An atlas and environmental profile of the Cuvelai Etosha Basin

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Chapter 1 Introduction

The Cuvelai Etosha Basin has been designated as a water management area in Namibia. Its purpose, boundaries, sub-divisions and attributes are described below, but it is necessary first to set its context within the much larger Cuvelai Basin, which is sometimes called the Owambo Basin. This is the purpose of Chapter 1.

In combination, several features set the Cuvelai Basin apart from all other drainage basins in the world; the Cuvelai is thus unique in the correct sense of the word. The core drainage area consists of hundreds of channels (called *iishana,* singular *oshana*) that mesh, network, separate and diverge thousands of times. Although some water comes from tiny, narrow tributaries that drain the southern slopes of the Angolan *planalto* highlands, most channels curiously have the same broad courses from their beginnings to their ends.

Most *iishana* are dry for much of the year. When flows do occur, they range between tiny trickles to wide fronts of flood water. All the water gradually disappears: evaporating, being transpired by plants or seeping away into the ground. The Cuvelai has no outlet to the sea, but some water reaches the famous Etosha Pan when flows are strong.

Another special feature is the Cuvelai's position as a trans-boundary wetland shared almost equally in extent between Angola and Namibia. Compared to surrounding areas and much of southern Africa, the Cuvelai is home to a very large number of people, largely because of the presence of shallow groundwater and relatively fertile soils in many areas. That has allowed the cultivation of crops as well as year-round access to fresh water for people and livestock.

There is also an unusual and extraordinary link between the Cuvelai and the Owambo (in Angola known as Ambó) people. Thus, the great majority of people in the Cuvelai are Owambo, and prior to recent migrations all Owambo people lived in the Cuvelai. To our knowledge, no other drainage basins are as intimately associated with a single group of people.

The Cuvelai Basin is indeed a special place! This book provides an overview of its main features.

Figure 1.1. The principal features of the Cuvelai Basin sandwiched between the Cunene and Cubango Rivers in Angola; the convergence of *iishana* channels into the Omadhiya Lakes and then into Etosha Pan. Olushandja Dam was built to store water from the Cunene River, while the grounds of the Ogongo Agricultural College protect a remnant patch of woodland that appears darker than the surrounding areas.

The large expanse of sand dunes visible as horizontal lines north-east of Etosha was formed during much drier times tens of thousands of years ago. The dunes are now covered in trees.

The furthest south that the Cuvelai can flow is the salty Etosha Pan, which is conspicuous from space and the centerpiece of the world-renowned national park that bears its name. The remains of fossils found along the margins of Etosha suggest that the pan may be at least six million years old.[1]

The borderline between Angola and Namibia is also clearly visible from space, one of only a few man-made international borders to be so conspicuous. This is largely due to the much higher population in Namibia where far more trees have been cut down for building and fencing. As a result, the Namibian side of the boundary has a quite different colour from the more forested Angolan side (see also the image on page oo). The photograph was taken from a space shuttle on 28 May 2000.[2]

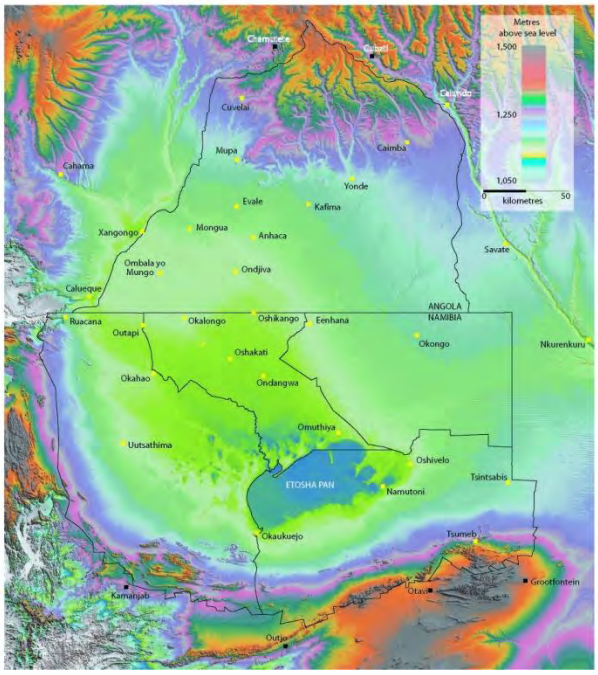

Figure 1.2. Elevations in the Cuvelai or Owambo Basin which lies between the Angolan *planalto* in the north and an encircling margin of carbonate rock formations to the south and west.[3] Most of Basin lies between 1,100 and 1,200 metres above sea level. It is also very flat, with very little change in altitude or relief. For example, there is a drop of only 110 metres between the town of Cuvelai and Oshakati 230 kilometres to the south. At about 1,085 metres above sea level, Etosha Pan is the lowest point in the Basin.

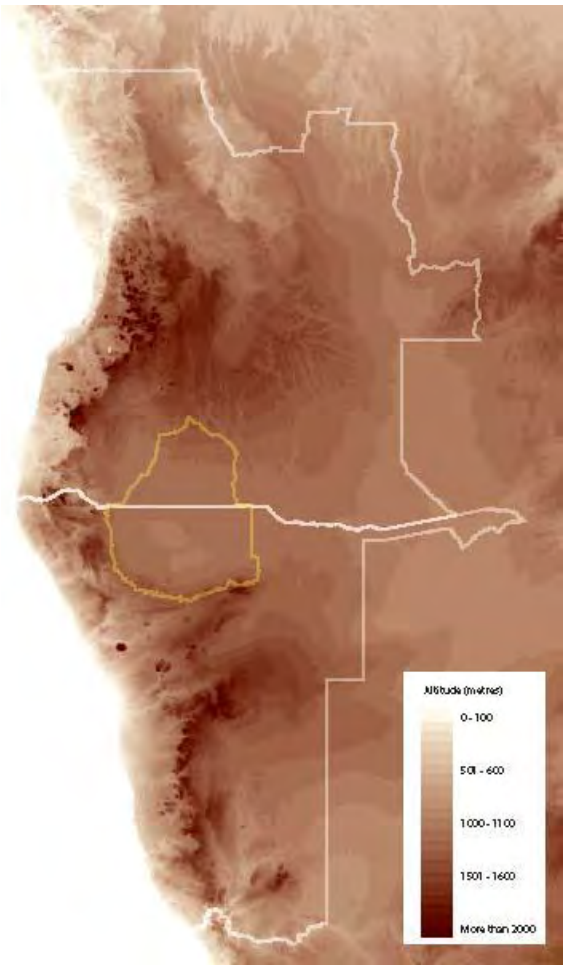

Figure 1.3. The Cuvelai Basin extends over 450 kilometres from north to south. The Basin's widest point is along the Angola-Namibia border from the Kunene River east towards the Cubango River. The landscape here is very flat with no discernible drainage channels or watershed, and so defining the eastern boundary of the Basin is difficult. For this reason, the political boundary between Kavango and Oshikoto and Ohangwena Regions has been adopted as the eastern margin of the Cuvelai Basin.

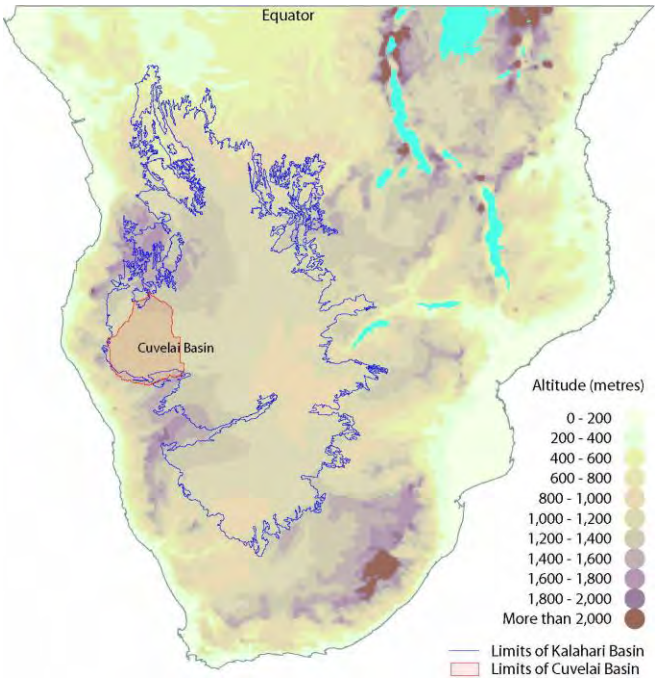

Figure 1.4. The Cuvelai lies within a relatively small depression along the western margins of the vast Kalahari Basin that covers much of south-central Africa. This small depression is now filled with hundreds of metres of sediments, most of which were deposited by rivers over tens of millions of years. The physical depression is widely known as the Owambo Basin, and so the Cuvelai and Owambo Basins are largely the same.

Figure 1.5. The Cuvelai is bordered by the Kunene and Okavango Rivers which drain large areas of the Angola *planalto*. Although the Kunene now flows west to the Atlantic Ocean, geologists generally accept that the Kunene once flowed into the Cuvelai Basin (see page oo), and it has recently been suggested that the Okavango also made its way due south into the Cuvelai.[4] Water flows and volumes of sediments would have then been orders of magnitude greater than we ever see these days, and Etosha was then a massive lake many metres deep.

There are some similarities between the Cuvelai and the Okavango swamps 800 kilometres to the east. Both have extremely gentle slopes and thus slow rates of flow. However, the Okavango is perennial, the Cuvelai ephemeral. Fresh waters characterise the Okavango while much of the water and soil in the Cuvelai is salty due to the high rates of evaporation.

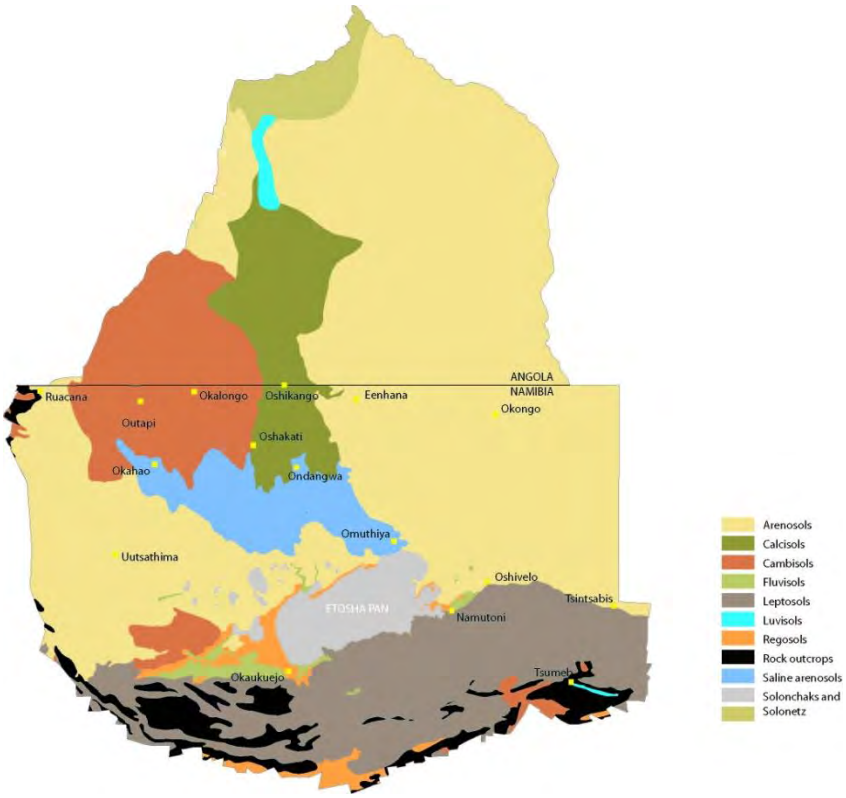

Figure 1.6. The nature of soils depends on the degree to which they have been deposited, reworked or influenced by wind, water or evaporation. Thus, most soils in the east are wind-driven (or aeolian) deposits,

those in the centre and west have been formed largely from the fine sediments carried in water, while evaporation has had the predominant effect in making soils in the south very saline.

The wind-blown sands are particularly infertile and hold little water as a result of the porous structure of the soil. The relatively few people who live in these areas (see page 00) centre their livelihoods on old pans and drainage lines where the soils have a higher clay content and thus hold more nutrients and water.

While water-borne sediments make up substantial areas of the central zones, they are concentrated within the *iishana* channels where the soils are too clayey for domestic crops. However, between the channels on higher ground (*omitunda*) are cambisols and calcisols that formed as a mix of water-borne and wind-blown sediments. This combination results in soils that are not too dense or clayey; and neither are they too sandy, infertile and porous. Together with access to fresh water in shallow wells, it is these fertile soils that allowed people to settle and farm here 500 to 600 years ago.[5] Most people live continue to live in the areas of calcisols and cambisols.




The composition and structure of plant life in the Basin is closely related to the underlying soils. In most places, no plants grow on the most concentrated pan salts (left). On less saline soils, plant life consists largely of spiky, hardy grasses and short shrubs (2nd left). Clayey soils that are flooded less often are characterised by mopane trees, which are surely the plant icon of the Cuvelai (3rd). On sandy substrates, the typical trees are Zambezi teak *(Baikiaea plurijuga*) and Angolan teak (*Pterocarpus angolensis*), red syringa (*Burkea africana*) and mangetti (*Schinziophyton rautanenii*). These trees are replaced in areas of higher rainfall (roughly half-way between Mupa and Cuvelai, for example) by woodland dominated by various species of *Brachystegia*, *Julbernadia* and *Isoberlinia* (right). These trees are characteristic of woodland known as Miombo, which stretches over a broad zone over much of southern Africa between Angola and Mozambique.

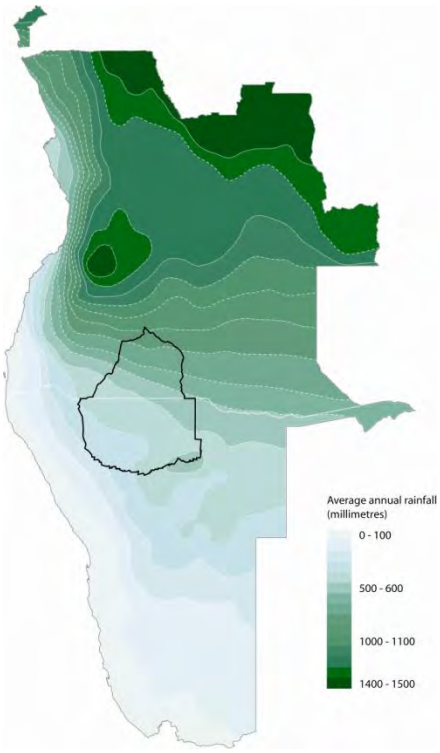

Figure 1.7. Average annual rainfall in the Cuvelai Basin and elsewhere in Angola and Namibia.[6]

Climatically, the Cuvelai spans an area between what may be called sub-tropical in the north and semi-arid in the south. Rainfall in the northern-most parts of the Basin averages about 900 millimetres per year, just over three time the average of 300 millimeters in the extreme south. In the southern half of the Basin, rainfall is higher in the east that the west, which reflects the effect of prevailing winds that bear moist air from the north-east.[7]

Figure 1.8. Major transport routes, towns, villages and types of land tenure in the Cuvelai. A great deal of trade in the Cuvelai is concentrated in towns along the major trunk route running from the south to Tsumeb, then north to Ondangwa, Oshikango and Santa Clara, Ondjiva, Xangongo and onto the rest of Angola to the north. Hundreds of big trucks ply this route every day, and millions of US dollars are exchanged each day at the Santa Clara/Oshikango frontier.

There are two national parks in the Cuvelai. Mupa was proclaimed in December 1964 but has not been managed for conservation in recent decades, and several thousand families now live there. Etosha was proclaimed in 1907, although its extent was then far greater than it is today. Much of the southern area of the Basin consists of large exclusively owned farms, most of which are several thousand hectares in extent. Apart from small town-lands (which are not shown here), all other land is communal and owned by the state.

Figure 1.9. Just about half – the upper half – of the Cuvelai Basin is in Angola while the remaining southern portion is in Namibia. Management of the Basin is thus shared between Angola and Namibia, and changes to water flows and use in the north may affect people in the southern half of the Cuvelai.

Angola is divided into 18 provinces, of which the Cunene province covers much of the northern Cuvelai. Ondjiva is the capital of Cunene. Small areas of the Cuvelai Basin lie inside the provinces of Cuando Cubango and Huila as well.

Much of the Basin lies in four Namibian regions: Oshikoto, Omusati, Ohangwena and Oshana, their respective capitals being Omuthiya, Outapi, Eenhana and Oshakati. Small areas in the southern areas of the Basin are included in the Kunene and Otjozondjupa regions.

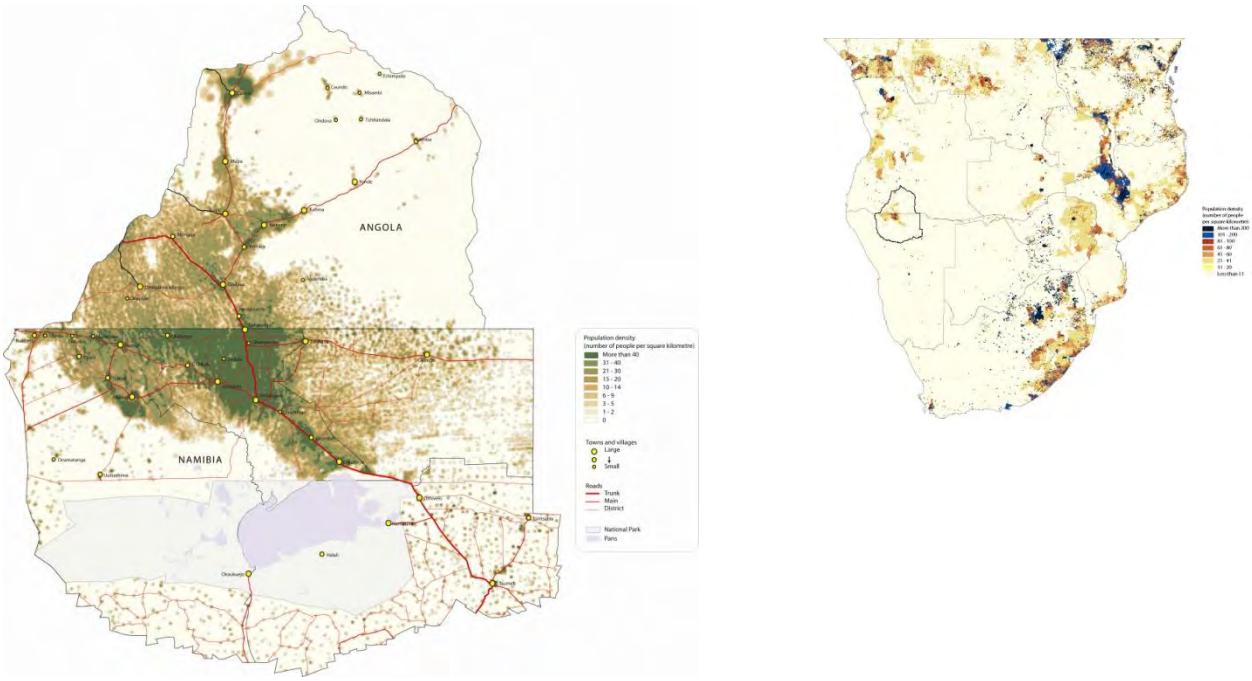

Figure 1.10. In 2010, approximately 1.2 million people were living in the Basin. About 70% of this population was in Namibia and 30% in Angola. The greater densities in Namibia are a consequence of migration from Angola over many decades as a result of political and economic factors (see page oo).

The Cuvelai Basin supports many more people per unit area than most rural places in southern Africa. This is a product of soils that are comparatively fertile and the availability of freshwater in shallow wells.

The leaf of a mopane or omusati tree commands the grave of to Mandume Ya Ndemufayo, the last king of the Kwanyama people who reigned between 1911 and 1917. To the right is the site of the monument which lies south-east of Namacunde, as seen in Google Earth at 17.332 South, 15.959 East.

The leaf and Mandume symbolise much of what constitutes the Cuvelai Basin since both the Kwanyama people and mopane are so widespread.



Traditionally, all rural households in the Cuvelai had small fields of crops and vegetables. Many homes also kept chickens, pigs, goats, donkeys and cattle. Home produce from fields and livestock supplemented by fish, frogs, other wildlife and wild fruits then provided all domestic food. This is still the case for the great majority of homes in Angola whose livelihoods are very much of a subsistence nature.

The same is still true for some homes in Namibia, particularly those in remote and less densely populated areas. But it is not the case for most rural households in the Namibian Cuvelai which now live on cash incomes derived from wages, business profits, pensions and remittances. Many of the incomes are supplied by family members who live and work for salaries elsewhere (see page 00). These cash-based households in rural areas nevertheless continue to cultivate fields and keep livestock, even though most of their sustenance is bought in local shops.

The effect of access to cash is clearly visible in the materials used for building. The very poorest homes are *built with labour* from locally-harvested materials, as in the photograph on the left. Such poor homes are usually small, often headed by a woman with few or no household members of a working age. Wealthier homes are larger, as seen from the many rooms in the homestead in the centre, and many of the rooms have been *built with cash*. There are also many modern homes belonging to wealthy people in rural areas (right). Local resources contribute very little or nothing to livelihoods in those wealthy households.

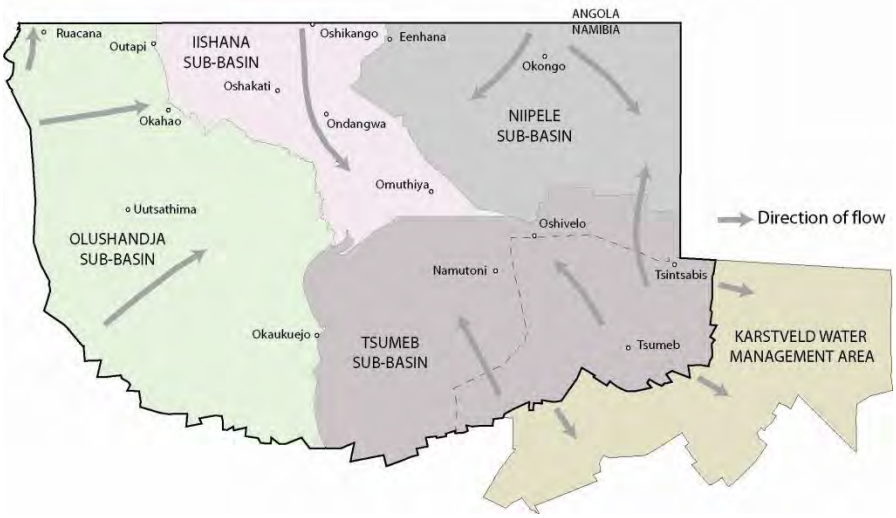

Figure 1.11. The Cuvelai-Etosha Basin is one of Namibia's areas that have been designated by the government for integrated water resources management. Its borders have largely been defined on the basis of the nature of bodies of water underground and the directions of water flow beneath the surface (see Figure xx, page oo).[8]

Just as the Basin – as a deep bowl – has been filled by sediments blown by wind and carried by water over tens of millions of years, water continues to flow into the Basin beneath the ground. Of course, the rate of flow is extremely slow. The arrows show the direction of water flow

Within the Cuvelai-Etosha Basin, four sub-basins have been demarcated as more local areas where water resources can be managed by people living within each sub-basin. The Karstveld Water Management Area straddles the south-eastern boundary of the Basin because it contains water resources that flow to the north-west and south-east.

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[1] Miller RM, Pickford M & Senut B. 2010. The geology, palaeontology and evolution of the Etosha Pan, Namibia: implications for terminal Kalahari deposition. *South African Journal of Geology* 113: 307-334.
[2] Image Science and Analysis Laboratory, NASA-Johnson Space Center. The Gateway to Astronaut Photography of Earth.
[3] Processed from Shuttle Radar Topography Mission (SRTM) elevation data. http://www2.jpl.nasa.gov/srtm/.
[4] Miller RM, Pickford M & Senut B. 2010. The geology, palaeontology and evolution of the Etosha Pan, Namibia: implications for terminal Kalahari deposition. *South African Journal of Geology* 113: 307-334.
[5] Williams F-N. 1991.Precolonial communities of southwestern Africa; a history of Owambo kingdoms 1600-1920. Archeia No. 16. National Archives of Namibia, Windhoek.
[6] Based on an interpolation of average seasonal totals calculated from records obtained from the Global Historical Climate Network database, and the Botswana and Namibia Meteorological Services.
[7] Detailed information on climatic variables is available in SINFIC, SARL. 2005. *Plano de Urbanização da Cidade de Ondjiva*. Report for Governo da Província do Kunene – Gabinete de Estudos, Planeamento e Estatística; and Mendelsohn, J.M., el Obeid, S & Roberts, C.S. 2000. *A profile of north-central Namibia*. Gamsberg Macmillan, Windhoek.
[8] Bittner Water Consult. 2004. *Demarcation of water basins on national level*. Report for Department of Water Affairs, Windhoek.