Economic Approaches to Water Resources Management in the Orange-Senqu River Basin

Integrated Water Resources Management Plan for the Orange-Senqu River Basin

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ECONOMIC APPROACHES TO WATER MANAGEMENT IN THE ORANGE-SENQU RIVER BASIN

Integrated Water Resources Management Plan for the Orange-Senqu River Basin – Phase 3

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1 Introduction

The objective of this document is to conduct a review of the various economic instruments for water management in the four countries that form part of the Orange-Senqu River Basin – Botswana, Lesotho, Namibia and South Africa. The critical outcome of the document will be the evaluation of the effectiveness of the approaches employed in the four countries in enabling economic and water efficiency, with the aim of making recommendations about where instruments could be strengthened or adopted for use in the IWRM plan going forward.

In doing this, one key factor must be borne in mind. Although there exists a wide array of funding options that could be considered in developing a funding framework for financing the implementation of the IWRM Plan, the reality remains that ultimately water costs are paid for by consumers or taxpayers (whether within recipient or donor countries). The only option available in this regard is the choice of what point the payments are made, and how they are distributed over time. Where possible, the aim must be to align the costs of the delivery of water with the users who benefit from the service.

Another important distinction that must be made when discussing economic instruments is between recurrent and capital costs. What makes this distinction important is the risk profile associated with the instruments used to finance the two types of costs: for example, though it is possible (and sometime even necessary) to finance recurring costs from national budgets or direct donor aid support, it is a much riskier approach to financing these type of costs. This is simply due to the unstable nature of such mechanisms. Capital costs, given the once-off nature, can be funded through a wider range of mechanisms.

This document starts off with an introduction to the various economic approaches to water management that could be utilised to promote water efficiency. The remainder of the document is structured in a way that looks at the situation in each of the four countries individually. For each country it starts with a review of the water laws and policies in each country, looking at the various economic tools that are provided for in those laws and policies. It then investigates the mechanisms used and the challenges associated with the implementation of those economic tools where challenges exist. It then concludes each country chapter with a section that provides country specific recommendations for improving the use of economic tools in that particular water sector. The final chapter is the conclusion which looks at the common challenges present in all fours countries and makes some recommendations of how to better make use of the economic tools available in each country for the purposes of the IWRMP. The countries in which the economic approaches to water management cases are presented are as follows:

- Botswana
- Lesotho
- Namibia, and
- South Africa

2 Review of economic approaches to water use efficiency

In international water, scientific and development communities there is an increasing consensus that in the next 20 to 30 years water scarcity will increase rapidly in many parts of the world. This will have significant environmental, social, political and economic consequences, which will in turn have profound impacts on agriculture, energy, trade and local livelihood. National sovereignty and international relations might deteriorate, as water scarce countries continue to deplete their resources and look to water rich areas to ensure their long term growth and sustainability.

It is for this reason that water needs to be recognised as more than an input into various sectors of the economy. Consideration needs to be made with respect to implications of water on potential development initiatives or strategies, and of the importance of water within the economy, driving development and growth. At a water management area level, catchment management strategies will increasingly have to adopt a more integrated development paradigm in addressing water resource concerns, through integrated physical/technical, economical and institutional approaches. However, as technical solutions become increasingly more expensive and inappropriate for local development needs, increasing water efficiency, improving management of water resources, alternative financing of water infrastructure, building government capacity in developing spaces and addressing inadequate, incapacitated or absent water supply and/or sanitation services are among the new agendas of focus within government. Therefore, allocative and institutional efficiency through the demand and supply management of water is imperative to meet water needs and promote water use efficiency.

Achieving water efficiency consists of optimizing water use, and different points of view should be considered when investigating water use efficiency. Absolute or physical efficiency means using the least possible amount of water for any activities. Economic efficiency seeks to derive the maximum economic benefit for the society. Institutional efficiency qualifies the functions of an institution regarding its water-related tasks. Social efficiency strives to fulfil the needs of the user community. Environmental efficiency looks at natural resource conservation. And finally, technological efficiency refers to the process of finding ways for extracting more valuable products from the same resources. Depending on the conditions of each users system, these non-exclusive definitions of water use efficiency can be achieved simultaneously. In any case, it is clear that efficient water use should be approached in a multi-objective, cross-sectional and comprehensive manner. In particular, it should include the management of both supply and demand, assigning an economic value to water resources.[1]

Water use efficiency includes any measure that reduces the amount of water used per unit of any given activity, consistent with the maintenance or enhancement of water quality. It is when water prices reflect the full social costs of developing supplies, that the incentives are created to use the resource efficiently and rationally. Hence, when resources are correctly valued, reflecting its contribution to production, the incentive exists, through the forces of supply and demand, to use those resources efficiently though the introduction of technological change. The achievement of economic efficiency in resource use is a major economic policy aim, for it means that the economy is

[1] Garduño, H., and F. Arreguín-Cortés, eds., 1994, Efficient Water Use, Proceedings of the International Seminar on Efficient Water Use, Mexico, October, UNESCO Regional Office for Science and Technology for Latin America and the Caribbean. Available at: http://www.unesco.org.uy/phi/libros/efficient_water/tapaefus.html

approaching its maximum in the context of available resources. The economics of water resource addresses these issue, both on a sector basis through stand-alone analyses, and in a comprehensive manner, through multi-objective approaches.[2]

Economic Instruments (EIs) are therefore approaches that are intended to modify individuals and corporations' behaviours in a favourable manner, such as reducing water consumption, reducing pollution, or adoption of water efficient techniques such as modern irrigation systems. There is therefore a need to increase the use of economic instruments, through enforcement or voluntary measures, and to share the knowledge and experiences in order to improve the effectiveness of the systems. Utilising EIs has a number of advantages, such as:

- Avoiding the cost of extensive infrastructure investment and making use of low-cost, non-technical measures;
- Generating revenue to finance water management, monitoring and other water-related infrastructure;
- Aligning incentives and strengthening policy coherence across the different interrelated sectors, such as water, energy, food or land-use; and
- Providing relevant information on the cost of current systems, the benefits of system improvements, and the distribution of associated costs and benefits.

At the catchment scale, increasing water withdrawals from freshwater ecosystems, which has social, economic and environmental consequences, can no longer be addressed by local engagement, but require effective water allocation mechanisms. The issue therefore becomes how the decisions and control of who abstracts water are made. This is accomplished through a system of economic approaches that are described by two concepts, namely water rights and water allocation.

- A **water right** refers to the formal or informal permit or entitlement that allows the holder of the permit or entitlement the right to withdraw a specified amount of water.
- **Water allocation** refers to the process where available water is distributed (i.e. allocated) to different users and the resulting water right is granted, transferred, reviewed or modified.

Therefore, the water allocation process generates water rights governing the use of water within a catchment. A wide range of various water allocation processes and water rights exist around the world, and the most effective means of allocating water will be determined by the local circumstances. Therefore, the correct selection or combination of water allocation mechanisms should reflect local conditions and capacity, and should be based entirely on the existence or development of significant institutional capacity at catchment and national level.

Although there is uncertainty over which economic instrument or approach is more effective, there is agreement of which economic approaches that have deemed more favourable. These various economic approaches will be discussed in detail throughout the remainder of this chapter.

[2] Billi A., Canitano G., and Quarto A., 2007. The economics of water efficiency: a review of theories, measurement issues and integrated models. In: Lamaddalena N. (ed.), Shatanawi M. (ed.), Todorovic M. (ed.), Bogliotti C. (ed.), Albrizio R. (ed.). *Water use efficiency and water productivity: WASAMED project.* Bari: CIHEAM, 2007. p. 227-262 (Options Méditerranéennes: Série B. Etudes et Recherches; n. 57)

2.1 MARKET BASED APPROACHES

2.1.1 Water Markets and Water Trading

Water markets involve the allocation of water through market based mechanisms, particularly in the case of the reallocation of water. The prevalence of water markets has seen a shift in water policies in many countries over the last two or three decades; a shift from overriding policies, to more decentralised and market driven policies. This is mainly due to the water markets allowing full cost recovery, and also a decentralisation of water management issues to more local catchment level. In addition to the prevalent formalised water markets, informal and local water markets are also common.

Water trading involves the process where water rights are bought and sold, and involves the permanent transfer of permits or entitlements, or the temporary or seasonal transfer of water allocation entitlements. Both of types of water trading involve the transfer of water from one user to another, with the aim of meeting the needs for agriculture, industry, tourism or the urban sector. It is possible for water trading to provide an efficient water allocation mechanism, but only under certain circumstances. For instance, there is a potential important role for localised trading, or the permanent reallocation of water rights between different sectors to meet urban growth demands.

There is a variety of water trading and water markets that are available, which can be introduced and practiced in any country.

- **Open water markets** exist when water rights are traded on a free market, mostly without administrative control and intervention. Open water markets can more easily be introduced and carried through when water rights are held privately, which implies that there are private property rights that can be traded by different water users. (Private property rights refer to the ownership of water by the owner of the private property, and usually indicate an absolute quantity of water that can be extracted.)
- **Spot trading water markets** are temporary exchanges of water that involve the holder of the water right to allow a different user temporary use of the water, while the holder retains the water right. As a temporary facility, spot trading is inherently more common than the permanent transfer of water rights, and is important as it allows the flexibility of systems with respect to demand and supply management. However, the temporary nature of the system undermines the security of long-term allocations, and therefore does not facilitate investments.
- **Administrative water trading**, is when a regulatory environment is introduced due to the failure of open water markets. The regulation usually exerts control over spatial elements of trading where water is traded between different catchments, social equity elements of trading to ensure social and political sustainability, sectoral water trading to prevent social and economic impacts, and the price at which water is traded.
- **Informal water markets**, are markets where trading is not sanctioned by a regulatory environment. Semi-formal water markets usually exist in irrigation region between users, and are managed and governed by the administrative function of that region.

Although there is a wide variety of water trading and water markets, there a number of overarching advantages and disadvantages that can be highlighted from the use of water markets, particularly from a socio-economic and environmental perspective. These advantages and disadvantages are highlighted in the table below.

Table 2-1: Advantages and disadvantages of Water Trading and Water Markets[3]

Advantages	Disadvantages
- The net benefit from water use is increased as water can be transferred from less productive economic activities to more productive ones. - Incentives are provided for water conservation as if any water used has to be purchased, or water saved can be sold, strong reasons to maximise the efficiency with which water is used are introduced. - Water markets can provide a transparent means of allocation as allocation and reallocation can be achieved without political involvement. Where water is allocated by administrative bodies or local communal authorities, control can be exercised by social and political elites. - Where a catchment has been over-allocated, the purchase of water rights may be the most efficient and politically acceptable method of securing water for environmental needs. The water efficiency measures stimulated by the market may make additional water available for environmental allocations without reducing overall economic activity. - Increased efficiency in use may reduce environmental pollution (e.g. irrigation return-flow laden with fertilisers and agrochemicals).	- Discrepancies in income levels and access to capital result in varying transaction costs and access to information. Markets can thus lead to adverse impacts for poorer and marginalised communities. Monopolistic acquisition of water rights, held by some as a success in water markets, often demonstrates significant inequities and inefficiencies. - While transactions on spot water markets may occur frequently, water markets for water rights are often not as active. - Third party effects experienced by individuals not involved in the transaction can be significant. E.g., decreases in agricultural activity following the sale of water rights by some farmers may make it unviable for any remaining agricultural businesses to maintain local irrigation, processing or distribution infrastructure. - In poorer communities, the short-term windfall of trading water rights may result in the sale of means of production and livelihood. While this may be an economically rational action, it is not a socially justifiable one (in terms of equity and social development considerations).

CASE STUDY: WATER TRADING, FREE MARKETS AND THE ENVIRONMENT, CHILE

Prior to 1981, the ownership of water resources in Chile belonged to the state, and concessions were required for legal water use, which was linked to land ownership for selected individuals. The enactment of the Chilean Water Code of 1981 by Pinot junta resulted in a review of the water rights system. Concessions were transformed into private property rights that were infinite and fully tradable. All uncommitted water resources were auctioned, and no allocation was retained for the environment.

The private property rights were intended to facilitate allocation and reallocation through market processes. Through water trading, water rights were obtained by users who pay the highest price for water. While financial gains were achieved, the system did not factor in the social and environmental objectives. Marginal social groups lost access to water, while the over-allocation of water resulted in reduced water flows and water quality impacts through abstraction and water discharge. This inevitably resulted in temporal and spatial environmental impacts and unhealthy water resources.

CASE STUDY: WATER SPOT TRADING IN MURRAY-DARLING BASIN, AUSTRALIA

In Australia an expanding market for the trading of water use rights has enabled water to be efficiently allocated amongst water users. Over a decade of water sector reform and framework establishment allowed for the country's market based approach, and the two key success factors were the decoupling of water rights from land rights, as well as providing proportional water rights instead of fixed volumes. This ensured that the sustainability of the basin is ensured

Most of the water trading in the country takes place within the Murray-Darling Basin, with the southern district contributing about 90% of the water trading. The water in the northern MDB as well as in areas outside the MDB in the states of Victoria, New South Wales (NSW) and Queensland account for a small share of water trading; water markets are least developed in the states outside MDB (Northern Territory, Western Australia and Tasmania). To a great extent this has been ascribed to the higher hydrologic connectivity in the southern MDB. Such transactional costs associated with water trading are often ignored in the efficiency calculations that are put forward by advocates of water trading.

3 WWF, 2007. Allocating Scarce Water. A Primer on Water Allocation, Water Rights and water Markets. WWF Water Security Series 1.

CASE STUDY: WATER TRADING IN THE UNITED STATES

The western United States is a mostly arid region, but supplies food for the United States. Irrigation accounts for 74% of water withdrawals compared to the national average of 40%. Midwestern and eastern regions have enough rainfall to sustain agriculture without intensive water infrastructure.

The U.S. does not have an overarching national legal framework for its water governance, and the allocation or different users is determined by the state laws governing property rights. Developments such as mining and agriculture required secure water rights. Appropriation law therefore evolved to recognise the water rights of the holder to claim water, provided it used something beneficial. By the 1970s, additional water supply was not viable, and the reallocation of water was therefore mandatory. However, due to the appropriation law, informal water trading markets were established, allowing for voluntary market-based mechanisms such as water banking, leading or trading.

2.1.2 Water Pricing

The effective pricing of water is dependent on good governance and efficient water management institutions, particularly at local level, which have the ultimate aim of securing socially and environmentally sustainable water use. The pricing of water is typically imposed for two reasons, namely:

- **Recovery of costs of water management** - Through the occurrence of catchment and basin institutions that are responsible for the management of water resources, there has been a move to partially or fully recover costs for developing and/or managing water resources through charging and collecting revenue from users. Generating revenue is an attractive approach as it works on a user pays principle, and if supported by good costs management mechanisms, can be used to promote efficiency.
- **Water allocation management** - The use of water is controlled by setting an appropriate price on water, instead of issuing water rights or facilitating water trading. The price of water is usually set to equal the costs associated with the provision of water, including environmental management costs. If, for instance, water shortages are experienced, an increase in the price of water should deter excessive water use, thus allowing water demand to increase and subsequently increasing the water that is available.

Water pricing is favoured because it allows for water efficiency as cost and benefits are equalised by making users pay depending on their usage. However, a number of disadvantages do exist, namely:

- Appropriate and fair pricing of water is often difficult due to lack of available information that would allow accurate monitoring, infrastructure and management cost assessments.
- Social equity is often not considered when pricing water, therefore often out-pricing the poor and marginalised.
- Extensive monitoring is required, which is not always possible due to current institutional structures, budgets, capacities and technical capabilities.

CASE STUDY: WATER PRICING IN CITIES AND AGRICULTURE, ISRAEL

Water pricing was used as a way to manage water demand, through water being metered everywhere and all users bearing the costs. Under the Ministry of Infrastructure, the Water Authority manages water demand and has promoted water efficient technologies. Consumers pay high water tariffs that reflect cost recovery, water scarcity and natural resource management. Increases in water tariffs have reduced the use of water and encourage recycling and desalination for irrigation. Although challenges do exist, such as the implementation of pricing, and the materiality of water charges relative to other development goals, the initiative has been a success. For instance, agriculture has historically consumed 70% of available water resources; this has reduced to 50% with an increase in recycling and desalination.

2.1.3 Water Banking

Water banking refers to the process where the water bank is an intermediary (or broker), and is responsible for bringing in together both buyers and sellers. The water bank acts is an institutional mechanisms that facilitates the legal transfer and market exchange of various types of water rights (i.e. surface, groundwater and storage entitlements). The water bank therefore facilitates the transfer of water from low-valued to higher-valued uses by ensuring effective demand and supply management.

Through a set of rules regarding prices and quantities, the water bank acquires a stock of available water licences that are available for purchase. Water banks encourage market activity by being an intermediary offering lower transaction costs, and also often regulating environmental and social impacts. Water banking also allows an efficient ecological reserve to be maintained, thus ensuring the sustainability of the catchment, and constant water availability.

Therefore, in order for water banking to be successful, strong oversight, good governance and accountability, as well as robust institutional systems are required to maintain trust in the bank. The involvement of the government and/or local authorities must also be retained to ensure a balance between profit and service. Water banks, similar to water markets, require clearly defined and secure water rights, supported by water management institutions or bodies that can monitor water use and water quality, enforce water tights, and ensure integrated water resource management.

CASE STUDY: ENVIRONMENTAL WATER BANKING, CALIFORNIA

After a continuous drought in California that lasted five years, a drought water bank (DWB) was established, whose aim was to enable the transfer of water from the agricultural sector in northern California to urban, municipal and agricultural sectors in southern California. Prices for purchases and sale of water rights (including transactional costs) were set, allowing allocation for groundwater recharge and environmental sustainability.

Through the DWB, there was increased income, social, environmental and economic benefits in southern California, although northern California experienced decreased employment and environmental impacts. The Californian DWB demonstrates the potential environmental benefits of water banking, as the introduction of an administrated trade environment (i.e. through the water bank) allows the third party effects, and the environmental impacts to be minimised.

2.2 PAYMENT FOR ENVIRONMENTAL SERVICES

The payment for environmental services (PES) is an economic approach where upstream water users are compensated by downstream water users; the aim is to promote water quantity or quality conservation by upstream water users through reducing, improving or changing behaviours and activities in the river basin. It is based on the notion that users who benefit from environmental services should pay for them, and those that are responsible for the creation of the environmental services should be compensated. In the PES approach environmental services are only paid for after they have been received by the user. PES mechanisms are advantageous because they allow for the revenue to be generated, and can be sustainable provided that the demand and supply of services is balanced. The system can, however, be abused through the deliberate pollution of water resources with the aim of benefitting from pollution reduction activities.

PES's are implemented with the goals of recovering and protecting valuable ecosystems, as freshwater ecosystems provide services that are crucial for human survival, economic stability and growth, as well as environmental sustainability. Rural livelihoods are also highly dependent on healthy aquatic ecosystems. PES's can also be used to compensate for the associated costs, or loss in economic benefit that was incurred by the process for water resources protection.

Key criteria that are needed to enhance PES effectiveness include:

- Removing perverse incentives: For a PES programme to produce effective incentives, conflicting market distortions, such as environmentally harmful subsidies, should be removed.
- Clearly defining property rights: The individual or community whose land use decisions affect the provision of ecosystem services must have clearly defined and enforceable property rights over the land.
- Clearly defining PES goals and objectives: These help to guide the design of the programme and enhance transparency.
- Developing a robust monitoring and reporting framework of biodiversity and ecosystem services.
- Identifying buyers and ensure sufficient and long-term sources of financing.
- Identifying sellers and target ecosystem service benefits: Accounting for spatial variation in ecosystem service benefits via economic valuation, benefit scoring, and mapping tools allows payments to be prioritised to areas that provide the highest benefits. If the PES budget is limited, this can substantially increase the cost-effectiveness of the programme.
- Establishing baselines and target payments to ecosystem services that are at risk of loss, or to enhance their provision: A PES programme should only make payments for ecosystem services that are additional to the business-as-usual baseline.
- Differentiating payments based on the opportunity costs of ecosystem service provision: PES programmes that reflect the cost of an alternative action that must be avoided (e.g. deforestation) so as to enhance ecosystem service provision, are able to achieve larger ecosystem service benefits per unit cost.
- Addressing leakages: Leakage occurs when measures to enhance ecosystem services provision in one location leads to increased pressures for conversion in another. If leakage risk is expected to be high, the scope of the monitoring and accounting framework may need to be expanded so as to detect, and consequently address, leakage.

- Consider bundling or layering multiple ecosystem services: Joint provision of multiple services can provide opportunities to increase the benefits of the programme, while reducing transaction costs.
- Ensuring permanence: Events such as forest fires may undermine the ability of a landholder to provide an ecosystem service as stipulated in a PES agreement. If the risks are high, this will impede the effective functioning of a PES market.
- Delivering performance-based payments and ensure adequate enforcement: Payments should be ex-post, conditional on performance. When this is not feasible, effort-based payments (such as changes in management practices) are a second best alternative, provided that changes in ecosystem management practices will bring about the desired change in service provision. [4]

CASE STUDY: PAYMENT FOR ENVIRONMENTAL SERVICES PILOT PROJECT IN LAKE NAIVASHA BASIN, KENYA

The pilot PES scheme which provides a financial mechanism for payments for watershed services in Lake Naivasha Basin, was developed by WWF-Kenya, CARE-Kenya and local partners. The Water Resource Users Association compensates small scale landowners and farmers for managing their land to provide good quality water to downstream users. Positive land management changes included the rehabilitation and maintenance of riparian zones, the establishment of grass strips/terraces to reduce runoff and erosion on steep slopes, reduction in use of fertilizers and pesticides, and the planting native trees. The scheme has reduced environmental threats as well as provided income and livelihood improvements for participating communities.

CASE STUDY: FONAG, THE WATER CONSERVATION FUND, ECUADOR

FONAG is a private trust fund that water users in the Quito Metropolitan District can utilise to support water management and conservation. It is a stable, long-term financial mechanism using revenues obtained from financial activities aimed at maintaining the hydrological basins that supply water needs to the district. The Fund constitutes a PES scheme, where activities include land purchase in critical areas to sustain ecosystem services and improvement of agricultural management practices, but no direct payments to farmers.

FONAG works to ensure the provision of a quality by supporting actions directed at protecting water resources, based on the principles of long-term natural sustainability. Maintenance of water quality and quantity in river and associated ecosystems improves conservation status of freshwater habitats and the species that depend on them.

4 OECD, 2010. Paying for Biodiversity: Enhancing the Cost-Effectiveness of Payments for Ecosystem Services. OECD Publishing.

2.3 Effluent and Pollution Charges

Effluent, or waste discharge charges occur when a water user obtains a permit or the right to discharge waste (or waste water) into water resources. There is however a major impact on downstream water users, thus requiring the system to be well managed. There needs to be close interaction between the allocation of water rights, the administration of waste discharge, as well as the monitoring of water quality and compliance; this can be achieved through the establishment or expansion of a single institution, or the cooperation between separate institutions.

Effluent charges are often implemented to finance necessary measures for wastewater facilities, collection and decontamination, and also to provide an incentive for the user to reduce the amount of effluent that is discharged. The charging is often based on the quality and quantity of the effluent, and the rates are determined by water management organisation. The success of the effluent charge system depends on numerous factors, such as establishing a suitable rate system, effective management by the administrative entity, as well as full awareness of the current state of the receiving water body and the downstream water users.

Pollution charges refer to the charge or tax that is paid by the users for abusing the receiving water body, and is based on the "polluter pays" principle. The charges refer to the chemical quality of water bodies, and have been integral in controlling pollution, with charges varying for different types of pollutants, such as heavy metals, nutrients, organic pollutants (BOD, COD) and suspended solids, and also sometimes differentiated according to polluting sectors (e.g. mining, agriculture).

The purpose for implementing pollution charges is either as a means of raising funds, or as an incentive to change behaviours. The revenue is often used for water related costs (such as treatment, monitoring and enforcement), or for investment on environmental related infrastructure or initiatives. Revenue for pollution charges often remains at local level, with some countries also having environmental funds or foundations that ensure that the revenue is used appropriately.

In order for effluent and pollution charge systems to be effective, numerous procedures and systems need to be in place. The charge systems are more successful when:

- combined with regulation and the administrative bodies are functional and have the ability to assess appropriate charge structures,
- applied to stationary pollution sources,
- costs vary amongst polluters and monitoring systems are effective, and
- polluters and permit holders respond and pay charges, and have the potential and will to reduce emissions and to change their behaviour.

CASE STUDY: SUMMARY OF WASTE DISCHARGE SYSTEMS IN VARIOUS COUNTRIES

Waste water discharges have been implemented in various countries. Various methods are used, such as taking the vulnerability of the recipient water body into account (Mexico), the use of technologies to treat water can lead to rebates for water users (Czech Republic), or non-compliance fees have to be paid for discharges in several countries if the pollution concentration exceeds permitted levels (China, Colombia, Czech Republic). The number of measured pollutants varies from country to country, but often complex systems of pollution charges are used (Mexico). Whereas some schemes cover only direct discharges, others include indirect discharges. In most cases fees/charges are collected at the local level (Australia, China), others at river basin level (Brazil, Colombia) and in some instances nationally (Czech Republic, Mexico, Australia). The country case studies offered the following insights for the establishment of waste discharges:

- Waste water discharges are an established tool for managing water quality and, when appropriately implemented, have been a successful and efficient instrument.
- A useful strategy is to set water quality standards at a watershed level, to start with low charges and to increase the charges by trial and error in order to achieve the standards
- Sufficient institutional capacity is essential for the implementation of these charges
- Monitoring and enforcement is as important to supporting the market based instruments. Furthermore, other water users have proved to be useful in supporting these activities

CASE STUDY: POLLUTION CHARGES, THE NETHERLANDS

In the Netherlands, water pollution charges are imposed on any user that emits waste and pollutes into surface water, or into a water purification plant. The charges are enforced by public authorities and Water Boards, and are based on the quality and quantity of the pollutants. The water pollution charges are primarily a finance incentive, intended to finance to costs of water purification. Apart from being an important source of finance for water treatment plants, the water pollution charge also has had a positive effect on water quality and infrastructure investments. In the 20 years since its existence, both the quality of water and the number of treatment plants have risen considerably.

2.4 CORPORATE ENGAGEMENT, PARTNERSHIPS AND FUNDING

Corporate engagements and partnerships refer to the involvement of the private sector to improve water use efficiencies, water security and water resources management. This can be achieved through, amongst others, funding, delegated management under Public Private Partnerships, outsourcing of nonrevenue water reduction activities, and technical assistance contracts.

Multinational corporations and other large corporations recognise the importance of water resources, as a constant supply of clean water is necessary as an input for the production processes. There are however often tensions between communities and corporations, particularly large consumers of water and corporations that discharge effluent, resulting in a competition for the resource. As these corporations often have operations and supply chains across the world, and sometimes in developing countries, a new rubric of water stewardship and shared water risks management has emerged. Corporations also aim to reduce operational water dependencies and waste water impacts.

Many corporations realise that water risks cannot be tackled independently, but require engagement and cooperation of other stakeholders that are dependent or affected by catchments and river basins. As such, corporations are transitioning from being high water users to water resource management.

Local government is responsible for providing water to communities, ensuring environmental sustainability, and institutional and infrastructural development. However, when local government is seen as not providing adequate services, corporations may take on an array of partnerships with other companies, NGOs and public services to provide the required services. This has a positive impact on receiving communities especially in developing countries where public capacity and funding may be limited.

The table below portrays numerous areas for action which, when implemented, would enhance the prospects of equitable and sustainable outcomes from new corporate engagements and partnerships focused on water security, water quality, or water resource management.

Table 2-2 : Proposed areas for action to enhance prospects of equitable and sustainable outcomes from new corporate engagement on water

	Accountable institutions	Transparent information	Equitable and sustainable investment
Community & catchment	Further evolution of new partnership models for multi-stakeholder water resources management at catchment level, with each partner playing a role according to strengths, and with a share in the benefits of use guaranteed to local communities and ecosystems	Further development of participatory risk assessment approaches with more transparent presentation by MNCs of the stake they have, as a business, in engaging in catchment and community-scale projects	Improved mapping of the total contribution of private sector investment delineated by type of water resources management project and longer-term intervention; Experimentation with new corporate models and vehicles which allow them to invest in such a way that gives equal emphasis to interests of local stakeholders alongside those of investors
Basin to national	Enhanced transparency and legitimacy through participation of civil society, particularly local civil society, in partnerships such as the Water Resources Group that are seeking to support and influence water resources management at basin and national scale	Full public disclosure of analysis and advice provided to governments in low- and middle income countries by MNCs and their partners; Informed technical critique of the details of the relevant analytical frameworks and methodologies by the academic and research community	Reorientation of partnership models at basin to national level, with country governments taking the lead to frame investment needs; with support, coordinated by development partners, drawing equally on private sector, civil society and other stakeholder groups

Source: http://www.odi.org.uk/sites/odi.org.uk/files/odi-assets/publications-opinion-files/8190.pdf

CASE STUDY: NAANDI FOUNDATION WATER TREATMENT PLANT, INDIA

The Naandi Foundation, an Indian based non-governmental organisation, was founded in 2006. It bases its approach to poverty on using public-private partnerships to create sustainable development initiatives for delivering essential services, such as safe and clean drinking water, to poor communities. Naandi, together with Water Health India (WHI), a disinfection technology provider that is a subsidiary of Water Health International (WHI), approached Global Partnership on Output-Based Aid (GPOBA) to request funding to pilot rural village water schemes in coastal Andhra Pradesh that combined cost-effective water purification technology with a community-driven and performance-based approach.

The partnership combines cost-effective water purification technology with a community-driven and performance-based approach for drinking water treatment and provision. The output-based approach requires that tariffs paid by users for consumption to cover the costs of operation and maintenance, user-fee collection, and education and communication activities with key stakeholders and vulnerable groups. As of 2010, Naandi had 300 plants serving safe drinking water to 393,000 households.

CASE STUDY: COCA-COLA'S COMMUNITY WATER PARTNERSHIPS, CHINA'S TARIM RIVER BASIN

Coca-Cola is involved in a 'Community Water Partnerships', which constitute discrete philanthropic projects across four broad themes: 'education and awareness', 'access to water and sanitation', 'watershed protection' and 'water for productive use'. In China's Tarim River basin, Coca-Cola is undertaking a 'water resources management program that is improving water management and allocation, enhancing local capacity in ecological agriculture, and improving the management capacity of local decision-makers, stakeholders, and farmers in water resources management' in partner with an anonymous multilateral institution.

CASE STUDY: OUT-BASED AID FOR SUBSIDISED WATER AND SANITATION, MOROCCO

Launched in 2007, and implemented by a public-private partnership between two private sector incumbents in Tangier and Casablanca, Amendis-Tanger and Lyonnaise des Eaux de Casablanca (LYDEC), and the public utility, Regie Autonome de Distribution d'Eau et d'Electricite de Meknes (RADEM). The Government of Morocco also played an oversight and monitoring role. Funded by Global Partnership on Output-Based Aid (GPOBA) and aimed at connecting 11,300 households in poor peri-urban neighbourhoods of three cities in Morocco to piped water and sanitation services.

Operators pre-financed expansion of services and a pre-agreed output-based Aid subsidy was disbursed once outputs were achieved – 60% upon a functioning household connection and 40% upon 6 months of service, independently verified. The subsidy allowed for reduced connection fees, bridging the gap between capacity to pay and actual cost of connection.

3 Botswana

3.1 Water Laws and Policies

3.1.1 Waterworks Act of 1962

The Waterworks Act was "an Act to provide for the constitution of water authorities in townships, to confer certain duties and powers upon such water authorities, to provide for the acquisition of existing waterworks and to provide for matters incidental thereto"[5]. The water authority herein established one overarching duty:

- The water authority may for the purpose of securing an adequate supply of water to its constituents acquire the rights to take water, and construct, make, purchase, expropriate or take over and manage waterworks necessary for this purpose, as well as the premise and servitudes required for the waterworks

The function of the water authority is essentially to do everything necessary to ensure the supply of water to the people in its area of responsibility, within the bounds of the existing legal framework of Botswana and the relevant legislation guiding such processes.

The water authority has an obligation to pay adequate compensation to the owners of the waterworks that they acquire in the execution of their duty to provide water. The amount to be paid as compensation having had regard to the fair market value, the value of debts and liabilities transferred to the water authority and an amount that the Board of Assessments deems to be the reasonable capital value of the net maintained income.

3.1.2 Water Act of 1968

The Water Act's (1968) primary objective is the control of water resources use and presents an institutional framework for water allocation. The Water Act specifies conditions for water rights for industrial, mining, power generation and forestry use. According to this Act, water rights are needed to abstract, store, dam and divert water and indicate the maximum amount and period of abstraction.[6] This allocation function is in itself an economic tool, though not necessary through a price linked mechanism. The ownership of public water rests with the state.

Botswana prioritises domestic use of water. Everyone has the right to water for basic needs and livestock. A water right is required to extract water. However possession of a water right is not a warranty that the amount of water is always available. The right can be revoked if current water demands are not met or if the quota is not utilised within 3 years. This makes reallocation and redistribution of water possible in the need ever arises.

The other relevant document for water allocation is the draft Botswana National Water Conservation Policy (2004). The policy prioritises different water uses as follows: water for human consumption (urban and domestic use has top priority), followed by water for production, environment, agriculture and livestock. The recent water sector reform

[5] Waterworks Act of 1962, Government of the Republic of Botswana, 1962.

[6] ORASECOM, 2014. National Action Plan for the Orange-Senqu River Basin in Botswana. Technical Report 039/2014

project implemented far reaching institutional reforms, and prepared new water legislation and tariffs. The Department of Water Affairs developed a draft National Water and Wastewater Policy for the country in 2010, which is firmly based on IWRM principles. An Integrated Water Resources Management and Water Efficiency Plan was concluded in May 2013.[6]

3.1.3 Boreholes Act

The Boreholes Act gives the Department of Geological Surveys (DGS) the authority to issue permission for borehole developments. DGS is then mandated to keep a borehole registry for the country and is responsible for monitoring, inspecting, water sampling and pump testing where necessary.

3.1.4 Water Utilities Act

The Water Utilities Corporation (WUC) is given responsibility for bulk water supply in water works areas where it is given authority. WUC will take necessary measures to ensure adequate water supply in areas of operation, including the setting of user charges to ensure the recovery of costs. WUC operates commercially, thereby necessitating full cost recovery from users.

3.1.5 Draft Water Bill

A Draft Water Bill has been produced as part of the ongoing water sector reform in the country and will, once promulgated as an Act, replace the 1968 Water Act. The new Draft Water Bill is based on the National Water and Wastewater Policy and will, once enacted, replace the 1968 Water Act, the Borehole Act and the Water Works Act. The proposed new Act will bring the country's legislation in line with IWRM principle.[7]

This Act will also establish a new water resources board with key decision-making functions in water resources management, allocation and development of policies related to water resources. National water planning will be supported by formal mechanisms for ensuring cross-sectoral consultation and inputs from all sectors whose interests must be taken into account and this function will be the responsibility of the proposed water resources board. The technical functions of this body will be carried out by a division of the Department of Water Affairs (DWA), which will act as the executive arm of the water resources board. Under the new legislative framework, the DWA will no longer have any water delivery functions, but will be responsible for assessing, national planning, developing and managing water resources for short-, medium- and long-term purposes, while the Water Utilities Corporation takes on the responsibility of a water supply authority (including wastewater operations) for all cities, townships and villages.[8]

[7] ORASECOM, 2014. National Action Plan for the Orange-Senqu River Basin in Botswana. Technical Report 039/2014
[8] ibid

3.1.6 Water Management Institutions

There are various water management institutions that have varying functions in Lesotho. An overview of the relevant water sector institutions and their respective responsibilities is provided in the table below

Table 3-1: Water Management Institutions in Botswana[9]

Institution	Responsibility
Ministry of Minerals, Energy & Water Affairs (MMEWA)	Formulates, coordinates and implements national policies and programmes for water resources. Important inter-ministerial planning and liaison.
Botswana Energy & Water Regulatory Authority	Recommends tariff amendments and promotes operational Efficiency
Department of Water Affairs (DWA)	DWA of the MMEWA leads the process of planning for surface water management and development, as well as information and data management.
Water Apportionment Board (WAB)	WAB falls under the DWA, and is responsible for reviewing and approval of applications for water abstraction.
Water Utilities Corporation (WUC)	Is responsible for water supply and delivery functions together with other institutions (DWA, WAB, etc.); also mandated for wastewater resources management countrywide and for developing the nation's water resources.
Water Resources Council (WRC)	Council is to be established via the new Water Act and will have a range of advisory functions, but importantly includes hydrological and hydro-geological investigations and the coordination and direction of the preparation of a National Water Resources Strategy.
Water Management Area Bodies	To be established via the new Water Act, Water Management Area (WMA) bodies.
District Council	Is an elected body with assigned responsibilities for the provision of social services such as water, health and education.
Village Water Development Committees	Advises residents regarding water resource management, promotes community participation and supports the development of the national water resource strategy.
Kgotlas	Localises participation and dispute resolution.

9 ibid

3.2 WATER TRANSFERS FROM NEIGHBOURING COUNTRIES

Botswana's surface water resources are shared with neighbouring countries, namely South Africa, Namibia, and Zimbabwe, with some of the watercourses also presenting as borders between the countries. Due to the varied spatial distribution of water relative to populations, within Botswana and neighbouring countries, it is inevitable that water transfers occur, and will continue at a larger rate with the predicted impacts of climate change.

According to Botswana's 2006 National Water Master Plan Review, it is inevitable that the use of shared water resources will increase, with annual transfers at the Chobe/Zambezi River predicted to be between 0.5 million and 1.7 billion m^3. Only modest abstractions of approximately 52.5 million m^3 are predicted from the Nata River, while abstractions from the Okavango Delta in the north are not recommended.

In the south, the Limpopo River is mostly abstracted by South Africa and Mozambique, with Botswana mostly abstracting 7.9 million m^3 per annum of water from the Molatedi Dam on the Marico River in the North West Province of South Africa. The Molopo-Nossob system in the Kalahari district of southern Botswana fall under the Orange River basin, and thus Botswana is part of the Orange-Senqu River Basin Commission (ORASECOM). In addition, the Government of Botswana recently completed the Middlepits cross-border water transfer scheme, which will transfer water between Botswana and South Africa.

3.3 IMPLEMENTATION OF ECONOMIC INSTRUMENTS

Botswana does not have a formal policy or legislation that explicitly stipulates a framework for funding water resources management. However, the Water Utilities Corporation Act, National Water Master Plan Review (NWMPR), National Development Plans (NDPs) and other government documents mention Botswana's water tariffs and their implementation. The Water Act specifies that self-providers have to develop, operate and finance their own water supply sources after water abstraction rights have been obtained from the Water Apportionment Board (WAB).

3.4 MARKET BASED APPROACHES

In Botswana the Water Act controls the use of water resources, presents an institutional framework for water allocation, and specifies conditions for water rights for different sectors. Although water rights are provided to water users, there is no public record of water markets, water trading, or water banking.

Water pricing, referred to as water tariffs, is applied in the country, and will be explored further in the section below.

3.4.1 Water Pricing: Water Tariff Policy

One of the outputs of the water sector reforms is a new water tariff policy that guides water pricing and the role of stakeholders in funding for water resources management in the country. During NDP 9, DWA undertook a study assessing affordability and Botswana's tariffs. The study would come up with a water tariff policy but the results are not available. Prior to the reforms, the principles behind water pricing were:

- Water users should pay the full costs in urban areas (capital and recurrent costs – effectively the areas supplied by the WUC
- In rural areas, water users should pay for the recurrent costs, and an attempt should be made to recover some of the capital costs (old DWA), and
- Water users, who rely on standpipes, do not pay in rural areas or pay a very low flat rate in urban areas. They are subsidised by high water users in their areas.

The tariffs therefore varied for urban centres, large villages and smaller settlements. The draft Water and Wastewater Policy of 2012 fully recognizes the need for an appropriate structure for cost recovery in the water sector. It therefore emphasizes a uniform national tariff structure for domestic consumption and mechanisms that would ensure social equity and affordability. The draft policy also mentions implementation of the polluter pays principle (PPP) where the fees and charges reflect the impact and cost of pollution. The current water tariffs are to some extent premised on the World Banks tariff policy recommendations (World Bank, 2010). These recommendations are summarized in Table 3-2 below.

Table 3-2: Proposed Policy Recommendations for Botswana's Water Tariffs Policy

Focus area	Proposed policy recommendation
1. Basis for tariffs: Tariffs set to recover all prudently incurred costs that are needed for water and wastewater service provision	To include costs requiring the use of cash and other legal requirements when determining costs to be covered through tariffs and subsidies. Depreciation to be excluded from tariffs
2. Uniform tariff structures	Develop uniform national tariffs with varying tariff levels for different services
3. Increasing block tariff	To be maintained. However, before the blocks are determined, a 6-10m^3 block should be considered for domestic users, and also consider a different block structure for commercial and industrial users.
4. Minimum charge or usage	This should be maintained
5. Wastewater tariffs	To develop a wastewater charge for wastewater customers connected to a central wastewater treatment system.
6. Drought management tariff	Establish and implement the drought management tariff to cut down water usage in severe drought conditions. However, the tariff should not be applied countrywide.
7. Extraction fee	Need to review the feasibility of applying a raw water abstraction fee in the country.
8. Government subsidies	Government operating subsidies to be maintained
9. Tariff coverage	Cover O&M costs while other financing costs incurred directly by WUC would be funded through a retail tariff.
10. Capital costs	Divide the capital budget into major and minor capital projects. Major capital costs to be incurred by government while WUC covers the minor ones. Need to establish the criteria for minor and major projects.
11. Surpluses	A 25% dividend of cash surplus WUC pays to government will be maintained
12. Customer service in remote areas	Implement cost effective technology in these areas to enhance customer services and payment options.

3.4.2 Water Pricing: Charging for Water Supply

Botswana uses water tariffs, user charges and public funds for water resource management in settlements. The private sector largely finances its own water supplies outside settlements. Prior to the Water Sector Reforms (WSR), DWA was responsible for water service provision in major villages and therefore it used a rising block tariff to ensure that the water users pay for the water received from the service provider. These tariffs were meant to at least cover the cost of operating and maintaining water systems in major villages. The NSC villages were charged almost 50% more than other major villages because of the need to pay part of the high supply costs of the NSC. With effect from April 2013, DWA no longer supplies water to any village in Botswana. However, the WAB in DWA charges consumers for application of rights to abstract water from surface and groundwater resources (but not for the actual amount abstracted).

WUC also applies a rising block tariff with the objective of recovering its capital and recurrent expenditures. WUC's tariff proposals need to be approved by the Minister of MMEWR, although tariffs are not regularly reviewed and amended. The current tariffs were introduced in June 2013 and are based on full recovery of the marginal supply costs. The new tariff structure (Table 3-3) applies to WUC's management centres under the user categories of government, domestic, industrial and commercial consumers. In all areas, government is charged a minimum of BWP22.40 for water usage per month while all other sectors are charged a minimum of BWP11.20.

Table 3-3: WUC Water Tariffs Structure

Domestic, commercial and industrial						
LA	Min (BWP)	0-5	>5-15	>15-25	>25-40	>40
1	11.2	1.5	4	9	12.5	18
2	11.2	2	8	11	16.9	20.85
3	11.2	2	6	11	16.9	18
4	11.2	2	6	11	16.9	18
5	11.2	1.5	4	9	12.5	18
6	11.2	1.5	3	7	10	15
7	11.2	2	4	9	10	15
8	11.2	1.5	4	7	10	15
DWA						
1	11.2	1.5	4	9	12.5	15
2	11.2	2	6	11	16.9	18
Government						
12	22.4	6	16	20.9	33	41

Domestic, commercial and industrial						
OLD WUC	Min (BWP)	0-5	>5-15	>15-25	>25-40	>40
7	11.2	2	8	11	16.9	20.85
8	11.2	2	5	7	10	15
9	11.2	2	8	11	16.9	20.85
10	11.2	2	5	7	10	15
11	11.2	2	4	7	10	15
DWA						
12	22.4	6	16	20.9	33	41
Old WUC						
13	22.4	6	16	20.9	33	41
14	22.4	6	16	20.9	33	41
15	22.4	6	16	20.9	33	41
16	22.4	6	16	20.9	33	41
17	22.4	6	16	20.9	33	41

District Councils also charged consumers for the use of water (for private connections only) but the billing process was fragmented and records were hardly kept.

According to the Department of Environmental Affairs' Policy brief on Botswana's Water Management, the WUC charges BWP 3.65 per m^3 for raw water, and BWP 12.50 per m^3 for potable water and over BWP 12 per m^3 in Gaborone. In addition, the agricultural sector creates the lowest value added and employment creation per m^3 of water, while the service sector offers the highest. Therefore, economic diversification should be focused on the service sector, and intensive water efficiency measures should be introduced in the agricultural sector. Overall, water efficiency in Botswana has increased significantly in the last few years, and is currently higher that Namibia and South Africa.

3.4.3 Water Pricing: Waste Water Treatment

According to the Department of Environmental Affairs' Policy brief on Botswana's Water Management, the water supply costs and amount charged per m^3 are BWP 2-3 per m^3 of outflow for wastewater treatment costs. The WUC charges BWP 3.65 per m3 for raw water, and BWP 12.50 per m^3 for potable water and over BWP 12 per m^3 in Gaborone. This cost difference suggests that it is possible to supply re-usable water at a lower cost than that provided by the WUC for potable water, which would lead to savings for Botswana's water users. Users that are vital to the economy could save millions if Pula, thus increasing the likelihood of job creation. The cost saving will also assist in incentivising the investment into advanced affluent treatment facilities and technologies, which will further improve efficiencies and increase water that is available for resale.

The 1991 BNWMP and the 2003 National Master Plan for Sanitation and Wastewater (NMPSWW) recognise the growing amount of wastewater that needs to treated, but is available for reuse or recycling. The NMPSWW has set the ambitious target of 96% of reuse of treated effluent by the years 2030. The 2006 Review of the BNWMP concludes that wastewater re-use needs to be accelerated, targeting sectors that do not require potable water. To encourage re-use and recycling, wastewater has been integrated into water accounts through three separate accounts:

- Wastewater stock accounts - these accounts record the amount of wastewater stored at the beginning and the end of each year. This basically equals the storage capacity of wastewater treatment works (WWTW);
- Wastewater supply accounts - these accounts trace the origin of wastewater flows into WWTW;
- Wastewater use accounts - these accounts show what happens to effluent entering the WWTW. Four destinations are distinguished, namely losses in the treatment process (as low as 5% for rotational filter technology and as high as 50% for pond treatment), re-use of treated effluent, recycling of treated effluent and discharge into the environment. At present production losses and discharge are most significant. There is no recycling and re-use is less than 20% of the inflows.[10]

3.4.4 Payment of Environmental Services

Botswana has numerous examples of successful payment of environmental services (PES) practices, such as local communities residing within catchment areas are incentivised to prevent soil erosion and pollution of resources for the benefit of the rivers, dams, ecosystems and users downstream.

The rising cost of water supply, and thus the high water tariffs, would affect economic growth and the competitiveness of the country. Regionally, Botswana has among the highest water tariffs, which affect the rate of investments in the country. National Water Accounts have thus been created and used as system of water resource accounting which is aimed at taking accurate stock of available water resources, and ensuring the efficiency of water allocation and water use.

[10] DEA, 2006. Policy Brief on Botswana's Water Management

3.4.4.1 National Water Accounts

In order to integrate an economic dimension into the management of natural resources, the preparation of National Water Accounts presents an integral stage. Supported by the UN Statistical Division, this system of water resource accounting has the following objectives:

- To monitor resources and developing a standardised system for data collection and international comparison
- Linking water availability and its use, contributing to water allocation efficiency and improving the water efficiency of different sectors and users
- Understanding the impacts of water management on all different users in the system
- Obtaining value from investment in water infrastructure through high efficiency
- Getting various stakeholders involved in decision making

The water accounts are a combination of stock accounts, that show how much water is available at the start and end of each year as well the inflows and outflows that have occurred during the year, and use accounts that show water use by different sectors, sources or suppliers. Water stock and water use accounts are expressed differently, with physical accounts being expressed in cubic metres, while monetary accounts are expressed in currencies (i.e. Pula or US Dollar).

Over the years, Botswana has developed three different types of water use accounts, namely water use accounts by source, water provider, and economic activity or sector. Water use figures over a number of years have had numerous results, and the main findings are that:

- Although Botswana has increased its water-use efficiency, the overall water efficiency has not improved, thus having an impact on economic growth especially in the irrigation and mining sectors;
- There is high variability in GDP contributions per unit water across the sectors. For example, agriculture has high water consumption but contributes relatively little to GDP or employment, while the service sector consumes little water but contributes significantly to GDP and formal employment[11]; and
- In future, sectoral based water efficiency should be considered in designing strategies for economic growth

3.4.4.2 Okavango Delta

The Okavango Delta is an alluvial fan at the base of the Okavango River Basin, which is shared between three countries, namely Angola, Namibia, and Botswana. The Delta is often referred to as the "jewel of the Kalahari" as it has diverse biological resources, multifaceted hydrological and ecological resources, and houses a population of approximately 124 000. The Delta is one of the largest declared Ramsar sites, with an area of about 55 324 km^2.

Botswana is highly impacted by upstream water users and has a thus has a vested interest in maintaining the status of the river in order to protest the socio-economic status and maintain livelihood of the communities in surrounding the Delta. Botswana is also highly dependent on the Delta for economic growth due to the scale of the tourism sector in

[11] WAVES: Available at: http://www.wavespartnership.org/en/botswana-moves-ahead-water-accounts

the Delta. In line with the principles outlined in its National Vision 2016, the Government of Botswana through funding from the World Conservation Union (IUCN), Danish International Development Assistance (DANIDA), German Development Corporation (DED) and Swedish International Development (Corporation) Assistance (Sida), developed the Okavango Delta Management Plan (ODMP), which strives for the sustainable use of natural resources through IWRM, ecosystem centralisation, and integrated planning.

A study on ecosystem valuation of the Delta's resources was also included in the ODMP. The Strategic Action Programme (SAP) thus also includes a component on PES options of a benefit-sharing approach. For examples, an environmental flows assessment eliminates all physical and political boundaries of the river basin, and treats the system in an integrated manner, with the main goal being to determine how changes to the system will affect the economy and livelihoods of communities.

3.4.5 Effluent and Pollution Charges

At present, Botswana also has no air quality standards, numerical noise standards nor waste disposal standards. It is expected that WHO standards will be used as a reference until local standards are adopted. Non-numerical waste disposal regulations are found in the Waste Management Act of 1998 and in the Guidelines for Disposal of Waste by Landfill.[12] Recommended effluent discharge standards for rivers in Botswana are also provided, although penalties and compliance enforcement are not evident. There is also no record of effluent and pollution charge systems in the country.

3.4.6 Corporate Engagements, Partnerships and Funding

Botswana is supported by numerous institutions, both national and international, which back the country in meeting its developing needs and ensure that the population is provided with clean water, and that healthy water resources are maintained.

3.4.6.1 DWA, SIWI and Sida

Botswana's Department of Water Affairs, in partnership with the Stockholm International Water Institute (SIWI) are implementing a joint two-year capacity building initiative that is aimed at supporting the restructuring Botswana water sector. The initiative is jointly funded by the Swedish International Development Cooperation (Sida) and the Government of Botswana.

As Botswana has recently reviewed its water sector master plan, and has restricted the water sector, SIWI, an internationally renowned policy institute, assisted the country in capacity building for a two year period ending in December 2013. The aim of this training was to assist the various government institutions with their new roles and responsibilities through the transfer of knowledge; the DWA which will now have exclusive mandate over water resources policy and management, and the WUC which will be responsible for water supply and wastewater treatment for the entire country.

[12] SAIEA, Available at: http://www.saiea.com/dbsa_book/Botswana.pdf

3.4.6.2 Government Subsidies

In order to meet the basic needs and ensure that the poor can afford water, the rates of the first 5 m^3 consumed per month are low and subsidised by higher charges in the upper use bands. Government subsidises water use in urban and rural settlements both directly and indirectly. In rural areas, government has traditionally paid for water infrastructure and part of the recurrent expenditures. There are no such subsidies in urban areas. However, indirect subsidies are provided in urban and rural areas through the high tariffs paid by government. Without the 'super' tariff for government, domestic users and the private sector would have had to pay more for water.

For the self-providers, there are no comprehensive subsidies. They pay the user costs but do not pay a 'water rent'. Livestock water costs have been subsidised for several decades through a various financial support programmes. The subsidies range up to 60% of the borehole costs for groups of livestock owners.

3.4.6.3 WAVES

In 2012, Botswana joined the Wealth Accounting and the Valuation of Ecosystem Services (WAVES) initiative along with Colombia, Costa Rica, Madagascar and the Philippines. The WAVES Global Partnership obtains funding from the Government of Switzerland, and is aimed at supporting sustainable development in countries by ensuring that the national accounts that are used to measure, monitor and plan for economic growth include the hidden value provided by natural resources. Other donors to WAVES include Norway, United Kingdom, France, Australia, Canada, Germany Denmark, The Netherlands and the European Commission.

Since inception, WAVES-Botswana has updated its water accounts from the 1990s to better assess the availability, uses, and economic contribution of water resources. The water accounts provide a framework where the country can transform data into valuable and usable information that will aid in decision making. Preliminary findings for Botswana show that 45% of the country's water resources are utilised by the agricultural sector, although it only contributes 2% towards GDP. While this is not recommended, the rural nature of the country results in a high reliance in agriculture for rural livelihood, and is thus essential for sustained growth.

3.5 Evaluation, Synthesis and Recommendation

Although Botswana is considered a water scarce country, the water sector has continuously met its water demand needs for its various economic sectors through a supply-oriented environment. Water rights have in the past been awarded to a few water service providers, with other private companies and individuals providing and supplying their own personal water needs. Therefore, for this private and public based system to be successful, both public and private investments in water infrastructure have to be extremely high.

However, as the country adopts a more balanced and shared supply and demand model, the enabling environment need to be strengthened, and there needs to be a shift from demand and supply driven approaches, to measures that promote water efficiency.

3.5.1 Policy Gaps

Gaps in the current policy environment need to be filled, and existing measure need to be strengthened. Water policies should prioritise allocative efficiency; for example the establishment of policies that support market based approaches and incentives for increased water efficiency. Policies should provide an effective environment and framework for holders of water rights.

Botswana has traditionally used property rights and water charges as major approaches to ensure adequate supply through various pieces of legislation. Under the current legislative environment, concerns exist over water rights in arable land, monitoring of water use rights, illegal water allocations and abstractions, and the efficiency of water service providers. There is therefore a need to strengthen the regulation and monitoring environment of water right holders and water service providers.

3.5.2 Market-based Approaches

An introduction of individual user water rights, supported by a favourable policy environment and frameworks will allow for market based approaches such as water markets, water trading and water banking to flourish. This may also assist other users, such as the agricultural sector, to be more incentivised to use water efficiently so that they can benefit from water right transfers and trading.

Water markets allow full cost recovery, and also a decentralisation of water management issues to more local catchment level. In addition to the internationally prevalent formalised water markets, informal and local water markets are also common and can be implemented at a local level.

3.5.3 Water Charge System

Due to water scarcity and spatial distribution, Botswana's water tariffs are among the highest in the region. This is also due to high development costs, water supply monopolies, cost recovery methods, and the overlooking of various IWRM options that are cheaper and more sustainable that the expansion of water supply infrastructure.

Cheaper options for ensuring water provision include:

- Water demand management by water providers (such as the reduction of water losses) and consumers (water efficiency by government, corporate and domestic users)
- Increasing the reuse and recycling of treated wastewater

It is also not always possible to obtain accurate and relevant cost and revenue data from water service providers, and it is therefore difficult to assess the reasonability of the water tariff structure for urban and rural users. Various measure such as introducing competition amongst water service providers, and ensuring transparency in reporting practices, could ensure water efficiency, fair tariff structures, and the reduction of losses.

3.5.4 Water Reuse and Waste Water Treatment

Waste water/effluent constitutes 16% of all the water resources of which only 20% is re-used. This represents an opportunity in agricultural production through irrigation. Additionally, despite efforts in the sector to promote conservation of scarce water resources, water losses and wastage continue with limited abatement. An estimated 46% of purified water is not accounted for. At such a rate of water-losses, water efficiency levels need to be increased drastically. Most villages are at the peak of their resource availability with water losses factored in. A 46% increase in water availability may be achieved by either developing more water resources (assuming infinite availability) or reducing water losses[13].

There is a number of potential revenue generating options available to government that would reduce the reliance of Botswana on subsidised water. The first of these could be a water resource rent to be paid by the private sector in cases where they have their own water supply infrastructure. Such a 'rent' is currently proposed in the draft Water Policy. A waste water treatment tariff can also be established in settlements with treatment facilities. This additional revenue can be used to reduce the level of subsidization to those users who can afford to pay the full cost of their water supply, as well as the development of storm water and rainwater harvesting infrastructure to ensure increased water security in the country.

In addition to revenue generation and savings options, Botswana can also implement a water demand management strategy. Some of the possible areas of focus that the government could start off with are the following:

- Re-use and recycling of treated wastewater. The amount of wastewater is in the order of 25 to 35 Mm^3 and re-use is very low (10%),
- Reduction of water losses, which are currently around 25%. The WUC target is 15%,
- Increasing water use efficiency of sectors, including irrigation, and
- Use of saline water for mining, construction and other sectors that do not require potable water

[13] Botswana Water Sector Policy Brief 2012: Reflecting on the Challenges of Attaining a Green Economy for Botswana.

This could further strengthen the attempts to augment water availability, while simultaneously helping to keep water costs from rising too rapidly.

3.5.5 Effluent and Pollution Charges

Botswana currently has no penalty system for individuals that do not comply with pollution and effluent discharge systems. An introduction of this system will ensure that water users are incentive not to pollute on water resources, and if they do the water sector institutions should be able to recover the costs for clearing up the pollution. This will only be successful if the policy environment is supported by good capacity for monitoring and compliance enforcement.

3.5.6 Corporate Engagements, Partnerships and Funding

Botswana's water sector has a fairly unique combination of government and private sector investment in the water supply infrastructure. Though the actual ownership of the water rests with the government, no rent is paid by private sector users of water because they pay and own the infrastructure that delivers the water where they need it. This is in keeping with the almost universally accepted principle of full cost recovery, as opposed to economic value charge setting. That which is unique about Botswana is the extent to which the private sector is involved in the supply of its own water. The general situation is that government financed water supply to settlements while the private sector mostly financed water supplies outside settlements. The latter included water supplies for mines, tourism operations and livestock farming, while government financed water supply systems, large dams, well fields and water transfer schemes.

In the past economic growth has not been severely constrained by water resources (other than by recurrent droughts), but this could change as development of new water supplies are limited and very costly and increasing competition for water can be expected between sectors such as (large scale) irrigation, mining, and domestic use. Finance requirements are increasing in Botswana due to the need for long distance water transfer schemes (NSC 1 & 2, and water transfers from Chobe-Zambezi River, and transfers from well fields). Unfortunately, the government development budget has been shrinking over the last few years (in real terms) due to lower government revenues, greater emphasis on public asset maintenance and rising recurrent expenditures.

This calls for better targeting of government expenditures in the water sector and greater investments from the private sector. With respect to government expenditures, water subsidies through the extra high tariff for government need to be reviewed. It will be difficult for government to sustain the current level of subsidies and more targeted subsidies are needed to ensure that water is affordable for the poor instead of using a blanket subsidy approach. Inevitably, this means that different avenues for funding need to be obtained (such as increased corporate funding and investment, and public-private partnerships), or water tariffs for households and businesses must increase.

4 Lesotho

4.1 Water Laws and Policies

4.1.1 Water Resources Act no 22 of 1978

The Water Resources Act of 1978 was enacted to provide for the "use and control, the protection and conservation of water resources"[14] in Lesotho. The 1978 Act prioritised domestic water use (defined as water for personal and household needs, for the watering of domestic animals, for agricultural production on a householder's residential land not exceeding an area of two hectares) and the supply of population centres above all other uses. In addition, domestic water use did not require a water use permit.

For those water uses that required permits, the Act also explicitly forbade the transfer of permits, except in the case of "an approved change in the occupancy of land"[15], thereby effective disallowing any water trading through a market system between water users. Water permits could only be granted for a period not exceeding 5 years, with the option of renewal for no longer than 3 years. Water use permits could also be revoked, in whole or in part, if the user did not use the water for a period of one year.

The 1978 Act gave the minister the power to vary or suspend the amount of water used for any period (s)he may deem necessary whenever water from any sources were deemed insufficient or likely to be insufficient through drought or other causes. The minister was also given the power to direct any person with a supply of water in excess of their domestic purposes during a water emergency to make the excess water available as per the minister's specifications.

Pollution is criminalised by the 1978 Act. Those who "willfully or through negligence pollute or foul any water so as to render it harmful to man, beast, fish of vegetation"[16] are deemed guilty of an offence and liable to a fine of five hundred rand and two years in prison. Those found to be responsible for the pollution or fouling can also be required to take adequate measures to prevent the pollution or fouling. That failing, they may be liable (on conviction) to a fine not exceeding R20 a day until the matter is rectified.

Conspicuously absent from the Act is the power to levy any charges or tariffs on water users for any kind of water use, for the purpose of developing water resources infrastructure or the management of water resources. This was in effect a subsidy to water users, albeit difficult to quantify given the unknown amount dedicated to the various elements of water management in Lesotho over the period of time that the Act was in effect.

14 Water Resources Act no 22 of 1978, Kingdom of Lesotho Government, 1978.
15 ibid
16 ibid

4.1.2 Lesotho Highlands Water Project Treaty

The purpose of the Treaty on the Lesotho Highlands Water Project (to be referred to simply as the treaty) is to "provide for the establishment, implementation, operation and maintenance of the project"[17]. The purpose of the project itself was to enhance the use of the Orange-Senqu River by storing, regulating, diverting and controlling its flow in order to deliver water to South Africa and generate hydro-electric power in the Kingdom of Lesotho.

The project has as one of its annexures a schedule of the minimum volumes of water to be delivered to South Africa from the project and each stage of the project is intended to be built in time to ensure that those minimum delivery volumes are met. The Lesotho Highlands Development Authority (LHDA) must develop a long term cost plan, a detailed cost plan for the upcoming financial year, a long and short term funding plan, a loan repayment schedule, a long term cash flow projection and cash flow projection for the financial year ahead separately for items relating to the delivery of water to South Africa and for those relating to the generation of hydro-power in Lesotho. These then get used in the process of determining the amount of money to be paid into the project by South Africa and Lesotho over the period of development and use of the project.

The LHDA also then established separate bank accounts into which the two countries are to pay in their portions of the costs as per the various schedules determined by LHDA. The Trans-Caledon Tunnel Authority (TCTA) plays this role on the South African side. The function of the LHDA and TCTA, including budgets, implementation, operations and maintenance plans etc., are overseen by the Joint Permanent Technical Commission, the cost of which is shared between Lesotho and South Africa in accordance with the expenditure associated with each country's delegation.

The treaty states that the LHDA and TCTA have the obligation to raise money by way of loans, credit facilities or other borrowings as per the requirements of the project for its implementation, operation and maintenance, with the prior consent of the relevant government. The governments also have to give the guarantees required by the lenders in cases where the consent to the debt being taken by the LHDA and TCTA.

In addition to the implementation, operation and maintenance costs related payments that the governments make to the LHDA and TCTA, the South African government has to pay royalties to the Lesotho government. The royalties are the equivalent of 56% of the net benefit computed in accordance with the procedures set out in the Royalty manual. The net benefit is essentially the difference between:

- The present value of the cost of the least cost scheme in Lesotho Highlands Water Project Initial Development and the Follow-on Orange Vaal Transfer Scheme, and
- The present value of the cost of the Least Cost Orange Vaal Transfer Scheme

This net benefit comprises an investment element, electricity costs difference related to pumping and the remaining O&M costs differences. Lesotho has these royalties paid to them in the form of a fixed component (relating to the investment element), a variable component (relating to the electricity element) and another variable component relating to the rest of the O&M costs. The payments are made on a monthly basis.

[17] Treaty on the Lesotho Highlands Water Project, 1986.

4.1.3 Water and Sanitation Policy 2007

The foreword of the water and sanitation policy states the following: "The Government of Lesotho has the duty to ensure that this resource is used in a sustainable manner and to the benefit of all users, and the responsibility to provide security of access to water sources and improved sanitation"[18]. The second (2007) version of this policy was produced to provide direction in dealing with water resources in pursuit of the above stated responsibility. The commitment of the government is to "ensure effective and efficient management and development of this resource in order to maximize socio-economic benefits"[19]. The first Water Resources Management Policy was adopted in 1999 and was set out to be updated every five years.

It is important to state at this stage that one of the four objectives of the water and sanitation policy is "to promote adequate and sustainable supply of potable water and sanitation services to all of the population of Lesotho"[20]. This takes us out of the realm of raw water in large part, however, given the fact that a lot of what becomes potable water in Lesotho is harvested directly from rivers or through boreholes, it is an important policy to consider in the paper.

The policy has eight guiding principles that underpin the strategies outlined within it for the different areas of focus. One of those principles that has a bearing on the economic tools used in Lesotho states the following: "Water has an economic value and should be recognized as an economic good. Managing water as an economic good is an important way of balancing its competing uses and achieving its equitable, efficient and sustainable utilization while encouraging its conservation and protection"[21]. This recognition of the economic value of water opens the door for setting water charges within Lesotho where necessary and appropriate.

The policy goes further when deal with the issue of water resources management. As one of its eleven strategies, the policy says that it will aim to "introduce water use charges taking into account the economic value of water without however compromising the ability of poor communities to utilize water for domestic and other productive purposes"[22]. This requires a balance that nearly all water charge setting processes seek to achieve within economically poor nations.

The water and sanitation policy, though short, sets out important objectives and strategies needed to ensure the sustainability of a water sector that contributes to the equitable development of Lesotho's economy.

[18] Lesotho Water and Sanitation Policy, Ministry of Natural Resources, Kingdom of Lesotho Government, 2007
[19] ibid
[20] ibid
[21] ibid
[22] ibid

4.1.4 Environment Act no 10 of 2008

The Environment Act of 2008 was enacted to "make provision for the protection and management of the environment and conservation and sustainable utilization of natural resources of Lesotho and for connected matters"[23].

An important principle of the Environment Act is that "the cost(s) of environment abuse or impairment are borne by the polluter"[24]. The Act is therefore guided by the polluter-pays principle, therein defined as follows: "polluter-pays principle means that the cost of cleaning up a segment of the environment damaged by pollution, compensating victims of pollution, cost of beneficial uses lost as a result of an act of pollution and other costs that are connected or incidental to the foregoing, is to be paid or borne by the person convicted of pollution under this Act and other applicable laws"[25].

Two main things stand out:

- The polluter-pays principle in Lesotho only really applies to identifiable point source pollution of water by individuals or entities and has no strategy for dealing with diffuse or non-point sources pollution
- The programmatic funding on pollution mitigation is not funded by beneficiaries of the mitigation process or polluters in cases where they are not identified

The execution of the environmental management plans required by the Act undoubtedly has costs associated with it. However, no provision is made in the Act for the funding of these plans through the charging of tariffs to beneficiaries of their outcomes. In cases where environmental impact studies are required for the execution of particular projects, the developer of the project pays for the study. This leaves activities such as the on-going monitoring of the environment and its constituent elements (water being one of them) without a revenue stream from users and beneficiaries.

In the place of user charges for pollution control and mitigation, the Environment Act has in place various combinations of fines (usually of no less than M5 000) and prison terms for those who fail to comply with the provisions of the Act.

A system of licences for various activities is provided for in the Act, including a pollution licence. The Act makes provision for the charging of a fee for the application for a pollution licence, which is only valid for a period of one year from the date of issue, to be determined in accordance with the polluter-pays principle. The Act further states that the "person contributing the greater amount of pollution shall bear the largest burden in paying for cleaning the environment"[26], though the Act does not stipulate how the costs are to be determined.

Section 56 of the Environment Act gives the Director the power to recover from the owner of the "pollutant which is spilled, all costs and expenses incurred by the department as a result of" any efforts to clean-up, remove, prevent, eliminate, ameliorate, dispose of or deal with the pollutant. Section 113 further gives the minister the power to prescribe fees and levies to be charged under the Environment Act and does not limit which activities can and cannot be charged for.

23 Environment Act No. 10 of 2008, Kingdom of Lesotho Government, 2008.
24 ibid
25 ibid
26 Environment Act No. 10 of 2008, Kingdom of Lesotho Government, 2008.

4.1.5 Lesotho Water Act no 15 of 2008

The Water Act of 2008 was promulgated to "provide for the management, protection, conservation, development and sustainable utilisation of water resources"[27].

This Act, like the 1978 Water Resources Act gives the highest priority to water for domestic use (here defined as water use for personal and household needs). Significantly, the Water Act 2008 does not have a user-pays principle as one of its pillars, though it does list the polluter-pays principle.

The Act gives the Minister the power to designate catchment areas for the management and protection of water resources, and the catchment area becomes the responsibility of a local authority (authorities established in accordance with the Local Government Act, 1997). One of the functions of the local authority is the "promotion of community self-reliance, including the recovery of costs for the operation and maintenance of waterworks"[28].

All water use can only take place if the user has a water use permit. To get a water use, a user must apply to the director and pay a non-refundable fee outlined in Schedule 2A of the Act. These water use permits are only valid for a period of five years (from the date of issue – the permit fee is payable every time the permit is renewed) and they are also transferable with the written consent of the Director. The combination of these two makes for the possibility of a something that could somewhat resemble a water market. The condition under which the Director permits the transfer of a permit from one user to another are not stipulated in the Act. There are other permits which must be applied for in the Act, but none (with the exception of the construction permit) of them have a fee associated with them.

The Act does not provide for the charging of tariffs that are specifically related to government waterworks. The Act implicitly makes provision for the construction of dams by private individuals, on condition that they acquire all the relevant permits needed to do so and maintain the dams in accordance with the dam safety standards set out by the commissioner of water, at the dam owner's cost.

4.2 Water Transfers to South Africa

The Senqu River (called the Orange River in South Africa) originates in Lesotho, and flows into South Africa, before flowing westwards and forming the border between South Africa and Namibia. Through the Lesotho Highlands Water Project, the multi dam project diverts around 40% of the all the water in the Senqu River basin to the Vaal River system in the Gauteng Province of South Africa. The project, currently rated as the world's largest infrastructure project, is an inter-basin water transfer scheme designed to divert water from the Senqu River to South Africa's urban and industrial centre through five dams and 200 kilometres of tunnels that are channelled through the Maluti Mountains.

Lesotho has abundant water resources that exceed requirements for possible future irrigation projects and development. The total water consumption in Lesotho is about 2m³/s, while the total availability is about 150m³/s. The project is being undertaken in phases. Phase one was completed in 2004 and was intended to supply water from Lesotho to South Africa. About 4.8 billion m³ of water had been transferred by 2007. The

[27] Water Act No. 15 of 2008, Kingdom of Lesotho Government, 2008.
[28] Water Act No. 15 of 2008, Kingdom of Lesotho Government, 2008.

second phase of the project has been approved. Once complete, the project will transfer about 2,000 million m³ of water from Lesotho to South Africa every year.[29]

The scheme is being managed by the Lesotho Highlands Development Authority in Lesotho (LHDA), and the Department of Water Affairs and Forestry (DWAF) through the Trans Caledon Tunnel Authority (TCTA) in South Africa. LHDA is responsible for the environmental protection, resettlement and compensation, and construction management. The Lesotho Highlands Water Commission (LHWC), previously known as the Joint Permanent Technical Commission (JPTC) was established to represent both countries.

4.3 IMPLEMENTATION OF ECONOMIC INSTRUMENTS

In the Kingdom of Lesotho there are only three water management institutions that have the ability to make use of or affect the available economic tools in the country's water sector. These institutions are the LHDA, WASCO and LEWA. The LHDA determine the appropriate costs associated with the projects it overseas, which ultimately influence the charges to be paid by the users who benefit from the water transfer schemes in South Africa. The Water and Sewerage Company (WASCO) has the power and authority to set charges on urban water use and LEWA plays the regulatory function over the charges set by WASCO. The other institutions are funded by government or donors and do not have tariff setting authority of any form.

4.3.1 Market Based Approaches

In Lesotho, the Water Resources Act explicitly forbids the transfer of permits, except in the case of "an approved change in the occupancy of land"[30], thereby effective disallowing any water trading through a market system between water users. There is also no public record of informal water markets, water trading, or water banking.

Water pricing, referred to as water tariffs, is applied in the country, and will be explored further in the section below.

4.3.1.1 Water Pricing: Urban Water Resource Management

In Lesotho's urban areas, the users of water resources include households, businesses (including industrial firms), schools, churches, orphanages and governments departments. Who pays for water resources is determined on the basis of the following principles: economic efficiency, water security, social equity, user pays principles and polluter pays principle. In pursuance of these principles in a balanced manner, the LWSP 2007 provides for a stepped tariff structure to ensure that urban domestic water users pay progressively higher tariffs per unit (m³) the higher their consumption is. This ensures that more affluent urban dwellers that use water beyond their basic requirement pay relatively more than poorer sections of the users. The institutions involved in the development of urban water in Lesotho for use by both Basotho and South Africans are as discussed in the section below.

[29] Lesotho Highlands Water Project. Available at: http://www.water-technology.net/projects/lesotho-highlands/
[30] ibid

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Water management institutions in Lesotho raise revenue through charging connection fees, tariffs, and other fees for the service they provide. In the urban areas, customers connecting to the water and sewerage system are required to pay connections fees before they are connected. In the past these connection fees were distance related such that the further away from the mains a prospective user was, the higher the connection fee paid. However, recently connection fees have been standardised through the adaptation of a banded connection fee structure where customers within certain distance bands (range) pay the same connection fee. For example, customer in the range 50m – 100m pay the same connection fee as opposed to the past where they would pay differently based on the exact distance from the mains.

The Water and Sewerage Company (WASCO) is Lesotho's potable water. The authority sets various charges that apply for the various services it provides in order that it executes its mandate. The consumption charges are set in a block tariff structure using four bands:

- 0 – 5 Kilolitres: Currently M3.59 per Kilolitre
- 5 – 10 Kilolitres: Currently M6.07 per Kilolitre
- 10 – 15 Kilolitres: Currently M10.67 per Kilolitre
- Above 15 Kilolitres: Currently M14.71 per Kilolitre

WASCO aims to ensure that at least 30 litres of water per person per day to an average family of 5 people are provided at an affordable price. This is what informed the first band and the subsequent bands were built on that as well. WASCO currently has no large infrastructure that it is responsible for and uses to provide water to its customers. This is expected to change once the Metolong dam has been built and commissioned. The dam will be handed over to WASCO and the costs of its operation and maintenance will then be added to the cost of water supply to be paid by users.

4.3.1.2 Water Reuse and Waste Water Treatment

Water management institutions in Lesotho raise revenue through charging sewerage disposal charges (for septic tank users) and other fees for the service they provide. The Water and Sewerage Company (WASCO) is Lesotho's sewerage services supplier. Sewerage is treated through the most effective and widely used treatment methods that harness biological processes to purify the sewerage or decompose the sludge. The impact of human waste on the environment is thus reduced. In Lesotho, sewerage is charged at either a standard rate, or an estimate based on the amount of water that is consumed.

- Sewerage is charged at M8.00 on 85% of the water consumed
- Non waterborne sewerage is charged at M8.00 on 60% of the water consumed
- Septic tanks, conservancy tanks, and ventilated improved pit latrines (VIPs) that are located in areas where there is no sewerage system are charged at M385.00 per load.
- Septic tanks, conservancy tanks, and ventilated improved pit latrines (VIPs) that are located in areas where there is a sewerage system are charged at M557.75 per load.

4.3.1.3 Lesotho Electricity and Water Authority (LEWA)

Lesotho Electricity and Water Authority (LEWA) was set up in terms of the Lesotho Electricity Act No.12 of 2002, as amended, to regulate the electricity supply sector, the urban water supply and sewerage services sub-sector. LEWA is currently funded by licenced electricity operators and through their customer levy. The aim is to have the water sector players who will be regulated by LEWA also pay a charge specifically for the execution of the regulation function by LEWA in order to fund the proportion of operation costs related to regulating the water sector charges.

The electricity regulation side of LEWA is the only is currently self-funded through its fees and tariffs. The Water regulation side is currently being funded by the World Bank. The aim is that the user charges from the water sector would mainly pay for the staff complement that will be working on water regulation, with the remainder of the costs still largely funded by the electricity regulation arm.

The charges and tariffs levied by LEWA aim to cover only one year's operations. The unit charge for LEWA is calculated on a volumetric basis to be paid for by the end user of water. This will be based on their actual usage. WASCO would then collect the charges on behalf of LEWA and pass them on to LEWA. This regulation charge is likely to be part of the consumption charge and not a separate charge on its own. There is still a need to determine how the different water user groups will have the regulation charge levied on them in keeping with the block tariff structure approach of the water sector. Electricity users currently all get charged the same levy.

4.3.1.4 Rural Water Resource Management

Rural area dwellers constitute about 74% of the population in Lesotho and also represent the majority of the poor in the country. As a result the principle of social equity takes precedence over other principles to ensure that the rural poor have access to affordable water and sanitation services. While it is expected that rural water and sanitation systems should be self-sustaining, their financing relies heavily on government funding through the DRWS in the Ministry of Energy, Water and Meteorology.

From available information, the commercial financing of governance-related and infrastructure-related activities in Lesotho is very limited, if any. There are three main sources of on-budget financing for these activities, namely self-financing (from tariffs and/or user charges), government financing, and donor financing (both loans and grants). Financing from commercial banks and other private credit institutions is very limited.

4.3.1.5 Water Trading: Lesotho Highlands Water Project (LHWP)

The main economic tool used for the LHWP is the royalty payments made by the South African government to the government of the Kingdom of Lesotho. These royalty payments were set when the treaty was first agreed upon and have been escalated using the producer price index (PPI) and the electricity supply index (ESI) for its two components – capital costs and the electricity/pumping costs respectively – which represent the fixed and variable components of the royalty payments.

These payments, however are not the only economic tool. In practice, the LHWP model also has a full cost recovery approach/model that it uses. The South African government is responsible for paying for the full capital and O&M costs of ensuring that all the dams that ultimately supply water to South Africa are developed and run properly, while the Lesotho government pays for development and O&M costs of the hydro-power generation components of the project. All the costs are calculated in 160 different cost centres (20 of which are parent cost centres) which have a specific cost allocation between South Africa and Lesotho (percentage of cost to be allocated to a country). The overhead costs are allocated on a cost-follow-cost basis, which means that they are allocating the overheads on the basis of which projects are spending money.

The challenge of the LHDA is that it does not actually have a direct income stream above the full costs of development and operation because the royalties are paid directly to the government of Lesotho. The running costs of the LHWP projects are paid directly to the LHDA. The Lesotho government pays money to the LHDA on a quarterly basis, while the TCTA pays money to the LHDA on a monthly and weekly basis, depending on the component.

The funding strategy of any one component of the LHWP is developed in consultation with the TCTA because the TCTA has the responsibility of raising the funds for the projects related to the water transfers schemes. The South African government has the right of final approval of the funding strategy.

4.3.2 Payment of Environmental Services

To better understand the context of IWRM in Lesotho, it is worth noting that WRM, more specifically water supply and sanitation, in Lesotho is divided into rural and urban areas, which are the responsibility of two separate entities, namely DRWS and WASCO respectively. In addition to the financing of WRM through rural and urban WRM, the majority of revenue in Lesotho is obtained from the LHWP. The conservation of the Drakensberg catchments is thus essential to Lesotho's economic and social development objective.

4.3.2.1 Sponges Project

The Government of Lesotho, with assistance from the SADC Regional Wetlands Conservation Project, established a Wetlands Unit in the Department of Water Affairs in 2003. The Wetlands Unit constituted the Wetlands Committee in 2004, and formulated a National Wetlands Programme in 2005, whose main purpose was to provide a comprehensive coordinated national framework that will guide conservation, management and efficient use of wetlands and other water resources for development purposes and rural livelihoods. With support from ORASECOM's Project Implementation Unit (PIU) and funding from the French Global Environmental Facility (FFEM) and Member States.

The conservation of the sponges in the Khubelu catchment was initiated as wetlands play an important roles in controlling the factors that negatively impact the water quantity and quality of the Senqu River, and hence support foreign revenue. The project is aimed at securing long-term water availability at good quality for the Senqu River and to establish a conservation and management plan for the sponges that will ensure sustainable management of wetlands, benefitting from the environmental services provided by people residing in the catchments.

4.3.3 Effluent and Pollution Charges

Under the Water Resources Act, pollution is criminalised; those who "willfully or through negligence pollute or foul any water so as to render it harmful to man, beast, fish of vegetation"[31] are deemed guilty of an offence and liable to a fine of five hundred rand and two years in prison. Those found to be responsible for the pollution or fouling can also be required to take adequate measures to prevent the pollution or fouling. That failing, they may be liable (on conviction) to a fine not exceeding R20 a day until the matter is rectified. There is however no public record available for the enforcement of the fines.

4.3.4 Corporate Engagements, Partnerships and Funding

Lesotho is a poor country, that benefits immensely from funding obtained through institutions, both national and international, that are aimed at support the country in meeting its developing needs and ensuring that the population is provided with clean water, and that healthy water resources are maintained.

4.3.4.1 Maseru Waste Water Project

In Lesotho, Maseru's Waste Water project in the Maqalika Catchment is managed by WASCO, with funding obtained from the European Union's Water Facility, the Lesotho Government, and the European Investment Bank (EIB). It is intended to improve sanitation services through the expansion and rehabilitation of wastewater and sanitation services.

Approximately 100 000 of Maseru's inhabitants benefitted from the project, which was completed in 2012. The project will provide modern and environmentally sustainable waste water collection and treatment facilities, and will increase the amount of people who have access to waste water and sanitation facilities in the country from 49% to 85%, which will contribute to Lesotho's efforts to meet the millennium development goals by 2015. The project is varied, and is based on the income levels of the receiving household, thus ranging from low cost onsite sanitation facilities, to connections to central sewer networks.

4.3.4.2 AngloGold Ashanti's CSI Fund - Lesotho Water Project

Lesotho offers a sizable labour force to the South African based operations at AngloGold Ashanti's. AngloGold Ashanti has major commitments to supporting development in communities where their labour force is based, and has thus, through the CSI Fund, been sponsoring the Lesotho Water Project since 2001. The project is run by Teba Development, which is a non-profit organisation that undertakes development projects in rural areas on behalf of the South African mining industry, both nationally and regionally.

From 2001 to December 2007, more than 36 000 households had reliable access to clean water, which represents about 10% of villages in Lesotho that previously relied on boreholes. A total of R3.7 million had been spent on the project, with the AngloGold Ashanti CSI Fund contributing R2.3 million. The AngloGold Ashanti CSI Fund contribute an additional R540 000 to cover the repair of 50 boreholes that had been damaged.

[31] ibid

4.4 EVALUATION, SYNTHESIS AND RECOMMENDATIONS

Lesotho has come a long way from its near complete reliance on government and donor transfers for its WRM financial needs. Though much still needs to happen to ensure a self-sustaining water sector in the country, the implementation of the Lesotho Water Sector Improvement Project (LWSIP) in 2004 made it possible for WASCO to raise tariffs to sustainable levels as a way to improve its financial performance and ultimately reach financial sustainability. A Tariff Policy Study that took place in 2007 led to a decision to allow WASCO to charge cost-recovery tariffs. This has helped raise the revenue needed to run at least some of WASCO's operation.

The separation of rural and urban WRM remains a valid and important given the need to achieve both the user pays principle and social equity (effectively protection of the poor). The majority of Lesotho's poor live in the rural parts of the country which makes it possible to protect the poor by targeting much of the subsidization at rural dwellings. This is by no means a perfect solution, but given the capacity challenges, both in terms of information gathering and program execution, this is a good enough place holder.

Lesotho needs to improve its data gathering capacity in order that the charge setting regime be improved. The setting up of the water regulation division within LEWA to ensure that WASCO sets its charges in accordance with its financial needs is a move in the right direction. However, WASCO needs to improve its data gathering and storing so as to make it possible for LEWA to regulate the tariffs set. Without the information, neither side will be able to make decisions that will lead to long term sustainability.

Given the conflicting demands on the national budget and the challenges facing ODA financing in the post-recession world, alternative sources of financing the water sector are needed. There are a number of areas which could open up channels to funding.

4.4.1 Policy Gaps

Gaps in the current policy environment need to be filled, and existing measures need to be strengthened. Water policies should prioritise allocative efficiency; for example, the establishment of policies that support market based approaches and incentives for increased water efficiency should be prioritised. Policies should provide an effective environment and framework for holders of water rights; there is therefore a need to strengthen the regulation and monitoring environment of water right holders and water service providers.

4.4.2 Market Based Instruments

An introduction of individual user water rights, supported by a favourable policy environment and frameworks will allow for market based approaches such as water markets, water trading and water banking to flourish. This may also assist other users, such as the agricultural sector, to be more incentivised to use water efficiently so that they can benefit from water right transfers and trading.

Water markets allow full cost recovery, and also a decentralisation of water management issues to more local catchment level. In addition to the internationally prevalent formalised water markets, informal and local water markets are also common and can be implemented at a local level.

4.4.3 Effluent and Pollution Charges

Although Lesotho recognises pollution under the Water Resources Act, implementation if the Act is not clearly tracked. This could either be due to a lack of enforcement of the Act, or a lack of available information. Either way, the system and institutional capacity could be improved or developed for individuals that do not comply with pollution and effluent discharge systems. An introduction or improvement of this system will ensure that water users are incentive not to pollute on water resources, and if they do the water sector institutions should be able to recover the costs for clearing up the pollution. This will only be successful if the policy environment is supported by good capacity for monitoring and compliance enforcement.

4.4.4 Private Sector Participation

The private sector has not been strongly engaged and involved in the development of the water sector in Lesotho. Much can be done to direct private sector funds towards the development of large scale water infrastructure. Private sector players could be given long-term leases in exchange for the development of government owned infrastructure to serve the public. The tariffs set by such players would or could be regulated by LEWA. The public good nature of water must be recognised and affordability of the water must be emphasised and enforced either through cross-subsidization of fiscal support where possible. Minimum service standards (including provision of a certain level of free/cheap basic water) would need to be set out for such investors.

4.4.5 Corporate Bonds Issuing

Another way to increase the flow of funds into the water sector in Lesotho could be the establishment of a body that has the power to issue and manage their own financial paper e.g. corporate bonds, for the development of key water sector infrastructure. Alternatively, such powers could be given to an existing body such as WASCO.

These recommendations are aimed at improving the water use efficiency by water right holders and water users, improving the flow of funding into the water sector and reducing its reliance on donor and fiscal funding.

5 Namibia

5.1 Water Laws, Policies and Legislation

5.1.1 Namibia Water Corporation Act no 12 of 1997

The Act was enacted to establish the Namibia Water Corporation Limited (NamWater), regulate its powers, duties and functions and to provide for a more efficient use and control of water resources. NamWater is incorporated as a public company wholly owned by the state. NamWater has two primary objects:

- the primary business of bulk water supply to customers, in sufficient quantities, of a quality suitable for the customers' purposes, and by cost-effective, environmentally sound and sustainable means; and
- the secondary business of rendering water-related services, supplying facilities and granting rights to customers upon their request[32].

In pursuit of these objects, NamWater has eight functions that they must perform. Six of these functions are the following:

- explore, develop and manage water resources for the purpose of water supply;
- acquire, plan, design, construct, extend, alter, maintain, repair, operate, control and dispose of waterworks
- supply water to customers within and outside the borders of the Republic of Namibia;
- investigate, research and study matters relating to water resources, waterworks and the environment;
- take such action as the Corporation may consider necessary or as the Minister may direct, for the purposes of conserving or augmenting water resources in Namibia;
- render services, provide facilities and lease rights, subject to the payment of relevant charges[33];

In order to be able to execute these functions, NamWater has been given certain powers. These powers include the power to:

- determine and levy tariffs on a full cost-recovery basis for water supplied;
- determine and levy charges for services rendered, facilities provided or rights leased by the Corporation;
- borrow funds from within the Republic of Namibia or abroad;
- mortgage, pledge or otherwise encumber the assets of the Corporation;
- hire out its assets and services not immediately required for the business of the Corporation;
- sell or dispose of any asset of the Corporation[34]

[32] Namibia Water Corporation Act no 12 of 1997, Government of the Republic of Namibia, 2007.
[33] ibid
[34] Namibia Water Corporation Act no 12 of 1997, Government of the Republic of Namibia, 2007.

These powers are subject to some restrictions including being unable to do at least four things without the prior approval of the Minister. These are the following:

- supply water to customers situated outside the borders of Namibia,
- construct or operate waterworks outside the borders of Namibia for the purposes of supplying water to consumers within Namibia
- borrow funds from outside Namibia for the purposes of its functions; or
- alienate, pledge, mortgage or otherwise encumber any asset of the Corporation with a market value exceeding N$10 000 000[35]

NamWater also has, as per the Act, certain duties that it must fulfill. Its main duty is to supply water. In fulfilling this duty, NamWater is obliged to consider every application for bulk water supply by any potential customer. In cases where the application is accepted, bulk water supply only takes place if there is a written agreement between NamWater and each customer. The entity can only establish new waterworks that are likely to affect the cost of water supply after it has negotiated with its major relevant customers.

The Water Corporation Act also gives the Minister the power to enter into a written agreement with NamWater "for the supply of water, services or facilities by the Corporation to any person, body, organisation or category of persons, at a cost subsidised or fully paid for by the Minister"[36], the difference of which will be paid for out of funds appropriated by Parliament for those purposes.

Most of the assets that belonged to the state that were intended for the purposes of bulk water supply – including all assets relating to specified waterworks, title in land, licences, permits, exemptions, certificates, authorizations and outstanding debtors – were transferred to NamWater. The management, operation and control of the specified waterworks was also transferred to NamWater. NamWater however, is specifically not allowed to sell any of the assets transferred to it, or to lease it for a period longer than five years, unless it is done by public auction of tender and for a price not lower than that obtained from a sworn appraiser.

The Act makes provision for NamWater to be able to establish a reserve fund in which it may invest a portion of its profit for financing future capital works. This is a provision that makes long-term planning possible for NamWater.

35 ibid
36 ibid

5.1.2 Water Resources Management Act No. 24 of 2004

The Water Resources Act was promulgated to "provide for the management, development, protection, conservation, and use of water resources"[37]. "The objective of this Act is to ensure that Namibia's water resources are managed, developed, protected, conserved and used in ways which are consistent with or conducive to (its) fundamental principles"[38].

The Water Resources Management Act is underpinned by fourteen principles. Of those fourteen, at least four have an impact on the economic approaches/tools used in the Namibian water sector.

These are:

- promotion of the sustainable development of water resources based on an integrated water resources management plan which incorporates social, technical, economic, and environmental issues
- recognition of the economic value of water in the allocation of water
- development of the most cost effective solutions, including conservation measures, to infrastructure for the provision of water
- a polluter is liable to pay all costs to clean up any intentional or accidental spill of pollutants[39]

The manner in which these principles are to be upheld is the part of what the remainder of the Act aims to detail to some degree.

A number of policies, institutions and committees are established through the Act, each of them with varying, though at times overlapping functions. These institutions have powers and responsibilities, some of which details the economic approach to water resources management in Namibia. Below is an outline of some of the institutions and the powers they have been given through the Act that provide economic tools for water resources management.

5.1.2.1 Water Regulator

One of the institutions established by the Act is the Water Regulator. One of the functions include the determination of tariffs and charges that may be levied by water service providers and other water suppliers (including the State) for water supply and/or distribution, as well as the fees or charges to be paid by licence holders for water abstraction, effluent discharge and the supply of re-use of effluent.

[37] Water Resources Management Act No. 24 of 2004, Government of the Republic of Namibia, 2004.
[38] Water Resources Management Act No. 24 of 2004, Government of the Republic of Namibia, 2004.
[39] ibid

The Water Regulator is required to determine the fees and charges in accordance with the norms and standards prescribed in the water, wastewater and effluent pricing policy. In setting these fees and charges, the Water Regulator may differentiate between:

- water services providers, other water suppliers, service providers or licence holders
- in accordance with the resource from which, or the method by which, water is supplied or abstracted
- in accordance with the purpose for which water is supplied or abstracted
- in accordance with the time of the year when water is supplied or abstracted, and
- between different areas of Namibia

The Water Regulator's members who are not full-time employees of the State are paid from money appropriated by Parliament. This includes payment for travel and subsistence allowances. This means that the Water Regulator is effectively a subsidised entity serving the needs of all water users in Namibia.

5.1.2.2 Pricing Policy for Services in the Water Sector

The Act mandates the minister to "develop and prescribe a pricing policy for services in the water sector which sets out norms and standards for the fixing of tariffs of fees and charges for those services by the Water Regulator"[40].

This pricing policy is to be developed in a consultative manner by inviting persons, interested groups and institutions connected with the water sector to make submissions, contributions and give recommendations during the formulation of the pricing policy. This is to be done in accordance with the procedures and time frames for such submissions, contributions or participation.

5.1.2.3 Basin Management Committee

A basin management committee is a group of representatives, stakeholders and persons who are organised or associated for the purpose of organising, planning or dealing with matters relating to the development, management, protection and enhancement of water resources in the basin or part of a basin

The basin management committee is established for the purpose of proper and integrated management of the water resources of the basins in Namibia. Their primary function is to protect, develop, conserve, manage and control water resources within its water management area.

Basin management committees have two main sources of funding: the minister for expenses pertaining to the functions of the committee and water resources management levies payable to the committee as part of charges for water abstraction and use and wastewater disposal charges. They can also get support from the minister for the establishment of a support office in the water management area of a basin management committee operated by staff members of the Ministry designated by the Permanent Secretary.

[40] Water Resources Management Act No. 24 of 2004, Government of the Republic of Namibia, 2004.

A key economic function of the basin management committee is the promotion of community self-reliance, including recovery of costs for the operation and maintenance of any waterworks in their designated area. Though the basin management committee has no explicit power to set the charges that they are meant to collect, they are an important part of the institutional set up in as far as ensuring the sustainability of the sector. Their success or failure in terms of collection can have a significant impact on the sector's financial viability.

Another important function of the basin management committees is the preparation of the integrated water resources management plan for its water management area which must be submitted to the Minister for consideration when preparing the Namibia integrated water resources management plan.

5.1.2.4 Water Point Committees and Local Water Committees

There are also established water point and local water user associations by the Act. These user associations have been entrusted with the responsibility of managing and controlling the supply of water at any rural State waterworks.

The Minister may, by regulation, make provision for the establishment and accreditation of these committees. These regulations may relate to, among other things, the setting of tariffs to be levied by a water point committee or a local water committee for the supply of water. This allows the committees to have some income stream to ensure their sustainability and that of the waterworks they manage.

5.1.2.5 Integrated Water Resources Management Plan

An important feature of this Act is the mandating of the development of an Integrated Water Resources Management (IWRM) Plan. The Act mandates the minister to develop such a plan for the development, conservation, management and control of Namibia's water resources. This plan incorporates the IWRM plans prepared and submitted to the Minister by basin management committees.

The scope of the IWRM plans includes the following:

- a water balance for the water management area of each basin management committee, or any other specified area in Namibia, that compares forecasted water demand with data and information concerning water availability, and
- proposed options for meeting forecasted demand for each water management area where the forecasted water demand exceeds available supply, including options in relation to water demand management programmes, infrastructure construction, desirable institutional initiatives, inter-basin transfers and appropriate legal reforms if needed.
- provision for the protection of water resources and resource quality

This IWRM plan is to be reviewed at any time, but in intervals of no more than ten years.

5.1.2.6 Licences

One of the elements of water use that the Act regulates is the licencing of water. The Act prohibits the transfer of a licence to abstract water or the rights conferred by that licence by way of a lease or sale. The licence can only be transferred in the event of the death of a licence holder through a will or to the heirs of the deceased if they so choose to take it up. Licences remain in force for no longer than five years, at which point they must be renewed as per the prescriptions of the Act. An application fee must be paid every time the lease is renewed. If a licence expires or is cancelled, the Minister has the right to require the holder of the licence to restore the abstraction point and affected area to a condition similar to the condition before the licence was granted. With the exception of the five year renewal requirement, the above holds for borehole licences as well.

The various licences that the Act mandates are the following:

- Water abstraction and use licence – to abstract and use water
- Effluent discharge licence – to discharge effluent
- Combined licence to water abstract and use water and to discharge effluent – to abstract and use water and to discharge effluent
- Borehole licence – to undertake or permit to be undertaken on the land any work to drill, construct, deepen, enlarge, alter, clean, rehabilitate or engage in a borehole drilling programme and construct a well or insert well-points
- Groundwater disposal licence – for abstracting and disposing of groundwater from a mine or other excavation to facilitate mining or other underground operations and to dewater an area for construction purposes
- Driller's licence – for drilling, deepening, enlarging, altering, cleaning, rehabilitating or sealing off boreholes and for construct a well or insert well-points
- Water service provider licence – to operate as a water services provider
- Wastewater treatment – to construct or operate a wastewater treatment facility or a waste disposal site
- Combined licence to water services provider – a combined licence to abstract, treat and distribute water, or to treat and distribute water

There is an application fee associated with each of these licences. People who abstract water from a water resource for own domestic use is exempted from the requirement for a licence to abstract and use water, as long as they are not abstracting the water in order to sell it to other people for domestic use.

5.1.2.7 Pollution

Anybody who is responsible for polluting any water resource must take the appropriate actions (including any directed by the Minister) to remedy the effects of the pollution. In the event that the responsible party fails to remedy the situation, the Minister can direct that certain measures be taken to remedy it and recover the cost of those actions from the person who was responsible for the pollution.

A local authority or any other authority or person that has authority over any area in which any domestic or industrial activity that may cause pollution takes place, is ultimately responsible for the prevention of any pollution in that area. The water service provider is therefore financially responsible for the activities needed to ensure that the effects of the pollution are remedied. However, the Act does not explicitly prohibit the recovery of those costs from water user in its area of responsibility. The local authority or other owner on a wastewater treatment facility may enter into agreements with persons who want to discharge industrial wastewater into their facilities if their licence has a specific condition approving such an agreement or if they are granted approval by the Minister in writing.

Any person can apply to the minister for exemption from needing a licence to dispose of their wastewater if it is to discharge effluent from any septic tank, french drain or similar private sewerage facility serving a single household into a water resource, including into a borehole or well. Those who do require licences and are granted those licence, are granted them for a period no longer than 5 years, at which point they must apply for their renewal and pay the requisite fee.

5.1.2.8 Recovery of Water Services Fees and Charges

The Act gives the Minister the power to prescribe tariffs of fees and charges, in accordance with a determination by the Water Regulator in respect of water services provided by the State to users of water controlled by the State and for the discharge of effluent or wastewater or the deposit of waste in a facility or at a site controlled or operated by the State. These fees are paid in arrears and bear interest on any amount that remains unpaid after the due date. In addition to the interest charged, the minister may prescribe a penalty fee to be levied and recovered from users in default. The Minister also has the power to restrict or suspend the supply of water to a user who is in default. Users then have to pay a reconnection fee for restoration of the supply.

Important to note, is the fact that fees and charges (including all interest, penalties and any cost awarded by a court) are a charge on the land. They may be recovered from the current owner without releasing any other person who may be liable for the fees and charges.

5.1.2.9 Water Tribunal

The Water Tribunal is established in the Act to hear and decide appeals in matters relating to the following matters:

- refusal to issue a licence;
- issuing a licence to discharge effluent or construct or operate a water treatment facility or a waste disposal site, if the appellant was an objector to the application for the licence;
- refusal to grant approval for the transfer of a licence to discharge effluent or construct or operate a water treatment facility or a waste disposal site,
- determining the term of a licence;
- imposing a discretionary condition on a licence;
- refusal to renew a licence;
- the amendment of a licence;
- suspending or cancelling a licence;
- ordering the holder of a driller's licence to pay a penalty under section 68(8)(c) of the Act;
- giving a direction to any person of measures to be taken as specified in the direction;
- a decision or action taken, or a prohibition imposed by notice, under section 101 of the Act;
- to recover expenses incurred in taking measures which a person failed to take in accordance with a direction given.

This Water Tribunal is funded by money appropriated by Parliament, which is effectively a subsidy.

5.1.3 Water Supply and Sanitation Sector Policy of 2008

The first Water Supply and Sanitation Policy (WASP) was adopted in 1993. It was in this version of the policy that the establishment of the Namibian Water Corporation Limited (NamWater) and the Directorate of Rural Water Supply (DRWS) in the Ministry of Agriculture, Water and Rural Development were recommended. The 1993 WASP was replaced by the Water Supply and Sanitation Policy (WSASP) of 2008.

5.1.3.1 Cost Recovery

The key thrust of the WSASP on cost recovery is that water is an economic good with a social responsibility to make water available to the poor and that the overall sustainability of the water sector will depend on its ability to become self-sufficient. The policy further recognises that the service providers in the sector cannot continue providing the services without the necessary revenue. In keeping with this assertion, the WSASP states that it is "essential to recover the full financial cost or, in low income rural and urban areas, at least the operational and maintenance costs with support from government subsidies or cross-subsidies amongst consumers"[41].

[41] Water Supply and Sanitation Sector Policy of 2008, Government of the Republic of Namibia, 2008.

The WSASP recognises the power of the Minister of Agriculture, Water and Forestry to determine the tariff policies in Namibia and recommends that the tariff determination process take the following tariff policy principles into consideration:

- Money generated through domestic water use or sanitation should not be used to subsidise water to any other economic activity
- Any industrial, commercial or mining activity should pay the full cost recovery tariff taking the scarcity of water and the cost of future water supply augmentation into account

The tariff structures in the urban centres is meant to take into consideration the scarcity of water in Namibia and encourage water conservation and reduce wastage through the application of a rising block tariff structure. This should aim to recover the full cost including an incentive to enhance water use efficiency linked to the cost of future supply augmentation. Additionally, the tariff in urban areas may also be designed to provide for transparent cross-subsidies between users, as long as residential consumers are never expected to subsidize industrial customers and the mining sector.

With respect to irrigation water supply, in cases where the water is supplied by government it is recommended that irrigation water is charged at a full financial cost recovery rate.

The WSASP further recommends that the Water Regulator to be established in Namibia should aim to harmonize the expectations of the consumers and policy makers without compromising the financial sustainability of the service providers.

5.1.3.2 Subsidization

Importantly, and in keeping with its assertion to make water available to the poor, the policy recommends that mechanisms for transparent subsidies and/or cross-subsidization by means of rebates be created for those who are unable to afford the charges paid for the various services. It also emphasises the need for these subsidies to be transparent, for consumers to know the amount of the subsidy, why the consumer is subsidized and by whom. Where rural water supply is concerned, the policy states that "government support services should be seen as a medium for eventual self-sufficiency and as a matter of principle, not be extended free of charge, but be priced, with cost recovery a primary principle[42]".

To this end, the policy recommends that as one of the rural water tariff policy principles it must be accepted that the communities should pay for operation, maintenance and replacement costs, even though there could be case where some form of subsidization would need to be put in place. Another recommendation of the policy is that there be a system in place that is able to do individual assessments that determine the need for rebates, cross-subsidies and/or subsidies.

For the urban centres, the policy recommends that there be a fixed, low price for a defined minimum lifeline volume of water or a rebate on usage by residential consumers.

If cabinet so decides, a transparent subsidy determined by the value of the produce relative to its socio-economic benefits can be extended to irrigation water users. However, that subsidy must be budgeted for by the line Ministry responsible for agricultural support.

[42] Water Supply and Sanitation Sector Policy of 2008, Government of the Republic of Namibia, 2008.

5.1.4 Basin Management Capacity

There is inadequate human resource and financial capacity for basin management at local level. There are eight basin management committees that have been established in Namibia. The ones that have been put in place play an advisory role to the minister and cannot set any charges at this stage. A ninth basin management committee has now also been informally established and a formalisation process is currently underway.

The lack of adequate human resources at this level of water resources management has made it difficult to attract funding in the form of donor/grant funding or commercial loans into the sector. If Namibia can be successful in creating adequate management capacity at the different decentralised levels, then it would be more efficient for the service providers to assume or retain control over the use of their own revenues. This would help reduce the uncertainty associated with the exposure to national budgetary processes that can often be unpredictable. However, given these recent challenges, much is yet to be done to build sufficient capacity for such a state of affairs. Alternatively, a mechanism can be devised to make use of the capacity at a central level to ensure that financial resources are sourced for the projects at local and basin level.

5.1.5 Infrastructure Development

The development of large water infrastructure in Namibia tends to be paid for completely by central government. When government develops infrastructure, the loan funding and interest payments for the infrastructure is not passed on to the user. Users only pay for the depreciation of that asset as part of the total water charge. Once this infrastructure is developed it is passed on to NamWater which then handles the maintenance and operation of this infrastructure and the costs are then paid for by users at scheme level on a full cost basis. Farms and mines tend to have small dams for water storage.

There are cases of small to medium sized infrastructure development which is handled by NamWater and paid for by users. It is usually in cases where they are extending existing schemes. NamWater has developed a lot of bulk water conveyance infrastructure. NamWater can take on some loans, but generally the aim is that NamWater builds a reserve which is then used for capital replacement. When it was first established, there was a subsidy given to NamWater to try and give the entity time to get its charges to full cost recovery without shocking the consumers by increasing charges too quickly. There is some grant funding from government to assist NamWater to make non-viable rural infrastructure sustainable.

5.2 WATER TRANSFERS FROM NEIGHBOURING COUNTRIES

Namibia is largely considered as one of the driest countries in Africa. Rainfall is sparse, often falling in intense local showers. Therefore, due to the aridity of the Namibian climate, the all rivers in the country are ephemeral, meaning that the rivers only flow when there is sufficient rainfall, which only happens for short periods during the late summer rainfall season.

Namibia's international boundaries, both northern and southern are marked by the Kunene River in the northwest, the Okavango River in the central north and the Zambezi and Kwando Rivers in the northeast. The Orange River marks Namibia's southern border. It is only in these rivers that perennial surface water resources are found. These rivers are all shared with neighbouring riparian states with an obligation for them to be managed and used in terms of the relevant rules of International Water Law.[43]

Namibia is therefore highly reliant on international transfers as well as groundwater resources. The table below presents an estimate of the surface water and groundwater potential of each basin, the current and future demands, the surplus or deficit that is likely to occur in each basin and the installed infrastructure capacity of each basin.[44] The table also thus highlights which river basins can be explored for future inter-basin transfers.

Table 5-1: Water Resource Potential and Utilization per Basin[44]

BASIN	WATER RESOURCE POTENTIAL Mm³/a			DEMAND Mm³/a		SURPLUS/(DEFICIT) Mm³/a		INSTALLED INFRASTRUCTURE CAPACITY (Mm³/a)	
	SURFACE	GROUND	TOTAL	2008	2030	2008	2030	SURFACE	GROUND
Cuvelai-Etosha	180.0[1]	24.0	204.0	63.7	85.6	140.3	118.4	74.0	13.0
Eiseb-Epukiro	0	20.0	20.0	8.6	11.2	11.4	8.8	0	5.8
Kuiseb	9,8	8.0	16.8	8.4	12.6	8.4	4.2	1.0	13,9
Kunene	31,5	26.2	57.7	10.0	11.2	47.7	46.5	0	7,9
Nossob-Auob	8.0	32.5	40.5	31.1	34.9	9.4	5.6	6.2	2,8
Okavango-Omatako	250.0[2]	29.6	279.6	58.1	215.1	221.5	64.5	36.7	2,2
Omaruru-Swakop	41.0	29.5	70.5	50.6	74.9	19.9	-4.4	27.5	18,1
Orange-Fish	379,9[3]	160.0	539.9	74.8	119.6	465.1	420.3	91.3	3,8
Tsondab-Koichab	0	1.8	1.8	3.9	5.1	-2.0	-3.3	0	5,8
Ugab-Huab	7,5	19.8	27.3	14.7	22.0	12.6	5.3	0	16,6
Zambezi-Kwando-Linyanti	4 000.0[4]	10.0	4 010.0	10.3	179.6	3 999.7	3 830.4	4.75	5,6
TOTAL				334.1	771.7				

Note
1. Agreed allocation with Angola from the Kunene River
2. Based on the irrigation of 16 550 ha @ 15 000 m³/ha/a. Calculated on low flow conditions in the river and 25% of the flow reserved for environmental flow.
3. A recent study into the management of the Lower Orange River considered various options to increase the yield of the entire Orange River System. Should additional measures be implemented to increase the yield of the system an allocation of 224.4 Mm³/a could be available to Namibia. This figure has been used in this study.
4. 10% of MAR at Katima Mulilo.

[43] Integrated Water Resources Management Plan for Namibia, 2010
[44] ibid

5.3 IMPLEMENTATION OF ECONOMIC INSTRUMENTS

Namibia has strong natural resources management policies and strategies in place or under development. However, the country has had some challenges in setting and recovering full cost charges for operations and management in the recent past. In some cases, the Local Authorities have needed bailing out from the Ministry of Regional, Local Government, Housing and Rural Development.

5.3.1 Market Based Approaches

In Namibia, The Act prohibits the transfer of a licence to abstract water or the rights conferred by that licence by way of a lease or sale. The licence can only be transferred in the event of the death of a licence holder through a will or to the heirs of the deceased if they so choose to take it up. The Act thereby effective disallowing any water trading through a market system between water users. There is also no public record of informal water markets, water trading, or water banking.

Water pricing, referred to as water tariffs, is applied in the country, and will be explored further in the section below.

5.3.1.1 Water Pricing: Water Tariff Policy

The water regulator that was meant to be established through the Act has not been established as yet. The regulation remains a dormant function within the ministry. There is no clear cut regulator in the country. The users are metered however, and that is how users are checked on to ensure that they have a handle on the water usage. Users have to install meters as part of their licencing conditions and must provide water readings every three months. The charges set by water service providers are not really checked by anyone except the requirement for cabinet approval. There is no process of stakeholder consultation in place either to ensure that those who set the charges are at least held accountable by those who end up having to pay for those charges.

5.3.1.2 Water Resource Management Costs and Charges

The costs of WRM in Namibia have not been quantified. The functions are being executed by different bodies (NamWater and the water resources management directorate in the ministry of agriculture, water and forestry) within the Namibian water sector. These entities are not really coordinating their efforts and determining points of duplication or sharing knowledge. One of the results is that the total cost of WRM in Namibia is clearly known.

The Namibian IWRM plan that was drafted in 2010 and is now undergoing a process of "populization" among stakeholders is going to guide what will get done and how much it is expected to cost. There are no specific WRM charges and the WRM in Namibia is mainly funded by central government. Users are getting this service for free effectively in some cases – where is being done through the directorate – and are paying for the services as part of their total cost of water without it being separated out in other case – like in the case of NamWater users. The table below presents summarised data on costs, charges and subsidies for the five major water supply institutions, for the years 1999 and 2001.)

Table 5-2: Supply Costs, User Charges and Subsidies for Water (Million N$)[45]

	1999/2000	2001/2002
Namwater		
Costs	212	264
Water transferred to other suppliers	164	179
Water delivered to end-users	49	84
User charges	170	274
Water transferred to other suppliers	131	218
Water delivered to end-users	39	56
Subsidy: user charges-costs	-	-
Water transferred to other suppliers	-33	39
Water delivered to end-users	-10	-28
All water	-43	11
Rural Water Supply		
Costs	92	108
User charges	0	0
Subsidy: user charges-costs	-92	-108
Rural communities		
Costs	5	9
User charges	1	6
Subsidy: user charges-costs	-4	-3
Self-providers in agriculture and mining	No information, but self-providers cover all costs themselves, so there is no subsidy	

5.3.2 Cost Recovery

Namibia has a range of cost recovery mechanisms (as listed in the section above) that are legally available for implementation. The principle of full cost recovery is applied in Namibia. The full cost of infrastructure operation, maintenance and depreciation, as well as the full cost of water resources management in reflected in the scheme level tariffs set by NamWater. The challenge facing the water sector in the country is one of non-payment for water related services provided. The revenue billed against users is not collected. The range of reasons for this include the perception by users that the tariffs are unfair and the fact that the revenue that is collected is often used to cover non-water expenses by the local authorities. Namwater has a large outstanding debt, most of which (over 70%) is attributed to local authorities. Funds from fiscus that could be directed towards financing water related programmes and projects are being utilised to finance bad debt. The underperformance of service providers in terms of financial and technical management needs to be addressed as a matter of urgency.

The most interesting aspect of how water charges are set in Namibia is that in practice no distinction is made between raw water and bulk water. NamWater, being the only body that sets bulk water charges and the main recipient of raw water, sets charges to municipalities and local authorities. NamWater, as the water utility, does not really pay for raw water. The get the water directly from rivers and dams constructed for their use for free and pass on the full costs of infrastructure maintenance and operation to their customers.

[45] Source: http://www.kunenerak.org/en/management/value+of+water/economic+value/namibia.aspx

5.3.3 Payment of Environmental Services

Namibia has numerous examples of successful payment of environmental services (PES) practices, such as community based resource conservation, and water conservation practices.

5.3.3.1 Community-Based Natural Resources Management (CBNRM)

Payments for ecosystem services (PES) programmes are widely recognized as novel and innovative mechanisms that seek to promote the conservation of biodiversity while simultaneously improving human livelihoods. A number of national-level PES programmes have made significant contributions to advancing knowledge of these mechanisms. Namibia's community-based natural resources management (CBNRM) programme effectively operates as one such large-scale PES programme, making it one of the world's longest-standing schemes.[46]

Payments for ecosystem services programmes are increasingly being used as a means of linking biodiversity conservation with human livelihoods. Namibia's community-based natural resources programme has led to increasing economic benefits for 230 000 people resident to communal conservancies, and that this increase in revenue generated by sustainable natural resource management has coincided with the improved management and recovery of populations of large wildlife throughout the affected communal areas. [47]

5.3.4 Corporate Engagements, Partnerships and Funding

Namibia is supported by numerous institutions, both national and international, which assist the country in meeting its developing needs and ensure that the population is provided with clean water, and that healthy water resources are maintained.

5.3.4.1 AusAID – WASH Fund

The Australian government has, through the Australian Agency for International Development (AusAID) provided funding of AU$10 million over a four year period starting in February 2013, to the Civil Society WASH Fund. The WASH Fund will support civil society organisations to deliver water, sanitation and hygiene. Australia will assist poor communities to gain access to safe water, improved sanitation and improved hygiene practices. This will assist in decreasing water related diseases that claim the live of marginalised individuals, especially children under the age of five.

5.3.4.2 European Union – Water Supply and Sanitation

Through the National Planning Commission, the European Union has increased funding from Euro 18 Million to Euro 36 million, which is aimed at the development of water infrastructure to assist both rural and urban communities. The project will support the Namibian Water Supply and Sanitation Sector to meet its development objectives with respect to water and sanitation.

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[46] Naidoo R., et al., 2011. Namibia's community-based natural resource management programme: an unrecognized payments for ecosystem services scheme. *Environmental Conservation* 38 (4): 445–453

[47] ibid

The project was to improve access to potable water, and also to provide acceptable sanitation services for communities. This was achieved through improving existing public welfare services, monitoring progress on several water projects, and ensuring funding is used appropriately. This will assist in increasing the access to water from 87%, and sanitation from 75%.

5.4 Evaluation, Synthesis and Recommendation

5.4.1 Policy and Institutional Gaps

The legislative framework in Namibia is well designed. The governing Acts and policies within the Namibian water sector make the creation of a sustainable water sector with an integrated management approach possible. There is however, still a need to develop clear policy on the setting of end-use tariffs and subsidies that would specifically guide how these are set and what they are to be used for.

The work of NamWater and the directorates responsible for water within the ministry of agriculture, water and forestry need to be better aligned to improve the level of collaboration within the sector by the major stakeholders. The silo approach currently employed leads to a lot of lost opportunities for improving the way the water sector operates in the country. Some work ought to be done to ensure this alignment.

Given the structure of the Namibian water sector, it is very important that a water regulator be established. The charges set for water must be tested by an objective party to ensure that they are raising revenue for relevant work and to ensure that the end user is protected from arbitrary increases in water charges. There are no water markets that the regulator would have to concern themselves about in Namibia. The sole focus of the regulator could therefore be the charge setting entities and their operations.

5.4.2 Market-based Approaches

An introduction of individual user water rights, supported by a favourable policy environment and frameworks will allow for market based approaches such as water markets, water trading and water banking to flourish. This may also assist other users, such as the agricultural sector, to be more incentivised to use water efficiently so that they can benefit from water right transfers and trading.

Water markets allow full cost recovery, and also a decentralisation of water management issues to more local catchment level. In addition to the internationally prevalent formalised water markets, informal and local water markets are also common and can be implemented at a local level.

5.4.3 Water Reuse and Waste Water Treatment

Despite efforts in the sector to promote conservation of scarce water resources, water losses and wastage continue with limited abatement. An estimated 46% of purified water is not accounted for. At such a rate of water-losses, water efficiency levels need to be increased drastically. Most villages are at the peak of their resource availability with water losses factored in. An increase in water availability may be achieved by either developing more water resources (assuming infinite availability) or reducing water losses.

There is a number of potential revenue generating options available to government that would reduce the reliance of Namibia on subsidised water. The first of these could be a water resource rent to be paid by the private sector in cases where they have their own water supply infrastructure. A waste water treatment tariff can also be established in settlements with treatment facilities. This additional revenue can be used to reduce the level of subsidization to those users who can afford to pay the full cost of their water supply, as well as the development of storm water and rainwater harvesting infrastructure to ensure increased water security in the country. This could further strengthen the attempts to augment water availability, while simultaneously helping to keep water costs from rising too rapidly.

5.4.4 Effluent and Pollution Charges

Although Namibia recognises pollution under the pollution Act, implementation if the Act is not clearly tracked. This could either be due to a lack of enforcement of the Act, or a lack of available information. Either way, the system and institutional capacity could be improved or developed for individuals that do not comply with pollution and effluent discharge systems. An introduction of this system will ensure that water users are incentive not to pollute on water resources, and if they do the water sector institutions should be able to recover the costs for clearing up the pollution. This will only be successful if the policy environment is supported by good capacity for monitoring and compliance enforcement.

6 South Africa

6.1 Evolution of Water Laws and Policies

6.1.1 Government Water Schemes Before 1970

Early Government water schemes in the Republic of South Africa were built mainly to encourage development under unfavourable conditions and often took the form of large irrigation schemes that served as welfare settlements. These schemes were generally financed by the State and there was no attempt to recover any significant portion of the costs from occupants through water rates. The undetermined direct and indirect benefits the schemes were expected to yield to the nation were regarded as sufficient justification for financing the schemes from State funds. Many schemes were built during these years – this was the well-known golden era of dam construction.

6.1.2 1970 – 1984: Commission of Enquiry into Water Matters

The recommendations of the Commission of Enquiry into Water Matters were accepted by the Government as policy in 1970. The first significant formal directives on tariffs arose from Recommendation 38 of the commission of enquiry. This recommendation was on agricultural schemes and it read as follows:

- That water rates on new irrigation schemes cover the full running costs as well as a percentage of the interest and redemption costs, bearing in mind the share of capital costs, of the scheme recoverable through raised land prices;
- That in so far as consistent with socio-economic conditions, the water rates on existing Government irrigation schemes be gradually raised to cover at least the operating costs;
- That water rates for each irrigation scheme be determined by the Department of Water Affairs after investigation by and consultation with the Department of Agricultural Economics and Marketing;

After the commission of enquiry, increasing emphasis was placed on identifying and recovering the actual costs of supplying each user or user group. Although tariff policies concerning water for industrial, domestic and agricultural use have evolved over decades, the first significant formal directives on tariffs arose from this Recommendation 38.

6.1.3 Water Research Act No. 34 of 1971

The Water Research Act (WRA), Act No. 34 of 1971, gives power to the Minister, with the concurrence of the Ministry of Finance, to set tariffs in respect of water research charges levied on quantities of water supplied, or made available for use, for various purposes. This Collection Strategy contains the objectives, methodology and implementation strategy for setting and collecting water research charges for purposes of funding water-centred Research and Development (R&D) on behalf of the South African water sector and the nation. The charges are paid into a national Water Research Fund and used by the Water Research Commission (WRC) to fund water-centred Research and Development (R&D) on behalf of the nation.

One of the key objectives of the collection strategy is to maintain levels of charges consistent with efficient and effective generation, dissemination and use of knowledge products required to sustainably manage South Africa's water resources, effectively deliver water services to all citizens and efficiently and beneficially use our limited water supplies.

Water research charges are currently only levied on water that falls under the abstraction related use category, and not on the non-consumptive and waste discharge related uses. The payment of these charges was based on quantities of water supplied, except in the case of irrigation water use, where a lot of the water supplied is not metered. In that case, the charge were levied on the area (hectares) of scheduled irrigation land on Government water schemes and schemes falling under Irrigation Boards. The aim however, was to phase in the payment of these charges on the basis of registered or licensed water use (water made available).

The way that the charges are set is such that the 2003/04 tariffs, which were themselves set on the basis of the R&D needs of the water sector, formed a baseline from which the inflation rate would be used to escalate the charges. DWA is responsible for collecting these charges from the relevant water management institutions and for paying these over to the WRC, and for this service, the WRC pays DWA a commission.

For the time being, these charges are only levied on domestic & Industrial and the Agriculture sectors. However, resource-poor irrigation farmers are exempt from the payment of water-research charges for an initial introductory period of five years or as otherwise negotiated.

6.1.4 1984 – 1995: White Paper on Water Tariffs WP N-'84

The 1970 recommendations were found to be sound but in need of refinement. As a result a reinvestigation of tariffs, rates and subsidies was conducted, which led to the adoption of the White Paper WP N-'84 of 1984. The White Paper contained some guidelines for water costing, pricing and payment. Some important recommendations came from the White Paper.

6.1.4.1 Cost Recovery

It was pointed out that the recovery of the full costs of a scheme from its users ignored the advantages which devolved upon other beneficiaries as a result of the development of infrastructure by the State. The result was that the principle of recovering the full cost did not form the only basis for determining tariffs. However, water from government water schemes was supplied at scheme-related tariffs, the redeemable costs of each

independent scheme being borne by its own consumers. A comprehensive determination of the potential on each scheme by the Department of Agriculture and Water Supply and the characteristics of each water supply system would be used to rectify the considerable anomalies which exist in the tariffs applicable to different schemes and to determine the final minimum tariffs. Where scheme level tariffs were too low, existing tariffs would be increased annually in increments that would make it possible for them to reach the predetermined tariff within a reasonable period. The recovery of at least the annual operating costs was a prime objective

Each White Paper on the establishment of a Government water scheme tabled in Parliament in terms of section 58 of the Water Act, 1956, would show how the capital costs of the project is divided between services to the various consumer sectors and what the expected socio-economic benefits are. It would identify any portion of the capital cost that would not be redeemed. Capital costs assigned to objectives such as flood protection, recreational use and the generation of socio-economic benefits would be deducted from the total cost to obtain a divisible capital sum on which to base water supply tariffs.

6.1.4.2 Ceiling tariffs

The ceiling tariff for each scheme is the maximum tariff that irrigators would be charged. It was to cover two-thirds of the annual interest and redemption charges of that portion of the capital cost which is assigned to irrigation, plus the full operating costs for supplying the water in a particular year. The operating costs were to increase with inflation. A White Paper for a new scheme would indicate the ceiling tariff and the proposed initial tariff, which was related to affordability.

DWA continued to determine water rates on an annual basis. Water rates on each scheme lied between the minimum and ceiling tariffs, on the condition that the water rates have to at least keep pace with annual increases in operating costs.

During this period the policy was not strictly adhered to. Where charges were very low, they were increased by 100% in some cases to catch up with other schemes. In the case of Wagendrift Dam tariffs were increased from R2.00 per ha to R4.00 per hectare. This caused a public outcry and the Minister made a ruling that increases in tariffs would not exceed 20% per annum. During the so-called anti-inflation drive in the late 80's charges were not raised and in many cases operation costs were still not recovered by the mid-1990's

6.1.4.3 Transfer of schemes to irrigation boards

The White Paper advocated that the State limit itself to the supply of bulk water and the operation of dams and other main components of schemes. Due to the high operating costs of comprehensive schemes and the idea that irrigators could potentially operate and maintain at least the secondary distribution systems under the control of irrigation boards, DWA had previously encouraged the devolution of authority, but with little positive reaction from the private sector. It was recommended that DWA vigorously pursue the aim of transferring the operation of Government water schemes that supply agricultural water to irrigation boards. The boards could be assisted in their effort to raise tariffs by being granted special transitional subsidies over a period of up to five years.

The operation and maintenance function of all agricultural orientated schemes in the Western Cape were transferred in the years that followed. Only the Hex Valley Irrigation Board opted for the option to purchase the distribution scheme at a determined amount as a loan from DWA. With the transfer of the operation and maintenance functions of agricultural schemes, or components thereof, a subsidy of up to a maximum amount equal to the difference in the cost of O&M and the revenue through tariffs was paid in the first year. In subsequent years the operating subsidy was reduced such that it fell away after a period of 5 years (decreasing by 20% of the first year's subsidy per annum).

6.1.5 1995 – 1999: Operation and Maintenance Cost Recovery

Negotiations were concluded in 1995 with the South African Agricultural Union (SAAU) on a strategy for tariffs to be imposed on State irrigation schemes. This strategy was based on the following principles:

- Full recovery of operation and maintenance (O&M) plus catchment management costs, plus
- A surcharge on the above costs to counter under-recovery during droughts, plus
- An agreed upon amount to cover future replacement, betterment and drainage works costs. Prior to the construction of any betterment or drainage works, negotiations regarding the repayment would have to be carried out on an ad hoc basis with the respective Advisory Committee or Irrigation Board.

To give impetus to implementation of the strategy, it was further agreed that tariff increases would be gradually and uniformly effected from 1996/97 onwards on the following basis:

- The full recovery of annual operating, maintenance and current drainage/betterment costs, plus a 10% surcharge had to be reached within 5 years at each scheme, i.e. by the end of the 2000/2001 financial year.
- The following catchment management costs would be added to O&M costs: abstraction and storage control, afforestation permit control, the Working for Water Programme (subsidised by 90% as a result of subsequent representations to the Minister) and water weeds control.
- Increases for 1996/97 would be based on one-fifth (20%) of the difference between the estimated 1996/97 costs plus 10% and the 1995/96 tariffs. For the following four years, the increases would be based on one-fourth, one-third, half and full recovery of the corresponding differences between costs and tariffs as recalculated annually.
- On schemes where the current tariffs already exceeded the following year's costs plus 10%, tariffs would remain at the current level.
- A maximum annual increase of 50% on the current tariffs would apply.
- To give impetus to implementation of the strategy, it was further agreed that tariff increases would be gradually and uniformly effected from 1996/97 onwards
- Tariffs would also not be decreased in any year

The determination of tariffs followed more or less these agreements with the exceptions that the catchment management costs were not added to O&M costs. This was only recovered with the introduction of the catchment management charge in 2002.

6.1.6 National Water Act No. 36 of 1998 (NWA)

The main economic tool provided for and established by the National Water Act (NWA) is the pricing strategy for water use charges. The Act gives the Minister the power to, with the concurrence of the Ministry of Finance, establish a pricing strategy for charges for any water use within the framework of existing relevant government policy. The pricing strategy may contain a strategy for setting water use charges for funding water resource management, water resource development and use of waterworks, as well as achieving the equitable and efficient allocation of water.

The NWA also, importantly, gives the minister the power to give financial assistance to any person for the purposes of achieving the objectives of the Act. This financial assistance can be in the form of grants, loans or subsidies, which may be made subject to such whatever conditions the Minister may set.

6.1.7 1999 – 2007: Pricing Strategy

After extensive consultation between 1997 and 1998 a new pricing strategy was established in November 1999 in terms of the National Water Act of 1998.

6.1.7.1 Guiding Principles of the Pricing Strategy

The pricing strategies that have been developed, refined and implemented in South Africa have been guided by four objectives considered to be of principal importance by the government – social equity, ecological sustainability, financial sustainability and economic efficiency. Together, these four objectives result in the need to ensure that water pricing strategy achieve the following:

- Water use charges coupled with the granting of financial assistance must contribute to social equity and redress of the imbalances of the past, both with respect to equitable access to water supply services and direct access to raw water
- Water needs for the effective functioning of aquatic ecosystems must be protected. The water required for the ecological reserve must be safeguarded and the cost of managing the Reserve must be paid for by all registered and billable users
- In order to ensure financial sustainability adequate revenue must be generated to fund the annual cost related to:
  - The management of the country's water resources.
  - The operations, maintenance and refurbishment of existing Government water schemes.
  - The development of augmentation schemes
- The price of water is set to reflect its scarcity value, to ensure firstly that water is conserved and secondly that some water used for low-value purposes is redirected to alternative high value purposes

6.1.7.2 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. A differentiation between infrastructure to meet social and commercial demand can be made. Typically the former is funded on-budget from the fiscus with charges being set to recover operational and nominal asset costs. Infrastructure for commercial demand on the other hand is funded using commercial off-budget finance with charges being set to recover the full financial cost of operation and debt repayment. Some infrastructure for commercial demand is developed on-budget to promote economic development, but the charges to commercial users are then negotiated at the full financial cost (equivalent to off-budget financing).

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. There is an interesting case in which the Berg River Project to supply the Cape Town metropolitan area with water was classified as commercial, despite a portion of the demand being driven by population growth in poor settlements. The classification as commercial was a result of the Cape Town City Council having access to national basic service grants for these settlements and the ability to cross-subsidise costs of servicing poor communities from wealthier users.

The classification of the type of water use as social or commercial demand is at the sole discretion of the Minister, but there is no clear definition of what constitutes social use. In general, social use is seen to be water for disadvantaged communities that cannot afford to pay the costs of the infrastructure.

6.1.7.3 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.

Agricultural irrigation charges may be reduced in times of drought in accordance with the percentage restriction required by DWA.

In 1997 the White Paper assumed the national water resources infrastructure asset were about R20 billion, in 2004 the asset were 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 more recent asset inventory was completed. This obviously has significant implications for the depreciation and ROA charges, but poses a problem because increases in infrastructure charges are capped (by the 2007 pricing strategy) 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".

6.1.7.4 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 state-owned intermediary (Trans-Caledon Tunnel Authority – TCTA). The 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, as well as financial strain to end users or unhealthy financial balance in the water sector.

6.1.7.5 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. These are charges upon the land and successors-in-title stay liable for unpaid charges.

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 some of these debts by farmers over the past decade. Although banks are willing to provide loans, the viability of the projects and revenue stream is carefully adjudicated. 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 when DWA insisted that all money collected be paid to them first, with the Association/Board only being remunerated later. This could result in significant delays in payment which was of concern to the agent. In addition, the Associations/Boards would be "jointly and severally liable" for an outstanding debt although DWA will provide administrative and legal support in difficult cases. Delays were experienced from DWA to finalise agreements, but this has now been sorted out.

Where functions to perform water resource management functions have been delegated to water user associations, part of the water resources management charge can be refunded to the institution.

6.1.7.6 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.

6.1.7.7 Water Resources Management Charges

The water resources management charge was introduced to recover the governance costs in a Water Management Area, 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, and stream flow reduction activities (commercial afforestation), but in 2007 was expanded to include waste discharge related users. The waste discharge charge, however, has not been implemented yet.

6.1.7.8 Alien Invasive Plant/Working for Water Charges (WfW)

Under the 1999 Pricing Strategy, a portion of the costs associated with clearing alien invasive plants (that evapotranspirate 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/m^3 and R0.05/m^3 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 (Pegram and Schreiner, 2009: 30).

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 (PES) 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. The WfW programme was moved to the Department of Environment Affairs as of April 2011.

6.1.7.9 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 licences applications received every year (not including the current 1300 backlog). In reality, the application fee has decreased 6% to 8% over the last decade (Pegram and Schreiner, 2009: 30). The only challenge with water use licences is that the delays in their processing has been used by water users as an example of why they are of the view that they should not be paying the WRM charge. That said, water use licences can be used to leverage off the strength of private water users to extend support to the emerging crop of historically disadvantaged farmers.

6.2 WATER TRANSFERS TO AND FROM NEIGHBOURING COUNTRIES

The national water resources strategy (2004) estimates that at current usage and price levels, available water resources will be insufficient to meet demands by 2025. The projected total water requirement in 2025 will be approximately 17 billion cubic metres versus a reliable yield of 15 billion cubic metres (that is at a 98 per cent assurance of supply level).[48] To meet demands, South Africa has inter-basin transfers, and also international transfers with neighbouring countries.

South Africa shares six river basins (Incomati, Limpopo, Maputo, Orange-Senqu, Thukela and Umbeluzi) with six neighbouring countries (Botswana, Lesotho, Mozambique, Namibia, Swaziland and Zimbabwe). The water available in four of these river systems – the Incomati, Limpopo, Maputo and Orange-Senqu basins – is under enormous pressure from existing demands for water in South Africa and in the neighbouring states.[49]

South Africa is the most highly developed member of the ORASECOM partnership. Through the LHWP, South Africa receives high amounts of water from Lesotho. The total natural runoff flowing along our rivers towards the sea amounts to some 50 billion cubic metres per year (on average), of which nearly 10% originates in Lesotho. Of the total runoff, a yield of some 14 billion cubic metres is available for use through dams, basin transfers and other water resource developments throughout the country. [50]

The table below shows a comparison of the water available with current water demands in each shared river basin reveals the degree to which the available water supplies can meet demands for water.

Table 6-1: Comparison of the current (2000) and projected (2025) water needs with the current (2000) and projected (2025) quantities of water available for the four river basins shared by South Africa. (All volumes given in millions of cubic metres per year[51]

River Basin	2000			2025		
	Water Available	Water Needs	Shortfall (-) / Surplus (+)	Water Available	Water Needs	Shortfall (-) / Surplus (+)
Orange-Senqu	9 568	9 208	360	10 816	11 579	- 763
Limpopo	2 585	2 771	- 186	3 778	3 703	75
Incomati	723	972	- 249	837	1 017	- 180
Maputo	847	468	379	849	480	369
Total:	13 723	13 419	304	16 280	16 779	- 499

[48] Local Government Budgets and Expenditure Review, 2011

[49] Ashton J.A. et al. Changes In Water Availability And Demand Within South Africa's Shared River Basins As Determinants Of Regional Social And Ecological Resilience

[50] Governing Board Induction Manual, Ch 1: Overview of the SA Water Sector

[51] ibid

6.3 IMPLEMENTATION OF ECONOMIC INSTRUMENTS

6.3.1 Market Based Approaches

6.3.1.1 Water Markets and Water Trading

Introduced on the late 20th Century, the South African system of water rights allocation is considered to be one of the most advanced frameworks in the world. The water rights that are granted to users cover a finite period, and can be revised should the water catchment be over-allocated. Under the framework, both permanent and temporary trading is permitted. Although the system is well designed, water trading is only practised at small volumes, and only at selected locations. The LHWP is the most successful water trading initiative in the country. The Water Act of 1998 provides protection to the environment, and this must be considered when allocating water rights in catchments.

Water rights are historically connected to land that is located adjacent to water resources. The water rights are allocated as a means of ensuring distribution of water and ensuring reallocating scarce water supplies; in periods of water shortages, all abstraction allocations are decreased, with no users obtaining preferential treatment. Water rights are typically transferred from low-value uses to higher-value uses.

The Lower Orange River is one area where there is evidence of water markets and water trading. Although the river is a water scarce resource, and development and production is dependent on irrigation and agriculture, it has one of the highest instances of water trading in the country.

A survey of irrigation farmers along the Lower Orange was conducted in November 1997. A follow-up survey was undertaken in the Lower Orange River during 2003/2004, where an active water market has developed. Market development for this particular category of irrigation water rights can be attributed to the scarcity of water in this arid region and an increasing demand for river water rights by table grape farmers wanting to expand production. The large number of willing sellers and the role played by the DWAF in administering market transfers, thereby reducing transaction costs and time, facilitated market development. Improving the efficiency of water market trades could be achieved by delegating authority to the regional office of the DWAF to approve transfers, extending support to market transfers of canal water, and ensuring that water extraction is closely assessed as use of river water increases in future.[52]

6.3.1.2 Water Banking

There are no water banking institutions available in South Africa.

52 Nieuwoudt W.L. and Armitage R.M., 2004. Water market transfers in South Africa: Two case studies. Water Resources Research, Vol. 40

6.3.1.3 Water Pricing

IMPLEMENTING THE WATER PRICING STRATEGY

With regards to the actual implementation of the pricing strategy so as to ensure that the guiding objectives are achieved, some guidelines on how water prices would be determined were developed. It was agreed that tariff increases would be gradually and uniformly effected according to the previous agreement.

Total existing tariffs would be increased gradually to reach full recovery of the South African Agricultural Union (SAAU) negotiated costs (envisaged by March 2001). The maximum annual increase of existing tariffs will be limited to 50% of the previous tariff during this period. Tariffs would also not be decreased in any year.

It was intended that all management, operating, maintenance and current refurbishment costs, together with certain water resource management costs plus a 10% surcharge, would be recovered in respect of existing Government schemes by March 2001, by gradually phasing out the subsidy over a five year period. This policy has been adhered to, but only a few users have been able to achieve the goal of full cost recovery.

From April 2001, a depreciation component of water resource development costs was added to the charge. The depreciation component was to replace the obligation to pay for the future replacement, betterment and drainage costs in terms of the former agreement.

The water resource management charge was introduced in April 2002. The aim was to reach full recovery of water resource management costs using a phased approach. The catchment management activity costs relating to water conservation (invasive plant and water weed control) and water utilisation (storage, abstraction and afforestation permit control), plus a 10% surcharge (to account for under-recovery of costs during drought years), would be phased in.

The agreement reached with the SAAU made provision for the allocated costs for the Working for Water Programme (water conservation) to be subsidised by 90% due to the fact that this activity would only increase the assurance of supply to this sector and would not make additional allocations possible. Only approximately 15 to 20% of the Working for Water funding was derived from the trading account and allocated to be recovered from charges. The balance was obtained from poverty relief funds and not subjected to recovery from water user charges.

The way the charges were set up later were such that only users who benefitted from the project were charged the unsubsidized portion of the project and those costs were determined on a project by project basis in consultation with the users involved. The Working for Water project has been moved to the Department of Environmental Affairs.

INFRASTRUCTURE CHARGES

The Department calculates the infrastructure 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 by the department only until the debt has been repaid whilst the capital repayment is done through the agreement with the financiers.

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.

CAPITAL UNIT CHARGE

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 a revenue agreement with TCTA, which provides a 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. The O&M charge on off-budget infrastructure is payable to DWA or the appropriate operator of the 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 DWA 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 of balancing tariffs between schemes, ensuring stable tariff regimes and optimising the yield of the system as water abstraction is not based on financial considerations of respective tariffs, but has not been expanded to the calculation of infrastructure charges.

WATER RESOURCES MANAGEMENT CHARGE

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, while excluding some functions for forestry (such as dam safety and Working for Water). Only approximately 15 to 20% of the Working for Water funding is derived from the trading account and allocated to be recovered from charges for irrigation water users. The balance is obtained from poverty relief funds and not subjected to recovery from water user charges. Urban-industrial users are paying the full allocated Working for Water cost whilst Agriculture only pays 10% of the allocated cost.

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 Catchment Management Agency (CMA) costs related to management of water resources in the Water Management Area (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 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 (Pegram and Schreiner, 2009: 28). Most of the water user associations and irrigation boards are paying these charges on behalf of their members and recover that through their charges. Municipalities are paying the charges for all water use within their distribution systems.

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 WRC. 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.

All water users from Government Water Schemes and within Irrigation Boards/Water User Associations and Municipalities have to pay the WRC levy and the task of billing water users for the WRC levy and collecting it lies with DWA. The only exceptions to this are the Rand Water Board and the Umgeni Water Board, both of which are billed by the WRC and payment is collected by the WRC as well.

WATER USE CHARGE SYSTEM

Government's objective is to ensure that all South Africans have access to basic water services. A basic water supply service refers to the infrastructure necessary to supply 25 litres of potable water per person per day from a source within 200m of a household and with a minimum flow of 10 litres per minute (in the case of communal water points) or 6 000 litres of potable water supplied per formal connection per month (in the case of house connections). [53]

The tariff charged by water boards to municipalities is regulated by the department. Several factors influence the tariffs that each water board charges. These include the actual purchase price of the raw water, the methods and cost of the purification of water and the cost of the capital investment requirements of the water board. The average bulk price charged by water boards will be approximately R5.12 in 2011/12. The highest bulk water tariff for 2011/12 is R10.07 per kl by Namakwa Water, while the lowest will be approximately R3.55 per kl for the Overberg Water Board. This partly indicates differences in the scarcity of water. These prices for treated bulk water impact directly on municipalities' retail water tariffs, as bulk water forms a large proportion of the overall retail tariff.[54]

[53] Local Government Budgets and Expenditure Review, 2011

[54] ibid

6.3.1.4 Waste Water and Sanitation 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. 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.

Government's objective is to ensure that all South Africans have access to basic water and sanitation services. A basic sanitation service refers to the provision of a basic sanitation facility which is easily accessible to a household, and the sustainable operation of the facility. This includes the safe removal of human waste and wastewater from the premises where this is appropriate and necessary, and the communication of good sanitation, hygiene and related practices.[55]

Municipalities need to take a number of issues into account when setting appropriate tariffs for sanitation. The servicing of on-site sanitation systems is not a monthly activity and is also highly dependent on the type of sanitation system installed, the households' responsibilities for maintaining the system and the accepted final disposal method of the wastes. An investigation of the emptying of pit latrines, for example, has indicated that these should be scheduled for emptying once every five to eight years and will cost between R600 and R1 200 each to empty (2007 prices). The approach to collecting tariffs for providing such a service may either be built into the water bill, to charge a fee for emptying or a number of other alternatives. [56]

[55] ibid
[56] ibid

6.3.2 Payment of Environmental Services

South Africa has numerous examples of successful payment of environmental services (PES) practices, such as water users paying for clean water that is provided by state utilities, or community based catchment management programmes.

6.3.2.1 Working for Water Program

The South African Working for Water (WfW) Program is the largest single natural resources based project in the country, and was conceptualized with the aim of improving natural resource efficiency. It was conceived in 1995m and was initiated as a public works program, with the dual function of controlling invasive species and providing social upliftment. Funding is obtained from the national government, and the goal of the project is to sustainably control invasive alien species by 2020.

The success of the project is widely known throughout the country, and is thus in great demand. This is mainly due to the fact that the project considers both environmental and social issues, with the focus being on improving water delivery. The project is also supported by three similar projects, namely the Working for Wetlands, and the Working for Woodlands projects, which engage habitat restoration in wetlands and forests, as well as the Working for Fire project which promoted the safe use of fire.

6.3.3 Effluent and Pollution Charges

In addition to the above systems, the Department of Water Affairs has also developed a wastewater discharge charge system that works on a 'polluter pays' principle. The aim is to recover the costs associated with different wastewater treatment and water quality management programmes and to provide incentives for large water users to treat their waste in-house rather than discharging it untreated into a water resource. The major sources of direct pollution include industrial effluent, domestic and commercial sewerage, acid mine drainage, agricultural runoff and litter. These pollution charges will be payable by polluters who exceed certain pollution load standards.[57]

6.3.4 Corporate Engagements, Partnerships and Funding

6.3.4.1 Water Stewardships: Emfuleni, Sasol and GIZ

The Emfuleni Local Municipality experiences annual water losses of about 44% of total water, which amounts to 36 million m^3. In addition to threatening the supply of water, business and economic development was also affected and exposed to high water shortage risks. The municipality did not have the necessary financial resources, capacity, or necessary instruments that were required for curtailing the losses. Extensive infrastructure upgrades were required to ensure water conservation and supply and demand management. Referred to as the Boloka Metsi project, funding was obtained from Sasol and the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH (on behalf of the German, British and Australian governments).

[57] ibid

The partnership focused on initiatives that were aimed at reducing physical water losses in identified areas. In addition, initiatives also focused on water conservation awareness, and the development of community plumbing bodies. The savings in drinking water and energy costs, as well as the additional revenue obtained from the increased water availability, will be invested for further development of water resources.

6.3.4.2 Water Futures Partnership: WWF and SAB

The Water Futures Partnership in George was a collaboration between SAB, WWF and GIZ. The aim was to bring together key stakeholder in the water-risk sector, which would assist in identifying possible water risks facing SAB in the hops industry located in George in the South-Western Cape. As hop is a critical ingredient for beer, it was essential for SAB to ensure that water risks were properly addressed.

The project focused on identifying the local hydrology, climate change patterns, socio-economic development and agricultural impacts. With the assistance of WWF, CSIR and local stakeholders, a water risk assessment was undertaken, by considering consequences from likely future scenarios. Recommended actions which will assist SAB in adapting to the water risk will enhance its resilience of operations in the George area and, through proper implementation of the recommendations, SAB will mitigate future water risks. The rehabilitation of the hydrological and ecological functionality of the Waboomskraal and Herold catchments will result in economic and water resource benefits to the region.

6.3.4.3 Public-Private Partnership: Emalahleni Water Reclamation Plant

The Emalahleni Water Reclamation Plant, which is located in Mpumalanga, is a public-private partnership between Anglo Thermal Coal, BHP Billiton and the Emalahleni Local Municipality. Situated in Witbank, the plant was initiated to prevent polluted mine water from transferring into the environment and rivers, and provide a sustainable solution that benefits the local communities residing in close proximity to the mining operations.

By utilising advanced water purification technologies, the plant desalinate volumes of about 25 ML of water per day, most of which is pumped to the Emalahleni Local Municipality as potable quality, thus meeting some of the daily water requirements. As the municipality has previously struggled to meet its water needs, the plant will assist in industrial, commercial and residential growth. The plant has also created employment opportunities for local residence.

6.4 EVALUATION, SYNTHESIS AND RECOMMENDATION

South Africa has fairly robust charge determination structures and processes. The challenge that South Africa faces is that of full and proper implementation of policy. For many years now the country (through DWA) has been attempting to achieve full cost recovery from those users who can afford to pay the full cost of supplying water to them. However, the irrigation sector (the biggest water user in the country) and the forestry sector continue to have their water use highly subsidised. To a large degree, the failure to follow through on attempts to put in place the envisioned transition to full cost recovery is the high level of stakeholder participation in the charge determination processes. There also needs to exist stronger political will to move towards full cost recovery in South Africa.

Another major hurdle towards full cost recovery is that some of the charges are in fact not based on the cost associated with the service they are intended to cover. An obvious and easy example is the ROA charge described above. It is in no way related to the actual cost of developing new social infrastructure, though the revenue collected from it is intended to pay for the cost of their development. A proper alignment of the charges with actual/expected costs of service provision would be an important change for the water sector in South Africa.

In addition to these two challenges, the responsible WMIs in South Africa face significant difficulty in collecting revenue from billed users. This is due to a combination of a number of things including:

- The requisite capacity does not always exist in those institutions tasked with collection
- Some of the water users cannot afford the charges set for their water usage, and
- Municipalities do not always use their unconditional water grants to pay for the water they buy from the service providers

These and other reasons necessitate the augmentation of the water sector budget by the national government to ensure the continued proper functioning of infrastructure and service provision.

6.4.1 Realignment of Charges with Costs

For the most part the South African Water sector structure regime aims to ensure that the actual full cost of providing that particular service is reflected in the charges set. However, in a few cases, the determination of charges is not necessarily aligned with the actual cost of providing the service or executing the task that it is intended to execute. The depreciation charge for example is meant to generate the revenue used to cover the costs of infrastructure refurbishment. The charge is however calculated on the basis of the accounting formula for depreciation. Though this is sound from an accounting point of view, it is not in keeping with the user pays principle as the revenue generated may be higher or lower than the actual refurbishment needs of the water sector. The same can be said of the ROA charge and its calculation.

Given the avoidance of charges more associated with the economic or market related value of water, it is important that all charges align with the chosen principle of full cost recovery. This can achieve multiple objectives at once. Users will better understand the design of the charges and their intended use, as well as making it possible for interested parties to monitor the use of the revenue generated through those charges against specific functions. In any given year, the charges should be set against the projected costs of executing the task for which they are set aside. In cases where too much or too little revenue is collected, the difference can be passed onto the following year.

6.4.2 Use of Targeted Subsidies

The department of water affairs in South Africa extends fairly blanket water subsidies to the irrigation and forestry sectors through the use of various caps on water related charges to those sectors. There are a number of fundamental issues associated with this practise. It is not in line with the principles of the country's pricing strategy, there is no known justification for this practice and it tends to lead to the subsidisation of the rich by the poor, as well as that of commercial water usage by domestic users.

Social equity and redress are key principles of the pricing strategy. However, in order to achieve this, subsidies must be designed specifically for achieving goals associated with this and distributed accordingly. Extending a subsidy to all farmers is a costly exercise that does not the goals of these associated with these principles. There is an argument to be made for the idea that the blanket subsidies further entrench the economic patterns of the past. The design of subsidy mechanisms in South Africa must include the developed of a guideline for the identification of water users who qualify for such subsidies. This will lead to the generation of much needed revenue and the realignment of users to the costs associated with their water use, while simultaneously protecting the poor who cannot afford the charges.

6.4.3 Capacitation of Institutions

In order to properly implement the policies in the water sector, more capacity must be built into the system, both in terms of additional skills for those currently working in the sector and the addition of more people into the sector. This will require a combination of talent identification, training and sufficient compensation to compete with the private sector.

One of the major challenges in South Africa has been the loss of talent within the public water sector to the private sector. There has been a loss of institutional memory for the purposes of intergenerational training and continuity in management of the sector. The general skills shortage in South Africa is also putting strain on the sector. The few qualified candidate are in high demand and tend to work where they are well compensated.

In order to combat this challenge, specific training programs must be implemented for those who are still in the sector at the moment to ensure that they are able to execute their functions with distinction. These up-skilled employees must then be adequately compensated to ensure that they remain within the public water sector, while those outside the public service are attracted in.

7 Synthesis of Economic Approaches

The range of economic instruments and tools available for the water sector is quite broad. It includes various instruments for funding water management and development, water markets where trading can occur, regulatory institutions and operations, funding from external as well as various demand and supply management tools. It should however be recognised that the economic approaches and economic tools to water management that a country may employ is largely dependent on its level of development. This is because the level of development influences the country or region's requirements for water resources management, ranging from developing infrastructure, strengthening institutions, or developing instruments or tools.

In underdeveloped countries, infrastructure development is not advanced. This means that the investment in infrastructure is a higher imperative than the advancement of institutions, or the development of tools. The advancement of institutions or the development of tools would also not succeed if they are not supported by well-developed infrastructure.

In developing countries, while the infrastructure is often well developed or in the process of being developed, the institutions are often not advanced and thus the governance structures are not able to cope sufficiently with the water resource requirements. Instruments and tools are often not successful as they are not well managed.

In developed countries, the infrastructure is well developed, and the institutional environment is advanced. Therefore, the approach to efficient water management requires the development of instruments and economic tools at a local, regional and national level that will support efforts. This is possible as the developed infrastructure, and the strong governance environment that exists allows the instruments and economic tools to be properly administrated and the equitably distributed between water users in the system.

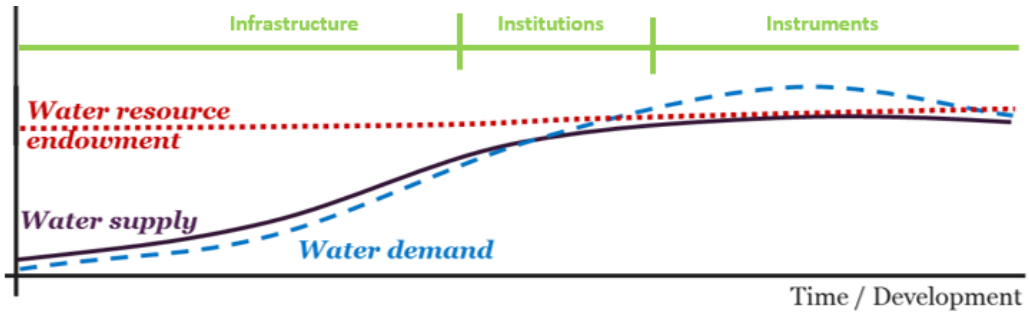

Figure 7-1: Water Management Requirements at Different Stages of Development

The country wide assessment above is also applicable to the regional and local context. At a country level, varying levels of development exist within the country, and therefore different instruments and tools would successful in different regions, catchments or river basins. This is also true for transboundary basins, as the countries have varying level of development. Therefore, what may be successful in one country, will not necessarily be successful across the basin due to, for example immature institutional structures.

As the Orange-Senqu River Basin is a transboundary basin, ORASECOM needs to recognise that the countries in the basin are at varying levels of development, both at a national scale and at a local scale. The water resource management strategy which the institution employs should therefore recognise that:

- Levels and nature of development trajectories determine the water resource management requirements.
- Water resource endowment, infrastructure and governance structures influence water resources by either mitigating or exacerbating impacts.
- Economic development enables opportunities to achieve water resource goals.

7.1 Advantages and Disadvantages of a Regional Approach

Regionalisation, if approached and managed appropriately, offers the opportunity to overcome national constraints. It offers local level water resource management across the basin, and enables economic and infrastructural development, effective river basin management, and trade and consumption to promote water efficiency. Through choosing adequate approaches such as water charges, water markets, trading or funding, ORASECOM can ensure that the region will achieve economic development, efficient water use and regional infrastructure and institutional development.

The regional approach does however have some disadvantages. Water trading, for example, is often easier to implement at a country level where overall development objectives are foremost, and also at a local level (catchment or river basin level) where water use efficiency and local economic development objectives are foremost. Trading between different countries, may result in numerous, sometimes perverse challenges, as countries trade their water rights for economic gain before meeting social needs of their country. The trade agreement between the different countries needs to be reasonable to both parties, and should promote equitable access to the resource. Changes in the development trajectories in the individual countries may impact the infrastructure, institutional advancement, and water requirements in the specific countries; infrastructure development and institutional advancement will impact the preferred pricing methodology, while an increase in development will increase the water needs in the country, resulting in less water being available for trade. It then becomes essential to consider what the country has to gain or lose by implementing the suggested instruments or funding mechanisms. This then alters the sovereignty of the country, as well as the country risk dynamics.

As a regional entity, ORASECOM therefore needs to acknowledge that the development trajectory, infrastructure development, institutional strength and maturity of governance structures, at both a regional and national level across the region.

7.2 ALIGNMENT AND HARMONISATION OF INSTRUMENTS AND TOOLS

As explored in the earlier parts of this report, there are various different instruments and tools that can be implemented to promote efficient water use. These instruments can ultimately be categorised into two broad groups, namely:

- instruments to influence behavioural change, and
- instruments to promote development and funding interventions.

The ultimate aim of the instruments is to use water efficiently, to gain financial resources, and to use resources to promote infrastructure and institutional development and the effective implementation of instruments. It is important that instruments are focused at the local and regional level, and to ensure that the instruments are applicable to that basin. In addition, instruments should be within reach or independently implementable by the local institutions (e.g. municipalities), and should promote development at the basin.

It is hard to implement generalised strategies as they may not consider the local context. Depending on the size of the initiatives, the instruments may be enforced and implemented at a local level. As buy-in and participation from local institutions is required, the local capacity to implement the instrument should therefore be considered. This includes the local infrastructure, institutional and resource capacity, as well as the maturity of the governance structure.

ORASECOM should recognise that although economic instruments are mandated at a country level, they are implemented at a local level. For example, the enforcement of behavioural change instruments is achieved at a municipal level, and not at a country level.

As a regional and transboundary entity, ORASECOM should seek to influence economic approaches in the different countries, and not seek to enforce or drive them. It is also imperative that the harmonization and alignment of instruments across the different countries is promoted. This will be easier to achieve if ORASECOM acts as the enabling entity and promotes the alignment of the behavioural instruments that are implemented. Instruments to promote funding interventions should however be focused on the local context to promote the development of the area.

7.3 THE ORASECOM APPROACH TO FUNDING AS AN INSTRUMENT

7.3.1 Overview of Funding as an Economic Instruments

Funding institutions are structured in various ways, depending on the ultimate function of the institutions. The institutional arrangement of the fund therefore depends on whether the function of the institution is to provide funding, or to become a collective investment scheme or vehicle. The distinction between these two arrangements is significant. The former definition refers to a financial arrangement through which finance is received, administered and disbursed, whereas the latter refers to an institutional arrangement that has strategic, governance and accountability implications.[58]

The institutional arrangement will ultimately define the governance and strategic direction that the institution employs. If the Fund is simply to be a financial vehicle for the collection, management and disbursement of finances, and supports fund accounting, the fund is a bank account or a ring-fenced line item within an existing account. A separate institution is responsible for the account, and develops a strategy according to which funding and disbursement is undertaken. This separate institution is accountable for the fund, assumes the risk associated with the fund and performs all the management and administrative functions associated with the fund. If the Fund is an institution in its own right, established as a legal entity with a governing board structure and management capacity, the fund requires a strategy for the institution, including sources and disbursement of funding, and is accountable for the implementation of that strategy.[59]

Therefore, funding through ORASECOM can be implemented in various manners. The ORASECOM Fund could either be a vehicle through which external organisation (countries, companies or donors) provide funding, and then ORASECOM distributes the funding, or the ORASECOM Fund could be an enabler of project funding, and will be accountable for the actual projects. The governance and strategic direction that the institution employs will ultimately depend on the institutional nature of the Fund.

7.3.2 Implementation of an ORASECOM Fund

The ORASECOM Fund should be mandated at a national level. This will ensure that the sovereignty of the country is maintained. In order to ensure that the fund is successfully implemented, the fund should be administered at the appropriate level. This will ensure that at that level (i.e. country, regional, local), projects and initiatives that require funding of projects and initiatives will be administered by ORASECOM, with the support of government.

58 Pegasys, 2009. Feasibility Study for the Development of a Mechanism to Mobilize Funds for Catchment Conservation. Business Case for the ORASECOM Conservation Fund.

59 ibid

7. SYNTHESIS OF ECONOMIC APPROACHES

Drivers for funding are different, depending on the level at which the funding is required. At a country level, the major driver for funding is ensuring development. However, at a local level, the driver for funding is development, and also ensuring supply and local sustenance. At this level, various innovations and interventions are possible, particularly through collaboration, partnerships from various members of society, such as:

- Water stewardship actions by private institutions in the areas in which they operate
- Local, provincial and national government based initiatives
- Interventions from local communities, including interventions that are externally funded by public and private institutions
- Joint interventions and partnerships between public and private institutions
- Catchment conservation through project such as the sponges project in Lesotho
- Wetland Recovery Project (WRP) risk based initiatives
- Pressure management

The decision-making process for which projects to support should be mandated through strategic direction, which should be driven by an IWRM Strategy. ORASECOM should ensure that initiatives are harmonized across the different countries. The principles of consistency in pricing strategies in the individual countries should be promoted, although pricing should also be conditional on development requirements. There is great value in an international body such as ORASECOM to align the strategies in the various countries, as it helps to improve water resource management in the river basin. In addition, since the countries in ORASECOM are at different levels of development; each country has different funding requirements. The funding that is provided by, or through ORASECOM should be adaptable, and be applicable to each country's development needs and funding requirements. The strategy employed in the country will guide the decision making process.

8 Conclusion

Across each of the four countries there exists a set of challenges unique to the particular conditions within those countries. However, there also exists some challenges that are common in all four countries. Resolving these challenges would likely lead to major improvements in the ability of the countries to manage their own water resources as well as the shared water resource.

None of the four countries have achieved the goal of full cost recovery, mainly because water charges are limited only to those water users who can afford it. Botswana, by allowing the private sector to provide for their own water needs has indirectly achieved this goal, but only by not involving government directly in the process, serving only to give permission and monitor activities. This is one model that could be followed, though it too has its challenges.

The result of this inability to achieve full cost recovery has been the inability (or at least difficulty) to generate sufficient revenue to develop self-sustaining water sectors that do not rely on government for support in the four representative nations. The reasons for this failure range from the charge calculation inaccuracy, lack of political will, to affordability concerns for users and capacity challenges within WMIs. This places an undue burden on the central governments in these countries to support the funding of costs that should be covered by users. In some cases this has also made it difficult for the water sector to attract funding from outside parties.

Another common challenge experienced across the Orange-Senqu River Basin is that of capacity deficiency. This is in the form of skilled labour, appropriate institutions, proper systems and tools, as well as a shortage of funds. Across all four countries this challenge manifests itself on some form of another.

The South African water sector is the only one of the four countries which has minimal reliance on external grants. This is a problem similar to that of over reliance on the national budget in that it is risky in cases where it is used for financing recurring costs. Financial intermediaries, development banks, commercial loans, bonds and equity structures are used to varying degrees in all four countries. There is certainly a lot of room for improved use of these instruments to ensure better alignment of costs and beneficiaries within and between generations of users, as well as for the improvement of the flow of funding into the water sector.

Each country does however have areas in which there is excellence: private sector investment in water infrastructure in Botswana, protection of the poor in Lesotho, robust legislative framework in Namibia and mechanisms for off-budget funding in South Africa are but a few examples of such areas. There is opportunity for collaboration in order to leverage these expertise between countries in a similar way that the LHDP does between Lesotho and South Africa.