STATUS OF GREY-WATER MANAGEMENT IN RURAL AREAS OF RAE BARELI DISTRICT

Photo credit: Mohit Patel/CSE

CSE surveyed 86 villages in the district of Rae Bareli in Uttar Pradesh to understand the generation and management of grey water.

Around 4 lakh households in rural areas of Rae Bareli have been connected with household water connections under Jal Jeevan Mission. Housholds also have private borewells and/or handpumps.

This clearly indicates that the amount of water received per capita is more than the norm of 55 litre per day set by Jal Jeevan Mission.

According to the rule of thumb, 70 per cent of the water used is converted to wastewater. Injudicious use of water will lead to generation of huge amounts of grey water from washing areas, kitchens and bathrooms.

Initiatives so far taken for rejuvenation of the ponds are not enough as the focus is never on management of grey water.

In most cases, the drains are not well-designed, and are clogged and silted up. The CSE survey during the monsoon period showed that the drains overflow and flood neighbouring areas.

Diseases such as cholera and malaria are prevalent in villages during the rainy season, and more so in villages where households lack toilets.

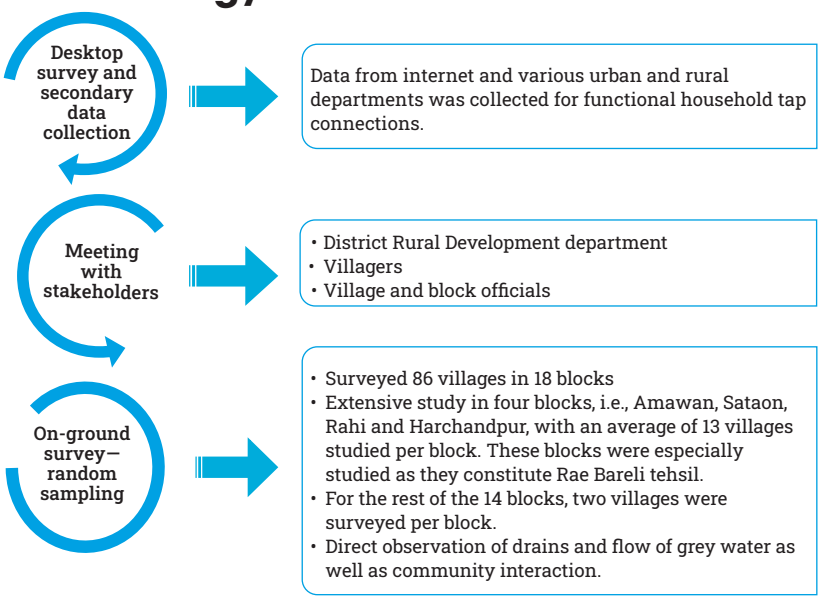
INTRODUCTION

Rae Bareli district of Uttar Pradesh, located on the Gangetic Plain, has largely clayey soil in most areas. The city of Rae Bareli is the district headquarter. Around 91 per cent of the population lives in rural areas of the district, which depend on groundwater for their needs. Over 400 waterbodies have been identified by the Department of Rural Development for restoration under the Amrit Sarovar programme. The waterbodies are either encroached on or receive wastewater from nearby villages.

Jal Jeevan Mission, which is in the process of connecting every rural household with drinking water, has reached almost 79.84 per cent of the households, which is almost 402,058 households as per the current data of the Department of Drinking Water and Sanitation under the Ministry of Jal Shakti.[1] Out of the 1,563 villages, 402 villages—accounting for about 26 per cent—have 100 per cent of the households with tap connections. Work on providing 100 per cent of the households with water connections is under progress for almost 74 per cent of the villages.

As per the JJM guidelines, the rate of water supply to the households is 55 litres per capita per day. This means that a family of six people will use almost 330 litres of water per day. The on-the-ground reality however is that although tap connections

Methodology



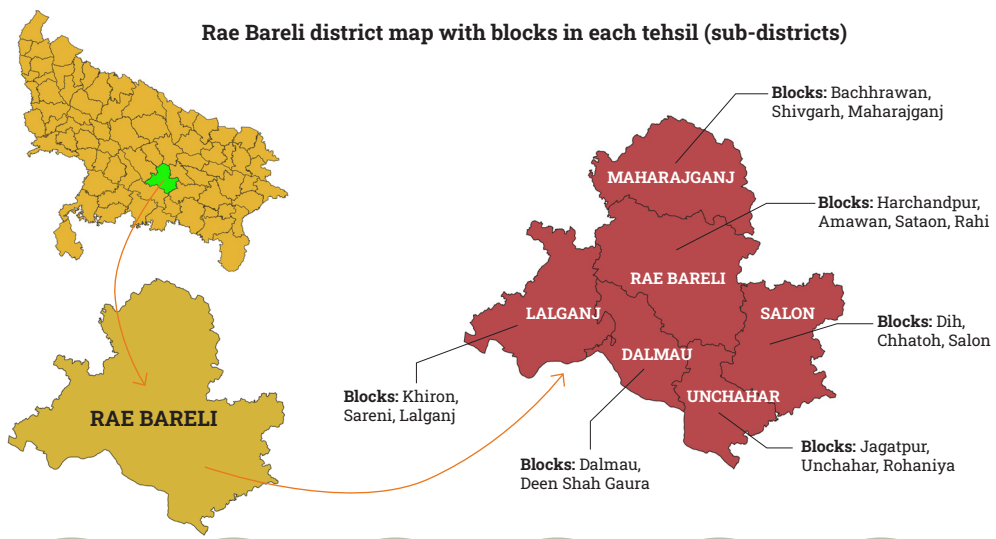
1. https://ejalshakti.gov.in/jjmreport/JJMState.aspx as viewed on April 26, 2024

are reported on the JJM dashboard, most of the households in the surveyed areas depend on borewells and handpumps. Each house extracts groundwater and stores it in 500-litre overhead tanks. In other words, the volume of water used actually by a family of six people is more than what is provided by government departments. This means that the amount of grey water extracted in the survey area is more than the amount predicted. Once all the households connected through taps start receiving water, a huge amount of grey water will be generated as according to the thumb rule around 70 per cent of the water is converted to grey water. People with individual borewells and tubewells may use more water than the others, generating even more grey water. Ground surveys clearly shows that the rural areas are unable to manage their grey water.

Centre for Science and Environment is in the process of understanding the gaps and challenges of management of lakes and waterbodies in different ecological regions of India. In this connection, the rural areas of Rae Bareli were studied to understand the state of waterbodies in this region. Interaction with government officials and the communities revealed the real stories on the ground, showing that most of the waterbodies in the sampled villages are contaminated with wastewater.

Rae Bareli district at a glance

Rae Bareli district map with blocks in each tehsil (sub-districts)



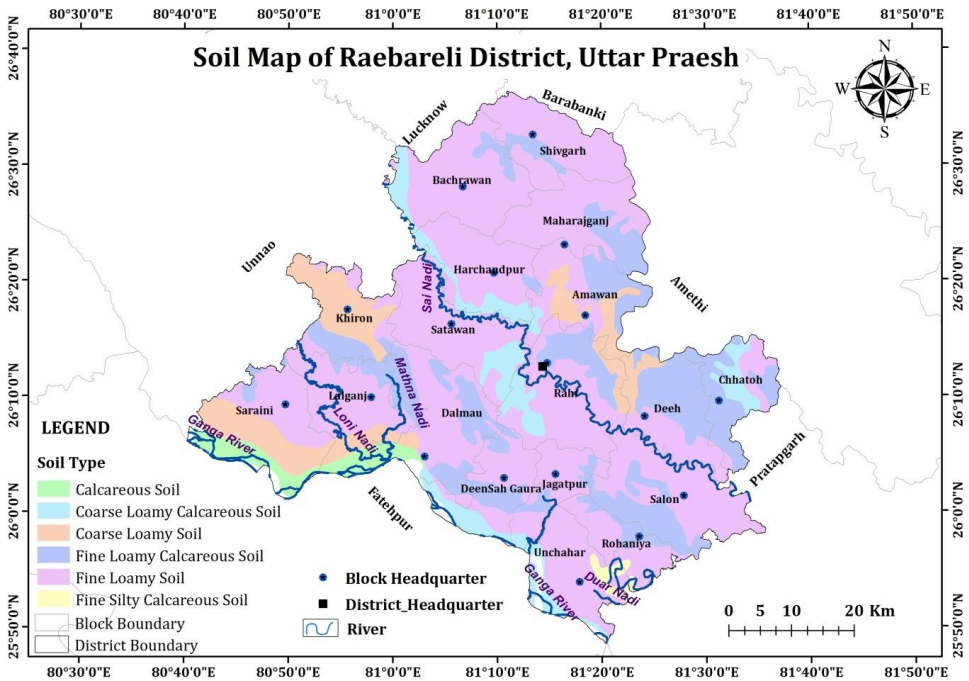
Tehsils: 6 **Blocks:** 18	**Gram panchayats:** 988 **Villages:** 1,548	**Rural population:** 26.22 lakh (2011 census)	**Major rivers:** Ganga and Sai Rivers	**Type of soil:** Clayey topsoil	**Average rural family size:** 5–6 people	**Source of water:** Groundwater (150–200-deep hand pumps and borewells)

Source: Compiled by CSE

Rivers and streams in Rae Bareli district

- The Sai River, a tributary of the Gomti, passes through Bachrawan, Satawan, Harchandpur, Rahi, Deeh and Salon blocks.
- The Ganga passes through Sarini, Lalganj, Dalmau, Deen Shah Gaura, Jagatpur and Unchahar blocks.

Figure 1: Soil map of Rae Bareli district

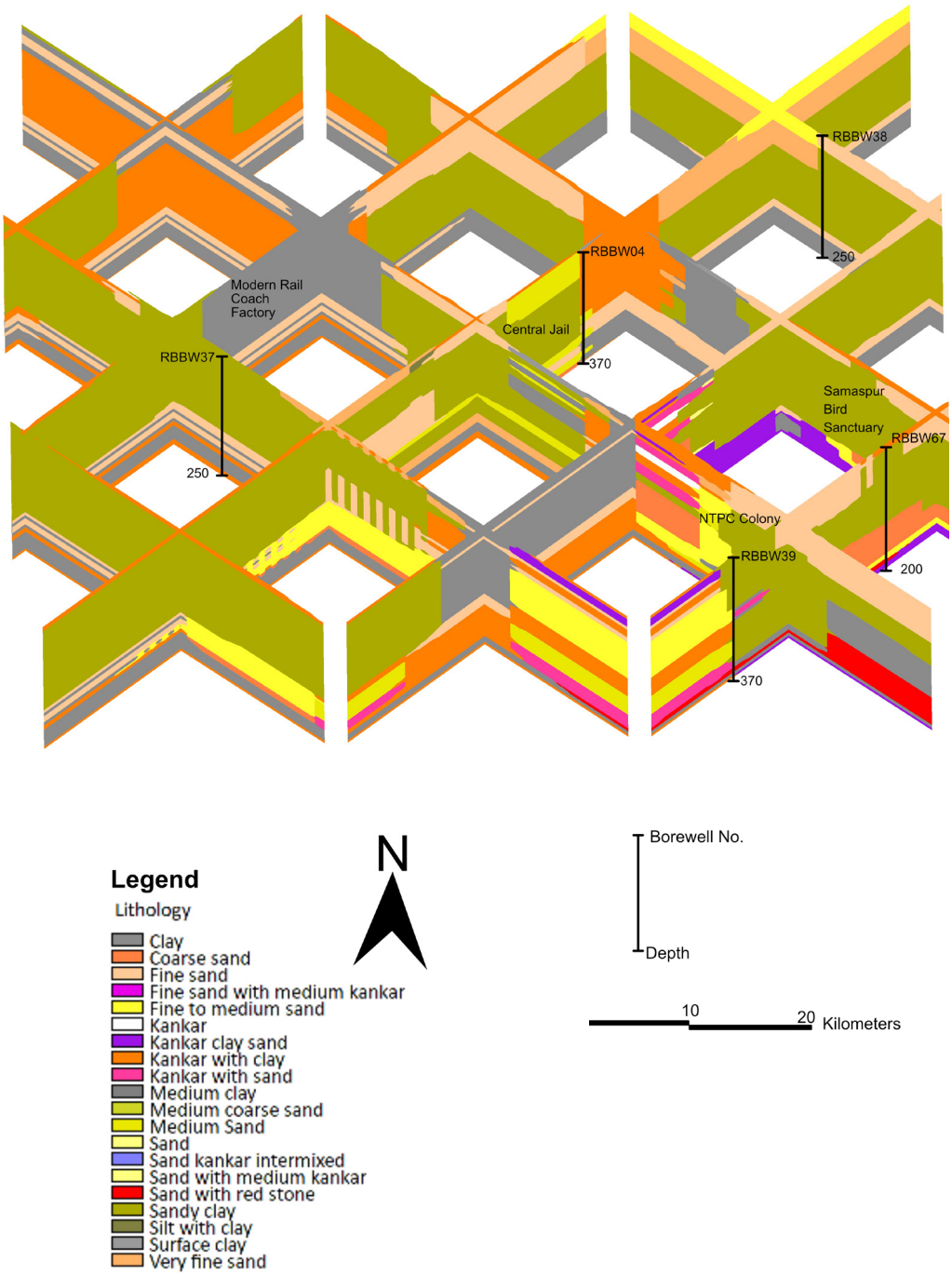


Source: Aditi Singh, 2023, Aquifer Mapping and Management of Groundwater Resources, Rae Bareli District, Uttar Pradesh, Central Groundwater Board, https://cgwb.gov.in/cgwbpnm/publication-detail/183

Soil lithology of Rae Bareli district

Around 67 borehole logs have been analysed to create a soil lithology of the district. The district shows that the dominant topsoil is clay. The thickness of the topsoil at places reaches 100 m. After the rains, the water stands for a long duration due to the porous and non-permeable nature of the topsoil, and the water takes long to get absorbed. The grey water that overflows from the drains also leads to mosquito breeding in the areas. This calls for urgent management of grey water in the rural areas of Rae Bareli.

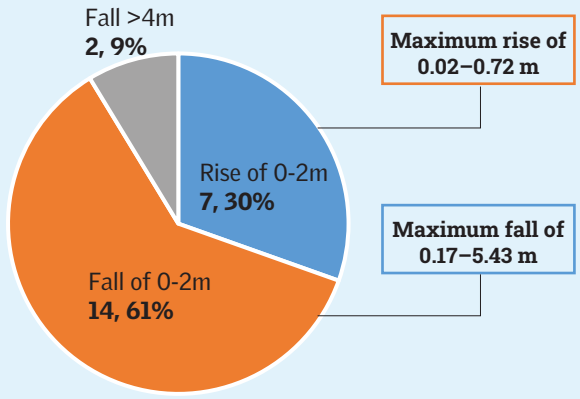
Figure 1: Soil lithology for Rae Bareli district



Source: Borewell logs sourced from UP Jal Nigam–Urban and Rural; compiled by CSE

Status of groundwater in Rae Bareli district

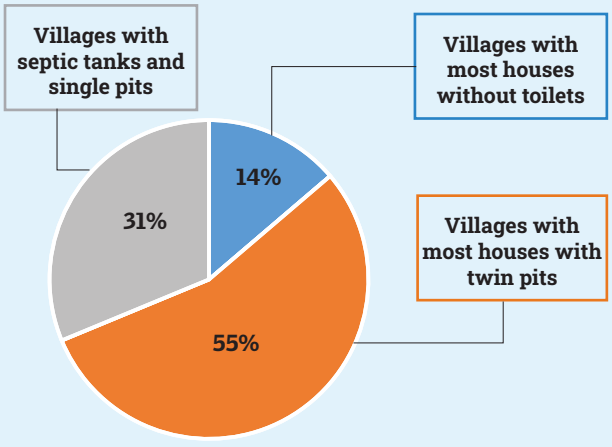
Percentage of wells with decadal water-level fluctuation—Rae Bareli (May'12-May'21)



- Sarini, Lalganj, Khiron, Satawan and some parts of Dalmau block have water levels at 10–20 meters below ground level (mbgl). Some parts of Sarini block has water level at >20 mgbl. The remaining parts of the district have water level in the range of 2–10 mbgl (pre-monsoon to May 2022).
- Groundwater in some blocks has fluoride, iron, uranium, manganese and bicarbonate above the permissible limits.[2]

Source: Central Groundwater Board, 2023, Ground Water Year Book Uttar Pradesh-2022–23, https://cgwb.gov.in/cgwbpnm/public/uploads/documents/17032384351875462524file.pdf

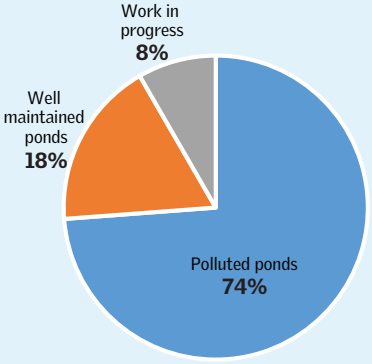
Status of toilets in surveyed villages



- Villages such as Pahremau, Chakdadar, Kondaras, Bhawani Nagar, Mainoopur in Amanwa block and Sataon village in Sataon block do not have toilets, and communities opt for open defecation.
- Black and grey water mix in open drains.
- Faecal waste from single pits and septic tanks when de-sludged is disposed of in open or main drains under nagar palika panchayat or nagar panchayats.

Source: Compiled by CSE

Status of ponds in surveyed villages

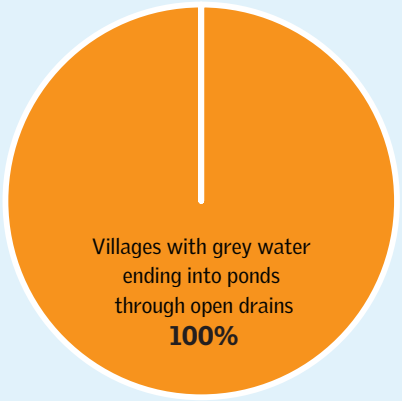


- Over 84 ponds were visited in 86 villages;
- 62 out of 84 ponds were polluted with wastewater. The remaining were maintained or were in the process of revival. Some ponds such as in village Bhuemau in Rahi block were revived but now suffer because of entry of wastewater; and
- Community-level soak pits, maintenance of which is often an issue, have been made at several villages.

Source: Compiled by CSE

2. Aditi Singh, 2023, Aquifer Mapping and Management of Groundwater Resources, Rae Bareli District, Uttar Pradesh, Central Groundwater Board, https://cgwb.gov.in/cgwbpnm/publication-detail/183

Status of grey water in surveyed villages



Source: Compiled by CSE

- Unplanned lined and unlined drains, clogged or encroached;
- Wastewater entering village ponds;
- Drinking water pipelines passing through or near these drains or handpumps near contaminated ponds in surveyed villages;
- The length and width of these drains not enough to accommodate storm water and grey water; and
- Major focus on solid waste management but significant amounts of plastic waste seen to be clogging drains and ponds.

Community speaks

The quality of drinking water is not good in our village. We source our water from handpumps that are roughly 30–45 m deep. The inside of buckets get a yellowish or brownish scale. Rusty water comes out from handpumps, and we have to let it settle for 30 minutes before use. Sicknesses such as diarrhoea and yellowing of teeth and skin-related issues are common in our village.

Forty-year-old farmer Sohan Lal, Pure Bhawaninagar village, Amanwa block

Status of grey water in the surveyed villages of four selected blocks of Rae Bareli district—Area of extensive mapping taken up by CSE

Block and population (Census 2011)	Number of villages visited	Name of villages visited	Quantity of grey water generated (70 per cent of 55 LPCD)	Grey water work taken up in gram panchayats by Panchayati Raj[3]	Total expenditure on SLWM as on March 5, 2024	Data as per SBM-G dashboard as on May 1, 2024	CSE's observations in villages surveyed
Amawan (131,866)	15 out of 84 villages	Pahremau, Baghail, Amawan, Lalpur Chauhan, Kondaras, Budhanpur, Chakdadar, Mardanpur, Sothi, Sidhauna, Bhawanipur, Mainoopur, Garhikhaas, Tajpur, Thulwasa **Amawan and Sidhauna surveyed by CSE have been marked as ODF-plus model villages under SBM (G)	52.74 lakh litres per day	Amawan, Roopamau and Sidhauna	Rs 92.72 lakh	• Block has 112 community soak pits. • 84 villages have liquid waste arrangements. • The three villages in which SLWM has been taken up has been declared as ODF model villages.	Household grey water is not managed and solid waste was found dumped near the ponds and across the villages. The few community soak pits observed in 50–60 per cent of the villages lacked maintenance. Grey water flowed into agricultural fields and ponds.
Sataon (166,296)	14 out of 70 villages	Sataon, Krisnapur Tala, Konsa, Porae, Chandwal, Ataura Khurd, Kailauli, Nak Phulha, Padri Ganeshpur, Malikmau Chaubara, Gojhari, Korihar, Reti Khurd **Gojhari, Konsa, Kailauli, Korihar, Porae, Sataon, Ataura Buzurg surveyed by CSE has been marked as ODF Plus model villages under SBM (G)	66.51 lakh litres per day	Gojhari, Hajipur, Kailauli, Konsa, Korihar, Manehroo, Onai Paharpur, Porae, Sataon, Ataura Buzurg, Bardar, Sultanpur Khera	Rs 478.30 lakh	• Community soak pits: 177 • 69 villages have liquid waste arrangements	Grey water in the villages flow into the ponds. The ponds which have been rejuvenated did not consider the management of grey water in their Detailed Project Report (DPR). Community places such as panchayat office have soak pits that in most cases were not maintained. Grey water was seen flowing out of these soak pits during the rainy season
Harchandpur (104,274)	12 out of 80 villages	Johwa Sharki, Pure Lasodhai, Hidain, Piyarepur, Shobhapur, Salimpur Khas, Majhigavan Hardoi, Mahmadmau, Kathwara, Guloopur, Datauli, Paidepur **Johwa Sharki surveyed by CSE has been marked as ODF Plus model villages under SBM (G)	41.71 lakh litres per day	Johwa Sharki, Katwara, Pashchhim Gaon	Rs 130.55 lakh	• Community soak pits: 303 • 80 villages have liquid waste arrangement	In every village both lined and unlined drains are present. The drains are not of uniform sizes and failing to hold the water during rains. Grey water flowing through the village drains ends up in village ponds or fields. Community places such as panchayat office has soak pits which in most cases not maintained.

3. As per Public Financial Management System (PFMS) report shared by district dated March 5, 2024

Block and population (Census 2011)	Number of villages visited	Name of villages visited	Quantity of grey water generated (70 per cent of 55 LPCD)	Grey water work taken up in gram panchayats by Panchayati Raj[3]	Total expenditure on SLWM as on March 5, 2024	Data as per SBM-G dashboard as on May 1, 2024	CSE's observations in villages surveyed
Rahi (201,395)	15 villages out of 102 villages	Jahanpur Kodar, Sultanpur Aaima, Suraj Kunda, Kalanderpur, Kasehtri, Khunwa, Bela Gusisi, Sarai Mungala, Umara, Garhi Mutwalli, Sulakhiyapur, Madhupuri, Lodhwari, Bhoye Mau, Rahi **Lodhwari, Bela Gusisi, Rahi surveyed by CSE has been marked as ODF-Plus model villages under SBM (G)	80.55 lakh litre per day	Lodhwari, Bhela Bhela, Bela Gusisi, Bela Khera, Rahi	Rs 229.09 lakh	• Community soak pits: 319 • 102 villages have arrangements for the management of liquidwaste	Drains are missing in almost in 40–50 per cent of the villages. Wherever drains are constructed they are not well-designed. Silting is a common feature for most of the drains. Many farmers in this block collect grey water in farm ponds and use this for irrigation. Some panchayats constructed settling tanks before the farm ponds to collect the floating debris. The tanks are not as per the norm and are just few faulty chambers. Community places such as panchayat office has soak pits which in most cases not maintained. The money used for SLWM is mostly for sorting the solid waste issues in the villages.

Source: Compiled by CSE

** ODF-plus model village: A village which has to sustain its open defecation free status and has arrangements for both solid- and liquid-waste management (SLWM) and observes visual cleanliness, i.e. has minimal litter and stagnant wastewater, no plastic waste dumped in public places and displays ODF-plus information and Education and Communication (IEC) messages.

CSE conducted extensive mapping in four blocks of Rae Bareli district (see *Table above*). An average of two villages per block were taken up in the rest of the 14 blocks. The following were the ground observations in these blocks:

- Drains are insufficient and silted up in most places;
- During rains, the drains overflow;
- The last resort of the grey water is the village pond;
- Rejuvenation of the ponds does not identify grey-water management and restored ponds quickly return to the poor state; and
- The data of SBM (G) dashboard talks about grey-water management structures in these blocks. But the ground-level survey by the CSE team finds that in most cases these structures are faulty.

The following table gives the details of the villages studied in the 14 blocks.

Generation and management of grey water in the 14 surveyed blocks

Block and population (census 2011)	Number of villages visited	Name of villages visited	Quantity of grey water generated (70 per cent of 55 LPCD)	Grey water work taken up in gram panchayats by Panchayati Raj[4]	Total expenditure on SLWM as on March 5, 2024	Groundwater management as claimed by SBM-G dashboard as on May 1, 2024
Bachharawan (158,556)	2 out of 65 villages	Tilenda, Ranikhera,	63.42 Lakh Liters Per Day	Ichauli, Neemteekar, Rajamau, Rampur Sudauli, Karanpur, Saroura, Sekhpur Samodha, Thulendi	Rs 235.05 lakh	• 221 community soakpits • 65 villages have liquid waste arrangements
Shivgarh (116,851)	2 out of 54 villages	Joravar Khera, Godiya Garhi	46.74 lakh litres per day	Gurha, Raipur Neruwa, Baiti	Rs 62.34 lakh	• 165 community soak pits • 52 villages have arrangements for liquid waste
Sareni (179,687)	3 out of 157 villages	Bhojpur, Madaikhera, Somvanshi Khera	71.87 lakh litres per day	Bhojpur	Rs 39.09 lakh	• 226 community soak pits, • 151 villages have liquid waste arrangements
Salon (222,894)	2 out of 132 villages	Bharatpur Rai, Chandika Baksh	89.16 lakh litres per day	Bewali, Dharai, Kithanwa, Mamuni, Pari, Ratason, Salon, Suchi	Rs 287.39 lakh	• 338 community soak pits, • 132 villages have arrangements for liquid waste
Khiron (155,508)	3 out of 94 villages	Samiri, Jagatganj, Bhawukhera	62.20 lakh litres per day	Bhitargaon, Khiron, Paho, Samiri	Rs 160.70 lakh	• 299 community soak pits • 94 villages have arrangements for liquid waste
Rohaniya (72,655)	2 out of 53 villages	Nimavar, Vanspur	29.06 lakh litres per day	Itaura Bujurg, Rasoolpur	Rs 133.10 Lakh	• 183 community soak pits • 52 villages have arrangements for liquid waste
Dalmau (178,617)	2 out of 124 villages	Barara Bujurg, Vansantipur	71.44 lakh litres per day	Aihar, Barara Bujurg,Govindpur Bhira. Terukha	Rs 144.73 lakh	• 296 community soak pits • 124 villages have arrangements for liquid waste
Lalganj (162,941)	2 out of 92 villages	Behta Kalan, Pure Baiju	65.17 lakh litres per day	Alampur, Ambara Paschim, Bahai, Haripur, Behta Kalan, Semer Paha	Rs 221.68 lakh	• 412 community soak pits • 92 villages have arrangements for liquid waste
Chhatoh (116,170)	2 out of 58 villages	Kherwa, Kunwar Mau	46.46 lakh litres per day	Nasirabad, Kunwar Mau	Rs 35.61 lakh	• 330 community soak pits • 57 villages have arrangements for liquid waste
Dih (134,128)	2 out of 68 villages	Nayapurwa, Ganguaha	53.65 lakh litres per day	Dih, Vinarwa, Raukha, Mau, Pothai, Tekari Dandu	Rs 323.57 lakh	• 227 community soak pits • 68 villages have liquid waste arrangements
Uchahaar (149,742)	2 out of 107 villages	Hasanganj, Gangauli	59.89 lakh liters per day	Uchahaar Dehat, Arkha Mustakil, Kandrawan, Patti Rahas Kaithwalmustakil	Rs 146.30 lakh	• 503 community soak pits • 100 villages have arrangements for liquid waste

4. As per Public Financial Management System (PFMS) report shared by district dated March 5, 2024

Block and population (census 2011)	Number of villages visited	Name of villages visited	Quantity of grey water generated (70 per cent of 55 LPCD)	Grey water work taken up in gram panchayats by Panchayati Raj[4]	Total expenditure on SLWM as on March 5, 2024	Groundwater management as claimed by SBM-G dashboard as on May 1, 2024
Jagatpur (91,455)	2 out of 62 villages	Lakshmanpur, Jagatpur	36.58 lakh litres per day	Jagatpur, Sudamapur	Rs 79.40 lakh	• 150 community soak pits • 62 villages have arrangements for liquid waste
Maharajganj (139,063)	2 out of 75 villages	Atrehta, Pure Mudu	55.62 lakh litres per day	Atrehta, Mau, Mon	Rs 127.74 lakh	• 342 community soak pits • 75 villages have arrangements for liquid waste
Deenshah Gaur (104,149)	2 out of 71 villages	Gaura Hardo, Raipur Kituli	41.66 lakh litres per day	Gaura Hardo, JalalpurDhai	Rs 71.25 lakh	• 158 community soak pits • 71 villages have arrangements for liquid waste

Source: Compiled by CSE

Need of the hour

- ✓ In this climate-risked world, Rae Bareli district—which depends mostly on groundwater—needs to protect and rejuvenate its waterbodies in order to recharge its groundwater sources. The district has had a maximum variation of 35 per cent from its normal rainfall in the last five years.
- ✓ Most of the waterbodies are located in rural areas of this district. For sustainability of groundwater sources, efforts should be made to restore and sustain the village ponds and waterbodies.
- ✓ Around 79 per cent of the households have been connected with taps under Jal Jeevan Mission, but the households have been found to extract water over and above this from private borewells and handpumps. Mindless usage of water leads to huge amounts of grey water from kitchens, washing areas and bathrooms.
- ✓ CSE's survey shows that grey water is not managed in Rae Bareli's rural areas and it finds its way into nearby waterbodies. Grey-water flooding may also contaminate the groundwater sources.
- ✓ To rejuvenate the ponds, management of grey water is vital.
- ✓ The district needs to explore the options for grey-water management at the household and community level as per soil conditions.

FACTSHEET

RAE BARELI

Photo credit: Mohit Patel/CSE

Lack of drainage results in waterlogging outside houses where households manage with temporary arrangements in Jahanpur Kodar village, Rahi block.

Photo credit: Dhiraj Kumar/CSE

Existing drains are silted or lack maintenance in Jahanpur Kodar village, Rahi block

Photo credit: Mohit Patel/CSE

Adharwaa taal receives grey water from households in Kondaras village, Amava block. The pond is covered with weeds and is used by the villagers for farming water chestnut. Use of chemical fertilizers for aquatic weeds has harmed the aquatic biodiversity to the point of extinction.

Photo credit: Dhiraj Kumar/CSE

Drainage in Budhanpur village, Amanwa block, ends in the Shingrahi pond, leading to pollution. The villagers use the pond as a dumping site.

Photo credit: Mohit Patel/CSE

Maintenance is an issue in community soak pits in Sataon village, Sataon block. This will affect the sustainability of soak pits in the long run.

Photo credit: Dhiraj Kumar/CSE

Grey water flows through improper drains in Sidhauna village, Amanwa block.