Co-managing floods and droughts on the Gangetic Plain through a novel MAR approach

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Intervention / Approach

Objectives

1. Develop a sound evidence-based case for Underground Taming of Floods for Irrigation (UTFI)

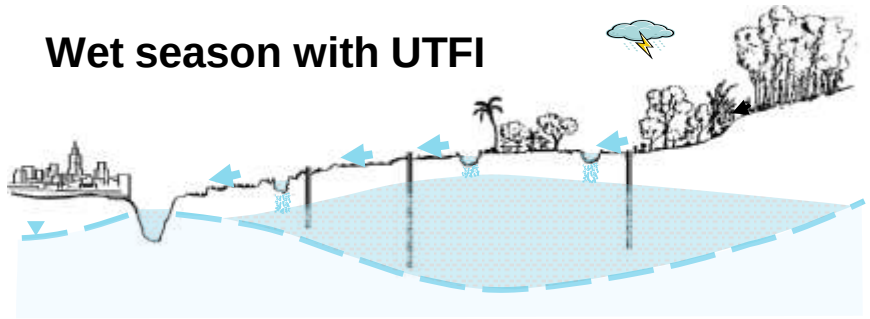
2. Facilitate opportunities for scaling up in prospective parts of the Ganges

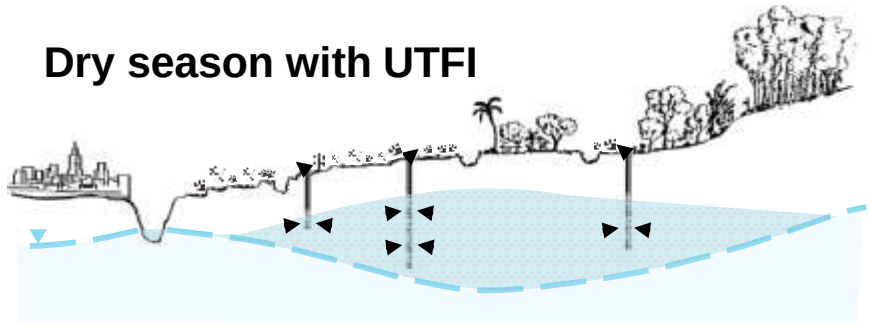
Approach

Research – mapping, hydrologic/ hydraulic modelling, pilot testing (technical, social/gender, economic, institutional, environmental analysis)

Engagement – workshops, open days, dialogue, trainings

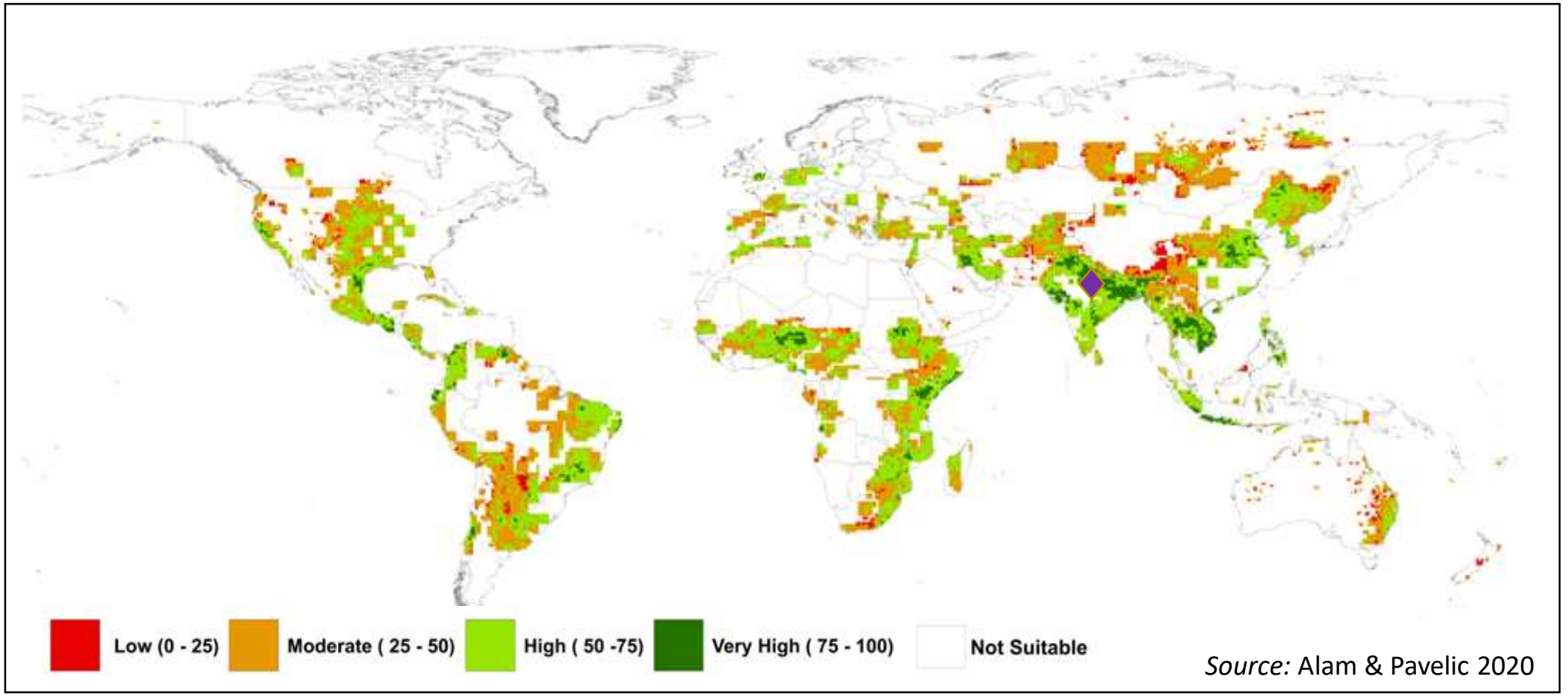
UTFI Concept





Source: IWMI

Site Selection & Wider Opportunities

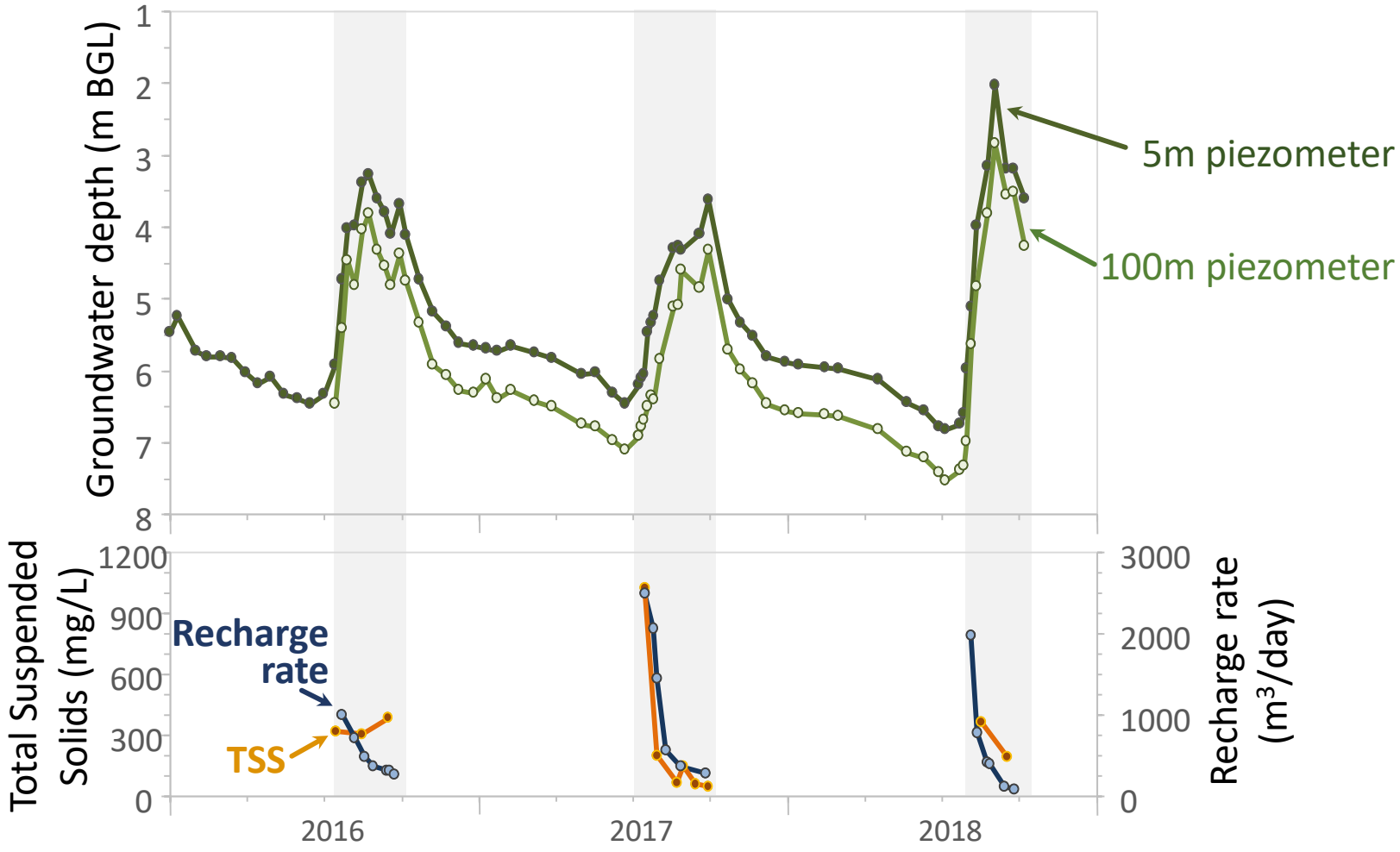


Source: Alam & Pavelic 2020

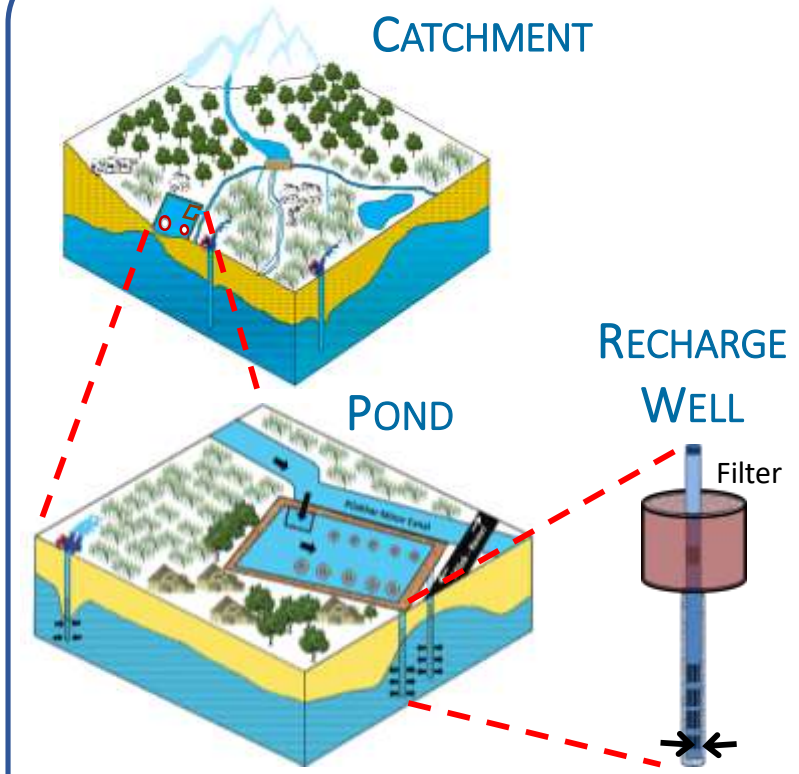
Green shaded areas highlight where the scope for UTFI is promising. These areas account for 50% of the global population and 40% of the crop area.

Areas where the piloting has taken place is highlighted by '◆' above.

Piloting Results – Water Quantity



Recharge Volumes (ML)	**45**	**62**	**26**
Rainfall (mm)	857	905	1812

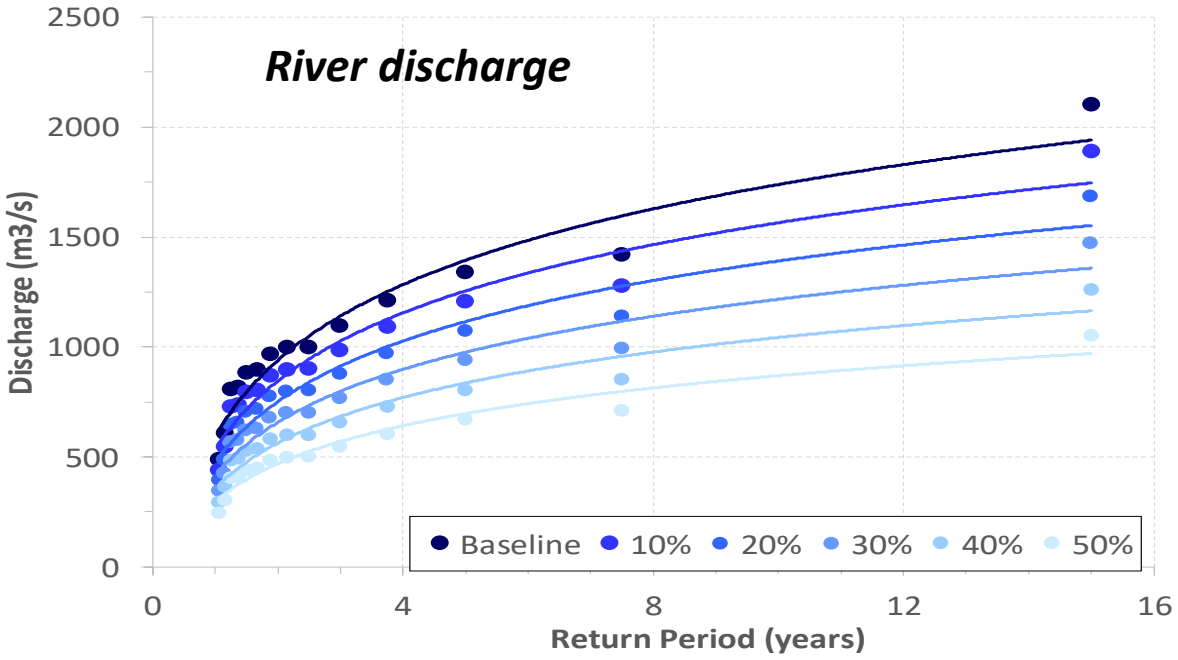


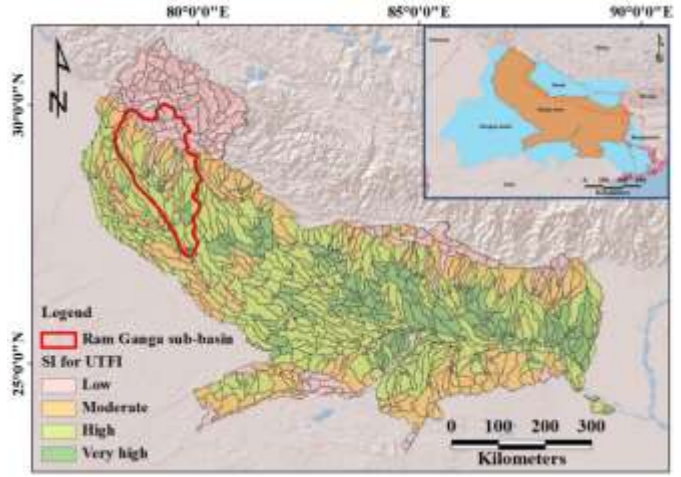
Piloting Results – Water Quality

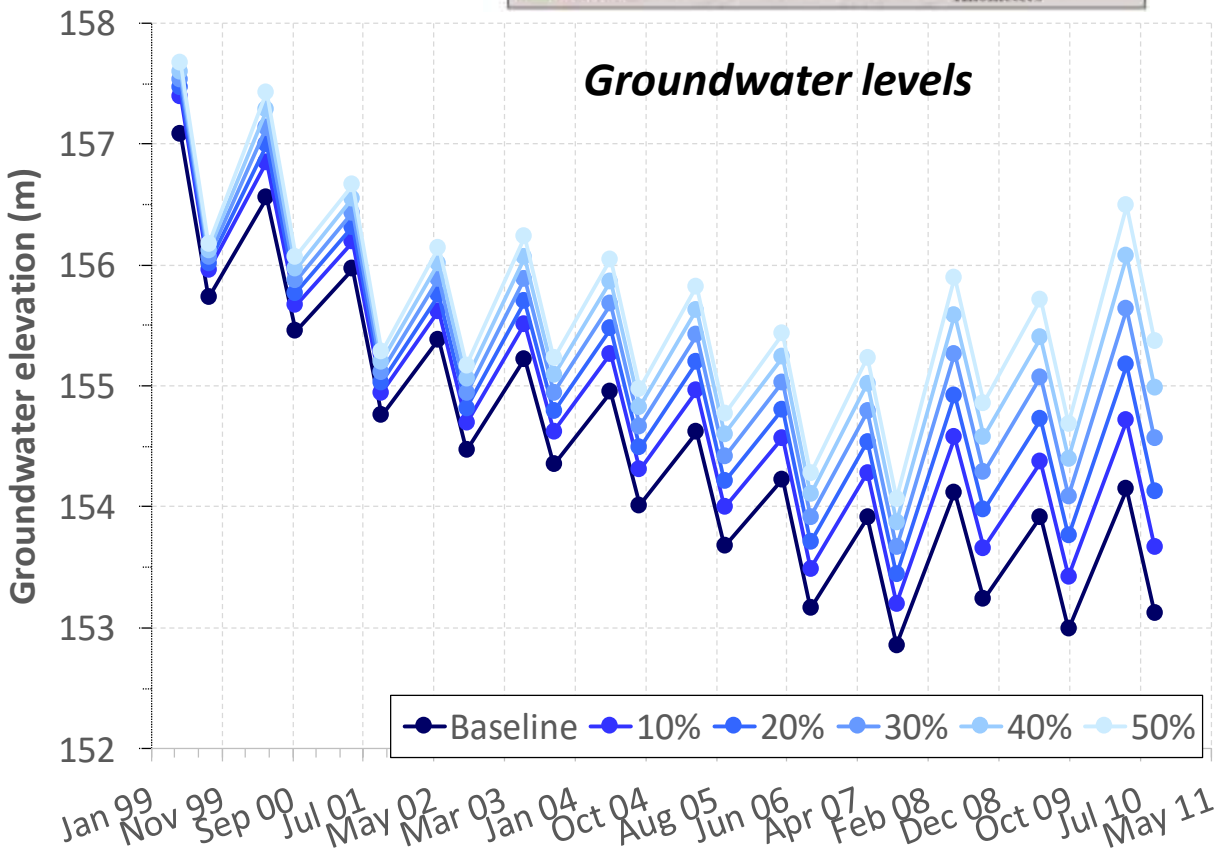
Parameter	BIS Std.	Recharge Water			Near-Groundwater			Far-Groundwater		
		N	Conc.	% Exceed	N	Conc.	% Exceed	N	Conc.	% Exceed
pH	6.5-8.5	27	7.6±0.45	0	72	7.6±0.4	0	42	7.4±0.4	0
TDS [8] (mg/L)	500	27	360±90	7	72	470±130	42	42	450±160	19
Fluoride (mg/L)	1	18	0.23±0.07	0	70	0.32±0.11	0	35	0.24±0.08	0
Nitrate (mg/L)	45	6	13.3±1.3	0	41	11.0±3.2	0	10	3.8±0.5	0
Arsenic (µg/L)	10 / 50	8	15.4±8.6	75 / 0	44	13.1±4.6	77 / 0	21	17.0±15.0	62 / 0
Chromium (µg/L)	50	8	38±40	25	44	34±36	18	21	53±55	43
Iron (µg/L)	300	8	201±76	0	44	212±92	7	21	138±119	10
Lead (µg/L)	10	8	5.8±6.0	38	44	2.7±1.4	0	21	4.4±4.6	14
Mercury (µg/L)	1	8	3.9±3.8	88	44	2.4±2.4	91	21	4.0±4.5	67
Nickel (µg/L)	20	8	28±44	13	44	28±43	48	21	20±23	29
Fecal coliform (MPN/100mL)	0	8	730±780	100	32	410±580	97	8	110±190	75

- Heavy metal and biological parameters exceed standard in both recharge water and groundwater
- GW influenced by recharge is of comparable quality to ambient GW

Upscaling Pilot to Basin Scale







- SWAT-MODFLOW modelling at basin scale for alternative scenarios of UTFI implementation
- GW depletion can be reversed and flood risk reduced

Source: Chinnasamy et al. 2018

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Thank you

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