DCM SHRIRAM FOUNDATION & THE/NUDGE Prize

DCM Shriram AgWater Challenge

Securing water and prosperity for 1 million farmers

inducing scalable innovations within India's agri-water ecosystem to improve agricultural water utilisation specifically in Fine Cereals & Cash Crops
& build productivity and prosperity for water stressed smallholder farmers to improve economic outcomes

In partnership with
Office of the Principal Scientific Adviser
to the Government of India

Arriving at problem statements for the DCM Shriram AgWater Challenge launch

1. Initial precursors identified as levers leading to problem statements

Technological

- Cost of technology has been a pain point for small farmers
- Technology/ innovations to make micro irrigation systems a low cost, affordable affair to SHFs without any subsidy

Need low-cost technology to save water

Regional

- Undocumented Indigenous Technical Knowledge (ITK)/ Indigenous Agricultural Practices (IAPs)
- North-western, western and southern states are highly water-stressed for agri, along with the Indo-Gangetic plains

Water-stressed region-specific interventions required

Institutional

- Inadequate awareness creation, capacity building and handholding
- Lack of discipline in implementation and governance of Govt. interventions
- Lack of farmer/ community-centric approaches for water interventions

Awareness creation to save water

Financial

- Lack of financial affordability to buy water-tech without external support
- Lack of favorable/ flexible financing options for tech adoption
- Lack of water valuation/ monetization interventions

Ease of finance for SHFs

Crop Specific

- Decreasing area under rice cultivation due to scarcity of water for irrigation
- Crops such as millets consume less water and are drought-tolerant – useful for crop diversification

Interventions required for water guzzling crops

Behavioral

- Increasingly fragmented and scattered landholdings
- Adoption of micro irrigation in field crops cultivation required a cultural shift
- Gap between pitch/ promises and practicality of solutions offered by agtech cos./ startups
- Unavailability and, if available, high cost of PSS; also delayed TAT

Innovations for field crops & Small land size

Administrative

- Lack of (timely) electricity supply hinders irrigation schedules
- Free electricity leading to unaccounted/ unbudgeted GW withdrawals in a few states
- Undocumented/ improper land titles
- Lack of reliable, economical and sustainable sources of energy
- Lack of inter-dept./ ministerial coordination

2. Precursors: 9 deprioritized and rejected

Administrative

- Lack of (timely) electricity at household level hinders with irrigation schedules
- Free electricity driving unaccounted/ unbudgeted GW withdrawals in some states
- Govt. initiatives such as ‘Har Khet Ko Paani’ and ‘More Crop Per Drop’ lack robust conveyance facilities
- Improper Ownership of land/ land titles
- Lack of reliable and economical sources of energy
- Lack of inter-departmental/ inter-ministerial coordination, schemes/ incentives offered to farmers in isolation/ silos

Behavioral

- Unavailability and cost (if available) of post-sales services & Delayed turnaround time for post sales services: For innovations to sustain in the market require after sales service for at least 3 to 5 years
- Field Crop cultivation shifting it to micro irrigation is a cultural shift

Institutional

- Lack of technical knowledge/ consumer awareness on purchase of right pump sets

3. 14 precursors merged into 6 problem themes basis a high level approach adopted

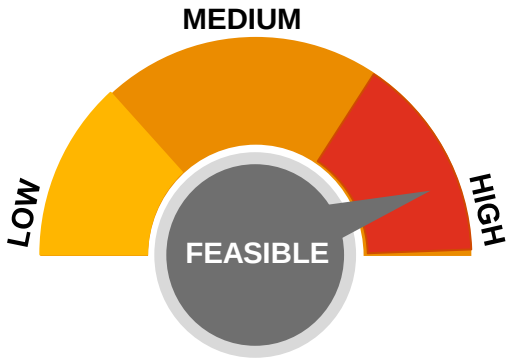
- Wider reach in terms of no. of SHFs and water-stressed regions
- Cash crops – impacting SHFs incomes
- Flexible financing models for better tech adoption
- Community participation and community led initiatives
- Low-cost/ affordable tech for better adoption
- Multi-pronged approaches for SHFs for ‘Saving Water’

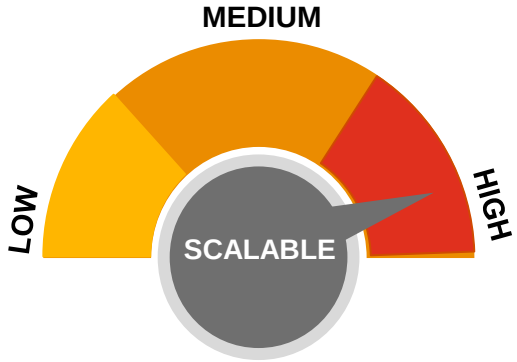
4. Problem statement 1: Innovating tech solutions to reduce water consumption in fine cereals (by >60% in rice and >40% in wheat)

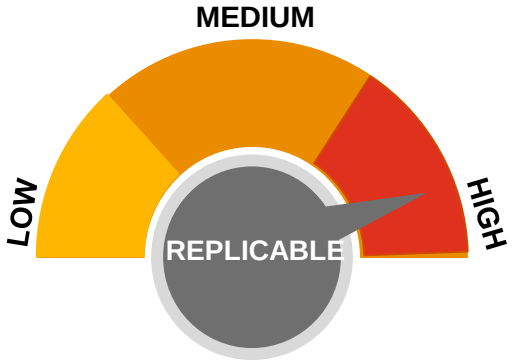
PRECURSORS

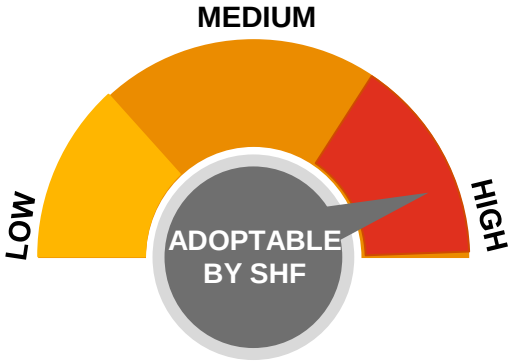
- Intensive cultivation in water stressed areas
- Decreasing area under rice cultivation
- Crop diversifications/ varietal preferences
- Unsuitability of micro irrigation systems in field crops
- Lack of low-cost tech/ innovations to reduce water consumption

RATING









RATIONALE

- A no. of Smart Irrigation Technologies are available i.e., Saturated Soil Culture, Alternate Wetting and Drying, Aerobic Rice (varietal change), SRI, etc. with soil moisture sensors, satellite imaging, etc.

- 50-70% of total cropped area is under rice cultivation 393.79 lakh hectares
- Wheat is grown under ~100% irrigated conditions, i.e., 318.69 lakh hectares in major wheat growing states

- This problem is relevant to all categories of farmers – marginal, small, medium and large, esp. in water critical states
- And other field crops too

- Moisture stress at vegetative stage of rice leads to 30% yield loss while 50-60% at reproductive stage
- In wheat, moisture stress leads to upto 72% losses in yield

Challenge:

Technological innovation to reduce water consumption in fine cereals (>60% in rice and >40% in wheat) with profitability improvements by atleast 40-50%, costing not more that 20% of cost of cultivation

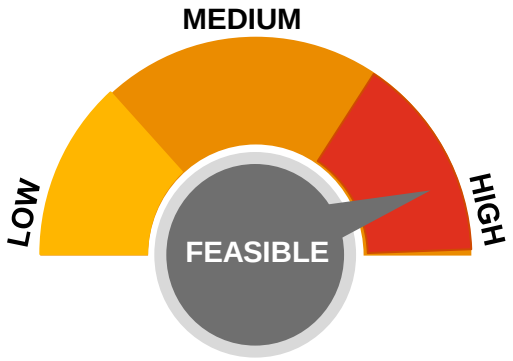
Achieving a verifiable pool of 5-6k smallholder farmers (or, 5k hectares)

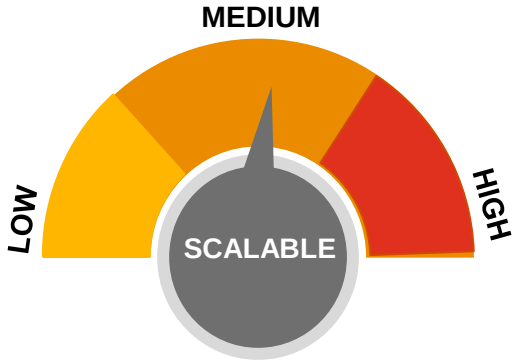
5. Problem statement 2: Innovating tech solutions to reduce water consumption in cash crops (by >20% in sugarcane and >50% in cotton)

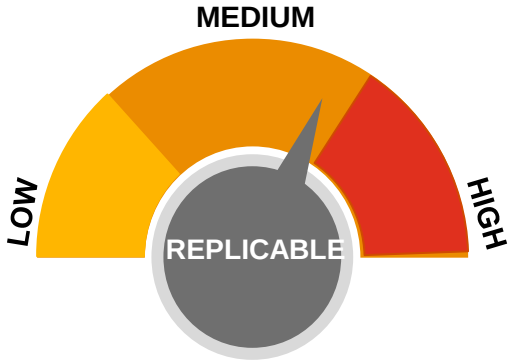
PRECURSORS

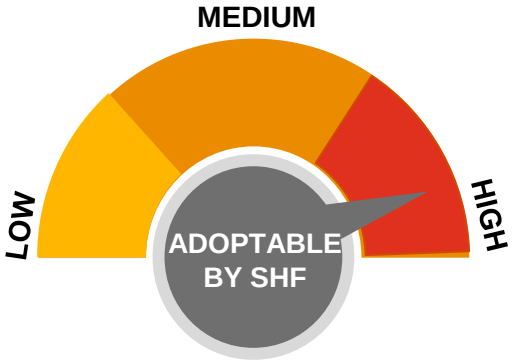
- Intensive cultivation at water stressed areas
- Lack of low-cost tech innovations to reduce water consumption
- Low adoption of micro irrigation systems in cash crops
- Crop diversification/ varietal preferences

RATING









RATIONALE

- Irrigation technologies such as drip, sprinkler, spray, sub-surface, bubbler, etc. are available along with AI/ ML and IoT assisted controlling

- Sugarcane is grown under ~100% irrigated conditions (48.84 lakh hectares); acreage under cotton is 120.69 lakh hectares
- Sugarcane and cotton both are grown in regions/ states that are already critically water stressed

- Can be replicable to other crops of similar spacing i.e., 75-90 cm

- The avg. LH size is small in top three sugarcane and cotton states, with 80% and 65% of production share
- SHFs have the intention and willingness, but many other factors come into play for tech adoption

Challenge:

Technological innovation to reduce water consumption in cash crops (>20% in sugarcane and >50% in cotton) with profitability improvements by atleast 40-50%, costing not more that 10-15% of cost of cultivation

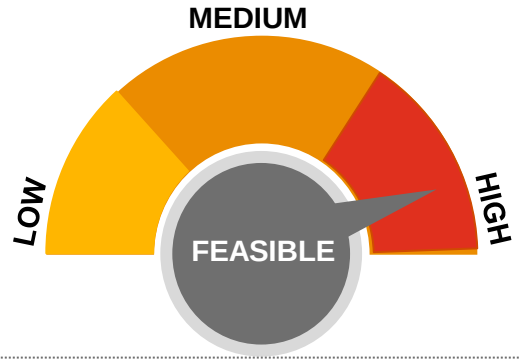
Achieving a verifiable pool of 5-6k smallholder farmers (or, 5k hectares)

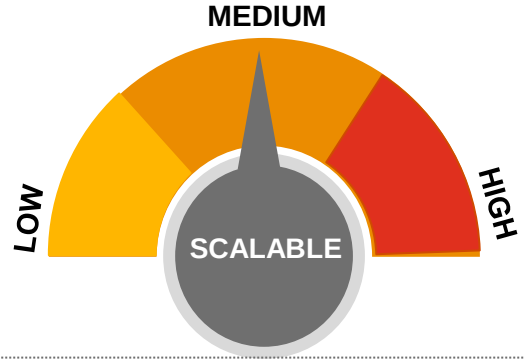
6. Problem statement 3: Scalable financing tools/ products for SHFs for promoting adoption of water saving tech at lending rate not more than 12%

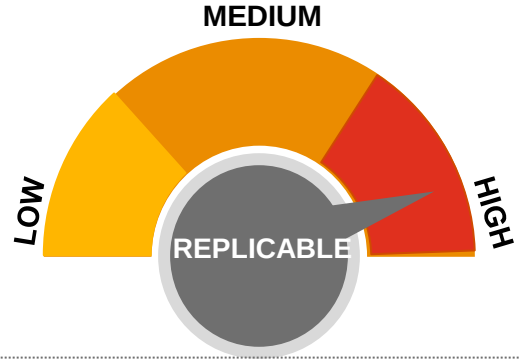
PRECURSORS

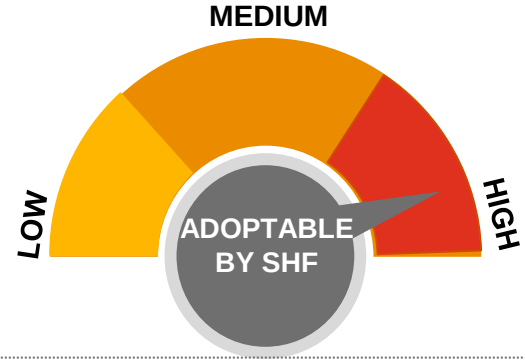
- Cost of technology is a major pain point for SHFs
- High subsidies in a tech with annual physical/ financial targets limits adoption rate, so do complex procedures to avail subsidy with no/ minimal handholding support to SHFs
- Lack of favorable financing options for tech adoption

RATING









RATIONALE

- Although multiple products such as subsidies and micro loans are available, they are not available for specific tech solutions
- 86% of farmers are small and marginal and they are unable to meet eligibility criteria for subsidies/ incentives due to lack of proper documents and knowledge on compliances and processes
- Access to finance to SHFs in adoption of not just tech to save water and increase WUE but other innovations also
- Indian farmers on an avg. have debt equivalent to 60% of their annual income
- That's why, further spending on technology adoption is low

Challenge:

Introducing financing tools/ models for SHFs for adopting water saving tech at lending rate not more than 12%

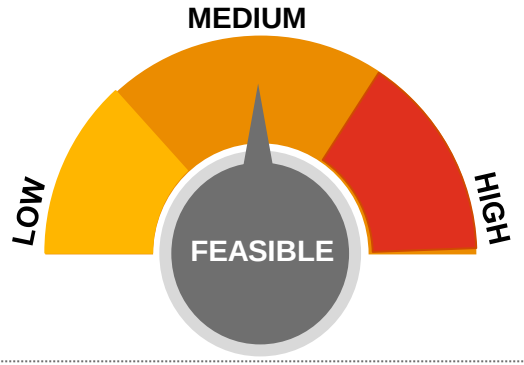
- NAFA (Netafim): Min. loan amt.= INR 1 lakh, Max. tenure= 5 y, Lending rate= 17-24%, Min. land size= 3 acres (https://www.nafa.co.in/agricultural-loans.html)
- SAFL (Jain): Loan amt.= INR 1 lakh, Max tenure= 5 y, Lending rate= 12-17%, Min. land size= 1 acre (https://www.safl.in/index.php/products/micro_irrigation_system_financing)

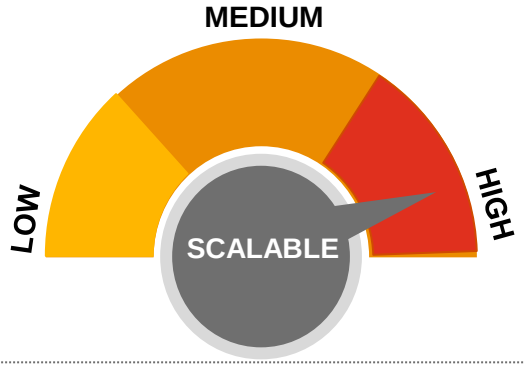
7. Problem statement 4: Monetizing water savings to not less than 35%* of the current revenues for SHFs through innovative models

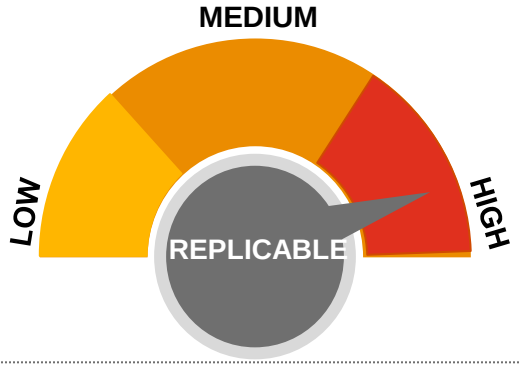
PRECURSORS

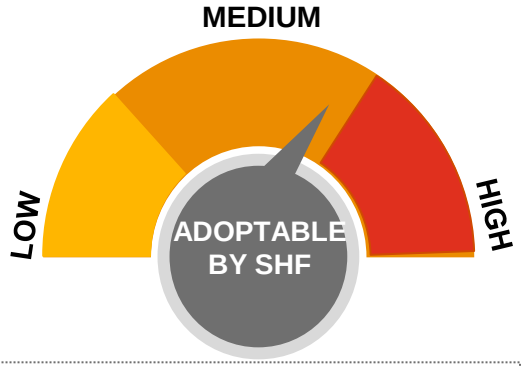
- Lack of financial flexibility
- Lack of insurance/ guarantee programs for farmers to adopt/ invest in tech/ innovation
- Risk taking appetite of SHFs is less as agriculture directly affects their livelihoods

RATING









RATIONALE

- Various insurance and yield/ income-assurance products are available in market, hedging risk for SHFs
- Providers for monetizing carbon and/ or water credits are available, but in limited no.

- 86% of farmers are SHFs and their livelihood is directly dependent on and affected by agriculture

- Will be relevant for different regions and different crops

- As this will provide incentives for farmer initiatives
- However, the quantum of incentives/ returns is limited

Challenge:
Innovations leading to creation of water market(s) in that guarantee added revenue to SHFs through water credits

- If farmers maintain the water level in fields at a certain threshold for a month, based on soil moisture detection by Fasal devices which tells whether water is adequately available to crops, then they get their subscription fees waived for that month i.e., INR 250-500, depending on services. [1,000 signed up in 2 months]

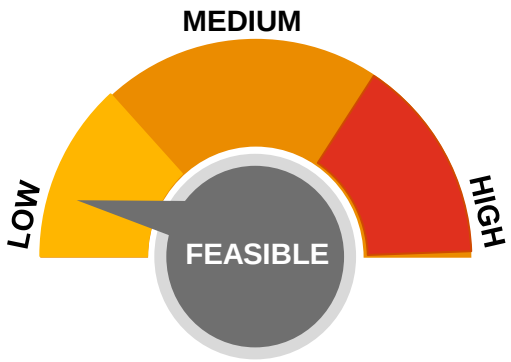
*Source: https://www.climatepolicyinitiative.org/wp-content/uploads/2020/09/Monetizing_Water_Savings_Instrument_Analysis.pdf

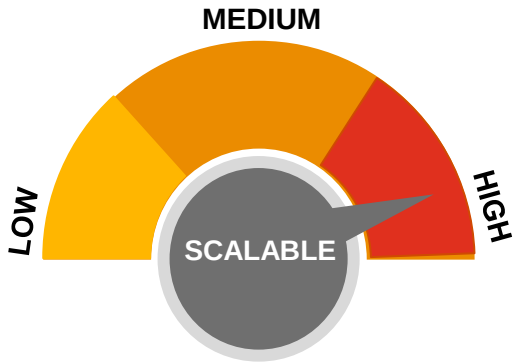
8. Problem statement 5: Creating institutional mechanisms for creating awareness on water stress esp. for SHFs in water-stressed regions

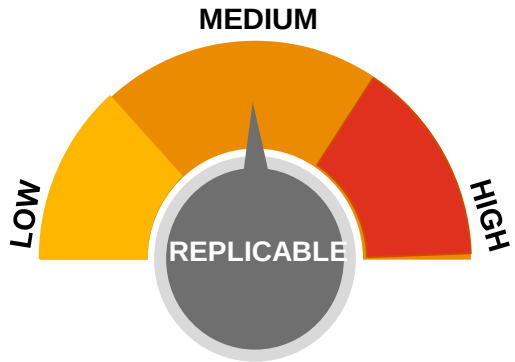
PRECURSORS

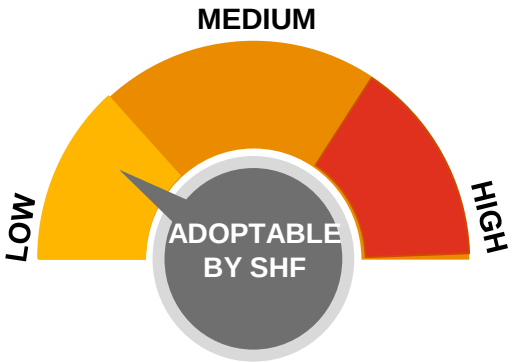
- Lack of awareness about water stress and optimal use of water
- Lack of monetized value to water i.e., water charges/ water credits/ water accounting or budgeting for SHFs
- Gap between pitch/ promises and practicality of solutions offered

RATING









RATIONALE

- There are only govt. initiatives to increase awareness around water crisis, and that also gets sidelined/ dropped from focus among other schemes
- There is no such private push

- There is a conspicuous decline in the groundwater levels across the country

- For awareness programs – different issues are dealt with differently, however, one issue may impact at multiple levels and can be inter-linked

- Water stress is not perceived as a problem by SHFs till the wells run dry or there is a severe dearth of water availability for irrigation

Challenge:

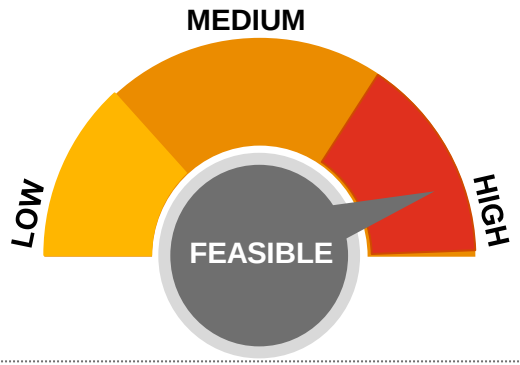
Create an institutional arrangement to spread awareness about the water stress among SHFs and sensitize them on the value and benefits of action taken to save water

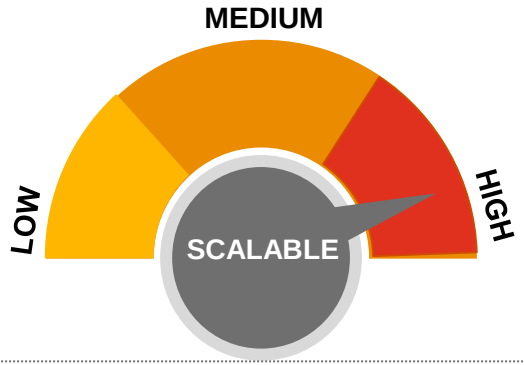
9. Problem statement 6: Scaling community-led approaches to water-budgeting/ rationing

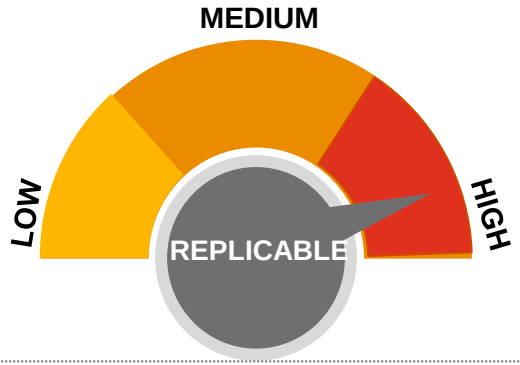
PRECURSORS

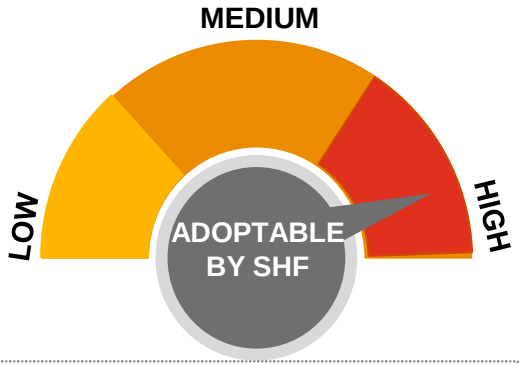
- Declining trend in groundwater level across the country
- Increasingly fragmented and scattered landholdings
- Lack of discipline in implementation and governance of initiatives/ interventions
- Undocumented Indigenous Technical Knowledge (ITK) of SHFs

RATING









RATIONALE

- Water associations/ water user groups/ cooperatives and other community development organizations are active across water-stressed regions in the country

- There is a declining trend in the groundwater levels across the country

- 20.35% area of the country is over-exploited and critical while 14% of area is semi-critical
- This comprises of 1/3rd of the country area that is water-stressed

- As aquifers are spread from few sq m to hundreds of sq km, individual farmer efforts without community support/ cooperation will not help groundwater to recharge and thus, will not yield results in saving water

Challenge:

Creating community-led innovations/ interventions for sustainable groundwater management with improved ground water level, and equitable distribution of water to farmers such as O&M of minor canal system and collection of irrigation water charges

10. Legend slide: description of parameters

Precursors – Information came through different sources such as secondary research, workshops and internal brainstorming sessions leading to specific problems

FEASIBLE	**Availability of technologies / service providers which/who can work upon to resolve the problem**	**LOW**	No or just one available
		MEDIUM	Less than 3 available
		HIGH	Mores than 3 available
SCALABLE	**Problems with wider reach or affecting large number of population**	**LOW**	Limited Problem
		MEDIUM	Problem persist but with limitation
		HIGH	Problem uniformly persist
REPLICABLE	**Problems which can be replicated to different regions, crops, group of farmers**	**LOW**	Specific problem
		MEDIUM	Problem with some restrictions
		HIGH	Problem no restrictions
ADOPTABLE BY SHF	**Extent to which problems affect small holder farmers**	**LOW**	Specific SHFs affected
		MEDIUM	Affecting majority but limited solution
		HIGH	Affecting majority of SHF


Thank you!