CONCLUSIONS

This paper describes factors currently influencing Leatherback turtle breeding success in the GNR. Suriname's beaches are highly dynamic and their lifespan (suitability for nesting) is limited. Mudflat expansion may render Samsambo unsuitable for nesting during or beyond the 2002 nesting season. Baboensanti is more stable and may be suitable for longer. The shifting coastline provides alternative nesting sites for those lost. However, anthropogenic activities must be closely monitored and limited within the GNR to protect one of the world's most important nesting sites for the critically endangered Leatherback turtle.

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Comparison of hatching success of *Caretta caretta* in 2000 and 2001 nesting seasons in the island of Boavista (Cape Verde, Western Africa)

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INTRODUCTION

Since 1998, a general study on the biology and conservation of the nesting population of *Caretta caretta* is being carried in the southeastern coast of Boavista island (Cape Verde, Fig. 1). During the 2000 season, up to 100 nests from the southeastern beaches of Ervatão and Ponta Cosme were incubated artificially to safeguard the survival of the eggs, because they were laid in non proper places as flooding areas or sand with roots of vegetation (García et al. 2000). However, in the 2001 season, no nest was incubated artificially. The nests from the closer beach of Calheta, have not been altered in any season, because previous experiences reported a high hatching success (Cejudo et al. 2000) and was used for comparisons.

The goal of this study is the general comparison of the hatching success of the nests incubated artificially in 2000 season, and those incubated in situ in 2000 and 2001 seasons, in the two beaches mentioned, and also the beach of Calheta.

MATERIAL AND METHODS

In July 2000, a hatchery of 225 m^2 was built in a beach closer to Ervatão and Ponta Cosme, as recommended by Mortimer (1999). Up to 100 clutches of *C. caretta* from those two beaches were reburied in the two following hours after they were laid by the female (Miller 1999), inside 45-cm-deep chambers, which was approximately the same depth as the ones observed in natural nests. Furthermore, 110 nests from Ervatão and Ponta Cosme, and 24 from Calheta, were tagged and monitored in their original places to compare with those incubated artificially. In the other hand, along the 2001 nesting season, 270 nests were tagged in the southeastern beaches of Ervatão (105), Ponta Cosme (141), and Calheta (24). After hatching, the nests were opened, and the number of empty shells and those not hatched were counted for further calculation of the hatching success as in Miller (1999).

RESULTS

If we compare the average hatching success in the three beaches studied, we see that in 2001 season, in the beach of Ponta Cosme there exists a low hatching success, while in Ervatão and Calheta this average is high (Fig. 2). The great majority of the females that emerge on the beaches studied, they do it on the beach of Ponta Cosme (Fig. 2), but only a small portion of them lays their eggs. In the beach of Calheta, this result is the opposite, where a small number of females emerge, but in a high percentage it finishes in nest.

The average hatching success is different also in the three beaches studied, with a higher value in Ervatão and Calheta (56.68% and 69.73% respectively) than in Ponta Cosme (22.98%, see Fig. 2). If we analyze now the beaches one by one, we see that in Ervatão there are no significant differences in hatching success in naturally incubated nests in 2000 and 2001 seasons, neither in those incubated artificially (Chi-square=1.8487, df=2, p=0.39), while there are significant differences in Ponta Cosme (Chi-square=56.4539, df=2, p<0.0001), due to the nests incubated artificially, which value is very similar to that obtained in Ervatão and Calheta (Fig. 3). As we can see in Fig. 2, while the beach of Ponta Cosme seems to be good for emerging the fe-

males, it appears to have not very good conditions for nesting neither for the incubation of the clutches, as the results of the nesting and hatching successes show. This was the reason why in 2000 season a hatchery was built. Those nests incubated artificially in 2000 season, from Ervatão and Ponta Cosme, show a relatively high percentage of hatching success, similar to that in Calheta (Fig. 3), where the nests were not relocated, and to those percentages we find in the literature (REFS).

DISCUSSION

The data from the 2001 season (with no nest incubated artificially), show how the hatching success in Ervatão and Calheta does not vary significantly from year to year, but in Ponta Cosme this value is even lower than in 2000 season. One explanation for this may be that in 2000 season, many of the nests from not proper locations were relocated (increasing the value of hatching success), and not in 2001, making the result of hatching success still lower.

The results of hatching success from Ponta Cosme, together with those in other works and the high numbers of females that emerge each year in this beach, make in some matter necessary the establishment of a program to incubate artificially as many nests as possible from this beach each year. This conservation effort could improve the hatching success. However, factors as the sex ratio resulted in the hatchery, the parasites and others, need to be beared in mind, in order to not alter important parameters of the sea turtles life cycle.

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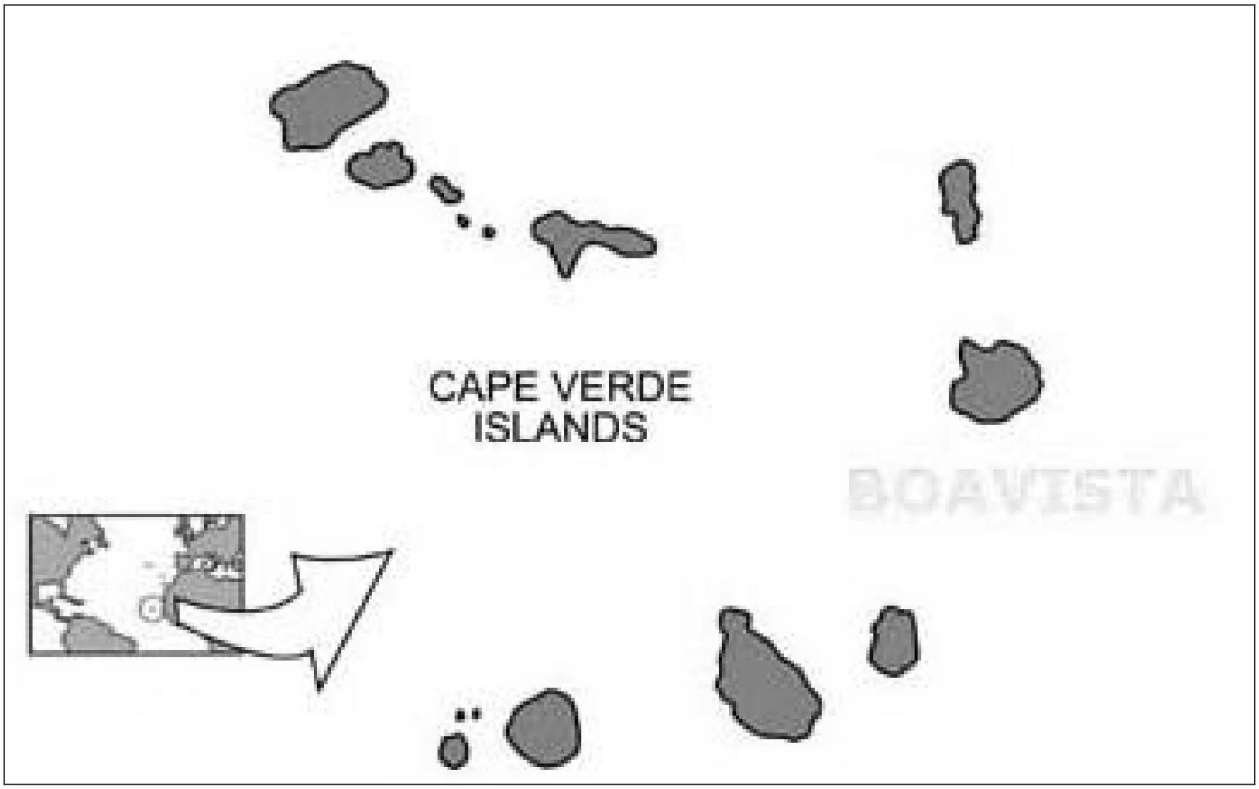

Fig. 1. Map showing the location of the Cape Verde archipelago and Boavista.

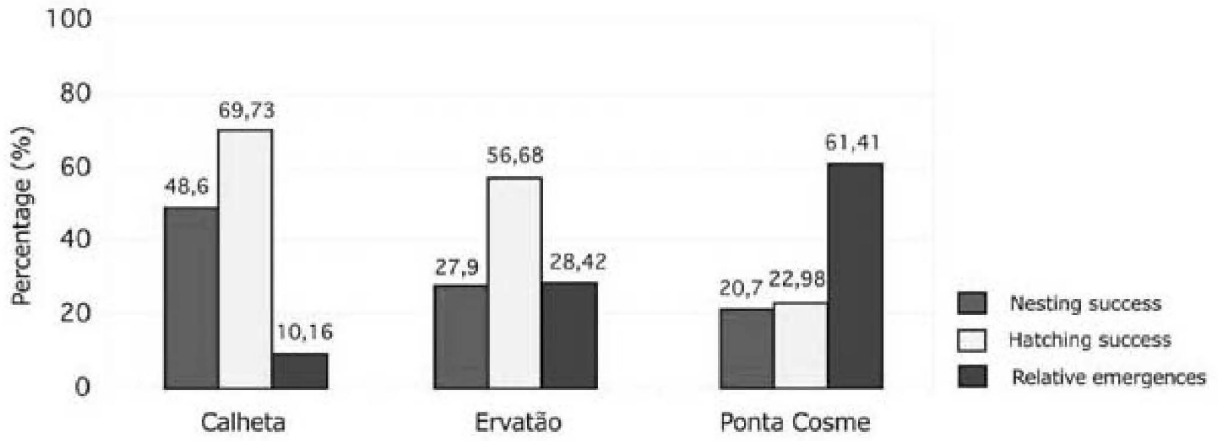

Fig. 2. Nesting success, hatching success and percentage of females emerged in the three beaches studied during the 2001 season.

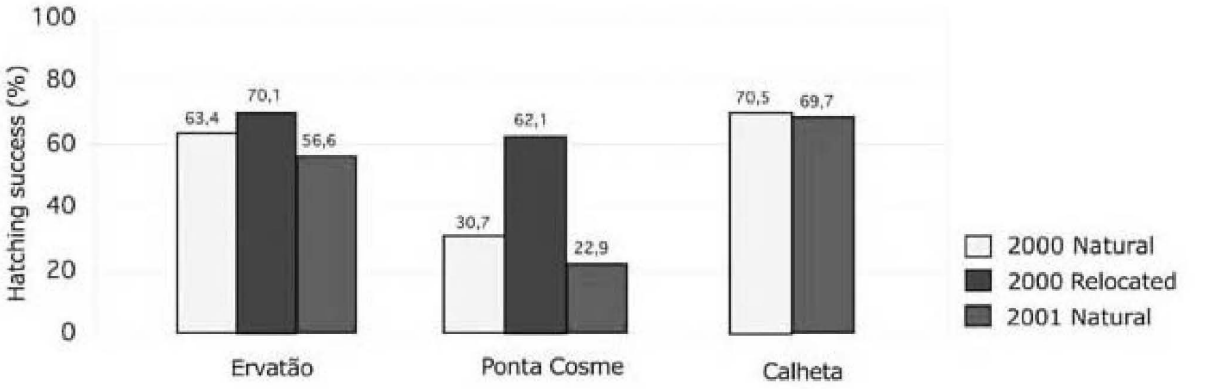

Fig. 3. Hatching success in nests incubated in situ in 2000, artificially incubated in 2000, and in situ in 2001 season, in the three beaches studied.

Comparison of five soil compaction measurement devices

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Beach renourishment has the potential to affect the biology of sea turtles by changing various aspects of their nesting environment such as beach slope, soil compaction, shear resistance, particle size and shape, color, temperature, density, moisture content, and mineral content. Renourished beaches that are thought to be too densely compacted, and therefore perceived as a hindrance to successful sea turtle nesting, can be softened by a process known as tilling. The decision to till a beach after it has been renourished is based upon measurements of sand compaction. However, the standard instrument used for obtaining these measurements—the cone penetrometer—has been shown to be dependent on the mass of the person using the instrument in densely compacted substrates. This study compares five different instruments used to measure soil compaction and shear resistance to determine the strengths and weaknesses of each and to ascertain which instrument, if any, is the most efficient and reliable. The instruments used in this investigation include the cone penetrometer, Lang penetrometer, Eijkelkamp penetrometer, soil compaction tester, and shear-testing device. Twenty reading were taken with each instrument in three different grain sizes of sand (coarse, medium, and fine) using a Latin-square design, standardized, and analyzed using a two-way ANOVA. We also compared the precision and the accuracy of each instrument, and we compared the instruments in terms of their cost, the relative time and effort required to use each instrument, and the amount of maintenance required to keep each instrument functional.