PREDICTING THE EFFECTS OF SEA LEVEL RISE ON THREE SEA TURTLE NESTING BEACHES IN COSTA RICA

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Sea level rise, which has been brought about by rapid climate change, is predicted to increase by approximately 0.6 m in the next 90 years according to the Intergovernmental Panel on Climate Change. This increase could affect the availability and quality of sea turtle nesting habitat. This investigation, a collaborative effort of Sea Turtle Conservancy, PRETOMA, Osa Conservancy and The Science Exchange Sea Turtle Internship Program, took place at Pejeperro Beach (Osa Peninsula), San Miguel Beach (Guanacaste), and Tortuguero Beach (Caribbean) in July and August of 2012. These beaches are monitored by the collaborating organizations for nesting of five out of seven of the world's endangered sea turtle species: greens, olive ridleys, leatherbacks, hawksbills, and loggerheads. Data were collected following the World Wildlife Fund (WWF) Temperature Monitoring Manual. At each beach, slope data were collected with an abney level along 60 five-meter transects distributed evenly over three separate 100-m zones that represent zero, low, and high turtle nest density areas according to the expert opinion of the supervisor from each organization. Two of these slope surveys were implemented, one at the beginning of the study and one at the end, in order to capture short-term natural rates of change in topography due to factors such as erosion and accretion of sand from wind, tides, currents, rivers, storms as well as turtle nest excavations and loss of sand from human activities such as beach development and sand mining. To predict the possible beach area loss from sea level rise in the year 2100, we took the average of the first and second survey elevations of each sample point and subtracted 0.6 m to simulate flooding of the beach. Only a few of our 1279 sample points were flooded resulting in a loss of 6% of the sampled beach area at Tortuguero (3% from the low nest density zone and 3% from the high nest density zone). The site with the most dramatic loss was at Pejeperro Beach, with a predicted 14% of the high nest density zone potentially being underwater by 2100. In this zone, 13 out of 20 transects are predicted to shrink five meters in width starting at the mid-tide line towards the back of the beach because there is a gradual slope with low elevations. We will present the natural rate of topographic changes and the actual nest densities observed within these same transects over the six to eight week study period. Our analysis will also include a comparison between these three beaches and with other beaches around the world that have implemented the WWF slope surveys. Conservation recommendations to mitigate for impacts of sea level rise on nesting beaches are continued slope surveys, promoting and enforcing development set back regulations, and hatchery programs to protect nests that are threatened with inundation.