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CASE STUDY
10

Lattice Log Complex

Interlocked log jams that increase channel and floodplain roughness, slowing and storing floodwaters while trapping sediment.

Overview

Lattice log complexes are log-jam style structures that rest above the channel bed or on the adjacent floodplain. Lattice structures work by increasing hydraulic roughness during high flows, mimicking naturally occurring wood accumulations. This slows the flow, promotes floodplain storage and traps coarse sediment.

Primary Function

Increase channel and floodplain roughness to slow runoff, promote sediment deposition, and enhance lateral floodplain connectivity and storage.

Location Considerations

- > Suitable for small upland streams, gullies, and floodplains.
- > Avoid sites with steep gradients or high stream power that could destabilise the structure.¹
- > Do not install near infrastructure (e.g., culverts, bridges) due to blockage risk.
- > Avoid areas with cobbles, boulders, or shallow bedrock where vertical stakes cannot be driven.¹
- > Ensure sufficient access for machinery or horses for installation.

How They Work

1. Online vs Offline

Online (Fig. 1a-b): Installed in small channels (from gully stuffing scale up to 2–3km² catchments).

Offline (Fig. 1c-d): Installed on the floodplain where high flows are diverted out of the larger main channel.

2. Roughness Creation

Interlocked logs increase hydraulic roughness in the channel or across the floodplain.

3. Slow the Flow

Increased roughness reduces flow velocity and delays the flood peak.

4. Sediment Retention

The reduced velocity traps coarse sediment behind the feature and on the floodplain.

** Riparian planting enhances roughness and provides future natural wood inputs that complement lattice log complex structures.*

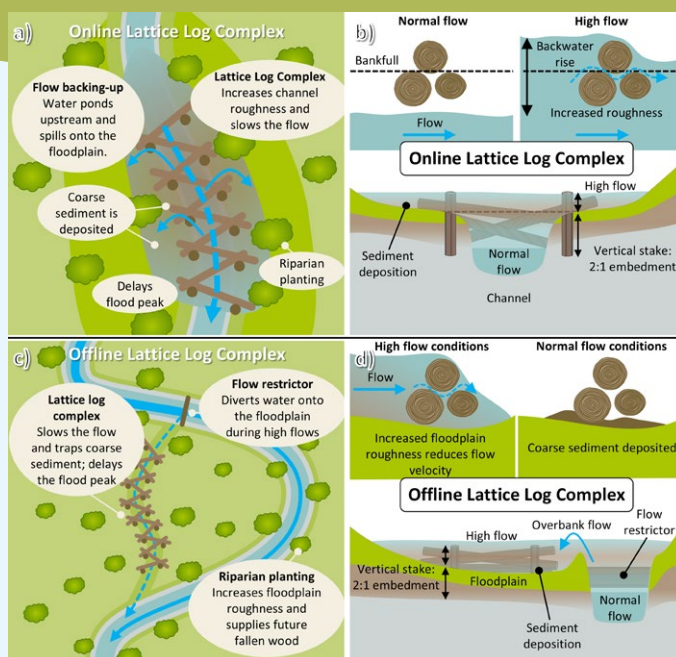


Figure 1: Online and offline lattice log complexes and their hydraulic function: (a) online plan view; (b) online cross-section; (c) offline plan view; (d) offline cross-section.

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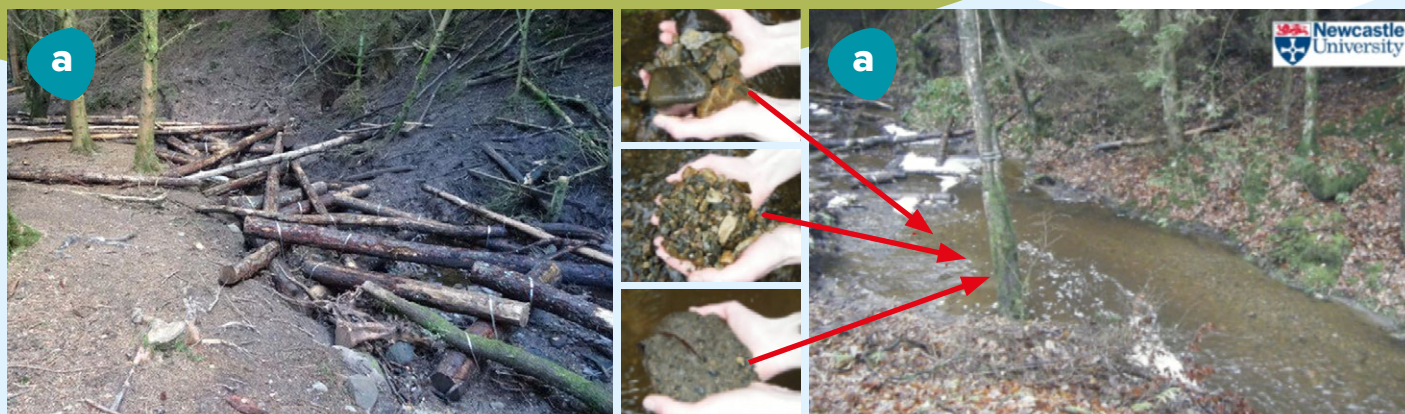


Figure 2: Online lattice log complex examples. (a) online lattice log complex kerplunk leaky barrier in a small channel (photo: Newcastle University); (b) Sediment deposition behind an installed feature at Haltwhistle Burn (photo: Newcastle University).

Design and Maintenance

- > Use sturdy vertical stakes at least three times the barrier height, with embedment at least twice the exposed height ("2 in, 1 out" rule).¹
- > Install stakes on both banks at ~0.6m spacing, and interlock logs longitudinally and transversely to form a strong 3D lattice.¹
- > Use locally sourced timber where possible to reduce cost and environmental impact.
- > Ensure the structure is well-anchored (stakes, wire, partial embedment) to withstand high flows.¹
- > Monitor for impacts on fish passage (where relevant) and sediment movement, especially in sensitive reaches.²
- > Inspect after storms, checking for movement, debris accumulation, or damage, and repair as required.

NbS Measure Summary

Aspect	Notes
Set-up cost	Costs vary with access, anchoring requirements, material availability.
Maintenance effort	Inspect at least twice a year and after storms, checking for scour, movement, or blockages. ¹
Lifespan	Structures can last for many years but may require periodic repair due to natural decay. ¹
Flow attenuation	Current evidence suggests roughness enhancement may be more important than barrier size or number in delivering effective flow attenuation.
Sediment retention	Field studies show upstream coarse sediment deposition and reach-scale aggradation. ³
Phosphorous (P) removal	Limited evidence; may capture some sediment-bound P depending on design.
Nitrogen (N) removal	Limited evidence for N removal, though offline designs may enhance denitrification as soggy margins or small wetlands develop.

Further Information

- ¹ Wren et al. (2022) The natural flood management manual, C802, CIRIA, London, UK (ISBN: 978-0-86017-945-0) (G)
- ² Dodd et al. (2016). The effect of natural flood management in-stream wood placements on fish movement in Scotland, CD2015_02. Available online (PDF Link) (G)
- ³ Addy et al. (2025). The hydro-geomorphic effects of wooden leaky barriers in a steep headwater stream. Earth Surface Processes and Landforms, 50(6), e70079. (R)
- SEPA's Regulatory Guidance on the Placement of Large Wood in the Water Environment (G)
- Newson (2015). Haltwhistle Burn – a total catchment approach to headwater run-off and pollution (PDF Link) (G)
- Time-lapse video showing a kerplunk-style leaky barrier in operation. Newcastle University (Video Link) (G)
- G = Guidance, R = Research

MATCH FUNDERS



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