



# Using Rainforest Research

## Measuring erosion on unsealed roads through the rainforest

February 2001

The erosion of road surfaces impacts on the environment in a number of ways. In the rainforest, road surfaces can be a source of rapid rainfall run-off leading to the transportation of particles into rivers and streams which subsequently affects water quality and impacts on biota. Resource and road management authorities within the Wet Tropics World Heritage Area (WTWHA) are greatly concerned regarding the operation and management of roads within the region.

The Rainforest CRC has therefore undertaken research to provide results which will improve decision-making regarding permits, road management, visitation and use in the Wet Tropics. The research had two distinct aims:

- To develop an Erosion Potential Index for the WTWHA, and
- To examine the relationship between the extent of tree canopy cover and the actual amount of road surface eroded.

### Erosion problems on unsealed roads

Erosion is a process that occurs in two parts: firstly, the detachment of soil particles from the surface, and secondly, the transportation of these particles by the erosive agents of running water and wind. Erosion on unsealed roads causes several types of road surface problems which include sheet, rill and gully erosion, as well as the formation of potholes, ruts and the protrusion of rocks.

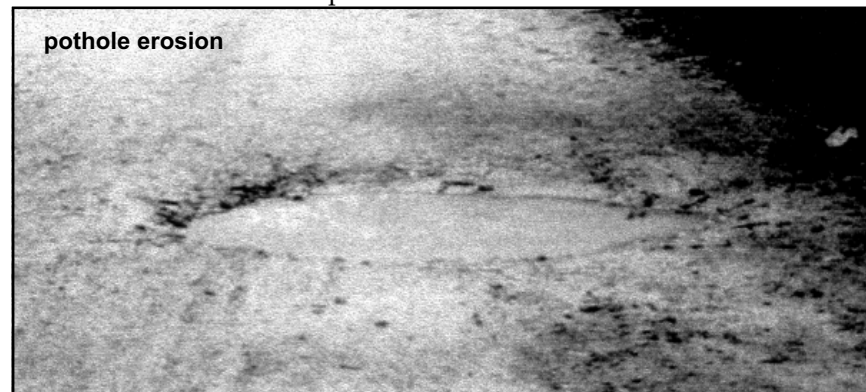
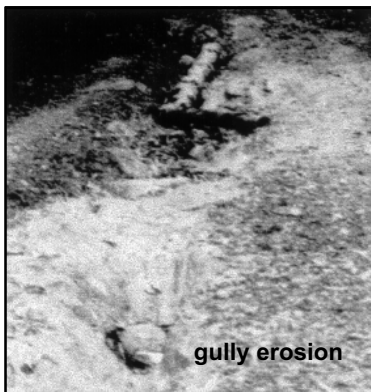
### The Erosion Potential Index (EPI)

Three major factors understood to affect the amount of erosion were integrated using a Geographic Information System to develop an Erosion Potential Index. These factors were rainfall, slope and soil type. The EPI estimates the potential for erosion across the Wet Tropics World Heritage Area and classifies the landscape into one of five erosion potential

The EPI not only provides a useful indication of which roads will potentially suffer more erosion, but can also be used to assess the suitability of areas within the World Heritage Area for different land uses. For example, managers making decisions regarding the use, maintenance or development of walking tracks, car parks, camping and day-use areas would find the EPI highly valuable.

Canopy cover and the amount of erosion

The EPI was used to identify 30 sites within the WTWHA in order to ground truth levels of erosion on unsealed roads. Two segments of road were selected at each sampling site, one under tree canopy cover of at least 60%, and one with no tree canopy cover. This method, known as *paired sampling*, strengthens results. A rapid assessment technique was used to examine the percentage of road affected by erosion, the type and severity of erosion, and percentage and characteristics of canopy cover.



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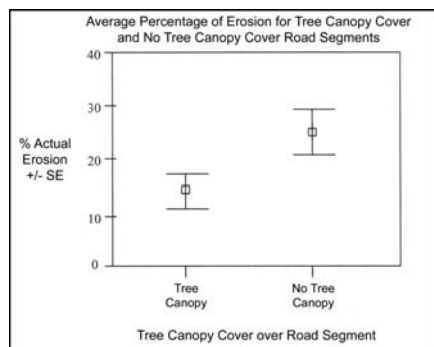
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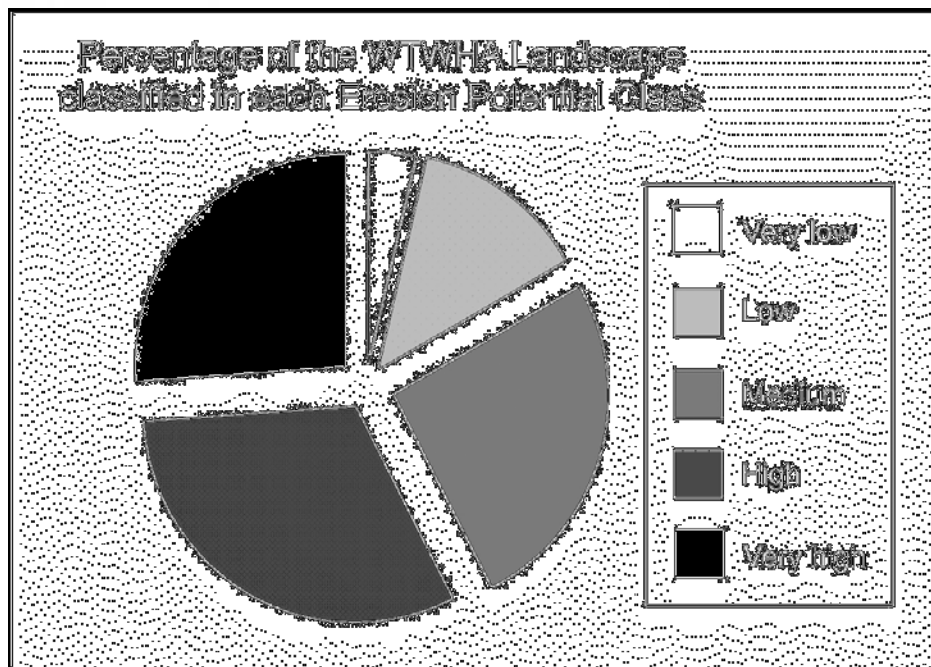
The Rainforest CRC is a research partnership involving the Commonwealth and Queensland State governments, the Wet Tropics Management Authority, the tourism industry, Aboriginal groups, CSIRO, James Cook University, Griffith University and The University of Queensland

The results indicate that road segments with no tree canopy cover have significantly more surface erosion than road segments with closed tree canopies. At the 30 sites sampled tree canopy cover appears to protect the road surface from erosion. This protection by tree canopies is likely to occur due to water being funnelled down the branches and trunks of trees and away into the forest rather than directly contacting the road surface.



These findings conflict with the long held view that road segments with tree canopy cover have greater surface erosion since the amount of sunlight reaching the road is reduced. However, no relationship could be established between the amount of sunlight reaching the road surface and the amount of erosion, a fact which further strengthens these new conclusions.

Further paired sampling would be useful to continue investigations of the relationship between road surface erosion, canopy cover and other factors.



The graph demonstrates that most land in the WTWHA falls into the high or very high erosion potential categories due to steep slopes, high rainfall and highly erodible soils.

### Implications for Managing the Wet Tropics

The research clearly indicates that tree canopy cover over unsealed roads in the Wet Tropics reduces the amount of surface erosion and therefore the environmental impacts associated with this erosion. Earlier Rainforest CRC research has demonstrated that tree canopy cover also mitigates other impacts of roads, including restriction of movements of fauna and changes in microclimate. These new results strengthen the understanding that tree canopy cover is a critical factor in mitigating the impacts of roads in the Wet Tropics World Heritage Area.

### Acknowledgments

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