

Sea turtles, climate change and future challenges for management.

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Sea turtles are particularly vulnerable to climate change since they have life history traits strongly tied to environmental variables and nest in vulnerable coastal areas. In the short-term, sea turtle's egg development phase will be the most affected life-history phase by climate change since incubating temperature can influence offspring phenotype, sex ratio and success and sea turtle eggs are vulnerable to sea level rise and cyclonic activity while they incubate. One of the ways sea turtles may adapt to climate is by changing the distribution of their nesting grounds. Changes of nesting locations may also have severe implications and cause further conservation challenges for this threatened population as turtles may be forced to nest where even less conservation measures are in place or management is logistically difficult. Nevertheless, changes may result in improved population performance as turtles may start nesting in areas with more favorable nesting and incubating habitat and/or areas with less. Here we investigated how sea level rise (SLR) will affect key nesting grounds for the northern Great Barrier Reef green turtle population, the largest green turtle population in the world. For this, we developed 3-D elevation models and applied three SLR scenarios projected by the IPCC 2007 and an additional scenario that incorporates ice melting. Results indicate that up to 38% of available nesting area across all the rookeries may be inundated as a result of SLR. More importantly, we also identified areas in the northern Australian coast that have the potential to serve as functional green turtle rookeries as SLR and how management will need to adapt if sea turtles shift their nesting to these areas. Further, we also demonstrate the broader applicability from studies of this nature and highlight the need to consider a changing climate in the conservation and management of key fauna.