Water Index for Sustainability, Equity, and Resilience (WISER)

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About WISER

The **Water Index for Sustainability, Equity, and Resilience (WISER)** initiative bridges gaps in water security monitoring by providing **a structured framework for tracking meaningful, outcome-based indicators**.

By systematically tracking key water security indicators, WISER enables **data-driven decision-making, improves resource allocation, and fosters more effective interventions** to achieve water security in India.

Why Do We Need a Water Index?

India is severely water stressed, and it's not a simple problem to solve.

India has been experiencing severe and escalating water crises.

This manifests in several ways:


TOO MUCH


TOO LITTLE


TOO POLLUTED

Water security is a multidimensional challenge, encompassing aspects like

sustainability

equity

resilience

productivity

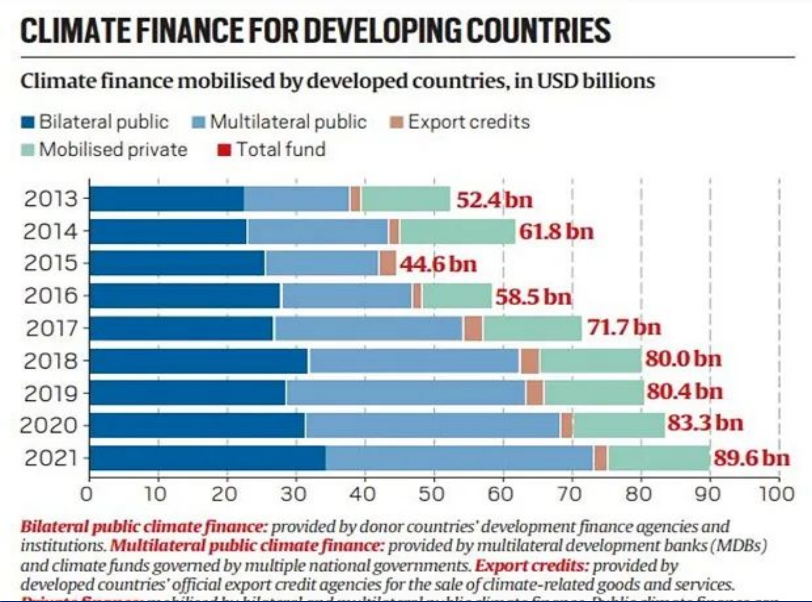
These dimensions, while critical, do not always align. Sometimes, achieving one might be at the expense of another.

We're spending a lot of money on solutions. But is it moving the needle?

As of FY 2024-25, there has been huge government and philanthropic investment in water management:

- MNREGA: ₹86,000 crore
- Jal Jeevan Mission: ₹70,000 crore
- Swachh Bharat Mission: ₹5,000 crore
- National Mission for Clean Ganga: ₹3,345 crore
- CSR: ₹3,000 crore
- Private philanthropy: ₹~300 crore
- Incoming ESG funding as well

However, there is **limited evidence** as to whether these efforts are yielding **measurable improvements** in water security.



Metrics for reforms, easing compliance burden: PM Modi's plan to Secretaries

These directions came during the PM's interaction with Secretaries on June 29, his first in the NDA's third term. Two days later, Cabinet Secretary Rajiv Gauba wrote to all Secretaries to "initiate immediate action" based on these.

Written by Harikishan Sharma , Amrita Nayak Dutta
New Delhi | Updated: July 6, 2024 07:32 IST

We are faced with critical questions...

Are worsening forces prevailing over improving ones?

What indicators should guide interventions?

How do we measure progress effectively?

	Village 1 Tribal Areas	Village 2 Alluvial Plains	Village 3 Hard Rock Areas
	A village has adequate water internally, though the vast majority don't have access to irrigation (no interest in 2nd crop).	A village is over-exploiting alluvial aquifer and the vast majority have reliable access, with low productivity use and declining GW levels.	A village with groundwater based agriculture, but in hard rock areas. This water is available based on the amount of rainfall.
Availability	✅	❌	❌
Access	❌	✅	✅
Productivity	❌	❌	✅
Resilience	✅	✅	❌

...and these are not easy to answer.

Water management is a **dynamic, multifaceted** issue. Water security is influenced by spatial, temporal, and socioeconomic factors that make it difficult to clearly assess outcomes.

Further, different stakeholders—water users, government agencies, donors, and civil society organisations—have **varied perspectives on what constitutes water security.**

The water sector needs consensus on what outcomes matter the most.

Current water security assessments primarily focus on **inputs** (for example, funds allocated) and **outputs** (for example, the number of check dams constructed) rather than **long-term outcomes**.

This results in gaps. A shift toward **outcome-oriented tracking** is essential to address this gap.

What gets measured gets managed:

A robust framework can help track water security outcomes beyond traditional input-output metrics.

However, this framework must be able to address the various strands of thought within the water sector, which are often opposed to each other:

- *What to track*: Outcomes or outputs?
- *Data collection:* Community-led or largely steered by the government and CSOs?
- *Unit of analysis* to assess water security: Watershed level or the village/block level?
- What should be the *frequency of tracking* selected indicators?

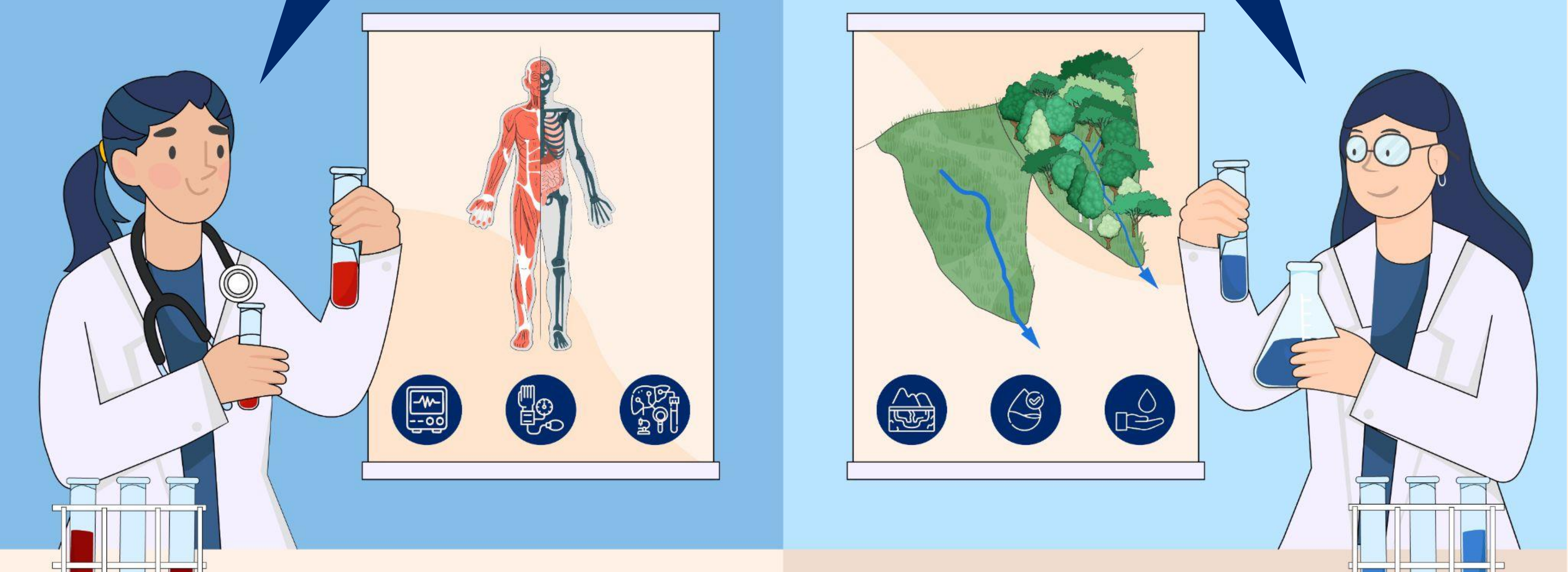
Conceptualising The Water Index

Imagine the water security of a region as analogous to the health of a person.

There are a set of vitals that indicate the person's overall health. We ideally track them repeatedly over time—think annual physicals—to learn about the person's health.

Just as a health check-up helps understand what the problem is, diagnose deeper issues, & evaluate improvement…

…. we want to develop a framework that helps holistically assess water security at the landscape scale.



Not asking "**How healthy is this watershed?**" or "**What's the problem?**" is akin to treating a patient without a health check-up.

Water security assessment in India requires an outcomes-focused, mutually exclusive and collectively exhaustive framework.

For this, it is critical to find an affordable yet comprehensive way of measuring biophysical complexities such as rainfall variability, runoff, surface water availability, and groundwater dynamics.

The Water Index for Sustainability, Equity, and Resilience (WISER) initiative seeks to bridge gaps in water security monitoring by establishing a structured framework to track meaningful, outcome-based indicators.

Its overarching objectives are:

Developing a coherent indicator framework that is scientifically sound and stakeholder-informed.

Leveraging existing data and remote sensing to enhance the accuracy, scalability, and real-time tracking of water security trends. This includes filling gaps with **systematic data collection** in collaboration with civil society organisations to help the water sector move **beyond anecdotal evidence**.

Visualising and communicating the gathered data effectively to foster change.

Recapping WISER Phase 1
(July 2024-March 2025)

Four project components that informed the creation and testing of the WISER framework.

STAKEHOLDER ENGAGEMENT

Engaging major sector players ensure the proposed indicators reflect ground realities and diverse needs.

During Aug-Sept 2024, we interviewed the 12 stakeholders from grassroots organisations, donors, academia, and policy think tanks to get a pulse of the water sector.

KEY LEARNINGS

1. There is **a need for landscape-level indicators**, which are currently missing in impact assessments.
2. **Data collection requires a lot of time and money**, and the collected data might not even be useful to track water security.
3. Water security is linked to different aspects of society and the environment, and **cannot be worked on in isolation**.

Input that informed WISER

A clear need for a comprehensive indicator framework to **track landscape-level, long-term impacts** on water security and **time-saving, cost-efficient ways to measure** indicators.

LITERATURE REVIEW

Engaging major sector players ensure the proposed indicators reflect ground realities and diverse needs.

During Aug-Sept 2024, we interviewed the 12 stakeholders from grassroots organisations, donors, academia, and policy think tanks to get a pulse of the water sector.

KEY LEARNINGS

We proposed a structured framework adapted from the Driver-Pressure-State-Impact-Response (DPSIR) approach. Inspired by the socio-ecological systems framework (SESF), it is **context-sensitive** and **ensures relevance to regional conditions**.

We selected **six dimensions** to build a comprehensive picture of water security. The dimensions, consisting of **12 indicators,** capture the diverse and interconnected aspects of water security, thereby providing a holistic perspective.

Input that informed WISER

All stakeholders concurred on the utility and comprehensiveness of these dimensions:

- **Water balance**
- **Water access**
- **Water productivity**
- **Water resilience**
- **Water governance**
- **Water & ecosystem health**

We have prioritised **12 indicators** across **6 dimensions**

BALANCE

- Groundwater Levels
- Surface Water Extent
- Water stress

ACCESS

- Cropping Intensity
- Domestic Water Access
- Domestic Water Quality

PRODUCTIVITY

- Crop Water Productivity

RESILIENCE

- Variation in Cropping Intensity
- Propensity to Droughts
- Propensity to Floods

GOVERNANCE

- Local Water Governance

WATER & ECOSYSTEM HEALTH

- Ambient Water Quality

LEGEND

- Primary Data
- Ground Truthed Secondary or Remote Sensing Data
- Purely Remote Sensing or Secondary Data

PILOT TESTING

Validating the indicators in diverse hydrogeological contexts to ensure their applicability and adaptability across different water-stressed regions in India.

During Nov 2024 to Jan 2025, we conducted a data collection pilot to test the indicator framework across five aquifer typologies to conduct primary surveys in two villages in each typology.

KEY LEARNINGS

A total of 30 households were surveyed in each of the 10 villages (total sample n=300) in the states of Punjab, Uttar Pradesh, Chhattisgarh, Maharashtra, and Karnataka. We also collected village-level data for indicators such as groundwater levels and surface water extent to validate the values obtained from remote sensing.

The pilot was useful in understanding how our proposed indicators perform on the ground and adding nuance to our understanding of landscapes. It also gave us insights into which indicators can be improved upon.

Input that informed WISER

Once our draft indicator framework and pilot results were ready, we conducted feedback sessions with technical experts and listening circles with select stakeholders.

Note: For an example of how we selected and computed the WISER indicators & the summary of WISER scores from the pilot, see the **Annexure**. For the summary of the literature review and the pilot results, see **this report.**

LISTENING CIRCLES & THE WISER ROUNDTABLE

Establishing partnerships with civil society organisations, research institutions, and government agencies to drive long-term institutionalisation and policy adoption.

During Feb-March 2025, we conducted listening circles with select stakeholders to gather user perspectives, presented the pilot findings to academic experts, and held a roundtable in Bengaluru with 30 stakeholders from academia, donor organisations, and grassroots groups to review Phase 1 pilot results and discuss how they would like to engage with WISER.

KEY LEARNINGS

Key feedback received was as follows:

- Simplifying the communication of findings while maintaining scientific rigour is key.
- A phased survey design needed for sustainable 'design for scale'.
- Improving the methodology and scientific rigour for specific dimensions and indicators such as water quality and governance.
- A mix of static and dynamic indicators, with a focus on usability, equity, and environmental flows.

Note: A more detailed summary of the key learnings from the stakeholder engagements, listening circles, and the WISER Roundtable can be found in **this learning note**.

Input that informed WISER

The roundtable shaped the future direction and elicited interest from participants in collaborating on fundraising, data collection, and research.

REFLECTIONS ON WISER PHASE 1

1 The WISER framework must not just be a measurement tool, but a driver of change.

Unlike older water indices, it must balance scientific rigour with simplicity, public engagement, and policy relevance.
In this respect, it takes inspiration from ASER's media traction and actionable data model.

2 We must distinguish between output and outcome indicators.

The former enable immediate, localised action (for example, competitions like the Water Cup), while the latter offer strategic guidance.

3 We must build a broad coalition and design data collection as a 'for the community, by the community' process.

This participatory model would promote public ownership and acceptability, provided the framework ensures transparency and accuracy.

4 It is important to choose the right unit of analysis, use adaptable sampling designs, and build robust, community-driven data infrastructure.

The latter includes direct water quality testing and surveyor capacity-building, and can promote both credibility and scalability.

What's next for WISER?

The WISER framework aims to **align the water sector** by bringing clarity on the different dimensions and outcome-based indicators that the sector should focus on. It will help stakeholders **take decisions on what to prioritise** and **assess the impacts of their decisions** based on **specific dimensions** like water balance, access, productivity, etc.

Ultimately, we would like to have **nation-scale annual sample surveys** to complement remote sensing data. The surveys help us move from anecdotal reporting of water issues to a systematic understanding of water security in the country.

In Phase 1, we developed and piloted the WISER framework. **In Phase 2**, we aim to:

1. Develop a **dashboard that streamlines secondary data analysis** at district and state levels.
2. **Design robust primary data collection protocols** so that data can be collected at scale. We will do this by collecting data at scale for a few chosen districts.
3. Establish WISER's adaptability to **provide value across different contexts** to communities, NGOs and governments.

We aim to test WISER along two pathways to change.

PATHWAY 1: GRASSROOTS

A LOCAL, COMMUNITY-DRIVEN EXERCISE FOR BETTER LOCAL WATER GOVERNANCE

Focuses on positioning **WISER as a digital public good** with **a do-it-yourself toolkit** that communities can use to assess their water security. Such a model empowers local actors to assess and act on water issues, though the density of the data they collect might be limited.

For this pathway to be effective, we would **need both landscape and HH-level** water security indicators. **Well-designed community engagement efforts would be required** to translate the data into on-ground efforts. The **identification of meaningful indicators and communication around them** would also be critical.

PATHWAY 2: GOVERNMENT PARTNERSHIPS

WATER SECURITY ASSESSMENT AT SCALE USING SECONDARY DATA-DRIVEN INDICATORS

Involves **partnering with state governments** to use secondary data and remote sensing **for large-scale assessments**. It would help address the most urgent water-related outcomes by **integrating WISER into state policy planning**. Government stakeholders can use this data to identify specific WISER dimensions that need urgent prioritisation and update the policies and resource allocation accordingly

For this approach to be effective, we would **need a statistically representative sample size for the whole state**. **Strong government partnerships would also be required** to funnel our findings into state-level water resources management initiatives.

Our priorities for Phase 2 of WISER are as follows:

1 Creating a modular framework.

The framework should be adaptable to different geographies and stakeholders. This can be facilitated using a core set of indicators and a secondary/optional one. This approach ensures flexibility across stakeholder needs and contexts.

2 Testing the framework along the two pathways to change

Building and testing hypotheses for the two pathways will help us narrow down the most effective strategies. It will also help us learn how to design for scale beyond Phase 2.

3 Balancing data collection and assimilation

Primary data serves as a sharp tool for targeted insights, while secondary data provides a broader foundation for analysis. A strategic blend of both ensures a comprehensive understanding without overcomplicating the data collection process.

4 Ensuring data ethics and ownership

Clear guidelines on data ownership, privacy, and access rights are essential to maintaining transparency and trust among stakeholders.

WISER is an ambitious initiative, and we are only at the beginning of this journey.

The enthusiastic engagement from key players during Phase 1 has reinforced our belief that **the water sector is ready for a robust indicator framework**. Their valuable feedback has strengthened our commitment to refining WISER into a tool that effectively addresses the most pressing questions and provides accurate, actionable insights.

As we move forward, we shall make WISER more practical and impactful.

In Phase 1, we worked to create the needle—**with Phase 2, we seek to move the needle on water security in India.**

Reach us at

welllabs.comms@ifmr.ac.in

https://welllabs.org

@WELLLabs_org

Water, Environment, Land and Livelihoods (WELL) Labs

THANK YOU!

Annexures

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CROPPING INTENSITY

DIMENSION: ACCESS

SELECTION CRITERIA SCORECARD

Outcome-oriented

Highly sensitive
to work on the ground

Highly relevant
to stakeholders & geographies

Ease of capturing:
Easy
(Ground-truthed remote sensing data)

What does it tell us?

- This indicator is a measure of the number of crop cycles in a given area in a year.
- It is a useful proxy for access to irrigation cropping after the monsoon in India, which generally requires irrigation.
- Low cropping intensity indicates reliance on rainfall, which may also indicate climate vulnerability.

How is it calculated?

Cropping intensity data from **2010-11 to 2022-23** was analysed to assess its relationship with irrigation access.
Irrigation access from cropping intensity: Irrigation access is assessed based on the **average cropping intensity** value, which is derived from the **most prevalent cropping intensity category** over 12 years.

Cropping intensity categorisation as a proxy for irrigation access:
Very Low (<90%), Low (90%-120%), Moderate (120%-150%), High (150%-180%), and Very High (>180%).

Data Sources

Natural Resources Census: **National Remote Sensing Centre (NRSC)** Land Use Land Cover at 1: 250K (Bhuvan)

Other land use datasets were assessed, but NRSC data was found to be working well.

How can you use it?

1. If the water stress in the area is low and the cropping intensity is also low, the NGOs and governments may prioritise increasing access to irrigation.
2. Cropping intensity numbers are needed in crop water budgeting.
3. In water-stressed areas with high cropping intensity, the stakeholders may guide farmers in adopting water-efficient. practices

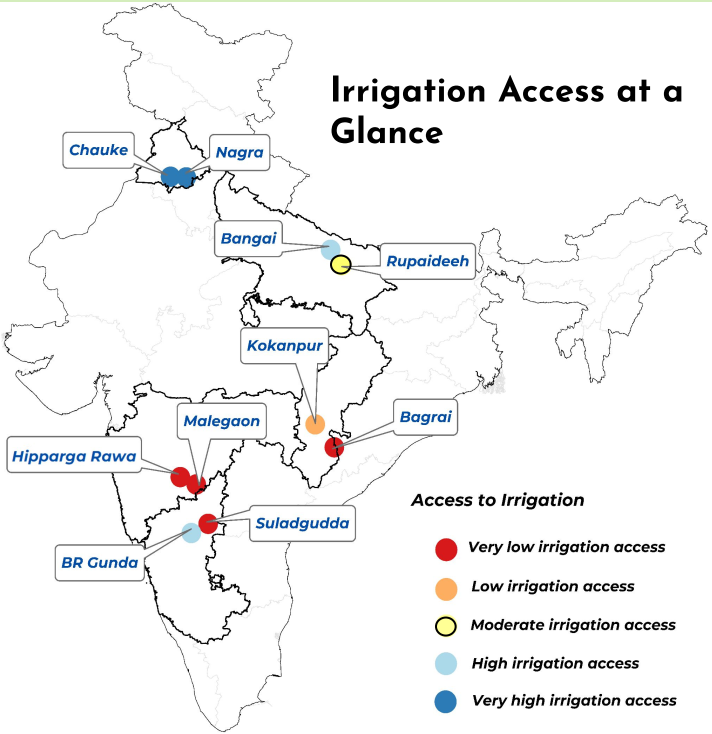
Limitations:

Cropping intensity may depend on factors apart from access to irrigation, like labour, market access, or the owner's proclivity. Some villages may achieve high cropping intensity even with limited irrigation by cultivating short-duration or drought-resistant crops.
This analysis, based on NRSC LULC data, may be complemented with primary data or ground truthing in areas with anomalous values.

Key takeaway:

Both villages in **Punjab** exhibit **very high cropping intensity (>190%)**, driven by extensive water availability from irrigation sources.
In UP, **Bangai has better access (176%) compared to Rupaideeh (152%)**, the latter has higher water stress, slightly declining GW, and lower resilience.
In KA, the data distinguishes well between **rainfed Suladgudda and canal irrigated BR Gunda.**
Other villages have relatively low access.

Irrigation Access at a Glance



State	Village	Average Cropping Intensity (% out of 200)	Most common irrigation source (% of farmers)	Second most common irrigation source (% of farmers)
PB	Chauke	192%	Well (97%)	Canal (53%)
	Nagra	198%	Well (100%)	Canal (42%)
UP	Bangai	176%	Well (100%)	Canal (33%)
	Rupaideeh	152%	Well (83%)	Buy Water (20%)
CG	Bagrai	84%	Well (43%)	Rainfed (30%)
	Kokanpur	97%	Well (53%)	Rainfed (40%)
MH	Hipparga Rawa	49%	Well (93%)	Buy Water (7%)
	Malegaon	54%	Well (100%)	None
KA	BR Gunda	168%	Canal (46%)	Rainfed (46%)
	Suladgudda	72%	Well (50%)	Canal (33%)

WISER Results Summary Matrix

DIMENSION	Indicator	Metric	How to interpret indicator values	Pilot Villages									
				PB		UP		CG		MH		KA	
				Chauke	Nagra	Bangai	Rupaideeh	Bagrai	Kokanpur	Malegaon	Hipparga Rawa	Sulad gudda	BR Gunda
BALANCE	Groundwater Levels	Change in groundwater level (**in meters**) between 2005 and 2021, calculated as the difference between 2021 and 2005 values for the same season	Closer to zero or more the better	-12.93	-15.63	0.1	0.72	-1.55	2.79	0.9	-1.44	2	-0.48
	Surface Water Extent	% reduction in surface water extent between post-monsoon (November) and peak summer (May).	Lower the better (0-100%)	80%	97%	95%	49%*	55%	80%	93%	69%	98%	No water bodies
	Water Stress	Indicates the balance between groundwater availability and extraction		Over exploited	Over exploited	Safe	Safe	Safe	Safe	Safe	Safe	Safe	Safe
ACCESS	Cropping intensity	Average cropping intensity calculated over the period 2010-11 to 2022-23, representing the sustained level of agricultural activity across years.	Higher the better (Values less than 100% indicate single cropping, while greater than 100% reflect multiple cropping cycles within a year.)	192%	198%	176%	152%	84%	97%	54%	49%	72%	168%
	Domestic Water Access	% of HHs who have adequate access to water for drinking & domestic use all year round, especially in the summer	Higher the better (0-100%)	100%	100%	53%	100%	33%	71%	77%	100%	83%	67%
	Domestic Water Quality	% of HHs that report they have access to clean water for domestic use (no visible contamination, foul smell, bad taste, etc.)	Higher the better (0-100%)	87%	10%**	97%	30%**	93%	57%	93%	100%	83%	38%**
PRODUCTIVITY	Crop Water Productivity	INR per m3 that farmers earn on average in the village (factors in crop choice & revenue per crop)	Higher the better	26	36	15	21	22	20	30	21	29	40
RESILIENCE	Variation in Cropping Intensity	Average reduction in cropped area during deficient rainfall years (with rainfall <20% of the long-term average).	Higher the better (Measured separately for kharif and rabi seasons, relative to their respective maximum cropped area, using 12 years of data (2010-11 to 2022-23). Based on this reduction, a resilience class has been assigned to each village.)	Very high resilience	Very high resilience	High resilience	Low resilience	Very low resilience	Very low resilience	Very low resilience	Very low resilience	Very low resilience	Moderate resilience
	Propensity to Droughts	Count of years (1991-2020) where SPEI < -1.3, indicating significant rainfall deficiency.	Lower the better	Low frequency	Low frequency	High frequency	High frequency	Low frequency	Low frequency	Low frequency	Low frequency	High frequency	High frequency
		% of cropping seasons between 2005-2022 where VCI < 35%, signaling severe vegetation stress	Lower the better	3%	0%	6%	0%	8%	3%	14%	11%	19%	17%
	Propensity to Floods	Likelihood of an area experiencing flooding based on rainfall patterns, land characteristics, and drainage capacity		Moderately vulnerable	Less vulnerable	Very highly vulnerable	Very highly vulnerable	Very highly vulnerable	Very highly vulnerable	Less vulnerable	Less vulnerable	Moderately vulnerable	Highly vulnerable
GOVERNANCE	Local Water Governance	% of HHs that report there is a local institution (formal or informal) in their village that decides how water will be shared among village residents, especially during water-stressed years	Higher the better(0-100%) (Exploratory questions asked in Phase 1. This indicator will be sharpened to be more reliable in Phase 2)	0%	0%	20%	6%	0%	0%	3.30%	0%	0%	25%
WATER & ECOSYSTEM HEALTH	Ambient Water Quality	Provides insights into the water quality and ecological health of lakes in villages by assessing the presence of eutrophication and fish population		Poor	Poor	Moderate	Poor	Moderate	Moderate	Moderate	Good	Good	No water bodies

LEGEND	Worse				Better

*Only for the year 2023-24.

** >60% of HHs in these villages were unaware of the quality of the water they used, but most of them reported using the water as is, indicating adequate water quality.

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A "scorecard" for a WISER village, complete with key takeaways, could look something like this:

BALANCE

2m	GW Levels
98%	SW Extent
Safe	Water Stress

PRODUCTIVITY

29	Water Stress

GOVERNANCE

0%	Local Water Governance

SULADGUDDA

Devadurga district, KA

Key Takeaways

With only 72% cropping intensity and a low water productivity score (29), agricultural output in Suladgudda remains limited. Despite safe water stress levels and strong domestic water access (83%), the area faces high drought propensity (19%) and very low resilience, signalling vulnerability in agricultural stability.

Limited Governance and Storage Risk:
With 0% local water governance and a 98% reduction in surface water extent, there's heavy dependence on existing water bodies. Strengthening governance and implementing better flood control and drought adaptation mechanisms are crucial.

ACCESS

Cropping Intensity (out of 200)	72%
Domestic Water Access	83%
Domestic Water Quality	83%

RESILIENCE

Variation in Cropping Intensity	Very low
Propensity to Droughts	High 19%
Propensity to Floods	Moderately vulnerable

WATER & ECOSYSTEM HEALTH

Ambient Water Quality	Good

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BR GUNDA

Devadurga district, KA

BALANCE

-0.48m	GW Levels
No water bodies	SW Extent
Safe	Water Stress

PRODUCTIVITY

40	Water Stress

GOVERNANCE

25%	Local Water Governance

Key Takeaways

High Agricultural Activity, Moderate Resilience: With 168% cropping intensity and 40 INR/m^3 productivity, agriculture thrives, but moderate resilience and high drought frequency (17%) pose risks.

No water bodies for storage, yet high flood vulnerability (25%), highlighting the need for better water management infrastructure.

ACCESS

Cropping Intensity (out of 200)	168%
Domestic Water Access	67%
Domestic Water Quality	38%

RESILIENCE

Variation in Cropping Intensity	Moderate resilience	
Propensity to Droughts	High	17%
Propensity to Floods	Highly vulnerable	

WATER & ECOSYSTEM HEALTH

Ambient Water Quality	No water bodies