CHAPTER 5

Cooperation in the Okavango river basin: The OKACOM perspective

Isidro Pinheiro, Gabaake Gabaake and Piet Heyns

Abstract

The Okavango River basin is shared between Angola, Botswana and Namibia. As well as the water resources, people living in the basin derive numerous natural resources from the basin ecosystem. Lying in the middle of a predominantly semi-arid region, the Okavango provides opportunities for water abstractions for numerous uses. The three basin states, sharing a concern for the basin environment, decided to strive to manage developments in the basin in a sustainable manner. In this regard, the three states agreed to establish the Permanent Okavango River Basin Water Commission (OKACOM). This agreement was formally signed on 15 September 1994.

Introduction

Access to water is a prerequisite to achieve the socioeconomic objectives of the Southern African Development Community (SADC). The need for amicable collaboration between riparian watercourse states in the development of internationally shared river systems is well recognised in Southern Africa. This is clearly demonstrated by the entry into force in September 1998 of the SADC Protocol on Shared Watercourse Systems (SADC 1995). Botswana and Namibia signed and ratified the SADC protocol. The protocol calls for the establishment of river basin institutions to manage shared water resources. This is complementary to the framework provided by other instruments of international water law, such as the Helsinki Rules on the Uses of the Waters of International Rivers and the United Nations Convention on the Law of the Non-navigational Uses of International Watercourses (UN 1997). Angola, Botswana and Namibia all voted in favour of the adoption of the UN convention and Namibia is a signatory to the convention. Within this context, these three states that are all riparians to the perennial watercourses of the Okavango basin established the Permanent Okavango River Basin Water Commission (OKACOM).

Features of the Okavango River basin

The Okavango basin comprises perennial and ephemeral sub-catchments. The Cuando Cubango river, internationally known as the Okavango, is one of the three

main rivers in Southern Angola. The Cubango and Cuito rivers are in the perennial or active part of the catchment. They originate east of Huambo on the Bie plateau in southern Angola. Both rivers flow in a south-easterly direction towards the Okavango Delta in Botswana.

The river is surrounded by the basins of Cuando to the east, the Zambezi to the north-east, the Kwanza to the north and the Cunene to the west, as well as an undefined drainage area known as the Cuvelai basin.

The exact extent of the southern perimeter of the Okavango basin is not well defined, but the watercourse system drains about 725,000 km^2 in the central Southern African subcontinent. The basin covers four watercourse states: Angola, Botswana, Namibia and Zimbabwe (see table 1 and, for more information, see map 1).

The rainfall over the catchment is seasonal and summer rainfall conditions prevail. The perennial runoff entering the lower Okavango ends up as a swamp in the Okavango Delta. In the high flood season, the swamp covers an area of about 15,850 km^2. During years of good flows, outlets from the delta may carry water as far as the Ngami and Dow lakes in the Makgadikgadi salt pans. In exceptional cases, the water may spill into the Cuando system through the Magweqgana at the Selinda Spillway, thus becoming part of the Zambezi system.

The Cubango (called Kavango in Namibia) forms the border between Angola and Namibia over a distance of some 400 kilometres between Mbambi in the west and Andara in the east. At Andara, just downstream of the confluence of the Kavango and the Cuito, the river turns to the south across 50 kilometres of Namibian territory in the Caprivi Strip on its way to Botswana.

The mean annual rainfall in the headwaters of the Okavango in Angola is 1,200 mm, but decreases to 600 mm in the middle Okavango. Further southwards, the precipitation is between 300 and 400 mm in Namibia and Botswana, respectively. The Okavango yields about 9,863 million m^3 (rounded off to 10 km^3) of water per annum on average at Mohembo on the border between Botswana and Namibia, just upstream of the so-called Panhandle of the Okavango Delta.

Due to the topography of the catchment in Angola, there is good potential for hydropower generation and the soil is suitable for irrigation, especially on the plains along the river where it forms the border between Angola and Namibia.

The Omatako River catchment in Namibia is topographically linked to the perennial Okavango River, but due to the low mean annual rainfall of less than 400 mm in the headwaters, the river is ephemeral. Due to the sandy nature of the terrain, no runoff has actually reached the Okavango in living memory. There are also a number of other ephemeral watercourses that flow eastwards from Namibian territory across the border into Botswana in the direction of the Okavango Delta, but these watercourse systems all dissipate in the Kalahari Desert before reaching the delta. Therefore, all the runoff up to Mohembo is in effect derived from the Angolan part of the catchment.

Table 1

The Okavango basin

Watercourse state	Area (km^2)	Percentage of total area	Runoff contribution at Mohembo (km^3/a)
Angola	200,000	28	10
Botswana	340,000	46	0
Namibia	165,000	23	0
Zimbabwe	20,000	3	0
Total	**725,000**	**100**	**10**

Note: Figures rounded off.

The mean annual summer rainfall in the Nata River catchment in Zimbabwe (where it is known as the Amanzamnyama River) is 500 mm and therefore runoff in the river is ephemeral. It flows into the north-east reaches of the Makgadikgadi Pan in Botswana. The pan is topographically connected to the Okavango Delta via the Boteti River, but the runoff in the Nata reaches neither the Boteti nor the Okavango. The mean annual rainfall over the catchment in Botswana is 400 mm.

The Okavango is one of the most pristine river systems in Southern Africa, if not in the world. Although large portions of the catchment in Angola, Namibia, Botswana and Zimbabwe are suitable and are used for stock farming, the effects of land degradation or mining and industrial development have not been a significant threat to the watercourse system.

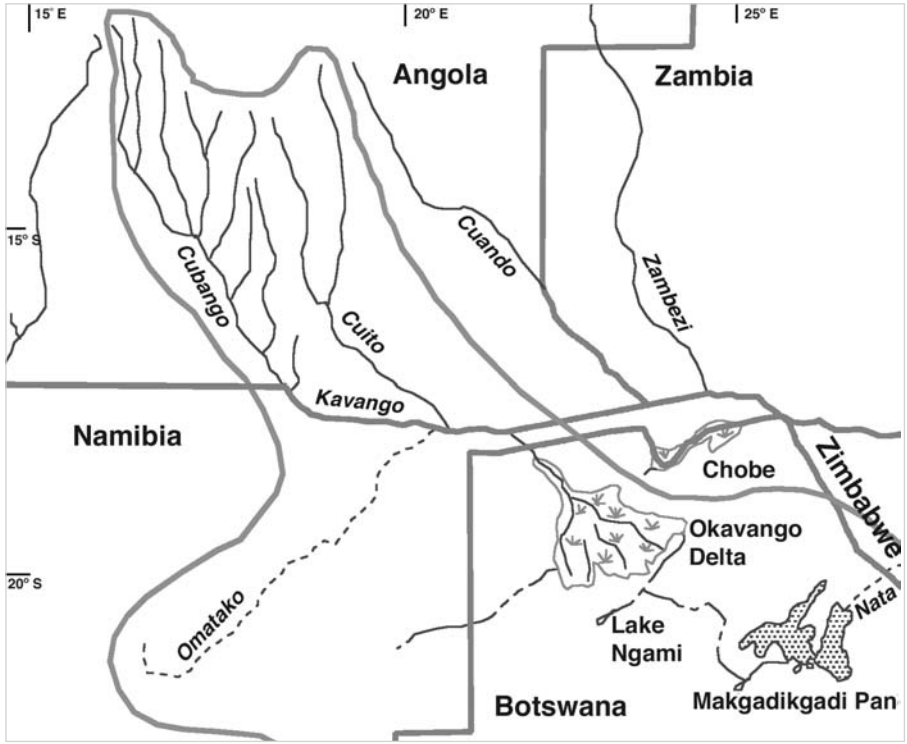
The catchment in Botswana is used for stock farming and large game parks have been created in the delta area. These parks are a major attraction for international tourism. The population centred around the delta also rely on the wetland resources and tourism for their existence.

National perspectives

The Okavango River basin traverses an area that is predominantly semi-arid. Therefore, the water carried by the river and the wetland resources it supports provide a livelihood for the residents of the basin. In all three basin states of the Okavango

Map 1

The Okavango River basin



River plans have been made on how best to utilise the water and the unique environment that the basin provides.

Angola

With the advent of peace, it is now possible to put in place programmes and projects focused on the displaced population in order to move them back to their areas of origin. This will ensure their place or engagement in upcoming agricultural projects. This priority is viewed as a global and strategic action to combat poverty and bring development in the short and long term to the country in general.

At this crucial stage, Angolan government programmes show that a great deal of financial resources are directed to actions focused on reconstruction, recovery and rehabilitation of all basic infrastructure such as roads, water and energy supply, as well as health and education services to improve the social conditions of the population wherever they are needed.

With Angola's existing potential, recovery can be rapidly made since the government has adopted an open door policy for joint ventures in most of the vital areas of the economy.

The upstream basin offers good conditions for the development of agricultural projects, with great potential for hydroelectric and agro-industrial projects that can be realised in the short and long term.

There are also other major government investment programmes in the pipeline (PIP 2002) that constitute a good source for employment in the region.

The ecotourism industry is another economic activity that cannot be neglected. A large part of the basin allows for the utilisation of different zones for the development of tourism projects similar to those already being implemented in the other basin states. In the long term, this will create conditions for the rehabilitation of wildlife, national parks and game reserves on the Angolan side. This will alleviate the great burden created by overpopulation of some species in the habitats of the two states.

It is important to note that, despite the good potential of Angola, it still has to achieve significant social recovery and reconstruction. This includes the rehabilitation of infrastructure, the promotion and revitalisation of productive activities, and the development of the capacity of local administrations to encourage the rural population to participate in community projects. These constraints need to be addressed so that the country can move forward.

Botswana

Botswana lies at the distal end of the Okavango River basin. All the water reaching the delta is derived from Angola, the upstream basin state. Being at the furthest end, the properties of the water that reaches the delta, both in terms of quantity and quality, depend very much on activities in the upstream states.

The presence of a vast body of water in a predominantly dry area has created a unique environment. From the natural environment and human settlements to a diverse animal and plant species, the Okavango Delta supports an ecosystem with entities that are highly dependent upon water.

While much of the surrounding area is influenced by the semi-arid nature of the Kalahari, the delta and its peripheries are characterised by lush vegetation drawing water from the perennially and seasonally flooded swamp.

A number of settlements have been established in and around the periphery of the delta all the way from Mohembo, close to the border with Namibia, down to the

villages along the banks of the Boteti River. These settlements rely on the system for their sustenance, and make use of the various resources that it supports. The largest of the settlements is the town of Maun, at the distal periphery of the delta.

The surface waters of the Okavango provide a ready source for livestock watering. From the early days, farmers have sustained their livestock from the waters of the delta, and grazed them on the grasses that grow in the seasonal swamp when the water recedes. As well as livestock, farmers also use seasonally flooded plains for crop production.

The mainly undisturbed wilderness environment and diverse wildlife are significant tourist attractions. Over the years, the tourism industry has consistently grown, and the delta has been a prime destination. The government of Botswana makes all possible efforts to keep the delta as a prime tourist attraction. In this regard, the government has opted for a low-volume/high-cost tourism policy.

In a thirsty land like Botswana, permanent water such as that found in the Okavango system represents a valuable source to meet various water needs. However, the remoteness of the delta from the major demand centres has ensured that it has remained relatively untouched. Apart from supply to settlements around the delta, no major abstractions have been effected.

The furthest location where water from the Okavango has been used is the Orapa diamond mine. However, apart from dredging a short reach in the Lower Boro during the early 1970s, no major engineering interventions have been undertaken. During good flows, which have not been experienced for a number of years now, water is able to reach the draw-off point for the mine naturally by flowing down the Boteti River.

Over the years, the delta has been viewed as a potential source to meet domestic, agricultural and other needs. In 1977, the United Nations Development Programme (UNDP) commissioned a study by the Food and Agriculture Organisation (FAO 1977) to investigate the Okavango Delta as a primary water resource for Botswana. This study looked at various aspects from engineering interventions, agricultural production, tourism, fisheries and others.

During the late 1980s, the government embarked on a project (Snowy Mountains Engineering Corporation 1987) to implement the recommendations of the UNDP/FAO report. The feasibility of the project was investigated, and detailed execution plans laid out. Engineering works that were recommended included dredging the Lower Boro to just inside the Buffalo fence, improving outflows from the delta, and a number of bunds to provide storage. However, before the project was implemented, environmental concerns were raised, and this led to the government suspending the project (IUCN 1992).

In carrying out activities in the delta, the government recognises the need to consult the different stakeholders. These range from citizens in the settlements around the delta, local and central government authorities, and different NGOs working in the delta.

The government of Botswana acceded to the Ramsar convention on 4 April 1997, and the Okavango Delta was listed as a Ramsar site of international importance. In accordance with article 3 of the convention, the country is required to promote the

conservation and wise use of the delta. In this regard, the country, under the leadership of the National Conservation Strategy Agency, has embarked on a management plan for the whole delta.

The plan was necessitated by the fact that existing land-use plans for different areas are often guided by somewhat conflicting guidelines. These had to be integrated into a single overall planning framework.

The long-term goal of the management plan is to provide an integrated resource management plan for the Okavango Delta that will ensure its long-term conservation and will provide benefits for the present and future well-being of the people, through the sustainable use of its natural resources.

Namibia

The Okavango wetland resources support the livelihood of about 140,000 people along the river and about 100,000 in the rest of the catchment in Namibia.

A preliminary study was done in 1969 on the development of a 40 megawatt (MW) hydropower station at the Popa Falls in the Caprivi Strip on Namibian territory (Department of Water Affairs, South-West Africa Branch 1969). In 1983, an assessment was made of the possibility to develop 30,000 hectares of land for irrigation on the Namibian side of the river (Department of Water Affairs 1984). At present, Namibia uses about 20 million m^3 of water per annum from the Okavango, mainly for domestic use and agricultural purposes.

Namibia has an extremely arid hydroclimate. The rivers in the interior of the country are therefore ephemeral in nature and the recharge to groundwater sources is limited. The potential of the surface runoff and the groundwater are respectively estimated at 200 and 300 million m^3 per annum or 500 million m^3 per annum in total. However, present estimates show that, in future, the managed water demand would exceed this figure by 2020. This means that Namibia will be looking to its perennial border rivers to augment the scarce water resources in the interior of the country.

Between 1970 and 1974, Namibia experienced growth rates of up to 7% per annum in the central area and an assessment was made of the water demand and supply situation. This led to the development of a proposed national water master plan (Department of Water Affairs, South-West Africa Branch 1974). The plan proposed, among others, the construction of the so-called Eastern National Water Carrier eventually to import water from the perennial Okavango River into the arid interior of central Namibia by 1986. It was decided to develop this project in five phases over time, depending on the actual increase in the estimated water demand, the yield performance of the internal water sources and the availability of capital funds for infrastructure development. The first phase of the project was the construction of the Von Bach dam, 70 kilometres to the north of Windhoek. The second phase of the project started in 1975 and two dams, the Swakoppoort and Omatako were completed and linked to the Von Bach dam. In view of the uncertainties leading up to the

independence of Namibia, economic growth could not be sustained and the need for the completion of the carrier was delayed beyond the original planned completion date. The third phase was the construction of a canal between the Omatako dam on the Omatako River and Grootfontein, about 250 km from Rundu on the Okavango River. This work was completed in 1987 and provided access to the karstified groundwater sources in the Otavi mountainland at Grootfontein. Only the fifth phase, the proposed Grootfontein-Rundu pipeline, remains to be completed (see map 2 for more information).

Although various economic and political factors reduced the growth in development and the corresponding water demand as anticipated in 1973, the demand was reduced even further and the yield of the various source components of the water carrier was increased through better water management practice.

Shortly after the independence of Namibia, it was decided to commence with a study to reassess the central area water demand and supply situation. The work was completed in 1993 and, according to the infrastructure development scenario presented, the link to the Okavango River had to be completed by as early as 2003 if the estimated yield of other water resources that could still be investigated in the interior of the country could not be mobilised as expected. However, it also became clear that even with the development of additional groundwater sources, the improved reuse of effluent, the integrated use of the existing water sources, the conjunctive use of surface and underground water, as well as better water demand management practice, the need to complete the proposed link to the Okavango to augment the internal water sources of central Namibia could only be delayed until 2009.

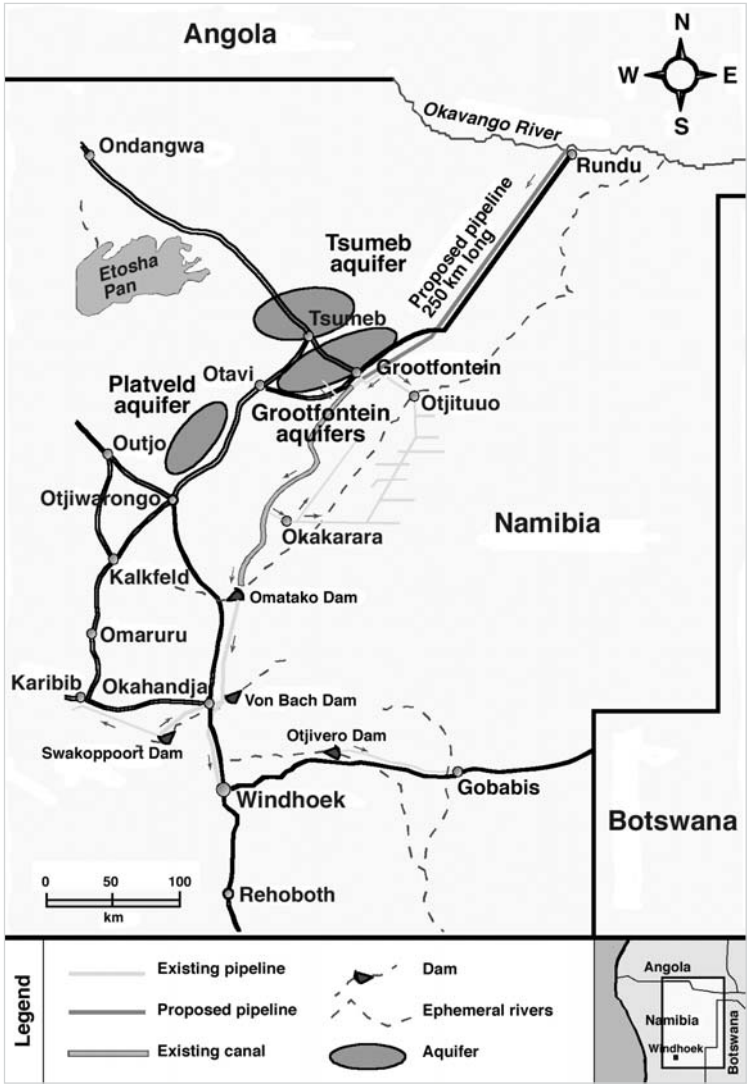
The possibility of utilising other water sources such as the supply of desalinated seawater into the carrier or to provide a link to the Orange River was ruled out as economically viable alternatives (Ministry of Agriculture, Water and Rural Development, Department of Water Affairs 1993). There are at present some 250,000 people outside the Okavango basin in the central area of Namibia who will need future access to water from the Okavango to sustain their socioeconomic activities (Ministry of Agriculture, Water and Rural Development, Department of Water Affairs 1997).

A major advantage of having the infrastructure in place to abstract water from the Okavango would be that Namibia could utilise the already developed surface water resources at higher yield, but a lower reliability. This link to a reliable water source will allow the utilisation of the accumulated surface water before it evaporates and will thus increase the environmental efficiency and yield of the dams. If any failure to supply would occur, then the availability of perennial water from the Okavango could provide the security of supply.

The 1993 study about the water supply to the central area of Namibia confirmed the results of the 1973 water master plan and the fact that Namibia would eventually have to obtain access to a reasonable and equitable share of the waters of the Okavango River to sustain further growth in the economy of the central area. It is therefore of critical importance to Namibia to know what the effect of development in

Map 2

The Eastern National Water Carrier



Angola would be on the flow in the Okavango at the proposed future abstraction point at Rundu.

Concerns about access to Okavango water

The prolonged war that started in Angola before 1974 ended recently and this considerably increased the potential for developments that would require water from the Okavango. It is now possible to achieve meaningful infrastructure development and to improve the socioeconomic conditions of an estimated 800,000 people living in the upper reaches of the Okavango catchment and on the plains in south-eastern Angola.

Feasibility studies that were done by the Portuguese authorities prior to 1974 indicated that there is potential for hydropower generation (350 MW) and the development of irrigation (54,000 ha) in the Angolan portion of the Okavango catchment, but very little recent information is available about the future development potential. The existing and future water requirements, as well as the impacts that possible future industrial, mining or irrigation activities might have on water abstraction, the quality of the water and the downstream environmental health of the Okavango are not clear. Angola is therefore seen as a potential sleeping giant that will come alive and that may have severe consequences for the future availability of water for Namibian abstraction on the Kavango where it forms the border between Angola and Namibia, or for hydropower generation at Divundu or on the Okavango Delta.

Although the Botswana government is sympathetic towards the legitimate and reasonable water requirements of Namibia, the international conservation community views Botswana as the custodian of the Okavango Delta and this may have an impact on the Namibian plans to utilise water from the Okavango. A large number of environmental NGOs are active in the delta. They may be, to a certain extent, in a position to bring pressure to bear on the Botswana government as far as developments in the Okavango are concerned.

The creation of OKACOM

Shortly after the independence of Namibia in 1990, the new Namibian government established a number of river basin institutions with other riparian states on the internationally shared border rivers of the country. The objectives of these commissions were to advise the respective governments about technical matters relating to the sustainable development, beneficial utilisation, integrated management and conservation of water resources of common interest among the watercourse states.

In September 1990, the governments of the People's Republic of Angola and the Republic of Namibia agreed to endorse and affirm the old agreements on the Cunene River between the colonial powers (Portugal and South Africa) and to re-establish the Permanent Joint Technical Commission (PJTC). In November 1990, the governments of the republics of Botswana and Namibia established the Joint Permanent Technical

Commission (JPTC) to deal with water resources of common interest. The watercourse states that are riparian to the active, perennial runoff in the Okavango basin are Angola, Botswana and Namibia and all three parties were represented on a bilateral basis in either the PJTC or the JPTC.

The need to utilise the waters of the Okavango to augment the water supplies in the central area of Namibia had already been identified long before independence, but the question of access to the water could not be taken up with the basin states because Namibia was not a sovereign state. The Namibian government therefore suggested to bring the commissioners of the PJTC and the JPTC together at a joint meeting in Windhoek to discuss the future development of the Okavango basin and the possibility to establish a tripartite water commission. This historic meeting took place in Windhoek in June 1991 and subsequently led to the establishment of the Permanent Okavango River Basin Water Commission (OKACOM) on 15 September 1994 in Windhoek between Angola, Botswana and Namibia.

At the first meeting of OKACOM, Namibia officially informed the other parties about the development of the proposed Eastern National Water Carrier and it became clear that the issue of co-ordinated development in the Okavango basin had to be addressed (Heyns 1999).

Initial activities of OKACOM

The first major achievement of OKACOM was to develop a proposal for a project to execute an environmental assessment of the Okavango basin and to develop an integrated water resource management strategy by June 1995 (OKACOM 1995). It was envisaged that the process to develop the strategy would provide comprehensive information about the state of the environment in the whole Okavango basin, and that an assessment of the prevailing situation would show the potential for the future development of the basin in each watercourse state. Such developments would require water from the Okavango watercourse system.

The envisaged management strategy would eventually enable the watercourse states to collect accurate data in order to provide a factual basis for informed discussions and sustainable decisions about the future utilisation of the water resources. This is viewed as one of the cornerstones of successful cooperation between the parties and would allow them to agree among themselves on the quantity of water required from the Okavango by each state to achieve its respective development objectives. Furthermore, the whole process would develop the required technical capacity and negotiating skills that are needed to reach consensus on the optimal solutions to achieve in an attempt to maximise the benefits of reaching the set objectives of each party.

In order to fund the proposed project, OKACOM approached the Global Environmental Facility (GEF) for support. The GEF agreed to make project development funds available to execute a transboundary diagnostic analysis in order

to identify the key areas of concern and the gaps in the knowledge of the biophysical, social and economic environment in the Okavango basin. OKACOM appointed a steering committee, the Okavango Basin Steering Committee (OBSC) to manage the project. A study manager was subsequently retained to organise and coordinate the activities of more than 20 consultants in various fields of expertise, representing all three basin states. In this process, the projects and programmes required for a strategic action plan to study the potential of the Okavango basin and to develop the proposed integrated management plan for the Okavango were determined.

The diagnostic analysis was completed and a project brief could be drafted for submission to the GEF for further consideration and agreement to release funds for the development and implementation of the proposed strategic action plan.

This could be seen as the first initiative in Southern Africa where so many individual consultants from three basin states of a shared river system worked together to achieve a common goal and is in itself a major achievement in integrated water resource management.

The present status of the GEF project is that the documents were approved by the GEF council and OKACOM. The start-up funds for the project will be released as soon as the document has been signed by all parties concerned.

OKACOM's functions

The integrated management of transboundary water resources is guided by three fundamental principles. These are the inherent sovereignty of each watercourse state, the obligation that one state should not cause significant harm to another state in the utilisation of water from a commonly shared resource, and the requirement that the water use must be equitable and reasonable.

However, these principles cannot be enforced, nor can any third party be called upon to resolve a conflict, unless all parties concerned have agreed to such an intervention. The foundation for the prevention of conflicts therefore lies primarily in the development of functional institutional mechanisms to facilitate a dialogue between the parties about their internationally shared watercourses.

OKACOM was established because the parties understood the importance of working together before a conflict situation would arise. This proactive initiative was not imposed on the basin states by any external agency and OKACOM actually mobilised much international support by having taken positive steps to manage the affairs in the Okavango basin in an amicable way.

The procedure to establish OKACOM was kept relatively simple by utilising existing basin institutions. The agreement on OKACOM is not an elaborate document, but succeeded in bringing the parties together around the table for meaningful discussions. OKACOM is not an expensive institution with a large staff complement and a big budget. The commission had eight meetings since 1995 and facilitated a number of constructive achievements that would otherwise not have been possible.

OKACOM is a relatively young institution that is still evolving to become a major driving force in the sustainable development of the Okavango basin. The commission will seek financial support to develop capacity and to implement projects to avoid conflicts between the parties. These objectives will certainly attract the support of the international donor community.

Conclusion

It is inevitable that Angola, Botswana and Namibia will use more water from the Okavango in future. While this may seem to be in conflict with environmental considerations, it is important that the mutual dependence of people and ecosystems in the Okavango basin should be accepted. There is therefore a need to maintain a balance between social, economic and environmental security in the basin.

OKACOM has already taken a number of steps to develop a process for the future implementation of an integrated water resource management strategy. The activities that have taken place so far – and will take place in future – are already building confidence, mutual understanding and trust between the parties through the exchange of information, joint planning and the development of a shared vision for the future (Heyns 1995).

These sentiments are the main driving forces behind the positive steps taken by the Okavango basin states to find a way to meet their future expectations.

References

Department of Water Affairs, South-West Africa Branch. 1969. *Popa Falls hydro-power scheme: Preliminary feasibility investigation.* Windhoek: DWA.

Department of Water Affairs, South-West Africa Branch. 1974. *Waterbronontwikkeling met spesiale verwysing na die benutting van binnelandse surplus watervoorrade as alternatief tot die benutting van die water van die noordelike grensriviere.* (Water resource development in South-West Africa with special reference to the utilisation of surplus water sources within the country as an alternative to the utilisation of the northern border rivers). Windhoek: DWA.

Department of Water Affairs. 1984. *Preliminary reconnaissance report on the irrigation possibilities along the Okavango River in the Kavango*. Windhoek: DWA.

FAO. 1977. *Investigation of the Okavango Delta as a primary water resource for Botswana*. Rome: Food and Agriculture Organisation.

Heyns, P. 1995. The Namibian perspective on regional collaboration in the joint development of international water resources. *International Journal of Water Resources Development* 11(4).

Heyns, P. 1999. *Water resources management in Namibia with regards to the implementation of the Protocol on Shared Watercourse Systems of the Southern African Development Community.* Windhoek: DWA.

IUCN. 1992. *The IUCN review of the southern Okavango integrated water development project*. Gland, Switzerland: IUCN.

Ministry of Agriculture, Water and Rural Development, Department of Water Affairs. 1993. *Central area water master plan. Volume 1: Summary report*. Windhoek: DWA.

Ministry of Agriculture, Water and Rural Development, Department of Water Affairs. 1997. *Feasibility study on the Okavango river to Grootfontein link of the Eastern National Water Carrier. Volume 1: Summary report*. Windhoek: DWA.

OKACOM. 1995. *Project proposal for an environmental assessment of the Okavango River basin and the development of an integrated water resource management strategy*. Windhoek: Permanent Okavango River Basin Water Commission.

OKACOM. 1999. *Final draft transboundary diagnostic analysis*. Windhoek: Permanent Okavango River Basin Water Commission.

SADC. 1995. *The Southern African Development Community Protocol on Shared Watercourse Systems*. Botswana: Southern African Development Community.

Snowy Mountains Engineering Corporation. 1987. *Southern Okavango integrated water development phase I: Government of Botswana*.

UN. 1997. *Convention on the Law of the Non-navigational Uses of International Watercourses*. New York: United Nations.

Other documents

Programa de Estabilização e Recuperação Economica de Médio Prazo (1998-2000), 1997.

Programa de Reabilitação Comunitaria e Reconciliação Nacional (Mesa Redonda dos Doadores (PRCRM). 1995/2002.

Programas de Infrastruturas Produtivas (PIP 2001-2).

Management and Development of the Water Resources Report of Country Situation, June 1998.