Article

Sustainable Water Resources Management: Issues and Principles of Water Governance in the Okavango Delta, Botswana

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Abstract

In the recent times, there is an increased awareness about the importance of water management as population growth, new technologies, increased food consumption, land use and economic activities, among others, continue to exacerbate competition among water users in their bid to access natural resources. Thus, water governance encompasses the allocation and management of aquatic resources within the context of a multilayered, competing demand for water resources. Employing a critical review of relevant literature and guided by the legal pluralism conceptual framework and situated within the Dublin water management principles, this article examines key principles and pertinent issues in sustainable water resources management in the Okavango Delta, Botswana; the delta is widely recognized as a wetland of international significance. Findings reveal that demographic and socio-economic factors such as age, education, religion, culture, gender and income play significant roles in household water management decision making. The results also show that although the water legislative environment in Botswana is characterized by outdated Water Acts, efforts and commitment from the government are underway to revise these Acts. This article argues that whilst water research scholars and policymakers continue to make advocacy for water governance at different levels, the local-level water governance needs to be accorded more priority in rural areas in Botswana.

Keywords

Economic growth, governance, multifaceted, rural, sustainable, tenets, water

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Introduction

The article addresses issues and principles of water governance in the Okavango Delta. It employs a literature review and case study approach to analyse data on water management in relation to the Okavango Delta in Botswana. Effective water resources governance is partly responsible for socio-economic growth and poverty reduction. The debate around culture and development has been stimulated by a growing awareness that water development programmes fail to consider the cultural environment and other related factors influencing their sustainability (Jackson 2006). Indeed, cultural rights and the recognition that people's cultural identity, beliefs and values can be a powerful ally as well as a barrier to development or poverty reduction (Head, Trigger and Mulcock 2005) are other important dimensions to the subject. Globally, water plays a central role in many religions and belief systems. Communities and indigenous people have assigned religious and cultural values to water for generations (Anderson and Gale 1992; Mitchell 1995). It is a key element in cultural ceremonies and religious rites. Many rural communities are linked to water for both physical and spiritual health (Head, Trigger and Mulcock 2005). Traditional water governance practices often reflect these socially determined norms for water allocation and sustainable practices. This phenomenon is not unique to the Okavango Delta in north-western Botswana but has been observed throughout human history (see Yan 2016, 170).

Rogers and Hall (2003) define water governance as encompassing all the political, social, economic and administrative systems put in place to develop and manage water resources as well as deliver water services at different levels of the society. It is about how government and other social organizations within a country interact and relate to the citizens and make decisions on water management. It is also about the frameworks upon which water policies define who gets power and how accountability for such power in water management is rendered. The Botswana Water Act (1968) and Water Policy (2012), in theory, promote equitable, efficient and social use of the country's water resources. However, there is still very limited understanding on the use of water for cultural and religious activities and the value(s) attached to these uses, and the way these affect water management decisions especially in the Okavango Delta (Stanley 2014). Recognizing cultural and religious activities of communities can be a powerful driver for social or economic growth and may engender a sense of cultural identity and self-confidence, all of which have a positive impact on the development and/or well-being of a community. Water represents many values to society, and it contributes to a complex system of services (Head, Trigger and Mulcock 2005). Social services provided by water include water for basic human need (Larson 1989). Each of these services should be understood and valued differently, where necessary. Understanding the complex totality of these values is an important element in Integrated Water Resources Management (IWRM). Likewise identifying the way specific values, attitudes, beliefs and practices affect state and water governance strategies is obviously very useful (Yan 2016).

Sustainable development issues currently prioritize poverty reduction, health and gender as urgent issues (Gumbo and van der Zaag 2002). However, sustainable

development using water for social and economic development is about ensuring not only that people have access to water and sanitation but that they have a good quality of life where their cultures and values are respected and enhanced (Jepson and Canney 2003). Hence, cultural values and beliefs also directly affect the institutions involved in water governance. The principles of IWRM are key for sustainable development (Gumbo and van der Zaag 2002). Within the framework of water resource management, the integration of cultural values in a water governance framework is necessary for the conservation of water resources (McIntyre-Tamwoy 2004).

However, the cultural uses of water are poorly understood in the Okavango Delta context (Toteng 2008). To bridge the information gap, this article provides a brief synthesis of the common demographic, economic and social issues and principles in sustainable water governance focussing on the Okavango Delta, Botswana. Having a major thrust of examining the key principles of and issues in water governance in the Okavango Delta, the article begins by outlining the theoretical underpinnings of sustainable water governance (the Theoretical Underpinnings section). While the third section addresses pertinent information on the Okavango Delta, the fourth section highlights the methodological approach adopted by the paper. The fifth section outlines the principles in sustainable water management as enshrined in IWRM. While the sixth section discusses the meaning of water as an economic good, the seventh section sheds light on statutory water management institutions in Botswana. The eight section identifies the factors influencing water demand in the Okavango Delta in general. Lastly, the concluding section provides a summary of pertinent issues provided in the article.

Theoretical Underpinnings

The thrust of this article is rooted in the legal pluralism theoretical framework conceived by Barry Hooker (1975) and Vanderlinden (1989) who opined that legal pluralism is a state of affair in which more than one legal systems operate in a single political unit. It is accordingly regarded in the context of this study as the coexistence of two or more different types of water institutions in the specific social context of water resource governance. Such conceptualization assists in understanding how traditional and modern institutions are fused in the governance of water resources. While legal pluralism is a practical reality in a number of countries; however, it is most notable in the post-colonial states of Africa (Pimentel 2011). Like many post-colonial states, Botswana formally recognizes customary institutions, and like almost all of them, she has a constitution with Bill of Rights which incorporates customary institutions. The definition of institutions is understood from Tiede's (2018) perspective where it refers to both formal and informal rules, laws, as well as organizations. The term customary institutions in this article denote both unwritten rules, norms and values on water governance and the organizations such as traditional courts (*kgotla*) together with traditional governance structures like the Chief and Village Development Committees. On the other hand, statutory institutions refer to written legislation, policy and management

strategies for water governance. Accordingly, Botswana Water Act (1968), Water Bill (2005), Water Policy (2012) and Water management strategies (2013) form statutory institutions and they also include water supply and management organizations such as Water Utilities Cooperation (WUC), Department of Water Affairs (DWAs) and Ministry of Land management, Water and sanitation services (see Gondo et al. 2018a).

Legal pluralism theoretical framework as applied to this study entails that the state recognizes different water governance institutions as well as dispute resolution systems that co-exist in the Okavango Delta insofar as they are not contrary to the fundamental principles and values of the constitution. The motive for embracing legal pluralism emanate from the fact that large population in former colonies have limited access to urban areas where statutory institutions are situated (Obani and Gupta 2014). Even if they can get to the city, few can afford the legal representation or legal advice that may be necessary to navigate the statutory water governance practice system (Gondo and Kolawole 2019). Thus, unless indegenes can get their water disputes and issues resolved locally, their water claims and issues are unlikely to be heard. Furthermore, the most compelling reason to embrace and pursue legal pluralism in the governance of water resources in the Okavango Delta and elsewhere is to preserve and respect the cultural traditions of the indigenous people which were devalued by the adoption of foreign models of water governance (Pimentel 2011). Literature has shown that most African states are grappling with how to preserve the cultural heritage reflected in their customary institutions (Cantwell 2015; Gondo et al. 2018b; Pimentel 2011; Tomaselli 2003). Despite the challenges, nevertheless, the best approach for the former colonized African countries is to maximize the role and independence of customary institutions in the governance of water through emphasizing legal pluralism. Consequently, this buttress Cantwell's (2015) point of view that a balance has to be struck between customary and statutory institutions in water governance to ensure that human rights to water are not unduly compromised. Such a balance will require a procedure by which both customary and statutory institutional decisions are respected. This view can be accomplished by adopting legal pluralism and without giving statutory institutions the absolute power in the governance of water resources in the Okavango Delta or elsewhere.

The Okavango Delta

The Okavango Delta is a large flood-pulsed alluvial wetland (See Figure 1) (Mendelsohn et al. 2010). It is characterized by very low level of anthropogenic transformation in the semi-arid north-western Botswana (Gondwe and Masamba 2014). The delta is located within 18°–20° East of the Greenwich Meridian and 22°–24° South of the Equator (Gondwe and Masamba 2014). It covers an area of 22,000 km^2 (Gondwe and Masamba 2014) and is the largest Ramsar Site in the world, having been designated as Botswana's first Wetland of international importance in 1997 (Mendelsohn et al. 2010). It is hydrologically unique and is the largest inland delta in sub-Saharan Africa after the inner delta of Niger

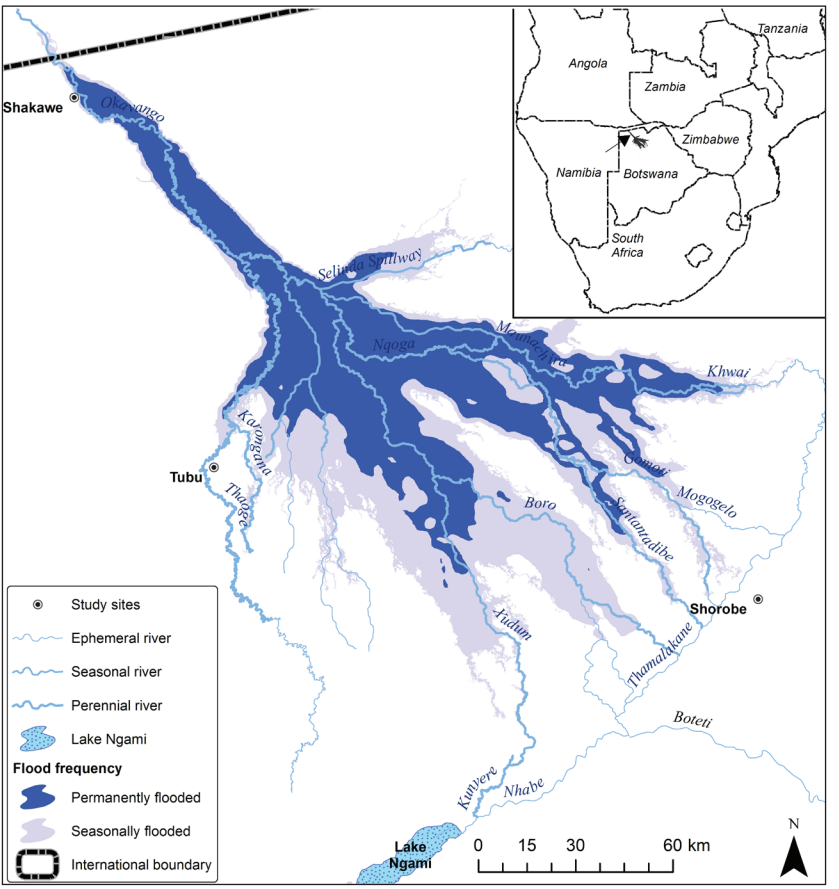

Figure 1. Map of the Okavango Delta Showing the Sampled Sites
Source: Gondo et al. (2019, p. 3).

(Mbaiwa 2005). The Okavango Delta was listed as the 1,000th World Heritage Site on the World Heritage List (Magole 2008), and it attracts a huge number of international tourists annually. The delta sustains the populations of some of the planet's most threatened mammals such as cheetahs, rhinoceros, wild dogs and lions. It is also home to 24 species of globally threatened birds and is key to the survival of Botswana's 130,000 elephants (Elephants Without Borders). There are five ethnic groups in the Okavango Delta, each with its own ethnic identity and language (Mbaiwa and Stronza 2010). They are the HamBukushu, BaTawana, BaYeyi, BaKalanga and BaKgalagadi. The HamBukushu, BaTawana and BaYeyi traditionally engage in mixed economies of subsistence agriculture, hunting and collection of wild fruit (Bock and Johnson 2004; Segadika 2006). On the other hand, the BaKalanga and BaKgalagadi engage in fishing, hunting and the collection of wild fruits. BaKgalagadi people utilize both forest and mineral resources.

Review Methodology

This article adopted a literature review and case study approach to analyse the principles and issues in sustainable water governance in the Okavango Delta. A case study is a research strategy and an empirical inquiry that investigates a phenomenon within its real-life which helps in contributing to knowledge by allowing an understanding of complex individual social phenomenon (Yin 1984). Consequently, a case study approach was adopted in this study to understand the principles and issues in sustainable water governance in the Okavango Delta. Therefore, to provide an in-depth scrutiny and insights into the governance of water resources in the Okavango Delta, a case study approach was used by engaging in literature and document analysis. Document analysis is a methodical technique for studying or evaluating both electronic and printed documents (Bowen 2009). By using an inductive process, we accessed papers on Google scholar using keywords, 'sustainable water resources', 'water as an economic good', 'water governance', 'water demand issues' and 'principles of IWRM'. The papers chosen were those that comprised, to a greater extent, an analysis of principles and issues in water governance. From these research papers, common themes were derived as they related to sustainable water governance. In this study, data were explored and examined using various themes related to the principles and issues in sustainable water governance. Assigning meaning as well as providing a broader understanding of the sustainable water resources governance is an essential component in the analysis of this article.

Principles in Sustainable Water Management

The current thinking on the crucial strategic issues in water governance is heavily influenced by the Dublin Principles (Gumbo and van der Zaag 2002). In preparation for the United Nation Conference on Environment and Development in Rio de Janeiro in 1992, the Dublin principles were formulated during the International Conference on water and Environment in Dublin (Ireland) the same year. Thus, the concept IWRM was coined and four principles for sustainable water management were put forward during the Rio summit (see Table 1).

Table 1. Dublin Principles Underlying IWRM

- Freshwater is finite, vulnerable and essential resource which should be managed in an integrated manner.
- Water resources development and management should be based on a participatory approach involving all relevant stakeholders.
- Women play a central role in the provision, management and safeguarding of water
- Water has an economic value and should be recognized as an economic good, taking into account affordability and equity criteria.

Source: Gumbo and Van der Zaag (2002).

Given the scope of these four principles, IWRM implies an inter-sectoral approach (Biswas 2004), representing all institutions and considering the sustainability of the physical environment (Gumbo and van der Zaag 2001). The main issues emanating from the principles include water allocation which prioritizes the basic human needs while other water uses are prioritized in accordance with societal needs and socio-economic criteria (Poff et al. 2016). Of importance also is the participatory approach in decision-making and the role of gender in water management. In summary, Principle 1 calls for a holistic approach to water governance which recognizes all the characteristics of the hydrological cycle and its interaction with other natural resources and ecosystems. The principle also recognizes that water is required for many different purposes, functions and services. Holistic management, therefore, involves consideration of the demands placed on a natural resource by different institutions (Pahl-Wostl et al. 2007). This principle also emphasizes the need for a holistic institutional approach to water management which involves the management of natural systems and coordinating them with a range of human activities (Mitchell 2005). In this regard, creating water-sensitive political economy requires coordinating policymaking at all levels of community and relevant government concerns.

Principle 2 places emphasis on the need to recognize water as a commodity in which everyone has a stake. Indeed, real participation only takes place when all institutions are part of the decision-making process (Biswas 2008). This can occur directly when local communities come together to make decisions on water supply management and use choices. Furthermore, participation requires that institutions at all levels or the social structures have an impact on decision at different levels of water governance. While Principle 2 on the one hand underscores the participation of all institutions, Principle 3 on the other hand is concerned with the involvement of women in decision-making, which is interwoven with gender hierarchies and roles within different cultures. The fourth Dublin Principle posits that water is an economic good having monetary value attached to it. Many failures witnessed in water resources management programmes in the past are attributable to the fact that the resource has been and is still viewed as a free good or at least, that the full value of water has not been recognized (Gumbo and van der Zaag 2002; Petit and Baron 2009). However, the issue which emanates from this principle is that of value. In literature, the word value has two different meanings (Hanemann 2000). According to Ostrom (2003), the word value sometimes expresses the utility of a commodity and at times the power of purchasing other goods which the possession of that good conveys. Thus, the former is called the *value in use* and the latter *value in exchange* (Hanemann 2000). One very important relationship is that the commodities which have the greatest *value in use* have frequently little or no *value in exchange*. Contrary-wise, those which have the greatest *value in exchange* have frequently little or no *value in use* (Hanemann 2000; Savenije and van der Zaag 2002). Nothing is more useful than water but nothing as well can be obtained from exchanging it with other commodities (Hanemann 2000). A diamond, for instance, has no value in use but very great quantity of other goods can be obtained in exchange for it (Hanemann 2000). Thus, the value of water in traditional societies is not in its exchange but its utility stemming from its relation to the divine spirit, which is determined by an inner goodness (intrinsic value) (Savenije and van der

Zaag 2002). As such, the crucial issue in the fourth principle is that in a situation of competition for scarce water resources like in the Okavango Delta, water may not be ascribed low value uses which statutory institutions as the dominant institutions perceive as having a limited economic value. While this article recognizes that water has an economic value, it also emphasizes the need to change the perceptions about the value of water and recognize the opportunity costs involved in current allocative pattern as well as recognize the intrinsic value of water in traditional societies most especially in the Okavango Delta. The word principle is differently interpreted. It is sometimes used as a synonym for rules which do not have to be enforced by law (von Bar et al. 2009) and at times used to refer to a fundamental truth which serves as the foundation for a system of belief or behaviour (Graham, Amos, and Plumptre 2003). In this study, the word principle refers to rules of a more general nature in the governance of water resources.

Water as an Economic Good

This section starts by defining and explaining the meaning of water as an economic good and highlights some controversy over the concept. It then concludes by using the general principles for cost and value of water as proposed by Rogers et al. (1997) to make a justification for the pricing of portable and non-portable water. To define water as an economic good would mean that it is a resource whose price is charged against its value and whose allocation can be improved through integrated decision making (Rutherford 2001). On the other hand, McNeill (1998) defines water as a scarce resource for which there are competing demands, which outweigh its supply. Grimble (1999) regards an economic good as a scarce good, yielding utility which must be allocated either by rationing or by the price mechanism but not a free good. In principle, regarding water as an economic good appears reasonable for two main reasons (Rutherford 2001; Yuling and Lein 2010). Firstly, it is a means to secure efficient use of water, and secondly, it offers a basis for cost recovery. The efficient argument is based on a simple but powerful narrative that since water is often a low-priced resource, it is wasted due to inefficient use and over usage (Yuling and Lein 2010), leading to water shortages and potentially water crises. The best way to rectify this potentially precarious scenario is to ensure that the cost or pricing is rightly and optimally determined (Rutherford 2001), which according to economists would ensure an efficient means to optimize water use within agriculture as well as across sectors.

However, the Dublin Principle 4 is rather vague and ignites some controversial issues. While some authors (e.g. Gleick 1998; Grimble 1999; Petrella 2001; Yuling and Lein 2010) believe water differs from other resources due to its non-substitutability and hence it should be treated as a basic right rather than a commodity, others (McNeil 1998; Savenije and van der Zaag 2002) argue that water is by nature an economic good, thereby making its allocation to become necessary. But then, there is a disagreement as to what this really implies. It is on this premise that the idea of a competitive market-based water pricing (to secure optimal water allocation) emerged. However, while the economic value of water is incontestable, it needs not be treated like an everyday economic good as it has many

characteristics which distinguish it from a normal economic good. Such water features include its being scarce, fugitive, non-substitutable, not freely tradable and complex (Grimble 1999; Savenije and van der Zaag 2002).

This subsection uses the general principles for water costing and valuing as proposed by Rogers et al. (1997) to explain its meaning as an economic good. In the model presented in Figure 2, Rogers et al. (1997) classify water costs into different categories, namely the full supply cost, which include the financial costs related to the production of water and these consists of the operation and maintenance (O & M) costs and the costs of investments in the infrastructure for water supply (capital charges). This is followed by the full economic cost, which in addition includes the opportunity cost (i.e. the cost of depriving the next best user of water) and the economic externalities (i.e. the damage incurred by the other institutions that is not considered) and the full cost, which includes the environmental externalities (environmental damage). While the value of water to the user may be quantified in terms of their willingness to pay, there are additional benefits such as return flows and multiplier effects from indirect uses and in a broader sense the benefits to meeting societal objectives. For instance, the societal objective could be to reduce poverty. The local community, in that context, might be exempted from, or made to pay, highly subsidized portable water bills or the objective could be to reduce food insecurity. It is, therefore, reflected in the reduction or subsidies in the local farmers' irrigation water bills from abstracting water from its source. Such adjustments to meet the societal objectives are over and above the value of water to the user and should be added to reflect various societal objectives. This aspect is usually neglected by water managers when setting water prices because it is difficult to quantify in monetary terms (Savenije and van der Zaag 2002), even though it is essential to integrate it into water supply decision-making process. As reflected in Figure 2, the intrinsic value of water consists of cultural, aesthetic and merit values. These are also very difficult to quantity in monetary terms (Savenije and van der Zaag 2002). In this case, the full value of water encompasses the full cost and full value of water. Thus, water as an economic good is interpreted to mean that the process of integrated decision making on the allocation of scarce resources, which does not necessarily involve financial transactions but making the right choices about the allocation and use of water resources, is based on an integrated analysis of all the advantages and disadvantages of alternative options (Green 2000).

Statutory Water Management Institutions in Botswana

The institutional landscape for statutory water resources management in Botswana has changed and is still changing since the Water Act (1968). The review of the Water Act (1968) in 2005 resulted in the publication of the Water Management Master Plan (2010) and the Water Policy (2012) documents. Unlike the Water Act (1968), the Water Bill (2005) focusses more on a decentralized participatory government model to redress the disparities in the water sector (DWA 2013). This section of the article provides a review of statutory water management institutions in Botswana. The section gives a summary of statutory water management institutions, mainly the Water Act (1968), Water Bill (2005) and Water Policy (2012).

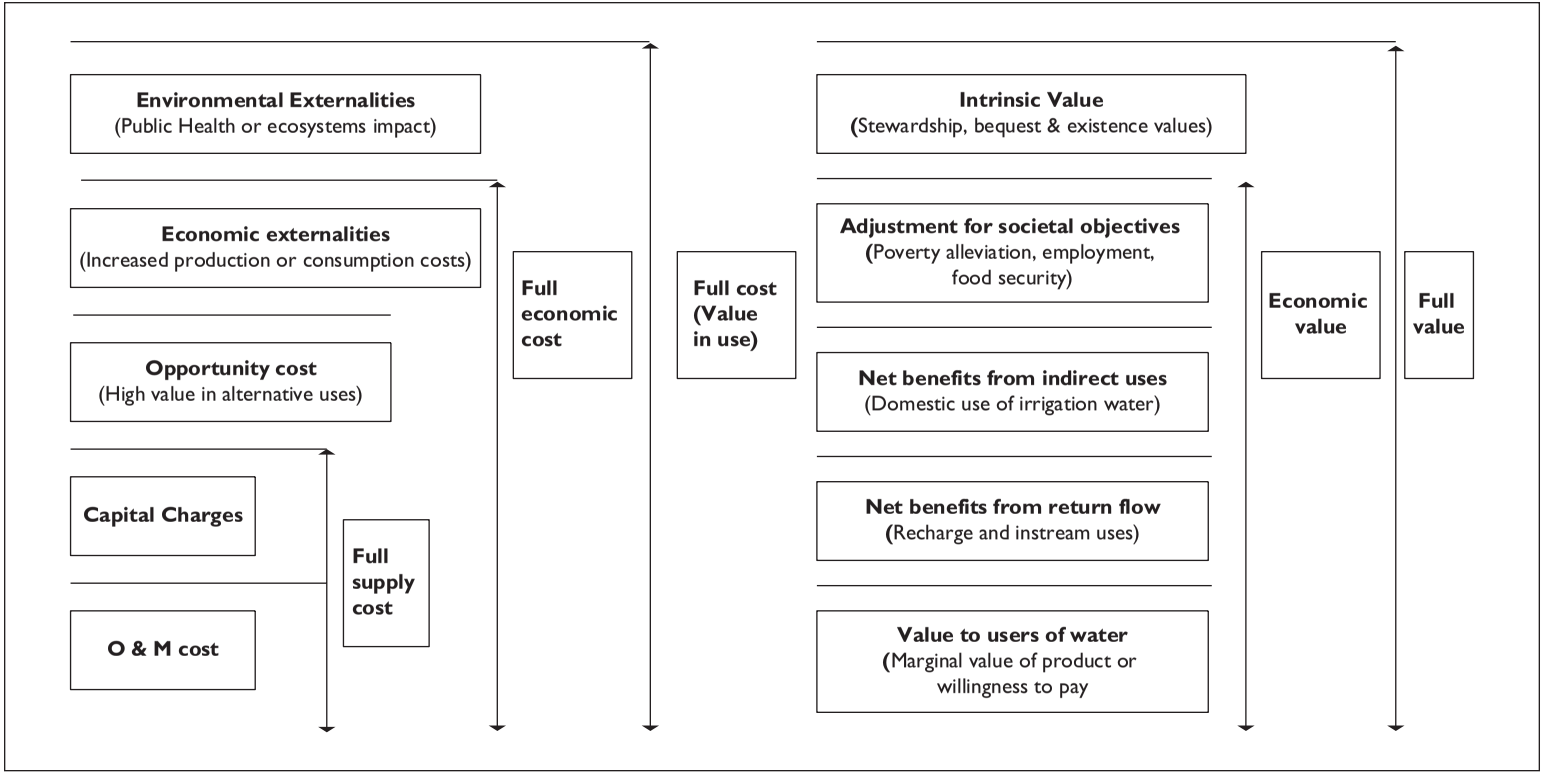

Figure 2. General Principles for Water Costing and Valuation

Source: Rogers et al. (1997).

Botswana water-related Acts includes Borehole Act (1956), Water Works Act (1962), Water Act (1968) and Water Utilities Corporation Act (1970) which are over 49 years old and thus are outdated (DWA 2013). While the legislative instruments are not consistent with current world water sector trends or the existing developments in Botswana, there is a commitment on the part of the government to try to ensure that the institutions are in line with global water trends. And while efforts have been put in place to review these Acts as indicated by the Water Bill (2005), the speed at which the process has moved needs to be re-examined with a view to allowing current issues to be captured in the water sector.

The key features of the Water Bill (2005) include the abolition of the common law riparian rights which attach water rights to land. In the draft Water Bill (2005), no owner or occupier of any land shall, by any reason, therefore, have any right that is enforceable against the Government or any other person (DWA 2005). Another key feature of the draft Water Bill (2005) is the creation of Village Water Development Committees (VWDC). The bill suggests the formation of the VWDC for any village in Botswana. This is a welcome development, especially in rural areas of the Okavango Delta. Once they are formed, it would mean that these villages would, to some extent, incorporate their customary institutions in water governance. As the VWDC would now have the responsibility to advise village residents on the protection, use, development, conservation, management and control of water resources in the village, it implies that the customary institutions will be a part of water management in rural areas.

Following the draft Water Bill (2005), a new Water Policy (2012) was promulgated in 2016 having been in draft form since 2005. The new National Water Policy (2012) provides a framework that foster access to good quality water by all users (DWA 2013). The policy is formulated on the core principles of sustainable development, and it embraces the principles of IWRM. The policy adopts a decentralized catchment area approach and uses the precautionary principle stating that '[w]e have sufficient scientific evidence to state that action is required. And where uncertainty still exists we must give the environment the benefit of the doubt' (Cameron and Abouchar 1991). The overarching guiding principles as enshrined in the National Water Policy (2012) are equity, efficiency and environmental sustainability. The Water Policy (2012) recognizes the importance of water for basic needs, and water allocation for such needs receive priority. A second priority in water allocation is given to the environment as it is the pillar for economic growth and social development and social equity as well as commercial uses. The gender and social equity components are also supported by the policy (DWA 2013). The policy also recognizes water as an economic good, hence costing and pricing of water resources pay a considerable attention to its economic value. The last of the three principles of the National Water Policy (2012) is the sustainability principle. This principle emphasizes the fact that water is a finite and vulnerable resources, and as such, it is an essential resource to sustain the lives of the Batswana. It is also emphasized in the policy that water has a value as an environmental allocation, and in this way, its governance and planning require all institutions to be on board, including the local community (DWA 2013). Though it is still to be formulated, the policy seeks to establish a Water Resources Board with the responsibility of equity and sustainable allocation of water resources, as well as the effective implementation of the IWRM plan.

Issues of Water Demands in the Okavango Delta

As earlier indicated, the Okavango Delta is widely recognized as a wetland of international significance that should be sustainably conserved in relation to its aquatic and terrestrial resources. Literature has shown that there are many factors and issues which determine domestic water use in any environment (Kadisa 2013; Kgomotso and Swatuk 2006; Kujinga et al. 2013; Oageng et al. 2014). It is, therefore, very ideal to understand these factors to enhance the sustainable management of water resources in the Okavango Delta and other similar socio-ecological contexts in other parts of the world. In general, the consumption lifestyles of different households are believed to be the main cause of stress over water resources (Hurlimann 2006). Studies have been conducted to investigate the determinants of water demand for both rural and urban settlements in Botswana (see Kujinga 2013; Oageng et al. 2014). Some of the studies addressing the Okavango Delta focussed on people's willingness to pay for water (Oageng et al. 2014) and water demand estimation, which assumed that water requirements were just a function of population growth and the type of settlements (Kujinga 2013; Mazvimavi and Mmopelwa 2006). Others focussed on economic models in which the roles of economic factors (e.g. water prices and consumer incomes) affecting demand were addressed (see Kgomotso and Swatuk 2006). Recently, demographic factors such as household size (Makki et al. 2013) gender and education (Mmopelwa et al. 2014)—all of which affect water demand—have been studied as well. While all these variables are very important to water governance, the studies done in the Okavango Delta did not make an in-depth analysis of how cultural water management practices and values affect water access and use among the indigenous people. This is in spite of the fact that rainmaking specialists (*baroka ka pula*) and the rainmaking enclosure (*segotlwana sa pula*) are accorded a high status within the delta (Stanley 2014). From an African perspective, ignoring such critical cultural water management values in favour of Western values is not only inimical to rural development (see Kolawole 2001, 2009, 2015) but also violates the fundamental human rights as enshrined in the African Charter on Human and Peoples' Rights of 1991. It is, therefore, imperative that cultural water management practices be accorded the same status as the Western methods of water management. While putting an emphasis on economic models of water governance is not entirely out of place, it may be unethical to pay little attention to cultural values of water within an area given socio-cultural context in which the local people place high value on cultural water management practices.

A number of the studies also reveal that ownership of water-related amenities (such as washing machines in the lodges, gardens and swimming pools) is also an important factor influencing water demand in the Okavango Delta (Kadisa 2013; Kujinga et al. 2013). Nonetheless, they did not pay attention to understanding how spirit mediums may have an effect on water demand and ownership of water sources among different ethnic groups within the Okavango Delta. Elsewhere, a range of attitudinal and behavioural factors (see Randolph and Troy 2008) and cultural and religious-related variables (Kanwar, Kaza, and Bowden 2016) as well as those bordering on urban built environment (Yan 2016) have been identified as those affecting water demand, although such studies in the Okavango Delta are

either scanty or non-existent. Household demand for water includes basic needs like drinking, personal hygiene, cooking and laundry as well as usage related to leisure activities like canoeing in Lake Ngami or some other activities such as garden watering and car washing (Kadisa 2013). In other words, household's water consumption in the Okavango Delta comprises discretionary and non-discretionary usage. This classification is very crucial when examining the factors affecting drivers of water demand.

Price, which is one of the most important factors influencing domestic water consumption, is also regarded as the most effective incentive for achieving water serving potential (see Oageng et al. 2014). The logic behind the emphasis of pricing is that higher water prices result in less water consumption (Savenije and van der Zaag 2002). Thus, price-elasticity tends to be greater when dealing with outdoor leisure-related activities than with indoor water usage, because indoor water usage fulfils more basic needs (Yan 2016) and hence there is less price elasticity. However, the price effect varies depending on several other factors, such as the metering approaches, the household's acknowledgement of pricing and the household's economic status (Mmopelwa et al. 2014). Lack of information about the water price among households is likely to render the pricing instrument less effective (Yan 2016). Kujinga et al. (2013) observe that income levels are positively related to residential water consumptions. The authors posit that an increase in income levels is often accompanied by an improvement in living standards, which suggests an increase in the number of new water consuming household appliances such as those used for doing laundries, watering gardens, washing cars and swimming pools. Another factor signalling income matters is that affluent households, unlike low income households, are not likely to respond to price incentives as they are not effective enough to induce such a response (Renwick and Green 2000; Yan 2016).

As earlier observed and beyond water price, demographic and social factors have been analysed in water demand studies across the Okavango Delta and elsewhere. Murdock et al. (1991) found out that demographic factors (e.g. age of a householder and household type) are of great importance than economic factors in explaining per capita water consumption. Household or population dynamics such as household size, household composition, age structure, gender and employment status is the basic elements that facilitate understanding of domestic water consumption (Lux 2008). As opposed to economic factors, socio-demographic factors have more influence on water usage than price incentives, although Arbués et al. (2010) observed that a certain level of economy of scale exists in large households. Yan (2016) found out that the more the number of members living in a household, the higher the aggregate water consumption by the household. The rationale behind Arbués et al. (2010) argument is that water is used more efficiently in large households as members share resources. For instance, people tend to take short showers in large households so that others can quickly take their turns in the use of bathrooms (Troy, 2000). However, Arbués et al. (2010) and Raditloaneng (2012) suggest that small households are better able to adjust and respond to water price changes due to reasons of incentives and capital control factors.

Age and gender also are of paramount importance in the study of water demand, although they have attracted less study compared to other variables in water demand

and management in the Okavango Delta and the whole of Botswana. Literature has shown that there are two opposing arguments on the relationship between age and water consumption (Billings and Day 1989; Schleich and Hillenbrand 2009). One argument proposes that as people age, they use more water (Billings and Day 1989). Schleich and Hillenbrand (2009), who analysed water consumption in over 600 water supply areas in Germany using regression analysis, found out that per capita water consumption increased by 1.8 litres per day with a one-year increase in the average age. This may have been because many retired people in the developed world spend more time at home and thus, have more chances to use water, such as watering their gardens and bathing (Billings and Day 1989). However, this finding contradicts Manzungu and Machiridza's (2005) study in Zimbabwe in which they observed that very old people in the city of Harare use less amount of water as compared to young people even though a majority of them spend most of their time at home. Thus, age has a negative relationship with water consumption (Nauges and Thomas 2000) just as Makki et al. (2013) who examined the factors engendering water consumption for showering in Australia noted that households with children consumes more water in shower than households without children. The contradictions between these empirical findings may be attributable to the differences in social context examined or to differences in the study periods (winter or summer) or geographical location (rural or urban). Buttressing this finding, literature from Western countries (Aminzadeh et al. 2000; Gitlin et al. 2001) have shown that many elderly people tend to use their bathroom more often due to health concerns, indeed concurring with Billings and Day's (1989) observation in Germany.

Gender is regarded as an important factor in water management due to the substantial variations in water use between genders. Females have been noted to use more water than males, given the fact that they are more likely to undertake water-related activities in the house than their male counterparts. Raditloaneng (2012) and Makki et al. (2013) observed that females are more likely to take a longer shower than males. Gender differences are also suggested to exist in environmental concerns. An investigation into gender differences in water usage indicates that females are more likely to have high-water demand levels than males (Fink 2011), particularly household-oriented water demand. While this might hold true to a considerable degree, the composition of today's households (where either males or females are staying away from their families due to labour movement) implies a change of roles in which males assume females responsibilities and vice versa. In other words, gender role becomes insignificant in determining water demand because all people (irrespective of gender) are engaged in the same household's chores.

The impact of household composition on water consumption mainly reflects the effects of age, gender and size. For instance, a study in Sydney, Australia, by an Independent Pricing and Regulatory Tribunal in 2010 indicates that large water consumption tends to increase in households comprising couples with children. Another way in which household composition impact on water use (demand) is the tenure status of the dwelling. Randolph's (2006) research on the relationships between dwelling type and water consumption in Sydney (Australia) reveals that

people who are renting tend to be inactive in adopting water saving actions compared to those who are living in their own dwellings. This phenomenon emanates from the fact that tenants in some cases do not pay their water bills directly to the service providers. A case in point is whereby the landlord includes water charges in the housing rentals, which precludes tenants from paying their water bills directly to the service providers. In such scenarios, the tenants are unaware of their water consumption rate. It is then difficult for them to respond to calls soliciting for the need to save water. For instance, Yan (2016) observed that, in Australia, tenants who do not pay their water bills directly to the water corporation see no reason for adopting water conservation strategies. However, given the fact that all people act as economic being (McNeil 1998), who try to minimize costs but maximize profits, it is highly unlikely that any landlord would want to pay exorbitant water bills incurred by tenants. As such, the landlord has three options. First, they can compel the tenants to reduce their water consumption. Second, they may decide to install a separate meter for the tenants. Third, they may be forced to not renew the tenant's rental contractual agreement if none of the suggested solutions prove to be efficient in reducing water consumption rates. Ultimately, ownership of water use appliances as well as dwelling tenure type have an impact on water demand even though the impact varies depending upon the frequency of usage of the facilities (Murdock et al. 1988) and the water use efficiency of the appliance (Grafton et al. 2011).

Water use difference between dwelling types is suggested to reflect the household make up, size or the presence of water use appliances. For instance, unit dwellers are less responsive to price incentives because they use a common meter for measuring the water usage in their building block. Other principal factors such as temperature and rainfall also matter. The climatic factors are expected to have an impact on outdoor activities such as garden watering and family swimming pools (Yan 2016). Education level is considered to correlate with an individual's water usage. The reasoning behind this is that highly educated people are expected not only to have extended knowledge of water demand issues, but also to be more conscious about water protection and management (Yan 2016).

Culture and religion play an important part in the lives of Batswana, more especially among rural Okavango Delta communities. Water has been and is still central to both their culture and religion. The African people have always maintained a connection between water and land. Water also plays a central role in many religions and beliefs in Africa and beyond; there are often rules regarding the use of water based on the religious teachings and principles. As a source of life, water represents birth or re-birth. It also represents purity, and these qualities confer a highly symbolic and even sacred status to water. Water is, therefore, a key element in ceremonies and religious rites. Religion provides a variety of examples of how water has been regarded as part of the sacred life process, and not just another product for consumption.

There are two main issues that pertain to the cultural and religious use of water; they are issues around (i) access to water sources and (ii) pollution. The statutory water management institutions like the WUC and DWA need to address these issues in their water management strategy or other complementary strategies.

Concluding Remarks

Various institutions have an interest in water management issues in the Okavango Delta because of its status as a wetland of international importance. Amongst these are customary and statutory institutions that give the mandate to allocate water to various sectors of the economy. To better understand the interests of different institutions in water management, the legal pluralism theoretical framework was applied, and analyses showed that water had a cultural value in rural areas unlike in the urban centres, where the economic value of water seemed to be more important. The article reviewed the milestones already recorded in Botswana's water sector legislative instruments. The findings showed that age, culture, education and income levels among others directly or indirectly influenced rural household water management decisions in the Okavango Delta. Although there is a commitment on the part of the government to improve the water sector as evidenced in the new draft Water Bill (2005), and the recently formulated Water Policy (2012), Botswana's water legislative environment has always been characterized by old and outdated laws. Whereas the current efforts on water policy issues are plausible, the main challenge associated with the process is the bureaucratic bottlenecks inherent in the approval and functionality of the policy documents.

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