

COMMUNITY MANAGEMENT OF RURAL WATER SUPPLY

Community Water ^{plus}



Malaviya National Institute of Technology, Jaipur

Understanding resource implications of the “plus” in community management of rural water supply systems in India: 15 years into the Swajaldhara scheme in rural Jaipur



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Community Water ^{plus} is a 20 case study research project managed by Cranfield University, UK, on behalf of the Department of Foreign Affairs and Trade (DFAT) of the Australian Government

Executive summary

The villages in this case study (located in Jaipur District, Rajasthan) have been provided with drinking water supplies through the Swajaldara programme: an early initiative by the Government of India to promote widespread community management of rural water supplies. Although they have been provided with high quality infrastructure, and receive improved water supplies (typically household connections), the long term success in individual villages is variable. Whilst the state of Rajasthan does provide limited on-going support through the Public Health Engineering Department (PHED), this is largely limited to technical issues and is reactionary – dependent on villages recognising the problems they face and seeking support. This has allowed community service providers in some villages of the villages studied to fail, resulting in a reduced service to households, and there are concerns over sustainability in others.

Some of the key points are:

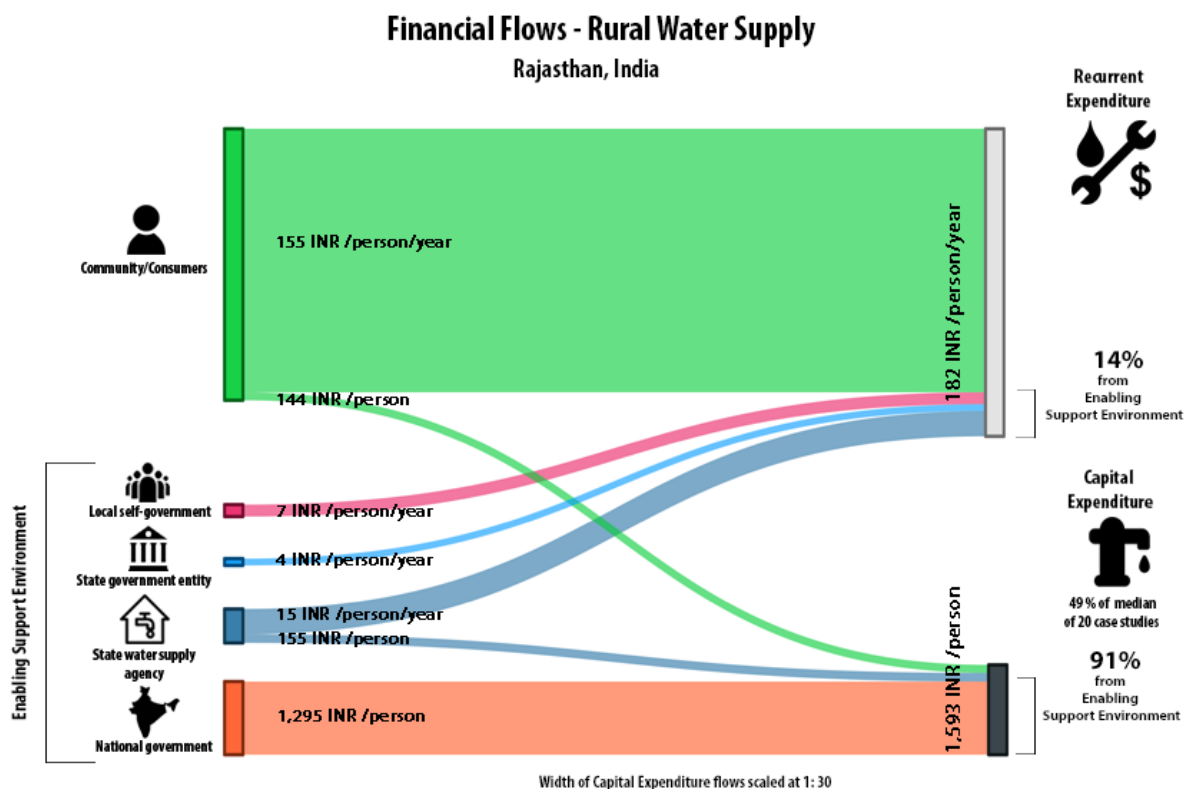
- **Community management can work with minimal support, but is susceptible to failure:** In this study the PHED only provides minimal, mostly technical, support to communities. Despite this two of the community service providers studied manage the water supply successfully, and on an apparently sustainable basis. However, this modality of support does allow community service providers to fail, leading to a poor service to communities.
- **Communities must be provided with a sustainable water source.** In all three of the 'best practice' villages, water committees expressed concern with the water source: either due to fluoride contamination or insufficient quantity. The source is ultimately the limiting factor in the service that can be provided, and providing complex treatment or establishing new sources is beyond the technical and financial capabilities of community service providers.
- **Water systems must keep pace with economic development.** The villages studied have experienced varying degrees of urbanisation, which has led to increased household wealth and a corresponding increase in demand for water for domestic purposes (for example, in water coolers). The systems, designed for only 40 lpcd, are no longer able to supply sufficient water, leading to households utilising alternative sources, potentially jeopardising the financial sustainability of the water supply systems.
- **Public water utilities must respond to changing funding patterns.** The Government of India is increasingly moving to channelling the majority of funding through Panchayat Raj Institutions, yet the Rajasthan PHED remains focused on centralised, engineering-focused interventions rather than supporting community service providers. This shift needs to happen, but can only happen with sufficient support from senior managers and state politicians.

See below for the summary cost table detailing the resource flows to the community managed water supply:

Rajasthan Summary Cost Table - calculated as the average cost per person, that is averaging across the three 'successful' villages

Source of funds	Use of funds - implementation			Use of funds - annual recurrent					RECURRENT EXPENDITURE TOTAL
	CapEx hardware	CapEx software	CAPEX TOTAL	OpEx labour & materials	OpEx power	OpEx bulk water	OpEx enabling support	CapManEx	
Community/consumers	INR 144	-	INR 144	INR 56	INR 45	-	-	INR 54	INR 155
Local self-government	-	-	-	INR 5	INR 2	-	-	-	INR 7
State government entity	-	-	-	-	INR 4	-	-	-	INR 4
State water supply agency	INR 56	INR 100	INR 155	INR 7	-	-	INR 8	-	INR 15
National Government	INR 1,295	-	INR 1,295	-	-	-	-	-	-
NGO national & international	-	-	-	-	-	-	-	-	-
International donor	-	-	-	-	-	-	-	-	-
TOTALS	INR 1,494	INR 100	INR 1,593	INR 68	INR 51	-	INR 8	INR 54	INR 182
Median of 20 case studies			INR 3,231						INR 207
'Plus' %age	90%	100%	91%	18%	11%	-	100%	0%	14%
Median of 20 case studies			95%						57%

The Financial Flow Diagram, below, has been developed as an advocacy and communication tool. It aims to assist policy-makers and programme developers to visualise the 'plus' resource implications necessary for sustainable community-managed rural water supply services.



Acknowledgements

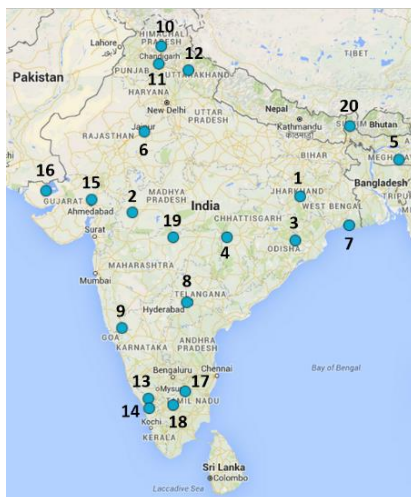
This case study research was led by Dr Urmila Brighu and assisted by Rajesh Poonia (both MNIT, Jaipur) supported by students from the MTech Environmental Engineering course at MNIT Jaipur. This report was compiled and written by Benjamin Harris (Cranfield University). Dr Snehalatha Mekala was the national research coordinator.

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This research project has investigated twenty reportedly successful community-managed rural water supply programmes and approaches across India, from which we have subsequently developed understanding on the support needed to make community-management service provision successful and sustainable. The project has been implemented by a consortium of partners, including: the Administrative Staff College of India (ASCI), the Centre of Excellence for Change (CEC), Malaviya National Institute of Technology (MNIT), the Xavier Institute of Social Service (XISS) and IRC, The Netherlands with overall project coordination provided by Cranfield University, UK.



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The twenty case studies

- | | | | |
|----|------------------|----|----------------------------|
| 1 | Jharkhand | 11 | Punjab |
| 2 | Madhya Pradesh | 12 | Uttarakhand |
| 3 | Odisha | 13 | Kerala (Kodur) |
| 4 | Chhattisgarh | 14 | Kerala (Nenmeni) |
| 5 | Meghalaya | 15 | Gujarat (Ghandinagar) |
| 6 | Rajasthan | 16 | Gujarat (Kutch) |
| 7 | West Bengal | 17 | Tamil Nadu (Morappur) |
| 8 | Telangana | 18 | Tamil Nadu (Kathirampatti) |
| 9 | Karnataka | 19 | Maharashtra |
| 10 | Himachal Pradesh | 20 | Sikkim |

The twenty case studies are available also in four page summaries, both in Indian Rupees and in US Dollar (PPP) versions, accessible from the project website. A Policy Brief and a Research Brief There is also a synthesis report available, published by Earthscan, London.

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1 Introduction

Rajasthan is a semi-arid area and suffers from acute water resource challenges: despite being the largest Indian state by land area, it contains only one per cent of the country's estimated water resources. Historically, drinking water supply in the rural areas in India has been outside the government's sphere of influence, being the preserve of communities and individuals using traditional water sources¹. Community-managed open wells, private wells, ponds and small-scale irrigation reservoirs have often been the main traditional sources of rural drinking water, with significant reliance on groundwater. Due to a rapidly growing population and increased demands for water, these water resources are increasingly unreliable.

National government intervention in drinking water supplies began in the 1970's and continued under various programmes, largely as a supply driven direct intervention. This report examines three villages that benefited from reforms under the Government of India funded Swajaldhara programme which began in 2002. Swajaldhara sought to extend the concepts of the 73rd Amendment (decentralising political and financial decision making across many government sectors) into rural water supply: making rural communities responsible for construction and management of their own water supply systems. The Government of India (via the PHED) provided the majority of the capital costs of the project, with users contributing 10% and paying for operations and maintenance on an on-going basis.

1.1 Background to the topic and the Community Water ^{plus} project

Community management has long been recognised to be critical for rural water supply services. Indeed, community management has contributed significantly to improvements in rural water supplies. However, those supplies are only sustainable when communities receive appropriate levels of support from government and other entities in their service delivery tasks. This may consist of easy access to call-down maintenance staff from government entities, or support from civil society organisations to renew their management structures and they may need to professionalize—that is, outsourcing of certain tasks to specialised individuals or enterprises.

In spite of the existence of success stories in community management, mechanisms for support and professionalization are often not institutionalised in policies and strategies. Success stories then remain pockets of achievement. Also, the necessary support comes at a price, and sometimes a significant one – though in many cases there is lack of insight into the real costs of support.

Community Water ^{plus} (Community management of rural water supply systems) is a research project which aims to gain further insights into the type and amount of support that is needed for community-managed water services to function effectively.

1.2 Overall objectives of the research and research questions

This research investigates 20 case studies of reportedly 'successful' community-managed rural water supply programmes across India in order to determine the extent of direct support provided to sustain services with a valid level of community engagement. The expected outcome – based on the empirical evidence from the 20 cases - of the project is to have a better understanding of the likely

¹Rajasthan has a history of large scale stepwells or 'Baoris', which accessed groundwater on a large scale.

resource implications of delivering the ‘plus’ of successful community management ‘plus’, for different technical solutions, at a level of competence and bureaucratic involvement that is indicative of normal conditions across many low-income countries, and the possible trajectories for institutional development of effective support entities for community management.

In order to achieve that outcome, the project focuses on the following main research question:

What type, extent and style of supporting organisations are required to ensure sustainable community managed water service delivery relative to varying technical modes of supply?

This is further broken down in the following specific questions:

- What are the current modalities of successful community management and how do they differ in their degrees of effectiveness?
- What supporting organisations are in place to ensure sustainable water service delivery relative to alternative modes of supply?
- What are the indicative costs of effective support organisations?
- Can particular trajectories of professionalising and strengthening the support to rural water be identified?

This report examines the successes and failures of the Swajaldhara scheme in Jaipur District, Rajasthan. Swajaldhara was an early attempt (2001) by the Government of India to roll out community managed water supplies across the country. In Rajasthan this saw infrastructure being financed jointly by the government and communities before being handed over to communities to run independently, with little on-going support.

1.3 Conceptual framework

Community Water^{plus} (community management of rural water supply systems) is a research project that aims to gain insights into the type and level of support and professionalisation that is needed, and the resource implications of this ‘plus’ (in terms of money, staffing, and other factors), in order to achieve sustainable community management. To achieve this, the research investigates twenty case studies of ‘successful’ (as initially reported) community-managed rural water schemes across India where the range of States, and their varying socio-economic as well as hydrological conditions, gives a good sample of technologies and approaches which are of relevance to many lower-income countries. Ultimately, the hypothesis underpinning the research is that some level of external support is needed to deliver on-going high quality water services through a community management model. Key to this support is what this research labels the ‘enabling support environment’ (ESE) that fulfils both ‘service authority and monitoring’ functions, such as planning, coordination, regulation, monitoring and oversight, and ‘direct support’ functions, such as technical assistance and financial contributions (Lockwood and Smits, 2011).

The research focuses on the level of water service people receive so as to validate the degree of success found under the different programmes. The way in which the community are involved in delivering this service is considered through what the study terms the ‘community service provider’ (CSP), which is the entity that takes on the responsibility for everyday operation and minor maintenance of the water supply service. It is recognised that an effective CSP should reflect both the local community and the complexity of the water system, leading to divergent models of

management and participation. However, firstly we investigate the form, function and resource implications of the ESE, along with an analysis of the strengths and weaknesses of this particular model. The study finishes with a detailed consideration of the total cost of providing water services, with a focus on the costs incurred by the ESE – whether directly or indirectly.

Figure 1-1 provides an overview of the different elements, whilst a detailed research methodology and explanation of the underlying has previously been published as part of the Community Water^{plus} project. Please see “Understanding the resource implications of the ‘plus’ in community management of rural water supply systems in India: concepts and research methodology”, Smits, S., Franceys, R., Mekala, S. and Hutchings P., 2015. Community Water Plus working paper. Cranfield University and IRC: The Netherlands; please see <http://www.ircwash.org/projects/india-community-water-plus-project>

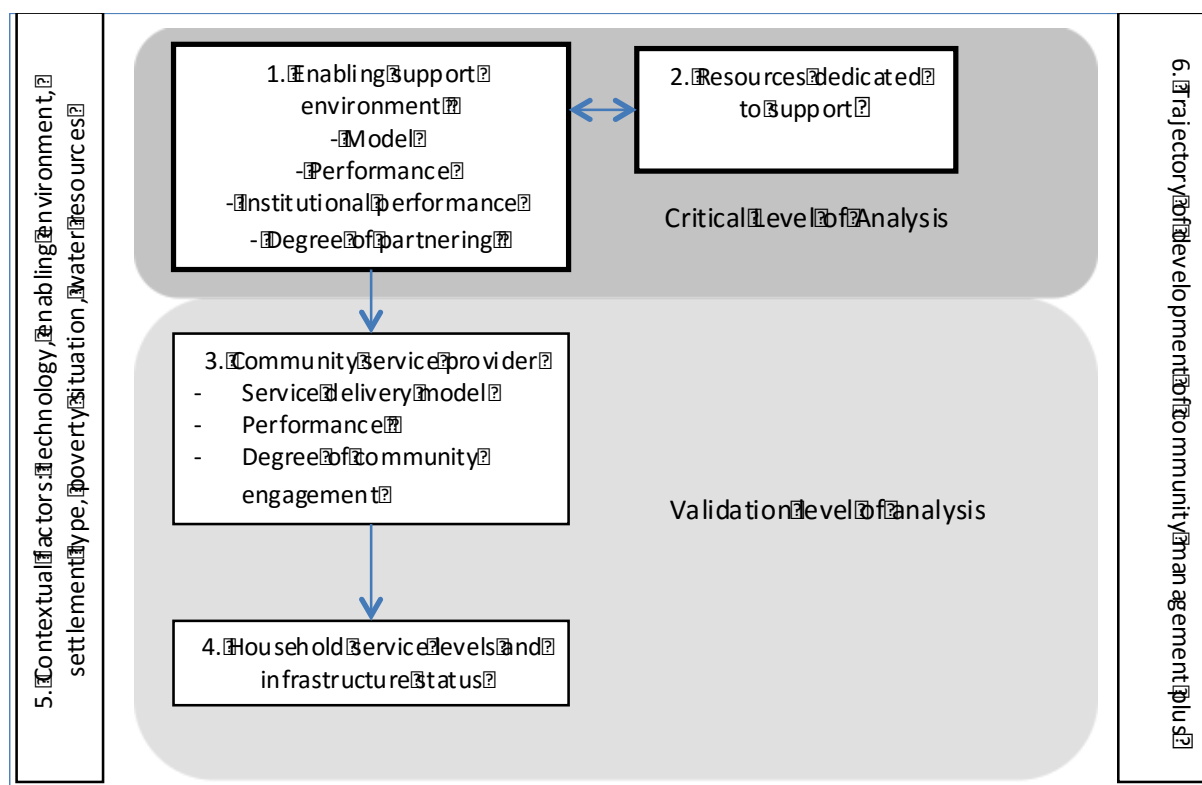


Figure 1-1 Relationship between the research elements

1.3.1 Data collection and analysis

In order to have information, on each of the research elements, this case study carried out the following data collection methods during field visits in late 2014 and early 2015, with this data complemented by a literature review. In total, 10 key informant interviews, 4 focus groups and 120 household surveys were collected as well as material from secondary sources (such as organisational reports).

Table 1-1: Data collection methods

Unit of analysis	Data collection methods
Enabling support environment	5 Key informants. All the informants were interviewed twice, second time after analysing the information received from first interview.

Community service providers	4 focus group discussions (one in each village)
Households	120 Household surveys (30 in each village) and no focus group discussions,
Resource dedication	Information on Swajaldhara scheme through GoI and GoR web resources

The data were processed in 4 databases (one for each of the units of analysis). These databases contain scoring tables for the performance of the enabling support entities, the service providers, the degree of partnering and participation and the service levels that users receive (for details of the scoring, see the project's research methodology and protocols (Smits et al., 2015). Though the scores obtained have informed much of the analysis presented here, these analyses were refined through validation meetings with CEC staff.

In the costing section, all prices quoted are given in Indian Rupees (INR) and have been given in actual prices at time of implementation unless stated otherwise.

For more information on the conceptual framework and research methodology please see Community Water ^{plus} Concepts and Research Methods (2015).

2 Context: water supply in rural Jaipur district

This case study has been conducted in Jaipur district: the largest district in Rajasthan centred on the state capital, Jaipur. Rajasthan is a semi-arid zone and the water has always been a scarce resource. Despite being the largest state of India geographically, Rajasthan contains only 1% of the country's surface water resources. Significant parts of the state (including all the sub-districts in this case study) have been declared a 'dark zone' by the Central Ground Water Board— that is an area where there are restrictions on the abstraction and use of groundwater due to depleted levels. The majority of villages in Jaipur district access groundwater, though a minority are supplied with bulk water supplied by the PHED from surface water sources. This bulk water supply is being progressively extended.

Rajasthan is one of the poorer states in India, having a GDP per capita of only 65,000Rs in 2013-14, although the area studied is influenced heavily by the proximity of Jaipur - one of the world's fastest growing cities with an annual growth rate of 3.6%. The villages studied lie to the South and North West of Jaipur city respectively (Figure 2-1), and mark various points on the transition between isolated rural settlements to industrial and urban areas. Despite increasing urbanisation, they are still considered as villages for all political and administrative purposes.

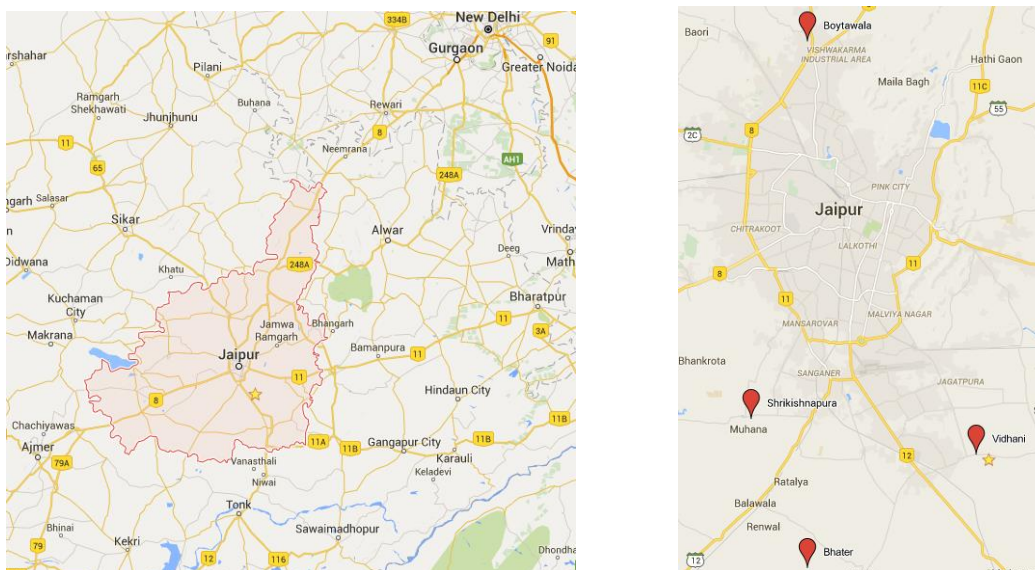


Figure 2-1The location of Jaipur district, and the villages studied

Under Indian law state governments are responsible for providing safe drinking water to their populations, but since the 73rd and 74th amendment to the constitution, the transfer of this responsibility to local self-government is in progress.

The villages in this case study have been served with drinking water through the Swajaldara programme, which was implemented by the GoI from 2002 as an improvement and scaling up of previous rural drinking water programmes, including the pilot Sector reform Project which was launched in 2000. This programme has now been superseded by the National Rural Drinking Water Programme (NRWDP), but the systems implemented under it are still functional, supported by the PHED. The principles of the Swajaldhara programme are as follows:

- i. adoption of a demand-responsive, adaptable approach along with community participation based on empowerment of villagers to ensure their full participation in

- the project through a decision making role in the choice of the drinking water scheme, planning, design, implementation, control of finances and management arrangements;
- ii. full ownership of drinking water assets with appropriate levels of Panchayats,
 - iii. panchayats / communities to have the powers to plan, implement, operate, maintain and manage all Water Supply and Sanitation schemes,
 - iv. partial capital cost sharing either in cash or kind including labour or both, 100% responsibility of operation and maintenance (O&M) by the users ;
 - v. an integrated service delivery mechanism ;
 - vi. taking up of conservation measures through rain water harvesting and ground water recharge systems for sustained drinking water supply; and
 - vii. shifting the role of Government from direct service delivery to that of planning, policy formulation, monitoring and evaluation, and partial financial support.

Key to the Swajaldhara programme is that *“Panchayati Raj Institutions (PRIs) are to be vested with functions and finances, and supported with functionaries to carry out the responsibilities of drinking water supply scheme planning, designing, implementation, operation, maintenance and management”*. That is that Village Water and Sanitation Committees (to be established as a sub-committee of the Gram Panchayat) are responsible, and should be enabled to be so, for all aspects of the water supply system.

3 Enabling Support Environment Level

The villages studied for this report manage their water supplies through the Swajaldhara programme. This was a programme to implement community managed rural water supplies across India, through the existing state Public Health (or similar) departments. The overriding objective was that:

“Panchayati Raj Institutions (PRIs) are to be vested with functions and finances, and supported with functionaries to carry out the responsibilities of drinking water supply scheme planning, designing, implementation, operation, maintenance and management”.

Although a nationwide programme, the implementation of Swajaldhara was the responsibility of individual states, and this has led to considerable variation in the scope and nature of the schemes supported. In Rajasthan the programme was implemented largely through existing PHED staffing structures, with Village Water and Sanitation Committees (VWSCs) created as a sub-committee of Gram Panchayats to act as the service provider.

3.1 Background and origin of the ESE, and context in which it operates

In the state of Rajasthan, the PHED, which was initially a part of the Public Works Department, has been responsible for the water services in urban and rural areas since establishment in 1960. Under successive Government of India schemes, responsibility for rural water supply has been progressively transferred to communities – the pace of change largely defined by the funding available. Although different schemes differ in the details of the implementation, they all see responsibility for delivering for operating and maintaining systems delegated to VWSC, although the PHED still maintains a key role in extending services to new rural areas, and continues to provide water directly in urban areas.

The function and culture of the PHED cannot be separated from the context in which it works. Being a water scarce area, water supply in Rajasthan requires considerable technical innovation and expenditure to guarantee access to water (such as large bulk water schemes). Equally, water is still seen by both politicians and consumers as a basic service that should be provided by the government. As a result, the PHED of Rajasthan is essentially a technical body with the majority of staff being engineers. Its main role is seen as the sanctioning and technical design of new rural water supply schemes, with only limited work on generating demand and sensitizing villages to the need for improved drinking water at the outset of new schemes.

There is an additional wing – the Water Supply Support Organisation (WSSO) – which provides training and other IEC activities, although this does not work directly with community based service providers.

Under the Swajaldhara a chain of committees was created within the PHED to implement programmes and monitor progress at state, district and village level. The State Water and Sanitation Mission was responsible for overall policy formulation and programme implementation, but had limited direct involvement with communities. District Water and Sanitation Committees were responsible for selecting and sanctioning new projects and channelling funding to VWSC.

However, the majority of direct support to VWSCs was provided by PHED staff working at sub-district level – staff who were able to provide technical support and monitor the progress of individual schemes.

For the purposes of this case study, the focus has remained with the support provided by the PHED, although it was observed that Gram Panchayats also played an undefined supporting role.

3.2 Enabling support environment description

As explained above most of the support to VWSCs is provided by field-level staff of the PHED: Junior, Assistant and Executive Engineers. The salaries of these staff members continues to be paid by the PHED, not being met from the Swajaldhara budget. Although Swajaldhara provided for IEC activities to be delivered by NGOs or other external bodies, this was not the case in Rajasthan.

Under the Swajaldhara guidelines, the implementation in each village was split into several phases: a 'Sensitisation and Identification phase'; 'Training'; 'Scheme / System Planning'; and 'Implementation and Commissioning'. Although the same guidelines recognise that on-going operation is in many ways the most challenging phase, no provision for or guidance on this was included in the programme.

In Rajasthan, the implementation of the sensitization phase consisted of visits by the engineering staff to villages identified as suitable to raise awareness of the scheme, to educate villages on the needs for improved water supply, and to explain the conditions of the Swajaldhara programme. This activity was largely achieved through meeting with Gram Panchayats rather than directly with communities, and there appears to be no evidence of community mobilisation or other such activities. A review of cash books from the Swajaldhara programme identified only limited spend on IEC or training activities – largely the cost of hiring venues and providing food and transport.

The scheme planning was carried out by the engineering staff of the PHED and it is unclear to what extent communities were involved in specifying the service they wanted to receive. Although the VWSC technically made the final decision on scheme design, the PHED established specifications for materials and contractors, in an attempt to control both cost and quality of the scheme. All schemes were designed for 40 lpcd – the minimum standard allowed under Swajaldhara (services up to 55 lpcd could be built, but with increased community and state contributions).

Although the PHED was on hand to monitor the construction phase and ensure work was carried out to a satisfactory standard, responsibility for hiring contractors was with the VWSC, and funding was only released from the PHED as and when it was needed. This was a significant transfer of responsibilities to the community, to encourage community oversight of the contractors and the quality of their construction. Subsequently the PHED provided limited training (again through the engineering staff) on operation and maintenance topics, including financial and technical upkeep of the system. Again, it is unclear how extensive this training was.

According to the Swajaldhara guidelines, once the water supply system was operational, the PHED had no further role to play. THE VWSC is responsible for financing and operating the system, whilst the technical member of the VWSC takes the lead on maintenance and asset renewal. However, the PHED does provides support in an informal way out of its own budget. This is mostly through engineering staff: the Junior Engineer attends meetings on a semi-regular basis (approximately twice a year) and is on hand to offer technical advice when VWSCs encounter problems or failures. The PHED also advises the VWSC on the need for asset maintenance and replacement, though capital replacement decisions and costs are purely the remit of the VWSC. Finally the PHED is also responsible for conducting regular water quality tests. However, implementation of this is not

consistent, and results are infrequently fed back to the VWSCs.

Through this case study it became apparent that the PHED also provides a range of other support to VWSCs. This is not done on a consistent basis, but includes:

- In cases where the source fails or borehole collapses, PHED officials are able to provide an alternative source or rehabilitate the borehole (if funding allows) after consulting with the resident hydrogeologist. The most obvious example of this is the drilling of three new boreholes in Boytawala village, funded by the PHED through the NRDWP programme.
- The villages included do not have 100% coverage from the piped supply, and existing handpumps continue to be used by a proportion of the community. Despite being the responsibility of the Gram Panchayat, during the summer the PHED runs a 'hand pump repair campaign' which ensures the handpumps are functional.
- The PHED has an incentive fund, which is given to VWSCs who have successfully managed water supply schemes for more than two years. It is not clear if this has been given to the villages in this study at any point

The PHED also encompasses a branch known as the Water Supply Support Organisation (WSSO), which is responsible for engaging communities through Information, Education and Communication (IEC) activities and social mobilisation. It is also responsible for internal staff development and training. Although financially and managerially separate to the PHED, it sits under the State Water Sanitation Mission whilst field staff are under the day to day supervision of Additional Chief Engineers of the PHED.

The WSSO's mission includes a mandate to mobilise communities to participate in water supply programmes and promote the participation of Panchayat Raj Institutions (PRIs) in programme implementation. Currently, it appears that much of the work is focused in Western Rajasthan – traditionally the poorer area of the state, and one which suffers from acute water shortage. As a result there is no evidence of this type of work in the villages studied, and it has not been possible to assess the cost of effectiveness of this.

The WSSO also runs IEC campaigns which address issues such as water conservation and hygiene promotion in addition to generating demand for new community managed water programmes. These campaigns are run through a mixture of print, electronic and folk media. Although these campaigns have a presence in the area studied, it can not be considered as direct support to the VWSCs, and it is not possible to estimate the cost of supporting individual villages.

Overall the WSSO has a budget of INR 25Crore (2015-16 down from 51 Crore in 2014-15), and a budget for supporting VWSCs in Jaipur district of INR 4 lakh. Anecdotal evidence suggests that the WSSO struggles to spend this budget, in part due to a lack of capacity to run programmes.

Finally, Gram Panchayats also play an undefined supporting role at the village level. During fieldwork for this case study it was observed that the Gram Panchayats provided some of the following support:

- occasional financial support to VWSCs to make good the revenue deficit for operation and maintenance expenditure;
- use of the Gram Panchayat office as a meeting place and office for the VWSC;
- the Sarpanch is an ex-officio Chairman of the VWSC, providing a link between the two bodies at a local level.

Other than the direct financial support given in Vidhani village it has not been possible to obtain estimates of the value of this support.

A summary of the work undertaken by the PHED is given in Table 3-1. For the purposes of this overview, any work conducted by the WSSO is considered as being provided directly by the PHED.

Table 3-1 Activities carried out by the PHED

Type of activity	Way of providing support	Modality of support	Explanations and comments
Monitoring and control (auditing)	Directly to service provider	Demand based	The J.En visits the village regularly, but only a few times each year.
Water quality testing	Directly to service provider	Supply based	Water quality testing is conducted by PHED (via WSSO) twice a year
Water resources management	Directly to service provider	On request	PHED does some water resource management, but not directly with CSPs. The PHED hydrologist may visit to help identify additional sources.
Technical assistance	Directly to service provider	On request	J.En provides technical advice on a request basis
Conflict Management	N/A	On request	There is very limited resource conflict. The PHED may step in when a VWSC fails completely, but unclear of mechanism for triggering this.
Support in identifying investments needs	Directly to service provider	On request	PHED will assist with identifying asset replacement/upgrade needs if requested.
(Re)training of service provider	Directly to service provider	Supply based	The WSSO covers training in all villages regardless of where infrastructure funding came from, but unclear how frequent this is.
Information and communication activities	Directly to service provider	Demand basis	WSSO conducts IEC activities on a district-level basis.
Fund mobilization	N/A	On request basis	Funding was only available for capital costs. No further fund mobilization conducted by PHED.

3.3 Enabling support environment performance indicators and institutional assessment

Two assessments were made of the intuitional performance of the PHED: the first using QIS indicators to assess performance in five areas (Table 3-2), and a second more detailed assessment made by scoring against 40 indicators in eight areas (Figure 3-1).

Table 3-2 QIS performance indicators for Rajasthan PHED

Indicator	Score	Definition
Indicator 1.1. Formality of the mandate for support	100	The ESE has a clearly articulated vision, mission and/or objectives for its support function, which is also supported by a policy mandate
Indicator 1.2 Working methods	50	The ESE has tools and methods but not for all the areas of support it provides. But where they exist, it does apply those systematically
Indicator 1.3 Information management	25	The ESE only keeps track of the service providers it supports in an informal and ad hoc manner
Indicator 1.4 Communication between service support authority and service providers	50	The ESE has one communication channel that is easily accessible to the service providers it supports
Indicator 3.1 Client satisfaction	25	The ESE doesn't keep track at all of the satisfaction of the service providers it supports

The QIS scores show that whilst the PHED has a strong mandate for its role – unsurprising given it is a government body – it has variable performance in other areas. The formality of the work with community service providers is inconsistent – relying on both the individual staff providing support and communities actively seeking that support – with little in the way of tools to support communities as opposed to building infrastructure. The PHED also scores poorly in information management (in relation to community managed supplies) and client satisfaction, with little to no information existing.

One criticism which was raised by key informants but not captured by the QIS, was that the PHED is heavily focused on current initiatives: if a village was provided with water under a now defunct programme (such as Swajaldhara) it is likely to receive less support than a village served under the latest Gol funding stream (i.e. NRDWP). Previous schemes are the responsibilities of PRIs through JilaParishads (District Rural Councils), and although the PHED provides some support, this is not necessarily systematic.

Scores for the detailed institutional assessment are given in the diagram below, but each area can be explained as follows:

- **Organisational autonomy:** The department has considerable scope in where it directs its efforts, but this is done within the confines of national and state government and policy. Notably, no revenue from water tariffs goes to the PHED, leaving it completely dependent on government for funding.

- **Leadership:** The PHED has a heavily hierarchical structure, which leads to strong administrative management. There appears to be widespread support from junior staff, though this may be due in part to the deferential nature of staff relationships.
- **Management and administration:** There is little evidence of systematic information management – what data there is can be difficult to identify, and is seldom used for management purposes.
- **Community orientation:** There is very limited community orientation, with the culture of the PHED still heavily in favour of infrastructure creation. Only field level staff deal with communities, with no indication that senior management consider the realities of working with communities.
- **Technical capability:** the PHED has strong technical capability, evidenced by its success in delivering water to an arid region, and the implementation of several major bulk water schemes. Sometimes this is more responsive than pro-active, especially in the summer dry season.
- **Developing and maintain staff:** Although jobs with government bodies are highly valued in India, there is limited staff training and development, which is done in an ad-hoc way. Although Swajaldhara specified training should be given in social aspects of the scheme, there is no evidence that PHED staff received this support, and there is no development available for non-engineering staff.
- **Organisational culture:** As a large body, the PHED does not have a distinct organisational identity. There are limited resources available to address this or undergo change to work in different ways (i.e. more community orientation).
- **Interactions with key external institutions:** the PHED appears to have good relationships with state and national government bodies, being aware of changes in policy and funding and being able to respond to these. There is limited interaction with NGOs, due in part to their limited presence in Rajasthan compared to other Indian states.

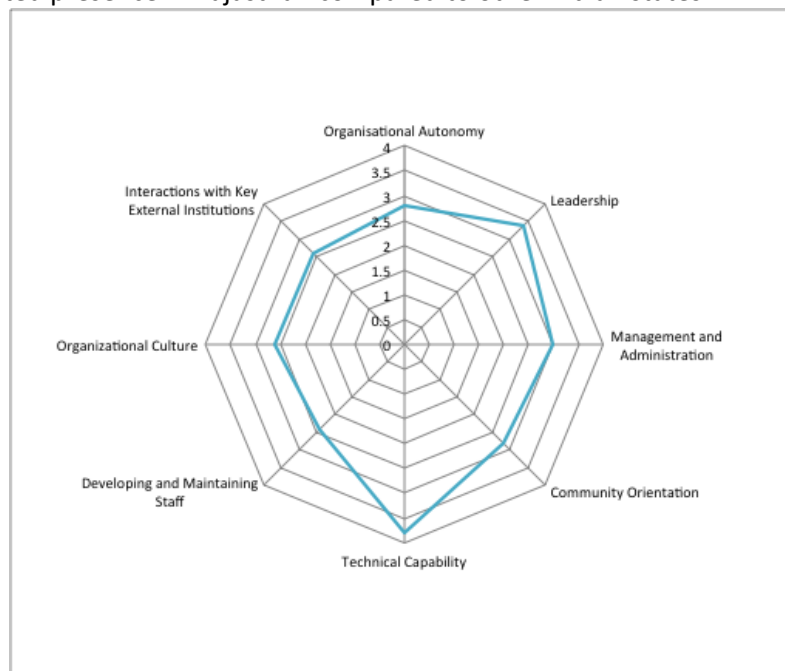


Figure 3-1 Institutional assessment for Rajasthan PHED

3.4 Enabling support environment partnering assessment

It is clear that the majority of support provided by the PHED is in the capital investment phase. However, there is some on-going support and the nature of this support changes. Using the concept of a 'ladder of participation' this case study attempts to categorise the partnership between the

PHED and VWSCs by matching the observed activity to one of five partnering typologies. The results of this assessment are shown in Table 3-3.

Table 3-3 Partnering assessment for Rajasthan PHED

Stage	Type of partnering	Description	Justification
Capital Investment	Contributory	ESE and CSP pool financial resources to meet the costs of capital investment in hardware and software provision during implementation	Whilst the PHED and VWSCs both contributed financially to the system construction, much of the scheme was still implemented by the PHED (though the CSP had to appoint contractors to do the work).
	Transactional	ESE and CSP initially negotiate a implementation plan that is then delivered by the ESE	
On-going service delivery	Consultative	The ESE and CSP have a systematic and transparent system for sharing information regarding administration, management, and operation and maintenance	The only on-going partnering is the VWSC consulting the Junior Engineer for advice, though this happens in an ad-hoc way. Although there is transparency, this is not systematic.
Asset Renewal	Consultative	ESE and CSP systematically share information regarding service levels and technology status enabling proper planning for asset renewal	The Junior Engineer is available to give advice on asset renewal, but only when approached by the VWSC. This cannot be considered truly systematic.
Service Enhancement or Expansion	Transactional	Service enhancement or expansion is dependent on negotiations between ESE and CSP following a request from the CSP	In the only example of expansion (Boytawala), the PHED provided the new boreholes, after negotiating with the VWSC, and confirming the need existed. It is likely future implementation of bulk water schemes will see the PHED make an offer to the VWSCs, with limited scope for negotiation.

Bottom up community development: the experience of Tarun Bharat Sangh

As part of the scoping for this study several visits were made to Alwar district to explore the work of Tarun Bharat Sangh (TBS): a long established Rajasthani NGO which works with communities to address depleted groundwater through constructing traditional rainwater harvesting structures. The work of Tarun Bharat Sangh has received significant attention and international acclaim – including Rajendra Singh, the chair, receiving the 2015 Stockholm Water Prize - for its' water restoration efforts and social mobilisation.

At the heart of the TBS model is a long-term approach to community development, waiting until villages are 'fully ready' to address water scarcity issues. This can involve repeated visits to a village over several years, slowly building understanding of the problem of depleted groundwater and the need for water recharge, before any construction work takes place. There is an emphasis not only on the actual recharge structures, but also water conservation and the need for local people to be disciplined in their use of water. TBS chooses to work directly with the community – bypassing PRIs which it sees as inherently political. This approach almost certainly generates significant community buy-in to the project, but over a timescale that would be unacceptable to most government or international projects.

Once a community is ready, work begins on constructing traditional structures to collect rainwater – typically earthen structures known as johads. The level of community contribution is particularly noteworthy: typically 30%, but rising to 70% in richer communities. This can be in money, but more typically in kind, through the contribution of labour and land. There is a considerable emphasis on communities working for themselves, with a rejection of mechanised labour and engineering-focused solutions (though, appropriately, engineered spillways are constructed in the earth embankments where required). What is certain is that these structures make a difference: external studies have shown an increase in groundwater recharge of 20 per cent, whilst there is evidence of dry wells bearing water again as well as some regeneration of river flows.

Whilst this helps the availability of water for irrigation and domestic purposes, it does not directly address drinking water. In some of the most successful villages who have worked with TBS, villagers were still using unprotected open wells, with individual houses running their own motors and pipes to supply water. In an interview with Rajendra Singh he was clear that the efforts of TBS are focused solely on water recharge.

For this reason it was decided that TBS did not make a suitable case study for the Community Water^{plus} project. But it also points to a wider point: here, in communities which have effectively worked together to build johads and improve water availability, domestic water was still seen as an individual responsibility. Creating enhanced water supply systems still requires external support and impetus, even in the most cohesive of communities. This is an interesting counterpoint to typical community managed programmes, where engineering focused public health departments progressively understand the need for social support for community development: here the community development has been fore and centre of the programme, with the need for engineering solutions progressively accepted.



Figure 3-2 Community Johad built with the help of TBS, and an unprotected open well used by the same community for drinking water. Multiple households have installed individual electrical pumps to provide water.

4 Community Service Provider Level

The heart of community managed water supplies is the Village Water and Sanitation Committee (VWSC). In this case study, as for all systems built under Swajaldhara, there is a VWSC which sits as a standing committee of the Gram Panchayat (the lowest level of local government in India), and has full ownership of and responsibility for operation and maintenance of the water system. This section explores the functioning of these VWSCs.

4.1 Context

All of the CSPs in this study are located in Jaipur district: Boytawala, Vidhani and *ShriKishnapura* are close to the outskirts of urban Jaipur, whilst Bhatar is further away. Being close to a major city (four million people and growing), life in the villages is changing rapidly: some are seeing changes in employment as people choose to commute to work in Jaipur, whilst in others rising land prices are resulting in farmers selling their land for development. Within this dynamic environment, the VWSCs represent a system that was intended for cohesive rural communities.

As part of this change, many inhabitants are becoming increasingly wealthy (in part due to the land sales mentioned above) which is in turn leading to increased demand for water. This places increasing strain on water systems which were designed over 10 years ago, to provide only 40 lpcd, and forces some households to utilise alternative sources.

Table 4-1 Summary data on villages

Name of Village	Total Population (2011)	% SC/ST	Total household	HH connections
Vidhani	731	10.8	103	37 (36%)
Bhatar	965	23.2	132	75 (57%)
Boytawala	8667	24.0	1645	950 (58%)
ShriKishnapura	1376	60.8	258	82 (32%)

All the villages were provided with piped water connections based on boreholes with motorised pumps and service reservoirs. A list of infrastructure in each village is given in Table 4-4 Infrastructure in each village. Those households which do not have access to a piped connection use a mixture of private borehole, water tankers, and standposts or handpumps – as detailed in section 6.

4.2 Community service provider descriptors

Under the Swajaldhara scheme each community had to establish a formal VWSC. These VWSCs are the owners of the infrastructure and responsible for the maintenance and operation of it. Although established as a sub-committee of the Gram Panchayat they are legally and largely operationally independent – the key link between the Gram Panchayat and VWSC is that the Sarpanch chairs the VWSC. There is not a simple relationship between Gram Panchayat and VWSC – for instance, Vidhani and *ShriKishnapura* are both in the same Gram Panchayat, so the same Sarpanch chairs two VWSCs.

There are at least 11 members of each VWSC and there are no formal quotas for the inclusion of women of other marginalised groups. Elections take place every five years in line with the Gram Panchayat elections and appear to happen in a systematic and fair way. However, the running of the

VWSC beyond elections appears to rely heavily on the initiative of the members, with no mechanism for ensuring meetings take place, or holding the VWSC accountable for use of funds. In the best practice villages meetings took place on a regular basis, but in *ShriKishnapura* the VWSC appeared to be largely non-functional. Although the Junior Engineer of the PHED is an observer member of the VWSC this appears to be a reactionary role: they will attend meetings if requested, but do not have any power to call meetings, set an agenda or compel the VWSC to take any particular action.

All the VWSCs have minimal staffing levels – typically just a pump operator. Activities such as bill collection are either carried out by the pump operator or on a volunteer basis. For larger maintenance roles, day labourers are employed as and when they are needed. Table 4-2 provides a summary of staffing levels and other activities.

Table 4-2 Staffing of VWSC

Staff	Vidhani	Bhater	Boytawala	<i>ShriKishnapura</i>
VWSC members	17	12	14	2 (active)
<i>Of which women</i>	unknown	unknown	3	unknown
Pump operator	1	1	2	1
Other staff	-	-	Repair staff (x2)	-



Figure 4-1 The Naandi plant in Vidhani (closed at the time of this visit at midday)

As detailed in section 3, the only supporting entity for the VWSC is the PHED. That doesn't mean there are no external actors though: in Vidhani the NGO Naandi operates an RO plant to provide safe drinking water, which users purchase for INR 3 per 20l container. The plant was constructed by Bosch as part of a CSR scheme, and uses water from a borehole constructed to serve an adjacent industrial area (not available for use by the community). Although an NGO, Naandi runs the RO plant on a quasi-commercial basis (as with all its water projects) through a subsidiary, Naandi Community Water Services Ltd. This fits the

model of a not for profit distributing organisation, as frequently seen in the delivery of public services in the UK, where although profit is sought this is reinvested in service delivery.

4.3 Detailed overview of VWSCs

Each VWSC faces its own challenges and has limitations on how well it functions and what services they provide. In summary these are:

Bhater

- Bhater is the most distant village from Jaipur, so is less influenced by the urbanisation seen in other villages.
- The groundwater in the area is partially fluoride contaminated. Although private shallow boreholes are affected by fluoride contamination, the borehole source for the VWSC is free

of fluoride as it is drilled to a greater depth. This gives households a clear incentive to pay for a household connection. In addition, the borehole is situated downstream from a pond that acts as a rainwater harvesting structure. This helps groundwater recharge (up to 50 feet in a heavy monsoon) and ensures the borehole does not run dry.

- Many households still utilise a private source or communal hand pump for domestic purposes, as the water provided by the VWSC (only for 1 hour each day) is insufficient to meet all increased demand as household wealth increases.
- As is common in villages with intermittent supplies, many households use 'booster pumps' to increase the quantity of water they can collect in storage. This has a distorting effect on the pressure of the network, and can prevent other households accessing enough water. To prevent this, the VWSC (with the help of the PHED) agreed with the electricity board to cut power supplies during the water supply period.

Boytawala

- As a large village (over 8,000 inhabitants) Boytawala has multiple water sources (boreholes). However, it still struggles to provide sufficient quantities of water. The village is split into 12 zones, each of which is provided water for 1 hour a day. The village is located either side of a railway, and initially only half of the village was supplied with water (it wasn't possible to pass the network under the railway line). The second half of the village was provided with a piped supply by the PHED at a later date.
- The VWSC functions effectively: it is seen to collect a regular tariff and undertake both reactive and preventative maintenance. It has also invested in some capital maintenance expenditure.

Vidhani

- The biggest problem is the fluoride contamination of water. Although at the limit of what is permissible under Indian regulations (3.0 ppm) it is still perceived as unsuitable for drinking. Most households purchase water from the RO plant for drinking.
- The village is adjacent to an industrial area under the control of RIICO – the Rajasthan State Industrial Development and Investment Corporation. This has led to an increased demand for land, with many villagers choosing to sell agricultural land. Many have invested the income from the sale of land into building new houses, and drilling private boreholes as a more reliable alternative to the piped water supply. The decreasing number of connections threatens the financial viability of the VWSC.
- The VWSC is considering selling water to tanker operators to increase its income, and estimates that it can generate INR 10,000 /month through this (though the economics of this venture are uncertain). However, this is currently thwarted by an intermittent power supply. It may be interesting to note that the adjacent industrial area enjoys both a regular power supply, and a private water source that provides a good service, but this is not available to the community.

ShriKishnapura

- *ShriKishnapura* is part of the same Panchayat as Vidhani, and shares the same Sarpanch. The Sarpanch at the time of the Swajaldhara programme lives in Vidhani, but was equally

enthusiastic about water supplies in both villages. After elections in 2009 there was a change of Sarpanch—the incoming Sarpanch being less interested in water supply and devoting more time to other issues. Whilst In Vidhani the outgoing Sarpanch was on hand to continue assisting the VWSC, the same was not true of *ShriKishnapura* and the VWSC ceased to function effectively.

- At the time of the first visit in May 2014, the VWSC was not functional, and water service was poor. The VWSC was not able to pay the power bills, and was relying on the PHED paying the outstanding bills (though it was not clear if this would be possible).
- *ShriKishnapura* does suffer from fluoride contamination, though not to the same extent as Vidhani. However, there is no alternative fluoride-free source (such as the Naandi plant), so those with household connections continue to use the water supplied for all purposes, including drinking water.

4.3.1.1 Community Service Provider/VWSC Focus Group

In all the best practice villages, meetings were held with the VWSC to gain feedback from committee members on the functioning of the system and support offered by the PHED. It was not possible to organise a focus group in *ShriKishnapura*.

In all the best practice villages it was felt that the support offered by the PHED Junior Engineer was valuable in ensuring the smooth running of the system. For example, in Boytawala it was the J.En who proposed splitting the village into zones and alternating supply to alleviate some of the problems caused by insufficient yield of the borehole. It was also recognised that the handpump maintenance programme was a valuable means of support: none of the VWSCs showed any inclination to maintain the handpumps themselves, lacking both the finance and expertise to do so.

In meetings where PHED staff were present, it was apparent that there was a good relationship between the VWSC and PHED, with the engineering staff responding positively to requests for help, although with the proviso that any help would be dependent on the available funding. It was also clear that the PHED was not always aware of problems in the villages (such as the high rate of disconnections in Vidhani) as the VWSC had not approached them for help.

Whilst the VWSCs appreciated support, all voiced that they would benefit from more support in one way or another: Whether technical support, a more reliable source or continuous electricity, as explained in the box 'The source of the problem'.

The source of the problem

All the villages in this case study have problems with the water source they use: whether it's fluoride contamination in Vidhani, inadequate yield in Boytawala, or intermittent power supplies in Bhatar and *ShriKishnapura*. What all these issues have in common is that they are beyond the scope of the VWSC to address, either financially, technically or both. The long-term solution to these problems must involve use of alternative water sources – almost certainly surface water. The PHED has already constructed a surface water supply for Jaipur city, and this source will be extended to rural areas progressively. It is likely to take at least four years to reach villages such as Vidhani, and maybe eight years or longer to reach Boytawala. In the mean time, the villages must continue to struggle with inadequate water sources. The arrival of a bulk water supply will radically change the economics of the support given to VWSCs. Whilst no firm plans are in place it is likely that this water will be sold to VWSCs at a heavily subsidised rate: in the range of INR 2-3/m³.

In one meeting with Boytawala VWSC it was stressed several times that “If we have a good source, we can run the system”. Problems with the source almost always lead to operational and financial problems – such as in Vidhani. Having a sustainable, reliable, safe source which yields adequate quantities of water may seem like an obvious prerequisite, but Rajasthan shows what happens to community managed water supplies when this is not the case. Equally, reliable power is a service that needs to be ensured by the government at some level.

4.4 Community service provider indicators

To understand the performance of the VWSCs across a range of parameters, a QIS was developed. This assigned a score from 0 to 100 to each parameter, the results of which can be seen in Table 4-3.

Table 4-3 QIS indicators for Rajasthan VWSCs

	Vidhani	Bhatar	Boytawala	<i>ShriKishnapura</i>
1.3 Selection of the Board of the service provider	50	75	75	25
1.4 Information sharing and accountability mechanisms	75	75	75	25
2.2 Cash reserves	0	25	75	0
2.3 Book keeping	50	50	100	No data
3.1 Technical folder	25	25	25	No data
3.2 Registry of operational information	50	50	75	25
3.4 Water metering	0	0	0	0
3.5 Waters security measures	0	50	25	No data
3.6 Water quality management	50	50	50	50

There are clearly significant differences in the performance of the VWSCs, Bhatar and Boytawala being assessed as performing stronger (an assessment borne out by the service level analysis in section six). Between these two villages, Boytawala would seem to function on a more formal basis with regards to record keeping, and also manages not insignificant cash reserves. This formality may be a result of the larger village forcing the VWSC to operate more as a conventional service provider. It should be stressed that a lack of formality doesn't imply that Bhatar functions poorly – mechanisms such as using a local shop for bill payment are resourceful, and ensure the service functions in a way which best suits the community.

As has been explored in the CSP descriptions, Vidhani and *ShriKishnapura* both face significant challenges in delivering a service and this is reflected in the scores above. *ShriKishnapura* in particular fails to meet even a basic level of function for many of the parameters – in part due to a lack of evidence to support any other score.

4.5 Infrastructure overview



Figure 4-2 The pump operator at Boytawala replacing an old valve

All the villages were provided with roughly similar infrastructure: a borehole (or several in Boytawala), connected to an overhead service reservoir and distribution network with household connections. None of the villages have any household water meters.

As of 2015, the oldest of the systems are 12 years old. This is almost half the estimated life expectancy (25 years) of the non-mechanical components of the systems (such as reservoirs and distribution networks). It is beyond the life expectancy (10 years) or mechanical and electrical components. In none of the villages is there evidence of wholesale replacement of these parts, or a plan to do so before they cease to function. Bhatar and Vidhani have purchased back-up motors, but this only represents a small part of the components that will need to be replaced.

The three best practice villages all carry out regular maintenance to the system (as witnessed in Figure 4-2), but this is mostly reactive. There does not appear to be any attempt to carry out preventive maintenance and, although financial records of maintenance expenditure are kept, there is not a systematic log of maintenance carried out and parts replaced.

Table 4-4 Infrastructure in each village

Infrastructure	Vidhani	Bhatar	Boytawala	<i>ShriKishnapura</i>
Borehole with submersible pump	1	1	7	1
Overhead tank	50,000l	1 (unknown)	1 (unknown)	50,000l
Water Treatment	Manual chlorination	Manual chlorination (seasonal)	Manual chlorination	Manual chlorination

Infrastructure	Vidhani	Bhater	Boytawala	<i>ShriKishnapura</i>
			(every 15 days for cleaning)	
Distribution network	Unknown length	3km	Unknown length	Unknown length

4.6 Community service provider participation assessment

Based on the idea of a ‘ladder of participation’ the research methodology included a tool to assess the extent and nature of community participation in water supplies, by matching observed and recorded behaviours against statements reflecting different types of participation for each of the four stages of service deliver. The results of this can be seen in Table 4-5.

Table 4-5 Participation assessment for VWSCs

	Vidhani	Bhater	Boytawala	<i>ShriKishnapura</i>
Capital Investment (implementation)	Functional participation	Functional participation	Functional participation	Functional participation
Service delivery	Passive participation	Functional participation	Functional participation	Passive participation
Asset Renewal	No data	No data	No data	No data
Service enhancement or expansion	No data	No data	Participation by consultation	No data

Although the Swajaldhara programme is intended to be community oriented, there is little evidence of active engagement with communities as a whole. ‘Functional participation’ implies that the community is involved in the decision-making process but only at a superficial level, with limited ability to change outcomes. This appears to be the case in the capital investment phase, where the PHED presented a fixed process for building the infrastructure, and the main conduit was the VWSC.

For service delivery, the VWSC acts in many ways like a typical service provider – the community may be able to elect the committee, but cannot directly influence the decision-making progress. In the two weakest VWSCs (Vidhani and *ShriKishnapura*) there appeared to be no input at all, with the VWSC making all decisions in isolation – for example the suggestion in Vidhani to sell water to tanker operators did not appear to have been discussed with the community.

As subsequent capital (maintenance) investment has been limited, it was often not possible to assess the participation, though there was a suggestion in Boytawala that the additional boreholes had involved only limited consultation with the community, and no active participation. Future enhancement to use bulk water supplies is likely to follow a similar model.

This possible reflects the concept of water as a basic service that must be provided to end users by the state, with the VWSC simply substituting for the PHED on a local level.

5 Household Service Levels

In this chapter data on household service levels is presented so to validate the level of success in each village. Ultimately, the purpose of providing effective support is that people receive good quality water services, so this section helps to assess whether this is happening in rural Jaipur. The services levels are compiled from data collected via the household surveys, as set out in the research methodology. This section starts by providing an overview of the coverage in the villages, followed by a detailed overview of service levels. The final sections discuss community view of the water service, as articulated in the focus group discussions and surveys in each village.

The household surveys for the case study were originally conducted in May 2014. However, due to incomplete data collection it was not possible to calculate household service levels and the exercise was repeated (in different households) in May 2015. Although the incompleteness of the earlier data prevents direct comparisons being made, it has allowed some understanding of changes in service levels over time.

5.1 Coverage and Equity

Using data collected from the CSPs and the 2011 Indian Census it has been possible to calculate what percentage of the households in each village are served by the CSP (Table 5-1)

Table 5-1 Households served

	Vidhani	Bhater	Boytawala	ShriKishnapura
Total Households	103	132	1645	258
Households served by CSP	37	75	950	82
SC/ST households	12	35	400	160
SC/ST households served	5	20	295	31
%coverage overall	36%	57%	58%	32%
% coverageSC/ST	42%	57%	74%	19%

Although Boytawala and Bhater are the best performing villages, they still cover less than 70% of the households in the area. The remaining household depend largely on PHED maintained handpumps (Bhater) or public standposts (Boytawala, including solar powered boreholes and tanks). This lack of coverage was not picked up through the household surveys, suggesting that the samples are not truly representative. Vidhani and *ShriKishnapura* appear to have similar levels or coverage, but Vidhani is currently on a downward trajectory. Although 37 households were served in May 2014, by May 2015 anecdotal evidence suggested that this had reduced to 30. As explored later in this section, the alternative sources used are very different in these villages.

Table 5-2 Coverage of CSP in each village

	Vidhani	Bhater	Boytawala	ShriKishnapura
Total Households	103	132	1645	258
Households served by CSP	37	75	950	82
SC/ST households	12	35	400	160
SC/ST households served	5	20	295	31
%coverage overall	36%	57%	58%	32%
% coverageSC/ST	42%	57%	74%	19%

It was also desirable to understand if coverage was equitable, by calculating the proportion of SC/ST households served. As can be seen, in all three best practice villages SC/ST coverage is equal to or greater than overall coverage, suggesting an equitable service. *ShriKishnapura* has less equitable service provision, with almost half the overall connection rate amongst SC/ST households. Anecdotal evidence suggests that many SC/ST families are agricultural wage labourers, and may have access to irrigation boreholes as a water source – although the extent of this and the quality of the service provided is uncertain. As the VWSC is largely non-functional, there is no means of addressing this inequality, or increasing the number of connections.

5.2 Quantity, Accessibility, Quality, Continuity, Reliability

The principle purpose of the household surveys was to give an insight into the service levels people receive in the villages. Using this data a service level was allocated for the quantity, accessibility, quality (perception), continuity and reliability. The categorisation of levels reflects the Government of India norms and is presented in the main research concept and methods paper (Smits et al. 2015).

5.2.1 Vidhani

In Vidhani out of the 30 households surveyed 22 were found to be using the piped system as their main supply. The remaining eight households used private boreholes as the main supply. As stated earlier, due to fluoride contamination, many households utilise a local RO plant for drinking water. Of the sample, 24 households - including 16 of those using the piped system, and all of the household with private boreholes – use RO water for drinking purposes.

Table 5-3 Service levels in Vidhani (n = 22 Summer, for houses using scheme water only)

Service Level	Quantity	Accessability	Quality (Perception)	Continuity	Reliability
High	4.5%	100.0%	22.7%	0.0%	27.3%
Improved	0.0%	0.0%	0.0%	0.0%	45.5%
Basic	18.2%	0.0%	59.1%	31.8%	0.0%
Sub-standard	36.4%	0.0%	18.2%	68.2%	22.7%
No service	40.9%	0.0%	0.0%	0.0%	4.5%

It can clearly be seen that the majority of households in Vidhani receive unacceptable service in terms of quantity and continuity. The two are closely linked: in summer the average availability of water is only 45 minutes per day. Although all households have storage it takes approximately two hours to fill a 500l tank. As the storage can never be completely filled, the quantity of water available in any one day is limited. These filling rates are taken from estimates provided in the household survey – as this was done in summer, they may be lower than rest of the year. In non-summer the situation is slightly improved (with 63.6% of households receiving inadequate quantities of water) but still unacceptable. All households using a private source had 24x7 supply, and a high quantity of water available.

In addition, the majority of users perceive the water quality to be only acceptable or bad. This is largely due to the presence of fluoride in the groundwater. As a result, all but five households (including all those with private boreholes) pay to receive RO water from a nearby plant as a secondary source. Although this provides excellent quality water for drinking, it is in relatively limited

quantities (an average of 4lpcd), limited availability (only two hours each in the morning and evening) and at a significant cost. Households pay INR 3 per 20l container, on average once per day (so INR 90 /month). Payment is made in the form of a pre-paid card. This is in addition to the INR 150 per month paid for a household connection, and is one of the reasons those households with access to a private source are choosing to disconnect.

5.2.2 Bhater

In Bhater all households surveyed were found to be using piped connections. Service levels are given in Table . In Bhater the VWSC source is not fluoride contaminated (although some shallower private wells in the area are) and there are no user concerns about the quality of the water.

Table 5-4 Service levels for Bhater village (n=30)

Service Level	Quantity %	Accessibility %	Quality %	Continuity %	Reliability %
High	7%	100%	100%	0%	37%
Improved	13%	0%	0%	0%	53%
Basic	17%	0%	0%	30%	0%
sub-standard	33%	0%	0%	70%	10%
no service	30%	0%	0%	0%	0%
n/a	0%	0%	0%	0%	0%

Reliability is largely rated as improved – due to a limited number of user reported breakages in a year (only 2-3) and relatively rapid response time (48 hours on average). The households that are rated as receiving a sub-standard service reported longer times for repairs to take place (up to 72 hours).

The largest issue is the number of households receiving a sub-standard or lower quantity of water or continuity. The two factors are essentially the same: as water supply is limited to less than an hour a day households cannot store enough water for use. The average availability of water was given as 47 minutes in summer, with a slight increase to 51 in non-summer. Although all households have storage (some over 10,000l) it is impossible to fill this in the time water is available – average flow rates reported by users based on the time to fill storage are only 5l/min in summer and 7l/min in non-summer.

This lack of continuity is wholly due to the intermittent power supply available in the village. It is reported that the source does not suffer from poor yield, in part because it is next to a rainwater harvesting structure.

Some households use alternative sources to supplement the limited supply of water from the piped connection. From the household survey, six use handpumps (which are owned by the VWSC but maintained by the PHED) free of charge, whilst seven purchase water from tankers.

5.2.3 Botywala

In Botywala, all households surveyed used the VWSC piped water, but it should be noted that this does not reflect the village as a whole, where a significant number of houses do not have connections. As shown in Table , the only indicator where significant numbers of households receive a sub-standard service is continuity, where all households were reported as receiving 30-45 minutes of water per day in both summer and non-summer.

Table 5-5 Service levels for Botywala village (n=30) *Reliability data taken from May 2014 survey

Service Level	Quantity %	Accessibility %	Quality %	Continuity %	Reliability %
High	57%	100%	77%	0%	17%
Improved	13%	0%	0%	0%	73%
Basic	30%	0%	23%	0%	0%
sub-standard	0%	0%	0%	100%	10%
no service	0%	0%	0%	0%	0%
n/a	0%	0%	0%	0%	0%

The hours of service are heavily limited due to the yield of the sources, and the size of the village. The village is split into 12 zones, which receive water in turn to ensure equitable distribution. This does of course limit how much water any single household can receive. However, despite limited continuity, no household has a service level for quantity below basic. This is because it is possible to store enough water during the time it is available to meet household needs. The reported flow rate from household surveys is 13l/min – significantly more than that reported at Vidhani.

In addition to the piped water, 24 out of the 30 households surveyed also purchase water via tankers. This is to meet needs over and above that which can be met from the piped supply. Anecdotal evidence suggests that this is partly due to rising affluence in the area, and people expecting more water for appliances such as air coolers, and washing machines. Those households using tankers purchase three 300l tankers per month, at a cost of INR 250 tanker. This equates to over INR 800 / m³. This is significantly greater than the cost of the piped connection: a fixed Itariff of NR 60 allows water to use an estimated average of 15m³ / month.

5.2.4 *ShriKishnapura*

In *ShriKishnapura* only 21 out of 30 households surveyed were using the VWSC piped connection. For those that are, less than 33% are receiving a quantity of water which meets Indian norms, and 62% report a response to breakdowns which is not satisfactory – the average time to repair is nearly three days.

Table 5-6 Household service levels for ShriKishnapura village (n=21, piped connections only)

Service Level	Quantity %	Accessibility %	Quality %	Continuity %	Reliability %
High	14%	100%	5%	0%	0%
Improved	0%	0%	0%	0%	38%
Basic	19%	0%	81%	86%	0%
sub-standard	43%	0%	14%	14%	43%
no service	19%	0%	0%	0%	19%
n/a	5%	0%	0%	0%	0%

As in other villages, the poor quantity is a direct consequence of the limited continuity of water – only one hour per day – and the time taken to fill household storage – the calculated flow rate is reported at only 6l/min.

The major quality issue is fluoride, and high TDS, although only three households perceived the water quality as ‘bad’. Unlike in Vidhani, there is no RO plant to provide an alternative safe drinking water source – though the level of fluoride is not as high in this village.

The majority of households (19 out of 21) supplement the scheme water using either tankers (three households) or more commonly handpumps (16 households). Detailed information on the water collected from these sources was not obtained, but from experience in other villages it can be assumed that purchasing water through tankers is significantly more expensive than piped supplies. Handpumps are free to use, but it is likely that only limited quantities of water are being collected.

Apart from the VWSC piped connections, nine households used other sources as their main water source. Two households used a private borehole or a tanker respectively, but seven relied solely on handpumps as they had not been provided a piped connection. It appears that the handpumps are close enough to homes that households are able to make multiple trips each day to collect water, with each trip taking relatively little time. However, it was not possible to collect accurate data on this, and the volume collected is still likely to fall below the Indian norm of 40 lpcd.

5.3 Community and household views

Table 5-7 User satisfaction in Rajasthan villages (n=30 for each village)

Village	Very satisfied		Somewhat satisfied		Not satisfied	
	Summer	Non-Summer	Summer	Non-Summer	Summer	Non-Summer
Vidhani	12	14	14	15	4	1
Bhater	22	25	4	2	4	3
Boytawala	24	24	5	6	1	0
ShriKishnapura	9	10	15	14	6	6

Table shows the number of users who are satisfied with the water service they receive in each village. It is clear that in Bhater and Boytawala the majority of users are very satisfied with the service, but in both Vidhani and *ShriKishnapura* more than half of households reported being only somewhat satisfied or not satisfied with the service received. In Vidhani, of those who are not very satisfied, 12 use a household connection, with comments including complaints about the presence of fluoride in the water, and poor availability of water. For those households that use the RO plant to purchase drinking water, there is strong satisfaction with this service – 16 of 18 households being very satisfied. In *ShriKishnapura* 13 out of the 21 households who are less than very satisfied with the service use a household connection, with the main complaints again being poor availability and some fluoride presence. All households that use a handpump as their primary source report being less than very satisfied, predominantly because of fluoride issues.

6 Costing

The section examines the life cycle costs of the system, using data from the PHED, VWSCs and household surveys, in attempt to quantify the costs implications of the support needed for successful community management.

6.1 Capital costs

The capital costs of the project are split into hardware (physical infrastructure) and software (the cost of information and education campaigns, and training conducted at the start of the project). Full costs are given in Table 6-1 Initial capital costs for Rajasthan Villages. Although the villages have similar systems (a piped supply based on borehole(s) and service reservoirs) the difference in the size of the villages means there is a marked difference in hardware costs. Additionally, in Boytawala the system was expanded considerably in 2012, to serve households on the opposite side of the railway. This expenditure is treated as an expansion of the system (as it extended access to un-served areas), and additional capital expenditure. It was funded by the PHED through the NRWDP, and there was no community contribution to the expansion.

The Swajaldhara programme contained limited provision for software support – despite an extensive review of contemporary PHED financial records it was not possible to identify any expenditure on specific IEC activities in the studied villages, beyond support offered by the engineering staff of the PHED. An estimate of software costs has been made from the staff time spent on the project, typically through visits to villages to raise awareness and support the establishment of VWSCs. It does not include the staff time used on preparing technical specifications etc. All staff time has been adjusted to include an estimate of overheads at 55%. This was calculated based on current expenditure of Jaipur district PHED rural division.

Table 6-1 Initial capital costs for Rajasthan Villages (historical prices)

Village	Vidhani	Bhater	Boyatawala	ShriKishanpura
Population	731	965	8667	1376
Date	2003	2003	2008	2003
CapEx HW	INR 1,012,000	INR 897,000	INR 3,950,000	INR 987,000
CapEx SW	INR 17,124	INR 19,149	INR 18,519	INR 17,687
Expansion				
Year	2012			
Cost	INR 1,350,000			

As per the Swajaldhara guidelines each village was required to contribute 10% of construction costs. Evidence from cash books at the time suggests that this rule was followed rigidly. However, villages were permitted to pay the cost in instalments, as and when they had raised the funds. Likewise, funding was only dispersed by the PHED once individual items of work had been completed and an invoice issued.

Table 6-2 Community contribution for Rajasthan villages

Village	Vidhani	Bhater	Boyatawala	ShriKishanpura
Community Contribution	INR 101,200	INR 89,700	INR 395,000	INR 98,700

6.2 Recurrent costs & revenue – Opex

The Swajaldhara programme contained no provision for on-going support, leaving communities to meet the full costs of operation and maintenance. It is apparent that in some villages, the Panchayat (or even the Sarpanch personally) contribute to the operation of the system. However, this is done on an ad-hoc basis, with no records kept of the amount provided. Detailed accounts were made available for Boyatawala village, allowing reliable information on recurrent costs to be presented (

Table 6-3). For all other villages accounts were either not available for viewing by the research team, or non-existent. In these cases oral information has been used to estimate running costs (

Table 6-4) – for *ShriKishanpura* this data is particularly unreliable do to the poor organisation of the VWSC.

Table 6-3 Yearly operating income and expenditure for Boyatawala village for 2013-14 and 2014-15

	2014-15	2013-14	Change
New Connections	INR 402,900	INR 489,600	-18%
Water Charges	INR 1,071,390	INR 1,050,570	2%
Interest	INR 37,795	INR 28,767	31%
Total Income	INR 1,512,085	INR 1,568,937	-4%
Electricity	-INR 1,069,758	-INR 470,176	128%
Salaries	-INR 126,000	-INR 118,000	7%
Spares	-INR 380,843	-INR 320,639	19%
Repair and Maintenance	-INR 185,556	-INR 200,958	-8%
Other	-INR 15,988	-INR 14,462	11%
Total expenditure	-INR 1,778,145	-INR 1,124,235	58%
Operating surplus/deficit	-INR 266,060	INR 444,702	-160%

Table 6-4 Estimated monthly income and expenditure for Rajasthan villages (2014)

Item	Vidhani	Bhater	ShriKishanpura
Tariff	150	100	70
Estimated income from tariffs	INR 5,550	INR 7,500	INR 5,740
Electricity	INR 3,500	INR 3,250	INR 3,500
Pump Operator	INR 2,500	INR 3,000	INR 1,800
Total O+M	INR 6,000	INR 6,342	INR 5,300

The significant increase in electricity bills for Boyatawala village was due to paying a backlog of bills following the construction of new boreholes – for a significant period nobody was aware of who

should pay the bills – but represents a one-off cost. Otherwise Boytawala is able to fully cover costs, including significant expenditure on maintenance, and has accrued reasonable reserves (INR 472,020 as of April 2015). This is from a flat rate tariff of INR 60/month. The VWSC feels unable to increase this tariff due to the limited service available. Boytawala has successfully expanded the number of connections from 150 connections at scheme construction to a current figure of 950.

The figures for the other villages show a mixed picture, with Bhatar and *ShriKishnapura* making a small surplus, and Vidhani running at a loss. For all villages there is no record of spending on maintenance. It appears that a limited amount of maintenance is carried out to ensure that the system works at a minimal level, but nothing beyond this. None of these three villages have any savings.

In Vidhani, the tariff has frequently changed - starting at INR 100, increasing to 200 then dropping to 150 - in response to incurred costs. For example, it increased in part to clear a backlog of electricity bills. This frequent changing suggests a limited understanding of the costs involved in running the water supply system, and a resultant inability to set appropriate tariffs. THE VWSC is reactive rather than proactive in covering costs through tariff collection.

It is reported that the Panchayat in Vidhani contributes up to INR 700/month to meet this shortfall, with funds provided from the Thirteenth Finance Commission (FC XIII). The FC XIII provides a block grant from national government to Panchayats to cover services including water and sanitation but it is not clear how much of this grant is spent on the intended services. In no other village was this mentioned as a source of income, and it is alleged that the funds are often diverted to pet projects of the Sarpanch regardless of the intended use – roads being the current project du jour.

All VWSCs are responsible for paying electricity bills, but this is charged at a reduced rate, ‘Small Industrial Power’, which lies between heavily subsidised domestic rates and (unsubsidised) non-domestic rates. Due to the variable nature of the price differential it is not possible to accurately calculate the value of using a cheaper tariff, but it equates to a roughly 28 per cent reduction. This is an implicit, unfunded subsidy for water production – it is not paid for by the PHED, but neither can it be directly attributed to (nor is accounted for by) any other arm of the government.

6.3 Direct support costs

There is limited support from the PHED, restricted to occasional visits by staff members (estimated at three to five days per VWSC per year), water quality testing, provision of chemicals for water treatment, and the repair of handpumps (for those villages where they are present). The latter is strictly the responsibility of the VWSC, but the PHED runs a repair campaign each summer, at an approximate cost of INR 1000/hand pump.

Table 6-5 gives full details of the cost of support from the PHED.

Table 6-5 Cost of support to Rajasthan villages from PHED (2014 prices)

Item	Vidhani	Bhatar	Boyatawala	ShriKishanpura
Staffing support	INR 2,217	INR 2,271	INR 2,271	INR 2,271
Water quality testing	INR 2,250	INR 2,250	INR 6,000	INR 2,250
Provision of bleaching powder	INR 1,250	INR 2,500	INR 6,250	INR 1,250

Handpump repairs	INR 8,000	INR 2,000	-	-
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As mentioned previously, there is also indirect support from the Water Supply Support Organisation (WSSO) – the branch of the PHED that supports IEC and similar activity. This activity covers topics such as water conservation and sanitation and hygiene, but it is not clear if this supports the VWSCs directly. There are conflicting accounts as to whether VWSCs receive training that directly supports them in operating and managing the water supply the system such as community mobilisation, or financial training.

6.4 Capital maintenance costs

All three best practice villages have invested in capital maintenance at one time or another, but this has been in limited amounts. Vidhani and Bhater have invested in back-up motors – it was not clear in which year these were purchased, so expenditure has been estimated based on 2014 prices for similar hardware. Boyatawala invested in drilling a new borehole to increase the water available, but it proved to be dry. Full details of these costs are in

Table 6-6. Only Boyatawala has been able to build up any reserves (INR 472,020 as of April 2015), but it is clear that the VWSC see this as mostly meeting the costs of unforeseen emergencies, rather than being available for investment in improved services or infrastructure replacement in the future.

Table 6-6 Capital maintenance expenditure for Rajasthan villages

	Vidhani	Bhater	Boyatawala	ShriKishanpura
Year	Unknown	Unknown	2013	-
Description	Purchase of backup motor, and replacement of 1000 feet of pipeline	Purchase of backup motor	Drilling of additional borehole (no lining or development costs)	-
Amount	INR 85,000	INR 35,000	INR 90,000	-

Table 6-7 Summary Cost Table (INR)

Rajasthan Summary Cost Table - calculated as the average cost per person, that is averaging across the three 'successful' villages

Source of funds	Use of funds - implementation			Use of funds - annual recurrent					RECURRENT EXPENDITURE TOTAL
	CapEx hardware	CapEx software	CAPEX TOTAL	OpEx labour & materials	OpEx power	OpEx bulk water	OpEx enabling support	CapManEx	
Community/consumers	INR 144	-	INR 144	INR 56	INR 45	-	-	INR 54	INR 155
Local self-government	-	-	-	INR 5	INR 2	-	-	-	INR 7
State government entity	-	-	-	-	-	-	-	-	-
State water supply agency	INR 56	INR 100	INR 155	INR 7	INR 4	-	INR 8	-	INR 15
National Government	INR 1,295	-	INR 1,295	-	-	-	-	-	-
NGO national & international	-	-	-	-	-	-	-	-	-
International donor	-	-	-	-	-	-	-	-	-
TOTALS	INR 1,494	INR 100	INR 1,593	INR 68	INR 51	-	INR 8	INR 54	INR 182
Median of 20 case studies			INR 3,231						INR 207
'Plus' %age	90%	100%	91%	18%	11%	-	100%	0%	14%
Median of 20 case studies			95%						57%

Table 6-8 Summary Cost Table (PPP USD\$)

Rajasthan Summary Cost Table - calculated as the average cost per person, that is averaging across the three 'successful' villages

Source of funds	Use of funds - implementation			Use of funds - annual recurrent					RECURRENT EXPENDITURE TOTAL
	CapEx hardware	CapEx software	CAPEX TOTAL	OpEx labour & materials	OpEx power	OpEx bulk water	OpEx enabling support	CapManEx	
Community/consumers	\$ 8.20	-	\$ 8.20	\$ 3.20	\$ 2.56	-	-	\$ 3.10	\$ 8.86
Local self-government	-	-	-	\$ 0.31	\$ 0.10	-	-	-	\$ 0.40
State government entity	-	-	-	-	-	-	-	-	-
State water supply agency	-	-	-	-	\$ 0.23	-	-	-	\$ 0.23
National Government	\$ 3.16	\$ 5.68	\$ 8.84	\$ 0.37	-	-	\$ 0.48	-	\$ 0.85
NGO national & international	\$ 73.79	-	\$ 73.79	-	-	-	-	-	-
International donor	-	-	-	-	-	-	-	-	-
TOTALS	\$ 85.15	\$ 5.68	\$ 90.83	\$ 3.88	\$ 2.89	-	\$ 0.48	\$ 3.10	\$ 10.35
Median of 20 case studies			\$ 184.16						\$ 11.78
'Plus' %age	90%	100%	91%	18%	11%	-	100%	0%	14%
Median of 20 case studies			95%						57%

The INR Indian Rupee conversion to the USD United States Dollar has been undertaken at the mid 2014 exchange rate of INR60/USD\$ with a Purchasing Power Parity (PPP) multiplier of 3.42 applied) in order to give the best interpretation of India costs in global terms (<http://data.worldbank.org/indicator/PA.NUS.PRVT.PP>).

7 Conclusions

The case study has examined the relative success of community service providers in four villages in Rajasthan that were provided with enhanced water supply systems under the Swajaldhara programme. Swajaldhara saw responsibility for operating and maintaining water supplies delegated from state Public Health Engineering Departments (PHED) to communities.

The only supporting entity present in this study is the PHED and in many ways this programme can be seen as community management – without a significant *plus*. Although the PHED played a key role in working with communities to plan and construct the systems, on-going support has been much more limited. Indeed, the Swajaldhara programme contained no provision for on-going support, and what support the PHED does offer is provided almost on a quasi-informal basis, relying heavily on the VWSCs approaching the PHED for help and the commitment of particular Junior Engineers. This form of support means that it is possible for VWSCs to fail, leaving communities with a poor service (as in *ShriKishnapura*), without any clear mechanism of support for recovery.

Despite this the case study has shown that two of the villages are providing a high quality service, whilst the third is providing a good service, but with question marks over the future sustainability of the service provision. The PHED excels at providing technical advice: both during the construction of the systems and to communities as and when they request it. Due to its engineering focus and staffing structure it is less well placed to provide support for some of the ‘software’ aspects of running a water system – including managing finances and actively engaging with the community. Although there is a wing of the PHED dedicated to IEC activity, this does not appear to directly support the VWSCs studied, with much

The limited nature of the support means that the ESE has relatively low costs for supporting VWSCs.

For the PHED’s purposes the Swajaldhara programme is considered closed: the funding has ceased and no new schemes have been sanctioned since 2006-07 when the NRDWP was introduced. Although there are differences between the programmes (e.g. in Swajaldhara VWSC were responsible for constructing the infrastructure, whilst in NRDWP the PHED builds the infrastructure before handing it over) the key principles are the same: that communities are responsible for all on-going operation and maintenance. Yet despite this common underlying principle, the PHED treats these schemes as entirely separate, and this fragmented approach prevents the development of consistent support systems for community managed water supplies.

Equally, although GoI funding initiatives channel almost all funding for rural water supply through community managed programmes, there is little evidence that the organisation and culture of the PHED has changed to reflect this. Although field level staff provide support to VWSC’s, senior staff place a greater emphasis on the engineering work of the PHED. In order to ensure consistently high level of services from VWSCs a coherent and comprehensive approach to support would need to be implemented, accompanied by significant change within the PHED.

In order to understand the nature of the community service providers, an attempt has been made to locate the VWSCs on the model of community service provider typologies developed by the Community Water ^{plus} project.

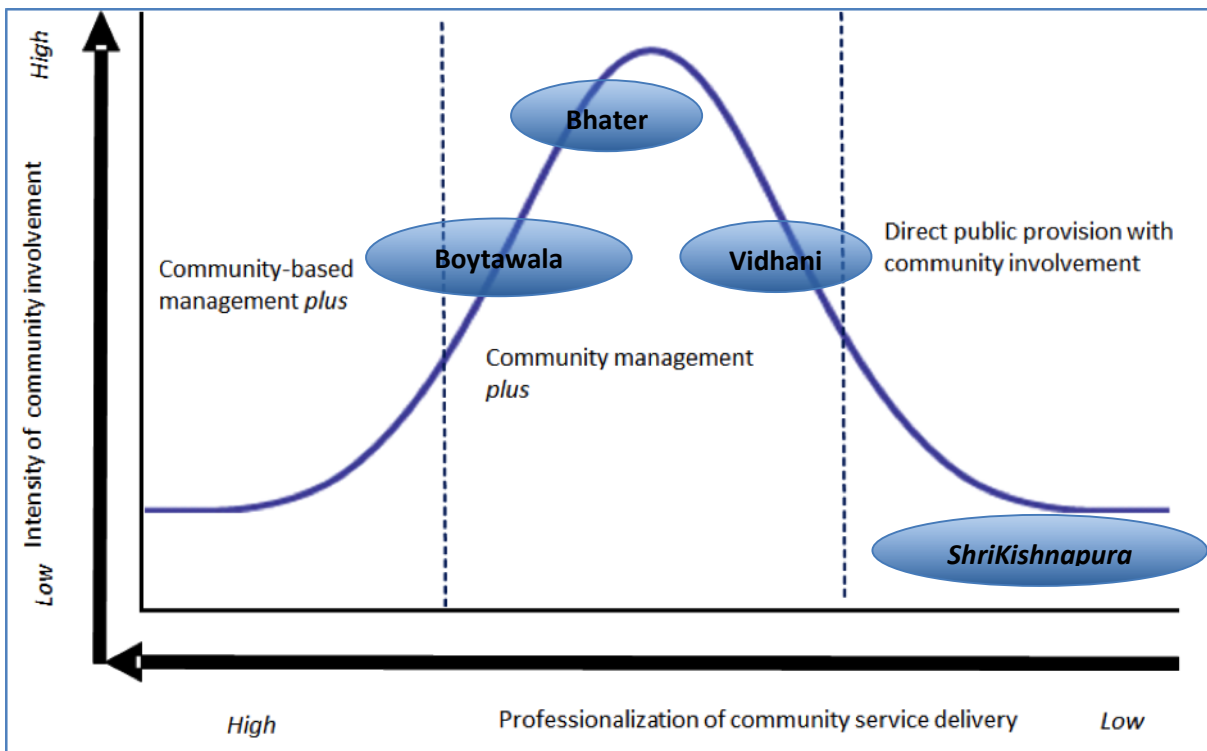


Figure 7-1 Continuum of community service provider typologies

Bhatar and Boytawala are in similar positions: although still involving the communities in decisions, the work of the VWSC is carried out by a small group of individuals. Boytawala appear to run on a more professionalised basis, partly due to the size of the village limiting the extent to which direct community involvement is feasible.

Vidhani is difficult to locate on the continuum: it has apparently similar levels of community engagement to Bhatar, but the increasing level of disconnections endanger this and the future sustainability of the service. Although professional in many ways, the VWSC lacks the financial and technical capacity to address to issues facing it (chiefly fluoride contamination) without further support.

ShriKishnapura, in its current status, fails to function effectively as a VWSC. The service is maintained at a basic level though work by the pump operator, but there is no overall management of the system or attempts to engage the community – evidenced by the fact that less than one third of the villages uses the system.

This case study reveals the successes and limitations of the PHED-led model of support. The high quality technical support has created systems that are well designed and function well with appropriate maintenance. However, the reactive and nature of on-going support relies on VWSCs being proactive in approaching the PHED for help, and lacks the safeguards needed to ensure consistent and equitable service provision. Finally, the report highlights that, even when VWSCs function effectively there are some issues that are beyond the capabilities of the communities to

manage. Contaminated or inadequate water sources require considerable technical and financial resources to overcome (such as a surface water source or bulk water supply) that can only be provided by a public body. Similarly, consistent water supply is dependent on a reliable source of power: again, providing this needs to be the responsibility of the state, and represents one of the many hidden costs of supporting community managed water supplies.

Despite these challenges, the Swajaldhara scheme has delivered improved drinking water to many villages, and represents a model that can be replicated in situations where there is an existing, technically competent, public water provider. To improve upon the model, greater investment is needed in alternative sources to supplement or replace depleted groundwater resources, and comprehensive planning for (and funding of) on-going support, which can be successfully provided by existing engineering staff provided they are given the time and space to do so.