

Water Management Initiatives in the Upper Olifants River Catchment

Anglo Coal's water management initiatives have improved water quality in the Mpumalanga province and raised awareness of the need for longer-term options in mine water management.

Monitoring water quality in the Olifants Catchment near the Goedehoop Colliery.

The introduction of a controlled discharge system under high flow conditions in the Upper Olifants River Catchment in the Mpumalanga province, South Africa, has reduced sulphate levels in the catchment. The project has been a successful partnership between the major water users in the area, including Anglo Coal, and government.

Pilot Sulphate Removal Plant at Anglo Coal's Landau Colliery.



The Witbank coalfields, located in the Mpumalanga province in the north east of South Africa, are one of the country's largest coal producing regions. The Highveld region is a major economic area, with concentrated industrial and agricultural activity – not only coal mines, but also chemical plants and a number of coal-fired power stations.

This area is located within the upper region of the Olifants River Catchment system, which flows into the Witbank Dam – the region's major water resource. Further downstream, the river flows through the Kruger National Park, into Mozambique and then into the Indian Ocean.

The concentrated industrial activity in the region has implications for managing the water quality of the Olifants River. The discharge of polluted water from mining, industrial and agricultural activity has been a problem, causing elevated calcium sulphate levels in the river catchment.

In 1996, following significant deterioration of water quality in the Witbank Dam to 300 mgSO₄/L, Anglo Coal – together with a number of other coal producers – led an initiative to investigate short to medium-term options to tackle the problem.

This investigation, which included the Department of Water Affairs and Forestry (DWAF) and other stakeholders, assessed the impact of a successful controlled release scheme implemented by coal operations in the Hunter Valley, New South Wales, Australia. The Australian scheme was based on the use of available assimilative capacity of rivers during periods of high rainfall. When the levels of water – and therefore dilution – in rivers are high, local industries are permitted to discharge to reduce the volume of polluted water stored in worked out mining areas. When levels are low, discharges are prohibited.

Controlled Discharge Scheme

Following this investigation, a controlled discharge system under high flow conditions was introduced in 1997 by the major water users in the catchment area, together with the support of industrial stakeholders. This initial collaboration served as a basis for further co-ordination in order to achieve gradual target improvements in sulphate concentrations in the Witbank Dam. The overall objective was to lower sulphate levels to below 155 mgSO₄/L. This target has been met most of the time, however in prolonged dry periods it has been exceeded.

An extensive network of monitoring systems was progressively installed, and river flow, pollutant load and dam pollutant models developed.





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Industries in the region, including the power stations, made significant capital and operational inputs into the project and co-ordination between stakeholders improved significantly. For Anglo Coal, the project involved investments – which total in excess of R100 million – on drainage, storage and treatment systems to improve both the quality and quantity of water leaving its mines.

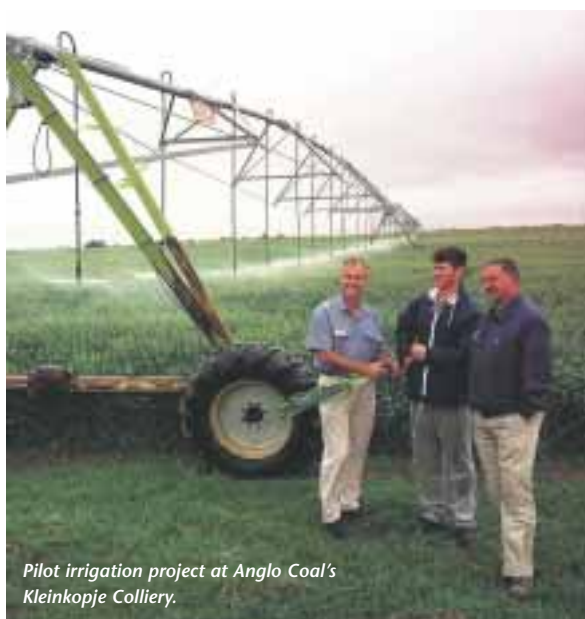
The Upper Olifants catchment is currently divided into Management Units, each with a waste load allocation based on the modelled assimilative capacity. During the summer release period, the waste load allocation and assimilative capacities of the units are calculated on a daily basis.

The scheme participants apply to DWAF for licences for controlled release on an annual basis. Participants are expected to improve on-site water management facilities and the progress made towards meeting this commitment is subject to audit by an external consultant.

Results

The scheme has successfully controlled short to medium-term water quality problems in the catchment. This has provided a number of benefits to the community and the mining industry.

1. The flood risk in workings and constraints on access to reserves have been reduced.
2. The risk of uncontrolled discharge has been reduced.
3. The retention time of water in the workings is reduced or avoided and the deterioration of water quality is limited.
4. Increased awareness of water management issues amongst mine operators.
5. The marked improvement in water quality in the Olifants River.



Pilot irrigation project at Anglo Coal's Kleinkopje Colliery.



Inspecting a bean crop irrigated with gypsiferous mine water.

Longer-term Options

Anglo Coal has also raised awareness of longer-term options in mine water management. This involves a four-step process of reducing imported water, increasing reuse/recycling, treatment and discharge of remaining excess water. Anglo Coal has introduced a number of pilot scale projects to test various, cost-effective water treatment systems.

One successful initiative has been the use of gypsiferous mine water to irrigate legume and cereal crops. Project work to determine if crops could be commercially produced started in 1997, undertaken at a 72 hectare pilot irrigation project at Anglo Coal's Kleinkopje Colliery. This phase ended in 2000 and results of the 3-year trial indicate that certain crops could be commercially produced at above average yields, without impacting on ground water quality, provided that fertilisation was carefully controlled. The project proved that the use of gypsiferous mine water for irrigation was sustainable. Commercial farmers have since successfully introduced this irrigation process.

Further research has now started to confirm findings over a longer timeframe, with different soil types and water quality. Opportunities to develop small and medium sized enterprises around this method of irrigation are currently being considered.

The water management initiatives in the Upper Olifants River Catchment have been a valuable learning experience for all parties involved. Aside from the benefits to the river environment and consumers, the project has led to increased transparency and cooperation between industry and the government and a shared understanding of management approaches between interested parties.

For further information on Anglo Coal's water management initiatives, please contact:

Anglo Coal
Tel: +27 (11) 638 3532/3162
Fax: +27 (11) 638 4043/5428
Web: www.angloamerican.co.uk/about/divisions.asp?type=coal