

**GREAT BARRIER REEF MARINE PARK AUTHORITY
TECHNICAL MEMORANDUM GBRMPA-TM-24**

**SEDIMENTATION RESULTING FROM ROAD DEVELOPMENT,
CAPE TRIBULATION AREA**

**D HOPLEY, R VAN WOESIK, DCJD HOYAL,
CE RASMUSSEN and ADL STEVEN
Sir George Fisher Centre for Tropical Marine Studies
James Cook University of North Queensland
Townsville Qld 4811 Australia**

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SUMMARY

In 1985 the Cape Tribulation to Bloomfield Road was extended through an area of small rainforested catchments adjacent to fringing reefs. Results of stream sampling clearly show that below the road suspended sediment concentrations may be an order of magnitude greater than in undisturbed catchment areas above the road. An average of 22 times enhancement took place in March 1985 in response to the most intensive rainfall in two years and at a time when much recently disturbed land surface lay bare. Continued sampling into 1989 showed a smaller increase in sediment yield as streams crossed the road, but no rainfall event equivalent to that in 1985 has occurred.

Sediment traps were deployed over the adjacent reefs during 1986 in three contrasting areas: i) south of Cape Tribulation adjacent to the old road; ii) along the section of fringing reefs adjacent to the new road; and iii) along a northern section away from the road and used as a control. Results show that sedimentation rates adjacent to the new road were up to six times greater than in the control area, and adjacent to the old road section, more than three times greater. Highest sedimentation rates occurred over the reef front, with lowest rates usually associated with the reef crest. These patterns resulted almost completely from the deposition of the fine sand fraction and were statistically significant. The finer mud fraction was deposited more evenly over all areas and zones with maximum rates in the south close to the Daintree River.

Correlation with environmental variables suggested that sedimentation was related to resuspension of sediments already present. Rainfall factors appeared to be important for the new road section as disturbance made this area more sensitive to runoff processes. A major input of sediment into the reefal area took place during and immediately after road construction. This sediment subsequently becomes resuspended over the reefs. Mud is to be put into suspension in even moderate wind conditions occurring for over 50% of the time.

Cape Tribulation sedimentation is of the same order of magnitude as over other Australian fringing and inner shelf reefs. Rates from other areas in the world, apart from reefs adjacent to disturbed catchments in Puerto Rico, are considerably lower. Islands such as Guam or Barbados have limestone hinterlands with minimal runoff containing very low amounts of particulate matter. Variations in relative Holocene sea level histories indicate that the inner shelf of the Great Barrier Reef has experienced over 6000 years of stable sea level, with build-up of an inshore fine sediment wedge. However, Caribbean and north Pacific sites have experienced a continuously rising sea level with no comparable nearshore mud deposit.

Cape Tribulation reefs are delicately balanced having prograded little in the last 5000 years. Whilst the new road remains unsealed with steep gradients, unstabilised cuts and poor drainage there is great potential for massive sediment yield during intensive rainfall as might occur with a cyclone. This could pass the fringing reefs beyond a threshold from which they may not recover.

KEYWORDS: Fringing reefs, Cape Tribulation, Great Barrier Reef, anthropogenic influences, sedimentation, rainforest catchments

Technical memoranda are of a preliminary nature, and represent the views of the author/s, not necessarily those of the Great Barrier Reef Marine Park Authority.

Please address comments or requests for additional copies to:

The Executive Officer
Great Barrier Reef Marine Park Authority
PO Box 1379 TOWNSVILLE QLD 4810 AUSTRALIA

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**Great Barrier Reef
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PO Box 1379
Townsville Qld 4810
Telephone (077) 81 8811
Facsimile (077) 72 6093