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Abstract Book

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The geography of metapopulation synchrony in dendritic river networks

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Dendritic habitats, such as river ecosystems, promote the persistence of species by favouring spatial asynchronous dynamics among branches. Yet, our understanding of how network topology influences metapopulation synchrony in these ecosystems remains limited. Here, we introduce the concept of fluvial synchrogram to formulate and test expectations regarding the geography of metapopulation synchrony across watersheds. By combining theoretical simulations and an extensive fish population time-series dataset across Europe, we provide evidence that fish metapopulations can be buffered against synchronous dynamics as a direct consequence of network connectivity and branching complexity. Synchrony was higher between populations connected by direct water flow and decayed faster with distance over the Euclidean than the watercourse dimension. Likewise, synchrony decayed faster with distance in headwater than mainstem populations of the same basin. As network topology and flow directionality generate fundamental spatial patterns of synchrony in fish metapopulations, empirical synchrograms can aid knowledge advancement and inform conservation strategies in complex habitats.