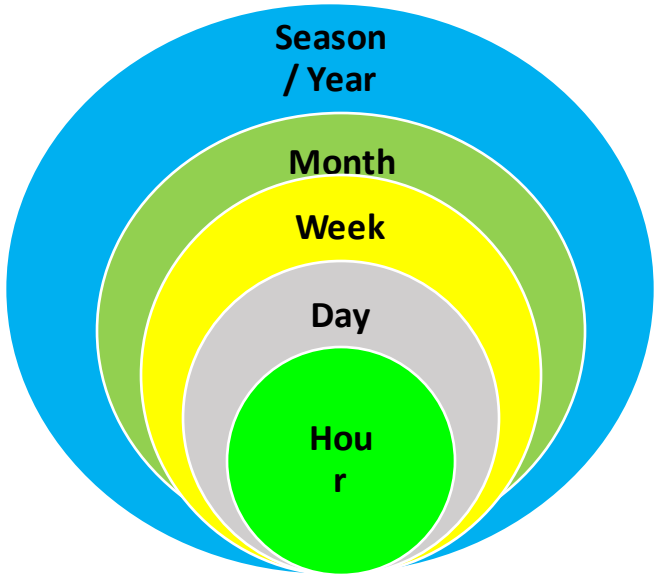
❑ COP26: net-zero emissions by 2050

Need for AWM across scales:

Spatial



Temporal



Smart agricultural water management solutions

Water demand management -potentially reducing non-beneficial evaporation and non-reusable return flows

Supply augmenting interventions- increase soil moisture, surface, and groundwater storage to build water resilience

Field based evidence demonstrated potential contribution of AWM interventions at

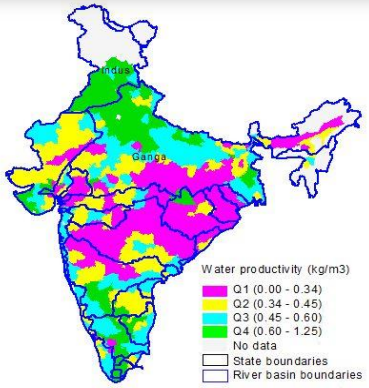
- enhancing resilience via increased land and water use efficiency
- increasing productivity, and
- reducing GHG emissions via reduced energy use and efficient fertilizer usage

Water use efficiency and water productivity

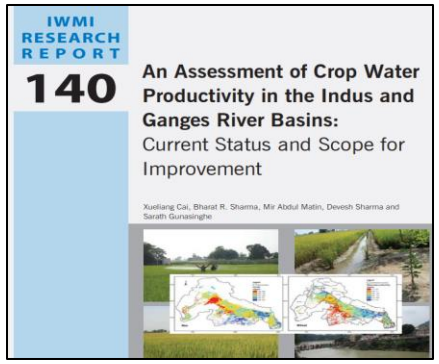
Working across scales

Physical and Economic WP

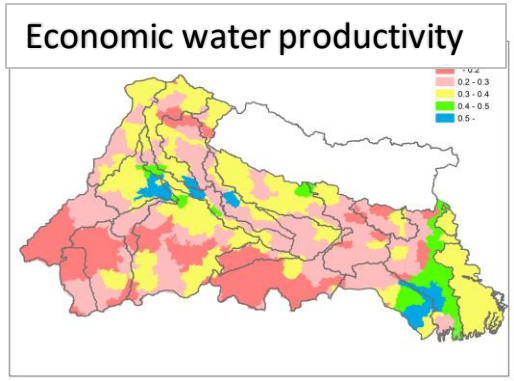
National → Basin → Irrigation command area → Farmers field

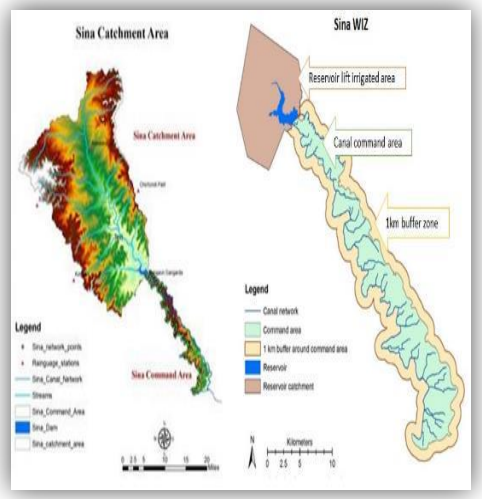


Water accounting



Economic water productivity

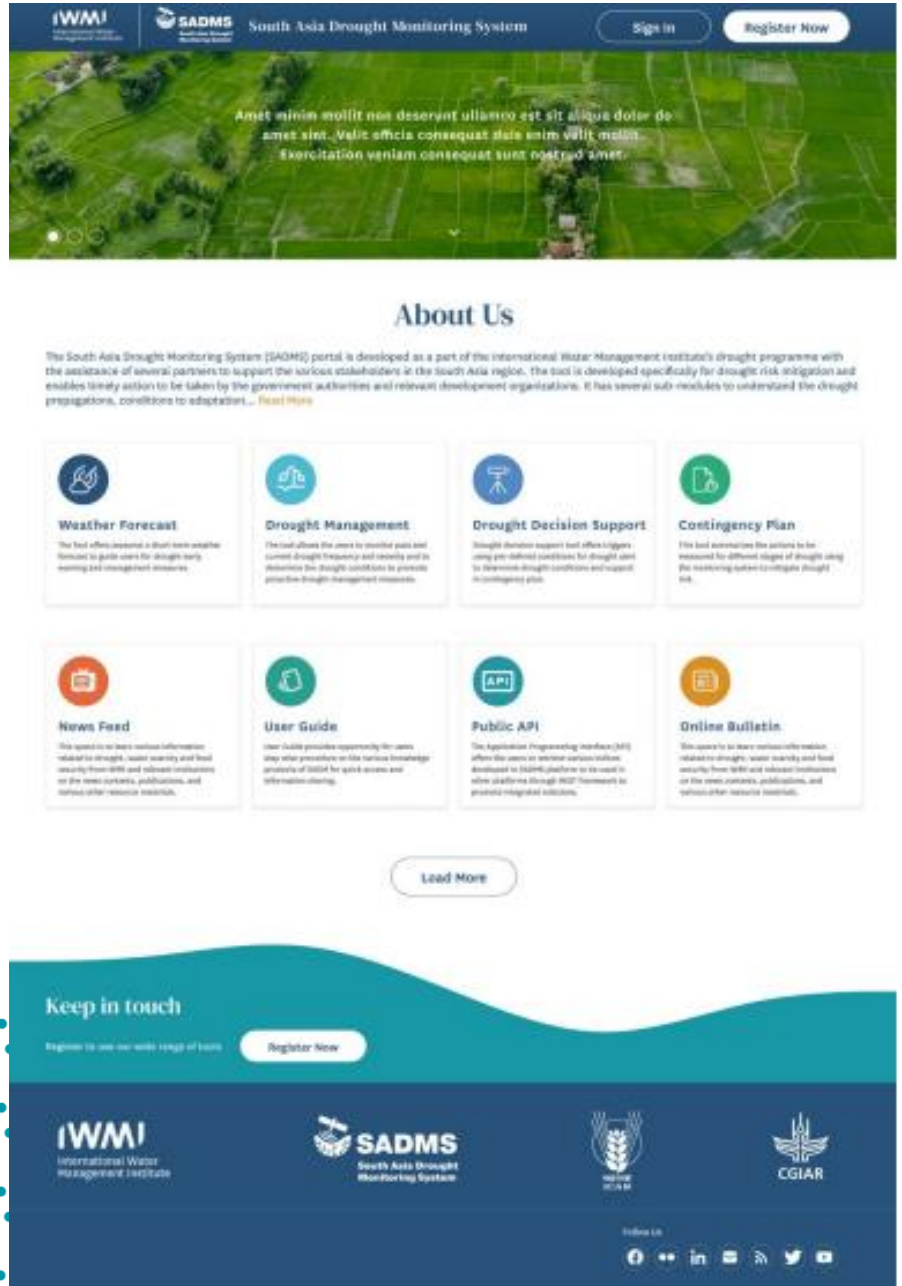




- Focus on a larger Water Influence Zone
- Reallocate water from lower to higher value water use (mixed combination)
- Allocate fixed area/Consumptive Water Use under perennial crops that can withstand dry years

Building Resilience: Odisha, Assam

South Asia Drought Monitoring System (SADMS)



Equipping nations to effectively manage drought

- SADMS- a satellite-based online resource that provides farmers, extension workers, and agriculture and water resources authorities with all the information needed to forecast, monitor and manage drought.

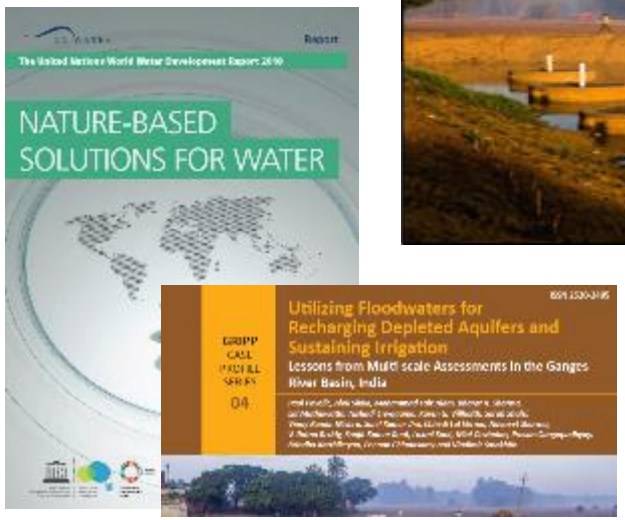
- Provides seasonal, sub-seasonal and seven-day weather forecasts; monitoring tools to indicate when drought is present; and district-level agricultural contingency plans that can be put into action if the system indicates that particular triggers have been reached.

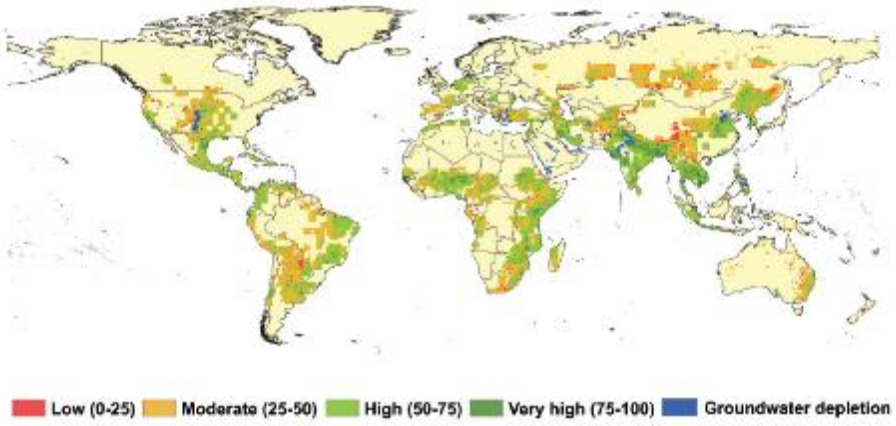
www.dms.iwmi.org

Smart Aquifer Management: Building Water Resilience

Managed Aquifer Recharge (MAR)
Underground Transfer of Flood Water for Irrigation (UTFI)

- Aquifer recharge using excess wet season flows
- Reduce flood risks downstream
- Dry season irrigation – e.g. rabi wheat
- Pilot scale demonstrations – Rampur district
- Buffering water supply for climate resilience

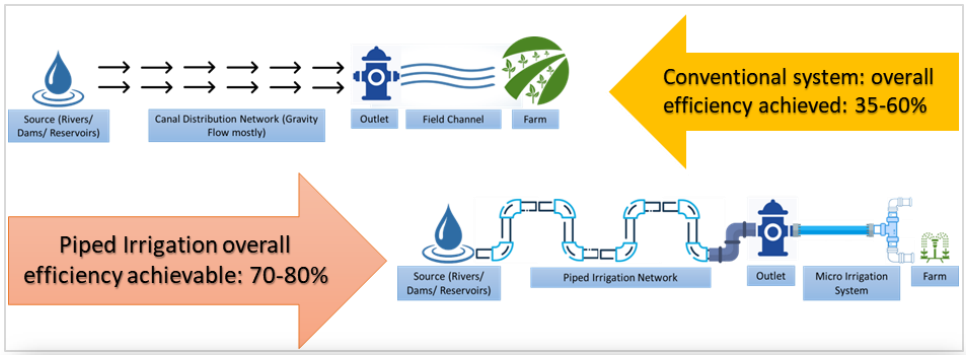


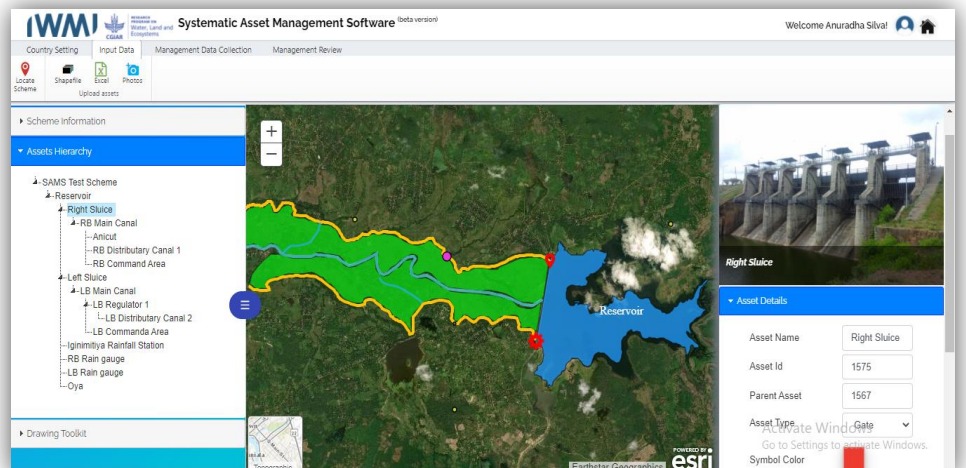


CGIAR Research Program on Climate Change, Agriculture and Food Security · CCAFS · CGIAR Research Program on Water, Land and Ecosystems

Mainstreaming Innovation in Irrigation Management

- Bringing piped network, pressurized irrigation/ micro-irrigation as adjunct with canals
- Use of sensors, space technology and ICT in precision irrigation management
- Dialogic tools (DSS) linking canal operation and on-farm water management bridging gap between the two
- Improving irrigation services delivery and asset management
- Direct cash incentive for electricity saving on irrigation water usage – Example: Punjab example Reduced irrigation hours for enrolled farmers, no negative impacts on paddy productivity





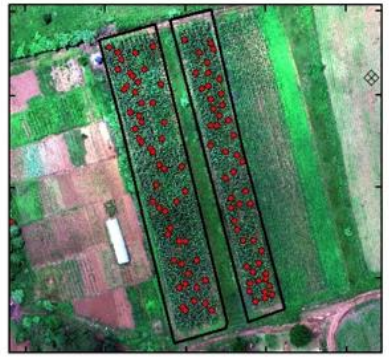
High Throughput Maize Field Phenotyping for understanding crop health and yield

PRECISION AGRICULTURE

- Measures and responds to spatial and temporal variability of soil and crop growth
- Enhances profitability and reduces environmental impact
- Improve water use-efficiency
- Reducing water usage
- Yield forecasting

DJI M300 & Micasense

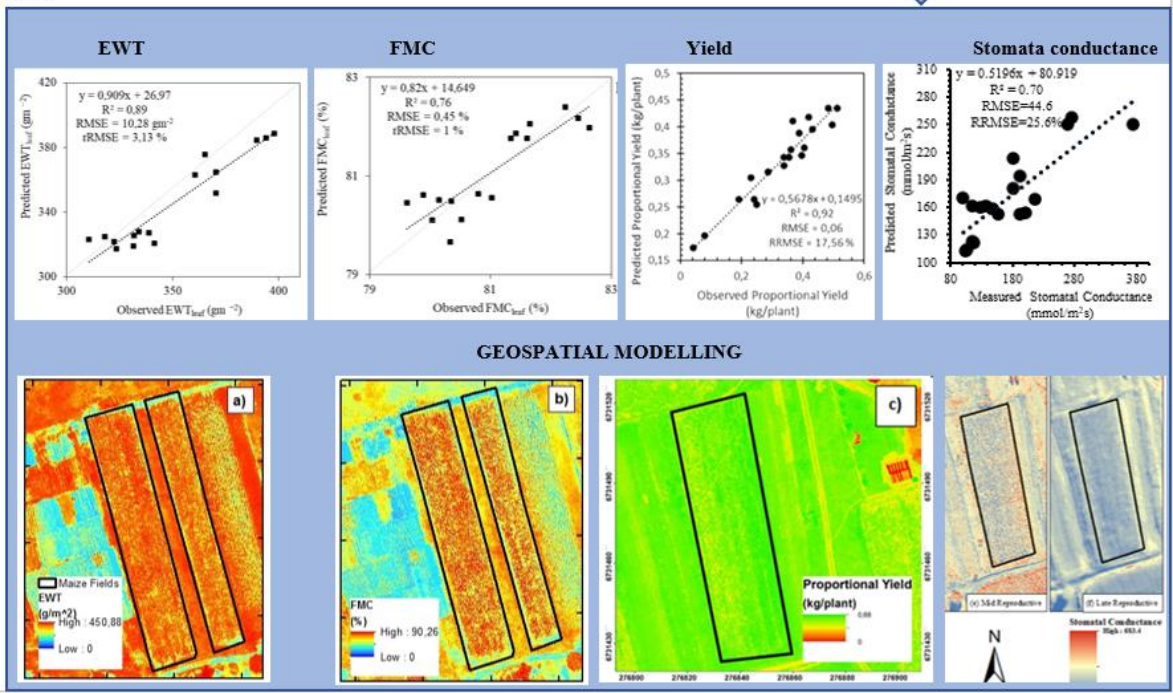
Smallholder Maize Farms



Maize water content & productivity estimations

Machine Learning regressions

RF, SVM, DT, ANN, and PLS



Utilisation of drones in monitoring crop health, water stress, crop water requirements

Key considerations

- Agricultural water management under CC will require, among other things, cross-sectoral and cross-scale innovative approaches and technologies
- A daunting and complex task, which calls for:
  - managing rather than meeting demand,
  - transformative and systems approaches,
  - landscape-level management, and
  - transitioning food systems towards being resilient and sustainable.
- Need to look beyond the water system – consider social, equity and inclusion dimensions
- This requires coordination and collaboration across all AWM stakeholders/actors and scales

Thank you

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