Supervising Scientist
notes

REHABILITATION AND EROSION AT NABARLEK MINE SITE

This study at Nabarlek used mathematical models to work out how much soil was being moved from the rehabilitated site by erosion. The results were used to estimate the stream sediment concentration in the creeks draining the site and in the nearby Cooper Creek which flows into the East Alligator River

Where is Nabarlek

Nabarlek uranium mine is 270 km east of Darwin at the western edge of Arnhem Land (fig 1). Water from the mine site drains into the East Alligator River catchment which forms part of the ARR. This area contains Kakadu National Park, a world heritage listed area. The mine is located in a pristine environment and it is important that the site is monitored so potential environmental impact can be minimised.

The history of Nabarlek

The Nabarlek uranium deposit, found in 1970 by Queensland Mines Limited (QML), was mined nine years after its discovery in only 143 days and the ore stockpiled and progressively processed until 1988.

Rehabilitation of the site in 1995 involved levelling all the buildings and structures, covering the area with waste rock and planting seeds. The final shape of the area was designed using a mathematical model to limit erosion on the site.

What the study looked at

The mathematical model used to plan the final shape of the landform at Nabarlek was used in this study to estimate how much soil was being moved off the Nabarlek site by erosion. This was done by collecting soil samples and vegetation cover measurements from the site and processing them in the laboratory to derive input parameter values for the model.

A mathematical model was also used to work out the natural sediment concentration in the streams draining Nabarlek. Using predicted soil loss values and stream flow it was possible to estimate the sediment concentration in Cooper Creek (fig 1). The estimated values were similar to observed values.

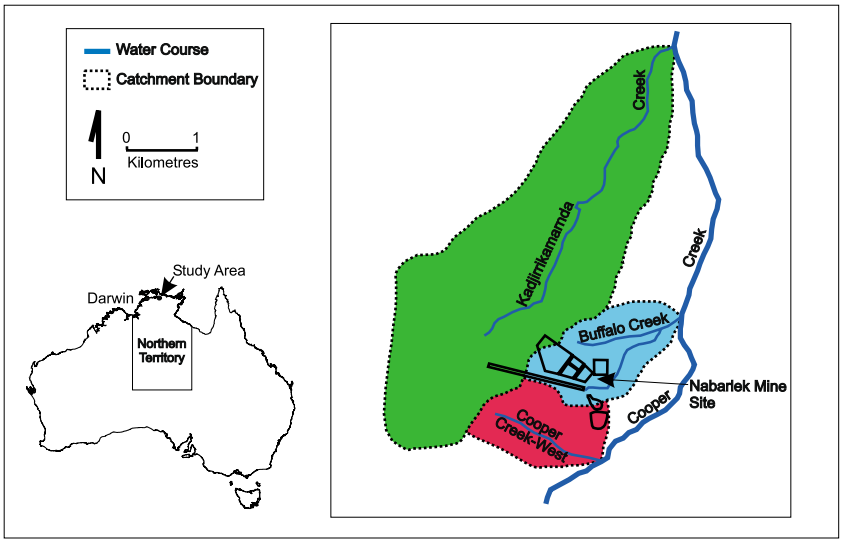

Figure 1 Location and catchments of the former Nabarlek Uranium Mine

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The results

Average soil loss on the rehabilitated Nabarlek site is only slightly higher than natural soil loss. However, some areas of the site have soil loss rates much higher than natural levels. These high soil loss areas are balanced by other areas with soil loss notably lower than natural levels. There are only marginal increases in soil loss from the Nabarlek site, but reduced runoff from ripped and vegetated areas of the site means that the sediment concentration in streams draining Nabarlek has increased.

How does this affect water quality?

Sediment concentrations in the three small seasonally flowing creeks draining the Nabarlek site (fig 1) have increased (fig 2). The concentration in Buffalo Creek has increased the most with the sediment load almost doubling. The sediment concentration in Buffalo Creek is high because the mine covered a large area of this catchment. During rehabilitation of the mine site the soil was disturbed which makes it easier for the soil to be removed. Streams with only a small amount of the mine site in their catchment have lower sediment concentrations.

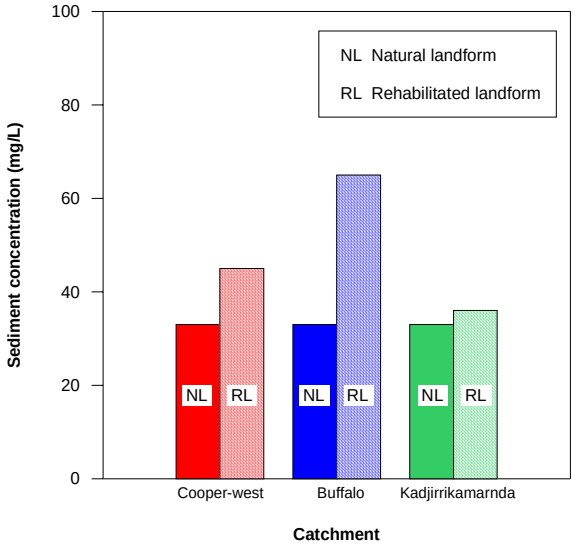

Figure 2 Stream sediment concentration in creeks draining the Nabarlek Mine site

When the small creeks draining the Nabarlek site empty into Cooper Creek, the sediment concentration is diluted. These results (fig 3) show that the increase in sediment concentration in Cooper Creek is very small.

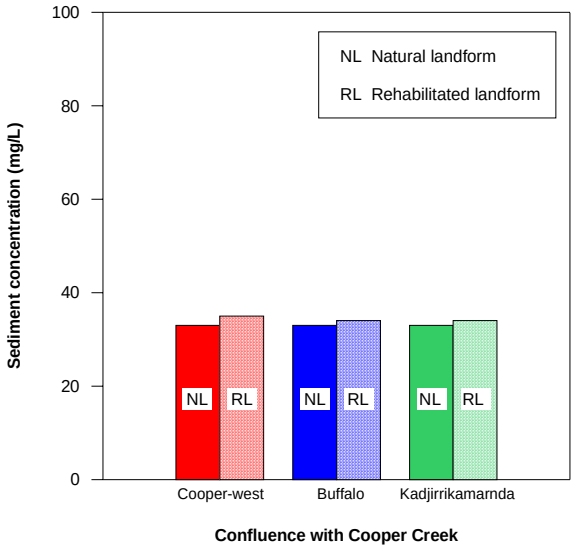

Figure 3 Stream sediment concentration in Cooper Creek downstream of the confluences of creeks draining the Nabarlek Mine site

Conclusions

Erosion on rehabilitated landforms result in sediment concentration increases. The extent of this increase has been shown for both the small creeks draining Nabarlek and the main stream of Cooper Creek. This means that, from an erosion and stream sediment concentration perspective, the Nabarlek Mine should have no impact on the lower reaches of Cooper Creek, and therefore the East Alligator River, if current erosion rates are maintained.

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