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Physics and Chemistry of the Earth 29 (2004) 1319–1326

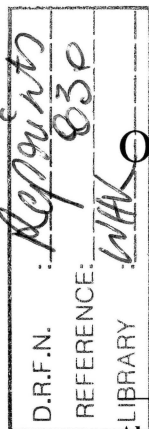
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# Causes and possible solutions to water resource conflicts in the Okavango River Basin: The case of Angola, Namibia and Botswana

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## Abstract

This paper reviews available literature concerning water resources use in the Okavango River Basin (ORB). It describes a number of common arguments regarding possibilities for the emergence of violent conflict in and among Basin states, particularly those states party to the Okavango River Basin Commission (Okacom)—Angola, Botswana and Namibia. The paper presents data concerning present and future water demands and examines a number of formal, institutional steps taken by global and regional actors to facilitate sustainable development, natural resources management and peaceful cooperation in the Basin. Contrary to trends in much of the literature, the paper suggests that there is great scope for enhanced inter-state cooperation in the Basin. It argues that to achieve sustainable utilisation of water resources and avoid violent conflict in the ORB, an integrated management plan for the entire basin needs to be developed. In addition, each basin member-state should observe international and regional conventions and treaties governing the use of water resources when designing national water development projects that require the use of water from the ORB. © 2004 Published by Elsevier Ltd.

*Keywords:* Okavango River Basin; Sustainable development; Water resource conflicts; Riparian states; Environmental impacts

## 1. Introduction

River basins play a significant role in sustaining livelihoods of people living along them. In recent years, they have become a source of income derived from the utilisation of flora and fauna for tourism purposes. River basins are also converted into other land uses such as irrigation and for industrial development. Because of these land use activities, river basins have become the most threatened of all environmental resources (Brouwer et al., 2001). The Okavango River Basin (ORB) remains one of the least human-impacted basins in the African continent. However, mounting socio-economic pressures on the use of the basin by riparian states of Angola, Botswana and Namibia threaten to change its present character (Porto and Clover, 2003). In the long

term, socio-economic pressures may result in irretrievable environmental breakdown and the consequent loss of domestic and global benefits (GEF, 2000).

The ORB provides an example of a transboundary system where human and ecosystem needs compete for scarce water supplies in an otherwise arid region (McCarthy and Ellery, 1998; Ashton and Neal, 2003). Historically, people everywhere have competed for natural resources needed to sustain their livelihoods (Buckles and Rusnak, 1999). Competition over natural resources such as water has the potential of leading to conflicts among users. The intensity of conflict over resources may vary from confusion and frustration among members of a community over poorly communicated development policies to violent clashes between groups over resource ownership rights and responsibilities (Kant and Cooke, 1999; Chenier et al., 1999; Suliman, 1999). In the ORB, conflicts have so far have centred on verbal disagreements particularly between Botswana and Namibia.

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This paper assesses the likely causes and possible solutions of water resource conflicts in the Okavango River Basin. In doing so, it is guided by the following questions: What socio-economic factors contribute to or have the potential to cause water resource conflicts between ORB member states? What are the current and future levels of water demand and use in ORB states? What regional and international treaties and conventions exist to help minimise water resource conflicts between ORB states? In terms of organisational structure, Section 1 introduces the paper. Section 2 gives a geographical description of the ORB while Section 3 discusses the theoretical base of the paper. The fourth and main section of the paper deals with potentially problematic socio-economic and (present and future) water demand issues in Angola, Botswana and Namibia. The fifth section discusses some of the formal mechanisms in place to help foster water resource cooperation in the ORB. The sixth and last section concludes the paper.

## 2. Geographical description of the Okavango River Basin

The Okavango River Basin has its origins in the highlands of Angola where the Cuito and Cubango Rivers eventually unite to become the Okavango River near

the boundary of Angola and Namibia. The river then flows across Namibia's Caprivi Strip and finally drains in northwestern Botswana (Fig. 1).

In Botswana, the Okavango River flows into a collapsed section of the earth's crust caused by tectonic activities forming a huge wetland that has come to be known as the Okavango Delta. The Okavango Delta covers about 3% of the total surface land area of Botswana of which half is permanently flooded (Tlou, 1985). According to Ashton (2003), the total catchment area of the ORB is about 348,954 km<sup>2</sup> (Table 1). As shown in Table 1, Angola contributes more water into the Okavango River than Botswana and Namibia (Ashton, 2003).

An estimated 122,064 people live in the basin in Botswana (CSO, 2002); with 179,000 people in Namibia, of whom 144,000 live not more than 10 km from the Okavango River (Obeid and Mendelsohn, 2001). In Angola, the civil war displaced a lot of people and there has been no reliable census carried out to provide information on the total number of people resident in the basin. Porto and Clover (2003), however, estimate there to be 140,000 people in Angola's portion of the basin with up to 204,024 unconfirmed internally displaced people also there. The livelihoods of communities living around the Basin are directly or indirectly associated with it.

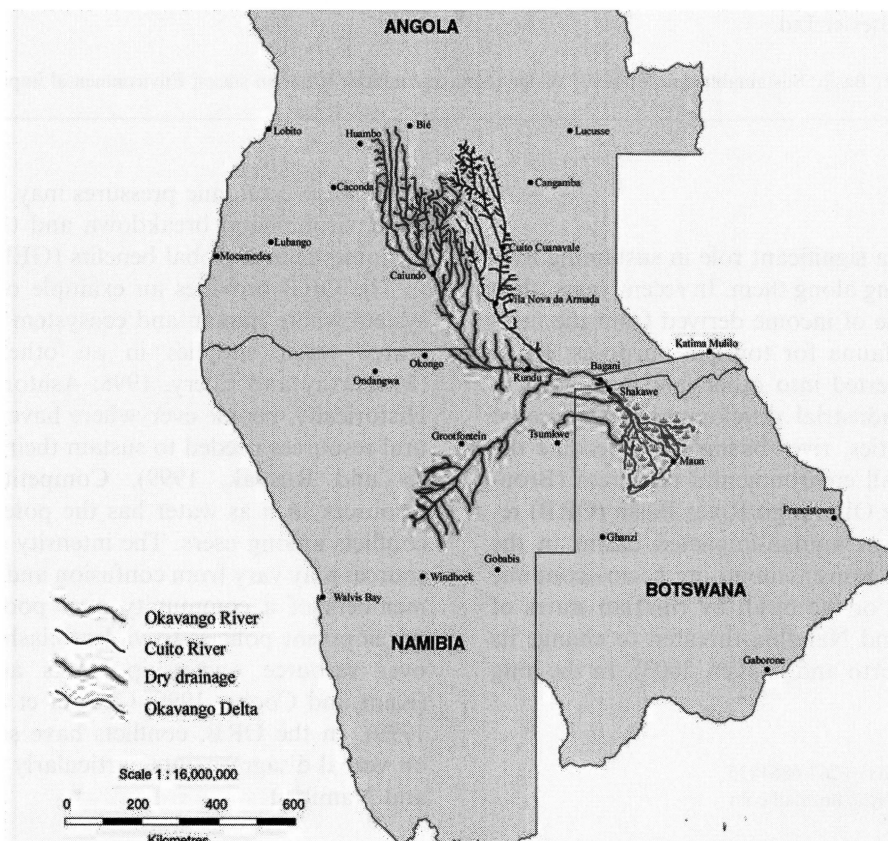


Fig. 1. The Okavango River Basin. *Source:* Molefe (2003).

Table 1  
Catchment area and the contribution of annual water flow by basin states

Basin country	Component catchment area (km <sup>2</sup> )	Average rainfall (mm)	Annual contribution to Delta inflows		Inputs to total Delta water balance (%)
			(Mm <sup>3</sup> )	(%)	
Angola	151,200	873	9572	94.45	71.76
Botswana					
River only	58,350	480	265	2.62	1.99
Direct rainfall onto Delta only	15,844	486	3205	–	24.03
Namibia	123,560	427	297	2.93	2.22
<i>Totals</i>					
• Basin only	333,110	639	10,134	100.00	–
• Basin + Delta	348,954	632	13,340	–	100.00

Source: Ashton (2003).

The Basin, therefore, can be described as a natural system that supports the socio-economic activities of the various people living in it. It also supports a rich biodiversity which, in Namibia and Botswana, is an important aspect of tourism-driven economic development.

### 3. Sustainable development and natural resource conflicts

Sustainable development is commonly understood to mean utilisation and management of renewable resources for the benefit of today's generations without compromising the ability of future generations to do the same (WCED, 1987). While acknowledging that the concept is not without controversy (Lele, 1991), it is argued here that 'real' development cannot be achieved unless strategies and practices are sustainable and consistent with environmental conservation as well as social values and institutions. It is also the argument of this paper that sustainable development in the Okavango River Basin requires equitable access and use of water for riparian states. At the same time, these member-states must develop institutions and policies that guard against the over utilisation of water resources, and help mitigate conflicts.

The nature, extent and possible solutions to natural resource conflicts can be understood and studied through an approach that recognises the importance of all stakeholders and actors in the conflict situation. In the Okavango River Basin, the countries of Angola, Namibia and Botswana are stakeholders and must be involved in any decision regarding water use. At the same time, the participation and consideration of local communities and other resource users in the basin is necessary if resource-based conflicts are to be avoided.

### 4. Socio-economic and ecological water needs

Many current and prospective socio-economic and ecological activities in Angola, Namibia and Botswana

are commonly thought to hold conflict potential. As discussed below, this is due primarily to a combination of the transboundary nature of the resource, and the ecological profile of the river system.

#### 4.1. Angola

Thirty years of civil war prevented collection of accurate data regarding water and other natural resource use in Angola's portion of the ORB. Nevertheless, it is known that subsistence agriculture and animal husbandry are the dominant economic activities among those resident in Kuando-Kubango province (Porto and Clover, 2003). Current water usage from the ORB in Kuando-Kubango province is limited to supplies to small regional centres, and some small-scale floodplain irrigation (GEF, 2000; Porto and Clover, 2003). In addition, there has been no considerable development and investments related to the Cubango and Cuito headwater rivers since Angola gained independence in 1975 (Porto and Clover, 2003). As the traditional stronghold of Jonas Savimbi's UNITA rebel movement until 2002, it was not easy for government to make comprehensive socio-economic plans in Kuando-Kubango, let alone implement them.

With the end of civil war, there are a number of proposed developments in the upper ORB. These developments, including resettlement of displaced communities, have the possibility of negatively impacting 'on one of the last pristine river systems in Africa' (Green Cross International, 2000). Resettlement will mean increases in water demands and socio-economic activities. Given the spontaneous and unplanned nature of much resettlement, environmental problems are sure to emerge. However, resettlement in most parts of the basin is likely to be delayed for some time due to the presence of land mines.

The mined area lies across the border with Namibia. Further upstream, however, dam development and agricultural expansion are real possibilities. In the colonial period, studies by the Portuguese Government indicated

potential hydropower generation of about 350 MW and the development of irrigation of about 54,000 ha in the Angolan portion of the Okavango catchment (Pinheiro et al., 2003). Potential development, not guided by sustainable development principles, is regarded by many as a fundamental threat to the Delta area. For example, according to Porto and Clover (2003, p. 77), the 'eutrophication that may result from agricultural development in the catchment may profoundly affect the nature of vegetation communities in the upper reaches of the fan [Delta area], and thus the patterns of sediment and water dispersal'. Ellery and McCarthy (1994) note that 'sustained removal of vegetation may result in salinisation of surface water, and would have a large impact on the ecosystem'. Green Cross International (2000) state that 'the development of any dams will alter the pulsed nature of the flooding, with detrimental environmental effect in the delta. Agricultural runoff will change the nutrient loads, impacting on one of the basic elements of the aquatic ecosystem functioning in the delta'.

The ORB in Angola is therefore likely to be affected by population growth, mining, hydropower, urbanisation and industrialisation which have the potential of leading to pollution, reduced river flow, and water quality. Environmental impacts in the upstream will affect downstream riparian states. Thus, Pinheiro et al. (2003, p. 114) state that Angola is a 'sleeping giant that will come alive and that may have severe consequences for the future availability of water for Namibian abstraction and the Okavango Delta'.

#### 4.2. Namibia

The ORB is one of the most important sources of perennial water available in Namibia. Water use in the Basin has a similar character to that of Angola. In addition, there are 250,000 people outside the Basin in central Namibia who will need future access to water from the Okavango to sustain their socio-economic activities (Pinheiro et al., 2003). Government planning envisages a pipeline from the Kavango River at Rundu, linking into the Eastern National Water Carrier at the town of Grootfontein (Ashton and Manley, 1999). Turton et al. (2003) note that, for the Government of Namibia, the 'pipeline is seen as a form of insurance policy that will enable existing (internal) water resources to be used when available, secure in the knowledge that if they fail, the Kavango River would always be there as a reliable backup'.

In the 1990s, the pipeline project raised much concern within Botswana and remains a key potential conflict flashpoint between Namibia and Botswana. In addition to the Rundu-Grootfontein pipeline, preliminary studies by the Portuguese Government in 1969 showed that it is possible to develop a 40 MW hydropower station at Popa Falls in the Caprivi Strip in Namibia (DWA,

1969; Pinheiro et al., 2003). It has since been proposed by the Namibian Government. The most important potential negative environmental effect of this project is blockage or damming of sediments that are one of the key life forces of the Okavango Delta system. Damming of these sediments will result in destruction of vegetation and an increase in depth of some river channels so impacting on tourism, fishing and other sustainable livelihood practices in the Delta.

#### 4.3. Botswana

In Botswana's north west, over 90% of the people living there directly or indirectly rely on natural resources found in the Okavango system to support their livelihoods (NWDC, 1997). These livelihood strategies include floodplain (*molapo*) crop cultivation, livestock farming, fishing, hunting, and gathering of veld products (Mbaiwa, 2002). Therefore, any upstream-initiated negative environmental impacts are bound to affect livelihoods downstream and cause resource conflicts with rural communities living in the Okavango Delta area.

In the last 10–15 years, the Okavango River Delta in Botswana has become the centre for tourism development. The presence of a vast body of permanent water in a predominately dry and harsh environment attracts a variety of animals, birds, reptiles, insects, and vegetation that are a source of attraction to tourists. Botswana's tourism industry is currently the second largest economic sector contributing 4.5% to GDP (BTDP, 1999; Mbaiwa, 2002). The 2003 public information seminar in Maun convened by consultants of the pre-feasibility study of the Popa Falls project revealed that members of the tourism sector in Botswana are opposed to its implementation. This is mainly because of the anticipated negative effects the project will have on water flow in the Okavango Delta which in turn will negatively affect tourism.

#### 4.4. Current water demand in Angola, Namibia and Botswana

The demand and use of water from the ORB in Angola, Namibia and Botswana, if not well planned, can cause conflict between these riparian states. All water use in the Basin should be guided by Integrated Water Resources Management (IWRM) principles, i.e. equity, efficiency and sustainability. Ashton (2003) calculated water demand for each of the three countries. Total water needed in the catchment during 2000 was approximately 23.2 Mm<sup>3</sup>/year; equivalent to 0.23% of the mean annual runoff recorded at Mohembo, the primary inflow point to the Okavango Delta. Ashton shows that of this total Angola required 13.8 Mm<sup>3</sup>, (60%), Botswana needed 4.1 Mm<sup>3</sup> (18%), and Namibia's requirement was 5.2 Mm<sup>3</sup> (22%) (see Table 2). Ashton's estimates

Table 2  
Estimated water demands in Angola, Namibia and Botswana, 2000 (all values in Mm<sup>3</sup>/year)

Water use sector	Angola	Botswana	Namibia
Subsistence use (rural)	5.646	1.484	1.266
Domestic use (urban)	7.445	0.699	0.813
Stock watering	0.250	0.267	0.145
Industrial activities	0.000	0.025	0.060
Agricultural activities	0.500	1.220	2.830
Tourism facilities (e.g. lodges)	0.000	0.418	0.100
Catchment total	13.841	4.113	5.214

Source: Ashton (2003).

are based on consumptive water needs and exclude any allowance for the quantity of water likely to be needed to maintain essential ecosystem services within the Okavango River or the Okavango Delta.

Results by Ashton indicate that within each of the three basin states there are small, yet subtle differences in water use patterns. For example, in Angola, rural and urban populations account for some 95% of all the water used, primarily for subsistence and domestic use. This does not include irrigated agriculture which has not been possible due to the disruptions caused by the recently ended civil war. In contrast, rural and domestic water use sectors use considerably less water in Namibia and Botswana, whilst agricultural activities (principally small-scale irrigation and subsistence agriculture) consume between 30% (Botswana) and 54% (Namibia) of all water used (Ashton, 2003). Accurate accounts of current water demands in each Basin state are important because binding decisions on equitable water abstraction and sharing between member-states can be made only when that data is available. At present, water from the ORB is not evenly distributed among member-states so having the potential to cause conflicts between them.

#### 4.5. Future water demands in Angola, Namibia and Botswana

Ashton (2003) shows that future water demands in the three ORB states are likely to rise. Using a two-scenario approach, he calculated future water demands for a 20-year period for Angola, Namibia and Botswana (Table 3). In Scenario A, projections are based on the assumption that existing patterns of water demand may only grow as a result of population growth. In Scenario B, projections are based on a situation where existing patterns of water demand are supplemented by new developments such as transfers out of the basin, or new agricultural (irrigation) developments.

Ashton shows that future domestic water needs depend heavily on the rates of population growth. In the lower estimate, Scenario A, water needs increase by approximately 44% between 2000 and 2020 if there is no change to the current patterns of water use. The amount likely to be needed in 2020 (33.3 Mm<sup>3</sup>) is equivalent to 0.33% of the mean annual flow at Mohembo, where the Okavango River enters Botswana (Ashton, 2003). In contrast, Scenario B suggests that the increased quantities of water needed to meet future irrigation developments in the three countries, and water transfers out of the ORB within Namibia, lead to a 13-fold increase in the total quantity of water needed each year (Ashton, 2003). This total (303.3 Mm<sup>3</sup>) is equivalent to 3.0% of the mean annual flow at Mohembo, of which riparian state requirements amount to 40.2% (Angola), 17.9% (Botswana), and 41.9% (Namibia). Ashton notes that Scenario B likely represents the *maximum* quantity of water (i.e. the worst case scenario) needed from the ORB by the three basin states within the 20 year time-frame evaluated, with Namibia surpassing Angola in Basin water demand. Clearly, much consultation and agreement between and among

Table 3  
Projected growth in consumptive water demand in the Okavango Basin (using two scenarios), 2000–2020

Basin country	Total consumptive water demand (Mm <sup>3</sup> /year)		
	2000	2010	2020
<i>A. Existing demand patterns with no new developments</i>			
Angola	13.841	17.352	21.750
Botswana	4.113	3.984	4.328
Namibia	5.214	6.130	7.206
Basin total	23.168	27.466	33.284
<i>B. Existing demand patterns plus potential new (transfers + irrigation) developments</i>			
Angola	13.841	67.352	121.750
Botswana	4.113	28.984	54.328
Namibia	5.214	66.130	127.206
Basin total	23.168	162.466	303.284

Source: Ashton (2003).

Basin states will be needed to prevent resource use conflict and negative environmental impacts.

## 5. Conventions, protocols and agreements

Sustainable use of the resources of the ORB are highly dependent on political co-operation between Angola, Namibia and Botswana. This is possible through regional and international water protocols and agreements on the use of water resources in the Basin. As shown below, there are a number of formal agreements in place which potentially form the basis for cooperative and sustainable resource use throughout the Basin. Much depends, however, on political will. Four key agreements are discussed: the SADC Protocol on Shared Watercourses, the Okavango River Basin Commission (Okacom), the Ramsar Convention and the United Nations Convention on the Preservation of Biological Diversity.

### 5.1. *The Southern African Development Community (SADC) Protocol on Shared Watercourses*

The original Southern African Development Community (SADC) Protocol on Shared Water Courses was signed in 1995 and came into force in 1998 when two-thirds of the original SADC member-states had ratified it. The revised protocol was signed in 2000 and it came into force in October 2003 when Tanzania became the ninth member-state to ratify it. Countries that have ratified the SADC Protocol are: Botswana, Lesotho, Malawi, Mauritius, Mozambique, Namibia, South Africa, Swaziland and Tanzania. The protocol is meant to bring water use in the region in line with international water law particularly the United Nations Convention on Non-Navigational Uses of International waters.<sup>1</sup> Some key provisions of the protocol include obligations that member-states within a shared watercourse system undertake to establish close co-operation with their neighbours in all projects likely to have an effect on the watercourse system; and that member states shall utilise a shared watercourse system in an equitable manner. The protocol also states that a shared watercourse system shall be used and developed by member-states to attain its optimum utilisation and for the benefits consistent with the adequate protection of the watercourse system (SADC, 2000; Ashton and Neal, 2003).

The SADC Protocol is meant to underpin all water development in the region. With regard to the ORB, key provisions are that each state should inform its neighbours of any plans to develop or modify a shared river system, to work together to ensure that each state

shares in the benefits of such plans, and to ensure that environmental degradation is avoided or minimised. While the protocol promotes co-operation between member-states and offers an alternative for peace in the use of water resources in riparian states, acting on its provisions requires political will on the part of policy makers in riparian states. Thus, water resource conflicts can erupt despite the existence of the protocol. Therefore, even though SADC countries have responded to the issue of water resources in the region with a protocol on shared river basins, the Okavango is likely to continue to be a source of strategic local and regional conflict in Southern Africa. However, political cooperation between and among Angola, Namibia and Botswana remain a long-term strategy for the sustainability of the ORB. Inter-state political cooperation can actually be translated into national acts and programmes on the use of the ORB by each member-state.

### 5.2. *The permanent Okavango River Basin Water Commission (Okacom) of 1994*

In partial reaction to the pressure on water resources but also as a reflection of the changing political context in the region, Angola, Botswana, and Namibia made the Permanent Okavango River Basin Water Commission (Okacom) agreement on 15 September 1994 in Windhoek (Namibia). Although Zimbabwe contributes water to the Makgadikgadi Pans through the ephemeral Nata River, it is not a member of Okacom. There has been no reason given yet for the exclusion of Zimbabwe from Okacom. Through Okacom, member-states recognise the importance of working together before conflict arises. Okacom is actually an institutional expression of the international and regional agreements meant to promote cooperation between countries on shared water resources. It is a relatively young institution and is still evolving to become a major driving force in the sustainable development of the Okavango Basin (Pinheiro et al., 2003).

Accurate information is a key to conflict avoidance. To this end, the three Basin Commissioners meet regularly while the technical arm provides advice on matters relating to the sustainable development, beneficial utilisation, integrated management and conservation of water resources of common interests in the Okavango Basin. There is also a steering committee to manage projects and provide advice where necessary. The organisation is, in this author's view, hindered by the absence of a Secretariat. Ideally, this entity would be empowered to oversee all developments in the ORB and ensure that activities are in line with IWRM principles.

In 1995, Okacom member-states declared their commitment to the sustainable use of the Okavango River Basin by proposing an environmental assessment and an integrated water management plan for the whole

<sup>1</sup> The author acknowledges the insights of two anonymous reviewers on these and related points.

basin, both of which are in this author's estimation long overdue. In the absence of a completed ORB management plan, riparian states should nevertheless undertake national Basin development plans in line with Basin-wide IWRM principles. Botswana has recently begun this process by initiating a project in 2003 known as the Okavango Delta Management Plan.

### 5.3. *The Ramsar Convention on Wetlands of International Importance*

In order to promote the conservation of the Okavango Delta, Botswana ratified the Ramsar Convention on Wetlands of International Importance in 1997. The Ramsar Convention is an international agreement that seeks to promote awareness and cooperation in the conservation of threatened wetlands (Ramsar Convention, 1971). The Convention is particularly important to ecosystems that support a wide diversity of species. The Okavango Delta is listed as a wetland of International Importance under Article 2 of the Convention. Through Article 3 of the same Convention, Botswana is obliged to ensure that the wetland together with all the natural resources found in it are conserved (Ramsar Convention, 1971). In order to adhere to the principles of the Ramsar Convention, Botswana has since drawn a National Wetland Policy and Strategy in 2000 and a study on the Integrated Management Plan for the Okavango Delta.

Namibia has so far ratified the Convention, whereas Angola has not done so (Ashton and Neal, 2003). The implication is that Angola is not obliged by international law to conserve the wetlands of the ORB. Given that 94.5% of the entire Okavango River flow originates in Angola (Namibia, 3.0%; Botswana, 2.6%), it is imperative that Angola become party to the Ramsar Convention in order to promote the sustainable use of the Okavango River Basin and reduce the violent conflict potential of disputes with other riparian states over the use of the water from the basin.

### 5.4. *The United Nations Convention on Biological Diversity*

The UNCBD is another international agreement aimed at promoting the conservation and sustainable use of biodiversity (UNCBD, 1992). Botswana, Angola and Namibia are signatories to the Convention. The Convention notes that individual states retain sovereign rights to use resources in their respective countries based on their environmental policies. It also notes that in the case of shared resources, activities of an individual state should not cause damage to the environment beyond its borders where other states become affected (UNCBD, 1992). The CBD is important for Angola, Namibia and Botswana in that it ensures that no member-state can pursue activities that negatively affect biodiversity

and ecological function in the ORB. This suggests that socio-economic developments by any Basin state should be undertaken in consultation and agreement with all other Basin states so as to sustain biodiversity—an issue of particular importance to downstream states.

International law has been able to promote the sustainable use of natural resources such as water especially when they are shared by more than one country. However, the major weakness with international law is that countries can choose to ignore it if it does not promote their socio-economic agenda. International law lacks the compulsory jurisdiction and enforcement that characterise domestic legal systems. It relies on its acceptance by the affected states and the opinion of the wider community (Ashton and Neal, 2003). Despite this limitation, international cooperation—at regional and global levels—can create an opportunity of sustainable water resource use and peace building among ORB states.

## 6. Conclusion

Water demands are increasing in the ORB—for agriculture (particularly irrigation), industrialisation, urbanisation, hydropower generation, and tourism. Increased pressure on shared water resources usually causes disagreements and conflicts between riparian states when sustainable institutional arrangements and agreements are not in place. As a result, political cooperation between and among Basin States is necessary to promote long-term sustainability of the ORB and to minimise inter- and intra-state resource-based conflicts. The foundation for peaceful and sustainable resource utilisation in the ORB lies primarily in the development of key institutional mechanisms to facilitate dialogue between basin states and recognition of regional and international agreements on various aspects of natural resources management. Through adherence to these protocols and agreements, Basin states can demonstrate their commitment to mutually beneficial and sustainable development in the ORB.

At a regional level, the SADC Protocol and Okacom together offer hope for the sustainable use of the ORB. For example, Okacom can provide an effective decision-making and dispute resolution process that can prevent riparian states from taking unilateral actions detrimental to the sustainability of the Basin. To this end, it remains the responsibility of Okacom to develop an integrated management plan for the entire Basin. This plan should provide a framework wherein each Basin state can develop national water plans and acts that are also in line with other regional and global protocols, conventions and agreements. Decision-makers within Okacom member-states should therefore consider establishment of a Secretariat as a matter of urgency. Finally, there is at present no generally

accepted model for equitable water sharing by ORB states. As a result, it is desirable that Basin states develop a model and requirements for equitable sharing of water resources from the Okavango River. The ORB presents an important opportunity to demonstrate that the sharing of water resources by riparian states can promote peace and sustainable development, rather than resource degradation and conflict.

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