

## [Controls on anastomosis in lowland river systems: Towards process-based solutions to habitat conservation \(Marcinkowski et al. 2017\) \[1\]](#)

Anastomosing rivers were historically common around the world before extensive agricultural and industrial development in river valleys. Few lowland anastomosing rivers remain in temperate zones, and the protection of these river-floodplain systems is an international conservation priority. However, the mechanisms that drive the creation and maintenance of multiple channels, i.e. anabranches, are not well understood, particularly for lowland rivers, making it challenging to identify effective management strategies. This study uses a novel multi-scale, process-based hydro-geomorphological approach to investigate the natural and anthropogenic controls on anastomosis in lowland river reaches. Using a wide range of data (hydrologic, cartographic, remote-sensing, historical), the study (i) quantifies changes in the planform of the River Narew, Poland over the last 100 years, (ii) documents changes in the natural and anthropogenic factors that could be driving the geomorphic change, and (iii) develops a conceptual model of the controls of anastomosis.

The results show that 110 km of anabranches have been lost from the Narew National Park (6810 ha), a 42% reduction in total anabranch length since 1900. The rates of anabranch loss have increased as the number of pressures inhibiting anabranch creation and maintenance has multiplied. The cessation of localized water level and channel management (fishing dams, water mills and timber rafting), the loss of traditional floodplain activities (seasonal mowing) and infrastructure construction (embanked roads and an upstream dam) are contributing to low water levels and flows, the deposition of sediment at anabranch inlets, the encroachment of common reed (*Phragmites australis*), and the eventual loss of anabranches. By identifying the processes driving the loss of anabranches, this study provides transferable insights into the controls of anastomosis in lowland rivers and the management solutions needed to preserve the unique anastomosing river pattern and diverse wet grasslands that are central to the conservation value of lowland floodplains.

**Keywords:** Anabranching; Fluvial geomorphology; Floodplains; Hydromorphology; Multithread river

### Highlights

- Controls on anastomosis in lowland rivers are not well understood.
- Anabranch loss in the anastomosing River Narew (110 km since 1900) provides a backdrop to investigate controls.
- River flow alterations, channel management, and floodplain vegetation interact to drive extinction of anabranches.
- Process-based solutions are needed to disrupt anabranch loss pathways and conserve wetland habitat.

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