Funding recurrent costs for improved rural water services

Rural water services in WASHCost research countries are chronically underfunded, with insufficient resources to provide and sustain a basic level of service that meets national norms and standards. In communities researched by WASHCost, most people did not receive this basic minimum, although they were covered by an improved water source according to national and Joint Monitoring Programme data.

The factors that lead to this situation in the four countries where WASHCost did research – Burkina Faso, Ghana, India (Andhra Pradesh) and Mozambique – apply in many other developing countries and include insufficient knowledge of and provision for recurrent costs, especially those to protect existing assets (capital maintenance) and to support service providers and communities (direct support).

Those considering capital investment in rural water services should ask themselves whether capital maintenance and other recurrent costs are properly funded. If the answer is 'no' or is unclear because data is not available, then either:

- this investment in water infrastructure will not provide the planned level of service for more than a couple of years or,
- a shift in financial allocation priorities is required to protect their investment and sustain services over time.

Improvements in the monitoring and reporting methods of service providers, governments and donors are required so that the costs of sustaining WASH services become transparent and can be accounted for on an annual basis.

WASHCost researched the actual costs of water services and service delivery levels in rural communities and small towns in four countries – India (Andhra Pradesh), Burkina Faso, Ghana and Mozambique. WASHCost developed a life-cycle costs approach (LCCA) to collect and analyse data and compared actual expenditure to the levels of service found in communities.

Water cost benchmarks for a basic level of service

A threshold of funds needs to be allocated per person per year as a necessary condition for sustainability. WASHCost has calculated a range of benchmarks that show what is necessary, at 2011 prices, to achieve and sustain water services. The benchmarks provide the best available guidance for planning, implementing and monitoring WASH services.

Table 1 **Capital and recurrent expenditure benchmarks for water services (2011)**

Cost component	Primary formal water source in area of intervention	Cost ranges * [min-max] in US$ 2011
Total capital expenditure (per person)	Borehole and handpump	20-61
	Small schemes (serving less than 500 people) or medium schemes (serving 500-5,000 people) including mechanised boreholes, single-town schemes, multi-town schemes and mixed piped supply	30-131
	Intermediate (5,001-15,000) or larger (more than 15,000 people)	20-152
Total recurrent expenditure** (per person, per year)	Borehole and handpump	3-6
	All piped schemes	3-15

* Benchmark cost ranges given in all tables are based on interquartile values from the data.

** See breakdown of recurrent expenditure below (Table 2)

NB Benchmarks are based on interquartile expenditure on facilities that provided a basic acceptable standard of service as set by country norms and policies.

Capital cost benchmarks to prepare, supply and install a borehole and handpump range from US$ 20 per person to just over US$ 60 per person. The benchmark costs for small piped schemes range from US$ 30 to just over US$ 130 per person. For intermediate and larger schemes benchmark capital costs range from US$ 20 to US$ 152 per person.

Expenditure on operation and minor maintenance (O&M), capital maintenance and direct support make up the total annual recurrent expenditure in this data (Table 2). Recurrent costs benchmarks range from US$ 3-6 per person per year for boreholes and handpumps, and from US$ 3-15 per person per year for piped schemes. Actual expenditure on recurrent costs is a tiny fraction of these sums.

Table 2 **Breakdown of recurrent expenditure benchmarks for water services (2011)**

Breakdown of recurrent expenditure*	Cost ranges [min-max] in US$ 2011 per person, per year	
	Borehole and handpump	All piped schemes
Operational and minor maintenance expenditure	0.5-1	0.5-5
Capital maintenance expenditure	1.5-2	1.5-7
Expenditure on direct support	1-3	1-3
Total recurrent expenditure	**3-6**	**3-15**

* 'Cost of capital' and 'expenditure on indirect support' are not included in Tables 1 and 2 owing to insufficient and unreliable sources of information.

Expenditure below the minimum benchmark risks reduced service levels and long-term failure. Expenditure higher than the maximum benchmark indicates that an affordability check maybe/is required for users and providers. There may be context-specific reasons for expenditure outside the benchmarks. Economies of scale can occur in densely-populated areas, and costs are higher in areas that are difficult to reach or sparsely populated, or where service levels are higher.

Main findings

Two decades of investment in water supply infrastructure has substantially increased the number of people with access to an improved water service. However, high breakdown levels and lack of support for monitoring, maintenance and repairs renders services unreliable. People, systems and finances need to be in place to ensure that systems continue to function following construction and that assets are maintained.

Monitoring often ceases three to five years after a contract has been signed. Finding cost data older than three years is a problem even when projects are implemented by governments, donors or the private sector. Where it does exist, data is rarely sufficiently disaggregated to show the difference between one time costs (capital costs) and annual recurrent costs that must be met to keep services alive.

WASHCost research strongly suggests that some of this is caused by a failure to finance water services properly, especially recurrent expenditure subsequent to initial hardware provision. Even the relatively small amount of additional money that is required is 6-12 times bigger than current spending on recurrent items – such as capital maintenance and direct support.

Governments, NGOs and donors may need to subsidise part of the recurrent costs over the longer term in developing countries, to ensure that water services for the rural poor remain achievable.

Life-cycle costs

The life-cycle costs approach developed by the WASHCost project analyses capital expenditure; minor operation and maintenance expenditure; capital maintenance expenditure; expenditure on direct support (sometimes known as "post-construction" support); and expenditure on indirect support and the costs of capital. A full explanation of the approach is presented in Briefing Note 1a - Life-cycle costs approach: costing sustainable services, published by IRC in November 2011.


Source: IRC, 2012

Service levels

A basic level of service is assumed to be achieved when *all* the following criteria have been realised by a *majority* of the population in the service area:

- **Quantity: people access a minimum of 20 litres per person per day,**
- **Quality: acceptable quality (judged by user perception and country standards),**
- **Reliability: an improved source which functions at least 350 days a year without a serious breakdown,**
- **Accessibility: spending no more than 30 minutes per day per round trip (including waiting time).**

Low levels of service to rural and peri-urban populations

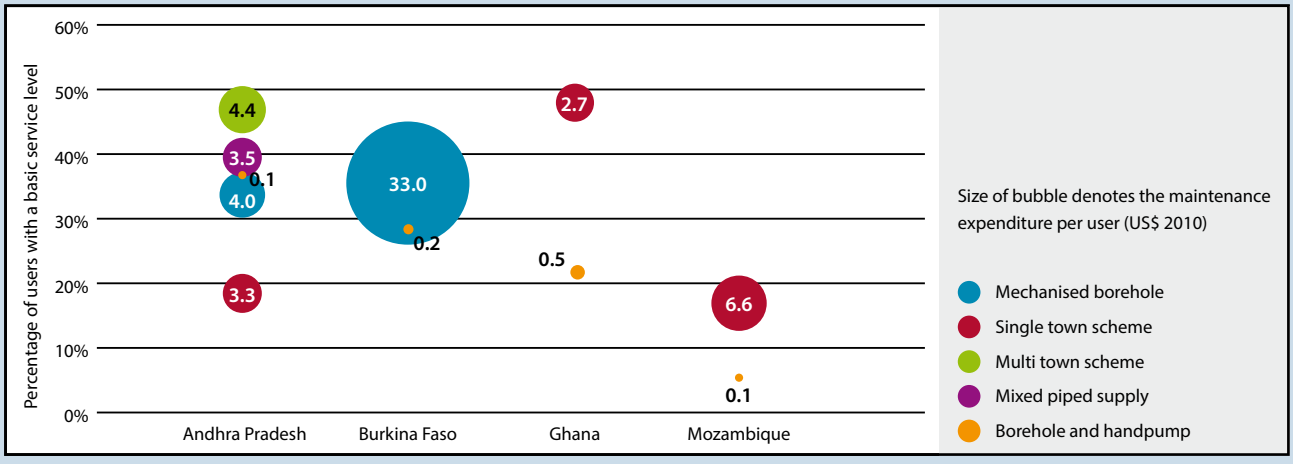
The actual population accessing a basic or better level of service was just 5% in Mozambique with a maximum of 73% in one piped network in Ghana. The vast majority of users across the countries had an inadequate water supply service that failed to meet country standards and norms.

Providing low levels of service was costly. Expenditure on boreholes with handpumps ranged from US$ 19-76 per person. Expenditure on piped networks was from US$ 21 to US$ 193 per person. Looking just at those who used the services, expenditure ranged from US$ 19-63 per user for boreholes with handpumps and from US$ 39-512 per user for piped schemes.

- Data from Ghana suggests that a five-fold increase in initial capital expenditure is required in order to move from a borehole delivery model to a piped supply.
- In some larger communities in Andhra Pradesh, more than half the sampled households had a private well or supply. Private expenditure across Andhra Pradesh communities totalled 20% to 150% of government expenditure.
- Context specific factors influence levels of capital expenditure, including materials used in construction, contract arrangements, depth of boreholes and location. No single cost driver explains all variations.

Figure 1 shows that recurrent expenditure per user on handpump schemes is very low – between US$ 0.10 and US$ 0.50 per user. Recurrent expenditure per user for most piped schemes ranged from US$ 2.70 to US$ 6.60. Although piped schemes generally provided a higher level of service, this was not always the case.

Figure 1 **Comparison of the percentage of users receiving a basic service level with maintenance (OpEx & CapManEx) expenditure per user (US$ 2010)**



Findings for users of boreholes and handpump schemes

Boreholes with handpumps continue to play a significant role as a main source and even in communities with piped networks are used as alternatives when piped networks fail.

However, they failed to supply a basic level of service to more than 36% of users in any of the research countries. In the African countries boreholes often failed to deliver the basic quantity of 20 litres per person per day because of problems with accessibility, rather than because of system "failure". People may not use the service for reasons of cost, distance, crowding, or not liking the taste. Lack of water quality testing was also a reason for service levels being low. In Andhra Pradesh, the main problem is frequent breakdowns and source failure.


Source: IRC, 2012

The highest mean expenditure on providing boreholes and handpumps was US$ 12,507 expended in Burkina Faso. This was more than 40% higher than US$ 8,922 in Ghana and US$ 8,660 in Mozambique, and almost seven times higher than the US$ 1,820, mean expenditure by the government of Andhra Pradesh.

Expenditure on recurrent operations and minor maintenance for boreholes and handpumps is a similar order of magnitude across countries at well below US$ 0.50 per user per year for the majority of schemes.

Source: IRC, 2012

Findings for users of piped schemes

Most piped schemes fail to provide a basic service to more than 50% of the population, with two exceptions being intermediate sized single town pipe networks in Ghana and small single town pipe networks in Burkina Faso.

Mean capital expenditure on small and medium sized piped schemes ranged from US$ 30–US$ 130 per person, compared with US$ 21–US$ 193 per person for intermediate and large schemes. Piped networks in Burkina Faso are responsible for the very high per-capita cost of small to medium piped networks, due to their being underused.

Although users tend to receive a better service from piped networks they have higher initial capital and recurrent expenditure. Larger piped services tend to be 25%-50% cheaper per person to construct than smaller ones.

In Andhra Pradesh, 37%-85% of people in research villages chose to use a source other than the piped scheme, partly due to the chronic unreliability of much of the formal piped infrastructure. Single town piped networks provided a lower percentage of users with a basic level of service compared with borehole and handpump service models despite having much higher recurrent expenditure.

Operational and minor maintenance expenditure on piped networks is roughly 5-8 times higher per person than for boreholes with handpumps, amounting to a mean of 4% annually of the initial capital expenditure. O&M for all piped schemes was between US$ 0.4 and US$ 4.8 per person per year.

Data collection and representativeness

The large database collected by WASHCost teams included more than 10,000 household surveys and is representative at the level of communities, technologies and service areas where it was collected. It does not claim to be statistically representative at a national level. However, this is the most complete data set related to the cost of rural water services that currently exists. WASHCost is confident that these are valid indicative ranges for the focus countries as a whole.

What is needed to build on the work WASHCost started?

The life-cycle costs approach developed by the WASHCost team is one way to analyse and address some of the key reasons for non-functional or underperforming water services. By bringing costs and service levels together it is possible to calculate:

- How much does it cost, *on a yearly basis*, to provide a specific level of service?
- *Who is paying* – or should be paying - for each of the cost components?
- What modalities will be used to *fund recurrent expenditures*, every year?
- Is it *affordable for all* the stakeholders involved?
- Do service delivery models need to be revisited *to ensure they last*?
- Can we *get more value for money* from existing capital investments?
- Can we provide at least *a basic level of service to everyone*?

Using the WASHCost life-cycle costs approach has significant programmatic implications. The yearly costs of WASH have to become transparent and widely known if the chasm between aspirations of water for all and the delivery of at least a basic level of service is to be bridged:

- Reporting systems need to change to collect and analyse relevant, up to date expenditure related to actual service levels. Governments, donors and NGOs need to ask the right questions and then set up the means to deliver the answers.

- If gaps in data sets are identified, realistic budgets can be calculated to budget for capital maintenance and direct support, including the costs of monitoring, training and technical support.

- Direct support and capital maintenance are costly but are not budgeted for or covered. How can the sector finance these expenditures in areas with very low income levels?

- Accountability mechanisms need revision to ensure financial sustainability and strengthen monitoring over the long term.

The life-cycle costs approach and methodology is flexible enough to be adapted to different contexts for organisations who wish to understand the sustainability of their service delivery models. Adopting the life-cycle cost approach can highlight gaps that lead to service failure and threaten sustainability.

WASHCost Briefing Notes and Working Papers for further reading

- Burr, P. and Fonseca, C., 2011. *Applying the life-cycle costs approach to sanitation: costs and service levels in Andhra Pradesh (India), Burkina Faso, Ghana and Mozambique.* (WASHCost Briefing Note 3) [pdf] The Hague: IRC International Water and Sanitation Centre. Available at: http://www.washcost.info/page/1626 [Accessed 17 April 2012].
- Burr, P. and Fonseca, C., 2013. *Applying a life-cycle costs approach to water: costs and service levels in rural and small town areas in Andhra Pradesh (India), Burkina Faso, Ghana and Mozambique.* (Working Paper 8) [pdf] The Hague: IRC International Water and Sanitation Centre. Available at: http://www.washcost.info/page/2665 [Accessed 12 January 2013].
- Fonseca, C., Smits, S., Nyarko, K., Naafs, A. and Franceys, R. (forthcoming). *Financing capital maintenance of rural water supply systems: current practices and future options* (WASHCost Working Paper 9). The Hague: IRC International Water and Sanitation Centre.

Visit the WASHCost website at www.washcost.info or IRC's WASH library at www.washdoc.info.nl to access global and country-specific publications and research material.

WASHCost

This Infosheet presents key messages about water expenditure and service levels emerging from WASHCost research. WASHCost teams in Burkina Faso, Ghana, Andhra Pradesh (India) and Mozambique collected and analysed cost and service level information for water, sanitation and hygiene in rural and peri-urban areas, applying the life-cycle costs approach. The life-cycle costs approach examines the complex relationships between expenditure, service delivery, poverty, effectiveness and sustainability.

Many people in the developing world experience poor and unreliable water services, although they are considered to be 'covered' by an improved supply. WASHCost research suggests that a failure to fully fund water services and especially to finance recurrent expenditure is a significant factor in frequent breakdowns and service weaknesses.

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