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BETA TESTING NESTING SAFE - NEW TECHNOLOGY FOR NEST FINDING AND ENVIRONMENTAL TEMPERATURE MONITORING

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Locating turtle nests is a challenge, especially on beaches where nest markings allow nest poaching. Yet, regularly locating and monitoring nests *in situ* during incubation are vital for understanding interactions of climate change, nest temperatures, egg development, and sex ratios. Furthermore, monitoring environmental temperatures is critically important in understanding sea turtle nesting biology. However, monitoring environmental temperatures *in situ* during nest incubation or dynamic beach conditions without disrupting the nest or nearby environment has, until now, remained a difficult challenge. This is because previous technology did not permit external monitoring of the devices after burial. Thus, temperature data could neither be detected nor displayed until the monitoring term ended. In some cases, logger failures resulted in loss of time and valuable data. Nesting Safe developed an innovative application of Radio Frequency Identification (RFID) technology to detect specially designed CRADAL (Concealed RADio Activated Localization) nest tags and temperature loggers addressing issues of relocating turtle nests and monitoring beach environments. Using a responsive mobile application to record geo-referenced nesting events and temperature loggers allows real time monitoring of nests with selected upload of *in situ* data. After uploading to a referential database, nest emergence times and temperatures are visualized in real time. We tested Turtle Nesting Safe Professional technology in two field applications. First, we deployed nest CRADAL tags on 5 beaches in countries at variable latitudes to validate positioning and map visualizations in the database. Some nests were relocated to hatcheries with associated tags moved to continue monitoring. We also deployed 2 temperature loggers with integrated sensors, and 2 loggers with 50 and 100cm probes to measure nest temperatures at different nest depths. Second, we deployed 16 hermetically sealed data loggers on a nesting beach in Utila, Honduras from July 4 – July 28, 2016 in a beach pollution experiment in four corridors with varying amounts of debris coverage to monitor surface sand temperatures. Four RFID temperature loggers were placed in each corridor and set to log temperatures every 20 minutes. Temperature loggers were scanned *in situ* every 4 – 5 days, and data saved in an offline mode on a mobile tablet until uploaded with an Internet connection. Temperature data were automatically stitched in the web database and later analyzed by ANOVA. We referenced 10 nests and were able to relocate all unmarked nests, and monitor *in situ* temperatures in both natural and relocated nests daily without having to mark or disrupt nests in any way. In Honduras, we found sand temperatures were significantly lower for the high density pollution corridor than for the control corridor by 0.6C during the day and by 0.71C overnight. These and other results demonstrate that Turtle Nesting Safe Professional technology can facilitate real-time nest locating, and nest and environmental temperature monitoring *in situ*. The ability to both locate nests and carry on *in situ* nest and environmental temperature monitoring without disrupting incubation has the potential to provide new insights into factors that influence hatchling success and sex ratios in response to global climate change.

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