



Coal mining and cattle production. With help from CSIRO, central Queensland's two largest industries are taking a more neighbourly approach to managing the impacts of climate extremes.

New outlook smooths the way for coal and beef

Research by CSIRO's Tropical Beef Centre has founded a cooperative approach to wastewater management in central Queensland.
Anne Leitch reports.

Water is a boon and a burden for beef and coal-mining industries in Queensland's Fitzroy River catchment. Rainfall in some parts has been below average for the past five years, yet the year's supply may arrive in a couple of prolonged downpours.

December 1990 was such an occasion. In the wake of Cyclone Joy, 450 millimetres of rain was dumped in three weeks at the Norwich Park coal mine near Dysart, one of eight in the region managed by BHP Australia Coal Pty Ltd.

The deluge continued until mid-February, flooding the mine pits and necessitating the pumping of water to storage dams. But the storages filled rapidly, causing pit water to be discharged directly into Rolf Creek (an ephemeral stream) for a period of about six months.

This overflow of mine-pit water into Rolf Creek raised concerns among beef producers on neighbouring properties who

took samples from the creek for analysis. The water was found to contain elevated sulfate levels and may have been unsuitable for cattle consumption. In some cases the sulfate concentration was above the 1000-milligrams-per-litre guideline set by the Australian Water Quality Guidelines for Fresh and Marine Waters (ANZECC 1992).

Despite these findings, it wasn't possible to judge whether the pit water was harmful to cattle. This was because the ANZECC guidelines are based on field observations, rather than experimentation, and little information existed relating to the effects of minerals on livestock.

To provide an independent assessment of the ANZECC guidelines, and the suitability of pit water for tropical-breed cattle, BHP sought the help of CSIRO's Division of Tropical Animal Production located at the Tropical Beef Centre, Rockhampton.

Coal, cattle and water

Norwich Park is one of 27 coal mines in the 160 000-square-kilometre Fitzroy River catchment. Sharing the catchment's resources are an estimated two million head of beef cattle on some 2100 properties. According to United Graziers Association president, Larry Acton, these grazing enterprises have such a marginal return rate that any factor reducing their productivity can harm their economic viability. One such factor is impaired water quality.

Although coal mining uses relatively little water (irrigated agriculture consumes the lion's share of water in the catchment), the extraction process can affect water quality.

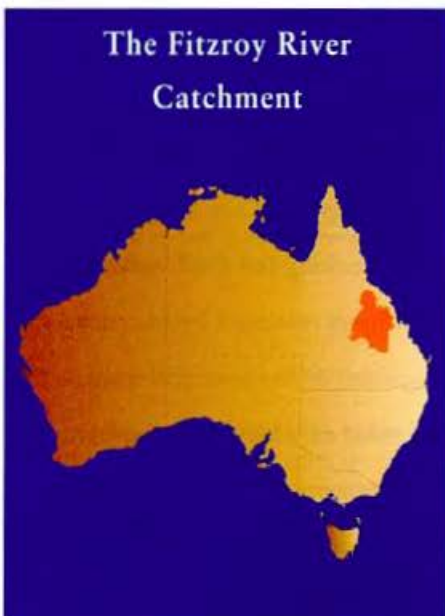
Open cut coal mining involves removing the overlying topsoil and rock to expose the coal seam. During the coal extraction process, dissolved salts are released into surface water and groundwater systems. In addition, water accumulated in

the coal mine pits must be pumped out for the pits to be mined. This water is usually stored in a holding dam for reuse. In certain circumstances, such as the deluge that followed Cyclone Joy, or when a storage dam discharges, pit water can be released outside the mine, thus becoming a source of drinking water for cattle.



Water that accumulates in coal mine pits can become a source of drinking water for cattle.

The effect of coal mine pit water on tropical-breed beef cattle productivity was studied for two years by scientists at the Tropical Beef Centre. They found relatively high levels of sulfate, chloride, magnesium,



sodium and calcium in the water, and measured the effects of different concentrations of these elements on steers. The 13 experiments, conducted in the centre's animal house, revealed that pit water containing up to 2000 mg/litre sulfate was not hazardous to the health and growth of tropical-breed beef steers.

Also investigated was the viability of calves in utero and in the post natal period, and the effect of sudden exposure to pit water on cows in late pregnancy. The only adverse results were a slight reduction in productivity for the cow/calf unit drinking pit water at 2000 mg/litre. This concentration may therefore be slightly excessive for lactating cows.

A third study examined the effect of diluted pit water on the digestion and metabolism of steers. The findings showed that animals drinking pit water did not retain more sulfur, calcium, magnesium, sodium and chloride than steers drinking town water, and did not have higher urea nitrogen or minerals in their blood (apart from magnesium, which was significantly higher in steers receiving pit water). The minerals were either directly excreted in the faeces, or absorbed and filtered by the kidney prior to excretion in the urine.

Cause for relief

While the research findings may help allay the fears of beef producers, they also show

that coal mine pit water could be used as an emergency drinking supply for cattle. Mines will not release water from the pits into natural waterways for this use, but they may, under certain circumstances, permit producers to pipe water to their properties for watering stock.

During the past five years, mine site water management practices have advanced as the industry has become more willing and able to develop strategies for wastewater control. Manager of Environmental Services at BHP Australia Coal, Peter Roe, says it is unlikely that water from the coal mines will be released into waterways in the future.

Since 1990, all the company's mines in central Queensland have upgraded their water management systems. This upgrading has reduced the need to release pit water from mined areas and reduced the mines' reliance on external water supplies.

In August 1995, CSIRO held two workshops to discuss the research results. Representatives from the coal mining and beef industries, as well as the water quality and environmental regulators, attended a technical workshop aimed at fitting these results into the water quality management framework. The second workshop was for those involved in the initial controversy: the staff of Norwich Park mine and the surrounding landholders.

The outcome was a better understanding among all stakeholders of the perspectives of the beef producer, the coal mine manager and the water quality regulators.



Experiments conducted in the Tropical Beef Centre's animal house tested the response of tropical breed beef cattle to coal mine pit water. The results showed that pit water could be used as an emergency drinking supply for cattle.