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Infrastructure Asset Management: a key building block for sustaining rural water services

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With high levels of non-functionality and low levels of service, it is clear that rural water assets are not being adequately managed. It is also a symptom of the current focus on first time access, which needs to shift to a focus on long term service delivery. There is a need for actors within the rural water sector to follow other infrastructure-heavy and professionalised industries, and start adopting asset management practices. This paper gives an overview of the main components of infrastructure asset management and makes a case for wider adoption in the rural water sector (for all types of rural water systems, including both hand pumps and piped schemes) in developing countries. It provides new evidence from a case study on good practices from rural municipalities in South Africa and identifies first steps for under-resourced municipalities.

High levels of breakdowns of rural water supply facilities are being recorded throughout developing countries (as high as 67% in Sub-Saharan countries (RWSN, 2009), with the main cause being the inability to ensure timely maintenance and associated financial planning. In developed countries and in the urban water sector in developing countries, professional service providers have been forced by a combination of factors (e.g. regulation, complexity of systems, high demand, contractual obligations) to tackle these issues and develop a range of tools to ensure services are and maintained at the agreed level and are not discontinued. Having an asset management system in place is vital for service providers that depend on the function and performance of their physical assets for the delivery of services or products, as their success is significantly influenced by the stewardship of its assets (IAM, PAS-55, 2008). In the rural water sector however, assets are not managed satisfactorily and the political drive is still very much focused on increasing coverage rates.

A definition of Infrastructure Asset Management

The International Infrastructure Management Manual defines strategic asset management in terms of its goal, namely “*to meet present and future required levels of service in a cost effective way through the creation, acquisition, maintenance, operation, rehabilitation and disposal of assets*”.

Infrastructure asset management refers to “*Systematic and coordinated activities and practices through which an organisation optimally and sustainably manages its assets and asset systems, their associated performance, risks and expenditures over their life-cycles for the purpose of achieving its organisational strategic plan*” (IAM, PAS 55, 2008). Asset management is not a one-off project, but an ongoing process, which requires planning and budgeting, adapting to user demand, establishing performance objectives, ensuring close monitoring, and facilitating a series of decisions regarding the acquisition, creation utilisation, maintenance, renewal and disposal of assets.

The importance of infrastructure asset management for rural water services

Assets in the water sector refer to the various physical components of water systems (e.g. pipes, pumps, reservoirs, meters, generators, storage tanks, valves). Their management includes all activities required

throughout the asset's life-cycle. This life-cycle spans the planning to decommissioning phases. Asset management is thus broader, more comprehensive and complex than planned operation and maintenance.

As for other infrastructure heavy service sectors (e.g. transportation, electrical utilities), the primary objective of IAM in the rural water sector is to ensure the service is maintained at its established level in terms of quantity, quality, reliability and accessibility (according to national standards and/or contractual obligation), thus ensuring people's basic human right of access to water service over time. This is particularly important in rapidly developing countries where coverage rates have reached a significant level, but "slippage" associated with people resorting to unimproved sources, is becoming the main concern.

The second objective of IAM is to maintain the value of assets over their full life-cycle and prolong their optimum performance, as shown in Figure 1. Well-planned asset management leads to fewer breakdowns and thus avoids the associated costs, which are often difficult to cover by under-resourced authorities and service providers. IAM also facilitates a shift in the focus on coverage only, to a focus on the value of investments in the ground that risk being wasted by lack of appropriate planning and management.

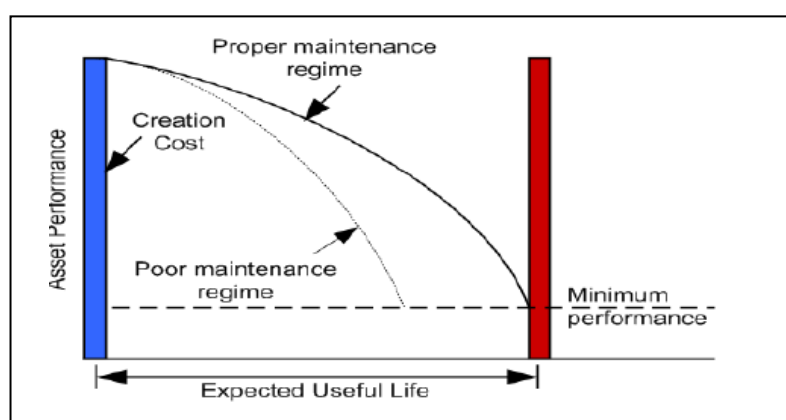


Figure 1. Example impact of maintenance on the lifespan of an asset

Source: Department of Water Affairs and Forestry, South Africa (2008)

Implementing infrastructure asset management in the water sector

The main components of asset management

The development of an effective infrastructure asset management strategy relies on a number of resources and key steps. These are listed below.

1. Development of an asset inventory (or asset register) is the first step required for effective management. This includes a clear definition of categories, hierarchy, physical attributes, asset valuation and accounting data. In South Africa for example, infrastructure asset hierarchies are defined in the following level of detail: i) scheme, ii) asset group, iii) asset facilities, iv) asset components. Information on type, location, condition, ability to perform key functions and estimated remaining useful life can be found to serve as a tool for technical and financial management and thus must remain functional and up to date for their needs.
2. Assessment of asset condition and performance, carried out through routine physical monitoring or indirect observations for underground assets. This allows the condition of an asset to be accurately tracked and required maintenance to be identified. This step should also be linked up to technical specifications of suppliers (support to planning) and can be done using a grading system for determining whether assets should be replaced, repaired or maintained depending on their condition, performance and associated risk of failure.
3. Valuation of assets, carried out to reflect fair value of assets. This can be determined using either age-based depreciation or condition-based management

4. Monitoring and data collection: asset management planning is data intensive and asset monitoring is costly. In developing countries where capacities are often limited, the Pareto principle (the 80/20 rule which states that that 80 percent of the output from a given situation is determined by 20 percent of the input) is useful to keep in mind. A systematic but rapid scan of infrastructure condition and critical problems may be sufficient for improved financial planning and more practicable cost effective than more detailed assessments.

Accurate assessment of asset condition and performance coupled with a deep understanding of assets' modes of failure and associated risk, which vary largely from electrical, to mechanical and physical components; leads to the development of an asset management plan.

Implementation of the asset management plan includes the establishment and implementation of maintenance processes and procedures and control activities across the whole life- cycle, including the creation, acquisition, financing, enhancement, utilisation, maintenance, decommissioning and disposal or assets.

Entities responsible for IAM

In urban areas, asset management is generally carried out by service providers, with oversight by a regulator, either the local government or a national regulatory body. In rural areas, responsibility for asset management is more fragmented, with both service providers (typically community-based organisations) and service authorities (typically local government) responsible for certain tasks related to asset management. The exact balance in task division between the two groups depends on the scale and complexity of technology, but also the availability of financial and technical resources. For example, water committees typically carry out the maintenance of water points, whilst service authorities monitor functionality of water points in their jurisdiction and take strategic decisions related to investment, rehabilitation and decommissioning.

Main barriers to effective asset management in the rural water sector

Despite its critical importance for ensuring long term service delivery, asset management is rarely carried out in the rural water sector. Some of the main explanatory factors are listed below:

- The rural water sector is driven by short term and piecemeal investment funding, dedicated to initial capital costs of building the infrastructure. This is very much driven by political pressure to demonstrate higher coverage rates, rather than a focus or prioritisation of the sustainability of services delivered to the population. This is coupled with a lack of resources in general for the sector as a whole, both long and short term;
- There is a general lack of knowledge of life-cycle costs associated with the long-term maintenance of rural water services, leading to unrealistic assumptions over resources that can be mobilised in different contexts through tariffs, transfers and taxes;
- There is a lack of clarity over the division of responsibilities amongst central and local government (service authorities), but also between service authorities and services providers in relation to asset ownership and funding of life-cycle costs, as evidenced by the table 1 below (Burr, 2013).

All these points demonstrate and reinforce the surprising lack of a professional approach to regulating and managing rural water.

Organisation	Capital expenditure		Operational expenditure		Capital maintenance expenditure		Expenditure on direct support	
	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Communities								
District Assembly								

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Community Water and Sanitation Agency								
Donors								
Others: Church groups etc...								

Black fill = commonly financed, Dark grey fill – occasional financed, Light grey fill – rarely financed, no fill – not financed

Source: Burr, 2013

An ongoing case study on asset management in South African municipalities

A legislative framework in place

South Africa is one of the few African countries to have developed a strategy for infrastructure asset management. This includes a supporting implementation framework and guidelines, to make sure local governments have the necessary information and support to adopt principles of infrastructure asset management for all types of infrastructure under their responsibility- not just water supply.

The existence of these written strategies, policies and the adoption of an annual audit of local governments' performance, including those related to asset management (called "the blue drop" audit¹), coupled with a relatively well-resourced water sector compared to other countries in Africa, constitute a case for gathering examples of good practices.

A Triple-S case study on two municipalities

As part of the Sustainable Service at Scale Initiative, (Triple-S) IRC/Aguaconsult and Maluti Water are carrying out a study on uptake of IAM practices in two rural municipalities in South Africa: Amathole District Municipality and Chris Hani District Municipality in the Eastern Cape. These municipalities were selected on the basis of their good performance with regard to water delivery (functionality levels and service levels) and uptake of asset management practices.

Through a series of interviews with national stakeholders focused on the overarching legislation and municipal representatives, this study aims at the following:

- Building a picture of current policies, approaches and tools used for asset management in two well-performing rural South African municipalities.
- Documenting the main elements of IAM taken up by well-performing rural municipalities, the factors leading to this uptake and their incentives for doing so and the political, technical and financial challenges encountered by municipal staff in adopting an asset management approach;
- Developing a cost-benefit analysis of adopting IAM. This will focus on linking up the costs associated with IAM practices and the level of water service offered to the population in these municipalities.
- Assessing the link between the uptake of IAM, the general performance of municipalities and the services provided to the population.

This will support the testing of the following assumptions, commonly shared in the sector: i) asset management has a value and leads to good operation and maintenance and ii) there is a link between asset management and service delivery.

The research team will use a combination of PAS-55², the *Local Government Capital asset Management Guidelines* (National Treasury, REF) and the *Blue Drop Services Audit requirements* (Department of Water Affairs, REF) as benchmarks for assessing the current asset management practices in each of the two study municipalities. In particular, the study will seek to identify the following elements of IAM practices:

- Asset knowledge,
- Strategic planning processes,
- Asset Management plan,
- Information systems,
- Organizational tactics.

Detailed results of this study will be available by June 2014 and lessons learnt will be disseminated in the three Triple-S focus countries (Ghana, Uganda and Burkina Faso) and fed into the on-going discussions, both at national and local levels.

Where can under-resourced rural municipalities start?

Each municipality must find the appropriate level of practices to suit its infrastructure profile but does not need to implement advanced practices of asset management immediately. In South Africa, requirements are split into three categories: i) basic, ii) intermediate and iii) advanced which offer options for different contexts and situations. The categories are presented below:

Category	Activity
Basic asset management	<ul style="list-style-type: none"> • Standard project planning for specified service levels and demands for the next 20 years • Project implementation in accordance with South African National Standards (SANS) and the Municipal Infrastructure Grant (MIG) process • Basic O&M skills and capacity to maintain service delivery • Compliance to minimum accounting standards to obtain approval of the Auditor General • Identification of the most critical assets and their related risk management requirements • Billing systems and cost recovery to maintain financial viability for the service delivery
Intermediate asset management	<ul style="list-style-type: none"> • Comprehensive feasibility studies to project service level developments and water demands • Project implementation in accordance with SANS standards and MIG process • Skills training and capacity building to improve O&M efficiency (e.g. reduce water losses to best practices level) • Compliance to improved accounting standards to demonstrate progression to the Auditor General • Compilations of a comprehensive risk register utilizing asset criticality, likelihood of risk events and the impact thereof. This will result in a first-order risk management action plan with priorities and intervention strategies • Enhanced financial management practices to improve viability for the service delivery
Advanced asset management	<ul style="list-style-type: none"> • Real-time monitoring of water demands and losses combined with predictive modeling for future service levels and demands based on socio-economic development indicators • Project implementation in accordance with SANS standards and the MIG process • Advanced O&M control and monitoring systems to inform operational actions • Advanced accounting standards to be rewarded above average efficiency and productivity ratings by the Auditor General • Comprehensive risk management developing and utilizing a risk response register where all risk events are rated (e.g. impact, likelihood, risk exposure) and countered with a series of risk treatments to maintain acceptable risk levels for the level of assurance specified for the water services being delivered • Financial management practices that achieve profitability and economic growth using sophisticated billing and cost recovery systems

Source: Department of Water Affairs and Forestry, South Africa (2008)

International good practice (IAMM, 2006) also recommends the development of a grading system for assets, to identify the condition and performance of each asset using a 1 to 5 scoring system for particular elements of performance/critical failure. The grading system can be simple or complex, depending on the capacity of the asset manager.

However, given that asset management is resource intensive, municipalities challenged by drastic funding shortages can take very preliminary steps. In Malawi, Engineers Without Borders and Wateraid have supported districts in the development of water point mapping, using an inexpensive excel database. Although this activity does not in itself constitute asset management per se, regular monitoring of systems and services does constitute a crucial first step.

Conclusion

As evidenced by low levels of functionality and even more alarmingly low levels of service in many Sub-Saharan African countries, there is a need for the rural water sector to shift from a focus on increasing coverage, to a more systematic approach to managing the assets currently in place.

Although asset management should be a common business practice in all infrastructure dependant industries, as it ensures services are maintained at the agreed level and bulky costs avoided, it is rarely taken up in the rural water sector. This is mainly due to the lack of focus on long-term funding, unknown costs of maintaining services over their life time and unclear responsibility for asset ownership and management. However, we expect that documentation of good asset management practices in the rural water sector in South Africa will bring out the following lesson learnt:

- Adopting asset management practices has benefits in terms of service delivery and there is a direct link between the adoption of asset management practices and the functionality of the water services, along with their level of services.
- Under-resourced municipalities in developing countries can and should take up useful first steps such as developing and updating asset registers and inventories and water point mapping before adopting and implementing fully-fledged IAM strategy and plan.
- Adopting asset management practices is resource intensive, both in terms of human resources and direct costs and requires strong political leadership to bring together technical and financial constraints together in any given context.

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Note/s

¹The water sector introduced in 2008 an incentive based regulation and the concept was defined by two programmes: the Blue Drop Certification Programme for Drinking Water Quality Management Regulation and the Green Drop Certification Programme for Wastewater Quality Management Regulation, both materialised by an annual audit of municipalities' performances with regard to water and sanitation.

²The Publicly Available Specification 55 (PAS 55) outlines a set of requirements and guidelines to assist organisations manage their physical assets in an optimal fashion. It is a strategic framework within which asset management can be implemented. PAS 55 is the internationally recognized benchmark for the implementation of IAM and includes both general specifications for the management of physical assets, as well as guidelines for their application. PAS-55 is gaining traction in South Africa, as evidenced by the recent public call to use it for assessing Umgeni Water's asset management systems.

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