6. SITUATION ASSESSMENT OF THE MIDDLE KEI SUB - AREA

6.1 General Overview

6.1.1 Topography and Rivers

This sub-area consists of the middle reaches of the Great Kei River and two main tributaries, the Tsomo River with its headwaters in the Stormberg (S50), and the Thomas River with its headwaters in the Amatola mountain range (S40). Both rivers are regulated with the Ncora and Tsojana Dams in the Tsomo River catchment and the Sam Meyer Dam in the Thomas River catchment.



Figure 6.1 The Middle Kei Sub-area

The Middle Kei sub-area lies predominantly within the inland plateau topographical zone. The Tsomo River valley has its source in the southern Drakensberg range (the Stormberg) at an altitude of approximately 2 500 masl and then descends in a fairly steep valley to enter the Great Kei River at 850 masl. The Thomas River has its source on the north eastern slopes of the Amatola mountain range at an altitude of approximately 1 800 masl before flowing in an easterly direction to join the Great Kei River at 1 000 masl.

6.1.2 Climate and Rainfall

The climate in this sub-area shows a similar pattern to that of the Upper Kei sub-area with hot and dry summer months to very cold winter months i.e. temperatures of over

40° C in summer and very cold (-10° C) in winter with widespread frost and snowfalls on the high lying ground.

There is a high temporal and spatial variation in rainfall over the catchment with the Mean Annual Precipitation (MAP) varying from approximately 600 mm in the Great Kei valley to a maximum of 1 200 mm in the Amatola and Stormberg mountains in the east and north respectively. Rain falls predominantly in the summer months (70% - 80%), generally in the form of high intensity thunderstorms often accompanied by hail. Variability of seasonal rainfall is high with frequent dry spells and droughts occurring. Mean Annual Evaporation (MAE) rates of up to 1 700mm around the Cofimvaba area are experienced.

6.1.3 Geology, Soils and Vegetation

The area is underlain by horizontal to very gently dipping rocks of the Karoo Supergroup (shale, mudstones and sandstones) with the Molteno formation in the uplands of the Tsomo catchment and the Tarkastad formation over the remaining area. The area is characterised by dolerite intrusions often in the form of ring structures. The Thomas River and town of Cathcart are located within one such ring structure.

Soils are generally moderate to deep clayey loams in the Thomas River catchment with very shallow and rocky soils mostly not suitable for crop production in the Tsomo River catchment. Alluvial soils are found in the river valleys.

Natural vegetation consists mainly of grassland in the Tsomo River catchment with a mix of savanna and grassland in the Thomas catchment. Valley thicket predominates in the Great Kei valley (refer **Fig. 2.5**). Areas of invasive alien wattle (black and silver) are found throughout the area.

6.1.4 Land Use and Settlement Patterns

The sub-area typifies the dichotomy that exists in terms of land use and settlement patterns in the ISP area. Within the Tsomo catchment land use is characterised by dispersed rural settlements and communal subsistence farming and grazing in the former Transkei area. Cala, Cofimvaba and Tsomo are the main formal towns in this catchment.

The Thomas catchment is located within the former RSA component of the area and comprises privately owned commercial stock farms. The only formal town in this catchment is the small town of Cathcart.

Natural pasture covers most of the sub-area with communal and private stock farming the main activity. There are no large irrigation schemes in the sub-area. Some small scale irrigation is carried out using run-of-river water abstractions. Water is however transferred from Ncora Dam to the Ncora Irrigation Scheme, which is located in the Mbashe River catchment.

There are small areas of afforestation in the upper catchments of both rivers.

Pressure on the land, poor soils and the harsh environment have resulted in unsustainable settlement and land use patterns especially in the former Ciskei and Transkei areas of the catchment. This has led to degradation of the land and vegetation and severe erosion in the Tsomo River catchment, with an increase in the turbidity of the rivers and sedimentation of the dams.

6.1.5 Demography

The residential pattern in the Tsomo River catchment (former Transkei area) is mainly rural with only three small towns, Cala, Cofimvaba and Tsomo and many small villages and settlements. The Thomas River catchment is sparsely populated due to the large farms with only the town of Cathcart.

The total population of the sub-area was estimated based on 1995 data (**Ref. 24**) and Census 2001 data (**Ref. 6**) at approximately 204,000 people in the year 2000. This population is not expected to increase substantially in the future due mainly to the lack of employment opportunities and the resultant outward migration of people from the sub-area.

Quaternary Catchment	Population
S40	34,000
S50	170,000
Totals	204,000

Table 0.1 I Opulation Estimates of the Minute Rei Sub-area (Tear 2000)
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6.1.6 Economic Development

The local economy is in dire straits and has been in decline for a number of years. There are very few economic opportunities in the area. The Tsomo River catchment has minimal commercial development and the people in this area generally rely on income from migrant workers and state social grant benefits. Unemployment rates in the area exceed 70%.

Within the sub-area, agriculture is the only commercial sector supporting the local economy. There are however no irrigation schemes of any significance and stock theft is a major problem for cattle, sheep and goat farmers.

6.2 Water Resources Overview

- 6.2.1 Surface Water
 - (a) Raw Water Resources and Supply Systems

Development of the Tsomo and Thomas Rivers has centred mainly on three dams viz. the Ncora, Tsojana and Sam Meyer Dams. The Ncora Dam was built primarily for Eskom to generate hydropower at the dam itself and to transfer water (105 million m^3/a) into the adjacent Mbashe catchment for hydropower generation at the

Collywobbles power station (85 million m^3/a) and irrigation at the Ncora scheme (20 million m^3/a - 3,000 ha scheduled) although very little irrigation is currently practised. Due to high erosion rates in the catchment of Ncora Dam resulting in sedimentation, and the lack of accurate flow gauging, there is uncertainty as to the yield of the dam. Flow gauging apparatus is presently being installed at the dam outlet and in the Mbashe catchment. Investigations for a more accurate assessment of the dam yield are presently being undertaken by DWAF.

The Tsojana Dam supplies water to Cofimvaba and surrounding rural villages. The small Sam Meyer Dam was built for water supply to Cathcart and is also used for recreation. This small dam was recently raised to increase the assurance of supply. Run-of-river water use for irrigation in the Thomas catchment upstream of the dam could be leading to a stressed situation. Ecological Reserve determinations should be considered in the medium term for these catchments.

Catchments	Rivers	Main Dams	Owner
S40	Thomas	Sam Meyer	Amahlati LM
S50	Tsomo	Ncora Tsojana	DWAF DWAF

 Table 6.2
 Main Rivers and Dams in the Middle Kei Sub-area

The surface water resource available from the Middle Kei catchment before abstractions for the ecological Reserve, invasive alien plants or afforestation is estimated at 134 million m^3/a . The impact of the ecological Reserve based on a desktop analysis undertaken as part of the NWRS is estimated at 10 million m^3/a and the impact of invasive alien plants is estimated at 2 million m^3/a . The groundwater resource availability is estimated at less than 2 million m^3/a and is discussed in **Section 6.2.2**.

Type of Water Resource	Amount (million m ³ /a)
Total surface water resource yield	134
Subtract:	
- Ecological Reserve	10
- Invasive alien plants	2
Net surface water yield available for use	122
Available groundwater resource	2
Usable return flows	0
Total Local Yield	124

Table 6.3 Available Water in the Middle Kei Sub-area (Year 2000)

Based on the above, there is a large amount of water available in the sub-area as a whole for further development. However a large part of this surplus (85 million m^3/a) is transferred to the Mbashe catchment from Ncora Dam for hydropower generation and for irrigation (20 million m^3/a) at the Ncora Irrigation Scheme. The uncertainty regarding the available yield from Ncora Dam must be resolved before an accurate assessment of the potential economic benefits and a revised allocation can be investigated.

(b) Water Supply Infrastructure

Cala obtains its water from the Zindhlwane stream, which is fed by springs above the town. In times of shortfall a weir on the Tsomo River is used to extract additional water. Cofimvaba obtains its water from Tsojana Dam by mean of a pipeline, which also supplies some 35 rural villages. There are plans to extend this supply to a further 35 villages which may exceed the capacity of the existing yield of the dam and infrastructure capacity. Tsomo obtains water from a small weir on the Tsomo River. Cathcart obtains its water from the recently refurbished Sam Meyer Dam. No problems with water availability due to resource constraints have been reported.

(c) Institutional Arrangements

The majority of bulk water infrastructure in this sub-area has been developed, operated, and maintained by DWAF. The process of transferring assets and the responsibility for operation and maintenance to the Chris Hani and Amatole District Municipalities was initiated in July 2003 and is scheduled to be complete by June 2005. As with other sub-areas in this ISP area, the lack of financial and skilled manpower resources will be a major constraint on successfully achieving this goal.

6.2.2 Groundwater

The total available groundwater resource in the area is unknown but it is estimated that there is moderate potential. Pollution of potential groundwater resources in the Tsomo River catchment caused by inadequate sanitation is gradually being addressed through

DWAF's sanitation programme. Recent outbreaks of cholera in the adjacent Mbashe catchment have highlighted the importance of this programme together with the need for a suitable surface and groundwater monitoring programme.

6.2.3 Current Water Requirements

By far the largest water allocation within this area is for irrigation, making up over 90% of the total requirement. However the bulk of the available water (105 million m³/a) has been allocated to inter-basin transfer to the Mbashe catchment for hydropower generation and for irrigation. As with other irrigation schemes in this region of the former Transkei, the 20 million m³/a irrigation allocation from the inter-basin transfer for the Ncora Scheme is mostly not being fully utilised due to the state of disrepair of the irrigation scheme. Within the Thomas River catchment irrigation is mainly opportunistic based on run-of-river flows.

Sector	Amount (million m³/a)
Irrigation	15
Urban**	1
Rural***	3
Afforestation	2
Total Local Requirement	21

Table 6.4 Local Water Requirements* in the Middle Kei Sub-area (Year 2000)

*At a 1 in 50 year assurance.

**Industrial demand has been included in the urban demand.

*** Stockwatering has been included in the rural water requirements.

6.2.4 Yield Balance

Based on the available yield of the system and water requirements, the yield balance in the year 2000 for the whole sub-area is summarized below.

Table 6.5 Reconciliation of the Middle Kei Sub-area in Year 2000

Description	Amount (million m³/a)
Local yield	124
Transfer in	0
Total yield	124
Local requirement	21
Transfer out	105
Total requirement	126
Water Balance	- 2

The Middle Kei sub-area is in deficit if the ecological Reserve is taken into account. The transfer allocation to the Mbashe catchment estimated at 85 million m^3/a for the hydroelectric power generation at Collywobbles as well as 20 million m^3/a for the Ncora Irrigation Scheme is the major reason for the current deficit. Due to the lack of adequate flow gauging there is also uncertainty as to the actual amount being transferred to the Mbashe catchment. The actual volume being transferred must be confirmed and the Regional Office is presently determining this.

The benefit and costs of the hydropower generation to the catchment, the wider region and to the WMA as a whole will need to be assessed both from an environmental and economic aspect. Any future water requirements in the sub-area will have to be met either by curtailing the amount of water to be transferred for hydropower generation (after determining how much water is presently being transferred), developing additional water resources or transferring water from the Upper Kei area if the irrigation schemes in that sub-area are not rehabilitated. This is an issue that will require further strategic development once the basic parameters such as actual water transferred is known.

6.2.5 Future Water Requirements

Other than the deployment and use of existing allocations of water for the rehabilitated Ncora Irrigation Scheme and domestic supply to rural villages not yet supplied with basic water, future large-scale growth in water use is not expected.

- 6.2.6 Water Quality
 - (a) Surface Water Quality

Water quality of the rivers is generally suitable for domestic and agricultural use. No major problems with respect to the water quality aspects of the rivers in the area have been detected although the number of monitoring points in the sub-area is small.

In general, due to the expansion of water supply to the rural areas it can be expected that the quality of river water and groundwater may deteriorate without the implementation of appropriate sanitation to these areas. Recent outbreaks of cholera in the nearby Engcobo area highlight the importance of providing safe drinking water and adequate sanitation. DWAF have recognised the importance of the latter and have embarked on a widespread sanitation implementation programme in the rural areas.

Leachate from unlicensed solid waste sites in the smaller towns may be a cause of pollution of water resources.

A comprehensive soil conservation programme should also be implemented in the Tsomo River catchment by the PDoA to reduce the loss of topsoil and the amount of sediment reaching the rivers and dams.

(b) Groundwater Quality

Groundwater quality in the area is generally good as is evidenced by the wide scale use of groundwater. Refer to the above section for additional comments.

6.3 Key Issues

Based on a detailed situation assessment of the Middle Kei sub-area as outlined above the following key issues have been identified.

6.3.1 Water Balance and Reconciliation

Issue : Accurate yield analysis required for Ncora Dam taking account of sedimentation and operational requirements of Eskom.

Issue : Yield of Tsojana Dam needs to be balanced with the proposed water supplies to rural villages.

Issue : Run-of-river water use in upper Thomas River may be causing a stressed state in this quaternary catchment.

6.3.2 Water Resources Protection

Issue : Water quality monitoring of surface and groundwater resources is inadequate.

Issue : Soil erosion due to bad land use management practices is leading to an increase in the turbidity of the rivers and high dam sedimentation rates especially in the Tsomo River catchment.

6.3.3 Water Conservation and Demand Management

Issue : No WCDM programmes have been undertaken in the small towns.