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Trends in the Green Turtle (*Chelonia mydas*) Nesting Population at Aldabra Atoll, Seychelles (Western Indian Ocean) and their Implications for the Region

by
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Introduction:

At the turn of the 19th century, the Aldabra green turtle (*Chelonia mydas*) nesting population is believed to have comprised some 6,000-8,000 females nesting annually (Mortimer 1985, 1988) and possibly as many as 12,000 (Spurs, 1892). Between 1904 and 1968, over-exploitation of green turtles in Seychelles to produce calipee for export to Europe reduced annual nesting numbers at Aldabra to well below 1,000 females nesting annually during the late 1960s (Frazier 1976, 1984; Hirth & Carr 1970) and mid-1970s (Gibson 1979). In 1968, Seychelles halted the export of green turtle products and began to manage Aldabra as a nature reserve. Since 1981, turtle nesting activity has been monitored at Aldabra using methodologies consistent from year to year, thus enabling an assessment of population trends between 1981 and the present.

The Study Site:

Aldabra is the most remote atoll in the Republic of Seychelles, and a World Heritage Site managed by the Seychelles Islands Foundation (SIF), where green turtles have been completely protected for 35 years (since 1968). Green turtle nesting habitat comprises more than 50 beaches whose total length is ~ 3.5 km -- or 4% of Aldabra's total outer coastline.

Methods:

Since December 1980, all 50 green turtle beaches at Aldabra have been monitored for sea turtle nesting activity, but with varying consistency. The most consistent survey effort has been on 17 index beaches -- i.e., the West Grand Terre beaches #1 to 17-- located along the south west coast of the atoll and within only a few km of the Research Station. Surveys entail early morning counts of all nesting emergences that occurred during the night in which they are categorised according to whether or not digging occurred (Mortimer 1997). 'Tracks' are defined as emergences in which digging occurred, while 'half-moons (HM)' or 'emergences-stopped-by-obstacle (ESBO)' are those in which it did not. An effort was made to survey beaches #1-17 at least 3 to 4 times each month (although the actual number of surveys ranged from 0 to 15 per month.) Previously, Mortimer (1988) determined that on beaches #1-17, turtles make an average of 1.5 "tracks" for each egg clutch laid. Based on these figures, the track count data were used to estimate the average number of egg clutches laid daily per month. These data were further extrapolated to provide estimates of numbers of egg clutches laid per year.

Results:

Track surveys were done on the index beaches #1-17 during 18 years, including: 1981-1989, 1992, and 1995-2002. Preliminary analysis of the data indicates the following:

(a) Nesting Seasonality. At Aldabra, green turtles nest year-round with a bi-modal peak in nesting activity during February to March and June to September. This pattern is typical of most green turtle rookeries in the western Indian Ocean (Rene & Roos, 1996). In most, but not all years (11 of 13, or 85%), the June to September peak predominated at Aldabra.

(b) Population Trends. Figure 1(a) shows the estimated numbers of egg clutches laid annually on beaches #1-17 during those 13 years (1981-84, 1989, and 1995-2003) when data were collected consistently throughout the year. Because during the other 5 years (1985-88 and 1992) insufficient data were collected to provide estimates of annual egg clutch production, data from those years are not indicated in Figure 1. .

Assessing trends in sea turtle nesting populations is complicated by the fact that individual green turtles do not nest during consecutive seasons, and also by inter-annual fluctuations in nesting activity (especially subsequent to the 1998 El Niño event) (Fig. 1(a)). To get a better indication of trends, means were calculated and graphed (Fig. 1(b)) for each period of four consecutive years for which data are available. Those graphs indicate a clear upward trend in nesting activity during the period 1981-2002, for the index beaches #1-17.

Discussion & Conclusions:

Numbers of nesting turtles appear to have increased significantly during the past 35 years. Mortimer (1985, 1988) had previously reported that nesting activity at Aldabra during 1981-1985 was approximately double that reported during 1968-70 (Frazier 1976, 1984; Hirth & Carr 1970) and 1975-76 (Gibson, 1979). Preliminary data produced for the present study indicate that there has been an additional increase in nesting activity since the early 1980s -- with the average numbers of egg clutches produced during the period 1995 to 2002 being approximately 2 to 3 times the number produced during 1981-1984. Clearly, the Aldabra green turtle population has responded positively to the 35 years of complete protection afforded nesting turtles at the atoll.

Because sea turtles are so vulnerable during reproduction, protection at the nesting beach is critical to the long term survival of any population. Nesting female green turtles show strong site fidelity in their choice of nesting beach (Miller, 1997), so we can expect the females to return consistently to nest at Aldabra (or an adjacent island) in years to come. But, green turtles are also highly migratory during other stages of their life cycle. Tagging studies show that adult green turtles migrate between their nesting grounds at Aldabra and feeding grounds located elsewhere in the western Indian Ocean (Mortimer, 2001). Meanwhile, genetic studies indicate that juvenile green turtles disperse to other parts of Seychelles and indeed throughout the region (Broderick et al., 1998; Mortimer 1998). It follows that protection of green turtles at Aldabra has positive implications for the entire region.

The Seychelles Government and SIF are to be congratulated on the success of their efforts to conserve the wildlife of Aldabra. But, the world also owes Seychelles a debt of gratitude for increasing the number of foraging green turtles in the region. Recent ecological studies indicate that the health of seagrass ecosystems and the prevention of such ecological

catastrophes as “seagrass wasting disease” may depend on maintaining large populations of herbivores. These include green turtles, dugongs, & herbivorous fishes whose populations have been largely destroyed by past over-harvest (Jackson, et al., 2001). Enabling green turtles to increase in numbers to the point that the turtles can fulfil their “ecological role” on their foraging pastures is likely to enhance the general productivity of the region’s sea grass ecosystems, and in turn to have positive implications for fisheries as well as global biodiversity.

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Figure 1. Estimated number of egg clutches laid at Aldabra index beaches #1-17 during those years adequately surveyed between 1981 and 2002. (a) shows numbers of egg clutches laid each year. (b) shows means for each period of four consecutive years (excepting 1989)

