

## **Dynamic Ecosystem Response to Tropical Cyclones**

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Ecosystems such as mangroves and forests can provide important economic services by mitigating the impact of tropical cyclones. This is of considerable interest in such alternatives to “hard engineering” solutions to disaster mitigation and preparedness now and under climate change. Research has demonstrated the benefit of these ecosystems by parameterising their impact on, for example, the roughness experienced by the tropical cyclone or ocean which can reduce the peak wind speed, maximum wave height or height of ocean surge on to land. This type of analysis is usually done by considering cases of with and without these natural barriers. However, in real situations one can expect that the capacity of these ecosystems to mitigate damage is dynamic during the event and actually reducing. This would imply that one should consider a dynamic approach to ecosystem response during the storm. In this project we will examine to what extent such a dynamic response is important in terms of the tropical cyclone structure and ultimate damage it can cause. We will examine land and marine based ecosystems. The student will gain an understanding of the turbulent boundary layers within natural ecosystems, and with the model also to be applied to complex natural forest stands to look at effects of contrasting patterns of tree architectural design on extreme high-wind resistance. This will inform future field campaigns focussing on ecosystem damage assessment, as well as providing new insights as to the basis of differential community responses to extreme high wind stresses. It will also provide providing for a better quantification of the services provided by natural ecosystems in terms of cyclone wind abatement.