Economic Boom Strains Waterberg Resource

Authorities are investigating several options to augment water resources within the Mokolo River Catchment, in Limpopo, in anticipation of a surge in economic development in the area. *Lani van Vuuren* reports.

The Mokolo River Catchment covers an area of 8 387 km^2, stretching from the Waterberg Mountains through the upper reaches of the Sand River. It includes a number of small tributaries that join the main Mokolo River up to its confluence with the Limpopo River, including the Tambotie River, Poer-se-Loop, and the Rietspruit River.

According to Beyers Havenga, Department of Water Affairs & Forestry (DWAF) Chief Engineer: National Water Resources Planning (North), water availability and water use in the catchment are in balance, with no spare resources existing for future allocations. "In addition, considering the water requirements of the Reserve as stipulated in South Africa's water legislation, there is insufficient water to maintain the present balance," he tells *the Water Wheel*.

Irrigation is the largest present water user here. The area contributes significantly towards agricultural activity in the province, with produce including tobacco, sorghum, maize and sunflower. An estimated 87% of present water use in the catchment is dedicated to agricultural activities.

Constructed in the 1970s, the Mokolo Dam is one of the main impoundments in the province. It is considered one of the largest dams in the Limpopo water management area, with a full supply capacity of about 146 million m^3. A concrete-faced rockfill dam, Mokolo was built mainly

to serve the 4 000 MW Matimba Power station, situated outside Lephalale (formerly Ellisras). Matimba is the world's largest dry cooling power station, and uses about 7,3 million m³/year of water.

The dam also serves the adjacent Kumba Resources' Grootegeluk, South Africa's biggest coal mine, which uses an estimated 9,9 million m³/year of water. Lephalale and surrounding areas as well as downstream farmers are also supplied with water from the dam.

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At the time the dam was built, its yield was given as 39 million m³/year. However, subsequent to the dam's construction, there was rapid and extensive irrigation development upstream, supplied from farm dams and from run-of-river. Consequently, the yield of the dam has dropped to an estimated 27 million m³/year.

ECONOMIC UPSURGE

The Waterberg District is set for huge economic growth in the nearby future, with water demand expected to grow from 25,5 million m³ in 2005 to 63,3 million m³ by 2025, encouraged mainly by mining and electricity developments.

In July, Eskom announced it would proceed with the construction of a 2 250 MW base load power station near Lephalale at a cost of R26-billion as part of its R97-billion expansion programme. The first phase (2 100 MW) of the new so-called Matimba B

Grootegeluk Coal Mine is one of the largest water users in the area.

Power Station will use 4 to 6 million m³/year of water, according to the Environmental Scoping Report. The first tenders for the boilers and turbines were issued in September. It is believed these will be awarded early next year.

In addition, new mining developments are set to further fuel the demand for water as the region contains more than 40% of the country's remaining coal resources. According to Kumba Resources, the Waterberg coalfields have resources of about 163 billion tons and reserves of 3,54 billion tons. The mining company plans to increase production at its Grootegeluk mine to serve the new power station.

At the same time, AngloCoal is continuing investigations into the commercial application of coal bed methane in the Waterberg area, but it is believed that the region might have coal bed methane gas deposits of 28 billion m³. By August, the first five-post pilot wells had been drilled.

Petrochemical giant Sasol also has extensive coal resources in the Waterberg coalfields. This surge

Estimated future water requirements in million cubic metres

	Allocation	Sub-allocation	Actual 2005	Requirement 2015	Requirement 2025
Grootegeluk Mine	10.9	6.4	1.8	5.6	7.0
Lephalale LM		4.5	3.8	7.5	11.0
Eskom	7.3	6.2	3.6	6.2	6.2
Marapong		1.1	0.5	1.0	1.8
Mogol IB	10.4	16.0	16.0	10.0	10.0
Eskom Future				12.0	12.0
Eskom Future					12.0
Eskom Future				2.5	2.5
Eskom Future					0.8
Total	**28.6**	**34.2**	**25.7**	**44.8**	**63.3**

Source: DWAF

Matimba Power Station will soon be joined by the addition of Matimba B.

in developments is set to attract a growing population to Lephalale, stimulating growth in domestic water consumption.

FINDING MORE WATER

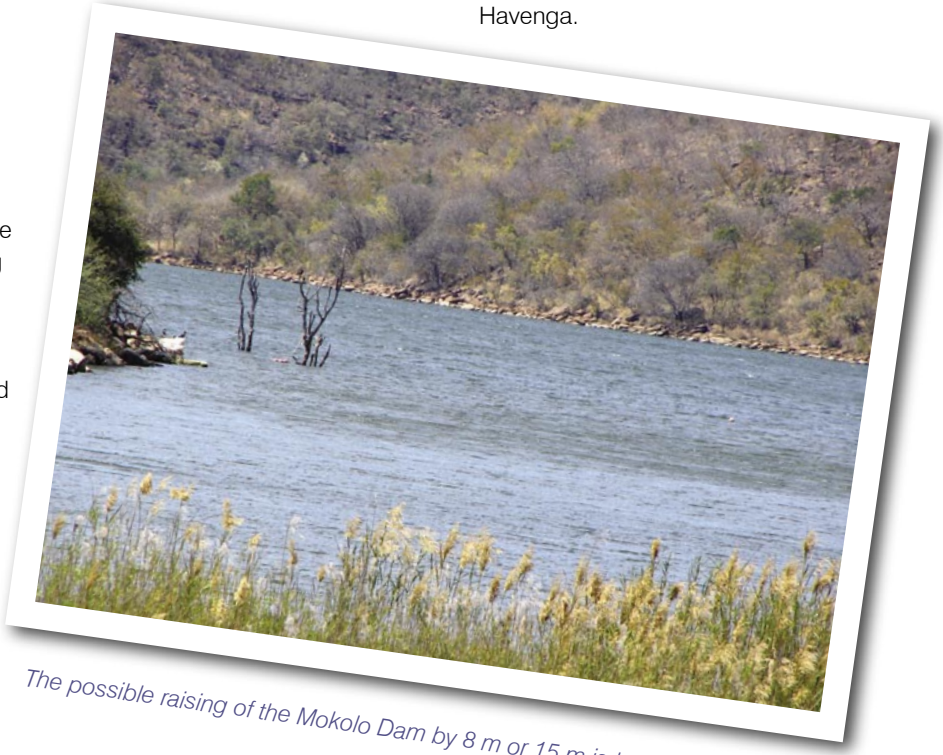
DWAF commissioned three simultaneous investigations into the Mokolo River Catchment in 2005. The first, which has already been completed, was a verification and validation study aimed at verifying the water use of each water user and then verifying the information. Satellite images and aerial photographs were applied to determine actual water use, while a rapid assessment model was applied to look at water registration.

"This will assist us with the issuing of licenses and the evaluation of new license applications," reports Havenga. Focus group meetings were held for different categories of water users (for example, irrigation farmers, and local municipalities). Public meetings were also held to promote access to information and transparency.

The second study, which is to be completed by mid-2007, is aimed at providing DWAF with an updated understanding of how much water (yield) is available in the catchment at present. This hydrology study is being based on the analysis of historic rainfall patterns, streamflow, ground and surface water resources. The study is also analysing the performance of the Mokolo Dam under different water abstraction scenarios.

Thirdly, a water conservation/water demand management (WC/WDM) study has recently been completed. While it is recognised that some sectors in the catchment are already practising WC/WDM, additional efforts are required to realise additional water conservation and efficient use of water, explains Havenga.

This study assessed the potential to implement further WC/WDM initiatives in the area, such as the removal of alien vegetation. According to Havenga, some interesting observations were made in this regard. For example, irrigation water is released from Mokolo Dam to be abstracted by riparian irrigators as requested. Huge losses in this system estimated up to 60% have been encountered. "By reducing these losses we can save up to 6 million m^3/year," says Havenga.



The possible raising of the Mokolo Dam by 8 m or 15 m is being investigated.

FEASIBILITY STUDIES

Further to the catchment studies, pre-feasibility and feasibility assessments have begun to determine the best solution to meet future water needs. The first possible water augmentation source entails the transfer of water from the Crocodile (West) and Marico Catchment to the Mokolo River Catchment.

The transfer will entail the construction of an 84 km pipeline. A total of 45 million m³/year has already been provisionally reserved within the Crocodile West/Marico water management area for this, and investigations around possible pipe sizes, tariffs and so forth are continuing.

Agriculture is the largest water user in the Mokolo River catchment.

Another option is the possible raising of Mokolo Dam. Havenga reports that the design and construction of the dam is such that it is possible to raise the wall to provide additional storage capacity. Two options are being considered. If the dam wall is raised by eight metres the dam will yield an additional ten million m³/year. If the dam wall is raised by 15 m the dam will yield an additional 21 million m³/year.

Since the Mokolo River is a tributary of the Limpopo River, which is an internationally shared watercourse, the possible raising of the Mokolo Dam wall will first have to be approved by South Africa's co-basin states, Botswana, Mozambique and Zimbabwe in accordance with international basin sharing agreements. Since these agreements tend to be long and time consuming, such an option might not prove viable considering present time constraints.

Water losses up to 60% of irrigation water has been reported.

Another solution being investigated is the development of borehole fields. Groundwater development has been extremely limited in the area to date due to reported low permeability, storage and transmissivity. There are no artesian boreholes or large-scale abstraction of groundwater reported in the area at present. A larger area of investigation might have to be scrutinised to find suitable discharge rates.

Havenga notes that the costs associated with the construction of new infrastructure and long-term sustainability will be the overriding factors determining which option is pursued. A final decision is expected by end-2007 to enable construction to be completed in time to coincide with the coming-on-stream of the new electricity and mining developments.