1.1 The life-cycle costs approach to WASH services: an introduction

Module 1 of the Costing Sustainable Services Training package introduces the underlying principles and key components of using the life-cycle costs approach in the WASH sector. It discusses:

- **How cost information contributes to sustainable WASH services.** What is the life-cycle costs approach and what are its benefits? What are the life-cycle costs components needed to plan and budget for sustainable WASH service delivery?
- **What constitutes a sustainable WASH service and what criteria can be used to cost and monitor services?** How to identify strengths and weaknesses of the WASH service being delivered. The creation of water, sanitation and/ or hygiene ladders with customised service levels. The evaluation of benchmark service levels to be achieved.
- **What are the benefits of a service delivery approach and what are the main WASH service delivery models?** How to create and share a concise description of service models.

Module 1 consists of ten handouts, each explaining key components of the life-cycle costs approach. Each handout can be used independently and is linked to publications with in-depth explanation and research results derived from the WASHCost project on life-cycle costing in Burkina Faso, Ghana, Andhra Pradesh (India) and Mozambique. Module 1 concludes with a quiz that puts your knowledge of the life-cycle costs approach to WASH services to a test.

Contents

Module 1 consists of the following handouts:

1.2 The life-cycle costs approach

This handout explains what the life-cycle costs approach entails and why it was developed.

Life-cycle costs are the full costs of delivering adequate water, sanitation and hygiene (WASH) services[1] to a specific population in a particular geographic area—not just for a few years but indefinitely. These costs include construction and maintenance of systems in the short and longer term, taking into account the need for hardware and software capital expenditure, including source protection, operations, short-term and long-term maintenance, capital maintenance, cost of capital and direct and indirect support (e.g., training, planning and institutional support).

Life-cycle costing[2] is an important tool for achieving adequate, equitable and sustainable WASH services. It makes reliable cost information readily available and informs WASH governance processes at every level. A significant element of the approach is understanding that costs can be compared and properly assessed only against particular levels of service, measured by quantity, quality, accessibility and reliability for water, and by accessibility, use, reliability and environmental protection for sanitation.

Why the life-cycle costs approach was developed

The sustainability of water, sanitation and hygiene services is a major challenge. A 2007 study by the Rural Water Supply Network found that 36% of handpumps across 21 countries in sub-Saharan Africa were not working. This level of failure represents a waste of US$ 1.2-1.5 billion in investments. More recent studies across various countries and technologies confirm a repeated pattern of failure in WASH services—not always for lack of financial resources or technological solutions but often because of a faulty approach to accounting for resources and costs in the sector.

Sustainable service requires that financial systems be able to fund timely repairs, extend and improve service as demand changes and eventually replace infrastructure at the end of its useful life—completing the life cycle at the heart of this approach. Maintaining service levels also depends on the competence and resources of the people and institutions that provide the service. All the associated costs figure into the total cost of providing a sustainable level of service.

Nevertheless, current budgeting and planning tools used in developing countries' rural and peri-urban water, sanitation and hygiene sectors do not include the full life-cycle costs of providing services into the future. Cash accounting has been the common approach. WASH sector professionals make cost comparisons for budgeting and reporting, but without a consistent accounting framework. Unit costs usually refer to a specific technology and the amounts paid by households for using that technology. This confuses prices with costs: the cost of a water connection to the household is not the same as

[1] Water and sanitation services and service criteria are explained in **1.4: Water service levels** and **1.5: Sanitation service levels** of the Costing Sustainable Services Training Package.

[2] Life-cycle costing is used in other disciplines to refer to the project planning analysis of the cradle-to-grave costs of a fixed asset, such as building a power generation system, where the capital and operating costs of alternative systems, along with major dismantling and disposal costs, may vary significantly; these total costs need to be compared before investment is undertaken. WASHCost uses life-cycle costs to refer to the ongoing services of a water or sanitation project.

the cost of producing and distributing water. In a privatised water system, the price to the household may closely reflect actual costs, but in a subsidised or underfunded service, the price to the household may be only a small fraction of the real costs.

Life-cycle costing has long been used by urban utilities. The WASHCost project has adapted this standard accounting and financing practice to the rural water, sanitation and hygiene sector. Beginning in 2008, the WASHCost project developed the life-cycle costs approach to costing sustainable water, sanitation and hygiene services and comparing costs against the levels of service provided. The approach has been tested in Burkina Faso, Ghana, Andhra Pradesh (India) and Mozambique and can be used by governments, investors, donors, service providers and service authorities to develop and maintain their own cost databases and incorporate them into management information systems and decision-support tools.

The life-cycle costs approach contributes to achieving adequate, equitable and sustainable WASH services by making reliable cost information readily available and informing WASH governance processes at every level. The ultimate aim is to catalyse learning and improve the quality, targeting and cost-effectiveness of service delivery.

How this approach improves WASH service delivery

The life-cycle costs approach accounts for all aspects of the infrastructure and service, from construction to operations, regular maintenance and eventual replacement. By monitoring how each component affects the overall costs of the service, governments, investors, donors, service providers and service authorities can plan for sustainable and appropriate levels of service delivery and keep the service quality high. For example, increasing expenditure on capital maintenance and direct support may reduce overall costs, especially where neglect is causing premature failure of the infrastructure. Timely repairs and replacement limit interruption of service so that people do not turn to unsafe water sources or revert to open defecation.

Using the life-cycle costs approach can yield surprising results. For instance, expensive technologies often yield only a moderate increase in quality of service: the level of service provided by a standpipe on a pipe network is often not very different from that provided by a borehole with a handpump (assuming the water resource is available). But neither provides any service if the technology breaks down and is not repaired because the budget does not cover maintenance.

Preliminary analysis of life-cycle costs in Burkina Faso, Ghana, Andhra Pradesh and Mozambique reveals that increasing expenditure on capital maintenance and direct support can sometimes decrease the overall costs of service delivery: it is more cost-effective to replace a handpump (US$ 500) every five to ten years than to wait for it to fail and then develop a new borehole (US$ 10,000). Yet around the world, failed handpumps are systematically replaced by entirely new boreholes.

Studies during 2010 in Burkina Faso, Ghana, Andhra Pradesh and Mozambique also reveal that most sanitation costs in rural and peri-urban areas are borne by households, and there is little external support for poor households to prevent latrines from failing.

In Ghana, communities spend US$ 26 per person per year on soap—more than cost the per person per year for a small town's water system.

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) [online] The Hague: IRC International Water and Sanitation Centre. Available at: <http://www.washcost.info/page/1626> [Accessed 17 April 2012].

Fonseca, C. et al., 2010. *Life-cycle costs approach: glossary and cost components*. (WASHCost Briefing Note 1) [online] The Hague: IRC International Water and Sanitation Centre. Available at: <http://www.washcost.info/page/752> [Accessed 28 April 2011].

Fonseca, C. et al., 2011. *Life-cycle costs approach: costing sustainable services*. (WASHCost Briefing Note 1a) [online] The Hague: IRC International Water and Sanitation Centre. Available at: <http://www.washcost.info/page/1557> [Accessed 17 April 2012].

1.3 Life-cycle cost components

This handout explains the components used in the life-cycle costs approach to planning and budgeting for sustainable water, sanitation and hygiene services.

Most people working in the WASH sector think of unit costs in terms of the initial capital expenditure on infrastructure, according to a rapid assessment exercise carried out by the WASHCost project in 2008 in Burkina Faso, Ghana, Andhra Pradesh (India), and Mozambique. Blind spots include how much is spent on the operations, maintenance, rehabilitation and replacement of infrastructure, as well as how much it costs to provide direct support.

Life-cycle cost components

Life-cycle costs are the costs of delivering adequate water, sanitation and hygiene services to a specific population in a particular place, not just for a few years but indefinitely. Such costs include not only construction of new systems but also short-term and long-term maintenance, district-level and national-level administration and planning, extension and improvement of services and eventual replacement of the infrastructure. All of these costs, taken together, form the total cost of providing a sustainable level of service (Figure 1).

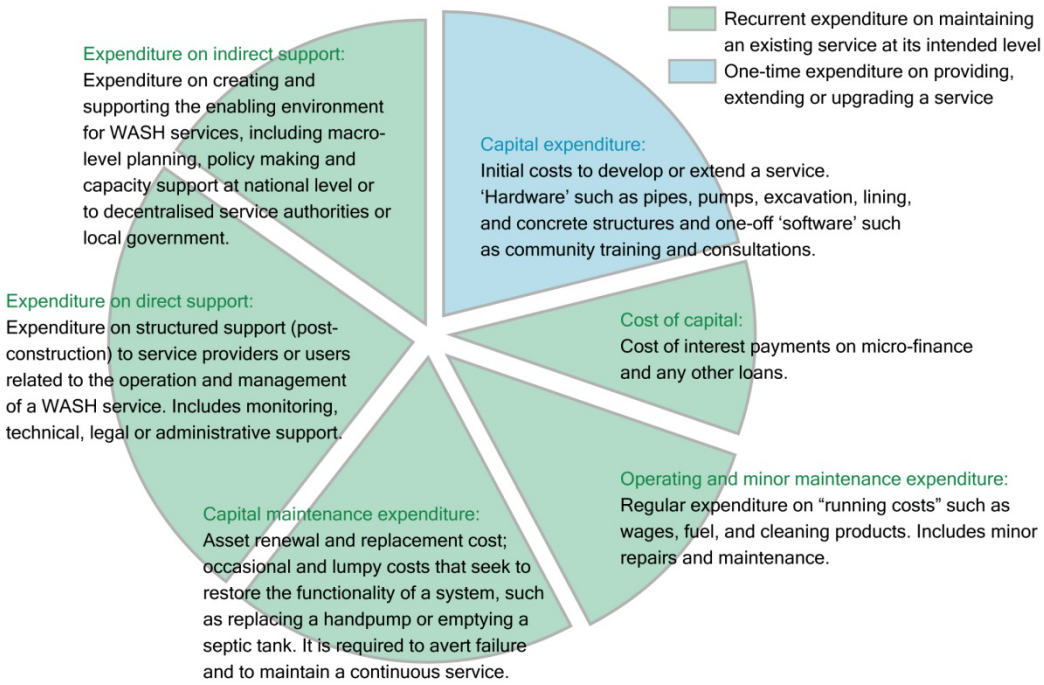


Figure 1 **Life-cycle cost components (updated in October 2012)**
Source: adapted from WASHCost, 2011.

1.3 Life-cycle cost components

Capital expenditure (CapEx)

Is the cost of constructing fixed assets, such as concrete structures, pumps and pipes, and the cost of extending and improving the system. Investment in fixed assets is occasional and 'lumpy' (i.e. high relative to ongoing costs). This component also includes one-time work with stakeholders before construction or implementation, such as the cost of capacity building.

Operations and minor maintenance expenditure (OpEx)

Covers labour, fuel, chemicals, materials and regular purchases of any bulk water, plus routine maintenance needed to keep systems running at peak performance; it does not include major repairs. For privatised utilities in a high-income country, operating expenses may amount to approximately 40% of total costs.

Capital maintenance expenditure (CapManEx)

Goes beyond routine maintenance to the repair and replacement of equipment to keep systems running; it covers asset renewal, replacement and rehabilitation. Accounting rules may govern what is included under capital maintenance and the extent to which the replacement assets can be depreciated. Renewing and reinvigorating community involvement may be part of capital maintenance. Capital maintenance expenditures and potential revenue streams for paying those costs are critical to avoiding the failures that result from haphazard system rehabilitation. Capital maintenance expenditure may represent 30% of total life-cycle costs.

Cost of capital (CoC)

Is the expense of financing a programme or project and includes loan repayments and the cost of tying up scarce capital. In the case of private sector investment, the cost of capital includes what should be a 'fair profit', to be distributed as dividends. The cost of capital may be 30% of the total; if it is possible to access lower-cost public capital (at a risk-free rate), the proportion decreases.

Direct support (ExpDS)

Includes expenditure on post-construction activities directed at local stakeholders, users or user groups.

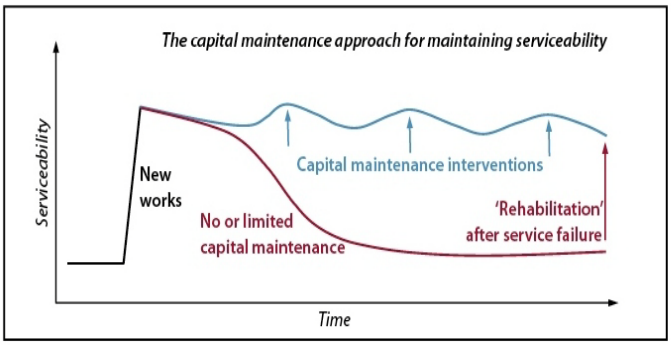
In utility management, expenditure on direct support, such as for overhead, is usually included in operating expenditures. However, these costs are rarely included in rural water and sanitation estimates. The costs of ensuring local government staff have the capacity and resources to repair broken systems and monitor private sector performance are often overlooked.

Indirect support (ExpIDS)

Includes government macro-level planning and policy making, plus developing and maintaining frameworks and institutional arrangements and capacity building for professionals and technicians. The expenditures are not tied to a particular programme or project.

Why life-cycle costing matters

When planning for a sustainable system, service providers need to account for the full life-cycle of costs, for both individual components and the overall system. By understanding how each component affects overall costs and budgeting, governments, investors, donors, service providers and service authorities can plan for sustainable and appropriate levels of service delivery (Figure 2, blue line).



The blue line shows that regular capital maintenance maintains serviceability, while (red line) service levels fall away over time without capital maintenance, eventually requiring the service to be "rehabilitated" or replaced.

Figure 2 **Capital maintenance and serviceability**
Source: Franceys and Pezon, 2010.

For instance, in Ghana[1], the annual per person operations and minor maintenance expenditure of a small piped scheme exceeded the costs of a borehole with handpump by a factor of 1, but capital maintenance expenditure increased by a factor of 100 (US$ 10-14 versus US$ 4). For a small piped water system, the average cost per person per year for operations and minor maintenance, capital maintenance and direct support ranged from US$ 10-14 but for water point sources was only about US$ 4.

Life-cycle costs represent the aggregate costs of ensuring delivery of adequate, equitable and sustainable WASH services to a population in a specified area.

The total life-cycle costs of the two kinds of systems must be considered alongside the quantity, quality, accessibility and reliability of the water that each delivers. In Ghana, boreholes with handpumps present a risk of unsanitary conditions, and if water quality is unacceptable, the more expensive system may be better.

Further reading

Fonseca, C. et al., 2011. *A multi-dimensional framework for costing sustainable water and sanitation services in low-income settings: lessons from collecting actual life-cycle costs for rural and peri-urban areas of Ghana, Burkina Faso, Mozambique and Andhra Pradesh.* [online] The Hague: IRC International Water and Sanitation Centre. Draft available at: <http://www.washcost.info/page/1036> [Accessed 3 May 2011].

[1] Data was collected in the WASHCost project during 2010 from 76 boreholes fitted with handpumps and 17 small piped systems drawn from five of the 10 regions in Ghana.

1.3 Life-cycle cost components

Fonseca, C. et al., 2010. *Life-cycle costs approach: glossary and cost components*. (WASHCost Briefing Note 1) [online] The Hague: IRC International Water and Sanitation Centre. Available at: <http://www.washcost.info/page/752> [Accessed 28 April 2011].

Franceys, R. and Pezon, C., 2010. *Services are forever: the importance of capital maintenance (CapManEx) in ensuring sustainable WASH services*. (WASHCost Briefing Note 1b) [online] The Hague: IRC International Water and Sanitation Centre. Available at: <http://www.washcost.info/page/866> [Accessed 28 April 2011].

Pezon, C., 2010. *Decentralisation and the use of cost data in WASHCost project countries: synthesis of country reports 2009*. (WASHCost Briefing Note 2) [online] The Hague: IRC International Water and Sanitation Centre. Available at: <http://www.washcost.info/page/842> [Accessed 28 April 2011].

WASHCost, 2011. Life-cycle costs approach for water and sanitation services that last. [brochure] January. The Hague: IRC International Water and Sanitation Centre.

1.4 Water service levels

This handout explains water service levels and service criteria.

In the life-cycle costs approach, costs are compared and assessed in relation to the level of water service delivered. Services are ranked in a 'ladder', from low to high, based on criteria for the level of functionality, rather than technology. Each step up the service delivery ladder requires a different combination of infrastructure, management systems and human resources.

Five water service levels

A water service level characterises the benefits that users receive, measured by a combination of criteria. Table 1 summarises the five service levels, from no service to sub-standard, basic, intermediate and high.

The household service level is determined by the lowest level of service on any of four service criteria: quantity, quality, accessibility or reliability[1]. These criteria can vary across countries, with the basic level of service being the national norm. Typically, a higher level of service means more of every criterion. Each criterion is measured by one or more indicators. For example, the indicator for reliability is the number of days when water is available throughout the year.

Table 1 WASHCost service levels and indicators

Service level	Quantity (in litres per person per day)	Quality	Accessibility (in minutes per round trip)	Reliability
High	>= 60	Good	<= 10	Very reliable
Intermediate	>= 40	Acceptable	<= 30	Reliable, secure
Basic (based on country norm)	>= 20			
Sub-standard	>=5	Problematic	<= 60	Problematic
No service	<5	Unacceptable	> 60	Unreliable, insecure

Source: adapted from WASHCost's proposed service levels and indicators by Moriarty et al., 2011, p. 12.

[1] For more information on the five indicators of water service levels, see Moriarty et al. (2011).

The water service ladder is a decision-making and planning tool that categorises the actual service for users. Often, service combines elements of different levels. For example, in a rural community in Mozambique, during the dry season 69% of people receive a sub-standard water service (or no service at all) in terms of quantity and 84% receive a sub-standard to intermediate service in terms of water quality. Even if a user receives less than a basic service of 20 litres per person per day, that sub-standard service still costs money to provide.

No service

Means less than five litres of water per person per day, or water of unacceptable quality from a source that is unimproved, or water that takes more than one hour per day to collect.

Sub-standard service

Is a 'better than nothing' level, between basic and no service. This level typically describes services that suffer from endemic problems or are complicated by context or low population density.

Basic service

Means that every day, each person can obtain at least 20 litres of acceptable-quality drinking water from a secure and improved source and spends no more than 30 minutes per round trip to collect it. This level of service is typical of most rural water supply schemes and also of some informal schemes in peri-urban and slum areas. The basic level of service is always based on the national norm set in a country.

Intermediate service

Provides twice as much water as a basic service: at least 40 litres. This level is typically found in small towns and peri-urban areas and is most often provided by small piped networks. Typically, an intermediate service offers some water treatment and requires more complex management structures than basic service.

High service

Is essentially a modern utility service involving taps in the home. It provides 60 litres per person per day as an absolute minimum, but often much more. Water is treated to higher levels of quality and is available reliably and on demand.

Why service levels matter

Identifying the level of service received by users allows planners and providers of water services to use cost comparisons in policy decisions that go beyond building infrastructure. In the life-cycle costs approach, the costs of sustainable water service delivery are compared against the level of service received by users. This information can help governments, investors, donors and service authorities make decisions on where it is most cost-effective to invest, plan for replacement infrastructure and extend delivery systems in response to increased demand. It enables planning for services that will last.

Box 1 The life-cycle costs approach

Life-cycle costs are the costs of ensuring adequate water, sanitation, and hygiene (WASH) services to a specific population in a determined geographic area—not just for a few years but indefinitely. Life-cycle costing goes beyond the cost of constructing new systems to include the cost of maintaining them in the short and long term and at higher institutional levels. Costs for both district and national administration and planning are included, as are the costs of replacing and extending infrastructure. With the life-cycle costs methodology, governments, investors, donors and users can develop and maintain their own cost databases and incorporate them into management information systems and decision-support tools.

Further reading

Fonseca, C. et al., 2011. Life-cycle costs approach: costing sustainable services. (WASHCost Briefing Note 1a) [online] The Hague: IRC International Water and Sanitation Centre. Available at: <http://www.washcost.info/page/1557> [Accessed 17 April 2012].

Moriarty, P. et al., 2011. Ladders for assessing and costing water service delivery. (WASHCost Working Paper 2, 2nd ed.) [online] The Hague: IRC International Water and Sanitation Centre. Available at: <http://www.washcost.info/page/753> [Accessed 17 April 2012].

1.5 Sanitation service levels

This handout explains sanitation service levels and service criteria.

In the life-cycle costs approach, costs are compared and assessed in relation to the level of sanitation service delivered. Services are ranked in a 'ladder', from low to high, based on criteria for the level of functioning, rather than technology, in the containment, disposal, treatment and reuse (where applicable) of excreta and urine. Each step up the service delivery ladder requires a different combination of infrastructure, management systems and human resources.

This sanitation service ladder is designed to describe domestic (household) sanitation. The service levels and criteria can be adapted for use at workplaces and in schools and colleges.

Four sanitation service levels

A sanitation service level characterises the benefits that users receive, measured by a combination of criteria. Table 1 summarises the four service levels, from no service to limited, basic and improved.

Table 1 WASHCost sanitation service ladder

Service level	Accessibility	Use	Reliability (operations and maintenance)	Environmental protection
Improved	Each family dwelling in compound has one or more toilets; easy access for all family dwellings	Facilities used by all household members	Regular or routine service (including pit emptying) requiring minimal effort; evidence of care and cleaning of toilet	Non-problematic environmental impact; safe disposal and reuse of safe by-products
Basic (based on country norm)	Concrete or impermeable slab at national-norm distance from household (per household or shared)	Facilities used by some household members	Unreliable service (including pit emptying) requiring high level of user effort; evidence of care and cleaning of toilet	Non-problematic environmental impact; safe disposal
Limited	Platform without impermeable slab separating faeces from users	No or little use	No service (e.g. no pit emptying); no evidence of cleaning or care for toilet	Significant environmental pollution, increasing with increased population density
No service	No separation between user and faeces (e.g., open defecation)			

Source: Potter et al., 2011.

1.5 Sanitation service levels

The household service level is decided by the lowest level of service received on one of the four service criteria–accessibility, use, reliability and environmental protection[1]. These criteria can vary across countries, with the basic level of service being the national norm. Typically, a higher level of service means more of every criterion. Each criterion is measured by one or more indicators. For example, the indicator for the use criterion is how many people in the household use the sanitation facility.

A basic sanitation service can entail a latrine with a concrete slab at the national-norm distance from the household. This latrine is used by some members of the household. Operation and maintenance of the latrine requires high effort by the users and takes place irregularly, but the environmental impact is minimal, and where necessary, sludge is disposed of safely.

No service

Is synonymous with open defecation: there is no separation between the person and faeces, and the associated environmental pollution increases with population density.

Limited service

Involves a platform that separates the user from faeces, but there is little or no evidence of cleaning of the latrine, and the environmental consequences are the same as for no service.

Basic service

Means that household members have reasonable access to a safe, clean facility, but not everyone uses it, and maintenance is weak. Sludge is safely disposed of, and thus the environmental impact is minimal. The basic level of service is always based on the national norm set in a country.

Improved service

Gives the household easy access to at least one convenient, safe, clean facility, which all members use. Maintenance is regular or routine, there is no significant environmental impact, and sludge is safely disposed of and perhaps even reused.

The sanitation service ladder is a decision-making and planning tool that categorizes the actual service for users. Often, service mixes elements of different levels. For example, in a rural community in Mozambique in 2010, 80% of people had sanitation that corresponded to limited or no service in terms of use, and 64% received service that was basic with regards to access[2]. The service levels received by the poor and the non-poor within a community can also be differentiated in this way.

Some practices, such as deep burial of faeces, do not meet the standards for basic service but are nevertheless better than open defecation and can thus be considered limited service. Moreover, a well-operated, regularly maintained, ventilated improved pit (VIP) is arguably a higher level of service than a badly maintained septic tank system or a full flush system with inadequate water supply. In fact, sophisticated technology that is not well operated or maintained represents substantially graver public health and environmental risks than more traditional sanitation technologies.

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[1] For more information on the four criteria of a sanitation service used in the life-cycle costs approach, read Potter et al. (2011).

[2] The data for this example were collected by the WASHCost project in Mozambique during 2010. WASHCost is a five-year initiative focused on understanding the true costs of sustainable services.

Why service levels matter

Identifying the level of service received by users allows planners and providers of sanitation services to use cost comparisons in policy decisions that go beyond building infrastructure. In the life-cycle costs approach, the costs of sustainable sanitation service delivery are compared against the level of service received by users. This information can help governments, investors, donors and service authorities make decisions on where it is most cost-effective to invest, plan for replacement infrastructure and extend delivery systems in response to increased demand. It enables planning for services that will last.

Box 1 The life-cycle costs approach

Life-cycle costs are the costs of ensuring adequate water, sanitation and hygiene (WASH) services to a specific population in a determined geographic area—not just for a few years but indefinitely. Life-cycle costing goes beyond the cost of constructing new systems to include the cost of maintaining them in the short and long term and at higher institutional levels. Costs for both district and national administration and planning are included, as are the costs of replacing and extending infrastructure. With the life-cycle costs methodology, governments, investors, donors and users can develop and maintain their own cost databases and incorporate life-cycle costs into management information systems and decision-support tools.

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) [online] The Hague: IRC International Water and Sanitation Centre. Available at: <http://www.washcost.info/page/1626> [Accessed 17 April 2012].

Fonseca, C. et al., 2011. *Life-cycle costs approach: costing sustainable services*. (WASHCost Briefing Note 1a) [online] The Hague: IRC International Water and Sanitation Centre. Available at: <http://www.washcost.info/page/1557> [Accessed 17 April 2012].

Potter, A. et al., 2011. *Assessing sanitation service levels*. (WASHCost Working Paper 3, 2nd ed.) [online] The Hague: IRC International Water and Sanitation Centre. Available at: <http://www.washcost.info/page/902> [Accessed 17 April 2012].

1.6 Hygiene as a service

This handout explains how hygiene relates to sustainable service delivery and recommends ways to promote better hygiene practices[1].

Sustainable water and sanitation services improve livelihoods and public health, but unless these services are used effectively and hygienically, the benefits will be dramatically undermined. A range of approaches, methodologies and tools developed for the WASH sector help people manage and use water and sanitation services more hygienically. These include participatory hygiene and sanitation transformation, sanitation marketing and social marketing approaches and tools.

Hygiene promotion is central to water and sanitation service provision. In fact, it can be seen as a public or environmental health function and therefore a service undertaken by public or environmental health departments or service providers, such as water and sanitation implementers or utilities.

Although hygiene interventions are conceptually part of broader public and environmental health services, they are rarely planned, managed or implemented in an integrated manner. Better integration of water-related and sanitation-related hygiene interventions, within a framework of broader public and environmental health services, will strengthen the overall benefit of WASH services.

The importance of hygiene

Curtis and Kanki (1998) define hygiene promotion as a planned approach to preventing diarrhoeal and other diseases caused by poor water and sanitation; it encourages the widespread adoption of safe practices. Hygiene promotion initiatives in WASH typically aim to improve health. The findings of a meta-analysis of recent studies and reviews (summarised in Figure 1) show that hygiene education is as effective as point-of-use water treatment and five times more effective than improved water supply at reducing diarrhoeal morbidity in children under age five.

Effective and sustained hygiene behaviour change cannot be achieved through one-time (project) interventions. Instead, hygiene behaviour change requires ongoing activities with consistent and targeted messages for diverse audiences using multiple communication channels, such as radio and other media, school outreach programmes and speeches by respected traditional, religious and political leaders.

Hygiene education and awareness activities by the water, sanitation, health and education sectors need to be coordinated and integrated. In some countries (e.g., Tanzania and South Africa) public health services are relatively well established, but this is unusual. More often, hygiene promotion activities take place just once or a few times, even though stand-alone activities are unlikely to result in sustained improvement.

[1] This handout summarises WASHCost's Working Paper 6 by Potter, et. al., 2011. The Working Paper is available at *http://www.washcost.info/page/1629*

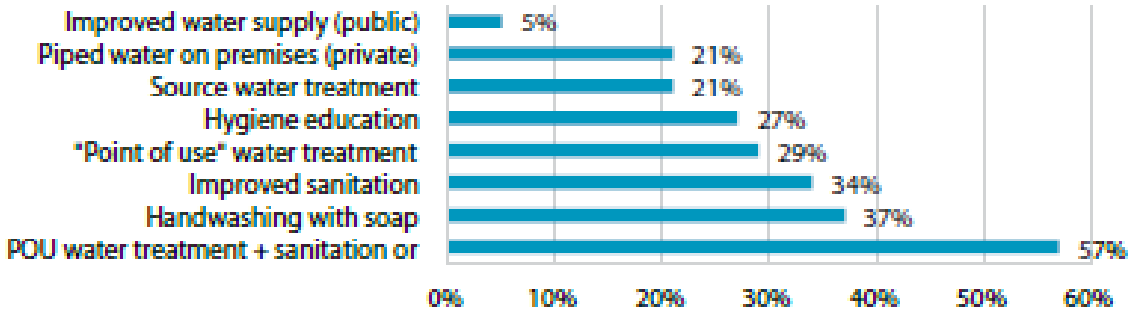

Figure 1 **Effectiveness [%] of WASH interventions to reduce diarrhoea morbidity in children under 5**
Source: 3IE (2009) in Potter, et. al., 2011.

In a literature review of best practices for hygiene promotion, Dubé and Krukkert (2010) identified four main hygiene behaviours known to deliver the most benefit for individual health:

- hand washing with soap after defecation and changing babies' nappies;
- hand washing with soap before handling any food (cooking or eating);
- use of sanitary facilities for the disposal of human excreta; and
- use of improved water supply services, systems and methods for the effective treatment, safe storage and drawing of drinking water in the household (Hernandez and Tobias, 2010).

Five elements of planning hygiene promotion programmes

Five elements are necessary (but not sufficient) for the successful and effective implementation of hygiene promotion initiatives.

Early planning and skilled facilitation

More successful hygiene programmes plan for the participation of communities from the outset. Through collaborative engagement between facilitators and targeted audiences, the purpose and objectives of the programme are defined. Local staff who are influential, are trusted by the community, and have good facilitation skills are the catalysts of change. Training and support from supervisors or other organisations develop local capacity. Facilitators know who in the community should be involved, how to involve them and in which practices.

Proper management

Hygiene promotion interventions require earmarked budgets, monitoring activities and human resources. According to the Water Supply and Sanitation Council (WSSCC, 2005), a good hygiene intervention should conduct the following kinds of activities:

- commission baseline studies on current hygiene practices;
- commission research to determine which behaviours to focus on;
- develop behavioural change strategies, including social marketing;
- determine roles and responsibilities for carrying out hygiene programmes;
- regularly monitor programme effectiveness; and
- train at all levels for programme implementation.

Well-defined and targeted interventions

Appleton and Sijbesma (2005) show that it is important to find out from the stakeholders and beneficiaries of a programme the type of changes *they* want, why *they* want to see these changes implemented, and what obstacles *they* see.

Interventions should be focussed. Hygiene interventions should target a small number of hygienic practices or behaviours.

Programmes that communicate and repackage messages for different sets of audiences, through appropriate channels, tend to be more successful. Being sensitive to gender and poverty is important, given the different roles, responsibilities and interests of men and women and the different literacy rates, access to means of communication, and financial resources of poor and better-off individuals. All these factors, and many more, affect people's ability to participate in programmes and practise new behaviours.

Longer-term interventions

Repeated promotion of initiatives, with follow-up, works better than single, stand-alone interventions. Shordt and Cairncross (2006) show that hygiene interventions should last more than one year and extend beyond the installation of water points or latrines, as part of a broader water or sanitation programme. Too often, once construction is completed, the community and households are left alone.

More sustained and various types of hygiene promotion interventions (e.g., consistent messages across mass-media campaigns, household visits and community or social group interventions), with monitoring and follow-up, will be more effective and help individuals and communities internalise hygienic behaviours.

Political will and an enabling environment

The support and awareness of politicians and officials at national and local levels is important for success. Building relationships with political representatives can support the implementation of hygiene programmes and help overcome unexpected difficulties. To influence decision makers, cost-benefit evidence and links with broader objectives, such as the Millennium Development Goals, are imperative.

Ideas for better coordination

All five of the above elements point to the need for better-coordinated hygiene promotion initiatives and their integration within the framework of public and environmental heath, and improved public and environmental health planning and provisioning. This means that the education, health, water and public works sectors of a country must work together, with the appointment of a lead agency responsible for coordinating and planning a wide range of hygiene education activities and initiatives.

To ensure programmatic links with the local health district and public health care services, hygiene promotion planners and implementers recommend the following:

- share and validate baseline study findings;
- identify common objectives;
- identify respective roles and responsibilities for training, facilitation, implementation, monitoring, support and follow-up;
- ensure that health messages are consistent, complementary and clear;
- give hygiene monitoring and evaluation information to local public or environmental health service departments; and
- provide specific information regarding follow-up, monitoring and support.

Further reading

Fonseca, C. et al., 2011. Life-cycle costs approach: costing sustainable services. (WASHCost Briefing Note 1a) [online] The Hague: IRC International Water and Sanitation Centre. Available at: <http://www.washcost.info/page/1557> [Accessed 17 April 2012].

Potter, A. et al., 2011. Assessing hygiene cost-effectiveness. (WASHCost Working Paper 6) [online] The Hague: IRC International Water and Sanitation Centre. Available at: <http://www.washcost.info/page/1629> [Accessed 17 April 2012].

1.7 Hygiene service levels

This handout explains hygiene service levels and service criteria.

In the life-cycle costs approach, costs are compared and assessed in relation to the level of hygiene service delivered. Services are ranked in a 'ladder', from low to high, based on criteria for the level of functionality, rather than technology. Each step up the service delivery ladder requires a different combination of infrastructure, management systems and human resources.

Five hygiene service levels

A hygiene service level characterises the benefits that users receive, measured by a combination of the following criteria: faecal containment and latrine use; handwashing with soap or substitute; and drinking water source and management. Table 1 summarises the five service levels, from no service to highly improved.

Table 1 WASHCost hygiene effectiveness ladder

Effective-ness levels	Faecal containment and latrine use	Hand washing with soap/ substitute	Drinking water source and management
Highly improved	- All household members use a latrine all the time - The latrine used separates users from faecal waste	Washing station in the household supplied by a household tap providing adequate water - Soap or substitute available and used at critical times	- Protected water sources always used - Collection vessel (if necessary) is regularly cleaned with soap or substitute - Water storage vessel (if necessary) is covered - Water is drawn in a safe manner
Improved	- All household members use a latrine most of the time. - The latrine used separates users from faecal waste - When there is no access to a latrine, faeces are generally buried		- Protected water sources always used - Collection vessel (if necessary) is regularly cleaned with ash or soap - Water storage vessel (if necessary) is covered - Water is not drawn in a safe manner
Basic	- All or some household members use a latrine some or most of the time - When there is no access to a latrine, faeces are generally buried. - The latrine separates users from faecal waste	- Household or compound has a washing station with safe water storage - Soap or substitute available and used at critical times	- Protected water sources always used - Collection vessel (if necessary) is regularly cleaned with soap or substitute - Water storage vessel (if necessary) is uncovered AND/OR - Water is not drawn in a safe manner

1.7 Hygiene service levels

Effective-ness levels	Faecal containment and latrine use	Hand washing with soap/ substitute	Drinking water source and management
Limited	- The latrine does not provide adequate faecal separation AND/OR - All/some family members generally do not bury faeces when not using a latrine AND/OR - All family members practice burying faeces	- Household or compound has a washing station with unprotected water storage AND/OR - No soap or substitute is available AND/OR is not used for hand washing	- Protected drinking water sources are not always used AND/OR - Collection vessel is not cleaned
No	Open defecation	Household members have no specific place to wash their hands and usually do not wash their hands after defecation	Unsafe sources mostly/always used to collect drinking water

Source: adapted from WASHCost's proposed service levels and indicators by Potter et al., 2011, p. 9.

The household service level is determined by the lowest level of service on any of the three service criteria[1]. These criteria can vary across countries, with the basic level of service being the national norm. Typically, a higher level of service means more of every criterion. Each criterion is measured by one or more indicators. For example, the indicator faecal containment and latrine use is measured by a combination of indicators such as latrine availability, number of family members using the latrine, frequency of use by each family member, and practice of burying faeces when defecating in the open[2].

No service

There is no separation between the user and faeces, e.g. open defecation, and unsafe sources are used to collect drinking water.

Limited service

Latrines are inadequate to separate faeces from the user, often not used, hand washing occurs in an open container, and drinking water sources are usually not safe.

Basic service

Human faeces are contained by a latrine or faecal burial used by most household members most of the time, hand washing facilities are within reasonable access, protected drinking water sources are used, but storage is not safe.

[1] For more information on the five indicators of water service levels, see Potter et al. (2011).

[2] Examples on how to measure the service criteria on faecal containment and latrine use; handwashing with soap or substitute; and drinking water source and management are represented as flowcharts in Potter et al. (2011, pp. 14-19).

1.7 Hygiene service levels

Improved service

Human faeces are contained, latrines are used by all household members, hand washing station prevents water contamination, hands are washed with soap or substitute, only protected drinking water sources are used, but storage containers are not covered.

Highly improved service

Human faeces are contained and inaccessible to humans and animals. Ground and surface water is not contaminated, all household members use a latrine all the time, hand washing station has running water and soap, only protected drinking water sources are used, collection vessels are washed and covered, and drawing method is safe.

Why service levels matter

Identifying the level of service received by users allows planners and providers of hygiene services to use cost comparisons in policy decisions that go beyond building infrastructure. In the life-cycle costs approach, the costs of sustainable hygiene service delivery are compared against the level of service received by users. This information can help governments, investors, donors and service authorities make decisions on where it is most cost-effective to invest, plan for replacement infrastructure and extend delivery systems in response to increased demand. It enables planning for services that will last.

Box 1 The life-cycle costs approach

Life-cycle costs are the costs of ensuring adequate water, sanitation, and hygiene (WASH) services to a specific population in a determined geographic area—not just for a few years but indefinitely. Life-cycle costing goes beyond the cost of constructing new systems to include the cost of maintaining them in the short and long term and at higher institutional levels. Costs for both district and national administration and planning are included, as are the costs of replacing and extending infrastructure. With the life-cycle costs methodology, governments, investors, donors and users can develop and maintain their own cost databases and incorporate them into management information systems and decision-support tools.

Further reading

Fonseca, C. et al., 2011. Life-cycle costs approach: costing sustainable services. (WASHCost Briefing Note 1a) [online] The Hague: IRC International Water and Sanitation Centre. Available at: <http://www.washcost.info/page/1557> [Accessed 17 April 2012].

Potter, A. et al., 2011. Assessing hygiene cost-effectiveness. (WASHCost Working Paper 6) [online] The Hague: IRC International Water and Sanitation Centre. Available at: <http://www.washcost.info/page/1629> [Accessed 17 April 2012].

1.8 Service delivery approach

This handout explains the service delivery approach, why it was developed and how it is linked to life-cycle costing.

A service delivery approach[1] is a concept for ensuring the sustainability of rural WASH services. It seeks to improve on the record of project- and implementation-focussed approaches (Figure 1, left), in which users initially enjoy good service (red line) after construction of a water or sanitation system (blue rectangle). But without support and proper asset management, the system quickly starts to deteriorate until it collapses completely. At some time in the future a new system is built, typically by another agency.

In a service delivery approach (Figure 1, right), a water system or sanitation facility (blue rectangle) is maintained indefinitely through a planned process of low-intensity administration and management, with occasional capital-intensive interventions to upgrade the service level (red line) and to replace the infrastructure at the end of its useful life.

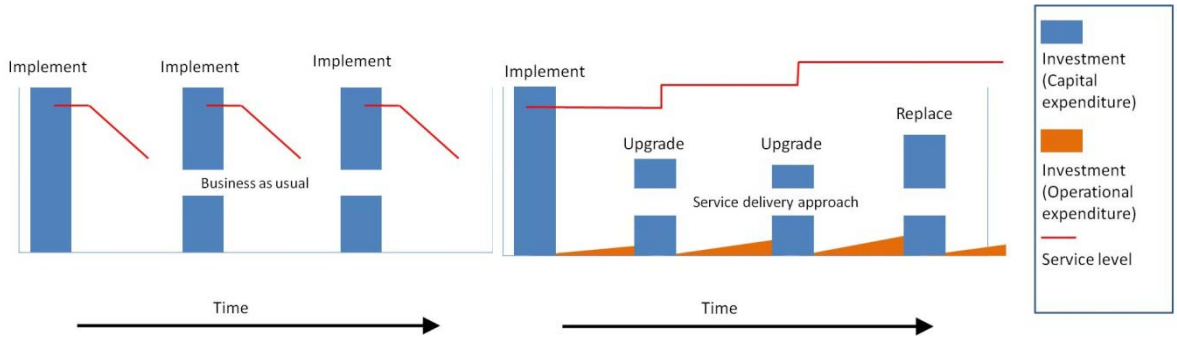

Figure 1 **Project approach versus service delivery approach**
Source: Triple-S, 2011.

Table 1 summarises the differences between the two approaches.

Table 1 **Comparison of approaches**

Project and implementation-focussed approach	Service delivery approach
Tends to focus on system construction, with limited attention to post-construction support	Focusses on both infrastructure and postconstruction activities (operations, maintenance, training, monitoring, support, etc.)

[1] A service delivery approach is an initiative of Triple-S (Sustainable Services at Scale) in collaboration with the WASHCost project. Triple-S began in 2009 and is a six-year, multi-country learning initiative, led by the IRC International Water and Sanitation Centre, to improve water supply to the rural poor. For more information, see *www.waterservicesthatlast.org*

1.8 Service delivery approach

Project and implementation-focussed approach	Service delivery approach
Often executed by temporary project structures or staff	Roles and responsibilities defined at national, service authority and service provider levels
Water supply often planned and implemented at system or community level	Services planned and implemented at intermediate level (district, municipality, region), allowing for economies of scale
Limited financial planning for initial investment and only small-scale repairs and replacement of parts	Considers financing requirements for full life-cycle costs at the outset to ensure asset replacement
Operates within finite timeframe linked to project cycle	Operates within unlimited timeframe for continuous service delivery; applies appropriate management and technical interventions at different times to individual systems
Works within defined geographic boundaries but may not seek full coverage	Works to achieve full coverage within defined geographic or administrative boundaries
Different actors work bilaterally and often fund parallel projects, with different policies and intervention criteria	Seeks to coordinate all actors to work collectively under overarching strategy, including commonly agreed models for different types of services
Resource efficiencies are rarely optimised	Aims to maximise efficiency of available resources

Source: Triple-S, 2011.

The service delivery approach and life-cycle costing

A service delivery approach aims to provide long-term services. Thus it goes hand-in-hand with life-cycle costing, which accounts for costs over the entire life-cycle of a service—both the initial engineering and construction of infrastructure and the software (capacity building, institutional support, financial planning) and maintenance required to sustain a certain level of water and sanitation services (Figure 2). Life-cycle costing provides the framework and information needed to budget and plan for service delivery into the indefinite future.

A service delivery approach requires defining roles and responsibilities for multiple actors working at different levels and improving coordination and harmonisation among their activities.

1.8 Service delivery approach

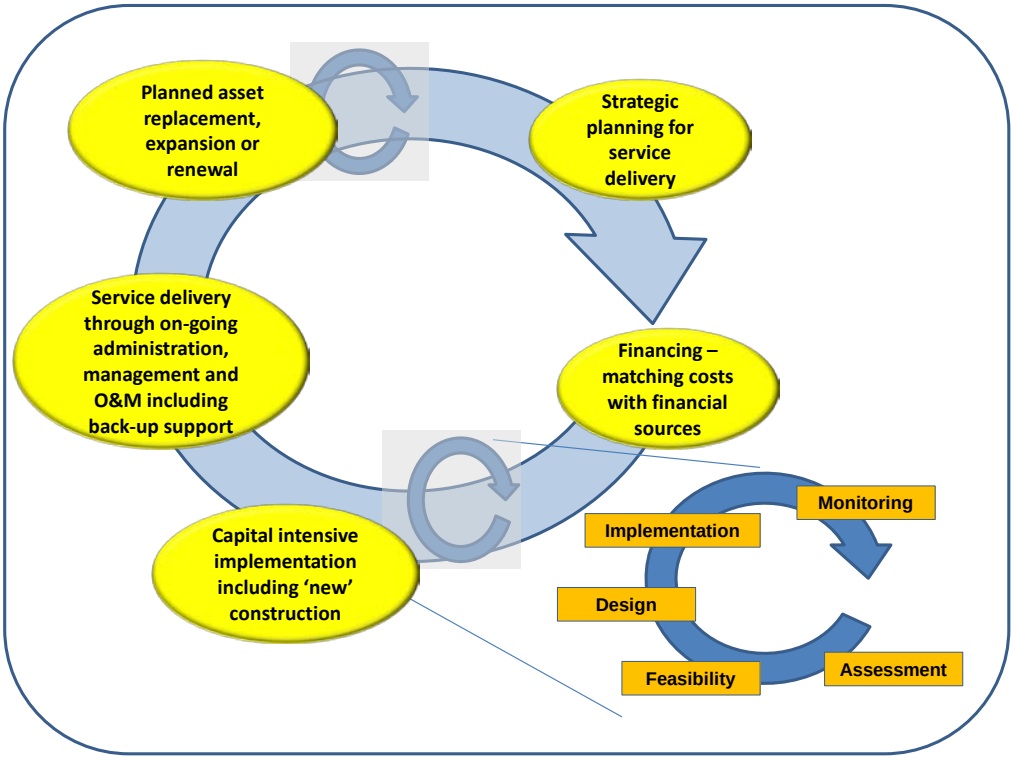

Figure 2 Stages in service delivery cycle
Source: Lockwood and Smits, 2011.

Why the service delivery approach matters

In the early 1990s, an estimated 30% to 40% of rural water supply systems in developing countries were not working. This failure rate has not changed much, and studies indicate that a similar proportion of systems, particularly handpumps, either do not function at all or are working at suboptimal levels (Evans, 1992; RWSN, 2009; WaterAid, 2009 in Lockwood and Smits, 2011). An analysis of the life-cycle costs of sanitation services in Andhra Pradesh, India, found that 10% to 30% of villages that had been awarded open defecation-free status were experiencing a return to open defecation by some residents. The underlying cause is the emphasis on building systems rather than delivering permanent services.

Because of the failure to focus on service delivery, the following problems have emerged:

- In the developing world, approximately one in three rural water supply systems is not working. Hundreds of millions of dollars has been wasted on infrastructure investment, and millions of people have returned to fetching water from distant, unsafe sources to the detriment of their health, education and livelihoods.
- True life-cycle costs are poorly understood and are not planned for, resulting in extended down time or the complete abandonment of systems, while funding for major repairs or replacement is sought.

1.8 Service delivery approach

- Community management—the predominant service delivery model—has limitations and is inherently unsuited to scaling up.
- Donors and NGOs have often taken their own approaches to implementing rural water supply projects, building systems without ensuring the institutional structures needed to sustain long-term services. Rural water sectors remain weak, despite significant investment.

Further reading

Lockwood, H. and Smits, S., 2011. *Supporting rural water supply: moving towards a service delivery approach.* The Hague: IRC International Water and Sanitation Centre and Wivenhoe: Aguaconsult.

1.9 Service authorities and service providers

This handout explains what is meant by service authorities and service providers and how these terms are used in the life-cycle costs approach[1].

Service authorities and providers are the main actors in rural and peri-urban water, sanitation and hygiene service delivery. The **service authority** is the institution that is ultimately and legally responsible, particularly under human rights legislation, for ensuring that WASH services are provided. Under decentralisation, this responsibility typically lies with local government. The service authority is accountable for planning, coordination, regulation, oversight and technical assistance but not necessarily the service provision itself. The **service provider** is the organisation or individual responsible for the day-to-day provision of water and for such tasks as the operations, maintenance and administration of the water system.

Service delivery functions

Broadly speaking, the service authority and the service provider are the two lower levels in a hierarchy, with the national or central government at the top. Each level has its own responsibilities in the WASH sector (Figure 1).

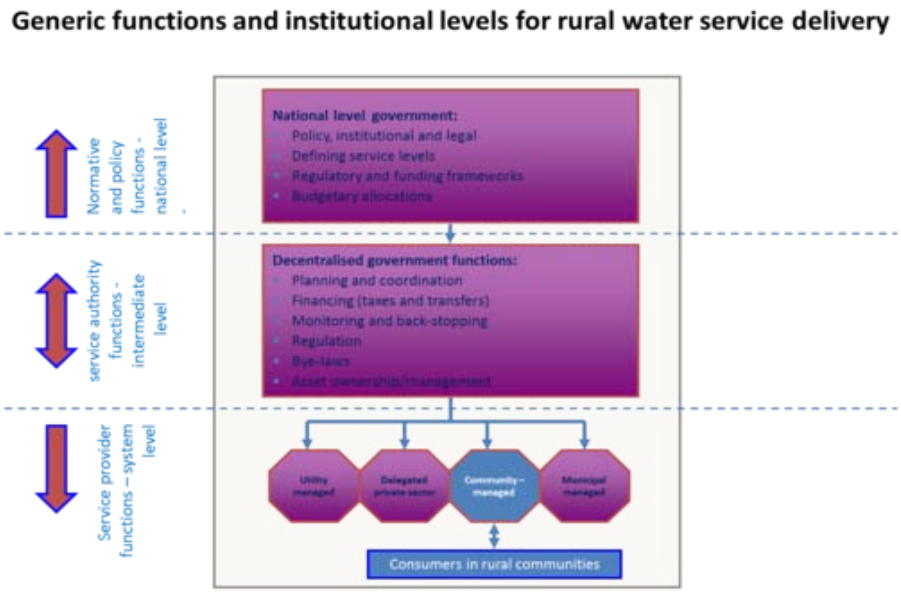

Figure 1 Rural and peri-urban WASH service delivery
Source: Lockwood, Smits and Schouten, 2012.

[1] This handout is based on the concepts and tools developed by Triple-S, an IRC initiative to help build services that last. See *http://www.waterservicesthatlast.org/Resources/Concepts-tools/Institutional-functions-and-levels*

National level: policy, normative and support functions

The national government determines the overall environment by setting sector policy, establishing norms and regulatory frameworks, defining service levels, conducting macro-level financial planning and coordinating with development partners. It can also be the level where broad sector development support functions are carried out, such as the promotion of learning, piloting and innovation, overall sector guidance and capacity building. In federal countries, states may also execute some of these functions. Support and backstopping functions are frequently carried out by the central government's regional offices.

Intermediate level: service authority functions

Service authority functions include planning, coordination and oversight in a geographic area of jurisdiction. The responsibility for these functions typically lies at the intermediate level (i.e., the district, commune, governorate or municipality between the national level and the local level). In some cases, local government entities own the physical assets of rural water supply systems, but this varies from country to country. Arguably, monitoring and technical support for service providers are the responsibility of the service authority, but these functions may also be contracted to other entities (private or public) or carried out by national agencies' regional offices.

System level: service provider functions

The day-to-day management of a water or sanitation service includes operation, preventive and corrective maintenance and administrative activities (bookkeeping, tariff collection, customer care, etc.). The service provider may also own the assets and have investment functions under certain arrangements. Typically, the service provider functions are found at the level of a community or group of communities, depending on the size and scale of the water supply system or sanitation service in question. Under community-based management, these functions are fulfilled by either a dedicated community-based service provider (water committee, water board, water users association, etc.) or a more general community-based organisation, such as a village development committee. Where community-based management is more professionalised, the service provider delegates or subcontracts certain tasks to an individual (plumber or technician) or local private operator. Under self-supply, the individual household fulfils the service provider function.

To provide services, most countries have a range of options. The service authority can provide services itself (through a municipal department or municipal company), delegate this responsibility to an outside agency, such as a community-based organisation, or contract with a private operator, NGO or public sector utility or company, which in turn may hire a private person (plumber or mechanic) to carry out parts of the work.

Why service functions matter

Historically in the rural water sector, institutional functions and the level at which these functions are carried out have not always been clear. In many countries, water sector reform and, more broadly, decentralisation have been slow, sometimes partial and frequently contentious; rural water supply has often received little attention. In cities, the planning, financing, operations and regulation functions have been clearly separated and assigned to different entities, in rural areas WASH responsibilities are often blurred and shared among central agencies, local governments and community-based service providers. The community-based service providers often lack formal legal status and hence have been unable to assume formal roles and responsibilities. Many development partners—including international NGOs, water charities and even programmes funded by bilateral donors—have ignored institutional mandates and boundaries, choosing instead to develop their own parallel institutional frameworks. In some cases, central government agencies have resisted decentralisation and not devolved powers to local authorities.

1.9 Service authorities and service providers

The result is a lack of clarity about which approach service providers and service authorities should follow—the institutional framework or 'the rules of the game'? Many interventions funded in the rural water sector have been based on mistaken assumptions about who legally owns the infrastructure assets and who is responsible for them. Well-intended projects and programmes have sought to fill the vacuum, sometimes with unintended consequences. For example, community water committees have been granted management responsibilities but in reality are not legal entities; that status greatly restricts their ability to support services to rural consumers. Even where functions are clearly understood, lack of capacity, especially at decentralised levels of government, is a major constraint to sustainable service delivery.

Further reading

Lockwood, H. and Smits S., 2011. *Supporting rural water supply: moving towards a service delivery approach*. London: Practical Action and The Hague: IRC International Water and Sanitation Centre. Available at: <http://www.source.irc.nl/page/67155> [Accessed 22 November 2011].

Smits, S. et al., 2011. *Arrangements and cost of providing support to rural water service*. (WASHCost Working Paper 5) [online] The Hague: IRC International Water and Sanitation Centre. Available at: <http://www.washcost.info/page/1567> [Accessed 17 April 2012].

1.10 Service delivery models

This handout explains what a service delivery model is and how it is used in the life-cycle costs approach[1].

A service delivery model is the way a water or sanitation service is provided. It defines the legal and institutional scope for delivering service, including commonly understood and accepted roles for the organisations involved. It includes all of the following:

- the service to be provided (level of quality, reliability, access, etc.)
- the infrastructure used to deliver the service
- the management system needed to operate and maintain the infrastructure
- the revenue mechanism that will make the service financially sustainable

The management system refers to the institutional arrangements for the service provider, which is supported by the service authority[2].

Service delivery models are guided by the country's existing policy and legal frameworks. These frameworks define the norms and standards for sanitation and water supply; the roles, rights and responsibilities of the providers and users; and financing mechanisms at national level. Service delivery models thus cut across different institutional levels.

Service delivery models for water and sanitation differ by level of service provided, type of infrastructure and management system. Four kinds of service delivery models are commonly used:

- community-based management
- public sector operators
- private sector operators
- self-supply

The different models may be used simultaneously within a country or even within a single decentralised administrative unit. Figure 2, on the next page, shows the water service delivery models used in Ghana.

The choice of service delivery model often depends on the context, such as: the area's water resources, geology, demography and users' preferences. Utility service delivery models, for example, are common in densely populated urban areas where consumers can easily be connected to a central piped system. Community-based management service delivery models are often applied in rural areas and small towns, though each may have different technology or service levels.

[1] This handout is based on the concepts and tools developed by Triple-S (Sustainable Services at Scale), an initiative that help build services that last. See *www.waterservicesthatlast.org/Resources/Concepts-tools/Service-Delivery-Model*

[2] Service providers and service authorities and their functions are covered in **1.9: Service authorities and service providers** of the Costing Sustainable Services Training Package.

1.10 Service delivery models

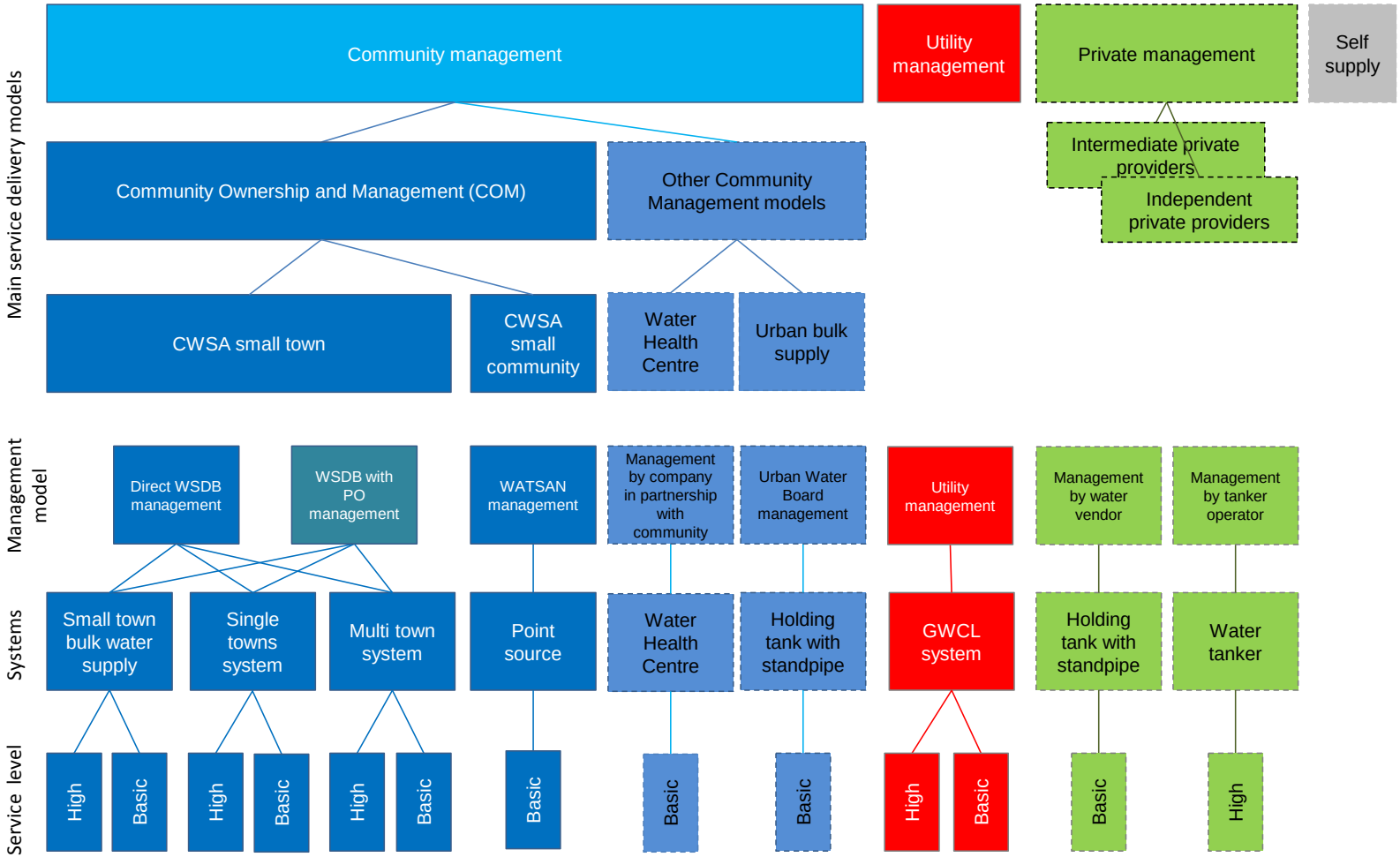

Figure 1 **Service delivery models in Ghana**
Source: Adank and Smits, 2012.

Why service delivery models matter

In the life-cycle costs approach, service delivery models are used to compare the costs of providing a service and the service levels received by users in different areas. To compare service levels and costs, it is important to understand not just which technology is used but also how the service is actually delivered. The service delivery model describes the practical implementation of a water or sanitation service.

Two examples based on WASHCost's research findings:

- *Comparing service delivery models for self-supply and community-based management*: In rural Burkina Faso, the per person cost of a service delivery model using a mechanised borehole supply as the technology option is very high–US$ 426 per user–because the systems are serving only one-fifth of the number of people they are designed for. Despite the very high cost, typically only 36% of users of these systems receive a basic service from this model, compared with 30% of users in a service delivery model using a borehole and handpump as the preferred technology option; these systems cost only US$ 65 per user.

- *Comparing service delivery models for utility management, private management, and community-based management:* In Ghana, a service delivery model using a piped supply as a technology option is more expensive, but provides better service than a service delivery model using borehole with handpump. Although both models can suffer from overcrowding at the access point, users of the service delivery model with a piped system as a technology option tend to receive higher quantities of water and a more reliable service in areas where local boreholes could be polluted: 48% of the piped supply users receive a basic service that costs US$ 98 per user, compared with 22% receiving a basic service from borehole and handpumps, at US$ 20 per user.

A WASH sector that takes a service delivery approach[3] provides clear guidance on where and when to apply a specific service delivery model. The choice should not be arbitrary neither should it depend on the perceptions of implementers, lest people living in similar situations who receive different levels of service (or pay different amounts for the same level of service) simply because their service providers use different service delivery models.

[3] The service delivery approach is covered in **1.8: Service delivery approach** of the Costing Sustainable Services Training Package.