Water institutions and governance models for the funding, financing and management of water infrastructure in South Africa

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ABSTRACT

The standard water institutions, governance and infrastructure reform and policy prescription package of the 1990s and early 2000s, i.e., restructuring, private-public partnerships (PPP), establishment of an independent regulator, have not yielded positive results for South Africa. These water institutions and governance challenges are resulting in inadequate investments, and millions in South Africa not having access to basic water and sanitation services. The framework for water sector infrastructure funding models was designed to meet the challenges presented by the current and growing imbalances that exist between the supply of and demand for water in South Africa. The research results identified 7 overarching governance models for the funding, financing and development of water infrastructure projects in South Africa, i.e. Model 1: direct fiscal (NRF) funding, Model 2: ring-fenced special purpose vehicle (SPV), Model 3: SPV housing dedicated water infrastructure cash-flows, Model 4: stand-alone water institution with strong balance sheet, Model 5: public-private partnership (PPP) with equity, Model 6: private concession, and Model 7: private development. Various institutional options for consideration for the future management and development of water infrastructure were investigated and considered. The emerging model is considered to be a hybrid model consolidating the national water resources and regional bulk infrastructure functions and capabilities, with regional bulk infrastructure primarily being a water board (water services provider) function.

Keywords: Funding and financing, water governance, water infrastructure, water institutions

INTRODUCTION

Over the past few years, South Africa has made impressive moves in a positive direction with its new investment strategies and initiatives to encourage investment in public infrastructure, in particular water (Economic Development Department (EDD), 2011; Presidential Infrastructure Coordinating Commission (PICC), 2012; National Planning Commission (NPC), 2013; Department of Water Affairs (DWA), 2013a). It has released a 5-year water infrastructure investment plan which set priorities and targeted more than R30 billion for water infrastructure investments by the end of the 2014/15 financial year (PICC, 2012; DWA, 2011a, 2012a, 2013b). Government administration and institutional structures continue to shape and influence infrastructure investment despite the trend towards corporatisation, privatisation and increased private provision of infrastructure since the end of the 1990s. Various proposals for the overhaul of financial relations continue to be advanced and discussed, but progress in implementation is not promising.

Preliminary institutional reforms have been undertaken by South Africa, mainly broader water-sector policy and legal measures, many of which have been achieved (RSA, 1997a, 1997b; DWAF, 2004; DWA, 2013a; RSA, 1998; Saleth and Dinar, 2005; Karar et al., 2011; Van Koppen and Schreiner, 2014). What lags behind are regulatory and governance reforms; these have taken much more time to bear fruit (Karar et al., 2011; Van Koppen and Schreiner, 2014). For instance, effective regulation in the whole water value chain requires building of water institutions/entities that would challenge established vested interests. Governance improvements, particularly in state-owned enterprises (SOEs), require aligning internal and external incentives, which again require broader reforms of the external environment for water infrastructure service providers.

Institutional competence, capacity and performance are important determinants of water infrastructure provision and management in South Africa (Saleth and Dinar, 2005; World Bank, 2010; Karar et al., 2011; Van Koppen and Schreiner, 2104). This seems obvious, but systematic analysis has been lacking on the nature and extent of the links between stronger institutions and better outcomes; specifically, broader access, higher service quality, and financially efficient services. There has also been new thinking about the options for water institutional reform and governance in South Africa on how large water infrastructure projects will be developed, managed, operated and maintained (RSA, 1997a, 1997b; DWAF, 2004, 2007; DWA, 2013a; RSA, 1998; Ruiters, 2013). The Department of Water Affairs (DWA) has recognised that the institutional frameworks require modification and has set up a project which should cover the 184 institutions involved, i.e., water services providers, water agencies, water-user associations, and water services authorities (DWA, 2012b). A number of institutional options are used for the development and management of water infrastructure (i.e. dams, large raw-water conduits such as tunnels and canals, distribution and reticulation networks, etc.) (DWA, 2012b, 2013a):

- The Department of Water and Sanitation (DWS)
- Water boards (bulk water services providers)
- Municipalities) (water services authorities)
- Special-purpose vehicles (water resources management agencies)

The main objective of the research paper was to focus on the different water institutional and governance models and reform approaches that affect the funding and financing of water infrastructure in South Africa.

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RESEARCH METHODS

Qualitative methods were used for the analyses and models involved in this research, namely surveys (questionnaires), interviews, documentation review (reports), observations, focus group sessions and case studies (Cranston, 2004; Coldwell and Herbst, 2004). The research involved both primary and secondary data collection.

A survey of a population sample to observe the relationship between a given set of variables is an increasingly useful method of quantitative data collection in research (Taylor, 2002; Coldwell and Herbst, 2004). A questionnaire was used for the collection of data from participants and stakeholders requesting information regarding water infrastructure institutions, governance funding and financing.

The primary and secondary data collection methods for the research involved the following:

- **Primary data:** interviews, surveys (questionnaires and checklists) and a series of workshops. The sample included the following:
  - Workshops, discussion focus groups and interviews with representatives of selected government departments (national and provincial): DWA, National Treasury (NT), Department of Cooperative Governance (DCoG), and Department of Public Works (DPW).; the national and provincial workshops were attended by 46 participants
  - Respondent groups and national organisations, e.g. DWA, NT, and DCoG
  - Funding agencies – Development Bank of Southern Africa (DBSA), African Development Bank (AfDB), World Bank (WB) and European Investment Bank
  - Water management institutions – Trans-Caledon Tunnel Authority (TCTA), Komati Basin Water Authority (KOBWA), Water Boards (utilities) (Rand Water, Umgeni Water, Sedibeng Water, etc.)
  - Local government – the South African Local Government Association (SALGA), and local, district and metropolitan municipalities
- **Secondary data:** Reports relating to water infrastructure institutions and governance, needs, funding and financing activities throughout South Africa were reviewed (DCoG, 2010; DWAF, 2008; DWA, 2010, 2011a, 2011b, 2012a, 2012b; NT, 2011a, 2011b, 2011c, 2013a, 2013b, 2013c).

RESULTS AND DISCUSSION

Water institutions and governance models: Rationale and challenges

The emerging infrastructure backlog and deficient capability warrant immediate attention if South Africa is to build on and secure its already impressive record of sustained economic growth, competitiveness and productivity gains. The first task is to overcome the highly visible and well-documented backlog in existing infrastructure. The interplay of the government's fiscal policies of budget deficit, debt reduction, vexatious financial relations and political considerations present an apparently insurmountable obstacle to overcoming the backlog in South Africa's infrastructure – and in putting in place fresh institutional structures for effective strategies that would lead to the prompt provision of water infrastructure. The second task is to establish new, forward-looking and resilient institutional frameworks to facilitate timely infrastructure investment by integrating the full range of strategic planning, management and technical expertise in South Africa's public and private sectors. Various proposals for the overhaul of financial relations continue to be advanced and discussed, but progress is slow and not promising.

Characteristics of a funding business model for water institutions identified three criteria of a good (funding) business model for water institutions which can predict whether it will be effective for governance and water infrastructure development and management (World Bank, 2010; Casadesus-Masanell and Ricart, 2011):

- Is it aligned with organisational, company or institutional goals? The choices made while designing a funding business model should deliver consequences that enable an organisation to achieve its goals.
- Is it self-reinforcing? The choices that executives make while creating a funding business model should complement one another; there must be internal consistency.
- Is it robust? The effectiveness of a good model should be sustainable and effective over time. Although the period of effectiveness may be shorter nowadays, robustness is still a critical parameter.

Water infrastructure is hierarchical and developmental in nature in South Africa (Fig. 1), based on administrative and/or political boundaries (RSA, 1997a, 1997b, 1998; Saleth and Dinar, 2005; Karar et al., 2011; Van Koppen and Schreiner, 2014). The hierarchy ranges from a national level to a local level (Fig. 1) with the responsibility for the implementation at each government level (sphere) varying within the administrative boundaries (cf. Appendix 1).

The standard water institutions, governance and infrastructure reform and policy prescription package of the 1990s and early 2000s, i.e., restructuring, private-public partnerships (PPP), establishment of independent regulator, and enhanced competition, yielded some positive results (RSA, 1997a, 1997b, 1998; DWAF, 2003, 2004). However, this set of reforms has proved more challenging to apply in South Africa. One finds numerous failures to implement or fully implement the policy package, outcomes below expectations and a high degree of official and public scepticism about whether the application of the package is producing the desired results (water institutions with the desired governance structures). A large part of the explanation for this situation is thought to lie in the relative weakness of South African practices, policies or policy implementation, and water institutions and appropriate governance structures that guide and oversee South Africa's water infrastructure institutions.

Water resource infrastructure with an estimated depreciated replacement value of R160 billion is currently managed by the DWA (DWA, 2013b). However, the water infrastructure asset inventory for many municipalities is incomplete or does not exist and the full depreciated value of South Africa's water infrastructure is thus incomplete. In 2011, the under-investment in the water sector was estimated at more than R600 billion and an estimated R66.3 billion is needed for water resource infrastructure development, according to the National Water Resource Strategy, to meet increasing water demand over the following 20 years (DWA, 2011a; 2013a, 2013b). The scale of the water resource infrastructure backlog therefore warrants immediate attention with respect to appropriate institutional and governance models. The challenges around water infrastructure management are:

- **Commercial funding of economic infrastructure:** Currently the DWA cannot raise capital finance directly from commercial sources and is relying on the TCTA to

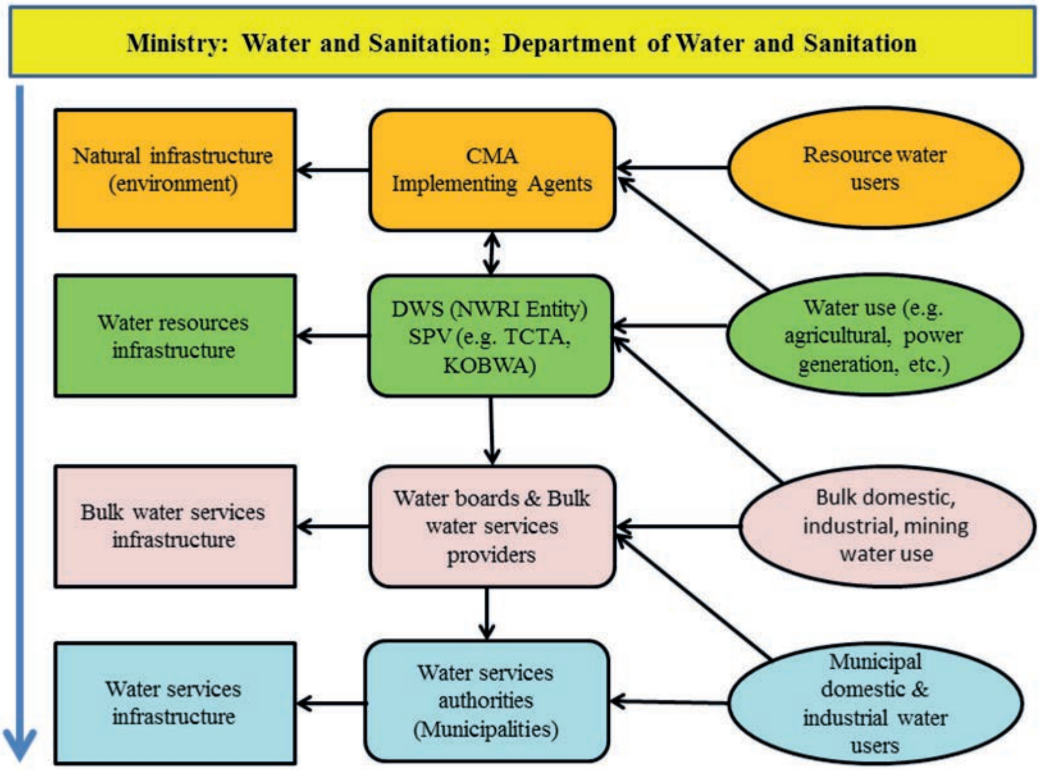

Figure 1

Financial flows and water infrastructure in South Africa

implement and finance commercially viable economic projects using financial markets. Capacity and credibility in the financing and development of water infrastructure have been developed by the TCTA as a special purpose vehicle (SPV).

- **Maintenance and refurbishment of infrastructure:** The maintenance of water infrastructure assets has not been adequate in some parts of the country and therefore poses a public safety risk.
- **Financial management and cost-reflective tariffs:** Water users are calling for appropriate regulation and transparency in tariff determination processes so that the sector can have cost-reflective tariffs. This issue should be dealt with in the current pricing review process.
- **Integrated management of the risk of raw water supply:** The entire risk for the water infrastructure, which includes financing, project implementation, operations and revenue management, is not managed by a single institution.
- **Transformation agenda of government:** Water infrastructure management has been slow to take up the South African Government's transformation imperatives in terms of equity and service delivery. This is due to limited capacity of designated groups in engineering disciplines and also non-competitive levels of remuneration in the public sector. There has also been slow response to customer-focused business orientation.

The above water institutions and governance challenges are resulting in inadequate investments and millions of South Africans not having access to basic water and sanitation services, i.e.:

- The water and sanitation sector is seriously under-financed, revenue management is poor and there is limited or no investment in maintenance. These have led to the deterioration and the eventual collapse of infrastructure at municipal level/sphere.
- Effective financial planning and pricing for the water sector requires finding the right mix of revenues from water use charges, tariffs, grants and transfers, i.e. 'sustainable cost recovery' (Ruiters, 2011, 2013).
- Full cost recovery from tariffs, which may theoretically be the ideal solution, in practice remains a distant objective in South Africa. However, even very poor countries can reach important cost-recovery targets at the subsector level, such as cost recovery for investments in urban water supply, or cost recovery for operations and maintenance expenditures in rural water supply. Increasing revenue from water use charges and tariffs requires a comprehensive approach, which includes reforming tariff levels and structures and increasing bill collection rates, but also increasing levels of service and putting in place social protection measures.
- Water use charges and tariffs have to meet diverging financial, economic, environmental and social objectives, some of which may be conflicting. A major challenge therefore is designing tariffs in such a way that an appropriate balance is struck between competing objectives.
- Effective and relevant fully-functional water institutions and governance structures for funding and finance flow in the water sector value chain with assurance of water infrastructure delivery to all consumers/users.
- National targets for eliminating the backlog in the provision of water and sanitation services have been set. These are challenging targets which will require increased investment, a rapid increase in capacity and much better use of existing capacity. Providing free basic water in a sustainable manner, particularly in rural areas, is also a significant challenge.
- Widespread poor performance related to the operation and maintenance of water infrastructure is evident. In some cases this has contributed to the contamination of potable water

supplies with associated adverse impacts on public health.
- Many (if not most) water services providers in South Africa do not provide adequately for investment in the rehabilitation, replacement and maintenance of water services infrastructure. Consequently the average age of the water infrastructure is increasing with time and the average condition of assets is deteriorating. This poses a significant threat to the future sustainability of water services infrastructure. Rehabilitation costs increase exponentially if these investments are left too late.
- Pressure on the water resources is increasing as a result of water resource constraints; viz., South Africa is a water-scarce country, increasing demand as a result of economic growth, and the uncertain impacts of climate change on the availability of water resources in South Africa.

Water-sector value chain

The framework for water sector infrastructure funding models was designed to meet the challenges presented by the current and growing imbalances that exist between the supply of and demand for water in South Africa (Figs 1–2) (Ruiters, 2011, 2013). In addition, the following principles were taken into consideration in the design or formulation of the funding models from the research results (Ruiters, 2011, 2013):
- Economic inclusion and ability to provide affordable services and to cross-subsidise should be improved.
- There should be integrated risk management.
- There should be ability to leverage finance for commercial projects.
- Economies of scale should be achieved.
- The model chosen should not compete with local government but should complement the local government Constitutional mandate and improve service delivery.
- There must be ability to attract and retain necessary skills to operate and maintain infrastructure.
- The reforms should enable the DWA to take charge of the entire water value chain while recognizing the legislative mandates of others.
- A differentiated approach should be adopted. The application of specific funding and financing models for specific water infrastructure development projects, i.e., separate funding and financing models for water services, sanitation and water resources.

Furthermore, the research identified principal drivers for the funding and financing of water infrastructure development through water institutions and appropriate governance models in South Africa (cf. Ruiters, 2011). These can be broadly grouped into three categories, i.e.:
- **Hierarchical impact:** Improved accountability for water infrastructure, water security, operations and maintenance, quantity (availability) and quality, and better management of the supply and demand for water (Figs 1–2).
- **Financial flows, pricing and management of water:** Barriers to investment in water infrastructure are removed by adopting a streamlined approach to legislation and the consultation process to manage and sustain a secure business (operational) (Figs 3–5).
- **Governance structures and reform:** Consolidation, consultation, reform and modernisation of water institutions and governance structures for water infrastructure would

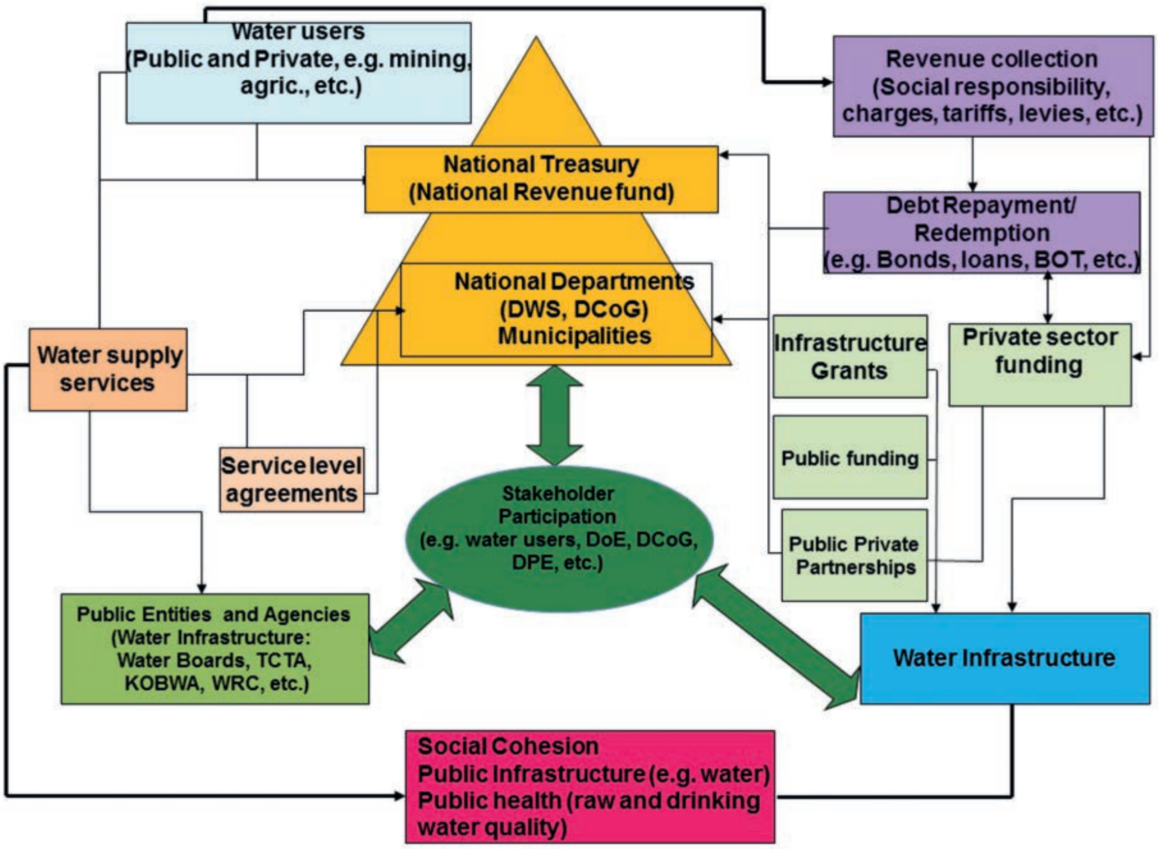

Figure 2
Main funding flows for water infrastructure in South Africa (source: Ruiters, 2013)

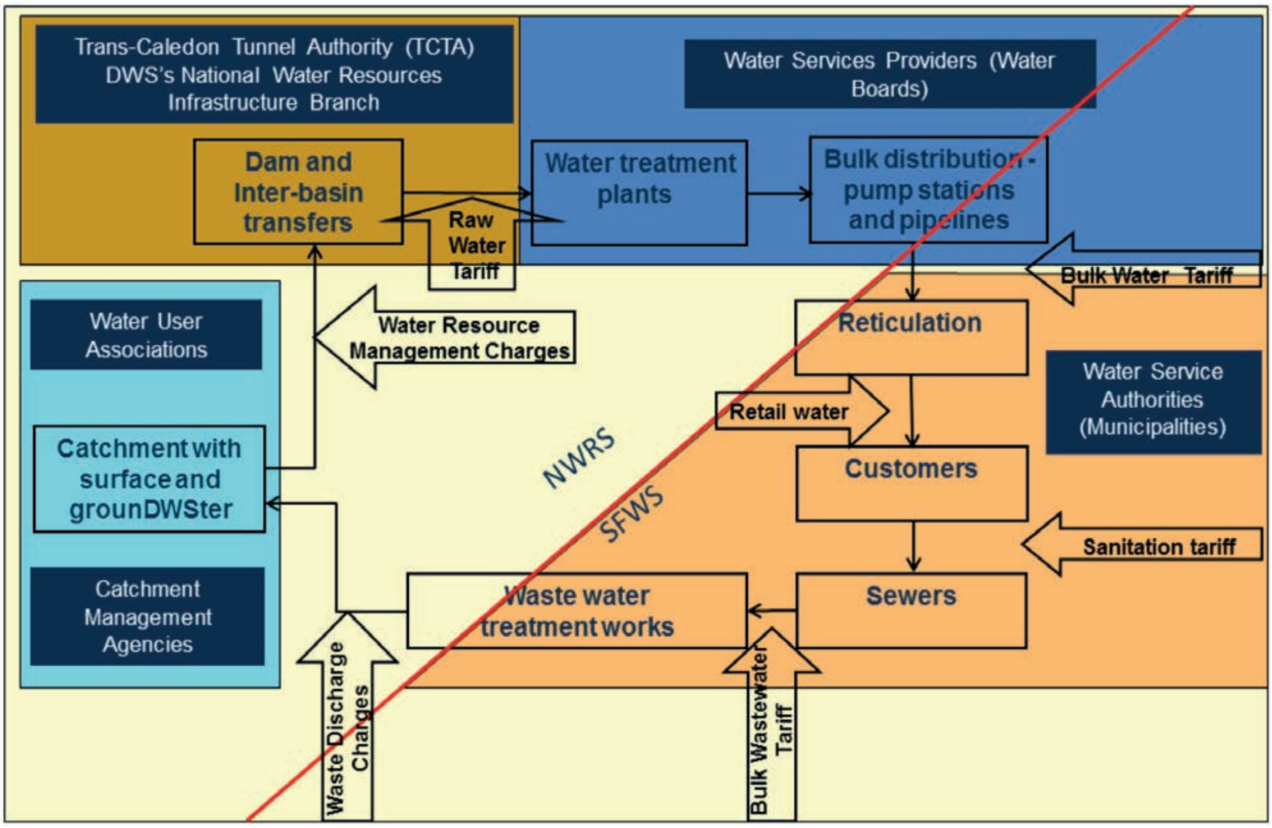

Figure 3

Governance structure of funding and financial flows for water infrastructure in South Africa

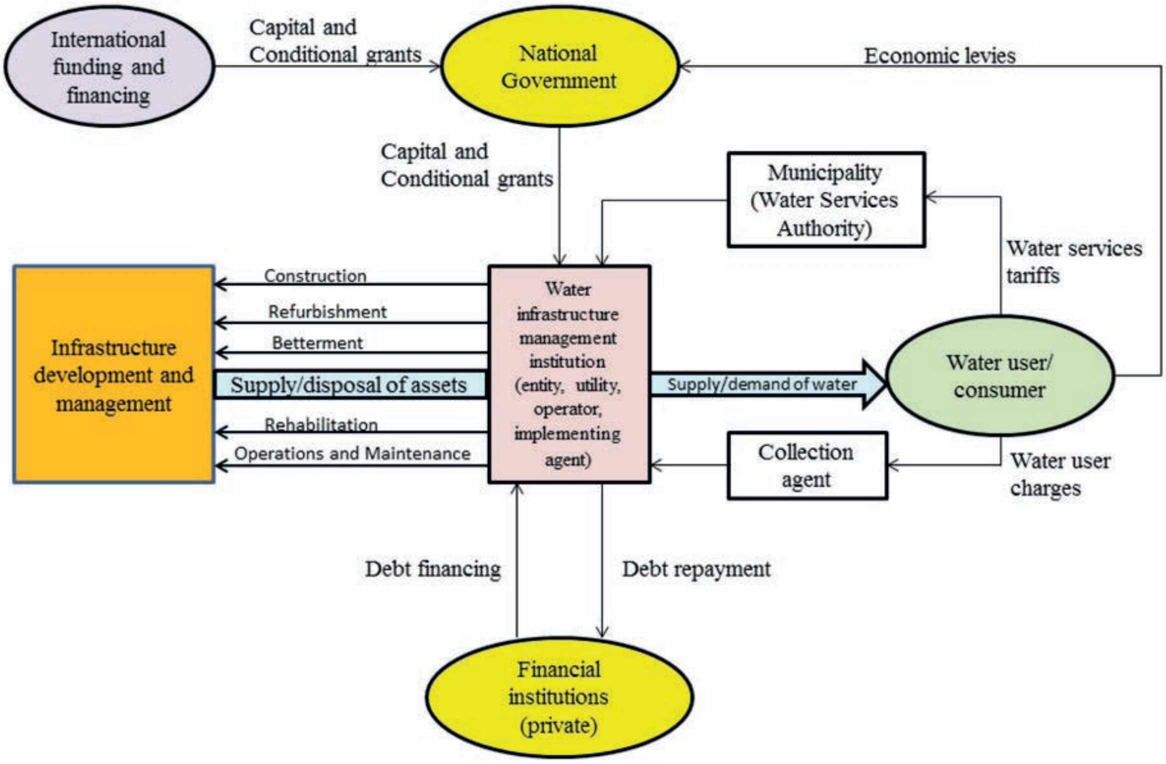

Figure 4

The water sector value chain in South Africa at the strategic and operational levels

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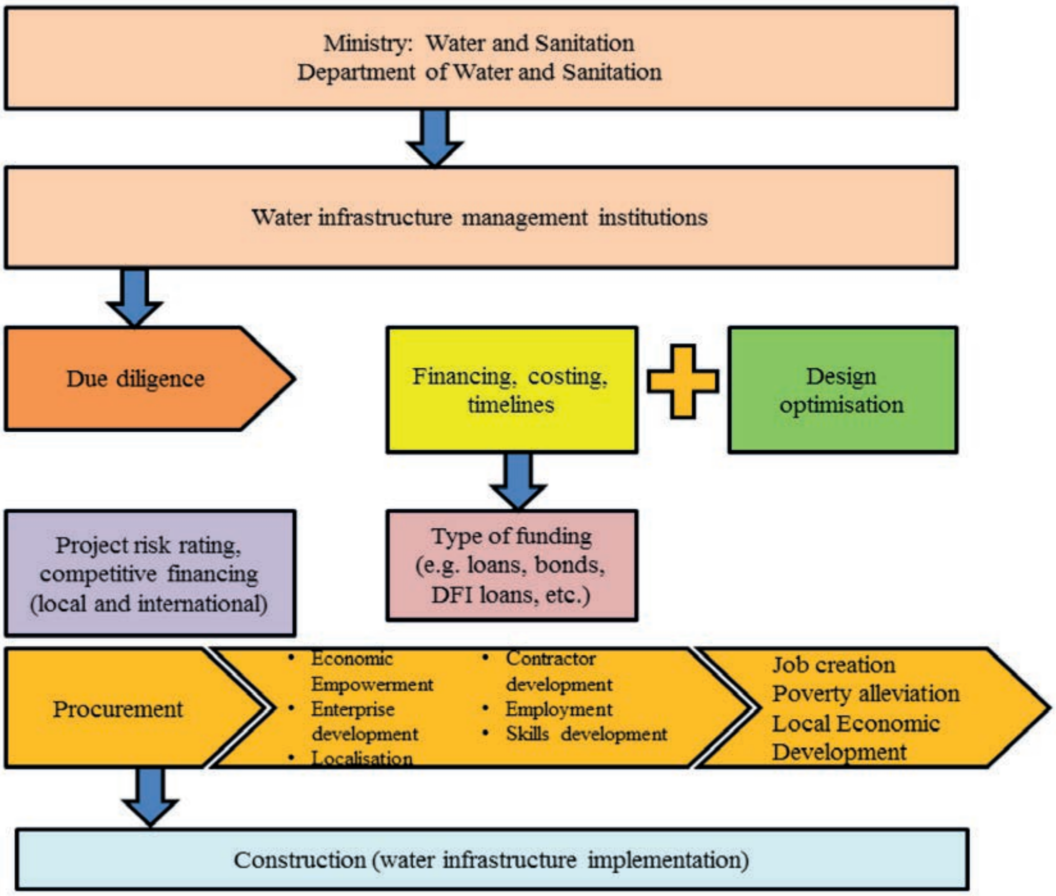

Figure 5

The sustainability of 'efficient' funding and/or business model for water infrastructure development in South Africa

provide a greater degree of certainty to the funders, financiers and developers that build, own and operate water infrastructure (Figs 1–5).

South Africa has undertaken preliminary institutional reforms, mainly the broader water sector policy and legal measures, many of which can be achieved by the stroke of a pen. What lags are regulatory and governance reforms; these have taken much more time to bear fruit. For instance, effective regulation in the whole water value chain requires building institutions/entities that challenge established vested interests. Governance improvements, particularly in state-owned enterprises (SOEs), require aligning internal and external incentives, which again require broader reforms of the external environment for water infrastructure service providers.

The water infrastructure institutions make a difference with strong links between institutional reforms and enhanced governance in water institutions and improvements in the quantity and quality of water infrastructure services (with water institutions variations) (Table 1; Figs 1–5) (Hope and Garrod, 2005; DWAF, 2008; DWA, 2012b, 2013a; Karar et al., 2011; Van Koppen and Schreiner, 2014). Given the link between institutional development and performance improvements, and the high costs of inaction, strengthening water institutions/entities and governance are worthwhile investments (Hope and Garrod, 2005; Karar et al., 2011; Muller, 2014; Van Koppen and Schreiner, 2014).

Funding and financing of water infrastructure

The sustainability of 'efficient' funding and/or business models is needed for water infrastructure development in South Africa, given future changes such as (i) changes in fiscal or treasury allocations, (ii) the impact of a financial crisis or crisis conditions on public sector budgets, and (iii) the impact of the economic environment on private (corporate or financial) and public sector funding.

Thus, the questions that arise when designing governance and funding models for water infrastructure are:

- Are there different implementation strategies for the different levels of a water infrastructure or are they just subsets or smaller versions of the global implementation strategy?
- How does the answer to the above question affect the funding policies?

Various institutional options for the future management and development of water infrastructure were considered (cf. Table 2) (DWAF, 2008; DWA, 2012b, 2013a; Karar et al., 2011). However, the emerging model is considered to be a hybrid model consolidating the national water resources and regional bulk water services infrastructure functions and capabilities. The research results identified 7 governance models for the funding and financing that are needed for the development of future water infrastructure projects in South Africa (cf. Figs 6–12; Table 2):

- **Model 1: Direct funding from the National Revenue Fund (NRF)** – infrastructure development budget allocated from

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TABLE 1
Water institutions and governance framework model of South Africa (source: World Bank, 2010)

Reform	Regulation	Internal Governance	External Governance
Legislation Existence of de jure reform (RSA, 1971, 1997a, 1997b, 1998) New National Policy and legislation for an Independent Water Regulator Implementation of reform **Restructuring** Unbundling and/or separation of business lines State-owned enterprise (SOE) corporatisation or agencies Independent regulatory body absent **Policy oversight** Oversight of regulation monitoring within the Ministry Dispute arbitration outside the ministry Tariff approval within the ministries (DWS, NT, DCoG) and Parliament Investment plan (Contract Compact) with the Ministry and tabled in Parliament Technical standard outside the Ministry **Private sector involvement** Private Public Partnerships Private sector management and investment, i.e. BOOT, concessions, etc.	**Autonomy** Formal autonomy on recruitment and disengagements Financial autonomy (full) (e.g. RSA, 1999, 2003) Managerial autonomy (full), i.e. Board of Directors **Transparency** Publication of decisions via report/Internet/public hearing Legislative provision **Accountability** Existence of appeal Independence of appeal (partial) – appeals routed to the Minister **Tools** Existence of Raw Water Pricing Strategy Existence of water user charges and water tariff methodology (tariff and charges determination and indexation) – no existence of Tariff Determination and Indexation Book Existence of regulatory review by DWS, DCoG and National Treasury Parliamentary submission Extensive consultation and length of regulatory review	**Ownership and Shareholder Quality** Concentration of ownership, i.e. national and/or municipality Corporatisation/limited liability Rate of return policy No dividend policy **Managerial and board autonomy** Autonomy in recruitment, disengagements, wages, production and sales Size of board determined Selection of board members by selection process and appointment by Minister (executive authority and political head) Presence of independent non-executive directors **Accounting, disclosure and performance management** Publication of annual reports International financial reporting standards/external audits/independent audit Audit publication by Auditor-General and tabling in Parliament Remuneration of non-commercial activity Performance contracts/with incentives No penalties for poor performance Monitored by DWS	**Labour market discipline** Disciplinary mechanisms for the dismissing employees Wages, compared to private sector Benefits, compared to private sector **Capital market discipline** Exemption from taxation Access to debt for SPVs (e.g. TCTA, water boards), compared to private sector State guarantees in most instances No public listing **Outsourcing** No outsourcing of billing, revenue collection and management, meter reading and human resources Information technology is outsourced

TABLE 2
Proposed national water infrastructure institutional options for South Africa

National Water Infrastructure Institutional Options			
Option 1	**Option 2**	**Option 3**	**Option 4**
All national units to be consolidated into a single water management institution	Strengthen the mandate of existing water management institutions (e.g. TCTA as a SPV, water boards, WTE, etc.) and restructure their business models	Create the National Water Infrastructure Agency (the 'Agency option') and other water management institutions (e.g. CMAs) outside of the DWS by merging of the resources and functions	Create regional water management institutions (entities) – expand the mandate of water boards to include water resources infrastructure and CMA functions
Will be responsible for planning, project management, project finance through NT.	Build on existing capacity	The business model of National Agency should take the same form as a state-owned entity (SOE)	No national water infrastructure agency; its functions will be consolidated into regional entities
Will be retained in current form to execute existing mandate	Revised business models of existing water management institutions, becomes the specialised water infrastructure providers	Business model to finance, develop and manage water infrastructure	Will enable regional integrated planning, attraction of professionals and capacity to support local government and to raise finances for regional development

Note: *NT = South African National Treasury; TCTA = Trans-Caledon Tunnel Authority; SPV = Special purpose vehicle; WTE = water trading entity; CMA = catchment management agency; SOE = state-owned enterprise; DWS = Department of Water & Sanitation*

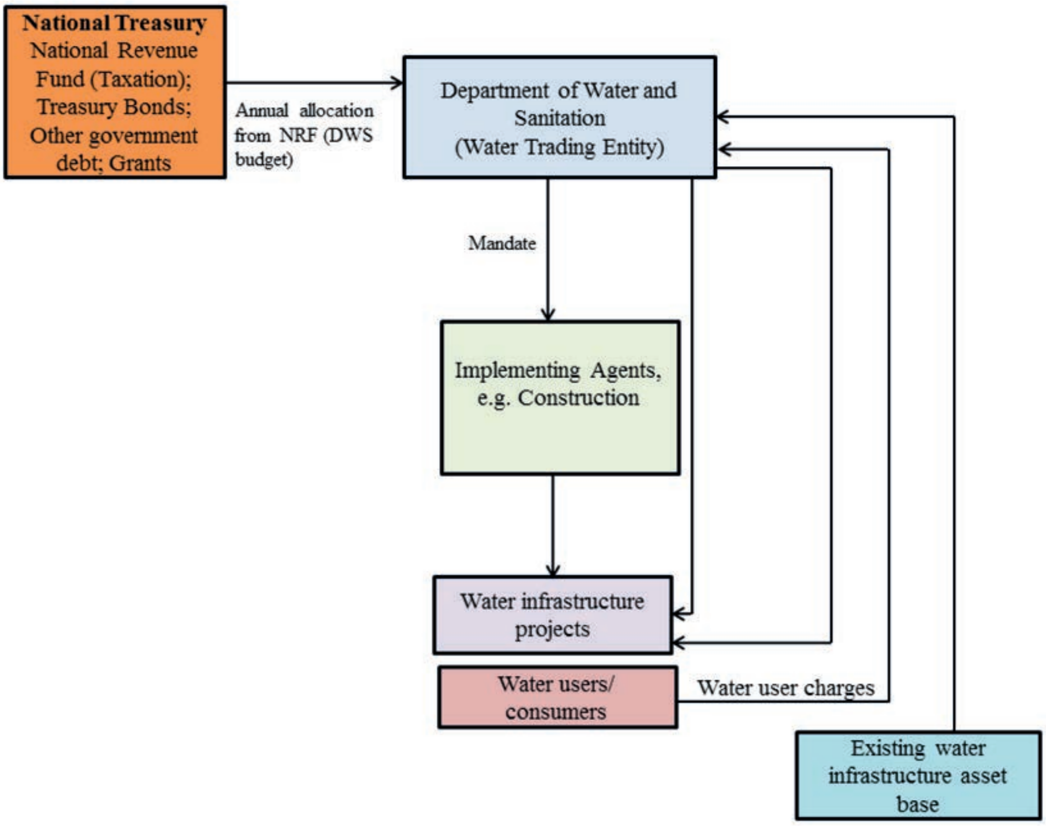

Figure 6

Direct fiscal (NRF) funding for infrastructure development and allocated budget from the National Revenue Fund

the National Revenue Fund (Fig. 6; Table 2) (NT, 2011a, 2011b, 2011c). The relevant government departments (DWA, DCoG), with support from NT, oversee and manage the total water and wastewater infrastructure projects at various levels of government throughout South Africa within the MTEF (Medium-Term Expenditure Framework) (DCoG, 2010; DWA, 2011a, 2011b, 2013a, 2013b, 2013c; NT, 2011a, 2011b, 2011c, 2013a, 2013b, 2013c). The projects include new infrastructure and existing infrastructure being refurbished, rehabilitated, upgraded and maintained. Infrastructure spending includes direct expenditure on national water infrastructure projects and indirect expenditure on regional bulk water supply and wastewater infrastructure projects through transfers to water services authorities.

- **Model 2: Ring-fenced special purpose vehicle (SPV)** – supposedly 'ring-fenced' water trading entity generating enough revenue for water infrastructure development projects, operations and maintenance, as set by the water pricing strategy (Fig. 7; Table 2) (RSA, 1999, 2003; DWAF, 2007). The DWA and water management institutions will be responsible for managing water infrastructure, while the ring-fenced SPV, e.g. TCTA, water boards, municipal own entity (ring-fenced municipal SPV) funds and implements specific commercially-viable projects (RSA, 1999, 2003). SPVs (e.g. TCTA) and municipalities, e.g., metropolitan municipalities, can maintain a strong presence in the commercial paper market and be able to secure funding at competitive prices. However, global limits are already being set by National Treasury and govern the total limit of gross liabilities of water infrastructure projects. The individual limit is set internally from time to time when markets are suitable to move from one instrument to the other. The borrowing limits for bonds are offset from the available utilisation on the bond as approved. For example, the current CPI (Consumer Price Index)-adjusted issued maturities for the TCTA as an SPV are R6 381 million (variable interest rate instrument), with a nominal maturity of R3 525 million, and the figure is R16 146 million (fixed interest rate instruments) for the commercial paper (TCTA, 2012). The limits for commercial paper and the individual bonds are the authorised limits for utilisation of the individual bonds and commercial paper, R30 500 million with a total borrowing authority global limit of R20 550 million.
- **Model 3: Special purpose vehicle (SPV) – institution to finance critical national infrastructure** (Fig. 8). The SPV will house dedicated water infrastructure cash-flows, such as water infrastructure projects (Fig. 8; Table 2). Such a national infrastructure institution should help finance transformative infrastructure projects of national strategic importance (Rowey, 2009; Tyson, 2011). Properly designed and governed, the SPV would assist in overcoming weaknesses in the current selection of infrastructure projects by removing funding decisions from politically-volatile appropriation processes (Rowey, 2009; Tyson, 2011). Investments could be selected after independent and transparent cost-benefit analysis has been done by objective experts. Relevant institutions could provide the most appropriate form of financing for each project, drawing on a flexible set of tools such as direct loans, loan guarantees or grants, and issuing medium and long-term tax-free bonds for specific or dedicated water infrastructure funding. However, this is very dependent on market conditions; research should be conducted on present and

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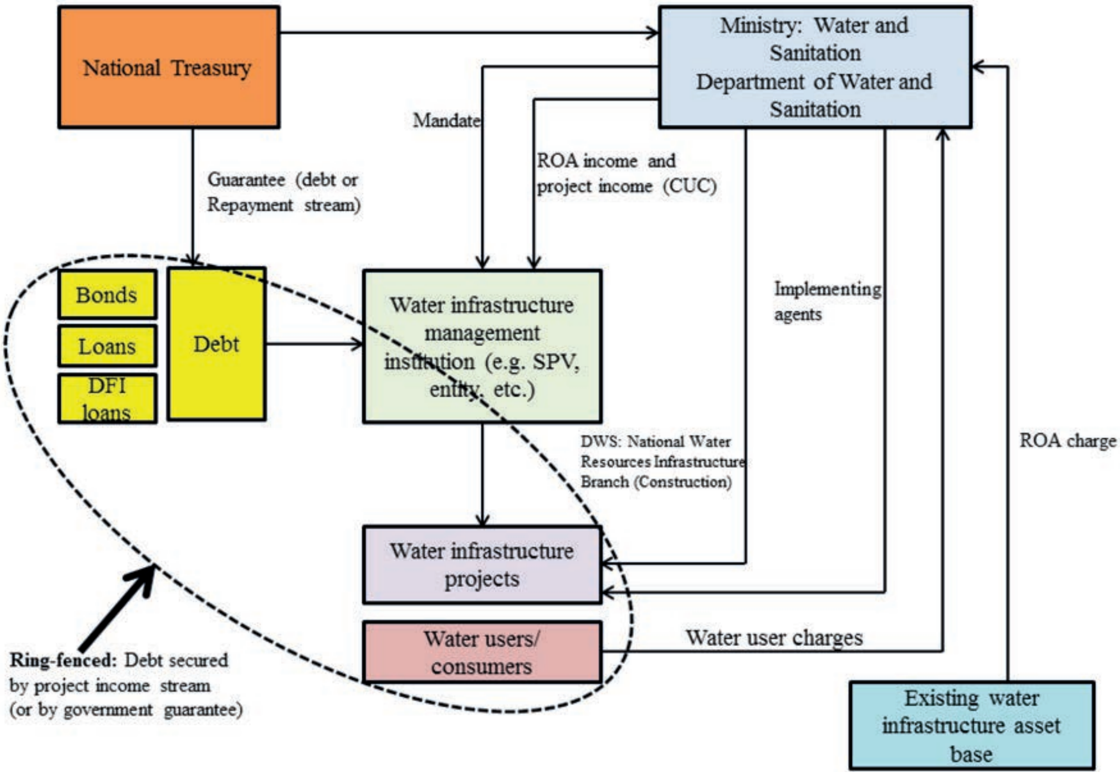

Figure 7

Ring-fenced special purpose vehicle (SPV) generating enough revenue for water infrastructure development

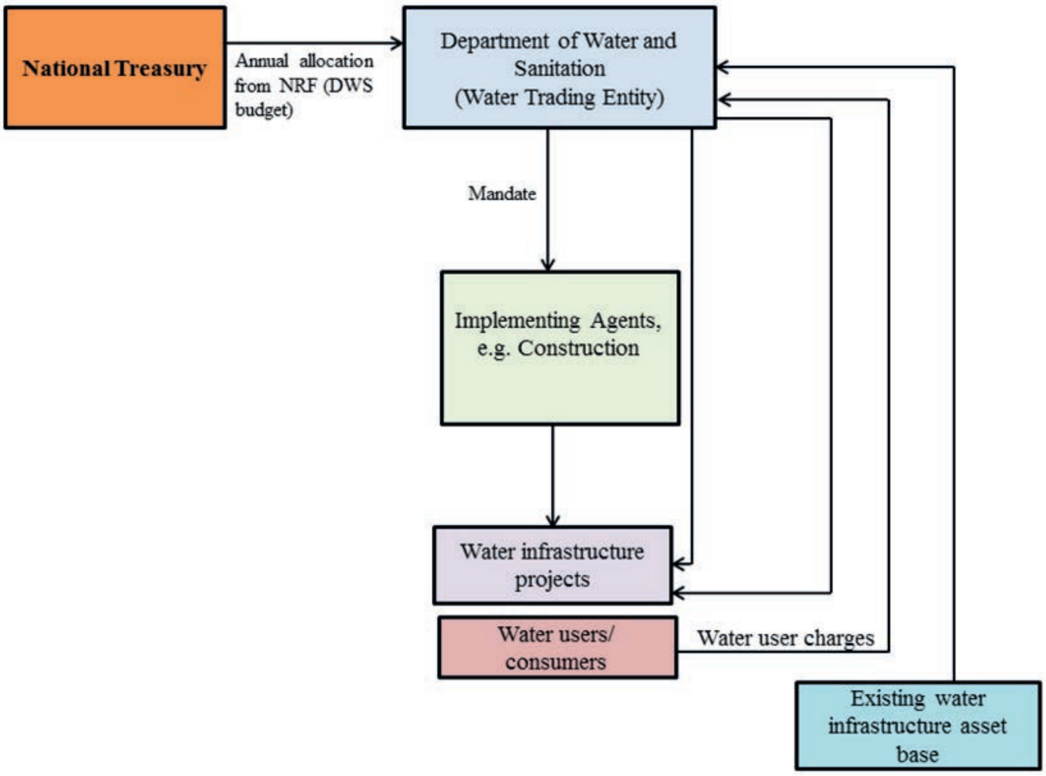

Figure 8

SPV housing dedicated water infrastructure cash-flows to finance critical water infrastructure projects future market conditions before pursuing this option and interest subsidies for possible 'Build South African Bonds' (cf. Lamb, 1984; Rowey, 2009; Tyson, 2011). That would enable the water institution or SPV to tap into the significant pools of long-term private capital, pension funds and dedicated infrastructure equity funds (cf. Ruiters, 2013). The concept of the DBSA fulfilling the role as a water infrastructure SPV with a pool of funds for low-interest loans has been endorsed already, such as infrastructure loans from the DBSA to municipalities in South Africa (cf. Lamb, 1984; Urban Logic, 2000; DBSA, 2012). Other approaches could be liquidation or recapitalisation of non-public-purpose or marginally public-purpose facilities to private ownership (cf. Fraser et al., 2000). Lastly, the creation of a water infrastructure service state-owned entity (SOE) could lead to issuing of 'Build South African Bonds' in this new organisation on the securities stock exchange or through private subscriptions, accessing of capital markets for specific and dedicated financial assistance such as revolving loans and other similar debt structures, and possible application of incentives such as matching ratios to stimulate investment (cf. Lamb, 1984; Urban Logic, 2000, Nebert, 2001; Rowey, 2009; Tyson, 2011).

- **Model 4: Stand-alone water institution with strong balance sheet.** It is important that the value of water derived from its application for economic production should be more than the cost of water supply for that particular use (Fig. 9; Table 2). A national agency is to be established to finance, develop and operate national water resources infrastructure by merging of the resources (the 'agency option'). Charges for achieving an equitable and efficient allocation of water (economic charge) must be implemented (Basson, 2010; Van Niekerk and Du Plessis, 2013a, b). The economic use of water is charged at the full cost of supplying water to the users over a specific time period, e.g. 20-year term (DWAF, 2007; Basson, 2010; Van Niekerk and Du Plessis, 2013a, 2013b). This requires the payment of a capital unit charge (CUC) to repay the off-budget loan funding (Basson, 2010; Van Niekerk and Du Plessis, 2013a, 2013b). Harnessing the significant potential for capital markets to finance water infrastructure, particularly local bond markets, is contingent on their strengthening and further development. It is, thus, also contingent on further reforms, especially those that would deepen the local institutional investor base. Well-functioning and appropriate institutional investors (commercial and investment banks, pension funds, insurance companies, etc.) would be natural sources of long-term financing for water infrastructure because liabilities would better match the longer terms of water infrastructure projects (cf. Inderst, 2009; World Bank, 2010; TCTA, 2012).
- **Model 5: Public-Private Partnerships (PPPs) with equity.** PPP initiatives to be used for the implementation of water infrastructure development projects (Fig. 10; Table 2). Regional utilities are to be established to manage water infrastructure (Table 2; DWA, 2013a). Nine catchment management agencies (CMAs) are to manage water resources infrastructure in addition to existing water institutions (DWAF, 2008; DWA, 2012b, 2013a) (Table 2; DWA, 2013a). Water boards are to have their mandate expanded to manage water resources infrastructure (Table 2; DWAF, 1997a, 1997b; DWA, 2013a). Consequently, the local process to consider service arrangements may have a regional dimension and may affect the financial viability of water boards. Some water boards are currently

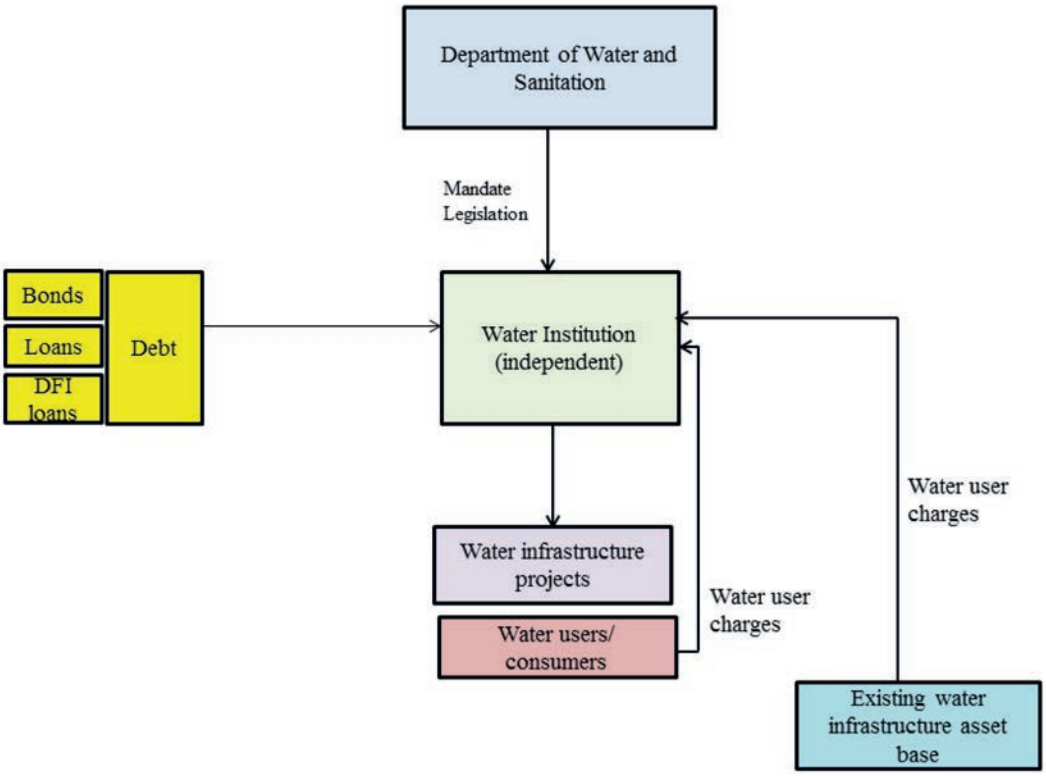

Figure 9
Stand-alone water institution with strong balance sheet for water infrastructure development

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operating, maintaining and investing in assets that were ceded to them by DWS in terms of specific agreements, but in some cases assets have not been formally transferred to the relevant water boards. An institutional framework was developed to guide this type of development (NT, 2000). The use of this framework is essential in including the private sector in the implementation of water infrastructure development projects (NT, 2000). More importantly, this would also help to convince the public that private involvement, other forms of non-traditional funding or delivery are appropriate. Attempts have been made to involve the private sector in the creation of public infrastructure but not with the commitment, consistency, or legislative protection that would encourage and protect private sector investment and encourage long-term partnerships (DCoG, 2010). There are a few contracts with private operators for service provision, e.g., Mbombela (Nelspruit) Municipality of the Mpumalanga Province; a lease-type contract in Lukanji (Queenstown) Municipality of the Eastern Cape Province; and an operating contract in uThungulu District Municipality of the KwaZulu-Natal Province (DCoG, 2010). The primary purpose of the concession arrangement was to inject the necessary capital and management resources into these water and sanitation operations. The contracts were delegated for the management, operation and maintenance of the water and sanitation services. Research confirmed that well-structured public-private partnership (PPP) models for water and sanitation infrastructure can be a success, on condition that sufficient revenue streams exist, and that appropriate contracting models and all parameters for the framework of PPP models are taken into account (DunnCavelty and Suter, 2009; Matji, 2013).

- **Model 6: Private concession-initiated water sector reforms to improve performance, encouraging private participation and improving governance from within** (Fig. 11; Table 2). Such private sector transactions have preciously occurred in South Africa, with most having been lease contracts (or *affermage*) (Fig. 11; Table 2). For example:
  - The City of eThekwini's Council identified the Durban Water Recycling/Reclamation Project as an opportunity and then commissioned a study to investigate recycling of at least 10% of the city's wastewater (Matji, 2013). Durban Water Recycling (Pty) Ltd was awarded a 20-year concession contract for the production of high-quality reclaimed water (Matji, 2013). The initial capital outlay of the facility was R74 million. The plant is capable of treating 47.5 million m^3/a of domestic and industrial wastewater to a near-potable standard for sale to industrial customers for direct use in their processes (Matji, 2013). The parties to the PPP partnership are Umgeni Water Board, Vivendi Water, Zetachem, Khulani Holdings, and Marubeni Europe (Matji, 2013).
  - The City of Cape Town entered into a concession agreement with TCTA, DBSA, ABSA Bank, European Investment Bank (EIB), and affected water user associations, to construct the multi-purpose Berg River Dam for both agricultural and domestic use (Matji, 2013). The total value of the project was about R1.1 billion. The duration of the repayment period was 20 years. The role of DBSA, ABSA Bank and the EIB was to finance the project activities through the TCTA (Matji, 2013).
  - Water and Sanitation South Africa (WSSA) (Pty) Ltd

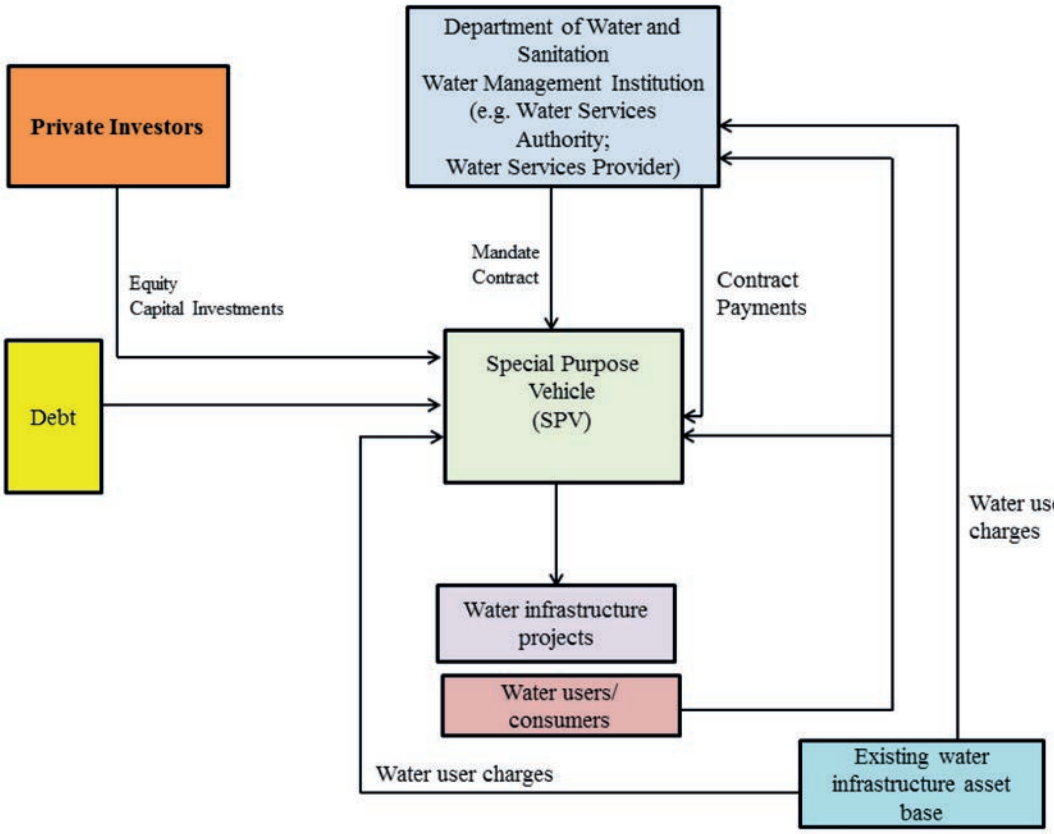

Figure 10
Public-Private Partnership (PPP) with equity to be used for the implementation of water infrastructure development projects

is currently running water-related PPP models in the Zululand and uMkhanyakude District Municipalities of the KwaZulu-Natal Province of South Africa.
- Sempcorp Utilities has taken over the Siza Water PPP in iLembe District Municipality of the KwaZulu-Natal Province for the operation and maintenance of water infrastructure (Matji, 2013).

- **Model 7: Private development.** This is based on the Build, Own, Operate and Transfer (BOOT) model (Fig. 12). Customers are wary of full-scale water privatisation; thus, a well-structured privatisation model could be part of the water infrastructure development, operations and maintenance solutions (Fig. 12). Often customers fear that water charges would become 'another tax' with no improvement in the quantity and quality of the water infrastructure. Customers would want to see clear incentives and commitments for extra capacity. A more proactive approach to funding would be to table all future financing requirements in advance. Furthermore, in order to promote interest in the commercial paper programme, funds could be raised ahead of any financing requirement and invested until the specific need for funding arises.

Water institutional reform and options

The review of the water institutional and governance challenges, achievements, lessons and recommendations in terms of operation led to important findings or recommendations (cf. DWAF, 2008; DWA, 2012b). It was clear that the Government would benefit from establishing a specialised

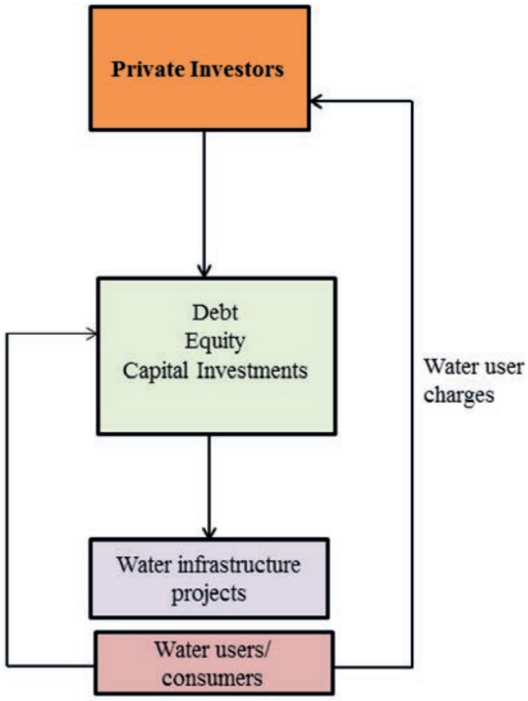

Figure 12
Private development, through a well-structured privatisation model, could be part of the water infrastructure development, operations and maintenance solutions

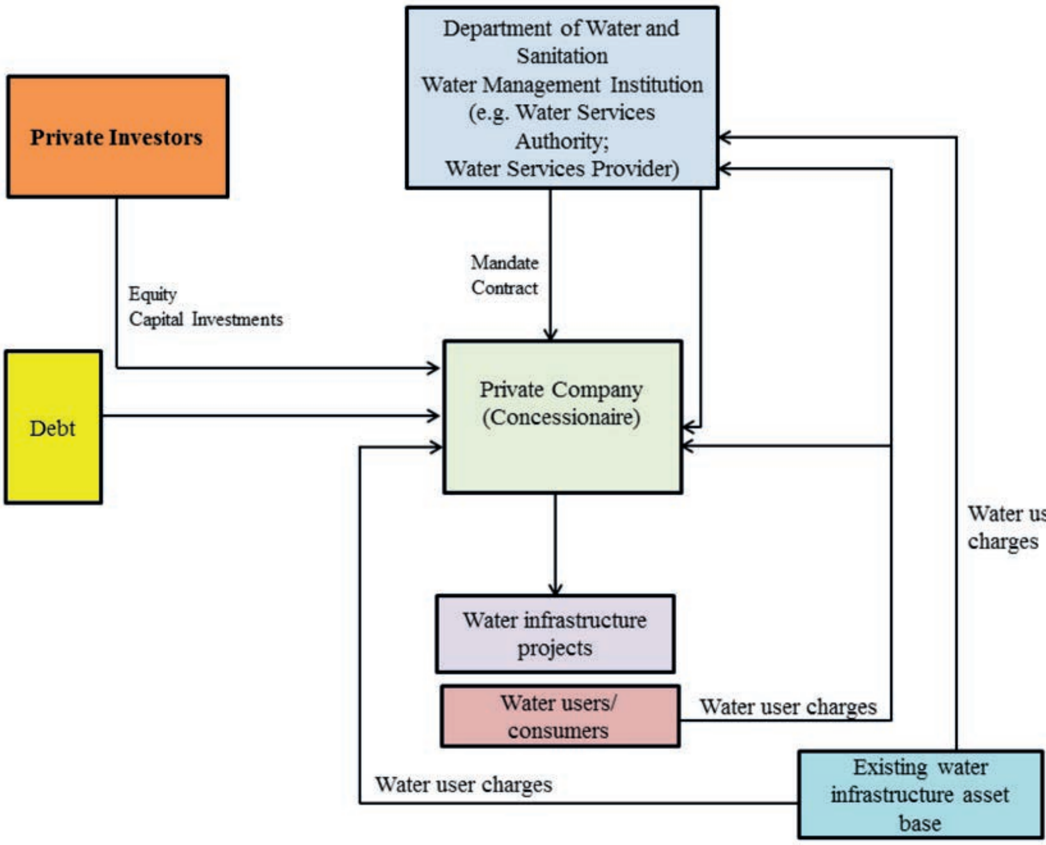

Figure 11
Private concession for the implementation and management of water infrastructure

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technical and financial support mechanism. However, such a structure must:

- Be mandated, recognised by and promoted by the Government
- Be able to benefit from (structured) partnerships with key stakeholders
- Have good systems and reliable service data
- Have available appropriate skills (including technical operational skills) mobilised in specialised technical units
- Be assured of securing loans and/or financial assistance
- Be able to deal with the challenge of capacity constraints, in terms of both human skills capacity and financial capacity

The institutional reforms are needed for (i) water resource infrastructure management and development, (ii) water resources management and (ii) water services and sanitation (DWAF, 2008; DWA, 2012b, 2013a). The NWRS is intended to set the long-term vision and strategy for the sector and it became clear during the compilation of this Strategy that DWA needed to clarify its strategy on the institutional framework for the sector (DWA, 2013a).

Various institutional options for the future management and development of water infrastructure were considered (cf. Table 2; DWAF, 2008; DWA, 2012b, 2013a). However, the emerging model is considered to be a hybrid model consolidating the national water resources and regional bulk infrastructure functions and capabilities, with the regional bulk infrastructure primarily being a water board (water services provider) function. As part of its investigations into institutional options for the management of national water resources infrastructure, DWS should consider the following options (cf. Table 2):

- DWS is to be responsible for managing water resources infrastructure, while TCTA funds and implements specific commercially viable projects. To reduce infrastructure costs, the TCTA business model should be restructured. The original model is a project-finance model designed specifically for the Lesotho Highlands Water Project Phase 1. In addition to this, TCTA should collect and manage revenue from users and not the Department of Water and Sanitation. It should take the form of entities in other South African sectors such as SANRAL and Eskom (Matji, 2013).
- A national agency is to be established to finance, develop and operate national water resources infrastructure by merging of the resources of the NWRI Branch and the TCTA (the 'agency option').
- Between three and five regional utilities are to be established to manage water resources infrastructure.
- The nine catchment management agencies (CMAs) are to manage water resources infrastructure (DWAF, 2008; DWA, 2012b, 2013a).
- One or more water boards are to have their mandate expanded to manage water resources infrastructure. Water boards, as regional providers, are involved in the provision of water services to many water services authorities. Consequently, the local process to consider service arrangements may have a regional dimension and may affect the financial viability of water boards. Some water boards are currently operating, maintaining and investing in assets that were ceded to them by DWS in terms of specific agreements, but in some cases assets have not been formally transferred to the relevant water boards.

CONCLUSION

In the paper it is argued that a solution to the funding and financing of the water infrastructure problem could be a combination of the water institutions and governance models listed above. Some of the water institutions and governance models are already in existence but they are fragmented and in need of serious review and reconfiguration. If there is the intention to proceed on the basis of the tenet that water infrastructure is an essential part of South Africa's capital infrastructure which provides a basis for economic, social and environmental development. Water institutions and governance models should be in place to facilitate for the funding and financing of water infrastructure and should be like the current models for other capital infrastructure development, e.g., electricity, energy, transportation (roads) and telecommunications. How the models should be combined or consolidated would depend on the governance structure, financial markets, funding and financing pool, and the political climate, to name but a few factors. If water infrastructure is classified as an essential part of a nation's capital infrastructure, producing goods for public benefits, then the above models should be favourable alternatives for obtaining capital financing. These models can be consolidated to create a water infrastructure funding and financing pool. From this pool, suitable model(s) can be selected for water infrastructure financing based on the implementation environment.

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REFERENCES

BASSON MS (2010) Assessment of the ultimate potential and future marginal cost of water resources in South Africa. DWA Report No. P RSA 000/00/12610. Department of Water Affairs, Pretoria.

CASADESUS-MASANELL R and RICART JE (2011) How to design a winning business model. *Harv. Bus. Rev.* **89** (1/2) 100–107.

COLDWELL D and HERBST F (2004) *Business Research*. Juta, Cape Town.

CRANSTON S (2005). Old Mutual: Closing the gap. *Financial Mail* 28 January 2005. 28.

DBSA (DEVELOPMENT BANK OF SOUTHERN AFRICA) (2012) Annual Report 2011/12. DBSA, Midrand, South Africa.

DCOG (DEPARTMENT OF COOPERATIVE GOVERNANCE, SOUTH AFRICA) (2010) Strategy for Accelerating and Improving Municipal Infrastructure Provision. Department of Cooperative Governance, Pretoria.

DWA (DEPARTMENT OF WATER AFFAIRS, SOUTH AFRICA) (2010) National non-revenue water assessment. Department of Water Affairs, Pretoria.

DWA (DEPARTMENT OF WATER AFFAIRS, SOUTH AFRICA) (2011a) Strategic Plan 2010/11-2012/13. Department of Water Affairs, Pretoria.URL: http://www.dwa.gov.za/documents.

DWA (DEPARTMENT OF WATER AFFAIRS, SOUTH AFRICA) (2011b) Annual Report 2010-2011. Department of Water Affairs, Pretoria. URL: http://www.dwa.gov.za/documents.

DWA (DEPARTMENT OF WATER AFFAIRS, SOUTH AFRICA) (2012a) Annual Performance Plan 2012/13-2014/2015. Department of Water Affairs, Pretoria. URL: http://www.dwa.gov.za/documents.

DWA (DEPARTMENT OF WATER AFFAIRS, SOUTH AFRICA) (2012b) Institutional and Re-alignment: A Strategic Framework for Institutional Re-alignment and Reform. Department of Water Affairs, Pretoria.

DWA (DEPARTMENT OF WATER AFFAIRS, SOUTH AFRICA) (2013a) *National Water Resource Strategy. June 2013 Second Edition*. Department of Water Affairs, Pretoria. URL: http://www.dwa.gov.za/nwrs2013.

DWA (DEPARTMENT OF WATER AFFAIRS, SOUTH AFRICA) (2013b) Strategic Plan 2010/11-2012/13. Department of Water Affairs, Pretoria. URL: http://www.dwa.gov.za/documents.

DWA (DEPARTMENT OF WATER AFFAIRS, SOUTH AFRICA) (2013c) Annual Report 2012-2013. Department of Water Affairs, Pretoria. URL: http://www.dwa.gov.za/documents.

DWAF (DEPARTMENT OF WATER AFFAIRS AND FORESTRY, SOUTH AFRICA) (2003) Water Services Strategic Framework. Government Printer, Pretoria.

DWAF (DEPARTMENT OF WATER AFFAIRS AND FORESTRY, SOUTH AFRICA) (2004) *National Water Resource Strategy. First Edition. September 2004*. Government Printer, Pretoria.

DWAF (DEPARTMENT OF WATER AFFAIRS AND FORESTRY, SOUTH AFRICA) (2007) Raw Water Pricing Strategy of South Africa. Government Printer, Pretoria.

DWAF (DEPARTMENT OF WATER AFFAIRS AND FORESTRY, SOUTH AFRICA) (2008) Emerging institutional models for water in South Africa. Department of Water Affairs and Forestry, Pretoria.

DUNNCAVELTY M AND SUTER M (2009) Public–private partnerships are no silver bullet: An expanded governance model for critical infrastructure protection. *Int. J. Crit. Infrastruct. Prot.* **2** 179–187.

EDD (ECONOMIC DEVELOPMENT DEPARTMENT, SOUTH AFRICA) (2011) New Growth Path Framework. Economic Development Department, Pretoria. URL: http://www.economic.gov.za/communications/new-growth-path-series.

FRASER N, BERNHARDT I, JEWKES E and TAJIMA M (2000) *Engineering Economics in Canada*. Prentice Hall, Scarborough, Ontario.

HOPE RA and GARROD GD (2005) Evaluating changes in water institutions: methodological issues at the micro- and meso-levels. *Water Polic.* **7** 21–34.

INDERST G (2009) Pension fund investment in infrastructure: OECD working papers on insurance and private pensions. Report No. 32. OECD Publishing, Paris. DOI:10.1787/227416754242.

KARAR E, MAZIBUKO G, GYEDU-ABABIO T and WESTON D (2011) Catchment management agencies: A case study on institutional reform in South Africa. In: Schreiner B and Hassan R (eds) *Transforming Water Management in South Africa: Designing and Implementing a New Policy Framework*. Springer, London. 145–164.

LAMB RA (1984) Creative financing of the infrastructure. *Ann. New York Acad. Sci.* **431** 54–58.

MATJI MP (2013) Development of the conceptual framework for public-private partnerships model: Case studies from municipalities in the Limpopo and Gauteng Provinces, Republic of South Africa. MBL thesis, University of South Africa, Pretoria.

MULLER M (2014) Allocating powers and functions in a federal design: The experience of South Africa. In: Garrick DE, Anderson GRM, Connell D and Pittock J (eds) *Federal Rivers: Managing Water in Multi-Layered Political Systems*. Edward Elgar, Cheltenham UK.

NEBERT D (2001) Developing spatial data infrastructures: The SDI cookbook. URL: http://www.gsdi.org/pubs/cookbook/cookbook0515.pdf. (Accessed 30 October 2013).

NPC (NATIONAL PLANNING COMMISSION, SOUTH AFRICA) (2013) National Development Plan for South Africa. NPC, Pretoria. URL: http://www.npc.gov.za/documents.

NT (NATIONAL TREASURY, SOUTH AFRICA) (2000) South African National Treasury PPP unit. URL: http://www.treasury.gov.za/organisation/ppp/default.htm (Accessed 30 September 2013).

NT (NATIONAL TREASURY, SOUTH AFRICA) (2011a) The estimates of national expenditure 2011: Vote 3 Cooperative Governance and Traditional Affairs. National Treasury, Pretoria.

NT (NATIONAL TREASURY, SOUTH AFRICA) (2011b) The estimates of national expenditure 2011: Vote 38 Water Affairs. National Treasury, Pretoria.

NT (NATIONAL TREASURY, SOUTH AFRICA (2011c) The Division of Revenue Bill. Government Printer, Cape Town.

NT (NATIONAL TREASURY, SOUTH AFRICA) (2013a) Minister of Finance Budget Speech 2013. National Treasury, Pretoria. URL: http://www.treasury.gov.za/organisation/nationalbudget/ene/default.htm.

NT (NATIONAL TREASURY, SOUTH AFRICA) (2013b) Estimates of national expenditure 2013. National Treasury, Pretoria. URL: http://www.treasury.gov.za/organisation/nationalbudget/speech/default.htm.

NT (NATIONAL TREASURY, SOUTH AFRICA) (2013c) The state of local government finances and financial management as at 30 June 2013**:** Analysis document. National Treasury, Pretoria. URL: http://www.treasury.gov.za/organisation/ppp/default.htm.

PICC (PRESIDENTIAL INFRASTRUCTURE COORDINATING COMMISSION, SOUTH AFRICA) (2012) A summary of the South African National Infrastructure Plan. Presidential Infrastructure Coordinating Commission, Pretoria. URL: http://www.economic.gov.za/communications/presidential-infrastructure-coordinating-commission.

ROWEY K (2009) *U.S. Infrastructure Investment in a Time of Uncertainty and Global Recession*. Freshfields Bruckhaus Deringer LLP, Washington, DC.

RSA (REPUBLIC OF SOUTH AFRICA) (1971) Water Research Act. Act No. 34 of 1971. *Government Gazette* **3105**. Government Printer, Cape Town.

RSA (REPUBLIC OF SOUTH AFRICA) (1997a) White Paper on a National Water Policy for South Africa. Government Printer, Cape Town. URL: http://www.dwaf.gov.za/Documents/Policies/nwpwp.pdf.

RSA (REPUBLIC OF SOUTH AFRICA) (1997b) Water Services Act. Act No. 108 of 1997. *Government Gazette* **18522**. Government Printer, Cape Town.

RSA (REPUBLIC OF SOUTH AFRICA) (1998) National Water Act. Act No. 36 of 1998. *Government Gazette* **19182**. Government Printer, Cape Town.

RSA (REPUBLIC OF SOUTH AFRICA) (1999) Public Finance Management Act. Act No. 1 of 1999). *Government Gazette* **19814** Pretoria: Government Printer, Cape Town.

RSA (REPUBLIC OF SOUTH AFRICA) (2003) Local Government: Municipal Finance Management Act. Act No. 56 of 2003. *Government Gazette* **26019**. Government Printer, Cape Town.

RUITERS C (2011) Funding models for the financing of water infrastructure in South Africa: A framework and comparative analysis of alternatives. MBA thesis, University of South Africa, Pretoria.

RUITERS C (2013) Funding models for financing water infrastructure in South Africa: A framework and critical analysis of alternatives. *Water SA* **39** (2) 313–326.

SALETH RM and DINAR A (2005) Water institutional reforms: Theory and practice. *Water Polic.* **7** 1–20.

TAYLOR P (2002) Analysing quantitative data. In: Charlesworth J, Lewis J, Martin V and Taylor P (eds) *Toolkit 2: Investigating Performance and Change*. The Open University Press, Hampshire, UK.

TRANS-CALEDON TUNNEL AUTHORITY (2012) Annual Report 2011/12. Trans-Caledon Tunnel Authority, Pretoria.

TYSON LD (2011) A better stimulus plan for the U.S. economy. *Harv. Bus. Rev.* **89** (1/2) 53.

URBAN LOGIC (2000) Financing the NSDI: National Spatial Data infrastructure. URL: http://www.fgdc.gov/whatsnew/whatsnew.html#financing (Accessed 30 September 2013).

VAN KOPPEN B and SCHREINER B (2014) Moving beyond integrated water resource management: developmental water management in South Africa. *Int. J. Water Resour. Dev.* **30** (3) 543–558.

VAN NIEKERK PH and DU PLESSIS JA (2013a) Hydrologic-economic appraisal of life-cycle costs of inter-basin water transfer projects. *Water SA* **39** (4) 539–548.

VAN NIEKERK PH and DU PLESSIS JA (2013b) Unit reference value: Application in appraising inter-basin water transfer projects. *Water SA* **39** (4) 549–554.

WORLD BANK (2010) *Africa's Infrastructure: A Time for Transformation*. World Bank, Washington D.C.

APPENDIX : TABLE A1
Water institutions and their functions in South Africa

Water institutions				Functions						
Sphere of government	**Institution**	**Brief description**	**Legislation**	**Policy**	**Regulation**	**Infrastructure development**	**Project funding mechanism**	**Liability management agency**	**Commission and fund water research**	**Undertake water research, technology development and innovation**
International	Komati Basin Water Authority (KOBWA)	Established in 1992, KOBWA is a bi-national (South Africa and Swaziland) implementing agent, for shared water resources between the two countries	The treaties between South Africa and Swaziland were ratified in late 1992, followed by the appointment of the KOBWA Board and Chief Executive Officer	No	No	Yes	Debt finance (South Africa issued guarantees for the loan). The two loans are paid directly from the South African national revenue fund	Yes	Yes	No
	Limpopo Watercourse Commission (LIMCOM)	LIMCOM acts as a technical advisor to the Contracting Parties (Botswana, Mozambique, South Africa and Zimbabwe) on matters relating to the development, utilisation and conservation of the water resources of the Limpopo.	Governed through treaties signed by member states	Strategic inputs	No	No	Member states	No	Yes	No
	Inco-Maputo Tripartite Permanent Technical Committee	Manage the water flow of the Inkomati River on behalf of the three member states (Swaziland, South Africa and Mozambique)	Governed through treaties signed by member states		No	No	Member states			
National	Department of Water and Sanitation (DWS)	Policy maker, regulator, planning and implementation (All-in-one)	National Water Act, 1998 (Act No. 36 of 1998) and Water Services Act, 1997 (Act No. 108 of 1997)	Yes	Yes	Yes	National Revenue Fund/appropriations	No	No	No
	Trans-Caledon Tunnel Authority (TCTA)	A special purpose vehicle established in 1986 by the pre-1994 government, the TCTA, was established as a project-specific finance vehicle for the Lesotho Highlands Water Project, with a lifespan of 25 years	TCTA was established in 1986 to give effect to the treaty on the Lesotho Highlands Water Project between the government of South Africa and the government of Lesotho.	No	No	Yes	Debt finance (State balance sheet is used to raise debt) , user-tariffs and government subsidy (government guarantees revenue through the water trading entity)	Yes	No	No

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APPENDIX : TABLE A1 (continued)

Water institutions				Functions						
Sphere of government	**Institution**	**Brief description**	**Legislation**	**Policy**	**Regulation**	**Infrastructure development**	**Project funding mechanism**	**Liability management agency**	**Commission and fund water research**	**Undertake water research, technology development and innovation**
	Council for Scientific and Industrial Research (CSIR)	Multidisciplinary science, engineering and technology council.	Scientific Research Council Act. Formed in 1945 (Act No. 33 of 1945, amended by (Act No. 46 of 1988, as amended by Act 71/1990)	Strategic inputs	Strategic inputs		No	No	Yes	Yes
	Water Research Commission (WRC)	Commission and fund research undertaken by universities, the CSIR and private institutions	Water Research Act (Act No. 34 of 1971)	Strategic inputs	Strategic inputs	No	Levy for water use paid by every water user in South Africa	No	Yes	No
	Agricultural Research Council (ARC)	Fund and undertake water research relating to agricultural sector	Agricultural Research Act (Act No. 86 of 1990)	Strategic inputs	Strategic inputs	No	National Revenue Fund/appropriations	No	Yes	Yes
	Council for Geoscience (CGS)	To develop and publish world-class geoscience knowledge products and to render geoscience-related services to the South African public and industry	Geoscience Act (Act No. 100 of 1993)	Strategic inputs	Strategic inputs	Yes	National Revenue Fund/appropriations	No	Yes	Yes
Regional or provincial	12 x water boards (Rand Water and Umgeni Water are the main ones)	Bulk water provision	Water Services Act, 1997 (Act No. 108 of 1997)	Strategic inputs	No	Yes	Debt, tariffs, own revenue	No	Yes	No
	District municipalities (Some of the district municipalities are also WSAs)	Bulk water provision	Water Services Act, 1997 (Act No. 108 of 1997)	Yes	Yes	Yes	Debt and own revenue	No	No	No
	Water user associations (WUA)		National Water Act, 1998 (Act 36 of 1998)	No	No	Yes	Own revenue and government subsidy	No	No	No
	Irrigation boards		National Water Act, 1998 (Act 36 of 1998)	No	No	Yes	Own revenue and government subsidy	No	No	No
	Catchment management agencies (CMA)	Oversee catchment management, licensing and regulation	National Water Act, 1998 (Act 36 of 1998)	Strategic inputs	Yes	No	Government grant	No	No	No

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Water institutions				Functions						
Sphere of government	**Institution**	**Brief description**	**Legislation**	**Policy**	**Regulation**	**Infrastructure development**	**Project funding mechanism**	**Liability management agency**	**Commission and fund water research**	**Undertake water research, technology development and innovation**
Local government (278 local municipalities, of which 152 are WSAs)	152 Water services authorities (WSAs)	Water services provision and regulation	Water Services Act, 1997 (Act No. 108 of 1997)	Yes	Yes	Yes	Debt and own revenue	No	No	No
	Community-based organisations operating as water services provider	Water services provision and operation and maintenance	Water Services Act, 1997 (Act No. 108 of 1997)							
	Public–private partnerships (PPPs	Water services provision and operation and maintenance	Structured regulation framework but managed by NT)	No	No	Yes	Debt, tariffs and municipal grants	Yes	No	No

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