



## Economic accounting of water: The Botswana experience



T. Setlhogile <sup>a,\*</sup>, J. Arntzen <sup>a</sup>, O.B. Pule <sup>b</sup>

<sup>a</sup> Centre for Applied Research, P.O. Box 70180, Gaborone, Botswana

<sup>b</sup> Department of Water Affairs, Government of Botswana, Botswana

### ARTICLE INFO

#### Article history:

Received 1 June 2016

Received in revised form

10 September 2016

Accepted 3 October 2016

Available online 10 October 2016

#### Keywords:

Water accounting

Botswana

IWRM

Water efficiency

Economic diversification

### ABSTRACT

Water accounts aim to capture the value of water resources and their use within the economy. The accounts complement the National Accounts as the latter's main indicator (GDP) does not reflect changes in natural capital. Botswana developed water accounts for the period 2010/11–2014/15 using the UN's standard System of Environmental Economic Accounting for water (SEEA-water). The article focuses both on the construction of physical flow accounts as well as on the policy implications for development planning and water resource management through the use of policy indicators. It also shows long-term trends in water abstraction and water use efficiency linking the SEEA water accounts with results of earlier (non-SEEA) water accounting projects in Botswana. The water accounts results show that water abstraction and consumption have been largely stable since 2010/11 despite population (1.9% p.a.) and economic growth (around 5% p.a.) likely due to a combination of water sector reforms and drought conditions in south eastern Botswana; the latter led to the drying up of several dams and the imposition of severe water restrictions. While public attention focuses mostly on water service providers, self-providers (mines and the agricultural sector) account for more than 50% of total water abstracted from the environment of water, demonstrating the need to pay more attention to self-providers in IWRM implementation. Water consumption is highest for the agricultural sector (70.2 Mm<sup>3</sup>) followed by households and mines at 41.2 and 39 Mm<sup>3</sup> respectively in 2014/15. In terms of water use efficiency, value added per m<sup>3</sup> has increased in time, showing (some) decoupling of water consumption and economic growth. This positive trend needs to be enhanced in the pursuit of economic diversification, which should focus on growth of water-efficient economic sectors. Finally, per capita water consumption has decreased over time; while this may indicate that people conserve water, it may also point at delivery problems associated with water sector reforms. This requires further analysis.

© 2016 Elsevier Ltd. All rights reserved.

### 1. Introduction

The environmental shortcomings of national accounts are well known and documented (see e.g. Munasinghe, 1993; and Common, 1996). To address these deficiencies,<sup>1</sup> natural capital accounting (NCA) was developed in the 1980s and 1990s (see. e.g. Pearce et al., 1989; Lange, 1996; Lange et al., 2003). By developing satellite accounts, a better measure of sustainable development could be developed (SADC, 2010; UN, 2012a). The Rio+20 Summit prioritised the concept of the Green Economy emphasizing that natural

resources are capital goods (UN, 2012b) and led to develop Sustainable Development Goals (SDGs) as a sequel to the MDGs beyond 2015. Implementation of NCA is one of the indicators of SDGs. NCA is a key element in the Gaborone Declaration on African Sustainability (GDSA) signed by Botswana and nine other African countries May 2012. The objective of the declaration was “to ensure that the contributions of natural capital to sustainable economic growth, maintenance and improvement of social capital and human well-being are quantified and integrated into development and business practice”: (GoB and CI, 2012, pp.5). This would be achieved through a number of activities including “Integrating the value of natural capital into national accounting and corporate planning and reporting processes, policies, and programmes, in agreed efforts, including the appended Communiqué on Natural Capital Accounting” (GoB and CI, 2012, pp.5).

Botswana has experimented with NCA since the 1990s through the development of resource accounts for water, minerals and

\* Corresponding author.

E-mail address: [tsetlhogile@car.org.bw](mailto:tsetlhogile@car.org.bw) (T. Setlhogile).

<sup>1</sup> NCA measures the stocks or wealth and flows of natural, physical, and human capital. For sustainability, the emphasis needs to be on wealth as a measure of generating potential development benefits; GDP is a mere flow measure that ignores changes in wealth (World Bank, 2012).

livestock (Lange et al., 2001; DEA and CAR, 2006). However, these accounts were never appropriately institutionalised within government. The partnership programme Wealth Accounting and Valuation of Ecosystem Services 2012–2016 (WAVES; [www.wavespartnership.org](http://www.wavespartnership.org)) between the government and the World Bank and the 2012 GDSA provided new stimuli to up-date and institutionalise NCA within government as well as to fully integrate the NCA results into the development planning process.

The Botswana WAVES programme is driven by government needs. At its May 2012 meeting, the Botswana Economic Advisory Council (BEAC) prioritised the up-dating and elaboration of water accounts given the importance of water resources for economic growth and their scarcity. The water accounts have been prepared through a partnership between the Department of Water Affairs (DWA) and the Centre for Applied Research (CAR).

The objectives of this paper are to present and discuss the results of the water accounts as well as the implications for water resource management and development planning at large. The paper focuses on the physical water flow accounts for years 2010/11 to 2014/15 (DWA and CAR, 2014, 2015 and 2016).

## 2. Water resource management in Botswana

### 2.1. Water resource issues

Botswana is water scarce, with endemic drought and highly variable rainfall. In order to meet increased water demand efficiently and sustainably, implementation of IWRM and water demand management is urgently required. Water accounts data can assist in a more proactive management of water resources in Botswana. River flows can be very low and dams dry up as recently happened, leading to water restrictions and tradeoffs between competing demands by mining, agriculture and industries. These challenges need to be addressed pro-actively to avoid hampering socio-economic progression and disturbance to ecosystems' health.

Botswana relies on both surface (see [Map 1](#)) and groundwater with conjunctive use practiced on a very low scale. The available safe yield from these sources combined is estimated at an average of 250 Mm<sup>3</sup>/annum. Current water annual water abstraction is estimated at 187.9 Mm<sup>3</sup>, showing considerable pressure on the country's sustainable water storage capacity. Although the recently commissioned Dikgatlong dam has significantly improved the water supply situation, there is still need to investigate options for water conservation and demand management to enhance sustainable utilization of the resource. With consideration of the economics of supply, the reliance on conventional water supply is likely to imply an unsustainable rise in the cost of water (SMEC and EHES, 2006). The knowledge on the actual potential of groundwater is sketchy and needs further detailed analysis. Water accounting is expected to support DWA to increase water efficiency and water demand management, given their new mandate as the water resources manager.

### 2.2. Policy and institutional environment

The water sector legislation is incomplete, fragmented and outdated. The Acts (Water Act 1968, Water Works Act 1962, Water Utilities Corporation (WUC) Act 1970 and the Borehole Act 1956) are over forty years old, do not incorporate recent IWRM principles and are not consistent with current world water sector trends. The policy environment consists of the draft Water and Wastewater Policy (2012) which aims to provide a framework that will enhance access to good quality water by all users and promote sustainable development of water resources to support economic growth, diversification and poverty eradication. The policy advocates for a

decentralised catchment area approach and uses the precautionary principle. Driven by three overarching guiding principles of *equity, efficiency and environmental sustainability*, the policy embraces IWRM and sustainable development. The challenge for implementation of this policy is to strike a balance between the three guiding principles. Once the policy is approved, the Water Resources Board (WRB) and Water Regulator will be established. The former has the responsibility of overseeing and allocating water resources and development of water related policies while the Regulator needs to ensure financial sustainability in the water sector by guiding and monitoring water tariff structures. The policy was approved by Cabinet in 2013 but awaits approval by Parliament.

The 2006 Botswana National Water Master Plan Review (NWMPR) and the 2013 national IWRM-Water Efficiency Plan can be arguably viewed as the country's water strategies. The NWMPR report states that continued supply expansion will lead to very high water costs, which would probably be unsustainable, and that therefore a policy shift towards water demand management (see [Box 1](#)) is required to curb rising water costs. The review further recommends monitoring of the water system operation and emphasises the re-use of treated effluent for activities that do not require potable water quality such as construction and landscaping. Treated effluent should be treated as an economic good and not as waste.

In fulfilling its obligation to the 2002 Johannesburg Summit for Sustainable Development and addressing present and future water resource management challenges, Botswana developed the National IWRM-WE plan (2013–2030). The plan is meant to

#### Box 1

##### WDM recommendations from the NWMPR

- Urgent review of the draft National Water Conservation Policy
- Water monitoring i.e. of the water system operation
- Water conservation and demand management plans for all suppliers and for villages + towns with piped water.
- The policy of removing all public standpipes from people below the poverty line be reviewed, rationalised and abandoned.
- A major water user forum.
- The water conservation unit should be properly resourced and funded to enable it fulfill its essential role of future management of water resources.
- The building codes and standards be reviewed in line with water efficiency and national products and services.
- Building standards be policed by appropriate authorities.
- Comprehensive review of the future of NSWC to determine and correct major leaks.
- A comprehensive review of the status of all water supply systems to indicate need for capital expenditure and major maintenance stock.
- DWA investigate institutional consumption to ascertain appropriate conservation measures that can be introduced.
- DWA & WUC undertake a detailed assessment of the industry and commercial sectors to evaluate their water usage, and to establish appropriate incentives to reduce water consumption in these sectors.
- DWA & WUC survey domestic consumers to establish the various price elasticities and ability to pay criteria.

Source: SMEC and EHES, 2006.

Download English Version:

<https://daneshyari.com/en/article/5784570>

Download Persian Version:

<https://daneshyari.com/article/5784570>

[Daneshyari.com](https://daneshyari.com)