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Freshwater conservation planning: the case for systematic approaches

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ABSTRACT

1. We review recent advances in systematic conservation planning in fresh waters. Most modern systematic planning approaches are based on the CARE principles: comprehensiveness, adequacy, representativeness and efficiency. Efficiency is usually provided by a complementarity-based strategy, aiming to select new conservation areas in the light of previously protected features. These strategies have to be modified to account for the connected nature of rivers.
2. Choice of surrogates for conservation features depends on the scale of the assessment, as well as the available expertise and resources. Ideally, real information about taxa or processes – extrapolated by models – ensures that target features are protected. Where this is not feasible, it is critical that the choice of environmental surrogates is informed by target biota or processes.
3. Setting adequacy targets – the most challenging aspect in planning – needs to be evaluated in a freshwater-specific context, as species–area relationships and the distribution of diversity differ in dendritic networks. Adequately designed conservation plans also need to consider upstream land use and catchment disturbances. Recent studies have largely addressed longitudinal connectivity either by setting rules to protect adjacent subcatchments (or even the entire catchment upstream), or by considering the magnitude of disturbance upstream of selected planning units. Very few studies have addressed lateral and vertical connectivity in a systematic way.
4. To implement freshwater conservation plans, we recommend adopting a recently proposed hierarchical protection strategy, from 'freshwater focal areas' that contain the actual features to be protected to mixed-use 'catchment management zones'. Stakeholder involvement is crucial, especially in the large multi-use areas upstream and in the surrounding catchment.
5. We conclude that conservation planning using CARE principles is the only efficient way forward. This special issue shows significant efforts are under way to adapt freshwaterspecific adequacy, connectivity and implementation issues in conservation planning. However, a more holistic research investment is required to link freshwater, terrestrial and marine ecosystems.