

PRESENT AND FUTURE OF THE GREEN TURTLE

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“The most valuable reptile in the world”, is how American Professor Archie Carr describes the Green Turtle (*Chelonia mydas*). Unfortunately, this value is reflected again in the great reptile’s alternative common name “the Edible Turtle”. Under the richly ironic scientific name of *mydas*, this ponderous marine has poured its rich juices into centuries of banquets proffered by the Lord Mayor of London or President of the United States. Genuine turtle soup is still a top status symbol in upper-class diet through most of the civilized world—except South-east Asia.

For reasons that are variously religious and traditional, but basically very sensible, the bodies of these turtles have long been respected, even venerated over most of Thailand, Malaya, Indonesia, Borneo, and the southern Philippines (but *not* in New Guinea, Melanesia, and Oceania generally). Only the eggs have been taken for food in our area. Elsewhere, the beast that lays the white ping-pong ball eggs has been slaughtered—and with cruel preliminaries. In consequence a survey of world literature shows that the Green Turtle is widely and in some areas rapidly decreasing. Unfortunately within the past two decades, pressures of genuine hunger, combined with the disturbance of traditional, legal, and conservation patterns, have begun to interfere with an initially not unfavourable picture, even within those seas where the Green Turtle has been beloved since prehistory.

From the Celebes, Timor, and Northern Australia come reports of trapping adult turtles for food, and one of the most disturbed areas of the whole east is now the Sea of Sulu, where important laying populations of Green Turtles happen to favour the same hide-outs as modern, mechanized, organized smugglers and pirates. These humans have scant respect for kindly tradition, none for aquatic law (natural or introduced).

By a further series of historical or casual circumstances—vital among them the far-sighted policy of the Brookes, rajahs of Sarawak—three small islands off the south-west tip of Borneo now have what is probably the largest and potentially most conservable Green Turtle population anywhere in the area ; perhaps in the world. In 1947 it became my privilege, as Curator of the Sarawak Museum, to curate these gentle creatures as well. Since then, we have collected just on 20,000,000 turtle eggs for sale to the public ; and transplanted many thousands more into special hatcheries, on gradually developed, slowly improved, techniques, pioneered here.

I serve as Executive Officer to the Turtles Board, composed of the two leading Malay Datus and other eminent citizens, under the Chairmanship of the Financial Secretary, Mr. A. St. J. Hepburn. The Board has been bold in encouraging conservation. During 1962 I have authority to put down 100,000 eggs as part of the project. In 1947, I had to start from scratch to devise ways of hatching and then of rearing turtles on the islands. There the average clutch size is 106 ; the period between laying

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and hatching varies from fifty-two to sixty days, according to variable beach and weather conditions. We started with a low figure of emergence, due to disturbance from other turtles, tides, predators, and own ignorance. Today we regularly obtain over 70 per cent healthy young hatched and emerged; over 60 per cent are reared until they are hard enough to be released at sea without becoming the immediate prey of sharks and other fish or birds (the last not a factor here).

All this research had to be financed out of the Board's own operational costs. We have an obligation to produce sufficient profit to maintain a country-wide range of dependent Malay mosques and charities. Only now do I feel entitled to put almost 10 per cent of our annual estimated egg harvest back into the sand for conservation, even at the risk of temporary financial difficulties.

This work goes on at three islands with a total beach expanse of only $4\frac{1}{2}$ acres. The resident staff, all Malays, is eleven; augmented in the peak laying season (July to September), when we get 50 per cent of the total yield. Our turtle launch, the *Burong Razwa*, regularly services the staff and collects the eggs. They are marketed through a small administrative unit in Sarawak's capital, Kuching. We wholesale at an average price of 8 cents (about three pence) an egg—widely regarded as about the best and least expensive food available.

The huge Leathery Turtle of Malaya has never been recorded in Sarawak waters. Three smaller forms of marine turtle, Loggerhead, Hawksbill, and Ridley, lay sporadically on the islands, mostly in the early months of the year—but rather more often on the extensive mainland beaches opposite.* In west Borneo only a negligible number of the Green Turtles nest on the mainland at the present time. There is, however, evidence, e.g. from our excavations at the Niah Caves, 400 miles up the coast, that turtles once played an important part in the food of earlier man. It is possible that the Green was driven off in most of the north-easterly mainland long since; but the islands were relatively safe from systematic human predation.

There are grounds for suspecting that any downward trend in the Green Turtle may have deep roots in the past. Be that as it may, there are further and disturbing indications of a decline on the islands themselves and, despite our control, even within sixteen years of my own experience. Records of varying reliability have been kept since 1927, of fair accuracy since 1949. Comparing three seven-year periods for which the figures appear reasonable, we get:

EGG YIELD, SARAWAK TURTLE ISLANDS	
<i>Average annual Green Turtle egg yield per annum during this</i>	
<i>7-year period.</i>	<i>7-year period.</i>
1929–36	2,184,095
1948–54	1,581,132
1955–61	1,038,129

(These and other figures are considered in detail in a paper of 1962 in the *Sarawak Museum Journal*.)

* This is the subject of an inter-related research, part of which is in preparation for publication.

These depressing indications are confirmed by my older Malay fishing and island friends. It seems probable that there was no appreciable decline, on the islands, at least, over many decades, until the Japanese occupation of 1941. This was followed in 1946, by the transfer of sovereignty from the Brookes and rather rapid economic development of the country. In recent years we have waged a continual battle to control the disturbance caused by motor-boats, fishing fleets, and foreign vessels coming into the area. For, unfortunately, these clumsy reptiles are shy and easily disturbed, particularly during the periods when they are moving in to the beaches or standing offshore along the general tide-flows off the coast. Loud under-water noises; oil and other fouling; bright lights shining at water-level; silliness along the shore: are all liable to put off the Green Turtle—though they have little effect on the smaller Hawksbill, Loggerhead, and Ridley.

At this point we come up against the great amount we still do not know about marine turtles. It is nice enough to tabulate egg statistics by the millions but we are far from clear what these figures mean, in truly turtilian terms. Until we started tagging studies with the help of Prof. J. Hendrickson, we had little idea even how often one female turtle laid, or at what intervals. On the evidence so far, compiled in ten years of returns, it seems that:

- (1) A turtle ordinarily lays more than once in one season—sometimes as many as eight times. Usually there are intervals of nine to twelve days; but there is an enormous amount of individual variation in almost all Green Turtle behaviour.
- (2) Normally and unless disturbed, once a turtle has started laying on one beach, it will continue laying on that beach and rarely even visit the neighbouring island during that particular cycle, although Talang-2 Besar and Talang-2 Kechil are less than a mile apart.
- (3) After a series of lays, the turtle disappears for three or more years.*
- (4) We have no idea whether our adult population migrates during this long period of absence; the only confirmed tag return outside Sarawak was one netted in North Borneo during the monsoon, 5½ years after it had been tagged as B.1468—and not reported back on the island in the interval (cf. Harrison 1959: 278).

Inadequate though this information is, it nevertheless makes it clear that earlier ideas about the numbers of turtles, here and elsewhere, require revision. Smaller numbers of animals are involved, but working on quite a peculiar cycle.

There is a strong possibility that our laying turtles move great distances during their years of absence. If they went elsewhere to lie up, one would expect tag-detection by now. An adult can swim as fast as a steamer. There is nothing to prevent migrations comparable to that of whales and

* This Sarawak cycle has since been confirmed, using the same tagging methods, by Drs. Carr and Ogden (1960) in the Carribean—though they had a few individuals repeating in two years there.

of eels and other fish. It is not, for instance, inconceivable, that Borneo turtles may fan out into the Pacific, across to the deadly waters of Christmas and Johnston islands. There have been disturbing, if unauthenticated, reports of large numbers of dead turtles afloat north of New Guinea.

As puzzling as the local disappearance of the adults is the vanishing of the hatchling baby turtles after hatching—they are no bigger than the palm of your hand. After they have safely reached the South China Sea—in our case having normally been taken to it artificially—nobody has ever seen a young Green Turtle anywhere in the Zone. Very few, if any, have been seen in the Indian or Pacific Ocean. Yet they take at least seven years to mature—and we have kept controls in tanks which were still sub-adult after eight years. This “mystery” makes it that much trickier to plan any adequate conservation programme. So much remains obscure, in need of further urgent research both here and elsewhere.

Clearly, then, a large sector of any wide-view turtle conservation programme lies outside anyone's control. We can ourselves limit local activity by agreement and/or legislation. We can and do strictly control visits to the islands and the movement of visitors off-shore. We retain NO control on what happens to the turtles themselves once they are out of our sight. Alas, there is plenty of reason to think that outside our waters their modern troubles really begin. Not only far off, but nearer home. Thus in recent years we have had numbers coming up to lay in Sarawak already injured by wire-netting, spear, or hooks. Several have been tied up with heavy wire, rope, or rottan, yet managed to escape after being kept in a trap or on deck. The Green Turtle is far stronger and more agile than the inexperienced suspects—especially when it works itself up in the cool of the night.

It is mere pious hope, wishful-thinking indeed, to believe that international symposia can cure this sort of ill. Nor will lip-service to legislation by governments achieve anything, except international self-satisfaction. Those who believe they are getting somewhere, conservation-wise, by recommendations and resolutions, know too little about the whole of this rugged and in many ways powerfully primitive part of the world, more especially our seas. Not one turtle, dugong, dolphin, whale, will ever be saved in this chit-chat way. The best that can be done, at present, is by limited local effort. Those making the effort must be unselfish about it. They ought to be prepared to realize that much of what they do within their area may be frittered away by human greed or stupidity elsewhere. They must face the fact that if they use the work of outsiders as an alibi for local neglect, then they will themselves certainly have no turtles at all before long.

To man, the survival of this turtle is valuable. Laying thousands of eggs in a lifetime, its potential in terms of marine food is very large. For Asians, turtle eggs are among the very top foods, both in popularity and diet value. Just how great this potential is can be seen if we look at the little shining white coral-sand beach on the second of our three Sarawak Islands, Talang 2 Kechil. Just over a hundred metres long and ten metres deep, this easily overlooked cove on a tiny, remote coconut island produced



Courtesy, Sarawak Museum.

A PAIR OF GREEN TURTLES (*CHELONIA MYDAS*) MATING CLOSE IN SHORE, TALANG-2 ISLAND.

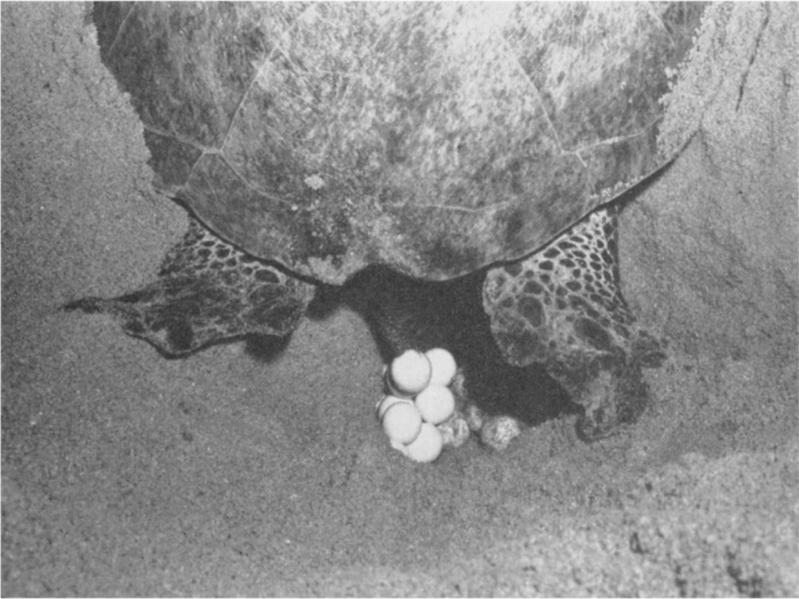
The males, which are few in number, never leave the sea.



Courtesy, Sarawak Museum.

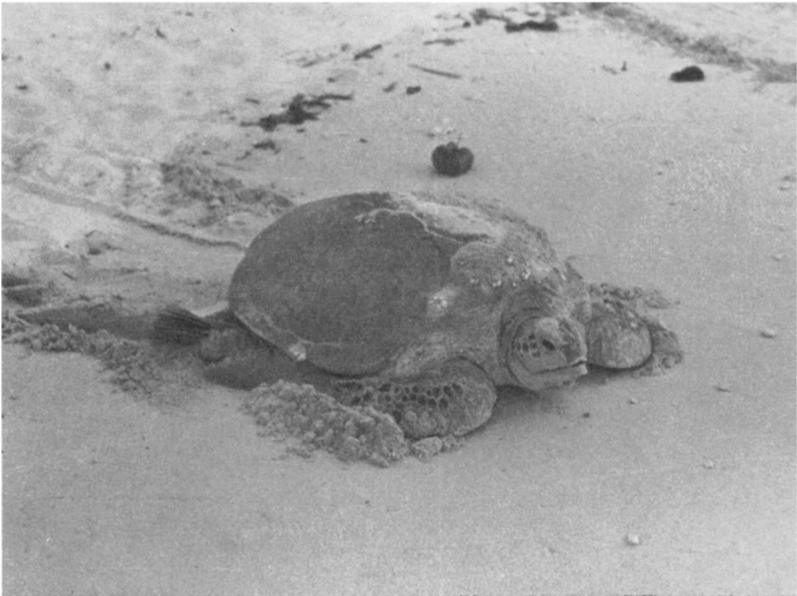
FEMALE GREEN TURTLE WORKING WITH FRONT FLIPPER TO EXCAVATE HER PRIMARY NEST IN THE SAND.

A narrower, deeper "secondary" nest is dug below.



Courtesy, Sarawak Museum.

DEPOSITING THE EGGS INTO THE SHAFT OF THE “SECONDARY NEST” DUG OUT BY THE HIND FLIPPERS.



Courtesy, Sarawak Museum.

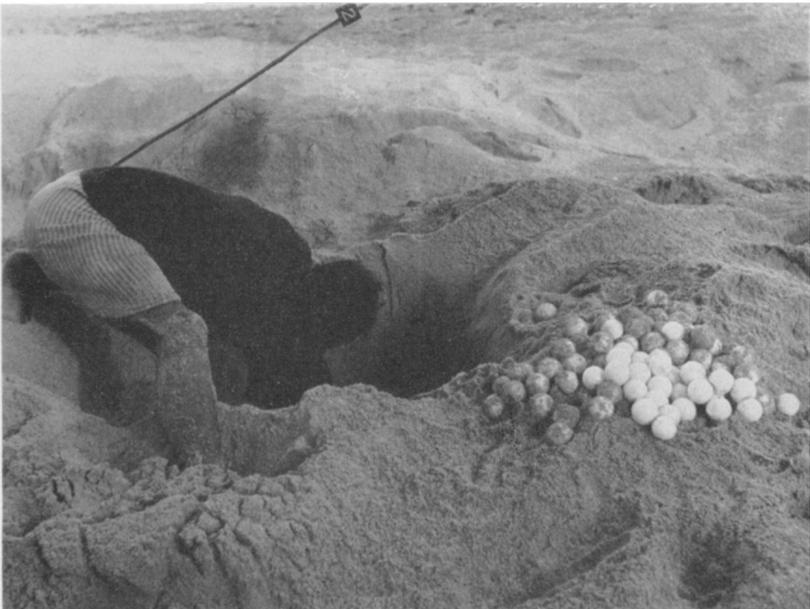
FEMALE GREEN TURTLE CRAWLING BACK TO THE SEA AT DAWN, AFTER LAYING HER EGGS.

She may have been ashore up to six hours and is exhausted.



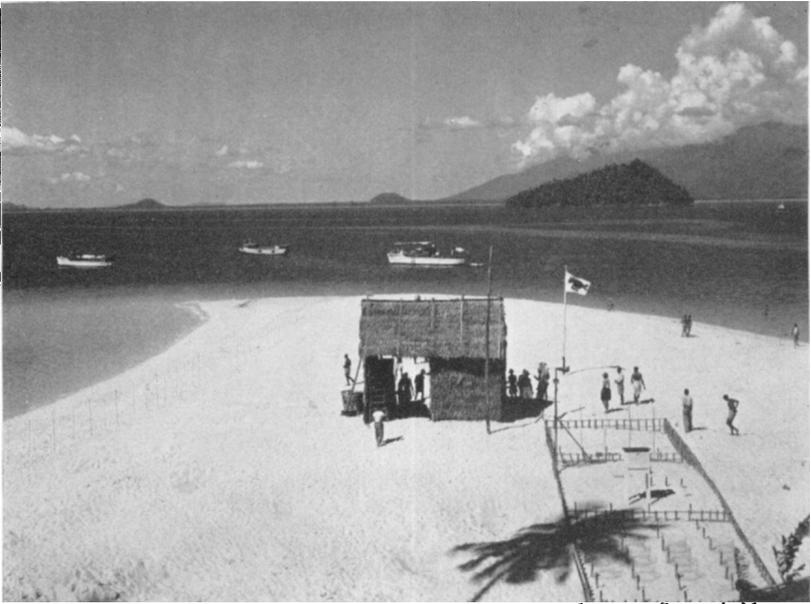
Courtesy, Sarawak Museum.

THE LAST TO GO BACK INTO THE BELOVED SEAWATER.



Courtesy, Sarawak Museum.

EXCAVATING A LAYER OF EGGS FOR SALE ON THE MARKET.
Each nest is marked with a flag as the eggs are laid during the night, to facilitate excavation at dawn.



Courtesy, Sarawak Museum.

THE BEACH OF TALANG-2 BESAR SHOWING THE ENCLOSED PROTECTED HATCHERY FOR BABY TURTLES WITH MET.-STATION AND WORKING HUT.

The island in the background is Talang-2 Kechil. On the two small beaches hundreds of thousands of eggs are laid each year.



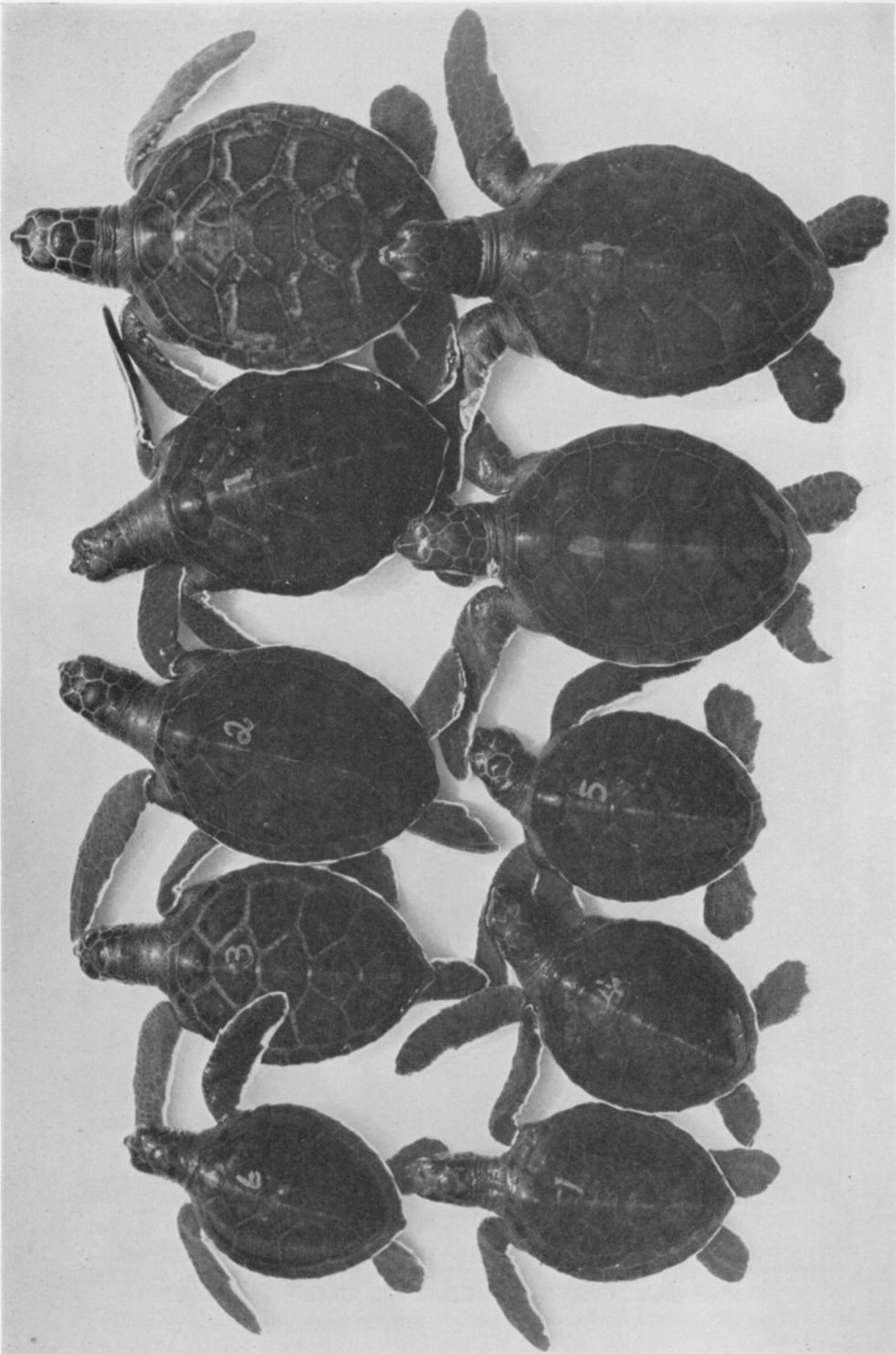
Courtesy, Sarawak Museum.

HATCHING BABY TURTLES, THE SIZE OF THE PALM OF A HAND.
They scramble frantically towards the light reflected off the sea, 50 yards away.



Courtesy, Sarawak Museum.

TAKING BABY TURTLES, AFTER SOME WEEKS OF CLOSE PROTECTION AND ARTIFICIAL FEEDING, OUT INTO THE SOUTH CHINA SEA TO AVOID PREDATORS CLOSE IN SHORE.



last year 517,823 first quality Green Turtle eggs for sale, at twopence each. Need one say more—even to convince a tough economist? Let alone the deeper common-sense of one kind conservationist?

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[Brogersma deals with interesting stray specimens in Europe. Caldwell includes a good biography of main world sources up to 1959. Mertens and Wermuth handle the confused synonymy of supposed subspecies. The rest are research papers or surveys of interest with relevance to the present theme. *S.M.J.* denotes *Sarawak Museum Journal*; a further series of reports are in press for this journal including notes on world and area population, and on hatching experiments as part of long-term conservation within Sarawak (1962 issues).]

GROWING GREEN TURTLES (NATURAL SIZE).

The new-born (Nos. 1 and 6 on plate) are completely vulnerable to sea-birds, sharks and other fish. Babies are reared in tanks until hard, strong and fast enough to resist most predation (top right).

See last illustration.

[Courtesy, Sarawak Museum]