

Table 1 | Key differences between freshwater and terrestrial ecosystems in physical, chemical, habitat and community properties and their hypothesized effect on community processes

Category	Property	Ecosystem comparison	Relevant process	Hypothesized effect on process	Reference
Physical	Buoyancy	Water > air	Dispersal	Intrinsic dispersal ability is greater in freshwater than on land	Bonte <i>et al.</i> 2012; Cornell & Harrison 2013; Srivastava & Kratina 2013
	Terminal velocity	Air > water	Dispersal	Intrinsic dispersal ability is greater in freshwater than on land	Denny 1990; Dawson & Hamner 2008
	Spatial structure of environmental variation	Terrestrial > marine > freshwater	Selection (abiotic)	Greater environmental structure on land could lead to stronger species sorting compared to freshwater	Herfindal <i>et al.</i> 2022
	Light attenuation	Water > air	Selection (abiotic)	Freshwater < terrestrial (greater niche differentiation)	Stomp <i>et al.</i> 2007
Habitat	Habitat structure	Rivers: dendritic Lakes: isolated Terrestrial: open (2D) Marine: open (3D)	Dispersal	Dispersal limitations (extrinsic) are greatest in freshwater habitats, and lowest in marine habitats	Baguette <i>et al.</i> 2013; Kappes <i>et al.</i> 2014; Wubs <i>et al.</i> 2016; Comte & Olden 2018
	Habitat stability	Terrestrial > freshwater	Speciation	In situ speciation plays larger role in dynamics of freshwater than terrestrial communities	Gillespie 2004; Miller <i>et al.</i> 2018
Chemical	Food quality	Freshwater > terrestrial	Selection (biotic)	May increase insect consumer populations and thus consumptive pressure in freshwater systems	Elser <i>et al.</i> 2000; Twining <i>et al.</i> 2021
Community	Species richness per area	Freshwater > terrestrial	Speciation	In freshwater habitats the diversification rates-per clade or lineage per unit time is highest	Miller <i>et al.</i> 2018; Rabosky 2020; Miller 2021
	Frequency of generalists	Freshwater > terrestrial	Selection (biotic)	Consumptive pressure expected to be stronger in aquatic compared to terrestrial habitats	Pringle <i>et al.</i> 2016; García-Girón <i>et al.</i> 2020
	Naïvete to predators	Freshwater > terrestrial	Selection (biotic)	Consumptive pressure expected to be stronger in aquatic compared to terrestrial habitats	Cox & Lima 2006; Anton <i>et al.</i> 2016, 2020
	Saturation of communities	Freshwater > terrestrial	Selection (biotic)	Competitive selection is weaker in freshwater habitats	Shurin <i>et al.</i> 2000; Shurin & Smith 2006; Alofs & Jackson 2014