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Asset management in rural South Africa

A case study of Amatole and Chris Hani district municipalities

Julia Boulenouar and Jim Gibson

Supporting water sanitation
and hygiene services for life



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Infrastructure asset management is a series of systematic and coordinated management practices that help maximize performance whilst minimising costs and associated risk. It can help water service providers and authorities ensure that services are maintained at the agreed level and that new services are provided according to strategic priorities. Even though basic asset management principles can increase cost-efficiency and help sustain services, they are not a common practice in the rural water sectors of developing countries. This case study looks at the implementation of asset management in two municipalities of South Africa.

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Abbreviations

ADM	Amathole District Municipality
CHDM	Chris Hani District Municipality
DWA	Department of Water Affairs (from 1994)
DWS	Department of Water and Sanitation (until 1994)
GIS	geographic information system
GRAP	generally recognised accounting practice
WSA	water service authority
WSP	water service provider

Introduction

Infrastructure asset management is a series of systematic and coordinated management practices that help maximize performance whilst minimising costs and associated risk. It can help water service providers and authorities ensure that services are maintained at the agreed level and that new services are provided according to strategic priorities. Even though basic asset management principles can increase cost-efficiency and help sustain services, they are not a common practice in the rural water sectors of developing countries. This case study looks at the implementation of asset management in two municipalities of South Africa.

Both in developed countries and in the urban water sectors in developing countries, professional service providers have responded to regulatory constraints, system complexity, demand for services and contractual obligations by developing a range of management tools to ensure that services are maintained at an appropriate level.

The rural water sector, however, is lagging far behind, as evidenced by high levels of dysfunctionality in developing countries—as high as 68% in sub-Saharan Africa (SNV, 2013). With the political focus on first-time access, lack of professional management and weak commitment to village-level operation and maintenance, the sector is currently bedevilled by insufficient planning and budgeting to maintain basic service.

Asset management is a recognized approach to maintaining infrastructure and using public funds wisely.

Look after the infrastructure, so that it yields the intended results and lives the life it is supposed to live, for the benefit of the consumers Asset management is also about making the best possible use of every public Rand available to provide services to the unserved.

Moses Shasha, Water Services Manager, Chris Hani District Municipality

Following background information (Section 1), this paper explains the concept and principles of infrastructure asset management (Section 2), details the regulatory and budgetary basis of the approach in South Africa (Section 3), and compares the experience of two districts in its implementation (Sections 4, 5). A discussion of the findings suggests the need for a national-level asset management framework (Section 6). The paper concludes with recommendations (Section 7).

1 Framework of the case study

1.1 Background

A systematic analysis of 13 countries' rural water sectors in 2010 (Lockwood and Smits) identified asset management as one of the ten building blocks of sustainable water services. In 2013, a qualitative document analysis carried out through Triple-S identified both asset management and the adoption of a life-cycle cost approach as the two weakest building blocks¹ in the organisations studied². The adoption of asset management practices is particularly critical in rapidly developing countries where coverage rates have already reached a significant level and sustainability is becoming the main issue for national and local governments. To document and disseminate examples of good practice in asset management in rural areas, Triple-S carried out research, with a view to disseminating findings and stimulating discussions in IRC's focus countries (Ghana, Uganda and Burkina Faso).

South Africa was selected as the focus country for this particular research initiative because it is one of the few African countries to have developed a strategy for infrastructure asset management, with a supporting implementation framework and guidelines (see section 3.2) for local governments. It is important to note that although in South Africa, water services cover both water and sanitation, this report only deals with potable water.

Findings from South Africa may not be directly applicable to other countries. However, the authors find that lessons learned (including the need for sufficient funding over the long term) from this context can be useful in other circumstances.

1.2 Research objective and methodology

Through i) a desk-based review of documentation, ii) interviews with national stakeholders about sector legislation and iii) interviews with district municipal representatives (Annex 1), the case study aimed at achieving the following objectives:

- Documenting what elements of asset management were taken up by high-performing municipalities;
- Identifying the political, technical and financial challenges encountered by municipal staff in adopting an asset management approach;
- Analyzing the costs associated with the adoption of asset management practices; and
- Identifying the factors and incentives that encouraged adoption.

This would support the testing of two assumptions, commonly shared in the sector: i) asset management has a cost, and good operation and maintenance practices are part of it, and ii) good asset management improves service delivery.

The team comprised **Jim Gibson**, an engineer at Maluti GSM, a private consulting engineering firm based in South Africa, who has extensive experience working with a range of municipalities, both as a water service provider and as a technical adviser, and **Julia Boulenouar**, WASH

¹ These building blocks can be understood differently in other frameworks and would most probably include life-cycle cost analysis.

² IRC and Aguaconsult; Qualitative Document Analysis, 'Practice' Document Review; 2012

consultant at Aguaconsult, who is involved in the international work of the Triple-S initiative and experiments in Uganda and Burkina Faso, in addition to long-term technical assistance to development partners.

1.3 Selection of municipalities

The municipalities chosen for the study were known to have a good record of water service delivery and to have adopted specific asset management practices. Five such municipalities were identified in the Eastern Cape and Zululand regions. Logistical constraints—primarily the difficulty of travel to remote parts of the country—led to the final selection of two municipalities, Chris Hani District and Amathole District, both in the Eastern Cape.

1.4 Framework of analysis

The case study used recognised frameworks to document the uptake of asset management practices and test the research questions listed above:

- *Publicly Available Specification (PAS-55)*, an internationally recognised benchmark for implementing asset management.
- *Blue Drop Services Audit* requirements developed by South Africa's Department of Water and Sanitation, the national incentive-based auditing mechanism used to monitor the performance of water schemes.

In particular, the research focused on the following elements of asset management practices in place in both municipalities: asset knowledge, strategic planning processes, practices, planning, information systems⁴⁴ and organisational tactics (PAS-55.1).

2 Understanding infrastructure asset management

2.1 Referenced standards

A literature review revealed a wide range of documents on infrastructure asset management. The following three frameworks are widely regarded as important references and quoted as a basis for developing country-specific policies, strategies and guidelines more generally:

- PAS-55 is an internationally recognised benchmark for implementing asset management in any 'asset-heavy' industry. It includes specifications for the management of physical assets (PAS-55.1) and guidelines for their application (PAS-55.2). It is not specific to the water sector or to public institutions.
- The United States Environmental Protection Agency has developed best practice guides, guidelines for building an asset management team and handbooks for managing small public water systems to help local officials in the water sector.
- The Local Government Association of South Australia has developed resources for its members, including a handbook with templates for implementing asset management.

2.2 General principles of asset management

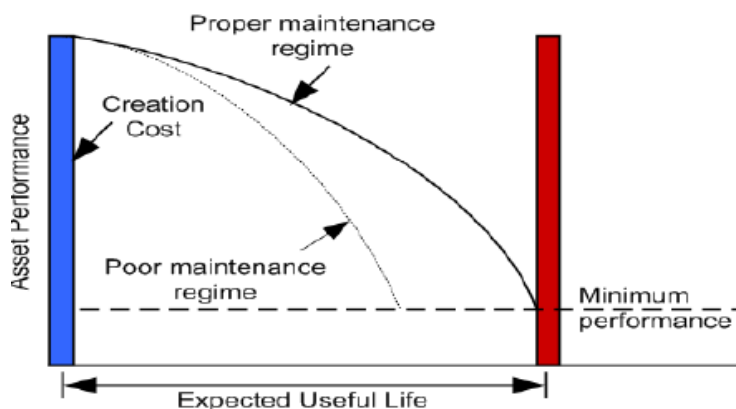
In essence, asset management is a body of management practices, using assets as the starting point for making operational and strategic decisions. It has been defined as

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 (PAS-55.2 p.V)

The objective of asset management is to deliver a required level of service in the most cost-effective manner through the management of assets for present and future customers.

In the water sector, *assets* are the physical components of water systems (water sources, treatment works, pipes, pumps, meters, generators, storage tanks, valves). Their *management* refers to the processes and decisions that ensure i) services are maintained at the agreed levels and ii) the value and functionality of the assets is prolonged to their maximum life to ensure optimum performance at the lowest possible cost. In short, asset management is about extracting an optimum functional life from any given piece of infrastructure. Well-planned, resourced and implemented asset management reduces costs by postponing expensive replacements and avoiding breakdowns and therefore constitutes a cost-effective strategy for asset owners and managers. Figure 1 illustrates how effective asset management can extend the lifespan of an asset through, for example, effective preventive maintenance.

FIGURE 1 EFFECT OF MAINTENANCE ON ASSET LIFESPAN

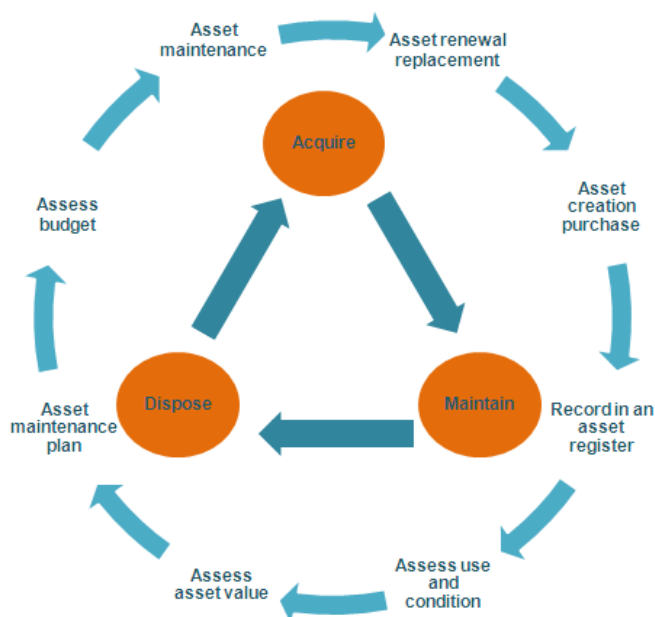


Source: Department of Water Affairs, South Africa, 2008

2.3 Steps of infrastructure asset management

Although asset management is commonly conflated with well-planned and adequately resourced operation and maintenance, it encompasses all the steps of service delivery, from the planning of assets to their decommissioning. For each of these steps, specific activities, tools and approaches can be identified to help the asset owner or manager achieve its objectives.

FIGURE 2 ASSET MANAGEMENT CYCLE



Source: South Australian Local Government Association, Community asset management guidelines for provincial and municipal staff

Asset management requires resources (technical and financial) and data and relies on accurate, up-to-date knowledge of existing assets—their condition, performance and associated risk of failure—and an understanding of service delivery responsibilities. The critical elements of asset management practices are often described as follows.

Defining the agreed service level. Meeting an agreed level of service in the most cost-effective manner is the starting point and primary objective of asset management. It is therefore crucial that asset managers define the benchmark from the outset and monitor performance against it closely. In the rural water sector, the benchmark is most likely the national standard for basic services, with indicators for the following:

- Collection distance;
- Micro-biological and chemical quality;
- Quantity made available; and
- Reliability of the service.

Monitoring performance against these indicators demonstrates the effectiveness of asset management practices and gives guidance on any corrective measures to be taken.

Developing an asset register. Accurate and detailed knowledge of assets is an important component of effective asset management. Asset registers should include a list of assets with their physical characteristics (definition, hierarchy, sub-components, physical attributes, construction date, location, condition), plus accounting information for financial reporting and modelling (expected useful life, current replacement cost). Information on the condition, performance and value of the assets should be monitored regularly and the asset register updated.

Assessments of assets' condition and performance are carried out through routine inspection and physical monitoring or through indirect observations (e.g., water loss measurements) for assets that are buried (e.g., pipes). This ensures that condition is accurately tracked and updated so that required maintenance can be identified.

Assessment of the value of assets relies on one of the following techniques:

- Age-based depreciation. Each asset is valued at its purchase and assigned an estimated lifespan. Its value is then depreciated by a defined percentage each year and the depreciation value treated as an operating cost, so that when it requires rehabilitation or replacement, sufficient resources are available.
- Condition-based management. The value of an asset is determined by its condition and performance, rather than by its age.

Understanding modes of failure and determining the maintenance models are the cornerstone of asset management and require technical knowledge. To develop a maintenance and renewal plan, it is crucial to understand how each asset deteriorates and what should be done to maintain it. Broadly, three categories of assets can be identified (IMIESA, 2014):

- Civil infrastructure (e.g., pipelines, reservoirs, structures, buildings);
- Mechanical infrastructure (e.g., pumps, fans, stirrers); and
- Electrical infrastructure (e.g., motors, switchgear, cabling).

Each has different deterioration patterns and requires different treatment.

- Pipelines deteriorate progressively, over a long period. Preventive maintenance is often difficult or even impossible, and only full reconstruction of sections of pipelines is practical.
- Other civil structures also deteriorate progressively but can be maintained in good condition with proper structural repairs, qualitatively similar to those undertaken on pipelines.
- Mechanical and electrical components tend to fail suddenly. Light rehabilitation and preventive maintenance treatments are possible but can be applied only a limited number of times before the assets must be replaced.

Determining the maintenance strategy. Maintenance strategies are identified through an approach called 'failure mode, effects, and criticality analysis' (FMECA), in which the probability of failure modes is mapped against the severity of their consequences. The result highlights failure modes with relatively high probability and severity of consequences, thereby identifying where remedial effort should be directed to produce the greatest value. Resulting maintenance models and replacement strategies can co-exist—that is, various strategies can be applied to different water supply components (IMIESA, 2014)—and include the following tactics:

- *Perpetual light renewals* can be performed on assets whose lifetimes can be significantly extended through minor repairs.
- *Light renewals alternating with full replacements* combines regular maintenance with full replacements.
- *Run to failure and fully replace* at the end of the asset's lifetime is appropriate if it is supported by an effective inspection programme to detect the failure quickly and replace the asset.
- *Run to failure and do nothing* is the default when funds are insufficient to carry out any kind of maintenance or replace failed assets.

Developing a long-term financial plan. This requires accurate information on life-cycle costs and a clear understanding of the most appropriate maintenance strategy for the assets and their components. When developing a financial plan, the manager must also know what tariffs, subsidies, taxes or government transfers may defray the costs. Long-term plans must be routinely updated.

Infrastructure asset management is a dynamic process and is inherently context specific: the asset register and the complexity of the asset management plan differ with the systems to be managed. Complex systems may require asset management plans that include elaborate computer software linked to geographical information systems (GIS) and sensors that collect data in real time. However, these are not necessary conditions. In fact, overemphasis on software, technology or other 'tools' may detract from the process and objectives of asset management.

For the rural water sector, asset management can include the development of asset registers in coordination with water point mapping. However, it requires much more than a one-off mapping exercise. Asset managers must have a clear understanding of the service level objectives, sufficient detail on maintenance strategies and priorities, and a commitment to obtain the data required to make informed decisions to implement a management plan. Asset management is more about the knowledge created by the iterative processes than it is about the development of registers, inventories, or other tools.

3 Asset management of rural water supply in South Africa

3.1 Roles and responsibilities for rural water supply in South Africa

The vision, policy, strategy, roles and responsibilities for the provision of water supply in South Africa are comprehensively articulated in a series of legislative documents, supported through national norms and standards, financial frameworks, monitoring and information systems, sector support strategy, regulation and a sector-wide approach (known as SWAp).

The following are the main legislative documents that delineate roles and responsibilities for the provision of rural water supply:

- The *Constitution (1996)* established decentralisation as the administrative arrangement, along with the transfer to municipalities of the responsibility to 'ensure the provision of services to communities in a sustainable manner' (Clause 27).
- The *Declaration of Powers and Functions* between district and local municipalities for water and sanitation (2001) clarified which municipalities would have executive and legislative authority for water and sanitation functions.

- The *Free Basic Water Services Policy* (2001) was introduced to ensure access to basic power, refuse removal and water services (potable water and sanitation) for poor households unable to pay for services. The policy stipulated a guideline of 6,000 litres of water per household per month to be provided free to indigent households.
- A *white paper on water supply and sanitation* (2004) was adopted by the Department of Water Affairs and Forestry. It outlines principles to increase the provision of sustainable water services (e.g., payment of water, demand-driven approaches, environmental sustainability).
- The *Strategic Framework for Water Services* (2003) was introduced to address policy shifts necessitated by the local government transformation process of 2000 and changes in the role of the Department of Water Affairs, from a provider to a local government supporter.

In addition to the Declaration of Powers and Functions between district and local municipalities for water and sanitation (2001), the specific roles and responsibilities for local government for the provision of water and sanitation are described in the following documents:

- The *National Water Act* (1998) legislates the protection, use, development and management of water resource (surface water and groundwater).
- The *Water Services Act* (1997) legislates the municipal function of providing water supply and sanitation services and distinguishes between water service authorities (WSAs) and water service providers (WSPs).

The Water Service Authority (WSA) refers to a municipality with executive responsibility for ensuring access to efficient, affordable, economical and sustainable water services for all consumers, by creating an enabling environment for water services within the local government sphere. This includes the development of by-laws; water services development plans and the identification of the preferred modality for providing the water services- either by performing the function of the water service provider itself or by contracting a water services provider; monitoring and regulation of the water service provision. The decision on the WSP model to be adopted by a WSA results from a comprehensive study (also known as a Section 78 study), as stipulated in the Section 78 of the Municipal System Act, 2000).

The Water Service Provision (WSP) function refers to the actual provision of the water supply and sanitation services to consumers. This includes the operational and maintenance of the water infrastructure, customer relations, revenue collection, administrative and financial management. These functions can either be carried out by the WSA internally or be contracted out to any legal entity: a municipality, a municipal entity, a water board, a non-governmental organisation (NGO), a community-based organisation (CBO), a private sector company, or any other public or private body capable of providing the necessary services. (de la Harpe, 2011)

The *Municipal Structures Act* (1998) specifies the structures for local government and the allocation of functions between different types of municipalities:

- *Category A.* South Africa has eight Category A municipalities—cities with large urban cores and extended rural peripheries. These municipalities have significant capacity to provide all municipal functions, including the provision of water and sanitation services.
- *Category B.* The majority of the country’s 231 local municipalities have responsibility for the provision of water and sanitation services, the exceptions being those within the jurisdiction of 21 C2 district municipalities (see below).
- *Category C.* This category consists of 47 district municipalities, which are divided into two subcategories. There are 26 C1 district municipalities that do not have responsibility for provision of water and sanitation services (because this function is handled by local

municipalities), and 21 C2 district municipalities that do (because their local municipalities were deemed to have insufficient capacity).

The *Municipal Systems Act* (2000) legislates and provides guidance on the internal systems of a municipality, including public accountability; development planning, performance management and monitoring; and municipal services, including tariff policies and mechanisms for provision of services.

The *Municipal Finance Management Act* (2003) applies to all municipal institutions; it establishes norms to ensure the sound and sustainable management of the fiscal and financial affairs of municipalities and municipal entities.

3.2 Interpretation of asset management

The end of the Apartheid regime in 1994 led to the evaluation of the imbalance in service provision, the identification of unserved populations and the development of a strategy to address the huge backlog through a targeted investment plan of ZAR 1 billion/year for 1994–2004, to be implemented by the Reconstruction Development Plan of the Department of Water Affairs (DWA).

Concerns over the sustainability of services prompted a review in 2001–2002, which found that only 50% of the new water systems were functioning. The evident failures in operation indicated a need to focus not just on building infrastructure but also on operation and maintenance.

Since then, the basic principle that asset management is the right approach to ensuring technical, financial and environmental sustainable delivery of services has been outlined both in DWA's sector policies and guidelines and in the National Treasury's financial policies and guidelines. The guidelines have been implemented by local governments with varying levels of precision and enforcement. Also, these policies and guidelines concern different positions and roles within local government structures (technicians vs. financial controllers), as described below:

The principles of asset management are articulated in the *Constitution*, which states that local governments' prime mandate is to provide services in a sustainable manner (Section 152), and the *Municipal Systems Act*, which states that a municipality has the duty to strive to ensure that municipal services are provided to the local community in a financially and environmentally sustainable manner (Section 4 (2 and d)).

Whereas in other countries, the ownership of assets is often an unclear mixture of state and community-based responsibility, South Africa recognises that water assets belong to government, and hence so does management responsibility. When the backlog eradication programme got underway in 1996, however, the sector was largely committed to a community-based approach to rural water supply. Then, in 2003, the powers and functions of municipalities were authorized, and simultaneously, the implementation of Free Basic Services significantly increased the flow of funds to municipalities for operation and maintenance. As a result, municipalities assumed responsibility for rural water supply infrastructure. Nevertheless, some municipalities still make use of community-based functionaries to assist with day-to-day activities, such as pump operation.

Department of Water Affairs: An incentive-based monitoring system. Although the government continues to invest at a rapid pace in infrastructure for disadvantaged communities, system breakdowns, water losses (up to 70% in rural areas) and customer dissatisfaction leading to non-payment for services (interview sources) have led DWS to acknowledge the importance of sound management of the water assets.

Asset management is understood by DWS as the comprehensive management of infrastructure and equipment through its life cycle, from planning through construction, refurbishment and decommissioning.

National water services infrastructure asset management strategy (2011). In 2011, a strategy was developed to set out the general principles of asset management and guide its adoption by the water sector. Although this demonstrated the government's proactive approach to providing systems for training, implementation, hands-on support and continuous improvement, the document remained in draft form and was never disseminated. In addition, it did not lead to the development of practical guidelines that could be used by both technical and financial municipal officials in their daily activities.

Blue Drop Certification (2008). After a survey indicated that less than 50% of municipalities monitored drinking water quality (DWA, 2008) as required by legislation, DWA in 2005 introduced its Drinking Water Quality regulation, an incentive-based regulatory programme with the objective of improving tap water quality through compliance monitoring. By 2008, the monitoring performance had improved, but mainly in urban areas. Blue Drop Certification was then launched.

Blue Drop seeks to improve service delivery by auditing and scoring WSAs' performance, with public awards for those WSAs scoring 95% or above. The results, announced at a formal and well-attended annual conference, inform support to under-performing municipalities from DWA national and regional offices and other government agencies.

The audit consists of examination of data submitted by WSAs, as well as site inspections. At this stage, only systems that include some form of water treatment facilities are considered. Awards are therefore allocated at a system level, and this information is shared with the general public.

The criteria considered, together with the allocated weighting, are in line with general best practices rather than national legislation and have evolved over time, from 11 indicators in the early years to five currently (Table 1). The framework includes a section on asset management, which is allocated a 14% weight (DWA).

TABLE 1 2014 BLUE DROP SCORING

Indicator	Sub-indicator
Water safety planning (35%)	Water safety planning process (10%)
	Risk assessment (30%)
	Risk-based monitoring programme (25%)
	Credibility of drinking water quality data (20%)
	Incident management (15%)
	Sampler's bonus
DWA process management and control (8%)	Works classification compliance (15%)
	Process control registration compliance (50%)
	Availability of water treatment works logbook (35%)
	Process control bonus
Drinking water quality verification (30%)	Drinking water quality compliance (microbiological) (50%)
	Drinking water quality compliance (chemical) (40%)
	Risk refined compliance (5%)
	Operational efficiency index (5%)
	Penalty data (1) difference
	Penalty (2)- ≤11 months data
	Penalty (3)- Notification failure
Management, accountability and local regulation (10%)	Management commitment (40%)
	Publication of performance (30%)
	Service level agreement/performance agreement (15%)
	Submission of drinking water quality data (15%)
	Bonus: Publication of performance
	Bonus: Performance agreement
	Penalty: Submission of drinking water quality data
Asset management (14%)	Annual process audit (20%)
	Asset register (15%)
	Availability and competence team (15%)
	Operation and maintenance manual (15%)

Indicator	Sub-indicator
	Operation and maintenance budget expenditure (20%)
	Design capacity vs. operational capacity (15%)
Water use efficiency and water loss management (3%)	Water balance (30%)
	WDM strategy and business plan and implementation (30%)
	Compliance and performance (40%)

Although Blue Drop has prompted a culture of monitoring and improving performance, including the adoption of systematic asset management practices, it has also created an incentive for WSAs to focus on getting a ‘good score’ rather than on delivering good services. This has mainly been the consequence of including indicators that focus on processes rather than explicit measurement of outcomes, in terms of water service quantity, reliability and accessibility in addition to quality³.

Interviewees have reported, for example, that just before a Blue Drop audit, WSAs often recruit consultants to fulfil the requirements and thereby earn a better score and obtain public recognition. A shift in approach by Blue Drop, with a stronger focus on service levels and regular monitoring of systems’ functionality, would contribute more directly to improving water service delivery. This change would, however, have serious practical implications for monitoring and be costly for DWA and WSAs to implement. Moreover, it is unclear who—WSAs or WSPs—would take responsibility for collecting the data, making use of the information and covering the additional significant cost involved.

Department for Provincial and Local Government: Guidelines for asset management. In 2004, the Department for Provincial and Local Government instituted municipal infrastructure grants to complement municipalities’ capital budgets for infrastructure to poor communities. To support local governments in managing these grants, the department developed guidelines on preparing sector-specific infrastructure asset management plans and aggregating them into a comprehensive municipal infrastructure management plan. The aim is to improve strategic and tactical planning of infrastructure, performance management, risk management, financial management and capacity building, aligned with existing statutory municipal processes.

National Treasury: Requirement to develop an asset register. National Treasury is responsible for managing South Africa’s national government finances, including the transfer of grants to local governments; these grants constitute the primary source of funding for many WSAs serving rural areas. National Treasury provides guidance on internal systems through the application of the Municipal Systems Act (2000) and the Municipal Finance Management Act (2003) and detailed regulatory requirements on public accountability and financial reporting through the application of generally recognised accounting practices (GRAPs).

Asset management is primarily seen by municipalities as an accounting mechanism and is largely regulated through the Municipal Finance Management Act and GRAP 17. This standard stipulates

³ It was also reported during the interviews that DWA recognises this challenge and the intends to address it.

the appropriate accounting treatment for property, plant and equipment, the asset class covering infrastructure. It provides the principles by which assets held for production purposes are identified, recognised, measured and depreciated and how life-cycle costs are dealt with. It specifies the following requirements for municipalities (National Treasury):

- *Develop a componentised asset register* that identifies components with different useful life expectations than that of the parent asset. This allows the manager to make nuanced and realistic depreciation calculations and thus understand the true financial status of the system. An asset hierarchy must be in place, with component-level unit rates based on replacement costs, useful-life expectations and residual values.
- *Update asset values* through either i) the cost model, whereby a municipality establishes the value of its infrastructure assets on the basis of depreciated replacement cost and updates the asset register accordingly, or ii) the revaluation model, whereby the municipality employs a condition grading index to quantify the extent of each asset's deterioration.
- *Annually review the useful-life expectations of assets* or adopt the revaluation model that requires that all assets be revalued on an annual basis. Regardless of the recognition model chosen, asset data must be incorporated in a structured asset register and the register must be maintained and updated on an ongoing basis, including through a physical verification carried out every three years.
- *Develop and implement an asset management policy* that states the approach to asset management, including the valuation model chosen. This should be based on its interpretation of the accounting standards, the nature and extent of its assets and due consideration of its operating environment.

To encourage good practice, National Treasury in 2008 issued local government capital asset management guidelines, which describe the scope of asset management practice, articulate key principles, provide implementation techniques and set out institutional arrangements for municipalities. The guidelines were issued in conjunction with a budget template that specifies the structure and manner of preparing and reporting on budget requirements.

Although DWS and the Department for Provincial and Local Government have developed instruments to encourage the adoption of asset management practices, these are more akin to recommended best practices. National Treasury, in contrast, has issued binding regulatory requirements for the adoption of asset management practices in municipalities. As a result, asset management is currently interpreted and operationalised as an accounting practice, as evidenced by the adoption and updating of asset registers by municipalities' chief financial officers.

Other frameworks for asset management practices. In the absence of clear and comprehensive guidelines for municipal officials besides chief financial officers, other frameworks are being developed throughout the country as practitioners recognise the importance of asset management:

- The Development Bank of Southern Africa⁴ has developed guidelines with general principles for municipal infrastructure asset management, but the guidance does not provide sufficient technical or practical information for municipal engineers.

⁴ The Development Bank of Southern Africa is a finance Institution wholly owned by the government of South Africa; it focuses on large infrastructure projects in the public and private sectors.

- PAS-55 is gaining traction, as indicated by the public call in March 2014 to use it for assessing the asset management systems of Umgeni Water, the second-largest water board in the country.
- The International Infrastructure Management Manual, including the principles outlined in PAS-55, was adapted for South Africa in 2006.

3.3 Accounting versus technical asset management

The focus for much of the past 20 years was correcting the imbalances in access to water infrastructure. Today, the WASH sector acknowledges the need to pay greater attention to sustaining water services, but it is still struggling to put this knowledge into practice.

Asset management features in official legislation and has been recognised by authorities as a useful set of principles to sustain services indefinitely in the most cost-effective way. Municipalities, the official water asset owners, have the responsibility for its sound management.

Interviews conducted at various levels for this study indicate a tension between the understanding of asset management as a technical practice, consisting of making appropriate decisions to extend an asset's life, and the understanding of asset management as a financial and accounting procedure, consisting of tracking asset components and their value and making financial projections and accounting decisions (capitalisation vs. expensing).

This tension is mirrored by the uptake of asset management principles by DWA and National Treasury and their translation into regulatory requirements. On the one hand, DWA's strategy on water asset management has not been finalised or translated into technical guidelines or regulations that apply to municipal practitioners; it remains at the level of aspiration. On the other hand, National Treasury has made the adoption and updating of asset registers a stringent requirement for municipalities and a requirement subject to the auditor general's verification.

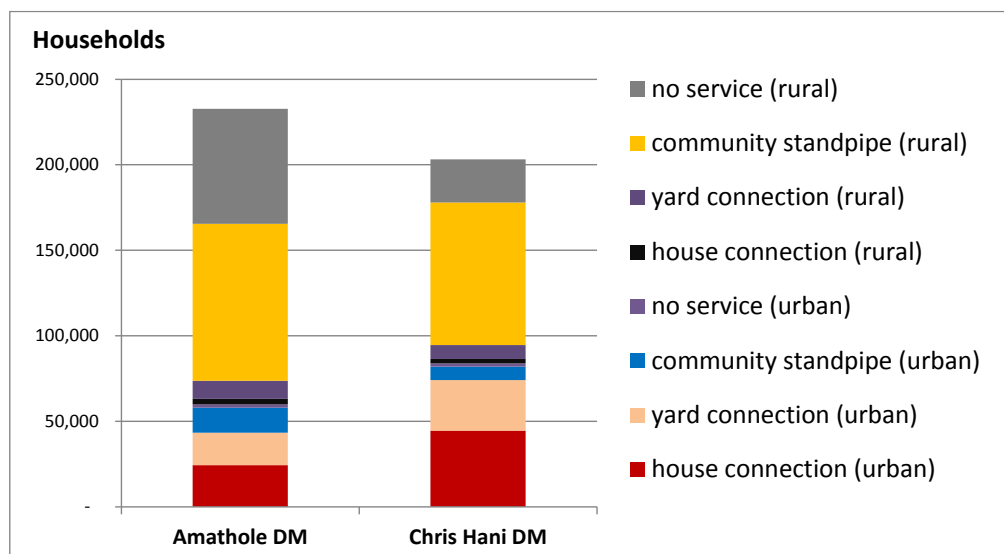
As it stands, the asset management legislation is implemented primarily as a financial and accounting requirement that places responsibility for implementation on municipal accountants and financial officers. Across all positions in municipalities and national government, interviewees demonstrated a clear understanding of the general principles of asset management, although rarely combining technical and financial elements. However, in the absence of technical guidance to translate the principles into specific activities, the understanding of roles and responsibilities and the practical application of the approach remain limited or subject to personal interpretation and experience.

4 Overview of water service provision in ADM and CHDM

4.1 Defining the rural water challenge

Amathole District Municipality (ADM) and Chris Hani District Municipality (CHDM) are similar in population and geographical area: ADM has a population of 892,637 (2011 census) and a geographical area of 21,595 km², and CHDM has a population of 795,461 (2011 census) and a geographical area of 36,000 km². Both district municipalities include concentrations of rural and peri-urban settlements in tertiary towns surrounded by vast rural areas, characterized by inferior infrastructure, low income and poor access to health facilities.

FIGURE 3 SERVICE DELIVERY IN AMATHOLE AND CHRIS HANI DISTRICT MUNICIPALITIES



These data indicate that both ADM and CHDM still have to address significant service delivery backlogs (30% and 13%, respectively), largely in the rural areas. The current service delivery responsibility is largely in rural areas, with ADM having 53% of served households living in rural areas and CHDM having 65%. Once the backlogs have been addressed, these figures will be 59% and 74%, respectively.

The vast areas of land under the jurisdiction of these district municipalities, combined with the limited secondary road networks and the hilly to mountainous landscape, create a challenging environment, especially for reaching remote rural areas to address unplanned and/or emergency operation and maintenance problems. The fact that CHDM is more rural has implications for the implementation of asset management practices, particularly operation and maintenance activities.

4.2 Institutional arrangements for the provision of water supply

As part of the decentralisation process, CHDM and ADM received powers and functions for water services in 2003 and became WSAs in the C2 category (see Section 3). However, the municipalities use different models for the provision of water.

When ADM officially became a WSA in 2003, local municipalities inherited the WSP functions until 2006, when a Section 78 study was carried out and the WSP function was given to ADM. A water and sanitation operation and maintenance division was created within the municipality, which currently employs approximately 1,000 staff in charge of all operation and maintenance. Notably, the Amatole Water Board is responsible for providing bulk clean water to parts of the ADM from a series of large regional schemes. Amatole Water is a state-owned enterprise created by national, provincial and local community stakeholders to serve as a bulk water services provider, with the core aim of assisting local governments in developing and sustaining operation and maintenance of safe, reliable water supply and waste water services. In addition, 14 positions have been created in the finance department to perform asset management functions.

After piloting alternative provision models (first a community-based, private sector model between 2004 and 2007, followed by the contracting of the regional water board as provider), CHDM appointed the eight local municipalities under its jurisdiction as service providers in 2009. This followed the completion of a study to determine the optimal service provision arrangements (Section 78 study). The WSP functions were then carried out by staff based in each local municipality, supported in each village by a community service provider that conducts routine operation and maintenance tasks and monitors the performance of the infrastructure.

However, at the time of this research, CHDM had decided to internalize the function and develop in-house operational capacity, primarily because of the local municipalities' poor performance over the previous five years. This transfer started in May 2014 in Lukanji, Inxuba and Yethemba and will extend to the other six local municipalities at a later date. The practical implication of this shift is that the staff currently undertaking WSP responsibilities will be absorbed into the district, thus reducing dramatically the functions (and associated budgets) of the local municipalities.

In terms of access to water, ADM and CHDM present almost 100% coverage rates in urban areas, but only 61% and 79% rural coverage rates, respectively (Table 2).

TABLE 2 COVERAGE RATES IN ADM AND CHDM

	Urban areas			Rural areas		
	Access	No access	Percentage coverage	Access	No access	Percentage coverage
ADM	57,969	1,929	97%	105,597	67,257	61%
CHDM	82,008	1,884	98%	94,113	25,197	79%

Source: Statistics South Africa General household survey, census 2011; 2012

The population counted as having access includes all levels of services, ranging from access to tap water inside the dwelling to access to a community standpipe at a distance greater than 1,000m. However, according to national standards, only people with access to water within 200m are regarded as having access; if this standard were applied, the coverage rates in rural areas would be 42% in ADM and 55% in CHDM.

In financial terms, the assets of the two WSAs have a significant value: ZAR 4 billion in ADM (in addition to ZAR 1 billion under the responsibility of Amatole Water) and ZAR 3 billion in CHDM⁵. In CHDM, this amount corresponds to three times the overall annual budget.

As described in the previous section, the challenge inherent to the management of assets is determined by their nature, associated modes of failure and maintenance activities required to extend their lifetime. Accordingly, sector experts with operational experience in managing water schemes find that the higher the electro-mechanical component density⁶, the more intense the preventive maintenance and light replacement activities. It is therefore important to understand the nature of the assets in ADM and CHDM.

⁵ This figure relates to the 'property, plant and equipment' category in the financial statement.

⁶ Electro-mechanical component density is the number of pumps, motors and other such elements per population served.

Both district municipalities have a combination of regional schemes and standalone town schemes, but the proportion of these two types of systems differs: ADM counts a higher number of complex regional schemes; CHDM counts a greater number of simpler, standalone schemes⁷. Table 3 details some pertinent differences between the two municipalities.

TABLE 3 WATER SYSTEMS IN AMATOLE AND CHRIS HANI DISTRICT MUNICIPALITIES

WSA	Water treatment works	Boreholes	Diesel engines	Wastewater treatment works
ADM	34	194	34	16
CHDM	17	362	174	16

Source: Asset registers, Blue Drop and Green Drop reports

Thus two WSAs that appear to have similar service delivery profiles may in fact face significantly different challenges, given the nature of the infrastructure that has been installed.

Regional schemes like those that predominate in ADM contain more complex technology and therefore require a sophisticated understanding of hydraulics to maintain an equitable distribution of water: water losses are more difficult to locate and address. As a result, interruptions can be lasting or chronic. Such schemes call for deep and technical understanding and effective on-the-ground presence.

The standalone schemes in CHDM are located across a wide territory, making the logistics difficult and expensive. Although the consequences of a breakdown can be acute, problems can be identified and resolved relatively rapidly because of the simpler nature of the system. In this case also, communication and on-the-ground presence are critical to ensure effective incident reporting.

4.3 Funding water services in ADM and CHDM

To support the decentralisation process and the transfer of responsibility for service provision to local government, inter-governmental fiscal reforms have been introduced to cover municipal capital and operational expenditures. The grants are either conditional (the money can be used only for specific activities) or unconditional (utilization decisions are at the discretion of the recipient municipality).

Grants previously allocated to national sector departments are now being directly allocated to local governments, as follows.

Unconditional grants. Equitable Share is a portion of the national revenue, calculated using a formula to support the provision (operation and maintenance costs) of free basic services (water, sanitation, electricity and refuse removal). The amount, currently R293 per household per month for indigent households, is updated every year. For water, the amount is R93 (Table 4).

⁷ The bulk supply infrastructure of many such schemes in ADM is operated by the Amatole Water Board. There is no water board that delivers bulk water in CHDM.

TABLE 4 ALLOCATIONS PER INDIGENT HOUSEHOLD PER MONTH, BY TYPE OF SERVICE

Type of basic service	Allocation per household below affordability threshold (Rands)			Total allocation per service (R million)
	Operation	Maintenance	Total	
Energy	54.20	6.02	60.22	6,289
Water	83.78	9.31	93.09	9,722
Sanitation	68.40	7.60	76.00	7,937
Refuse	57.34	6.37	63.71	6,654
Total	263.72	29.30	293.03	30,603

Source: National Treasury, Division of Revenue Act, 2014

Although the Equitable Share grant is unconditional and can therefore be used at the municipalities' discretion, it has been designed to cover operation and maintenance activities. This mechanism, unique among African countries, demonstrates the government's concern over asset management and commitment to service delivery. However, Equitable Share has been criticized for not being sufficiently linked to the assets already owned by the municipalities and to the size and nature of the operation and maintenance challenges they face. Equitable Share represents 10.3% of the asset value in ADM and 9.1% in CHDM.

The RSC levy is another transfer made to local governments to replace the historical tax that districts were able to collect from businesses in their area. The amount is calculated based on what the districts collected previously and therefore differs by municipality (with a significant difference between ADM and CHDM).

Conditional grants (capital grants). The Municipal Infrastructure Grant is intended to support infrastructure that provides at least a basic level of service for the poor. The formula for water and sanitation is based on a percentage of the backlog in each district municipality.

The Municipal System Improvement Grant provides grant funding for capacity building of local government institutions.

The Regional Bulk Infrastructure Grant is an indirect grant (the money is channelled through DWA rather than flowing directly from Treasury to WSAs) to cover the social component⁸ of large-scale infrastructure.

⁸ The social component is the proportion of the construction cost that can be attributed to providing services to indigent households.

4.4 Comparison of funds for water and sanitation

ADM and CHDM have similar financial situations. Table 5 lists funding sources for water and sanitation in 2013 and highlights the proportion of capital and operational funding made available.

TABLE 5 OVERVIEW OF BUDGET AND FUNDING IN ADM AND CHDM, 2013–2014 (MILLION)

WSA	Asset value (property plant and equipment)	Annual expenditure	Surplus	Equitable Share	Regional services levy replacement	Tariff income*	Capital grants
ADM	R3,617	R1,274	R180	R 373	R248	R201	R460
CHDM	R3,276	R715	R372	R 298	R53	R126	R439

*ADM actually collected 37% of this amount (a similar analysis was not possible for CHDM).

Notes:

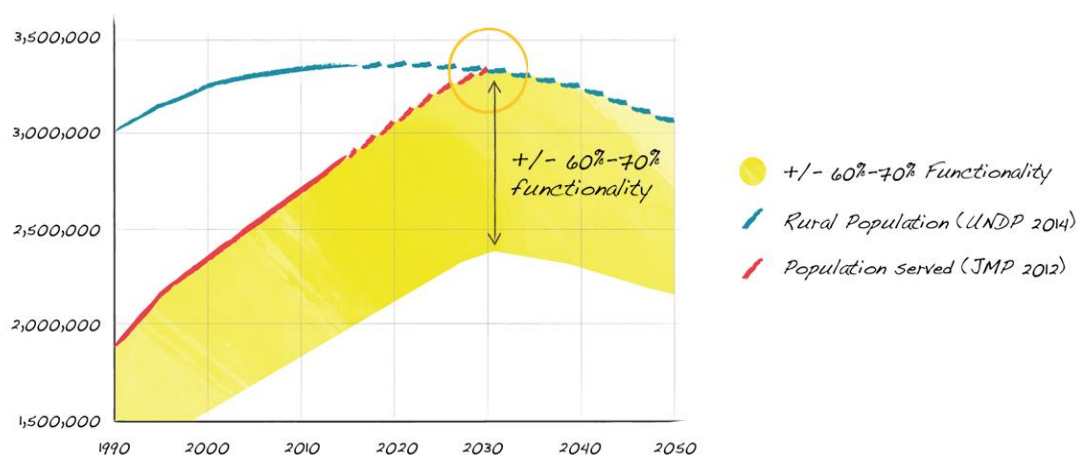
1. All figures are for the 2013–2014 financial year.
2. Data come from annual financial statements of ADM and CHDM for 2014 and DORA 2013.

5 Uptake of asset management practices in ADM and CHDM

5.1 Political commitment to asset management

South Africa has provided access to water services for 94% of the population (GLAAS 2011), but service levels risk falling to the ‘danger zone’ (Figure 2). That is, although eradicating the backlog and providing first-time access remain critical, maintaining existing infrastructure so that it can continue to provide services is increasingly important and must become a priority. This is where asset management can make a difference.

FIGURE 4 DANGER ZONE OF SUSTAINABILITY



Source: Lockwood and Smits, 2011

Interviews with local and national government staff indicate that the concept of asset management for water services is on the agenda in South Africa. Political commitment to making asset management a reality is evidenced by the following elements:

- the understanding of asset management as a set of principles;
- the development of policies and strategies;
- the creation of asset management positions in local government;
- the financial commitment to covering life-cycle costs; and
- the development of incentive-based regulation to ensure asset management practices are in place.

In practice, however, recognition of the importance of asset management often reduces to a commitment to collect, record and update information in an asset register: asset management become the process of counting and valuing assets.

The next sections review the performance of ADM and CHDM with regard to asset management by water service authorities.

5.2 Good performance generally but weak operation and maintenance

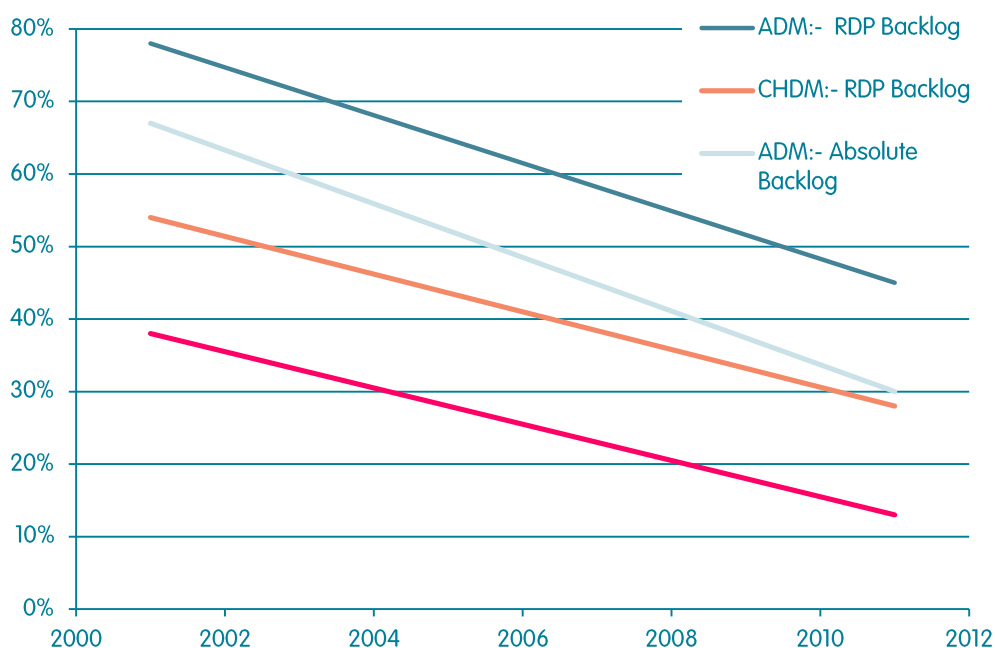
ADM and CHDM both exhibited good performance on key WSA functions, but specific challenges relate to operation and maintenance.

Planning and construction. Both district municipalities have worked to increase water coverage and address the backlog, particularly in rural areas. Each has set up and staffed a planning unit and a project management unit within the WSA to i) create development plans and ii) manage the construction of water systems. Geographical clusters and dedicated teams have been identified to manage the eradication of backlogs and implement projects.

To ensure good-quality construction, both districts use nationally accepted design standards, technical specifications (SANS 1200) and contractual specifications. Staff members considered the quality of construction good and did not report particular issues.

Figure 5 demonstrates progress in eradicating the backlog, distinguishing between 'backlog', the population without any access to water, and 'absolute backlog', the population unserved according to national standards.

FIGURE 5 ADDRESSING POTABLE WATER BACKLOGS IN ADM AND CHDM, 2000–2012



Source: Statistics South Africa, 2001 and 2011

Service delivery. WSAs are not currently required by regulation to monitor functionality and report performance against national standards, which prescribe that water supply be available to communities 95% of the time, with interruptions of less than seven days a year (and no single incident longer than 24 hours). As a result, there is currently no system for monitoring functionality systematically, and in most cases, the information is gathered through incident reporting and rarely aggregated at the WSA level. The only regularly collected information on functionality comes from the national household survey, whose sampling is representative only at the provincial level. (The survey is annual but uses different sample sizes at different time intervals.)

In CHDM, the Project Management Unit informed the research team that non-functional systems were sometimes reported only during the monthly meetings with the local municipalities, thus making follow-up and regulation difficult. In the absence of incentives to monitor and report functionality levels, the information is collected on an ad hoc basis. In ADM, the WSP is looking into the development of a monitoring system that would use communities, existing staff and technology (cell phones) to facilitate the process of data collection. This activity is driven operationally, by the WSP. The challenge of collecting real-time data on functionality is not specific to South Africa and bedevils the sector across the continent.

In the absence of a monitoring system, it is difficult to draw conclusions about actual functionality levels or downtime, but technical staff interviewed did not mention specific challenges, other than those related to overstretched water resources and capacity of systems.

Operation and maintenance. In both ADM and CHDM, technical staff raised concerns about operation and maintenance and identified this phase of the service delivery process as the

primary weakness in the management of assets. Although resources are allocated to develop processes and approaches, eradicating the backlog remains the focus. In fact, there is no monitoring system for tracking operation and maintenance performance, and the researchers were informed that in CHDM, the WSA's performance is formally assessed against construction targets rather than any criteria related to quality of the service actually delivered. Reports on performance are informal, communicated directly to municipal staff and elected people, but this is largely ineffective, given the number of villages and the population that must be served.

Operational plans are in place and maintenance strategies are being developed (at least in ADM), but actual maintenance is ad hoc, with minimal preventive maintenance, resulting in a run-to-failure approach. Contributing factors include i) the difficulty of carrying out preventive maintenance on a large number of assets in remote locations, ii) insufficient knowledge of maintenance requirements and iii) lack of resources to conduct preventive maintenance in remote rural areas.

Although the Blue Drop standards prescribe allocating 5% of the annual budget to maintenance and refurbishment, ADM allocates only 1% of its budget. At the WSP level, only 3% of the budget is spent on operation expenditures and the remainder is allocated to salaries⁹. Similarly, only 2.35% of the allocated budget for repairs and maintenance had actually been spent in 2013 (see Table 5).

According to the National Treasury, neither ADM nor CHDM carried out asset renewals over 2013, and ADM spent only 2% of its budget on repairs and maintenance.

5.3 Asset management tools

To support their mandatory functions and ensure sustainable management of their assets, ADM and CHDM have developed or adopted several tools to improve service delivery over time. These tools alone, however, do not constitute asset management practices.

Asset management policies. Guidelines have been developed, in line with accounting requirements, for accurate compilation of assets; accounting treatments for the acquisition, disposal, recording and depreciation of assets; and adherence to standards for maintaining financial records. These policies primarily support the financial requirements in the development and maintenance of asset registers and compliance with the GRAP 17 requirements.

Asset registers. Both ADM and CHDM have asset registers, and compliance with national accounting legislation (GRAP 17) helps each district obtain a 'clean audit'. The development of asset registers in CHDM and ADM was outsourced to consultants and both driven by and designed for accounting and reporting purposes; the process was managed by the financial departments.

Legislation requires that asset registers be updated annually and that components be physically verified every three years (however, CHDM indicated that this may have been extended by National Treasury to five years to lower the costs of update). The registers are audited every year by the auditor general. In CHDM, the physical verification of the assets has been outsourced and is estimated to cost ZAR 1.5 million per annum.

⁹ This information was provided by WSP staff in ADM.

In accordance with legislation, these registers include a wealth of detailed information (totalling 83 attributes in CHDM):

- The assets and their components;
- Location and condition;
- Cost and current value;
- Remaining useful life; and
- Depreciation.

Although the existence of these registers is a huge achievement for service providers that have so many assets to track, challenges remain:

- Technical staff interviewed during the field visit spoke of the difficulty of componentisation and said that the detailed information in the registers was useful primarily for accounting purposes (to differentiate capital expenditures from expenses and update the value of assets) but did not provide information useful to technical staff.
- Decisions regarding replacements or preventive maintenance are not generated by the system and therefore require analysis and interpretation, which is not done systematically.
- The information in the asset registers emanates from the WSP level but is directed towards the WSA for compliance purposes mainly. In the absence of a systematic feedback mechanism to share the data and, more importantly, its analysis, the information is delinked from operation and maintenance and does not contribute to the improvement of services.

Internal monitoring and reporting systems. In addition to the asset registers, ADM and CHDM use many other systems to monitor activities, but in both cases, these are not integrated and therefore co-exist and are often only partially functional.

ADM currently has more than 28 information technology systems in use, including a financial system and GIS. The attempt to develop an integrated information system began in 2006 with building asset data on a framework of a hydraulic model. This system cost USD 800,000 to purchase and install. After contracting with several suppliers to populate this data-intensive system, ADM could not keep it up-to-date and is considering a simpler system that would enable the WSP to monitor operations and maintenance.

In CHDM, the local municipalities submit monthly reports on performance indicators, in paper format and at regular meetings. However, the information emerging is not aggregated or rigorously checked or analysed at the WSA level.

GIS is used mainly as part of the planning process to determine served and unserved areas. However, this system is disconnected and incompatible with the asset register, which serves mainly budgetary purposes and is Excel based.

5.4 Linking concepts and practice

In both ADM and CHDM, the main components of asset management are in place. The district municipalities have the necessary systems, perform the main functions adequately and have the resources to address the backlog and carry out operation and maintenance activities.

Nevertheless, the focus is still short-term, first-time access: the full scope of asset management strategies is not yet a priority at the municipal level. As a result, asset management is treated in silos by technical and financial officials, with limited integration.

Asset management is erroneously understood as a legislative requirement that boils down to developing and updating asset registers for budgeting and financial reporting compliance. Effective asset management, however, is the management of services throughout their life cycle. In the absence of systems and regulatory requirements to monitor services, it is not possible to assess whether the current procedures and mechanisms can allow for the provision of adequate services. We find a disconnect between the concepts of asset management and the practicalities of their implementation: unlike other approaches to management, asset management cannot be reduced to a set of tools or discrete activities.

Managers at several levels—municipal, national and even international—tend to look for practical tools rather than take a broad, integrated consideration of the WSA functions that ensure service delivery. ADM and CHDM have implemented significant parts of asset management practice, but with a focus on the letter of the law and without entering into its spirit. The advances that they have made have been largely driven by regulatory requirements.

However, ADM is starting to see synergies between the components of asset management, based on a thorough analysis of maintenance needs, and developing systems to monitor services more closely in order to improve them. This operational perspective, linking the asset register with robust internal monitoring systems, will surely help improve services in the long run.

6 Discussion

6.1 Asset management at the national level

How, given the challenges of its implementation, can countries devise effective asset management frameworks at national level? Institutions are guided by legislation and regulation. Current regulation focuses on only a small aspect of asset management. Although asset registers are essential, they are merely a first step in implementing comprehensive asset management.

Asset management addresses the improvement and maintenance of services and therefore cuts across financial and technical silos. What incentives, then, will spur the political commitment to shift from a short- to a long-term view, from construction to ongoing maintenance, from asset registers to all aspects of genuine management of assets? The starting point might be robust monitoring services and feedback mechanisms.

6.2 The nature of asset management

Asset management requires i) accurate and detailed information about assets and ii) a strategic approach to maintenance. Unexpected problems can occur, but most operation and maintenance activities can be anticipated. Nevertheless, sector experts recognize that effective maintenance involves assessing the nature and degree of risks and their associated consequences and developing a maintenance philosophy, which might not include preventive maintenance.

It is assumed that the various components of asset management—an asset register, life-cycle planning, effective operation and maintenance—constitute a package, and their application should lead to better outputs and outcomes. However, practice demonstrates that the elements are not always systematically integrated, which may suggest that rather than being a

precondition or cause of good service, asset management may in fact be the result of good management.

Similarly, although asset management frameworks assume the adoption of a suite of tools and approaches, it might be the case that elements can be adopted separately before coming together as a package.

7 Recommendations

South Africa provides an inspiring example of how aspects of asset management have been incorporated into a formal regulatory framework and applied. WSAs are largely supported by a favorable environment in terms of funding and capacities and WSAs in rural areas have adopted many of the elements of good practice. Service delivery and its associated activities are largely understood, and both the planning and the construction of new infrastructure to address backlogs are satisfactory. Of the specific tools needed to support asset management frameworks, however, only the development and updating of asset registers are in place.

Blue Drop scores and national regulations on the adoption of asset registers appear to have changed WSAs' behavior. In addition, significant resources are being systematically allocated for operation and maintenance, largely through Equitable Share, a unique mechanism on the continent. Despite this conducive environment, the challenge of implementing effective operation and maintenance programmes is a consistent topic of discussions with sector stakeholders, and the problem may be more the lack of appropriate skills rather than the availability of funding.

To make use of this example, it is important to acknowledge the following aspects for uptake by other countries:

The journey to asset management requires considerable resources and a consistent stream of funding. At the national level, funding should cover human resources for developing clear policies, strategies and guidelines for municipalities and an effective regulatory framework and auditing mechanism to verify application at the local level.

At the municipal level, funding must cover human resources in all departments and all the functions of service delivery, from planning to decommissioning. This includes budgets not only for building new schemes but also for post-construction supervision, operation and maintenance. (In South Africa, Equitable Share provides grants to cover local governments' costs of operation and maintenance activities—a critical part of asset management.)

Funding should also be available for the development of specific tools and approaches that support municipal functions. Examples include the adoption and updating of internal monitoring systems and the development of an asset register and its updating.

The natural tendency for institutions to comply with regulation suggests strategic consideration of what is regulated, monitored and measured:

People don't do what you expect, but what you inspect

Louis V. Gerstner, Former CEO, IBM

The monitoring system should focus on the outcome (delivery of services) rather than the process (creation of an asset register). In early stages, local institutions should be guided through the process via verification of performance.

A useful starting point for the implementation of asset management would be close monitoring of services, accurate and up-to-date information on asset performance and an understanding of the true nature of maintenance to inform decisions on mechanical, electrical and civil engineering needs.

Where capacities are limited, it may be useful to keep the Pareto principle in mind: that for many events, roughly 80% of the effects come from 20% of the causes. A systematic but rapid scan of infrastructure condition and critical problems may be more practicable and more cost-effective than highly detailed assessments.

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Annex 1. Interviewees

Organisation	Name	Title
Chris Hani District Municipality (WSA)	Makaya Dungu	Director, technical services
	Ntombeko Mayekiso Magaga	Control finance officer
	Thulethu Ncokazi	Area manager, Project Management Unit
	Fezeka Kato	Technician, Project Management Unit
	Moses Shasha	Water services manager
Tsolwana local municipality	Zolile Nongene	Area manager
Department of Water Affairs, Eastern Cape	Neville Lawry	Blue Drop auditor
WSSA	Kevin Derbishire	Former operations manager
Aurecon	Phillip Pratt	Technical director
Amatole District Municipality	Steven Nash	General manager, Water Service Provision (operations)
	Gervais Seri	
	Sibongile Mkhohlikadi	Asset management officer, Finance Department
Amatola Water Board	Craig Thompson	Director, Planning and Development
Gibb	Andrew Mc Donald	Engineer
AECOM	Abri Vermeulen	Engineer, former DWA director of Policy Development
SALGA	William Moraka	WASH specialist
Department of Water Affairs	Allastair Wensley	Director, Information and Planning
National Treasury	Steve Kenyon	Director, local government budget process

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