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Multi Village Water Supply Schemes in India

The World Bank

Policy Paper extracted from the World Bank Study on Review of Effectiveness of Rural Water Supply Schemes in India, June 2008

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Multi Village Water Supply Schemes in India

There are a large number of multi village water supply schemes (including regional schemes) in India. The prime motivation for setting up multi village schemes is based on the desire to provide full water supply coverage to rural areas despite local water scarcity and increasing contamination of sources. In such circumstances, it becomes necessary to make use of distant water sources. However, treating and piping water from remote sources is often complex and expensive, and it is felt that the cost of supply can be reduced and options broadened if a number of villages are served by one scheme.

Multi village schemes have the potential to capture economies of scale and provide a higher level of service. Scale economies arise from the bulk water system and professional support for the scheme. There are, however, some serious disadvantages of multi village schemes. Such schemes require significant investment (longer pipe length due to dispersion of the population served), substantial technical capabilities, and coordination and cooperation among diverse groups. Further, there are problems of inequity in distribution, physical losses of water in the system, and efficiency losses due to erratic power supply.

In the 10-state study on the *Effectiveness of Rural Water Supply Schemes* undertaken by the World Bank at the request of the Government of India, a large number of multi village and regional schemes were analyzed. An assessment of the cost of schemes and their performance was based on the survey data. The analysis brought out that the multi village schemes are more costly than single village schemes, with inferior performance and lower cost recovery.¹

Costs of Multi Village Schemes and Cost Recovery

Taking a weighted average across states, the capital cost per household of multi village schemes is found to be about 25 percent higher than that of the single village schemes, while the operation and maintenance (O&M) cost of multi village schemes is about 11 percent higher. The cost of multi village schemes is somewhat low in West Bengal and Orissa. If these two states are excluded from the comparison, then the average capital cost of multi village schemes is found to be 50 percent higher and the average O&M cost 25 percent higher than that of single village schemes (Table 1).

The averages conceal the high variations that exist in the cost of schemes. In a number of cases, the capital cost per household is very high

¹ The analysis of the comparative performance of multi village and single village schemes was confined to 9 out of the 10 states surveyed, leaving out Uttarakhand, since the scheme cost and operating conditions in Uttarakhand are quite different from other states.

Table 1 Average Costs of Single and Multi Village Piped Water Supply Schemes

| Technology | Capital cost (Rs per household) | | O&M cost (Rs per household per annum) | |
|---|------------------------------------|--|--|--|
| | All states | Excluding West Bengal and Orissa | All states | Excluding West Bengal and Orissa |
| Single village scheme | 5,300 | 5,300 | 280 | 270 |
| Multi village (including regional) schemes | 6,600 | 7,700 | 310 | 340 |

in multi village schemes. The capital cost per household exceeds Rs 10,000 in 16 percent of the cases, and exceeds Rs 20,000 in 4 percent cases.

While the cost of multi village schemes is relatively high, the cost recovery from beneficiary households is relatively low. In consequence, the financial burden on the central and state governments to construct and manage such schemes is much higher than what it would have been if the same households were served by single village schemes. The proportion of private connection users who regularly pay towards the O&M of the multi village schemes is 53 percent,

whereas it is higher, at about 75 percent, for single village schemes. Very few among the standpost users pay, and this reduces the level of cost recovery.

In Andhra Pradesh, Tamil Nadu, and West Bengal, the single and multi village piped water supply schemes mainly serve the standpost users with very few paying customers, which causes the level of cost recovery to be low. Overall, the level of recovery of the O&M cost through user charges is about 50 percent in single village schemes and about 35 percent in multi village schemes.

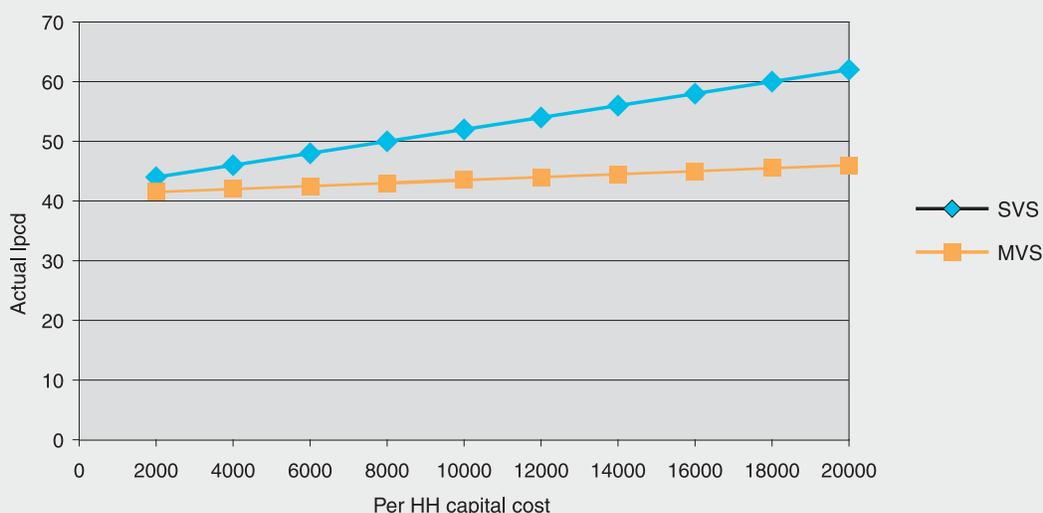
Taking a weighted average across states, the capital cost per household of multi village schemes is found to be about 25 percent higher than that of the single village schemes, while the O&M cost is about 11 percent higher



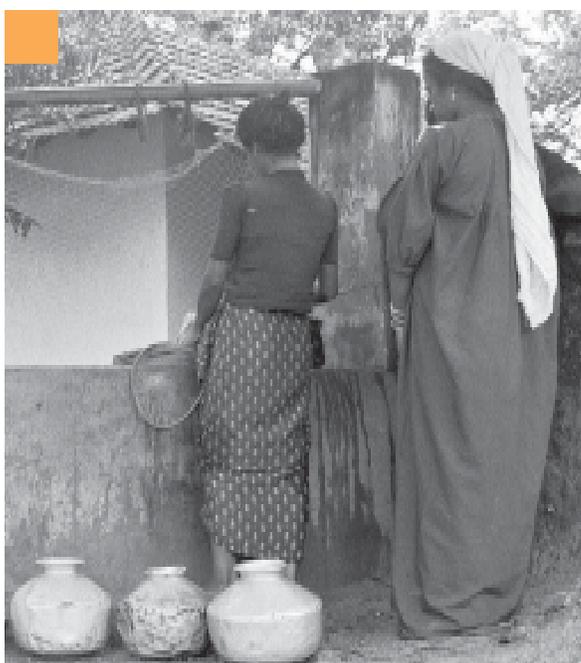
Performance of Multi Village Schemes

The higher cost of multi village schemes would be justified if these provided a more reliable service. However, this is not so. Among the existing multi village and regional schemes, a fairly large number (one-third) are based on surface water. These surface water schemes are expected to be less affected by seasonal variations in groundwater availability and hence should provide a more regular supply of water. Indeed, the multi village schemes are designed to provide a regular supply of water at the level of 40 lpcd (liters per capita per day) or higher. In reality,

Figure 1 Investment and Actual Lpcd, Single and Multi Village Schemes, Estimated Regression Equation



Source: Estimated from scheme survey data.



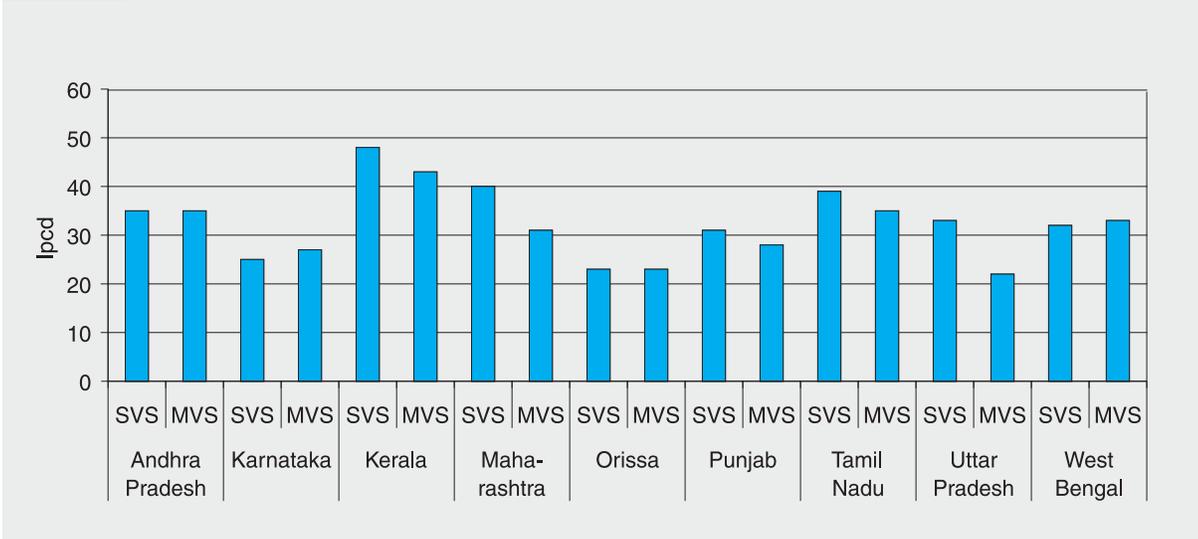
however, the multi village schemes are in many cases not providing water regularly and the supply level falls short of the government norm of 40 lpcd. An analysis of the relationship between investment per household and the actual lpcd level (as reported by the scheme management) shows that while in single village schemes, higher investment is associated with higher lpcd, this is not the case with multi village schemes (Figure 1).

In many respects, the performance of multi village schemes is worse than the single village schemes. The design hours of supply of multi village schemes are on an average higher than that of single village schemes, but the actual hours of supply are about the same as that of single village schemes (Table 2). In other words, there is a larger gap between design and actual hours of supply in the case of multi village schemes. The actual lpcd level in multi village

Table 2 Average Design and Actual Hours of Supply, Single Village and Multi Village Schemes

| Technology | Design hours of supply | Actual hours of supply |
|--|------------------------|------------------------|
| Single village scheme | 4.6 | 2.6 |
| Multi village (including regional) schemes | 7.7 | 2.9 |

Figure 2 Water Supply in Summer, by Technology and State



Source: Survey data.

schemes in summer is generally less than that of single village schemes (Figure 2). The gap is quite marked in the case of Uttar Pradesh and Maharashtra.

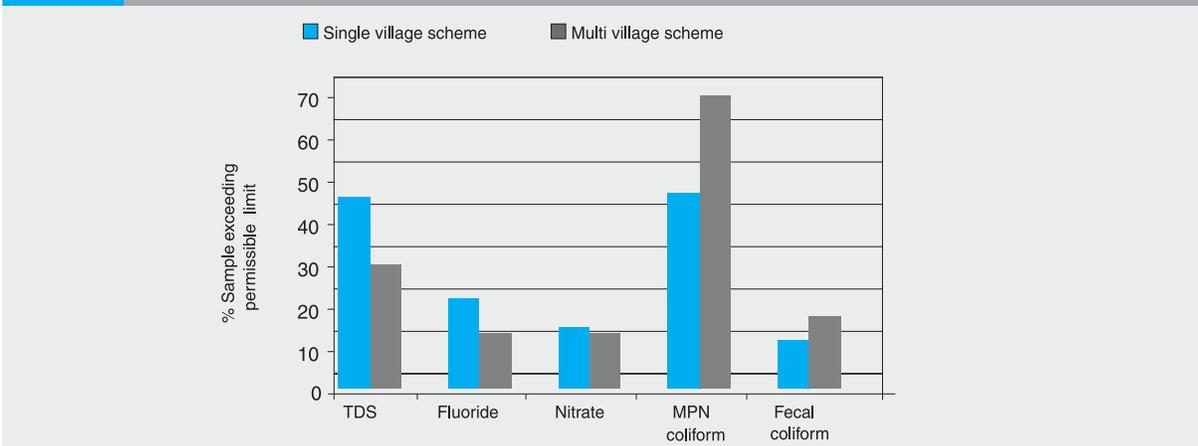
schemes have a clear disadvantage (Figure 3). MPN coliform exceeds the permissible limit in about 70 percent of water samples of multi village schemes.

The multi village schemes perform worse than single village schemes not only in terms of the quantity of water supplied but also in terms of some important parameters of water quality. A study of water quality for 56 single village schemes and 52 multi village (including regional) schemes in seven states reveals that in terms of total dissolve solids (TDS), nitrate, and fluoride the multi village schemes are doing better, but in terms of MPN coliform, the multi village

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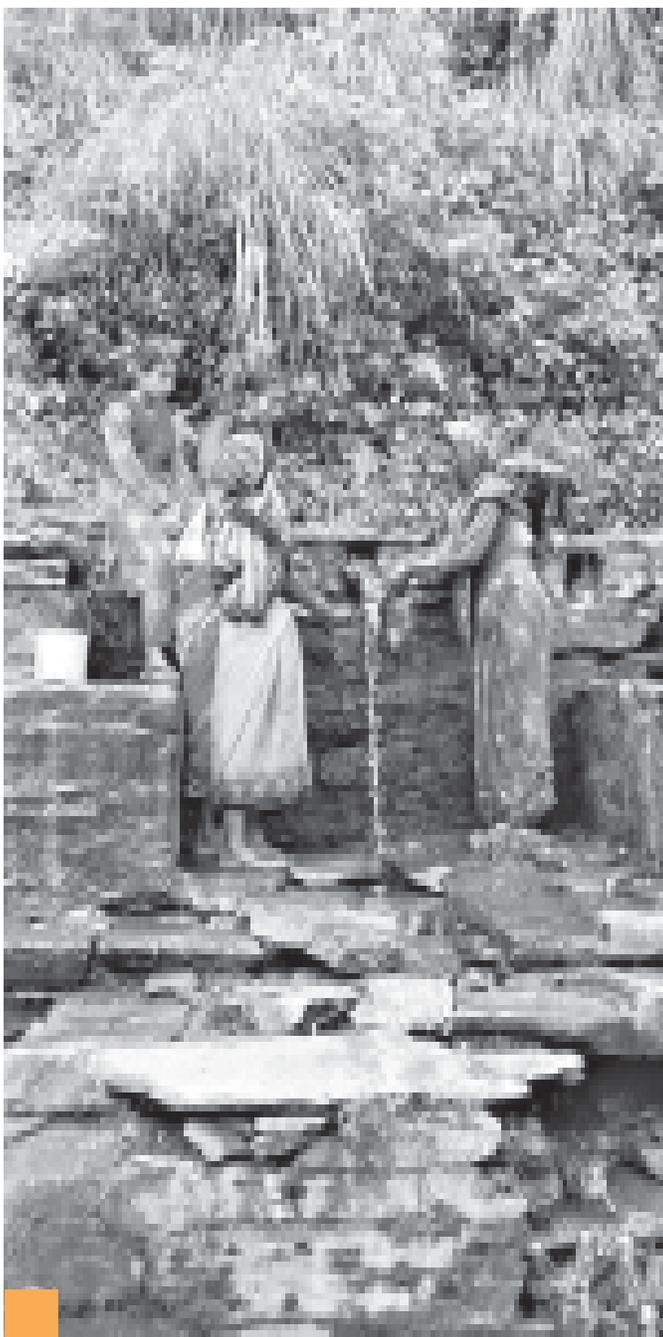
Figure 3 Water Quality, Single vs Multi Village Schemes (Distribution Point)



Source: Water quality survey.

Table 3 Performance of Single and Multi Village Schemes, Comparison of Select Parameters

| | Single village schemes | Multi village schemes |
|---|------------------------|-----------------------|
| % HH not able to meet more than half of their water requirement from scheme | 21% | 33% |
| % HH getting water only once a week or 2/3 days a week | 8% | 13% |



In several other respects, the performance of multi village schemes is relatively worse than that of single village schemes. About 33 percent households using multi village schemes are able to meet less than half of their water requirement from the scheme; this proportion is lower at 21 percent for single village schemes (Table 3). About 8 percent households using single village schemes get water only one day a week or two/three days a week. This proportion is higher at about 13 percent for multi village schemes.

There are various reasons for the poor performance of multi village schemes. It is well known that since the distribution is over a larger number of habitations, there is a considerable proportion of households who are at the tail-end of the scheme and face problems due to inadequate water supply and pressure. Also, the expenditure incurred on repair and maintenance in multi village schemes falls far short of the norm. In single village schemes the expenditure on minor repair and maintenance is about 1.3 percent of the total capital cost of the schemes. The corresponding figure for multi village schemes is about 0.4 percent. Similarly, expenditure on repair and maintenance per household served is Rs 40 per year in single village schemes, while it is about Rs 20 per year in multi village schemes. Evidently, the relatively lower expenditure on maintenance of multi village schemes adversely affects their performance. The problem of inadequate maintenance is further compounded by the problem of inadequate yield from the water source, especially during summer months. As a result, the supply and pressure is low.



Policy for Multi Village Schemes

Given the relatively high cost and weak performance of multi village schemes, there is need for a major revamping of the planning and policy for such schemes. District-level planning should identify areas where multi village schemes would constitute a sustainable option and are also cost-efficient, based on aquifer and watershed information. Catchment area programs need to be incorporated in district plans for strengthening water supply sources. Multi village schemes relying on surface water would need to be taken up mostly when aquifers are over-exploited or the groundwater is of poor quality.

An important issue in this context is the need for an independent appraisal and approval of proposals for multi village schemes. As the payment of 'centage' to state engineering agencies could create perverse incentives, proposals for new multi village schemes need to be independently appraised, according to clear technical and economic criteria, to ensure that the least cost option is implemented. Therefore, guidelines, processes, and procedures need to be

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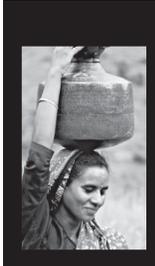
prepared for the appraisal and approval of multi village schemes.

In planning and implementing multi village schemes in areas where these are justified, new approaches to management should be taken to improve scheme performance. The key elements of these are unbundling of the management function and providing communities a role in decision-making and the management of water distribution at the village level. Thus, bulk water supply and water distribution need to be unbundled. Bulk supply could be managed by a professional public or private operator that enters into enforceable contracts with the Gram Panchayats (GPs) and/or user committees that are responsible for distribution at the local level.



The formation of user groups such as Village Water and Sanitation Committees and district/block user committees are critical for improving accountability of such schemes. However, many multi village schemes are often too large and costly to be managed solely by user groups. A Memorandum of Understanding or formal contracts are other ways of increasing accountability between the user committee and the bulk water providers. These contracts can be the basis of detailed agreements regarding the performance targets, including quantity and quality of water to be supplied, payment for water supplied, and penalties in case of non-payment. As regards the existing multi village schemes, a similar move has to be made towards the decentralization of service delivery. This requires unbundling multi village schemes into smaller schemes and handing over the O&M responsibility of intra-village schemes to the GPs.

States need to encourage private consultants, contractors, and operators becoming more active in rural water service delivery, as several examples in India show that they are often more effective in improving service delivery



Finally, there is need for a change in the attitude of state governments towards private sector agencies in the context of rural water supply. States need to encourage private consultants, contractors, and operators becoming more active in rural water service delivery, as several examples in India show that they are often more effective in improving service delivery. This is particularly important for the planning and implementation of multi village schemes.

This Report has been prepared by Smita Misra (Sr. Economist, SASDU, World Bank), the Task Manager of this study.

The study was carried out under the overall guidance of Sonia Hammam, Sector Manager, Water and Urban, SASSD, World Bank. Data analysis has been undertaken by Professor B.N. Goldar and his research team at the Institute of Economic Growth, Delhi and the consumer survey was carried out by the ORG Centre for Social Research (a division of A.C. Nielsen ORG MARG Pvt Ltd). Comments and inputs at various stages of preparation from the following World Bank persons are gratefully acknowledged: Michael Carter, Rachid Benmessaoud, Clive G. Harris, Alain R. Locussol, Francis Ato Brown, Alexander E. Bakalian, Oscar E. Alvarado, G.V. Abhyankar, R.R. Mohan, S. Satish, N.V.V. Raghava, and Catherine J. Revels (WSP-SA). Special thanks are due to the Department of Economic Affairs, Ministry of Finance, the Department of Drinking Water Supply, Ministry of Rural Development, and the Rajiv Gandhi National Drinking Water Mission for their interest and collaboration in the study. Comments and data inputs during the preparation of the Report are gratefully acknowledged from R.P. Singh and M. Nagaraju (DEA), Bharat Lal and R.K. Sinha (RGNDWM) and their team, and the respective State Government officials.

The Report has been discussed with the Government of India but does not necessarily bear their approval for all its contents, especially where the Bank has stated its judgements/opinions/policy recommendations.

Policy Papers

This is one of the six policy papers that have been prepared on the basis of the World Bank study on Review of Effectiveness of Rural Water Supply Schemes in India (June 2008). These policy papers, published along with the Report, are on the following themes:

- Paper 1:** Willingness of Households to Pay for Improved Services and Affordability
- Paper 2:** Inefficiency of Rural Water Supply Schemes in India
- Paper 3:** Multi Village Water Supply Schemes in India
- Paper 4:** Operation and Maintenance Expenditure and Cost Recovery
- Paper 5:** System of Monitoring and Evaluation
- Paper 6:** Norms for Rural Water Supply in India



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