

MEDIUM AND LONG TERM SHORELINE EROSION AT NEGRIL

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Abstract. Whilst beach erosion in Negril over the past 5-10 years has gained significant media attention, the calculation of the true rates of erosion that could be used in the design of rehabilitation works requires careful analysis. Ideally, a long-term database of regular beach profile measurements would be available and could be analysed to separate beach response to storms, seasonal fluctuations and long-term trends. In the absence of this long-term data set, two main sources of beach width data have been examined. The first is aerial and satellite images from 1968, 1980, 1991, and 2003, and the second is a series of beach profile measurements taken between 2000 and 2003. In addition, a series of detailed beach profile measurements were made in 2006.

This paper looks at the available sources of beach width data and determines related erosion rates for Long Bay and Bloody Bay. The long-term vertical images were rectified and shoreline positions were estimated and overlaid for comparison purposes (1968 – 2003). In 2006, the shoreline position was obtained using differential GPS and this was also used in the long-term analysis (Figure 1 below). The 2000-2003 profile measurements were used to determine beach width variations with time for a medium-term timeframe. The width was measured from the profile origin to the shoreline and these values were extracted from the profile measurements and plotted in a time-series manner.

The analysis of images did not reveal a uniform rate of erosion over the past 40 year period, but suggested a dynamic system that is characterised by periods of erosion and recovery. However, the trend of erosion appears to be overriding from the long term perspective, as the 1968 shoreline was found to be seaward of all of the other profiles along 78% Long Bay. This finding suggests that erosion of the shoreline is continuing and is widespread.

The envelope of shoreline positions between 1968 and 2006 ranges up to a maximum of 55m in the central portion of Long Bay, but was generally found to be about 25m. Over the period of investigation, there appears to have been up to 40m beach width lost from 1968 to 2006 in Long Bay and 20m in Bloody Bay. This represents an annualized average erosion rate of 1.0m/yr in Long Bay and 0.5m/yr in Bloody Bay.

By contrast, analysis of the beach width from the profile measurements (2000-2003) revealed a period of rapid beach recovery, with widths increasing by 20-40 metres, between 2000 and 2001, followed by wide fluctuations and a weak trend of erosion over the remaining two years of monitoring. The main short-coming of this method is that as the duration is only 4 years, any long-term trends are expected to be masked beneath seasonal and storm-induced fluctuations that may be an order of magnitude larger.

The objective of this paper is to present a comparison of the two methods and time-scales that have been used for evaluating beach erosion rates at Negril and to provide guidance to the interpretation of these data, in reporting on and understanding the erosion-recovery-erosion cycle. In addition, through a review of hurricane activity and swell events, the impact of these events on the erosion and recovery processes are evaluated, within the context of longer-term erosion trends.

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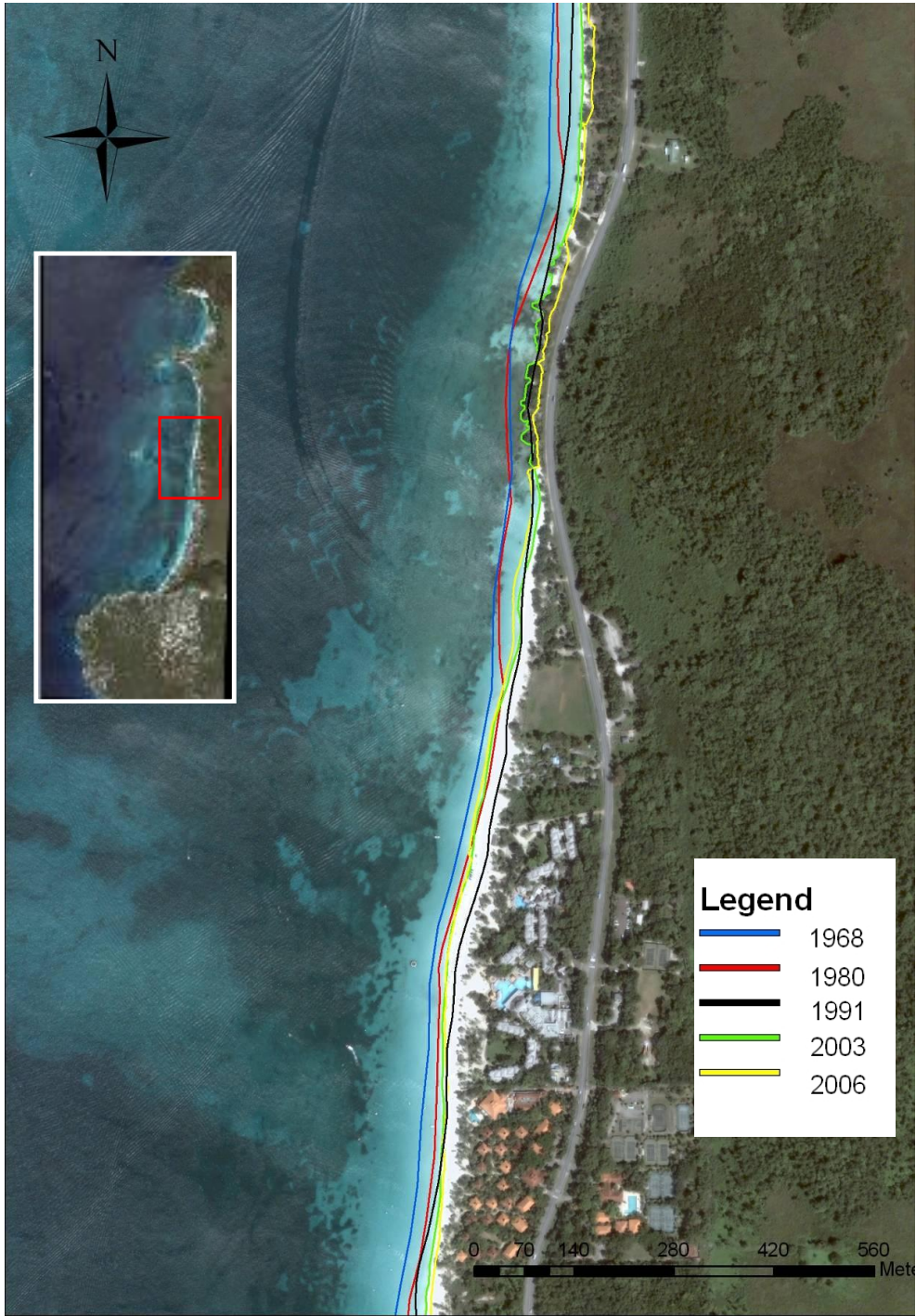


Figure 1. Historical Comparison of Beach Width – Central Long Bay (1968 – 2006)