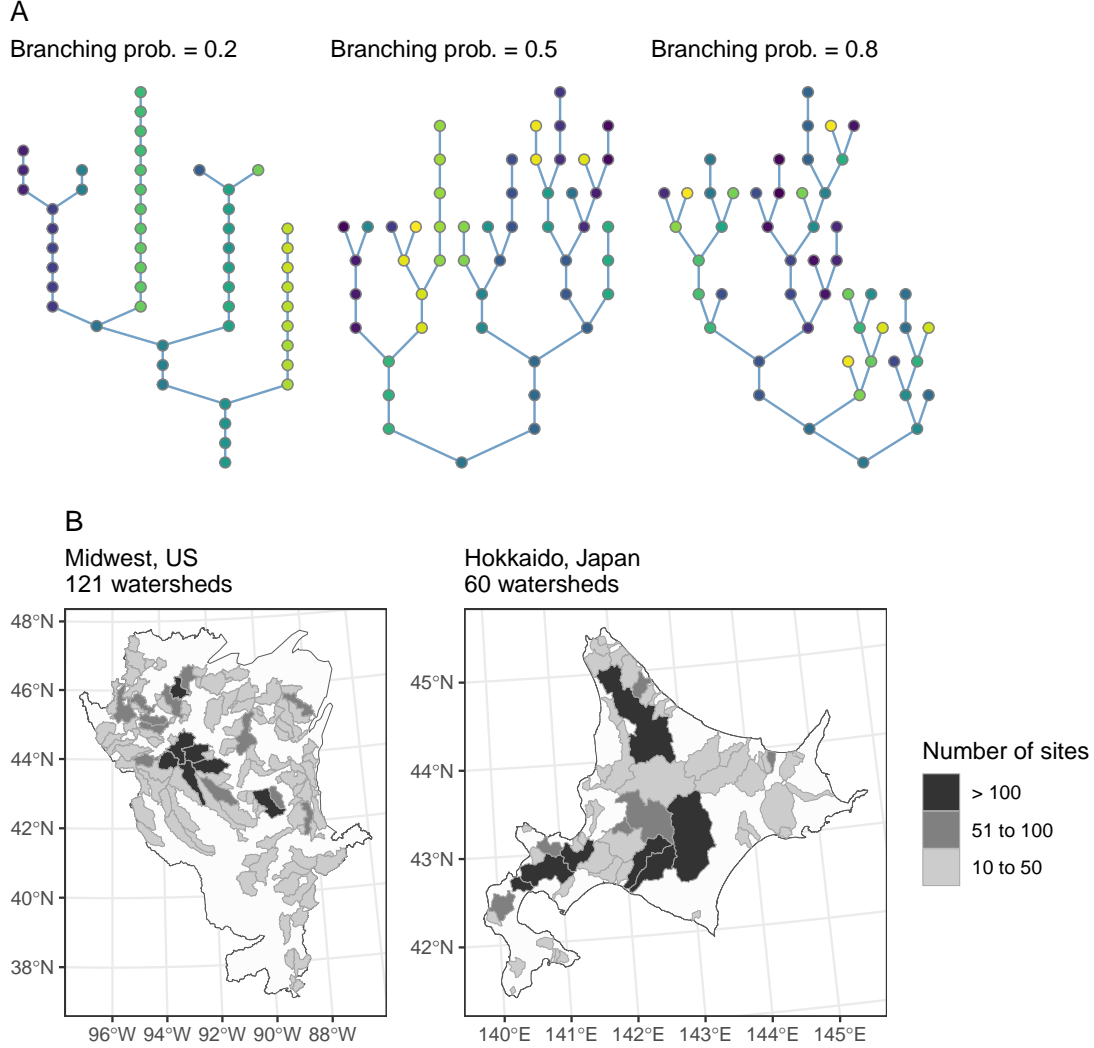# Figures

Figure 1: (A) Example of theoretical branching river networks. Branching river networks are dipicted as a network of connected habitat patches, in which the number of habitat patches N and branching probability P_b dictate the ecosystem size and complexity ($N = 50$ and $P_b = \{0.2, 0.5, 0.8\}$ in this example). Environmental conditions at the headwaters (the most upstream patches) are generated randomly and propagate downstream with local noises. Habitat patches are colored in proportion to environmental values (similarly-colored habitat patches have similar environmental values). (B) Map of study regions (left, Midwest, US; right, Hokkaido, Japan). Watersheds (i.e., metacommunities) are colored in propotion to the number of sites for fish surveys.

Long−distance dispersal (θ = 0.10)   Short−distance dispersal (θ = 1.00)

Strong competition (α_{max} = 1.50)

Weak competition (α_{max} = 0.75)

Species richness

Number of habitat patches

α diversity
β diversity
γ diversity

Long−distance dispersal (θ = 0.10)   Short−distance dispersal (θ = 1.00)

Strong competition (α_{max} = 1.50)

Weak competition (α_{max} = 0.75)

Species richness

Branching probability

— α diversity
— β diversity
— γ diversity