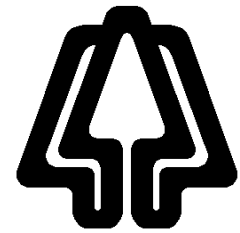
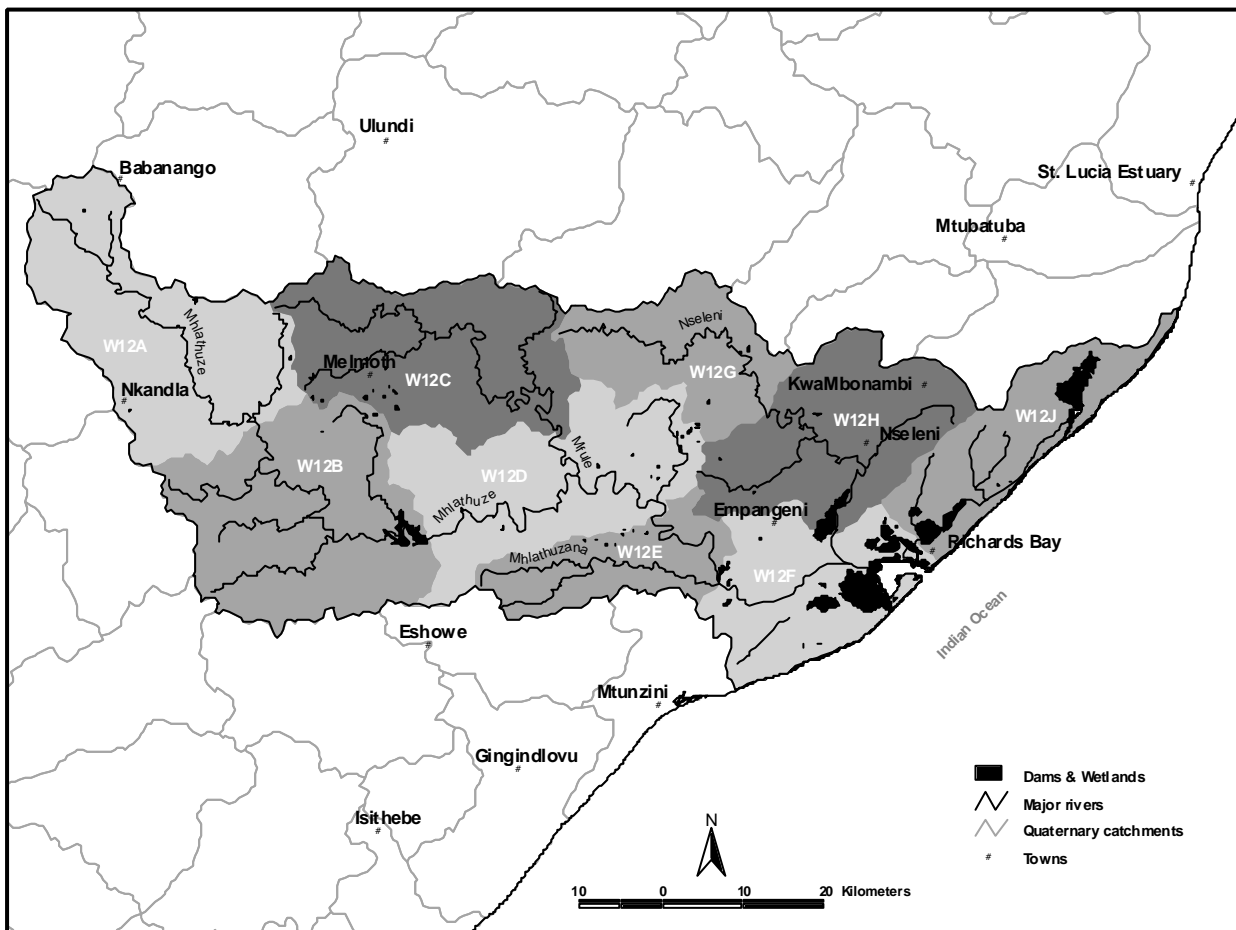


## **APPENDIX B**



# STRATEGIC ENVIRONMENTAL ASSESSMENT FOR WATER USE MHLATHUZE CATCHMENT



## WATER RESOURCES ASSESSMENT

MARCH 2000

## 1. INTRODUCTION

The purpose of these notes is to provide an overview of the water resources of the Mhlathuze catchment to assist with the formulation of a strategic environmental assessment.

The Mhlathuze river is situated on the North coast of Natal and flows into Richards Bay. The Mhlathuze catchment covers an area of 4 209 km<sup>2</sup> and is bounded by the Thukela catchment in the south and west and the Mfolozi catchment in the north. The towns of Richards Bay, Empangeni and Melmoth are situated in the catchment.

The main water supply system in the Mhlathuze catchment consists of the Goedertrouw Dam, with a capacity of approximately 300 million m<sup>3</sup> and the Thukela Transfer Scheme, which pumps water from the Thukela River to the Goedertrouw Dam at a rate of approximately 34 million m<sup>3</sup>/annum. Water is released from Goedertrouw Dam for irrigators downstream of the dam while Mhlathuze Water abstract water from the Mhlathuze Weir some 35 km downstream of the dam to supply Urban and Industrial users in Richards Bay. The natural lakes in the catchment also contribute to the yield of the system.

## 2. THE WATER RESOURCE

### 2.1 Rainfall

Rainfall in the Mhlathuze catchment can be considered to be high in comparison with the rest of South Africa and varies from about 850mm per annum in the west to over 1200mm per annum in the eastern coastal area <sup>(5)</sup>. Table 2.1 lists the mean annual precipitation in the quaternary Mhlathuze catchments.

**Table 2.1: Mean rainfall and evaporation**

| Quaternary catchment | Area (km <sup>2</sup> ) | Mean Annual Precipitation (mm) | Mean Annual Evaporation (mm) |
|----------------------|-------------------------|--------------------------------|------------------------------|
| W12A                 | 623                     | 876                            | 1450                         |
| W12B                 | 656                     | 932                            | 1400                         |
| W12C                 | 570                     | 848                            | 1400                         |
| W12D                 | 569                     | 848                            | 1350                         |
| W12E                 | 249                     | 1041                           | 1350                         |
| W12F                 | 399                     | 1285                           | 1300                         |
| W12G                 | 326                     | 835                            | 1350                         |
| W12H                 | 485                     | 1039                           | 1350                         |
| W12J                 | 332                     | 1280                           | 1350                         |

**Source:** Department of Water Affairs and Forestry (1999); **Mhlathuze Operating Rules and Future Planning: Hydrology Module Report**

### 2.2 Evaporation

Evaporation varies from 1 450mm in the west to as low as 1 300mm in the east <sup>(5)</sup>, as indicated in Table 2.1. This is relatively low compared to the rest of South Africa, but still higher than the average rainfall - the point being that there will always be a net loss from water surfaces in the catchment.

### 2.3 **Runoff**

The runoff from the Mhlathuze catchment is difficult to estimate accurately due to inaccurate and inadequate gauging within the catchment. Runoff is also obviously affected by development within the catchment and hydrologists have therefore attempted to determine the so-called natural or virgin runoff i.e. the runoff that would occur if the catchment was in a completely natural state, to provide a fixed basis from which to proceed with water resources studies. The accurate determination of the natural flow is hampered by the lack of accurate historical data of catchment developments which have impacted on runoff e.g. afforestation, farm dams, irrigation, etc.

The estimated natural runoff from the Mhlathuze catchment is as indicated in Table 2.2.

**Table 2.2: Natural runoff**

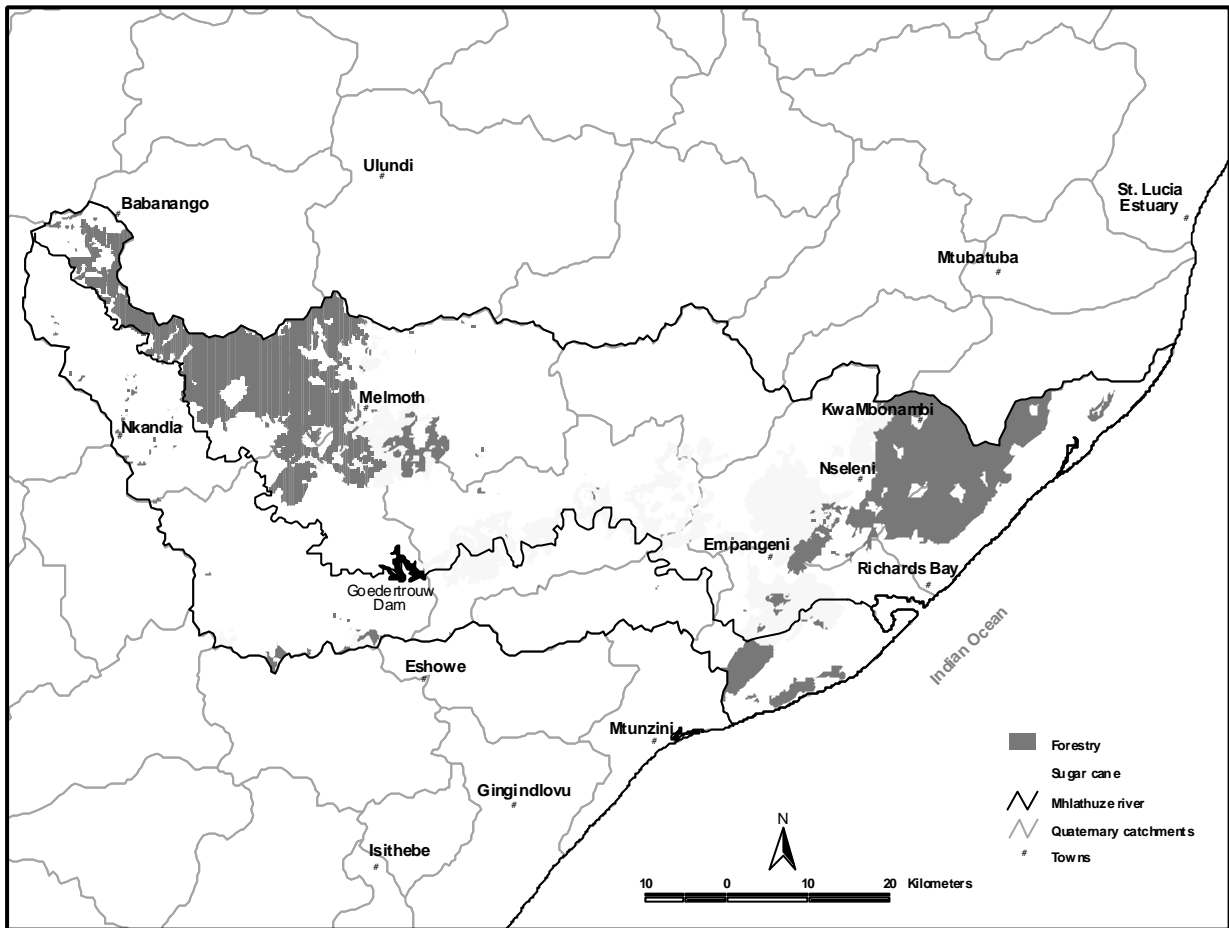
| <b>Catchment</b> | <b>MAR (million m<sup>3</sup>/annum)</b> | <b>% Runoff</b> |
|------------------|--|-----------------|
| W12A             | 69                                       | 12.6            |
| W12B             | 94                                       | 16.2            |
| W12C             | 56                                       | 11.6            |
| W12D             | 49                                       | 10.2            |
| W12E             | 41                                       | 15.8            |
| W12F             | 92                                       | 17.9            |
| W12G             | 30                                       | 11.0            |
| W12H             | 71                                       | 14.1            |
| W12J             | 81                                       | 19.1            |
| <b>TOTAL</b>     | <b>583</b>                               |                 |

**Source:** Department of Water Affairs and Forestry (1999); **Mhlathuze Operating Rules and Future Planning: Hydrology Module Report**

## 3. **LAND USE**

### 3.1 **Afforestation**

The relatively high rainfall in the Mhlathuze catchment makes conditions for forestry good and much of the catchment is heavily afforested. Afforestation reduces runoff from a catchment by increasing rainfall interception losses and evapo-transpiration when compared to the natural vegetation it replaces. Table 3.1 lists the amount of forestry in each quaternary catchment together with the estimated reduction in runoff.



**Figure 1: Afforestation & Sugarcane distribution in Mhlathuze catchment (Source: DWAF, 1996)**

### 3.2 Dry-land sugarcane

Like afforestation, dry-land sugarcane reduces the catchment runoff by increased rainfall interception and evapo-transpiration when compared with the natural vegetation, which it replaces. Although most of the sugarcane in the Mhlathuze catchment is currently irrigated, there is a significant amount of dry-land sugar cane, especially in the Melmoth area, which needs to be taken into account when allocating the limited water resources within the catchment. The impact of dry-land sugarcane has yet not been studied in any detail but needs to be addressed in order to improve our knowledge of the catchment.

Figure 1 gives an indication of the spatial distribution of sugar cane cultivation in KwaZulu-Natal and Mpumalanga. The boundaries of the Mhlathuze catchment have been superimposed on this map to give an indication of the distribution of sugarcane in the catchment. It is interesting to note that the sugar industry do not consider any of the sugarcane in the Mhlathuze catchment to be fully irrigated. This is an important issue because the water allocations to this water user sector are based on full irrigation.

**Table 3.1 Afforestation in the Mhlathuze catchment**

| <b>Quaternary catchment</b> | <b>Catchment Area (km<sup>2</sup>)</b> | <b>Afforested Area (km<sup>2</sup>)</b> | <b>Reduction in runoff (million m<sup>3</sup>/annum)</b> |
|-----------------------------|--|---|--|
| W12A                        | 623                                    | 167                                     | 14.9   |
| W12B                        | 656                                    | 81                                      | 9.5  |
| W12C                        | 570                                    | 152                                     | 9.8  |
| W12D                        | 569                                    | 15                                      | 0.8  |
| W12E                        | 249                                    | 0                                       | 0  |
| W12F                        | 399                                    | 0                                       | 0  |
| W12G                        | 326                                    | 0                                       | 0  |
| W12H                        | 485                                    | 99                                      | 7.7  |
| W12J                        | 332                                    | 40                                      | 4.2  |
| <b>TOTAL</b>                | <b>4209</b>                            | <b>554</b>                              | <b>46.9</b>  |

**Source:** Department of Water Affairs and Forestry (1999); **Mhlathuze Operating Rules and Future Planning: Hydrology Module Report**

### 3.3 Alien invasives

Alien flora species tend to invade the riparian zones of river courses, using considerably more water than the natural vegetation. A recent study by the CSIR<sup>(13)</sup> estimates the reduction in runoff due to alien invasives to be as high as 90 million m<sup>3</sup>/annum. This information was derived from mapping done by experts at a 1:250 000 scale in workshops based on their knowledge of the area. Due to the apparent huge impact of alien vegetation, it is imperative that this data be verified or improved by means of detailed mapping and ground truthing.

The information on the impact of alien invasives has only recently been published and has not been taken into account in the latest hydrological analyses of the catchment. The impact that the reduction in runoff may have on the yield of the system is also not known at this stage. Due to the uncertainty relating to this information, the reduction in runoff due to alien vegetation has not been included in the water balance shown in Table 6.5.

### 3.4 Farm dams

Farm dams reduce catchment runoff by increasing losses through evaporation from their water surfaces and delaying runoff into major storage dams. Although there is not an over-abundance of farm dams in the Mhlathuze catchment, especially when compared with some other catchments, they do have an impact since irrigators are known to use water from their farm dams when restrictions on river abstractions are applied<sup>(9)</sup>. Hydrological studies of the Mhlathuze have not taken farm dams into account in the past as they were not considered to be significant but in future this should be investigated.

## 4. WATER USE

### 4.1 Irrigation

There is extensive irrigation within the Mhlathuze catchment, mainly along the banks of the river downstream of the Goedertrouw Dam. Irrigation activities are controlled by several Irrigation Boards (soon to become Water User Associations) who have fixed water allocations. However, the amount of water allocated is seldom abstracted in full due to the high pumping costs. Table 4.1 lists the water allocation to the various Irrigation Boards.

**Table 4.1: Irrigation boards**

| Irrigation board | Area irrigated (ha) | Allocated Area (ha) | Allocation         |                               |
|------------------|---------------------|---------------------|--------------------|-------------------------------|
|                  |                     |                     | m <sup>3</sup> /ha | Million m <sup>3</sup> /annum |
| Nkwaleni         | 6362                | 6362                | 12 600             | 80.1                          |
| Mfuli            | 774                 | 774                 | 11 800             | 9.1                           |
| Heatonville      | 5230                | 5230                | 11 800             | 62.0                          |
| Kwazulu          | 993                 | 1993                | 11 000             | 10.9                          |
| Lower Mhlathuze  | 1582                | 1582                | 9 000              | 14.2                          |
| <b>TOTAL</b>     | <b>14 941</b>       | <b>15 941</b>       |                    | <b>176.5</b>                  |

Source: Mhlathuze Water <sup>(4)</sup>

It should be noted that the KwaZulu Irrigation Board has not yet developed their full allocation. Should this additional 1 000 ha also be developed, the total irrigation water requirement would increase to 187 million m<sup>3</sup>/annum.

## 4.2 Domestic

### 4.2.1 Urban and light industrial

The water usage of the various urban users is shown in Table 4.2, as projected to the year 2000.

**Table 4.2: Urban and light industrial water use**

| Consumer               | Current water use (million m <sup>3</sup> /annum) | Water source                      |
|------------------------|---|-----------------------------------|
| Richards Bay           | 14.1  | Lake Msingazi<br>Mhlathuze system |
| Eshowe                 | 0.5   | Mhlathuze system                  |
| Esikhaweni             | 5.9   | Lake Cubhu<br>Mhlathuze system    |
| Nseleni                | 2.0   | Mhlathuze system                  |
| Vulindlela             | 1.5   | Lake Mangeza<br>Mhlathuze system  |
| Empangeni & Ngwelezane | 8.4   | Lake Nsezi<br>Mhlathuze system    |
| <b>TOTAL</b>           | <b>32.4</b>                                       |                                   |

Source: Management of the Water Resources of the Mhlathuze Catchment: Document for Stakeholder Briefing Session <sup>(2)</sup>

### 4.2.2 Rural water use

The water use by the catchment's rural population of about 373 000 was estimated at approximately 1.4 million m<sup>3</sup>/annum in 1995. This is very low but is consistent with the low level of water services at that time. As water supply infrastructure is put in place, the unit consumption will no doubt increase and it is assumed that it will eventually increase to about 60 l/person/day. Assuming target supply rates of 25 l/person/day and 60 l/person/day for the medium and long term respectively, the total water requirement of the rural community is still very low when compared with other consumers (see Table 4.3).

**Table 4.3: Rural water use and requirements**

| Catchment                                       | Population    | Current supply<br>(m <sup>3</sup> /day) | Requirement<br>25 l/capita/day | Requirement<br>60 l/capita/day |
|---|---------------|---|--------------------------------|--------------------------------|
|   |               |   | (m <sup>3</sup> /day)          | (m <sup>3</sup> /day)          |
| W12A  | 41850         | 262                                     | 1049                           | 2511                           |
| W12B  | 40415         | 583                                     | 1010                           | 2425                           |
| W12C  | 21500         | 61                                      | 538                            | 1290                           |
| W12D  | 46650         | 462                                     | 1166                           | 2799                           |
| W12E  | 39300         | 628                                     | 983                            | 2358                           |
| W12F  | 93220         | 984                                     | 2331                           | 5593                           |
| W12G  | 16170         | 91                                      | 404                            | 970                            |
| W12H  | 61420         | 465                                     | 1536                           | 3685                           |
| W12J  | 12300         | 254                                     | 308                            | 738                            |
| <b>Total</b>                                    | <b>372825</b> | <b>3790</b>                             | <b>9321</b>                    | <b>22369</b>                   |
| <b>Total in million<br/>m<sup>3</sup>/annum</b> |               | <b>1.38</b>                             | <b>3.40</b>                    | <b>8.16</b>                    |

Source: Mhlathuze Operating Rules and Future Planning: Water Demand Module Report<sup>(4)</sup>

Also of significance in the rural areas of the Mhlathuze catchment is water use by stock animals. Table 4.4 lists this water use in equivalent Large Stock Units (LSU) with a water consumption rate of 45l/LSU/day i.e. all stock are taken into account but converted to the equivalent use of cattle.

**Table 4.4: Water use for stock watering**

| Quaternary catchment | Equivalent Stock Units (LSU) | Large | Water consumption (million m <sup>3</sup> /annum) |
|----------------------|------------------------------|-------|---|
| W12A                 | 15 300                       |       | 0.25  |
| W12B                 | 16 100                       |       | 0.26  |
| W12C                 | 14 000                       |       | 0.23  |
| W12D                 | 14 000                       |       | 0.23  |
| W12E                 | 6 100                        |       | 0.10  |
| W12F                 | 9 800                        |       | 0.16  |
| W12G                 | 8 000                        |       | 0.13  |
| W12H                 | 11 900                       |       | 0.20  |
| W12J                 | 8 200                        |       | 0.13  |
| <b>TOTAL</b>         | <b>103 400</b>               |       | <b>1.69</b>                                       |

Source: Water Resources Situation Assessment: KwaZulu-Natal<sup>(3)</sup>

### 4.3 Industrial

The water use by industries in 1998 in the Mhlathuze catchment is listed in Table 4.5.

**Table 4.5: Industrial water use**

| <b>Consumer</b>       | <b>Current water use<br/>(million m<sup>3</sup>/annum)</b> | <b>Water source</b>                              |
|-----------------------|--|--|
| Richards Bay Minerals | 40.0   | Lake Nhlabane and Mfolozi River Mhlathuze system |
| Alusaf                | 1.2  | Lake Mzingazi                                    |
| Mondi Richards Bay    | 28.5   | Mhlathuze system                                 |
| Mondi Felixton        | 2.9  | Mhlathuze system                                 |
| Tongaat Hulett        | 1.8  | Mhlathuze system                                 |
| <b>TOTAL</b>          | <b>74.4</b>  |  |

**Source:** Management of the Water Resources of the Mhlathuze Catchment: Document for Stakeholder Briefing Session <sup>(2)</sup>

## **5. RESERVE REQUIREMENTS**

### **5.1 Basic human needs**

A basic human need, currently assumed to be 25 l/capita/day, has to be provided for within the catchment. This minimum requirement applies to all inhabitants within the catchment but has already been accounted for in section 4.2.

### **5.2 Ecological requirements**

A process to determine the ecological requirements of the Mhlathuze system has been in progress over the last year, the results of which are summarised below.

#### **5.2.1 Riverine**

The catchment upstream of the Goedertrouw Dam is mostly undeveloped. The ecological reserve for this river reach is therefore met by natural flows.

Below the Goedertrouw Dam the environmental requirement has been estimated to be the following <sup>(14)</sup>:

- Maintenance flows: 54 million m<sup>3</sup>/annum (30% of the MAR)
- Drought flows: 14 million m<sup>3</sup>/annum (6.3% of the MAR)

while downstream of the Mfule confluence it is estimated to be the following <sup>(14)</sup>:

- Maintenance flows: 81 million m<sup>3</sup>/annum (26% of the MAR)
- Drought flows: 24 million m<sup>3</sup>/annum (7.8% of the MAR)

Due to the fact that there are already significant flows in the Mhlathuze river originating from releases from the Goedertrouw Dam for downstream users, the impact of the environmental requirements on the system yield, estimated at 16 million m<sup>3</sup>/annum, is relatively small <sup>(2)</sup>.

#### **5.2.2 Estuarine**

The estuary receives the environmental releases of approximately 12 million m<sup>3</sup>/annum made from the abstraction weir and these flows, together with natural incremental inflows downstream of the weir and spills from the weir, provide sufficient water for the environmental requirements of the estuary.

### 5.2.3 Lakes

There are a number of natural lakes in the Mhlathuze catchment from which various consumers abstract water. The environmental water requirements of these lakes has recently been determined and are listed in Table 5.1

**Table 5.1: Environmental water requirements of the Mhlathuze lakes**

| Lake          | Environmental requirement<br>(million m <sup>3</sup> /annum) |
|---------------|--|
| Lake Nsezi    | 2.9  |
| Lake Mzingazi | 4.5  |
| Lake Cubhu    | 1.5  |
| Lake Nhlabane | 14.3   |
| <b>TOTAL</b>  | <b>23.2</b>  |

**Source:** Management of the Water Resources of the Mhlathuze Catchment: Document for Stakeholder Briefing Session <sup>(2)</sup>

## 6. SUPPLY AND DISTRIBUTION SYSTEM

### 6.1 The Mhlathuze water supply system

The main water supply system in the Mhlathuze catchment consists of the Goedertrouw Dam, with a capacity of approximately 300 million m<sup>3</sup>, the Mhlathuze weir (a small abstraction works), and the Thukela-Mhlathuze Emergency Transfer Scheme, which can pump water from the Thukela River to the Goedertrouw Dam at a rate of approximately 34 million m<sup>3</sup>/annum. Water is released from Goedertrouw Dam for irrigators downstream of the dam while Mhlathuze Water abstract water from the Mhlathuze weir some 35 km downstream of the dam to supply Urban and Industrial users in Richards Bay. The natural lakes in the catchment also contribute to the yield of the system.

The latest yield estimate of this system, including the lakes, is 270 million m<sup>3</sup>/annum at a 1:100 assurance after allowing for the ecological water requirements below the Goedertrouw Dam and including a transfer of 34 million m<sup>3</sup>/annum from the Thukela River.

### 6.2 Natural lakes

The estimated yields of the natural lakes, if operated in isolation, are as Indicated in Table 6.1.

**Table 6.1: Yield of natural lakes (assuming environmental requirements are met)**

| Lake     | Historic firm yield<br>(million m <sup>3</sup> /annum) |
|----------|--|
| Cubhu    | 3.8  |
| Nzesi    | 8.6  |
| Mzingazi | 6.2  |
| Mangeza  | ± 1.0  |
| Nhlabane | 30   |

**Source:** Management of the Water Resources of the Mhlathuze Catchment: Document for Stakeholder Briefing Session <sup>(2)</sup>

### 6.3 **Ground water**

While the use of groundwater in the Mhlathuze catchment is limited, a recent study <sup>(3)</sup> has indicated the potential could be as high as 147 million m<sup>3</sup>/annum at a 1:50 year level of assurance. This information was gathered at a reconnaissance level of detail and may not reflect the true situation accurately, however. Nevertheless, it appears as if there is ample potential to meet the water requirements of the rural areas from groundwater. The quality of the water is, however, not always suitable for human consumption.

Although there is potential for harnessing groundwater, it has been found in the past that groundwater resources cannot be economically harnessed for supply to the larger urban and industrial users. This is especially the case in the Mhlathuze catchment where the yield of individual boreholes is low <sup>(11)</sup> and immense infrastructure would be required to link together the thousands of boreholes that would be required to deliver a sustainable yield of significant proportions into the existing urban distribution system. Conventional sources such as inter-basin transfers have been found to be more economical in the past.

It must also be noted that groundwater is an integral part of the water cycle and is not an additional source of water. Groundwater use will reduce surface runoff and, more importantly, reduce groundwater seepage into the natural lakes and the yield from the lakes will reduce. The reduction of groundwater seepage into the lakes could also have significant ecological implications.

### 6.4 **Water allocations**

Water allocations were made to the various user sectors based on previous estimates of the available yield (see Table 6.4). The actual water use is often less than the allocation but allowance must be made for growth in water consumption due to population growth and industrial expansion. Note that the total allocations exceed the available yield.

### 6.5 **Water balance**

Table 6.5 summarises water use, availability and allocations in a single table.

**Table 6.4: Water allocations**  
(all units in million m<sup>3</sup>/annum)

| Consumer                             | Water source                       | Allocation<br>(million m <sup>3</sup> /annum) |
|--------------------------------------|------------------------------------|---|
| Richards Bay (domestic)              | Lake Mzingazi                      | 16.4  |
|                                      | Mhlathuze system                   | 8.5   |
| Eshowe (domestic)                    | Mhlathuze system                   | 0.4   |
| Esikhaweni (domestic)                | Lake Cubhu                         | 3.4   |
|                                      | Mhlathuze system                   | 5.8   |
| Nseleni (domestic)                   | Mhlathuze system                   | 1.9   |
| Vulindlela (domestic)                | Lake Mangeza                       | 0.2   |
|                                      | Mhlathuze system                   | 1.3   |
| Empangeni & Ngwelezane<br>(domestic) | Lake Nsezi and<br>Mhlathuze system | 4.4<br>1.4                                    |
| Mtunzini (domestic)                  | Mtuze River                        | 0   |
| Melmoth (domestic)                   |                                    | 0   |
| Richards Bay Minerals                | Lake Nhlabane and<br>Mfolozi River | 40.2  |
|                                      | Mhlathuze system                   | 15.0  |
| Alusaf                               | Lake Mzingazi                      | 2.3   |
| Mondi Richards Bay                   | Mhlathuze system                   | 28.5  |
| Mondi Felixton                       | Mhlathuze system                   | 1.8   |
| Tongaat Hulett                       | Mhlathuze system                   | 1.8   |
| Irrigation                           | Mhlathuze system                   | 187   |
| Mhlathuze Water                      | Thukela transfers                  | 34  |
| <b>TOTAL</b>                         |                                    | <b>354.3</b>                                  |

Source: Management of the Water Resources of the Mhlathuze Catchment: Document for Stakeholder Briefing Session <sup>(2)</sup>

**Table 6.5: Water Balance for the Mhlathuze catchment**

| Water availability          | Available | Requirement/<br>allocation | Balance |
|-----------------------------|-----------|----------------------------|---------|
| System yield                | 270       |                            |         |
| <b>Current requirements</b> |           |                            |         |
| Irrigation                  |           | 176.5                      |         |
| Domestic                    |           |                            |         |
| Urban & light industrial    |           | 32.4                       |         |
| Rural & stockwatering       |           | 3.1                        |         |
| Industrial                  |           | 74.4                       |         |
| Total                       |           | <b>286.4</b>               |         |
| <b>Balance 1</b>            |           |                            | -16.4   |
| <b>Allocations</b>          |           |                            |         |
| Domestic                    |           | 43.7                       |         |
| Industrial                  |           | 89.6                       |         |
| Irrigation                  |           | 187.0                      |         |
| Mhlathuze (unspecified use) |           | 34.0                       |         |
| Total                       |           | <b>354.3</b>               |         |
| <b>Balance 2</b>            |           |                            | -84.3   |

## **7. WATER QUALITY**

### **7.1 Surface water**

The surface water quality within the Mhlathuze catchment is generally good and there are no significant diffuse sources of pollutants. The industrial and urban areas are obviously sources of pollution but these are discharged to sea via a marine outfall pipeline following screening of the sewage.

### **7.2 Groundwater**

The quality of the groundwater is generally adequate although there are some areas, notably the W12G and W12H quaternary catchments where the quality is poor and not fit for human consumption.

## **8. WASTE DISCHARGE AND REUSE**

### **8.1 Irrigation return flows**

Irrigation return flows are generally accepted to be in the order of 10% of the water application to the crops. This water returns to the river course as groundwater seepage and is available for use further downstream.

### **8.2 Domestic effluent**

The Richards Bay TLC treats domestic effluent and the effluent is currently discharged into the sea through a sea outfall pipeline. Mhlathuze Water has shown an interest in treating this effluent for reuse in mining activities where quality is not critical.

### **8.3 Industrial effluent**

Industrial effluent from the Richards Bay area is discharged to sea through two outfall pipelines. On average, the discharge rate through the pipelines is in the order of 60 million m<sup>3</sup>/annum, including the domestic effluent, which comprises only a small percentage <sup>(1)</sup>. The option of treating and reusing the industrial effluent has been mooted but due to the high levels of toxins the cost of treating this effluent to any usable standard would be considerably higher than obtaining water from alternative sources.

## **9. INSTITUTIONAL ARRANGEMENTS**

### **9.1 Mhlathuze Water**

Mhlathuze Water is a water board whose main function is the provision of bulk water services within their area of jurisdiction of which the Mhlathuze catchment is only a small part. The responsibilities of the board include bulk storage, treatment and supply to the Richards Bay Town Council and to Mondi.

### **9.2 Richards Bay Town Council**

The Richards Bay Town Council is responsible for water reticulation within the Richards Bay area as well as wastewater treatment and disposal.

### **9.3 Regional Services Councils (RSC)**

Regional Services Councils are responsible for water distribution and sanitation in the smaller towns and rural communities. The uThungulu Regional Council has jurisdiction within the Mhlathuze catchment.

#### 9.4 **Irrigation boards (Water User Associations)**

There are five irrigation boards within the Mhlathuze catchment, details of which are provided in Table 4.1. The purpose of these irrigation boards is to control the irrigated water use within their area of jurisdiction.

### **10. FUTURE SCENARIOS**

#### 10.1 **Water requirements**

The water resources of the Mhlathuze catchment are over-allocated and the current estimated water requirements exceed the system yield. This is due to the revised hydrological simulation based on new flow data and an allocation to the Reserve. The problem of over-allocation will have to be addressed firstly by water conservation and water demand measures and to this end, allocations within the catchment will probably have to be cut across the board. Once water demand management measures have been fully implemented, future growth in the water requirements, if they materialise, can be met from other sources e.g. the Thukela or Mfolozi Rivers.

##### 10.1.1 Irrigation

The water allocations to irrigators within the catchment will probably be reduced due to over-allocation. However, because not all allocations have yet been taken up, there is limited scope for development and this expansion has been earmarked for smallholder development by previously disadvantaged communities.

##### 10.1.2 Industrial use

Assuming a low-growth scenario in Richards Bay, it is estimated that the industrial water requirement will increase to a peak of approximately 102 million m<sup>3</sup>/annum by 2020. The reason for the growth up to 2020 is the possible establishment of mines by Iscor at Hillendale and Fairbreeze, with an estimated peak water demand of 11.4 million m<sup>3</sup>/annum, and a significant increase in the water requirement of Mondi in Richards Bay. The Iscor mines will be phased out after 2020 but it is expected that this water will be allocated to other industries and that a steady growth in industrial demand will be experienced from that point onwards<sup>(2)</sup>.

Major industries with large water usage can create sudden huge increases in water demand in what would otherwise be a moderate escalation and this has a direct impact on the future implementation of water supply schemes.

##### 10.1.3 Urban domestic use

Notwithstanding the impact of water demand management measures, the urban water requirements will eventually increase due to population growth and is predicted to increase from the current use of about 32 million m<sup>3</sup>/annum to approximately 70 million m<sup>3</sup>/annum by 2020 due to population growth (Note that this estimate does not include the reduction in water demand due to water demand measures which have not yet been quantified). Thereafter the growth in water requirement is expected to continue at a rate of between 2 and 3% per annum. Once water demand management measures have been fully implemented, this increased urban requirement can be met from additional transfers from the Thukela and/or Mfolozi catchments<sup>(2)</sup>.

##### 10.1.4 Rural use

Assuming fairly rapid infrastructure development to provide rural domestic users with the minimum 25 l/capita/day and later 60 l/capita/day as well as allowing for population growth, it is estimated that the rural domestic water demand will grow to about 9.5 million

m<sup>3</sup>/annum by 2020. Thereafter the growth in water requirement is expected to continue at a rate of between 2 and 3% per annum. This is still not a significant amount of water compared with the much larger irrigation and industrial requirements and these rural requirements can probably mostly be met from groundwater<sup>(2)</sup>.

It is not expected that stock watering will consume significantly more water in the future than currently because the catchment is mostly already over-stocked and there is little capacity for additional stock.

#### 10.1.5 Total future water requirements

Based on the above, the total water requirements by the year 2020 are estimated to be between 302 and 336 million m<sup>3</sup>/annum<sup>(2)</sup>.

### 10.2 **Water supply**

The transfer of additional water to the Mhlathuze catchment has been studied at a pre-feasibility level and it appears that future requirements can be supplied by means of increased transfers from the Thukela with minimal impact on the ecology of the lower Thukela River<sup>(2)</sup>. These additional transfers will only be considered once all water conservation and demand management measures have been exhausted.

### 10.3 **Catchment management strategies**

In terms of the National Water Act of 1998, a catchment management strategy (CMS) must be established for each water management area. This CMS will have to be in line with the National Water Resources Strategy (NWRS) which is currently in the process of being formulated. The process of establishing the strategy will have to include consultation at all levels but some factors that will have to be considered in this strategy are listed below:

- Currently more than half the water use within the catchment is used for irrigation purposes. Since there are already water shortages within the catchment, any increase in irrigation use will necessitate increased imports from neighbouring catchments. Since irrigation will not be viable with imported water due to the high cost, the CMS is likely to discourage further irrigation expansion although market forces will probably be left to dictate whether or not irrigators are prepared to pay the high cost of additional water to expand. The NWRS is likely to encourage irrigation development only in areas where there is an abundance of unutilised water and to discourage costly water imports for irrigation purposes.
- The CMS should strongly promote the implementation of water conservation and water demand management within the catchment.
- Industries have located in Richards Bay, and will continue to do so, because of the proximity to the harbour. Industrial expansion in this area should not be discouraged due to water shortages since the water supply can be supplemented if really required, albeit at a significant cost, from neighbouring catchments. The cost of water supply to industries is generally a small component of an industry's input cost and should not be a significant factor.
- Afforestation already has a significant impact on the water resources of the catchment by reducing runoff. Due to water shortages, afforestation expansion should be discouraged.
- Dry-land sugar cane also reduces runoff but if situated along the coastal belt, there will be no impact on the utilisable water resource of the catchment although there could conceivably be an impact on the ecology of the estuaries and lakes due to reduced quantity and quality of runoff. The CMS should therefore encourage dry-land sugar cane in the coastal belt rather than afforestation or irrigation in the upper catchments.

- The increasing urban domestic water use can probably be significantly curtailed by means of water demand management but can also be supplemented from inter-basin transfers when all other in-basin options have been exhausted.
- Where possible, rural communities should be supplied from groundwater as this appears to be an under-utilised resource.
- Alien invasive vegetation must be eradicated as a matter of priority and a maintenance programme put in place to keep the riparian zones free from alien vegetation in future.

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