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Supplementary material

Human impacts on connectivity in marine and freshwater ecosystems assessed using graph theory: a review

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Table S1. Studies that have applied graph theory to spatial connectivity in aquatic ecosystems

Text in parentheses for 'Human influence on connectivity' are other influencing factors

Citation	Year	Aquatic realm	Quantitative or review	Ecosystem type	Ecosystem	Taxa	Organism	Life stage	Region	Human influence on connectivity
Adams *et al*. 2012	2012	Marine	Quantitative	Pelagic	Coastal pelagic	Invertebrates	Sea lice	Larvae	Scotland	Habitat addition (climate, salinity)
Anadón *et al*. 2013	2013	Marine	Quantitative	Benthic or pelagic	Temperate coastal	Fish	Fish (64 species)	Larvae	Gulf of California	Fishing – MPAs (spacing)
Andrello *et al*. 2013	2013	Marine	Quantitative	Pelagic	Pelagic	Fish	Fish	Larvae	Mediterranean	Fishing – MPA; (location, season, PLD, Biological characteristics, vertical migration, spawning month)
Auerbach and Poff 2011	2011	Freshwater	Quantitative	Lotic	Dendritic	Not specified	Not specified	Unspecified	Theoretical	None (biological characteristics)
Barták *et al*. 2013	2013	Freshwater	Quantitative	Lotic	Rivers	Mammal	Beavers	Unspecified	Czech Republic	Habitat linkages – dams
Bunn *et al*. 2000	2000	Freshwater	Quantitative	Lotic	Coastal plain	Mammal, bird	Mink; Warblers	Adult	North Carolina	None (species)
Cantwell and Forman 1993	1993	Freshwater	Quantitative	Lotic	Rivers	Not specified	NA		Not specified	Habitat – landscape variability
Carranza *et al*. 2012	2012	Freshwater	Quantitative	Lotic	Rivers	Mammal	River otters	Adult	Italy	Habitat – loss and degradation
Decout *et al*. 2012	2012	Freshwater	Quantitative	Lentic	Ponds, forest	Amphibian	Common frog	Adult	French Alps	Habitat – land degradation (anthropogenic barriers, landscape permeability, habitat suitability)
Erős *et al*. 2011	2011	Freshwater	Quantitative	Lotic	Rivers	Fish	Fish	All	Hungary	Habitat – dams
Erős *et al*. 2012	2012	Freshwater	Review	Lotic	Dendritic					NA
Fortuna *et al*. 2006	2006	Freshwater	Quantitative	Lentic	Ephemeral ponds	Amphibian	Amphibians	Adult	Spain	Climate – drought
Fox and Bellwood 2014	2014	Marine	Quantitative	Demersal	Coral reefs	Fish	Reef fish	Adult	Great Barrier Reef	NA
Fullerton *et al*. 2011	2011	Freshwater	Quantitative	Lotic	Rivers	Fish	Pacific salmon	All	Oregon and Washington (lower	Habitat – reduced habitat quality, dams, fish

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Citation	Year	Aquatic realm	Quantitative or review	Ecosystem type	Ecosystem	Taxa	Organism	Life stage	Region	Human influence on connectivity
									Columbia and Willamette Rivers)	hatcheries
Campbell Grant *et al*. 2007	2007	Freshwater	Review	Lotic	Dendritic					NA
Grill *et al*. 2014	2014	Freshwater	Quantitative	Lotic	Rivers	Migratory fish	Fish	All	Mekong River Basin	Habitat – dams
Hock *et al*. 2014	2014	Marine	Quantitative	Benthic or pelagic	Coral reefs	Invertebrate	Crown of thorns starfish	Larvae	Great Barrier Reef	None (pest management, inferred)
Ishiyama *et al.* 2014	2014	Freshwater	Quantitative	Lotic	Wetlands	Fish, invertebrates	Fish, freshwater Invertebrates	All	Japan	Habitat – agricultural lands
Iwamura *et al*. 2013	2013	Marine	Quantitative	Benthic	Intertidal mudflats	Bird	Shorebirds – 10 species	Adult	East Asian–Australasian Flyway	Climate change – sea-level rise and habitat loss
Iwamura *et al*. 2014	2014	Marine	Quantitative	Benthic	Intertidal mudflats	Bird	Migratory shorebirds	All	East Asian–Australasian Flyway	Climate change – sea-level rise and habitat loss
Jacobi and Jonsson 2011	2011	Marine	Quantitative	Benthic or pelagic	Coastal temperate	Invertebrates	Mussels	Larvae	Baltic Sea	Fishing – MPAs
Jacoby *et al*. 2012	2012	Marine	Quantitative	Pelagic	Coastal pelagic	Fish	Sharks (2 species)	Adult	Bahamas; UK	Habitat removal
Jaeger *et al*. 2014	2014	Freshwater	Quantitative	Lentic	Streams	Fish	Fish	All	American south-west	Climate change – drought
Kininmonth *et al.* 2010*a*	2010	Marine	Quantitative	Benthic or pelagic	Coral reefs	Invertebrates	Coral	Larvae	Great Barrier Reef	NA
Kininmonth *et al*. 2010*b*	2010	Marine	Quantitative	Benthic or pelagic	Coral reefs	Invertebrates	General or coral reef	Larvae	Great Barrier Reef	None (biological characteristics)
Kininmonth *et al*. 2011	2011	Marine	Quantitative	Benthic or pelagic	Theoretical – coral	Invertebrates	Theoretical or coral reef	Larvae	Theretical	Fishing – MPA network type
McIntyre and Strauss 2013	2013	Freshwater	Quantitative	Lentic	Wetlands	Wildlife – general	Wildlife – general		Texas	None (spatial scale)
McKay *et al*. 2013	2013	Freshwater	Quantitative	Lotic	Dendritic Rivers	Fish	Fish	Unspecified	Theoretical or Nevada, USA	Habitat – dams
Mumby *et al*. 2011	2011	Marine	Quantitative	Benthic or pelagic	Coral reefs	Invertebrates	Coral	Larvae	Bahamas	Climate change – warming temperatures
Padgham and Webb 2010	2010	Freshwater	Quantitative	Lotic	Dentritic	Fish	Fish	Unspecified	Theoretical	Habitat quantity or quality
Pereira *et al*. 2011	2011	Freshwater	Quantitative	Lentic	Ponds	Reptile	Turtles	All	Coastal plain, Portugal	Habitat loss
Perkin *et al*. 2013	2013	Freshwater	Quantitative	Lotic	Streams	Fish	Fish	Adult	Theoretical	Habitat – road crossings
Peterman *et al.* 2013	2013	Freshwater	Quantitative	Lotic	Ponds	Amphibians	Frogs	All	Missouri	(None – rainfall, population size, habitat type)

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Citation	Year	Aquatic realm	Quantitative or review	Ecosystem type	Ecosystem	Taxa	Organism	Life stage	Region	Human influence on connectivity
Ribeiro *et al*. 2011	2011	Freshwater	Quantitative	Lentic	Ponds	Amphibian	Amphibians (9 species)	All	Central western Spain	NA
Rossi *et al*. 2014	2014	Marine	Quantitative	Pelagic	Ocean basin	Not specified	n.a.	Larvae	Mediterranean	None, although implications for MPA design discussed
Schick and Lindley 2007	2007	Freshwater	Quantitative	Lotic	Dendritic	Fish	Fish	All	California	Habitat – dams
Segurado *et al*. 2013	2013	Freshwater	Quantitative	Lotic	Rivers	Fish	Fish	Adult	Portugal	Habitat – dams
Søndergaard and Jeppesen 2007	2007	Freshwater	Review	Lotic	Dendritic					NA
Thomas *et al.* 2014	2014	Marine	Quantitative	Benthic or pelagic	Coral reefs	Invertebrates	Coral	Larvae	Great Barrier Reef	None – (species)
Treml *et al*. 2008	2008	Marine	Quantitative	Benthic or pelagic	Coral reefs	Invertebrates	General – based on PLD – giant clam, coral	Larvae	Tropical Pacific	None (season; PLD)
Van Looy *et al*. 2013	2013	Freshwater	Quantitative	Lotic	Rivers	Mammal	River otters	Adult	France	Habitat – river straightening, urbanisation, forest fragmentation
Watson *et al*. 2011	2011	Marine	Quantitative	Benthic or pelagic	Coastal pelagic	Fish, invertebrates	Fish, sea urchin	Larvae	California	Fishing – MPAs

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