

Impacts of selective logging on the oxidative status of tropical understorey birds

ABSTRACT

Selective logging is the dominant form of human disturbance in tropical forests, driving changes in the abundance of vertebrate and invertebrate populations relative to undisturbed old-growth forests. A key unresolved question is understanding which physiological mechanisms underlie different responses of species and functional groups to selective logging. Regulation of oxidative status is thought to be one major physiological mechanism underlying the capability of species to cope with environmental changes. Using a correlational cross-sectional approach, we compared a number of oxidative status markers among 15 understorey bird species in unlogged and selectively logged forest in Borneo in relation to their feeding guild. We then tested how variation of markers between forest types was associated with that in population abundance. Birds living in logged forests had a higher activity of the antioxidant enzyme superoxide dismutase and a different regulation of the glutathione cycle compared to conspecific birds in unlogged forest. However, neither oxidative damage nor oxidized glutathione differed between forest types. We also found that omnivores and insectivores differed significantly in all markers related to the key cellular antioxidant glutathione irrespective of the forest type. Species with higher levels of certain antioxidant markers in a given type of forest were less abundant in that forest type compared to the other. Our results suggest that there was little long-term effect of logging (last logging rotation occurred ~15 years prior to the study) on the oxidative status of understorey bird species. However, it is unclear if this was owing to plasticity or evolutionary change. Our correlative results also point to a potential negative association between some antioxidants and population abundance irrespective of the forest type.