STOCK-WIDE ASSESSMENT OF COASTAL VULNERABILITY AT FLATBACK NESTING SITES IN THE PILBARA REGION OF WESTERN AUSTRALIA*

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Sandy beaches are essential nesting habitats for sea turtles but their persistence and stability are threatened by rising sea levels and increases in the frequency and severity of storms, driven by climate change. Identifying which nesting beaches are at greatest risk from climate change is an important goal of sea turtle conservation globally. To date, efforts to identify at-risk beaches have been hindered by the ability to model complex processes and incomplete information on nesting distribution and abundance. This study explores the risk of beach erosion and inundation at sites utilised for nesting by flatback turtles (*Natator depressus*) in the Pilbara region of Western Australia, using the InVEST (Integrated Valuation of Ecosystem Services and Trade-offs) Coastal Vulnerability Model. A coastal exposure index was calculated for mainland and island shorelines in the Pilbara in terms of six bio-geophysical variables: (1) empirical wind- and (2) empirical wave- hindcast data to capture the effects of storms, (3) distance from the continental shelf to estimate storm surge potential, (4) coastal geomorphology which influences landscape stability, (5) coastal elevation, and (6) observed changes in sea level rise. Exposure was then coupled with published information on the distribution and abundance of *N. depressus* nesting activity, resulting in an exposure index for 402 sandy beaches, spanning more than 600 km of coastline. The majority of beaches (~70%) had an intermediate to high exposure index. In particular, 34% of beaches with the highest abundance of *N. depressus* nesting activity had the highest exposure. This suggests that coastal exposure is a key vulnerability for *N. depressus* reproductive success in this region. Promisingly, five beaches with the highest abundance of nesting activity also had the lowest exposure and these beaches may be critical for the long-term natural resilience of the stock against coastal exposure. Exposure varies across spatial scales and the approach presented here allows for a rapid and broadscale assessment of exposure and inundation risks at a scale most relevant to management.

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