Recruitment and El Niño-Southern Oscillation long-term effects on green turtle (Chelonia mydas) nest abundance

ABSTRACT

Efforts for the conservation of green turtles (Chelonia mydas) in the Chagar Hutang Turtle Sanctuary (CHTS), Redang Island, Malaysia, have been in place for over two decades. Here we propose that the recruitment of new mothers to this rookery has a significant influence on the recovery of nest abundance in the long term. A 2–3 years' quasi-periodic oscillation in nest abundance was also observed. This fluctuation might have been a consequence of El Niño-Southern Oscillation (ENSO), which affects sea-surface temperature (SST) in the South China Sea (SCS) in the months following El Niño/La Niña events. To test these hypotheses, the number of clutches laid in the CHTS over a 24-year period was assessed via the Seasonal and Trend Decomposition by Loess (STL) algorithm. The long-term trend of nest abundance was shown to be dependent on the recruitment of new mothers, while a 2–3 years' quasi-periodic oscillation in nest abundance showed a 2.5-year-lagged negative correlation to the Oceanic Niño Index (ONI) and a 2-year-lagged negative correlation to the SST data series from SCS shallow waters, including known foraging grounds of green turtles nesting in the CHTS. In summary, we demonstrated that La-Niña peaks by decreasing SST in the SCS for the subsequent semester promotes green turtle nesting after 2–3 years. These results highlight the influence of broad climatological fluctuations in the sea turtles' life cycle and the importance of conservation measures to secure their entire home range and life stages.