

# ANNUAL REPORT 2013



# SUMMARY

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- In 2013 Lang Tengah Turtle Watch commenced its turtle conservation efforts, hosting a total of 24 volunteers from April-October.
- 29 nests laid by endangered green turtles were saved from poaching.
- Average percentage of successful hatching was 71.2%, calculated from 13 nests.
- Lang Tengah Turtle Watch's efforts and observations suggest that Lang Tengah Island should be gazetted as a Turtle Sanctuary.

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We would also like to thank all the volunteers who helped in the gathering and collation of data.



# BACKGROUND

## ***The Lang Tengah Turtle Watch Project***

The Lang Tengah Turtle Watch Project started as a conservation endeavour by Hayati Mokhtar, who upon visiting her property on Turtle Bay, Pulau Lang Tengah, was appalled by the degradation of the entire area; the dying corals in the sea and the amount of rubbish along the beach.

A total of 24 people consisting of local Malaysian volunteers along with teams from three British universities: University of Cambridge, University College London and University of Birmingham *inter alia* came out to Lang Tengah to help protect the turtle eggs from poachers, and the results they obtained over the time they were there show that the island is indeed used as an important breeding ground for green turtles (*Chelonia mydas*).

## ***Malaysian Sea Turtle Conservation Status***

Sea turtles in Malaysian waters have been noted as being threatened since the 1980's (Chan et al., 1988), although the primary global and local concern for sea turtles then was their incident capture by trawl fishing nets (Carr, 1977; Chan et al., 1988; Gunter, 1981). Nowadays, loss of nesting habitat, marine pollution and egg exploitation are strongly recognised for their devastating effect on sea turtle population (Chan, 2006; National Research Council, 1990; Tisdell & Wilson, 2002).

The state of Terengganu, Malaysia is one example of where these processes are exerting extremely detrimental pressure on turtle populations (Chan, 2006, 2010; Chan et al. 1988). Since the turn of the 21<sup>st</sup> century, the region has seen the disappearance of the olive ridley (*Lepidochelys olivacea*) and leatherback (*Dermochelys coriacea*) turtles (Chan, 2010). These are species that were once common along the mainland coast of the state (Chan, 2006, 2010; Chan et al., 1988). The two remaining species are the green (*Chelonia mydas*) and hawksbill (*Eretmochelys imbricata*) turtles. The latter is now critically endangered in the region, with only five recorded nests in Terengganu in 2002 and no nesting since 2003 (Chan, 2010).

Thankfully, recent trends show an increase in nesting activity from the species with 17 nests recorded in 2008 (Chan, 2010), hopefully due to local conservation efforts. The green turtle has also suffered dramatic population crashes, with only half as many nests being laid in 2000 as there were in 1984 (Chan, 2006). Their nesting numbers have too shown a slight increase in recent years, although as of now it remains unclear as to whether this is due to local conservation efforts or just a peak period in the naturally fluctuating breeding patterns of sea turtles (Chan, 2010).



### Tourism and Sea Turtle Conservation

Tourism and conservation has been recognised as viable and mutually beneficial alliance for the past couple of decades and is known commonly as ecotourism (Brightsmith et al., 2008; Tisdell & Wilson, 2002). This relationship can, however, become detrimental to conservation activities if proper education is not provided to the participants (Brightsmith et al., 2008; Tisdell & Wilson, 2002). Volunteer programmes for conservation projects are widely considered as the most beneficial in terms of educational, environmental and economic outcomes – proving the worth in encouraging the development of such projects (Tisdell & Wilson, 2002).

A study by Tisdell and Wilson (2002) at Mon Repos Conservation Park in Australia found that after tourists had spent an evening with the park rangers or volunteers, 62% were inclined to take more care when disposing of plastics and 47% when discarding fishing gear, 68% wanted to see all lights near nesting beaches turned off and 88% said they would report poaching activities to the relative authorities. Most notable of all was after visitors had encountered a live turtle, 98% agreed that more needed to be done to help save these animals from extinction. This evaluation highlights the value and benefits of having sea turtle conservation activities available

for people to interact with, in a local, national and international context. Tourists provide essential revenue, not only for conservation practices but for entire countries and states (Brightsmith et al., 2008; Tisdell & Wilson, 2002). When relating this to sea turtle conservation, as with most wildlife, the key in generating and sustaining interest from tourists is directly related to the probability of seeing a turtle or the animal in question (see Figure 1; Tisdell & Wilson, 2002).

Countries like Malaysia and moreover states within, such as Terengganu, rely heavily on the revenue from both national and international tourism. Most of said tourists are drawn to the east coast of Peninsular Malaysia to enjoy the beautiful landscapes and seascapes that the region has to offer. Nearly all of the visitors to islands such as Perhentian, Redang and Lang Tengah indulge in marine-based activities on a daily basis (R. J. Zevenbergen, personal communication, 2013). All dive centres on the archipelago advertise the possibility of diving with sea turtles. The tipping point from Figure 1 will soon be reached according to recent trends in sea turtle population numbers (Chan, 2006, 2010). The only way to prevent this is by promoting and supporting conservation initiatives to the fullest, or else the region will soon see a major crash in tourism, resulting in devastating effects for the local economy and the livelihoods of many people in Terengganu.

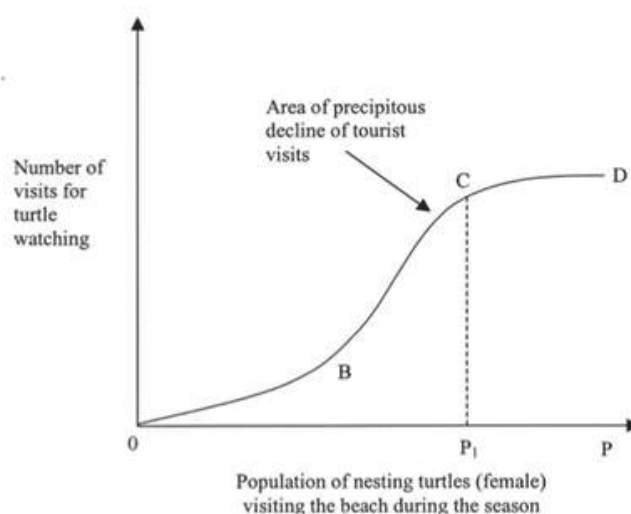


Figure 1. Interrelation of sustainable ecotourism and sustainability of turtle populations (taken from Tisdell & Wilson, 2002)

# METHODOLOGY

## Study Area

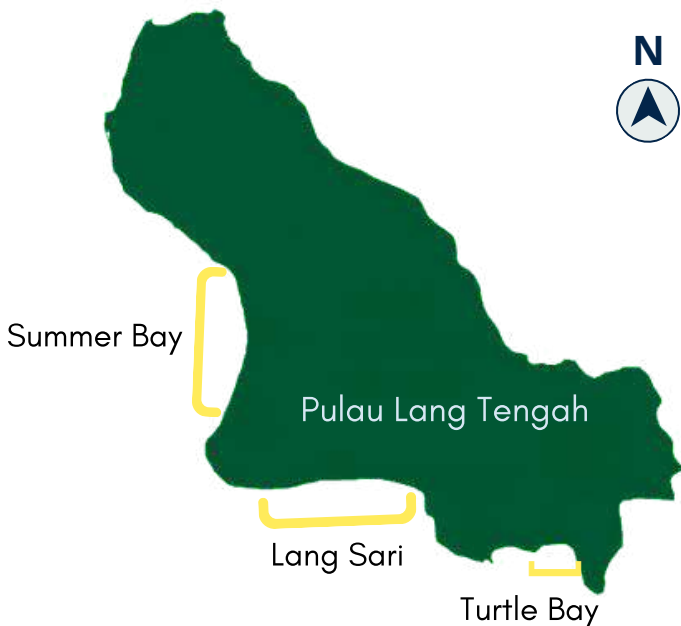


Figure 2. Principal nesting beaches on Pulau Lang Tengah: Lang Sari, Turtle Bay and Summer Bay.

This consists of three beaches: Turtle Bay, Lang Sari and Summer Bay. They cover a distance of coastline measuring 50 m, 450 m and 500 m respectively on Pulau Lang Tengah, Terengganu, Malaysia (see Figure 2). All three beaches are located on the southern side of the island. Both Lang Sari and Turtle Bay are south-facing, but Summer Bay is west-facing. The northern coast of Lang Tengah is composed of granite rocks which provide unsuitable nesting habitat for sea turtles. All three beaches provide suitable ecological nesting habitat for sea turtles, with reports of landings occurring on all of them. However, Summer Bay is subjected to high levels of light and noise pollution which act as major deterrents to nesting individuals and therefore we consider Turtle Bay and Lang Sari to be the principal nesting beaches on Lang Tengah.

Patrols were conducted by different groups along each of the beaches every night (when volunteer numbers were sufficient, see Discussion section) from 8 p.m. to 6 a.m. Any nests found on Lang Sari or Summer Bay were carefully relocated to Turtle Bay. Once back on Turtle Bay, the nests were marked and then monitored until they hatched. Any disturbance to the nests from visible signs of predation such as dug out holes by poachers, water monitor lizards (*Varanus salvator*) or crabs were noted. Once the eggs had hatched and emerged from the nest, a post-hatch inspection (PHI) was carried out in order to determine how many individuals had successfully hatched (Figure 3). Notes were also taken on other developmental aspects, such as any unfertilised eggs, underdeveloped eggs that had succumbed to predation by, among other predators, ants.

## Survey Method



Figure 3. Volunteers collecting post-hatch inspection data.

# RESULTS

Between 11 April and 21 October 2013, we documented a total of 29 nests being laid from both beaches combined: 12 on Lang Sari and 17 on Turtle Bay with none being laid on Summer Bay. The average clutch size was 92 eggs (see Table 1 & Table 2). Out of these we know four nests were lost to poachers. We also had reports of three more landings on Lang Sari as we left the island. This means from the time we were on Lang Tengah a minimum of 32 nests were laid.

## 29

*total nests saved*

## 92

*average clutch size of nests*

Table 1. Nest incubation data of green turtles on Lang Tengah ('-' indicates data deficient).

Nest No.	Month Laid	Days to Emergence	No. of Eggs	No. Successfully Hatched
1	April	61	106	104
2	May	62	122	34
3	May	-	-	-
4	May	63	100	74
5	June	64	104	78
6	June	64	108	81
7	July	-	-	-
8	July	63	73	41
9	July	Did not hatch	58	0
10	July	62	-	-
11	July	66	40	14
12	July	65	107	107
13	July	70	69	12
14	July	72	82	78
15	August	64	103	102
16	August	-	-	-
17	August	-	118	91
18	August	-	-	-
19	August	-	-	-
20	September	-	-	-
21	September	-	-	-
22	September	-	-	-
M1	July	-	-	-
M2	August	-	-	-
M3	August	-	97	93
<b>Average</b>		<b>64.67</b>	<b>91.93</b>	<b>65</b>
<b>Total</b>			<b>1,287</b>	<b>909</b>



Table 2. Hatching success data of green turtles on Lang Tengah ('-' indicates data deficient).

<b>Nest No.</b>	<b>% Successfully Hatched</b>	<b>Relocated</b>	<b>Remarks</b>
1	98.0	Yes	
2	28.0	Yes	
3	-	No	No post-hatch inspection data
4	74.0	Yes	
5	75.0	No	
6	75.0	No	
7	-	No	Bad marking of nest - could not be found for post-hatch inspection
8	56.0	Yes	
9	0	No	Relocated 3 days after laying (eggs 'oval' shaped)
10	-	No	
11	35.0	Yes	Nest was being poached, then relocated
12	100.0	No	
13	17.4	Yes	Nest reburied very shallow - predation and incubation issues
14	95.0	No	
15	99.0	No	
16	-	Yes (already on Turtle Bay)	Nest disturbed by laying of another female (Nest 18)
17	77.2	No	
18	-	No	Left island before hatch date
19	-	Yes	Left island before hatch date
20	-	No	Left island before hatch date
21	-	Yes	Left island before hatch date
22	-	No	Left island before hatch date
M1	-	No	Could not inspect as too close to Nest 17
M2	-	No	Could not inspect as too close to Nest 18
M3	-	No	
<b>Average</b>	<b>71.2</b>		

As our research started late in the season and we had moments of inefficiency due to a lack in volunteer numbers, it can be conservatively estimated that there were over 60 nests laid on Lang Tengah during 2013 (see Discussion section).

The most prolific month for egg laying was in July, with nine nests laid, The month with the least laid was April with one nest (see Table 1). Nests with the number prefixed by the letter 'M' (e.g. M1, M2, M3) are nests that were unmarked and unknown to the volunteers until they were seen hatching.

During our time on Lang Tengah, we documented 909 turtle hatchlings go into the sea from 14 nests (see Table 1). We are missing some hatchling data, denoted by ‘-’ in Table 1 and Table 2, this is for several reasons.

From six nests data is missing as either their location could not be determined or they were too close to other incubating nests to carry out a post-hatch inspection (Nests 3, 7, 10, 16, M1, M2; see Table 2). From these nests we estimate 486 individuals to have emerged.

Again, extrapolating from our past success rates, we predict another 338 hatchlings will emerge from the five remaining nests (i.e., Nests 18, 19, 20, 21, 22) that we were unable to document due to the arrival of the monsoon,

bringing our season total to 1,733 hatchlings from 25 nests.

We omitted the data from Nest 9, as the eggs had defects that were due to either genetic or physiological abnormality of the mother and therefore are not suitable for representing the effects of relocation on hatching success rates (see Table 2). Our average hatching success rate was lowered by 18% from having to relocate nests from LS to TB (see Table 2 & Figure 4). The difference between the success rate of undisturbed and relocated nests was 37%, dropping from 88% to 51% (see Figure 4). If we were able to leave the nests undisturbed in their original location, we would have expected 171 additional hatchlings from the eight relocated nests, an additional 21 turtles per nest.

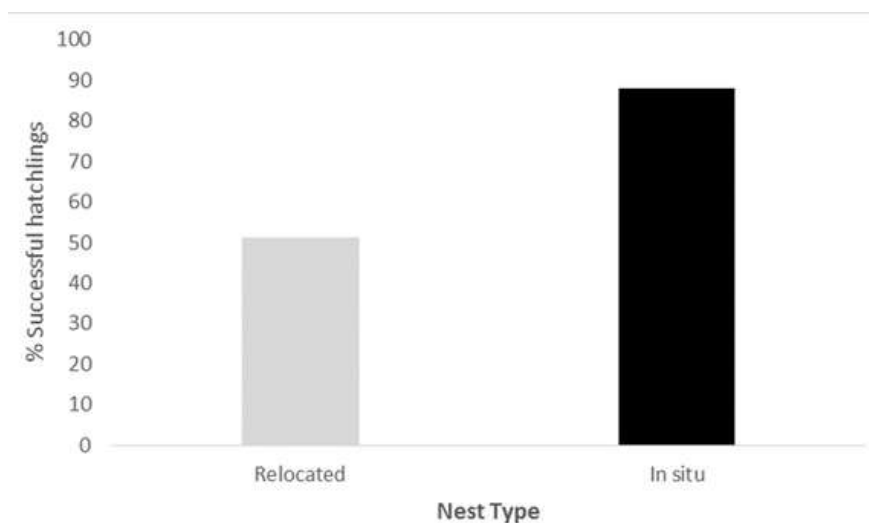


Figure 4. Average percentage of successful hatchling emergence in relocated nests and in-situ, undisturbed nests.

## DISCUSSION AND RECOMMENDATION

Our findings this season show that 17 nests were found on Turtle Bay and only 12 were found on Lang Sari (see Table 2). This seems to be a biased result, as Lang Sari is four times larger than Turtle Bay, with most of it composed of ideal nesting habitat. This bias is most likely due to the lack of volunteers for eight weeks of the collection period. During five of those weeks the total amount of volunteers present was three (two women and one man), and for the three other weeks of this eight week period, only one volunteer was on the project. In this situation guarding the many nests on Turtle Bay was the priority. Due to the way some of the resort staff acted towards the women they could not be left to patrol by themselves. Thus, Lang Sari was not patrolled efficiently during this time, and poachers may have covered the turtle tracks by the time we were able to check the beach in the morning.

With volunteer numbers down for two of the months, we only efficiently surveyed four of the eight peak (March–October) nesting months for breeding turtles on the island. We can then, conservatively, predict at least double the amount of turtle nests over the entire year, bringing the number of nests in 2013 on Lang Tengah up to over 60. This is further reinforced by verbal accounts stating that the peak nesting season started early this year. Using our average clutch size and natural undisturbed nest success rate (imagining we did not have to relocate nests from Lang Sari), there could have been more than 4,857 green turtle hatchlings on Pulau Lang Tengah during the breeding season of 2013.

Analysing the data from the University Malaysia Terengganu (UMT) SEATRU programme for the last season they surveyed only April to October (in 2005), we find that our number of nests per metre of beach (on Turtle Bay alone) are nearly half that of the densities on Redang: Turtle Bay, Lang Tengah = 0.34 nests/m; UMT Chagar Hutang Turtle Sanctuary, Redang = 0.63/m. However, half of the beach on Turtle Bay, Lang Tengah is unsuitable nesting habitat for sea turtles, thus we can consider our nesting densities to be 0.68 nests/m over 25 m of viable nesting habitat, rivalling that of the Redang site.

As there is no human stronghold (village or town) on Lang Tengah, the collection of turtle eggs is not a traditional community practice on the island. Thus, gazettement of these nesting beaches as a Turtle Reserve or Sanctuary would not impact on the income of local people in the area. In fact, the principal and only form of economic revenue from the island is from tourism. All the resorts on Lang Tengah orient their activities around the sea, so the preservation of this ecosystem is essential for the short and long-term profitability of the island. Indeed, two of the resorts (Summer Bay Resort and Lang Sari Resort) explicitly advertise sea turtles in their communal areas and should therefore welcome the conservation of these animals on the island for their immediate and long-term benefit.

Issues on the island affecting the ecosystem include the problem of waste disposal. Resorts on the island have landfill areas on the seafront, at the high-tide mark. The rubbish boat has not come for over two months, and the monsoon

tides will surely wash everything in the dumps out to sea. We believe for the preservation of a Marine Park, the focus should not only be on what happens underwater, but also on what is leeching from the land into the sea. A presumed 'purging pipe' has also been documented at one of the resorts (see Figure 5), and only became 'active' during the last week of our data collection.

Lang Tengah has terrestrial fauna (reptiles and birds) that has been highlighted by WWF members as being of great interest for the archipelago (including Perhentian, Lang Tengah and Redang), and the east coast of Malaysia in general. We would like to obtain your permission to carry out scientific transect surveys in order to obtain a species inventory and abundance data for the island. We believe that this island is of great biological interest, and that it should be preserved in order to be enjoyed by the many tourists who come to Terengganu to see the turtles.



Figure 5. A presumed purging pipe leading into the sea from a resort on Lang Tengah.



Although the general trend in sea turtle population around Terengganu has been negative since the mid 1980's (Chan, 2006, 2010; Chan et al., 1988; Tisdell & Wilson, 2002), there has been a slight growth in recent years (Tisdell & Wilson, 2002). This has not yet been confirmed to be the result of conservation efforts, although it certainly looks like it could be. A study in Hawaii shows a 30-year long recovery trend for the depleted stocks of green turtles through egg and turtle harvesting as well as degraded habitats (Balazs & Chaloupka, 2004). This long recovery time is mostly due to the long life expectancy of the species. The population in Hawaii was heavily exploited until the 1970's and had recovered by 2000 (Balazs & Chaloupka, 2004). A rise in population numbers only became evident 15 years after the conservation projects had started, so the slight rise we see in Terengganu 18 years after UMT started their programme (1993-2010; Chan, 2010) may well be due to the delayed recovery period observed as in the Hawaii study. This shows that sea turtle conservation can and does work when given the chance. In the context of Terengganu, raising sea turtle numbers can ensure a continued and perhaps augmented (see Figure 1) arrival of tourists, who visit the islands in order to see the turtles. We believe Lang Tengah is of great biological interest, and should be preserved as part of the state's effort to stunt biodiversity loss in the region.

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