

FINANCING WATER RESOURCE MANAGEMENT

South African Experience

Case Study Report

Final Draft

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EXECUTIVE SUMMARY

This South African paper represents one of a number of comparative cases commissioned by EUWI Finance Working Group and the Global Water Partnership, as part of the OECD exploration of water resources management financing during its 2009-2010 programme of work. The paper provides important narrative about the attempts and successes in implementation of innovative financing mechanisms in a developing country context. Two recurrent themes weave through the paper:

Firstly, the development of water resources infrastructure supplied a growing primary and secondary economy and was funded by taxes until the early-1990's, after which economic water resources infrastructure funded off-budget supported the growth of the tertiary urban economy, allowing fiscal support to be allocated to supply social needs.

Secondly, the increasing development and utilisation of river basins associated with economic growth and demographic shifts resulted in greater stress and management complexity, which required greater investment in water resources governance and the adoption of associated financial instruments to recover costs and influence behaviour of water users and dischargers.

Through the analysis of the detailed data and trends, five key observations have been derived.

- ✚ Pro-poor water resources management requires investment by the state in local infrastructure to support rural development, which in reality will be largely focused on agriculture. Requiring the formal economy to pay the full financial costs of water infrastructure releases state resources to focus on those communities that cannot afford to pay for the full costs of this investment.
- ✚ Commercial funding of economically-driven infrastructure provides an important mechanism to optimally use state resources. However, the need for long-term project supply agreements to be signed by economic users as a condition for funding (where National Treasury resists guaranteeing the loans), poses challenges in basins with multiple, changing users or unidentified future users, even where a compelling case can be made for economic development.
- ✚ The increasing management requirements of basin complexity or new policy imperatives require greater expenditure by the fiscus and/or revenue from water users. The temptation to develop and implement the perfect instrument across all areas (assuming funding from users) should be resisted. Rather a gradual, prioritised and sequential approach is more appropriate, with scaling-up as human, financial and information resource requirements become available.
- ✚ Cost-recovery from users for governance functions provides an important mechanism for financing the increasing water resources management requirements in highly developed-utilised basins. However, users tend to resist additional charges, except where the value-benefit of these charges is apparent, the collection-disbursement is transparent and/or the information-billing systems are effective, so implementation needs to address these issues in a coordinated manner.
- ✚ While there are a multitude of potential financial mechanisms and instruments that may be used to collect revenue and/or create incentives for behaviour change, these need to be designed as a coherent package that achieve national/basin water resources management goals, considering the challenges and opportunities provided by the country's history and current situation.

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INTRODUCTION

As part of its 2009-2010 programme of work, the OECD is exploring the financing water resources management (WRM) globally, with the intention of developing a “reference work” to help decision makers think through the needs and options for funding WRM. The report will have three objectives: (i) to provide a reference framework for examining the issue of financing WRM, (ii) to take stock of current experiences in financing WRM, and (iii) to identify emerging challenges in financing WRM. Water Resources Management (WRM) refers to the set of actions taken to achieve objectives related to water availability, water quality and protection from risks such as droughts and floods. Those actions may include ecosystem management, infrastructure management and water governance.

The EUWI Finance Working Group and the Global Water Partnership are actively collaborating with the OECD Secretariat to mobilise a limited number of case studies to enable the comparison of experiences of both OECD and developing countries. This case study report presents the results of an investigation of financing water resources management in South Africa, as part of this case study process.

It is important to note that the one-month timeframe and limited resources required the investigation to be largely based on secondary information and personal communication with key officials and specialists in the South African water sector. The authors wish to acknowledge the invaluable inputs provided by a range of practitioners and managers, without which the paper would not have been as data-rich.

Some limited primary information on recent charges, tariffs and scheme costs were however obtained to support the experience and conclusions. While an attempt has been made to support the case with quantitative information about water resources management in South Africa, there are difficulties in interpreting the expenditure and income reflected in annual reports and information about local institutions is largely anecdotal and cannot be synthesised at a national scale.

The report structure was outlined in the Terms of Reference and these have been strictly adhered to, given that they covered the key issues of relevance to the South African water sector financing. However, emphasis in the different sub-sections was based on the degree to which the South African experience could inform that topic. The report is presented in five parts, with the first two providing background to WRM in South Africa, the third part engaging the costs and expenditure on WRM, the fourth part exploring the funding of WRM and the final part concluding with issues and lessons.

Throughout the report, financial data is presented in South African Rands to provide a single reference, rather than translating these to US dollars. The reason is that over the past 15 years the Rand has fluctuated dramatically against international currencies typically in a band between R6 and R10 to the US dollar; during January 2010 (while this report was written), the Rand traded around R7.5 to the US dollar. Furthermore, data is presented in nominal values, rather than correcting for inflation; inflation over the past 15 years has averaged at about 6% (varying between 0% and 13%).

The South African case provides a compelling story about the attempts and successes in implementation of innovative financing mechanisms in a developing country context, with two key themes running through the paper. Firstly, the way in which water resources infrastructure was

developed to ensure supply and was funded by a growing economy and recently urbanising population under hydrologically challenging circumstances. Secondly, the way financial instruments were used to support the evolving management requirements of increasingly stressed and complex basins.

PART 1: SETTING THE SCENE

1.1 Background

South Africa rates very low in terms of water availability per capita, and receives low rainfall by international standards – around 60% of the world average. Furthermore, it has one of the lowest ratios of Mean Annual Precipitation (MAR) to Mean Annual Run-off (MAR) in the world – only 9% of rainfall enters the rivers, compared to a global average of 31% (DWA, 1996). Rainfall is generally higher in the north and east, decreasing significantly to the west, and is highly seasonal, exacerbated by high inter-annual variability and frequent droughts. The result is water scarcity, with high levels of spatial and temporal variability in river levels, dam storage and groundwater levels.

As a result of the economic development path of South Africa during the first half of the 20th Century, which was largely driven by the presence of minerals such as gold, coal and diamonds, urban development has not been aligned with the availability of water. The largest urban area, around Johannesburg sits on the watershed of three catchments, and is poorly endowed with water.

To cope with the combined climatic and physical challenges, South Africa has developed sophisticated and extensive surface water storage and transfer schemes, including inter-basin transfer schemes, and most catchments are linked to a degree that is unusual elsewhere. Figure 1.1 illustrates the transfers between catchment areas in South Africa.

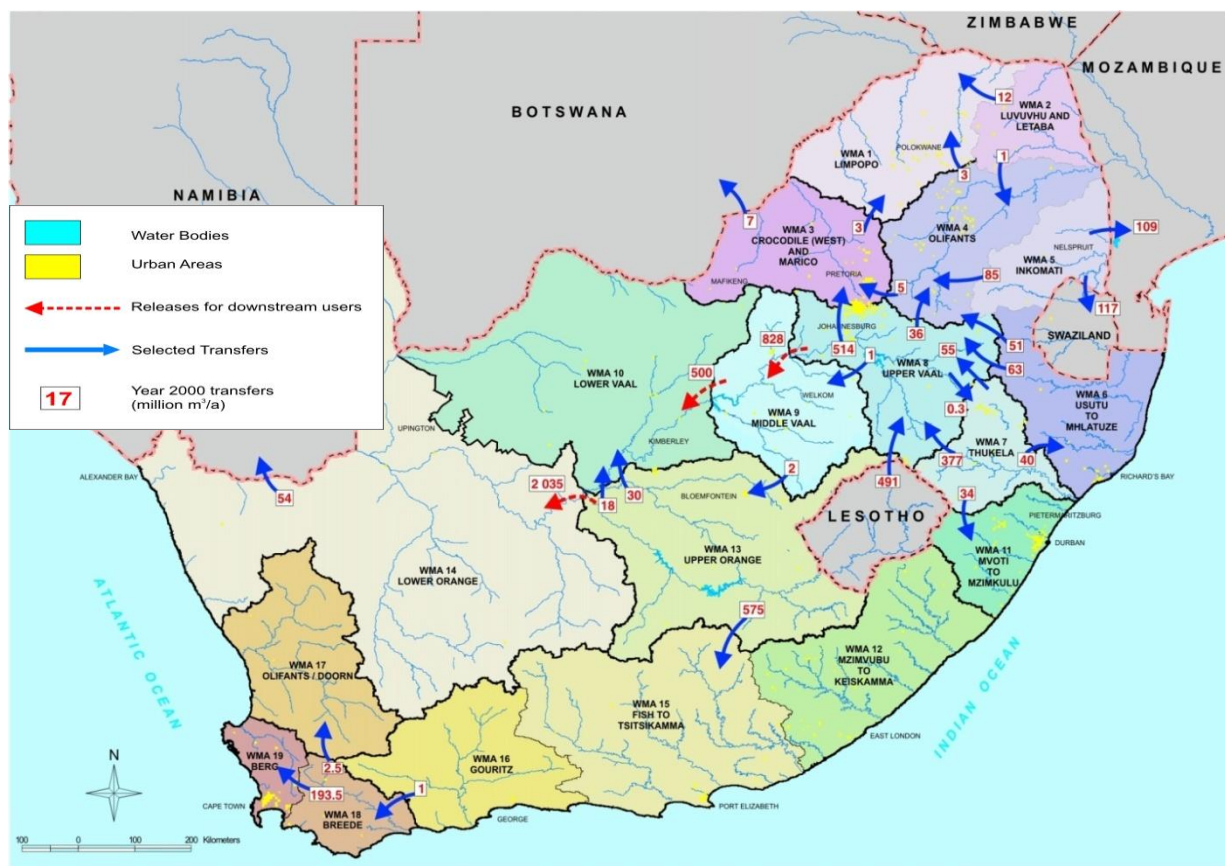


Figure 1.1: Selected interbasin transfers and downstream releases (Source: National Water Resources Strategy)

These engineering solutions provide a high degree of water security relative to the availability and location of resources. However, South Africa is approaching full utilisation of available surface wateryields, and is running out of cost effective and physically appropriate sites for new dams. While South Africa has a well-developed system of macro-infrastructure, there is also a significant wealth of infrastructure at the meso level (such as municipal and farm dams) and the micro level (such as boreholes, small scale irrigation schemes, water for food gardens). All three levels are critical in ensuring water security in the country.

The focus on surface water means that South Africa has under-exploited its groundwater reserves, and it is only recently that data is beginning to offer a relatively reliable assessment of national groundwater reserves. About 15% of South Africa's total water use is currently from groundwater. Added to the challenge of water scarcity is the issue of deteriorating water quality, from increased industrial, manufacturing and agricultural activity, increased population pressures, and deteriorating municipal waste water treatment works. This is an increasingly severe problem, particularly with inadequate human and financial resources available for the operation and maintenance of municipal sewerage treatment works.

A further complication stems from the political history of the country. Under apartheid, black South Africans were forcibly resettled into so-called 'homelands' which remained deeply underdeveloped areas with appallingly high levels of poverty. The development of water resources infrastructure was largely aimed at the 'white' economy, and to this day, access to raw water for productive purposes remains largely in the hands of the white minority. In addition to managing water scarcity and increasing water quality problems, the South African government is faced with the massive challenge of reallocating water, or the benefits derived from water, to the poor black majority, to achieve the equity enshrined in the Constitution of South Africa, the White Paper on a National Water Policy for South Africa, and the National Water Act (Act 36 of 1998).

South Africa shares its major basins with Namibia, Lesotho, Botswana, Zimbabwe, Mozambique and/or Swaziland. Development in these states is very uneven, and there is a major imperative, supported by the regional integration and transboundary water management policies of the South African Development Community (SADC), to ensure that water in these shared basins supports growth and development in all basin states. SADC has developed and is implementing the *Regional Indicative Strategic Development Plan (RISDP)*, which highlights that poverty is "one of the major development challenges facing the SADC region" and which gives priority to poverty eradication, sustainable economic growth and deepening economic integration; all of which are dependent on water and will in turn impact on scarce resources.

1.2 The nature of the South African economy and water use

South Africa is the largest economy in the SADC region, and until the challenges of the global financial crisis, economic growth had been positive since 1994. The economy is dominated by the manufacturing, retail and services sectors which contribute nearly 50% of GDP. General government services contribute a further 12.7%, while mining contributes 5.8% and agriculture, forestry and fishing only 2.3% (StatsSA). Major economic activity takes place largely in and around urban areas, while the areas of highest poverty and underdevelopment remain the rural ex-homeland areas. In 2004 South Africa ranked 121 on the Human Development Index, showing that the benefits of economic growth are not reaching poorer households (World Bank, 2006). The country has to deal

not only with issues of absolute poverty, but with high and widening inequality.

The economy has well developed inter- and intra-sectoral linkages and international trade relations. It is relatively well diversified, although insufficient beneficiation of raw products takes place. These factors together with well developed water resources infrastructure protected South Africa from worst impacts of the droughts of the latter part of the 20th century, showing that the country has managed to separate economic growth from rainfall, unlike many other developing countries.

While the economic development is relatively immunised from hydrology by the relatively minor role of agriculture in the economy and the extensive water resources infrastructure base, agriculture still uses more than half of the water in South Africa with urban domestic, commercial and industrial use using about one quarter (Figure 1.2). It is important to note that most industry obtains water and discharges waste through municipal systems and that in some parts of the country bulk water supply systems themselves act as interbasin transfers. Thus the line between water resources and bulk water supply infrastructure is often blurred.

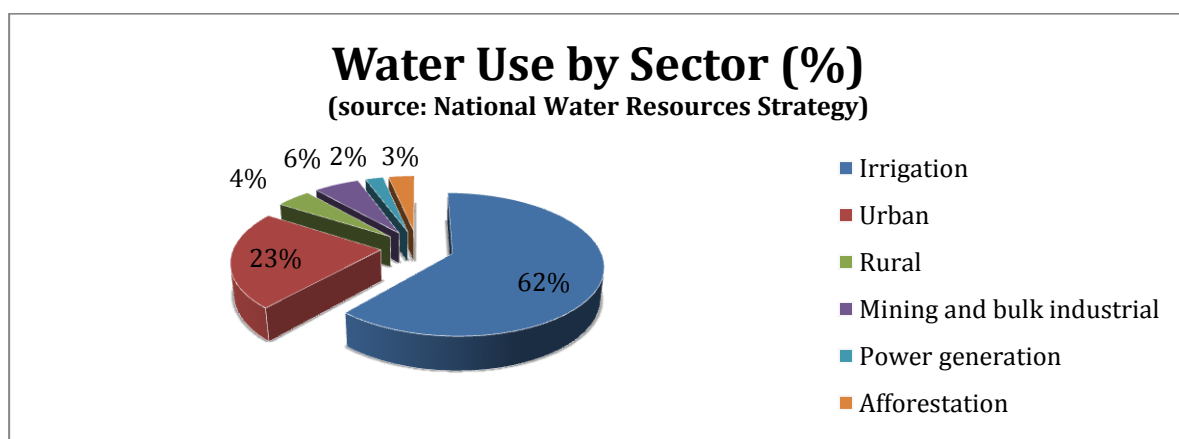


Figure 1.2: South African Percentage Water Use by Sector (Source: National Water Resources Strategy)

In the context of limited water resources it is important to understand the link between water use, value-add and employment. There is a large degree of variability in these relationships but, in general industry generates about 100 times the economic value added and about ten times the employment per unit of water used relative to irrigated agriculture. However, this analysis does not take into account spillover benefits and multiplier effects, the contribution of agriculture to industrial activities, national food security and the strategic role of agriculture in rural poverty alleviation and environmental protection.

1.3 Policy and Legislation for water resources management

Shortly after 1994, Prof Kader Asmal, then Minister for Water Affairs and Forestry, began an intensive and widely consultative process to reform the national policy and legislation governing water resources. This process resulted in the adoption by Cabinet of the White Paper on a National Water Policy for South Africa in 1997, and the promulgation of the National Water Act (Act 36 of 1998) a year later, both driven by the need to create more socially just, economically efficient and environmentally sound water management and allocation regimes in the country. This was a substantial deviation from the previous legislation which was largely focused on the allocation of water to the white irrigation, mining and industry sectors, and the control of pollution from mining and industry in particular.

Prior to 1994, race, gender and class were the dominant factors driving South Africa's political economy and water management. Under this regime, very few black men or women used any significant quantities of water for productive uses, or had a formal water allocation. Water resources were concentrated in the hands of the minority white population.

The new policy was aimed at contributing to building a society in which the ecologically sustainable use of water supported equitable economic growth and social transformation. Thus the White Paper brought in several significant changes in the approach to water resources management:

- Groundwater and surface water were accorded the same legal status, with groundwater no longer seen as an essentially private matter. All water belonged to the people of South Africa, with the Minister acting as custodian;
- Water for basic human needs and for the sustainable ecological functioning of water resources was recognised as a right, under the concept of the Reserve;
- Water for international purposes was accorded the second highest priority, after the Reserve;
- Riparian rights were substituted by time bound allocations (water use entitlements);
- Water resources management was to be performed according to catchment boundaries, by decentralised catchment management agencies;
- Water could be reallocated to address past inequities in access and to meet water quality and ecological requirements; and
- Water should be priced to recover the full financial cost of infrastructure and governance to provide access to water, considering social equity and national strategic imperatives.

Based on the White Paper, the National Water Act (1998) was drafted, consulted on, and passed. The Act, drawn up with considerable international advice, maintains what was good from the pre-1994 period, such as the operation and development of a massive infrastructure system and government's ongoing regulatory role for large-scale users, while being fundamentally transformative in terms of righting the wrongs of the apartheid era. The objective of the National Water Act is *"managing the quantity, quality and reliability of the nation's water resources is to achieve optimum social and economic benefit for the nation from their use"*.

The National Water Act also requires the development of a National Water Resource Strategy (NWRS), to be reviewed every five years, and the development of a Pricing Strategy for raw water, also to be reviewed every five years. The NWRS sets out the strategies, policy and approaches to implementing the policy and managing the water resources of the country. The first NWRS was published in 2005¹ and spelt out a phased programme for the introduction of institutional reforms and new management instruments. It is binding on all government departments and spheres of government.

1.4 Institutional arrangements

Under the Constitution of South Africa, water resources management is a national competency. The Department of Water Affairs (DWA) is responsible for exercising the custodianship role envisaged in the White Paper, including through the allocation, protection, management and development of water resources. Provincial government has no water resources management function.

¹ DWAF, National Water Resource Strategy First Edition (NWRS), Pretoria, 2004

Local government does not have any constitutional responsibility for water resources management, but are responsible for provision and management of water supply and sanitation services. They are also responsible for land use planning and development within their area of jurisdiction. While municipalities fall under the oversight of provincial and other national government, DWA is responsible for ensuring the effective delivery of services and the meeting of national norms and standards for water services and sanitation.

The decision taken in 1994 to bring together in one Department the oversight of water resource management and water service (water supply and sanitation) provision helped to provide a coherent perspective on the full cycle of water resource management and water service provision.

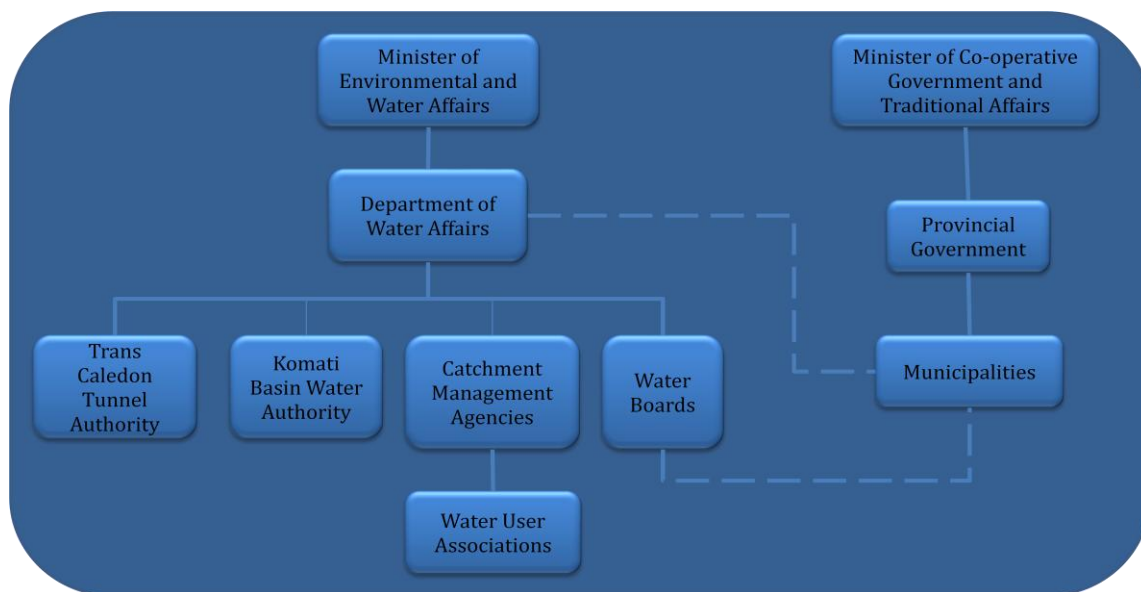


Figure 1.3: Key water management and water services institutions in South Africa

While the NWA enables the establishment of Catchment Management Agencies (CMA) to manage water resources at the basin level, only 2 of an originally envisaged 19 are actually up and running. A further 6 have been established on paper. The CMAs are intended to be responsible for the implementation of water resources management at the basin level. A current review of the establishment of CMAs seems likely to recommend that 9 be established, rather than 19.

Water Boards are responsible for bulk potable water supply to municipalities and bulk users in specific areas in the country. Water user associations and irrigation boards are responsible for the management of local water resources used for common purpose; largely, but not entirely, for agricultural irrigation purposes.

The Trans Caledon Tunnel Authority (TCTA) and the Komati Basin Water Authority are bodies established for the funding and development of international infrastructure projects. The TCTA has, however, had its mandate extended to the funding and development of national infrastructure projects as well.

PART 2: THE BENEFITS OF WATER RESOURCES MANAGEMENT

2.1. The contribution of water resources management to national goals

Following the preceding background, the first important message is that over the past century, South Africa has built about 32 km³ of storage capacity to provide a reliable yield for the 13 km³ of water use, from the highly variable total mean annual runoff of about 49 km³. This water supply supports the approximately US\$ 300 billion economy and population of about 45 million people, neither of which are typically located near major water resources (Figure 2.1).

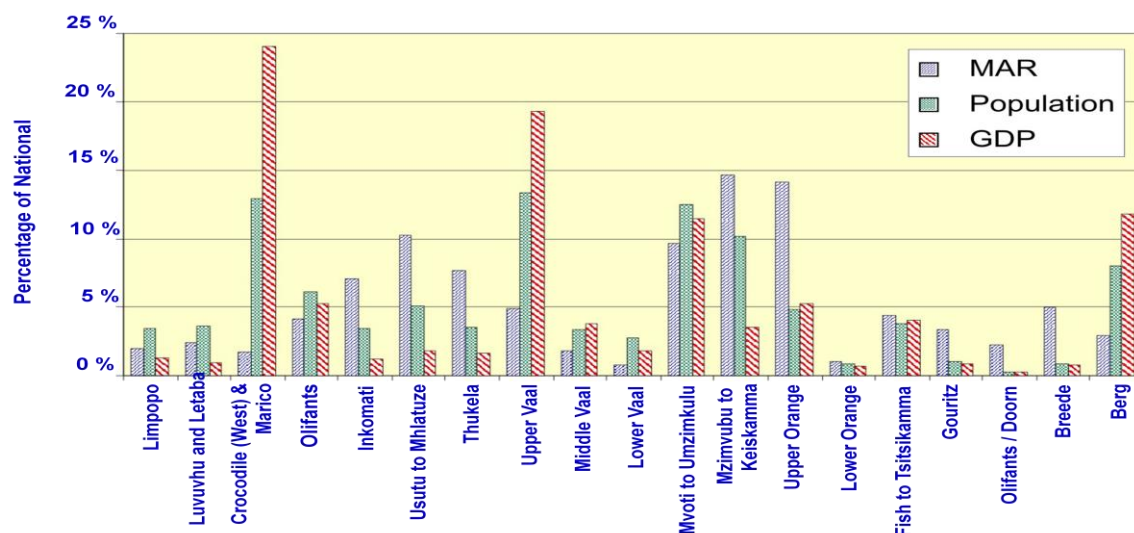


Figure 2.1: Mean annual rainfall (MAR), population and GDP per water management area (National Water Resources Strategy, 2005)

While the storage-population ratio is not high in comparison to many industrialised and developing countries, it is far greater than other Southern African countries; Figure 2.2a indicates the spatial distribution of large dams in Southern Africa. Without this level of infrastructure development, the South African economy would not have been able to sustain the economic growth rates and pattern of the past 50 years; Figure 2.2b indicates the spatial distribution of GDP in South Africa.

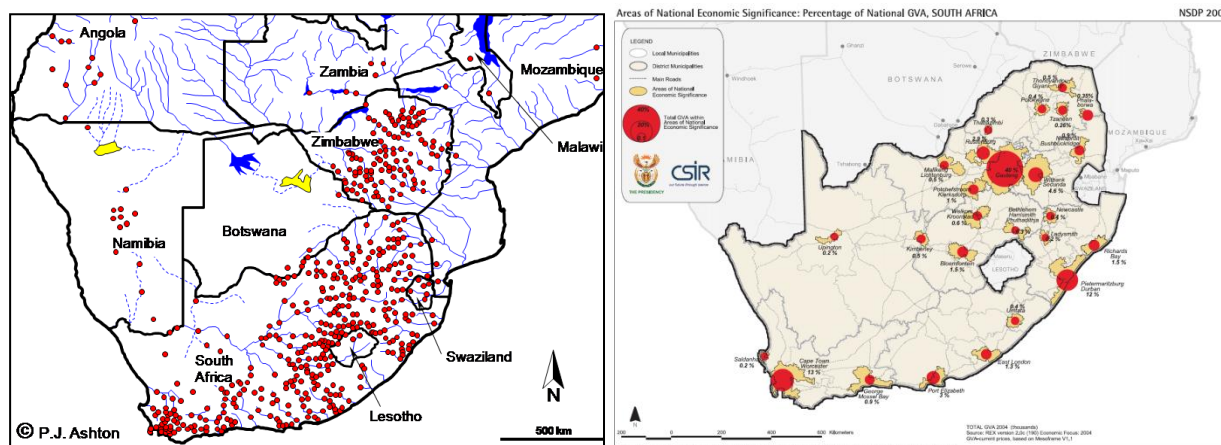


Figure 2.2: Distributions of (a) Large dams in Southern Africa (Peter Ashton, 2005) and (b) GDP in South Africa (NSDF, 2007).

Conversely, the intensive development of water resources infrastructure from 1960 to 1980, financed from the fiscus, would not have been possible without this economic growth. The concurrence of storage capacity and real GDP in South Africa is highlighted in Figures 2.3.

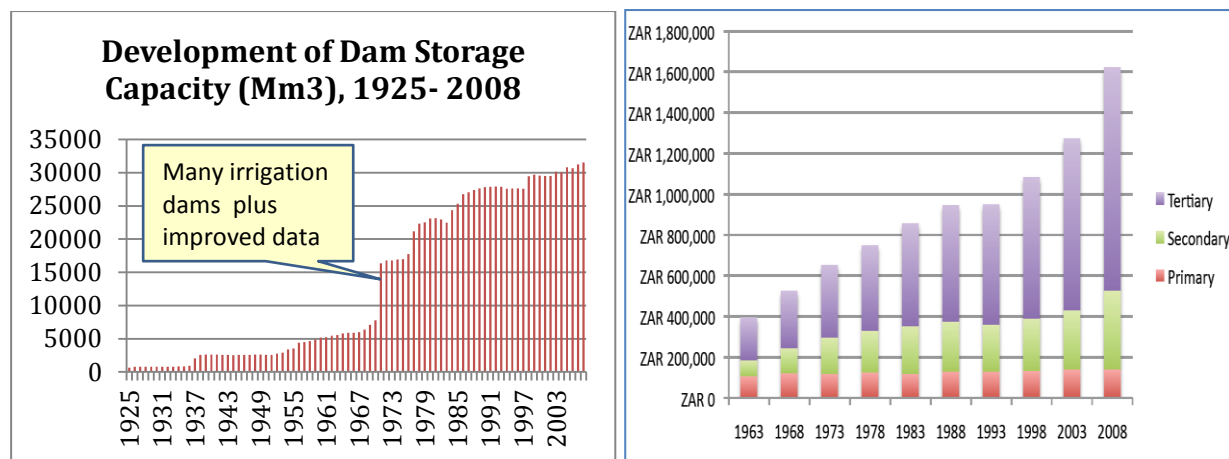


Figure 2.3: Growth in (a) storage of major dams (Source Eales and Schreiner 2008) and (b) real GDP (R bn) in 2005 prices (Reserve Bank)

In understanding the relationship between hydrology, storage and GDP, it is important to understand the evolving nature of the South African economy, and particularly the water using primary and secondary sectors, together with the shifting focus of water supply over this period. Before 1950, the economy was strongly built on the primary sectors of agriculture, forestry, fishing and mining (about 30% of GDP), whereas the secondary sectors of manufacturing, energy, water and construction only represented a quarter of GDP. By 1980, this had shifted to about 15% in the primary sectors and one third in the secondary sectors. The current-day South African economy has matured, with primary sector production dropping to 8% and manufacturing down to about one quarter of GDP.

Over this period, irrigated agricultural shifted from more than 75% of total water use in the 1950's to less than two thirds in the current day, with very little expansion of irrigation after the mid-1980's. Mining use has always been relatively limited, rather being concerned with dewatering and waste discharge. On the other hand, urban and industrial use has risen steadily over the past 50 years, with a doubling of national urban use between 1980 and 2000. The important interpretation of this is that South African historical water resources infrastructure development was initially driven by water supply to commercial irrigation and mining (including the urban areas supporting the mines) and then increasingly by growth in manufacturing, all of which depend strongly on water for production.

However, since 1990 water infrastructure has been more strongly driven by urban demands linked to an increasingly mature commercial and industrial economy. An important implication of this is that since 1990, the South African economy has become decreasingly linked to the country's variable hydrology and more able to afford to pay for economic infrastructure, while government's focus has shifted to meeting the social needs of the rural poor. In support of this hypothesis, GDP was affected by severe national droughts in the pre-1994 era, while more recent droughts have had less impact on GDP growth. It is worth noting that the water sector only contributes about 1% directly to GDP.

The second important message arises from the past thirty years, in that this economic development has contributed to increasing water stress, deteriorating water quality and management complexity, following the typical basin development trajectory. The policy and legislative reform of the 1990's and the implementation of water resources governance instruments over the past 20 years reflect this changing situation in line with the broadly accepted principles of Integrated water resource management. While the impacts of this complexity and stress on social and economic priorities is

less quantifiable, initial work around the waste discharge charge system indicated that externalities associated with poor water quality may have a negative impact of about 1% of GDP² through increased municipal and industrial water treatment costs, decreased yields and quality of crops, human health and ecosystem health. There are no comprehensive assessments of the value of water to the economy, but various case studies have indicated significant economic, social and ecological costs and/or benefits at a local level associated with water resources.

Against this backdrop, the following South African government national goals for the period 2009 to 2014 (as set out in the Medium Term Strategic Framework) are relevant to water resources management:

- Ensuring more inclusive economic growth, decent work and sustainable livelihoods;
- Expanding and improving economic and social infrastructure;
- Rural development, food security and land reform;
- Improved health care;
- Building cohesive and sustainable communities and reducing poverty and unemployment;
- Creation of a better Africa and a better world;
- Sustainable resource management and use;
- A developmental state including improvement of public services.

While there is little empirical data on the direct contribution of water resources management to these national goals, it is clear that in South Africa, which is vulnerable to droughts and floods, most of these goals are dependent on effective water resources management.

These two trends are reflected theoretically in Figure 2.4, which plots water resources infrastructure and governance costs against increasing development and then management of a hypothetical basin's water resources.

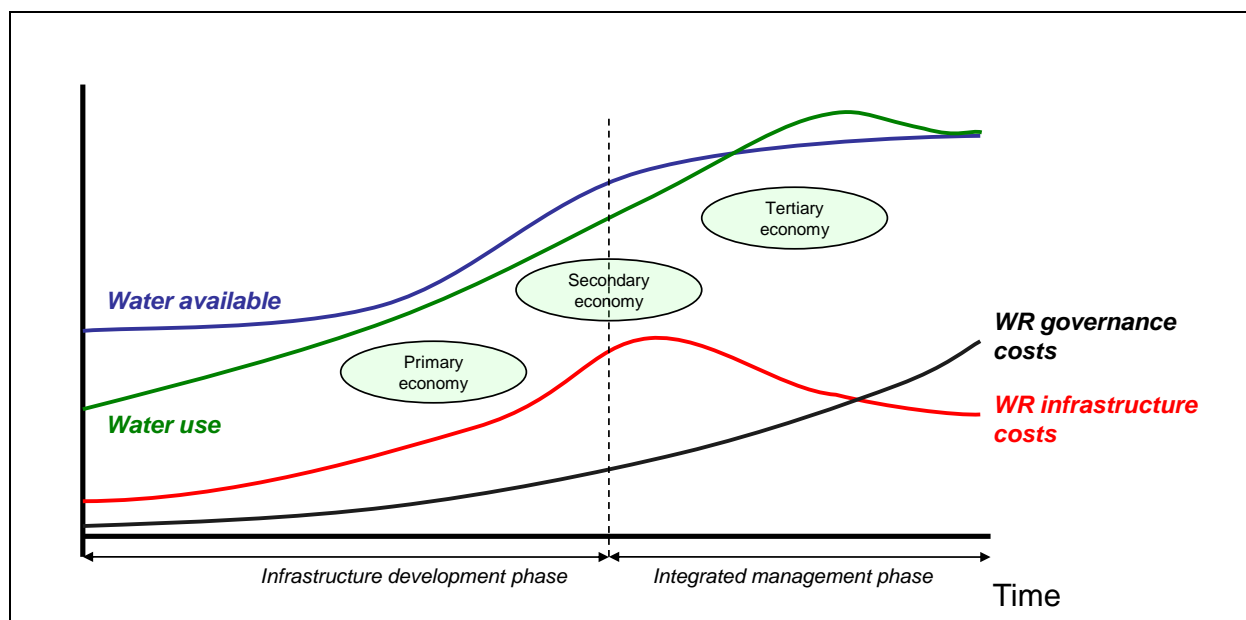


Figure 2.4: Variation of WR governance and infrastructure costs with increasing basin stress.

² DWAF 2006: Waste Discharge Charge System, Pretoria

2.2. Beneficiaries of water resources management

The preceding discussion has highlighted the role that water resources has played in enabling sustained economic growth and urban development in South Africa, and how the management of water resources has become more complex. The primary beneficiaries of this are the institutions, private sector companies and individuals that are linked to the formal urban or rural economy, rather than the population living in informal settlements in urban and rural areas.

The White Paper on a National Water Policy for South Africa requires that water resources are used beneficially and in the public interest. Two priority beneficiaries of this are poor (predominantly black) rural communities and the aquatic environment. Although policies, strategies and approaches to reallocating water to these requirements have been developed, there has been little progress in achieving results on the ground in river basins. This continues to have a significant negative impact on poor communities in a society that is estimated to be one of the most unequal in the world. While there are no studies on the overall benefit or cost of water resources to these communities and associated with aquatic ecosystems, localised cases have demonstrated the real value of water resources to livelihoods and the local economies at this scale. This is an important reminder that understanding of the impacts of investment in water resources management should be rooted in both macro and micro perspectives, while understanding the implications of both the infrastructure and governance aspects at these levels.

PART 3: INVESTING IN WATER RESOURCES MANAGEMENT

3.1. Available information on water resources management expenditures

3.1.1 Water Resources Governance Related Costs



The water resources governance function is taken to include the non-infrastructure related activities required to manage water resources. The formal expenditure in this sector is primarily through national government Department of Water Affairs (formerly Dept. of Water Affairs and Forestry) and its agencies, although there is significant albeit unquantified expenditure by local government and private sector institutions.

Table 3.1 presents an indicative summary of the water resources governance expenditure in South Africa over the last decade since the 1998 National Water Act (NWA) was promulgated, separating it according to the categories described below. It must be noted however that the budget programme structure changed and collection of charges on the ICM trading account was started during this period, so the figures are approximations based on the information in the DWA annual reports.

Table 3.1. Governance-related water resources management costs

Functional area	2008/09	2004/05	2000/2001
Policy & Planning (allocation and resource protection)	R210 million (14.7%)	R210 million	R120 million
Monitoring & Information	R300 million (21.1%)	R210 million	R160 million
Research (WRC)	R105 million (7.4%)	R75 million	R65 million
Water Use Administration, Control & Enforcement	R600 million (42.3%)	R300 million	R200 million
Institutional Development & Stakeholder Engagement	R45 million (3.1%)	R20 million	R10 million
Corporate, Coordination & Overheads	R160 million (11.3%)	R105 million	R80 million
TOTAL WRM Governance	R1 420 million	R920 million	R635 million

Sources: DWAF and WRC Annual Reports 2008/09, 2004/05 and 2000/2001 (nominal values)

-  **Policy and Planning:** includes the development of strategies, methods and instruments to implement the policy and legislation, as well as national water resources planning for reconciliation of supply and demand, including resources protection and water allocation; this has historically been exclusively DWA expenditure.
-  **Monitoring and Information:** includes the creation and maintenance of water resources information systems to support the other functions, as well as the acquisition and sharing of

monitored water resources related data; these figures are taken from DWA, but there is considerable obscured WRM expenditure in other government department and agency budgets.

- ✚ **Research:** includes formal research in the water resources sector; much of this is funded by the Water Research Commission (these figures), but there are university, research institutions (CSIR) and foundation (NRF) research budgets for water resources that are difficult to assess (at least comparable amounts), not even including the private sector research into technologies.
- ✚ **Water Use Administration:** includes activities for authorisation, control and enforcement around the use of water resources for abstraction, storage or waste discharge/disposal; this is historically the responsibility of DWA, although water user associations/irrigation boards also play an important (but unquantified) role in control activities.
- ✚ **Institutional Development and Stakeholder Engagement:** involves the establishment, development and oversight of water management institutions, such as catchment management agencies and water user associations, and the engagement and empowerment of stakeholders through this process; a new function being developed by DWA.
- ✚ **Corporate, Coordination and Overheads:** involves the management, coordination and liaison functions required for water resources management at local, catchment, provincial, national and international scales; primarily a DWA function, but also with involvement of the other parties.

It is worth noting that these governance costs have increased in real terms over the past decade, as is to be expected in a country attempting to implement more integrated and coherent water resources management in increasingly complex basins. In interpreting this expenditure, it is important to recognise that the first part of this period involved active policy, strategy and instrument development to give effect to the NWA, which has more recently shifted to an implementation focus.

The concept of “commissioning activities” was referred to during the first part of the period, noting that these were once-off activities required to develop instruments, create systems or establish institutions to support ongoing implementation. These activities related primarily to the policy, information and corporate categories. Some of this expenditure is missed in the data presented in this table, because it occurred between 2001 and 2004. From a financial perspective, an important aspect of this commissioning process was the development of systems to support the water use management (WARMS) and billing (SAP), which required significant resources; in excess of R100 million between 2000 and 2004. A review of the commissioning requirements versus expenditure is provided in Section 3.2 below.

3.1.2 Water Resources Supply Infrastructure Costs

In unpacking the water resources infrastructure expenditure for supply purposes, it is obviously important to distinguish capital from ongoing costs. The second issue that is worth noting, is that over the past decade, DWA and TCTA have primarily developed large regional, national and international infrastructure, while local government, water user associations and private land owners have primarily been developing local and micro infrastructure. The difficulty in quantifying this is that limited information is available at a national scale on the extent and asset value associated with farm dams and local schemes. This last point highlights a further complexity around the interface between water resources infrastructure and water supply/services infrastructure, both at a regional scale where bulk supply schemes transfer large quantities of water between catchment areas and at

the local scale around groundwater and rainwater harvesting systems. For the purposes of this paper, these issues will be highlighted, but cannot be quantitatively unpacked.

Capital Expenditure

Water resources infrastructure capital expenditure includes new construction, betterments to improve the yield of existing schemes and rehabilitation-refurbishment of schemes due to operational deterioration (or inadequate maintenance), while the new construction may be on-budget through DWA or off-budget (commercial finance) through TCTA.

Table 3.2 presents the valuation of the national water resources infrastructure assets owned by national government (including TCTA). The significant increase in the DWA asset value between 2000 and 2009 was largely due to an asset revaluation (rather than new development), that assessed the current-day asset value in its existing state and compared this to the current replacement value of these assets estimated to be about R130 billion in 2009. This revaluation had a major impact on the depreciation estimates on the DWA income statement, as well as infrastructure charges discussed in Part 4.

Table 3.2. Water Supply Infrastructure costs

	2008/09	2004/05	2000/01
Infrastructure Asset Value			
<i>DWA</i>	R75 billion	R40 billion	R25 billion
<i>TCTA</i>	R19 billion	R15 billion	R14 billion
Capital additions			
<i>On-budget (DWA)</i>	R1.2 billion	R0.02 billion	R0.2 billion
<i>Off-budget (TCTA)</i>	R0.75 billion	R0.17 billion	-
Ongoing annual expenditure	R1.05 billion	R1.0 billion	<i>R0.9 billion</i>

Sources: DWAF and TCTA Annual Reports 2008/09, 2004/05 and 2000/2001 (nominal values)

However, DWA did build about R2 billion of new infrastructure and betterments since 2000, while about R3 billion was spent in the past 4 years on the refurbishment of infrastructure deemed to pose dam safety and operational risks. On the other hand, the R3.5 billion TCTA asset value increase was due to new construction during this period. Figure 3.1 indicates the variation ("lumpiness") in new infrastructure capital expenditure over the past 5 years, distinguishing between DWAF and TCTA.

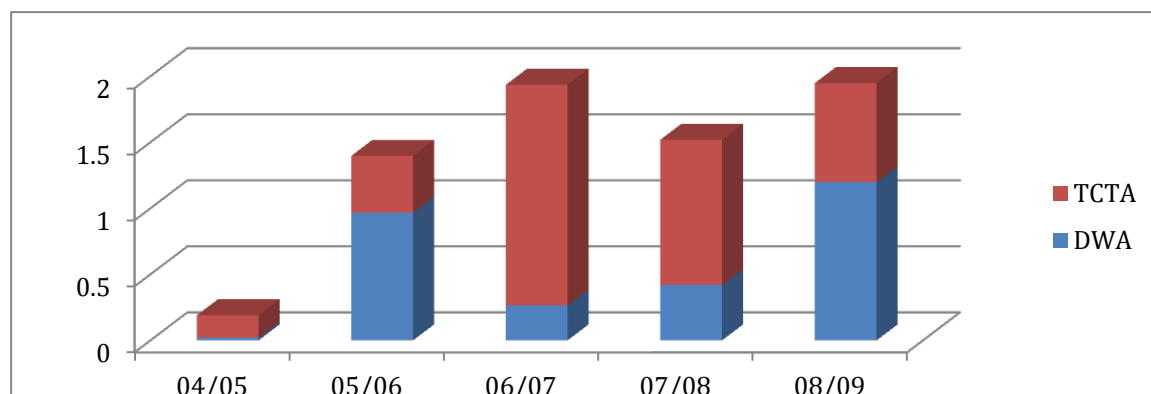


Figure 3.1: Annual variation in capital expenditure on infrastructure (R bn) over the past 5 years (nominal values).

Recurrent Operational Expenditure

The recurrent operational expenditure consists of fixed and variable costs associated with managing infrastructure, including the operation and maintenance of the schemes (including national TCTA projects) and national management, administration, planning, design and construction capacity. About a third of this expenditure relates to direct scheme operation and maintenance costs, a quarter is indirect scheme overheads and the remainder relates to the national functions. Indications are that the recurrent infrastructure expenditure has dropped in real terms over the past decade, even while the capital asset has increased and the infrastructure is aging. The debt repayment on the TCTA infrastructure debt (about R2 billion in 2008/09) has not been included in the operating expenditure, as this is dealt with under financing mechanisms.

While these figures include transfers to LHDA and KOBWA for operation of the international Lesotho Highlands and Inkomati projects, respectively, they do not include the capital invested or operational expenditure of the hundreds of schemes owned and/or operated by local government and water boards for supply purposes, nor the thousands of small schemes and dams operated by water user associations, private land owners or communities. While these schemes may not have significant asset values in comparison to the national infrastructure, they incur significant in-kind or monetary operational expenditure (anecdotal evidence indicates that this may be in the same order of magnitude as the national infrastructure).

3.1.3 Other Water Resources Management Costs

A range of other water resources related infrastructure or intervention costs should be highlighted to complete the budget and expenditure picture for water resources management.

- ❑ **Flood management:** South Africa is not generally prone to large flooding risk, apart from localised flash floods in urban and peri-urban areas. As a result, national flood management focuses on dam operation and response coordination during flooding events, rather than the development of large flood defense infrastructure. There is a national flood office that is mobilised during these events, but with significant general disaster management resources in provincial and local governments. Local governments are responsible for localised flood defense, but information on this expenditure is hidden within public works budgets. The main specific flood investment in the past 15 years was the Quedasisi Dam in Ladismith upstream of a

settlement that suffered perennial flooding, at a capital cost of R220 million and annual operating budget for the local municipality of about R2 million per year.

- ❑ **Drought Relief:** On the other hand, South Africa suffers from regular drought and government mobilises drought relief to address water supply challenges in regions where a drought emergency is recognised. This is typically in the grey area between water resources, water service and disaster relief, but is typically coordinated by the water resources function in the DWA in cooperation with water services and Provincial Government. In early 2010, a budget of R282 million was allocated for emergency drought relief in three of the nine Provinces, and this is not an atypical situation. Many local municipalities also make provision for drought relief – for example the use of water tankers to drive water to remote locations.
- ❑ **Pollution Abatement and Desalinisation:** While water quality around the country has been gradually deteriorating over the past few decades, little government sponsored water resources scheme related pollution abatement has been implemented (apart from the water quality management costs associated with governance). It must however be said that the private sector investment in waste treatment has been significant, if problematic to quantify. Nevertheless, acid mine drainage is a major concern in the coal mining areas on the highveld and so the Brugspruit Treatment Works was developed during the 1990's to capture and neutralise the highly acidic streamflow downstream of a number of exhausted and abandoned coal mines in Witbank. This had a total capital cost of R35 million and has an annual operating cost of about R3 million per year.
- ❑ **Desalinisation:** Desalinisation of sea water is only being piloted at the current time in South Africa, with bulk raw water costs being quoted at about R4/m³, which is comparable to the marginal cost of the next augmentation in some cities. However, with the rapidly increasing electricity costs in South Africa and the carbon implications of desalinisation, possibilities of linking plants to proposed nuclear facilities are being discussed. More recently there are a few private sector initiatives for regional schemes to drain existing and abandoned mines to a regional desalinisation plant, from which water will be transferred (and sold) to urban and industrial water users. These schemes are prompted and financially motivated by the threat of the waste discharge charge system and the increasing water supply treatment costs to users like Eskom. The first scheme in the Witbank area is expected to cost about R400 million with an annual operating cost of R35 million, resulting in cost of water at about R7/m³.
- ❑ **Hydropower:** There are limited opportunities for hydropower in South Africa, with small facilities being added to water supply infrastructure systems such as at Gariep Dam on the Orange River and at Muela as part of the Lesotho Highlands Water Project. Small pump-storage schemes were built and operated in the Drakensberg and Palmiet schemes, but their relative asset values and expenditure are relatively small and are subsumed into the water supply infrastructure operating budget.
- ❑ **Ecosystem Management:** There is little formal water resources aquatic ecosystem rehabilitation in South Africa (apart from local government green belt improvement), except around the following three programmes: *Working for Water*: clears alien vegetation from riparian and

catchment areas with the consequent water availability and biodiversity improvements, with national government expenditure in excess of R400 million in 2009; *Working for Wetlands*: has followed on the success of WfW and is involved in the rehabilitation of wetlands; and *Aquatic Weeds Removal*: involves the chemical and physical control of aquatic weeds from rivers and impoundments, with national government funding decreasing to about R7 million in 2009.

3.2. Evaluations of the costs of water resources management

Table 3.3 presents the national water resources management budget allocations against water sector (including water services), national budget, GDP and population information. Firstly, it is interesting to note that the allocation to water resources has stayed relatively stable as a portion of total water sector allocation (at just below 60%). However, its proportion of the total national budget has dropped over the past decade to about 0.5% as national priorities have shifted to social spending and the expanded public works programme. Water resources management spending has remained relatively stable at about 0.15% of GDP, although there has been a decline in the annual recurrent expenditure for water resources management (from 0.15% of GDP in 2000 to only 0.11% in 2008). While per capita expenditure seems to have increased recently, the per capita recurrent (governance and infrastructure operations) budgets have stayed relatively constant in real terms over the past 10 years.

Table 3.3. Water resources management expenditure compared to fiscal allocations (nominal)

	Financial year		
	2008/2009	2004/05	2000/2001
Total operational WRM budget	R3 670 million	R1 940 million	R1 735 million
<i>Governance</i>	R1 420 million	R920 million	R635 million
<i>Infrastructure recurrent</i>	R1 050 million	R1 000 million	R900 million
<i>On-budget infrastructure</i>	R1 200 million	R20 million	R200 million
WRM budget as % of water budget	57%	60%	58%
Total Water Sector budget	R6.5 billion	R3.3 billion	R3.0 billion
WRM budget as % RSA budget	0.47%	0.53%	0.75%
Total RSA Budget	R784 billion	R369 billion	R234 billion
WRM budget as % of RSA GDP	0.16%	0.14%	0.16%
Total RSA GDP	R2 284 billion	R 1 395 billion	R 1 100 billion
WRM budget per capita	R75/capita	R41/capita	R39/capita
WRM recurrent budget per capita	R50/capita	R41/capita	R34/capita
Total RSA population	49 million	47 million	45 million

Sources: Stats SA and Annual Reports (above)

It is not clear whether these trends are likely to change dramatically over the next 10 to 20 years, given the uncertain outcomes of the financial crisis for the South African government. Interestingly,

the 2010-2014 DWA Strategic Plan indicates approximately 3% real increase in budget allocations to water resources management over the next three years, largely driven by increased allocation to infrastructure and increasing recognition of the needs of water resources compliance. This is a reflection of the current concern about the availability and quality of the nation's water resources, following the energy crisis associated with inadequate development of generation infrastructure, an emerging recognition of water's importance as a catalyst or constraint on social and economic development (under Water for Growth and Development) and the delegation of water services implementation responsibilities to local government. Nevertheless, there may be less on-budget capital available for the 15 proposed water resources infrastructure schemes planned over the medium term (R20 billion over 10 years), implying a greater reliance on off-budget commercial sources of finance. It will be interesting to see how this budget allocation develops over the next few years given the current funding constraints following the economic downturn in South Africa.

The question of whether the budget allocation has been adequate over the past 10 years is complex, because there are no good benchmarks on the appropriate expenditure on water resources in developing countries and these would need to reflect the conditions and challenges faced in the nation's water resources and basins. Taking a resource perspective, there are three indicators that inadequate attention has been paid to the management of water use over the past decade, namely:

- a continued deterioration of water quality in many parts of the country related primarily to increasing urbanisation and inadequate treatment of waste discharge;
- a decrease in the reliability of water supply in many basins, due to unlicensed expansion of irrigation, abstraction of water and development of small farm dams; and
- a deterioration in the state of national and regional infrastructure throughout the country due to inadequate investment in maintenance and refurbishment.

This was the result of inadequate financial resources, as well as losses of human resource capacity. Recent prioritisation and budget allocation to infrastructure refurbishment and water use management reflect this recognition. On the other hand, there has been a delay in the implementation of key aspects of the 1998 NWA (even though the methods and strategies were developed), particularly around:

- resource protection (classifying water resources and determining environmental flows),
- water allocation (redress of historical inequities and achieving environmental flows),
- institutional development (CMA establishment and WUA transformation), and
- information management (creating systems).

The TINWA (Team for the Implementation of the National Water Act) process initiated early in the new millennium identified a range of priorities for implementing key aspects of the NWA (closely linked to the above activities), involving increased budgets for commissioning and implementation. The response of DWA management was to re-evaluate the implementation schedule and priorities, particularly since prior to its passing, Minister Asmal had assured parliament that the NWA would not incur additional fiscal expenditure.

Unfortunately at the same time, implementation budget planning (in the DWA regional offices), upon which the new water resources charging regime was to be based, were derived from historical expenditure and largely ignored the additional responsibilities and functions required to implement the NWA. This constrained implementation resources and to some degree constrained later

increases in water use charges. This contradicted the assumptions about DWA's ability to collect revenue for water resources governance functions. This trend may be reversed with the expected establishment of CMAs across the country, particularly if adequate human and financial resources are made available for water resources governance through the direct collection of water use charges.

Finally and quite critically, the development of the strategies, methods and approaches to implementing the NWA were generally over-ambitious, had significant resource requirements and did not typically consider the financial implications of implementation in a developing country with resource limitations such as South Africa.

On the positive side, both social and economic infrastructure development was adequately funded, partly due to the sustained national economic growth and increasing government revenue collection. Infrastructure revenue was well collected, but a significant portion of the water resources revenue was used to support the under-recovery of operational costs on the water services infrastructure inherited from the former homelands. This contributed to the underspending on maintenance, which in turn led to the belated refurbishment budgets discussed above. A recent asset review has indicated the need for up to R1 billion per year to refurbish and replace infrastructure over the next 10 years.

3.3. *Experiences in reducing costs*

The South African experience with reducing costs associated with water resources management is implied in the previous sections and has had mixed emphasis and success. On the governance side, the initial TINWA estimates were not implemented, largely due to the postponement of the *de facto* implementation of a number of activities and by not adequately performing the basin water resources management functions through cost-cutting measures (leading to unplanned deterioration in resource quality and reliability). Rethinking of strategies, instruments and approaches to be more affordable has not yet been widely implemented, although more recently there have been discussions about new approaches to water allocation reform and realignment of the broader water sector institutional arrangements. Recognition of the importance of water use control has led to an emerging strategy for effective-efficient water use compliance and enforcement.

A potentially positive aspect of the water law is that while all water use was included in the definition, not all water use required a license, with smaller users being defined under Schedule 1 or general authorisations (although this latter approach has not been fully exploited).

On the other hand, infrastructure planning has been quite effective in adopting sophisticated methodologies to optimise system planning-development, as well as system operation, in order to maximise water yields from infrastructure and postpone required augmentation infrastructure. In many cases, water demand management and restriction of illegal water use have been identified as the preferred interim option, before infrastructure augmentation, but the implementation of these plans through the water resources governance functions has not been as effective as the opportunity (partly linked to the above-mentioned issues).

While there are cases of efficient agricultural and urban use of water, many urban areas in South Africa have rates for unaccounted-for-water in excess of 50% and many irrigation schemes suffer significant transmission losses. Comprehensive regulatory instruments (and funding mechanisms)

are being developed to assist the demand management and enforcement functions, with demand management being a top priority of DWA. However, these have to engage the concept of water use efficiency in a highly unequal society where many poorer individuals do not even receive access to adequate safe drinking water.

There has been less success in managing the deteriorating water quality problems (eutrophication and salinity) that impose externalities on system operation, water treatment and users, and these have been gradually increasing in many parts of the country, due to financial and human resources constraints.

As will be seen in the next Chapter, various innovative economic instruments and institutional arrangements have been explored to assist water resources management but are yet to be implemented.

While some initiatives to cooperate with partner departments in land and agriculture have been attempted, these have not had great success apart from Provincial coordination and liaison committees that promote aligned planning and expenditure. Recently, there has also been some alignment between water and energy efficiency initiatives at a household / site scale, although increasing carbon pressures have negative water efficiency consequences for certain sectors (such as dry cooling thermal power stations).

In summary, one can expect water resources management in a water-stressed middle-income country with dramatic inequality and highly developed river basins such as South Africa to have increasing costs associated with water resources management (i.e. governance complexity and marginal infrastructure costs). Recent indications are that allocations are being made to more effectively use the available resources, but the challenge remains to translate this expenditure into effective water resources governance and to ensure that infrastructure development serves social and ecological imperatives, as well as the economic imperatives that are typically catered for.

PART 4: PAYING FOR AND FINANCING WATER RESOURCES MANAGEMENT

4.1. Policy framework for financing water resources management

The 1997 White Paper on a National Water Policy for South Africa recognised that “the historic financial arrangements for water resource development in South Africa have not been adequate.” It recognised that an estimated R20 billion of state money had been invested in water resource infrastructure, for which users did not pay the O&M costs, let alone a contribution to capital costs. At the same time, budgetary constraints meant that many water resources projects could not be implemented despite being financially viable and socially justifiable.

The challenge lay in the way that raw water was valued and charged for. As a result, in 1996, the Cabinet decided that the price paid for water by major users should be raised, over time, to cover the full financial costs and to reflect its value to society. The planned new Water Act would need to enable this approach.

However, as a result of the high levels of poverty and inequity in South Africa a further principle in the White Paper was that the introduction of ‘realistic pricing for water’ should not penalise poor black communities.

The White Paper also states that:

- ✚ *The price of water will vary according to location and will be calculated on a system, catchment or sub-catchment basis and will include operating, maintenance and capital costs where appropriate as well as a water resource management levy and a resource conservation charge. The levy may include charges for effluent disposal and significant interception of water related to land uses such as afforestation or rainfed agriculture.*
- ✚ *Disadvantaged individuals and communities will be supported through specific measures for beneficiaries of land restitution, land reform or other programmes of corrective action. These may include periods during which the full cost of water will not be charged.*
- ✚ *Where the imposition of the full water price discourages the use of available water, provision may be made for some elements of the tariff, including capital and depreciation costs in existing Government water schemes, or the resource conservation charge, to be suspended for a limited period of time.*
- ✚ *Income from water charges will be divided between operational agencies, water management authorities and national Government in accordance with their contributions and responsibilities.*

The National Water Act, which gives legislative form to the White Paper, requires the development of a Raw Water Pricing Strategy. The preamble to the section on the Pricing Strategy outlines that it may differentiate between geographical areas, categories of water users, or individual water users, and that the achievement of social equity is a key element of this differential approach. While enabling the setting of infrastructure, water resources management and conservation charges, the Act also specifies that these may not be “a tax, duty or levy”, which limits the Pricing Strategy to addressing cost-recovery.

The first edition of the Pricing Strategy was published in 1999. The most recent Pricing Strategy (2007) “contains the objectives, methodology and implementation strategy for setting water use charges for purposes of:-

- *funding water resource management by DWA and water management institutions, through water use charges*

- *funding water resource development and use of waterworks by DWA and water management institutions.*
- *achieving the equitable and efficient allocation of water, through a charge hereafter referred to as the “economic charge”.*
- *providing for a differential rate for waste discharges.*³

The revenue generated by the sale of water as guided by the Pricing Strategy serves to operate, maintain and refurbish state owned waterworks, most of which are operated and maintained by DWA, but some of which are funded by the Trans-Caledon Tunnel Authority (TCTA) which receives that revenue from schemes which it has funded. The TCTA is a state-owned entity mandated to implement and fund raw bulk water infrastructure and is empowered to raise funds from the domestic and international money markets.

With the introduction of the pricing strategy, water managers had greater flexibility in financing water resources management activities through parliamentary appropriation (fiscus) or collection of charges from water users (cost-recovery); other sources of financing are relatively insignificant in the South African situation. The intention is that water resource management charges become the primary source of finance for catchment management agencies. However, the issue of what should be financed from the fiscus and what should be financed through water resources charges has been and remains a dilemma, both at a principled and pragmatic level in South Africa, as will be seen through the discussion of experience with financing instruments in the following section.

A 2009 review of the Pricing Strategy has made a number of recommendations for consideration in future versions, particularly around verifying registered water use, setting consistent charges and creating appropriate institutional arrangements.

A further important source of funding in the South African water sector is a unique arrangement for funding water related research. The bulk of water research funding is generated through a Water Research Commission levy, under the Water Research Commission Act (Act 34 of 1971), which enables the Minister to levy rates on land irrigated with water provided by the State, and/or for water supplied by the state or state agencies for agricultural, urban or industrial purposes. This money is disbursed by the Water Research Commission for water-related research.

4.2. Experiences with instruments for raising revenues

Figure 4.1 shows the water supply and sanitation cycle and its connections with water resources and their management (arrangements for bulk industrial supply and agriculture are similar). It also indicates seven different charges that may be levied for the different functions undertaken. A range of instruments for raising revenues related to water resources management (charges related to 1, 2 and 7 on Figure 4.1) have been applied or proposed to address different aspects of water resources management in South Africa, both before and after the introduction of the Pricing Strategy. The following discussion addresses these instruments around their intent and function, beginning with infrastructure charges, moving through water resources management charges and then addressing a range of other charges and levies.

³ DWAF, Establishment of a pricing strategy for water use charges in terms of section 56(1) of the National Water Act, 1998, Government Gazette No. 29697, 16 March 2007

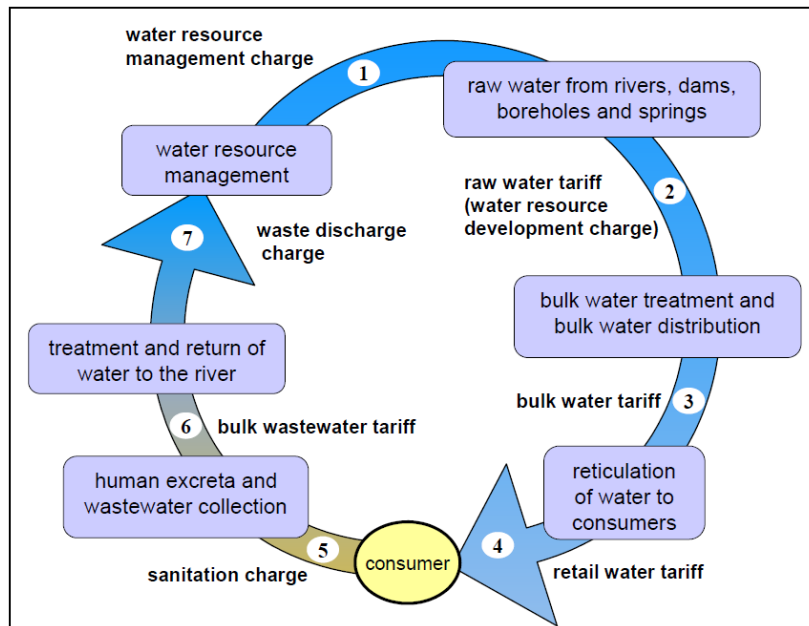


Figure 4.1: Water Pricing Chain linking water resources and water services (Strategic Framework for Water Services, 2005)

4.2.1 Raw Water Infrastructure Charges

Financing of the development and operation of water resources infrastructure is done primarily in terms of the Pricing Strategy, with different institutions being involved at different levels. There is a distinction made between infrastructure to meet social versus commercial demand. Typically the former is funded on-budget from the fiscus with charges being set to recover operational and nominal asset costs, while the latter is funded using commercial off-budget finance with charges being set to recover the full financial cost of operation and debt repayment. There are cases where infrastructure is developed on-budget to promote economic development, but with charges to commercial users negotiated at the full financial cost (equivalent to off-budget financing).

The classification of a project (or water use) as social or commercial is at the sole discretion of the Minister, but there is no clear definition of what constitutes social use; an interesting dimension of this was the classification of the Berg River Project to supply the Cape Town metropolitan area as commercial, despite a portion of the demand being driven by population growth in poor settlements, because the Cape Town Council has access to national basic service grants for these settlements and the ability to cross-subsidise costs of servicing poor communities from wealthier users. In general, social use is seen to be water for disadvantaged communities that cannot afford to pay the costs of the infrastructure. The treatment of financing costs such as interest and transaction costs is fundamentally different for social and commercial investment. For social investments these costs are incorporated into national treasury operations as part of the cost of financing government. For commercial infrastructure these costs are explicitly ring-fenced and recovered at a project level.

National Raw Water Infrastructure Charges for Government Funded Schemes

The raw water charge for existing publicly financed infrastructure consists of three elements calculated for each scheme in the country, namely:

- *Operation and Maintenance Charge*: to cover the direct (personnel and materials) and indirect (overhead) costs associated with administering, operating and maintaining that scheme, estimated through the annual budgeting process.
- *Depreciation Charge*: to cover the typical refurbishment costs associated with loss of functional performance that is not restored by current maintenance, estimated on a straight line basis on the depreciable portion of the current asset value over its total useful life.
- *Return on Assets (ROA) Charge*: to cover the social opportunity cost of capital (partially covering the financial costs) to government for publicly funded infrastructure, to be used for funding augmentation planning studies, new schemes or betterments of existing schemes for social purposes or dam safety betterment, estimated as a percentage (currently 4%) of the depreciated replacement value.

The Department calculates these charges annually for each government water scheme on a volumetric basis (Rand per cubic metre) and invoices water users according to their sector, with the following general rules:

- Municipal, bulk industrial, power and mining users are charged O&M, depreciation and ROA charges and are typically billed on a monthly cycle.
- Agricultural users are charged O&M and depreciation charges and are typically billed on a 6 monthly cycle; the argument for not applying ROA to agriculture for existing schemes is that future social infrastructure will be primarily for domestic and livelihoods use.
- Water users associated with off-budget schemes are charged an O&M charge only until the debt has been repaid.

An individual water user obtaining water from multiple sources would potentially pay different scheme costs for each source, but would only receive one invoice with each scheme as a line-item. Agricultural irrigation charges may be reduced in times of drought in accordance with the percentage restriction required by DWA.

There are about 8000 customers paying infrastructure charges on about 250 government schemes nationally. The revenue on these schemes was about R1.1 billion in 2008/09, with about 55% being derived from O&M and depreciation charges. Importantly, about 90% of the revenue is derived from urban and industrial users, who typically pay between R0.05/m³ and R1/m³ as opposed to agricultural users typically paying between R0.01/m³ and R0.1/m³. It is also interesting to note that the payment rates on national infrastructure (predominantly to the large municipalities and bulk industries) is in excess of 95%, while for local infrastructure to small municipalities and commercial farmers the payment rate is only about 70%.

In 1997 the White Paper assumed the national infrastructure asset was about R20 billion, in 2004 the asset was estimated at about R40 billion and in 2009 this had risen to about R75 billion current value (and ZAR 131 billion replacement value) once the recent asset inventory was completed. This obviously has dramatic implications for the depreciation and ROA charges, but poses a problem because increases in infrastructure charges are capped (by policy) at PPI + 10%. The 4% ROA charge rate was originally based on projected national average increase in domestic and industrial demands, and this has more recently been supported by the medium-term projected capital requirements for social infrastructure and betterments. However, no rigorous methodological or policy approach has been developed to estimate an appropriate rate for ROA charges. This approach has generated

significant debate, particularly by the larger municipalities that believe they will not benefit from the significant ROA payments they have made, due to classification of their demands as meeting “commercial needs”.

While a reserve fund to roll-over infrastructure charges between years has been mooted with National Treasury, this has not yet been implemented, which implies that all unspent infrastructure charges are returned to the national accounts. It is also relevant to note that potential yield reductions associated with climate change are not yet considered in the pricing strategy and no concept of adaptation reserves have been explored.

Infrastructure and Capital Unit Charges (CUC) for Off-budget Funded Schemes

Since 1994, the development of water resources infrastructure (particularly the large schemes) has predominantly been funded off-budget and costs recouped from water users. This was mainly done through a specialised parastatal intermediary (TCTA). Over the past 20 years, about R21 billion of investment in the Lesotho Highlands, Berg River Dam, and the Vaal River Augmentation projects was funded from commercial sources (predominantly the bond market) through TCTA, while at least another R12 billion is planned in the next 5 years. Finance costs on the repayment of these debts represented 81% of TCTA expenditure in 2008/09⁴, which was largely covered by the R2.5 billion in income collected directly from the “commercial users” supplied from these projects. TCTA’s funding model remains sound with its long term debt sufficiently covered by long term assets, even though it has capitalised interest over the past few years.

The setting of “capital unit charges” (CUC) for debt repayment is specified in the Pricing Strategy, which reflects the revenue stream required to pay off the debt over a reasonable time (between 18 to 25 years). In practice this must consider stability in tariffs in real terms, but growing with inflation (CPIX); the debt profile, acceptable growth and level of debt of the project; overlap with and funding requirements of future augmentation projects in the basin; and financial strain to end users or unhealthy financial balance in the water sector. The 2009 CUC for the Vaal system is about R1.5/m³, while the charge for Berg River Project is about R3/m³.

Before capital can be raised off-budget, off-take agreements must be signed with DWA by the commercial recipients of the water guaranteeing to purchase a specified amount of water at the set price for the duration of the project debt repayment. In turn, DWA signs an income agreement with TCTA, which provides an implicit guarantee for the agreed charges and reduces TCTA risk. The CUC is then billed and collected from users by DWA as a line item on the infrastructure invoice and transferred to the TCTA, together with an O&M charge on off-budget infrastructure. It is intended that a water resource development charge will be set by the Minister (which principle will be less than the ROA) once the project debt has been paid off, and that this will be applied with a depreciation charge.

It is also important to note that TCTA has adopted an integrated risk and pricing methodology on a systems basis which takes account of future infrastructure development in the Vaal and Western Cape systems, related to the Lesotho Highlands and Berg River projects. This represents a shift from the scheme based infrastructure charges for publicly financed infrastructure. This has the advantage

⁴ From TCTA, 02008/09 Annual Report, Pretoria, 2009.

of balancing tariffs between schemes and ensuring stable tariff regimes, but has not be expanded to the calculation of infrastructure charges. Other experience with raising commercial finance for infrastructure is explored in Section 4.5 below.

The following table provides indicative charge/tariff levels, billing and recovery rates for different water resources charges in 2008/09 and compares these against the budgeted expenditure for the related functions.

Charge	Indicative charge (R/m ³)	Billed amount (2008/09)	Estimated recovery (%)
Capital Unit Charge (TCTA)	R1.5 – R3	R2 billion	100%
Raw Water Infrastructure Charge (NWRI)	Ag: R0.01 – R0.1 U&I: R0.05 – R1.5	R1.05 billion	95%
WRC Levy (WRC)	R0.0354	R140 million	95%
WRM Charge (CMA)	R0.005 – R0.01	R150 million	50%

Irrigation Board and Water User Association Scheme Levies

Irrigation Boards and Water User Associations are entitled to set charges/levies on their Members to recover the costs of administration, operation, depreciation and debt repayment of their own schemes, following the requirements of their constitutions. Where they are responsible for the operation of government water schemes, they can act as billing and/or implementing agents for DWA. Some irrigation boards/water user associations have outstanding pre-1994 loans with the Land Bank, while some have taken commercial loans for infrastructure development. There have been difficulties in repayment of all of these debts by farmers over the past decade, which has restricted the willingness of banks to provide loans. Current government policy is that the state will no longer underwrite either private sector or Land Bank loans.

Water user associations and Irrigation Boards can apply for billing agent status. This not only provides the opportunity to improve efficiencies of collection of water use charges, which are very low in some water management areas, but it also provides for more localised regulation and oversight. The approach applied incentives to improve efficiencies of collection, based on the level of collection and age of arrears collected.

However, difficulties arose as DWA insisted that all money collected be paid to them first, with the Association/Board only being remunerated later. This could potentially result in significant delays in payment which was obviously of concern to the agent. In addition, the Associations/ Boards would be “jointly and severally liable” for an outstanding debt which also was not acceptable to them. As a result, these agreements have not been widely used.

Water Board Bulk Infrastructure and Local Government Water Supply Tariffs

Water Boards and Local Government in South Africa often own and/or operate water resources infrastructure as part of their bulk water supply systems. The recovery of operation, maintenance

and refurbishment costs for this infrastructure is usually through the institutions' water supply tariffs.

Estimation of the water resources infrastructure portion of the more than R10 billion collected annually across the country for water supply services is not possible from the financial reporting of these institutions. However, it may be assumed to be up to 10% of the total operational expenditure of about R15 billion for water supply. Typical water supply tariffs ranges are on average approximately R6/kl which is an order of magnitude higher than the typical raw water infrastructure charges.

There is no legal scope for recovering water resources management costs through land rates in South Africa, but municipalities are able to cross-subsidise service expenditure and land rates bills; while some of the smaller poorer municipalities with limited billing capacity have done this, the common practice is to cross subsidise other municipal functions from water bills.

4.2.2 Water Resources Management Charges

The water resources management charge was introduced to recover the governance costs in a basin, including but not limited to:-

- Planning and implementing catchment management strategies.
- Monitoring and assessing water resource availability and use.
- Water use allocations.
- Water quantity management, including flood and drought management, water distribution, control over abstraction, storage and stream flow reduction activities.
- Water resource protection, resource quality management and water pollution control.
- Water conservation and demand management.
- Institutional development and enabling the public to participate in water resources management decision-making.

Under the 1999 Pricing Strategy this applied to consumptive water uses, namely abstraction, storage (losses) and streamflow reduction activities (commercial afforestation), but in 2007 was expanded to include waste discharge related users. A policy decision was made to apply a single charge to all users within each sector (urban-industrial, agriculture and forestry) in a water management area, considering assurance of supply (see Section 4.2.8 for more clarity on this), while excluding some functions for forestry (such as dam safety). As with the infrastructure charge, subsidy mechanisms have been developed to waive charges to emerging black farmers for a specified duration.

The intent was for the WRM charge to recover the CMA costs related to management of water resources in the WMA, but in practice with the delayed establishment of CMAs, the charges have been calculated and collected by the regional offices of DWA in their capacity as "proto-CMAs". The implementation of water resources management charges to all legally registered users in the country, required the registration and billing of in excess of 60 000 customers with about 80 000 water uses. However, as is to be expected less than 20% of these customers represent more than 80% of the revenue and these are typically the same users that are paying infrastructure charges, as illustrated for the Inkomati water management area in Figure 4.1.

The process of registering users, maintaining the data base, billing according to water use and recovering costs has required significant technical, managerial and financial resources by DWA, linked to the establishment of the WARMS national register and SAP billing systems. In retrospect, it

seems that the system that were adopted were far more complex than were actually required. The implications for delegation to CMAs remains unanswered and recent proposals imply that CMAs will be responsible for authorisation and collection of charges, but DWA will retain responsibility for the national water register (under WARMS) and invoicing (through SAP). In some ways, this contradicts the original spirit behind establishing CMAs. Originally, the policy was that all charges (i.e. infrastructure, WRM, WRC and WfW) were to be included on a single invoice to a given customer, but during the process of establishing the Infrastructure Branch in anticipation of the National Water Resources Infrastructure Agency, a dual invoice system was recommended. After a lengthy institutional realignment process, that has questioned the need and format for these various institutions, the single invoice system is still in place.

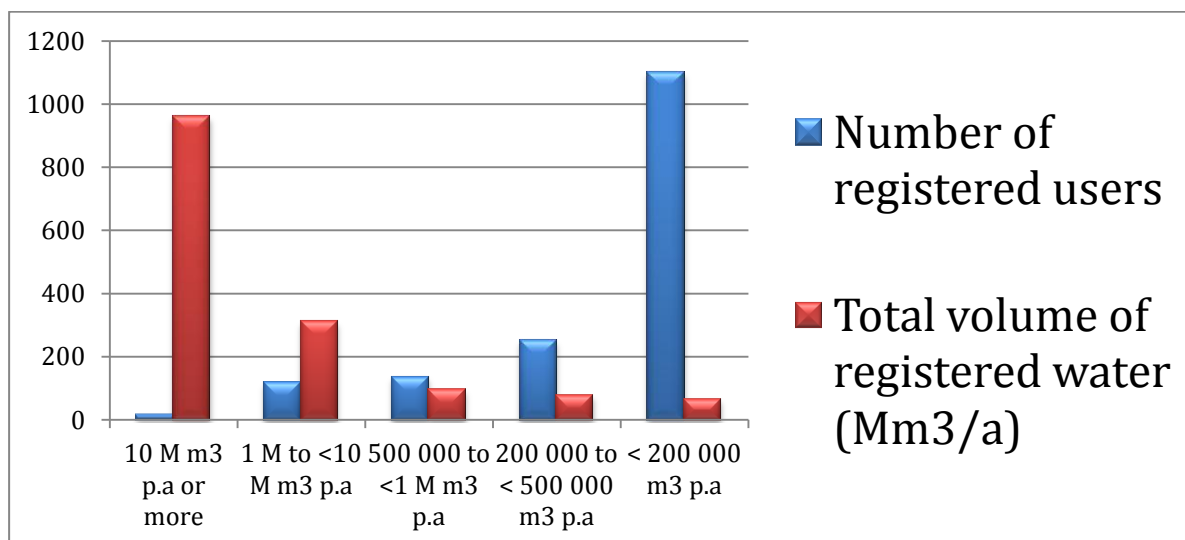


Figure 4.1: Registered water use per category of water use by volume in the Inkomati catchment

Poor performance in water resources management in some water management areas has contributed to the seemingly low payment rates for WRM charges. Of the roughly R150 million in WRM charges invoiced in 2008/09, it seems that only about 50% was recovered by DWA, although inadequate financial management of the system prevents accurate estimation of this amount. In some cases farmer groups have deposited the charges into trust funds, stating that these would only be paid once DWA demonstrates delivery of the functions being billed for, including timeous authorisation of license applications and control/enforcement of illegal water use.

These low payment rates have also been exacerbated by the inadequate mobilisation of new users who have not had to pay for water previously (unlike many of the infrastructure scheme water users), even though typical WRM charges range between R0.005/m³ and R0.015/m³; a cap of R0.015/m³ has been applied to agriculture, but has not been exceeded by the current DWA charges. However the indications are that once CMAs are established, WRM charges would most likely need to double from current levels. There is an ongoing debate about the basis for financial support to CMAs, and particularly the degree to which they should all aspire to complete self-sufficiency. The key lesson being learned from the WRM charge implementation is the importance of engaging customers in the charge setting process and the demonstration of value added by the associated functions being charged for. This has been lacking due to the delayed implementation of CMAs in South Africa.

4.2.3 Alien Invasive Plant / Working for Water Charges

Under the 1999 Pricing Strategy, a portion of the costs associated with clearing alien invasive plants (that evapotranspired water from catchment areas) could be applied to urban-industrial and agricultural irrigation water users in a Water Management Area, linked to the water resources management charge. Working for Water (WfW) charges were typically between R0.01/m³ and R0.05/m³ for urban users and only 10% of this for agriculture, due to a 90% subsidy arrangement. The approximately R75 million annual billing was supported by a much larger fiscal subsidy of in excess of R300 million, reflecting the public works and biodiversity value of the programme.

With the 2007 Pricing Strategy, this was shifted to a willing user arrangement, where stakeholders and users in a catchment area with infestation could agree to fund the alien clearing with charges calculated on the relative use by each user, possibly supported by subsidies where available. Additional water made available above that required to address environmental and over-allocation needs could be allocated to those contributing financially to the clearing. This reflects the closest experience that South Africa has to a payment for environmental services scheme.

The planning and implementation of WfW has somewhat suffered from its diverse water resource, biodiversity and social development mandates, but its broader success has led to the implementation of a Working for Wetlands initiative funded entirely from the fiscus. While WfW is currently located in DWA, there are ongoing debates about its possible delegation to CMAs.

4.2.4 Water Research Levy

Since 1984, water research levies have been charged on urban, industrial and irrigation water from government water schemes to support water related research by the Water Research Commission. The R127 million received in 2008/09 was collected from the R0.354/m³ levy (relevant from July 2008), which increases with inflation. The WRC board in consultation with DWA allocates funding to both solicited and unsolicited water research projects addressing both water resources and water services policy and implementation challenges in South Africa. South Africa has benefited considerably over the past few decades from this earmarked research funding. These benefits have occurred as a result of long-term water research programmes being ring fenced from other changing operational needs. South Africa's lead role in water policy and implementation can be ascribed to long term research programmes around environmental flows, institutional development, agricultural water use, water quality management and instruments to give effect to integrated water resources management.

4.2.5 Water Use Licensing Fees

While a license application fee of R114 (including VAT) has been in place for many years, this is a relatively insignificant income stream for DWA and does not reflect the full cost of evaluating the 100 to 200 water use licenses applications received every year (not including the current 1300 backlog). In reality, the application fee has decreased 6% to 8% over the last decade.

4.2.6 Waste Discharge Charge System

In 2006, DWA proposed a waste discharge charge system (WDCS) to give effect to the polluter pays principle, targeting basins in which the water quality was deteriorating below agreed levels. It has not yet been implemented, but indications are that this will happen during 2010/11. The system was based on two distinct charges reflecting fundamentally different approaches to managing water quality problems.

Firstly, the *mitigation charge* is a user charge to recover the costs of mitigation measures undertaken in the resource. It is intended for application where mitigation in the water resource provides an economically efficient option to support the achievement of water quality objectives in a catchment, in comparison to the costs of reducing effluent load at source. Its calculation is simply by apportioning the full financial cost of mitigation to dischargers according to their waste load.

Secondly, the *incentive charge* is designed to achieve the economically optimal use of the resource for discharging or disposal of waste, by setting a charge at a level that seeks to change dischargers' behaviour and reduce total waste load to a level that will enable the achievement of economically, socially and ecologically acceptable water quality objectives. This is calculated against an estimate of the marginal costs of treatment for all dischargers, setting this at the level that will cumulatively achieve adequate waste load reduction to meet the catchment water quality objectives.

A key challenge to the incentive charge is that being a non-required "environmental tax" it requires an amendment to the clause in the National Water Act prohibiting a "duty, tax or levy" and also requires a Money Bill to be presented by the Minister of Finance to enable the setting of such a charge by the Minister of Water Affairs. Importantly, revenue collected from imposition of the charge must return to the fiscus to be potentially disbursed against proposed business plans for water quality mitigation projects in that or neighbouring catchments (to achieve a "double dividend" from the charge). On the other hand, establishment of the mitigation charge requires dischargers to commit to paying for the measure, at least until capital costs have been repaid, similar to the off-take agreements required for off-budget water supply infrastructure financing.

Furthermore, as with the implementation of the WRM charge system, an extensive registration process is required supported by appropriate information management and billing systems for those catchments in which it is to be applied. An interesting development is that just the threat of implementation of the WDCS has led some industries and mines to adopt cleaner technologies with significant costs for new developments.

A preliminary 2005 case study to address eutrophication in the Hartbeespoort catchment downstream of Johannesburg and Pretoria indicated incentive and/or mitigation charges in the order of R50 to R90 per kg PO₄, with a projected revenue of between R10 million and R20 million, depending upon the way in which the incentive and mitigation charges were combined.

4.2.6 Other Investigated / Proposed Instruments

Other instruments that have been explored, but not implemented include:

- An *economic charge* to promote water use efficiency, which was not adopted because the charge levels required to change behaviour were extremely high due to relatively low price elasticity of demand in most sectors (including most agriculture).
- A proposed *Fund Facilitation Unit* to package and channel loan funding for demand management measures (particularly in municipalities) where financial payback periods associated with water savings are often less than 3 years.
- An administered financial *water banking-exchange* that would allow surplus water to be obtained for environmental or redistribution purposes, through buying water at a lower marginal price and selling at a higher marginal price through auction.

- A *recreational charge* for non-consumptive water use to support the operations and maintenance of infrastructure, most significantly dams, and management of localized water resources so as to encourage localized economic development.

Unfortunately, these innovative proposals did not capture the imagination of Departmental officials and were not taken further, due to process challenges, limited capacity and risk aversion in decision makers.

4.2.7 Transboundary Water Management Financing

Two generic types of transboundary management and associated institutions are relevant for South Africa, namely:

- Basin authorities for joint infrastructure management, i.e. LHDA for the Lesotho Highlands Water Project and KOBWA for the Inkomati Water projects
- Basin commissions/committees for cooperation around the management of transboundary water resources, i.e. ORASECOM on the Orange, LIMCOM on Limpopo and the JPTC on Inkomati.

The former have been funded under the auspices of treaties between the countries benefiting from the infrastructure. KOBWA is funded from the DWA budget, while LHDA is funded from raw water infrastructure charges paid by South African users. Interestingly, in addition to the operating costs, South Africa pays Lesotho a royalty for access to Lesotho water through the LHWP.

On the other hand, the basin commissions have historically been funded from the fiscus, either by in-kind contributions of time and resources by the riparians in the case of committees or by an agreed contribution of R500 000 per year from each of the Parties to ORASECOM to cover core operating costs, with projects being funded on an ad hoc basis by one or more of the Parties and/or international cooperating partners through ODA directly with the Commission. Interestingly, as part of a study to evaluate the potential sources of finance for transboundary conservation initiatives under ORASECOM, it was indicated that any possible user charges and levies would have to be raised in each country under the relevant legal provisions, but that this would be limited by ORASECOM's advisory mandate.

4.2.8 Systems and Considerations for Water Use Charging

The following issues that have emerged through the implementation of water use charging initiatives should be highlighted.

Firstly, charging requires the registration and billing of water users, which for water resources management (governance) generally involves multitudes of small users. There is a significant information system and resources overhead requirement to establish and maintain these systems, although there are clearly benefits in terms of improved understanding of the water users in a basin and the obvious potential revenue. Unfortunately, while there is valuable information on the national water use register, it still requires validation and verification, because there are both inaccuracies and intentional overstatement of use by many users.

Secondly, some distinction needs to be made for charging different users according to their average use of water related to their reliability (assurance) of supply, as well as the relevance of the benefit received from different management functions being charged for. In South Africa, average assurance for urban was assumed to be 97% of maximum, equivalent to 100% water for 70% of the time and

90% for 30% of the time. Agriculture was assumed to be at 91% of maximum, equivalent to 70% of water for 30% of the time. This has caused significant confusion, particularly amongst farmers that have registered their maximum water use rather than their long-term average use.

Thirdly, the issue of selecting an average (fixed) registered use as opposed to monitored (variable) abstraction, depends upon the main purpose of the charge. For institutional cost recovery, income stability is critical, so registered use is relevant to avoid drop in revenue during drought when costs may actually increase. On the other hand, monitored use is relevant where the charge must incentivise efficiency or provides income for highly variable operational costs.

4.3. Experiences in managing public financial resources

Public sector funds in South Africa are controlled by the Public Finance Management Act (PFMA), which stipulates, inter alia, that the relevant Minister must table the proposed budget for her department before Parliament on an annual basis, for approval by Parliament. The tabled budget must include estimates of expected revenue, expected expenditure, interest and debt servicing charges, and capital expenditure estimates. Budgeting is done within a multi-year (3 yearly) cycle.

Departmental budgets in South Africa are allocated in a multi-year budgeting system, in which budgets are allocated for the first financial year of three, with estimated amounts provided for years 2 and 3 in the cycle. Budget submissions are made to the National Treasury, in accordance with national government objectives and departmental priorities as set out in a five year strategic plan. Adjustments to budgets are made by National Treasury in accordance with available funds and national priorities. The budget of each department is presented to Parliament by the relevant Minister for approval. As a general practice, the budgets have not been amended by Parliament before approval. Where necessary, a national adjustments budget is tabled by the Minister of Finance later in the financial year, which allows for appropriations to be made in respect of unforeseen and unavoidable expenditure. The money collected by DWA through user charges is also viewed as public money and must be accounted for under the PFMA, including where this is collected by agents of DWA (CMAs and WUA).

Within the Department of Water Affairs, the budgeting process begins with the identification of strategic priorities for the following three to five years. These should be aligned to the national priorities, and are captured in a multi-year strategic plan as required by the Public Finance Management Act. An internal process is then put in place to allocate the budget between these priorities, and other necessary functions. While a zero-based budgeting approach has been used on occasion, it did not prove particularly useful, and the approach tends to practically involve an adjustment based on the previous budget allocations.

The budgeting process was complicated by a lack of alignment in the budgeting processes in the nine regional offices, resulting in different requirements both in terms of fiscal appropriations and in terms of tariff determination.

In the departmental budgeting process, those activities funded from water use charges are dealt with separately from allocation through Parliamentary appropriation from the fiscus. Allocation of water resource management charges should be according to the charging structure and the priorities of the particular water management area, although there have been concerns raised by water users that they do not see the management activities taking place for which they are paying.

Although the principle is in place that economically viable new infrastructure should be paid for by the users, this is not always adhered to (as in the case of Steelpoort dam) and specific application must be made to the National Treasury in this case for fiscal support for infrastructure development. Such support is provided as ear-marked funds that may not be used for other purposes. The parliamentary appropriation is more flexible, with some possibility of moving funds between programmes and activities.

Institutions involved in WRM financial management

The Minister of Water Affairs has a number of responsibilities in relation to financial management for water resources. Firstly, while the Director General of the Department of Water Affairs is accountable for the effective budgeting and expenditure of the department, the Minister must ensure that expenditure is in line with national priorities.

The TCTA is run by a Board, appointed by the Minister, and must report annually to Parliament on its finances. The TCTA has managed, since its establishment, to achieve and retain ZA-AA+ Fitch rating on its projects. The Board carries the fiduciary duties of any governing board, while the Minister, as representative of the sole shareholder (government) must ensure that financial management of the TCTA supports government's key objectives.

The Department of Water Affairs is also responsible for oversight and regulation of the Catchment Management Agencies and Water Boards as public entities, ensuring effective governance in these institutions and oversight of the appointed Boards.

Finally, the Department is guarantor on a number of loans taken by irrigation boards from the Land Bank under the apartheid regime. This policy of state guarantee of loans has since been discontinued, but some loans remain.

The Auditor General conducts an annual audit of national departments and other spheres of government. Over the 5 years to 2007/8, the Department of Water Affairs received a qualified audit, largely because of the extended time taken by the Department to move from cash based accounting on the water trading account to accrual accounting (particularly for the collection of infrastructure and water use charges). Accrual accounting was required by National Treasury without the systems being in place to introduce it. Internal capacity constraints also made it extremely difficult for the Department to introduce the more complex accrual accounting systems. In the 2008/9 financial year the Department received a clean audit.

The participatory and consultative approach to water resources management contained in the national policy and the National Water Act demanded a more transparent approach to the setting of raw water tariffs. A process of annual consultation with water users on the tariffs resulted in demands for more clarity and transparency in the calculation of the tariffs, and the costs and assumptions behind the tariffs. This compelled the Department to consider its tariff setting and associated budgeting processes in more detail and to establish approaches that were more standardised across the nine regional offices, and more accessible to water users who would have to pay the charges.

Investigation of the infrastructure charges for state owned irrigation schemes in particular revealed that the asset register for these schemes was in a parlous state, and a major project had to be put in

place to update the register and ensure effective quality control. For some of the ex-homeland dams, little or no records existed of value or construction costs, and specific studies had to be done to determine their asset value.

4.4 *Experiences with the use of Official Development Assistance*

Donations make up a very small percentage of funds utilised in the water resources sector. A major concern with donations is that a well-intentioned donation may create responsibilities, obligations or other consequences that the recipient had not considered. For example, the donation of an asset may give rise to operating and maintenance costs that are not sustainable. In order to prevent these scenarios, National Treasury formed an International Development Co-operation (IDC) directorate which was responsible for the establishment of a policy framework and management system for Official Development Assistance (ODA).

ODA is regarded by National Treasury as an official resource flow which is supplementary to the budget and is not viewed as replacement funding for normal revenue. ODA may take the form of grants as actual non-repayable funds, technical cooperation in the form of expertise and financial co-operation as loans or credit guarantees. The Department of Water Affairs receives a direct funding through its Directorate for International Relations. The bulk of ODA received by DWA are grants from the European Commission, Ireland, Belgium (Flanders) and DFID.

The ODA listing, run for all donations to the Water and Sanitation sector, covering a period ranging from 1996 (and stretching into the future to as far as 2026 for some of the loans), reveals total committed funds of R5.8bn (with expected matched funds of R2.6bn). The vast majority of these funds are directed towards water services and sanitation services.

A few examples of water resources management exist. In 1997, the Danish development agency (DANIDA) provided a grant of R25 million to assist in water resource management and capacity building. In 1998, the UK development agency (DFID) provided a technical assistance grant of R5 million for a strategic assessment of water in catchments. DANIDA again provided a technical assistance grant of R35 million for strengthening stakeholder engagement in the establishment of the management of catchment management agencies.

Some finance has been provided by donors for seed funding of demand management through South African development institutions, such as the DBSA. There are opportunities for endowment funding or guarantees for funds that support small local infrastructure investments to meet social investments.

While the social challenges facing the water resources sector in South Africa are significant there does not seem have been a great deal of philanthropic support to this sector. Even though accessing information on these sources of financing is difficult, it seems that philanthropic financing has focused on the most basic needs of housing, education, health, water supply, and information technology. Similarly in-kind contributions at a community level tend to be focused on these basic needs rather than the secondary requirements of water resources management. However, there has been some funding from large corporations and international NGOs around the rehabilitation of wetlands (Mondi Wetlands Project).

More recently as a result of the corporate water neutrality programme introduced by WWF,

corporate social responsibility funds are now being channelled into alien removal projects. Following the emerging understanding of corporate risk around water, there have also been financial contributions by some companies to local government operation and demand management initiatives.

4.5 Experiences with the use of commercial and other finance

There is considerable experience in SA around the use of commercial sources of finance for infrastructure development (through TCTA), as outlined in Section 4.2.1 above. Without duplicating that discussion, there are a number of important observations and lessons that have arisen from this experience.

The first major off-budget financing water project for South Africa was the Lesotho Highlands Water Project. An important distinction between this and the later initiatives was that the South African government guaranteed the loan, which avoided the need for off-take agreements, long term supply contracts with credit worthy customers, and minimised the perceived investor risk associated with the intangible asset located in Lesotho. An interesting aspect of the composition of the financial institutions providing capital for the project was that while the World Bank provided a relatively small share of the capital, they had a disproportionate influence on the project development, as the *de facto* lead financial institution upon which the commercial banks depended to mitigate their risk in the project development process.

It is in the interest of the South African government not to guarantee loans, in order to manage their debt profile. As a result for all South African off-budget water resources debt since then, National Treasury avoided guaranteeing the loan, which introduced the need for off-take agreements to underwrite the income stream against which the debt could be raised. Distinct observations around this process can be made from the recent experience of these projects.

The Berg River Project was delayed in its implementation beyond the planned commissioning date, because Cape Town resisted signing the off-take agreement, focusing rather on demand management measures that did not achieve the expected reductions. Conversely, offtake agreements for the Vaal River Augmentation Project were signed relatively expeditiously with the large corporate entities Eskom and Sasol.

The Olifants River Augmentation Project was first initiated to provide assured water supplies for the rapidly expanding platinum mining industry, with additional objectives being to supply very poor rural communities (over a million people) in the region, as well as to maintain minimum environmental flows through national parks and cross-border flows to Mozambique. Initial funding proposals aimed at raising more than 50% of the construction capital by establishing purchasing agreements with the mines, with the remainder being funded from fiscal sources. This arrangement posed some institutional difficulties in the asset ownership between DWA and TCTA.

This water development had a six year lead time (six years) and the mining development was still at the stage where junior (prospecting and development) companies predominated, which complicated the entering into the necessary long-term off-take arrangements as these companies had no solid assets therefore their guarantees would have been meaningless. As a result, the country's National Treasury agreed to provide the full investment cost of the project to be recouped through full financial cost user charges, that the mining companies in the area have agreed to pay for water from

this project should they need to expand production. In the interim, one mining company sought to establish a dedicated alternative supply, which would have prejudiced its competitors as well as reducing the viability of the public project. This illustrates the risks inherent in public infrastructure investment for private users without adequate assurance of long term demand.

More recently, the proposed Mokolo-Crocodile Water Project to supply future thermal power generation and other coal mining projects in a water scarce area of Limpopo is planned for funding by TCTA. With shifting energy policy, it is no longer clear that Eskom will be responsible for additional power stations in the area, as they may be given to private operators. However, this means that Eskom is not prepared to sign off-take agreements beyond the first station requirement, which in turn poses a problem for TCTA to finance the entire scheme.

In 2005 an evaluation was made about the possible institutional arrangements for infrastructure management in South Africa⁵. This led to Cabinet agreeing to establish the NWRIA as an amalgamation between TCTA and the DWAF Infrastructure Management Branch. Key financial motivations for the NWRIA were to ensure appropriate ring-fencing of revenue towards operations, maintenance and refurbishment and to enable the raising of general (non-project related) debt against the (primarily ROA) income stream associated with the existing water resources infrastructure assets. This would enable the institution to overcome the short-term constraints associated with requiring project based off-take agreements before off-budget funding could be raised for commercially driven infrastructure. Unfortunately, other political imperatives have shelved the establishment of the NWRIA and with it the possibility of addressing the project financing challenges.

Two further observations are worth making around the TCTA experience and commercial financing of water resources infrastructure. Firstly, TCTA has been extremely effective at branding itself at investor conferences over the past couple of decades (even when it was not floating bonds) and this ongoing investor relationship management contributed to its bond issues being well respected by the finance industry, highly rated by the rating agents and taken up by investors. Secondly, the risk management requirements for asset ownership on the TCTA balance sheet and direct management of high-profile off-budget project implementation has created conflict between TCTA and DWA, particularly where DWA technical staff wished to be more actively part of the design and construction process. DWA has become a facilitator and regulator of off-budget infrastructure, however maintaining its development role for on-budget social infrastructure.

At a more localised level, many local governments and water user associations have problems with institutional credit worthiness and as such have limited scope to raise private capital to implement projects without government guarantees or support. However, current government capital constraints associated with the financial crisis have limited the willingness and ability of government to provide this support, except for emerging farmers – but these types have been limited by the structural challenges of emerging farmer access to land and water.

⁵ DWAF, Institutional Options for Water Resources Management in South Africa, Pretoria, 2005

4.6 *Experiences in reforming policies and institutions for financing*

The focus of this section is on policy and institutional reform to reduce costs, raise funds, manage funds, and mobilise commercial finance for water resources. Much of the preceding discussion has highlighted the experience with institutional reform for water resources management in South Africa and the sound principles upon which these arrangements have been based.

However, it is instructive to reiterate that political and logistical processes have delayed the establishment of the key water management institutions proposed for water resources management (i.e. CMAs) and water resources development (i.e. NWRIA). Other innovative arrangements such as water banking-exchange and the demand management fund facilitation unit were stillborn. This has constrained the ability of the sector to effectively and efficiently finance water resources management from user charges and commercial infrastructure development through commercial finance. These limitations together with severe fiscal constraints have limited the necessary expansion in budgets required to meet the increasingly complex and expensive water resources management functions required for increasingly developed and stressed basins (as highlighted in the previous Chapter).

In retrospect, there was a complete underestimation of the systems, resources and marketing required to effectively implement a widespread comprehensive cost recovery system for water resources management in South Africa, while complicating this with a necessary shift from cash-based accounting to an accrual-based accounting system. At the same time, lack of experience may have led to over-complicating of these systems and information requirements so that it became the preserve of a limited few. It should have and could have been done a lot cheaper and considering the real needs of decentralisation to other entities, such as CMAs. These processes have taken a long time to become established, demonstrating a difficulty in sequencing of instruments with institutional structures.

On the whole, there has been a high recovery rate for water resources infrastructure charges (close to 90%), as a result of supply to a limited number of larger users who pay their charges. On the other hand the recovery rates for water resources (governance) charges has been lower (approximately 50%) for the many reasons described in detail above.

The 2009 pricing strategy review⁶ seeks to analyse the current arrangements of the water sector as it affects tariff setting, including those arrangements in the raw water, bulk potable water and retail sub-sectors. Beginning in late 2009, the report is a multiple stakeholder process and therefore is still in its initial stages. However, some of the preliminary conclusions are as follows:

- Alignment of economic policies with water scarce resources
- Efficient pricing that reflects true economic cost of water resource
- Institutional strengthening and capacity building in revenue collection activities
- Conclude off-take agreements for water supply with large users
- Phasing out of the price differential between the TCTA charge and others
- Determine the affordability of agricultural users as they are largest users but often pay the least for water

⁶ DWAF (2009) Report on the Current State of Water Pricing in South Africa. Pretoria


PART 5: CONCLUSIONS


This paper has presented the fascinating narrative of financing in the South African water resources sector over the past few decades. It is worth reiterating the two recurrent themes of the paper, namely that:

- Water resources infrastructure development funded through the fiscus underpinned the growth of the primary agricultural-mining and secondary manufacturing-urban economies until the early-1990's, after which economic water resources infrastructure funded off-budget supported the growth of the tertiary urban economy and fiscal support could be shifted to water supply for social infrastructure and rural development.
- The increasing development and utilisation of river basins associated with economic growth and demographic shifts resulted in greater stress and management complexity, which required greater investment in water resources governance and the adoption of associated financial instruments to recover costs and influence behaviour of water users and dischargers.

It is against this backdrop that the following five observations and lessons should be read.

- ✚ South Africa continues to be a highly unequal society, where the poorest rural dwellers have few livelihood opportunities. A pro-poor water resources management philosophy requires investment by the state in local meso and micro level infrastructure to support rural development (as opposed to widespread urbanisation), which in reality will be largely focused on agriculture. The ability of the formal economy to pay the full financial costs of water resources infrastructure, leverages and/or releases state resources to focus on those communities that cannot currently afford to pay for the capital and operating costs of this investment.
- ✚ Capital financing of economically driven water resources infrastructure from commercial sources, through a special purpose government vehicle, provides an important mechanism to reprioritise state resources for social purposes, but does have challenges. The need for long-term project-based off-take agreements to be signed by economic users before implementation, as a requirement for funding poses challenges in basins with multiple or changing users, unidentified future users or resistant institutions, even where a compelling case can be made for economic development. The risk management requirements of implied guarantees on income streams may be resisted by National Treasury, while the need to manage the project by the “financing entity” can cause institutional problems with the government infrastructure managers. A potential solution may be found in the establishment of an infrastructure entity with an asset base and income stream, but this itself poses political, governance and institutional challenges.
- ✚ The increasing management requirements driven by basin complexity or policy imperatives require greater expenditure by the fiscus and/or revenue from water users. There is a temptation to attempt to develop and implement the perfect instrument across all areas, rather than take a gradual, prioritised and sequential approach, with the assumption that users will pay. It is more appropriate to initially develop a few simple and cost-effective approaches to address priorities, realistically considering the human, financial and information resource requirements from national sources. While development assistance may be useful in the commissioning process, care should be taken not to over-design these instruments.

-  Implementing cost-recovery on governance functions provides an important mechanism for financing the increasing water resources management requirements in highly developed-utilised basins. However, users tend to resist additional charges, except where the value-benefit of these charges is apparent, the collection-disbursement is transparent and/or the information-billing systems are effective. Consequently, these charges may be particularly effective when linked to meaningful institutional decentralisation that balances national imperative and local interest. Care must therefore be taken to ensure adequate service delivery of associated water resources management functions, communication/marketing and system development, by understanding and allocating the resources required to overcome resistance and inertia by those charged. It should also recognise that draconian enforcement of revenue collection may alienate those users whose participation in water resources management is often as critical as the charges that they pay.

-  While there are a multitude of potential financial mechanisms and instruments that may be used to collect revenue and/or create incentives for behaviour change, these need to be designed as a coherent package that achieve national/basin water resources management goals, considering the challenges and opportunities provided by the country's history and current situation. While the primary objective of both governance and infrastructure charges is cost-recovery, the former typically have limited impact on the behaviour of all but the most inefficient agricultural users. On the other hand, full-financial cost recovery for infrastructure may begin to affect water use efficiency by urban domestic and industrial users, while being completely unaffordable to irrigation. The macro and micro implications (and potentially perverse outcomes) of the suite of financial instruments should be understood before adopting them, together with the most effective institutional arrangements for their implementation (preferably building on existing institutions, rather than developing them anew).

In summary, while there are some aspects of the South African case that are specific to the country's history, there are many similarities and learning points that may inform other countries' engagement of financial instruments to support water resources management. Importantly, the wide range of experience may inform those countries that are still primarily agricultural or mineral resource-based, as well as those countries in which the economy has matured and urbanised.