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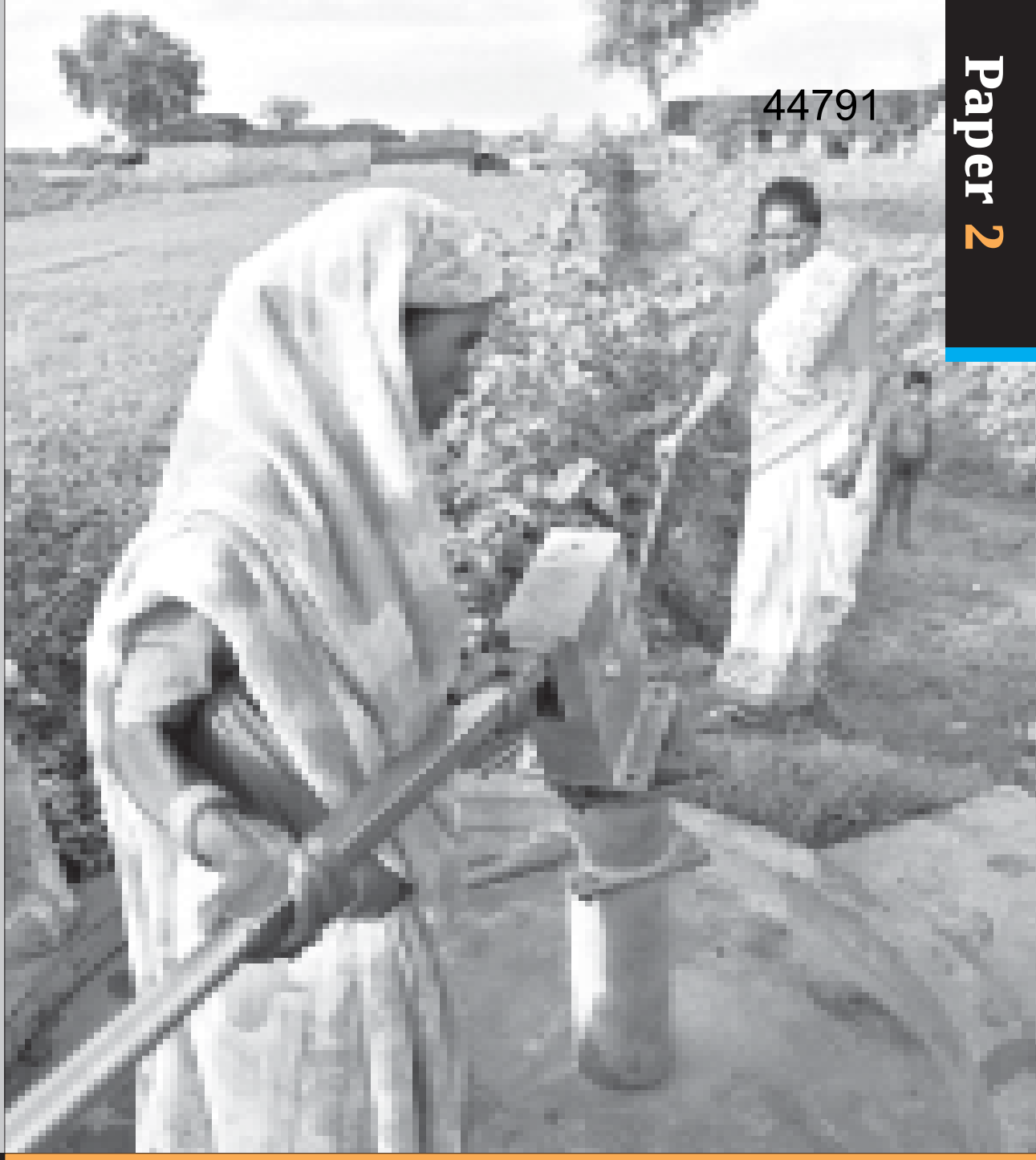
Paper 2



Inefficiency of Rural 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

June 2008

Inefficiency of Rural Water Supply Schemes in India

In the last one-and-a-half decades, there has been an annual average expenditure of about one billion US dollars in the rural water supply sector in India. This has led to an appreciable increase in coverage (from 75 percent in 1997 to 97 percent in 2006, according to official statistics), but the overall improvement in the provision of water supply in rural areas has not been commensurate with the level of expenditure undertaken due to inefficiencies and wastages of various kinds. 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, has looked at various aspects of 'inefficiency' along with measures to address these issues.

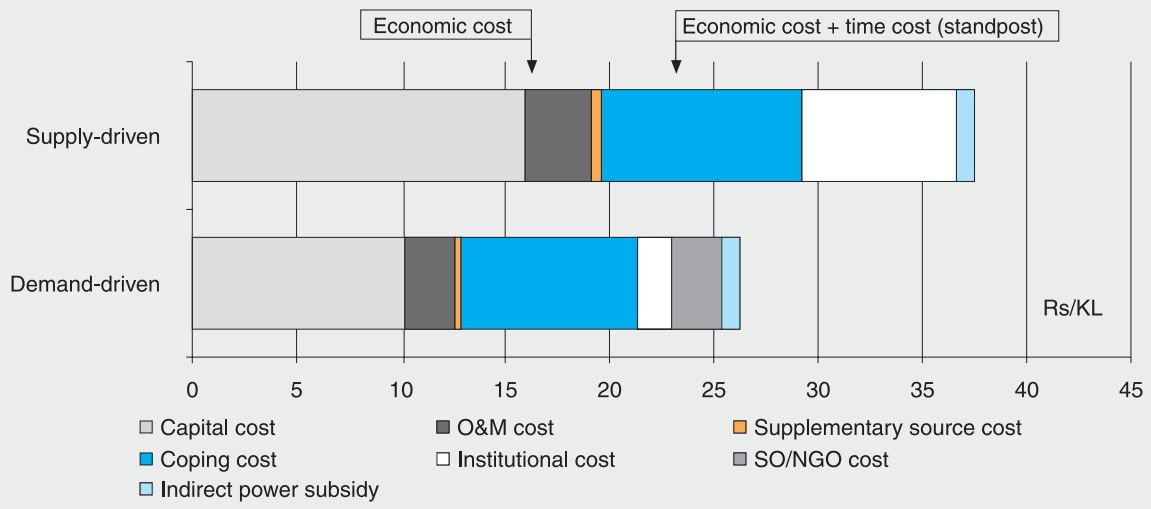
Cost of Water

The total cost of water supply per kiloliter (KL) is a useful summary measure of resource use efficiency. This has been estimated for supply-driven and demand-driven piped water supply schemes for the various states covered in the study. The total cost of water has been computed by taking into account the capital, and operation and maintenance (O&M) cost of the main scheme, the capital and O&M cost of supplementary government-provided sources, the institutional cost, indirect power subsidy provided to the schemes, the cost of services provided by Support Organizations/non-government organizations, and the coping cost borne by households such as the opportunity cost of time spent on water collection, expenses incurred on own water source, and for the repair of government-provided sources. This is found to be high with an average of about Rs 38 (US$0.9) per KL for the supply-driven schemes of the 10 states together, compared to an economic cost[1] of about Rs 16 (US$0.3) per KL for a good performing scheme. The schemes under demand-driven programs have a distinctly lower cost of Rs 26 per KL (US$0.6) of water supply as compared to schemes under supply-driven programs. The overall efficiency of schemes under demand-driven programs is greater than that of schemes under supply-driven programs.

Currently, the supply-driven rural water supply schemes dominate the scene. If the cost of water in supply-driven schemes could be brought down to that of the demand-driven scheme, there would be savings of resources of about Rs 12 per KL or about Rs 120 per household per month, assuming the household water consumption level

[1] The economic cost is derived from the cost norms for various states. Efficient institutional cost is taken as 10 percent of the total cost. It is assumed that water could be supplied at 70 lpcd. Assuming that a proportion of households would access standposts and will spend time to collect water (about one hour each day), the cost of water including the cost of time spent would be about Rs 23 per KL (US$0.5).

Figure 1 Total Cost of Water Supply, Piped Water Schemes



Source : Computed from survey data.

(from all sources) to be about 70 liters per capita per day (lpcd). This is quite a large saving of resources, which could be put to alternative use in rural areas, benefiting the rural people.

Sources of Inefficiency

Why is the cost of water so high, especially in supply-driven schemes? Four important reasons are: (a) the high capital cost of the schemes; (b) high institutional costs associated with the programs; (c) the existence of multiple schemes serving the same population leading to resource wastage; and (d) unsatisfactory performance of the schemes in terms of the quantity of water supplied in relation of design supply and in other respects, forcing the households to incur significant coping costs.

Excessive capital cost: Compared to the cost norms, the capital cost of schemes is found to be higher by 50 percent or more in 18 percent cases. It is higher than the norm by 100 percent or more in 11 percent cases. This obviously pushes up the cost of schemes. A second factor that tends to raise the capital cost of schemes is that in many cases the economies of scale are not being reaped. Econometric analysis of the cost data of piped water schemes reveals significant economies of scale—as the number of households covered by the scheme goes up, the cost rises less than proportionately. A study of cost variation with scheme size in terms of the number of households covered shows that, for groundwater-based supply, the size classes 500 to 1,000 households and 1,000 to 1,500 households have relatively lower cost, compared to smaller or larger piped water supply schemes.

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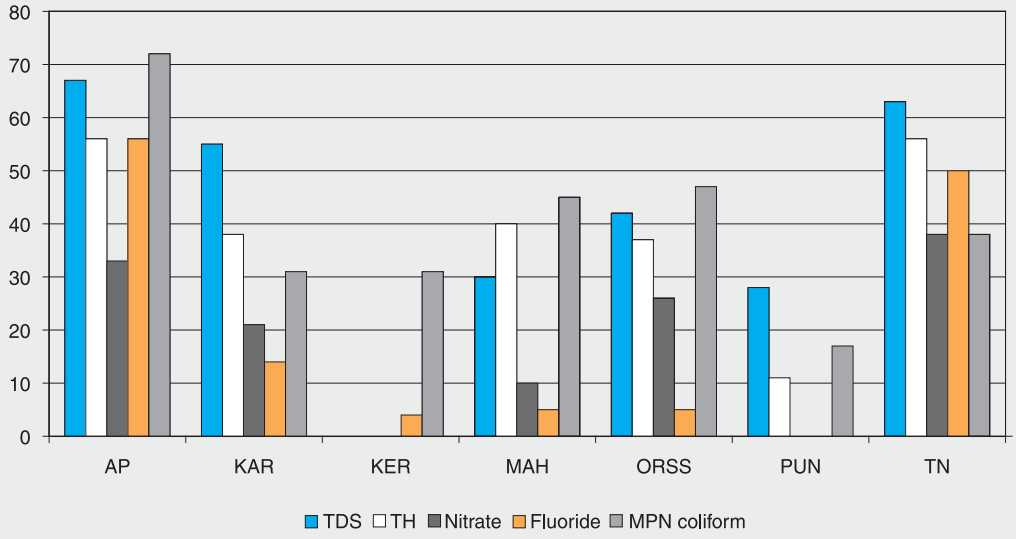
Among existing groundwater-based schemes, about one-third are in size below 200 households. The implication is that in many cases a larger scheme than the existing ones would be able to reap economies of scale and reduce cost. On the other hand, there are a number of surface water-based schemes serving more than 7,000 households, with huge diseconomies in scale.

High institutional cost: The high institutional costs of supply-driven schemes tends to raise the cost of water supply. In demand-driven programs, the institutional cost (as percent of total expenditure) is on average about 11 percent. In supply-driven, the corresponding

Figure 2 Water Quality, Rural Water Supply Schemes (Percent of Sample Exceeding Permissible Limit, by Parameter), Source End



AP = Andhra Pradesh; KAR = Karnataka; KER = Kerala; MAH = Maharashtra; ORSS = Orissa; PUN = Punjab; TN = Tamil Nadu.

Source: Water quality survey.

figure is about 24 percent. There is, however, significant variation across states. The ratio of institutional cost to total expenditure on rural water supply in the supply-driven programs is 50 percent in Karnataka, 40 percent in Kerala, about 30 percent in Uttar Pradesh and Uttarakhand, but much lower at about 15 percent in Maharashtra. These variations confirm that substantial reduction in institutional cost is possible.

A detailed examination of the components of institutional costs reveal that in supply-driven programs more than 85 percent of the institutional costs are the salaries and staff welfare costs, including gratuity and pension. The expenses on travel, publicity, and so on, are rather small in relation to a demand-driven program. In the demand-driven programs, the staff costs are the main item, but it accounts for only a half of the total expenses. Travel and rent are important items of cost. Administrative cost and office cost, other than rent and publicity, account for about 20 percent of the total institutional cost. A comparison of the break-up of the institutional cost between supply-driven and demand-driven water supply programs clearly shows that a part of the institutional cost under supply-driven programs may not be very productive insofar as it is used merely to pay salaries and meet other staff costs for an unduly large bureaucratic set-up created for the implementation of the central and state government schemes for rural water supply.

Existence of multiple schemes: Resource wastage arises also from the existence of multiple schemes in the same area. Often, the poor functioning of one scheme makes it necessary for it to be supplemented by another scheme. Needless to say, this raises the overall cost of service provision to the government. Survey results bring out that about half of the households in Karnataka and Tamil Nadu are using more than one scheme. The same applies to the users of piped water schemes in Uttar Pradesh. Overall, about 30 percent households are using multiple schemes to meet their requirements.

Unsatisfactory performance of schemes: The day-to-day operations of the piped water supply schemes leave much to be desired. The performance is unsatisfactory in terms of both the quantity and quality of water supplied.

A study of the water quality[2] reveals that several important parameters exceed the permissible limits in a significant proportion of cases (Figure 2). In regard to water consumption, the

[2] Water quality study has been undertaken for 7 states out of the 10 surveyed.

survey finds that the quantity of water obtained by rural households from the piped water supply schemes is commonly less than design, especially in summer months. In multi village and regional schemes, for instance, the design lpcd is 47 on an average, but the actual supply in summer reported by households is 31 lpcd.

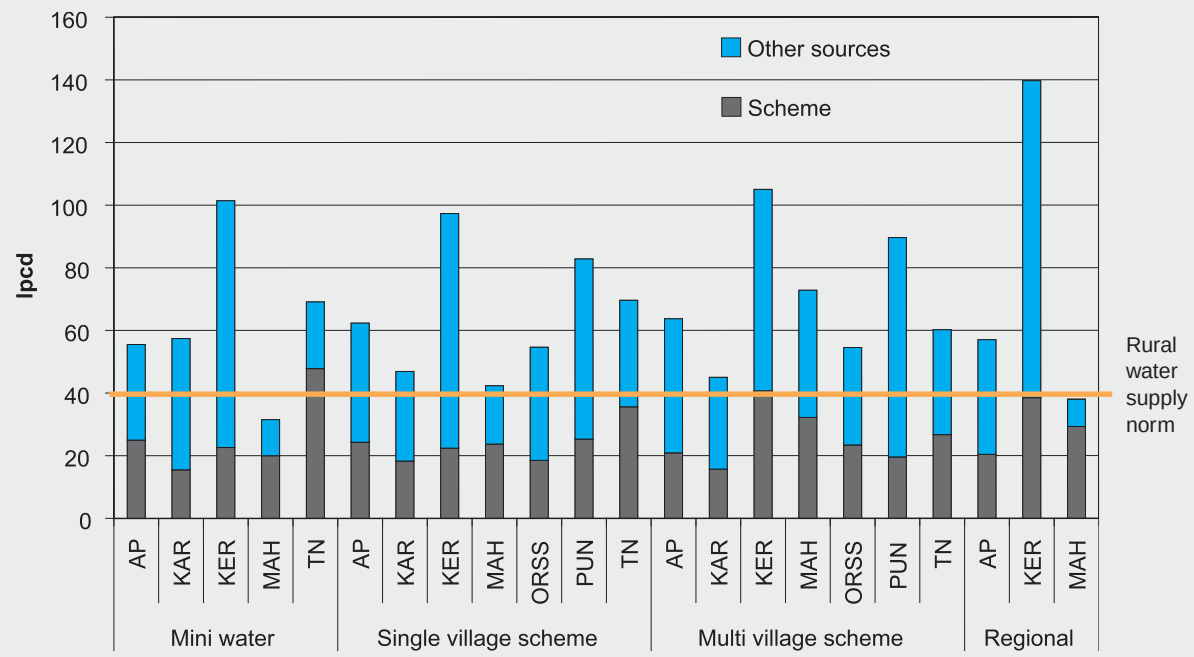
Water consumption study (based on actual measurement rather than recall) reveals that the piped water supply schemes meet only a minor part of the water requirements of households. The quantity of water obtained from the scheme is generally well below the norm of 40 lpcd currently being used by the government for rural water supply (Figure 3). The implication of supplying a small quantity of water compared to design is obviously a high cost per KL of water supply.

Some of the other dimensions of unsatisfactory performance of piped water supply schemes are that the hours of water supply are lower than design, a section of households does not get daily supply of water, and there are problems of frequent breakdowns. In multi village and regional schemes, for example, the actual hours of supply on average are 3.3 as against the average of design hours of 8.

Some of the piped water schemes (20 percent to 30 percent) do not function for many days in a year due to system breakdowns (annual breakdowns is 23 days in Karnataka and 36 days in Uttar Pradesh). Around 30 percent households using piped water schemes do not get daily supply in summer (some do not get daily supply even in other seasons).

The day-to-day operations of the piped water supply schemes leave much to be desired. The performance is unsatisfactory in terms of both the quantity and quality of water supplied

Figure 3 Water Consumption, Households Using Piped Water Schemes, by Scheme Type and State



AP = Andhra Pradesh; KAR = Karnataka; KER = Kerala; MAH = Maharashtra; ORSS = Orissa; PUN = Punjab; TN = Tamil Nadu.

Source: Water consumption survey.

Costs borne by households: The unsatisfactory performance of the piped water supply schemes compel the rural households to adopt coping strategies in the form of traveling considerable distances and standing in long queues to collect water, storing water, incurring expenses on private water sources, and incurring expenses on repairing public water sources. These and other measures taken by households (for example, some households boil water) impose a heavy cost on them. The average coping cost per household is Rs 81 (US$1.8) per month (about 3 percent of income), ranging from Rs 32 (US$0.7) to Rs 287 (US$6.5) per month across different categories of schemes.

Defunct schemes: Another dimension of inefficiency is that many schemes get defunct before they complete their useful life. According to the results of the Habitation Survey undertaken in 2003, about 28 percent of spot sources in Kerala are defunct. This proportion in some of the other states covered in the study is 17 percent for Tamil Nadu, 14 percent for Maharashtra and Karnataka, and 10 percent for Uttarakhand. Information from other sources indicate that in Karnataka, 19 percent of the handpumps, 8 percent of the mini water schemes, and 7 percent of the piped water schemes are defunct. In Uttar Pradesh, 10 percent of piped water supply schemes are defunct and 55 percent are only partially functional.

Resource saving: Given that there are marked inefficiencies in the rural water supply schemes, significant savings of resources can be made through efficiency improvement. For the 10 states studied, the wastages of resources in the period 1997–98 to 2005–06 due to inefficiencies of the schemes has been assessed at Rs 470 billion. These resources, if invested productively in these states, would have raised their net state domestic product by about one percent. Evidently, the inefficiencies of rural water schemes impose a significant cost to the economy.

How to Reduce the Inefficiency of Rural Water Supply Schemes?

To reduce the inefficiency of rural water supply schemes, action is needed basically on three fronts. First, a substantial part of the inefficiency is traceable to high institutional cost. This can be

reduced through decentralization, for example, shifting the responsibility of mini water schemes and single village schemes to Gram Panchayats (GPs) and user communities; unbundling multi village schemes into smaller schemes and handing over the O&M responsibility of intra-village schemes to the GPs (except in 'over-exploited' aquifers or in 'quality-affected' areas, where multi village schemes, relying on surface water, would be justified), and by moving over increasingly to demand-driven programs.

Even though the advantages of demand-driven programs are recognized, such programs constitute at present only about one-tenth of the total expenditure being incurred on rural water supply. The fact that charges are not imposed, or if imposed are not compulsorily collected from beneficiary households in supply-driven schemes, discourages rural households from opting for demand-driven schemes in which they would be required to bear the entire cost of the O&M.

This obviously needs correction through the installation of an appropriate mechanism to increase cost recovery in supply-driven schemes. To provide added encouragement to the reform process, financial incentives should be provided to states to adopt reforms for all new rural water supply investment and address institutional and cost recovery issues for all schemes. Incentive to increase state allocations under Swajaldhara could be provided through central funds, by linking these with matching or increasing state funds utilized for implementing the Swajaldhara reform program; central funds can top-up state funds disbursed on Swajaldhara principles.

Similarly, incentive for a state-wide approach could be provided to states that commit upfront to developing a state-wide and sector-wide approach and adopt sector reforms, irrespective of sources of financing.

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Second, cost reduction can be made by ensuring that new schemes are large enough to reap adequate scale economies. The analysis of cost data suggests that significant economies of scale can be achieved when designing rural water supply schemes serving 500 to 1,500 households, unless local conditions are such that only a small scheme is cost-effective. At present, engineering considerations tend to dominate the choice of scheme size. Economic considerations also need to be brought in for making this choice. For the existing large multi village and regional schemes, greater efficiency may be achieved by dividing such schemes into smaller schemes, and handing over the O&M responsibility to the GPs and user communities.

Third, there is need to develop mechanisms for enhancing 'accountability' in service delivery. The roles and responsibilities of institutions at the state, district, and GP level need to be better defined with regard to policy formulation, financing and regulation (that should remain state responsibilities), and ownership and development of assets, and operation of service (that should be devolved to local levels). Institutional changes are needed to establish greater accountability and thereby improve efficiency. Going for contractual relationships with performance improvement targets to improve service performance will definitely help. To this end, the Panchayati Raj Institutions and user committees could be permitted to contract the planning, designing, construction, and maintenance functions to agencies of their choice, which could include the state engineering agencies or private engineering consultants and operators. Another innovative step is to unbundle the bulk water supply and water distribution in multi village schemes (in areas where such schemes are justified). Bulk supply could be managed by a professional public or private operator, who could enter into enforceable contracts with the GPs and/or user committees that are responsible for distribution at the local level.

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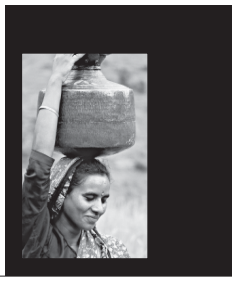

Policy Papers

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

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

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