

Sivani Piped Water Supply System,

District Kanker,
Chhattisgarh



Sumitra Mandavi, a 40-year-old woman, lives in Sivani gram panchayat, in Gond tribe-dominated

Durgukondal block of Kanker, Chhattisgarh. She has been witnessing the marvel of flowing tap water for the last three years. Earlier, the households in this village depended on a single public hand pump. In the summers, the water level often went below the pumping levels of the hand pump, further limiting their access to adequate water supply.

In the 12-household habitation of Aampara in Sivani village, the very idea of water gushing out of a tap was a distant dream till just a few years ago. As the houses in the habitation were located at a distance from each other, a village-level piped water supply scheme was unviable.

Sumitra's situation improved as a result of WaterAid India (WAI) and its partner, Samarthan's initiative to ensure that every household in the area had access to clean water at their doorstep. With support from

WAI and Samarthan, five piped water supply (PWS) schemes were made operational in Sivani gram panchayat—two schemes in village Sivani started in 2017 and 2018, covered 48 households; and three schemes in village Goyenda, of which two started in 2017 and one in 2018, covered 37 households.

PIPED WATER SUPPLY AS PART OF A COMPREHENSIVE WASH PROGRAMME

Enabling access to piped drinking water within the premises is part of a comprehensive WASH programme being implemented by WAI-Samarthan in Kanker district since 2015 to pilot diverse models of piped water supply schemes, toilets, handwashing stations, and wastewater treatment methods. On the one hand, WAI and Samarthan advocated with the Chief Executive Officer, Zilla Parishad to implement piped water supply systems in rural areas. On the other hand, they also held discussions with the communities on improving their understanding so as to achieve drinking water security with regard to quantity and quality.

Around the same time, the Public Health and Engineering Department (PHED) in Chhattisgarh was also replacing hand pumps (which were considered to be low yielding and unsustainable) with mini piped water schemes, using existing boreholes, wherever possible, or new ones. The gram panchayats had been building their own mini power pump schemes with stand posts for several years, with the support of PHED. With some initial support and setting up of the piped water schemes, the systems were handed over to the gram panchayats or the constitutionally mandated Village Water and Sanitation Committees (VWSCs) for operations and maintenance (O&M). However, in most villages, VWSCs were more or less non-functional and the system would fall into disrepair in no time.

HABITATION LEVEL PIPED WATER SUPPLY SCHEME AT SIVANI

Until 2015, the water supply schemes in Sivani gram panchayat were based on groundwater sources, such as hand pumps and open wells. At Sivani¹, the gram panchayat decided that the dispersed settlement pattern was a challenge for piped water supply coverage and that the only option was to provide small electric motorised power pumps drawing water from boreholes, with an overhead tank and domestic water connections at the individual habitation level.

At the same time, WAI and Samarthan had been working on generating a demand for toilets, and on their design in terms of quality, convenience, and privacy. The daily lives of the community had been impacted

and the programme on open defecation free (ODF) sustainability had led to widespread behaviour change, inducing communities with a history of open defecation to adopt new habits. While leach pit toilets were promoted in Sivani, bio-toilets were the appropriate choice in other gram panchayats due to the rocky or water-logged terrain, which is not suited for twin leach pit toilets. Additionally, the community soon realised that piped water was important because toilets without water supply were ineffective and became unused over a period of time.

Thus, it was decided to implement a habitation level piped water supply scheme. WAI and Samarthan² worked on leveraging government funds as well as adopting a demand-driven approach to facilitate participatory decision making and ownership at all levels. It was also observed that in Sivani gram panchayat, the VWSC focussed on sanitation more than water supply. Hence, scheme-level Peyjal Prabandhan Samitis (drinking water management committees) were constituted at the habitation level.

The peyjal samiti draws on self help groups³ (SHGs) for its membership and comprises only women who are part of the SHG. There is social capital built around SHGs, and this was tapped for work on the PWS scheme. The SHG functionaries were already trained to manage accounts, and as members of the peyjal samiti, they were additionally trained on various aspects of piped water supply, operations, management, water quality testing etc. These samitis were provided with continuous support in terms of creating

¹ Sivani gram panchayat has nine habitations about 1-2 km away from each other.

² Drinking water security is a core area of their work and they have been working in Chhattisgarh since 2004.

³ Since August 2017, WAI-Samarthan has adopted the strategy of training SHG women in its 25 project panchayats to manage PWS.



Water supply system at household level

awareness, training, and handholding on various aspects of drinking water supply and sanitation; such as planning, implementation, management, as well as O&M. Efforts were made to ensure that the gram panchayat as well as the peyjal samiti developed an understanding of the rural drinking water supply and sanitation programmes, and were empowered to shoulder their responsibilities. The project ensured equity in access to the scheme in all villages.

The committee managed the operations and finances of the system, fixing and collection of tariffs, and raising demand with the gram panchayat about the system's faults and repairs. The peyjal samiti was also involved in selecting the borewell, its preparation, cleaning, and selection of the location to install an overhead storage tank. They were also responsible for ensuring proper construction and for the laying of pipelines from the overhead storage tank to the households.

Funds to the tune of INR 8.31 lakh were leveraged from Sivani gram panchayat for full financing of the capital costs for constructing the PWS. Moreover, connection charges for households below the poverty line (BPL) were waived off.

At Aampara, water from the hand pump, which was converted into a tubewell through deepening, is being pumped into a 1,000 litre capacity overhead storage tank using a 1HP (horse power) submersible pump through a rising main. Before going ahead with the project, it was ensured that the tubewell yielded fluoride-free drinking water. Water from the overhead tank is supplied by gravity to the habitation through a 1.13km distribution network and a stand post. The frequency of water distribution is decided by the Peyjal Prabandhan Samiti. In most of the habitations, water is supplied for two hours each in the morning and evening. However, water supply is restricted further during summers.

The Aampara habitation now has 100 per cent tap connectivity through groundwater for drinking and domestic purposes. Sumitra has two tap connections; one in her toilet and one in her kitchen. She is relieved that she no longer has to run around to collect water, and can focus on productive work instead.

THRUST ON SOLAR-BASED PIPED WATER SYSTEMS

As per the report on the Saubhagya website⁴; as of 31 March 2019, all the villages in Kanker have been electrified. Only 18,734 (2.44 per cent) households in the state are yet to be connected to the grid. The state not only boasts of a good record on electrification, but has also taken a lead⁵ in installing solar pumps for rural water supply. This is reflected in the Sivani gram panchayat, where, in some of the piped water supply systems, solar powered pumps have been introduced.

One solar pump and four power pumps were installed in five habitations, while the pipeline has been extended to supply piped water to 93 households⁶. In all the five habitations, peyjal samitis were set up at the scheme level to handle the O&M for the power pump, stand posts, and piped water supply.

On an average, INR 25 is collected per household per month towards O&M. The decision regarding the user charge was left to the peyjal samiti and they decided on INR 20 in some habitations such as Aampara, and INR 30 in others. Some committees, such as in Sivani main village, have set up a bank account and others like in Aampara, plan to

follow suit. Book keeping is maintained by the peyjal samiti and the income and expenditure for water supply is systematically tracked. Training was provided at Aampara habitation on community hygiene practices, safe drinking water, sanitation, safe handling of water, protection of drinking water sources, and operation of the piped water supply scheme.

The cost of recovery for O&M goes towards payment of electricity charges for running the system; between INR 100 to INR 200 a month per habitation, on an average. Minor repairs are done by the committee, while major costs for repairs are borne by the gram panchayat. Fund mobilisation is done by PHED for major repairs, following a request by the gram panchayat.

The scheme does not hire an operator and this has reduced their costs. The woman who resides next to the system takes responsibility for its operation. In her absence, the responsibility is passed on to others. The valve needs to be operated in case of solar-based systems, whereas for electricity-based systems, the work is simpler and involves just switching the system on.

CASE OF GOYENDA VILLAGE: INTERCONNECTED SYSTEM OF SOLAR AND ELECTRIC-BASED PWS

The Ganga Peyjal Prabhandhan Samiti was set up in Goyenda village in Sivani gram panchayat in 2018 with the support of WAI and Samarthan. There are twelve households that get piped water supply from the solar-

⁴ <https://saubhagya.gov.in/>

⁵ Chhattisgarh has been doing well in the country in the front of providing domestic water connections under the National Rural Drinking Water Programme (NRDWP). The state also had a major achievement when it was at the forefront at the countrywide level for installing solar pumps. The CREDA is currently working on solar-based mini piped water supply systems

⁶ PWS schemes in Sivani gram panchayat – two schemes in village Sivani (Nov 2017 & March 2019) covering a total of 56 households; three schemes in village Goyenda (Feb 2018, Nov 2018, March 2019) covering 37 households



The piped water scheme at Sivani main village

based water pumping scheme. Solar energy for water pumping based on photovoltaic (PV) technology that converts solar energy into electrical energy to run a DC or AC motor-based water pump is emerging as an alternative to conventional electricity and diesel based pumping systems in the district and state at large.

A single phase 1HP solar powered submersible pump was installed in a high yielding borewell that had a hand pump earlier. Pumped water is stored in a 2,000 litre raised tank, which has been elevated to a height of three metres to give sufficient head for the distribution system. Water supply is provided to each house through a tap, and a stand post has been constructed right below the overhead tank. Water supply from the tank is provided twice a day for two hours each in the morning and evening. The committee decided that each household should pay INR 30 per month as O&M charges. Subsequently, between (2019, two more PWS were set up in the village, both

tapping water using electricity-based water pumping systems.

Before the commencement of the scheme, a 'yield' test was done using a submersible pump and generation set. The scheme was sanctioned only after it was clear that the yield was above the desired limit of 2,800 litres per hour. Technical sanction for a solar-based scheme was accorded by the technical agency, Chhattisgarh Renewable Energy Development Agency (CREDA), while the administrative sanction was provided by the gram panchayat. In the electricity-based systems, normally the Rural Water Supply Division under the Zilla Parishad or PHED provides technical sanctions. In this case, CREDA used pre-fabricated steel structures and pre-cast RCC foundation blocks and the system was installed in a week's time.

An innovation in the system is that all the three schemes have been interconnected with each other through valves. Should any of them fail, the other two are used for providing water to the households. If the



The green dot represents a colour code used by WAI and Samarthan to categorise houses, based on toilet availability and usage; doorposts were painted with a green dot if they had, and used, toilets; red if they lacked a toilet; yellow if they had but did not use toilets; and black for households that refused to make a toilet

solar pump does not function due to cloudy weather, the valve is adjusted so that water is supplied from the electricity-based system. Likewise, when electric supply is unavailable, water is accessed through the solar-based pumping system.

The secretary of the Ganga Peyjal Prabandhan Samiti in Goyenda ensures operation of the scheme and recovery of user charges from all the user households. The households also paid a one-time charge of INR 100 to join the scheme, which was deposited in the bank.

“Our peyjal samiti had set the user charges higher, at INR 30 a month, as compared to the other two samitis who were charging INR 20 per month. The users soon raised an objection and we had to lower the charges to INR 20 a month,” says 22-year-old Tuleshwari Koliyaya, Secretary, Ganga Peyjal Prabandhan Samiti. She has, however, been pointing out the need to enhance the user charges anticipating higher costs of repair in the

long run as the system is powered by solar energy. As of now, annual maintenance for the first five years of the solar water pumping system is provided free by the manufacturer, but this does not cover all the spare parts. There have been instances in nearby villages where the solar panel was damaged and the complaint to the block office was not attended for weeks. Tuleshwari also feels that better reserves may help the system become financially sustainable over time.

These are pure solar-based systems and not dual pump-based water supply schemes that can be either powered by conventional electricity or solar energy. “The scheme is very useful, economical, eco-friendly and popular. The users of the other piped water supply (electricity-based) scheme are attracted to the solar-based scheme considering its zero electricity charges,” Tuleshwari pointed out.

The peyjal samiti regularly monitors and assesses the functioning of the scheme.

Although the water table and yield are not monitored as of now, the water quality is monitored twice a year. The samiti also monitors leakages and wastage in water use. The users are advised to mend their ways, but no system of fines has been instituted yet. There is a need to reconstitute and build the capacities of the VWSCs through training sessions, so that their role in service provision gets institutionalised.

The decision to use solar-based technology was taken by the state implementing agencies, such as CREDA after a push from NITI Aayog. In the long run, solar-based systems are as economically viable as conventional electricity or diesel-based systems, but as of now the supply chain for repair and procurement of spare parts is poor. The government needs to give greater incentives for photovoltaic pumping, and policy initiatives are needed for the promotion of solar water pumping.

Samarthan had some reservations about solar-based pumping, considering its high initial costs. They have been pushing for conventional electricity-based water pumping systems to improve coverage of piped water supply schemes.

HANDHOLDING SUPPORT TO DISTRICT WATER AND SANITATION MISSION (DWSM)

Samarthan has been serving as an extended delivery arm of the District Water and Sanitation Mission (DWSM) on handholding support, and acts as a link between DWSM and the gram panchayats, peyjal samitis and village communities. It has been guiding the peyjal samitis in implementing and monitoring the work related to water supply schemes and sanitation, as envisaged in



The solar-based water pumping scheme at Goyenda

the village action plan prepared by the gram panchayats. It played a crucial role in ensuring that the gram panchayats get requisite clearances and permissions from all authorities at various levels.

The PHED engineers plan and design schemes, while private contractors implement them. After construction, they hand over the scheme to the gram panchayat and the scheme is run by the peyjal samiti. Samarthan plays a key role in coordinating with department officers in charge of rural water supply and sanitation. WAI and Samarthan rely on this initial briefing as a critical support arrangement that ensures the functioning of the schemes. So far, 16 peyjal samitis have been set up in Kanker to manage piped water schemes. Samarthan is also instrumental in arranging training courses on various aspects of water and sanitation at the

block, district, and state levels for members of peyjal samitis, gram panchayats, PHED etc. Awareness generation and development communication activities were also taken up with gram panchayat, peyjal samiti members as well as the village community.

THRUST ON WATER QUALITY

Even though Kanker receives plenty of rainfall, it is erratic and groundwater contaminants—fluoride (>1.5 mg/l), iron (>1.0 mg/l), nitrate (>45 mg/l)—are present in many gram panchayats. Therefore, water quality testing was conducted in Sivani gram panchayat to identify quality-related problems, notably fluoride presence in drinking water. Women have been trained to use field test kits for testing water. Water provided by the piped water supply system is not treated, but the tank is cleaned using bleaching powder on a bi-monthly basis. Moreover, groundwater levels have been dropping in the area and source sustainability is a concern. The project, therefore, includes the component of rainwater harvesting at both, the household and community level, to make the scheme sustainable.

CONCLUSION

The five PWS schemes operational at the habitation level in Sivani gram panchayat through engagement of SHG women seem encouraging but more work needs to be done on institutional aspects, like opening of bank accounts and encouraging people to create a corpus through one-time payment for meeting major and minor repairs. While the monthly tariff amount should be based on the user's ability to pay, the corpus should be enough to meet the day-to-day operation costs.