

*Connection between riparian vegetation and water quality*

**THE CONNECTIONS BETWEEN RIPARIAN VEGETATION AND WATER  
QUALITY IN THE ATLANTIC FOREST**

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**Supplementary Material**

Table 1S. Articles used in this review, see methods for selection criteria. \* MG= Minas Gerais; RJ= Rio de Janeiro; RS= Rio Grande do Sul; SP= São Paulo; SC= Santa Catarina; PR= Paraná.

Cod	Authors	Year	Title	Land use and land cover in riparian zone	Brazilian state	Environmental variables	Aquatic ecosystem	Biological group	DOI
1	Piazza et al.	2018	Influence of hydroclimatic variations on solute concentration dynamics in nested subtropical catchments with heterogeneous landscapes	Native forest, agriculture, pasture, bare soil, silviculture, constructed area	SC	Rainfall, temperature, chloride (Cl), nitrate, phosphate, sulfate, sodium, ammonium, potassium, magnesium, calcium and total (TC), organic (TOC), inorganic (IC) carbon	River	Absent	<a href="https://doi.org/10.1016/j.scitotenv.2018.03.394">https://doi.org/10.1016/j.scitotenv.2018.03.394</a>
2	Ferreira et al.	2019	Can forests buffer negative impacts of land-use and climate changes on water ecosystem services? The case of a Brazilian megalopolis	Forest, agriculture and urban	SP	Absent	Water basin	Absent	<a href="https://doi.org/10.1016/j.scitotenv.2019.05.065">https://doi.org/10.1016/j.scitotenv.2019.05.065</a>
3	Machado-Silva et al	2022	Forest cover controls the nitrogen and carbon stable isotopes of rivers	Forest cover	RJ	Conductivity, pH, dissolved oxygen, temperature, turbidity, ammonia, nitrite, nitrate, total phosphorus and nitrogen	Streams	Periphyton, algae, macroinvertebrate (general) and fish	<a href="https://doi.org/10.1016/j.scitotenv.2021.152784">https://doi.org/10.1016/j.scitotenv.2021.152784</a>
4	Fritzsons & Mantovani	2021	Protection of riparian forests and water quality in a basin in the Atlantic Forest biome	Natural forests, forestry, agriculture, pasture, mining and buildings	PR	Turbidity, color, pH, electrical conductivity, alkalinity, and nitrate and chloride concentrations	River	Absent	10.5380/rf.v51 i2.62957
5	Da Silva et al.	2018	Leaching of carbon from native and non-native leaf litter of subtropical riparian forests	Decomposition experiment	RS	Dissolved organic and inorganic carbon	Streams	Absent	10.4081/jlimnol.2018.1662
6	Andriotti et al.	2022	Exploring the impacts of non-native leaf litter on invertebrate community and leaf decomposition in a Atlantic Forest stream	Decomposition experiment	SC	Electric conductivity, water temperature, pH, dissolved oxygen concentration, water velocity,	Streams	Macroinvertebrate (general)	<a href="https://doi.org/10.1590/S2179-975X7121">https://doi.org/10.1590/S2179-975X7121</a>
7	Hepp et al.	2016	Influence of land-use on structural and functional macroinvertebrate communities associated on detritus in Subtropical Atlantic Forest streams	Vegetation, agriculture, pasture and exposed soil	RS	Water temperature, dissolved oxygen, pH, conductivity, turbidity and total dissolved	Streams	Macroinvertebrate (general)	<a href="http://dx.doi.org/10.1590/S2179-975X0616">http://dx.doi.org/10.1590/S2179-975X0616</a>

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8	Alvarenga et al.	2017	Hydrologic impacts due to the changes in riparian buffer in a headwater watershed	Vegetation and pasture	MG	Rainfall	Headwater watershed	Absent	<a href="https://doi.org/10.1590/01047760201723012205">https://doi.org/10.1590/01047760201723012205</a>
9	Hepp et al.	2023	Agriculture affects functional diversity of aquatic insects in Subtropical Atlantic Forest streams	Native arboreal vegetation, agriculture and pasture	RS	Water temperature, turbidity, electrical conductivity, nitrite and total phosphorus concentrations, dissolved organic carbon and total dissolved nitrogen	Streams	Macroinvertebrate (EPT)	<a href="https://doi.org/10.1590/S2179-975X2323">https://doi.org/10.1590/S2179-975X2323</a>
10	Breda et al.	2020	Alpha and beta diversities of Trichoptera (Insecta) assemblages in natural and rural subtropical streams	Agriculture	RS	Water temperature, electrical conductivity, turbidity and dissolved oxygen, total phosphorus and nitrite, total dissolved nitrogen and dissolved organic carbon	Streams	Macroinvertebrate (Trichoptera)	<a href="https://doi.org/10.1590/S2179-975X3219">https://doi.org/10.1590/S2179-975X3219</a>
11	Paula & Fonseca-Gessner	2010	Macroinvertebrates in low-order streams in two fragments of Atlantic Forest in different states of conservation, in the State of São Paulo (Brazil)	Canopy cover	SP	Temperature, electrical conductivity, dissolved oxygen, oxygen saturation, hydrogen ion potential, dissolved solids, depth of the water column and breadth of the channel, mean speed of the current,	Streams	Macroinvertebrate (general)	<a href="https://doi.org/10.1590/S1519-69842010000400021">https://doi.org/10.1590/S1519-69842010000400021</a>
12	Piffer et al.	2021	Native forest cover safeguards stream water quality under a changing climate	Native forest, agriculture, pasture,	SP	Precipitation, dissolved oxygen (mg/L), a measure of water	Streams	Number of thermotolerant fecal coliforms	<a href="https://doi.org/10.1002/eap.2414">https://doi.org/10.1002/eap.2414</a>

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				silviculture and urban		aeration and photosynthetic activity; total nitrogen (mg/L); total phosphorus (mg/L); turbidity (NTUs), a metric that captures soil runoff, fine organic matter inputs, and in-stream production; total dissolved solids (mg/L).		(units/mL)	
13	Braun et al.	2018	Responses of riffle beetle assemblages to deforestation in a semi-deciduous Atlantic Forest remnant	Agriculture and pasture	RS	Water temperature (WT; °C), electric conductivity (EC; µS/cm), dissolved oxygen (DO; mg/L), and turbidity	Streams	Macroinvertebrate (Elmidae)	<a href="http://dx.doi.org/10.1590/0001-3765201820160853">http://dx.doi.org/10.1590/0001-3765201820160853</a>
14	Braun et al.	2018	Effects of riparian vegetation width and substrate type on riffle beetle community structure	Agriculture	RS	Altitude, stream width, pH, water temperature, turbidity, electrical conductivity, and dissolved oxygen	Streams	Macroinvertebrate (Elmidae)	<a href="https://doi.org/10.111/ens.12283">https://doi.org/10.111/ens.12283</a>
15	Robinet et al.	2018	Impacts of forest conversion and agriculture practices on water pathways in Southern Brazil	Agriculture	RS	Oxygen isotopic signature	Water pathways	Absent	<a href="https://doi.org/10.1002/hyp.13155">https://doi.org/10.1002/hyp.13155</a>
16	Siegloch et al.	2014	Effect of land use on mayfly assemblages structure in Neotropical headwater streams	Agriculture, pasture and silviculture	SP	Electrical conductivity, dissolved oxygen concentration, pH, temperature and velocity water, depth and width of streams	Streams	Macroinvertebrate (Ephemeroptera)	<a href="http://dx.doi.org/10.1590/0001-3765201420130516">http://dx.doi.org/10.1590/0001-3765201420130516</a>
17	Fernandes et al.	2015	Diagnóstico ambiental da faixa ciliar e qualidade de água de duas microbacias utilizadas para abastecimento humano	Forest cover and pasture	RJ	Cádmio, cobre, chumbo, manganês e zinco	Watershed	Coliformes totais e termotolerantes	<a href="https://doi.org/10.15809/irriga.2015v20n1p128">https://doi.org/10.15809/irriga.2015v20n1p128</a>
18	Fontana et al.	2022	<i>Hovenia dulcis</i> Thunb. ( <i>Rhamnaceae</i> ) invasion in the riparian zone alters the	Invasive species	RS	Water temperature, electrical conductivity,	Streams	Macroinvertebrate (general)	<a href="https://doi.org/10.1007/s10201-021-00711-1">https://doi.org/10.1007/s10201-021-00711-1</a>

Cod	Authors	Year	Title	Land use and land cover in riparian zone	Brazilian state	Environmental variables	Aquatic ecosystem	Biological group	DOI
			<i>dynamics and decomposition of organic matter in subtropical streams, but not of associated invertebrate assemblages</i>			pH, dissolved oxygen, total dissolved solids and turbidity were measured in situ with a Horiba® multiparameter analyzer; Dissolved organic carbon and total dissolved nitrogen			<a href="https://doi.org/10.1007/s10641-018-0749-8">00695-7</a>
19	Gonçalves et al.	2018	Trophic structure of coastal freshwater stream fishes from an Atlantic rainforest: evidence of the importance of protected and forest-covered areas to fish diet	Forest cover	SP	Absent	Streams	Macroinvertebrate (general) and Fish	<a href="https://doi.org/10.1007/s10641-018-0749-8">https://doi.org/10.1007/s10641-018-0749-8</a>
20	Esteves et al.	2008	Trophic structure of a fish community along environmental gradients of a subtropical river (Paraitinga River, Upper Tietê River Basin, Brazil)	Primary forest, pasture and urban	SP	pH, temperature (C), conductivity (IS cm-1), total dissolved solids (mg l-1), turbidity (NTU) and dissolved oxygen (mg l-1)	River	Fish	<a href="https://doi.org/10.1007/s10750-007-9172-4">https://doi.org/10.1007/s10750-007-9172-4</a>
21	Santos et al.	2023	Assessment of Water Ecosystem Integrity (WEI) in a Transitional Brazilian Cerrado-Atlantic Forest Interface	Native vegetation, pasture, reforestation and exposed soil	SP	Water odor, flow characteristics	Streams and river	Filamentous algae and Macrophyte	<a href="https://doi.org/10.3390/w15040775">https://doi.org/10.3390/w15040775</a>
22	De Paula et al.	2018	Multi-scale assessment of forest cover in an agricultural landscape of Southeastern Brazil: Implications for management and conservation of stream habitat and water quality	Forest cover	SP	pH, total alkalinity, ammoniacal nitrogen, total phosphorus, total potassium, total calcium, total magnesium, conductivity, total acidity, hardness, carbon dioxide, total suspended sediments, color and turbidity.	Streams	Absent	<a href="https://doi.org/10.1016/j.ecolind.2017.11.061">https://doi.org/10.1016/j.ecolind.2017.11.061</a>

Cod	Authors	Year	Title	Land use and land cover in riparian zone	Brazilian state	Environmental variables	Aquatic ecosystem	Biological group	DOI
23	Silva-Araújo et al.	2020	Effects of riparian deforestation on benthic invertebrate community and leaf processing in Atlantic forest streams	Canopy cover	RJ	Water temperature, depth, discharge, width, water current velocity, pH, minimum daily O <sub>2</sub> saturation, canopy cover, and ammonium (NH <sub>4</sub> <sup>+</sup> ) and soluble reactive phosphate (SRP) concentration.	Streams	Macroinvertebra te (general)	<a href="https://doi.org/10.1016/j.pecon.2020.09.004">https://doi.org/10.1016/j.pecon.2020.09.004</a>
24	Siegloch et al.	2016	Effects of small changes in riparian forest complexity on aquatic insect bioindicators in Brazilian subtropical streams	Canopy cover	SC	water velocity; width and depth of streams (cm), determined using a measuring tape; electrical conductivity (mS cm <sup>-1</sup> ); dissolved oxygen concentration; pH and water temperature,	Streams	Macroinvertebra te (EPT)	<a href="http://dx.doi.org/10.1071/MF15162">http://dx.doi.org/10.1071/MF15162</a>

Table 2S. Most frequently used words in the keywords of the articles reviewed, see methods for selection criteria.

Words	Frequency
Forest	11
Water	7
Cover	6
Land	6
Riparian	6
Environmental	6
Vegetation	5
Aquatic	4
Soil	4
Food	3

Words	Frequency
Area	3
Integrity	3
River	2
Subtropical	2
Atlantic	2
Scenario	2
Quality	2
Use	2
Restoration	2
Ecology	2
Assessment	2
Permanent	2
Preservation	2
Invertebrates	2
Watershed	2
Biological	2
Richness	2
Stream	2
Landscape	2
Managment	2
Zones	2
Conservation	2
Insects	2
Species	2
Leaf	2
Macroinvertebrate	2
Agriculture	1
Catchment	1
El	1
Niño	1
Modelling	1
Quantity	1
São	1
Paulo	1
Deforestation	1
Webs	1
Cycle	1
Global	1
Warming	1
Mediation	1

Words	Frequency
Active	1
Isotope	1
Carbon	1
Stocks	1
Health	1
Functions	1
Mixed	1
Ombrophilus	1
Rain	1
Colonisation	1
Headwater	1
Brazilian	1
Act	1
Traits	1
Dissimilarity	1
Taxonomic	1
Agriculture	1
Impact	1
Conversation	1
Recovery	1
Monitoring	1
Low	1
Order	1
Changes	1
Precipitation	1
Provision	1
Ecosystem	1
Services	1
Coleoptera	1
Converted	1
Elmidae	1
Buffer	1
Biology	1
Shredders	1
Critical	1
Tracers	1
Pathways	1
Dam	1
Tailings	1
Ether	1



Words	Frequency
Amine	1
Sodium	1
Stress	1
High	1
Ph	1
Phytoremediation	1
Ephemeroptera	1
Non-native	1
Invasion	1
Litter	1
Decomposition	1
Organic	1
Matter	1
Dynamic	1
Terrestrial-aquatic	1
Linkage	1
Preference	1
Habits	1
Niche	1
Overlap	1
Remote	1
Sensing	1
Protocol	1
Plecoptera	1
Trichoptera	1
Indicator	1
Processing	1
Bioindicator	1
Community	1
Metric	1
Secondary	1
Degradation	1