

Benefits of riparian forest for the aquatic ecosystem assessed at a large geographic scale



Claimed benefits of riparian forest cover for the aquatic ecosystem include purification, thermal control, organic matter input and habitat provision, which may improve physicochemical and biotic quality. However, these beneficial effects might be flawed by multiple stressor conditions of intensive agriculture and urbanization in upstream catchments. We examined the relationship between riparian forest cover and physicochemical quality and biotic integrity indices in extensive large scale datasets. Measurements of hydromorphological conditions and riparian forest cover across different buffer widths for 59 × 103 river stretches covering 230 × 103 km of the French river network were coupled with data for physicochemical and biotic variables taken from the national monitoring network. General linear and quantile regression techniques were used to determine responses of physicochemical variables and biological integrity indices for macroinvertebrates and fish to riparian forest cover in selections of intermediate stress for 2nd to 4th order streams. Significant responses to forest cover were found for the nutrient variables and biological indices. According to these responses a 60% riparian forest cover in the 10 m buffer corresponds to good status boundaries for physicochemical and biotic elements. For the 30 m buffer, the observed response suggests that riparian forest coverage of at least 45% corresponds with good ecological status in the aquatic ecosystem. The observed consistent responses indicate significant potential for improving the quality of the aquatic environment by restoring riparian forest. The effects are more substantial in single-stressor environments but remain significant in multi-stressor environments.

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Obtenir le document : EDP Sciences

Mots clés : hydromorphological quality, riparian buffer, nutrient reduction, biotic integrity indices, qualité hydromorphologique, zone tampon riveraine, réduction nutriments, indices d'intégrité biologique

Thème (issu du Text Mining) : MILIEU NATUREL

Date : 2013-04-18

Format : text/xml

Source : <https://doi.org/10.1051/kmae/2013041>

Langue : Anglais

Télécharger les documents : <https://www.kmae-journal.org/10.1051/kmae/2013041/pdf>

Permalien : <https://www.documentation.eauetbiodiversite.fr/notice/benefits-of-riparian-forest-for-the-aquatic-ecosystem-assessed-at-a-large-geographic-scale0>

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