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## The short-term impacts of a cyclone on seagrass communities in Southwest Madagascar

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### Abstract

Cyclones are large-scale disturbances with highly destructive potential in coastal ecosystems. On February 22, 2013, a powerful tropical cyclone made landfall on the southwest coast of Madagascar, a region which is infrequently hit by such extreme weather events coming from the Mozambique Channel. Seagrass ecosystems, which provide valuable ecosystems services to local communities, are especially vulnerable because they thrive in shallow waters. The impact of Cyclone Haruna on seagrass diversity, height and coverage and associated fish diversity, abundance and biomass was assessed in 3 sites near Andavadoaka (22°07'S, 43°23'E) before and after the event using fish underwater visual census, video-transects, and seagrass quadrats. The cyclone caused a significant loss in seagrass cover at all 3 sites. *Thalassia hemprichii* and *Syringodium isoetifolium* were the most affected species. Andavadoaka beach, the most exposed site, which was also subject to human use and was most fragmented, suffered the largest negative effects of the cyclone. Cyclone Haruna was not found to significantly affect fish assemblages, which are highly mobile organisms able to use a diversity of niches and adjacent habitats after seagrass fragmentation. Extensive sampling and longer time-scale studies would be needed to fully evaluate the cyclone impact on communities of seagrass and fish, and track potential recovery in seagrass coverage. The intensity and destructive potential of cyclones is expected to increase with global warming, which is of concern for developing countries that encompass most of the world's seagrass beds. This study provided a unique and key opportunity to monitor immediate impacts of an extreme disturbance in a region where cyclones rarely hit coastal ecosystems and where local populations remain highly dependent on seagrass meadows.

**Keywords:** cyclones, southwest Madagascar, seagrass ecosystems, Haruna impact, fish assemblages, local communities

### 1. Introduction

Madagascar is extremely vulnerable to cyclones, tropical storms and floods. While cyclones are particularly common on the northeast and east coasts, the southwest coast is much less affected, as the deviation or formation of cyclones in the Mozambique channel is relatively rare, with 94 tropical cyclones recorded from 1948 to 2010 (Matyas, 2014). Intense storms and cyclones hitting this region cause large increases in expected rainfall, as well as other major damage caused by

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