KC Liwanag

Environmental Science 11
Final Research Project

Population Status and Conservation of the Endemic Pygmy Three-Toed Sloth *(Bradypus Pygmaeus)*

The pygmy three-toed sloth *(Bradypus Pygmaeus)* also known as the dwarf sloth, is the smallest of the six sloth species in the world. They are endemic to a small island named Isla Escudo de Veraguas off the Carribean coast of Panama. Pygmy sloths solely inhabit the red mangroves (Rhizophora mangle) of the island's tidal areas. This project is to assess the population status of the pygmy three-toed sloth through two studies conducted in which observed their numbers in the island. According to the IUCN Red List, this species is critically endangered as their current population trend is decreasing. Thus, this spiked my interest in this topic, concerning their low numbers and major threats to their population. The first study conducted a visual systematic survey of all 10 mangrove thickets on the island to compare pygmy sloth population numbers in mangroves versus subpopulations beyond its periphery. A radio-tracking method was used in the second study to analyze the behaviour and movement of mangrove-dwelling pygmy sloths venturing into the interior of the island. Both studies also determined the main cause of their population's regression.

Due to the limited research conducted on the pygmy three-toed sloth and only to their population in the red mangroves, this first study *("Observations on the Endemic Pygmy Three-Toed Sloth, Bradypus Pygmaeus of Isla Escudo De Veraguas, Panamá" from Plos ONE's Public Library of Science)* is done to prove the hypothesis that pygmy sloths are obligate mangrove specialists. In order to develop a conservation plan for this species, understanding their dietary needs is crucial. So, this research is created to investigate their ability to scatter around and utilize non-mangrove mixed lowland forests for food. It focused on assessing their population and habitat distribution on Isla Escudo. Their first task is to determine the location of all mangrove thickets and map out their boundaries based on GPS data. They used ecological boundaries between mangroves and other tree species to distinguish each mangrove thicket. Next, the surveyors conducted a line transect survey. The strip census method was used throughout all mangrove thickets. Once they encountered a sloth, it is assigned an identity number. They recorded its location with GPS as well as noted other observations such as its physical appearance and dorsal colouration. The data collection is acclaimed accurate because the thin canopy density of the mangroves made for easy spotting of sloths and observers ensured double counting of total individual sloths by beginning and finishing of each day. Within their calculated total mangrove habitat (106,699 m2, 0.024% of the total island area), 70 pygmy sloth individuals were detected. The average was 7 individuals in a thicket. Only 9 were located in non-mangrove trees just beyond the periphery of the mangroves. Their population density is highest in medium-sized mangrove thickets while in larger thickets, it was lower. In the simple linear regression analysis, the data suggested that the overall population levels are dependent

on mangrove area. Sloths are often observed feeding on mangrove leaves, however, none of those spotted outside mangrove habitats were seen eating. Observers have noticed human activity, mangrove logging, cutting approximately 30% of the total mangrove habitat they have surveyed. This habitat disturbance and fragmentation, trees being cut inconsistently in different areas, could be a factor in the pygmy sloths' population density as well as a cause of their declining population. Ultimately, the research concluded that the endemic pygmy three-toed sloths' diet is mainly reliant on mangroves, thus the protection of their mangrove habitat is extremely crucial for the survival of their species.

Another scientific journal *("Biology and conservation of the pygmy sloth, Bradypus pygmaeus" from Oxford University Press' Journal of Mammalogy)* performed a radio tracking study of pygmy sloths with a similar intent as the first study. However this study's hypothesis is to confirm that these mangrove-dwelling sloths do venture into the interior forests of Isla Escudo. The reason for this research being done is because no systematic efforts have been made to find pygmy sloths in the island's interior. This study involved the radio tracking of pygmy sloths. First, they captured 10 sloths in mangrove thickets and attached radio collars onto them in order to monitor their movement. In 3-6 month intervals, the sloths' locations were checked and marked with GPS. Initial data presented that some sloths do travel from the mangroves to the interior forests as four sloths were tracked far outside the mangroves and five were discovered in non-mangrove trees near the mangrove periphery's edge. Three pygmy sloths were always found in the mangroves. As calculated, the average minimum area used by an individual sloth was 0.25 ± 0.13 hectares. However, these data are inadequate for calculating an accurate home range because of the inconsistent locations of the sloths. Through the researcher's other findings, he estimated that the actual population size of pygmy sloths in Isla Escudo is perhaps 500-1500 individuals. This is because he suggested that the interior forests of the island have a similar density of pygmy sloths as in the mangrove thickets which is also similar to a study done with Brown-throated sloths (Bradypus variegatus) living in a central Panamanian rainforest. The Panamanian rainforests' plant diversity and canopy height are greater than Isla Escudo's but are very much alike in terms of botanical species. Thus, his radio tracking study, as well as information from other studies, led to the researcher's evaluation of the pygmy sloths' population on the island's interior being greater than what the first study had suggested. Even in this case, their population is still in critical status. The reason proposed by the researcher is due to human activity as timber is being harvested on the island's forests for building structures and these various trees are heavily relied on by pygmy sloths.

Although there is no accurate information on the total population size of the pygmy three-toed sloth *(Bradypus Pygmaeus)*, these two studies have observed their species in both the mangroves and the interior forests of Isla Escudo de Veraguas, addressing the issue of its declining population. Both studies' estimation of their population is relatively small. It was previously suspected that this species exclusively inhabit the red mangroves and primarily feed on mangrove leaves. However, in the two studies, they have discovered pygmy sloths in the interior of the island as well. The first study discovered that there are small numbers of sloths scattered throughout the mangroves, with some mangrove thickets having a higher population

density of sloths than others, while an even smaller number of sloths have been located within the interior forests. On the contrary, the second study examined that there is perhaps a similar population density of sloths in the interior as there is in the mangroves. It has also estimated that their population is higher than what is suggested in the first study. Nevertheless, the pygmy sloths' estimated population is still extremely low for an entire species. The result is not surprising as this species is endemic to a single island in Panama and their population can easily be affected as a whole since they can only be found in this one area. The methods used in the studies to test their hypothesis and calculating the sloths' population were different. However, both assured a convincing and systematic data. These studies have addressed and validated the critical condition of this endangered species in which the results, gathered data and information can contribute to the organization and planning of their conservation. With the studies' additional evidence of human activity, the logging of trees on the island which can be a major threat to the sloths' population as habitat loss continues, it is certain that a comprehensive conservation plan to protect this species and their island must take in action. In researching this topic, there are new questions that kept me wondering, especially about certain prospects of the future which were left unanswered. These include: is there a way to accurately determine the population of this species?, what poses other threats on this species and their environment?, how would their extinction affect their ecosystem?, what developments could be done or have already been done to protect pygmy sloths? The fate of their declining population may depend largely on human action and our determination to cease major threats affecting it . Although the two studies have greatly provided information, more scientific research on the pygmy three-toed sloth is needed to better understand their species and allow us to ensure their survival.

Bibliography

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