Research Paper

Study of national rural drinking water programme implementation during last five years (from FY 2010–2011 to 2014–2015) in state of Madhya Pradesh, India

Abhishek Parsai and Varsha Rokade

ABSTRACT

The Ministry of Drinking Water and Sanitation (MDWS), Government of India is entrusted with the responsibility for providing financial and technical resources for ensuring safe and sufficient drinking water in rural habitations of India. As per data available on the online portal of MDWS regarding progress of the National Rural Drinking Water Programme (NRDWP), out of a total 1,696,664 habitations nationwide, 1,249,695 (73.65%) habitations have been provided with a minimum of 40 litres per capita per day of water supply. Only 40.14% of the total habitations nationwide are provided with piped water supply schemes (PWSSs), and the remaining 59.86% of habitations have hand pumps and other schemes, whereas in the case of Madhya Pradesh, these figures are 15.96% and 84.04%, respectively. With the present rate of habitation coverage and quality of programme implementation, it seems almost impossible to reach the targets set in the ‘Strategic Plan for the rural drinking water sector for the period 2011 to 2022’. This study presents the findings of a state wide quantitative assessment of NRDWP implementation during the last five financial years (2010–2011 to 2014–2015) and also qualitative assessment of 16 PWSSs in 4 selected districts.

Key words | LPCD, NRDWP, piped water supply schemes, service delivery, strategic plan

INTRODUCTION

Rural drinking water supply in Madhya Pradesh

Rural water supply has traditionally focused on extending coverage to rural areas in order to provide a ‘safe’ quality of water and service. However, water being a State subject, the primary responsibility for providing drinking water facilities in the country rests with the respective State Governments. States generally plan, design and execute water supply schemes (and often continue to operate them) through their State Public Health Engineering Departments, while the Ministry of Drinking Water and Sanitation (MDWS), Government of India, formulates policies and guidelines for the sector and supplements the efforts of State Governments by providing technical and financial assistance under the centrally sponsored National Rural Drinking Water Programme (NRDWP). The programme was launched in 2009.

For coverage of rural habitations with sufficient and safe water, the Public Health Engineering Department (PHED) executes various water supply schemes such as hand pumps, dug wells, stand-posts and piped water supply schemes (PWSSs) (small single village and big multi-village schemes). PWSSs are water supply systems that provide water to various points away from the source of water through a pumping or gravity system and connections through pipelines. The water supply points may be situated at a single public place in the form of stand-posts, where people come and fetch water from tap connections, or these points may be available in the form of household (HH) tap connections.

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The PHED of the State Government of Madhya Pradesh is responsible for designing, executing and commissioning PWSSs (be it single village, multi-village or mega water supply schemes) in rural areas of the State. The PHED does so with financial assistance from the Government of India and from its own sources. For execution of multi-village PWSSs based on surface water, a separate legal entity has been constituted in the name of Madhya Pradesh Water Corporation Limited.

After execution and commissioning, these schemes are handed over to Gram Panchayats (GPs), Panchayat Raj Institutions (PRIs) or the local community for operation and maintenance. As per the recently notified Madhya Pradesh Gramin Nal Jal Praday Yojna Sanchalan Evam Sandharan Niyam, 2014, published in the State Gazette on 20th January, 2015 for operation and maintenance of a piped water supply in each village, a Drinking Water Sub-Committee, on the recommendation of Gram Sabha, shall be constituted. As per the rules, the responsibility of the PHED is limited to execution and commissioning only; legally saying the department is not responsible for any kind of post-commissioning support.

In the new policy directions as contained in the new NRDWP guidelines, the Strategic Plan 2022 and the 12th Five Year Plan for 2011–2017 (MDWS 2011), the Government of India envisages enhancement of rural drinking water service levels from 40 l per capita per day (LPCD) to 55 LPCD, and a shift to piped water supply, with HH connections to reach 80% in rural areas by 2022. The necessary enabling tools for the implementation modality already exist in the Constitution, in the form of the 73rd and 74th amendments (April 1993), placing drinking water and sanitation as mandatory functional areas of the 3-tier PRIs, comprising the district, the block and the village. Further, the issue of providing safe water is also linked with the Millennium Development Goals (MDGs).

In accordance with these policy directives, a large number of PWSSs have been launched in rural areas of Madhya Pradesh, akin to other states.

A major problem has been encountered in achieving the above policy directives – many of the newly developed PWSSs have also become non-functional within a few years, and in the same timescale many of these new PWSSs have also been found to be only partially functional.

PWSSs in Madhya Pradesh

Prior to the advent of the NRDWP, Madhya Pradesh had 4,337 PWSSs altogether. Within six years of the launch of the programme (from 2010–2011 to 2014–15), 13,514 schemes have been executed in the State.

The number of PWSSs has increased 223% since 2009 (the base year), but the habitations covered by these schemes are only 20,626 (16.17% of the total 127,559 habitations). Though the period following 2009 is marked with a surge in execution of PWSSs, the actual service delivery by these schemes has not been enhanced as intended. Assuming the rate of slipping back of habitations to be constant, if scheme execution and completion follow a similar trend, it would take around 31.11 years to cover the remaining 83.83% of habitations of the State, much later than the target set in the Strategic Vision for 2022 of the Government of India. This is the status of scheme execution and commissioning of PWSSs in rural areas of Madhya Pradesh.

As per the Twelfth Five Year Plan (2012–2017) and NRDWP Guidelines – 2013 issued by the Government of India, the in-village water supply schemes should be planned, approved, implemented, managed, operated and maintained by the PRIs and local community (MDWS 2013). The Government has to play the role of facilitator and, with the help of non-governmental organizations/community based organizations and civil society, build the capacities of local community/PRIs to manage the in-village water supply systems and sources (GoI 2011).

Objectives

1. To review the five years of the NRDWP in Madhya Pradesh.
2. To provide suggested measures for enhanced NRDWP programme implementation.
3. To review the (technical and socio-economic) performance of successful and failed/defunct PWSSs.
4. To provide inputs for sustainability of successful schemes and their replication, and suggest corrective measures for failed/defunct schemes in order to enhance the drinking water supply service standards.
METHODOLOGY

A review of data regarding physical and financial progress during the five years from FY 2010–2011 to FY 2014–2015 available on the Management Information System (MIS) of the MDWS was undertaken (MDWS 2015).

A review of literature existing on PWSSs in the study area, looking for performance efficiency, the role of PRIs so far, and the role and preparedness of PRI representatives and other stakeholders, etc. was undertaken. Meetings with all stakeholders engaged with water supply-related work were held in 16 villages in 4 districts. A structured questionnaire was designed, taking into consideration all the aspects of PWSSs.

Scope

Secondary data regarding various components of NRDWP from 2010–2011 to 2014–2015 were reviewed. For the study, groundwater based single village PWSSs covering a population of maximum 2,500 persons were selected. Sixteen such schemes in four districts were selected.

DATA ANALYSIS: PART – I

Part – I of data analysis depicts secondary information available on MIS of the MDWS, Govt. of India, which includes: the number of schemes & habitation coverage (Figure 1); service levels and handing over of schemes (Figure 2); and funding availability and expenditure patterns (Table 1).

It is evident from Column 9 of Table 1, that both governments at Central and State level sometimes release more funds than originally allocated for the particular financial year. But utilization of funds has never been more than 75% (as shown in Column 10) on an annual average basis. Every financial year starts with a huge opening balance. The underutilization of funds is a clear indication of the department’s poor fund absorption capacity.

The information shown in Tables 2 and 3 highlights the status of two critical components of the NRDWP, namely operation and maintenance (O&M) and sustainability.

Sustainability is an important component of NRDWP, which focuses on source and system sustainability in long run. Table 3 depicts information on prioritization of
districts/blocks from an expenditure purpose based on
the classification of the Central Ground Water Board
(CGWB).

As per the classification of the CGWB, an agency of the
Ministry of Water Resources, Government of India, all 313
blocks of Madhya Pradesh can be classified in four major
Table 2 | Expenditure on O&M and resource gap

<table>
<thead>
<tr>
<th>Financial Year</th>
<th>GoI (15% under NRDWP)</th>
<th>State (15% Matching)</th>
<th>Finance Commission Grants exclusively for O&amp;M</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010–2011</td>
<td>36.27</td>
<td>36.27</td>
<td>36.27</td>
<td>108.81</td>
</tr>
<tr>
<td>2011–2012</td>
<td>41.50</td>
<td>41.50</td>
<td>41.50</td>
<td>124.50</td>
</tr>
<tr>
<td>2012–2013</td>
<td>58.97</td>
<td>58.97</td>
<td>58.97</td>
<td>176.91</td>
</tr>
<tr>
<td>2013–2014</td>
<td>69.42</td>
<td>69.42</td>
<td>69.42</td>
<td>208.26</td>
</tr>
<tr>
<td>2014–2015</td>
<td>59.26</td>
<td>59.26</td>
<td>59.26</td>
<td>177.78</td>
</tr>
<tr>
<td>Total</td>
<td>265.42</td>
<td>265.42</td>
<td>265.42</td>
<td>796.26</td>
</tr>
<tr>
<td>Annual Average Expenditure</td>
<td></td>
<td></td>
<td></td>
<td>159.25</td>
</tr>
</tbody>
</table>

Average annual expenditure on O&M of Rural Drinking Water Supply assets is INR159.25 Crore. Whereas funds to the tune of INR257.45 Crore are required annually for O&M. Hence there is a gap of INR98.20 Crore (40% of total funds required for O&M annually).

Data in Column 2 is available on www.indiawater.gov.in.
Data in Column 3 is share spent by State matching GoI grants.
Data in Column 4 is assumed to be matching with GoI share in Column 2, but in reality it is much less than this.

Table 3 | Status of funds utilization under sustainability component

<table>
<thead>
<tr>
<th>Financial Year</th>
<th>% (of total funds) spent by 10 highest spending districts</th>
<th>Districts and Number of exploited blocks covered (09/24)</th>
<th>Districts not prioritized for sustainability structure in the year</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010–2011</td>
<td>47.79</td>
<td>06/20</td>
<td>Barwani, Dewas, Satna</td>
</tr>
<tr>
<td>2011–2012</td>
<td>54.02</td>
<td>04/11</td>
<td>Dewas, Indore, Ratlam, Satna, Ujjain</td>
</tr>
<tr>
<td>2012–2013</td>
<td>48.10</td>
<td>03/08</td>
<td>Dewas, Dhar, Mandsaur, Satna, Shajapur, Ujjain</td>
</tr>
<tr>
<td>2013–2014</td>
<td>52.01</td>
<td>03/09</td>
<td>Barwani, Dewas, Dhar, Satna, Shajapur, Ujjain</td>
</tr>
<tr>
<td>2014–2015</td>
<td>54.73</td>
<td>03/09</td>
<td>Barwani, Dewas, Dhar, Indore, Satna, Shajapur</td>
</tr>
</tbody>
</table>

categories namely Safe (218), Semi-critical (67), Critical (4), and Over-exploited (24) based on the stage of ground water development. For details on this classification, refer to the report on Dynamic Ground Water Resources of India, March-2011 (CGWB 2011).

In simple terms, as one block moves from the Safe category to the Over-exploited category, its condition of groundwater development is deteriorated. The Over-exploited blocks must be prioritized for sustainability structures and should be followed by Critical and Semi-critical and finally Safe blocks.

DATA ANALYSIS: PART – II (BASED ON PRIMARY INFORMATION)

Though the above schemes (Table 4) were reported to be running successfully by the PHED, in-depth investigation revealed that these schemes were only partially successful. In the remark column, the reasons behind the partial performance of PWSSs are given.

As shown in Table 5, source failure and damage by road construction are major reasons behind the non-functional status of schemes. Besides, there is a lack of community initiatives once a scheme stops delivering services.

CONCLUSIONS BASED ON DATA ANALYSIS IN PART – I

Sluggish pace of scheme execution and habitation coverage

The period following financial year 2010–2011 has seen a surge in execution of PWSSs (a 223% increase in five years). It is evident from data illustrated in
Figure 1(a)–1(c) concerning scheme execution and coverage of habitations, that at the present rate, it would take around 31.11 years to cover the remaining 83.83% of habitations in the State, much later than the target set in the Strategic Vision for 2022 of Government of India.
The reasons behind the sluggish pace are lengthy administrative procedures and a dearth of competent contractors for execution of schemes, especially PWSSs.

**Areas of critical importance are neglected**

Under the coverage, quality and O&M components of the NRDWP, the financial cost is borne by the Government of India and the State Government on a 50:50 cost sharing basis, whereas for the components of sustainability and support activities, 100% of funds are provided by the Government of India. These are the critical components of NRDWP that are responsible for long-term sustainable service delivery by water supply assets.

In the components supported fully by the Government of India, viz. sustainability and support activities, neither is proper need assessment undertaken nor are funds allocated based thereon.

**Sustainability**

As defined in the NRDWP Guidelines, 2013 issued by MDWS-GoI, the component of sustainability has four elements, namely source sustainability, system sustainability, financial sustainability and social and environmental sustainability (MDWS 2013).

Within the purview of the NRDWP guidelines, any structure that helps in or improves the sustainability of a drinking water source is a sustainability structure. It is evident from Table 3 that over-exploited blocks are not prioritized for creation of sustainability (civil) structures. Districts Dewas and Satna are those districts that have not been considered for higher spending in the last five years for the creation of sustainability structures.

As per the classification given by the CGWB, over-exploited blocks are those blocks where the annual groundwater extraction exceeds the net annual groundwater availability, resulting in a significant decline in the long-term groundwater level.

On other elements of sustainability such as system sustainability, financial sustainability and social and environmental sustainability, the State’s efforts are not visible.

It is worthwhile mentioning here that one of the major reasons behind the defunct status of both PWSSs and hand pumps is source failure. It is because schemes are designed without any detailed geophysical investigations. The resistivity survey findings only form the base for scheme design, which is also not done in a scientific manner.

**Support funds**

Activities to be supported by support funds include (i) establishment of a Water and Sanitation Support Organisation for undertaking information, education and communication (IEC), and human resource development activities, (ii) provision of MIS for effective planning, monitoring and implementation of the NRDWP and (iii) research and development (R&D).

Under these three major categories, support funds are spent on sub-categories, namely administrative expenses, training, procurement of equipment, IEC, MIS, water quality monitoring and surveillance programme (WQMSP), R&D, State technical agency /expert, monitoring and evaluation, and community involvement in the National Rural Drinking Water Quality Monitoring & Surveillance Programme (NRDWQMSP).

Though districts report expenditure mostly on administrative and training activities under support funds, none of the districts in the State has spent funds on R&D.

As per a recent study (Parsai 2014) conducted on 56 water quality testing labs in 16 districts with reference to the Uniform Drinking Water Quality Monitoring Programme of MDWS, 73.21% of labs did not distribute Field Test Kits (FTKs) to the community in the last one year of the study. It is important to note that these FTKs have a validity period of one year. It means that the FTKs available in GPs under the jurisdiction of these labs had expired at the time of study. This fact shows the lack of community involvement in the NRDWQMSP.

**O&M**

As per Para 9.7 of the NRDWP Guidelines 2013, up to 15% of total NRDWP funds can be utilized by States/Union Territories for O&M and States/Union Territories will make a matching contribution, which along with funds provided under the Finance Commission’s recommendations as grants to PRIs will be used to meet the O&M expenditure on drinking water supply schemes (MDWS 2013).
Assuming the matching funds are received under Finance Commission Grants and with the share of GoI (15%) and State (15%), around INR159.25 Crore (GBP£16.2 million) have been spent on O&M of drinking water supply assets in rural areas of Madhya Pradesh in the year 2014–2015. But the funds required for O&M of 20,261 PWSSs and 600,073 hand pumps in the State is INR257.45 Crore (GBP£26 million). Hence State wide there is a resource gap of INR98.20 Crore (GBP£9.9 million), which is around 38.14% of the total funding requirement. The revenue collected from beneficiaries in the form of a monthly water tariff has not been considered, because it is negligible as compared to the total funding requirement.

The district-wise analysis of the resource gap in O&M funds reveals that only five districts received funds greater than the State average in the year 2014–2015. In the remaining 46 districts, this gap varies from INR0.02 Crore (GBP£20,239) to INR7.62 Crore (GBP£770,819). This is because the allocation of funds for O&M is done on annual funding requirements for a particular district, not on the basis of funding requirements for total drinking water supply assets present in the district.

**CONCLUSIONS BASED ON DATA ANALYSIS IN PART – II**

**Attributes common in all functional schemes (as shown in Table 4)**

**Clarity in the process of scheme hand-over**

During the hand-over process, the GP can learn the fine-tuning of the PWSS from the PHED in order to make the PWSS successful in the future, when its operation and maintenance comes into the hands of the GP. An aware GP can also adopt steps towards source-sustainability by synergizing and convergence of inter and intra-departmental efforts aimed towards augmentation of groundwater. The GP directly itself, or with the help of Community Based Organizations and/or Non-Government Organizations involved at grass-roots level, can also launch an awareness campaign on the benefits accruing from water supplied through pipelines and other related issues, which will ensure its acceptability among the villagers at large, eventually leading to the success of the PWSS.

**GP fixes the HH tariff and ensures its recovery**

The GP (or a villager assuming the role of a leader), in consultation with villagers, can fix the tariff structure for the HH water connection and channelize efforts in collection of water bills. The later part however is very tricky, as it requires a major change in the mindset of people who are used to having had free access to water since historical times. The GP can also outsource the recovery of water bills for the village, but obviously at village level it will not be a financially viable and attractive option. A sustained campaign needs to be launched (with or without the GP) to encourage people to pay their water dues regularly, inculcating this habit into their system.

**Availability of a trained pump operator**

The GP, after implementing all the above components successfully appoints a trained pump-operator for day-to-day operation and maintenance of the pump which releases water in the main pipeline. This is one of the most important parts of the PWSS as an improperly trained pump operator will increase the malfunctioning of the motor, more than average, consequently increasing the cost incurred for repairs of the motor.

**GP ensures fund availability for operation and maintenance of the scheme**

To assume that all expenses related to a PWSS can be recovered from the recovery of water bills will be indeed like living in a fool’s paradise. Therefore it is always a daunting challenge for GPs to raise and keep adequate funds for operation and management of a PWSS, as trouble can crop up at any time and has to be attended to as early as possible. It has been found that each GP has developed its own system in this regard, wherever possible. For instance, one GP has earmarked the income accruing from the auction of land where the weekly local market (haat) is held for the operation and management of the PWSS. Another GP has kept a part of the funds received from the Finance Commission in reserve, solely to be spent under this heading.
Attributes common to all non-functional schemes (as shown in Table 5)

People's participation in the process of conceptualisation, designing and implementation of scheme is missing

There is no official role and scope for people's active participation in the design, planning and implementation of a PWSS. As a result, people have no sense of ‘ownership’ of the assets created, and perceive it as a completely government project. The resolution passed by the GP is taken as a proof of people's participation. In practice, however, most of the PWSS schemes are built on receipt of the funds, and once completed (or partially completed), officials from the PHE department of the concerned Block approach the GP to get the resolution passed. This is corroborated by the fact that a large number of PWSSs (for instance, as many as 90% in Panna district), are considered to be one-sided, ‘handed-over’ by the PHE department, after the expiry of 90 days from the completion of the project.

Acute lack of IEC activities

People in the villages under study have no idea about the benefits and advantages of PWSSs, the linkage between water and diseases, the adverse impacts of consuming unsafe water and other related issues.

Long gestation period of schemes

There have been cases where it has come to light that an overhead tank has been constructed but pipelines have not been laid or vice versa, or if everything is ready, then the sustainable water source remained elusive.

Equity and social justice are missing

The economically weaker groups, which include Scheduled Caste, Scheduled Tribes, minorities, backward class, etc. rarely have tap connections in their homes, as these people often have no political voices. It impacts them doubly – the precious time of women is lost in fetching water, which causes a reduction in their earning as a daily wage provider. Table 6 clearly shows the distribution of tap connections among HHs.

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Village</th>
<th>HH</th>
<th>No. of Connections</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Silgi</td>
<td>250</td>
<td>52</td>
<td>20.80</td>
</tr>
<tr>
<td>2.</td>
<td>Dharampur</td>
<td>460</td>
<td>122</td>
<td>26.52</td>
</tr>
<tr>
<td>3.</td>
<td>Bajag Raiyyat</td>
<td>490</td>
<td>120</td>
<td>24.49</td>
</tr>
<tr>
<td>4.</td>
<td>Bajag Mal</td>
<td>598</td>
<td>83</td>
<td>13.88</td>
</tr>
<tr>
<td>5.</td>
<td>Karanjia</td>
<td>1,676</td>
<td>100</td>
<td>5.97</td>
</tr>
</tbody>
</table>

Source: survey data (Singh 2014), (Saxena 2014).

Stress on PHED officials

In March, stress starts playing havoc on PHED officials, till the end of June or more appropriately with the onslaught of the monsoon. In every village there is one problem or another related to water. With the increased awareness, anyone can now talk directly to Bhopal using the toll free number advertised by the government, and the concerned authorities in Bhopal turn to the Collector, who immediately contacts the PHED office. Though technically the PWSS no longer rests with the PHED, it is held responsible for providing water to the village. Thus, through no fault of its own, the PHED is frequently at the receiving end of everyone. Throughout the four months of summer, PHED officials are on their toes round the clock, under tremendous pressure, doing a thankless job. It indeed seems a miracle that despite being severely understaffed both in terms of supervising staff as well as field staff (who attend to calls for repairs of hand pumps, leakage and seepage from pipelines, and repairs of pumps) the PHED somehow manages to cope with the crises, year after year.

GP's financial inability to satisfactorily run schemes

The GP has a limited budget nowadays, compared to earlier times when it was constructing Panchayat buildings, school buildings, Anganwadi buildings, etc. With completion of these major works, the funds allocated to the GP have been drastically curtailed. The GP's ability to raise its own funds from villages has fallen flat, so there is a kind of resource crunch in the GP. In this context, the few funds available to the GP are insufficient to smoothly run the PWSS in the village – recurring expense for motor repairs, the monthly salary of the pump-operator, payment of the...
monthly electricity bill, expenses on repair of joints and other sources of leakage and seepage often lead to the easier option of declining to take over the newly-built PWSS.

**GP**s are not geared up for operation and maintenance of schemes

The operation and maintenance of a PWSS is a highly skilled task for which GPs are not geared up. Earlier, trained PHED mechanics/pump operators were taking care of this. Now, after handing over the PWSS to the GP, PRI members often have great difficulty in finding a suitable person to carry out this work. The net result of this major lacuna is frequent dysfunctionality of motors. The present scenario for O&M appears bleak in terms of the sustainability of the PWSS, especially when the field staff of the PHED continue to shrink.

**Village water and sanitation committees are weak**

The village water and sanitation committees (VWSCs) and the newer version, the Village Ad-hoc Committee, exist only on paper. In a few cases, the Chairpersons of the VWSCs are more than 60 years old. Personal interaction with them revealed that they hardly know anything about water quality and they have never attended training.

**Inability of GP to collect monthly HH bills**

There has been an abject failure of GPs in collecting the monthly water tariff from the HHs with water connections. There are scores of reasons for this. People are accustomed to having access to water free of cost, and this mindset is very deeply rooted in their psyche.

**Post-handover of scheme, accountability and responsibility of the GP is missing**

There is no legal binding or responsibility cum accountability of GPs in the post-handover of the PWSS phase, which is the most severe lapse on the part of policy. The concept of ‘one-sided handover’ has also been observed, where the case of a continued refusal to take over the PWSS by the GP would be deemed to be a ‘one-sided handover’ after the lapse of 90 days in the post-completion phase. This kind of handover process does not place any legal binding on either of the parties.

**Dual responsibilities of the public health engineering department and panchayat and the rural development department**

The model of dual-responsibility – pre-construction of PWSS with the PHED, and post-construction with the Panchayat & Rural Development (P&RD) Department – has failed to yield the desired results and is causing more problems than it is solving. Neither is the ‘unilateral handing over’ of the PWSS coming to anyone’s rescue – both the concerned departments pretend to look in the other direction.

**Inflated electricity bills to the GP for PWSS operation and maintenance**

Highly inflated bills for motors engaged in water storage and distribution are imposed on GPs, which are already devoid of funds. These inflated bills are also raised during non-functional periods.

**PWSSs are commonly weak in terms of performance**

The survey data bring out serious inadequacies in the water supply schemes. The quantity of water supply and hours of supply commonly fall short of design, especially in summer. Sizeable sections of HHs face problems caused by frequent breakdowns, non-availability of the daily supply, and insufficient water supply compared to the requirement. Due to the inadequacies of water supply schemes rural HHs typically depend on multiple water sources, including their private sources.

**O&M expenditure is inadequate, causing schemes to perform below design and shortening their useful life**

On average, the actual O&M expenditure on piped water schemes is about half of the good practice design performance O&M cost (that is, the O&M expenditure needed to run the scheme regularly, supply water at the design LPCD level, and undertake proper maintenance). The
implication is inadequate maintenance with an adverse effect on the functional status of the schemes.

** Significant wastage of resources arises from over-provisioning by some schemes, defunct schemes, and the existence of multiple schemes**

The number of HHs sharing a hand pump or a stand-post is commonly much lower than the government stipulated norm of 50 HHs per hand pump/stand-post. Many schemes become defunct before they complete their useful life. About 50% of HHs are using multiple schemes to meet their water requirements (Misra 2008).

** The total cost of piped water schemes is much higher than the efficient cost of service delivery**

The total cost of piped water schemes per kL of water consumed (which measures overall efficiency in resource use, based on the capital and O&M cost of the main scheme, the cost of supplementary schemes, and the coping costs borne by HHs) is high, with an average of about Rs 26 (GBP£0.26) per kL (it is Rs 37 (GBP£0.37) per kL including the institutional cost and indirect power subsidy), compared to an economic cost of Rs 16 (GBP£0.16) per kL for a well-performing scheme. The schemes under demand-driven programmes have a distinctly lower cost per kL of water supply compared to schemes under supply-driven programmes, signifying their superior overall efficiency.

** Economies of scale are yet to be realized**

Econometric analysis indicates that the schemes can be made more cost-effective by reaping economies of scale and avoiding diseconomies that set in beyond a stage. A study of cost variation with scheme size in terms of the number of HHs covered shows that for groundwater based supply, the size classes 500 to 1,000 HHs and 1,000 to 1,500 HHs have relatively lower costs, compared to smaller or larger PWSSs. Since a sizeable portion (one-third) of the existing groundwater-based schemes are of a size below 200 HHs, economies of scale are not being realized.

** There is strong demand and willingness to pay**

Assessment of rural HH willingness to pay (WTP) for improved services reveals a strong demand for service improvement. The HHs using private connections are on average willing to pay about Rs 60 (GBP£0.61) per month for the O&M cost of improved services, and those using stand-posts of piped water schemes, about Rs 20 (GBP£0.20) per month. Among HHs currently using hand pump schemes, the average WTP for better maintenance of the existing public hand pumps is about Rs 6 (GBP£0.06) per month, and that for a new hand pump is about Rs 8 (GBP£0.08) per month. The estimates of average WTP can cover most of the O&M cost for service improvements. If the HHs were charged according to their WTP, cost recovery would be much better than at present, and the additional resource made available could enhance coverage by about 14%.

** Service improvements are affordable**

Analysis of affordability brings out that affordable payment for a private connection is Rs 50 to Rs 60 (GBP£0.51 to GBP£0.61) per month or higher for a majority of states. Regarding stand-posts, the affordable payment level is generally about Rs 20 to Rs 25 (GBP£0.20 to GBP£0.25) per month. The affordable capital cost contribution is about Rs 900 to Rs 1,000 (GBP £9.12 to GBP£10.14). Thus, the costs of an improved water supply in rural areas are commonly within affordable limits.

** RECOMMENDATIONS BASED ON PART – I ANALYSIS**

** Single window system for administrative and financial sanction of schemes**

Starting from a physical survey, schemes pass through various administrative stages, which delay the entire process and sometimes even take more time than the time required for execution itself.

A single window system may be devised for clearance of schemes both at administrative and financial levels. Besides this, schemes should be executed on a turnkey basis, so that
a single contractor is responsible for delivering all the components of a particular scheme.

**Development of a competent cadre of scheme executing agencies**

At State level, agencies with a huge financial turnover are available, or often national level agencies also participate in the tendering process and get the contract. But at district level, and in remote places, there is a dearth of competent agencies. The State Government may think of developing a district-wise cadre of technical people and agencies. This initiative may boost the progress of the scheme of execution by reducing the volume of the opening balance and demanding more funds from MDWS-GoI.

**Integrated planning and just resource allocation**

Very often, different components of the NRDWP are seen in isolation. The district/block-wise integrated planning may be done keeping in mind the actual needs of local residents and available resources.

Based on a district’s needs in different areas of programme implementation, such as scheme execution, O&M, training and stages of water availability (surface and ground), resources may be allocated and utilized judiciously.

The planners should also consider the impact of various natural forces on variations in availability of water, especially groundwater. The classification of blocks under different categories such as Safe, Semi-critical, Critical and Over-exploited as devised by the CGWB must form the basis for resource allocation. Differential planning may also be carried out to ensure resource availability for Semi-critical, Critical and Over-exploited blocks.

**Attention to critical components of programme implementation**

For example, districts with over-exploited blocks may be preferred for funding under the sustainability component. In these blocks, sustainability structures should form an integral part of Detailed Project Reports (DPRs).

The sustainability component of the NRDWP does not talk about source sustainability only, but of system, financial, social and environmental sustainability also. Proper planning should be carried out to incorporate these dimensions, so that overall sustainability is enhanced.

Under the Support component, proper scientific and logical need assessment should be undertaken. The staff of the implementing agency should be trained in innovative topics such as behaviour change communication and the application of hydro-geo-morphological maps etc., which would have direct impact on the success of programme implementation and its longevity.

In pursuance of policy directions as given in the 12th Five Year Plan Approach, 73rd & 74th Constitutional Amendment Acts, and NRDWP Guidelines, the responsibility for post-construction operation and maintenance of a scheme is with the water user’s committees or village level institutions, which are solely responsible for post-construction sustainability of schemes. These water user’s committees or village level institutions need to be empowered with financial and technical resources in letter and in spirit.

**RECOMMENDATIONS BASED ON PART – II ANALYSIS**

Throughout its entire life cycle, every PWSS passes through five stages, namely demand generation, planning, execution, handing over and O&M. In its life cycle, a PWSS has two distinct transition periods, where it traverses from social to technical and again back to the social domain (Figure 3). In each stage, different types of actors are involved and their attitude, knowledge and skills have a marked influence on sustainable service delivery by that particular scheme.

Without understanding the various stages, their nature and actors involved therein, sustainable service delivery from a PWSS cannot be ensured. In order to understand it thoroughly, the following points need to be considered:

**Demand generation**

Prior to allocating and designing a scheme for any village, it is of utmost importance to ascertain the real demand for drinking water especially through the PWSS in that particular village. The existing water supply through various schemes, be it hand pump or PWSS, needs to be ascertained.
This will enhance investment safety and also needy communities will be benefited.

**Integrated planning**

This stage should involve assessing the technical, financial and social feasibility of a scheme. Having assessed the demand at village level, intra-village planning is very important to ensure social justice and equality. Very often, based on arithmetic calculations, villages have sufficient water as per LPCD norms, but in reality because of skewed distribution, some sections of society, especially disadvantaged sections, are devoid of it.

As mentioned in Table 3, some of the schemes become non-functional because of source failure. In order to avoid this difficult situation and resultant resource wastage, proper source and site selection should be achieved through application of hydro-geomorphological maps (HGMs) as the base map, and site-specific geological and geo-physical investigations. These HGMs have been developed by the National Remote Sensing Centre, Hyderabad, with financial assistance from MDWS, and are available in the public domain.

Financial feasibility of schemes in terms of sustainable O&M with a tariff collected from the community should also be assessed. Many times, GPs or village level committees bear the entire cost towards O&M.

**Execution**

Prior to the execution of schemes, all specifications with regard to finance, material, design and workmanship should be shared with concerned stakeholders, especially water users or committees thereof. This will help the implementing agency in getting local support and building trust. This will also help in ensuring ownership of the scheme after commissioning, by community, and post-construction operation and maintenance.

**Handing over**

After execution, a scheme should be run on a trial basis to ensure that all its components function as per the specifications mentioned in the DPR. No community, group or committee will be interested in or will take over a sub-optimally performing or mal-performing scheme.

Prior to handover, the community should be prepared for taking over the scheme, which involves their capacity building and initial financial support to meet the recurring costs. Based on the trial run, a scheme should be commissioned and handed over to the community. This entire process of handing over should encompass the clearly spelled out roles/responsibilities of all stakeholders, be properly documented and mutually agreed upon. It may be thought of as according it a legal status.

In the State of Madhya Pradesh, two departments of State Government, namely PHED and P&RD, are involved in delivering the drinking water supply in rural areas. The PHED plan, design, execute and commission schemes, whereas after handing over, these schemes are operated and maintained by GPs or a sub-committee thereof. These GPs or their sub-committees are governed and supported by the P&RD department. During the operation and maintenance stage, a major recurring cost item is electricity
bills, hence the role of the Madhya Pradesh State Electricity Board (MPSEB) becomes critical. Even during periods of non-functionality, inflated bills are raised by the Board. The coordination between these three key departments needs to be attained through a well-defined policy mechanism.

Post-construction O&M

At this stage, the role of water users/committees is of prime importance. At times, users/committees are not ready to take over a scheme because of their limited technical knowledge and scarce financial resources to run a scheme. If sufficient resources in terms of finance and technical capacity are provided to custodians of schemes, i.e. users and committees, any scheme can be run on a sustainable basis, satisfying the desired/designed service levels.

Financial resources can be arranged from various government provisions like the O&M funds available under NRDWP, Finance Commission Grants or with other schemes. These should be supplemented through building the capacities of village level institutions responsible for O&M.

The need assessment for drinking water is the very first step towards sustainable service delivery by water supply schemes. Considering the resource availability, it should be followed by integrated planning. The integrated planning must be supported with an assessment of the social, technical and financial feasibility of the scheme. To ensure sustainable service delivery and to safeguard the investments in capital intensive PWSSs, comprehensive initiatives at both policy and implementation level need to be undertaken. These initiatives may inter-alia include a fool-proof coordination mechanism among the key actors, viz. PHED, P&RD, MPSEB and PRIs, additional resource allocation to and capacity building of PRIs, and creation of an enabling policy environment. This coordination cannot be achieved without formulating a State wide comprehensive ‘Operation and Maintenance Policy’ covering all stages in the life cycle of PWSSs. All these initiatives cannot bear fruit without the involvement of real water users from the conceptualization of schemes. A good service delivery model, be it community or PPP based, supported by a sound policy framework, may serve the purpose.

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