Coral traits and their link to extinction risk

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Functional traits determine the fitness of organisms and shape their ecological niches. A quantitative assessment of the link between coral traits and abiotic variables has great potential for predicting the sensitivity or robustness of reef corals to global change. The main drawback of this approach is the paucity of trait data for many species, especially of traits that are difficult to measure (i.e. mode of larval development). Here we use phylogenetic imputation approaches to estimate expected values for missing trait entries. Observed and imputed traits can then be linked to the threat status of species as reported by the International Union for Conservation of Nature (IUCN). We find that, besides geographic range size, several other traits are suitable explanatory variables for the categorization of extinction risk. We propose a generalized linear model of 12 traits derived from 739 coral species. A third order recombination model comprising growth form, water depth, symbiont clade, colony diameter, corallite width, range size, growth rate, mode of larval development, symbionts in propagules and life history strategy explains up to 40 % of variation in the corals' IUCN status. Removing range size from the analyses lowers the explanatory power to an adjusted R^2 of 0.25, which, however, is still highly significant. Consequently, intrinsic coral traits can provide additional information on the extinction risk assessment of reef coral species.