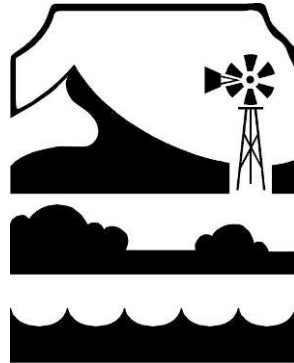


# **Kuiseb Basin Water Resources Management Project**



KUISEB BASIN MANAGEMENT COMMITTEE

## **Water Resources Management Plan for the Kuiseb Basin**

### **Volume 1**

### **Action Plans**

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## Abbreviations

BMC	Basin Management Committee
CBM	community based management
CETN	Coastal Environmental Trust of Namibia
CNWSS	Central Namib Water Supply System
DRFN	Desert Research Foundation of Namibia
DRWS	Directorate of Rural Water Supply Services
DWAF	Department of Water Affairs and Forestry
EPL	Exclusive Prospecting License
GDP	Gross Domestic Product
GIS	Geographical Information System
HDI	Human Development Index
KBMC	Kuiseb Basin Management Committee
KWRMP	Kuiseb Water Resources Management Plan
ℓ	litre
LSU	large stock unit (average 350 kg)
mg/ℓ	milligrams per litre
Mm <sup>3</sup> /a	million cubic meters per year
MAWF	Ministry of Agriculture, Water and Forestry
MET	Ministry of Environment and Tourism
NDP	National Development Plan
RoN	Republic of Namibia
SEA	Strategic Environmental Assessment
SSU	small stock unit
TDS	Total Dissolved Solids
WADE	floodWater recharge of Alluvial aquifers in Dryland environments in Ephemeral rivers
WRMA	Water Resources Management Act, 2004

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## 1 Introduction and overview

In a bid to manage Namibia's water resources more equitably and sustainably, previous approaches to water management have been subjected to a critical review in the late 1990s. On the basis of several in depth studies of various aspects of water management, the National Water Policy White Paper was approved by Cabinet in August 2000. Acknowledging the integrity of the hydrological cycle, the central tenet of the Policy is the need for an integrated approach to water resources management. This requires that information on the hydro-environmental situation is combined with socio-economic data to analyse spatial distributions of both and match available resources with needs and projecting impacts of economic development (RoN 2000: 32). It proposed a new legislative framework to facilitate the integrated management of the resource

by reflecting the interrelationship between surface and groundwater, and between the allocation of water resources for use and protection of its quality, as well as making it obligatory that the integrated planning principles are followed when planning new water supply schemes or augmenting existing schemes. (RoN 2000: 34).

As a result, the Water Resources Management Act, 2004 was gazetted in December 2004. It provides for the establishment of Basin Management Committees, either at the initiative of the Minister or upon application by interested parties, and defines the functions of these committees. One of the functions is to prepare a water resources management plan for the basin which must be submitted to the Minister for consideration when developing the National Water Master Plan.

The Kuiseb Basin Management Committee is the first Basin Management Committee to be established in Namibia. It acquired the services of a multi-disciplinary team of consultants to prepare the Water Resources Management Plan for the Kuiseb in 2007. This Water Resources Management Plan for the Kuiseb represents the first attempt at the development of such plan for Namibia.

The core of this Plan consists of eleven Action Plans, covering the most pertinent aspects regarding water resources management. They are intended to serve as a road map for the Kuiseb Basin Management Committee in executing the responsibilities and functions bestowed on it by the Water Resources Management Act. The Action Plans are based on detailed studies carried out by the consultants on the following topics:

1. F. Wittneben and P. Klintenbergl 'Agriculture and related issues in the Kuiseb Basin'
2. S. Bethune 'Environmental issues in the Kuiseb Basin'
3. P. Heyns 'Water planning and utilisation in the Kuiseb Basin'
4. M. Falke ' Geohydrology'
5. F. Oosthuizen 'Socio-Economic Assessment in the Context of Vision 2030 and Millennium Development Goals'
6. S. Bethune ' Water education'
7. M. Seely 'Institutional development and capacity building'
8. P. Klintenbergl 'Databases for improved management of the Kuiseb River Basin by the KBMC: considerations, recommendations and an Action Plan'
9. J. & J. Kinahan '!Khuseb Basin archaeological baseline study'
10. P. Heyns 'Legislation for water abstraction'

These reports are comprehensive and require time to study. To save the reader time, the next section will provide a brief overview of the Basin and issues pertinent to the sustainable management thereof in the form of a summary of these reports. Extracts from consultants' papers or paraphrases of their contents are used liberally in this overview. Needless to say, this brief

summary does not do justice to the richness of information provided. It is therefore recommended that the interested reader study the detailed consultant's reports in the Appendices.

### 1.1 Location

The Kuiseb River Basin is one of eleven river basins identified in Namibia. As the name suggests, it refers to the area from which any rainfall will drain into the Kuiseb River through surface flow (RoN 2000: 44). The Kuiseb River is one of Namibia's 12 westward flowing ephemeral rivers. It links the wetter Khomas Hochland plateau, where most of the rainfall feeding the river occurs, to the dry coastal plains of the central Namib. The river originates approximately 30 km west of Windhoek at an altitude of 2081 m and traverses through commercial farms in its upper reaches, through the Namib-Naukluft Park where it keeps the extensive Namib sand sea at bay, past Gobabeb and ten communal Topnaar villages in the middle to finally form the alluvial aquifer at the Kuiseb Delta that currently supplies Walvis Bay and previously supplied other coastal towns and mines with water. The river course is approximately 420 km long.

The Basin encompasses an area of approximately 21,940 km<sup>2</sup> and is divided into three catchment areas:

1) Upper catchment (highland)	9,620 km <sup>2</sup>
2) Middle catchment (escarpment & plains)	11,250 km <sup>2</sup>
3) Lower catchment (most western part)	1,070 km <sup>2</sup>

The Basin can be divided into 5 main landscapes:

- The hilly, Khomas Hochland Plateau at an altitude between 1,700 and 2,000 m with typical savannah vegetation;
- The small section of the Rehoboth Plateau around Weissenfels where deeper sand supports a grassland savannah with camel thorn trees;
- The steep escarpment which descends 1,000 m to the coastal plain with shallow soils supporting plants typical of the semi-desert savannah transition zone;
- The gravel desert plains with isolated inselbergs with a greater diversity of life as they provide more habitats and receive more moisture from fog; and
- The Namib sand sea of dunes south of the Kuiseb River which supports virtually no vegetation.

The Kuiseb River Basin is characterised by low rainfall coupled with high evaporation rates. Most of the Basin's rain falls in summer from moisture-bearing clouds blown in from the north-east as the Inter-Tropical Convergence Zone moves southwards. The average annual rainfall varies from 350 mm in the upper catchment to less than 20 mm in the lower catchment. In the eastern part of the Basin, above the escarpment, rainfall is seasonal albeit in variable amounts, whereas the west which lies in the central Namib Desert receives very little rain. Due to low rain fall in the west, the flow of the Kuiseb River in the lower catchment is almost entirely dependent on the amount of rain falling in the eastern parts of the Basin.

The Kuiseb River only flows for a short period following rainfall within the Kuiseb Basin. The length and intensity of the flow mainly depend on the amount of rainfall received in the catchment area. For most of the year the river therefore has no surface water. It is important to note that the river does not flow every year, nor necessarily flow throughout the entire length of the river. Even though the Kuiseb River is an ephemeral river, water is captured, moved and stored in many different ways in and around the main river course, which contributes to the presence and subsequent support of vegetation, wildlife and domestic animals, people and their livelihoods as well as industry throughout the Kuiseb River Basin.

The upper catchment makes the most significant contribution to the mean annual runoff of the river. As result of extremely steep mountainous areas in the upper catchment and shallow top soils, run off is generally very fast and very little rainwater reaches the groundwater table compared to flatter and sandier areas elsewhere in the country. Surface water is almost non-existent except for single pools of water in very steep and shady canyons and a few fountains. One

major dam, the Friedenau dam with a storage capacity of 6,7 Mm<sup>3</sup> was constructed in the early seventies to supply Matchless mine with water. Farm dams on freehold farms in the upper catchment impound an estimated 20 per cent of runoff. About three quarters of the runoff is not accounted for and only 13 per cent are believed to enter the middle Kuiseb as runoff. This constitutes the only source of water available to recharge the aquifers in the middle and lower Kuiseb.

## **1.2 Demographic overview and water demand**

The inhabited areas of the Kuiseb Basin mirror its resource base. The highest concentration of people is found in Walvis Bay, very few along the middle and lower catchment and slightly higher population densities in the upper catchment. According to the 2001 Population and Housing census, the Walvis Bay Urban enumeration area had 6,471 households and a total population of 25,026. In the Walvis Bay rural enumeration area 4,426 households with a total population of 16,293 were counted. On the assumption that 4 households (the farm owner and three labourers' households) with 3.8 people on average per household live on the 109 farms in the freehold farming area, its population has been estimated to be 1,657 people.

The total population of the basin area is therefore estimated to be 42,976 with a total of 11,333 households. More recent population figures for Walvis Bay suggest a total population within the jurisdiction of Walvis Bay Municipality of 70,000. This represents almost three times as many people as in 2001. If this figure is accepted as a more up-to-date and accurate estimate and population numbers for the rural and farming communities are assumed to have remained relatively constant, the total population in the Kuiseb Basin amounts to approximately 88,000 persons. The fact that 70 per cent of this population falls in the age bracket of 15 to 59 years suggests that population growth in the Basin is not only due to natural increases, but includes a large proportion of migration into the region, especially into Walvis Bay, as a result of socio-economic factors and considerations.

The Human Development Index of Erongo Region is the second highest after Khomas Region. This Index consists of three components: life expectancy at birth, literacy rate and per capita income. Significantly, Erongo Region is the only region to achieve an improvement in its HDI from 1991-1994 to 2001-2004. All the other thirteen regions in Namibia experienced a decline as mirrored by the national index. However, unemployment remains high at 34 per cent according to the 2001 Census.

Ninety-nine per cent of the population in Erongo Region has access to safe drinking water. This exceeds the targets set by NDP 2 which were to achieve 90.7 per cent access for rural communities and 98.4 per cent for urban areas. The main issue in the Basin is thus not so much providing access to potable water to its population, but rather to ensure reliable, sustained and affordable water.

### **Upper and middle catchment**

#### *Commercial farming*

As the Kuiseb River Basin is generally very rugged, it is almost exclusively used for extensive large stock farming. The southern and south western parts of the upper catchment have also been used for small stock farming in the past when karakul pelts were still strong in demand. Karakul sheep are the only small stock that are adapted to the extreme conditions typical for these areas and in those days many farms could make a good living on the edge of the Namib desert. Most of the farms used for karakul farming were fenced off with jackal proof mesh wire in order to keep predators out. These fences restricted migration of game, especially along the Kuiseb River itself.

Estimates of the number of freehold farms in the upper and middle catchment range between 109 and 120. Farm sizes vary between 6,000 and 20,000 ha, the average farm size being 8,826 ha.

The carrying capacity of the commercial farms in the area is directly correlated to the annual rainfall, higher rainfalls leading to higher carrying capacity. In the eastern, higher rainfall areas of the upper catchment, 10 ha of rangeland provide enough fodder for one large stock unit. A farm situated on the edge of the Namib close to Solitaire has a carrying capacity of about 1 large stock

unit to 30 ha. A large stock unit is defined as an animal weighing 450 kg. Bush encroachment is impacting negatively on rangeland productivity. The main encroaching bush species are *Acacia mellifera* (blackthorn), *Acacia reficiens* (rooihaak) and *Acacia erubescens* (withaak). To facilitate improved rangeland management, most commercial farms are divided into camps. This enables farmers to utilise different veld and soil types in response to circumstances. Animals are rotated between camps in order to accommodate resting, seed production, stimulation and growth of grasses in the different camps.

An estimated 30,000 large stock units are kept in the freehold sector. Seventeen per cent of this consists of small stock, predominantly sheep. Due to the harsh topography, farmers use highly adapted cattle breeds. These are predominantly medium framed breeds such as Bonsmara, Simbra, Brahman, Simmentaler, Sussex, and several cross breeds of these. While it is not clear whether livestock farming is likely to increase in future, livestock numbers in the upper catchment are said to have reached optimum levels, but it is not clear on what criteria this assessment was made. In the lower rainfall areas some farmers are returning to karakul farming. The karakul market collapsed in the 1980s forcing many farmers to diversify, particularly into tourism. However, more recently, the international karakul market has shown promising signs of recovery, which makes an increase in karakul farming likely.

Livestock farming in the upper and middle catchment of the Kuiseb Basin is risky and yields relatively low returns. Many farmers have to complement their farming incomes by engaging in other economic activities. In the middle catchment particularly, i.e. below the escarpment, many farmers are in full-time employment in Windhoek or in Walvis Bay and Swakopmund. Across the middle and upper catchment, many farmers have diversified their land based activities into tourism, game farming and trophy hunting. The topography and landscapes in the middle and upper catchment lend themselves to tourism and the area is rated to have a medium high to very high tourism potential. It is estimated that more than 40 per cent of freehold farms have diversified into tourism and game farming. Official data suggest that there are 15 tourism establishments and 6 camping sites in the upper and middle basin in 2006. It must be anticipated that in line with efforts to increase tourism in Namibia as whole, tourism in the middle and upper catchments of the Kuiseb Basin is also likely to increase.

Game and trophy hunting became an economic opportunity for land owners when legislation was changed in 1972 to transfer the ownership of wildlife located on a farm to the farm owner. With wildlife becoming an economic commodity, numbers steadily increased. Although no disaggregated figures for wildlife in the upper and middle catchment area exist, estimates suggest that there are approximately 17,000 koe-doe, zebra, oryx and other species in the area.

Different land uses impact differently on water demand. A large stock unit consumes on average 30 l of water per day, compared to 7-12 l per day for koe-doe, zebra and oryx. Based on these averages and estimated livestock and game numbers, the total annual water consumption for livestock amounts to 328,500 m<sup>3</sup> and that for game to 50,526 m<sup>3</sup>, resulting in an overall estimated total water consumption of livestock and game of 380,000 m<sup>3</sup> per year. In comparison, the average tourist consumes 200 l of water per day. It is also common that tourism establishments have lush gardens and swimming pools. Game and trophy hunting usually lead to a reduction in livestock numbers, thus resulting in lower water consumption. Diversification into tourism, however, generally does not lead to a reduction of livestock and game numbers.

The main water source in the middle and upper catchment consists of boreholes. The number of boreholes in the upper catchment is given as 1,292. Due to the geological formations boreholes are generally quite deep – up to 150 metres and more - and yields are usually weak, ranging from 200 to 2,000 litres per hour. In addition small dams supply farmers with water. Estimates on the number of farm dams vary widely. Research completed by the Department of Water Affairs identified more than 300 dams in the commercial farming area in the upper basin area covering a total area of 3,928 km<sup>2</sup>. The Kuiseb Profile estimates the number of farm dams to be 503 with storage capacities ranging from 94 m<sup>3</sup> to 59,000 m<sup>3</sup>. Another estimate based on intimate field level knowledge of commercial farms suggests that there are 750 farm dams with a total surface area of ± 12.3 Mm<sup>2</sup> in the upper catchment. The combined effect of all the dams was estimated to amount to a reduction of the average flow of the Kuiseb River by 21 per cent. The effect is higher in drier



years. One study conducted in the mid-1990s did not regard the impact of these dams on the quantity and frequency of downstream water flows as significant. However, in view of more recent research which indicates that floods with a depth of 15 to 20 cm recharge the aquifer, the earlier finding should be re-evaluated.

The wide discrepancy in estimates of farm dams in the upper catchment suggests that there is a need to establish a more accurate figure on existing farm dams and their size. The emphasis on size should indicate that many of these 'dams' are silted up. Very few dams have been constructed since the subsidy was removed in the 1970s.

Some of these dams may have been constructed without the necessary permission from DWAF. Managing farm dams will be one of the major challenges of the KBMC. Too many dams and dams that are too large will reduce the quantity and frequency of downstream water flows which will not only impact negatively on aquifer recharge but also on the riparian woodlands of the Kuiseb.

### *Small scale farming in the Namib Naukluft Park*

Small scale farming is practiced in the Kuiseb River by a small community of Topnaars. Sources differ on the number of villages along the river, but numbers range from 10 to 18 between Rooibank (about 40 km east of Walvis Bay) and Homeb (about 140 km east of Walvis Bay). The total population amounts to approximately 300 people. Most members of this community are pensioners and young children. People in the other age groups are either at school or working in Walvis Bay.

There are no reliable statistics on the numbers of livestock belonging to the Topnaar. Numbers are estimated to be 200 cattle, 2,500 goats, 120 donkeys and 50 sheep. Livestock is primarily kept with the objective to maximise herd size rather than for regular marketing. Generally, livestock is only sold when there is an immediate need for money, e.g. for school fees, weddings and funerals. The small stock is of indigenous breeds and large stock is commonly a mix of European breeds and indigenous Sanga cattle. Donkeys are kept for transport purposes.

The only source of fodder for the livestock in the Kuiseb comes from the riverine forest, supplying pods and leaves. The most common trees are *Faidherbia albida* (Ana tree), *Acacia erioloba* (Camel thorn), *Euclea undulata* (False Ebony). The Ana tree and the Camel thorn have different production cycles, i.e. while one is dormant the other flowers and bears fruits. This ensures a regular supply of fodder. Unlike other parts of Namibia, the Topnaar experience 'drought', i.e. a lack of fodder for their livestock, during an overabundance of water or flood event, as the pods are washed away, leaving less fodder available for the animals. Livestock movements are mainly restricted to the riverbed and riverbanks as the sand dunes to the south and the gravel plains to the north do not offer any significant amounts of fodder. Donkeys and horses range kms north and south of the river.

Harvesting and processing of the !nara melon constitutes an integral, if declining part of livelihoods among the Topnaar. In the early 1990s the average !nara yield was estimated to be 26,000 kg. However, the total harvest volume declined by 30 per cent during the 1990s. Several possible explanations for this decline have been advanced. These include a declining interest in !nara business due to a lack of market incentives for the !nara harvesters, a decline in !nara productivity, insufficient labour harvesting as people move into town, a change in harvesting methods and the breakdown of customary controls of access to !nara fields.

Traditionally the Topnaar obtained water from hand dug wells in or close to the riverbed of the Kuiseb River. The increased utilisation of the Kuiseb aquifers lowered the water table, leading to the drying up of most wells in the lower valley where NamWater extracts water. In addition, the dying off of some trees and !Nara plants is attributed to the lower water table.

As the importance of hand dug wells decreased, the Topnaar community had to rely increasingly on boreholes for water. These were provided by government and water users are expected to pay for the cost of providing water. Implementation of this principle proves difficult, placing communities

in debt to the water providers. This poses a potential threat to their water supply and is an issue that needs to be addressed by Rural Water Supply and the leaders of the Topnaar community.

Hand dug wells were used by all until 1980 when the Topnaar leader asked Judge Steyn for boreholes. All villages were provided with diesel-powered pumps and the less convenient hand dug wells were abandoned. At the request of the community, the DRWS replaced all diesel pumps with solar pumps when payment according to CBM was initiated,

The boreholes are currently powered by solar pumps and the village is not charged (theoretically they will have to replace the solar panels and pipelines etc as needed; for that purpose Water Point Committees have been initiated). The only place where payment is an issue is where NamWater provides the community with water from its pipelines. The issue at Homeb is that DRWS currently maintains the solar pump while the community sells water from the DRWS installation to prospectors for own gain.

### *Mining*

At present, mining does not occur on any significant scale in the upper catchment. The Matchless copper mine situated 70 km west of Windhoek closed a number of years ago due to low copper prices. It consumed approximately 0.4 Mm<sup>3</sup> of water per year, which was supplied from Friedenau dam in the Kuiseb River. The likelihood of the mine being commissioned again depends on international copper prices and cannot be excluded.

The picture in the middle catchment is very different, however. At present there are 2 active mining operations mining mostly granite and/or marble, one salt mine. The Langer Heinrich Uranium Mine falls in the Tubas basin which is a minor ephemeral basin located only in the desert between the Kuiseb and Swakop river basins. However, the Langer Heinrich mine will be considered as falling in the Swakop basin because it receives water from the Omaruru River via Swakopmund. Prospecting licenses have been granted covering large areas of the Namib-Naukluft Park in the middle catchment. Hope and Gorob are two old mines where renewed prospecting is taking place.

A number of mineral deposits have been identified. Apart from the known copper and uranium deposits there are also substantial gypsum and marble deposits that are not yet mined. The potential for new mining operations in the middle catchment in particular is reflected by high levels of exploration work going on currently and the large number of pending exclusive prospecting license (EPLs). Towards the eastern parts of the basin exploration focuses on base metals and minerals which are mainly copper, zinc and to a lesser extent gold. The central part of the basin is heavily explored for uranium and latest reports suggest that significant findings have been made especially towards the south-western part of the basin. Closer to the coast, exploration activities focus on marble, granite and other dimension stone.

It is expected that between 2008 and 2014 nine new uranium mines will come into operation in Central Namibia Area. They will provide 5,700 new jobs and require 52 Mm<sup>3</sup> water per annum. Given high unemployment levels on the coast, a large number of these new employment opportunities, particularly in the unskilled segment, are likely to be taken up by people already resident along the coast although the attraction of new jobs is expected to result in a substantial influx of job seekers.

Growth in mining nationally and hence also in the Kuiseb Basin is encouraged by a specific strategy outlined in NDP 3. With rising long-term global demand for base metals and minerals as well as uranium, mainly spurred by China and India, it can be expected that commodity prices will continue to rise. This scenario makes mining development very attractive for investors and the recent interest shown in mining development in Namibia, especially in the target area, is evidence of this.

## Lower catchment

Walvis Bay and surrounds places the biggest demands on available water resources. Apart from its deep sea port, it is the centre of Namibia's fishing industry, has a growing tourism industry, a salt mine and growing manufacturing industry.

### *Shipping and related activities*

Walvis Bay has a sheltered deepwater harbour benefiting from a temperate climate. Due to the absence of bad weather it can offer a no-delays service. It receives approximately 1,000 vessel calls each year and is handling 3.4 million tonnes of cargo. A container terminal can host 150,000 containers per annum. Namport has completed the implementation of its Port Master Plan to develop the Port of Walvis Bay as a Hub Port for Southern Africa. The Port Authority is currently busy updating the existing Port Master Plan to cater for developments for the next five to ten years. Amongst other things, this period is likely to witness increased exports of mining products, as new mines in the Central Namib Area come into production. An investment of N\$50 million will be made to deepen the harbour and develop other infrastructure to position the Port of Walvis Bay as the gateway to countries in Southern Africa through the Walvis Bay Corridor.

### *Fishing*

Namibia has one of the most productive fishing grounds in the world, rich in populations of demersal and large and small pelagic fish. The fishing industry has always been one of the mainstays of the Namibian economy. Walvis Bay and its economy have developed around this industry.

During the period 2001-2006, Namibia's annual fish catches averaged about 572,460 tonnes, valued at N\$3.6 billion. The total industry employed about 13,400 persons, a number that remained fairly stable over the last 5 years. Although major lay-offs were experienced, the increase in onshore processing created additional job opportunities. Revenue from fisheries is the second most important foreign exchange earner in Namibia after mining and it contributed on average about 4.8 per cent to GDP during the period 2001-2006. In addition, onshore fish processing contributed 1.7 per cent to GDP.

Available data do not make it possible to give an accurate figure on the direct contribution of the fishing industry to the town of Walvis Bay. On the assumption that only 50 per cent of total fishing revenues are generated in Walvis Bay – the other 50 per cent being Lüderitz - the industry contributes approximately N\$1.8 billion to the Walvis Bay economy and provides employment to 6,700 people. This is not taking into account the forward and backward linkages in the total value chain of the industry.

In addition to mainstream fishing, a small but lucrative mari-culture industry also developed in Walvis Bay. Nationally, oyster mari-culture production amounted to 670 metric tonnes, valued at N\$64 million per year.

Both mainstream fishing and mari-culture are subject to natural and international economic fluctuations. Natural factors impact negatively on the industry from time to time. Oyster farming experienced a severe setback when adverse sea water conditions caused major losses recently. Total allowable catches also fluctuate in response to sea water conditions and have led to lower volumes being caught. Together with exchange rate fluctuations, the industry had to restructure, which implied, among other, things a reduction in the labour force.

According to the Natural Resource Accounts published by the Department of Water Affairs and Forestry in the Ministry of Agriculture, Water and Forestry the fishing industry consumed a total of 0.7 million cubic meters of water in 1997/98 and 1.6 million cubic meters in 2001/02 nationally. This represented less than 0.6 per cent of total national water demand. Given the fact that the fishing industry is the second largest contributor to GDP, the industry must be regarded as a very efficient user of water and value added per unit of water. The use of sea water by some fishing companies during fish processing has contributed to this situation.

## Tourism

Statistics provided by the Namibian Tourism Board indicate that of the 40 tourism establishments in the basin area, 28 are situated in Walvis Bay. Together these 40 establishments offer a total of 652 rooms or 1,432 bed nights to accommodate tourists. This constitutes 6 per cent of the total number of beds offered nationally.

Based on the national average of 0.88 jobs created per bed offered, it is estimated that the tourism industry contributed a total of 1,260 jobs to the total job market in the basin area. In terms of the economic value of each bed night sold, the value added to the total economy of the basin has been N\$688 per bed night sold. At an average rate of 30 per cent occupancy and based on these averages, the tourism industry within the basin contributed an estimated N\$107 million to the total economy of the basin area in 2006. Roughly 70 per cent of this amount is generated in Walvis Bay.

### 1.3 Water utilisation and management

Present day water supply in the Central Namib Area is from two alluvial aquifers near the coast. These are the aquifers at Rooibank B and Dorop South and at Swartbank and Rooibank A in the lower Kuiseb. The most recent available information (2001) concerning the total sustainable yield of the active Kuiseb aquifers suggests this to be in the order of 7 Mm<sup>3</sup>/a. This figure excludes the estimated environmental demand of approximately 0.8 Mm<sup>3</sup>/a. In 2001, the average abstraction was 8.34 Mm<sup>3</sup>/a, representing over-abstraction for the aquifers.

Fifty-seven production wells are located in the lower Kuiseb abstraction areas. These are operated by Namwater. A complex integrated bulk water supply network supplies water from these aquifers to consumers at the coast. However it is possible to transfer water from the aquifers in the Kuiseb Basin to consumers outside the Kuiseb Basin such as Swakopmund town, Rössing mine, Langer Heinrich Mine and various small consumers along the Swakopmund-Rössing pipeline. This system has been in operation for thirty or more years and major components are coming to the end of their useful life and need replacement. Efficiency of the system can be improved by remote monitoring and control and the efficient utilisation of the resources can be improved by the establishment of new boreholes.

There are four major water users in the Kuiseb Basin: the Municipality of Walvis Bay, the Topnaar settlements, Gobabeb Training and Research Centre and commercial farmers in the upper catchment. Insignificant amounts of water are consumed by tourists in the Namib-Naukluft Park and prospecting at Hope. In the wider Central Namib Area, Walvis Bay, Swakopmund and Rössing mine consumed 86 per cent of the water supplied by Namwater, with Walvis Bay being the largest single consumer in Financial Year 2007. Of the 12.2 Mm<sup>3</sup> of water sold by Namwater in 2007, Walvis Bay bought 4.3 Mm<sup>3</sup>/a or 35 per cent.

Mining will have a very large impact on future water demand in the Central Namib Area. If all uranium companies presently busy with exploration and feasibility studies will establish new mines, current water demand is expected to quadruple from an actual consumption in 2007 of 12.8 Mm<sup>3</sup>/a to 38.8 Mm<sup>3</sup>/a in 2012. Two new mines are likely to be developed in the Kuiseb Basin. These are the Tumas and Tubas mines located 70 and 40 km respectively to the east of Walvis Bay with an estimated water demand of 3 Mm<sup>3</sup>/a by 2012.

Water demand of Walvis Bay has decreased since 1999 by 1.1 per cent. This is attributed to several factors. Firstly, Walvis Bay Municipality introduced measure to reduce water consumption in 1999. These included increased and restructured water tariffs to determine the water demand at tariff levels which would prevail after the establishment of the proposed desalination plant. Although per capita water consumption decreased by 38 per cent during Financial Years 2002 and 2007, it is not clear whether this reflects a reduction in consumption, or whether the decrease is the result of an influx of people to the town. Secondly, the fishing industry reduced its demand for potable water by switching to seawater for some of their processes. Finally, the Municipality of Walvis Bay introduced the sale of recycled semi-purified water in 2003 for use in gardens. Although this accounts for only 0.6 per cent of water sold by the Municipality at present, it is expected that this will increase to 5.8 per cent by 2015.

Despite the success of Walvis Bay's water demand management, its annual demand for water is expected to increase by 2.15 per cent over the next 10 years. Included in this figure is the demand for semi-purified water. Underlying the expected increase in demand for water is the likely economic growth of the town. Walvis Bay Municipality has started to implement an economic strategy which seeks to decrease dependency on the fishing industry by promoting economic diversification through the encouragement of small and medium enterprises and manufacturing activities and promoting the tourism sector. In addition, volumes of cargo exported by Namport are expected to increase as more mining companies come into production.

Walvis Bay Municipality has reported that water losses in its distribution system are currently in the order of 12 to 14 per cent.

The dramatic increase in demand for water calls for new sources to be developed. Additional ground water is available in the paleochannel aquifer with an estimated 340 Mm<sup>3</sup> of water. Of this amount, 100 Mm<sup>3</sup> are brackish. A further estimated 160 Mm<sup>3</sup> is available in the Tsondab Sandstone. The most promising area for ground water development in terms of accessibility and yield potential is the J-line. However, due to the uncertainty of the capacity of J-line, exploration is needed for future planning purposes.

The capacity of J-line alone will not be sufficient to satisfy future water demand and will have to be complemented by a desalination plant for Walvis Bay. While desalination is less financially viable than developing the J-line, it is the only other option. All other options were either not financially viable or unreliable and are therefore not recommended. Water for new mining development may have to come from desalination, and one mine in the Central Namib Area is currently busy constructing its own desalination plant near Wlotzkasbaken.

### 1.3.1 Ecological water requirements

Ecological water requirements are essentially the water that is needed by the river itself to maintain the eco-systems dependent on the water of that river. It is the volume as well as the timing and duration of river flows that keep the aquatic and semi-aquatic systems linked to the rivers functioning and productive.

While water demand and sustainable yields of aquifers can be fairly accurately determined, there is not as yet a tested method to determine the ecological water requirements or to do flow assessments for ephemeral rivers. KBMC should continue to encourage river water scientists in Namibia to co-operate with scientists elsewhere in southern Africa to work towards developing a method to assess the environmental flow requirements of ephemeral rivers and to test this on the Kuiseb River. NDP 3 includes testing such methods on one ephemeral river in Namibia, and KBMC should lobby to make the Kuiseb the one river.

### 1.4 Water quality

Quality guidelines for drinking water have been set out by the DWAF. These are based on the old Water Act of 1956 and are currently being revised for inclusion in new regulations prepared under the Water Resources Management Act of 2004.

A common indicator to determine whether groundwater is suitable for drinking is the concentration of Total Dissolved Solids. This refers to the concentration of chemicals and minerals such as calcium, magnesium, sodium, nitrates, sulphates and fluorides in the water. Drinking water should have a TDS lower than 2,000 mg/l. Most of the groundwater within the Kuiseb Basin is considered suitable for drinking. Higher TDS concentrations of 2,000 – 2,600mg/l are found closer to the escarpment and at one site in the lower Kuiseb, possibly Gobabeb or Klipneus. For much of the middle Kuiseb there is no data. In the upper catchment, TDS concentrations range from below 1,000 mg/l to between 1,000- 2,000 mg/l in some sites along the escarpment. In the lower Kuiseb, water quality in the alluvial aquifers is better than elsewhere in the Basin and saline near the coast.

Monitoring of water quality in the Kuiseb Basin is a concern. The *State of the Environment Report* recommended that Namwater analyse groundwater samples from sentinel boreholes at the end of the dry season each year to detect changes in groundwater salinity and TDS concentrations. Namwater's frequency of sampling varied but was usually twice a year for the boreholes and

reservoirs. However, no samples were analysed from Rooibank A and Dorop South after December 2005 and from Rooibank B and Swartbank after December 2006. The reservoirs were sampled twice a year until 2006 and quarterly after that, possibly because regular sampling of the individual boreholes had been discontinued. No water quality database exists in the Department of Water Affairs and Forestry.

Concerns with regard to groundwater contamination do exist. Scoping meetings and reports on the possible impacts of new uranium mines have identified accidental seepage from tailings dams as a potential threat to groundwater quality. KBMC could take the lead to appoint an independent organisation to co-ordinate a long-term monitoring programme to minimise the risk of contamination.

In the commercial farming sector of the upper catchment cattle feedlots and other intensive farming practices as well as waste water and effluent disposal of tourism operations pose a potential risk of groundwater contamination. No monitoring of this is currently taking place.

Possible saline intrusion into the production area of the Kuiseb Aquifer either from the surrounding, more saline groundwater to the south and west or, with time, sea water intrusion, may become a risk. Regular monitoring of boreholes is necessary.

Pollution from Walvis Bay harbour and other land based sources may lead to the contamination of Walvis Bay lagoon and other wetlands. The KBMC should lobby MET to have the Walvis Bay wetlands proclaimed as a protected area.

In terms of the Water Resources Management Act, all water users engaged in any activity that produces waste water are required to apply to the Water Environment Division for exemption for disposal of waste water or effluent. Of concern is that very few applications for waste water and effluent disposal exemption are received. No such exemption has yet been granted to the Municipality of Walvis Bay or any guest farm in the Basin. However, new uranium mines are working closely with DWAF to monitor their effluents to prevent groundwater contamination. Pollution officers should be members of Basin Management Committees or wider stakeholders' forums in their areas of responsibility.

### **1.5 Environmental issues**

Accelerated economic development in the basin will not only increase demands for water, but introduce environmental risks. Over last decades a reduction in vegetation cover along the middle and lower Kuiseb was reported. Different possible reasons were adduced which include a lowering of the ground water table as a result of intensive ground water abstractions in the lower Kuiseb valley. The consequences of a lowering of the water table would result in:

- the death of the dense acacia woodland which forms a linear oasis across the desert
- the unhindered northward advance of dunes from the Namib Sand Sea
- the depletion of drought reserves for plains game and Topnaar domestic stock through the loss of the acacia woodland and associated vegetation
- and ultimately the siltation of Walvis Bay Lagoon.

Livestock farming in the Kuiseb may exacerbate the situation. Goats feed especially on new sprouts and young trees, hampering these new tree generations to grow up.

The environmental impact of mining is a growing concern in the Kuiseb Basin. Apart from risks of groundwater contamination, criss-crossing the desert for exploration purposes and developing mining infrastructure is likely to impact negatively on the flora, fauna and archaeological sites. To assess the cumulative impacts of mining in the lower Kuiseb area, a Strategic Environmental Assessment has been commissioned. This should be followed by the development of an environmental monitoring programme to check and control the impacts of mining.

The disposal of toxic mining effluent will become an increasingly important issue as more uranium and other mines come on stream. There is no water available to dilute or flush pollutants from underground or surface water sources once such contamination has occurred. Pollution should therefore be totally prevented.

In view of the fact that the quality of industrial and mining effluent depends on the specific treatment process, the producer of the effluent must assist the DWAF by providing information about the quality of the waste water and to specify the treatment process proposed to dispose of the effluent to the satisfaction of the requirements of the DWAF in terms of the Act and any regulations. In the application for a waste water disposal permit it is required that a full environmental assessment should be done and the results submitted a part of the application. The proposed treatment process is then evaluated by the DWAF or the evaluation may be outsourced to a competent consultant that can advise the Ministry about the adequacy of the procedures proposed by the applicant to deal with the disposal of the waste water in such a way that there would be no unmanageable detrimental environmental effects.

The KBMC can play an important role in assisting the DWAF to implement water legislation efficiently if they are afforded the opportunity to participate in the decision-making about the award of licenses and permits for the allocation and use of water or the disposal of waste water. The KBMC is therefore advised to approach the DWAF and to insist that full collaboration must be implemented between the parties to protect the interests of the local stakeholders in the water and environmental resources of the basin. This could be achieved with a formal Memorandum of Understanding or an Agreement between the Parties.

The DRFN has been asked to develop *Guidelines for environmental management in mining* to assist mining companies in minimising negative environmental impacts. The KBMC has an important role to play in ensuring that all stakeholder concerns are fully taken into account in the Strategic Environmental Assessment. It should also take the lead to ensure that stakeholders within the Basin are monitoring these impacts.

Another less well publicised but important issue is that valuable archaeological sites will disappear unless existing legislation is effectively implemented. All archaeological remains in Namibia are protected by the National Heritage Act of 2004. Provisions of the Act extend to objects and sites more than 50 years old that may be considered to have national heritage significance. The Act also requires that archaeological impact assessments are carried out where large development projects are intended in areas of known archaeological significance and proper mitigation of archaeological impacts is also required.

The Kuiseb River Basin is regarded as one of the most important archaeological environments in Namibia, as the entire archaeological sequence is represented, from terminal Pleistocene artefact scatters to evidence of the contact period. The Kuiseb Delta is unique in that the limited development of Walvis Bay and the difficulty of access to the dunefields have preserved archaeological evidence of indigenous responses to contact arising from the global spread of Western commerce. On freehold farms in the upper catchment, archaeological sites provide evidence of both pre-colonial and historic copper working.

Many of these sites are increasingly threatened by uncontrolled tourism and recreational use of the Walvis Bay dunefields. This trend is encouraged by the increasing ownership of 4x4 vehicles. Commercial activities such as salt mining, for example, have already destroyed one of the largest shell middens in the area at Wortel. KBMC has an important role to play in controlling the destruction of archaeological sites. Specific activities can include facilitating the development of appropriate management plans for both archaeological landscapes and specific sites as well as supporting the proclamation of exceptionally significant areas in the Delta specifically under the National Heritage Act. This may go some way to protect those areas.

Appropriately trained guides should accompany all visitors to archaeological sites. KBMC should support training of guides and assist in creating awareness of freehold farmers in the upper catchment, but also the general public about the importance of archaeological sites and the provisions of the National Heritage Act. These campaigns should be accompanied by the production of pamphlets and other literature, as well as site museums.

Finally, more research is required. Currently only approximately half of all sites considered to be archaeologically significant, have been surveyed. More research will contribute towards improved insights and understanding.

The issue of farm dams in the upper catchment has been raised above. The impact of these dams on the riparian vegetation and groundwater recharge in the alluvial aquifers should be further investigated. Such investigations should form part of an environmental flows assessment to attempt to determine the ecological water requirements of the Kuiseb River ecosystem.

Although the extent of alien plant invasion in the Kuiseb Basin has not been well documented, it is an issue that needs to be monitored. There is a concern that invasive plants, particularly those growing alongside rivers, reduce groundwater levels. Care should be taken to distinguish between naturally occurring trees and alien species.

The pollution and ultimate risk of destruction of the lagoon at Walvis Bay has been mentioned above. Apart from the lagoon, the internationally important freshwater wetlands at Sandwich Harbour are believed to be dwindling rapidly as the amount of freshwater seepage decreases and the sand bar protecting the wetland gradually erodes. No data has been obtained on the extent of this process.

As economic development accelerates along the coast, demand for building sand increases. Sand harvesting is therefore likely to become an issue that will impact negatively on river ecosystems.

### **1.6 Water education and awareness**

The development of new water sources has to be accompanied by continued efforts to improve demand management of water. Water demand management can be defined as an integrated approach towards the sustainable development of water supply infrastructure and the utilization of water resources. This involves the implementation of efficient water use practice, economic efficiency and protecting the water resource environment from over exploitation. Managing water demand can reduce the excessive consumption of water, delay the development of additional capital intensive water supply infrastructure and conserve scarce water resources.

Indications are that many organisations in the Kuiseb Basin are not aware of integrated water management and their responsibilities with regard to demand management. Increased awareness creation and consumer education need to be promoted by the KBMC. The important components of a strategy to enhance the sustainable and conservative use of water would be to obtain public participation, to inform the public about practical measures to reduce water wastage and to conserve water, as well as to introduce punitive water tariffs to discourage high water consumption. If water is used more efficiently at the consumer point, less water has to be supplied from the primary water sources.

The production of educational materials on the Kuiseb Basin is regarded as an essential component of an integrated approach to water, wetlands and basin management. A wide diversity of materials was produced by the publications unit set up by the National Water Awareness Campaign in 1992. This Campaign was set up in the Department of Water Affairs with the responsibility to educate the public about our shared water and wetlands resources. Resource books for teachers and water managers have been published which could support the KBMC in developing awareness campaigns and educational programmes aimed specifically at the Kuiseb Basin. Finalising the Kuiseb Profile, which was started by DRFN, could prove useful. World Wetland Day and World Water Day could be used to focus attention on the Kuiseb basin and its specific issues.

Materials are being developed to support training and education of basin management committee members. The Basin Management Approach guidebook has been completed and is aimed to assist members of basin management committees in a number of skills such as an improved understanding of the role of basin management committees and their members, mobilising communities, develop awareness raising material, study water issues in a basin, monitor water issues in the basin and raise funds. A generic basin management training course is currently being developed by water scientists and educators. A first course will be offered to members of the



Omaruru Basin Management Committee in 2008, and if successful, will be rolled out in 2009 and 2010.

The KBMC must continue to raise awareness about water and wetlands issues in the Kuiseb Basin by supporting teachers in educating learners and involving schools in water related activities. In addition, students at the Polytechnic of Namibia and the University of Namibia should be encouraged to base their practical research projects on pertinent issues in the Kuiseb Basin.

### **1.7 Institutional and planning issues**

The roles of Basin Management Committees as described in the Water Resources Management Act are ambiguous. It is not clear whether Basin Management Committees are implementing agencies, facilitators of 'the establishment of an operational and maintenance system' or advisors to government. It is anticipated that these roles will be defined more clearly with the revision of the Act.

An array of institutions operates in the Kuiseb Basin. At government level, the Erongo and Khomas Regional Councils have administrative and political jurisdiction over parts of the Kuiseb Basin. However, ultimate responsibility for managing the water cycle in Namibia and hence also in the Kuiseb Basin rests with the Department of Water and Forestry in the Ministry of Agriculture Water and Forestry. Its Department of Rural Water Supply supplies water to the Topnaar community along the middle Kuiseb. NamWater is responsible for bulk water supplies to Walvis Bay Municipality, Gobabeb and the Topnaar who fall within NamWater abstraction area. Other ministries with responsibilities in the Basin include Environment and Tourism under whom the Namib-Naukluft Park falls and Mines and Energy, which will become more prominent in the granting of mining licences to uranium, dimension stone and copper mines in the Namib Desert. Finally, the Ministry of Fisheries and Marine Resources is in control of the fishing industry. The Municipality of Walvis Bay is the only local authority in the Basin. Gobabeb houses the Gobabeb Training and Research Centre, which is an NGO. In the upper catchment, owners of commercial farm land are in control of water abstraction.

While most of these institutions have a clear idea of their own, narrow mandates, many are not aware of their responsibilities with regard to integrated water resources management including demand management. Apart from the KBMC, a number of other groupings exist that link organisations with each other. These include the Coastal Bulk Water Users Forum, representing all water managers and major users on the West Coast; the Health, Environment and Radiation Safety Committee which was established by the Chamber of Mines in response to the increase in uranium mining and Regional Council meetings. While the first two focus on water supply and waste water management, they do not yet fully integrate integrated water resources management and water demand management in their long term strategies and planning. Through the Municipality of Walvis Bay information from these forums is available to the KBMC.

A common vision for the Kuiseb Basin exists among members of the KBMC and members of other fora. Whether this vision is interpreted in the same way across all institutions and whether it is implemented is a moot point. As membership of the KBMC changes, it is questionable whether all participating institutions have a good understanding of issues of the Basin, and ongoing awareness creation has not been possible from within the KBMC.

Participation by stakeholders in the basin, in terms of monitoring, evaluation and adjustment mechanisms, is limited. The KBMC members meet quarterly and discuss developments within the basin based on their institutions' ongoing monitoring and evaluation. Consultative planning takes place at the quarterly KBMC meetings although lack of time and staff limit ongoing implementation from taking place between meetings. Broader consultation takes place through KBMC representatives within their own institutions but the extent of this consultation varies widely.

Documentation and dissemination to interested parties at all levels of processes, actions, information and results is mixed. Within the KBMC itself, minutes of meetings and discussions are documented and disseminated. This includes information on various activities within and affecting

the basin. Broader dissemination takes place through the newsletter of the Walvis Bay municipality and various articles in popular media.

The KBMC has not yet realised its full potential. It has been entirely dependent on its elected members who are supported by their parent institutions. This has meant that limited resources, particularly staff and time, are available for KBMC activities. In addition, the ambiguous role of the KBMC raised above is exacerbated by different messages being sent as to its value and expected orientation of efforts. These come from different people and at different times from the same ministry.

As a knowledge driven institution, the KBMC has access to an extensive knowledge base provided by its member institutions. However, obtaining information beyond member institutions has proved to be difficult. To assist the KBMC in this, 3 databases have been developed by the KWRMP. A GIS database will contain all the GIS files and related attribute data that have been created for the Kuiseb Profile together with the freely available data of the Atlas of Namibia. It is ordered into a simple thematic structure so that all rainfall data for example, are stored in the same folder, making the compilation of maps straightforward. A meta database is a basic searchable database containing all the information about different datasets that were located during the preparation of this Management Plan. Finally, the searchable source material database consists of all the documents produced for the Water Resources Management Plan.

Although several member organisations of the KBMC have technical expertise available, there are gaps. One institution that provided information on capacity stated that 70 per cent of its work force was unskilled. Another institution reported availability of staff with vast practical experience, but lacking formal qualifications. This disadvantaged staff in terms of employment conditions. Based on the limited information available on capacity, it appears that development of the capacity of mid-level managers, technical and supervisory staff is a key area requiring attention.

At KBMC level, members need to be provided with a constant flow of easily assimilated information concerning the basin and of other institutions in the basin so that they can exercise their mandate effectively. Short courses should be implemented to address the requirements of the basin. Outsourcing and the use of mentors should be engaged in to support ongoing activities in terms of awareness raising and capacity building. All these proposed activities require the backing of the Ministry of Agriculture, Water and Forestry to be effective and sustainable.

The KBMC will have to strengthen its capacity to understand the legal framework of the water and environmental sectors. It is advised to approach the DWAF to brief them on the progress with the revision of the Water Act and even to comment on the draft regulations to be made in terms of the Water Act. It should also request the DWAF to inform them about the interpretation and implementation of the Water Act by means of an appropriate training workshop where all Parties and stakeholders can be aware of and understand how the Water Act will be implemented and what contribution can be made by the KBMC to ensure the proper implementation of and compliance with the legislation. The same recommendations apply to the National Heritage Act and environmental legislation

## **1.8 Conclusion**

The reports on which this Management Plan is based provide a complex tapestry of issues which the KBMC will help to address. These issues range from hydrological and geo-hydrological to socio-economic and environmental concerns. The aim of this Plan and in particular the Action Plans that follow, is to provide the KBMC with a road map to address these issues and facilitate a process that will balance different interests and issues in the interests not only of stakeholders, but the sustainable use of natural resources in the Basin.

The one issue that this management plan has not addressed is whether the management of the Kuiseb Basin as a separate basin is the most efficient way to manage water and the environment in the Central Namib Area. At present, water from the Kuiseb Basin supports activities such as mining and the urban population of Swakopmund in the adjacent Swakop Basin. These are also supplied with water from the Omaruru Basin. It is submitted that serious thought be given to manage the Central Namib Area with its 3 adjacent basins as one unit.

## **2 Action Plans**

### **2.1 Summary of cross-cutting actions and introduction to Working Groups**

This section presents 11 Action Plans. These Action Plans are based on extensive narrative reports which can be found in the Appendix. They summarise the most important short- and long-term Actions required to enable the KBMC to become more efficient and affective in carrying out the mandate bestowed on it by the Water Resources Management Act, 2004. They are intended to provide a road map guiding the KBMC in its activities. Notwithstanding the fact that these Action Plans are a summary of activities, they are quite voluminous. The KBMC therefore requested the team of consultants to summarise activities that are pertinent to several work plans. This summary is presented in Table 1. It was decided to cluster all those activities that pertain to institutional development in the first part of the table and rank them in some kind of logical order. The second part of the table refers to important activities that are not directly related to institutional development but contribute to functioning of the KBMC and can run concurrently with some of those.

Table 2 lists specific activities under each Action with references to specific Action Plans. The columns in red represent action plans that have not yet been completed by the end of the consultancy (October 2008).

**Table: 1 Actions identified in short-term Action Plans**

**Institutional development**

Actions identified	Action Plan no.										
	1	2	3	4	5	6	7	8	9	10	11
1. Establish working groups	✓	✓					✓				✓
2. Raise funding	✓	✓		✓			✓			✓	✓
3. Appoint staff / consultants	✓	✓	✓				✓		✓	✓	✓
4. Establish closer ties with NamWater, MME, MET, Walvis Bay Municipality and DWAF		✓						✓			
5. Enhance capacity of KBMC members							✓	✓			
Activities	Action Plan no.										
	1	2	3	4	5	6	7	8	9	10	11
1. Conduct awareness / education campaigns			✓		✓		✓				
2. Establish databases			✓		✓			✓			
3. Complete Kuiseb Profile	✓						✓				

**Other activities**

**Table 2: Specific activities identified by Action Plans for institutional development**

Action	Specific activities
<b>1. Establish working groups</b>	<p><b>AP 1:</b></p> <ul style="list-style-type: none"> <li>✓ Identify most important issues and knowledge gaps and draft ToR for consultants</li> </ul> <p><b>AP 7:</b></p> <ul style="list-style-type: none"> <li>✓ Review lessons learnt</li> <li>✓ Coordinate preparation of expert information in lay terms</li> </ul>
<b>2. Raise funding</b>	<p><b>AP 1:</b></p> <ul style="list-style-type: none"> <li>✓ AWG to develop and submit proposal to secure funding for the completion of the Kuiseb Profile</li> </ul> <p><b>AP 10:</b></p> <ul style="list-style-type: none"> <li>✓ Raise funds to appoint consultants</li> <li>✓ Secure funding for hardware and software</li> </ul> <p><b>AP 11:</b></p> <ul style="list-style-type: none"> <li>✓ Prepare funding proposal for five year period</li> <li>✓ Secure funding from relevant sources, locally and internationally (review ideas developed for lishana sub-basin)</li> <li>✓ Set up procedures for KBMC functioning and programme; e.g. filing system, financial management, regular internal communication, outsourcing procedures, annual planning, indicators and monitoring system</li> <li>✓ Initiate annual planning including revisit of vision/ purpose/ value added of KBMC; review need for support to ensure attendance of basin community; formalise annual programme including networking, awareness raising, educational activities</li> </ul>
<b>3. Appoint staff / consultants</b>	<p><b>AP 1:</b></p> <ul style="list-style-type: none"> <li>✓ AWG to identify knowledge gaps about economics of resource utilisation by the agricultural sector in the Kuiseb and appoint consultant</li> </ul> <p><b>AP 2:</b></p> <ul style="list-style-type: none"> <li>✓ Appoint consultants to conduct an investigation to determine the integrated flow requirements of the Kuiseb River and the sustainable safe yield of the aquifers to maintain or improve the integrity of the lower Kuiseb environment</li> </ul> <p><b>AP 9:</b></p> <ul style="list-style-type: none"> <li>✓ Contract consultant to work with KBMC monitoring coordinator to develop monitoring system and reporting format covering sustainable management of water resources and disaster management in the Kuiseb Basin</li> </ul>

	<ul style="list-style-type: none"> <li>✓ Consultant &amp; KBMC monitoring coordinator to identify required information in terms of water demand management in the basin</li> <li>✓ Consultant &amp; KBMC monitoring coordinator to establish natural resources accounting (NRA) system for basin</li> <li>✓ Consultant and KBMC to develop scorecard process for annual reporting</li> <li>✓ Consultant and KBMC to develop reporting format for Minister and for public awareness</li> <li>✓ Consultant and KBMC to develop indicators for sanitation parallel to those for water management</li> </ul> <p><b>AP 10:</b></p> <ul style="list-style-type: none"> <li>✓ Contract database developer for the establishment of the database</li> <li>✓ Prepare proposal for securing funding for one data manager for the KBMC</li> </ul> <p><b>AP 11:</b></p> <ul style="list-style-type: none"> <li>✓ Identify volunteer to re-kick-start KBMC</li> <li>✓ Hire KBMC coordinator, one permanent staff, full time</li> <li>✓ Contract consultant to undertake analysis of WRMA in terms of requirements and potential from the Kuiseb Basin</li> </ul>
<p><b>4. Establish closer ties with NamWater and Ministry of Mines and Energy</b></p>	<p><b>AP 2:</b></p> <ul style="list-style-type: none"> <li>✓ Consult with Namwater about their plans to ensure the safety of supply from the Kuiseb boreholes during major flood events</li> <li>✓ Consult with Namwater about their plans to facilitate the possibility to supply water from Swakopmund to Walvis Bay</li> <li>✓ Consult with Namwater and the Department of Water Affairs on the best assessment of the sustainable safe yield of the Kuiseb Aquifers and an appropriate monitoring programme.</li> <li>✓ Conduct an investigation to determine the integrated flow requirements of the Kuiseb River and the sustainable safe yield of the aquifers to maintain or improve the integrity of the lower Kuiseb environment</li> <li>✓ Keep contact with the Ministry of Mines and Energy (MME) about possible mining development in the Kuiseb basin and with the Department of Water Affairs and Forestry (DWAF) as far as measures to prevent pollution from any new mining development.</li> </ul>
<p><b>5. Training of KBMC members</b></p>	<p><b>AP 8:</b></p> <ul style="list-style-type: none"> <li>✓ Take up offer of training courses for KBMC members and their alternatives</li> <li>✓ The KBMC to invite or co-opt relevant institutions to address the KBMC about their water related activities at scheduled meetings of the KBMC</li> <li>✓ The KBMC should invite the DWAF to address them on specific technical issues</li> </ul>

	<p>relating to water resources management</p> <ul style="list-style-type: none"> <li>✓ The KBMC should invite Namwater to address them on the technical and operational issues, as well as the planning and implementation of future water supply infrastructure developments.</li> <li>✓ The KBMC should request Namwater and the Municipality to facilitate a site visit to water supply, water reticulation and waste water disposal facilities</li> <li>✓ Members of the KBMC who are not so conversant with water issues should be afforded the opportunity to attend water conferences and workshops to improve their understanding of water issues</li> </ul>
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**Other activities identified in Action Plans**

Action	Specific activities
<p><b>1. Conduct awareness/education campaigns</b></p>	<p><b>AP 3:</b></p> <ul style="list-style-type: none"> <li>✓ Improve awareness of water pollution – use DWAF Water pollution books</li> <li>✓ Train willing land owners, lodge managers and community members living at strategic sampling points along the river to take regular water samples and submit them to NamWater for routine Group 2 Water Quality analysis and supply information to KBMC on regular basis</li> <li>✓ Improve awareness of water pollution – use DWAF Water pollution books</li> </ul> <p><b>AP 5:</b></p> <ul style="list-style-type: none"> <li>✓ Conduct a continuous awareness campaign on the water demand and supply situation in the Kuiseb Basin</li> <li>✓ Implement an appropriate water demand management programme</li> </ul> <p><b>AP 7:</b></p> <ul style="list-style-type: none"> <li>✓ Coordinate preparation of expert information in lay terms</li> <li>✓ Host World Wetland Day event – 2 February 2009</li> <li>✓ Establish IWRM demos, at Gobabeb &amp; Walvis Bay; explanation sheets available</li> <li>✓ Arrange KBM Forum meetings twice a year</li> <li>✓ Hold annual information exposition at Christmas fair in Walvis Bay or Swakopmund</li> <li>✓ Circulate committee and forum members and relevant authorities and NGOs with a quarterly newsletter</li> <li>✓ Arrange with selected schools to contribute to observation of UN days; e.g. World Wetland Day 2 February 2009</li> <li>✓ Support NACOMA activities with respect to planning, education and awareness</li> </ul>

	<ul style="list-style-type: none"> <li>raising</li> <li>✓ Commission, complete and publish Kuseb Basin Profile</li> </ul>
<b>2. Establish databases</b>	<p><b>AP 3:</b></p> <ul style="list-style-type: none"> <li>✓ Establish Water Quality database for the Kuseb linked to the NamWater database</li> </ul> <p><b>AP 5:</b></p> <ul style="list-style-type: none"> <li>✓ Encourage the use of natural resource accounting to determine the priorities for the allocation of water resources</li> </ul> <p><b>AP 10:</b></p> <ul style="list-style-type: none"> <li>✓ KBMC to decide which institution to house meta-database, stakeholder database and GIS database, based on assessment and recommendations by geographer/ database expert</li> <li>✓ Secure funding for hardware and software</li> <li>✓ Purchase hard and software required to operate and maintain databases based on recommendations from Geographer/ database expert</li> <li>✓ Contract database developer for the establishment of the database</li> <li>✓ Register and develop KBMC web site and develop web interface for access to public data in database</li> <li>✓ Prepare proposal for securing funding for one data manager for the KBMC</li> </ul>
<b>3. Complete Kuseb Profile</b>	<p><b>AP 1:</b></p> <ul style="list-style-type: none"> <li>✓ Secure funding for the completion and dissemination of the Kuseb Profile</li> </ul> <p><b>AP 7:</b></p> <ul style="list-style-type: none"> <li>✓ Kuseb Profile should proceed and where relevant should incorporate any new results from the work done on the Kuseb Water Resources Management Plan and the recent uranium mine and water desalination EIAs</li> </ul>

It will be seen that the first activity under institutional developed concerns the establishment of Working Groups. The main rationale behind this proposal is to reduce the work load of members of the KBMC by delegating certain functions to thematic working groups. The main functions of these working groups will be to do the ground work in their respective areas of responsibility for the KBMC to act. To illustrate with an example: the KBMC will have to do fund raising. However, specific working groups can prepare funding proposals for the KBMC to act on. Another example is recruitment of permanent staff and consultants. The KBMC will have to contract such people, but working groups should identify the need for this, and in the case of consultants, draft Terms of Reference.

The proposal is that the KBMC establish 5 working groups as follows:

1. Working Group 1: Capacity and institutional development
2. Working Group 2: Water utilisation and quality
3. Working Group 3: Bio-physical and socio-economic environment
4. Working Group 4: Awareness raising and participation



5. Working Group 5: Monitoring and evaluation and data management.

It is envisaged that the Working Groups (WG) will be led by a member of the KBMC or someone specifically identified by the KBMC to undertake the task and report regularly (monthly) to the KBMC. Once the WG is established and functioning, quarterly reporting to the KBMC should be sufficient. The other members of the working groups should be volunteers interested in or with expertise in the functions of the WG. The WG may split the responsibilities of the WG amongst themselves reporting to the leader monthly or as progress is made. It is expected that the KBMC will propel the process by making the WGs accountable at their quarterly meetings.

The functions of respective working groups are tabulated below.

<b>Working Group 1 Capacity and institutional development</b>	<b>Working Group 2 Water utilisation and quality</b>	<b>Working Group 3 Bio-physical and socio-economic environment</b>	<b>Working Group 4 Awareness raising and participation</b>	<b>Working Group 5 M &amp; E and data management</b>
<ul style="list-style-type: none"> <li>- Identify volunteer to re-kick-start KBMC</li> <li>- Develop an overall budget for five year period</li> <li>- Prepare funding proposal for five year period</li> <li>- Secure funding from local and international sources</li> <li>- Hire KBMC coordinator, one permanent staff, full time and identify appropriate coordination base</li> <li>- Contract consultant to undertake analysis of WRMA in terms of requirements and potential from the Kuiseb Basin</li> <li>- Set up procedures for</li> </ul>	<ul style="list-style-type: none"> <li>- Develop budget for five year period and feed into overall KBMC budget</li> <li>- Draft Terms of Reference for consultants to investigate the integrated flow requirements of the Kuiseb River and the sustainable safe yield of the aquifers to maintain or improve the integrity of the lower Kuiseb environment</li> <li>- Draft Terms of reference for consultant to identify required information for water demand management</li> <li>- Consult with Namwater about their plans to</li> </ul>	<ul style="list-style-type: none"> <li>- Develop budget for five year period and feed into overall KBMC budget</li> <li>- Identify information gaps in the agricultural, socio-economic and environmental fields and draft terms of reference for consultants to address these</li> <li>- Initiate reassessment of impact of farm dams on commercial farms on recharge of Kuiseb aquifers</li> <li>- Draft ToR and contract consultant(s) to determine the ecological water requirements of the Kuiseb</li> </ul>	<ul style="list-style-type: none"> <li>- Develop budget for five year period and feed into overall KBMC budget</li> <li>- Review lessons learnt</li> <li>- Co-ordinate preparation of expert information in lay terms</li> <li>- Improve awareness of water pollution – use DWAF Water pollution books</li> <li>- Co-ordinate training of willing land owners, lodge managers and community members to take regular water samples and submit them to NamWater</li> <li>- Improve awareness of water pollution – use DWAF Water pollution books</li> </ul>	<ul style="list-style-type: none"> <li>- Develop budget for five year period and feed into overall KBMC budget</li> <li>- Draft Terms of Reference to appoint data management consultants</li> <li>- Advise on contracting database developer for the establishment of the database</li> <li>- Develop specifications and prepare tender documents for hardware and software</li> <li>- Establish Water Quality database for the Kuiseb linked to the NamWater database</li> <li>- Encourage the use of natural resource accounting to</li> </ul>

<p>KBMC operations (filing system, financial management, outsourcing procedures, annual planning etc.)</p> <ul style="list-style-type: none"> <li>- Initiate annual planning process</li> <li>- Revisit vision / purpose / value added of KBMC</li> <li>- Review need for support to ensure attendance of basin community</li> <li>- Formalise annual programme including networking, awareness raising, educational activities</li> <li>- Identify training courses for KBMC members and their alternatives</li> <li>- Identify and invite or co-opt relevant institutions e.g. NamWater, DWAF) to address the KBMC about their water related activities and specific technical and operational issues relating to water resources management</li> <li>- Request Namwater and the Municipality to facilitate site visits to water supply, water reticulation and waste</li> </ul>	<p>ensure the safety of supply from the Kuseib boreholes during major flood events</p> <ul style="list-style-type: none"> <li>- Consult with Namwater about their plans to facilitate the possibility to supply water from Swakopmund to Walvis Bay</li> <li>- Consult with Namwater and the Department of Water Affairs on the best assessment of the sustainable safe yield of the Kuseib Aquifers and an appropriate monitoring programme.</li> <li>- Keep contact with the Ministry of Mines and Energy (MME) about possible mining development in the Kuseib basin and with the Department of Water Affairs and Forestry (DWAF) as far as measures to prevent pollution from any new mining development</li> <li>- Draft Terms of Reference and facilitate recruitment of a consultant to develop indicators for sanitation parallel to those for water management</li> </ul>	<ul style="list-style-type: none"> <li>- Initiate and oversee the establishment of appropriate databases</li> <li>- Strengthen co-operation with CETN to manage Ramsar sites (Walvis Bay wetlands and Sandwich Harbour)</li> <li>- Lobby for Walvis Bay wetlands to be proclaimed a protected area</li> <li>- Contribute towards the development of an environmental monitoring programme and encourage stakeholders in the Basin to monitor impacts of their activities</li> <li>- Gather and disseminate information on important archaeological sites in the Basin</li> <li>- Draft ToR and recruit professional archaeologists to develop appropriate management plans for archaeological landscapes and specific sites</li> <li>- Lobby for the proclamation of exceptionally significant</li> </ul>	<ul style="list-style-type: none"> <li>- Coordinate a continuous awareness campaign on the water demand and supply situation in the Kuseib Basin</li> <li>- Implement an appropriate water demand management programme</li> <li>- Host World Wetland Day event – 2 February 2009</li> <li>- Establish IWRM demos, at Gobabeb &amp; Walvis Bay; explanation sheets available</li> <li>- Coordinate awareness and education programmes with Gobabeb Centre's Training and Outreach Programme</li> <li>- Arrange KBM Forum meetings twice a year</li> <li>- Hold annual information exposition at Christmas fair in Walvis Bay or Swakopmund</li> <li>- Circulate committee and forum members and relevant authorities and NGOs with a quarterly newsletter</li> <li>- Arrange with selected schools to contribute to observation of UN</li> </ul>	<p>determine the priorities for the allocation of water resources</p> <ul style="list-style-type: none"> <li>- Advise KBMC on which institution to house meta-database, stakeholder database and GIS database, based on assessment and recommendations by geographer/ database expert</li> <li>- Secure funding for hardware and software</li> <li>- Register and develop KBMC web site and develop web interface for access to public data in database</li> <li>- Prepare proposal and develop ToR for securing funding for a person to co-ordinate data management and monitoring</li> <li>- Draft ToR and contract consultant to work with KBMC monitoring coordinator to develop monitoring system and reporting format covering sustainable management of water resources and disaster management in the Kuseib Basin</li> <li>- Secure funding for the</li> </ul>
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<p>water disposal facilities and implementation of future water supply infrastructure developments</p> <ul style="list-style-type: none"> <li>- Identify and encourage members of the KBMC who are not so conversant with water issues to attend water conferences and workshops to improve their understanding of water issues</li> </ul>	<ul style="list-style-type: none"> <li>- Appoint an organisation to co-ordinate long-term water quality monitoring</li> </ul>	<p>archaeological areas as conservation areas</p> <ul style="list-style-type: none"> <li>- Lobby MET to review uncontrolled use of archaeological sites for tourism purposes</li> <li>- Encourage more research on archaeological sites</li> <li>- Coordinate with Gobabeb Research Programme</li> </ul>	<p>days; e.g. World Wetland Day 2 February 2009</p> <ul style="list-style-type: none"> <li>- Support NACOMA activities with respect to planning, education and awareness raising</li> <li>- Commission, complete and publish Kuiseb Basin Profile</li> </ul>	<p>completion and dissemination of the Kuiseb Profile</p> <ul style="list-style-type: none"> <li>- See to it that Kuiseb Profile should incorporate any new results from the work done on the Kuiseb Water Resources Management Plan and the recent uranium mine and water desalination EIAs/SEAs</li> <li>- Coordinate/ integrate KBMC requirements with Gobabeb Monitoring and Data Manager</li> </ul>
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<b>2.2 Action Plan 1: Assessment of impact of agricultural practices on the hydrological cycle in the basin and economics of resource utilisation by this sector</b>						
<b>Goal: Required data (including spatial information) and capacity available to implement the Water Resources Management Plan for the Kuiseb Basin</b>						
<b>Output: Increased knowledge about impacts of agricultural practices on the hydrological cycle and economics of resource utilisation by this sector</b>						
<b>Short-term action plan:</b>						
<b>No</b>	<b>Actions</b>	<b>Institution</b>	<b>Time frame</b>	<b>Resources (for KBMC)</b>	<b>Output/ target</b>	<b>Progress (for use by KBMC)</b>
1	KBMC to form an agricultural working group (AWG)	KBMC	Nov 2008		Working group formed and operational	
2	AWG to develop and submit proposal to secure funding for the completion of the Kuiseb Profile	AWG	Dec 2008		Proposal compiled and submitted	
3	AWG to identify the most pertinent issues related to agriculture and its impact on the hydrological cycle based on expert report prepared for the WRMP and other relevant sources	AWG	Feb 2009		Most pertinent issues related to agriculture and its impacts on the hydrological cycle identified	
4	AWG to identify knowledge gaps about economics of resource utilisation by the agricultural sector in the Kuiseb	AWG	Feb 2009		Report describing knowledge gaps about economics of resource utilisation compiled and made available	
5	AWG to compile terms of reference for an in depth study of these issues (ST3 and ST4)	KBMC/AWG	March 2009		Terms of reference compiled and advertised	
6	Based on terms of reference, develop project proposal to secure funding for the two studies (ST3 and ST4)		March 2009		Project proposal developed and submitted to funding agency	
7	Appoint tendering institutions	KBMC	Sept 2009		Institutions appointed	
8	Draft report circulated by consultants to major	KBMC/Consultant	Sept 2010		Draft report available	

	stakeholders for comments and stakeholder workshop held to elaborate reports					and workshop proceedings compiled and distributed	
<b>Long-term action plan:</b>							
No	Actions	Institution	Time frame	Resources (for KBMC)	Output/ target	Progress (for use by KBMC)	
1	The two agricultural studies ST 3 and ST 4 updated on a five years basis	Consultant	Every five years		Five yearly reports completed and distributed		
2	Mid-term stakeholder workshop to be held on a five years basis to elaborate new terms of reference for the next five yearly update (six months before the next study to commence)	AWG/KBMC	Every five years		Workshop proceedings compiled and disseminated, new terms of reference compiled and advertised		
3	Stakeholder workshop to discuss the findings	Consultant/AWG	Every five years		Workshop proceedings compiled and disseminated		
4	Findings of studies together with final reports incorporated into KBMC database as resource material supporting KBMC's decision making and advice to the Minister	KBMC	Ongoing		Findings incorporated into KBMC database and relevant information made available to decision makers and the Minister		

### Extensive footnotes to explain elements of action plan

#### Short-term action plan:

**S-T1:** Forming an agricultural working group. This working group would have members with an interest and expertise in the agricultural field that are members of the broader stakeholder forum of the KBMC. The purpose of this group is to lead the KBMC's activities within the agricultural sector. The group would take the lead in identifying what knowledge gaps there are within the sector and develop a strategy towards how to fill these gaps. The group would report its findings to the stakeholder forum of the KBMC and the committee itself.

**S-T 2:** This is an essential study to be completed. As the agricultural report pointed out, there is a large database in place containing baseline information for the Kuiseb basin. It is high time that this information is compiled into one document and made available to the KBMC and the stakeholders. However, as the report also concluded, much of the data in the profile is out dated and therefore has to be updated. This should be included as an essential component of the proposal to be compiled and submitted. This activity has to be coordinated with Activity 10, the database and GIS component, as the updated information has to be incorporated into the KBMC database.

**S-T 3:** A first assignment for the AWG would be to identify key issues related to agricultural practices in the Kuiseb River Basin and their impacts on the hydrological cycle. The basis for this assessment would be the expert report prepared for the KBMC WRMP and other relevant studies. The findings would be discussed and further elaborated with the stakeholders and the basin management committee. This activity should result in the development of detailed terms of reference for the study.

**S-T 4:** A second assignment would be to indentify gaps in our knowledge about economics of resource utilisation in the agricultural sector in the Kuiseb River Basin. The report prepared by the agricultural expert will form the basis for the identification of these gaps. The findings would be discussed and further elaborated with the stakeholder forum and the basin management committee. This activity should result in the development of detailed terms of reference for the study.

**S-T 5:** It is important that that the KBMC secures funding for these, and other studies that the AWG and other stakeholders find being of importance for the KBMC and the stakeholders in the agricultural sector. Therefore the AWG should take the lead in developing project proposals seeking funding for identified studies. The dependence on external funding, especially donor funding is not a long-term solution, but most likely required to get these key studies done. In the long run the KMBC should develop more sustainable funding mechanisms, providing enough funding for the committee and its working groups to operate, and allowing commissioning of studies to external experts. This is not only central to the agricultural sector but to the entire KMBC.

**ST6:** The approach proposed here, the establishment of an agricultural working group, comprising of members of the broader stakeholder forum, assumes that this group will take the lead in the identification and formulation of issues that need to be addresses. However, the actual investigations would not be done by this group but should be done by external institutions/ individuals on a consultancy basis. This would most likely led to a more rapid generation of results compared to a situation when KBMC members and stakeholders would have to do these studies along with their day-to-day duties. The AWG has a very important role in advising and reviewing the work of appointed consultants.

#### **Long-term action plan:**

**L-T 1-L-T 3:** To ensure that the studies address the identified issues as completely as possible it is important that stakeholders in the Kuiseb River Basin are given the opportunity to review and add to these studies. Therefore it is suggested that draft reports are circulated widely and that each specific study is presented and elaborated during a one day workshop, where all stakeholders are given the chance to discuss with the content and the way forward.

**L-T 4:** This is a very important aspect of the suggested action plan. The findings from any study conducted, adding knowledge to the situation in the Kuiseb River Basin should be entered into the KBMC database. This is essential, as the KBMC must have reliable information at hand to be able to

provide credible advice when requested from the Minister or other stakeholders in the basin. This activity would have to be co-ordinated with Action Plan 10, to ensure that a functional database is in place, allowing for the information to be entered and accessed.

<b>2.3 Action Plan 2: Vulnerability assessment of water resources with respect to pollution and materials that are harmful to the environment</b>						
<b>Goal: Water resource are protected against pollution and flood damage, used on an environmentally sustainable basis, and conserved through efficient use</b>						
<b>Output: A strategy that would ensure that industrial developments in the basin do not pollute the runoff in the river, flood events do not curtail water production and over-abstraction does not compromise environmental integrity.</b>						
<b>Short-term action plans:</b>						
<b>No</b>	<b>Actions</b>	<b>Institutions</b>	<b>Time frame</b>	<b>Resources for KBMC (N\$)</b>	<b>Output/ target</b>	<b>Progress (For use by KBMC)</b>
1	Consult with Namwater about their plans to ensure the safety of supply from the Kuiseb boreholes during major flood events.	KBMC/ Namwater	6 months	1 000	The ability to supply water to Walvis Bay is maintained during and after flood events.	
2	Keep contact with the Ministry of Mines and Energy (MME) about possible mining development in the Kuiseb basin and with the Department of Water Affairs and Forestry (DWAF) as far as measures to prevent pollution from any new mining development.	KBMC/ MME and DWAF	Continuous	1 000	Aware of new mining developments and assurance from water affairs that permits will be issued to prescribe the management of mining effluent	
3	Consult with Namwater about their plans to facilitate the possibility to supply water from Swakopmund to Walvis Bay	KBMC/ Namwater/ Municipality/	1 year	2 000	Ability to supply water from Swakopmund in emergencies is established	
4	Consult with Namwater and the Department of Water Affairs on the best assessment of the sustainable safe yield of the Kuiseb Aquifers and an appropriate monitoring programme.	KBMC/ DWAF/ Namwater/ Municipality	1 year	2 000	Agreement about the safe yield of the Kuiseb Aquifers	
5	Conduct an investigation to determine the integrated flow requirements of the Kuiseb River and the sustainable safe yield of the aquifers to maintain or improve the integrity of the lower Kuiseb environment	KBMC/ DWAF/ Namwater/ Consultants	1 year	10 00	Measures are implemented to maintain the environmental integrity of the lower Kuiseb	
<b>Long-term action plans:</b>						
<b>No</b>	<b>Actions</b>	<b>Institution</b>	<b>Time frame</b>	<b>Resources</b>	<b>Output/ target</b>	<b>Progress</b>



				for KBMC (N\$)		(For use by KBMC)
1	Develop a strategy to monitor the activities related to pollution control and prevention, flood management, the security of supply during flood events or any other contingency and the state of the environment in the lower Kuseb	KBMC	Continuous	2 000	Compliance with the objectives to protect and conserve water resources is achieved	
2	Cooperate with a proposed Namwater groundwater project to investigate the yield and economic viability of abstracting an additional 1,5 million cubic metres of water per annum from the alluvial Kuseb Aquifers along the so-called J-line.	KBMC/ Namwater/ Municipality/ Consultants	3 years	10 000	The availability of more water will be confirmed	
3						

### Extensive footnotes to explain elements of action plan:

The vulnerability of water resources in the Kuseb Basin is related to three possible threats. These are:

1. Pollution from mining developments where effluent disposal is not properly prescribed or compliance monitored;
2. Unsustainable abstraction and environmental consequences
3. Access to water installations during and after flood events

### Short-term Action Plan

**S-T 1:** Namwater is aware of the possibility of damage to water abstraction infrastructure during flood events and how access to the water abstraction infrastructure can be affected. Steps have taken steps to implement measures to deal with the issue and the KBMC should liaise with Namwater to understand what the strategy is and how the parties can cooperate.

**S-T 2:** Mining developments where proper attention is not given proper and controlled mining effluent disposal is viewed as an important threat to the ephemeral surface water and groundwater resources of the Kuseb Basin. The Ministry of Mines and Energy is responsible to grant prospecting and mining licenses. The MME is therefore aware of the sited where prospecting is taking place and where mining licences will most probably be issued. The KBMC should therefore be fully aware of all prospecting licenses awarded by the MME and which mines are most probable to be developed and what measures will be taken to ensure that no pollution spill ever occurs. This includes contingency plans in such events. The Department of Water Affairs and Forestry. (DWAF) is responsible for pollution control and must issue permits which prescribe effluent treatment and disposal at mining operations. The DWAF must also monitor compliance with the permit conditions

**S-T 3:** Namwater is making provision for the possibility to transfer water from Swakopmund to Walvis Bay to supply water to Walvis Bay in case there is an emergency water supply situation. The KBMC should be informed about these measures and close liaison with Namwater and the Municipality is advised.

**S-T 4:** The determination of the long term sustainable safe yield of an aquifer in an ephemeral river system is a complex matter and often very difficult to do. It is therefore appropriate to base such an assessment on the available monitoring data over a long time and to determine the aquifer behaviour under operational conditions. This will lead to further refinements and adjustment of previous assessments. It is therefore important that all parties should be in agreement on the latest assessment of the safe yield (taken as 7,0 million cubic metres per annum at present) in order to facilitate long term planning, but measures should also be agreed upon to monitor the situation and to adjust the agreed figures according to the latest best information.

**S-T 5:** The KBMC should play an active role as local stakeholder and custodian of the Kuiseb basin to ensure that the environmental integrity of the lower Kuiseb is not unduly compromised as a result of over abstraction and other threats to the water resources. An integrated flow assessment should be done and correlated with the assessment of the long term sustainable safe yield of the aquifers. There would be a number of stakeholders in this endeavour, including Namwater, the Municipality, the Ministry of Environment and tourism, as well as the Research Institute at Gobabeb.

#### **Long-term Action Plan**

**L-T 1:** The KBMC should be in a position to keep track of the activities to mitigate the threats to the water resources and the environment of the Kuiseb. It is therefore necessary to introduce an integrated monitoring programme in which all actors in the Basin make a contribution as far as their respective responsibilities allow them to do so. The DWAF should monitor all abstraction and water level fluctuations. The Institute at Gobabeb may be in a position to monitor the environmental situation while the DWAF should monitor all effluent disposal activities with regard to permit compliance.

**LTAP 2:** The long term availability of water resource for development at the Walvis Bay will be dependant on the outcome of an investigation of the potential of the water resources along the so-called J-Line in the Kuiseb Aquifers. Close cooperation is required between all institutions such as the KBMC, DWAF, Namwater and the Municipality as far as such a project is concerned.

<b>2.4 Action Plan 3 – Water quality and pollution prevention management</b>						
<b>Goal: Regular water quality monitoring in the Kuiseb Basin and appropriate management to prevent water pollution or deterioration of water quality.</b>						
<b>Output: A water quality monitoring and pollution control programme to ensure protection of the precious water resources of the Basin</b>						
<b>Short-term action plan:</b>						
<b>No</b>	<b>Actions</b>	<b>Institution</b>	<b>Time frame</b>	<b>Resources for KBMC</b>	<b>Output/ target</b>	<b>Progress (for use by KBMC)</b>
1	Establish Water Quality database for the Kuiseb linked to the NamWater database and include other recent or new analysis e.g. from the WADE study	KBMC, NamWater, GTRC	1 year		A database of water quality with 10 years of useful data to build on	
2	Identify strategic sites for regular Water Quality monitoring	GTRC, KBMC DWAF	Six months		At least 10 sites along the length of the Kuiseb River + 2 in major tributaries routinely monitored	
3	Train willing land owners, lodge managers and community members living at strategic sampling points along the river to take regular water samples and submit them to NamWater for routine Group 2 Water Quality analysis	GTRC, KBMC Stakeholder Forum	1 year		Expansion of the data base to include WQ data from the upper and middle catchments	
4	Investigate present tailings dam at Matchless mine, assess the probability of it leaking into Friedenau Dam and insist that the owners take remedial action prior to re-opening the mine	MME	immediately		Prevention of potential spillage contaminating surface and groundwater supplies	
5	Improve awareness of water pollution – use DWAF Water pollution books	KBMC GTRC, CETN	2009		Learners in the Kuiseb Basin are aware of water pollution causes and solutions	
6	Encourage Kuiseb Basin Stakeholders to apply for waste water and effluent disposal exemption permits	KBMC DWAF	Six months		Sound disposal of wastewater and effluent, well monitored.	
<b>Long-term action plan:</b>						
<b>No</b>	<b>Actions</b>	<b>Institution</b>	<b>Time frame</b>	<b>Resources for KBMC</b>	<b>Output/ target</b>	<b>Progress (for use by KBMC)</b>
1	Capture pertinent historical Water Quality data on	KBMC	1 – 2 years		A long term WQ record that	

	database and share this with the NamWater database				includes historical data e.g. 1982 WQ maps, CSIR studies	
2	Continue regular monitoring of Water Quality at strategic sites making use of farmers, lodge owners, mines and community water point organisations to collect samples	KBMC	Ongoing			
3	Set up a transect of monitoring boreholes between the sea and the production boreholes in the lower Kuiseb to detect sea water intrusion	CBWUF	5 years		Solve the issue of sea water intrusion to allow timely remedial action	
4	Ensure that all existing and proposed new mines have a sound groundwater monitoring programme in place and the data is regularly submitted to and entered into the KBMC WQ database	KBMC MME	Ongoing		Early detection of potential groundwater contaminants from mining activities	
5	Ensure that all intensive farming practices such as cattle feedlots monitor potential groundwater pollution downstream	KBMC MAWF	Ongoing		Early detection of potential groundwater contamination from intensive agricultural activities	
6	Continue pollution awareness at different levels of community: villagers, farmers, schools; urban areas; technical levels	KBMC CETN GTRC	Ongoing		Annual water and pollution awareness campaigns and resource materials produced.	
7	Encourage the Walvis Bay municipality to continue to monitor water quality in the harbour and lagoon and to be vigilant about pollution from the land entering the wetlands	KBMC WB Municipality. Harbour Au. CETN	Ongoing		Feedback from MET at BMC meetings	

### Extensive footnotes to explain elements of action plan: Short term actions

#### Short-term Action Plan

**S-T 1:** NamWater currently has nearly 500 records of Water Quality analysis for the lower Kuiseb aquifer since 1998, this should form the basis of a KBMC database shared with/linked to NamWater, this can then be jointly expanded to include all new analysis by both NamWater and GTRC. Encourage the Water Environment Division of the Department of Water Affairs and Forestry to establish a National Water Quality database and enter the many years of backlog, perhaps starting with the Kuiseb River Basin, encourage them to arrange these by river basin and not political district.

**S-T 2:** To broaden the current database to include sites all along the length of the river, together with a geo-hydrologist from either DWAF or NamWater select at least 10 accessible sites along the length of the Kuiseb and 2 in each major tributary (Gaub River). It might be advisable to link this to the main sites that contribute rainfall data i.e. Neuheusis, Clarental, Tantus, Hohenheim, Weissenfels, Gobabeb.

**S-T 3:** Recently DWAF in Maun, Botswana and the BioKavango Project successfully involved lodge owners based in remote parts of the Okavango Delta to contribute to the regular monitoring of the Okavango Delta by regularly collecting water samples and submitting to the DWAF laboratory in

Maun for analysis. The KBMC should through the Stakeholder Forum encourage farmers, guest house and lodge owners, villagers in the Topnaar settlements and nature conservators in the Namib Naukluft Park to regularly (twice a year) collect submit groundwater samples to NamWater for analysis. It may be possible to approach the GTZ for initial funding to cover the cost of such analysis.

**S-T 4:** The tailings dam/s at Matchless Mine are gradually eroding and there is danger that they may spill their noxious contents downhill into Friedenau Dam. As there is discussion of reopening the mine, the KBMC should request that the MME investigate the state of the tailings dam as a matter of urgency and take remedial action prior to any permission being granted to reopen the mine. Renewed mining activities should be subject to an EIA.

**S-T 5:** Using the water resources materials developed for schools by the National Water Awareness Campaign for high schools in 1999 (*Water Pollution a resource book for IGCSE in Namibia*) and by the Wetlands Working Group for junior schools in 2007 (*Caring for our water – A resource book for upper primary teachers and learners*) the GTRC should engage the schools within the Kuiseb Basin in a project to investigate water pollution or invite senior schools to participate in a debate on water pollution. Involve the Coastal Environmental Trust of Namibia who over many years have established strong links with schools at the coast.

**S-T 6:** The KBMC should invite the pollution control officer from the Division Water Environment who is responsible for the Erongo Region to the next Stakeholder Forum meeting to inform all members of the need to apply for a wastewater and effluent disposal exemption permit for all enterprises that generate waste water of effluent, be it a factory, mine, school, or guest farm.

### **Long-Term Action Plan**

**L-T 1:** Over the longer term attempt to enter historical water quality for the Kuiseb River Basin form reports, maps and hard copies of past water analysis onto the database to expand the record by several decades to allow the tracking of water quality trends. Share this information with NamWater and if it exists yet, the DWAF national WQ data base.

**L-T 2:** Source long term funding, possibly through the MAWF budget for long term monitoring of groundwater quality at strategic sites within the basin and continue to encourage land owners, lodge managers, nature conservators, mine operators and community water point committees to voluntarily collect and submit regular water samples to the NamWater or DWAF laboratories or investigate the possibility of laboratory in Walvis Bay capable of doing Group 2 (drinking water) or Group 4 (Groundwater /drinking water) analysis.

**L-T 3:** KBMC should request that the major water users sharing the lower Kuiseb Aquifer undertake a joint project though the CBWUF to monitor whether or not sea water intrusion is a threat to the production boreholes using a transect of monitoring boreholes between the sea and the aquifer.

**L-T 4:** Using the groundwater contamination detection procedure currently in operation at Rössing Uranium in the Khan River as an example, insist that all present and proposed new mines have similar monitoring boreholes downstream of all mining activities to detect water contamination and a monitoring programme that tests for all Group 2 parameters as well as all possible contaminants used in the mining process or that may be leached out during operations. Ensure that this is part of the environmental management plan of every mine and that no environmental clearance certificate is issued until such monitoring has been tested and implemented.

**L-T 5:** Identify intensive farming practices in the upper catchment (cattle feedlots) and close to Walvis Bay (diary, abattoir) and regularly monitor borehole water immediately downstream for contaminants such as nitrates. Routinely test for either Group 2 or Group 4 contaminants as well as nitrates and do bacteriological analysis too.

**L-T 6:** Continue to involve basin residents at all levels in activities to raise the awareness of water and water pollution in the Kuiseb River Basin, target one event a year to do this and target a different audience or different part of the basin in successive years.

**L-T 7:** Through the KBMC encourage the Walvis Bay municipality and the Harbour Authority to remain vigilant regarding potential pollution of the lagoon, wetlands and harbour and insist that the water quality of these waters be regularly tested and the results included in the KBMC data base. Work with CETN and keep the legacy of Keith Wearne alive.

<b>2.5 Action Plan 4: Identification of the implications on natural resources (including water), the hydrological cycle, and on the ecosystem in the Kuiseb Basin when giving effect to development objectives as set forward in Vision 2030, Millennium Development Goals 2015, NDPs and local development agendas, including Local Agenda 21; and devising basin management strategies in response thereto</b>						
<b>Goal: To develop and maintain a water resource management that would ensure delivering sectoral development contributions in compliance with development objectives and expectations stemming from Vision 2030 with its delivery targets guided by successive National Development Plans recognising other relevant development agendas</b>						
<b>Output: A water resources management plan that will identify critical management aspects with a related monitoring and evaluation system that would enable the KBMC to continually monitor key indicators in order to assess compliance with development targets</b>						
1.	Evaluate the specific goals and objectives as defined within Vision 2030 and related long-range development ideals for Namibia and translate these into region specific objectives in terms of the potential impact on basin resources.	KBMC	1 week		Define required delivery from Kuiseb basin towards national goals	
2.	Assess the approaches recommended within the Global Water Partnership guidelines and experiences of other countries in the development of IWRMPs in order to establish best practices bench marks.	KBMC	1 week		Define best practices	
3	Evaluate the current status quo in the context of the sustainable value in use model for the cost of water and assess the potential for minimising opportunity cost and optimising supply efficiencies via enhanced demand management actions.	KBMC	2 months		Current cost of water against sustainable use cost recovery	
4	Establish baseline definition of prevailing supply and demand profile in the context of trendline indicators from the perspective of “all things being equal at what point will we exhaust supplies” and the rate at which the supply gap will widen.	KBMC	1 month		Supply-Demand profile with calculated breakeven point	
5.	Development of scenarios for future demand possibilities. – impact on gap between sustainable supply and demand profile.	KBMC	1 month		Demand growth with supply gap	

6	Communicate resources constraints and/or development potential to relevant stakeholders and obtain feedback	KBMC	1 month		Stakeholders are continuously informed about resource status	
7	Develop an IWRM strategic plan and management/implementation programme with appropriate mitigating actions aimed at minimising the sustainable supply gap.	KBMC	3 months		Resource Strategic Management Plan with clear performance indicators	
8	Conduct a Social and Economic Impact Assessment (SEIA) of the expected outcomes of the strategic plan and realign the plan as is necessary.	KBMC	2 months		SEIA study	
9	Develop an organisational design for a basin management facility based on the resource requirements identified in the strategic plan and management plans.	KBMC	3 months		Implementation and operational plan	
10	Development of a monitoring and evaluation model and framework	KBMC			Monitoring & Evaluation Plan	
11	Establishment of a basin management facility	KBMC	ongoing		Management facility according to management Plan	
12	Developing a demographic profile for the basin area that would accurately reflect the demographics of the basin for planning purposes as well as M&E	KBMC	Ongoing		Basin Demographic Profile	
<b>Long-term action plan:</b>						
<b>No</b>	<b>Actions</b>	<b>Institution</b>	<b>Time frame</b>	<b>Resources (for KBMC)</b>	<b>Output/ target</b>	<b>Progress (for use by KBMC)</b>
1	Contingent on the outcomes of the short-term action plans	KBMC				

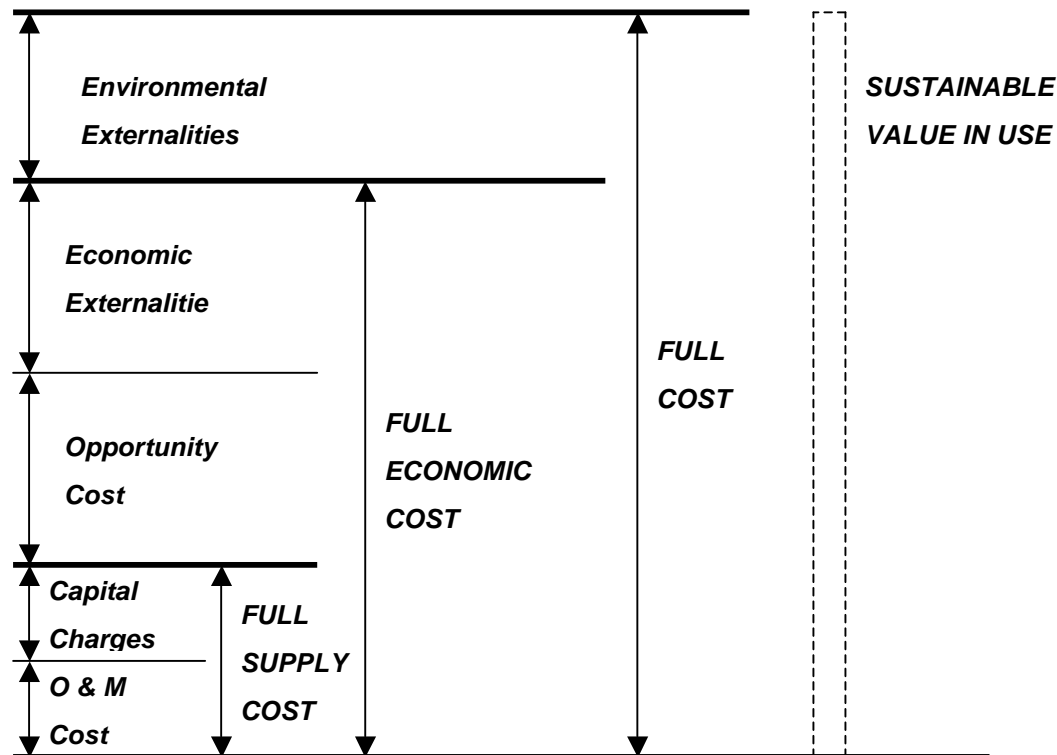


### Extensive footnotes to explain elements of action plan: Short-term Action Plan

**S-T 1:** It will be essential to translate the higher level goals and objectives set for Namibia in terms of Vision 2030 and related long-range planning instruments, such as the MDGs, into area specific strategic themes and related objectives. In this context it will also be necessary to review the Erongo Regional Council strategic plan in terms of the strategic themes, objectives and initiatives set for this region. The impact of these medium-range plans on the overall economic resource bank for the basin will need to be assessed. This information will serve as the basis for extrapolating the long-range goals that are most likely to be applicable within the confines of Vision 2030 and beyond in terms of the expected contribution to the achievement of the national development aims. Finally these expectations will need to be reviewed in the context of known available resources and the probability that these resources will be able to accommodate demands that will be placed on them.

**S-T 2:** Given the fact that many other countries in the world have already made considerable progress towards the achievement of the IWRM targets set during the course of the 2002 summit in Johannesburg, it is recommended that a comprehensive review of the lessons learned by them during the course of their implementation programmes be carried out. Coupled with this exercise will be the need to carefully consider the guidelines published by the GWF with regard to the development of strategies and related implementation actions that may be adopted in working towards the achievement of the IWRM goals. The primary purpose of this exercise will be to define a series of best practice benchmarks that serve as the foundation for the development of a planning model and logical framework.

**S-T 3:** It is essential that a comprehensive profile of current usage be developed in line with the following cost of water model:



In the context of the above it is also important to consider the water demand losses in terms of volume abstracted (supplied) vs. cost recovery of the volume in order to ascertain supply efficiency in terms of the condition of the supply infrastructure and/or non-payment of supplies by consumers.

An assessment should then be undertaken in the context of ability to improve efficiencies (minimise opportunity cost and demand losses) in order to ascertain optimum supply value recovery. Coupled with this will be the necessity to consider the additional supply volume available as a result of savings generated by improved efficiencies and minimising losses.

**S-T 4:** The above information should also be considered in the context of trendline information in order to identify various usage trends during the course of the last 10 to 15 years. Naturally weather patterns during this period will also need to be considered in order to serve as a basis for explaining some of the variances that will inevitably be encountered in the plotting of the trend in the context of deviations from the mean or medium. This trend data will also be utilised for series of statistical progressions in terms of plotting possible future scenarios in the context of establishing a possible supply gap on the basis of unchanged patterns, i.e. based on an assumption that the prevailing average consumption patterns will remain unchanged with the only variables being in terms of population dynamics and socio-economic development.

**S-T 5:** As the action description suggests it will be essential to develop a number of scenarios based on varying combinations of key variables in terms of potential outcomes of long-range (possible 100 year time horizon) predictions based on extrapolations of prevailing objectives and related development initiatives aimed at achieving medium term (Vision 2030) indicators. In all instances the impact of these scenarios will need to be evaluated in the context of available economic resources (including natural resources) and the possible supply gap that is likely to result as the basis for the develop of possible mitigating strategies.

**S-T 6:** The full extent of the outcomes of the previously mentioned assessments and evaluations will need to be presented to the relevant stakeholders in order to afford them the opportunity to respond and provide their inputs and views. The primary aim of this final stage of the situational review will be to finalise the baseline situational position and reach agreement on the most likely future scenarios that will need to be incorporated into the strategic plan development for this basin.

**S-T 7:** Having established the aforementioned situational review and potential future scenarios it will be a relatively uncomplicated process to develop the strategic plan and detailed management/implementation action programme based on the series of initiatives identified within the context of the strategic themes and related objectives. The primary emphasis will be on the mitigating strategies that will need to be initiated in order to minimise the impact of the sustainable resource supply gap (vs. the various demand profiles of the various scenarios).

**S-T 8:** On completion of the strategic planning exercise it will be necessary to evaluate the likely social and economic impact the planned strategies and related action plans. When once this evaluation has been completed it will be possible to finalise the plans prior to commencement of the implementation programme.

**S-T 9:** Essentially an element of the strategic planning process, and based on the axiom of structure follows strategy, it will be necessary to develop an organisational design based on functional operational tasks that will be clustered into relevant jobs with the accompanying job and person specifications that will serve as guidelines in the recruitment and selection of candidates for the various positions within the basin management facility.

**S-T 10:** During the course of the organisational design it will also be necessary to develop a monitoring and evaluation model that will serve as the basis for the performance management system applicable to the management and staff of the basin management institution when once operational.

**S-T 11:** As the action headline states the final stage in the short-term planning (i.e. for completion within a one-year time frame) will be the actual establishment of the basin management institution who will then assume responsibility for the day-to-day operations of the institution in compliance with the parameters defined within the strategic plan and normal accepted operational management practices.

**Long-term Action Plan**

**L-T 1:** It is not considered appropriate to develop any form of long-term action within the current framework as it will be entirely contingent on the outcomes of the short-term actions as previously described.

<b>2.6 Action Plan 5: Water demand and conservation management</b>						
<b>Goal: Water resource are used on a sustainable basis and conserved through efficient use</b>						
<b>Output: A strategy that would ensure water demand management is implemented to ensure the efficient use of water resources</b>						
<b>Short-term action plans</b>						
<b>No</b>	<b>Actions</b>	<b>Institutions</b>	<b>Time frame</b>	<b>Resources for KBMC (N\$)</b>	<b>Output/ target</b>	<b>Progress (For use by KBMC)</b>
1	Conduct a continuous water awareness campaign	KBMC/ Municipality	Continuous	5 000	Stakeholders are aware of the most important water supply challenges and water conservation issues.	
2	Implement an appropriate water demand management programme	KBMC/ Municipality	Continuous	5 000	Water is used more efficiently and conserved	
3	Encourage the use of natural resource accounting to determine the priorities for the allocation of water resources	KBMC/ Municipality	Continuous	5 000	The allocation of scarce water resources to the most economically viable activities is possible	
<b>Long-term action plans</b>						
<b>No</b>	<b>Actions</b>	<b>Institution</b>	<b>Time frame</b>	<b>Resources (for KBMC)</b>	<b>Output/ target</b>	<b>Progress (For use by KBMC)</b>
1	Develop a strategy to monitor the activities related water demand management and water use efficiency.	KBMC	Continuous		Compliance with the objectives to utilize and conserve water resources is achieved	

**Extensive footnotes to explain elements of action plan:**

A water demand management programme is based on a number of important pillars that are closely linked with social change, regulatory and economic instruments. These are:

1. The aim of social change is to orientate human behaviour and practice with regard to water use and includes information communication and knowledge dissemination;
2. The aim of regulatory instruments are to prescribe appropriate policies, rules, laws , standards and technologies for users and service providers;
3. The aim of economic instruments is to implement economic market regulation such as water pricing, subsidies, cross subsidies and cost recovery mechanisms.

### **Short-term Action Plan**

**S-T 1:** The general public, all water users and other relevant stakeholders should be made aware of the water supply and demand situation in the Kuiseb Basin. The KBMC must ensure that there is continuous water awareness campaign in the Kuiseb basing by utilising various institutions such as the Municipality, the DWAF, the agricultural unions and mobilising schools, the mining fishing and tourism industry as well as the general public to participate in water awareness activities. These activities may include workshops, excursions, public meetings and addressing the youth at schools.

**S-T 2:** The water users in the basin, and especially at the coast, should also be advised about measures to conserve water such as the use of garden irrigation systems, to cover swimming pools and to reduce the unnecessary wastage of water when cleaning and washing. A proper water demand management strategy should be developed and the public should be advised about measures to conserve water, reduce water losses and to prevent water wastage.

**S-T 3:** The KBMC should encourage the use of natural resource accounting to use the information to inform the public about the economic value of water and how water inputs contribute to the economy. To enable this analysis on a continuous basis it is necessary that information and data should be obtained in a structured way form all relevant stakeholders. This information will also be of extreme value when decisions about the allocation of water should be made.

### **Long-term Action Plan**

**L-T 1:** After the KBMC had been instrumental in creating an enabling environment for water demand management and natural resource accounting it will be necessary to monitor progress and positive outcomes over a long period of time to make adjustments and to improve efficiency

## **2.7 Action Plan 6 Readiness and response plans to extreme natural events**

Finalisation of this plan will only be possible by mid-December. The project member initially tasked with this output was not able to deliver, and a member of the KBMC has volunteered to develop this Action Plan.

<b>2.8 Action Plan 7 – Stakeholder participation and awareness raising</b>						
<b>Goal: Extensive stakeholder participation in Kuiseb Basin Management and implementation of the Water Resources Management Plan for the Kuiseb Basin</b>						
<b>Output: Programme to ensure progressively increasing community participation in all relevant aspects of basin management including, <i>inter alia</i>, conservation of water resources, pollution reduction, management of water demand, recovery of cost of water supplied and response to floods.</b>						
<b>Short-term action plan:</b>						
<b>No</b>	<b>Actions</b>	<b>Institution</b>	<b>Time frame</b>	<b>Resources (for KBMC)</b>	<b>Output/ target</b>	<b>Progress (for use by KBMC)</b>
1	Review lessons learnt and develop awareness and education working group (WG)	KBMC	1 year	2000	Ongoing file	
2	Coordinate preparation of expert information in lay terms	KBMC WG	1 year	20,000	Loose-leaf file sheets for dissemination	
3	Establish IWRM demos, at Gobabeb & Walvis Bay; explanation sheets available	Gobabeb & Municipality & WG	1 year	20,000	Demos available for stakeholders	
4	Arrange KBM Forum meetings twice a year	KBMC & WG	Initiate 2009	5,000	Full attendance and proceedings	
5	Hold annual information exposition at Christmas fair in Walvis Bay or Swakopmund	WG	Initiate 2009	10,000	Brochures and information; record of queries	
6	Circulate committee and forum members and relevant authorities and NGOs with a quarterly newsletter	WG	Initiate 2009	20,000	Quarterly newsletter and contact list	
7	Arrange with selected schools to contribute to observation of UN days; e.g. World Wetland Day 2 February 2009	WG	Initiate 2009	5,000	National celebration and media coverage for e.g. Wetland Day 2009	
8	Support NACOMA activities with respect to planning, education and awareness raising	WG	Initiate 2009	2,000	Records of meetings; jointly prepared materials	
9	Commission, complete and publish Kuiseb Basin Profile	DRFN & KBMC	18 months	100,000	Kuiseb Basin profile available to layman	
<b>Long-term action plan:</b>						

No	Actions	Institution	Time frame	Resources (for KBMC)	Output/ target	Progress (for use by KBMC)
1	Arrange exposure excursions; associated with Forum meetings	KBMC	Ongoing		One exposure excursion per year	
2	Involve Regional Councils; focus on Division for Rural Services and planners initially; target for meetings	KBMC	Ongoing		Attendance of RC at BMC meetings	
3	Involve MET; focus on NNP staff; target for meetings	KBMC	Ongoing		Attendance of MET at BMC meetings	
4	Involve NamWater; focus on active participation in meetings and discussion; target for meetings	KBMC	Ongoing		Attendance and participation of NamWater at BMC meetings	
5	Identify larger water users with money and involve them in KBMC activities	KBMC	Ongoing		Corporate sponsorship for selected activities	
6	Target different levels of community: grass roots, education system; urban areas; technical levels	KBMC	Ongoing		Annual campaigns and file of materials & experiences	
7	Organise internships in basin; local and international	KBMC	Ongoing		One intern per year; or 2 for 6 months each per year; reports on file	

### Extensive footnotes to explain elements of action plan:

#### Short-term Action Plan

**S-T 1:** Request information from Basin Management Coordinator in DWAF and maintain active file; invite coordinator and representatives from other basins to attend KBMC meetings; attend BMCs of other basins where invited and feasible; request funding from organisers of other BMCs and from BM coordinator to support attendance. Establish a Working Group on Awareness and Education.

**S-T 2:** Assemble existing information about water management, particularly from Walvis Bay and Gobabeb; have it available for use by schools, visitors and others; when new materials are being compiled, target them to stakeholders in the basin; this should be part of the ongoing activities of these two main stakeholders; information on the CBWUF; desalination developments and similar matters should be translated for lay people and made available on an ongoing basis. Preparation of materials could also be coordinated with local schools to serve as part of a project under the relevant class and teacher. The Enviroteach book 'Sink or Swim' has ideas on how to integrate water into all school subjects and should be consulted. Establishment of such a programme could be integrated into the Gobabeb Centre's Training and Education Programme.

**S-T 3:** Establish IWRM demonstrations at Walvis Bay and Gobabeb; provide written, take-home type of information to accompany the demonstrations; hold 'open house' or something similar on quarterly so stakeholders can familiarise themselves with ongoing activities of key stakeholders; invite school



groups and other relevant groups. Again, school groups could be invited to help establish materials and even serve as guides for such demonstrations under adequate tutelage.

**S-T 4:** Arrange KBM Forum meetings twice a year coupled with excursions, demonstrations on other action-oriented activity. As with ELAK, find out from members what sort of information they would like to obtain.

**S-T 5:** Use brochures and posters to increase awareness on the Kuseb Basin at the Christmas Fairs in Walvis Bay or Swakopmund. Perhaps team up with stand that has food or drink for sale.

**S-T 6:** The Awareness and Education Working Group should compile and circulate an e-mail newsletter on the Kuseb Basin quarterly.

**S-T 7:** The Working Group or the KBMC should collaborate with Gobabeb Centre and arrange with selected schools to observe the various UN designated days. According to Ramsar, the 2009 international theme will be focussed on River Basin Management. The KBMC should grasp the opportunity to liaise with the national World Wetland/ Water Day committee at DWAF and the Wetland Working Group of Namibia to collaborate to host the 2009 celebration with the Kuseb Basin, possibly at Friedenau Dam. This event annually involves scholars, students, NGOs, the Regional Council, NamWater, Municipalities and Government departments responsible for water and wetlands and their resources.

**S-T 8:** KBMC/ Working Group should develop close ties with NACOMA and the Gobabeb Centre to implement various education and awareness activities, particularly with schools but with the newspapers and other media also.

**S-T 9:** Further work on the Kuseb Profile should proceed and where relevant should incorporate any new results from the work done on the Kuseb Water Resources Management Plan and the recent uranium mine and water desalination EIAs/ SEA; an effort should be made to complete and publish this with the next 18 months. World Water Day 2010 could be targeted for the launch.

### **Long-term Action Plan**

**L-T 1:** Arrange exposure excursions for forum meetings; these could involve visits to the demonstration sites established under S-T 3. Request funding or in-kind support from local sponsors or donors. The excursions could also target water developments outside of the basin, e.g. the desalination plant at Wlotzkasbaken. These exposure excursions could attract more stakeholders to the annual meetings. School classes could be involved in identification of interesting sites and materials to be prepared and shared.

**L-T 2:** Focus on Erongo Regional Council first and then involve Khomas Regional Council in the future. Directly target Deputy Director of the Division of Rural Services into which the old Rural Water Supply has been decentralised in Erongo (no DRWS in Khomas). Focus on Planners as well. Identify individuals and make personal contact. Invite Regional Council members on exposure visits. Use regional council facilities for meetings.

**L-T 3:** Attempt to involve MET in BMC. Discuss with Minister and PS, and request information concerning formal invitations if these need to be resent. Request one member of the BMC to follow-up on this action, preferably from another government ministry, e.g. MAWF. Request assistance from the Basin Management Coordinator in DWAF.

**L-T 4:** Invite NamWater, through their representative, to also develop a practical demonstration with information focused on their Kuseb water supply scheme for Walvis Bay and the Topnaar Community. Request written information useful for stakeholders; arrange for one of the BMC meetings or a forum meeting to include an excursion along the lower Kuseb (including the diversion dam).

**L-T 5:** Initiate personal invitations to identified CEOs of larger industries (e.g. mines) and institutions (e.g. banks) and invite them to exposure excursions and provide them with information. They may be able to assist with publication of stakeholder information if their logo is included. Identify selected activities for corporations to sponsor, e.g. the publication of the Kuiseb Basin profile; school exposure visits to Gobabeb Centre or the wetlands; prizes for school quiz, art or science competitions.

**L-T 6:** In the KBMC annual programme and materials development, target different groups of stakeholders at different times. Involve groups such as Rotary to help identify clubs, educational programmes, active school teachers and programmes and any other organisations that could help to multiply the outreach of the KBMC. Link to CETN for annual wetland quiz and include information and quiz questions on river basin management and the Kuiseb River Basin.

**L-T 7:** As is currently done at the Gobabeb Centre, arrange for internships with different members of the KBMC, under the supervision of the BMC. This could, for example, involve an internship with NamWater to help develop stakeholder explanatory materials concerning the bulk water supply scheme in the lower Kuiseb. Or it could involve a GIST programme of the Gobabeb Centre for a six month period. Such an internship, if properly managed, could contribute to most of the above outreach activities of the KBMC and others identified in other Action Plans.

<b>2.9 Action Plan 8: Building the Capacity of the Kuseb Basin Management Committee (KBMC)</b>						
<b>Goal: To enable the KBMC to direct the implementation of the proposed Integrated Water Resources Management Plan (IWRMP) for the Kuseb Basin</b>						
<b>Output: The KBMC is capacitated and the IWRMP is implemented</b>						
<b>Short-term action plan:</b>						
<b>No</b>	<b>Actions</b>	<b>Institution</b>	<b>Time frame</b>	<b>Resources for KBMC (N\$)</b>	<b>Output/ target</b>	<b>Progress (For use by KBMC)</b>
1	The KBMC to invite or co-opt relevant institutions to address the KBMC about their water related activities at scheduled meetings of the KBMC	KBMC/ Stakeholder Institutions	6 monthly	2 000	The KBMC is informed about the latest developments that will impact on water resources management in the basin	
2	The KBMC should invite the DWAF to address them on specific technical issues relating to water resources management	KBMC/ DWAF	6 monthly	2 000	The KBMC informed about water resources management issues	
3	The KBMC should invite Namwater to address them on the technical and operational issues, as well as the planning and implementation of future water supply infrastructure developments.	KBMC/ Namwater	6 monthly	2 000	The KBMC informed about water supply and operational issues	
4	The KBMC should request Namwater and the Municipality to facilitate a site visit to water supply, water reticulation and waste water disposal facilities	KBMC/ Namwater Municipality	6 months	5 000	The KBMC informed about the location and operation of water infrastructure with regard to bulk supply, reticulation and waste water disposal.	
5	Members of the KBMC who are not so conversant with water issues should be afforded the opportunity to attend water conferences and workshops to improve their understanding of water issues	KBMC/ Individuals	Ongoing	Donor support	Individual capacities are improved.	
6	Members of KBMC take up offer of training for themselves and their alternatives	NNF/GTZ	9 months		New KBMC members more aware of obligations of BMCs and their specific river basin	
<b>Long-term action plan:</b>						
<b>No</b>	<b>Actions</b>	<b>Institution</b>	<b>Time frame</b>	<b>Resources for KBMC (N\$)</b>	<b>Output/ target</b>	<b>Progress (For use by KBMC)</b>

1	The KBMC should keep contact with keys stakeholders and institutions, liaise with them in a structured way to be informed about new developments	KBMC/ Relevant Institutions	Continuous	2 000	KBMC remains in contact with new developments	
2	Capacity building of existing and new members of the KBMC should be continued over time by means of workshops where information can be disseminated. These workshops can be arranged to coincide with other water events such as World Water Day and could include other stakeholders so as to provide an opportunity for interaction between the KBMC and the stakeholders	KBMC/ Donor Agency	Annual	200 000	The capacity of the KBMC and other stakeholders are enhanced over time	

### Extensive footnotes to explain elements of action plan:

#### Short-term Action Plan

**S-T 1:** The KBMC needs to be informed about water related activities going on in the basin and it is proposed that the KBMC draft a program to invite different institutions **not represented** on the KBMC to address the Committee at each of their meetings about the activities of those institutions as far as it may impact on water related issues in the basin. Institutions that may be involved are:

1. The commercial and communal farmers' agricultural unions
2. Fenata
3. Ministry of Environment and Tourism
4. Chamber of Mines
5. Nampower
6. Hospitality Association of Namibia
7. Namport
8. And others

**S-T 2:** The objective of the KBMC invitation to the DWAF is to be informed about technical water resource management issues that will enable the Committee to have a better understanding of the Government responsibilities, activities and operations. Issues to be addressed over time are among others

1. National water policies and water legislation;
2. The water allocation and pollution control permit system

3. The hydrology of the Kuiseb Basin
4. The hydrogeology of the Kuiseb Basin
5. Water quality and water environment issues, including integrated flow assessments
6. Water demand management
7. Natural resource accounting

**S-T 3:** The objective of the KBMC invitation to Namwater is to be informed about technical issues relating to water scheme operation, as well as the planning, investigating and development of new water supply infrastructure

**S-T 4:** The objective of a comprehensive site visit by the KBMC to all the water infrastructure components would enable the Committee to have a better understanding of the location, purpose and operation of each component

**S-T 5:** The objective of this activity is to give members of the KBMC that come from other disciplines than water management, the opportunity to learn more about water issues and how it should be applied in a basin management context where a water resources plan must be implemented.

**S-T 6:** NNF together with GTZ are developing a generic basin management training course for river Basin Management Committees in Namibia, each course will be customised to the particular river basin. The first one-week course will be offered (and tested on) the new Omaruru Basin Management Committee in October and once evaluated the course will be open to other BMCs in the country. KBMC should request this training course (funded by GTZ) for all KBMC members and their alternatives (particularly for new members who were not involved in the ELAK process) early in 2009.

### **Long-term Action Plan**

**L-T 1:** The objective is to maintain the capacity and knowledge of the KBMC over time about new developments that may impact on water issues

**L-T 2:** The objective of this activity is arrange a workshop where all stakeholders can be informed about the activities of the KBMC and the KBMC, as well as the other stakeholders can be informed on a collective basis about technical issues and water developments in the basin. This can be seen as an important platform for interaction between the stakeholders and the opportunity can also be utilised to review the status of the implementation of the Integrated Water Resources Management Plan of the Kuiseb Basin. The program should be well designed and competent speakers identified to make presentations. High level personalities should also participate in these events

<b>2.10 Action Plan 9 – Monitoring and reporting</b>						
<b>Goal: The Minister is aware of the effectiveness of policies and action toward achieving sustainable management and disaster management in the Kuseib Basin.</b>						
<b>Output: Processes and procedures for monitoring and reporting to the Minister. This would focus on effectiveness of policies and action toward achieving sustainable management of water resources and toward achieving disaster management in the Kuseib Basin.</b>						
<b>Short-term action plan:</b>						
<b>No</b>	<b>Actions</b>	<b>Institution</b>	<b>Time frame</b>	<b>Resources (for KBMC)</b>	<b>Output/ target</b>	<b>Progress (for use by KBMC)</b>
1	KBMC to establish principles and policy for monitoring and reporting to the Minister; establish a monitoring working group	KBMC	3 months		Monitoring working group	
2	Contract consultant to work with KBMC monitoring coordinator to develop monitoring system and reporting format covering sustainable management of water resources and disaster management in the Kuseib Basin	KBMC	3 years		Complete monitoring system tested and functioning	
3	Consultant & KBMC monitoring coordinator to identify required information in terms of water demand management (WDM) in the basin	KBMC	3 years		Catalogue of data to be contributed by relevant institutions	
4	Consultant & KBMC monitoring coordinator to establish natural resources accounting (NRA) system for basin	KBMC	3 years		Catalogue of data to be contributed by relevant institutions and procedures for NRA	
5	Consultant and KBMC to develop scorecard process for annual reporting	KBMC	3 years		Scorecard process for annual reporting	
6	Consultant and KBMC to develop reporting format for Minister and for public awareness	KBMC	3 years		Formats for Ministerial and public reporting	
7	Consultant and KBMC to develop indicators for sanitation parallel to those for water management in S-T 1-5	KBMC	4 years		Monitoring system on sanitation tested and functioning	
<b>Long-term action plan:</b>						
<b>No</b>	<b>Actions</b>	<b>Institution</b>	<b>Time frame</b>	<b>Resources (for KBMC)</b>	<b>Output/ target</b>	<b>Progress (for use by KBMC)</b>
1	Prepare 'State of the Basin Report' at five yearly intervals	KBMC	5 yearly intervals		State of the Basin Reports	

2	Prepare Executive Summary of State of the Basin Report for Minister	KBMC	Ongoing		Executive summary for Minister	
3	Prepare annual scorecard for Minister and public	KBMC	Ongoing		Annual scorecard for Minister and public	

### Extensive footnotes to explain elements of action plan:

#### Short-term Action Plan

**S-T 1:** KBMC should establish & review monitoring objectives; establish monitoring working group to support this requirement

**S-T 2:** The consultant and the KBMC monitoring coordinator should take advantage of the existing monitoring systems such as that used by the Conservancy Programme and Local Level Monitoring to develop systems and reporting formats.

**S-T 3:** Elements of WDM should be identified as indicators of sustainable water management, e.g. monthly records of unaccounted-for water from NamWater, the Walvis Bay Municipality and Gobabeb; amount recycled and/or reused from the Walvis Bay Municipality and Gobabeb; proportion of cost recovery from NamWater and the Walvis Bay Municipality; percentage of pipeline infrastructure renewed annually. This should also include elements of the disaster management programme and activities for the basin.

**S-T 4:** Natural Resource Accounting provides important information for decision making. A system of NRA for the basin, using data from NamWater, the Walvis Bay Municipality and the industries they serve, Gobabeb, the commercial and communal farmers and other users should be established to provide annual values.

**S-T 5:** A scorecard system, with appropriate indicators, for 'soft' components of basin management should be developed to encompass elements such as: linkages established and active between the KBMC and other basins, the coordination desk and other partners; participation of stakeholders in basin activities; number of newspaper articles on the Kuseb appearing in local newspapers; number of international mention of the Kuseb activities, number of enquiries from stakeholders, number of research projects undertaken in the Kuseb. They should also be reported on in a similar format to the WDM components.

**S-T 6:** A specially designed, graphic format to provide vital information to the Minister that is easy to comprehend but addresses key issues should be developed. This would be backed up by the necessary tables, graphs and other information gathered and analysed in S-T 1-4 and 6.

**S-T 7:** In view of the revised Water Supply and Sanitation Policy and the emphasis placed on sanitation to reach the MDGs, indicators of provision of sanitation should be developed and monitored as are components of water supply and management in the basin.

#### Long-term Action Plan

**L-T 1:** Compile and publish a 'State of the Basin' report on at five yearly intervals. This would be based on the indicators and monitoring system developed for the basin supplemented by additional descriptive information related to the Kuseb Profile.

**L-T 2:** Compile a specially designed 'Executive Summary' of the 'State of the Basin' report, well illustrated, to provide the Minister with an overview of the impact of policies and actions towards sustainable management of water resources and disaster management in the Kuseb Basin.

**L-T 3:** Compile an annual scorecard which would represent a brief overview of progress in the basin toward sustainable management of water resources and disaster management in the Kuiseb Basin.



<b>2.11 Action Plan 10: Strategies for collection, interpreting and sharing such data as are necessary to properly manage the basin in co-ordination with the Minister and to fill the gaps identified above, and associated database and GIS development, usage and up-keeping;</b>						
<b>Goal: Required data (including spatial information) and capacity available to implement the Water Resources Management Plan for the Kuseb Basin</b>						
<b>Output: Database and GIS to be used by the KBMC</b>						
<b>Short-term action plan:</b>						
No	Actions	Institution	Time frame	Resources (for KBMC)	Output/ target	Progress (for use by KBMC)
1	KBMC to decide which institution to house meta-database, stakeholder database and GIS database, based on assessment and recommendations by Geographer/ DATABASE expert	KBMC	Dec 2008	None	Institution identified	
2	Secure funding for hardware and software	KBMC	Feb 2009		Funding secured	
3	Purchase hard and software required to operate and maintain databases based on recommendations from Geographer/ database expert	KBMC	Feb 2009		Hard and software purchased	
4	Contract database developer for the establishment of the database	KBMC	March 2009		Database developer contracted	
5	Register and develop KBMC web site and develop web interface for access to public data in database		May 2009		Web site in place	
6	Prepare proposal for securing funding for one data manager for the KBMC		June 2009		Proposal finalised and submitted to potential funder	
<b>Long-term action plan:</b>						
No	Actions	Institution	Time frame	Resources (for KBMC)	Output/ target	Progress (for use by KBMC)
1	Secure funding for one data manager for the KBMC	KBMC/donor	October 2009		Funding secured	
2	Identify and employ data manager for KBMC	KBMC/Hosting institution	October 2009		Data manager employed	
3	Develop plan for data management for the KBMC	KBMC	December 2009		Plan developed	
4	Secure funding for sustainable implementation of the data management plan	KBMC	December 2009		Funding secured	
5	Populate databases	Hosting institution	February 2010		Available data entered into database	

6	Develop a plan for services and information dissemination to key stakeholders in the Kuiseb River Basin and in Windhoek, using the various databases developed	KBMC	March 2010		Plan in place	
7	Secure funding for service provision and information dissemination	KBMC	April 2010		Funding secured	
8	Provide services according to the plan	KBMC/hosting institution	June 2010		Services provided to key stakeholders	

### Extensive footnotes to explain elements of action plan 10

#### Short-term action plan:

**S-T 1.** This is a central step in the establishment of the maintenance and operation of these databases. It is important to note that these databases can be housed at different institutions. For instance the GIS database does not have to be housed by the same institution as the one housing the stakeholder directory. However, if we would like to be cost efficient, it is suggested that one institution, being a member of the KBMC would take on the responsibility of housing all databases. This would save on both staff and hardware costs. To ensure adequate access to the information kept in these databases it is suggested that a web-based interface is used when ever possible. That would make **access** to data platform independent and would not require any specialist software. However, analysis of information, e.g. GIS data would still require specialist software and a trained operator. Given this condition it is also essential that the institution housing the data has adequate access to the Internet and a reliable web server. This criterion would exclude the Gobabeb Research and Training Centre, as that institution presently does not have adequate access to the Internet, and could therefore not provide outside access to the databases, if situated there. However, if a sustainable solution is found for the present Internet issues at Gobabeb than this would be a suitable institution given its long experience in collecting, storing and analyzing data from the Kuiseb River Basin.

**S-T 2.** As the KBMC does not have any funding on its own for purchasing of hard and software it is essential that they identify donors or other funding agencies, e.g. private sector, that can provide the required funds. A technical proposal has to be prepared, including the cost of buying and maintaining the hardware, purchasing cost and licensing costs of the required software. The number of servers/ computers to be purchased depends on which institution or institutions that will house the different databases. If one institution houses all data, then there is only need for one server, and maybe one dedicated GIS/Remote sensing computer. However, if several institutions will be involved in housing the different data, then costs will escalate. The hardware should follow the recommendations outlined in the Geographer's report.

**S-T 3.** This follows on ST2. It is essential that KBMC makes a thorough assessment of the state of the art of hardware and software prior to submission of a proposal and before actually purchasing the equipment as the rate of development in the IT sector is rapid, and what is being recommended in this assessment might not be the best available equipment at the actual time of purchase.

**S-T 4.** The KBMC would have to contract an external expert to develop the data base(s). The terms of reference for the developer must be very clear, stating that the database should be web based, easy to maintain and be compatible to various platforms, e.g. PC running Windows or Linux, and Apple computers. Further, to ensure sustainability and independence, the developer has to provide a complete account of the design of the database, making it possible for the KBMC to make future changes to the design, independent from the original designer.

**S-T 5.** The web site should be registered as part of the process of developing the databases, as one requirement of the databases is that they should be accessible via the Internet. Optimally the database designer should also be capable of designing the web interface to ensure optimal functionality. The same applies here, that the designer should provide complete account for how the web interface is designed, allowing KBMC to change the design and functionality of the web interface independent of the original designer.

**S-T 6.** The proposal seeking funding for the KBMC data manager should be compiled and submitted as soon as the database designer has started to develop the databases. The reason for not doing this before is mainly to ensure that the initiative of developing the required tools for data management has been taken before the KBMC starts to look for a suitable candidate for the operation and maintenance of these tools. It is important that the funding for this position is long term and not only based on a short-term contract. Further, the proposal has to present a plan for how to ensure the sustainability of the position after the external funding has come to an end.

#### **Long-term action plan:**

**L-T 1.** Funding has to be secured before the data manager can be appointed, so this is a central step towards the KBMC being able to use the data collected in a meaningful way, including providing a service to the stakeholders in the basin and elsewhere. The responsibility of the KBMC is mainly to identify potential donors and to keep a dialogue with them, until the funding is secured.

**L T 2.** The actual employment of the data manager would be done by KBMC and the host institution. It is important that the person to be appointed has very good general IT skills together with specialist skills in database operation and maintenance, GIS, remote sensing and web design.

**L-T 3.** The plan for data management has to be developed by the KBMC based on the intended use of the data, and the expectations from stakeholders in the basin. It is important that the plan takes into consideration the need for updating some of the data stored in the databases. If the KBMC sees itself in the role of generating new information, e.g. collecting data in the field, then it is essential that enough funds be secured allowing this to be done in a professional manner. One way to do this would be to engage students in the data collection with supervision from the Gobabeb Training and Research Centre. However, one should always keep in mind that involvement of students requires both extensive supervision and quality assurance, which both require substantial inputs from senior experts, and therefore comes with a cost.

**LT-4.** Proposals have to be compiled and submitted to potential funders. Again, future sustainability is essential. Therefore the proposals should present a plan that ensures that the funding contributes to the establishment of a system that ensures enough funds to be generated from the service provision, allowing the data management plan to be implemented independent from external funding.

**LT-5.** The population of databases should be done by the person that has to be identified by KBMC, responsible for the day-to-day operation and maintenance of the databases. This will ensure that the operator understands how to access and modify the content of the database. It is important that the designer of the database provides instructions for how to maintain the database, see ST4.

**LT-6.** This is a central component of the KBMC. Here it will be central to conduct workshops, individual consultations with stakeholders in and outside the basin to identify what information needs they have. The results of these consultations will form the basis of the development of relevant information to be disseminated. The plan should not only look at what information the KBMC can provide to the stakeholders in the basin, but also to identify what information stakeholders can contribute to the KBMC. If possible the plan should also look into the possibilities of KBMC being able to charge for the services offered. This would be one of few possibilities of making the system less dependent on external funding for its operation.

**LT-7.** The implementation of the plan would require funding, so KBMC would again have to compile and submit a proposal to suitable funders. Sustainability aspects are central.

**LT-8.** It is envisaged that it will take the KBMC about two years to reach this point, when stakeholders can get access to 'all' relevant data for the Kuiseb River Basin. It is important to note that for this to be successful the KBMC has to secure funding for all actions. This is a major threat to the plan. A thorough assessment of the present and future donor landscape together with identification of other funding sources e.g. from the private sector should be considered carefully before any major commitments are made.

<b>2.12 Action Plan 11 - Institutional development and capacity building</b>						
<b>Goal: Sufficient qualified institutions and capacity available to implement the Water Resources Management Plan for the Kuseb Basin</b>						
<b>Output: Programme to ensure availability of sufficient, cooperating qualified institutions and human resource capacity</b>						
<b>Short-term action plan:</b>						
<b>No</b>	<b>Actions</b>	<b>Institution</b>	<b>Time frame</b>	<b>Resources (for KBMC)</b>	<b>Output/ target</b>	<b>Progress (for use by KBMC)</b>
1	KBMC to establish or review principles and policy for KBMC operations; review vision; establish an 'executive committee'	KBMC	3 months		Revised vision and understanding of functions of KBMC; executive committee	
2	Prepare funding proposal for five year period	KBMC	3 months		Funding for dedicated KBMC coordinator & institutional support	
3	Identify volunteer to re-kick-start KBMC	KBMC	3 months		International volunteer for one year	
4	Develop mailing list for KBMC members and Forum; revise annually	KBMC	3 months		Accessible mailing list	
5	Hire KBMC coordinator, one permanent staff, full time	KBMC	4 months		Coordinator in place (Gobabeb?)	
6	Set up procedures for KBMC functioning and programme; e.g. filing system, financial management, regular internal communication, outsourcing procedures, annual planning, indicators and monitoring system	KBMC	1 year		Operations manual	
7	Initiate annual planning including revisit of vision/ purpose/ value added of KBMC; review need for support to ensure attendance of basin community; formalise annual programme including networking, awareness raising, educational activities	KBMC	1 year		Annual plan of operation	
8	Circulate information concerning reactivated KBMC, on proactive basis, and work toward establishing working groups	KBMC	2 years; ongoing		At least 3 active working groups functioning	
9	Contract consultant to undertake analysis of WRMA in terms of requirements and potential from the Kuseb Basin	KBMC	2 years		Analysis	

10	Secure funding from relevant sources, locally and internationally (review ideas developed for Iishana sub-basin)	KBMC	4 years; ongoing		Secure financial situation	
11	Review functioning of the KBMC after 3 years to assess adequacy of the institutional structure of the KBMC	KBMC	3 years; ongoing at 3 yearly intervals		Review of institutional structure and revised actions plans to address short-comings	
11	Track networking with Basin Management Coordination desk in MAWF with aim of enhancing interactions as the desk develops		Year 1 ongoing		Files	
<b>Long-term action plan:</b>						
No	Actions	Institution	Time frame	Resources (for KBMC)	Output/ target	Progress (for use by KBMC)
1	Establish working groups and facilitate annual revision and continuous support as they address basin issues	KBMC	Ongoing,		Functional working groups with quarterly reports filed	
2	Establish and cultivate Trust Fund in support of KBMC	KBMC	Ongoing		Trust Fund to support KBMC institutional needs and activities	
3	Three yearly review of institutional structure of KBMC	KBMC	Ongoing		Evolving structure to meet needs of basin	
4	Ministry of Agriculture, Water and Forestry, through their Basin Management coordination desk must actively support institutional development and capacity building within the KBMC, based on needs identified by the KBMC, and other basins throughout Namibia	MAWF	Ongoing		Strengthened KBMC	
5						

**Extensive footnotes to explain elements of action plan:**

Note: this Action Plan is drawn up on the assumption that the Gobabeb Centre will host the KBMC secretariat/ coordinator on a long term basis.

### Short-term Action Plan

**S-T 1:** This step should be focused on reaffirming the purpose and outputs of the KBMC and establishing an effective, dynamic executive committee to oversee and take all Action Plans forward.

**S-T 2:** The first funding proposal should be directed immediately to the GTZ who are interested in supporting BMCs throughout Namibia. The proposal should take the position that after establishment of the KBMC, the structures and particularly a funding source were not adequately established. This proposal is requested to focus on securing a long-term funding source and long-term programme for the KBMC.

**S-T 3:** Select volunteer from numerous applicants, *inter alia*, to Gobabeb Centre and DRFN.

**S-T 4:** Take advantage of existing lists drawn up by consultants and KBMC and Forum

**S-T 5:** Hire local coordinator, preferably from ranks of interns with experience of Gobabeb. This coordinator would be expected, *inter alia*, to serve as secretariat to the KBMC, manage administration and finances, network regularly with Forum members and other relevant resource management entities, coordinate/ implement an information outreach programme, establish and maintain active information resource centre, and encourage participation on all levels. Many of these activities, e.g. outreach programmes, information resources management, could be integrated into ongoing activities of Gobabeb. The coordinator would be expected to 'put the KBMC on the map' amongst those living in or using water from the basin.

**S-T 6:** Two staff members should establish operations manual and test out during first year of operation.

**S-T 7:** Annual programme planning with built-in review of purpose/ vision to re-orientate KBMC in the rapidly changing environment; focus on pro-active programme of networking and outreach

**S-T 8:** Based on the model presented in the Institutions Report, the KBMC coordinator should initiate a programme of identification of key issues requiring attention in the Kuiseb (review ELAK results, hold mini-workshop sessions at the KBMC and Forum meetings). Small working groups, ranging in size from 2 to 6 people maximum, should address various issues. These would include the results from the analysis of the WRMA described in S-T 7.

**S-T 9:** Hire consultant to make analysis of KBMC's responsibilities with respect to the WRMA. KBMC coordinator should use these results to develop a programme of action to establish capacity within the KBMC as required. Some of these issues could be addressed through working groups, others through appropriate networking.

**S-T 10:** Coordinator should work on establishing a secure financial basis for the KBMC. Using ideas from the Ilishana sub-basin consultancy, e.g. twinning with international rivers, levy on water sales in the basin or for uranium mining in the basin, establish a firm financial foundation for the KBMC.

**S-T 11:** Establish three yearly cycle of review of the institutional structure of the KBMC and revise as necessary. E.g. the West Coast Management Plan set up by Nacoma, extensive uranium mining and other developments may influence the framework in which the KBMC operates.

### Long-term Action Plan

**L-T 1:** Dynamic review of working groups, the important issues in the Kuiseb Basin and how these are being addressed.

**L-T 2:** As indicated in S-T 8.

**L-T 3:** As indicated in S-T 9.

**L-T 4:** Currently the Basin Management coordination desk of MAWF is being established. It is expected that within a few years this support desk will be, *inter alia*, providing regular information to the KBMC concerning policy and resource management developments affecting the basin, identifying capacity building opportunities for KBMC members and the coordinator, identifying networking opportunities to enhance capacity and information base of the KBMC, locating funding opportunities and other pro-active support to the KBMC and other basins in Namibia.