
River Balvag Delta, Stirling

[NN 560 153]

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Highlights

Within a confined area, this site provides good examples of fluvio-lacustrine features which have hitherto been relatively neglected in Scotland, but which now warrant more attention.

Introduction

Loch Lubnaig is situated within the upper River Teith catchment of the River Forth Basin, in the Central Highlands of Scotland. The prograding delta, where the River Balvag flows into Loch Lubnaig, is shaped like a spit and provides an exceptional example in Scotland of the importance of river regime, sediment-size characteristics and vegetation type as controls on the types and rates of landform development in a low-energy, fluvio-lacustrine environment.

Description

Loch Lubnaig occupies a narrow rock basin excavated across a pre-glacial watershed (Whittow, 1977). The River Balvag drains downstream successively Lochs Doine and Voil, and this dampens and substantially moderates the magnitude of its flood flows. In fact, Loch Voil is only c. 5 m above Loch Lubnaig although it is 6.5 km distant. Progressing in a downstream direction, the River Balvag has a straight to sinuous channel pattern and is characterized by a low slope and channel bed material composed mainly of sand and fine gravel. Its banks are continuously bordered with alder right down to the spit mouth. These trees provide an inherent stability in the course taken by the channel to the loch, despite frequent overbank inundation. The straight reaches can be up to 20 channel widths in length.

Localized channel shifting or avulsion over the floodplain area has, however, taken place in the past, with palaeochannel location indicated by double rows of alder. Although there have been several bathymetric surveys of the loch (e.g. by Murray and Pullar in 1910; Asaad, 1982), little attention has been focused on the impact of the River Balvag on this lacustrine environment. The progradation of the river/loch interface appears to be rapid, with the gradual sedimentation through frequent over bank floods aggrading the neighbouring flat and marshy floodplain area. The curious long, spit-shaped narrow delta (Roinn Mor), with excellent examples of well-developed natural levees, extends for over 100 m into Loch Lubnaig (Figure 2.20). Murray and Pullar in 1910 note that silting up was taking place within the delta, with the development of 'tongues of alluvium' at the head of Loch Lubnaig. Strathlochans, small water bodies bounded by alluvial deposits due to sedimentation at the entrance to the loch, are also characteristic of the process of sedimentation in this type of fluvio-lacustrine environment. The delta currently appears to be in the process of isolating a new strathlochan (Figure 2.21) to the west, with loch depths of less than 5 m in this area (see Asaad and McManus, 1986).

Interpretation

The straightness of the River Balvag is noteworthy, since it is very unusual to have naturally straight channels over distances longer than a few channel widths. The delta is both unusual in shape and length and has been made a more permanent feature by the growth of alders which extend along the river banks right to its tip and have stabilized the location of the channel.

There are also good sites for studying the progressive development of strathlochans (for example, Lochan Buidhe; see Duck, 1984), where the development of the spit into the loch has isolated a small lake. The rate of this accumulation of sediment and subsequent vegetation colonization is indicated by the fact that the 'little pool known as Lochan Buidhe'

was almost isolated from the rest of Loch Lubnaig in 1951 (Forestry Commission, 1951, p.2). Certainly the Military Survey of Scotland (1747–55) by William Roy indicates the lochan area as part of the loch, while the 1866 and 1898 1 : 10 560 OS maps indicate rapid isolation of Lochan Buidhe, with an outflow channel to Loch Lubnaig.

The Forestry Commission (1951) also report that severe floods occur nearly every winter when the River Balvag floodplain is periodically inundated with floodwater. This is confirmed in the field by the presence of high flood trash lines in the alder which border the channel. Also important in the accumulation of sediment is the colonization of flood deposits by rushes, which facilitate further trapping of sediment. This assists both in the progressive reduction in the surface area of the isolated strathlochan and also in the general extension of the area of accumulation into Loch Lubnaig itself.

Conclusion

The analysis of rates of sedimentation and modes of deltaic development within this unusual low-energy environment promises to provide interesting results, especially as current rates of sediment accumulation appear to be high. Contrasts can be made with more dynamic channel switching at the delta where the River Coe enters Loch Achtriochtan in the Western Highlands of Scotland (a coarse-grained, high-energy environment). Thus, although no detailed monitoring of sedimentation rates and associated landform development has taken place at this site to date, this is an area in which important contributions could be made in the future.

References



(Figure 2.20) The River Balvag delta: a narrow spit-shaped delta prograding into Loch Lubnaig (to the bottom of the picture) with upstream strathlochans in various stages of development. (Photo: Royal Commission on the Ancient and Historical Monuments of Scotland; print 018, 51188; flown June 1988: Crown Copyright.)



(Figure 2.21) The tree-lined channel of the River Balvag and the delta prograding into Loch Lubnaig: (Photo: U. McEwen.)