Reproduction biology of green turtle in Itsamia, Mohéli (Union of Comoros)

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Introduction

Mohéli is the most important site of the Comoros Archipelago for the reproduction of *Chelonia mydas* (Frazier, 1985). Created in 2001, the Mohéli Marine Park (MMP) includes all the southern area from Miringoni Itsamia covering more than 40000 Ha. The fringing reef surrounding the MMP is well developed and between 250-1300m wide. Itsamia is the Eastern village of the MMP. Since 1994, the Association pour le Developpement Socio- Economique d'Itsamia (ADSEI) has been preserving the importance of the beaches of Itsamia for green turtles through protective actions. Currently, the beaches of Itsamia are one of the more important nesting sites for *Chelonia mydas* in the South West of the Indian Ocean. About 3000 females nest per year on the five beaches monitored daily by the ADSEI/MMP field guards (ADSEI, unpublished data) as part of a monitoring program that has been running since 1998. A few *Eretmochelys imbricata* are observed too. The present study describes data collected between April and June 2009.

![Figure 1: Map of Itsamia and the Moheli, Union of Comoros. (Courtesy: J. Bourjea)](image)

Materials and methods

Each female that laid was measured (curved carapace length - CCL) and tagged with a monel tag. Sixty nests were monitored to determine clutch size and emergence success (Miller, 1999). During the ovoposition, 10 eggs were measured and weighed from each nest. A Wemco temperature logger was positioned in the centre of the clutch for 30 nests. The nest location was indicated by a net. These nets were examined twice per day to monitor if the emergence had occurred. Fifteen emerged individuals per nest were measured (straight carapace length - SCL) and weighed before being released on the beach. Once 72 hours had passed since the last emergence, nests were excavated to categorize nest contents and determine hatchling and emergence success (Miller, 1999).

Results

Means are presented with associated standard deviations. During the study 742 females were
measured, and the mean CCL was $108.12 \pm 5.29\text{cm}$ (range: 92-129). The average clutch size was $116 \pm 24$ eggs. The mean egg size and weight were respectively $42.38 \pm 1.32 \text{mm}$ and $42.50 \pm 3.88 \text{g}$. The mean length and weight of hatchlings was $47.43 \pm 1.51\text{mm}$ and $21.42 \pm 1.85\text{g}$. Three of the 60 nests monitored were destroyed by females during the study, and two nests laid by the same female did not hatch. The hatching success was $75.3 \pm 33.37\%$ (range 0-146; n=57). The emergence success is $64.80 \pm 29.00\%$ (range 0-100; n=57).

Nesting females dug up four of the 30 temperature loggers during the study. Table 1 and Figure 2 suggest that nest temperature may be different between the two beaches studied, although the sample size at Itsamia is small.

<table>
<thead>
<tr>
<th>Nests</th>
<th>Mean temperature of incubation ($^\circ\text{C}$)</th>
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<tbody>
<tr>
<td></td>
<td>Entire duration</td>
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<tr>
<td>-------</td>
<td>-----------------</td>
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<tr>
<td>Overall (n=26)</td>
<td>$32.38 \pm 1.09$</td>
</tr>
<tr>
<td>IT (n=6)</td>
<td>$31.11 \pm 0.63$</td>
</tr>
<tr>
<td>TS (n=20)</td>
<td>$32.76 \pm 0.89$</td>
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</tbody>
</table>

Table 1: Temperature of incubation for 26 nests of *Chelonia mydas* at Itsamia (Mohéli – Union of Comoros). April to June 2009. IT= Itsamia beach, TS= Mtsanga Nyamba beach.

The mean temperature during the 2nd third of the incubation determines the sex ratio of the clutch (Yntema & Mrosovsky, 1980; Davenport, 1997; Godley et al., 2002). Even if the precise pivotal temperature is unknown for the species in Mohéli, the temperature during the 2nd third of the incubation period for the nests monitored was higher than $30^\circ\text{C}$ during the study (Figure 2). So the sex ratio may be biased in favour of the females. Additionally, analysis of the temperature profiles shows that for 11 of the 26 nests the critical temperature of $35^\circ\text{C}$ was exceeded during the incubation. The mean duration spent beyond this temperature was $11.55 \pm 7.81$ days (range=1.4-23.9, n=11).

**Conclusion**

This study confirms the importance of Itsamia as a
site for green turtle reproduction, with 742 females tagged during four months on two of the five beaches of Itsamia. Clutch size was close to the mean number of eggs for *Chelonia mydas* (113 ± 4 eggs, Miller, 1997). Egg size and weight in Itsamia was slightly lower than the mean values for the species (44.9 ± 0.7 mm and 46.1 ± 1.6 g, Miller, 1997). On the other hand, the size and weight of hatchlings was similar to the mean values for the species (46 - 57 mm and 20 - 25 g, Pritchard & Mortimer, 1999). The fact than the temperature in some nests exceeded 35°C can explain the relative low hatching and emergence rate observed during the study, and may have a significant impact on marine turtle reproduction in the context of global warming, though more data are needed to confirm this hypothesis.

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**Literature cited**


