Table S1. Definitions of hydrological connectivity from different perspectives.

Research areas	Definitions of hydrological connectivity	References
Water cycle		
	1. From headwaters to downstream extent, the physical variables within a stream system present a continuous gradient of conditions including width, depth, velocity, flow volume, temperature, and entropy gain.	Vannote et al., 1980
	2. The condition by which disparate regions on a hillslope are linked via lateral subsurface water flow.	Creed and Band, 1998
	3. Use the term "connectivity" to denote the extent to which connected features, such as arbitrarily shaped bands or pathways having similar (e.g., high) values, are present in a hydrologically relevant spatial pattern.	Andrew et al., 2001
	4. Hydrological connectivity is the migration efficiency of runoff and the material or energy carried from the source region to the drainage area based on hydrology.	Freeman et al., 2007
	5. An ecological context to refer to water-mediated transfer of matter, energy and/or organisms within or between elements of the hydrologic cycle.	Pringle, 2003
	6. Connection, via the subsurface flow system, between the riparian (near stream) zone and the upland zone (also known as the hillslope) occurs when the water table at the upland-riparian zone interface is above the confining layer.	Vidon and Hill, 2004; Ocampo et al., 2006
	7. Hydrological connectivity is a dynamic property of interconnected flows of substances, energy and information in the river system.	May et al., 2006
	8. Ecological functional connectivity refers principally to the movement of biota (animals and propagules) around the ecosystem, and hydrological functional connectivity refers principally to the flow of water, sediment and nutrients over the landscape.	Turnbull et al., 2008
Landscape features		
	1.The relationship between the spatial structure and function of the river landscape, which is used to measure the degree of correlation between landscape units and represents a parameter of landscape function.	Amoros et al., 1988
	2.A corridor landscape that facilitates or impedes the flow of organisms between resource patches from the perspective of landscape ecology.	Malard et al., 2002 and Wiens et al., 2002
	3. Physical linkage of sediment through the channel system, which is the transfer of sediment from one zone or location to another and the potential for a specific particle to move through the system.	Hooke et al., 2003
	4. The extent to which water and matter that move across the catchments can be stored within or exported out of the catchment	Lane et al., 2004
	5. The internal linkages between runoff and sediment generation in upper parts of catchments and the receiving waters [. . .] two types of connectivity: direct connectivity via new channels or gullies, and diffuse connectivity as surface runoff reaches the stream network via overland flow pathways.	Croke et al., 2005
	6. All the former and subsequent positions, and times, associated with the movement of water or	Bracken and Croke, 2007

	sediment passing through a point in the landscape.	
	7. Flows of matter and energy (water, nutrients, sediments, heat, etc.) between different landscape components.	Tetzlaff et al., 2007
	8. Connectivity may be structural, based on adjacency of landscape features, or functional, based on how that adjacency translates to movement of organisms.	Van Looy et al., 2014
Spatial patterns		
	1. Hydrologically relevant spatial patterns of properties (e.g. high permeability) or state variables (e.g. soil moisture) that facilitate flow and transport in a hydrologic system (e.g. an aquifer or watershed).	(Western et al., 2001)
	2. The physical coupling between discrete units of the landscape, notably, upland and riparian zones, and its implication for runoff generation and chemical transport.	Stieglitz et al., 2003
	3. Spatially connected features which concentrate flow and reduce travel times.	(Knudby and Carrera, 2005)