Predicting the habitat distribution and grazing of coral reef fish

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(signature) ..................................................................................................................
To Devon, a small farewell
For my peace (your gift)
Deep gratitude from the middle of my heart.
ABSTRACT

Although today coral reefs need to be managed to ensure their persistence in the challenging conditions imposed by a rapidly changing environment, practitioners worldwide often lack adequate tools to achieve this. Spatial patterns of the abundance of reef resources, but also of the processes that govern reef recovery after disturbance, need to be mapped at relevant scales to identify priority conservation measures. In this thesis I took important steps towards the construction of adequate tools for reef managers: towards creating maps of reef resilience. The first step comprised the accuracy enhancement of thematic maps to discriminate typical forereef habitats that differ in their structural complexity. The second step consisted of the creation of statistical models to predict spatial patterns of the density and biomass of several fish species including grazers. To date, fish species richness can be mapped but not the spatial patterns of abundance or biomass of key species of reef fish. Here, I demonstrate that it is possible to predict spatial patterns of the abundance of key species of grazers across large scales on Caribbean reefs by mapping their acoustic roughness. The third and fourth steps focused on improving our understanding of the process of parrotfish grazing on Pacific reefs. I created models to predict the grazing impact of populations of grazers from their abundance data incorporating sources of spatio-temporal variability in their grazing behaviour. Although grazing of Pacific parrotfish communities is a subject of growing concern and several aspects of its dynamics are well understood on the Great Barrier Reef, this thesis contributes with two major future goals: (1) to rank Micronesian parrotfish species according to their relative contribution to grazing impact and (2) to aid the generation of maps of grazing.
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