COMMUNITY MANAGEMENT OF RURAL WATER SUPPLY

Community Water *plus*

Xavier Institute of Social Service, Ranchi, India

Understanding resource implications of the "plus" in community management of rural water supply systems in India: the case of PHED, Chhattisgarh

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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

This case study analyses the support given by the Public Health Engineering Department (PHED), Government of Chhattisgarh, to community service providers for rural water supply and assesses the level of service achieved through this arrangement. A majority of consumers in the 'best practice' villages were found to receive acceptable service levels, which confirms the effectiveness of service provision. However, 41% still access quantities classified as inacceptable and 34% spend more than 30 minutes a day on collecting water so major challenges remain.

The study found that water supply is managed by communities through the Gram Panchayat. In only one village an independent, functioning water committee could be found. Nonetheless, communities are involved or at least consulted about major decisions through village meetings or informal channels. Therefore, the service delivery model was classified as a form of direct public provisioning with community involvement. The Gram Panchayats as service providers have effective mechanisms for accounting and managing cash, whilst improvements could be made in technical capability such as water security planning. Due to insufficient tariff collection, they have to cover between 22% and 63% of operating expenditure from general budgets, which points to issues with cost recovery.

PHED Chhattisgarh is the main institution responsible for implementing rural water supply schemes and supporting communities in their management. The assessment showed the department to be very qualified technically but lacking capacity and a perceived mission for community empowerment and capacity building. Support is mostly given in the initial phase after construction, by training the community pump operator. After that, the level of ongoing support is limited to water quality testing and assessing functionality.

Costs for initial construction have been estimated at INR 1,933 per person with INR 36 per person estimated for initial training and capacity building. The costs for supporting the service providers at the PHED level with support from the State and Central Government support to the State were estimated to be INR 43 per person per year with an additional INR 9 through the GP. Tariffs and the PHED grant cover 80% of the direct operating expenditure in Kutulbod Bhatagaon, and between 29% and 46% in the other villages. The remaining amount is paid from GP funds, using both money raised internally through taxes and rental property, as well as state and central government grants, as described.

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

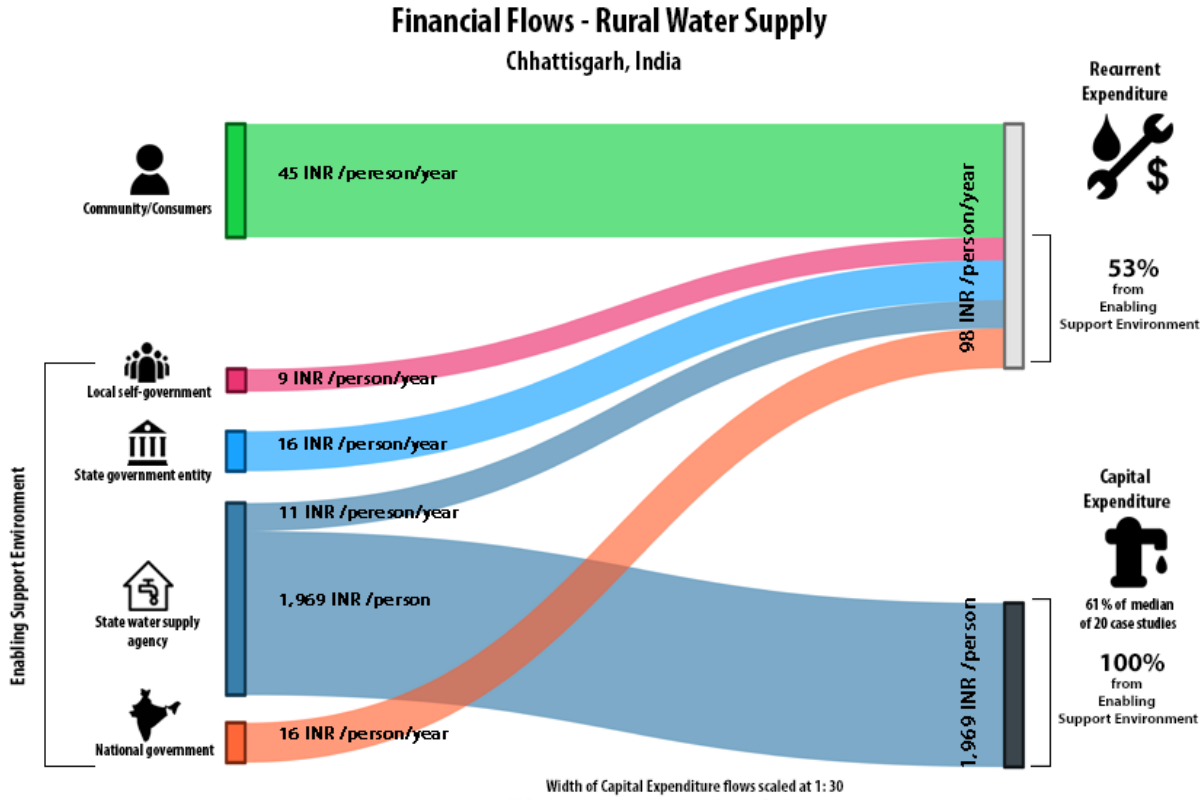
Source of funds	Use of funds - implementation			Use of funds - annual recurrent					
	CapEx hardware	CapEx software	CAPEX TOTAL	OpEx labour & materials	OpEx power	OpEx bulk water	OpEx enabling support	CapManEx	RECURRENT EXPENDITURE TOTAL
Community/consumers	-	-	-	INR 10	INR 33	-	-	INR 3	INR 45
Local self-government	-	-	-	INR 2	INR 6	-	-	INR 1	INR 9
	-	-	-	-	-	-	-	-	-
State government entity	-	-	-	INR 3	INR 11	-	-	INR 2	INR 16
State water supply agency	INR 1,933	INR 36	INR 1,969	INR 2	INR 4	-	INR 4	INR 1	INR 11
National Government	-	-	-	INR 3	INR 11	-	-	INR 2	INR 16
NGO national & international	-	-	-	-	-	-	-	-	-
International donor	-	-	-	-	-	-	-	-	-
TOTALS	INR 1,933	INR 36	INR 1,969	INR 20	INR 65	-	INR 4	INR 9	INR 98
Median of 20 case studies			INR 3,231						INR 207
'Plus' %age	100%	100%	100%	50%	49%	-	100%	70%	53%
Median of 20 case studies			95%						57%

Notes: Assuming a 50/50 split of the funding for OpEx support to the community by the State water supply agency between the Government of India and the State

The three main points of this case study are given below

- The initial three to six months after construction in which PHED staff and engineers operate the schemes and involve local technicians and the community service providers is crucial to the support arrangement as it ensures the functioning of the system and that communities have the capacities to run the schemes after handover
- After the handover, there is a lack of systematic support to community service providers. This is recognised by parts of the PHED but there is no special funding for it and staff trained in community engagement or social sciences are missing. An annual grant is given to service providers, whilst other support is limited to water quality and functionality testing
- The distinction between water committees and the Gram Panchayat was found to be very blurred or entirely missing in the studied villages. Although this can be seen as a lower level of community involvement, it does enable the service provider to use its authority as Gram Panchayat to enforce tariff collection

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.



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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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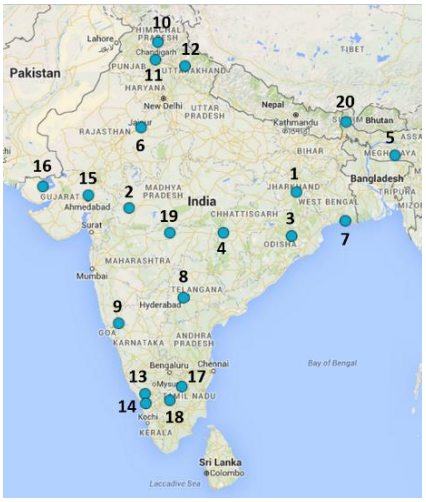


The twenty case studies

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.

Contents

List of acronyms

PHED	Public Health Engineering Department
PRD	Panchayat Raj Department
GP	Gram Panchayat
NRDWP	National Rural Drinking Water Programme
ESE	Enabling support environment
CSP	Community service provider
VWSC	Village water and sanitation committee

1 Introduction

This report is a part of the Community Water plus series of case studies on community-managed rural water supply in India. It documents the overall support provided by the Public Health Engineering Department (PHED), Government of Chhattisgarh, which implements community-managed rural water supply schemes and provides support to Gram Panchayats[1] and Village Water and Sanitation Committees (VWSC). This report describes this support arrangement in detail, and assesses the effects of the support in terms of service delivery. It also provides an approximation of the costs involved in support.

1.1 Background to the topic and the Community WaterPlus 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 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:

[1] A Gram Panchayat is the village-level local self-government found in India, which is responsible for providing a number of services in the village, including water supply

- 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 provides the results from the case study of community-managed piped water supply systems in Chhattisgarh. The Village Water and Sanitation Committees (VWSC) that manage these systems are supported by the Public Health Engineering Department (PHED), Government of Chhattisgarh. This report investigates both the service provision and the support provided.

1.3 Structure of the Report

This report is divided into 7 sections. Following this introduction, Chapter 2 gives an overview of the conceptual framework and methodology of the research. The following four chapters follow the elements of research in the project. Chapter 3 deals with the Enabling Support Environment, in this case the PHED, Government of Chhattisgarh. Its role in supporting rural water supply is explained followed by an assessment of its performance and partnering. In Chapter 4, the four community service providers are introduced and their performance assessed. Chapter 5 presents the results from the household surveys and assesses service levels users receive. This is followed by an analysis of the costs associated with support in Chapter 6. Finally, Chapter 7 gives a summary and of the findings and conclusion.

2 Concepts and methodology

Community-management remains the predominant approach for rural water supply services delivery in low-income countries. It originated in response to the perceived limitations of the 'public works department' phase, and built on the insights around appropriate technology, eventually leading to the present 'community management' paradigm. Though this has undoubtedly brought benefits (Schouten and Moriarty, 2003; Harvey and Reed, 2006; Lockwood and Smits, 2011) and is often the most appropriate service delivery model, evidence shows that the community management approach is necessary but not sufficient for sustainable services (Harvey and Reed, 2006; RWSN, 2010).

The hypothesis is that sustainable services delivery requires a combination of community engagement and community management of appropriate technology with the necessary government institutional support (potentially including a level of out-sourcing to the private sector). We see that there is the need to professionalise the support elements of community-management in order to provide on-going support. The needs and possibilities for this differ widely and the need for institutional/functional segmentation and resulting differentiation of support, most likely according to technology use, needs to be further investigated.

Ultimately, we believe that for successful community management, proper support is needed to deliver water services that are: *effective* in terms of quantity, accessibility, quality and reliability; *equitable* in that all rural households can access services irrespective of gender or social status, indeed that there is a bias towards the poorest who most benefit from good public health provision;

sustainable or *viable*, in that there are adequate resources available, from whoever, to ensure the continuation of the service; *efficient* such that the minimum resources are used to deliver the desire quality of outputs; and *replicable* such that approaches can work at scale across different localities, not being dependent upon particular situations or leaders.

Building on these principles and applying general insights from the theoretical literature on participation and partnerships, the research identifies several "community-engaged approaches" to ensuring the fulfilment of the human rights to water. These are illustrated in Figure 1 below and include: 1) direct provision with community involvement, 2) community management with direct support and 3) professionalised community-based management. These three broad approaches represent different levels of balance of what communities themselves do, and the extent to which they are supported by external agencies. We believe that these different approaches are closely related to factors such as average income levels, cost of technology, development status and context and that across the demand and cost continuum it is expected that the intensity of community involvement will vary.

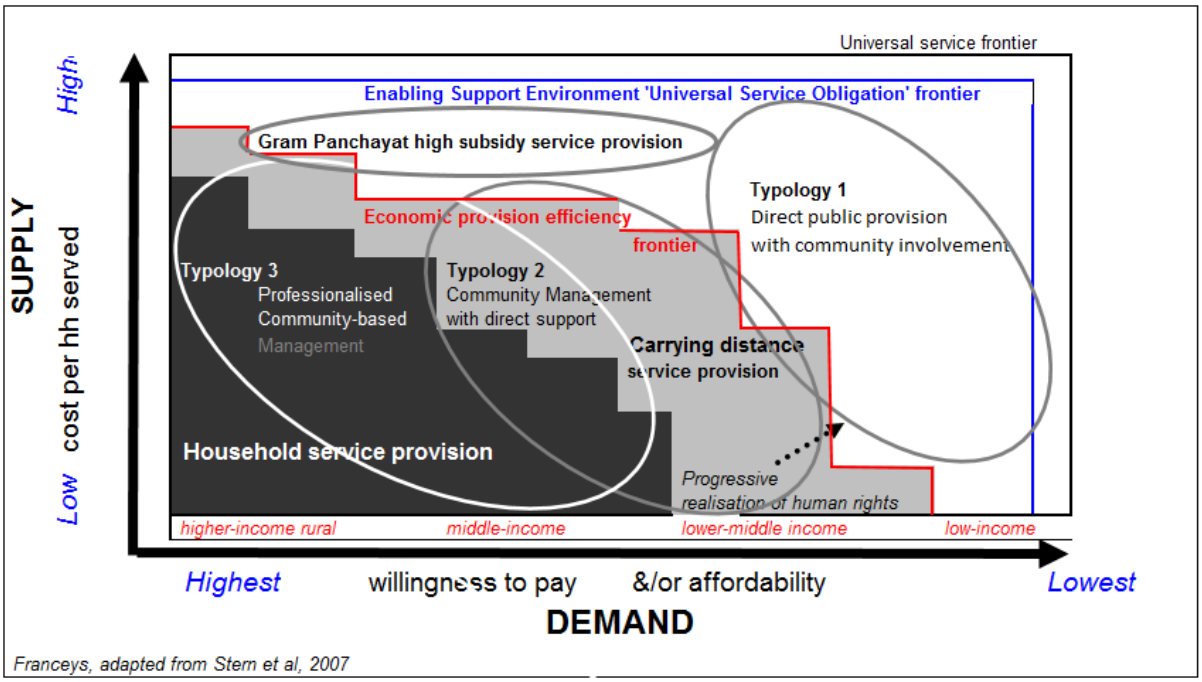


Figure 1: Application of *plus* approaches in relation to demand and costs of water supplies. Source: adapted from Franceys and Gerlach (2008) after Stern et al. (2007)

Key to all three models is the presence of what is called an 'enabling support environment' within the Indian context. The enabling support entities (ESE), that make up this environment, fulfil what Lockwood and Smits (2011) call service authority and monitoring functions, such as planning, coordination, regulation, monitoring and oversight, and direct support functions, such as technical assistance. The main objective of such support is to help communities in addressing issues they cannot solve on their own and gradually improve their performance in their service provider functions. Within this research, we will seek to classify the varying types of community management and the necessary enabling support environment, and get a further understanding of which models are functioning best. An interrelated objective will be to identify the resource implications of this

plus, economic as well as financial, which is needed to deliver demonstrably successful, sustainable water services across these typologies.

2.1 Methodology

The focus of this research is thus to investigate successful cases of community-managed rural water supplies, and in that assess the type and size of support that has been deployed to make it successful. What can be considered successful can be understood at various levels: at the level of service that users receive, at the level of the service provider carrying out its tasks with a certain degree of community engagement, and at the level of partnership between the support entities and the service provider. The research will therefore assess the degrees of success across various elements, as summarised in Figure 2 below, and further elaborated below.

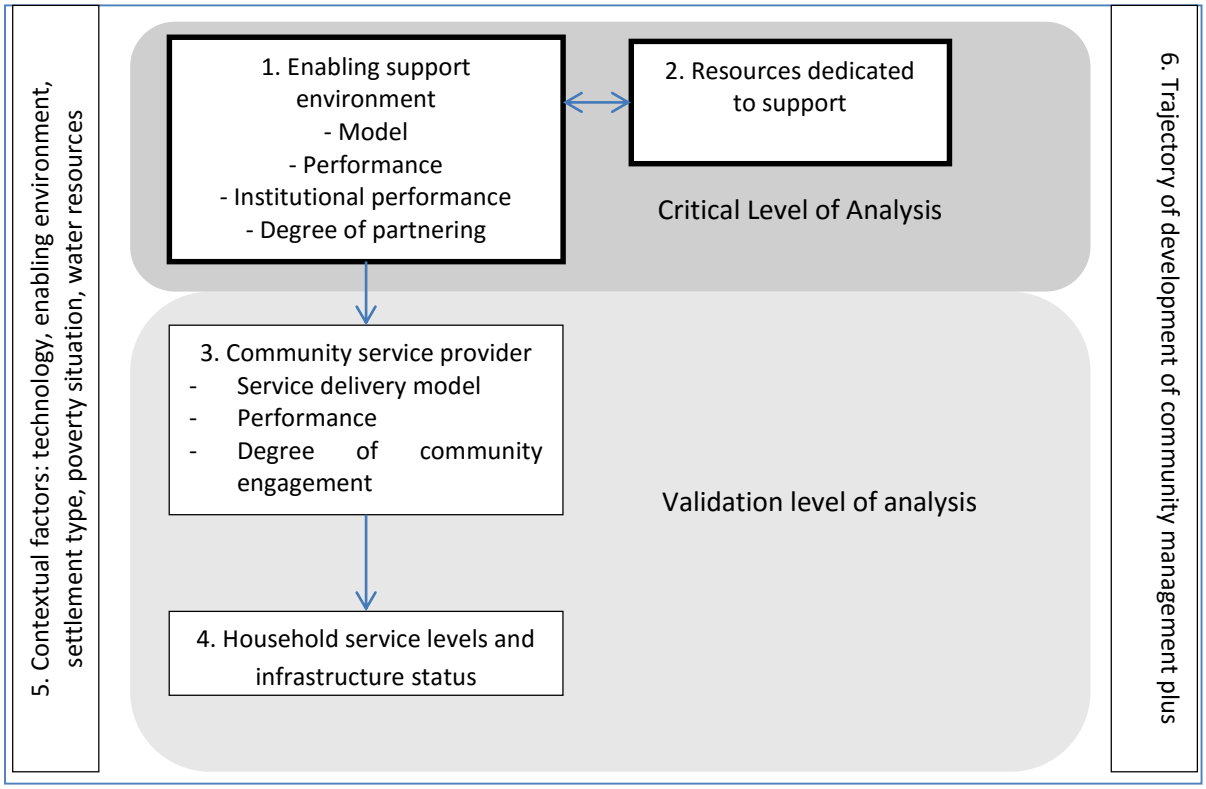


Figure 2: Elements of the research

This implies the following:

1. **Enabling support environment.** To assess the degree of success in support, we look into the following elements:
   - We describe the ***enabling support environment model***, by defining which type of entity (or entities) fulfil these roles, and the relationships between them.
   - ***Performance of the enabling support environment***. This refers to the degree to which the support entities are fulfilling their roles adequately, against a set of performance indicators.
   - ***Institutional performance***. This entails the internal institutional process such as leadership, organisational culture and community orientation that allow the external performance to happen.
   - ***Degree of partnering***. This is a description of the type of partnering between the enabling support entity and community service providers, using the partnership categories defined by Demirjian (2002).

2. **Resources dedicated to support**. This refers to the resources dedicated to the various functions carried out by the enabling support entities. This refers both to the monetary costs (as per the cost categories) as well as non-monetary ones, such as presence of skilled staff and political capital. We will quantify both financial and human resources and provide a qualitative description of other resources, like political capital, that are spent on this. In this, a differentiation will be made between the different life-cycle cost categories: Capital Expenditure (CapEx) during project implementation- particularly the 'software' part, the Operation and Minor maintenance Expenditure (OpEx), Capital Maintenance Expenditure (CapManEx) and direct support costs (Fonseca et al., 2011).

3. **Community service provider**. To validate that the support has been successful, we assess the degree of success of the service providers supported by the ESE through three elements:
   - ***Service delivery model.*** This refers to description of the entity that carries out day-to-day operations and maintenance and administration, and the degree to which the entity may have professionalised certain tasks, e.g. to a paid-for caretaker or mechanic, and its scope and scale of operations.
   - ***Performance***. This refers to the extent to which the service provider is fulfilling its roles in operation, maintenance and administration adequately, as defined by formal regulations or general good business practices.
   - ***Degree of community engagement in service provision***. We believe that community engagement in service provision is a good thing per se, as it empowers users to take appropriate levels of responsibility and oversight over their water services. We will assess the degree of community engagement, based on the ladders of participation (based on Pretty (1994), adapted from Adnan et al. (1992).

4. **Household service levels and infrastructure status**. Whether a water service can be considered successful is eventually measured by the characteristics of the water supply that users eventually receive, i.e. the service level. In this, we will look at aggregate service levels, as well as their break-down between the constituting elements, including water quantity, quality and accessibility. In addition, it will be disaggregated for different groups within a community, to assess equity in service levels. We will complement data on service levels, with data on the status of the infrastructure.

5. **Contextual factors.** We recognise that what might be required to be successful in one case may not be adequate to be successful in another. Specifically, we will describe the type of technology employed, the socio-economic and poverty status of the community and the type of settlement and the water resources situation.

6. **Trajectories.** Last, but not least, we recognise that the organisational partnerships between communities, service providers and support agents have a particular history and trajectory of development that is often not replicable to another situation. Still, insights in the various trajectories of development of these *plus* partnerships may help identify common elements to take into account when promoting such partnerships elsewhere. Therefore the research provides a qualitative description of the trajectories of development of partnerships will be undertaken.

2.1.1 Case study selection

In selecting twenty successful case studies, the research has scanned over 161 community-managed rural water supply programmes in India, covering a combined population of nearly 50 million people. Through a detailed process of selection using both secondary data and pilot visits, 20 programmes were selected to become case studies.

The research aimed at covering programmes from a wide range of socio-economical, political and environmental conditions found in India and investigate the levels of (relative) success achieved. The Chhattisgarh case was selected to understand service provision in one of the newer and less developed states in India. Chhattisgarh has the lowest Human Development Index of all Indian states and is ranked 26th out of 33 states in terms of GDP per capita (Government of India, 2011). This case was therefore selected after consultation with relevant government officials to show the kind of success that is possible and what 'best practice' looks like in this context.

The body responsible for providing water supply to both urban and rural citizens in Chhattisgarh is the PHED, the Enabling Support Environment in this case study. After implementation, schemes are handed over to Gram Panchayats, who should form Village Water and Sanitation Committees (VWSC) and are responsible for ongoing operation and maintenance, which makes them the Community Service Providers.

The 'best practice' villages were selected according to three criteria of success: the system should be run by the GP for a number of years; there should be a substantial percentage of household connections; and the CSP should pay the electricity bill for the pump by collecting user charges. Using these criteria, a number of villages were shortlisted and after initial field visits, the following three villages were selected as best practice:

- **Kutulbod Bhatagaon** in Dongargaon block
- **Amatola** in Ambagarh Chowki block
- **Belgaon** in Dongargarh block

A less successful village close to Amatola, ***Chilhati*** in Ambagarh Chowki block, was selected as the control village.

2.1.2 Data collection and analysis

To gather information on each of the research elements, data was collected during fieldwork from 25 June 2015 to 05 July 2015. In total, 13 key informant interviews, 6 focus group discussions and 120 household surveys were conducted; complemented by a review of published and unpublished literature, documents and organisational reports.

The data were processed in 4 databases (one for each of the units of analysis). These databases contain scoring tables for amongst other 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)).

In the costing section, all prices quoted are given in Indian Rupees (INR) and have been converted to 2014 prices. Inflation has been calculated using the construction price index for hardware costs and the consumer price index for other costs, as available from the Reserve Bank of India. Prices in this report have been reported in INR only but the US dollar basic conversion rate should be read at the 2014 average of $63.2 to INR 100.

3 Enabling Environment Level

This section focuses on the Enabling Support Environment (ESE), in this case PHED Chhattisgarh. First, an overview of the organisation, the support it provides and an assessment of what it is responsible for throughout the service delivery cycle. This is followed by a closer assessment of the ESE's performance and its partnering with the service providers it supports.

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

The responsibility for providing water supplies to both urban and rural citizens in Chhattisgarh lies with PHED, a State government entity. It was formed in 2000, when Chhattisgarh became a separate state. Before that, it was part of PHED Madhya Pradesh and operated in a similar manner. PHED is implementing piped water supply (PWS) schemes in rural areas under the National Rural Drinking Water Programme (NRDWP). This programme mandates that schemes are handed over to Gram Panchayats and/or VWSCs, who are then responsible for ongoing operation and maintenance (O&M). Apart from implementing community-managed piped water schemes, PHED is directly responsible for maintaining handpumps and solar-powered pumps with public standposts. Compared to the neighbouring state of Jharkhand, which is similar in its recent formation and low levels of human development, Chhattisgarh has seen a phase of political stability and strong government, which has resulted in a stable PHED.

3.2 Enabling environment description

As stated above, PHED is responsible for implementing the NRDWP in Chhattisgarh. The current State government issued a vision document stating that all villages with populations higher than 1,000 should be covered with PWS. This is implemented in a phased manner, according to village populations. In these schemes, the aim is to provide at least 30% of users with household connections and the rest with public standposts. The department had adopted this vision, and has drafted a document stating its duties and mission. The department has an internal organisation to live up to this mission, with clear hierarchies and systems for supervision and control. In the civil engineering section, there are three regions with two zones and several districts each. This section is supported by an accounting and a special projects and mechanical engineering section. The ESE's organogram is given in Hindi in Appendix 1.

The PHED division primarily involved in implementing the schemes in this case study is the Rajnandgaon district office, which has a total number of 179 employees. Details of their educational and professional background can be seen in Table 1. The majority of qualified staff are engineers, showing that the ESE has high technical capability, but a lack of 'soft' skills and knowledge in regards to community mobilisation, capacity building and training. Our discussions showed that there is a lack of funding or mandate for this, but also that many officials do not see these activities as their responsibility, but rather focus on technical project implementation.

Table 1: ESE staffing level

Professional background	Number
Engineering	18

Social scientists/Social mobilisers	0
Finance/ economics/administration	2
Technical staff	59
Logistical support staff	100
Total staff	179

An overview of support activities provided by PHED is given in Table 2. Schemes are planned and designed by PHED engineers and implemented by private contractors. After construction, PHED directly operates the schemes for three to six months, in which time the VWSC is trained in operating the scheme. This training was found to be focused on the technical operation and only aiming at the pump operator. Aspects such as billing, setting a tariff for cost recovery, tariff collection and accounting, which are major parts of successful management, are not part of the training. However, having the PHED engineers in the community for the initial time is considered an essential part of the support arrangement as it ensures that the schemes are actually functioning and that the community gets experience in operating them before the schemes are handed over.

After this initial phase, schemes are handed over to the Gram Panchayat and PHED withdraws from day-to-day operation. PHED gives a subsidy to schemes that are successful in providing water all year round. This subsidy amounts to Rs 15,000 a year for schemes with overhead storage tanks and Rs 5,000 to direct supply schemes. Water quality testing is done twice a year by PHED handpump mechanics. PHED also provides technical assistance for major repairs that exceed the capacity of the Gram Panchayat. The annual accounts of the Gram Panchayat are audited by the Panchayat Raj Department. These accounts include water supply, but not as a separate account. As this was the only support activity provided by the Panchayat Raj Department, and it is only marginally related to water supply, this department was not assessed as a separate support entity.

Table 2: Support provided by PHED

Type of activity	Is this type of activity undertaken by the ESE?	Modality of support	Frequency of support	Explanations and comments
Monitoring and control (auditing)	Yes	Supply based	2	Functionality of schemes assessed regularly, Gram Panchayat accounts audited by Panchayat Raj Department
Water quality testing	Yes	Supply based	2	Water testing is done by PHED engineer twice a year and entered into the government database. Also VWSC should use field testing kits, but this is not done regularly
Water resources management	No			Used to have a WRM programme up to last year, building checkdams, groundwater recharge etc.; but not any longer
Technical assistance	Yes	Both (On request and supply based)		TA for major repairs, expansions etc
Conflict Management	No			
Support in identifying investments needs	Yes	Supply based		Preparation of detailed project reports (needed for funding) for system expansion is done. Also replacement after design life should take place, but unclear if this really happens
(Re)training of service provider	Yes	Supply based		Training of VWSC in water quality testing and management of the scheme in the first 3-6 months after implementation. After that, no systematic training
Information and communication activities	No			
Fund mobilization	Yes	On request		Funds for major repairs etc. are mobilised from the ESE following a request by the GP

Table 3 depicts the activity and responsibility of various actors for tasks and activities relating to water supply. Roles are defined as follows:

- **Responsible (RES)** – the actor or entity that is responsible for the completion of a specific task.
- **Involved (INV)** – those actors or entities who directly contribute to the completion of a specific task.
- **Interested (INT)** – those actors or entities that are likely to be affected by a specific task.
- **Paying (PAY)** – those actors or entities that cover the costs of an activity, but do not carry it out directly

The matrix shows that PHED is mostly involved in capital intensive activities related to physical infrastructure. Initial implementation, as well as major repairs and capital maintenance that exceed the capacity of the CSP, are the responsibility of PHED. The matrix also shows the gaps in the current ESE setup. No actor is responsible for providing ongoing software support to communities, which means that CSPs are largely left alone in operating the schemes and training of new committee members or technical staff does not happen systematically. The Panchayat Raj Department audits the Gram Panchayat accounts every year, which include the overall income and expenditure on water supply, but not as a separate account. Apart from that, no ongoing support is provided by the Panachayat Raj Department. The Gram Panchayat itself is involved in and pays for a large part of the ongoing service delivery in all four studied villages, as will be shown below.

Table 3: Activity and responsibility matrix

Entities / Actors	Tasks / Activities																		
	Allocation of finance / Budgetary approval	Monitoring service levels & water quality	Project planning	Infrastructure design & implementation	Social intervention design and implementation	Operation and minor maintenance	Ongoing software support to community	Water resources management measures	Capital Maintenance and renewal	Major repair	Approval of user charges	User charge collection	Management of community involvement	Community capacity development & Training	Dispute resolution	Paying of water charges	Institutional & human resources development	Auditing	Evaluation/performance assessment
Central Government	INV			PAY				INT											
State Government	RES		INT + PAY	PAY				RES + PAY	PAY										
PHED	RES	RES + PAY	RES	RES	INV	PAY		INV	RES + PAY	INV + PAY				RES + PAY					RES + PAY
PRD																		RES + PAY	
Local government/ Gram Panchayat			INV	INV	RES	PAY			INV + PAY	INV + PAY								INV	
Formal private enterprise (contractor)				RES															
Water committee		RES + PAY	INV	INV	INV	RES			INV	RES + PAY	INV	RES		INT	RES	INV		INV	INV
Operator or mechanic						RES				INV									
Households			INV		INV	INT + PAY			INT	INT	RES	INV			INV	RES + PAY		INT	

3.3 Enabling environment performance indicators

This section provides an assessment of the ESE professionalisation using different indicators, as shown in Table 4. Scores are obtained using a QIS developed for this project and range from 0 (reflecting low performance) to 100 (indicating high performance).

Table 4: ESE performance indicators

	PHED
Formality of the mandate for support	100
Working methods	50
Information management	25
Communication between service support authority and service providers	50
Tracking client satisfaction	25

The ESE scores highly on the formality of mandate indicator, as it is a state government entity and therefore directly responsible for providing water supplies to the population. The working methods indicator refers to the extent to which standardised tools and methods are applied in providing support. Although most activities have systematic tools and methods, there is no formalised training process, which leads to the relatively low score. Training happens 'on the job' during the initial three to six months, when PHED operates the schemes. Information management and tracking client satisfaction is not done very systematically and although communication channels between the ESE and CSP exist, these are not used very frequently, according to our interviews.

3.4 Enabling environment institutional assessment

The ESE's institutional performance was assessed in detail, using a number of questions for each parameter which are then averaged to a score from 1 to 4, results of which are shown in Figure 3. Based on this exercise, PHED scores very highly on the technical capability and management and administration indicator, showing that staff are qualified and experienced and that administrative procedures work well. Generally, staff place an emphasis on implementing technical projects, not on engaging with communities or working directly with them. A tendency to view rural communities as backwards and incapable of managing their schemes could be observed, which leads to the comparatively low score for community orientation. The low score on the leadership indicator is caused by the fact that no strong sense of mission could be observed in most staff. Work is done towards achieving State and national policy goals, but no real ownership of this mission could be observed. The ESE scores rather high on the remaining indicators, suggesting that PHED is a desirable place to work and is an institution that is well-established and stays informed about external policy. Tables containing the detailed scores can be found in Appendix 1.

Figure 3: ESE institutional assessment

3.5 Enabling environment partnering assessment

An assessment was also made on the types of partnering that are found between the ESE and CSP. This is done against six types of partnerships (Demirjian, 2002):

- Collaborative. The sharing of responsibility and authority through joint decision-making
- Contributory. Partners pool resources or leverage new funds for implementation and maintenance of service
- Operational. The sharing of working (division of labour) and co-ordinate operations
- Consultative. To systematically obtain and share relevant information to improve service design, delivery, evaluation or adjustment
- Transactional. This refers to the exchange of funds for services or products
- Bureaucratic. This is the partnering to fulfil regulatory or normative expectations regarding the need for partners to work together

These types of partnering do not imply any hierarchy and a partnership may have elements of all these six types of partnering. Partnering is assessed in the four phase of service delivery and assigned a score from 1 to 4. In each phase, the partnership can show characteristics of all partnership types. Results are shown in Figure 4 and discussed below. The tables containing the original scoring can be found in Appendix 1.

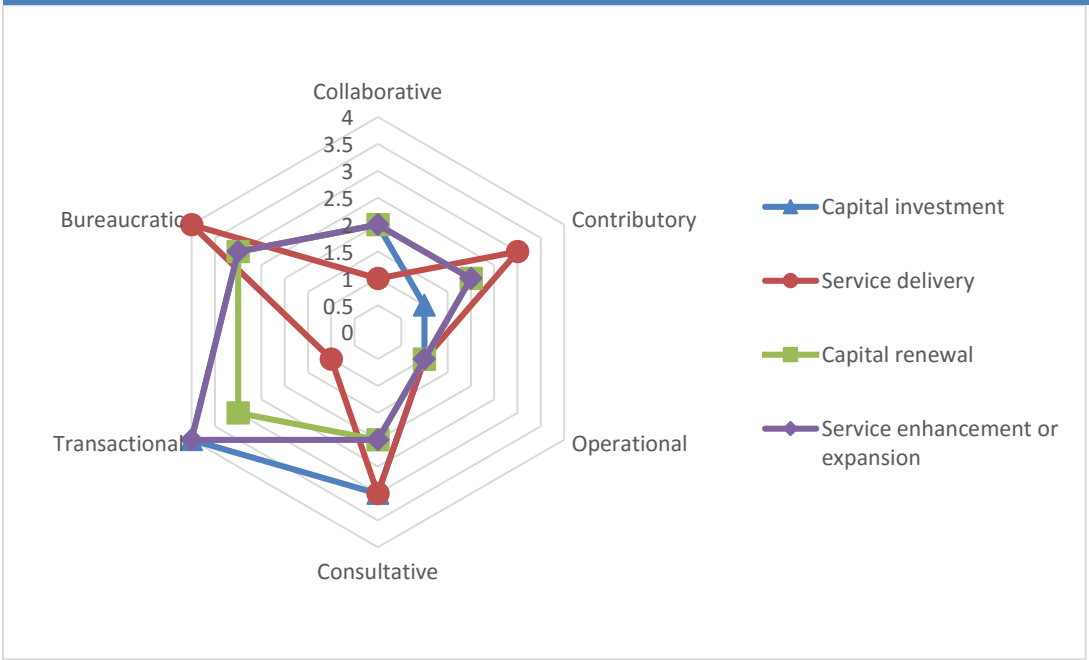


Figure 4: ESE partnering assessment

As the ESE is a government entity, the bureaucratic partnering type is the most prominent. Roles and responsibilities, as well as procedures are governed by official guidelines in each phase of service delivery. This should not be seen as something negative, as effective bureaucratic systems are necessary to serve large populations in a transparent and efficient manner. All phases bar service delivery show a strong degree of transactional partnering, because initial implementation and all extensions or renewals follow requests from communities, which are then sanctioned and executed by the PHED. Communities are informed and have the chance to make limited changes to project designs, for example the location of overhead storage tanks and boreholes, as well as details of the distribution network, resulting in relatively high scores for consultative partnering. The level of collaborative, operational and contributory partnering is low, as there is very limited direct cooperation between communities and the ESE. In the implementation and renewal phases, PHED provides funds to a contractor who does the work, without community contribution of labour or resources. After construction by the contractor, the PHED operates the scheme for 3-6 months and then hands over the scheme to the Gram Panchayat. In this initial phase the partnering could be classified as operational, however, this is only a temporary arrangement.

After handing the scheme over, PHED supports the community with an annual grant, but apart from that the CSP is responsible for managing service delivery.

4 Community Service Provider Level

The last section explained how the ESE operates and provides support to villages but in this section we examine experiences of support at the village level by investigating the community service providers that have been supported by the ESE. The section introduces the four villages and their service providers before moving to an assessment of their performance and partnering.

4.1 Context

Four villages from Raipur division have been selected for inclusion in the study. As discussed above, successful villages were identified using the following criteria: the system should be run by the CSP for a number of years; there should be a substantial percentage of household connections; and the CSP should pay the electricity bill for the pump by collecting user charges. The following three best practice villages were selected:

- **Kutulbod Bhatagaon** in Dongargaon block
- **Amatola** in Ambagarh Chowki block
- **Belgaon** in Dongargarh block

A less successful village in close proximity to Amatola, ***Chilhati*** in Ambagarh Chowki block, was selected as the control village.

Table 5 gives an overview of the four villages. All villages are supplied by groundwater from boreholes. In Kutulbod Batagaon, Belgaon and Chilhati the water is pumped to overhead storage tanks and distributed from there whilst in Amatola it is supplied directly to the distribution network without an overhead storage tank. In all villages, there are community-managed household connections and public standposts, as well as handpumps managed by PHED. In Belgaon, there is also one solar pump with overhead storage supplying a public standpost, which is also managed by PHED directly. While the scheme in Kutulbod Bhatagaon is relatively new, the other schemes were all implemented more than 15 years ago. The scheme in Belaon started as a direct supply scheme in 1990 and received an overhead storage tank in 2000, and new boreholes in 2007 and 2013. No information about major expansion of the other schemes could be obtained.

Table 5: Key information on the villages

	Kulbod Bhatagaon	Amatola	Belgaon	*Chilhati*
Population	1709	1067	2594	1165
Total number of households	355	232	520	217
Percentage SC	10%	35%	23%	10%
Percentage ST	21%	17%	16%	55%
Coverage with household connections	37%	33%	66%	53%
Tariff per household and month	Rs 50	Rs 30	Rs 60	Rs 35
Connection costs	Rs 300	Rs 500	Rs 1500	Rs 500
Date of scheme implementation and major expansion	2012	2000	1990/2000	1995

Overview of households sampled for household analysis:

The following two tables present an overview of the randomly sampled households in all four villages. As can be seen from the Table 6, all four villages are exclusively Hindu. Kutulbod Bhatagaon and Belgaon are dominated by Backwards Castes, whilst Amatola has a large proportion of

Scheduled Castes. Almost three quarters of respondents in *Chilhati* belong to Scheduled Tribes. The difference between the percentages presented here and the census data is due to our sampling size of 30 in each village, whilst the census takes into account all households. The level of education is quite uniform across the four villages, although self-reported illiteracy is highest in Amatola and *Chilhati.*

Table 6: Social indicators

Social Indicators		Kutulbod Batagaon	Amatola	Belgaon	*Chilhati*
Religion	Hindu	100%	100%	100%	100%
Caste	BC	73%	27%	60%	20%
	SC	3%	47%	13%	7%
	ST	23%	27%	27%	73%
Education (male household head)	Illiterate	10%	37%	23%	33%
	1st to 5th class	40%	20%	23%	20%
	6th to 10th class	37%	27%	40%	33%
	Intermediate	7%	13%	13%	10%
	Degree and higher	6%	3%	0%	3%
	Below matriculation	87%	83%	87%	87%
Household size	Mean	6.3	4.8	6.1	5.2
	Median	6	4	5	5

The economic condition of the surveyed households is presented in Table 7. The distribution of house types is quite uneven. Whilst most surveyed houses in Kutulbod Batagon were of high quality (pucca), the other two best practice villages are dominated by low quality (kuccha) housing. All villages have nearly universal land ownership. Agricultural work dominates in all villages, with only 10 to 20% working in other sectors. Reported household incomes are slightly lower in Belgaon and highest in Kutulbod Batagaon.

Table 7: Economic indicators

		Kutulbod Batagaon	Amatola	Belgaon	*Chilhati*
House type	Kuchcha (low quality)	27%	83%	83%	77%
	Semi-Pucca (medium quality)	0%	7%	13%	7%
	Pucca (high quality)	73%	10%	3%	17%
Land ownership		100%	100%	100%	97%
Occupation of male household head	Agricultural	69%	80%	70%	72%
	Agricultural wage labour	10%	0%	7%	0%
	Gov/regulated/irregular non-farm employment	7%	7%	7%	10%
	Self-employment including business	3%	10%	10%	10%
	Homemaker	10%	3%	7%	7%
Reported annual household Income (INR)	<= 25000	0%	7%	3%	3%
	25000 – 50000	20%	20%	20%	23%
	50001 – 100000	43%	43%	63%	57%
	100001 – 150000	17%	20%	7%	7%
	150001 – 250000	10%	0%	7%	3%
	250001+	10%	10%	0%	7%
	Mean income	121,600	105,850	79,600	93,733
	Median income	80,000	82,500	70,000	62,500

4.2 Community service provider descriptors

An overview of the four service providers is given in Table 8. Although as by NRDWP guidelines all four are managed by formal water committees, evidence of a functioning water committee could only be found in Kutulbod Batagaon. In the other villages, the water committees were found to be not active or existing only on paper. Therefore, responsibility for the management of the system reverted back to the Gram Panchayat, as the institution responsible for providing water supplies. In Belgaon the current Sarpanch (president of the Gram Panchayat), as well as his two predecessors were found to be very interested and involved in the scheme operation, whilst in the other villages, the scheme was mostly run by the pump operator. In Amatola, the Sarpanch had recently returned to the village after living in an urban area for years and therefore was not very involved in these matters, whilst in *Chilhati*, the general institutional performance of the Gram Panchayat was found to be poor, therefore the Sarpanch was not active in the water supply either. In all villages, book keeping was done by the Gram Panchayat secretary, although to a different degree of professionalisation.

Operation by the Gram Panchayat directly can be seen as a form of institutional resilience. Because the Gram Panchayat exists as an institution, it can take over operation if committees fail or are not properly formed. Although it can be argued that the level of community engagement is lower, the members are directly elected from the village and therefore still possess democratic legitimation and represent the community. Furthermore, the Gram Panchayat can use its ability to sanction to exert authority, as shown below.

None of those responsible for system management were specifically trained for the administrative aspects of service provision such as book keeping or promoting cost recovery through tariffs. Whilst the Gram Panchayat members receive some training from the Panchayat Raj Department after they are elected, this is only general training for the position and does not relate directly to the functioning of the water supply scheme. The pump operators received varying levels of technical training from PHED. In the best practice schemes, the pump operators were trained in the 'transitionary phase' when the scheme was run by PHED after construction, whilst this cooperation did not happen in *Chilhati*. The pump operators also received additional practical training in two villages. In Kutulbod Batagaon, the pump operator out of his own motivation got employed by the contractor in the initial construction phase, which provided him with technical knowledge of the system. In Amatola, the pump operator is employed as an assistant to the local PHED handpump mechanic. This experience, although not strictly related to piped water supply, enables him to do most minor repairs himself.

In all villages there are tariffs and connection charges but these are significantly higher in Belgaon, which leads to a more healthy financial balance as shown in the costing section below. Water from standposts is currently supplied free of charge in all villages. In Kutulbod Batagaon the VWSC in cooperation with the Gram Sabha decided to introduce a tariff of 120 INR per year for those users to increase cost recovery, but at the time of visit this rule had not come into effect yet. The service provider in Belgaon used its authority as local self-government to reduce the non-payment rate effectively. This is because a lot of users were not paying their water fees – and other taxes – so the Gram Panchayat in cooperation with the community decided not to provide any benefits such as pensions or ratio cards to users who are more than three months late with their payments. This step has reduced the number of defaulters almost to zero.

Finally, across the villages, coverage rates with household connections vary with Belgaon having the highest and Amatola village the lowest coverage. Although there is a large number of household connections in *Chilhati,* many users do not receive water at all because of very low pressure and leaks in the system. Worryingly, household connection coverage rates are significantly lower amongst marginalised groups indicating that equity is a problem.

Table 8: CSP descriptors

	Kutulbod Batagaon	Amatola	Belgaon	*Chilhati*
Type of organisation	Formal water committee	Gram Panchayat	Gram Panchayat	Gram Panchayat
Organizational capacity				
Staffing of governing body of CSP	11	2	2	2
Staffing of the CSP	12	2	2	2
Coverage with household connections				
Number of households with household connections	131	76	342	114
Households served by the CSP	355	232	520	217
Coverage with household connections	37%	33%	66%	53%
Coverage with household connections among vulnerable groups				
Number of SC/ST households with household connections	No data	12	116	No data
SC/ST households served by the CSP	No data	121	203	No data
Coverage with household connections among vulnerable groups	No data	10%	57%	No data
Financial descriptors				
Tariff per household and month	50 INR	30 INR	60 INR	35 INR
Connection costs	300 INR	500 INR	1500 INR	500 INR

4.3 Community service provider indicators

This section assesses the performance of the service providers using a set of indicators developed by the research team. Using a QIS, each parameter is assigned a score from 0 to 100, results of which are shown in Table 9.

As per official guidelines, governance in all four villages is provided by a committee of around 12 people on paper. Some village functionaries such as the Sarpanch (village leader) and the Gram Panchayat secretary are committee members automatically, and some members are selected from the community. The Gram Panchayat nominates these members who are then approved in the general village meeting (Gram Sabha). However, this committee was found to be functional and active only in Kutulbod Batagaon. As discussed above, the other villages defaulted back to management by the Sarpanch or and pump operator directly, with administrative assistance by the Gram Panchayat secretary. The Sarpanch is elected in a formal way, but not explicitly for this function, therefore the governance indicator could not be assessed for these villages. The three best practice villages provide accountability to users by sharing information and receiving user feedback and complaints in the Gram Sabha meetings, which is being done regularly and effectively. Although

this way of providing accountability should also exist in *Chilhati*, due to limited communication and transparency, it is not used effectively.

In all the villages, the funds for water supply are kept with the general GP funds, which leads to high scores on the cash reserves indicator. GPs are legally required to deposit cash reserves of more than INR 5,000 into their bank account. Because the accounts for water supply are part of these overall GP accounts, they are audited every year. However, only the three best practice villages were found to be keeping track of income and expenditure for water supply systematically, whilst the accounts in *Chilhati* did not include essential parts of expenses for water supply, such as the pump operator salary or costs for repairs.

Table 9: CSP performance indicators

Indicator	Kutulbod Bhatagaon	Amatola	Belgaon	*Chilhati*
Selection of the board of the service provider	50	N/A	N/A	N/A
Information sharing and accountability mechanisms	50	50	50	25
Cash reserves	75*	75*	75*	75*
Book keeping	100*	100*	100*	25*
Technical folder	0	0	0	0
Registry of operational information	75	25	25	25
Water metering	0	0	0	0
Water security measures	0	0	0	0
Water quality management	0	0	0	

4.4 Community service provider participation assessment

This section provides an overview of the extent of community participation in service delivery. Participation is understood functionally as 'an active process whereby beneficiaries influence the direction and execution of development projects rather than merely receive a share of project benefits' (Paul, 1987). Using a participation ladder adapted from Arnstein (1968) and Adnan et al. (1992) and specifically designed for this project, the degree of community participation in community service provision is assessed at each stage of the service delivery cycle.

As can be seen in Table 10, participation in the initial implementation and service delivery phase was found to be on the functional level in all villages. Communities are informed about the plans and arrangements and can amend limited elements. The community was for example involved in siting boreholes and overhead storage tanks, as well as approving tariff increases or salaries for the pump operator in the Gram Sabha. Participation in the asset renewal phase was found to be higher in the best practice villages. In *Chilhati*, the service provider only informed the community about planned asset renewals, whereas the community in the best practice villages had a chance to amend the renewal plans. In the service enhancement or expansion phase, the level of participation in best practice villages was found to be highest. In these villages, decisions about extensions are made after intensive discussions and in cooperation with the community. In Amatola, for example, the community decided that a request for a second overhead storage tank should be made at the PHED and that no new household connections will be given until the tank is built, as users were already experiencing limited water pressure.

Table 10: Participation assessment

Stage of delivery cycle	Kutulbod Batagaon	Amatola	Belgaon	*Chilhati*
Capital Investment (implementation)	Functional participation	Functional participation	Functional participation	Functional participation
Service delivery	Functional participation	Functional participation	Functional participation	Functional participation
Asset Renewal	No data	Functional participation	Functional participation	Participation by consultation
Service enhancement or expansion	Interaction participation	Interaction participation	Interaction participation	Participation by consultation

4.5 Community service provider costs

This section presents the costs incurred at the service provider level. None of the communities contributed to capital expenditure, whilst operating expenses are paid by the VWSC or Gram Panchayat directly.

Table 11 shows the recurrent costs for the four CSPs. All service providers employ only one pump operator, with varying salaries. Belgaon pays the highest salary to its pump operator, which reflects the fact that he already had experience working with pumps before joining the service provider and is able to do most repairs himself. The salary paid in Amatola is particularly low, but is accepted by the pump operator, as it is only a part-time employment for him. Electricity costs are markedly higher in Belgaon, because this village has four pumps and operates them for six hours a day to fill up the overhead storage tank. This can be seen as additional costs to provide good service to users. Maintenance expenses are highest in Belgaon and *Chilhati*, which is caused by the age of the schemes, which leads to frequent repairs. The providers in Kutulbod Batagaon, Amatola and *Chilhati*, repaired burnt pumps in the last year and paid for it from their own funds, costs of which are given under the major repairs category.

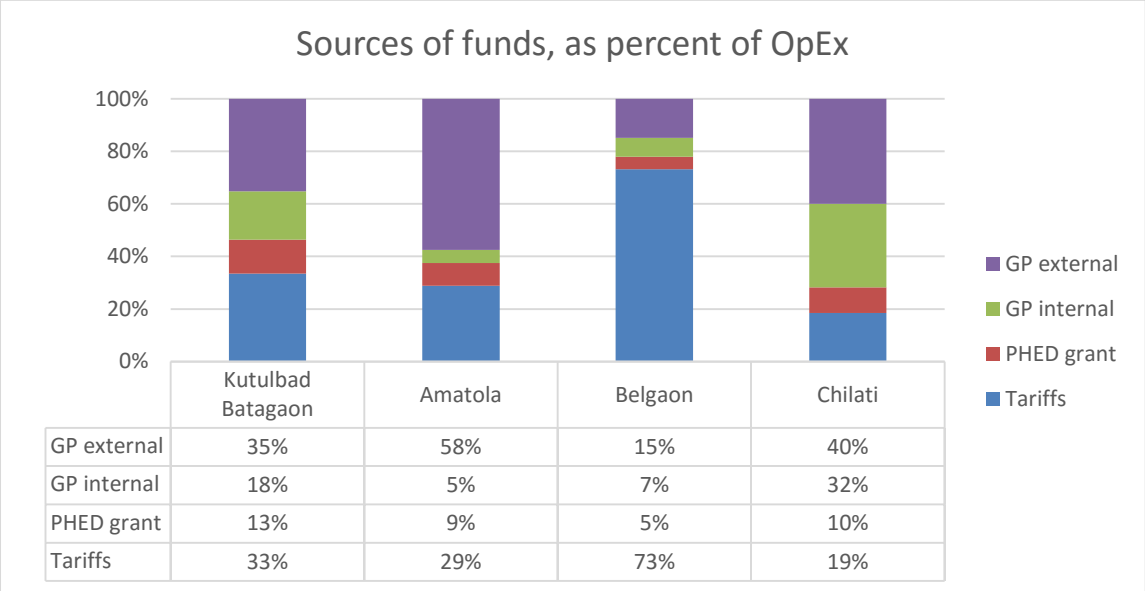
Table 11: Recurrent costs to CSPs

	Kutulbod Batagaon	Amatola	Belgaon	*Chilhati*
Pump operator salary	24,000	9,600	48,000	36,000
Electricity	72,000	55,740	257,820	84,000
Chemicals	0	0	1,300	0
Materials and spare parts	6,700	2,000	12,490	15,000
Maintenance and repairs	13,000	19,900	0	20,000
Total recurrent costs to CSP	**115,700**	**87,240**	**271,610**	**155,000**
Population supported	1709	1067	2594	1165
Recurrent costs to CSP per person (INR)	**68**	**82**	**123**	**133**
Recurrent costs to CSP per person (USD)				

4.5.1 Sources of funds

The water tariffs cover only part of the operating expenditure in all of the villages. As mentioned above, one other source of funds is the PHED subsidy, while the remaining deficit is paid from general GP funds. An attempt was made to understand the sources of funds within this general budget. Internal revenue comes from house tax, shop tax, from renting out GP real estate and from fisheries, while external sources are the untied fund from the state government and the funds received from the central government through the 13th Finance Commission. Figure 5 shows the

fund sources for the four villages. Belgaon has significantly better cost recovery than the other villages, in this village tariffs and the PHED grant cover almost 80% of operating expenses. The other best practice villages this percentage is 46% and 38%, respectively. *Chilhati*, the control village, covers only 29% of its OpEx by tariffs and the PHED grant. In all villages, a substantial part of operating expenditure comes from external GP funds, thereby representing a direct subsidy. Only directly attributable costs for water supply that are billed to the service providers could be included in this figure, therefore it excludes costs such as the salary for Gram Panchayat employees drawn from the Panchayat Raj Department or costs for the Gram Panchayat office, which are necessary for operation, but not accounted for in the service provider's costs. Including them would lead to an even lower percentage of operating costs covered by the community.



	Kutulbad Batagaon	Amatola	Belgaon	Chilati
GP external	35%	58%	15%	40%
GP internal	18%	5%	7%	32%
PHED grant	13%	9%	5%	10%
Tariffs	33%	29%	73%	19%

Figure 5: Sources of funds for OpEx

5 Household Service levels

This section details results from the household surveys designed to validate the success by analysing the water supply service levels users receive. It starts with a general overview of coverage levels, then provides details of single parameters and finally looks at equity in terms of water service levels. Service levels are assessed on five parameters: quantity, perception of quality, accessibility, reliability and continuity. The service each household receives is scored for each parameter from 'no service' to 'high'. The 'basic' service level represents the Indian Norms for Rural Drinking Water, therefore any level above that can be seen as acceptable, any level below as unacceptable service.

5.1 Coverage

The types of water sources the surveyed households use can be seen in Table 12. Belgaon has the highest percentage of household connections, as well as the lowest percentage of handpump users. Amatola has the lowest number of household connections and none respondents were using public standposts as their primary source of water. In this village more than half of respondents are relying on handpumps, however, three respondents (10%) use handpumps as their primary water source but supplement it with drinking water from public standposts. Another two households have private connections but get their water for washing and bathing from the communal standpost supplied by a solar pump, which is also completely managed by the PHED. In all villages, handpumps were seen as a reliable source of water outside the piped water supply hours. In this way, the PHED-managed handpumps and solar pumps provide what can be called 'hardware resilience', acting as a backup system and complementing the community-managed piped water scheme.

Table 12: Type of water sources used by sampled households

	Kutulbod Batagaon	Amatola	Belgaon	*Chilhati*
Household connection	57%	43%	63%	53%
Pit tap	0%	0%	3%	0%
Public standpost	13%	0%	23%	10%
Private open well	7%	0%	3%	0%
Handpump	23%	57%	7%	37%

5.2 Service levels

The analysis of household service levels suggest that the best practice villages receive better services than in the control village, as shown in Table 13 and Table 14. Users in best practice villages receive significantly higher service levels in terms of continuity and higher service levels in respect to quantity. In *Chilhati*, the control village, most users receive water for only 30 minutes a day, which leads to the very low scores on continuity. Quantity service levels are generally quite poor, with only 59% and 43% of users receiving acceptable on service on this indicator in best practice and the control village, respectively. This is mainly due to the low number of users with household connection. Almost 90% of handpump users receive quantities classified as unacceptable, which agrees with findings in Uganda, where only a third of point source users were fetching quantities meeting national standards (Bey et al., 2014; Magara, 2014). In Belgaon, the village with the highest percentage of household connections and the lowest number of handpump users, 70% receive acceptable quantities. It could also be found that household connections in Belgaon delivered better service than household connections in the other villages, showing the higher performance of this scheme.

Interestingly, almost all respondents considered their water quality 'good', in both best practice and control villages. Reliability likewise was perceived as very high in all villages, although there are differences between best practice and control villages. In best practice villages, 82% of respondents did not experience a breakdown in the last year, compared to 67% in the control village. In all villages breakdowns were usually fixed within one day. Detailed tables showing service levels for each village are given in Annex 2.

Table 13: Service levels for best practice villages (n=90)

	Best Practice				
	Quantity	Accessibility	Quality	Continuity	Reliability
High	21%	58%	99%	44%	98%
Improved	22%	1%	0%	20%	2%
Basic	16%	8%	1%	36%	0%
Sub-standard	29%	16%	0%	0%	0%
No service	12%	18%	0%	0%	0%

Table 14: Service levels for control village (n=30)

	Control				
	Quantity	Accessibility	Quality	Continuity	Reliability
High	20%	57%	100%	0%	97%
Improved	13%	3%	0%	0%	0%
Basic	10%	3%	0%	16%	0%
Sub-standard	23%	20%	0%	84%	0%
No service	33%	17%	0%	0%	3%

5.3 Equity

In this section the equity dimension is explored, specifically in regards to caste.

In all villages, disparities between castes in access to household connections could be observed. As shown in Table 15, almost half of respondents belonging to Scheduled Castes and Scheduled Tribes rely on handpumps, compared to 13% of those belonging to Backwards Castes. Looking at the quantity service level gives a similar picture, with 52% of Scheduled Castes and 55% of Scheduled Tribes receiving unacceptable quantities, compared to 33% of Backwards Castes. These findings suggest that marginalised groups receive less benefit from the schemes. These groups mostly live on the edge of the village and might have less power in deciding about system designs and pipeline layouts, resulting in worse coverage for their hamlets. Resulting from this, they receive lower service levels. The PHED spending more time on community mobilisation and placing an emphasis on empowering marginalised groups in the planning stage would be one way leading to a more equitable service.

Table 15: Water source by caste

Water source	BC	SC	ST	Total
Household connection	36	10	19	**65**
Pit tap	0	0	1	**1**
Public standpost	8	1	5	**14**
Private open well	3	0	0	**3**
Handpump	7	10	20	**37**
Total	**54**	**21**	**45**	**120**

5.4 User satisfaction

The survey also quantified the degree of satisfaction users express. As shown in Table 16, there is a quite strong variation in user satisfaction. In Belgaon, almost everybody is very satisfied, whilst in both other best practice villages satisfaction is markedly lower. Amatola has a number of completely dissatisfied users, mostly because of the distance to the nearest handpump. Two thirds of users in *Chilhati*, the control village, are not satisfied with their water supply. Most people complain about inadequate pressure, which leads to limited quantities. Other issues are the short supply duration and the distance to the nearest water source for some households. Many residents were found to be unhappy about the uneven coverage and were asking for household connection in every single house.

Table 16: Satisfaction with water supply

	Kutulbod Batagaon	Amatola	Belgaon	*Chilhati*
Very satisfied	60%	57%	97%	23%
Somewhat satisfied	37%	27%	3%	10%
Not satisfied	3%	17%	0%	67%

6 Enabling support environment costing

This section presents the costs associated with the ESE in supporting rural water supply to the CSP. It provides data, where available, on both Capital Expenditure (CapEx) on software and hardware. Following this it presents the direct support costs incurred at the ESE level as well as estimates for indirect support costs. These costs help in identifying the 'plus' component that supports the sustainable functioning of community-managed rural water supply systems in Chhattisgarh. All costs are given in INR unless otherwise specified. The costs incurred in the past are adjusted to 2014 prices using the annual average consumer price index calculated by the Reserve bank of India. Software costs are based on 2014 prices and the number of man days and salaries gathered in key informant interviews at the ESE level.

6.1 Capital Costs

Table 17 shows capital expenditure on hardware, which covers investment in initial construction costs as well as staff salaries for technical design, preparation of tender and construction supervision. Furthermore, 80% of staff salaries for the initial operation by PHED is included, as a major part of this time is not used for training, but regular system operation. No data on initial costs could be obtained for Amatola. In Belgaon, cost data was only available for the first phase of the project. The system was expanded twice, but no records of the costs for these expansions could be obtained.

Table 17: Capital Expenditure

	Kutulbod Batagaon	Amatola	Belgaon	*Chilhati*
CapEx hardware	3,743,672	N/A	1,647,780	4,493,331
CapEx software	41,640*	N/A	42,640*	42,640*
Total CapEx	3,785,312			

** estimated as an average expenditure, therefore it was not divided by the respective village size*

CapEx Software, which are expenses for initial capacity building and training, could only be assessed through key informant interviews, as average cost per scheme. This cost was then divided by the mean population in the four villages to arrive at a per capita cost, as dividing it by the respective village sizes would imply smaller villages receiving a higher level of support. CapEx software includes the initial visits to set up the committee and involve communities in the system design, as well as 20% of the costs for operating the system after implementation. This percentage was assumed to represent the proportion of time spent on training and involvement of the local pump operator. Total expenditure on CapEx Software was found to be around INR 41,640 per scheme or INR 23 per person. This is about 1% of the expenditure on hardware, which shows the little emphasis placed on community mobilisation by PHED.

6.2 Recurrent costs

Table 18 shows the recurring costs incurred by the ESE. Costs for direct support include the salary for water quality testing and monitoring of functionality, which is done by the PHED. These costs could only be estimated through key informant interviews on as an average cost per scheme of INR 2,765 per year. The second main recurring cost is the yearly grant provided by PHED to cover parts of the service provider OpEx. The ratio of direct support costs to grant is about 1:10, except in Amatola, which receives a lower grant because the village does not have an overhead storage tank. The Indirect support cost includes expenses for coordination with other institutions and macro-level

policy and was estimated from the overall budget at INR 3 per person and year. No information about capital maintenance covered by PHED could be obtained.

Table 18: Recurring costs at ESE level

	Kutulbod Batagaon	Amatola	Belgaon	*Chilhati*
Annual OpEx direct support costs	1,834	1,834	1,834	1,834
PHED grant	15,000	5,000	15,000	15,000

6.3 Overview of costs

Overleaf is a table containing the total costs for rural water supply for this case study. Where the data is available it is averaged across the three best practice village to produce an overview. It shows that the ESE covers 100% of implementation costs and 57% of recurrent costs.

Table 19 Summary Cost Table (INR)

Chhattisgarh 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					
	CapEx hardware	CapEx software	CAPEX TOTAL	OpEx labour & materials	OpEx power	OpEx bulk water	OpEx enabling support	CapManEx	RECURRENT EXPENDITURE TOTAL
Community/consumers	-	-	-	INR 10	INR 33	-	-	INR 3	INR 45
Local self-government	-	-	-	INR 2	INR 6	-	-	INR 1	INR 9
	-	-	-	-	-	-	-	-	-
State government entity	-	-	-	INR 3	INR 11	-	-	INR 2	INR 16
State water supply agency	INR 1,933	INR 36	INR 1,969	INR 2	INR 4	-	INR 4	INR 1	INR 11
National Government	-	-	-	INR 3	INR 11	-	-	INR 2	INR 16
NGO national & international	-	-	-	-	-	-	-	-	-
International donor	-	-	-	-	-	-	-	-	-
TOTALS	INR 1,933	INR 36	INR 1,969	INR 20	INR 65	-	INR 4	INR 9	INR 98
Median of 20 case studies			INR 3,231						INR 207
'Plus' %age	100%	100%	100%	50%	49%	-	100%	70%	53%
Median of 20 case studies			95%						57%

Notes: Assuming a 50/50 split of the funding for OpEx support to the community by the State water supply agency between the Government of India and the State

Table 20 Summary Cost Table (PPP USD$)

Chhattisgarh 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					
	CapEx hardware	CapEx software	CAPEX TOTAL	OpEx labour & materials	OpEx power	OpEx bulk water	OpEx enabling support	CapManEx	RECURRENT EXPENDITURE TOTAL
Community/consumers	-	-	-	$ 0.57	$ 1.87	-	-	$ 0.15	$ 2.59
Local self-government	-	-	-	$ 0.12	$ 0.36	-	-	$ 0.04	$ 0.52
	-	-	-	-	-	-	-	-	-
State government entity	-	-	-	$ 0.17	$ 0.60	-	-	$ 0.13	$ 0.91
State water supply agency	$ 110.19	$ 2.04	$ 112.24	$ 0.11	$ 0.25	-	$ 0.25	$ 0.04	$ 0.64
National Government	-	-	-	$ 0.17	$ 0.60	-	-	$ 0.13	$ 0.91
NGO national & international	-	-	-	-	-	-	-	-	-
International donor	-	-	-	-	-	-	-	-	-
TOTALS	$ 110.19	$ 2.04	$ 112.24	$ 1.14	$ 3.68	-	$ 0.25	$ 0.50	$ 5.57
Median of 20 case studies			$ 184.16						$ 11.78
'Plus' %age	100%	100%	100%	50%	49%	-	100%	70%	53%
Median of 20 case studies			95%						57%

Notes: Assuming a 50/50 split of the funding for OpEx support to the community by the State water supply agency between the Government of India and the State

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

This study analysed the extent of support given to community service providers in Chhattisgarh and how this impacted their performance. PHED Chhattisgarh is the institution responsible for implementing rural water supply systems and supporting water committees. It was found to have very qualified technical staff and well-functioning administrative systems but there is room for improvement in the area of community mobilisation, capacity building and other 'soft' skills. At the moment, the department only employs engineers, which is understandable given its mandate, but suggests that partnering with an institution focusing on community interaction would enable it to provide more holistic support to service providers. The level of ongoing support, or *plus*, after construction was found to be limited to regular water quality and functionality testing and financial support by PHED. However, the initial support given by running the schemes for three to six months whilst involving the community pump operator and training them was found to be a crucial part of the support arrangement and one of the reasons leading to success. Extending this training to other committee members and to topics such as setting cost reflective tariffs or accounting would be a step towards professionalising service providers. Furthermore, introducing a system for retraining new committee members would ensure that capacity is not lost after elections or when the pump operator changes. Partnering between PHED and service providers is mostly characterised by the bureaucratic and transactional type, which is the case for most government institutions.

Service provision in the villages was undertaken either directly by the Gram Panchayat or by a VWSC in very close conjunction with the Gram Panchayat. This overlap between service provider and local self-government might lead to issues regarding accountability, but also provides the service provider with more authority. A benefit of this could be seen in Belgaon, where the GP effectively enforces water tariff payment by withholding any GP benefits to defaulters. In two villages, interesting approaches towards pump operator training developed. In Kutulbod Batagaon, the contractor constructing the scheme employed the pump operator as an assistant plumber for the initial work. In Amatola, the pump operator is employed as an assistant to the PHED handpump mechanic. Both could improve their technical skills this way and are now able to do most repairs himself. These approaches can be seen as a way to provide additional training to communities and should be considered for inclusion in future programmes.

The type of service provision, according to the model developed by Smits et al. (2015), can be classified as direct public provisioning with community involvement, as shown in Figure 6. Community involvement, as well as professionalisation of the service providers, was found to be quite limited. The Gram Panchayat as elected body performs a lot of functions directly and pays for significant amounts of the service provision. Communities are still involved directly in some decisions, as well as indirectly due to the fact that that the Gram Panchayat itself is formed from the local communities. The level of involvement and professionalisation was found to be higher in Kutulbod Batagaon, which places this village slightly higher on the graph.

Service levels in all four villages were assessed using household surveys. Users in best practice villages enjoy better service, although still 40% of users receive unacceptable quantities. Coverage with household connections was found to be between 33% and 66%. In all villages, a significant proportion of users rely on handpumps managed by the PHED, which can be seen as 'hardware resilience' providing a very low but reliable level of service. Users in best practice villages are

generally satisfied with the water service, with the lowest satisfaction in Amatola, which also has the lowest percentage of household connections.

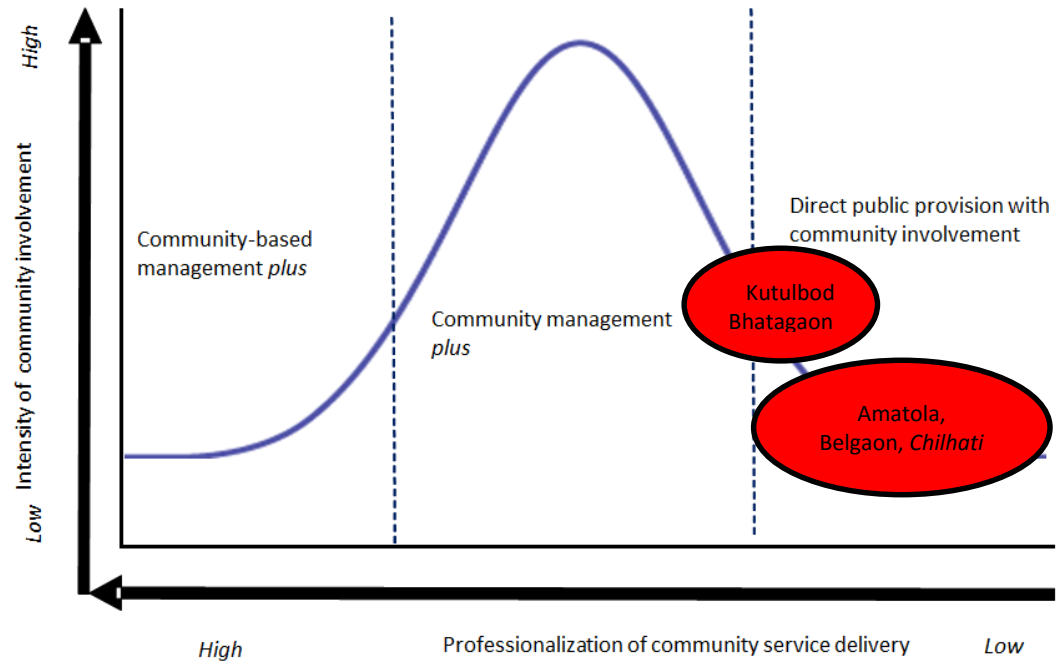


Figure 6: Typology of management for the four service providers

Costs for initial construction have been estimated at INR 1,933 per person with INR 36 per person estimated for initial training and capacity building. The costs for supporting the service providers at the PHED level with support from the State and Central Government support to the State were estimated to be INR 43 per person per year with an additional INR 9 through the GP. Tariffs and the PHED grant cover 80% of the direct operating expenditure in Kutulbod Bhatagaon, and between 29% and 46% in the other villages. The remaining amount is paid from GP funds, using both money raised internally through taxes and rental property, as well as state and central government grants, as described.

These findings suggest that the current model of supporting community-managed rural water supplies in Chhattisgarh is successful in delivering acceptable services to a majority of users. This can be seen as a level of relative success which is an achievement recognising the challenges faced in one of the poorest and least-developed states in India. However, coverage rates vary and many people still rely on handpumps, even in communities with successful piped water schemes. There is room for improvement in community participation and capacity building, as well as cost recovery, as currently tariffs only cover parts of the operating expenses and Gram Panchayats therefore have to directly subsidise water supply.

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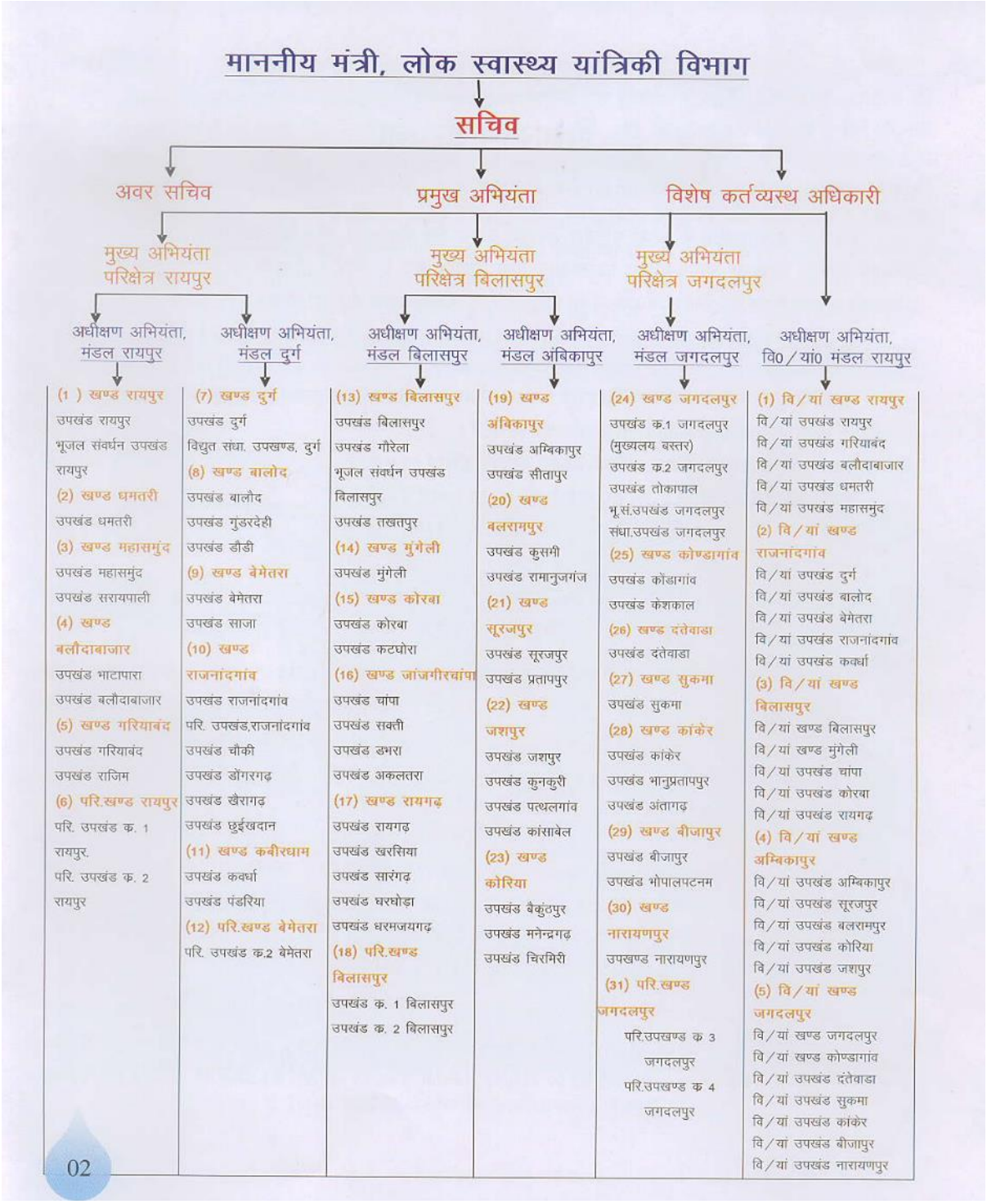
Appendices

Appendix 1: Organogram of PHED



Appendix 2: ESE assessment tables

Institutional assessment

Statement	Agreement
Organisational autonomy	
Sets own organisational policies and goals and changes them as necessary to provide guidance and direction in achieving the objectives of the institution	Disagree (2)
Determines level of funding required to meet organisational goals and secures sufficient funds from appropriate sources	Agree (3)
Conducts such studies as may be necessary and carries out long-term planning to meet the expected demands on the institution; approves and acts on such studies and plans, including appropriate levels of investment to meet future demand	Disagree (2)
Determines own organisational structure including roles and responsibilities of major divisions	Strongly Agree (4)
Employs levels of employee compensation, including salaries and benefits, sufficient to attract and retain capable staff	Agree (3)
Average Score	2.8
Leadership	
Provides clear sense of mission; articulates mission; involves people with the mission so they get a sense of ownership of mission; gets people excited about the mission, believing in it.	Disagree (2)
Identifies clear performance standards and is strict but fair; gives positive and negative feedback where due; disciplines where necessary based on performance.	Agree (3)
Maintains sense of balance between future vision and everyday operational matters.	Disagree (2)
Demonstrates personal integrity (i.e., does not claim false overtime, take money, or cut corners for personal gain); instils sense of integrity in others.	No data
Continuously guides technical staff on need to ensure that levels of technology used by the institution are those which are most suitable in terms of simplicity of operation and maintenance; monitors activities in this regard.	Disagree (2)
Average Score	2.25
Management and Administration	
Managers have a clear sense of their own and others' roles and responsibilities. They communicate roles and expectations clearly to others and involve them in the process of defining their roles and responsibilities.	Agree (3)
People are held accountable for getting work done.	Agree (3)
Administrative systems for the following functions have been developed and are regularly used. (Note: rate each system for effectiveness.)	
a. Accounting and Budgeting	Strongly Agree (4)
b. Personnel	Agree (3)
c. Management Information	Strongly Agree (4)
Average score	3.4
Community Orientation	
Staff at every level demonstrate that they are oriented toward serving the community / community service provider, and ensure engagement with different groups within community, including the most marginalized; when observed, their decisions and actions are clearly driven by what is best for the	Disagree (2)

community.	
There are identifiable mechanisms for communities / community service providers to interact with key areas of the institution over important matters (e.g., call-down for technical assistance, bill disputes, service problems), that are also accessible to the most marginalized groups within the community.	Agree (3)
There is clear evidence that the institution responds to complaints, emergencies, and suggestions which community members / community service providers make.	Agree (3)
There are identifiable, ongoing, and effective measures to educate communities / community service providers about institutional services and requirements.	Disagree (2)
The institution makes efforts to invite and evoke an effective level of community / community service providers participation (e.g., mechanisms for communities to bring concerns/complaints to the institutions).	N/A
Average score	2.5
Technical Capability	
Consistently makes sound technical decisions and effectively serves management by conducting technical studies and planning as requested.	Strongly Agree (4)
Ensures effective control of the quality of the end product and all other technical operations.	Strongly Agree (4)
Uses or adapts technology which is suitable for the specific needs of the institution and avoids temptation to use more exciting-but not appropriate-technologies learned by staff who were trained in other settings.	Strongly Agree (4)
Maintains levels of in-house technical skills adequate for routine technical responsibilities and sub-contracts to outside specialists those tasks which are either beyond the institution's own capabilities or necessary to meet peak needs.	Strongly Agree (4)
Conducts practical research and experiments to improve existing uses of technology for local conditions and needs.	Disagree (2)
Average score	3.6
Developing and Maintaining Staff	
A clear process for determining skill needs exists and is the basis for designing training programmes.	Disagree (2)
A system exists for developing competent managers and supervisors.	Agree (3)
The institution provides adequate incentives to maintain staff (i.e. salary levels, employee, benefits)	Agree (3)
A clear system exists for hiring qualified personnel and firing or disciplining personnel when necessary.	Strongly Agree (4)
A career path is open to social/community development staff and technical staff and management staff.	Disagree (2)
Average score	2.8
Organizational Culture	
An observable team spirit exists among the staff.	Strongly Agree (4)
People express a sense of ownership and pride about working that is communicated by such statements as "this is a good place to work."	Disagree (2)
Employees are able to articulate the history and legends of the organization in positive ways.	Disagree (2)
Continuity in the organizational culture is maintained (even with staff turnover at high or low organizational levels).	Strongly Agree (4)

Staff place a value on maintaining the organisations physical infrastructure (offices, treatment plants, grounds) of the organization. Facilities look clean, well maintained, and attractive.	Agree (3)
Average score	3
Interactions with Key External Institutions	
Top management stays well informed about external policy, financial, and regulatory issues and actions.	Strongly Agree (4)
Management maintains direct contact with the key individuals in all important external entities.	Agree (3)
Specific strategies are formulated to influence policies, legislation, and other activities to obtain necessary approvals and resources.	Disagree (2)
Programmes are developed to influence the public in support of institutional goals.	Disagree (2)
To the extent to which it is not already responsible/involved in services, local government/Panchayati Raj is kept full informed and involved in the process of support and monitoring	Agree (3)
Average score	2.8

Partnership assessment tables

Capital Investment (implementation)	Statement	Agreement
A. Collaborative	ESE and CSP share responsibility for decisions regarding hardware (e.g. infrastructure) and software (e.g. capacity building) development during implementation	Disagree (2)
B. Contributory	ESE and CSP pool financial resources to meet the costs of capital investment in hardware and software provision during implementation	Strongly Disagree (1)
C. Operational	ESE and CSP work together contribuing labour and/or resources to deliver hardware and software provision during implementation	Strongly Disagree (1)
D. Consultative	ESE and CSP communicate regularly during implmentation with structured opportunties for feedback and dialogue	Agree (3)
E. Transactional	ESE and CSP initially negoitate a implementation plan that is then delivered by the ESE	Strongly Agree (4)
F. Bureaucratic	ESE provides CSP with a standardised model of hardware and software provision during implementation	Agree (3)
On-going service delivery	**Statement**	**Agreement**
A. Collaborative	ESE and CSP share responsibility for decisions regarding administration, management and operation and maintenance	Strongly Disagree (1)
B. Contributory	ESE and CSP pool financial resources to cover costs of administration, management, and operation and maintenance	Agree (3)
C. Operational	ESE and CSP work together contributing labour and/or resources to support administration, management, operation and maintenance	Strongly Disagree (1)
D. Consultative	The ESE and CSP have a systematic and transparent system for sharing information regarding	Agree (3)

	administration, management, and operation and maintenance	
E. Transactional	The ESE and CSP fulfill different elements of the administration, management, and operation and maintenance functions as per negoitated arrangements	Strongly Disagree (1)
F. Bureaucratic	Bureaucratic standards dictate the system for administration, management, and operation and maintenance	Strongly Agree (4)
Asset Renewal	**Statement**	**Agreement**
A. Collaborative	ESE and CSP share responsibility for decision making regarding asset renewal	Disagree (2)
B. Contributory	ESE and CSP save and pool financial resources to meet the costs of asset renewal	Disagree (2)
C. Operational	ESE and service provider contribute labour and/or resources for asset renewal	Strongly Disagree (1)
D. Consultative	ESE and CSP systematically share information regarding service levels and technology status enabling proper planning for asset renewal	Disagree (2)
E. Transactional	Asset renewal is dependent on ngeoitations between ESE and CSP following a request from the CSP	Agree (3)
F. Bureaucratic	Asset renewal is dependent on generic programme timelines (i.e. every X years)	Agree (3)
Service Enhancement or Expansion	**Statement**	**Agreement**
A. Collaborative	ESE and CSP share responsibility for decisions regarding service enhancement or expansion	Disagree (2)
B. Contributory	ESE and CSP save and pool financial resources to meet the costs of service enhancement or expansion	Disagree (2)
C. Operational	ESE and CSP contribute labour and/or resources for service enhancement or expansion	Strongly Disagree (1)
D. Consultative	Information regarding service levels, technology status and population is systematically shared, enabling proper planning for service enhancement or expansion	Disagree (2)
E. Transactional	Service enhancement or expansion is dependent on ngeoitations between ESE and CSP following a request from the CSP	Strongly Agree (4)
F. Bureaucratic	Planned asset replacement, expansion or renewal is dependent on generic programme timelines (e.g. every X years and/or with every X% of population increase)	Agree (3)

Appendix 3: Service level tables

	Kululbod Batagaon (n=30)					Amatola (n=30)				
	Quantity	Accessibility	Quality	Continuity	Reliability	Quantity	Accessibility	Quality	Continuity	Reliability
high	23%	63%	100%	5%	93%	13%	43%	100%	23%	100%
improved	20%	3%	0%	57%	7%	23%	0%	0%	0%	0%
basic	13%	13%	0%	38%	0%	13%	0%	0%	77%	0%
sub-standard	23%	13%	0%	0%	0%	37%	17%	0%	0%	0%
no service	20%	7%	0%	0%	0%	13%	40%	0%	0%	0%

	Belgaon (n=30)					Control village: *Chilhati* (n=30)				
	Quantity	Accessibility	Quality	Continuity	Reliability	Quantity	Accessibility	Quality	Continuity	Reliability
high	27%	67%	97%	85%	100%	20%	57%	100%	0%	97%
improved	23%	0%	0%	0%	0%	13%	3%	0%	0%	0%
basic	20%	10%	3%	15%	0%	10%	3%	0%	16%	0%
sub-standard	27%	17%	0%	0%	0%	23%	20%	0%	84%	0%
no service	3%	7%	0%	0%	0%	33%	17%	0%	0%	3%