Policy Brief

Findings of Botswana Water Accounts 2010-2012

December 2013

Prepared by Department of Water Affairs & the Centre for Applied Research

1 Introduction

The Botswana Government has prioritised the development of water accounts as part of the implementation of the 2012 Gaborone Declaration that endorsed natural capital accounting and in line with the 2013 Draft Final Water Policy and the final 2013 IWRM-WE Plan. This policy brief seeks to inform policy and decision makers about the main results and policy implication. The ultimate aim is to ensure that the findings are fully integrated in water management and development planning.

DWA has developed water accounts for 2010/11 and 2011/12 focussing particularly on the water flows and stocks in the country[1]. Five main policy messages have emerged and will be further discussed:

- There is an urgent need to increase water use efficiency;
- There is an urgent need to allocate water to most deserving sectors and uses;
- People's basic water needs, ecological water requirements (EWR) and water requirements of strategic sectors need to be safeguarded;
- Water bills need to be kept affordable; and
- Data need to be better collected and analysed to contribute to informed decision making.

2 Recent developments in water resources management

Increasing water supply has been the core of water resources management to ensure adequate piped water supply to the population (a Millennium Development Goal) and to sustain economic growth. The 2006 Review of the Botswana National Water Master Plan concluded that a shift was necessary towards water demand management in order to keep water provision affordable. This conclusion has led, among other to the water sector reforms (WSR) programme and the adoption of integrated water resources management (IWRM) in the Draft Final water Policy and to the 2013 Botswana IWRM Plan. The main features of each are shown in Table 1.

Category	Results and comments
Water sector reform (WSR)	• WUC has assumed overall responsibility for water provision and wastewater management while DWA deals with water resources management; • Legal and institutional frameworks – development of a Water Policy, tariffs policy, establishment of Water Resources Board and Water Regulator.
Enabling environment	• Sustainable water use and management recognised in the recent National Development Plan (NDP 10) as well as implementation of the WSR and development of large water supply infrastructure to meet the country's water needs. • **Review of the National Water Master Plan (2006**) – the plan fully endorses IWRM and calls for water use efficiency and water demand management and WSR. It also recognises water accounting as an important tool for enhancing water management in the country. • **Draft Final National Water Policy** – the policy is premised on the principles of

[1] This brief is based on the work undertaken by Department of Water Affairs (DWA) and Centre for Applied Research (CAR) under the World Bank's Wealth Accounting and Valuation of Ecosystem Services (WAVES) programme. The full report (DWA & CAR, 2013) is available from DWA and WAVES programme.

	IWRM and sustainable development with emphasis on water use efficiency, water quality, diversification, poverty eradication and managing under a decentralised catchment approach. This policy is yet to be approved by parliament. • **2013 Botswana IWRM-WE Plan** – country commitment made at the 2002 World Summit for Sustainable Development (WSSD). The plan adopts the concepts of sustainable development and IWRM toolbox and identified 10 strategic areas with 55 activities for implementation. Emphasis given to water use efficiency, water demand prioritisation and management, water quality, ecological water requirements, and benefit sharing of shared water courses.

3 Water accounting in Botswana

Botswana prioritised the development of physical use and stock accounts, while wastewater and monetary accounts will be developed later. The current use accounts adopt the United Nations' System of Environmental Economic Accounting for Water (SEEA-Water) framework. The SEEA is the international standard satellite system to the existing UN's System of National Accounts (SNA). The SNA is confined to economic data only and results in traditional economic performance indicators such as economic growth. No attention is given to what happens with natural capital such as the water resources. To counter such environmental inadequacies of the SNA, the SEEA links water resources data to the SNA.

The SEEA framework covers *stocks* and *flows* of water in *physical* and *monetary* terms and also addresses water quality issues through pollution and emission accounts. The SEEA records water information by economic sector and indicates the flows and distribution of water within the economy and to/from the environment. The standard classification of economic sectors is used (same as for the NSA; Statistics Botswana uses the revised version 3 ISIC classification).

The following water accounts have been developed at the moment:

- Physical use and supply accounts indicating:
  - ✓ Water abstraction by sector
  - ✓ Water abstraction by source of water
  - ✓ Water imports and exports
  - ✓ Water use and consumption by sector
  - ✓ Water abstraction by WUC management centre
- Physical stock accounts for WUC operated reservoirs

4 Policy implications of the Water Accounts

The findings of the water accounts generate significant policy implications for the water sector and overall economic development. The five main policy message are further explained below.

I. <u>Botswana needs to further increase water use efficiency through water demand management</u>

The 2006 BNWMPR concluded that a shift towards water demand management is urgently required to keep water affordable and avoid future water shortages. The Water Accounts show the following:

- ✓ There is an urgent need to measure the amount of outflows of treated waste water and to increase its re-use and recycling; treated wastewater amounts to some 20 to 30 Mm^3 per annum and only 10% is currently re-used;
- ✓ There is an urgent need to reduce water distribution losses, currently estimated to be around 25%. The WUC target of 15% needs to be rigorously pursued.

Re-use and recycling of treated effluent need to be encouraged to achieve the national target of 96% re-use by 2030. Currently waste water inflows and outflows from treatment plants are not measured. However the resource has increased (estimated at 27.1Mm^3 in 2003; DEA and CAR, 2006) and amount of collected wastewater will rapidly increase in future, offering growing opportunities for re-use and recycling particularly in sectors such as agriculture and mining. Presently, government is investing in irrigation schemes that utilise treated wastewater, e.g. Glen Valley Irrigation Scheme in Gaborone. However, the productivity of the irrigation schemes and their water use efficiency need to be increased.

Non-revenue water for service providers (or distribution losses) has remained constant at 25% in 2010-12. However WUC has set a target of 15% which would save 6.3 Mm^3 of water or about 5% of total water use in the country. The implementation of WUC's IWRM & WDM Strategy needs to be prioritised. As self- providers (e.g. mines and large irrigation schemes) account for more than half of the annual water abstraction, they should also report water losses in their water annual water reports to the WAB and aim to reduce such losses.

Due to lack of data, return flows are currently not captured in the water accounts, and therefore monitoring of return flows needs to be encouraged (e.g. from wastewater treatment plants and self-providers).

In-terms of water use productivity, the following indicators were generated from the water accounts:

- Value added/ m^3 (constant 2006 BWP)
  - ✓ 2010/11: 337.09
  - ✓ 2011/12: 369.41
- Formal employment (jobs/000 m^3)
  - ✓ 2010/11: 2.3
  - ✓ 2011/12: 2.3
- Formal & traditional agricultural employment (jobs/ 000 m^3)
  - ✓ 2010/11: 3.5

Combining the 2010-12 accounts with earlier accounts suggests that the output per m^3 has increased in time. This is positive and further output growth needs to be pursued.

II. Efficiency of water allocation

Given increasing water demand and limited water resources, competition for water resources is growing and it is unlikely that in future all sector demands can be met. This requires careful and informed allocation strategies prioritising most beneficial (e.g. strategically or livelihoods) and productive (e.g. value added or employment) sectors.

The water accounts show that overall water use has been stable over the two years at 173 Mm^3 in 2010/11 to 172 Mm^3 in 2011/12. Similarly, freshwater abstraction is fairly stable at around 195 Mm^3. Water flows within the economy are shown in Figure 1. The agricultural sector, livestock and irrigation,

is the highest water user (43 and 44% in the two years respectively) followed by households and mining sector. Self-providers use more than half of the total water used in the country and they require more attention in DWA's water resources management efforts. Mining, electricity generation and irrigation are likely to seriously compete for water in future and therefore allocative efficiency needs to be prioritised.

Continued neglect of allocative efficiency will carry high costs when water scarcity is increasing. It is therefore recommended for example, that the use of water from the Chobe/Zambezi water allocation (495 Mm^3 per annum) needs to be carefully considered by government and decided upon. Generally, allocation should prioritise sectors that are of strategic importance and/or contribute to sustained economic diversification and growth, poverty reduction and food security. The WA results should be used as inputs into the water allocation decision making process. The National IWRM-Plan recommends the development of water allocation efficiency guidelines (among others) for DWA and the Water Resources Board.

Water demand management needs to be improved in sectors that have high water use and their productivity be improved. Water use, value added and formal employment creation by sector are shown in Figure 2. The agricultural sector uses a high proportion of water and creates low value added and formal employment (the picture only changes marginally if informal employment is included). This poses a water management challenge, where agriculture competes for water with other sectors. This is generally not the case for the livestock sector, with boreholes scattered over the country with no or few competing uses. However, competing water uses exist for the irrigation sector, and need to be carefully considered.

In contrast with the agricultural sector, the service sectors generate relatively high outputs and employment per m^3 used, and therefore are attractive sectors for economic diversification from an IWRM perspective. Clearly, water resources comparative disadvantages need to be factored into economic diversification and trade policies.

Figure 1: Water flows within the economy (Mm^3; 2010-11)

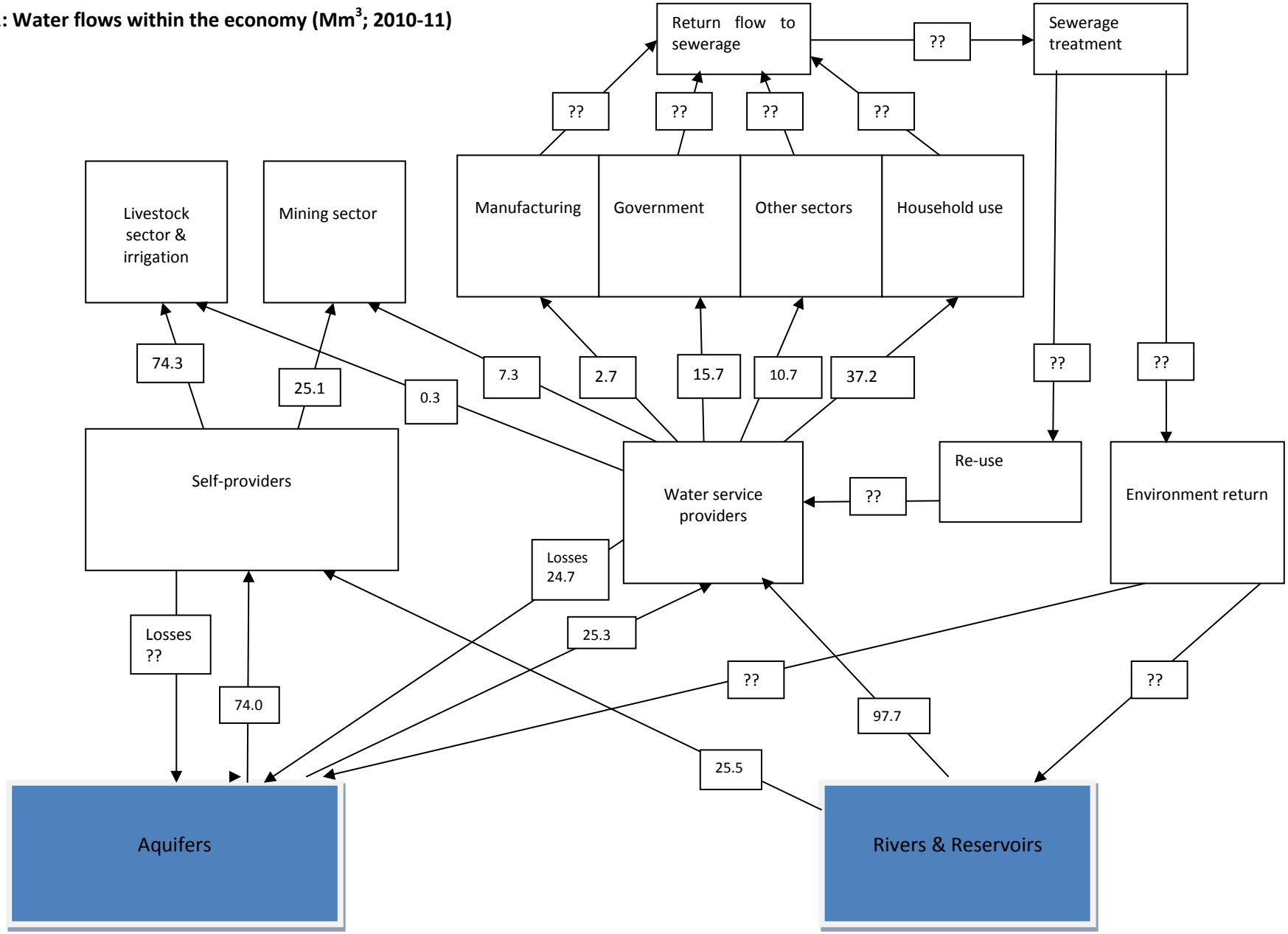
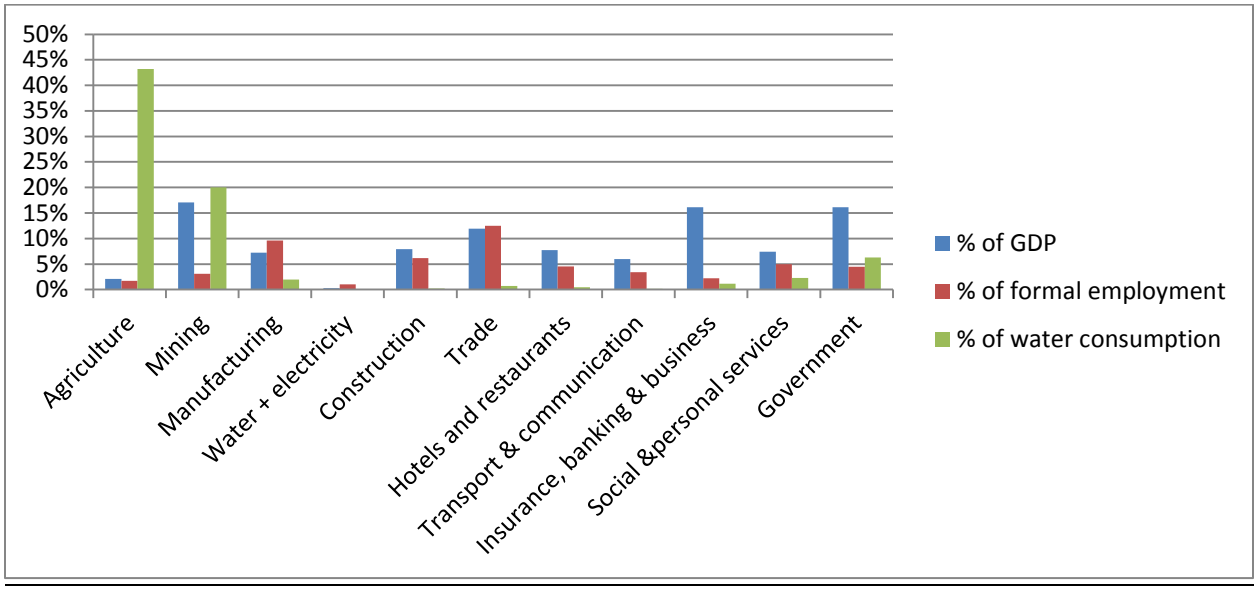


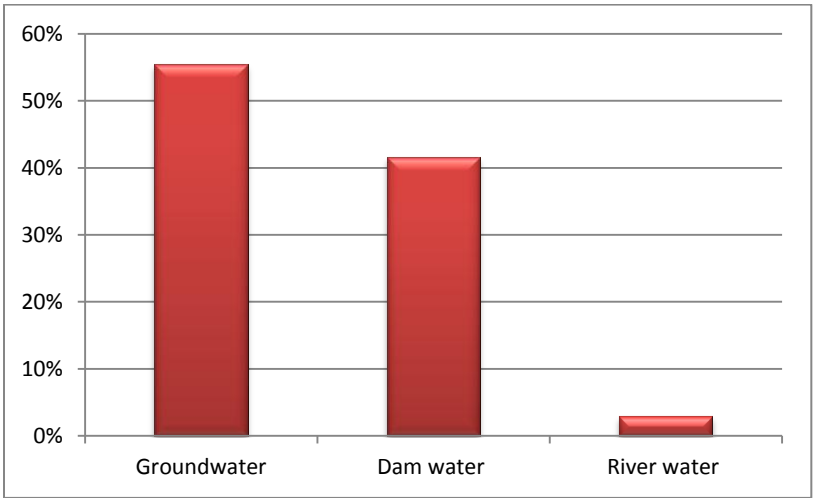
Figure 3: Sectors' share in water consumption, GDP and employment



III. Safeguarding of basic needs of water and EWR

The country's water resources are limited and opportunities for increased large water reservoirs are also limited. Abstraction is highest for groundwater (103.4 Mm^3) in 2011/12, followed by reservoirs (75.6 Mm^3) and rivers at 15.4 Mm^3 (see Figure 3).

Figure 3: Water abstraction by source (%; 2011/12)



Reservoir water abstraction is almost similar to the safe yields of reservoirs hence additional reservoirs such as Dikgatlhong dam are critical to ensure water availability for the country's development and environmental integrity. Current water storage capacity in reservoirs is 422 Mm^3 with safe yields of 73.5 Mm^3. Groundwater abstraction from existing well fields is also unsustainable and recharge is low thus more well fields need to be developed to increase storage capacity. Feasibility studies for increasing

both conventional and non-conventional water resources need to be explored. In particular, potential for use of desalination plants, capturing and utilising run-off, wastewater and return flows.

The following water resources availability indicators are derived from the accounts:

- Total water abstraction per year (Mm^3)
  - ✓ 2010/11 197.7
  - ✓ 2011/12 194.4
- Abstraction from groundwater(Mm^3) 103.4
- Abstraction from surface water (Mm^3) 91.0
  - ✓ Reservoirs 75.6
  - ✓ Rivers 15.4
- Abstracted for own use (Mm^3)
  - ✓ 2010/11 99.5
  - ✓ 2011/12 103.4
- Abstraction for distribution (Mm^3)
  - ✓ 2010/11 97.7
  - ✓ 2011/12 90.9

IV. Keeping water affordable

Water has an economic value which must be reflected in its cost to users. At the same time, basic water needs need to be met at affordable costs. This dilemma is currently addressed by a low water charge for the lowest use band (0 -5 m^3 per month). However, future supply costs are likely to rise, and water demand management measures and efficient WUC operations are needed to keep water affordable in future. Initial water accounting work on revenues and costs of WUC shows that the costs/revenues balance is has deteriorated during the implementation of the WSR (Figure 5).

Figure 5: WUC's unit expenditures and revenues (2002-2011)

Data for recent years (2012/13 and beyond) need to be added, but it is clear that the 2011/12 situation cannot be sustained without cost saving and/or revenue increasing measures. Possible reasons for the cost-revenue imbalance include delays in customer billing and increased outstanding revenues, the water sector reform transition with increased coverage of supply and the additional costs of waste water treatment, which do not (yet) generate revenues (based on treatment charges).

Cost reduction and cost sharing mechanisms need to be enhanced in view light of rising water supply costs. Cheaper and more efficient water provision and conservation measures (IWRM) need to be explored. For example, if untreated fresh water is supplied to sectors (e.g. construction, mining and agriculture) that do not need potable fresh water, costs savings could be achieved. Full re use and recycling of treated wastewater is also likely to reduce the costs of water provision. These measures would be part of the implementation of the 2013 IWRM-WE plan and the Draft Final National Water Policy. Cost sharing mechanisms (especially with the private sector) could also increase investments in the sector and reduce costs of water supply borne by government.

V. Data collection and analysis

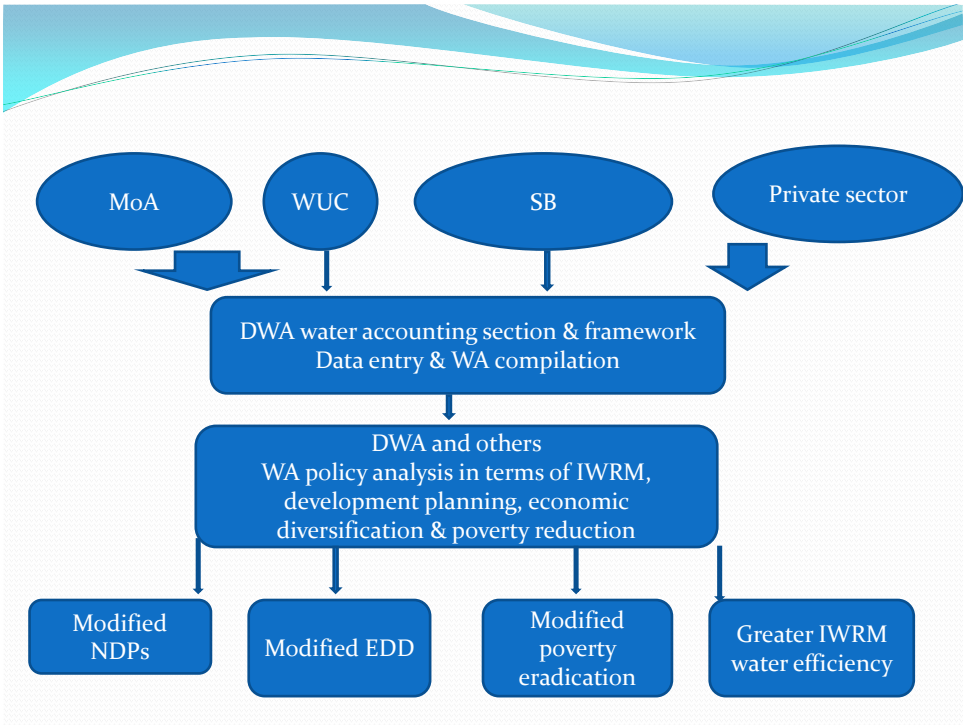
Data gaps and underutilisation of existing data impedes proper planning and development of the water sector. Many data exist, but are not sufficiently connected, stored, used and monitoring is lacking. Collection and storage of water abstraction and use data for all users are critical. Water accounts form a suitable framework for storage and analysis.

Small settlements need to be metered and private sector data need to be improved. Currently it is unclear whether data provided for self-providers denotes water abstraction or use. Better data for the agricultural sector are needed, for instance, irrigation water abstraction and use, productivity as well as livestock water use by species. Wastewater data are lacking (inflows and outflows) and this hampers re-use and recycling of treated effluent as targeted by the National Master Plan for Sanitation and Wastewater. Government has set a target of 96% re-use of the outflows by 2030. It is therefore important that WUC measures and monitors the inflows and outflows from wastewater treatment plants. Where available, the data would also necessitate construction of wastewater accounts and incorporation in the existing flow accounts for Botswana.

The absence of economic sector classification for WUC customers is a constraint for Botswana's water accounting process. The current classification distinguishes businesses/commercial, domestic and government as the major sectors. This is not in line with the national accounting system or the SEEA requirements. Therefore WUC needs to incorporate economic classification data in their customer base, making it easy to annually generate water use figures by sector. Reporting in the SEEA water format would also provide WUC and DWA with a better understanding of the water provision market and provide for informed planning and allocation of resources where they are most required. Additionally, it could also generate information on where water is most used and help target water rationing and where to employ robust water demand management measures. Discussions and agreement between WUC, Statistics Botswana (SB) and DWA are therefore critical to fast track the process.

Regular data collection and analysis requires an adequate institutional structure with involvement of the main water sector stakeholders, which is critical for the annual construction of the accounts. DWA will establish a water accounting unit with the following support of other stakeholders and inputs into the development planning and policy process.

Figure 5: Proposed structure for the compilation of water accounts and their policy analysis



VI. <u>In conclusion</u>

The development of water accounts is consistent with the Draft Final Water Policy and the 2013 IWRM-WE Plan as well as with the 2012 Gaborone Declaration on Sustainability in Africa. The WA are meant to influence policy and decision making as well as development planning. It is therefore important that the results of the water accounts are fully incorporated in the national development planning frameworks. There is an opportunity to influence the NDP11 preparation process through integration of the following main points:

- Future water allocations based on social and economic merits of sectors
- Strategies for wastewater re-use and recycling for major sectors
- Assessment of full costs of water management and cost sharing strategies to ease the burden off government and
- The economic diversification drive to integrate water scarcity.