Jolahkarma Piped Water Supply System,

District Koderma, Jharkhand

For the first time ever, women are taking the lead and are actively involved in the operations and maintenance (O&M) of water supply in Jolahkarma, a small village located in Koderma district of Jharkhand. The work at Jolahkarma was inspired by the success of the piped water supply system at Belkhera, a nearby village.

PRADAN is a development sector organisation helping marginalised communities since 1983 to develop their own skills and initiatives. It had begun its intervention in the drinking water supply sector in Jharkhand in early 2010 with the Belkhera water supply system in Chandwara block of Koderma district. The system was implemented with the support of the Damodar Valley Corporation (DVC) as a part of the latter's corporate social responsibility (CSR) initiatives. In the meanwhile, the Drinking Water and Sanitation Department (DWSD)[1] was trying to increase the state's coverage of rural piped water supply from four per cent in 2011 to 25 per cent in 2017. By then, Jharkhand had, as a matter of policy, adopted a demand-driven approach to execute community drinking water schemes.

The Belkhera model—inspired by the Gram Vikas[2]-led intervention in Samiapalli village in Ganjam district of Odisha—presented the case of a women-led self-help group (SHG)[3] that managed the planning and implementation of a piped water supply (PWS) scheme. Village Belkhera had a lift irrigation scheme since 2008. In 2010, it decided to install a piped water supply (PWS) scheme. The PWS system is operated through an electric motorised system that draws substratum water from the stream bed of the river Gauri, a tributary of the river Barakar.

[1] At the state level, DWSD is organised in two units: the State Water and Sanitation Mission is responsible for implementation of hardware, while the State Programme Management Unit (SPMU) is responsible for monitoring the programme. Each unit also has a body at the district level

[2] Gram Vikas is an Indian non-governmental organisation based in Orissa, and founded in 1979. It uses common concerns for water and sanitation to unite and empower rural communities, including adivasi communities

[3] PRADAN had created a federation of over 400 SHGs – Damodar Mahila Mandal – in Chandwara block of Koderma district.

Water is available at a depth of about 10–15ft post monsoons and at about 20ft in the summers. The committee purchased a diesel pump and a transformer with INR 90,000 of its own funds as a standby in case of electricity breakdown.

The project, at an estimated cost of INR 11 lakh, was implemented by the Village Water and Sanitation Committee (VWSC)[4] which took a lead in all aspects of design and execution; from procurement of material to functioning of the system. VWSCs were being formed after 32 years in Jharkhand, including in Jolahkarma, after the first panchayat elections in the state in 2011. Thereafter, the responsibility of managing the water and sanitation schemes in the village were vested with VWSC and a bank account was opened in accordance with the policy guidelines of the Drinking Water and Sanitation Department (DWSD).

All 75 households covered under the scheme at Belkhera contributed ten per cent to the capital expenditure (CapEx) and INR 40 per month for O&M of the scheme. In 2019, this was raised to INR 80 per household per month. 20 new households were added to the scheme and the total coverage of the system now stands at 95 households.

Nine years down the line, the system has begun to exhibit minor problems, such as leakages in the overhead tank. Even so, the Belkhera case has presented good practices around several fronts, such as improved service delivery, efficient O&M, cost recovery, water quality, measures to ensure source sustainability, and efforts to manage wastewater. The VWSC at Belkhera was able to manage the programme, ensure community participation, and mobilise resources for O&M of the programmes as a measure of sustainability.

Encouraged by the success of the system, the DWSD decided to adopt institutional reforms at the state level in 2011. As a part of this, it tried to develop a standard set of guiding principles to ensure that community-based water supply schemes are replicated soundly. Earlier in 2009, the Government of India launched the National Rural Drinking Water Programme (NRDWP) by modifying the Accelerated Rural Water Supply Programme (ARWSP) and subsuming earlier sub-missions and schemes.

A pilot community-based water supply programme was rolled out in 2012 on a state-wide level for 20 villages following a tripartite agreement between DWSD, UNICEF, and PRADAN. PRADAN was instrumental in facilitating field-level implementation of the programme, while UNICEF provided support in coordination, monitoring, and reporting on the field. Funds available through NRDWP were used for the hardware component of the project, which was implemented by the VWSC. As a part of this, the 'Gramin Nal Jal Yojana' (GNJY) was developed to supply piped water to all households in villages and hamlets with approximately 80–100 households.

[4] VWSC is a standing committee under the gram panchayat formed at the revenue village level. Its main function is to address the issues of drinking water, sanitation, and hygiene in the village. "With a view to decentralise the implementation and management of water and sanitation programmes, funds are being transferred to the VWSC accounts. The VWSC has 12 members, out of which six are women; the mukhiya (elected head of the gram panchayat) is the President of the VWSC; a member of the Block Panchayat is selected as the Vice President of the VWSC and the jal sahiya (a woman volunteer selected from the community to work on water and sanitation) is the Treasurer. The jal sahiya is paid an honorarium for different activities related to water and sanitation in the village." (Sudhir Prasad, Panchayat leading the way in decentralised water management: Case study on the role of VWSC in revival and management of a Rural Water Supply, undated, unpublished)

This pilot helped to highlight the importance of community-managed rural water supply services, including piped water supply systems. It also helped to reiterate the notion that systems become sustainable only when communities receive adequate support from both the government and development organisations in building the community's capacity to take up service delivery and O&M tasks.

In spite of the existence of success stories in community management, mechanisms for support and professionalisation are often not institutionalised in policies and strategies[5].

THE CASE OF JOLAHKARMA

When PRADAN began its work in village Jolahkarma in 2006, a large section of the rural populace in this part of the district was struggling for access to safe drinking water. Jolahkarma, a mixed village with around 52 households in the Chandwara block of Koderma, about 12kms from the block headquarters, continued to suffer in silence. During the initial years of PRADAN's work, the community did not draw attention to this issue and PRADAN continued with its core work of forming women's self-help groups (SHGs). The village comprised roughly of an equal number of Muslim and other backward caste Hindu households[6]. Initially, there was resistance regarding women's participation in SHGs from the Muslim men, who were averse to the idea of women joining SHGs.

Thereafter, PRADAN directed its efforts to mobilise the Hindu women into two women SHGs with a focus on savings and credit. The SHGs stabilised in a year, following which PRADAN came up with a livelihood plan. The livelihoods of the people depended on rain-fed agriculture, supplemented by seasonal migration of men for wage labour work. A bank extended credit support to the SHGs based on a farm-focused livelihood plan, while PRADAN extended technical support to facilitate the groups in adoption of improved agriculture. Vegetable cultivation was encouraged in small plots of land and the members recorded substantial monetary gains in the subsequent few years, leading to reduced migration. Seeing this, many other women, including Muslim women, were encouraged to join the SHGs. By 2009, the village had four women SHGs with women from all households.

DEMAND FOR DRINKING WATER CAME FROM WOMEN

PRADAN was preparing a comprehensive land and water management plan for Jolahkarma at the request of the SHGs in 2011, when the issue of water scarcity for farming cropped up. At that point, women underscored the fact that drinking water scarcity far outweighed the problem of irrigation for agriculture. With the lack of a proper drinking water source, barring the seven private dug wells and two public hand pumps that would go dry in the summers, women had to queue up in front of the lone hand pump that had water during summers. This hand pump churned out turbid high-iron water, and women fought for their turn even when the water was non-potable.

Water collection is solely the responsibility of women who had to spend an average of three hours per day to fetch water. In forests and hilly terrain, they often had to travel

[5] https://www.ircwash.org/sites/default/files/1_jharkhand_xiss_cw_2016.pdf

[6] Koderma district has 45 per cent Muslim and 55 per cent Hindu population

for approximately three kilometres in the summers for water. They were also compelled to collect water from small chuas (sand pits) to tap substratum water from the stream bed. No government assistance came their way and the absence of any drinking water project in the area worsened the situation for these waterborne disease-stricken areas. The population suffered from a range of health issues like cholera, typhoid, dysentery, malaria, and skin ailments, among others. The village also suffered from a high infant mortality rate. A survey by PRADAN indicated that on an average, 15–20 per cent of the people—mostly women and children—were affected by waterborne diseases. "Most of us, including our children, drank dirty water from dug wells, as we had no other option. This resulted in a large number of cases of skin diseases and diarrhoea. Our plight worsened during summer, when the wells and hand pump dried up," said Dolly Sinha, a member of the VWSC.

Preliminary analysis of the credit records by PRADAN indicated that a third of the total borrowings from the SHGs were for medical treatment. Further discussions revealed the poor state of menstrual hygiene among women due to the dearth of safe water. The need to have a special focus on water and sanitation was felt acutely. Subsequently, PRADAN began its engagement with the community to understand the challenges related to access to clean water, safe sanitation, and hygiene.

PRADAN piloted a community-driven approach in water and sanitation services in 2012, when it supported the setting up of a VWSC at Jolahkarma. The members of the VWSC were nominated by the SHGs based on their interest and work. All of them, barring the village mukhiya[7], belonged to Jolahkarma. As a first step, the VWSC members and some of the women SHG members were taken for an exposure visit to Belkhera.

According to Avijit Mallik, "the women of Belkhera explained the project and role of the user groups in operations and maintenance—the system for tariff collection, regular repairs, and monitoring of water quality. They were eloquent in sharing the impact of the water supply system, which included minimising the drudgery of women, drastic reduction in gastro-intestinal disorders, and enhancement of a sense of well-being among villagers." [8]

DECISION TO SET UP A PIPED WATER SUPPLY SCHEME IN JOLAHKARMA

On returning, the VWSC and the SHGs convened a meeting of all villagers and shared their experiences of the exposure visit to Belkhera. A resolution was passed in a meeting presided over by the mukhiya to set up a piped water supply system at Jolahkarma. PRADAN informed the villagers about the provisions of NRDWP[9]. Subsequently, the DWSD and UNICEF, which was providing techno-managerial support to the former, were consulted. PRADAN supported the VWSC of Jolahkarma in preparing a Detailed Project Report (DPR) for installation of a piped water supply system. The development of the DPR entailed two rounds of iteration with the gram sabha to

[7] Jolahkarma comes under Kanko Panchayat in Koderma block and the Mukhiya belongs to the main village

[8] Avijit Mallik, The Transformation of Jolahkarma, http://www.pradan.net/sampark/wp-content/uploads/2019/07/The-Transformation-of-Jolahkarma-By-Avijit-Mallik.pdf, Newsreach Jan-Feb 2015

[9] NRDWP (National Rural Drinking Water Programme) is a flagship programme of the Government of India to support rural people to access safe drinking water.

Orientation meeting at village Jolahkarma, Kanko gram panchayat

finalise the plan. This was submitted to the District Water and Sanitation Mission (DWSM) under the scheme 'Gramin Nal Jal Yojana' with PRADAN as the technical support agency.

According to Avijit Mallik, "The mukhiya, as chairperson of VWSC, submitted the DPR to the District Water and Sanitation Mission (DWSM) with copies to the Principal Secretary DWSD, and UNICEF."[10] Technical sanction was provided to the DPR by the office of the superintending engineer at Koderma, while the DWSD at Ranchi granted administrative approval on behalf of the Government of Jharkhand. UNICEF played a key role in strengthening coordination between the stakeholders. The SHG members took the lead in identifying private lands and for building consent for installation of the sanitary well, pump house, and the overhead tank. Members also made land donations to VWSC.

The assessment of the overall water requirement of the village in various sectors such as drinking, domestic use, etc was done keeping in mind the population of 495 people in 2016 as well as the design population of 693 people twenty years down the line (2036). The system was designed for a per capita water demand of 70lpcd. It also considered the water demand of animals.

The daily demand for water was 48,510 litres. It was available at the source, which was sited at a low lying area of the village. A sanitary well (covered well with cement structure) of about 25ft diameter and 30ft depth was constructed. Though water was accessible throughout the day, the system was designed for making water supply available for four hours a day (two hours in the morning and two hours in the evening). The system covered 52 households, and now has ten more households under its

[10] Avijit Mallik, The Transformation of Jolahkarma, http://www.pradan.net/sampark/wp-content/uploads/2019/07/The-Transformation-of-Jolahkarma-By-Avijit-Mallik.pdf, Newsreach Jan-Feb 2015.

The VWSC, along with PRADAN, spent three days exploring various options to create a sustainable water supply system for Jolahkarma

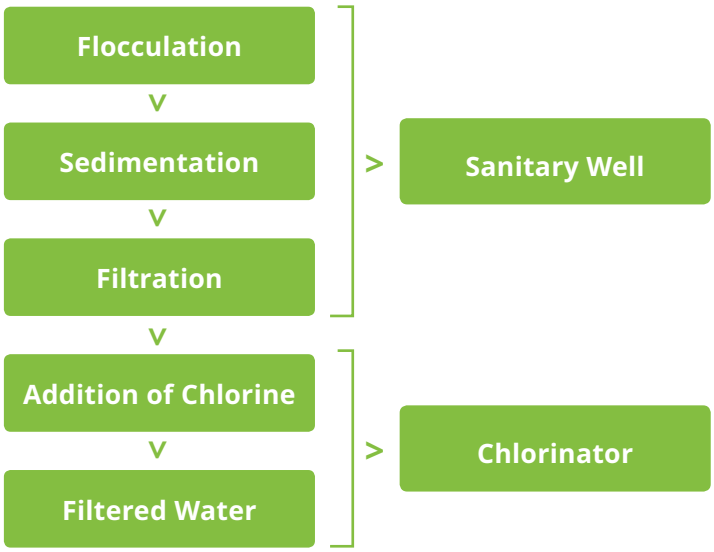
ambit. Each household has been provided two connections – one each in the kitchen and bathroom, as per the DWSD guidelines. Apart from this, three public institutions—the panchayat building, anganwadi centres and government primary school—have been provided water under the scheme.

An innovative system, the Jolahkarma PWS taps sub-surface water flow[11] and uses a solar-powered pumping device for lifting water. A 2HP (horse power) submersible pump set from Grundfos, a Danish company which offers off-grid water pumping systems and has a low operating cost, was selected. The distance from source to water tank is about 1,400ft. The overhead tank (3.5mx3.5mx2m with a staging/support structure of 6m) has a capacity of 24,500 litres.

Individual household connections were provided to all 52 households in the village and water is supplied through a gravity flow overhead tank. The capacity of the tank was designed to ensure that it could store 60 per cent of the overall daily water requirement. Buffer storage for two days for the community would have cost much more, so the community relies on alternate sources like hand pumps during times of poor water availability. The method of conveyance and distribution of water to the households comprises mild steel and PVC rising mains and branches.

Borewells are not common in the area as the water in the deep aquifers is insufficient. To improve water security and maintain source sustainability, the committee renovated a pond which is just 15ft away from the sanitary

[11] Tapping water in this high rainfall area in stream beds or discharge areas in the low lying lands helps draw in substantial amounts of substratum water.



Water treatment in the system (Source: PRADAN)

well. Financial support was taken from DWSD to the tune of INR 1.5 lakh to deepen and widen the pond. This helped improve the recharge of the sanitary well. To manage turbidity of water at the source, the sanitary well was provided with a cover to prevent entry of solar light; the well is also cleaned periodically with bleaching powder.

The cost of the system was INR 22,66,300 and it provides water at two paisa per litre. In Jharkhand, PRADAN has promoted ten such piped water supply schemes for 70–90 households so far. Coverage of households under the piped water supply scheme was a hundred per cent. Funds were received in the VWSC bank account in four instalments for execution of the system. The mukhiya and jal sahiya operate the bank account. Monitoring of the programme was done by the four SHGs in the village. The community made a ten per cent contribution to the capital cost for labour and building material by purchasing the connecting pipes and procuring sand. The project was completed within the stipulated period of less than one year.

SYSTEM HANDED OVER BY VWSC TO GRAM SWACHHTA SAMITI

The committee detailed out the work plan, material procurement, and labour management. The utilisation of funds submitted to the gram sabha was laid out by the VWSC. “During the implementation phase, the fund flow was from DWSD to VWSC. Post implementation of the scheme, VWSC handed over the system to the Gram Swachhta Samiti, which is now responsible for the system’s O&M,” said Satyabrata Acharya, Programme Director, PRADAN.

The Gram Swachhta Samiti has a rotational policy for members and after three years, one-third of the members change. The roles and responsibilities of the duty bearers and bodies that look into the functioning of

community-managed PWS have been defined. There are written by-laws that have been contextualised locally for the duty bearers.

The users paid INR 1,000 per household for building a corpus for O&M of the system and pay INR 60 per household per month for its O&M. The corpus fee for the absolute poorest (single women headed and elderly deserted households) was waived off. “The collected user fees of INR 60 per household per month are managed by the committee and held in an official bank account. Payment logbooks and receipts for users are provided to all households. There is transparency around the collection, management, and disbursement of user fees,” said Zulaikha Khatun, the former operator of the system. A surplus fund to the tune of INR 80,000 exists in the form of a fixed deposit in the bank.

Money from the user charges raised over the years is being used for regular repair and operation of the system. The committee also keeps an eye on the overall management of the system, optimum water use; including checking for wastage, and monitoring water quality. Per capita supply of water is 75 litres per day. Thus, a family of six receives 450 litres of water per day.

The technical capacities of the staff and the committee were enhanced so that the fixing of minor repairs could be easily done at the local level. The project had an elaborate capacity building plan which comprised: (a) concept seeding of the project among the villagers, (b) exposure of VWSC members and some SHG members to successful piped water supply schemes, such as Belkhera, (c) orientation of VWSC around DPR preparation; estimates, engineering aspects etc., (d) transact of the village for planning of water distribution system and its subsequent mapping, (e) training of VWSC members around membership, role and responsibilities, and technical know-how, (f) training of jal sahiya[12] in accounts, book keeping, and audit, (g) training of jal sahiya and other VWSC members in water testing and maintaining water quality, and (h) monthly meeting with VWSC members.

Support was taken by VWSC from Aqua Clara, a US-based expert group, in setting up an automatic chlorine dosing system to ensure a supply of bacteria-free water. The operator is paid INR 1,000 a month, and the chemical reagent costs INR 400 a month. In Jolahkarma, DWSD often pays for spares and some major repairs. However, according to DWSD guidelines, VWSC is responsible for all O&M tasks. Thus, the support arrangement is somewhat unclear.

A system is in place for monitoring of the key components: (a) water level in the sanitary well is monitored by VWSC, (b) water testing kits are used by the operator who is trained in testing turbidity and bacterial contamination (periodicity of the test is monthly during monsoons and once in two months for the rest of the year), and (c) accessibility is checked by the operator.

[12] In Jharkhand, each VWSC has a ‘Jal Sahiya’ (water volunteer), selected from among the women of the village, who acts as a treasurer and is responsible for water quality testing

The valve of the water distribution system being opened by Zulaikha Khatun, the former operator

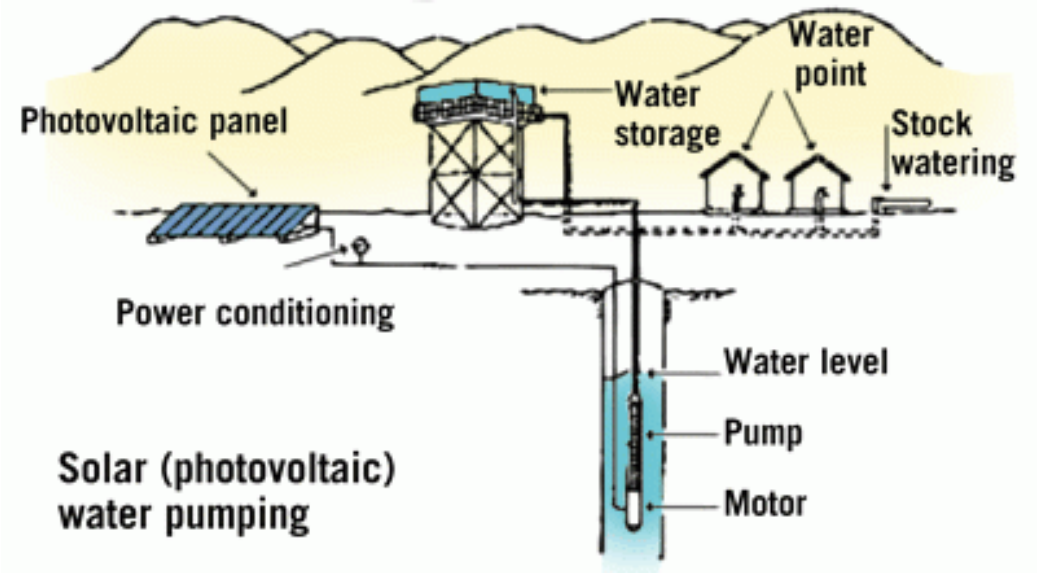
SOLAR POWERED PIPED WATER SUPPLY SYSTEM

The DWSD was exploring an innovative, environmentally sustainable and climate-smart approach to water supply, and chose the solar powered drinking water system as it met the criteria. The system was correctly sited and dimensioned to get the most from the borehole. The panels were sufficient to match the energy demand of the pump and the pump capacity was sufficient to draw water from the requisite depth.

PRADAN took a number of design considerations into account to ensure sustainable water security for the village. The system has no energy costs as it is powered with solar panels. It is low maintenance and has manageable service requirements, unlike diesel pumps that last no more than five years, and hand pumps which break down often. The solar powered system gradually extracts water throughout the day, reducing the pressure on the source.

Additionally, solar powered systems last more than ten years. In Jolahkarma, the Grundfos pump came with a warranty period of 25 years. The wattage procured was 2200W instead of 1600W which is sufficient for a two HP pump. This helps deal with the poor energy production during monsoons.

“The area has 320 sunny days and even on cloudy days, there is a small window during the day when clouds retreat, providing a scope for generating energy. We rarely struggled even during a cloudy day to provide sufficient water for everyone in the community. The system thus continues to be a sustainable and effective method of providing safe water to the community,” says Mohammad Azim, a member of the VWSC.



Though the solar panels work even in diffused sunlight, the system does experience issues with seasonality, and water supply is found to be insufficient for a few days per year. This happens either when there is very heavy cloud cover (during peak rainy season) or due to a very high water demand (during the peak dry season).

The price of solar panels has been on the decline and the system has been providing high quality services to the community. Though the initial investment of the solar powered system was greater than electric systems, it has a low day-to-day running cost and is durable in the long run, making it financially competitive when compared to electric or diesel motorised systems. “Electricity is highly erratic in this part of the state and solar power works fine for us. Locally qualified technicians are available to fix repairs and minor spare parts are sourced from the local supply chain”, says Mohammad Azim, a member of the VWSC.

PRADAN has put the VWSC in touch with local vendors for small spare parts and for the rest there are vendors in Bengaluru. The system has not incurred any major cost of repair so far, but VWSC is aware that the potential cost of repair could be significant in the future,” says Avijit Mallik, Team Coordinator, PRADAN.

“The control panels may have a lifespan of maximum seven years, but the solar panels and pump have a 25 year warranty. We have provided safeguards against lightning so it remains fully functional over the period,” adds Avijit. Early on in the project, there was a theft of some solar panels, which the committee replaced (at a cost of INR 12,000) from its funds. The system was then made secure by providing a wired cover. The valve too has been replaced at a cost of INR 6,000.

The system at Jolahkarma is not a hybrid one and does not require a back-up generator system. It is automatic and not manually operated and therefore has less chances of malfunctioning. The task of the operator (Geeta Devi, who is incidentally also the

jal sahiya of the village) is not just limited to opening the valves twice a day to distribute water from the overhead tank. She also oversees the day-to-day running of the system, especially checking for water wastage, and regular cleaning of the tank. System overhaul is rare and most of the problems are fixed as and when they occur. Solar panels are cleaned once a year. A significant amount of system downtime wherein the system is disabled for weeks over a minor issue is unusual. Common causes of malfunction are failure of the wiring and electrical components that are often sourced locally.

The system does not use batteries to store energy and allow pumping at night. Batteries are generally not sustainable due to their limited life span, so the committee preferred to make the most out of the system during the daylight hours. Water is stored in the overhead tank and provided at night to households, if required, on occasions like weddings etc. It is also rationed during peak demand season (summers), or poor supply season, such as monsoons. Water supply is also increased during important festivals based on the requirement of the community.

CONCLUSION

Though the Jolahkarma PWS system is innovative as it taps sub-surface water flow and uses a solar powered pumping device for lifting water, the system also faces challenges around protecting the solar panel from theft. Being located in an isolated area away from the main habitation, four of the six panels were stolen and the system ran on grid-based electricity until replaced by new set of panels and secured by providing a wired cover.

“Jolahkarma was the first open defecation free village in Koderma district where the piped water supply programme went hand-in-hand with toilet construction under the Swachh Bharat Mission (SBM). The financial support received under the Nirmal Bharat Abhiyan (NBA) was supplemented by contributions from each household (up to INR 12,000) for proper toilets. Under NBA, some households also constructed bathrooms by increasing their financial contribution. The SHGs came forward to provide interest-free loans and the committee tried to ensure convergence of MGNREGA with NBA,” says Sunita Giri, mukhiya of the village. The project has completed eight years of successful operations and has shown remarkable achievement in providing access to piped water supply to the rural community in Jholkarma.