The Magela Creek catchment in Kakadu National Park, photo Supervising Scientist Branch, Australian Government.

Northern Australia Environmental Resources Hub

National **Environmental Science** Programme

# Tree water use and sensitivity to contaminated mine water

Start-up factsheet

Salty water from mine waste rock may affect riverbank ecosystems

Riverbank, or riparian, vegetation provides many ecosystem benefits that keep creeks healthy, including habitat and food for fish and wildlife, shade to cool water temperatures and roots to stabilise banks. Because groundwater likely meets more than half of the dry season needs of riparian vegetation in the Top End, groundwater contamination here could significantly impact riparian vegetation and associated river health.

Weathering of waste rock from the Ranger Uranium Mine releases contaminants, including magnesium sulfate. These contaminants are washed out by rain and are predicted to move through the local groundwater towards Magela Creek. Depending on the concentration, magnesium sulfate (a salt) has the potential to affect the trees, other plants and ecosystems along riverbanks downstream from the Ranger mine site.
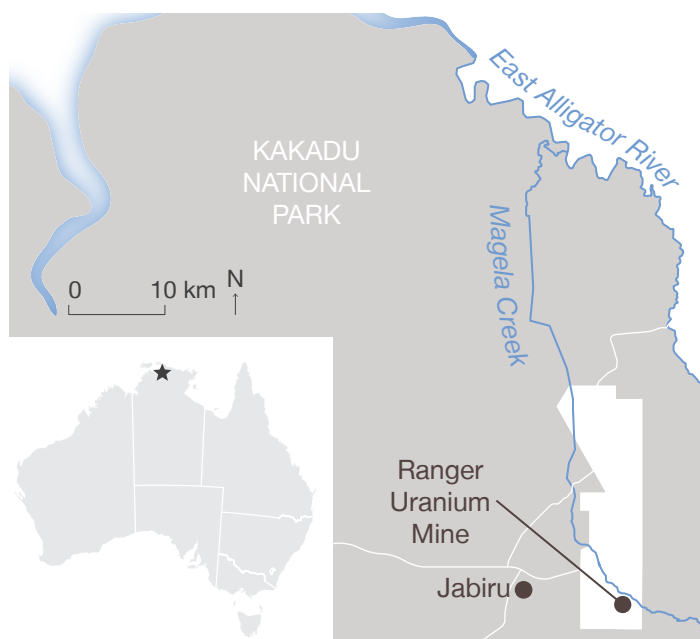
Fieldwork will take place at the Ranger Uranium Mine as well as upstream and downstream of the mine area.

Overview

This project will:

- identify where the trees along the creeks in the Magela catchment get their water from – from the soil, from the creek itself or from the shallow groundwater – and the relative quantities from each

- assess how sensitive common tree species are to magnesium sulfate levels

- assess risks to riparian vegetation from the contaminated water, predict its impact and identify where ongoing monitoring should be focused

- identify which tree species grow best in salty areas if rehabilitation is needed

- inform mine closure criteria.

Knowing where trees get their water from and their sensitivity to salty water will inform mine closure

The Ranger Uranium Mine is due to cease operations in 2021 and be revegetated by 2026. This study will lead to better knowledge of common riparian woody species' groundwater uptake, and therefore their relative dependence on it, to help predict contaminant impacts and inform mine closure and monitoring. The project will also increase our understanding of the sensitivity of riparian and forest ecosystems to changes in groundwater levels, which can then be applied to changes caused by other factors such as irrigated agriculture developments or climate change. The work will help improve our understanding of surface water–groundwater interactions in similar environments.

Project activities

- Compare the isotope signature of trees in the catchment to the isotope signatures of soil, creek, and shallow and deep groundwater to determine the age and source of water that the trees use and their relative dependence on groundwater over a wet–dry cycle

- Estimate the water use of riparian vegetation through calibrating remotely sensed images

- Assess the sensitivity of common riparian woody species to magnesium sulfate using greenhouse-based trials

Riparian vegetation provides many ecosystem benefits that keep creeks healthy, photo Supervising Scientist Branch, Australian Government.

- Quantify risks to riparian vegetation associated with the discharge of mine-related contaminants into surface and groundwater through analysis and surface and groundwater modelling.

Anticipated outputs

- Technical reports and associated scientific papers

- Recommendations for monitoring riparian health

- Maps of areas that mine-related contaminants are likely to most affect.

- Communication products for policy-makers, ecological restoration consultants and for the mining and agricultural industries.

This project is investigating the sensitivity of riverbank trees to magnesium sulfate, photo Supervising Scientist Branch, Australian Government.

Who is involved?

This project is being led by Professor Lindsay Hutley from Charles Darwin University (CDU). Professor Hutley will be assisted by researchers from CDU, the University of Western Australia and the Supervising Scientist Branch of the Department of the Environment and Energy.

This project has been approved by Gundjeihmi Aboriginal Corporation.

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For further information and project updates, visit the project webpage at www.nespnorthern.edu.au/projects/nesp/riparian-vegetation-sensitivity

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