

## 5 MZIMVUBU RIVER KEY AREA – WATER RESOURCE OVERVIEW, ISSUES AND STRATEGIES

### 5.1 INTRODUCTION

This chapter describes the characteristics of the Mzimvubu key area, the water availability and use and the yield balance, based on the updated information that was sourced during the ISP investigation. The issues, constraints and development opportunities available in the Mzimvubu key area are also described. The identification of these issues is based on the interviews conducted with the DWAF Regional Office personnel and the issues raised at the two ISP workshops. Information on the Vaal Augmentation Planning Study (VAPS) completed in 1996, has also been used in identifying the potential future development of the Mzimvubu catchment. The Eastern Cape Provincial Growth and Development Strategy (PGDS, 2003) <sup>(13)</sup> has also been a source of information. The detailed strategies to address these issues, constraints and opportunities for the use and management of the water resources of the key area are described in **Part 2** of this ISP document.

### 5.2 MZIMVUBU KEY AREA CHARACTERISTICS

The Mzimvubu River is South Africa's largest undeveloped river (see **Figure 5.1**) with an MAR of 2 897 million m<sup>3</sup>/a. As such, it presents huge opportunities for water resource development and for possible economic growth. The water resources of this catchment could be used for transfer to major development but is subject to approval at national level (NWRS, 2004, Appendix D12) <sup>(1)</sup>.

The Mzimvubu key area covers a surface area of 20 060 km<sup>2</sup>. It falls from an altitude of about 2 900 m on the Drakensberg escarpment to sea level over a distance of approximately 200 km (Republic of Transkei; 1990) <sup>(20)</sup>. The escarpment was formed as a result of the uplift of the interior of Southern Africa which took place over a prolonged period in relatively recent geological time. This process has caused the rivers to be deeply incised and to have well-developed meanders. There are therefore many sites that have potential for the generation of hydro-electricity on the Mzimvubu River and its four main tributaries, namely the Tsitsa, Tina, Kinira and Mzintlava rivers. There are waterfalls of some significance on the major tributaries of the Mzimvubu River. These are notably the Tsitsa falls and the Tina falls where effective hydro-electric power generation development is possible. The high seasonal rainfall variation necessitates the construction of reservoir storage where hydropower schemes are considered.

Most of the Mzimvubu key area (approximately 17 000 km<sup>2</sup>) falls within the Eastern Cape Province. A smaller but very economically significant area of approximately 3 060 km<sup>2</sup> lies within KwaZulu-Natal as shown in **Figure 5.1**. In this key area the Sisonke District Municipality is the local authority in KwaZulu-Natal while the rest of the local authorities lie in the Eastern Cape Province. This adds to the complexity of integrated water resource management in the area.

The population of the Mzimvubu key area is mainly rural. Approximately 10% of the population is located in the urban centres of Kokstad, Matatiele, Cedarville and Port St Johns. Kokstad has experienced water shortages since the construction of the large new prison near the town. The urban population is expected to increase by 4.5% in 30 years to 107 815 (DWAF; 2002) <sup>(23)</sup>. This increase will be due to migration from the rural areas because of people with HIV/AIDS seeking medical assistance. The annual urban population growth is expected to be only about 0.15% per annum. **Table 5.1** presents the population figures of this key

area and the expected growth up to the year 2025.

The water requirements for the key area are not expected to change with the exception of Kokstad. Kokstad experiences periodic water shortages, and a strategy for water supply to the town was developed. This strategy is described in **Part 2** of this document. Please refer to Strategy No 1.6.

The rural population of the Mzimvubu key area is expected to peak in 2005 and thereafter decline by approximately 0.3% per annum because of the prevalence of HIV/AIDS and migration to urban areas.

**Table 5.1: Mzimvubu key area population distribution**

	1995 Population	2025 Population	Average annual growth rate
Rural	907 268	821 312	-0.33%
Urban	103 191	107 815	0.15%
Total	1 010 459	929 127	-0.28%

### 5.3 WATER AVAILABILITY

There are a few small dams in the Mzimvubu catchment. The remainder of the yield available in the catchment is derived mostly from run-of-river. The run-of-river yield was determined independently as part of this ISP project using the Rapid Simulation Model and was found to be very similar to that given in the NWRS. No changes to the NWRS figures are therefore recommended. The water availability in the Mzimvubu key area is shown in **Table 5.2**.

**Table 5.2: Water availability in the Mzimvubu key area (at 1:50 year assurance)**

Resource category	Yield (million m <sup>3</sup> /a)
Gross available surface water resource	241
Subtract:	
- Ecological Reserve (Impact on yield)	156
- Invasive alien plants (Impact on yield)	1
<b><i>Net surface water resource</i></b>	<b><i>84</i></b>
Ground water	3
Return flows	4
Total local yield	91
<b>Grand Total</b>	<b>91</b>



## 5.4 WATER REQUIREMENTS

Compared to the large water resource available in the Mzimvubu key area, the actual water use is small. The largest water requirement is that of the irrigation sector although even this is relatively small. The urban water use is by the towns of Kokstad, Cedarville and Matatiele.

There is a large area of afforestation in the Mzimvubu key area (73 000 ha) and this reduces the runoff by an estimated 80 million m<sup>3</sup>/a. The NWRS gives the impact of afforestation on the available yield as 3 million m<sup>3</sup>/a. This seemed very low for such a large area of afforestation and was therefore checked using reconnaissance level modelling techniques and an impact of 11 million m<sup>3</sup>/a was determined. This is the impact of afforestation on the yield that is used in the ISP. All other current water requirements are the NWRS figures. Table 5.3 lists all the known current (year 2000) water uses in the Mzimvubu key area.

**Table 5.3: Major water users/requirements in the Mzimvubu key area (at 1:50 year assurance)**

User sector	Water requirement/ Impact on yield (million m <sup>3</sup> /annum)
Irrigation	15
Urban	6
Rural	9
Mining and bulk	0
Afforestation	11
Total local requirements	41
Transfer out	0
<b>Total local requirements</b>	<b>41</b>

## 5.5 RECONCILIATION OF REQUIREMENTS AND AVAILABLE WATER

The reconciliation of the available water resource and the water requirements is given in Table 5.4.

**Table 5.4: Reconciliation of the water requirement and the water resource in the Mzimvubu key area (all units are million m<sup>3</sup>/a)**

Key area	Available water			Water requirements			Balance
	Total Local yield	Transfers in	Total	Local requirements	Transfers out	Total	
Mzimvubu	91	0	91	41	0	41	50

Based on the figures shown in **Table 5.4**, there is a substantial surplus in the Mzimvubu key area, even in its undeveloped state. There is still large potential for developing the resource and making yields available for in-basin use or transfer to other catchments.

Although the reconciliation indicates a significant present surplus, some local deficits were identified. The local deficits are mainly in the smaller catchments where rural communities are dependent on run-of-river yield as a source of supply. The catchments identified with deficits are T33A, B, C and D as well as T32G, H and J.

## 5.6 WATER QUALITY

The sewage treatment works in the Mzimvubu key area are relatively small. There are water quality problems in the towns of Tsolo, Ugie and Maclear because of inadequate sewage treatment works resulting in overflows. Although water quality is in general not a major problem, there are potential quality problems particularly with groundwater and springs which are the sources of supply of many of the rural towns in the key area. However a specific water quality management strategy for the Mzimvubu key area is not justified. The above issues have been noted in the ISP area-wide water quality management strategy (see Strategy No 2.2). During flood events the rivers transfer high volumes of sediment.

## 5.7 FUTURE SCENARIOS

The Mzimvubu River is the largest undeveloped river in South Africa, and is characterised by high natural runoff and limited consumptive water use. No changes in water requirements are expected in the Mzimvubu key area in the short to medium term. The NWRS has identified this key area to be of strategic importance as regards possible future water transfers to other areas. Therefore any future large developments within the Mzimvubu catchment will be subject to authorisation at national level. The potential schemes to transfer water from the Mzimvubu River to the Vaal River Supply Area sometime in the future were identified as part of the VAPS. Expansion of forestry is also planned and a Strategic Environmental Assessment (SEA) has been commissioned to determine potential areas, viability and sustainability of forestry development.

The area currently under irrigation (only 3 600 ha) is very limited considering the size of the catchment whilst there is an extensive area under forestry, estimated at 73 000 ha. Although the Mzimvubu Basin Study (Republic of Transkei, 1990) <sup>(20)</sup> identified a larger total irrigation potential of 127 000 ha, a recent study conducted by DWAF identified a likely future development scenario for irrigation in the Mzimvubu catchment of 44 600 ha. This takes into account where the soils are suitable for irrigation, the steep topography, and overlap of competing users like forestry and dryland cultivation, as well as access roads and villages. A similar likely afforestation scenario is quoted as 120 000 ha, but the current Forestry SEA for the Eastern Cape could drastically reduce that area.



Water use for poverty eradication could be limited to run-of-river yield, or development of smaller local storage dams could be built. Even if the full irrigation of about 44 600 ha is developed, from a water availability point of view it would not exclude possible later large-scale development for transfers serving regional and national interests.

### 5.7.1 Water Balance and Reconciliation strategic perspective

The Mzimvubu River key area currently has surplus yield and significant potential can still be developed. This water can be used for development within the Mzimvubu catchment and for transfer to other areas. :

- ❑ **Development within the catchment.** The water resources study undertaken in 1990 (Republic of Transkei; 1990) <sup>(20)</sup> identified potential for hydro-electricity generation at the Tsitsa and Tina falls. This would require balancing storage in order to allow for the high seasonal variations in run-off from the catchments. It should be noted that the study was undertaken before the National Water Act was promulgated, which established the Reserve and resource-protection requirements, which would reduce the volume of water available for development within the catchment.
- ❑ **Transfers to other areas.** Even after reasonable and viable developments within the catchment are allowed for, it is likely that further water resource potential will remain available for development and transfer to other areas. A recent study (DWAf, 2004) <sup>(30)</sup> showed that the cost of such transfers will be high. Even local transfers to areas of need within the Eastern Cape Province, such as the Fish and Sundays catchments, could cost in the order of R15 / m<sup>3</sup>. Such water transfers would hardly be justifiable for irrigation purposes. To take Mzimvubu River water to the Karoo areas further west will cost considerably more. The VAPS identified that, although currently not financially and economically viable, there could be justification for inter-basin transfer of water to the Vaal River Supply Area sometime in the future. All transfers between WMAs are under the control of the Minister. Authorisation for large-scale use of the Mzimvubu surplus water will have to be approved by the Minister, whether for use in Eastern Cape areas or in other provinces.
- ❑ **Irrigation.** It is estimated that up to 44 600 ha of new irrigation could possibly be developed within the Mzimvubu catchment. Due to the hilly topography of this key area such large-scale development will be very expensive. It will also require storage dams to secure supplies. Smaller, more localised developments would be more viable, especially if run-of-river sources are used. Even if only a portion of the full irrigation potential is developed it could make a significant contribution to the eradication of poverty in the region.
- ❑ **Afforestation.** Further afforestation is regarded as the most likely, the most affordable and possibly also the most profitable further use of Mzimvubu River water in the short to medium term. The report on Water Utilisation Opportunities: Mzimvubu River Basin (NWRP: 2004)<sup>(30)</sup> gives a possible afforestation scenario of 120 000 ha if dedicated water resource development (dams) is undertaken to make up for the resulting streamflow reduction effect. If local communities embrace afforestation as an acceptable land-use, it could also go a long way towards reducing poverty in the area.
- ❑ **Hydro Power generation.** This is not a consumptive user of water except for dam evaporation and some other minor losses. It does however tend to cause major changes to natural river flow patterns which lead to serious environmental impacts and a reduced ability to supply Reserve requirements. Although the hydropower potential of the Mzimvubu River is large, Eskom is at present considering

only minor development.

- ❑ **Other.** It is expected that, for the foreseeable future, other water uses such as urban and industrial supply and tourism will take up only a small fraction of the water available in the Mzimvubu Key Area.

### 5.7.2 Water resource protection strategic perspective

There are a number of wetlands particularly in the upper catchments of the Mzimvubu key area. These wetlands are productive ecosystems and are vital for preserving biological biodiversity and hydrological integrity, but extensive agricultural development and subsistence farming has already had a major negative impact. The wetland inventory programme (Mondi Wetlands) is in the process of listing these wetlands and categorising their importance. A programme for classification and rehabilitation of the wetlands is required once the wetlands inventory programme is completed.

- ❑ Most of the wastewater treatment works in the key area are not working properly because of capacity and resource constraints within local municipalities. The Tsolo local authority is upgrading its pond system and disposing of effluent by irrigation.
- ❑ The existing wastewater treatment works at Maclear is becoming problematic because of increased of sewage volumes. The WwTW now caters for many more users than it was designed for.
- ❑ The influx of people into Maclear and Ugie is impacting on the solid waste of the towns. The town of Mt Fletcher relies on groundwater which may be contaminated if the siting of the solid waste site is not done correctly.
- ❑ The town of Maluti has conservancy tanks, which are overflowing. This is causing environmental damage.
- ❑ Port St Johns does not have a wastewater treatment works. Their sewage is discharged directly to the sea. It has a new solid waste site.

In order to maintain the quality of the water resource in the Mzimvubu key area, DWAF must engage with the local authorities to ensure compliance with source-directed control measures.

### 5.7.3 Water Use Management

DWAF must promote and support co-operative governance to ensure that there are no delays in investment opportunities being developed in the Mzimvubu key area. It is important to fast-track administrative processes where development will contribute to poverty eradication in the key area.

A licence application for developing 83 hectares of Eucalyptus and wattle has been received from the Mvenyane Landcare and Wattle Management Committee. DEAET's record of decision has not been received and that is delaying finalisation of the licence application.

Verification and validation of existing water use has not been done.

### 5.7.4 Water conservation and water demand management (WC/WDM)

With increasing water demand within the Mzimvubu ISP key area, adequate attention to developing and implementing water conservation and water demand management strategies is becoming increasingly important. WC/WDM holds tremendous potential particularly in the domestic water use sector where it has

---

been identified that water use is highly inefficient. It is estimated that losses account for more than half of the domestic water use. Very few WC/WDM measures have been implemented in the Mzimvubu key area. The Department's strategic approach to WC/WDM in the ISP area is described in detail in the strategy tables (See Strategy No 4.1).