Bye Bye Galapagos Tortoises

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Abstract

The Galapagos have seen many visitors. Hundreds of years ago, the islands were a popular port for explorers, pirates, and whalers. When they stopped, they would capture tortoises to store in them in the ship to later eat or kill for oil. To make room for the tortoises they would unload their animals. These nonnative animals such as goats, pigs, cattle, donkeys, rats, dogs and cats are a continuing threat to the food supply and eggs of the tortoises. Tortoises could not compete against these animals and in return their species started to decline due to loss of habitat and food. Due to human exploitation of the tortoises and the introduction of new species, several species went extinct or are on the brink of extinction.

Introduction to the Galapagos Islands

The Galapagos Islands are located at the equator of South America. Millions of years ago the tops of the Galapagos volcanoes emerged. They rose above the water for the first time about 600 km from Ecuador (Species Arrival to Galapagos, 2020). They are derived from hotspots deep inside the earth called mantle plumes. The Galapagos Islands lie below the Nazca Plate, this caused the volcanic chain of islands (White, 1997b). Considering the formation of these islands, it is believed that the species that inhabited the islands arrived by sea and air. Vegetation rafts are thought to have brought most species, such as mammals, reptiles, and amphibians. Aquatic animals on the island most likely found their way through ocean currents (Species Arrival to Galapagos, 2018). Animals of flight such as birds found their way to the Galapagos by air and wind. Many small insects and snails arrived on the islands by wind and air. Vegetation appears on the islands due to seed dispersal thanks to the wind and the ocean (Species Arrival to Galapagos, 2020).

The Galapagos Islands have the highest level of biodiversity. It is home to many endemic species; these species are found nowhere else on earth. They include 80% of the land birds, 97% of the reptiles and mammals, 20% of the marine species, and more than 30% of the plants (Biodiversity, 2020). Tortoises are one of these endemic species found on the islands. Unfortunately, these amazing creatures are low in number throughout the islands. Humans have caused the extinction and the endangerment of all of the tortoise populations.

Background Information on the Tortoises of the Galapagos Islands

Tortoises are the reason the Galapagos Islands got their name. In Spanish the word "galapago" means tortoise (Schellhase, 2018). Scientists believe tortoises first arrived at the Galapagos 2 to 3 million years ago on vegetation rafts. They then dispersed throughout the islands eventually establishing 15 separate populations. There are two morphological forms of these tortoises. The domed carapace, which are larger and live on larger islands in humid zones and the saddle-backed carapace, which are found on drier islands (Giant Tortoises, 2020).

Darwin's theories of natural selection and evolution were created thanks to his research from these islands. The shells of the Galapagos tortoises are how Darwin determined living creatures change over time. Darwin notes "It is the circumstance that several of the islands possess their own species of tortoise. These species having the same general habits, occupying analogous situations, and obviously filling the same place in the natural economy of this archipelago, that strikes me with wonder" (White,1997a). He was fascinated how one type of tortoise found on one island could be so distinct from another tortoise found on a different island.

The Galapagos tortoises are the largest in the world. Some of these tortoises were recorded exceeding 5 feet in length and reaching 550 pounds (Galápagos Tortoise, 2018). It is remarkable how they can grow so large. The tortoise's activity level promotes this growth. They are driven by temperature and food availability. They are herbivorous feeding on grasses, fruit,

and cactus pads. They drink large quantities of water in which they can store in their bladders for long periods of time (Giant Tortoises, 2020). As long as food and water are available, Tortoises breed during the hot season primarily from January to May. A female can lay 1 to 4 nests over a nesting season. The female digs the hole with her feet then lets the egg drop down into the nest and covers it. The eggs incubate from 110 to 175 days. The sex of the hatchling is determined by the incubation temperature, with females developing at hotter temperatures than males (Giant Tortoises, 2020). These tortoises have the longest lifespan of all vertebrates, averaging over 100 years (Galápagos Tortoise, 2018). Throughout their life span Tortoises have a commensalism relationship with birds since they keep the bugs off their skin. Birds will dance around the tortoise to indicate they are ready to eat and the tortoise responds by stretching out its neck (Giant Tortoises, 2020).

Human Arrival to the Galapagos Islands

The Galapagos Islands were first discovered in 1535 by European voyagers but did not appear on the map until 1570 (Galápagos Islands, 2020). The island housed many explorers, pirates, and whalers who only came to capture as many goods as possible such as the tortoises. Visitors of the islands learned following tortoise paths into the highlands would lead them to fresh water (White, 1997 a). The first known resident on the islands was a man named Patrick Watkins. He managed to survive by hunting tortoises and trading tortoises to whalers in return for food (Galápagos Islands, 2020). Up to 1832, the islands were owned by Spain until they were claimed by Ecuador. For over 100 years these islands were constantly visited by merchants, pirates, and whalers.

Tourists first arrived from cruise ships in 1934. From the 80s to the 2000s cruise ships and vessels capacity nearly tripled. From 1991 to 2006 fleet revenues increased from about $20 million to $120 million (Epler, 2007). Galapagos responded to the increasing tourism in several ways. In 1993 Galapagos instated the $100 fee to foreign tourists in which 40% of this fee goes to the national parks. By 1998 24-hour electricity was available on main islands. Telephone and internet were available on the islands by 2000 (Epler, 2007). Many mainland Ecuadorians migrated to the Galapagos to find work. They make up the largest percentages of the Galapagos Islands. Of the Islands Santa Cruz is the most populated and developed with 18,000 residents. San Cristobol inhabits 9,000 residents. Isabela is home to 2,700 residents. Floreana is the least populated with 100 people (Epler, 2007). Tourists have multiple accommodations to choose. From 1982 to 2006 hotel numbers increased from 18 to 65. In the last 15 years total hotel revenues in the Galapagos have increased from $1.2 million to $10.7 million in US currency (Epler, 2007). Increased residents and tourists have introduced these fragile islands to many threats. One of the largest threats to the islands are invasive species such as goats, donkeys, tropical fire ant, and rats.

Humans Impact on Galapagos Tortoises

Early inhabitants of the Galapagos Islands threatened the existence to the tortoises. Explorers and pirates enjoyed the giant tortoises of the Galapagos. The biggest benefit of the tortoises was that they provided fresh meat that could last the whole crew. These tortoises were highly prized by mariners because they were easy to keep alive on ships for many months without food or water (White, 1997 a). By 1793, there was a new threat to the tortoises, whalers. Like the pirates, whalers would hunt tortoises. The only difference is that they were

not only after them for food but for oil. Whalers were much greedier than pirates they quickly caused races of tortoises to become extinct. Over the course of the 19th century thousands of tortoises were taken. By the time that Darwin visited in 1835 tortoises were already disappearing from Floreana. Darwin found over 100 people living on the island surviving on the tortoises. He recalls, "their numbers have of course been greatly reduced in this island, but the people yet count on two days hunting giving them food for the rest of the week" (White, 1997a). By 1846, there were no tortoises found on Floreana but there were thousands of cattle and wild dogs roaming the island. In the 19th century the Santa Fe and Rabida tortoise races also became extinct (White, 1997a). By 1935, 3 of the 15 races of tortoises were gone forever, and populations of others were vastly reduced. At this time only a single individual remained of the Pinta race.

In addition to their direct exploitation by humans for both food and oil, tortoises also faced challenges of exocytic animals by humans. The first explorers of the islands deliberately released goats from their ships to provide more storage for tortoises (White, 1997a). What they did not realize is that the goats would greatly multiple threating the native herbivores, such as the giant tortoises. In the 1980's a few goats on Isabela crossed the barren of lava flows and reached Volcano Alcedo (White, 1997a). This Volcano was home to the largest population of tortoises and up until this time had little to no contact with humans and their feral animals. In less than ten years these few goats multiplied and between 50,000 and 100,000 goats were found living on the volcano. The goats almost completely defoliated the volcano, threatening one of the best tortoise habitats (White, 1997a). Project Isabela got rid of the goats on Isabela

island by aerial shooting. It did take years for the vegetation to replenish on the volcano and the tortoises to bounce back from this awful species (Schellhase, 2018).

Goats were not the only introduced species by humans that threatened the livelihood of the tortoises. Pigs that were also purposely let off the ships of sailors. These pigs devoured native plants, invertebrates, and tortoise eggs. Pigs threatened the population of tortoises since they destroyed their habitat and food supply and preyed on their eggs. Similarly, humans released donkeys and cattle from their ships. These exotic animals trampled the nests and decimated the habitat of the tortoises. Humans introduced species like rats which prey on tortoise eggs.

Introduced species were the major driver that caused the tortoises ecosystem to change. By the end of the 20th century giant tortoises were inching toward extinction. Over the course of 150 years, the giant tortoise population fell from an estimated 100,000 to 200,00 to around 15,000 to 20,000 (Schellhase, 2018).

The Fishing War

In 1995, a new stricter fishing law was put in place. This law prevented them from exploiting more of the islands resources and cashing in on tourism. Fishermen had taken over seven million sea cucumbers from the Galapagos Marine Reserve, which is ten times the harvest allowed (Pearce, 1995). Fishermen were furious and claimed that they were being deprived of the opportunity to earn a livelihood. Fishermen argued that the Charles Darwin Station people want to keep the Galapagos as their own plantation. Tortoises were threatened as a consequence of stricter fishing laws (Epler, 2007). In 1994, more than 80 tortoises were

slaughtered on Isabela. Several fishermen made threats to Lonesome George in which they knew he was the last standing tortoise of his kind.

Conclusion

The Galapagos Islands are one of the most unique places in the world. They are home to species found nowhere else. Giant tortoises are one of these unique species. Unfortunately, they have either been driven to extinction or are on the brink of extinction due to humans. Hundreds of years ago pirates and whalers hunted the tortoises for meat and oil. This tragically led to the species decline. Also, the introduction of exotic animals by humans destroyed the tortoise's habitat. Humans also have endangered these tortoises by allowing situations such as the fishing war to occur. The fact that they slaughtered more than 80 tortoises and got away with this execution is disturbing. Humans caused many of these amazing species to become extinct or have severely wiped them out to a point where there are only a few thousand left. If it was not for human interruption, the 15 species of the Galapagos tortoises would not have gone extinct.

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