Sea Turtle Behaviour and Conservation at Alphonse Island

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Hatchling Survival

Social cooperation in hatchling sea turtles

Newly hatched sea turtles work together in an interesting example of social cooperation to escape from their nest. The first baby turtle to hatch usually does not start digging until enough of its brothers and sisters are also free of their eggshells and able to join forces together. During the first hours of their life, hatchlings show an amazing group organization. Depending on their position in the nest chamber, the turtles share different tasks: the hatchlings on the top scratch down the ceiling, those on the sides undercut the wall, those on the bottom compact the sand that arrives from above.

On average, a turtle nest is between 50cm to more than 1m deep, with those of Hawksbills being consistently shallower than those of Green Turtles. The vertical displacement of the group can take several days (about 4-6 days), during this progressive ascension turtles take frequent breaks to rest. Unfortunately, it frequently happens that some offspring hatch too late. Without the assistance of the group they may die of exhaustion and suffocation in the sand column.

The ICS team rescues straggler hatchlings from the turtle nest

2012-2013 was a good season for nesting Green and Hawksbill Turtles on Alphonse, so we were able to study the survival rate of a large number of nests. Each new turtle nest recorded during our daily turtle monitoring is flagged so we can easily find it again later. We also record the species, the GPS Waypoint and the laying date.

This last information helps us to anticipate the hatching date knowing that the incubation lasts between 52-74 days. The period of incubation is influenced by temperature, with warmer nests having a shorter incubation period. We also know that hatching has occurred by checking the sand around the nest site for flies or flipper tracks of baby turtles. Often we find a depression in the sand just above the nest that indicates when the hatchlings have arrived near the surface of the sand. All these clues help us to locate the egg chamber. Then we carefully dig by hand until we reach the empty shells and any dead, unhatched eggs.

We do all this to record rates of egg clutch survival in the nests. Sometimes we find dead hatchlings at the bottom of the nest. But, sometimes we are very excited to find live hatchlings -- the stragglers. Only a few generally stay behind. But we are thrilled to be able to rescue them.

These rescue efforts of only a few individuals may appear insignificant knowing that out of the entire nest of hundreds of hatchlings maybe only two or one (...or none), will ever reach sexual maturity after the approximately 3 decades that it takes for them to grow to adulthood. But we keep up our efforts because the one that we save today just might be the one that will come back as an adult 30 years later!

A hatchling green turtle removed from the bottom of its nest. It was alone among the empty egg shells that its nest mates left behind

How we make sure baby turtles find the sea

Visual orientation of hatchling sea turtles

Hatchling sea turtles emerge from the nest when ambient temperatures are relatively low, therefore emergences happen generally at night (but can also happen during rainy daytime, at dusk or at dawn). The time spent crawling down the beach to reach the sea, needs to be short. They have to go fast to avoid terrestrial or aerial predators.

Vision is the key sense for successful hatchling orientation and, in a completely natural environment, hatchlings will be attracted by the natural light (especially in the blue range) that is reflected from the sea surface. It is helpful to them when light from the moon or stars reflect off the ocean but they can find the sea even on a completely dark and overcast night.

Unfortunately, their attraction to light makes hatchlings vulnerable to being drawn to artificial lighting. Even in a bright moon night the turtle will be attracted by an even brighter illumination source, and so artificial light can disrupt the hatchling sea-finding behavior. Because such light usually comes from a source on land behind the beach, it tends to draw the turtles inland where they become exhausted, dehydrated, and subject to predation by animals such as crabs.

ICS and the hotel on Alphonse Island work together to minimise light pollution

On Alphonse, ICS and Alphonse Island Resort use a number of strategies to reduce light pollution visible from the nesting beach. The hotel equipped its guest house outdoors with red bulbs, a color to which the turtles are less sensitive. We ask the tourists to turn-off unnecessary lights inside their rooms. Lights on the roadways have been made more 'turtle friendly' by placing them at ground level and using dimmer bulbs. Because we keep track of all the nests near the hotel, we know when each is expected to hatch. So prior to their anticipated hatching date, we set up a screen of coconut tree leaves behind the nest to shield the new born hatchlings from visible artificial lighting. Our actions to minimize the light disturbance have greatly improved the hatchling survival on Alphonse and very few disorientation events happen now. The staff and guests of the Alphonse Island Resort have also shown great concern for the welfare of the hatchlings, and are very happy to help us in our efforts to protect these tiny creatures.

Aurélie excavates a turtle nest. She estimates the egg clutch survival and rescues any straggler turtles that she encounters

How we keep the nesting sea turtles coming back for more

The possible role of the Earth's magnetic field on nesting sea turtles

Sea turtles migrate long distances — hundreds or even thousands of kilometers — between their home/feeding areas and the beaches where they nest. Their nesting beaches tend to be near the beaches where they were born themselves. You probably wonder what makes turtles come back to the same area to nest time after time?

This little-understood event may happen thanks to the Earth's magnetic field: it resembles the dipole field of a vertical giant bar magnet placed at the center of the Earth. Field lines curve around the planet from South to North. The inclination of the field lines curve varies with latitude; lines are parallel to the ground above equator and are perpendicular to the ground at the poles.

Magnetite crystals, like those in compasses that we use for navigation, have been found in the sea turtle brain. These crystals line up relative to the North Magnetic pole, similar to what they do in our compasses. As the turtles migrate, these magnetic crystals would help the animals distinguish among the magnetic field intensities that exist in different geographic locations.

Scientists have produced evidence that, while running down the beach to reach the sea, the new-born hatchling is imprinting into its own head information about the magnetic field intensity of its nesting beach. This information will likely be used by that turtle many years later to find its way back as an adult turtle to nest in the same area.

Turtle Tagging Programme on Alphonse shows the return of nesting turtles to their natal beaches

On Alphonse since 2007, ICS has been running a turtle tagging program that was designed by Dr. Jeanne Mortimer, well-known in Seychelles by her nickname 'Madam Torti'. Thanks to the application of tags on the Alphonse's turtles, we are able to recognise the same individuals coming back to nest twice or three times in one nesting season, sometimes exactly at the same beach section. We have also this remarkable example of a nesting green turtle tagged in August 2007 by our colleague Pierre-Andre Adam on the eastern beaches and observed again, exactly 5 years later, in August 2012 on that same eastern beach.

The ICS team keeps the Alphonse beaches clean to help the nesting sea turtles and their offspring. The degradation of the beaches by erosion or by accumulation of debris can cause serious problems for a turtle trying to find a suitable nesting site. During our daily turtle monitoring around Alphonse Island, we sometimes find evidence that turtles stopped by obstacles. The obstacles can be a sand cliff below the beach platform, uprooted trees felled by coastal erosion, growth of invasive young coconut trees and accumulation of broken tree branches or coconuts. In addition to these natural debris we sadly observe an increasing amount of marine waste, the product of human society, washed ashore by the sea. Hatchlings are particularly vulnerable to this kind of pollution. Plastic bottles, caps, flip-flops…are obstacles that can slow down the vulnerable hatchlings in their way to the ocean, and make them more likely to fall prey to crabs or to dry out in the sun. To help the turtles, we regularly remove potential obstacles in the critical nesting sites and undertake routine beach clean-ups around Alphonse Island. Yes, it is an endless thankless task, but it is so great to know that we are helping the turtles!

A nesting green turtle going back to the sea after having successfully laid on a beach without any obstacle