



# Solar-based Mini Piped Water Supply Scheme

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Sector Wide Approach to Strengthening Health (SWASTH) in Bihar, Government of Bihar Initiative  
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## ABOUT THIS PROGRAMME REPORT

This programme report has been developed to describe the Solar-based Mini Piped Water Supply Scheme that was supported by SWASTH. It draws from internal documents and conversations with different stakeholders. Information from the ground was gathered through a field trip to Dobhi and Bodh Gaya blocks of Gaya district in Bihar. The field work included some personal interviews and group discussions with external stakeholders. These blocks were selected because the initiative was reported to have brought about some changes there since its implementation.

## SECTOR WIDE APPROACH TO STRENGTHENING HEALTH (SWASTH)

Government of Bihar Initiative Supported by DFID, UK

The SWASTH programme aims to improve the health and nutritional status of people of Bihar by increasing access to better quality health, nutrition, and water and sanitation services, particularly for the underserved groups. The focus of this programme is to strengthen the systems through better planning, organisational strengthening & human resource management, decentralisation and convergence among key departments. The programme also uses community level processes to manage, demand and monitor services.





## SUMMARY

*The Solar-based Mini Piped Water Supply Scheme (MPWSS) aims to ensure the supply of safe drinking water in 100 Mahadalit habitations in Bihar that have still not benefited from targeted government schemes. Launched by the Public Health Engineering Department (PHED), Government of Bihar, under the Sector Wide Approach to Strengthening Health (SWASTH) programme, the scheme is being implemented in the Gaya district. This initiative recognises the challenge posed by irregular supply of electricity in areas inhabited by these deprived communities, and harnesses solar energy to pump water.*

*This initiative has brought regular supply of safe drinking water to habitations where the units have been set up, and has aimed to reduce the incidence of water borne diseases. It has built-in mechanisms for regular operation and maintenance for a period of five years. Overall, this initiative has made a significant improvement in the lives of communities living in the targeted habitations.*

## INTRODUCTION

Safe drinking water is vital to sustain healthy human habitations. In recognition of this fact, one of the 17 Sustainable Development Goals (SDG) introduced by the United Nations in 2015 aims to 'ensure availability and sustainable management of water and sanitation for all'. Amongst other things, this SDG speaks of attaining universal and equitable access to safe and affordable drinking water for all by 2030, by improving water quality, integrating water resources management, restoration of ecosystems and community participation.

According to the Department of Drinking Water and Sanitation (DDWS), the ground water table is high in Bihar, but the availability of water varies between regions and seasons as the State is prone to both floods and droughts. Moreover, water contamination is a major problem, with 13 districts affected by high arsenic, 11 districts affected by high fluoride and 9 districts affected by excess iron in their water. Access to drinking water is another significant challenge in Bihar, with only 10% of the State's population having access to piped water supply, and the rest depending mainly on hand pumps and bore wells. Access to safe drinking water is a particularly significant challenge in habitations of traditionally marginalised communities.

The Solar-based Mini Piped Water Supply Scheme (MPWSS), implemented under the Sector Wide Approach to Strengthening Health (SWASTH) programme, aims to ensure the supply of safe drinking water in 100 Mahadalit habitations in Bihar that have still not benefited from targeted government schemes. This initiative was launched in 2012 by Public Health Engineering Department (PHED) of the Government of Bihar with the objective of achieving significant improvements in the health and nutrition of the population in Bihar, by addressing the problem of water supply.

## THE SOLAR-BASED MINI PIPED WATER SUPPLY SCHEME (MPWSS)

The Solar-Based Mini Piped Water Supply initiative was conceived to ensure regular supply of safe drinking water to Mahadalit habitations in Bihar,

where water quality has not been affected. Since the residents of these habitations do not have access to electricity, this intervention uses solar power for its energy requirements. Targeting 100 units in as many Mahadalit habitations across four blocks of Gaya district, this initiative has sought to provide supply of safe drinking water pumped from underground sources using solar energy. PHED floated tenders to select and recruit private partners for the construction of solar-based units, periodic operation and maintenance, and monitoring. Additionally, one member per habitation was trained as a caretaker and provided with an operator's room with water and sanitation facilities on the campus.

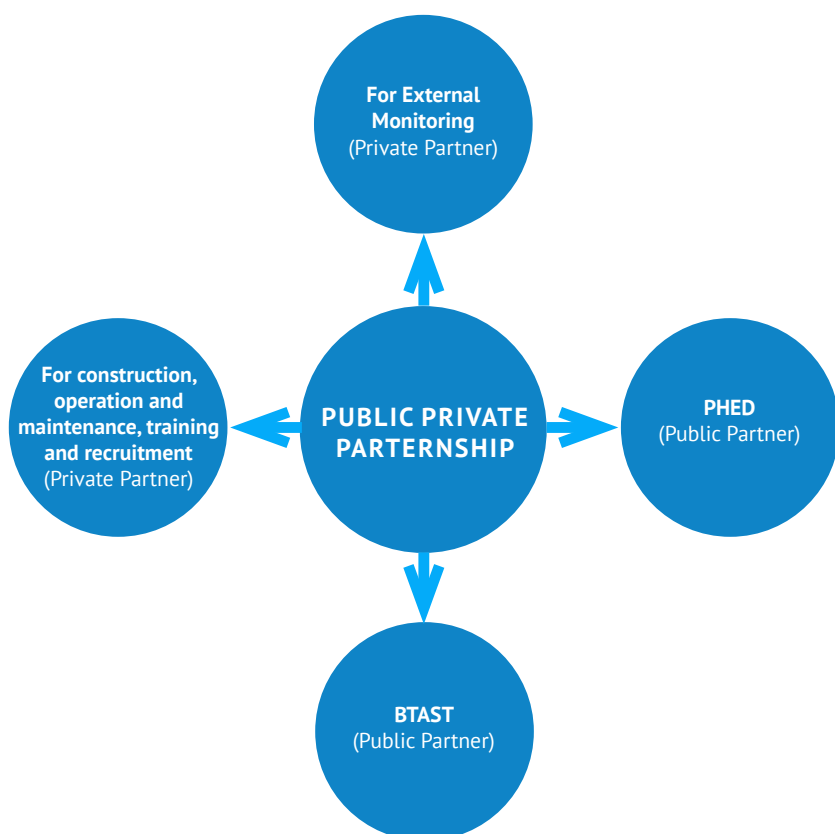
The funds for this Government of Bihar initiative have been provided through the financial assistance from DFID for the SWASTH programme. And the technical assistance is provided by Envirotech East Private Limited. This private agency was selected through a tendering and bidding process by PHED, which adopted a Public Private Partnership (PPP) model to deliver this service in Gaya. Envirotech East Private Limited was selected for constructing the plant, and operating and maintaining it for a period of five years, and training the caretakers. Similarly, BTAST, in consultation with the PHED, recruited Ranchi Design and Consultancy Services for monitoring the initiative closely. While PHED undertakes close supervision of construction activities, BTAST engages in monitoring and maintains a Management Information System (MIS) with relevant data.

## THE PROGRAMME COMPONENTS AND ITS IMPLEMENTATION

The initiation and establishment of MPWSS and then implementing it has followed a rigorous process and involves a set of components which are laid down below.

### Site selection and construction

A suitable site for the construction of the unit had to be identified in a manner that it would be accessible to the target population. BTAST assisted PHED in the identification of such suitable habitations where the population of Mahadalits was between 1,000 and



1,500, ensuring that all selected habitations were demographically dominated by Scheduled Castes to qualify for the scheme.

The PHED engineers have played an active supervisory role from the commencement of construction activity by the contractor, through to completion. Junior Engineers are in charge of 2-3 blocks and supervise all

construction activities at the block level by being present at the sites to check concrete work, reinforcement, etc., and report periodically to the Assistant Engineer. The Assistant Engineer supervises 50% of the work personally. Cross verification of work and random checks are also undertaken, and a compiled report is submitted to the Executive Engineer at the PHED. Any anomalies at the block level are regularly corrected by the Assistant Engineer. Besides, after the construction took place, officials from the PHED headquarters undertook field visits from time to time. Third party inspection is done to check the material provided. Inspection and monthly progress reports are now regularly prepared and submitted to the head of the department.

The units have been constructed along with a stand-post with lavatory facilities for use of the caretaker. This in particular has been taken care of to reinforce the message against open defecation. Upon completing construction, the contractor of the construction had to submit a certification stating that there is no contamination in water provided at the site. Operation and maintenance of the unit is being carried out by the private partner for five years, including a preliminary trial period of three months, after which it is being handed over to the community.

### Capacity building of caretakers

Envirotech East Private Limited has also trained one community member from each habitation as a caretaker of the unit for regular operation and maintenance. This training included imparting knowledge about solar panels, SCADA (supervisory control and data acquisition), battery, equipment, vats, cleaning process of the vats, etc., so that he/she could effectively manage the entire system for smooth functioning of the initiative. The caretaker was also trained about the various roles and responsibilities he or she has to play in the course of his/ her work and made to understand the entities he/ she must contact when faced with problems related to the unit and its functioning.





## Community awareness generation

To increase awareness of the local communities with regard to the water supply unit, PHED has conducted awareness drives for the habitations. BTAST has facilitated the workshops held at the block level and emphasised upon the importance of safe drinking water, the use of solar energy, the use of the water supply unit, its maintenance, etc.



## Community-level Grievance Committee

A committee has also been formed with the help of the Sarpanch of each habitation to deal with the grievances of the resident users. This committee comprises three or four people and includes at least one female member. The committee is also responsible for awareness generation.

## Monitoring

There are 100 units of MPWSS in Gaya, out of which 35 units were made completely functional and the remaining 65 are running on a trial basis. To monitor functioning of this initiative, Ranchi Design and Consultancy Services has set up a team of engineers and social development experts. BTAST is also involved in regular field level monitoring and has designed an MIS for regularly updating information. On the basis of information collected,

reports are prepared, and accordingly actions are undertaken. Additionally, a Reform Support Unit has been set up in PHED, Patna, to monitor the progress of the ongoing projects. Day-to-day monitoring of the solar-based unit is done by caretakers recruited under the initiative to ensure smooth and uninterrupted functioning as far as possible.

## EMERGING LESSONS

Programmatic learning from the implementation of this initiative is as follows:

**Mitigation of water borne diseases:** The installation of the solar-based mini piped water supply scheme has made safe drinking water available to the community and enhanced people's awareness regarding the link between water quality and health. Residents of the habitations studied reported reduced vulnerability to water borne diseases as against earlier times when people's dependence on contaminated water commonly led to diarrhoea, fever, skin diseases, etc. There was a lack of knowledge regarding water quality and its impact on health. However, with the installation of MPWSS in the community, there is availability of safe drinking water.

**Energy efficiency:** The scheme's dependence on solar energy is advantageous as most Mahadalit habitations lack regular electricity supply. However, this could also present a challenge during the monsoon season when sunlight is restricted, affecting the operations of the unit.



**Ensuring regular water supply:** The supply of water is regular now and since it is dependent on solar energy, supply is limited only on days when sunlight is inadequate. The presence of a caretaker at each unit also ensures continuity of supply as the community can bring any concerns to his/ her attention immediately and the caretaker can deal with minor problems without delay. The caretaker has also been trained to escalate complicated issues to the attention of a particular concerned authority, depending on the nature of the problem, so that corrective action can be expedited.

**Increased coverage:** Multiple factors have contributed to increased coverage. BTAST's involvement has facilitated generation of increased financial capital, by bringing in funds from DFID. The integration of a PPP model within this scheme for the construction, operation, maintenance and monitoring has also enabled greater coverage and reach by increasing the scale of operations and bringing in sectoral expertise in a planned manner.

**Operation and maintenance:** Regular maintenance and upkeep is necessary and any occasional delays in necessary repairs of the units disrupt regular supply



*"I was trained by Envirotech East Private Limited. Being part of the intervention, I will get income, and this will help in getting my children educated... people use mini pipe water supply scheme because hand pump water is difficult to fetch, and the mini pipe water supply scheme's water is readily accessible, pure and fresh. The community is very supportive."*

*Kapil, MPWSS Caretaker, Gazipur*



*"Water is suitable for drinking and even good for cooking. The tank is cleaned every 15-20 days by the caretaker. I have been using it for at least six months. There has been no problem. I use it for everything. Water supply is timely."*

*Sarvan Kumar, Community Member*

of safe drinking water, leaving the community to resort to contaminated sources in such situations. Additionally, at sites where the scheme is running on a trial basis, caretakers are volunteers. The absence of a tangible benefit for working is likely to affect the response of volunteers to the daily operation and maintenance requirements of the units.

**Human resource constraints:** PHED states that the current number of Junior Engineers and Assistant Engineers is not adequate to supervise and manage field operations at such a large scale. This implies that technical oversight on ground during the construction phase can be weakened if this were to be taken up on large scale, unless better resources and mechanisms are put in place.

## SUSTAINABILITY AND REPLICABILITY

The use of an alternative and renewable source of energy, i.e., solar energy, in the absence of electricity connections and unreliable supply in Mahadalit habitations contributes to the sustainability of this initiative. The intervention has been also sustainable due to the effective stakeholder engagement. Even the concept of five years of operation and maintenance





*“MPWSS water is clean, and hand pump water is dirty. Water is available through the day. Life has eased after installation of MPWSS, earlier hand pumps dependence prevailed, and its usage was a difficulty.”*

*Surmati, Community member*

and subsequent handing over to the community is an effort towards making it sustainable in the long run. This will help the community to gain knowledge about the intervention in detail which will enable them to manage the unit through their local committee once external support is withdrawn.

Replicability of the scheme can be ascertained from the fact that a second phase of implementation has been planned by the Government of Bihar. It provides for another 100 solar-based units in three districts of Bihar -- 35 units in Jehanabad, 30 units in Kaimur and 35 units in Nawada. BTAST's internal data reveals that the positive response to the scheme has also led PHED to sanction more than 1,000 such schemes for the deprived and excluded communities in other parts of Bihar. Additionally, PHED is considering implementing the same approach in 38 habitations, which are affected by Japanese Encephalitis.

This intervention has ensured a regular supply of safe drinking water to habitations that have thus far depended on unsafe sources of water. Apart from the obvious health concerns that prevailed before its implementation, this initiative is motivated by a strong aspiration to promote inclusive development by bringing the benefits of ongoing development initiatives to poor people.

The use of solar power to deal with lack of electricity demonstrates innovative use of technology to circumvent a formidable, yet foreseeable challenge. With strong community ownership and an organised system of payments, the solar-based mini piped water supply scheme could be successful in providing safe drinking water to habitations such as these.

## ACKNOWLEDGEMENTS

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