



The geomorphological impact of historic coastal mineral extraction on cliff form and process

N.J. Rosser and D.T. Pybus

Department of Geography, University of Durham, UK. DH1 3LE. (n.j.rosser@dur.ac.uk / tel : 00 44 191 334 1918)

This paper presents evidence of the significant impact of historic mineral extraction on coastal form and process during the last 400 years and into the future in the UK. The geomorphology of coastal cliffs provide some of the most easily accessible exposures of mineral resources. The exploitation of these resources during the last 400 years has in places left a clear and persistent imprint on the coastal landscape, often in areas now celebrated for their natural beauty. Indeed it is this industrial legacy which forms the basis of the UK's 'Heritage Coast' preservation designation. This paper examines a stretch of the North Yorkshire, UK coastline known for both its fossiliferous strata and historic mineral exploitation, in an attempt to understand the range and magnitude of modification to the coastal geomorphology and explore the evidence for the impacts of this activity on coastal processes. The paper through a combination of geomorphological mapping, field observations and extensive historic archive research aims to better understand the extent of mining activity, and explores some of the mechanisms through which this may (have) influence(d) the evolution of the coastline, with a particular focus on the cliff-face and foreshore. The research builds up a 400 year magnitude frequency history of significant coastal failures, and compares this to the changing patterns of intensities of mineral extraction.

The results show a surprising range and scale of impacts, where in many instances the magnitude is far in excess of equivalent changes anticipated by, for example, sea level rises associated with climate change. As such this type of historic modification to the coast may provide a unique analogy, or natural laboratory, for examining coastal response to potential future change. In many instances features which have previously been considered as geomorphic phenomenon, when considered in the context of the mining history of the coast, may be suggested to be derived through anthropo-

morphic activity. There is also an apparent coincidence between the exploitation of coastal minerals and the occurrence and sequencing of coastal retreat as a result of mass movements. This has clear implications for our extrapolation of archived data on coastal behaviour as a tool for predicting likely future scenarios of change.