



G L  M A R
Ph.D. Defence



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Title of the Thesis Colloquium:

**The Mexican Caribbean reefs:
from benthic changes and stressors
towards a sustainable management strategy**

1 November 2023 - 16.30 hrs.
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and online via Zoom

The Mexican Caribbean reefs: from benthic changes and stressors towards a sustainable management strategy

The Mexican Caribbean is home to many coral reefs with a high ecological and economic value for people in the country and beyond. Nevertheless, these ecosystems are highly threatened due to a combination of global (anthropogenic climate change) and local stressors (mass tourism, land-based pollution, and overuse of resources). Therefore, this thesis aimed first to understand the benthic dynamics of change and the main stressors causing these changes to propose a conceptual framework to improve coral reef management.

A large-scale spatiotemporal analysis between 1978 and 2016 on coral and macroalgae cover in the Mexican Caribbean reefs was conducted through meta-analysis. Here, findings revealed that hard coral cover decreased from ~ 26 % in the 1970s to 16 % in 2016. In contrast, macroalgae cover steadily increased along the reef system. Both groups showed high spatiotemporal variability. The cumulative impact assessment on hard coral and macroalgae benthic communities exposed to multiple stressors (thermal stress, nutrient inflow, sedimentation, hurricane impact, and anthropisation) revealed that sea surface temperature increased by 0.30 °C in 12 years, and bleaching susceptibility strongly influenced coral cover change, followed by the negative effect of anthropogenic activities, which incorporates the increasing pressures of urban hubs. The future of Mexican Caribbean coral reefs is at high risk due to cumulative impacts from local and global stressors despite monitoring and restoration efforts over the past few decades, which begs the question of why and how protection and management may be improved. Consequently, a conceptual framework was generated focusing on an integrated management strategy to improve the understanding of the unique and vital services that coral reef ecosystems in the Mexican Caribbean provide.