



WATER
CONVENTION

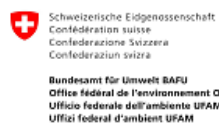
Global Workshop on
Water, Agriculture and Climate Change
17-18 October 2022, Geneva and online

Smart Water Management for Enhancing Resilience at Multiple Scales

Tafadzwa Mabhaudhi
South Africa/IWMI



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



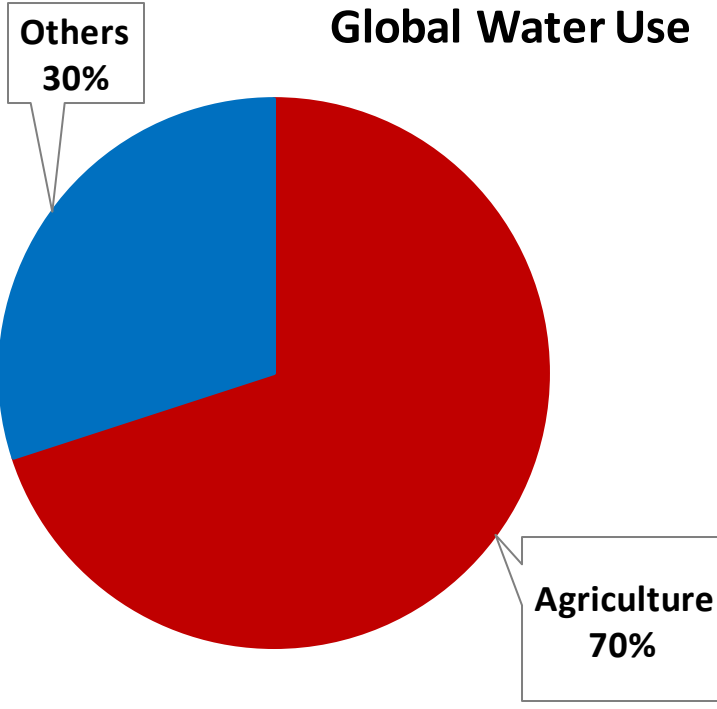
Bundesamt für Umwelt BAFU
Office fédéral de l'environnement OFEV
Ufficio federale dell'ambiente UFAM
Uffizi federal d'ambient UFAM



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.

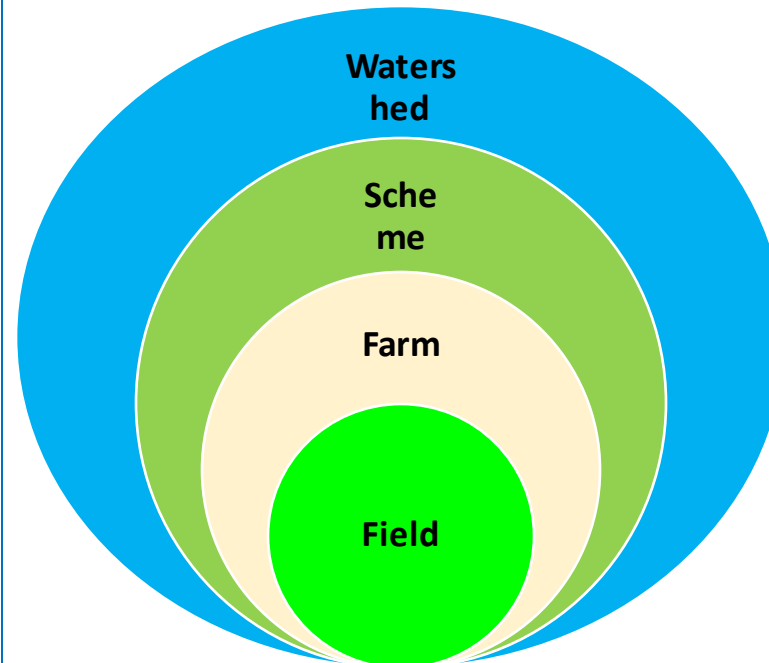
Global Water Use



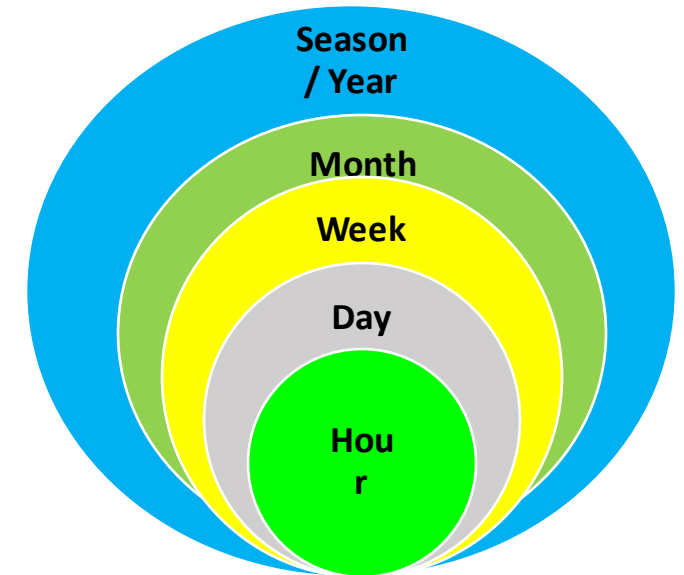
- COP26: net-zero emissions by 2050

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

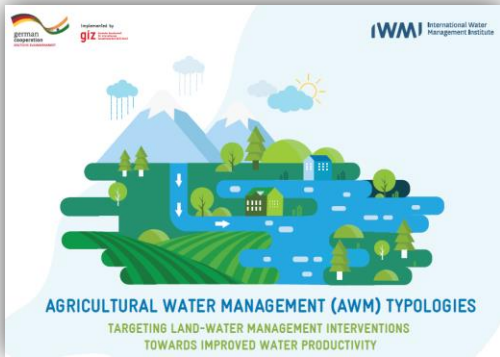
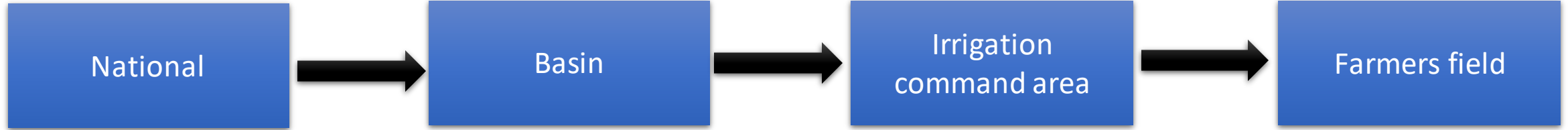
- enhancing resilience via increased land and water use efficiency
- increasing productivity, and
- reducing GHG emissions via reduced energy use and efficient fertilizer usage



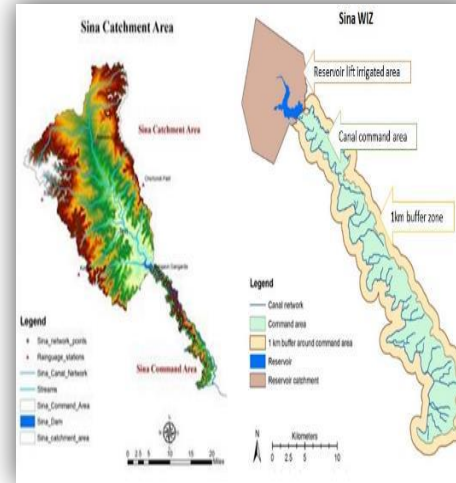
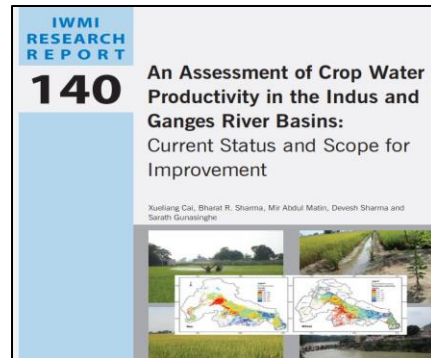
Water use efficiency and water productivity

Working across scales

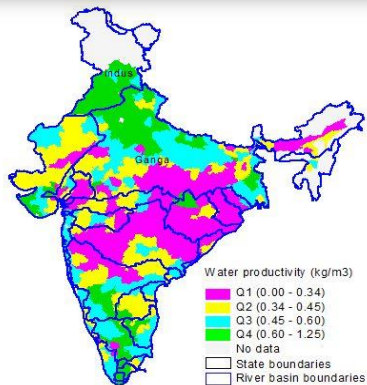
Physical and Economic WP



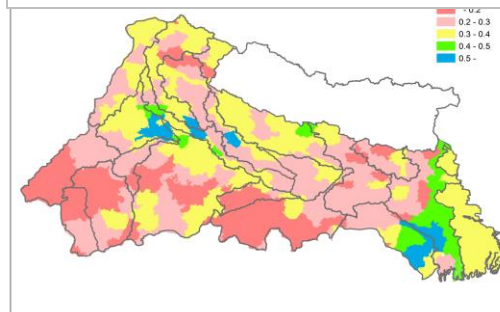
Water accounting



Building Resilience: Odisha, Assam



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

South Asia Drought Monitoring System (SADMS)



About Us

The South Asia Drought Monitoring System (SADMS) portal is developed as a part of the International Water Management Institute's drought programs with the assistance of several partners to support the various stakeholders in the South Asia region. The tool is developed specifically for drought risk, mitigation and enables timely action to be taken by the government authorities and relevant development organizations. It has several sub-modules to understand the drought propagation, conditions to adaptability... [Read More](#)

 Weather Forecast The tool offers seasonal and short-term weather forecast to guide users for drought early warning and management measures.	 Drought Management The tool shows the users to monitor past and current drought frequency and severity and to determine the drought conditions to promote proactive drought management measures.	 Drought Decision Support Drought decision support tool offers triggers using pre-defined conditions for drought alert to determine drought conditions and support in contingency plan.	 Contingency Plan The tool summarizes the actions to be measured for different stages of drought using the monitoring system to mitigate drought risk.
 News Feed This space is to share various information regarding drought, water security and food security from IWMI and relevant institutions on the news, contents, publications, and various other resource materials.	 User Guide User Guide provides step-by-step for users who are new to the system knowledge database of SADMS for quick access and information sharing.	 Public API The Application Programming Interface (API) offers the users or external organizations to access SADMS platform to connect to other platforms through REST framework to provide integrated solutions.	 Online Bulletin This space is to share various information regarding drought, water security and food security from IWMI and relevant institutions on the news, contents, publications, and various other resource materials.

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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.

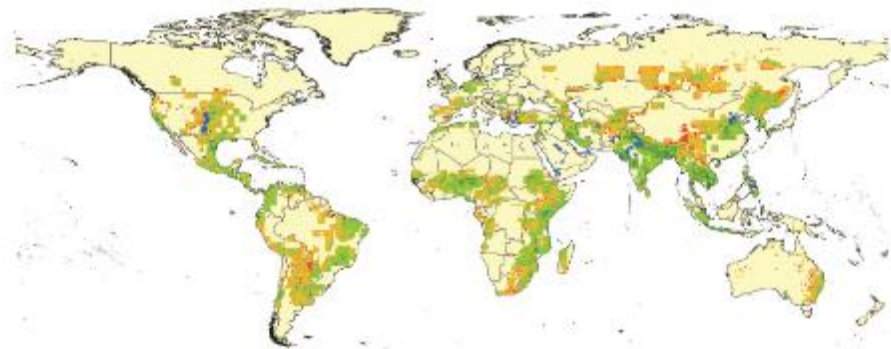


Smart Aquifer Management: Building Water Resilience

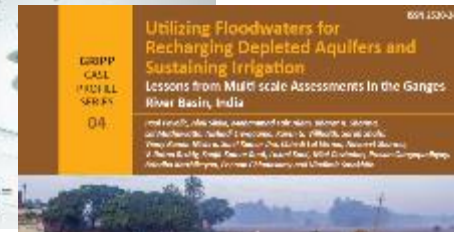
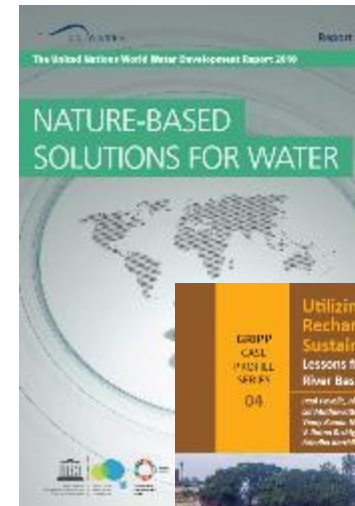
Managed Aquifer Recharge (MAR)

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



Low (0-25) Moderate (25-50) High (50-75) Very high (75-100) Groundwater depletion



RESEARCH PROGRAM ON
Climate Change,
Agriculture and
Food Security



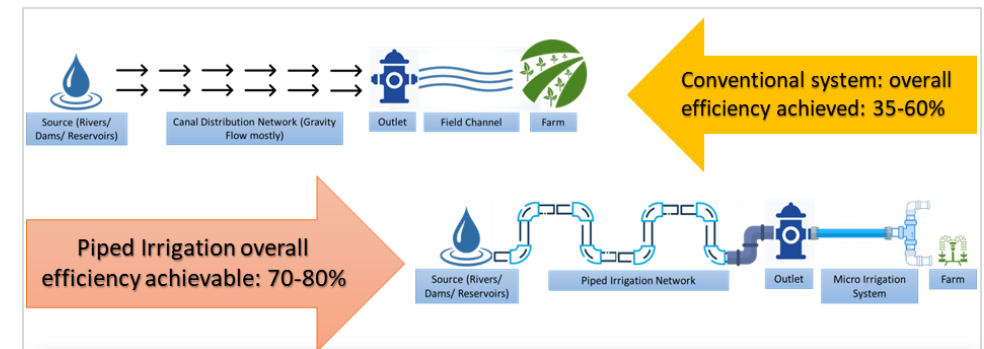
RESEARCH PROGRAM ON
Water, Land and
Ecosystems



LEISA
SCALE

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

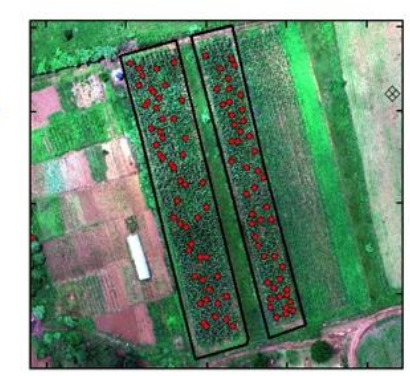
- Measures and responds to spatial and temporal variability of soil and crop growth
- Enhances profitability and reduces environmental impact
- Improve water use-efficiency
- Reducing water usage
- Yield forecasting



DJI M300 & Micasense



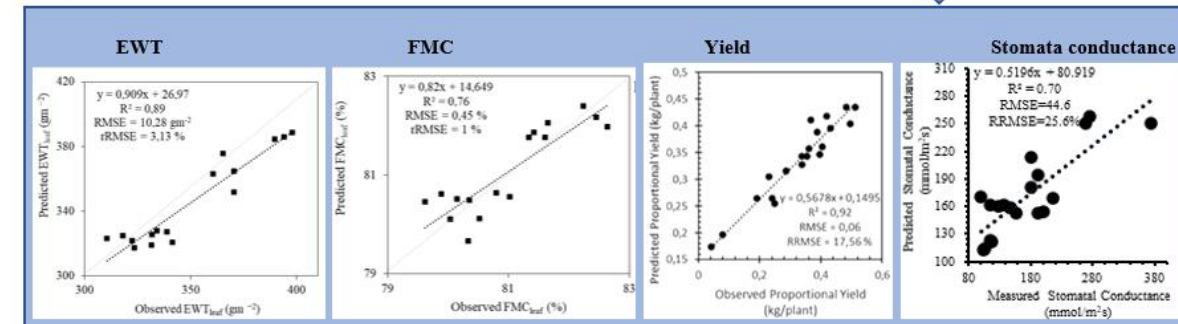
Smallholder Maize Farms



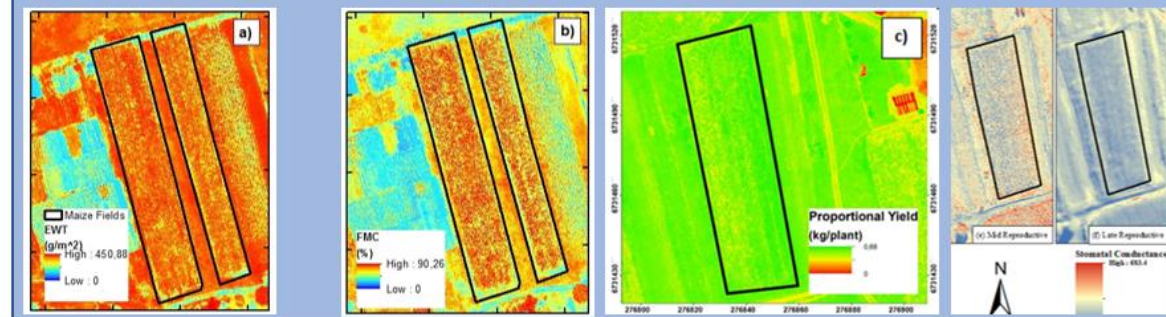
Maize water content & productivity estimations

Machine Learning regressions

RF, SVM, DT, ANN, and PLS



GEOSPATIAL MODELLING



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



Email address: t.mabhaudhi@cgiar.org



Website: www.iwmi.org



Twitter: [@TafMabhaudhi](https://twitter.com/TafMabhaudhi)

