Village Water Security Plan, Raepur

Gram Panchayat - Raepur

(Block Ujiarpur, District Samastipur)

Bihar

Plan prepared by

Raepur Gram Panchayat, September 2019

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Inner page: Land use mapping exercise in Raepur on July 23, 2019

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Village Water Security Plan, Raepur

September 2019

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ARID COMMUNITIES & TECHNOLOGIES

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Contents

I. GRAM PANCHAYAT APPROVAL OF THE PLAN

II. BACKGROUND

The National Rural Drinking Water Programme prescribes the preparation of village water security plans for safeguarding the sustainability of drinking water services in villages. This water security plan has been prepared by the Gram Panchayat and Ward Implementation and Management Committees of Raepur Gram Panchayat, Ujiarpur block, Samastipur District, Bihar in keeping with the guidelines issued by the Department of Drinking Water and Sanitation, Ministry of Jal Shakti, Government of India in its Handbook for Gram Panchayats[1] to help village institutions plan, implement, operate, maintain and manage drinking water supplies and ensure its sustainability.

Technical support for water point and household surveys, dug well surveys and water regime mapping, land parcel mapping, Participatory Rural Appraisals, identification of WASH (Water, Sanitation and Hygiene) and source sustainability issues and possible water security interventions among other things was provided by the Watershed India Programme. The programme focuses on improved management and governance of water and sanitation services and water resources they depend upon. The programme is being implemented in Samastipur District in Bihar. The programme details are given in the Annex VIII.

III. PARTICIPATORY PLANNING PROCESS

Baseline assessments of WASH and water resources was carried out in Raepur village using the following tools

1) Secondary data collection from existing government records
2) Key Informant Interviews
3) Survey of all public water points in the villages
4) A sample household survey
5) Focal Group Discussions(FGD) and Participatory Rural Appraisals

WASH planning

Community participation at various levels was ensured through Focal Group Discussions (FGD), participatory mapping exercises. Ward wise meetings with ward members, women and marginalised communities were held to capture water and sanitation issues and identify priorties with respect to drinking water, sanitation and hygiene services.

Source security planning

FGDs and key informant interviews helped outline historical trends in water regimes. Remote sensing and GIS (Geographic Information System) mapping technology were used to understand surface water flows and its pathways and map hydrological structures. SRTM

[1] https://jalshakti-ddws.gov.in/sites/default/files/GPHandbook_0.pdf

Digital elevation Model (DEM) was used to derive surface drainage networks and understand water flow pathways. This was ground checked using mobile GIS mapping technologies.

The finer natural and man made drainages not captured through Remote Sensing data in and around village was digitised using mobile based applications, Google Earth. Remote Sensing and GIS tools were also used for water body mapping, analysis of land use and land cover changes over time. Indian Meteorological Department (IMD) data was used to understand rainfall variation.

To capture groundwater dimensions and see its behaviour *vis a vis* geology and landform, dug well inventorisation of sample wells and borewells in the village and its surrounding areas was conducted during pre and post monsoon season in 2018 after a training of Watershed partners, Panchayat and ward members on its methodology. This led to mapping for geology, generation of sub-surface geo-hydrological profiles across the watershed and development of groundwater level maps i.e. Reduced Water Level (RWL) maps for flow direction and Static Water Level (SWL) maps for occurrences of groundwater at different depth.

Village meeting on 18th September 2019 was held to conduct parcel wise land use mapping, survey of defunct borewells, calculation of water balance based on local water demand and supply with the participation of ward members, women, Village Panchayati Raj Institution head (Mukhiya), local key informants and youth. Appropriate source security interventions and sustainable land and water management activities were discussed and framed as part of this meeting.

The water source interventions, the service improvement, operationand maintenance and water safety interventions were presented, discussed and finalised in a Panchayat meeting held on 18th September 2019 (Annex VI).

IV. WATER SECURITY PLAN COMPONENTS

This water security plan contains

- Water balance estimates
- Source sustainability interventions
- Water safety interventions
- Service improvement measures for hand pumps and piped water supply schemes

V. VILLAGE PROFILE

1. Name of the GP

Raepur

State Code	State Name	Dist-rict Code	District Name	Sub District Code	Sub District Name	CD Block Code	CD Block Name	GP Code	GP Name	Village Code	Village Name
10	BIHAR	221	Samastipur	01298	Ujiyarpur	0286	Ujiyarpur	0018	Raepur	237094	Raepur

2. Total current population in the GP and number of households

Total population of GP – 14,893

Total Households of GP – 3,889

3. Number of villages and wards in the GP

Total number of villages in GP – 3 (Raepur, Ujiyarpur, & Madhopur)

Total number of wards in the GP – 14

4. Names of villages proposed for coverage

Raepur

5. Wards proposed for coverage

Total fourteen wards falling under Raepur revenue village Ward no. 3 to Ward no. 13

6. Population of villages/wards and number of households

Total population of the village – 10,036

Number of households - 2151

7. Ward wise population details

Village	Tola Name/Ward No	Households	Population	SC population	OBC population
RAEPUR	Ward No. 3	187	933	0	559
RAEPUR	Ward No. 4	193	967	0	967
RAEPUR	Ward No. 5	184	754	0	326
RAEPUR	Ward No. 6	209	803	89	714
RAEPUR	Ward No. 7	166	736	89	467
RAEPUR	Ward No. 8	197	979	0	979
RAEPUR	Ward No. 9	227	1248	204	1044
RAEPUR	Ward No. 10	199	1115	223	892

RAEPUR	Ward No. 11	207	698	534	164
RAEPUR	Ward No. 12	169	867	514	353
RAEPUR	Ward No. 13	213	936	274	662
	Total Raepur	**2151**	**10,036**	**1927**	**7127**

Population is based on lists available at Panchayat level, Source: Mukhiya, Raepur Panchayat and ward members, 2019

8. Description of the water system

100 % sampling of all water points (safe and unsafe) including hand pumps, wells, public stand posts, tap inside house was done for the village. All the water points were geo-located and photographed. The baseline figures were updated to arrive at current figures. The water point survey covers the following topics –

- Information about the type of water point
- Functionality and service levels
- Users per water point and water usage
- Installation, O & M of water points
- Response of service providers for O & M
- Seasonality and sufficiency of water supply
- Water quality and existing monitoring mechanisms
- Drainage and water safety
- Perceptions about water quality
- Institutions responsible for O & M
- User tariffs
- Fund utilization and management

S.No.	Type of waterpoints	Number	Functional	Dysfunctional (Not working since over a year)	Not working since few days/months
1.	**Type and number of public water source**				
	Mark II Hand pumps	28	17	6	5
	Non-specific Hand pumps	0	0	0	0
	PHE6 Hand pumps	50	32	12	6
	Pipeline/tap (inside the house)	67	67	0	0
	Public tap/stand post	27	24	1	2
	Unprotected/Open Dug Well	19	7	12	0
	HH Connection[¥]	1513	1513	-	-

	Overhead tanks	0	0	0	0
	No. of tube wells pumping water in piped water supply schemes	0	0	0	0
2.	**Families using public water source**				**1513**
3.	**Families using private water source**				**638**

The figures are based on water point surveys of all public water points in September –October 2017. The number and status of water points has been updated based on inputs from Panchayat and WIMC members in meeting held on 23rd July 2019, Source: Panchayat and ward members

¥ Details of household connections are given below

Village	Ward No.	Total Household	Number of households having drinking water supply	Sources
Raepur	Ward No. 3	187	187	PHED
Raepur	Ward No. 4	193	193	WIMC
Raepur	Ward No. 5	184	184	WIMC
Raepur	Ward No. 6	209	209	WIMC
Raepur	Ward No. 7	166	166	WIMC
Raepur	Ward No. 8	197	197	WIMC
Raepur	Ward No. 9	227	73	PHED
Raepur	Ward No. 10	199	199	PHED
Raepur	Ward No. 11	207	105	PHED
Raepur	Ward No. 12	169	0	PHED
Raepur	Ward No. 13	213	0	PHED
	Total	**2151**	**1513**	

9. Key issues

Till July 2019, some parts of ward 9, 10 and 11 had access to piped water supply of the PHED. In rest of the areas in these wards handpumps were the only drinking water source. In wards 4, 5, 6, 7 and 8 Har Ghar Nal Jal Yojana has started functioning providing piped water to the households as given in the table above. As of November 2019, in wards 3, 9, 10, 11, 12 and 13 work on household water supply schemes has been started but not yet completed. Hand pumps continue to be the main source in these wards. The main issues with respect to hand pumps is listed below.

S. No.	Issues	Units
1.	**Service improvement issues hand pumps**	
	Newly constructed households away from main habitation have poor access to hand pumps	0
2.	**Service improvement issues household piped water scheme**	
3.	**Water safety issues household piped water schemes**	
	Information on water quality of new pipe water borewells has not be made available at Panchayat and ward level and also to the common public	
4.	**Water safety issues hand pumps**	
	Hand pumps and public stand posts with no platforms	51
	Hand pumps and public stand posts with cracked/broken platforms	28
	Hand Pumps and public stand posts with good condition platforms	42
	Fecal matter presence near water points	56
	Hand pumps and wells with toilets at a distance of less than 10 metres	34
	No drainage around Water points	20
	Run off from water point flows in to water body	9
	Coliform presence	24 public water points
	Hand pumps with Iron in excess of acceptable limits of 0.3 mg/litre	33public water points
5.	**Operation and maintenance issues hand pumps**	
	Hand pumps requiring repair	56
	➢ Broken handles of hand pumps	➢ 18
	➢ Handle is too tight	➢ 26
	➢ Hand pumps with damaged water pipes	➢ 12

VI. SERVICE IMPROVEMENT AND O & M PLAN

1. Hand pumps operation and maintenance

Type of service Improvement/ Operation & Maintenance	Units	Priority (Immediate/ This year/Next year/Later/Not required)	Responsibility	Cost
Installation of new hand pumps to reach out to communities with poor access				
Procurement of spare parts (cylinders)to repair hand pumps	24	Immediate	PHED	Rs. 500 – 1000/-
Administrative tasks	Keeping ledgers on hand pumps, functionality and records	This year	PHED	

2. Piped Water Supply System

This lists down the training requirement and operational activities for piped water supply connections in the wards.

Type of Service Improvement/ Operation and Maintenance	Action proposed	Responsibility, and how frequently	Priority (Yes/ No) (Immediate / Next year)	Cost if any
Contract management capability for ward committee members	Training to ward committee members		Next Year by BDO	
Operation and maintenance capability	Design terms of reference or basic service agreement for operator	Ward committee	Immediate	
Household Connections	Subsidizing connection cost for SC, ST or BPL households, women headed households	Ward committee	Yes	
Spare part management	Procurement of spare	Operator	Yes	
Regular operation and maintenance	Pump operation	Operator	Yes	

	Checking of valves	Operator		
	Flow, pressure, electric panel, wiring check	Operator		
Storage tank maintenance	Tank cover	Operator, Monthly	Yes	
	Regular cleaning of tanks	Operator, Three months		
	Any other	Operator		
Pipe network (leakage)	Leak detection and repair	Operator, monthly	Yes	
Water quality	Sanitary surveys, Sample collection for regular testing at district laboratories	ASHA, Half yearly	Yes	
	Chlorine check	ASHA, Weekly	Yes	
Customer Service	Setup a customer complaints recording system and set response time	Ward committee	Yes	
Accounts and Bookkeeping	Keep ledgers for operational and financial records	Ward committee, monthly	Yes	
Customer database, billing and collection arrangements	✓ Procedures for new connection ✓ Application ✓ Billing and tariff collection ✓ Disconnection policy	Ward committee, monthly	Yes	
	Maintenance of record of houses with a connection Record of non-payment	Ward committee member/Operator, monthly	Yes	

VII. WATER SAFETY PLAN

Risks	Control measures	Units	Priority (Immediate/ This year/Next year/Later /Not required)	Costs per unit if any
Hand pumps, wells and stand posts				
Area around water points is muddy and poorly drained	Construction of raised platform around handpumps and public stand posts	23	Next year	Rs 3000/unit
	Repair of existing platforms around handpumps and public stand posts	40	Next year	Rs 500 - 1000 /unit
	Construction of wastewater drains to take water away from water points under the the *Har Ghar Nali Gali scheme*		Next year	Estimate would be prepared and integrated in the scheme
Livestock encroachment and animal feces	Fencing	-	Not required	
Risk of contamination from toilet effluents	Relocate latrines at least 10 meters away	24	Not possible due to space constraint	
Fecal matter around water points	Public awareness through in Panchayat meetings, Use of IEC signboards	Monthly Nukkad Sabha		
Livestock effluents	Public awareness for construction of Nullahs by livestock owners to relocate effluent pathways away from hand pumps in consultation with livestock owners	Monthly Nukkad Sabha		
Treatment systems				
Chemical and bacteriological contamination	Monthly ward meetings with participation of ASHA workers to take stock and to ensure that bleaching is	-		

	done every three months by ASHA workers			
	Pre monsoon and post monsoon sample collection by WIMC members and sending to District laboratories for testing	-		
Household storage and handling				
Unclean storage container, absence of lid on storage container, no handwashing with soap	Public awareness/IEC and empower women groups to advocate for personal hygiene and proper storage and handling	Discussion on water handling, health and hygiene in monthly Nukkad Sabha		
Drinking water does not meet potable standards	Household drinking water purification – IEC on household water treatment measures	Discussion on water handling, health and hygiene in monthly Nukkad Sabha		
Household solid waste management				
Risk of contamination of water points, nitrification and dumping in open water bodies	Awareness generation through proper use of IEC materials to promote waste segregation practice	-		
	Training on Vermi composting	1		

VIII. SOURCE SUSTAINABILITY PLAN

1. Description of the sources

Water sources	Number	Water use			Average depth
		Domestic	Irrigation	Groundwater recharge	
Open Wells	46	40	0		25-30 feet
Bore wells	23	0	23	0	60-90 feet
Pond	5	0	5	No	25-30 feet
River	No	No	No	No	No

Chaur, Maun, Jheel	1 (Debkhal chaur)	No	Yes	No	1-6 feet

2. Geo-hydrological characteristics

Domat Mitti is found from 0 to 5 feet below ground level. A layer of *Chikani Mitti* is encountered at 5-10 feet. *Kali Mitti* is found at around 10-17 feet. *Kankrit* is found at 18-24 feet. A sandy layer at 25-30 feet forms the shallow aquifers.

3. Land use

Land use	Area in ha
Agriculture in two season	79.78
Agriculture in three season	198.97
Fishpond	0.81
Settlement	86.44
Road	11.23
Waterbody	34.33
Stream	2.31
Cemetery land	0.48
Plantation	1.67
Railway	3.52
Total	**419.54**

4. Average water quality

Average TDS levels in observed dug wells was found to be mostly below 330 -470 mg/l (Acceptable limits for drinking water is below 500 mg/l)[2]

5. Average water table

Average water levels during post monsoon season ranges from 0 to 10 m below the surface. This depletes up to 10 –12 m during summers. In major portions the water levels improve from 8-10 m before monsoons to 4-6 m below ground level after monsoons. In the northern part the static water level is high and between 0-2 m whereas the central southern part of the village the water level is between 10-12 m below ground. (See Annex III)

[2] Acceptable limits for drinking water is below 500 mg/l as per Bureau of Indian Standards

To understand groundwater flow reduced water level maps have been prepared. The ISO RWL map reveals that the groundwater flow during pre-monsoon season is from north to south direction.

The surface water flows in the village are from north west to south east direction.

6. Water balance

Water demand estimation has been done using area cultivated under different crops as per the cropping mix prevalent in nearby villages in the current year and domestic water consumption. Surface water supply estimates were calculated using rainfall and other parameters.

Water balance of the village taking in to account local rainfall is negative (-1.11 MCM). While the water balance may improve, if riverine inflows and groundwater component are also considered, nevertheless it is important that village optimizes its water consumption which can be done employing water efficient irrigation techniques, suitable water conservation and recharge measures and by preservation and restoration of wetland regimes.

	Annual Water balance estimation for Raepur village[3]	
Annual water demand (MCM)	Agriculture demand	5.189
	Domestic (@ 70 litres per capita/day)	0.256
Annual water supply (MCM)	Surface	4.334
	Groundwater	Not calculated
Water balance (MCM)		-1.112

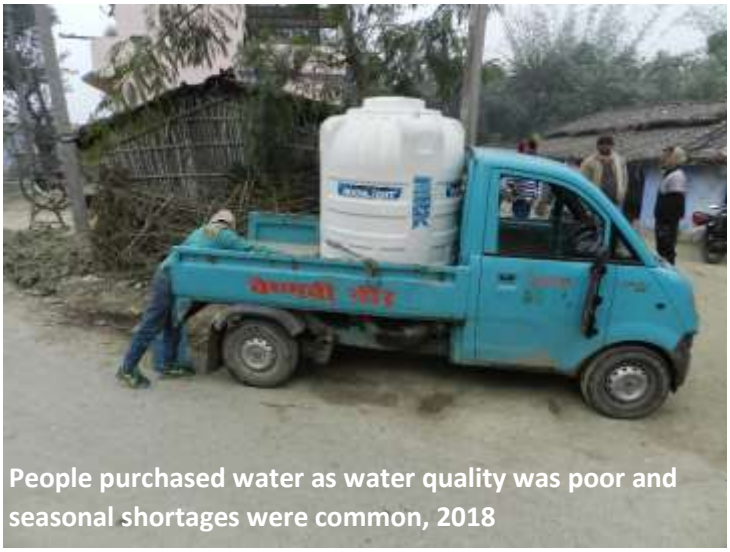
2. Problems with source sustainability and strategy

Depletion of shallow aquifers and lowering of water tables was found to be a major issue in the village. This is a major factor responsible for non-functionality of handpumps. Land use changes have taken place and there has been a gradual loss of surface water storage structures and hence groundwater recharge in the village as natural wetland areas in and around the village have declined over the years.

Southern parts of the village the water levels remain depleted in summers as well after monsoon. These areas are intensively cropped during all the three seasons – Rabi, Kharif and Garma. Groundwater also flows towards the southern parts in the village but that too does not compensate for the water that is being abstracted. This points for the need of

[3] Note: The water balance estimation is subject to refinement after taking into consideration the groundwater component and also riverine inflows. Livestock water requirement being a very small fraction of overall water use has not been added. However the estimates here roughly capture the water balance situation

- Improvement of surface water storage by restoration and rejuvenation of wetlands such as ponds, Chaur and nullahs (Annex V)
- Conjunctive use of water for irrigation particularly in water depleted areas in southern parts of village
- Adopting less water intensive cropping choices and use of water efficient irrigation practices
- Awareness on suitable land use practices



People purchased water as water quality was poor and seasonal shortages were common, 2018

Drainage channels need to be maintained to support irrigation, drainage and groundwater recharge, 2019

Irrigation borewells are drying up, 2018

Poor drainage around hand pumps and high risk of contamination of water, 2018

3. Water Source Plan

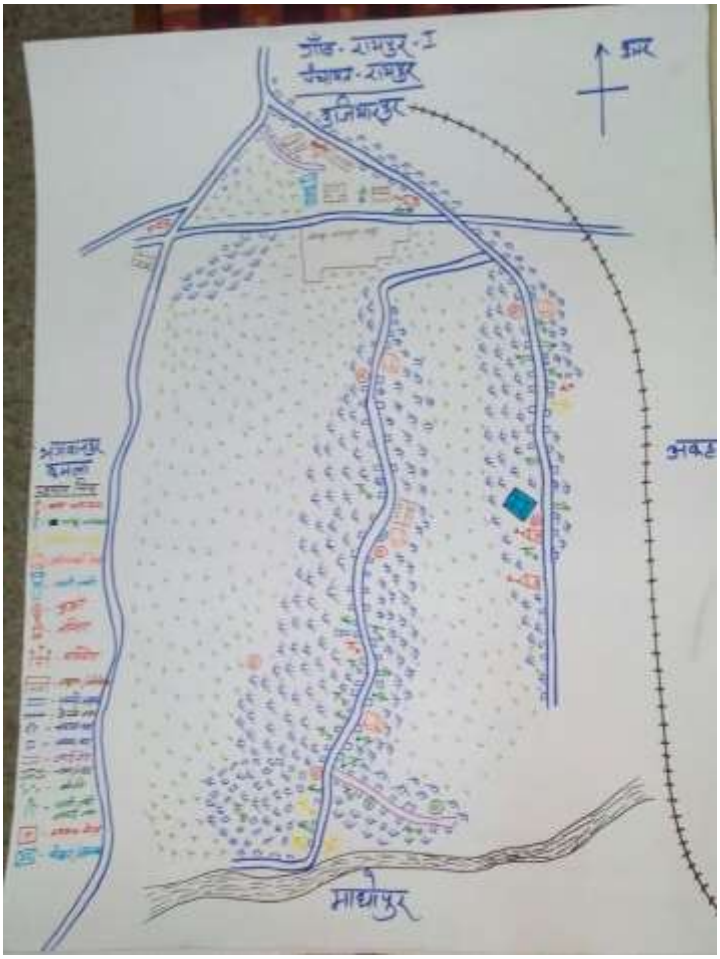
Accordingly the following strategies have been proposed for water management in the village.

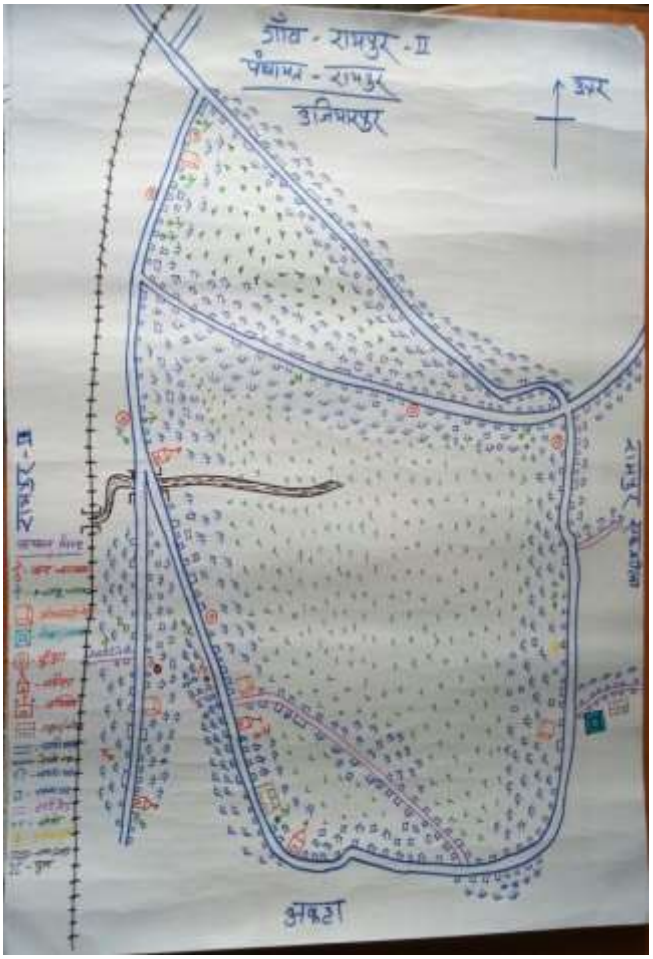
S No.	Sustainability strategies	Units	Priority (Immediate/ This year/Next year/Later /Not required)	Cost per unit
Improvement of surface water storage				
1.	Rejuvenation of **Pokhar** and **Chaur areas** as water storage structure	5	This year but subject to availability of funds	Rs. 1-1.5 Lakh but subject to preparation of actual estimates
2.	Monthly awareness meetings through Nukkad Sabah for maintenance of water channels in the village and removal of encroachments/obstructions to water flow		This year	
3.	Training on agroforestry practices for maintenance of buffer zone around water bodies for soil conservation	1	Next year	
Groundwater recharge in recharge zone				
1.	Demonstration on conversion of borewells in to recharge structures	1	Immediate	
2.	Meetings with borewell owners to promote awareness on the utility of converting defunct borewells into recharge borewells		Immediate to this year	
3.	Training on use of dug wells in to recharge structures	1	This year to next year	
4.	Use of dug wells as recharge structures ✓ Cleaning of wells ✓ Cover the dug wells ✓ Construction of roof water harvesting structures and diverting the flows to dugwells	-	This year to next year subject to availability of funds	
Water conservation in farming practices				
1.	Trainings to facilitate uptake of water conserving irrigation practices such as micro irrigation methods	-	This year	

2.	Awareness generation through Nukkad Sabha for promoting conjunctive use of groundwater and surface water for agriculture		Yes	
3.	Awareness generation through Nukkad Sabha for promoting water demand side management measures		Yes	
4.	Knowledge dissemination through IEC on less water intensive crops		This year	
Monitoring of water regimes				
1.	Monitoring of water levels and water quality in dugwells through survey in pre and post monsoon season		Next year	
2.	Training on preparing inventory and monitoring of water bodies – ponds and chaur area, mapping their water spread area, water storage capacity, usage among other things		Next year	
3.	Maintenance of village level records on status of water sources integrating inputs from dugwell surveys and water body mapping that gets updated annually	-	Next year	

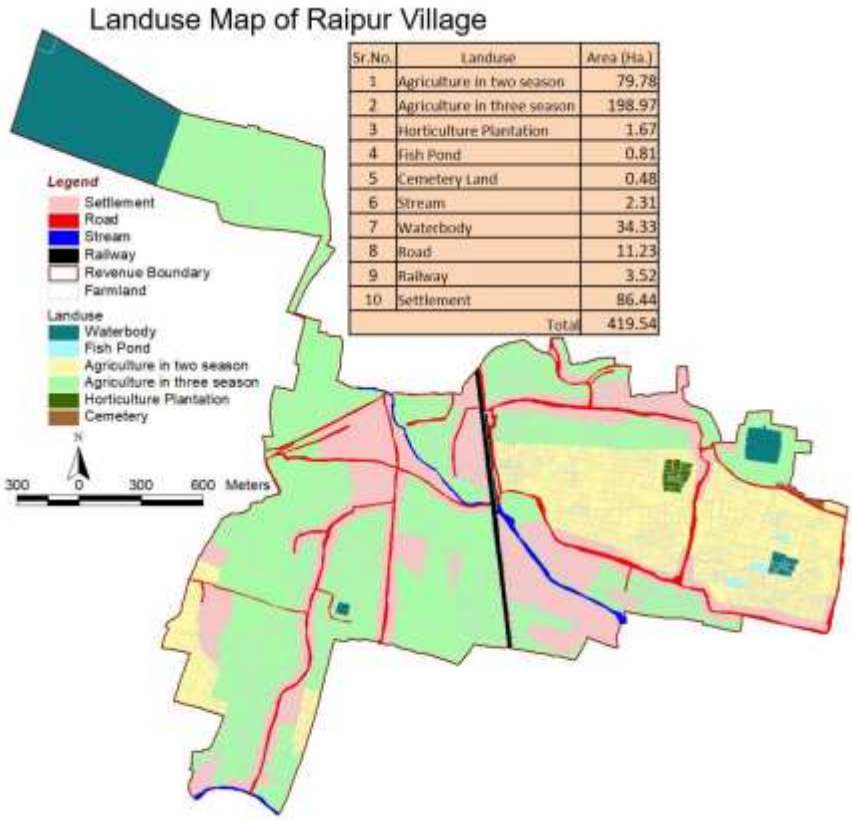
Annex I

PRA resource map of Raepur village





Land use map of Raepur village

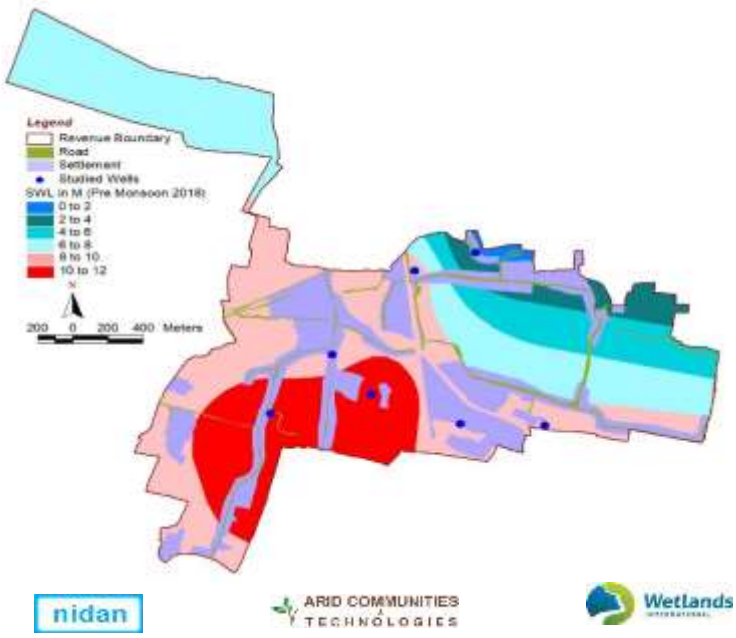


Large areas are under three season cropping. An irrigation cum drainage channel maintained by the Water Resource Department runs through the village supporting agriculture in some parts. Agriculture water use needs to be optimised. Debkhal Chaur is a source of irrigation and water storage capacity of the wetland should be maintained.

Annex III.

Map showing Static Water Levels during (A) Pre-monsoon season and (B) post monsoon season in village Raepur during year 2018

A



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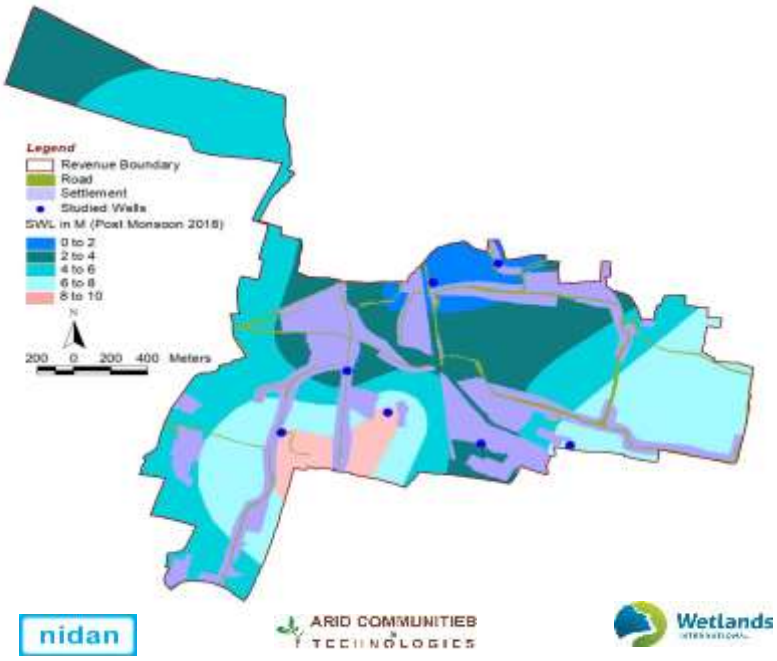
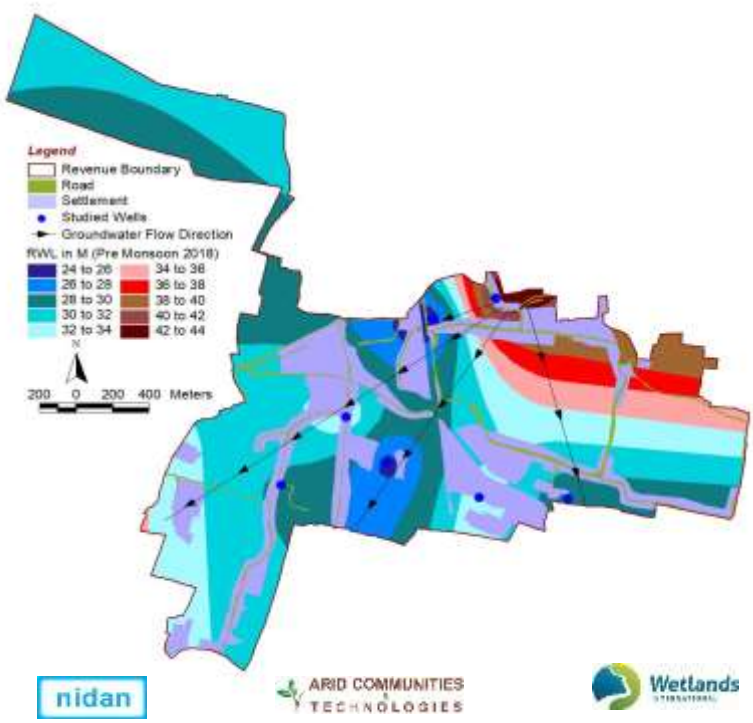


The groundwater levels remain permanently low in southern parts of the village highlighted in red. The handpumps/water systems located in the south central habitations of the village face higher risk of dysfunctionality in the absence of any recharge from wetlands (Chaur), high groundwater abstraction irrigation water use and very little groundwater inflows in this zone.

Map showing Reduced Water Level Zones during (A) Pre-monsoon Season and (B) Post Monsoon Season in village Raepur during year 2018

A



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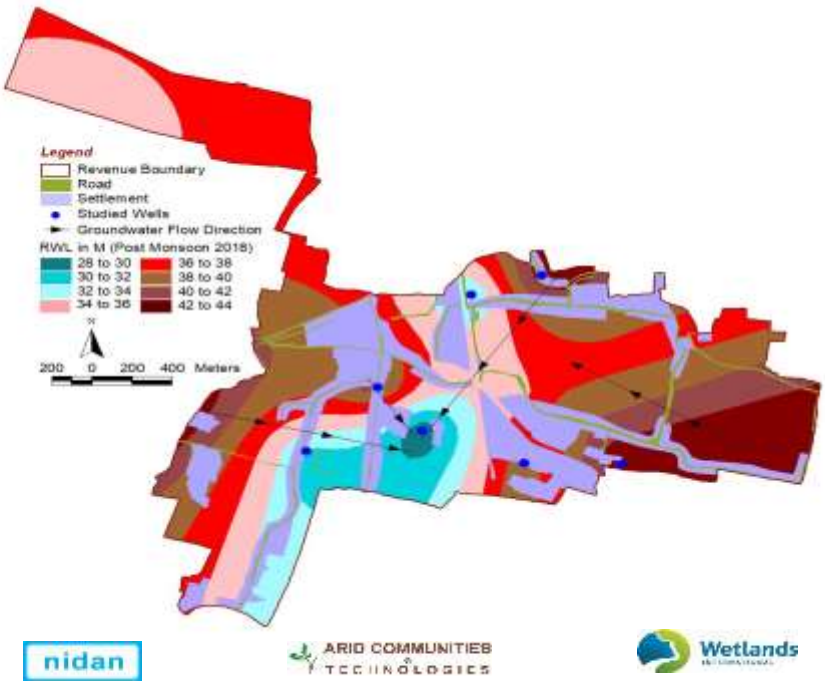
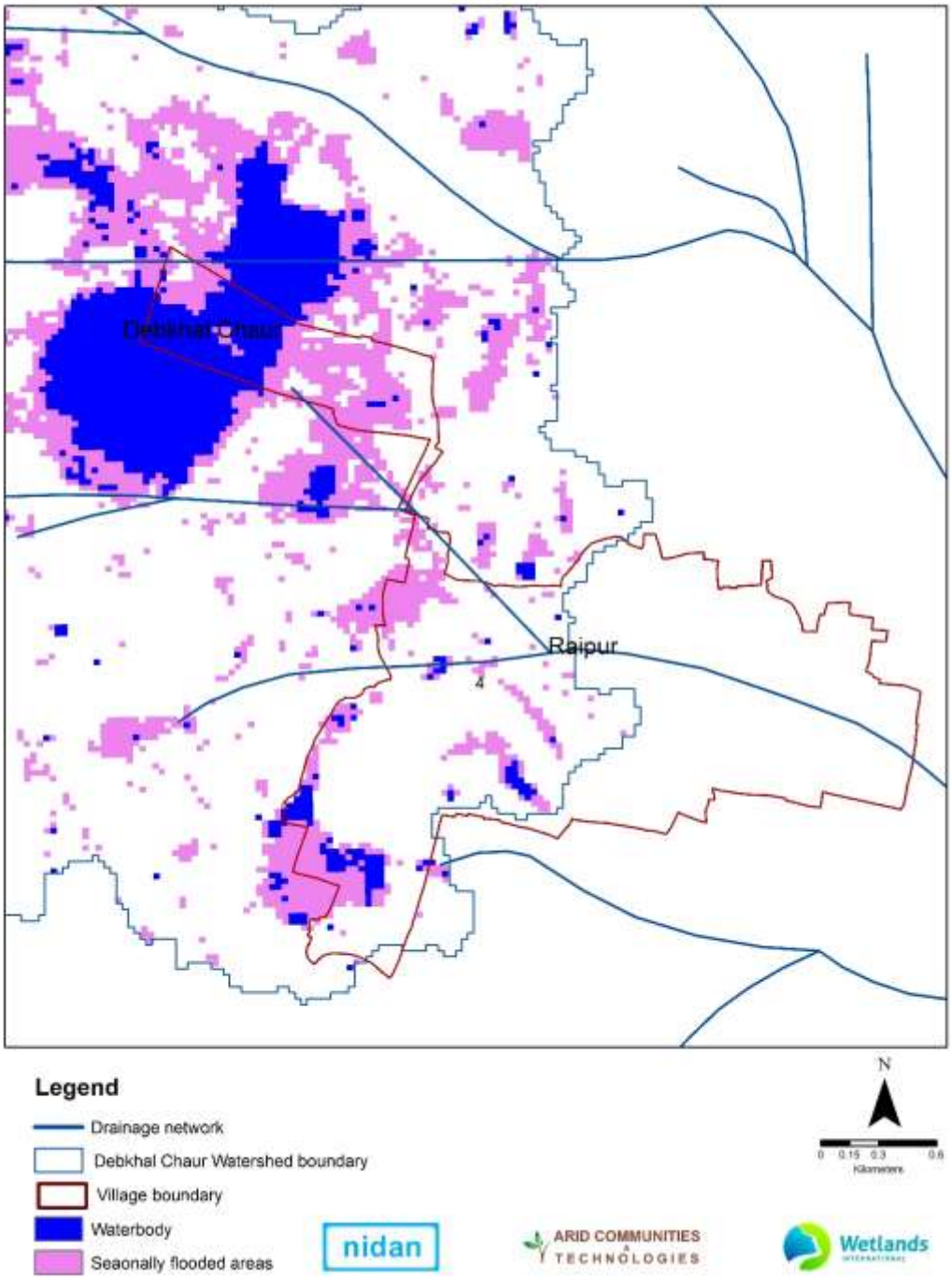


Arrows show the direction in which groundwater flows in the village.

Annex V.

Map showing surface drainages derived from satellite data and wetlands



This information can be used to align drainage lines in and around Raepur. The map shows wetland areas (*Chaur* areas) both seasonal and permanent that can be rejuvenated for improving water storage to support irrigation after consultations with land owners. Debkhal Chaur overlays with parts of the village.

Annex VI.

List of village representatives attending meeting for land use mapping held on July 23, 2019 in Raepur

Sl. No.	Name	Designation	Ward No.
1.	USHA DEVI		
2.	MANTUN CHAUDHARY	Community leader	
3.	CHANDAN KUMAR	Community Leader	
4.	MANJU DEVI	Ward Member	5
5.	SITA RAM JHA	Ward Member	6
6.	SUBDHI DEVI	Ward Member	7
7.	HARISH CHANDRA GIRI	Ward Member	8
8.	SOBHA DEVI	Ward Member	9
9.	VINDESWARI DEVI	Ward Member	10
10.	BHULLI DEVI	Ward Member	11
11.	JAGDISH RAM	Ward Member	12
12.	SHIBU BAITHA	Ward Member	13
13.	SHEELA DEVI	Community Member	
14.	PRAMOD SAHANI	Community Member	

Annex VII:

List of village representatives attending meeting on water security planning held on September 18, 2019 in Raepur

Sl. No.	Name	Designation	Ward No.
1.	USHA DEVI		
2.	MANTUN CHAUDHARY	Community leader	
3.	CHANDAN KUMAR	Community Leader	
4.	MANJU DEVI	Ward Member	5
5.	SITA RAM JHA	Ward Member	6
6.	SUBDHI DEVI	Ward Member	7
7.	HARISH CHANDRA GIRI	Ward Member	8
8.	SOBHA DEVI	Ward Member	9
9.	VINDESWARI DEVI	Ward Member	10
10.	BHULLI DEVI	Ward Member	11
11.	JAGDISH RAM	Ward Member	12
12.	SHIBU BAITHA	Ward Member	13
13.	SHEELA DEVI	Community Member	
14.	PRAMOD SAHANI	Community Member	
15.	UPENDRA SAHANI	Sarpanch	
16.	RAM BABU RAI	Secretary	

Annex VIII:

About the Watershed India Programme

This water security plan has been prepared by the Raepur Gram Panchayat and village communities with the support of Wetlands International South Asia, Nidan and Arid Communities and Technologies (ACT) under the Watershed India programme.

Watershed India is a strategic partnership programme of the Dutch Ministry of Foreign Affairs, Wetlands International, IRC and Akvo. The programme is being implemented in Debkhal Chaur wetland basin in Samastipur District, Bihar in partnership with Nidan and in Tampara wetland basin, Ganjam District, Odisha in partnership with Gram Utthan.

Working through pilot locations where water resources are scarce or contested and where environmental management is at the core of the WASH sustainability challenge, the programme aims to deliver improvements in the governance and management of water, sanitation and hygiene services and ensuring sustainability of water resource they depend on. More about the programme can be accessed from the website https://watershed.nl/.

Contact:

Ms Kalpana Ambastha - kalpana.ambastha@wi-sa.org - Wetlands International South Asia

Mr Vishal Anand - vishal@nidan.in - Nidan

Mr. Yogesh Jadeja - ACT

Mr. Jayantilal Gorsiya - ACT

Mr. Tirath Nishad – Nidan

Mr Jitendra Kumar Ravi - Nidan

Stay in touch

Wetlands International South Asia
A – 25, Floors 1 & 2, Defence Colony
New Delhi – 110024, INDIA
Email: wi.southasia@wi-sa.org
Tel: +91 - 11 - 24338906, 46038906

Email: wi.southasia@wi-sa.org
URL : http://south-asia.wetlands.org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