
Allt Coire Gabhail, Highland

[NN 164 553]

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Highlights

The Allt Coire Gabhail is a unique site within Scotland in which an alluvial valley has developed upstream of a catastrophic rockfall. As the normal downstream transfer of sediment is blocked, the basin has steadily aggraded since the slope failure occurred.

Introduction

The Allt Coire Gabhail site (the Lost Valley) comprises an alluvial basin which has been sealed by a catastrophic rockfall (Ballantyne, 1991b). Within a distance of only 2 km the stream displays a remarkably rapid transition through a series of channel types. For much of the year, the flow in the lower part of the basin is subsurface, thus affording ideal conditions for detailed sedimentological analyses of the bed material.

Description

The Allt Coire Gabhail flows into an alluvial basin, the exit of which is blocked by the largest single rockfall debris cone in Great Britain. The massive cliff collapse causing this rockfall occurred on the southeastern slope of Gearr Aonach, the middle member of the 'Three Sisters of Glencoe'. The precise date of this massive slope failure is not known, although it clearly post-dates the Loch Lomond Stadial (11 000–10 000 BP). Following the failure a new local base level for the stream was created. The valley floor then aggraded throughout the rest of the Holocene, since very little sediment could be evacuated from the alluvial basin upstream of the rockfall debris cone (Figure 2.40) and (Figure 2.41)

The Allt Coire Gabhail alluvial basin is approximately 600 m long and 150 m wide, the long profile of the accompanying stream being highly concave on account of the recently created local base level. This concavity has induced rapid downstream fining in the bed material. At the upstream end of the alluvial basin, the stream issues from a structurally controlled, straight bedrock reach which follows the line of a porphyritic dyke. The D_{90} of the bed material in this reach is c. 54 mm. On reaching the alluvial basin the channel becomes a coarse-grained mountain torrent (D_{90} c. 36 mm) flowing from the apex of an alluvial fan. The main channel is currently incised into the northwestern side of this fan, from which position it also truncates a debris cone issuing from the slopes of Gearr Aonach. At this location the flow percolates into the fluvial gravels and the stream ceases to be perennial. The bed material continues to fine in a downstream direction (D_{90} c. 22 mm) and the channel pattern is now a wandering gravel-bed stream, locally incised into the valley floor. The lowest third of the alluvial basin adjacent to the rockfall barrier displays very fresh fluvial sediments in the form of gravel sheets both within individual channels and across the floodplain. In response to intense or long-duration rainfall, these channels support an active braided system, which results in local reworking of the valley floor. This degree of fluvial activity is partly a result of the much reduced grain size in this part of the alluvial basin (D_{90} now reduced to c. 12 mm). Just upstream of the largest blocks from the rockfall, the channel systems become less divided and more stable prior to their disappearing within the rockfall barrier. The margins of the alluvial basin are steadily being encroached upon by the development of debris cones supplied by rockfall and debris flow sediments from the surrounding slopes.

Interpretation

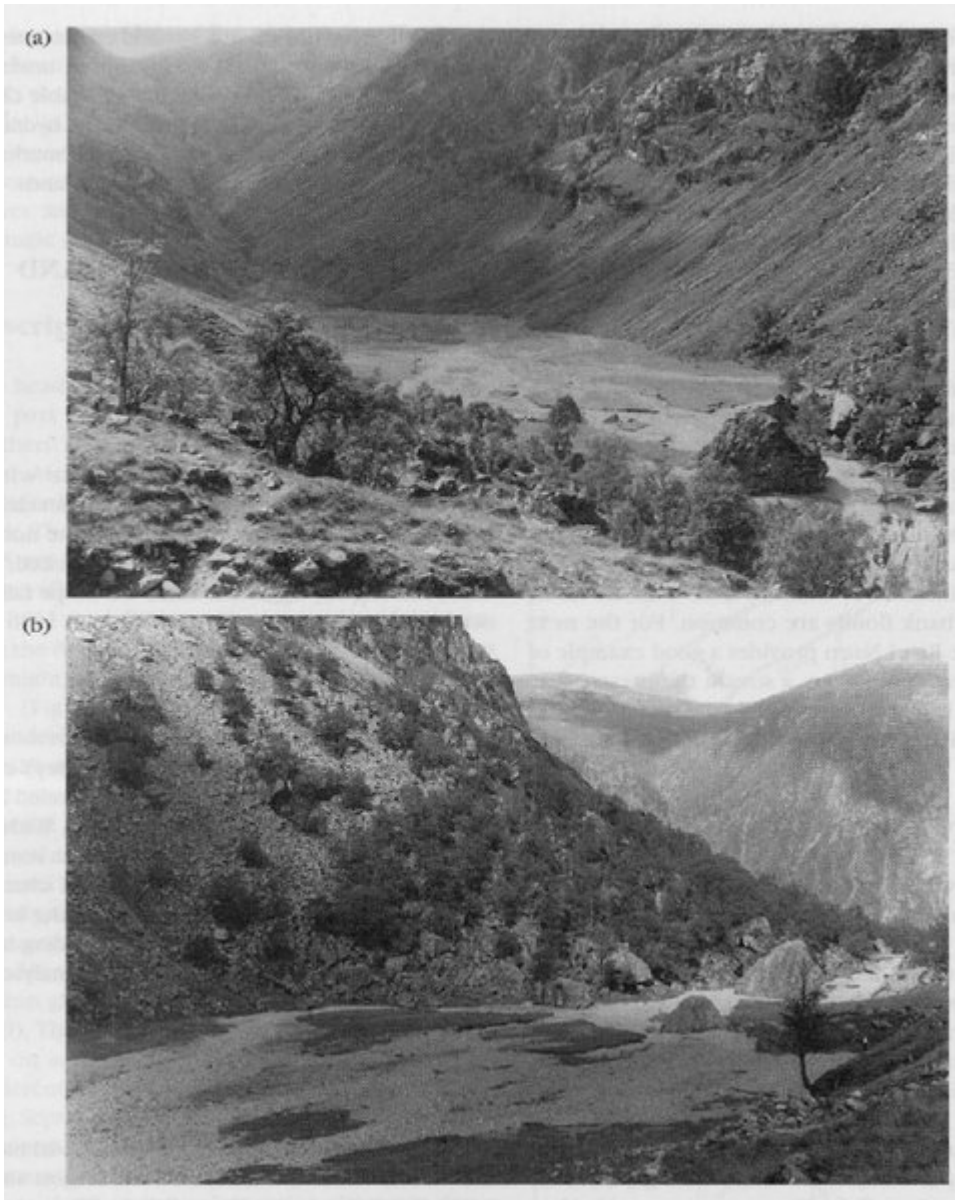
The Allt Coire Gabhail is an important site, since it is a unique example within Great Britain, where the outlet of a drainage basin has been sealed by a catastrophic rockfall. If the age of the rockfall and the volume of the alluvial infill could reliably be determined, this site would provide a valuable estimate of the long-term sediment yield for a small,

high-mountain drainage basin in upland Scotland. The site is also significant in terms of the study of fluvial sediments, since it provides an unusual opportunity to analyse alluvial sedimentary facies from a number of channel types. These are all within very close proximity and from locations at which the channel bed itself is generally dry.

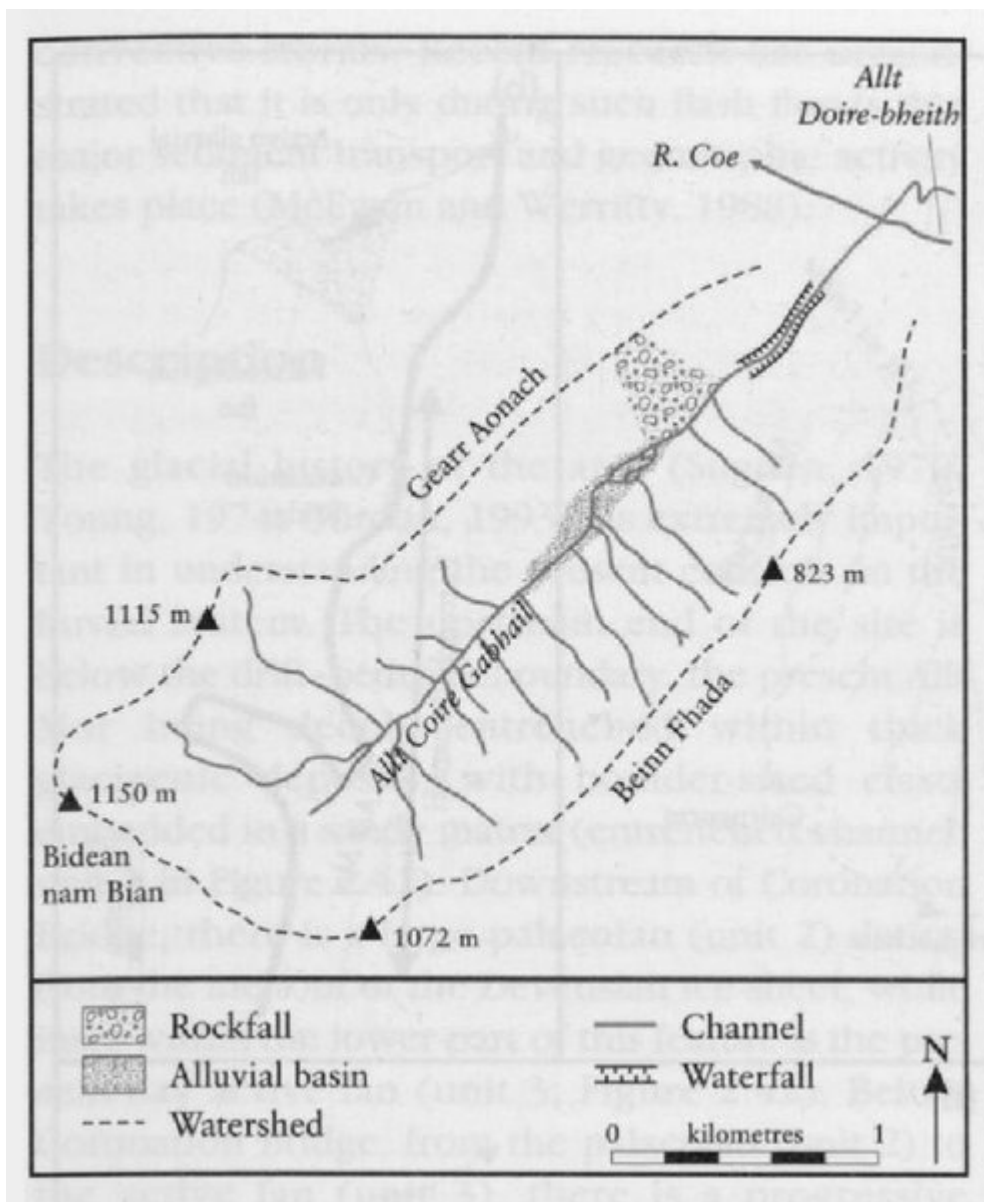
Conclusion

This unique site comprises an alluvial basin the development of which has been entirely controlled by the blockage formed by a massive cone of rock-fall debris at the basin's lower downstream end. The local base level thus created has produced a highly concave long profile, rapid downstream fining of the bed material and a remarkable transition through a series of channel types within the comparatively short distance of 2 km. The site has the potential to provide an estimate of long-term sediment yields for small, high-mountain drainage basins in upland Scotland, because all slope and fluvially-derived material is retained within the basin.

References



(Figure 2.40) *The Lost Valley. (a) A general view of the alluviated valley surrounded by talus slopes: note the highly divided channel planform on the valley floor. (b) The major rock slope failure which has piled up as a talus cone, blocking the mouth of the alluviated valley. (Photos: A. Werritty.)*



(Figure 2.41) The geomorphology of the Allt Coire Gabhail (The Lost Valley).