Ministry of Land Management, Water and Sanitation Services

Republic of Botswana

Department of Water Affairs

BOTSWANA WATER ACCOUNTING REPORT

2015/16

DECEMBER 2017

www.water.gov

Contents

Abbreviations

BPC	Botswana Power Corporation
DWA	Department of Water Affairs
GoB	Government of Botswana
GDP	Gross Domestic Product
ISIC	International Standard Industrial Classification
MC	Management Centre
MCM	Million Cubic Meters
MFED	Ministry of Finance and Economic Development
MoA	Ministry of Agriculture Development and Food Security
MLWS	Ministry of Land Management, Water and Sanitation Services
NSWC	North South Water Carrier
NRW	None Revenue Water
SB	Statistics Botswana
SDG	Sustainable Development Goals
SEEA	System of Environmental Economic Accounting
SNA	System of National Accounts
WA	Water Accounts
WAB	Water Apportionment Board
WAU	Water Accounting Unit
WB	World Bank
WUC	Water Utilities Corporation
UN	United Nations
WAVES	Wealth Accounting and Valuation of Ecosystems Services

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1 Introduction

This is the fourth (4^{th}) SEEA styled water accounting report for Botswana. The accounts cover the period 2015-16 but also highlight the 2010-11 to 2014-15 trends. Three (3) earlier reports have been published, covering the years 2010-11 to 2014-15 (DWA and CAR, 2013, 2015 and 2016).

The SEEA styled water accounts for Botswana started in March 2012 when the Government of Botswana (GoB) entered into a partnership with the World Bank (WB) to develop accounts for natural resources and to value ecosystem services under the Wealth Accounting and Valuation of Ecosystem Services (WAVES) Programme. The WAVES initiative has since become a continuous activity of the Department of Water Affairs (DWA)'s road map towards sustainability as per Sustainable Development Goal (SDG) number 6.

The Water Accounting (WA) activities of WAVES-Botswana have gone several phases with the current phase signifying full institutionalization of the accounts. The DWA is currently undertaking the updating of the accounts on their own without support of full-time consultants and this is a major achievement within the institutionalization roadmap.

The current Botswana Water Accounts are based on the United Nation's System of Environmental– Economic Accounting for Water (SEEA-Water; UN 2012). The framework describes the hydrological system *(assets or stocks*) in terms of a country's water resources existing at a certain point in time, the exchanges between water resources, flows of water from the environment and within the economy in physical and monetary terms and also captures water quality issues. It also considers water-economic interactions, which is important for addressing cross sectoral and broader issues related to water resources management. SEEA- Water directly links water data to the System of National Accounts (SNA). Current water accounting efforts in Botswana focus on physical flow accounts (use and supply) only. Separate reports on assets accounts for major dams and monetary aspects focusing on the revenues and costs of

water supply will be released later. The Botswana Water Accounts also provides information on the water abstraction and consumption of key industries (e.g. agriculture, mining, manufacturing and service industries) and households.

Major stakeholders in the production of water accounts are Water Utilities Corporation (WUC), Statistics Botswana (SB), Ministry of Agriculture Development and Food Security (MoA), Botswana Chamber of Mines and Ministry of Finance and Economic Development (MFED). Although not directly involved in the production of the Botswana Water Accounts, the MFED plays a significant role in the process as it provides overall coordination of the WAVES programme in the country and is one of the main users of the results together with the Ministry of Land Management, Water and Sanitation Services (MLWS).

This 2015-16 Botswana Water Accounts report has some improvements compared to earlier reports. This signifies the continuous improvement aspirations by the Water Accounting Unit. There have been further improvements on water abstraction and consumption of the irrigation sector following additional irrigation surveys and better irrigation data provided by the Ministry of Agriculture Development and Food Security. Waste water estimates have been improved further using the currently available waste water billing data from WUC. In addition, major strides have been made towards institutionalization of the Water Accounts at the Department of Water Affairs (DWA). The DWA established a Water Accounting Unit (WAU) in 2015 and the focus and dedication has improved significantly as the Unit has three (3) professionals focusing mainly on the water accounts and numerous technical contact people within the DWA core divisions. The WAU has taken the lead and overall production of the 2015-16 accounts and the preparation of this report.

2 Main findings of the 2015-16 Water Accounts

This chapter highlights the main findings from the compilation of the Botswana Water Accounts (WA) for the year 2015-16. It also presents the main tables and figures for the physical supply and use of water, a long-term time series of water consumption, water consumption by industry and region and water productivity by industry. The 2015-2016 Botswana WA follow the international standard of the United Nation's System of Environmental Economic Accounting for Water (SEEA-Water; UN, 2012).

The accounts show physical flows from the environment to the economy, flows within the economy and flows from the economy to the environment. It is worth stating that lack of data does exist especially from self-providers and this makes it impossible to prepare full monetary accounts.

The main findings from the current report are:

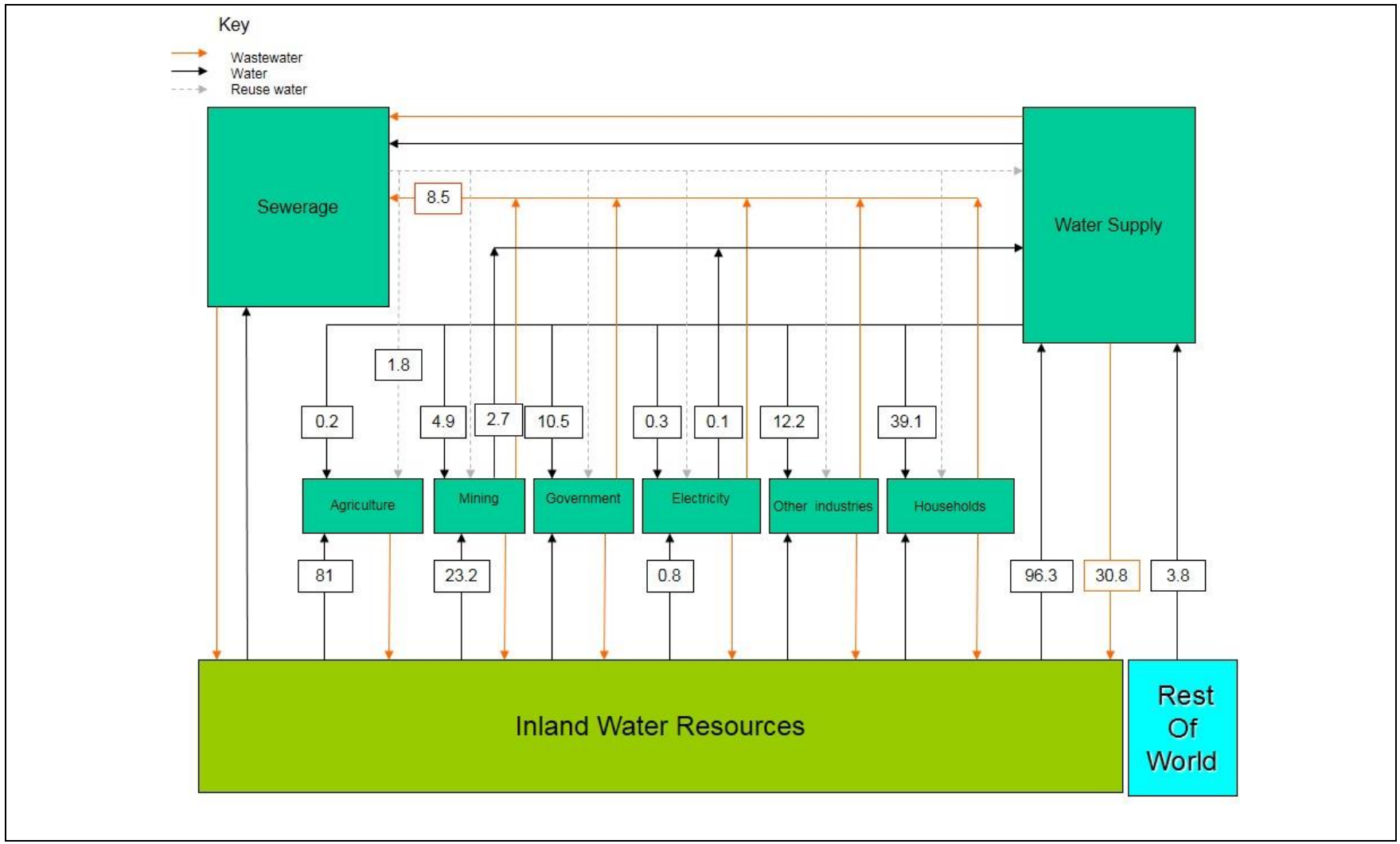
- Total water consumption in 2015-16 was 170 MCM, which was a 2% increase from 167 MCM in 2014-15;
- Water consumption by industry (Agriculture, mining, manufacturing, etc., excluding households) in 2015-16 was 135 MCM, which is a 2 % increase from 133 MCM in 2014-15;
- Water consumption by households in 2015-16 was 39.1 MCM, which was a very slight decrease from the 41.2 MCM in 2014-15;
- Water extracted from the environment to support the Botswana economy in 2015-16 was 201MCM which was an increase of 7% from 188 MCM in 2014-15.
- Of the total 201 MCM extracted from the environment, around 48% or 96 MCM was extracted by the water supply industry while the remaining 52% or 105 MCM was extracted directly by self-providers (The agriculture sector at 83 MCM and the mining sector at 23 MCM);
- The agriculture sector consumed the largest volume of water in 2015-16 with 83 MCM, a significant 18.5% increase from 2014-15 consumption of 70 MCM; and
- The agriculture sector accounted for 48% of Botswana's total water consumption in 2015-16. The next largest water users were households with 23%, mining with 16%, Other Industries with 7% and government with 6%.

Table 2.1 shows the 2015-16 physical supply and use of water using the internationally accepted table formats, definitions and classifications of the SEEA-Water. An extended table, showing greater industry detail, is found in Appendix 1.

Table 2.1: Physical supply and use for 2015-16 (MCM)

		Agriculture	Mining and Quarrying	Electricity	WUC	Sewage	Government	Other Industries	Total agr & ind	households	Rest of the world	Total
I. Physical use table												
From the environment	1. Total abstraction	81.0	23.2	0.8	96.3	0.0	0.0	0.0	201.3	0	0	**201.3**
	1i.Surface water	32.4	0.7		55.9	0.0	0.0		89.0	0	0	**89.0**
	1ii.Ground water	48.6	22.4	0.8	40.4	0.0	0.0		112.3	0	0	**112.3**
Within the economy	2. Use of water from other economic sectors	2.0	4.9	0.3	2.4	8.5	10.5	12.2	40.5	39.1	0	**79.9**
	3. Total use of water (1+2)	83.0	28.1	1.1	98.7	8.5	10.5	12.2	242.1	39.1	0.0	**281.3**
II. Physical supply table												
Within the economy	4. Supply of water to other economic units	0.0	2.7	0.1	72.1	1.8	0.0	0.0	76.7	0.0	3.8	**80.5**
Into the environment	5. Total returns	0.0	0.0	0.0	30.8	0.0	0.0	0.0	30.8	0.0	0.0	**30.8**
	6.Total supply of water (4+5)	0.0	2.7	0.1	102.9	1.8	0.0	0.0	107.4	0.0	3.8	**111.2**
	7. Consumption (3-6)	83.0	25.4	1.1	-4.2	6.7	10.5	12.2	134.7	39.1	-3.8	**170.0**

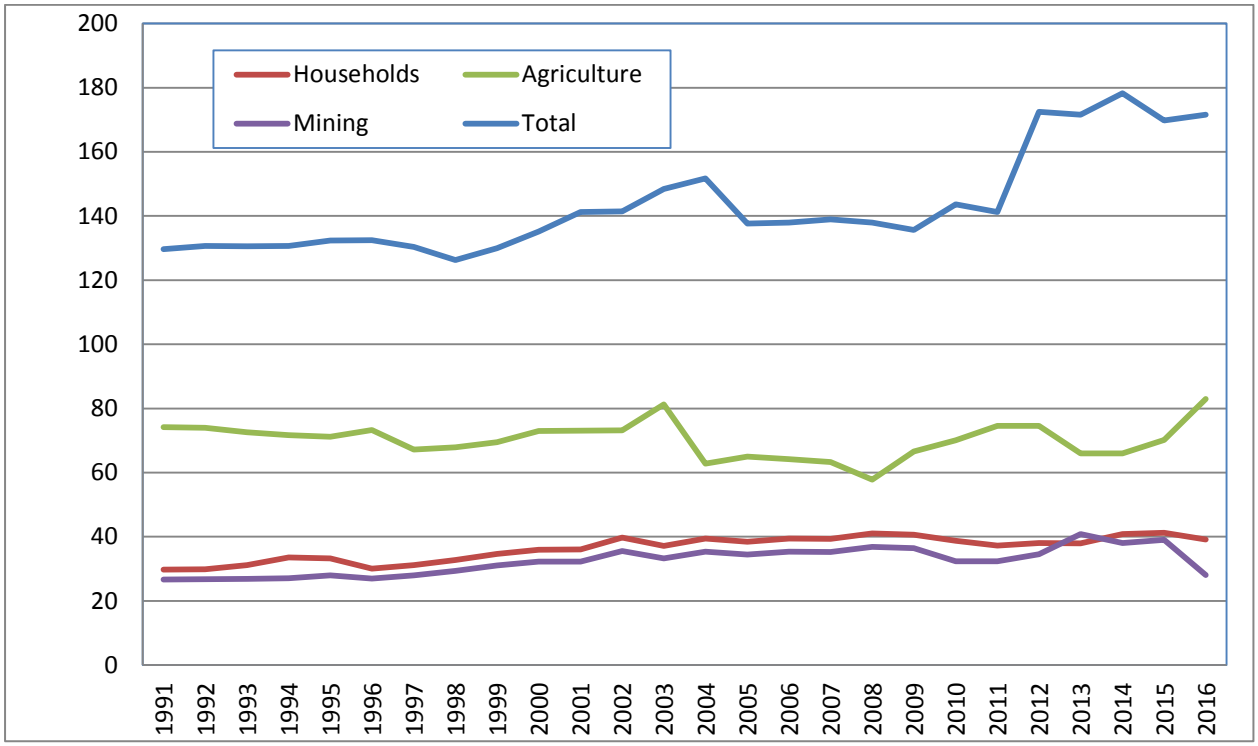
Figure 2.1: Diagram of physical water supply and use in Botswana, 2015-16 (MCM)



A schematic display of the physical water supply and use is provided by Figure 2.1. The figure highlights the movement of water between selected industries, households and the environment. It is worth noting that sewerage has somewhat been quantified for this reporting period as WUC started billing for waste water discharged into the sewer network. The waste water figures are an underestimate as the billing is only done for consumers which are connected to the sewer network.

The arrows without numbers in Figure 2.1 show water flows (e.g. for reuse water) for which there are currently no data. The returns to the environment by the water supply industry are shown and these are the water losses (e.g. for leaky or burst pipes).

Figure 2.2: Long term time series for water consumption within selected sectors (MCM)



The long-term trend in water consumption (1990 to 2016) is shown in Figure 2.2. The time series was constructed through an intensive data manipulation exercise. A summary of this work is provided in Annex 2 of the 2014-15 Botswana Water Accounting Report. Overall the time series shows increasing water consumption but with occasional decreases (e.g. in 1998 and 2004) and stabilization (2005-2010). Sectoral trends are discussed further in chapters 3-8. There is an observed jump in the total consumption for the period 2011-12. This jump coincides with the takeover of water supply by WUC and maybe caused by improved billing of water consumption. For the current reporting period there has only been a significant change in Agriculture consumption which has increased from 70 MCM in 2014-15 to 83 MCM in 2015-16.

Figure 2.3: Water consumption by economic sector, 2013-14, 2014-15 and 2015-16 (MCM)

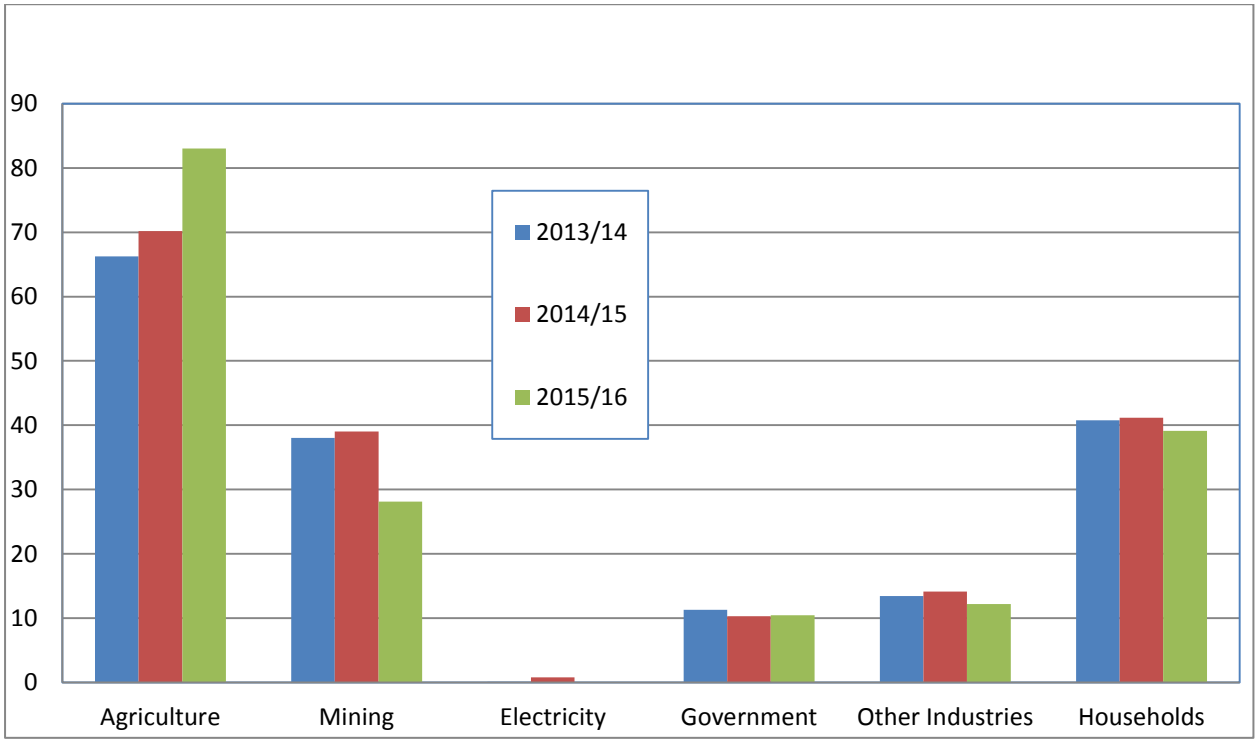
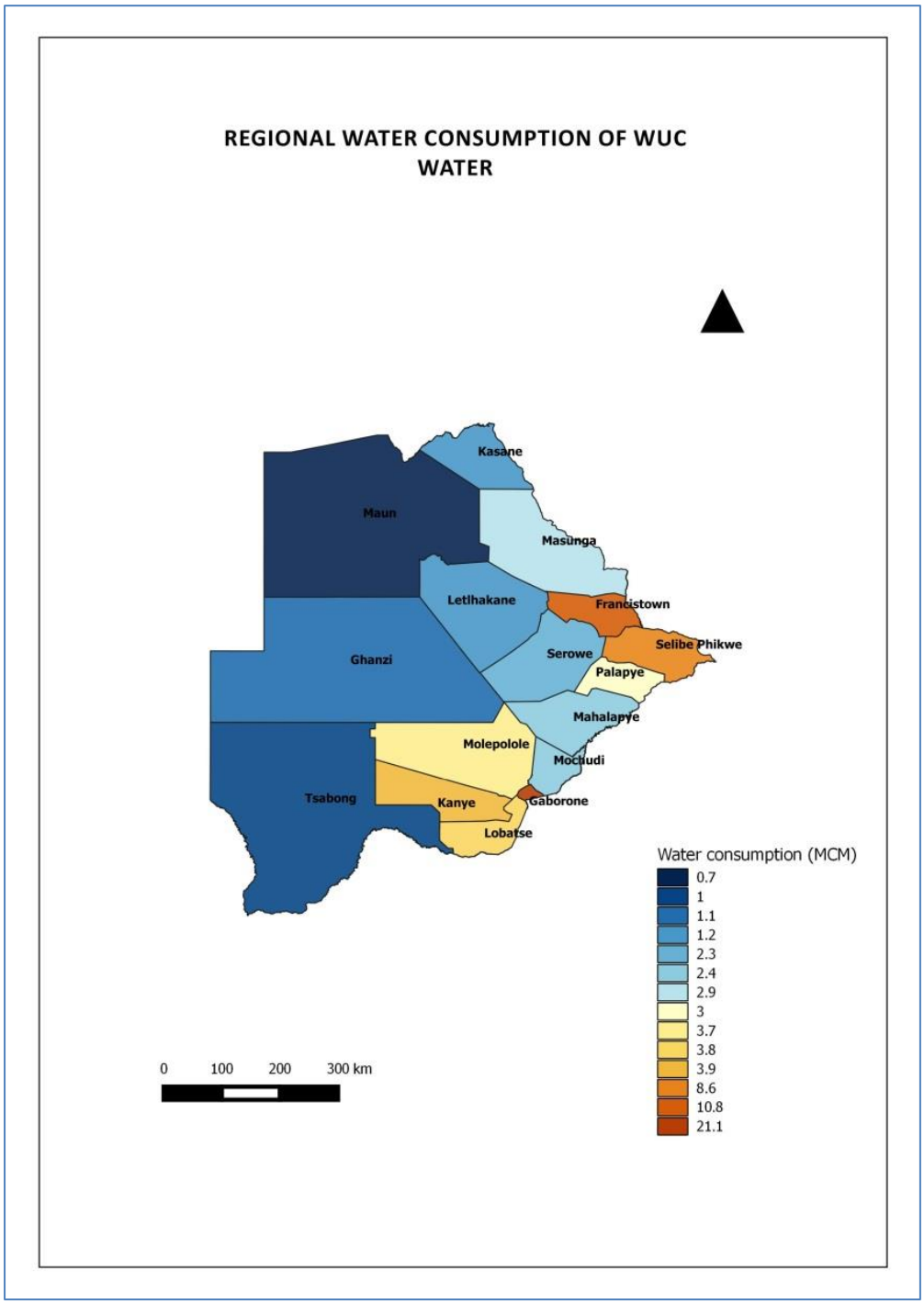


Figure 2.3 shows the water consumption by economic sectors for 2013-14, 2014-15 and 2015-16. Consumption is highest for agriculture followed by households and mining. This trend has been observed from the 2013-14 and 2014-15 reports as well (DWA and CAR, 2015 & 2016). Figure 2.2 also highlights how agriculture and households have accounted for the majority of water consumption over a longer period (1991 to 2016). There has not been any significant variation in water consumption for the last two accounting periods. The consumption for 2013-14, 2014-15 and 2015-16 are almost similar for different industries, except for an increase in agriculture and the decrease in mining for 2015-16. The variation in the consumption for agriculture is mainly due to improved figures for irrigation and changes in livestock numbers (see chapter 4).

There are significant differences between regions in water consumption. Map 1 highlights the spatial variation in water consumption within the country. It should be noted that the map refers to water supplied by WUC only. Consumption is higher, as would be expected, in the highly populated cities and towns, such as Gaborone MC, Francistown MC, Selibe Phikwe MC and Lobatse MC. The arid Management Centre (MC) of Tsabong has the lowest consumption. The variation in consumption is due to the fact that the majority of the population and economic activities are located in eastern Botswana. The Gaborone MC accounts for 29% of the national consumption. The cities and towns of Gaborone, Francistown, Selibe-Phikwe and Lobatse combined account for almost two-thirds of the national consumption (~61%). It is interesting to observe that water consumption in Gaborone MC did not significantly decrease in 2015-16 despite water restrictions and rationing, which were imposed due to the drought and drying-up of Gaborone dam.

The Gaborone MC caters for the largest population amongst all MCs. The MC depends on various water sources, including the Gaborone dam, Bokaa dam transfers, Molatedi dam transfers, North-South Carrier transfers and the Masama wellfields. The North-South Water Carrier (NSWC) transfers water from Letsibogo and Dikgatlhong Dams in northern Botswana to Gaborone. It has to be noted that the high demands of the Gaborone MC are further strained by the fact that this MC transfers water to the Lobatse MC. As can be seen in Map 1, this MC also has significantly high consumption (4th highest consuming MC).

Map 1: Water consumption by WUC Management Centers



3 Water Supply Industry

In this chapter we discuss the water supply industry, Water Utilities Corporation (WUC); how much water was abstracted and used by the 16 Management Centres (MC) and the amount that was not billed (Non-Revenue Water).

Water Utilities Corporation is still the largest water distributer to settlements and industries. Other distributors of water include the diamond subsector and electricity subsector which supply WUC and other industries. For the year 2015-16 the water supply industry was hit by drought and extreme measures were put in place to try and curb the situation like water rationing, water bowsing to some areas, and rehabilitation of some well fields and conjunctive use of surface and groundwater sources.

There was more dependence on ground water putting more pressure on the resource and some boreholes experienced low yields and some failed. Some dams also failed and this includes Gaborone dam, Bokaa dam and Nnywane dam in the current reporting year. Besides the three sources of water (groundwater, reservoir and river water) WUC is currently exploring feasibility of alternative sources of water such as effluent re-use and brackish water use.

Table 3.1: Water supply by WUC MCs 2015-16

MC	Production (000kl)	Groundwater	Dam	River
Serowe	4 262	61%	39%	
Selebi Phikwe	11 119	16%	84%	
Tsabong	1 496	100%		
Francistown	15 890		100%	
Gaborone	24 436	6%	94%	
Ghanzi	1 411	100%		
Kasane	1 555	4%		96%
Kanye	6 492	100%		
Lobatse	6 892	59%	41%	
Maun	4 280	80%		20%
Molepolole	6 038	98%	2%	
Letlhakane	1 884	100%		
Mochudi	3 570	10%	90%	
Mahalapye	5 100	41%	59%	
Masunga	4 601	58%	42%	
Palapye	3 528	10%	90%	
Grand total MCs	**103 000**	**35%**	**63%**	**2%**

Table 3.1 shows that the 2015-16 water use by the Water Supply Industry has increased by 6 % from 96.9 million cubic meters (MCM) to 103 MCM. Dam water abstraction is the highest at 63% followed by groundwater at 35% and river water at 2%. There is significant change in the abstraction as there has been an increase in dam water and a decline in

groundwater abstraction compared to the 2014-15 report. This decline in groundwater might be due to low yields and failure of some boreholes because of low rainfall.

Selibe Phikwe Management Centre (MC) water use has increased significantly from 8 MCM to 11 MCM. Palapye MC dependence on groundwater has shifted to reservoir water. Lobatse and Gaborone ground water use is now accounted as an improvement from previous accounts. There is some dam water use in Kanye MC which has not been shown that is supplied to Ranaka because it was not separated from borehole water.

To improve on water abstracted per source accuracy, there is a need for WUC to separate borehole water from dam and river water for the next water accounting report.

Table 3.2: Production, use and losses for all WUC MCs

MC	PRODUCTION (MCM)	Use (MCM)	LOSSES (MCM)	LOSSES %
Serowe	4.3	2.3	2.0	46%
Selebi Phikwe	11.1	8.6	2.5	23%
Tsabong	1.5	1.0	0.5	34%
Francistown	15.9	10.8	5.1	32%
Gaborone	24.4	21.1	3.3	14%
Ghanzi	1.4	1.1	0.3	24%
Kasane	1.6	1.2	0.4	25%
kanye	6.5	3.9	2.6	40%
Lobatse	6.9	3.8	3.1	45%
Maun	4.3	3.0	1.3	30%
Molepolole	6.0	3.7	2.3	39%
Letlhakane	1.9	1.2	0.7	36%
Mochudi	3.6	2.4	1.2	34%
Mahalapye	5.1	2.4	2.7	52%
Masunga	4.6	2.9	1.7	38%
Palapye	3.5	3.0	0.6	16%
Grand total MCs	103	72.2	30	30%

Water loss for 2015-16 is at a national average of 30% an increase of 5% from 25% in 2014-15.Mahalapye Mc has a huge loss of 52% which makes it 7% increase in losses from 45% of 2014-15. There is a notable reduction in losses for some MCs including Molepolole which had a huge loss of (62%) in 2014-15.

Despite water loss reduction in some MCs the losses are still high and WUC needs to reduce these losses further. The losses may be attributed to dilapidated infrastructure and billing inefficiency.

4 Agriculture

This chapter discusses water use by the agriculture sector, with the main focus being on livestock and irrigation (horticulture) subsectors. Current water accounts exclude rain fed agriculture, which shall be covered by soil moisture accounts which will be produced in the future.

The 2015-16 physical supply and use accounts (Table 2.1) show that agriculture continues to be the leading water consumer in Botswana, accounting for 83 MCM of water, which is 46.7% of the total national consumption. This industry is also the second largest abstractor after the water supply industry WUC, abstracting a total of 81MCM from the environment. The contribution of the water supply industry to this sector's water use remains minimal (1.8MCM) as agriculture is mainly self-abstracting from the environment.

Table 4.1: Water Consumption in Agriculture (2015-16; MCM)

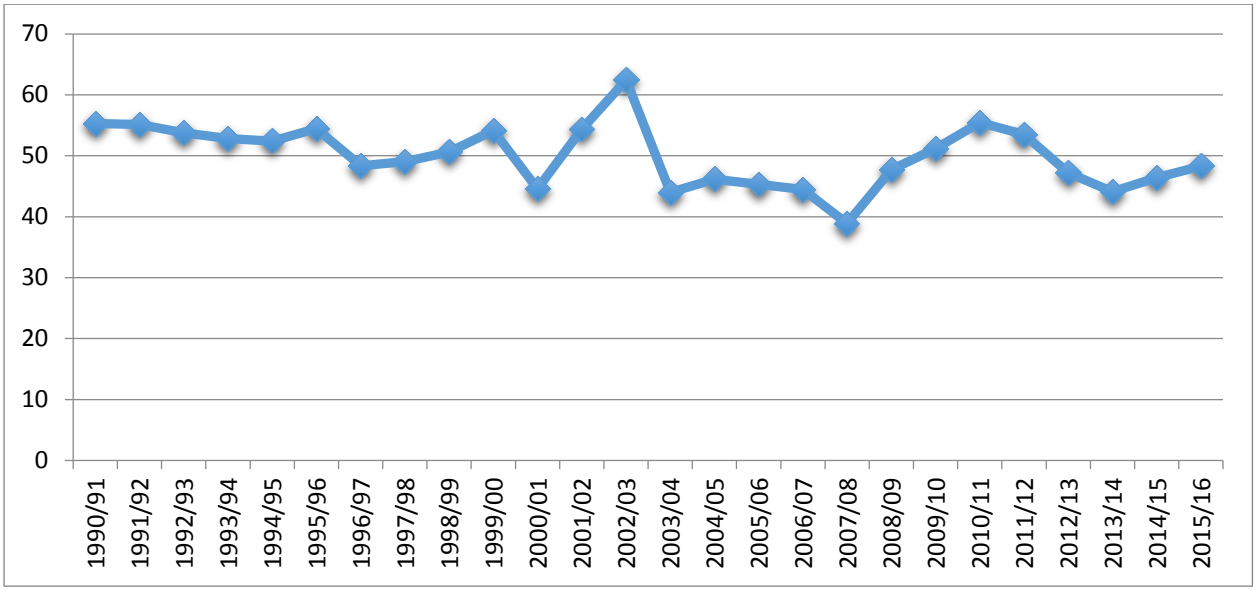
Variable	**Quantity (MCM)**
Total livestock water consumption	**48.3**
of which	
traditional livestock sector	43.3
commercial livestock sector	5.0
of which:	
water for cattle	41.1
water for goats	3.7
water for sheep	0.7
water for donkeys	2.2
water for other animals	0.6
Total Irrigation Water consumption	**34.7**
of which	
surface water	20.4
groundwater	12.5
Treated effluent	1.8
Overall water consumption agriculture	**83.0**

4.1 Livestock

Livestock subsector is made up of both traditional and commercial pastoral farmers. As shown on table 4.1 Livestock subsector consumes 48.3MCM, out of which the traditional sector consume a larger share of 43.3MCM and the commercial sector consuming only 5MCM.

Table 4.1 also shows water consumption by different livestock types. Botswana has a cattle population of 2.254 million heads and cattle farming consume 41.1MCM. This is 85% of the total water consumed by the livestock subsector. Goats are the second leading water users, consuming 3.7MCM, followed by donkeys 2.2MCM, then sheep 0.7MCM and lastly Other livestock at 0.6MCM.

Figure 4.1: Trend in livestock water consumption (1990 – 2016; MCM)



Long term trend in livestock water consumption has been established from 1990 to 2016, figure 4.1. There is a fluctuating trend in water consumption by this sub sector with a high of 62.5MCM in 2002-03 and a low of 38.9MCM in 2007-08.The trend in livestock water consumption appears to be stabilizing, and this may be due to more reliable data from Ministry of Agricultural Development and Food Security (MoA) and Statistics Botswana (SB).

FIGURE 4.2: Livestock water consumption by Districts (2015-16; MCM)

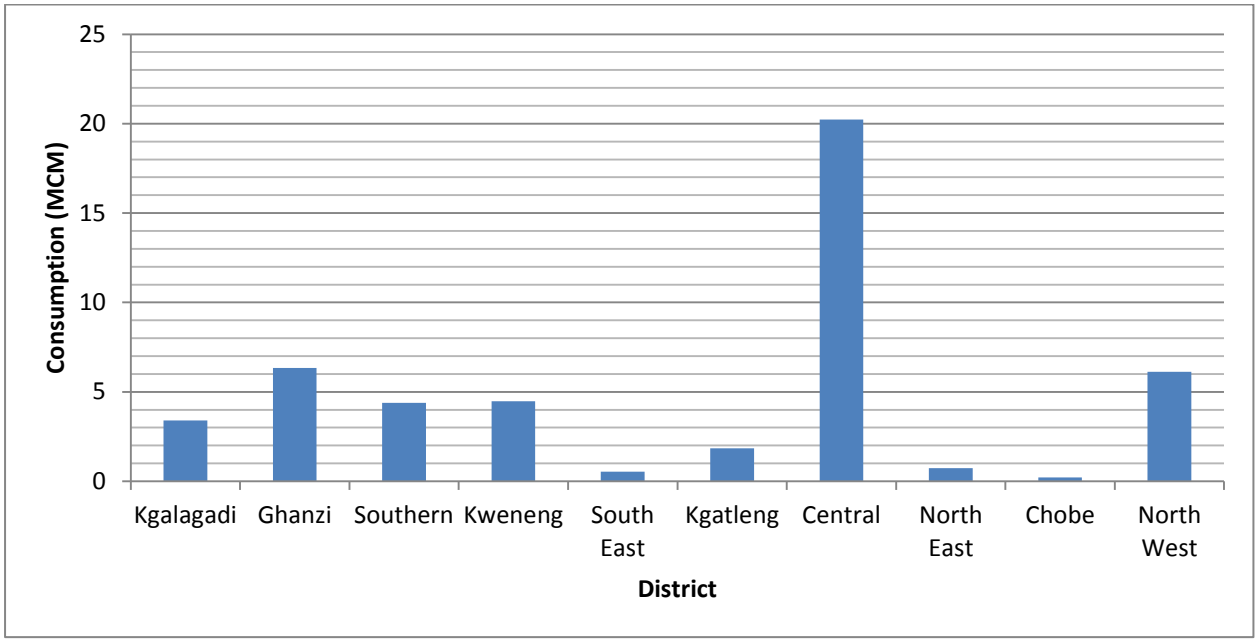


Figure 4.2 shows that Central district is leading in water consumption by livestock. This is mainly due to the large number of livestock (mostly cattle) in this area. Central district consumes 20.2MCM followed by Ghanzi and North West by 6.3MCM and 6.1MCM, respectively. South East, North East and Chobe are the least water consuming districts with a combined consumption of 1.5MCM.

4.2 Irrigation

Irrigation surveys were carried out in North East District as part of the efforts to improve on the available irrigation data. The main objective of these surveys is to assess water use by horticultural farmers. Water consumption by the irrigation sub sector was estimated at 34.7MCM (Table 4.1). This is a significant increase from 23.7MCM in previous year 2014-15, which is brought by increase in the area planted and the new water use per hectare from the irrigation survey. Surface water resources contribute more (21.5MCM) to this subsector and groundwater contributes only 13.2MCM.

5 Mining

This section discusses water abstraction, use and consumption by the mining sector. Mining is still the dominant economic sector of the country and includes the sub-sectors of diamond, copper nickel, coal, soda ash, gold and others/ including prospecting. Diamond mining remains the highest water consuming subsector. Majority of the water used in mining sector is self-abstracted. The mining sector supplies water to other economic sectors e.g. Debswana supplies Jwaneng Township.

A record total of eight (8) mines out of ten provided comprehensive data on their water usage in 2015-16. Two mines closed before submitting their water usage data (African-Copper Mowana and Tati-nickel). The section also reviews the quantity used by different mining categories by MC, as well as the trend of water usage from 2010 to 2016.

5.1 Water consumption and abstraction by the mining sector

Mining water Abstraction (MCM)							
Period	diamonds	copper-nickel	soda ash	coal	gold	Other	total Mining
2010/11	19.9	3.0	0.6	0.1	-	-	23.5
2011/12	19.8	3.3	0.6	0.1	-	-	23.7
2012/13	22.5	3.8	0.5	0.1	0		
2013/14	25	5.1	0.1	0.6	-	-	30.8
2014/15	27.4	2.6	0.6	0.0	0.5	0.0	31.1
2015/16	21.2	0.9	0.6	0.1	0.4	0.0	23.2
Mining Water Consumption(MCM)							
2010/11	18.0	3.0	0.6	0.1	1.2		22.8
2011/12	17.8	3.3	0.6	0.1	1.2		23.0
2012//13	21.3	14.6	1.0	1.9	1.9	0.1	0.0
2013/14	23.3	11.9	0.7	1	1.1	0.1	38
2014/15	25.7	9.5	0.9	0.9	2.0	0.1	39.0
2015/16	18.8	4.3	0.9	0.2	1.2	0.0	25.4

Abstraction for mining in 2015-16 is 23.2 MCM (11%) of total national water abstraction Table 5.1. This shows a reduction of 6% water usage by the mining sector compared to 2014-15.

The mining sector consumed 14% (25.4 MCM) of the total consumption of the country compared to 23% (39 MCM) in 2014-15, with diamond mining accounting for 74% of total mining consumption in 2015-16. The reduction in consumption may be due to closing of some mines. Mine subsectors with significant abstraction and consumption are the diamond and copper-nickel only since 2010-11. The diamond subsector supplied WUC with around 2.4 MCM (Debswana Jwaneng).

Item	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Total water Abstraction MCM	25.2	29.1	26.9	30.8	31.1	23.2
Total Consumption MCM	32.4	34.6	40.8	38	39.0	25.4

Figure 5.1: Trend in abstraction and Consumption from 2010-11 to 2015-16

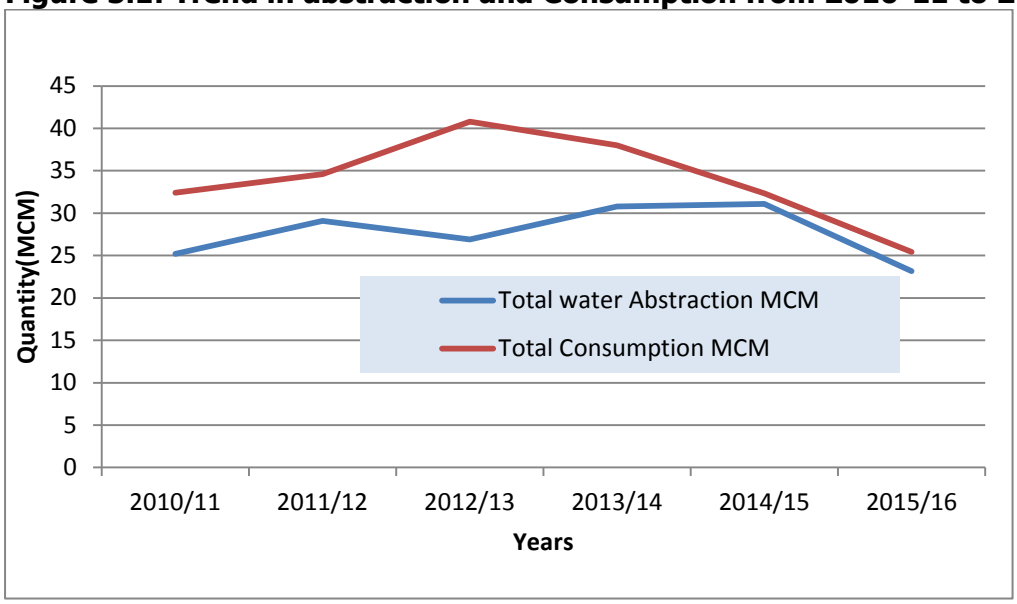
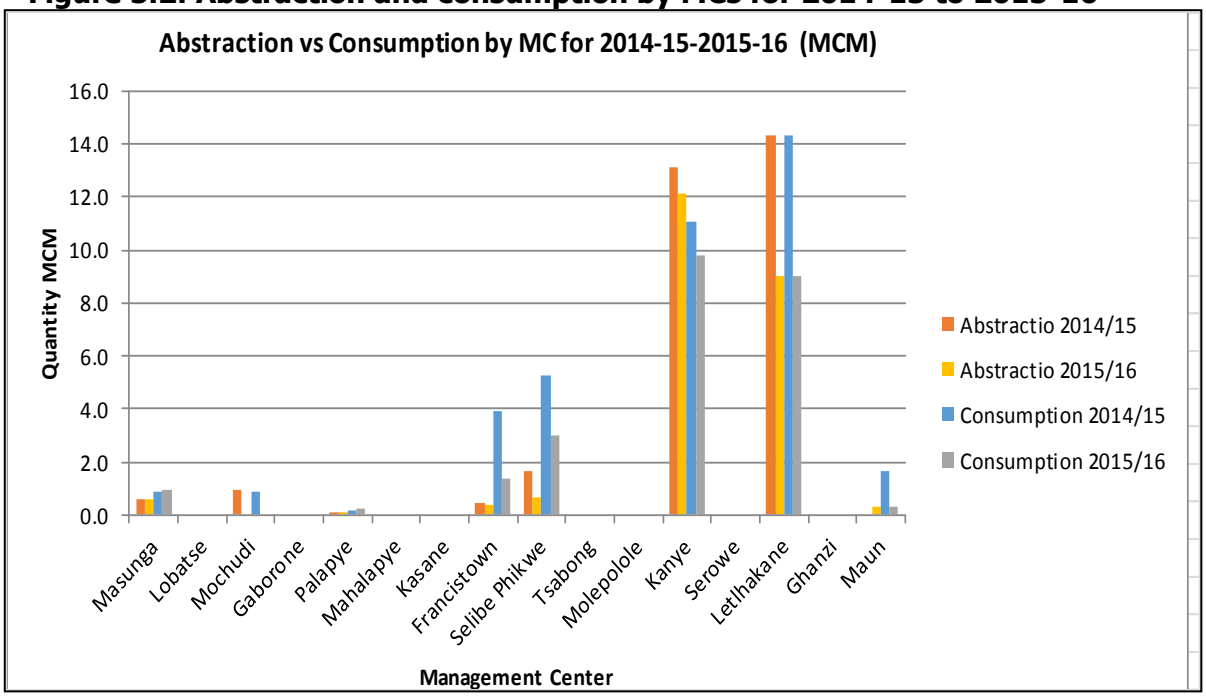


Figure 5.1 shows the trend in mining from 2010-11 to 2015-16 in water abstraction and consumption. Over the years there has been a fluctuation in both abstraction and consumption with a significant decline in 2015-16. This may be due to closure of some mines and reduction in production.

Figure 5.2: Abstraction and consumption by MCs for 2014-15 to 2015-16

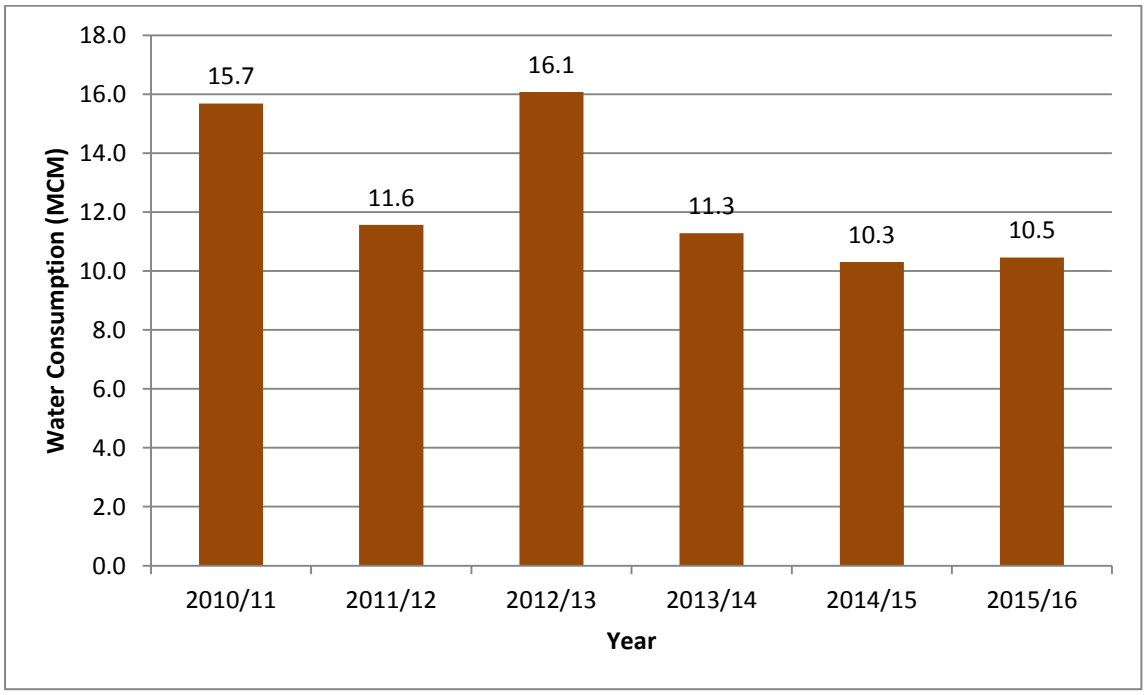


From figure 5.2 for 2015-16 Kanye MC is the highest in both abstraction and consumption, followed by Letlhakane MC. Both mines in these management centres undertake diamond mining. Palapye MC consumes and abstracts the least amount. Water abstraction and consumption for 2014-15 is higher than the current reporting year (2015-16).

6 Government

According to the International Standard Classification (ISIC, revision 3), this sector is made up of Central and Local government. It includes all public administration segments but excludes education, health and social work activities. As shown in Table 2.1 Government is the 3rd largest water consuming industry after Agriculture and Mining, with all its water supply coming from Water Utilities Corporation. Abstraction by this industry is a subject yet to be investigated; Self abstraction within this industry will be done in future studies.

Figure 6.1: Trend in water consumption by government (2010-11 to 2015-16; MCM)



As shown in figure 6.1 water consumption by government was 10.5 MCM for 2015-16. This is 6% of the total water consumed in 2015/16. This also indicates a slight rise of 0.2 MCM from 10.3MCM for the year 2014-15.

Long term trend in water consumption (2010-2016) is shown in figure 6.1. This figure shows a fluctuating trend, with a high of 16.1 MCM recorded in the year 2012-13 and a low of 10.3MCM recorded in 2014-15. The figure also shows a decreasing trend in water consumption from 2012-13 to 2015-16. This may be due to the severe drought that the country has experienced for the past years which resulted in the introduction of Water rationing by WUC.

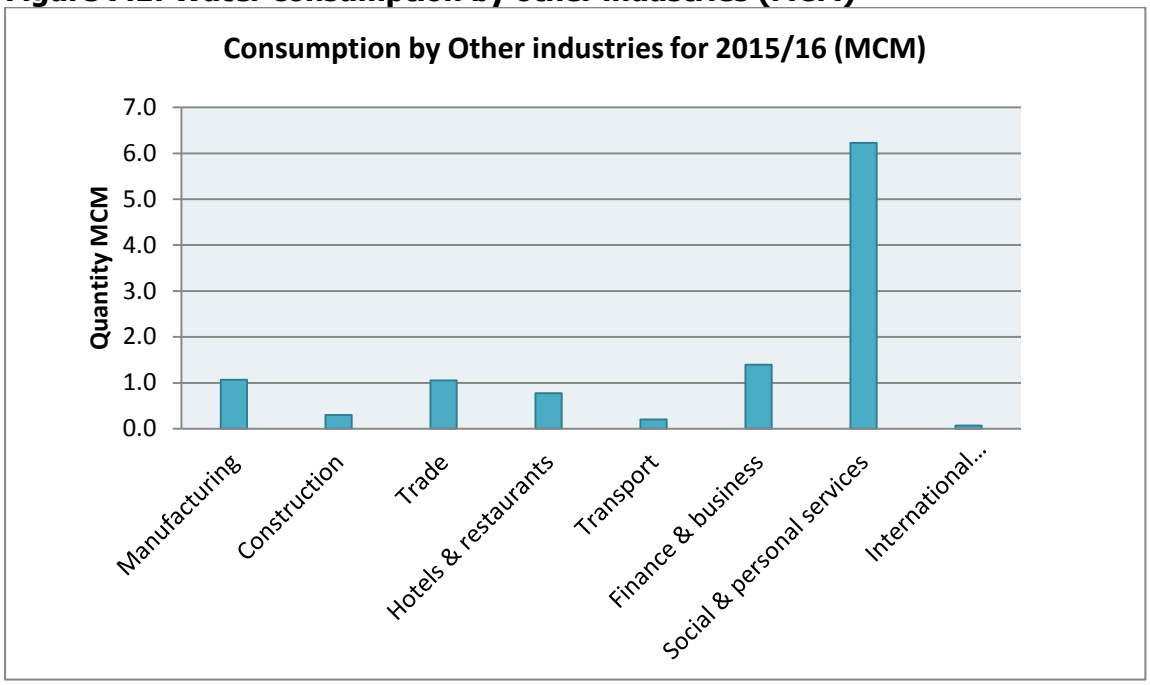
7 Other industries and electricity generation

7.1 Other industries

Other industries refer to those industries using fewer amounts of water and they are; Trade, Hotels & Restaurants, Construction, Transport, International organizations, Finance & Business, Manufacturing and Social & Personal services. For this reporting period the breakdown of Water usage for these categories was not categorized from the raw data due to billing system challenges. Established consumption ratios for 2014/15 were then applied to the lump water usage that was given by WUC so as to estimate actual water used by each sector.

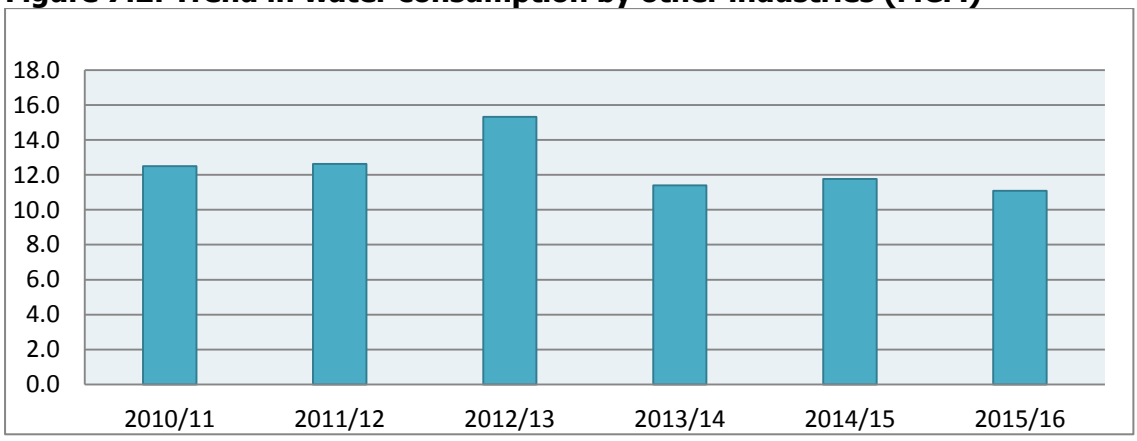
For 2015/16 other industries consumed 11.1MCM (6%) of the total water consumed.

Figure 7.1: Water consumption by other industries (MCM)



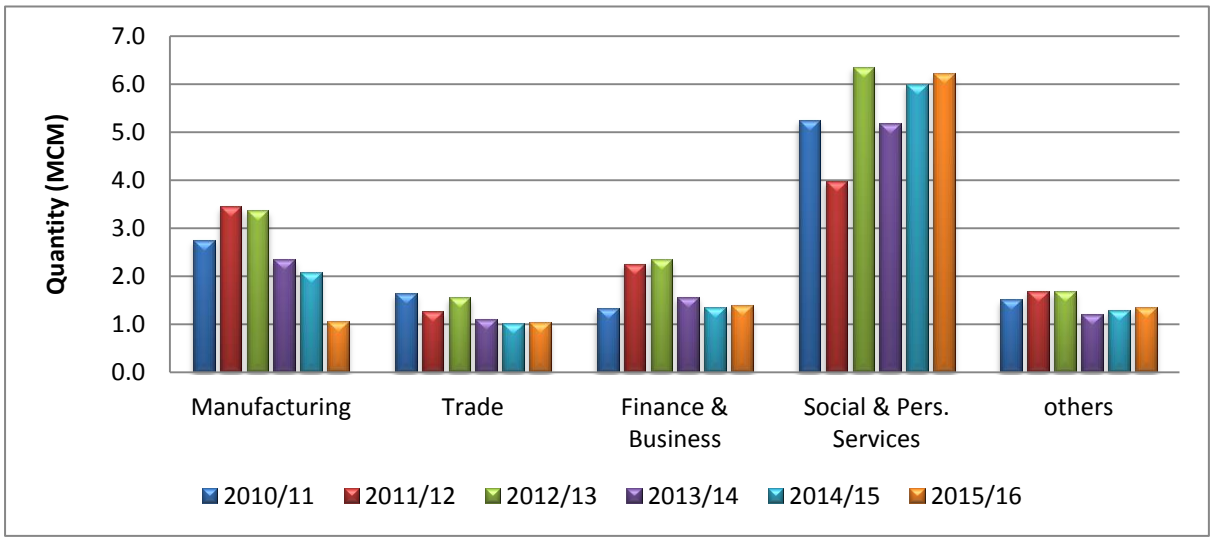
From figure 7.1 social & personal service sector consumed 56% (6.2MCM) making it the largest consumer in this sector then, finance & business, trade, manufacturing and hotels & restaurants respectfully. International Organization is the least consumer with 1% only.

Figure 7.2: Trend in water consumption by other industries (MCM)



A six year trend from figure 7.2 depicts how other industries have been doing in terms of water usage. Since 2010-11 there have been slight increases in water consumption of at least 0.1MCM by other industries with an exception for 2012-13 where there has been significant increase from 12.6 MCM to 15.3 MCM, a slight increase of 0.4 MCM in 2014-15. There was a marginal reduction in 2015-16 of 0.3 MCM.

Figure 7.3: Trend in water consumption by sectors within the other industries (MCM)



In **figure 7.3** a trend of sectors within the other industries have been shown well and how much they accounted for from 2010 up to 2016.Social and personal is the highest consumer over all the years followed by manufacturing. In 2015-16 manufacturing and trade used the same amount of 1.1 MCM, Finance and Business was 1.4 MCM making it second after Social and Personal Services.

7.2 Electricity

Botswana Power Corporation is the leading power supply company in Botswana. The 2015-16 reporting year looks at the water used by both the Morupule A and B power plants. Data used in this report were from the WAB 2015 BPC reports.
Morupule A plant was still under refurbishment at the time of the reporting year. The plant is expected to return to service by May 2017.Morupule B Unit 5 is expected to be on commercial operation by June 2018

Table7.2: Use of water within the electricity sector in 2011-15 (MCM)

Item	2011-12	2012-13	2013-14	2014-15	2015-16
Water abstracted from the environment	- *	-	-	0.7	0.8
Water supplied from other economic sectors	0.1	0.2	0.1	0.1	0.3
Water supplied to other economic sectors	-	0.01	0.02	0.07	0.1
Water consumed by electricity industry	0.1	0.2	0.1	0.8	1.1

-denotes data is not available

Electricity Water consumption has increased for 2015/16 by 33% (0.3 MCM) from 0.8MCM to 1.1 MCM.

8 Households

Households consumed 39 MCM in 2015-16 which represents 23% of the total water consumed in 2015-16.There has been a decrease in water consumption from 41 MCM to 39 MCM, this could be attributed to the persistent drought that was experienced which lead WUC to ration water and also restrict some activities e.g. lawn watering, car washing etc.

Households get their water mainly from WUC but there are those households that have no access to reticulated water and so must abstract the water themselves from wells or surface water (e.g. rivers). Household water consumption discussed in this chapter only covers the households that are supplied by WUC. Water consumed by households outside the WUC network is currently not accounted for. Efforts are being made to make estimates for this water (refer to Annexed case study: water abstraction by households not connected to water utilities corporation network).

Figure 8.1: Trend in household water consumption (2010-11 to 2015-16; MCM)

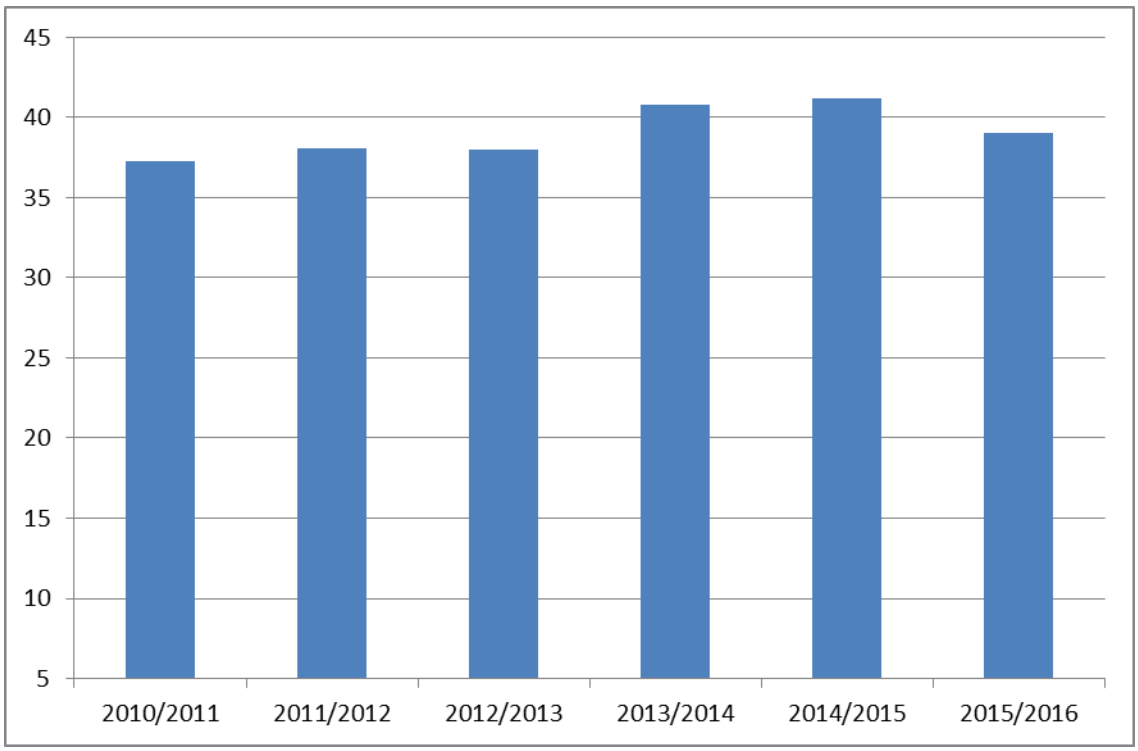


Figure 8.1 shows that water consumption by households in 2015-16 was 39 MCM. The trend shows a 2% increase in water consumption between the year 2010-11 and 2011-12. Between 2011-12 and 2012-13 there was no major change in consumption but between 2012-13 and 2013-14, household consumption increased by 7% and increased only slightly since then. For the year 2015-16 household consumption decreased by 5 % that is from 41 MCM to 39 MCM which is quite significant.

9 Data sources and methods

This chapter accounts for the data sources used, the methodology employed, and where necessary assumptions made to fill data gaps. Among other things, it provides details on the numerous data sources, how the data was cleaned, sorted and analyzed. The chapter also includes a data quality statement. and a note on the WA revision policy.

The water accounts data comes from numerous sources and each key data source will be discussed. The data sources include:

- Water Utilities Corporation (WUC)
- Department of Water Affairs (DWA)
- Mining companies
- Ministry of Agricultural Development and Food Security (MoA)
- Statistics Botswana (SB)

9.1 WUC DATA

9.1.1 Customer data

The water sales (volume and value) provided was not disaggregated by ISIC sector classification. WUC uses ten client categories comprising domestic, business and industries, some mines and government. For 2015/16 data provided was only showing the total volumes and value. It was impossible to assign the economic codes. This challenged was mitigated by using the established percentages from the 2014/15 report. This helped in providing a somewhat accurate estimate of how much each industry has used from the total volumes provided for 2015/16 period.

9.1.2 WUC water abstraction and use

Comprehensive and up to-date WUC water abstraction data was provided by MC. An improved in the current reporting period was that this time the abstraction data was provided by actual source. In the past this was calculated using ratios of water sources.

9.2 MINING DATA

A total of 8 mines provided data and two other mines were closed that is; A-Cap Resources and Tati–Nickel mines. A water balance was then created for each mine and an overall water balance for the mining sector was produced. The overall balance for the mining sector groups the mines into similar sectors e.g. diamond, gold, coal.). The annual Water Apportionment Board (WAB) monitoring reports offered another data source and these were used to verify the data received from the mines. The water abstraction was categorized to indicate the source of water (groundwater, surface or waste water). The mining companies also indicated how much water they receive from WUC (where applicable). Mines and WUC have differing data on water provided to mines. To be consistent, WUC sales data was used for all mines that receive (some) water from WUC.

9.3 AGRICULTURE

9.3.1 LIVESTOCK

Water abstraction by livestock was estimated by multiplying livestock numbers by daily water requirements per type of livestock (Cattle, goats, sheep, donkeys, chickens, pigs and

horses). Usually livestock numbers are obtained from the Annual Agriculture Survey report but since the 2015/16 report was not yet released, percentage change in the Veterinary data was applied to the 2014/15 livestock data to calculate estimates for 2015/16. Daily water requirements by livestock types were obtained from the Ministry of Local Government and Rural Development design manual for rural water supply.

Table7.3 Livestock standard daily water consumption

Animal	Consumption
Cattle	50 L/day/animal
Goat and sheep	5 L/day/animal
Donkey	20 L/day/animal
Horse	30 L/day/animal
Pigs	12.5 L/day/animal
Chickens	0.25 L/day/animal

Source: rural water supply guidelines.

9.3.2 IRRIGATION

For the previous accounts (2010-11 to 2013-14) irrigation water use estimates were constant at 18.8MCM. Irrigation water use estimates changed for the first time in the 2014/15 water accounts after the successful completion of the pilot irrigation survey in South East District. In an effort to improve these estimates another survey was carried out in North East District by the Water Accounting Unit in collaboration with Ministry of Agriculture and Food Security. A sample of 20 projects was taken from different places in North East; Mapoka, Kgari, Ramokgwebana, Masunga, Tsamaya, Francistown, Matshelagabedi and Ditladi. This survey results were merged with the previous (South East) pilot survey results to obtain the average water use estimate of 10599m^2 per hectare for the year 2015-16. This figure was then multiplied by the total area irrigated (provided by Ministry of Agriculture and Food Security) during that year to obtain water use estimate of 35MCM.

9.4 SEEA- Water supply and use table

Water imported from South Africa (Molatedi dam) is captured in the supply table as the water supplied to other economic units by the 'Rest of the world'. It has been deducted from WUC's abstraction for distribution, as well as from water supplied by WUC to other economic units.

WUC water abstraction for own use is derived from the WUC sales to the water sector. It is deducted from WUC water abstracted, and WUC water supplied to other sectors (58.6).

Water received by WUC under the water use table includes water from the mining sector (Debswana Jwaneng). Therefore, this figure is also captured under the diamond sector as water abstracted for distribution, and also water supply to other economic units (WUC) in the supply table.

The Botswana Power Corporation groundwater monitoring reports which are submitted to WAB were used to account for the electricity sector's water use. The reports give all required details of water abstracted from the environment, water used and water supplied

to other economic sectors. The only shortfall is that the reports provide data using the calendar year and not the desired government financial period.

9.5 SEEA terminology

Terms	SEEA description	Comment
Water abstraction	The amount of water that is removed from any source, either permanently or temporarily, in a given period of time for consumption and production activities. Water can be abstracted for distribution or for own use (once it is used it can be delivered to another user for treatment or re-use).	Rainfall that is not captured is not abstraction. For example, rain-fed crop production uses rainfall but this is not recorded in the WA; in contrast, irrigation water is usually abstracted and stored and therefore accounted for in the WA
Water use	Water intake of an economic unit. It is the sum of water: a. provided to that economic unit by a water service provider or another economic sector; and b. water abstraction from the environment by that economic unit.	
Water consumption	That part of water use which is not distributed to other economic units and does not return to the environment because during use it has been incorporated into products, or consumed by households or livestock.	When return flows are unknown consumption becomes similar to water use. Water consumption is not equal to water sales but consumption relates to the hydrological water cycle.
Return flows	Water that is returned into the environment or another economic unit by an economic unit. Returns can be classified according to the receiving body and to the type of water, such as treated water.	Return flows can potentially be used again within the economy.
Water losses	The volume of water lost during transport through leakages and evaporation between a point of abstraction and a point of use, and between points of use and re-use.	Water losses from water infrastructure become return flows into the environment.

Source: United Nations, 2012

9.6 Data quality statement

Data quality was assessed using the seven (7) dimensions of data quality used by the Australian Bureau of Statistics (ABS) (2009) and a traffic light approach:

- Green, data quality greater than 75% (use with some confidence)
- Amber, data quality between 50 and 75% (use with caution)

- Red, data quality below 50% (indicative only and liaise with data providers before any use)

The ABS Data Quality Framework is comprised of seven dimensions of quality, which are:

1. Institutional Environment,
2. Relevance,
3. Timeliness,
4. Accuracy,
5. Coherence,
6. Interpretability, and
7. Accessibility.

The ABS Data Quality Framework is similar to other international frameworks (eg Statistics Canada Quality Assurance Framework and the European Statistics Code of Practice).

9.6.1 Institutional environment

The overall objective of the Department of Water Affairs is to assess, develop and protect Botswana`s water resources for sustainable contribution to socio-economic growth. In order to provide effective leadership for water resources planning, development and management, the department will assist and advises in the formulation of water resources development and management policies. The Department assesses plans, develops and manages water resources for short, medium and long term purposes.

It also administers the water law and other related legislations, and liaises with the riparian users of national and international rivers on the saving, conservation and protection of water resources. WA is part of the National Water Master Plan Review of 2006 (Volume 5, Section 2: Natural Resource Accounting) and the IWRM-WE plan of 2013. Both reports call on the need to have a system in place for water accounting.

The Water Accounts are prepared by DWA by a dedicated WA unit working with the technical working group that has representatives from WUC, SB, MOA, MFDP and BCM. High level guidance provided by WAVES PSC.

At present all data exchanges occur without any formal legal agreement.

The quality of the institutional environment for 2015-16 Botswana water accounts report is amber.

9.6.2 Relevance

Botswana is a dry country and water scarcity has been identified as a national priority in a draft of the NDP 11. Understanding the impacts of the increasing population and economic growth on water supply is a critical issue.

The relevance of water accounts for Botswana is high and therefore this dimension of data quality is rated green.

9.6.7 Timeliness

The WA for 2015/16 are scheduled to be published 17 months after the reference period. This has declined from the previous accounts which were available 9 months after the reference period.

The timeliness of water accounts for Botswana is internationally comparable (eg Australia and Netherlands) and therefore this dimension of data quality is rated amber.

9.6.8 Accuracy

The accuracy of the data varies between industries and different water flows.

- Water supply – Information from WUC is available on the volume of water used and the amount paid. The information is mostly from metered water use. The allocation to the economic sectors through ISIC coding was done based on previous year's consumption percentage. Data quality green.
- Agriculture – Information was obtained from the Ministry of Agriculture, special surveys conducted by DWA as well as information from Statistics Botswana. There are several data gaps and estimates based on the available information had to be used. Data quality amber.
- Mining – Information was directly collected from the mines by DWA. Information on abstraction was good but there was limited information on return flows. Data quality green.
- Other Industries – Information was obtained from WUC but no information was available on self-abstraction, therefore the total use is likely to be underestimated significantly (eg Construction and Hotels). Data quality amber.
- Households – Information was obtained from WUC but no information for self-abstractors, therefore total use is slightly underestimated. This has been confirmed by the case study on self-abstracting households. The study estimates water use by self-abstracting Households was 1.8MCM.Data quality green.

9.6.9 Coherence

WA for Botswana are based on the SEEA and all of the data have been aligned with key concepts and classifications of this document. Data quality green.

9.7.0 Interpretability

WA for Botswana includes tables, graphics and interpretive text to assist readers' understanding of the information. Data quality green.

9.7.1 Accessibility

WA for Botswana are available as a document which can be downloaded on a public website. The main supply and use table is also available as an excel file from the website. Data quality green.

9.7.2 Overall assessment

The overall quality of the 2015-16 Botswana water accounts report is amber. This rating is based on the fact that the data is highly relevant as key information for the accounts is available, the accounts will be completed in a timely manner, the data is of varying accuracy, much of the data is from primary sources, the data compares well over time, and information to help users understand data is provided. It is however worth noting that data was not collected under any legislation or legal agreement.

The quality of the data will be refined as and when the missing data becomes available and when new methods are revised.

If you have information or methods which will help us improve the data please contact DWA (+267 3607100, obpule@gov.bw).

10.0 References

SEEA-Water; UN 2012) United Nation's System of Environmental– Economic Accounting for Water

Department of Water Affairs and Centre for Applied Research (2013). Environmental-Economic Accounting for Water in Botswana: Detailed accounts for 2010-11 and 2011-12 and General Trends 1993-2010. Ministry of Minerals, Energy and Water Resources.

Department of Water Affairs and Centre for Applied Research (2015). Botswana Water Accounting Report 2015. Ministry of Minerals, Energy and Water Resources.

Botswana Power Corporation report 2015
Water Utilities Corporation report 2015

Appendix 1: Physical Supply and Use Tables for 2012-13, 2013-14, 2014-15 and 2015-16

A1.1 Physical supply and use table 2012-13

2012/13 Physical Supply and use (000m^3)		Agriculture		Mining and Quarrying						Manufacturing					Water												
		Irrigation/Com	Livestock	Diamond mining	Copper/nickel mining	Coal mining	Soda ash mining	Gold mining	Other mining	Meat & meat p	Textiles	Leather & leat	Other manufac	Electricity	Water service p	Construction	Trade	Hotel & restau	Transport	Finance and bi	Social & perso	Government	Int. Organisat	Total agr & ind	households	rest world	Total
	ISIC code (as per Rev 3)	11	12	1423	1320	1010	1424	1425	1426	1510	1700	1910	?	40	4100	45	50-52	55	60-64	65-74	80,85, 90-93	75,407,550	99				
I. Physical use table																											
From the environment	1a.Abstraction for own use	18,840.000	47,188.113	20,927.793	3,755.784	97.970	527.471								150.991									**91,488.121**			91488.121
	1b.Abstraction for distribution			1,557.193											93,204.388									**94,761.581**			94,761.581
	1. Total abstraction	18,840.000	47,188.113	22,484.986	3,755.784	97.970	527.471								93,355.379									**186,249.702**	-	-	186,249.702
	1.Reservoir water	1375.320	9,437.623	215.234	79.900										**64,610.026**									**75,718.102**		-	75,718.102
	1i.Ground water	7234.560	35,391.084	22,269.752	3,675.884	97.970	527.471								**26,748.099**									**95,944.820**			95,944.820
	1ii.River water	10,230.120	2,359.406												**1,997.254**									**14,586.780**			14,586.780
	1iv.Rainwater harvesting																										
	Abstraction from water resources (1i+1ii+1iii+1iv)	18,840.000	47,188.113	22,484.986	3,755.784	97.970	527.471								**93,355.379**									**186,249.702**		-	186,249.702
Within the economy	**2. Use of water from other economic sectors**	86.968	120.570	345.965	10,870.738	1,837.651	445.259	1,902.794	112.091	1,524.719	271.453	0.533	1,569.160	179.711	1557.200	446.436	1,557.927	817.736	265.029	2,350.608	6,357.991	16,073.339	157.499	**48,851.379**	37,949.883		86,801.262
	3. Total use of water (1+2)	**18,926.968**	**47,308.683**	**22,830.951**	**14,626.522**	**1,935.621**	**972.730**	**1,902.794**	**112.091**	**1,524.719**	**271.453**	**0.533**	**1,569.160**	**179.711**	**94,912.579**	**446.436**	**1,557.927**	**817.736**	**265.029**	**2,350.608**	**6,357.991**	**16,073.339**	**157.499**	**235,101.081**	**37,949.883**	-	**273,050.964**
II. Physical supply table																											
Within the economy	**4. Supply of water to other economic units (4a+4b)**			1,557.193										11.250	77,528.142									**79,096.585**		7,706.900	86,803.485
	4a. Re-used water																										
	4b. Wastewater to sewerage																										
Into the environment	**5. Total returns (5.a+5.b)**														15,676.246									**15,676.246**			15,676.246
	5.a. To inland water resources																										
	5.a.1. Surface water																										
	5.a.2. Groundwater														15,676.246									**15,676.246**			15,676.246
	5.a.3. Soil water																										
	5.b. To other sources																										
	6.Total supply of water (4+5)	-	-	1,557.193	-	-	-	-	-	-	-	-	-	11.250	93,204.388	-	-	-	-	-	-	-	-	**94,772.831**		7,706.900	102,479.731
	7. Consumption (3-6)	**18,926.968**	**47,308.683**	**21,273.758**	**14,626.522**	**1,935.621**	**972.730**	**1,902.794**	**112.091**	**1,524.719**	**271.453**	**0.533**	**1,569.160**	**168.461**	**1,708.191**	**446.436**	**1,557.927**	**817.736**	**265.029**	**2,350.608**	**6,357.991**	**16,073.339**	**157.499**	**140,328.250**	**37,949.883**	**- 7,706.900**	**170,571.233**

A1.2 Physical supply and use table 2013-14

2013/14 Physical Supply and Use (000m^3)		Agriculture		Mining and Quarrying						Manufacturing					Water												
		Irrigation/Comm	Livestock	Diamond mining	Copper/nickel mining	Coal mining	Soda ash mining	Gold mining	Other mining	Meat & meat p	Textiles	Leather & le	Other manufactu	Electricity	Water service p	Construction	Trade	Hotel & rest	Transport	Finance and bus	Social & perso	Government	Int. Organisa	Total agr & ind	households	rest world	Total
	ISIC code (as per Rev 3)	11	12	1423	1320	1010	1424	1425	1426	1510	1700	1910		40	4100	45	50-52	55	60-64	65-74	80,85, 90-93	75,407,550	99				
I. Physical use table																											
From the environment	1a.Abstraction for own u	18,840.000	47,188.113	23,013.623	5,147.227	99.830	576.613								62.809									**94,928.215**			94,928.215
	distribution			1,949.331											91,042.996									**92,992.327**			92,992.327
	1. Total abstraction	**18,840.000**	**47,188.113**	**24,962.954**	**5,147.227**	**99.830**	**576.613**								**91,105.805**									**187,920.542**		-	**187,920.542**
	1i.Reservoir water	1,375.320	9,437.623	141.538	61.399										**63,051.449**									**74,067.328**		-	74,067.328
	1ii.Ground water	7,234.560	35,391.084	24,821.417	5,085.828	99.800	576.613								**26,393.065**									**99,602.368**			99,602.368
	1iii.River water	10,230.120	2,359.406												**1,661.292**									**14,250.817**			14,250.817
	1iv.Rainwater harvesting																							-			-
	Abstraction from water resources (1i+1ii+1iii+1iv)	**18,840.000**	**47,188.113**	**24,962.954**	**5,147.227**	**99.800**	**576.613**								**91,105.805**									**187,920.512**		-	**187,920.512**
Within the economy	2. Use of water from other economic sectors	73.530	145.618	248.099	6,743.000	620.180	380.456	1,141.342	61.811	1,099.876	187.998	0.459	1,061.656	89.072	1,949.000	320.930	1,111.578	613.672	187.666	1,563.872	5,173.935	11,277.252	78.994	**34,129.997**	40,750.485	-	74,880.482
	Total use of water (1+2)	**18,913.530**	**47,333.730**	**25,211.054**	**11,890.227**	**720.010**	**957.070**	**1,141.342**	**61.811**	**1,099.876**	**187.998**	**0.459**	**1,061.656**	**89.072**	**93,054.805**	**320.930**	**1,111.578**	**613.672**	**187.666**	**1,563.872**	**5,173.935**	**11,277.252**	**78.994**	**222,050.540**	**40,750.485**	-	**262,801.025**
II. Physical supply table																											
Within the economy	4. Supply of water to other economic units (4a+4b)			1,949.331										18.420	66,406.162									**68,373.913**		6,506.900	74,880.813
	4a. Re-used water																										
	4b. Wastewater to sewerage																										
Into the environment	5. Total returns (5.a+5.b)														24,636.834									**24,636.834**			24,636.834
	5.a. To inland water resources																										-
	5.a.1. Surface water																										-
	5.a.2. Groundwater														24,636.834									**24,636.834**			24,636.834
	5.a.3. Soil water																										
	5.b. To other sources																										
	6.Total supply of water (4+5)	-	-	1,949.331	-	-	-	-	-	-	-	-	-	18.420	91,042.996		-	-	-	-	-	-	-	**93,010.747**	-	6,506.900	99,517.647
	7. Consumption (3-6)	**18,913.530**	**47,333.730**	**23,261.723**	**11,890.227**	**720.010**	**957.070**	**1,141.342**	**61.811**	**1,099.876**	**187.998**	**0.459**	**1,061.656**	**70.652**	**2,011.809**	**320.930**	**1,111.578**	**613.672**	**187.666**	**1,563.872**	**5,173.935**	**11,277.252**	**78.994**	**129,039.793**	**40,750.485**	- **6,506.900**	**163,283.378**

A1.3 Physical supply and use table 2014-15

2014/15 Table (000m^{3})		Agriculture		Mining and Quarrying						Manufacturing					Water														
		Irrigation	Livestock	Diamond	Copper/nickel	Coal	Soda ash	Gold	Other mining	Meat & meat	Textiles	Leather & les	Other manuf	Electricity	Water servic	sewerage	Construction	Trade	Hotel & reste	Transport	Finance and	Social & pers	Government	Int. Organisa	**Total agr &**	**Ind**	household s	rest world	**Total**
	WA code	**2**	**1**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**14**	**13**	**31.1**	**15**	**16**	**17**	**18**	**19**	**20**	**21+22**	**23**					
I. Physical use table																													
From the environment	1a.Abstraction for own use	21,902.8	46,271.2	25,445.2	2,600.9	46.6	580.0	467.6						743.1	56.5										**98,114.0**			98,114.0
	1b.Abstraction for distribution			2,000.4	-	-	-	-							87,735.6										**89,736.0**			89,736.0
	1. Total abstraction	**21,902.8**	**46,271.2**	**27,445.6**	**2,600.9**	**46.6**	**580.0**	**467.6**	**-**	**-**	**-**	**-**	**-**	**743.1**	**87,792.2**		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**187,850.0**		**-**	**187,850.0**
	1i.Reservoir water			2,987.4	0.0	1.2	-	-							**50,041.5**										**53,030.2**		-	53,030.2
	1ii.Ground water	8,287.6	34,703.4	24,458.2	2,600.9	45.4	580.0	467.6						743.1	**36,872.7**										**108,758.8**			108,758.8
	1iii.River water			-											**877.9**										**877.9**			877.9
	1iv.Rainwater harvesting														-										-			-
	1v.(Reservoir and river water	13,615.3	11,567.8																						**25,183.1**			25,183.1
	Abstraction from water resources (1i-1v)	**21,902.8**	**46,271.2**	**27,445.6**	**2,600.9**	**46.6**	**580.0**	**467.6**	**-**	**-**	**-**	**-**	**-**	**743.1**	**87,792.2**										**187,850.0**		**-**	**187,850.0**
Within the economy	**2. Use of water from other economic sectors**	1,826.7	160.5	238.6	6,864.9	821.1	337.5	1,578.1	51.2	952.5	174.5	1.0	1,009.0	104.5	2,053.5		295.1	1,035.3	765.7	196.8	1,376.7	6,153.1	10,303.2	68.8	**36,368.5**	41,177.0	-	77,545.5
	Total use of water (1+2)	**23,729.5**	**46,431.8**	**27,684.2**	**9,465.7**	**867.7**	**917.5**	**2,045.7**	**51.2**	**952.5**	**174.5**	**1.0**	**1,009.0**	**847.6**	**89,845.7**		**295.1**	**1,035.3**	**765.7**	**196.8**	**1,376.7**	**6,153.1**	**10,303.2**	**68.8**	**224,218.5**	**41,177.0**	**-**	**265,395.5**
II. Physical supply table																													
Within the economy	**4. Supply of water to other economic units (4a+4b)**			2,000.4										72.8	66,653.7	1,775.9									**70,502.8**		7,042.7	77,545.5
	4a. Re-used water															1,775.9												
	sewerage																												
Into the environment	**5. Total returns (5.a+5.b)**														21,081.9										**21,081.9**			21,081.9
	5.a. To inland water resources																												-
	5.a.1. Surface water																												-
	5.a.2. Groundwater														21,081.9										**21,081.9**			21,081.9
	5.a.3. Soil water																												
	5.b. To other sources																												
	6.Total supply of water (4+5)	-	-	2,000.4	-	-	-	-	-	-	-	-	-	72.8	87,735.6	1,775.9		-	-	-	-	-	-	-	**91,584.7**	-	7,042.7	98,627.4
	7. Consumption (3-6)	**23,729.5**	**46,431.8**	**25,683.8**	**9,465.7**	**867.7**	**917.5**	**2,045.7**	**51.2**	**952.5**	**174.5**	**1.0**	**1,009.0**	**774.8**	**2,110.0**	**-1,775.9**	**295.1**	**1,035.3**	**765.7**	**196.8**	**1,376.7**	**6,153.1**	**10,303.2**	**68.8**	**132,633.8**	**41,177.0**	**-7,042.7**	**166,768.1**

A1.3 Physical supply and use table 2015-16

000m³		Agriculture		Mining and Quarrying						Manufacturing					Water													
		Irrigation	Livestock	Diamond	Copper/nickel	Coal	Soda ash	Gold	Other mining	meat products	Textiles	leather products	Other manufacturing	Electricity	Water service providers	sewerage	Construction	Trade	Hotel & restaurants	Transport	and business	personal services	Government	Organisations	Total agr & ind	households	rest world	Total
	WA code	2	1	3	4	5	6	7	8	9	10	11	12	14	13	31.1	15	16	17	18	19	20	21+22	23				
I. Physical use table																												
From the environment	1a.Abstraction for own use	32900.92	48122.19	18798.62	945.39	71.50	579.24	395.14							58.61										**101871.61**			**101871.61**
	1b.Abstraction for distribution			2371.08			0.00	0.00							96241.32										**98612.39**			**98612.39**
	1. Total abstraction	**32900.92**	**48122.19**	**21169.70**	**945.39**	**71.50**	**579.24**	**395.14**							**96299.92**										**200484.00**			**200484.00**
	1i.Surface water	20385.39	12030.55	573.53	16.21		0.00	146.65							**55853.96**										**89006.28**			**89006.28**
	1ii.Ground water	12515.52	36091.64	20596.17	929.19	71.50	579.24	248.49							**40445.97**										**111477.72**			**111477.72**
	1iii.Waste water																								**0.00**			**0.00**
	Abstraction from water resources (1i-1iii)	**32900.92**	**48122.19**	**21169.70**	**945.39**	**71.50**	**579.24**	**395.14**							**96299.92**										**200484.00**			**200484.00**
Within the economy	**2. Use of water from other economic sectors**	1827.44	162.96	0.00	3349.37	449.71	350.31	797.48		966.82	177.11	1.03	1024.15		2433.89	8501.75	299.58	1050.85	777.23	199.77	1397.41	6225.57	10458.041	69.81519	**40520.28**	39131.21		**79651.49**
	3. Total use of water (1+2)	**34728.36**	**48285.15**	**21169.70**	**4294.77**	**521.21**	**929.55**	**1192.62**	**0.00**	**966.82**	**177.11**	**1.03**	**1024.15**	**0.00**	**98733.81**	**8501.75**	**299.58**	**1050.85**	**777.23**	**199.77**	**1397.41**	**6225.57**	**10458.04**	**69.82**	**241004.28**	**39131.21**	**-**	**280135.49**
II. Physical supply table																												
Within the economy	**4. Supply of water to other economic units (4a+4b)**	0.00	0.00	2371.08		295.12								76.80	72139.24	1775.91									**76658.14**		3820.82	**80478.96**
	4a. Re-used water															1775.91									**1775.91**			**1775.91**
	4b. Wastewater to sewerage																								**0.00**			**0.00**
Into the environment	**5. Total returns (5.a+5.b)**														30766.39										**30766.39**			**30766.39**
	5.a. To inland water resources														30766.39										**30766.39**			**30766.39**
	5. a.1. Surface water																											
	5.a.2. Groundwater														30766.39										**30766.39**			**30766.39**
	5.a.3. Soil water																											
	5.b. To other sources																											
	6.Total supply of water (4+5)	0.00	0.00	2371.08	0.00	295.12	-	-	-	-	-	-	-	76.80	102905.63	1775.91	-	-	-	-	-	-	-	-	**107424.53**		3820.82	**111245.35**
	7. Consumption (3-6)	**34728.36**	**48285.15**	**18798.62**	**4294.77**	**226.09**	**929.55**	**1192.62**	**0.00**	**966.82**	**177.11**	**1.03**	**1024.15**	**76.80**	**-4171.82**	**6725.85**	**299.58**	**1050.85**	**777.23**	**199.77**	**1397.41**	**6225.57**	**10458.04**	**69.82**	**133579.75**	**39131.21**	**3820.82**	**168890.14**