

# Using species sensitivity distribution approach to assess the risks of commonly detected agricultural pesticides to Australia's tropical freshwater ecosystem

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## ABSTRACT

To assess the potential impacts of agricultural pesticides on tropical freshwater ecosystems, the present study developed temperature-specific, freshwater species protection concentrations (i.e. ecotoxicity threshold values) for 8 pesticides commonly detected in Australia's tropical freshwaters. As relevant toxicity data for native tropical freshwater species to assess the ecological risks were mostly absent, scientifically robust toxicity data obtained at  $\geq 20$  °C were used for ecologically relevant taxonomic groups representing primary producers and consumers. Species sensitivity distribution (SSD) curves were subsequently generated for predicted chronic exposure using BurrIioz 2.0 software with mixed chronic and converted acute data relevant to exposure conditions at  $\geq 20$  °C. Ecotoxicity threshold values for tropical freshwater ecosystem protection were generated for ametryn, atrazine, diuron, metolachlor and imidacloprid (all moderate reliability), and simazine, hexazinone and tebuthiuron (all low reliability). Using these SSD curves, the retrospective risk assessments for recently reported pesticide concentrations highlight that the herbicides ametryn, atrazine and diuron are of major concern for ecological health in Australia's tropical freshwater ecosystems. The insecticide imidacloprid also appears to pose an emerging threat to the most sensitive species in tropical freshwater ecosystems. Exposed temperature-specific approach may be applied for the development of water quality guideline values for other environmental contaminants detected in tropical freshwater ecosystems until reliable and relevant toxicity data are generated using representative native species. This article is protected by copyright. All rights reserved.