The life-cycle costs approach is a methodology for monitoring and costing sustainable water, sanitation and hygiene (WASH) services by assessing costs and comparing them against levels of service provided. The approach has been tested in Burkina Faso, Ghana, Andhra Pradesh (India) and Mozambique. The aim of the life-cycle costs approach is to catalyse learning to improve the quality, targeting and cost effectiveness of service delivery.

People expect WASH services to last. The life-cycle costs approach estimates the cost of all elements of service provision from initial construction through repairs, replacements and expansion. Planning and identifying life-cycle costs is an essential aspect of a ‘service delivery approach’ geared towards achieving sustainable services at scale.

Alongside global progress towards increasing WASH service coverage, there is evidence that coverage in some countries stagnates at around 60 - 80% due to insufficient focus on recurrent expenditure. Moving past this danger zone requires that the right mix of life-cycle costs are covered, such as capital maintenance expenditure and expenditure on direct support to service providers, user groups and users.

For example, an analysis of sanitation life-cycle costs in Burkina Faso, Ghana, Andhra Pradesh (India) and Mozambique is finding that there is minimal expenditure further down the sanitation chain for removal and treatment of sludge, rehabilitation, and support such as continued demand creation and hygiene awareness. Currently, most sanitation costs in rural and peri-urban areas are borne by households and there is little outside support for (poorer) households to prevent slippage and failed latrines. In Andhra Pradesh, India, it was found that 90% of villages, which had been awarded open defecation free status, see a return to open defecation by some members.

Using the life-cycle costs approach can reveal surprising results about value for money. The sector must begin to monitor all life-cycle costs and associated service levels in order to improve investments and keep the promise of sustainable WASH services, especially for the poor.

The WASHCosts methodology for collecting data, measuring service levels, and implementing a life-cycle costs approach is available online. Some governments and organisations, e.g. Government of Mozambique, Government of Ghana, Water For People, Fontes Foundation, Water for the Urban Poor, the Water and Sanitation Program of the World Bank, are beginning to pilot and test components of the methodology.

For more information, visit the website www.washcost.info or contact us by e-mail at washcost@irc.nl.
Life-cycle costs for WASH services that last

Life-cycle costs represent the disaggregated costs of ensuring delivery of an adequate, equitable and sustainable WASH service level to a population in a specified area.

Adopting a life-cycle costs approach requires that all aspects of the life cycle of a service are considered and catered for from construction to operation, rehabilitation and eventual replacement. It is all of these costs taken together that form the total cost of providing a sustainable level of service (represented graphically below).

Recurrent expenditure on maintaining an existing service at its intended level
One time expenditure on providing a new or extended service where there was none
Cost of capital: Cost of interest payments on micro-finance and any other loans.
Capital expenditure: Initial costs to develop or extend a service. ‘Hardware’ such as pipes, pumps, excavation, lining, and concrete structures and one-off ‘software’ such as community training and consultations.
Operating and minor maintenance expenditure: Typically regular expenditure, such as wages, fuel, and the purchase of cleaning products. Neglect can lead to service failure and expensive capital (maintenance) expenditure.

Expenditure on indirect support: The cost of macro-level support, planning, policy making and capacity building. Includes support to decentralised service authorities or local government. These costs have a direct impact on long-term sustainability.
Expenditure on direct support: Cost of support activities for service providers, users or user groups, not directly related to implementation, e.g. training for a community or a private sector operator. Critical to achieve long-term functionality and scale.
Capital maintenance expenditure: Asset renewal and replacement cost; occasional and lumpy costs that seek to restore the functionality of a system, such as replacing a handpump or emptying a septic tank. It is required to avert failure and to maintain a continuous service.
Operating and minor maintenance expenditure: Typically regular expenditure, such as wages, fuel, and the purchase of cleaning products. Neglect can lead to service failure and expensive capital (maintenance) expenditure.
Capital expenditure: Initial costs to develop or extend a service. ‘Hardware’ such as pipes, pumps, excavation, lining, and concrete structures and one-off ‘software’ such as community training and consultations.

To learn more, read WASHCost Briefing Note 1a Life-cycle costs approach.

Recurrent expenditure: keeping services going

Timely rehabilitation ensures limited interruption and prevents a return to unsafe water sources and the environmental risks of open defecation. Maintaining service levels also depends on qualities and capacities of the people and institutions that provide the services: all of which have costs attached.

By understanding how each component affects overall costs and budgeting, governments investors, donors and users can plan for sustainable and appropriate levels of service delivery (blue line in the figure). For example it is clearly more cost effective to replace a US$ 500 handpump every five to ten years, than to wait for it to fail and then develop a new US$ 10,000 borehole.

For more details, refer to Briefing Note 1b Services are forever: The Importance of capital maintenance (CapManEx) in ensuring sustainable WASH services and Briefing Note 1c The cost of capital: Costs of financing capital expenditure for water and sanitation.
In order to facilitate monitoring, accessibility is often measured by the proxy measures distance and crowding, instead of minutes per capita per day spent fetching water.

Source: Moriarty et al., 2011.

To explore the details of the water ladder, download Working Paper 2, 2nd edition Ladders for assessing and costing water service delivery.

What's in a service?
The life-cycle costs approach measures a service in terms of a combination of different indicators, such as access, quality and reliability. These indicators and their sub-indicators vary according to the country context and norms. A higher level of service is achieved when all the horizontal indicators are reached. The tables show the agreed shared indicators and levels used as a framework for analysis of sanitation and water services and costs across the four WASHCost countries. This framework is easily adapted to country and organisation norms and standards (Potter et al., 2011).

Assessing sanitation service levels

<table>
<thead>
<tr>
<th>Service levels</th>
<th>Accessibility</th>
<th>Use</th>
<th>Reliability (O&amp;M)</th>
<th>Environmental protection (pollution and density)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improved service</td>
<td>Each family dwelling has one or more toilets in the compound</td>
<td>Facilities used by all members of HH</td>
<td>Regular or routine O&amp;M (including pit emptying) requiring minimal user effort</td>
<td>Non-problematic environmental impact disposal and re-use of safe-by products</td>
</tr>
<tr>
<td>Basic service</td>
<td>Latrine with impermeable slab (HH or shared) at national norm distance from HH</td>
<td>Facilities used by some members of HH</td>
<td>Unreliable O&amp;M (including pit emptying) and requiring high user effort</td>
<td>Non problemmatic environmental impact and safe disposal</td>
</tr>
<tr>
<td>Limited ‘service’</td>
<td>Platform without (impermeable) slab separated faeces from users</td>
<td>No or insufficient use</td>
<td>No O&amp;M (pit emptying) taking place and any extremely dirty toilet</td>
<td>Significant environmental pollution, increasing with increased population density</td>
</tr>
<tr>
<td>No service</td>
<td>No separation between user and faeces, e.g. open defecation</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

HH = household; O&M = operation and maintenance

Source: Potter et al., 2011.


Climbing a service ladder

Each step up the ‘service delivery ladder’ requires a different combination of infrastructure, management systems and human resources with its own associated life-cycle costs. Taking a step up also depends on the behaviours of users and communities: people in rural areas sometimes choose to visit unprotected sources such as a local lake for certain uses, for example, washing and cooking for perceived convenience. The Venkatapuram case study on the next page demonstrates how a more detailed level of analysis can reveal differences between the rich and poor and give a more detailed idea of who moves up the service ladder when service delivery is improved, and who is left behind.

Assessing water service levels

<table>
<thead>
<tr>
<th>Service levels</th>
<th>Quantity</th>
<th>Quality</th>
<th>Accessibility, distance and crowding (kg srcpeeppm b mn)</th>
<th>Reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>&gt;= 60 litres per person per day</td>
<td>Meets or exceeds national norms based on regular testing</td>
<td>Less than 10 minutes (water available in the compound or household)</td>
<td>Very reliable = works all the time</td>
</tr>
<tr>
<td>Intermediate</td>
<td>&gt;= 40 litres per person per day</td>
<td>Acceptable user perception and meets/exceeds national norms based on occasional testing</td>
<td>Between 10 and 30 minutes. (less than 500m AND &lt;= normative population per functioning water point)</td>
<td>Reliable/secure = works most of the time</td>
</tr>
<tr>
<td>Basic (normative)</td>
<td>&gt;= 20 litres per person per day</td>
<td></td>
<td>Between 30 and 60 minutes. (between 500 and 1000 meters AND/ OR more than normative population per functioning water point)</td>
<td>Problematic = Suffers significant breakdowns and slow repairs</td>
</tr>
<tr>
<td>Sub-standard</td>
<td>&gt;= 5 litres per person per day</td>
<td>Negative user perception and/or no testing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No service</td>
<td>&lt; 5 litres per person per day</td>
<td>Fails to meet national norms</td>
<td>More than 60 minutes (more than 1000 m)</td>
<td>Unreliable/insecure = completely broken down</td>
</tr>
</tbody>
</table>

In order to facilitate monitoring, accessibility is often measured by the proxy measures distance and crowding, instead of minutes per capita per day spent fetching water.

Source: Moriarty et al., 2011.

To explore the details of the water ladder, download Working Paper 2, 2nd edition Ladders for assessing and costing water service delivery.
Close up: village level analysis reveals unequal access for the poor

Venkatapuram is a fairly typical village in Andhra Pradesh, India. It received an award as an open-defecation free village in 2008. Despite this award, not all households have toilets. The percentage of households having toilets differs by caste area. It is highest in the Other Castes area (86%), as seen on the map, and lowest in the Scheduled Castes area (73%) and defecation in the open is still taking place. This implies that the award should not have been made or, more likely, activities leading up to the award were not sufficient in prompting a behavioural change that could sustain 100% open-defecation free status over time.

The pattern of expenditure highlights the priority given to engineering solutions and capital expenditure. WASHCost surveys and mapping of service levels have also highlighted problems with these systems in terms of operation and maintenance and source protection.

Similar to the majority of villages in southern India, Venkatapuram is struggling with water scarcity (i.e. an increasing imbalance between water supply and demand). Increased groundwater-based irrigation and construction of private wells within the village has led to a failure of one of Venkatapuram’s two borewells that supplies the public water supply network. Also the majority of handpumps fail during the summer season. Falling groundwater levels have made things worse because this has led to fluoride concentration. Hence the need to install the reverse osmosis plant that provides drinking water to households that are willing and able to pay for this water – currently around 50% of households.

Spatial analysis of service levels and expenditure shows that the capital expenditure of households in water supply tends to be lower in the northern and southern Scheduled and Backward Caste areas, and this expenditure decreases with distance from the centre of the village. Households in the southern area of the village (Other Castes) had been found to have a significantly higher summer water use per person.

Surveys and mapping of service levels and private and public expenditure have led to a good understanding of the fundamental causes of Venkatapuram’s WASH service problems. More importantly, these surveys have led to the identification of solutions that if implemented, have the potential to lead to WASH services that last in this village.

Explore the use and significance of mapping in Briefing Note 5 Mapping and spatial analysis: Understanding costs, services and poverty aspects of WASH services delivery.
Getting started: collecting life-cycle costs and service levels assessments

The aim of the life-cycle costs approach is to catalyse learning to improve the quality, targeting and cost effectiveness of water and sanitation service delivery. Here are some activities to get started with the collection of life-cycle cost information together with sector stakeholders:

- **Specify information needed** based on a needs assessment. Specify details of the cost and service level information required, including the required degree of disaggregation, the scale of maps, the granularity, and the levels of precision.
- **Specify the domain for information collection**, the initial spatial boundaries, such as the area served by a supply system or a district, temporal boundaries, and time limits within which to measure trends. Collect sufficient information to triangulate findings and make judgements based on service delivery to marginal social groups.
- **Identify sources of information**, both secondary sources (e.g. information already collected by government departments) and primary sources (i.e. new field data collection), which are needed to fill gaps, quality control existing information, and bring knowledge bases up to date.
- **Define the scope of engagement** through multi-stakeholder learning platforms (learning alliances) that identify wider stakeholder processes to link into, such as the national benchmarking water and sanitation services. Facilitate and ensure the participation of key partners to make the collection and use of information both sustainable and realistic.
- **Form a multidisciplinary team** to carry out the work. A range of skills and experience will be needed to collect, quality control and analyse life-cycle costs and assess WASH service levels. Experienced data managers (with GIS skills) are also highly desirable. Allow sufficient time for capacity building activities as required.

Life-cycle costs approach as a WASH sector learning process

Planning WASH services levels using the investigation of how life-cycle cost expenditure patterns might be modified to improve services and/or value for money. This analysis can be based on identifying gaps in expenditure patterns (e.g. no allocation for some cost components), extrapolating relationships between expenditure and service levels and/or modelling. Outputs from this phase inform future financing and expenditure.

Analysis of existing WASH service levels to characterise the services being provided and accessed by users. The aim is to get a good understanding of current levels of the life-cycle cost components, the influence of contextual factors and cost drivers. Particular attention should be given to any slipping back to lower levels of service.

Targeted awareness raising to engage stakeholders. Many national, state and intermediate level stakeholders use unit cost information but the concept of life-cycle costs may be new for some. At the local level, attention has to be given to ensuring that poor and marginalised groups are aware of activities and able to participate.

Institutional mapping is critical to take account of the roles and responsibilities of different WASH stakeholders in planning, budgeting and monitoring and, by association, the activities that should be costed, such as indirect support. This phase seeks a full understanding of the life-cycle cost components of WASH services delivery system(s) in a specified area and seeks to identify who has incentives to use these costs in their own work.

Gathering information and quality control for an up to date and accessible information base. Triangulation of data from different sources and geographical levels is useful to ensure consistency of data.

Making the findings explicit for fast dissemination to key stakeholders in formats that are most likely to inform decision making. The outcome should present a widely-discussed understanding of the life-cycle costs needed to deliver sanitation and hygiene services that last.
Download the following publications at www.washcost.info/pubs

Briefing Note 1a  Life-cycle costs approach: Costing sustainable services
Briefing Note 1b  Services are forever: The importance of capital maintenance (CapManEx) in ensuring sustainable WASH services
Briefing Note 1c  The cost of capital: Costs of financing capital expenditure for water and sanitation
Briefing Note 2  Decentralisation and the use of cost data in WASHCost project countries: Synthesis of country reports 2009
Briefing Note 3  Applying the life-cycle costs approach to sanitation: Costs and service levels in Andhra Pradesh (India), Burkina Faso, Ghana and Mozambique
Briefing Note 4  Applying the life-cycle costs approach to water: Costs and service levels in Andhra Pradesh (India), Burkina Faso, Ghana and Mozambique
Briefing Note 5  Mapping and spatial analysis: Understanding costs, services and poverty aspects of WASH services delivery

Working Paper 1  WASHCost’s theory of change: Reforms in the water sector and what they mean for the use of unit costs
Working Paper 2  Ladders for assessing and costing water service delivery (Second edition)
Working Paper 3  Assessing sanitation service levels (Second edition)
Working Paper 4  Cost-based decision support tools for water and sanitation
Working Paper 5  Arrangements and cost of providing support to rural water service providers
Working Paper 6  Assessing hygiene cost-effectiveness

For country-specific publications, including materials in Portuguese and French, visit the country pages on the WASHCost website.

Training and targeted support

Is your institution interested to learn more about the possibility of targeted support and training on the life-cycle costs approach? Please contact us for more information: washcost@irc.nl

Visit www.washcost.info/training to learn about available life-cycle costs approach and service delivery approach trainings.

WASHCost is a five-year initiative focused on exploring and sharing an understanding of the costs of delivery and access to sustainable water, sanitation and hygiene services.