

# Saving the Hawksbill Sea turtle, A Step in the Right Direction

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## ABSTRACT

The Hawksbill sea turtle has been facing extinction with little sign of improvement for the past several years. Rising sea levels, as a direct result of climate change, have increased the extinction risk due to the unique anatomy and life cycle of the hawksbill sea turtle. Global climate change is a threat to the life processes of the sea turtle due to elevated temperatures, changing currents, and elevated sea levels. This specific species of sea turtle exemplifies the damaging effects of global climate change throughout the ecosystem. In order to minimize the effects of climate change on the Hawksbill, proactive steps can be taken through mitigation efforts such as, ecotourism, policy reinforcement, and the reduction of waste. Saving the Hawksbill sea turtle will serve as a model for the protection of different species around the world.

## INTRODUCTION

Many animals are facing extinction today, but the Hawksbill Sea Turtles are definitely one of the most important on the list. Being not only beautiful and harmless creatures, they are also important in many ways. The Hawksbill Sea Turtles have a major role in the marine world by keeping order and access for other organisms. However, little improvement has been seen for the past several years and their risk of extinction is becoming more critical for a variety of reasons. Saving the Hawksbill will not be easy, but is plausible, worthwhile, and can be done in different ways. Saving the sea turtles will not only benefit them but many different species as well.

### Overall Goals:

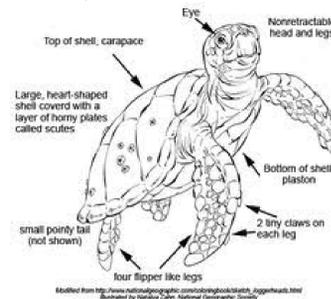
- Raising awareness about the relationship between climate change & extinction
- Providing small steps in which to get more involved in helping prevent the extinction of sea turtles



## ANATOMY & LIFE CYCLE

The anatomy of the hawksbill sea turtle is very closely related to any other vertebrate anatomy with a three chambered heart, two lungs, a lobed liver, and the common bones and muscles. The Hawksbills' shell is different and distinguishing from all other sea turtles in that it has unique carapace (or the top shell). The carapace contains 5 central scutes and 4 pairs of lateral scutes. The carapace also has a beautiful "tortoiseshell coloration", which often makes them victims to poachers. The anatomy of the Hawksbills' front flipper form a wide, long, wing-like structure that help the hawksbill "fly" through the water while the back flippers act as rudders for steering. The hawksbill sea turtle also have two claws on their front flippers which are theorized to help them latch on to the coral while they forage for their favorite food. The other evolutionary trait used to help the sea turtle find and eat its main source of food is their beak made of keratin. Instead of teeth sea turtles grow these horny beaks, which vary by species, to help in foraging their main food supplies. In addition the Hawksbills' beak is also pointed like the beak of a hawk and is adapted to reach and rip off pieces of sea sponges.

The Hawksbills' main source of food are these sponges that are usually found on and in the tight crevices of the coral reef bed. The Hawksbill are omnivores though, and therefore have been known to eat mollusks, marine algae, crustaceans, sea urchins, fish, and jellyfish (specifically Portuguese men-of-war).



## CLIMATE CHANGE

Climate change is not scientifically controversial topic. About 97% of scientists are in agreement that climate change is happening and affecting our planet in several ways. Although climate change has been occurring since the Industrial Revolution, it is more significant than ever because it is human induced. When fossil fuels are burned, volcanoes erupt, and respiration occurs, CO<sub>2</sub> and other natural gases are released and become trapped in the atmosphere. As the amount of greenhouse gases increases and becomes thicker the Earth becomes warmer.

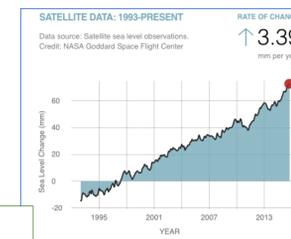
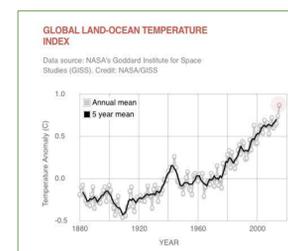
There is an abundance of evidence that proves climate change is affecting our planet. According the NASA, "Global sea level rose about 17 centimeters (6.7 inches) in the last century. The rate in the last decade, however, is nearly double that of the last century. All three major global surface temperature reconstructions show that Earth has warmed since 1880. Most of this warming has occurred since the 1970's, with the 20 warmest years having occurred since 1981 and with all 10 of the warmest years occurring in the past 12 years. Even though the 2000's witnessed a solar output decline resulting in an unusually deep solar minimum in 2007-2009, surface temperatures continue to increase. The oceans have absorbed much of this increased heat, with the top 700 meters (about 2,300 feet) of ocean showing warming of 0.302 degrees Fahrenheit since 1969."

Sea levels rise due to two main factors:

1. The addition of water from melting of land ice
2. The expansion of seawater due to warmer temperatures

The rate of global climate change is so rapid that sea turtles cannot adapt to different conditions in the same amount of time. These changes, if they remain the same, are predicted to cause the extinction of several species of sea turtles. The Hawksbill sea turtle, specifically, is at risk of survival due to climate change. As polar ice melts, sea levels increase, which erodes the beaches depleting nesting options. Rising sea level isn't the only effect of climate change that affect the Hawksbill sea turtle.

As temperature increases the temperature of the sand increases as well, making it difficult to hatch eggs and can result in complete nest failure. For these sea turtles, the temperature of the sand is especially important because it determines the sex of the hatchlings. Warmer temperatures produce more females which creates a disruption in the balance of males and females. Along with rising sea levels, the temperature change of the sea water also affects the ability of the sea turtle to catch prey and travel. Also, as temperature increases, the currents change making it difficult for the sea turtle to find prey due to abundance and distribution of prey. More dangerously for the southerly Hawksbill sea turtle, is migration patterns further into northern regions that are increasingly out of their normal range. The Hawksbill sea turtle is also highly dependent on coral bleaching. As the water becomes warmer these coral reefs are damaged causing struggle for the sea turtle. As temperature changes, the amount and severity of tropical storms increases as well. Storms can completely wipe out nesting sites and flood sea turtle nests.



## MIGRATION PATTERNS

One organization that is uncovering the Hawksbill Sea Turtle's migration patterns is the World Wide Fund for Nature (WWF or World Wildlife Fund in the US) by doing an experiment that lasted from 2002- 2009. The WWF tagged and tracked six sea turtles around South America. The way that tagging works is by placing a chip on the turtle that tracks its movement, (but the chip has no harm on the turtle and will fall off eventually and naturally); and the experimental results were beyond interesting. Some turtles stopped transmitting sooner than expected and different turtles went different directions. A few examples of different migration patterns are, "Paulina was the first turtle to be tagged but unfortunately she stopped transmitting at the beginning of October", "Blanquita Turbi headed west and stopped off around Jaragua National Park, where she stayed for the last three months", "Yvonne has taken a different route to the other turtles and headed north", and "Mirabal is the latest, and last, turtle to be tagged in the Dominican Republic and she started her journey a bit differently from the other turtles by heading east" (Where are the Hawksbill sea turtles going?). Having done this experiment showed the turtle's lifestyle as well as many ways to protect the turtle.

### Excerpt:

"The data will tell us where important feeding areas are, help us understand migration patterns, and anticipate where turtles may come in contact with fisheries and their gear" (What WWF is Doing). Knowing the turtles feeding areas allows for intervention and protection for the Hawksbill when vulnerability is high for all age turtles. Additionally, knowing the turtle's migration patterns will allow for a better prediction of where the turtle's will be traveling to next and making sure that there is a safe arrival. Ensuring a safe arrival could prevent many threats, such as hunters, natural predators, climate threats, and unintentional danger. A few methods to change for heightening Hawksbill survival is "Embedding light-emitting diodes in the roadway pavement instead of using overhead lighting near turtle nesting beaches", and "the use of non-magnetic materials [since] galvanized steel cages are magnetic and could alter turtles' subsequent ability to navigate back to their nesting beach as adults" (Migration Approach).

## HUMAN THREATS BEYOND CLIMATE CHANGE

1. Consumption: using sea turtle meat and eggs as food (poaching); they are considered delicacies
2. Illegal Shell Trade: Killing of sea turtles for their golden shells, which are used to make jewelry and luxury items



3. Fishing/Nets: Sea turtles get caught/entangled in nets, ropes and fishing lines that are used to catch fish, shrimps and other animals



4. Marine Pollution & Debris: Sea turtles confuse plastic bags, balloons and other items for food, which leads to suffocation and intoxication/interference with digestion.



Pollution/Oil Spills: Fibropapillomas (disease)

5. Beach Activities: driving (creates misleading paths away from the beach), artificial lighting (disturbs females at night trying to lay their eggs), coastal housing/armoring

## FINANCIAL BUDGET FROM ORGANIZATIONS

Many global organizations have contributed assistances and aids for saving the population of the hawksbill sea turtles and reducing the current threatening risks of extinction. The Sea Turtle Conservation Bonaire for instance is a non-governmental research and conservation organization serves to protect sea turtle population. Over the past years, this organization has made efforts in protecting the sea turtles in the Caribbean Sea. Hawksbill turtle, of course being one of the targets. They conducted field studies on the beaches and researched the turtles' habits, figuring out what is necessary for their survivals. This organization's funds were mostly from grants, donations, and fundraisings. Moreover, it spent most of its budget on conducting field researches, launching projects, and training its staff members. One of their sponsors, WorldWide Fund for Nature (WWF) is another non-governmental organization which has the same goal as the Sea Turtle Conservation Bonaire yet in a more global sense. This organization aims for promoting the reduction of human influence on nature. This organization conducted various field researches on the biodiversity conservation, not only so, it also funded other organizations for their projects. These organizations are all working together for the same goal and reason of protecting and preserving nature's beauty and need to save those endangered species. Therefore, people should support these organizations either through donating or volunteering as every action can make a difference in our society.

Liquid Assets	
Current Account	4,129.87
STCB Savings account	101,815.16
STCB Savings account - WWF funds	15,091.45
<b>Total</b>	<b>121,036.48</b>

Sales & Research Expenses	
Provision	1,032.45
Fundraiser expenses	602.97
Apogee satellite tracking time & transmitters	139.07
Field work expenses - fuel	3,594.58
Special projects:	
- Apps	20,140.00
- Appeals	148.00
- Boat fuel	623.00
- Research Consultation	2,160.00
<b>Total Sales &amp; Research Expenses</b>	<b>38,600.06</b>



## TAKE ACTION!

- Speaking to congressmen to make punishments more severe for hunting/ killing and selling of sea turtle shell jewelry, sea turtle meat and sea turtle eggs for food
- Raising/ donating money to protect hatchlings and adults through the Pacific Whale Foundation: Adopt a Sea Turtle program
- Gate off the sea turtle migration beaches during the breeding season and provide "lifeguards" for hatchlings to help them to the ocean.
- Limit fishing in sea turtle feeding grounds and only allow fisherman with Turtle Exclusion Devices (TED's) to fish
- Eliminate physical, noise, and light pollution (at night) on beaches
- Raise awareness on the severity climate change has on our ecosystem, awareness can be spread through ecotourism, festivals, reaching out to students to get more involved (because we are the main generation, we set the trends)

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