Assessment of a hawksbill turtle (Eretmochelys imbricata) foraging population in the Derawan archipelago, East Borneo, Indonesia: a pilot study
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Introduction

The Derawan-archipelago off the east coast of Borneo is the largest nesting site of the green turtle in Indonesia. It is less well known, however, that its extended coral reefs also house an important foraging population of the critically endangered hawksbill turtle. Unfortunately, despite being officially protected in Indonesia, the archipelago’s hawksbills are regularly hunted for their shell or to end up as wall decorations. Turtle products are openly and bluntly sold to tourists on the market of Derawan, and enforcement is virtually absent. Thus, protection measures are urgently needed, and in 2014 we started a research and impact mitigation initiative for the hawksbill turtles of the Derawan archipelago.

Despite hawksbills are frequently reported in the area, the current population size is unknown, as is its trend, its structure, and its spatial distribution in and among the reefs of the archipelago. Further, the actual nesting sites and migration routes of this population are completely unknown. The major goal of the research part of this initiative is to gain sufficient insights into the hawksbill turtle population of the archipelago, and to lay the foundation for a comprehensive conservation and research program for the hawksbill turtles of Maratua. Covering three different approaches to gain first insights into the hawksbill turtle population of the archipelago, and to lay the methodological foundation for future comprehensive studies.

One major objective of this study was to find a suitable and efficient method for in-water capture of hawksbills, in order to perform a mark & recapture study and a systematic analysis of the data. For this purpose, we tested (1) the “rodeo method”, consisting of lassoing turtles with a rope from a small diving boat ("rodeo method"), 2) systematic snorkelling surveys at the reef edge and hand-catching of turtles, 3) scuba diving along with turtles and hand-catching turtles resting on the sea floor, 4) catching with continuously monitored gill nets.

The “rodeo method” yielded no catches, and due to specific local conditions we judged this method as generally unsuitable for this location. With the snorkelling method we caught five juvenile hawksbill turtles during a total in-water survey time of 35 hours. To test the scuba diving method we hired for one night a suitable expedition ship (local standard wooden boat with davits), and set up a lay-by platform (4.5 m underneath) with new inflatables anchored including divers. In this nights 50 juvenile hawksbills have been caught, marked, and measured. The set-up worked very well, but we are confident that the number of captured hawksbills during an expedition ship, as too fast, too costly, and also unsuitable for the turtles. Captured hawksbill turtles have been immediately marked with inserts 400 tags, and a comprehensive measuring protocol for obtaining following basic data had been applied (curved carapace length and width, straight carapace length and width, straight midline plastron length, head, tail, weight, length). A small tissue sample (fin nipp) was obtained for further lab-based DNA and microsatellite analysis. Every turtle was caught for disease, parasites, and external injuries. Then, the turtles were photographed and subsequently released with a VHF tag.

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Mark & recapture study

We conducted an interview campaign among inhabitants of Maratua aimed by a standardised questionnaire to ask people about frequencies, locations, and times of their sea turtle encounters, but also about social and economical situations, fishing practices, and attitudes toward conservation measures. We interviewed 187 persons (about 6% of the island total population of about 3,200 people, 73.7% males and 26.3% females). The educational level on Maratua appears generally low. About 62.8% of the respondents received only primary school education. Fishing was stated as the most important income source with 79.8% of the male respondents stating fishing as their primary profession. Asked for illegal fishing practices 9.7% and 37.6% stated to have practiced dynamite and cyanide fishing, respectively. Only 6 respondents stated to have hunted hawksbill turtles, but 22.7% declared that they kill hawksbill turtles that had been accidents caught for selling their shell. In contrast to the interviewees, 96.6% of the interviewees would appreciate better protection of the sea turtles.

We found that the Derawan archipelago is the main nesting area of hawksbills in Indonesia and is the second major one in Southeast Asia. We identified three primary nesting areas in and among the archipelago of Maratua, which are the southern end of the long-named island of Maratua (source courtesy Petra Minnasch). C B. Turtle dive site Jokot and our first hawksbill turtle (IDB0009) during a scuba dive on the archipelago despite the officially rigidly protected status of all turtle nesting sites.

Conclusions

1. Mark & recapture study: With scuba dive surveys at night carried out from a fully equipped expedition ship that can stay at sea over an extended time we found an affordable, efficient, and flexible method for acquiring basic information about the population status of hawksbills. This will allow us in future to conduct comprehensive mark & recapture studies with high chances of sufficient capturing yield to address important questions about population status, migration routes, and nesting locations of the region’s hawksbill turtles.

Another interesting and important source of information on the occurrence of hawksbill turtles is provided by local dive bases and recreational divers who spend their holidays there. While interviewing locals can provide a broader overview of the distribution of hawksbills throughout the archipelago, using the divers can reveal more detailed information on the occurrence of turtles at certain dive locations that are regularly visited by local dive bases; moreover, this way we can attain a universal fluctuation of hawksbill occurrence at the dive site could be obtained. Therefore, we developed a questionnaire for recreational divers, which is handed over to them by the managers of collaborating dive resorts together with a short motivation letter, and on which divers can briefly report about species, numbers, dates, and times of their turtle encounters. Filling one questionnaire does not require more than a few minutes, and ideally one questionnaire should be completed after each dive. During our pilot work two dive bases on Maratua collaborated to our study (Nabucco and Nunukan Dive Resorts). In this time 12 divers completed 62 questionnaires (1–18 questionnaires per diver, average: 5.5, SD: 4.6). With this study we already been continue over a longer period of time, resulting as much data possible. Already on location remained valuable data that first to possible hot spots of hawksbill turtle abundance off the coast of Maratua. Further, our previous observations have been confirmed that in distinct locations green turtles aggregate in high numbers, while hawksbills were much less abundant, but could be regularly encountered.

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