

# **Cuchlaine King Symposium 2026 & Earth Surface Processes & Landforms Special Issue: *Biogeomorphology: Animals and Plants as Drivers of Geomorphic Change***

## *Biota as Drivers of Landform Evolution*

The recognition of the importance of biology's central role in landform development marks a significant paradigm shift in geomorphology. Rather than existing on an abiotic 'template', biota have co-evolved with, and actively shaped, Earth's environments. This perspective has opened new understandings of landform history, and foregrounds key uncertainties about how geomorphic processes and hazards may unfold under climate change.

## *A Long Intellectual Lineage*

Foundational figures in geomorphology and related disciplines have long recognised the reciprocal relationships between biological and physical processes – from Darwin's (1881) work on earthworms, to Langbein and Schumm's (1958) observations on vegetation and slope stability, to Leopold et al.'s (1964) articulation of their complex interdependence. Indeed, Keller and Swanson's (1979) '*Effects of large organic material on channel form and fluvial processes*' remains Earth Surface Processes and Landforms' most cited non-methods, non-review paper to date. The umbrella term and formal discipline of *biogeomorphology* was conceptualised and introduced by Heather Viles in 1988, and the field has expanded rapidly since, with 233 *ESP&L* articles since using the term. Yet whilst Etienne (2010) argues that biogeomorphology has shifted from 'fun' to 'fundamental', Rice (2021) highlights that scepticism still persists across parts of the geomorphological community.

## *Why Biogeomorphology Matters Now*

However, substantial evidence now demonstrates that biogeomorphology must be integrated as a central component of geomorphological science. In the fluvial setting, recent estimates suggest that biologically available energy can exceed that of flood events at both local (Johnson et al. 2024) and global scales (Harvey et al. 2025), and global syntheses show that Nature-based Solutions for fluvial floods are effective well beyond small, localised contexts (Howarth et al. 2025). These insights coincide with rapid innovation and implementation of Nature-based Solutions in policy and practice, as the limitations – and in some cases, the maladaptation risks – of grey engineering become increasingly apparent under non-stationarity. For instance, the 2025 wild-release licencing for beaver reintroduction in the UK exemplifies this shift, marking a landmark moment in the integration of biogeomorphological understanding into national-level policy.

## *Climate Change and Novel Biogeomorphic Regimes*

Climate change brings both new challenges and opportunities for biogeomorphology (Viles and Coombes 2022). Fundamental geophysical processes are shifting across montane, glacial, fluvial, coastal, aeolian, and marine environments, while the environmental suitability of many species is changing. Some geomorphic agents may lose suitable habitat, whereas new areas may become viable for invasive, non-native species. As a result, geomorphic systems may experience altered balances among existing biotic-abiotic interactions, leading to modified morphodynamics and feedback. Others may encounter entirely new combinations of biological and physical processes, presenting uncertain risks and the potential for thresholds to be crossed into new equilibrium states.

## *New Tools, New Data, New Possibilities*

Yet, our ability to understand these systems is expanding rapidly. Observations from changing environments are generating new conceptual insights; emerging technologies are transforming field measurements and

laboratory experimentation; enhanced modelling approaches allow exploration of scenarios with increasing spatial, temporal, and entropic complexity; global datasets, coupled with advanced statistical techniques, are enabling more powerful meta-analyses; while novel policy frameworks are increasingly supporting innovative applied practice.

### *Symposium and Special Issue Overview*

Thus, this Cuchlaine King Symposium and accompanying *ESP&L* Special Issue will be dedicated to advancing contemporary biogeomorphological research. The Symposium will centre on a small number of invited speakers whose work addresses key frontiers in the field, while submitted oral abstracts, presented throughout the congress, will extend and deepen these themes. A longer-than-normal poster session, combined with short 'pop-up' poster introductions, will further encourage exchange and collaboration among attendees.

### *Call for Abstracts*

This is the first call for abstracts for the Symposium, and we are particularly keen to attract submissions from across geomorphology that engage with the following topics:

#### *1. Biogeomorphic Processes, Interactions, and Feedbacks*

- Morphodynamics and feedback loops
- Process understanding across biotic–abiotic interfaces
- Spatial or temporal patterns of biogeomorphology

#### *2. Quantifying Biotic Contributions to Geomorphic Change*

- Magnitude and mechanisms of biotic influences on sediment transport and landscape evolution
- New techniques, datasets, and modelling approaches that yield novel insights
- Applications and conceptual advances of emerging technologies or methodological innovations

#### *3. Biogeomorphology Under Climate Change*

- How climate change may alter biogeomorphic relationships
- Identification and quantification of at-risk landscapes under shifting climates and species distributions
- Changing morphodynamics under non-stationarity

#### *4. Biotic Change: Losses, Invasions, and Novel Assemblages*

- Challenges associated with the loss of ecosystem engineers
- Impacts of invasive or non-native species on geomorphic processes
- Emerging or novel biotic–abiotic combinations and their geomorphic implications

#### *5. Opportunities for Intervention: Reintroductions and Nature-Based Solutions*

- Restoration opportunities via species reintroductions and Nature-Based Solutions
- Monitoring, reporting, and evaluating the geomorphic outcomes of novel interventions
- Applied case studies demonstrating biogeomorphology-informed management
- Conceptual proposals for future techniques, tools, or policy-supported interventions

All accepted abstracts will be eligible to submit their papers to a special issue of Earth Surface Processes and Landforms. Authors who are unable to attend the Symposium but who would like to submit a paper to the special issue of ESPL are welcome to do so.

### References

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