Destruction of Shark Habitats and Populations

Manoj Vasa

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The sharp decline of shark populations is blatantly evident from images seen of the sharks roaming among the coral reefs today. As opposed to the rich abundance of species and population of the sharks in the coral reefs decades ago, recent observations yield rather alarmingly less of these shark species in the oceans. This sharp decline stems from several external influences. The majority of the influence is derived from land based pollution and overfishing. Humans are decreasing the shark populations by habitat degradation and shark finning. This critical decline in shark population could result in major catastrophic consequences both on land and water environments. Such consequences include the alarming rise of invasive species that deplete the various species of fish in the oceans and the spread of disease from the ocean to the surface largely affecting humans and the quality of the oceans as well.

The coral reefs have been observed to be the preferable habitat of sharks. Dr. Espinoza and her colleagues have studied five major shark species and their associations with their environment in regards to the Great Barrier Reef. Through extensive observation they found that some sharks were observed more in northern sites with high coral cover while other shark species preferred southern sites with high coral cover (Espinoza, Cappo, Heupel, Tobin & Simpfendorfer, 2014, p. 3). This provided evidence that certain species of sharks are separated into their preferred habitat. Furthermore, the coral reef acts as a divider to prevent conflict among various species of sharks. Through further observations, Dr. Espinoza has discovered that more sharks tend to prefer areas of the coral reef that had higher structural complexity (Espinoza et al., 2014, p. 5). Consequentially, there was a distinct lack of sharks in areas of the coral reef with low structural complexity. This structural complexity refers to high, low, soft, hard, and the unique composition of the coral species in these habitats. This variance of coral cover serves to be very crucial to the survival of many shark species. Such crucial variance allows for various other species to exist in these coral reef habitats that convey a mutualistic relationship with sharks. Such species that play a critical role in the survival of sharks are the cleaner species that reside in these unique habitats.

Dr. Simon P. Oliver and his colleagues conducted a study on such species that live in the distinct coral reef cover. This study analyzed the mutualistic relations of sharks and cleaner species that “forge on ectoparasites” (Oliver, Hussey, Turner & Beckett, 2011, p. 1). These cleaner fish consist of species such as cleaner wrasse and lobroides dimidiatus (Oliver et al., 2011, p. 1). Specifically, this study followed the interactions between sharks throughout the coral reef systems and these small cleaner fish and shrimp. In the study, specific locations were mentioned as cleaner stations where sharks frequently visited to be searched for parasites (Oliver et al., 2011, p. 7). Dr. Oliver observed that the cleaner species would more often feed from the side of the sharks that had ectoparasites as opposed to another part of the shark (Oliver et al., 2011, p. 8). The ectopaarasites infecting he sharks could cause them to suffer severe health consequences such as “anemia, the deteriorated development of reproductive organs, reduced respiratory function, and chronic and debilitating skin disease (Oliver et al., 2011, p. 8).” Thus, without the existence of these cleaner species, sharks face a risk of dying and decreasing in their population and species richness as they become infested by these ectoparasites. Furthermore, these ectoparasites can reproduce and extend their influences from one shark to another. This means that their influence can rapidly spread through the whole population if these cleaner fish and shrimp weren’t ridding of the parasites from the sharks’ skins. The degradation of the richness and abundance could destroy and deplete the population of these critical cleaner fish. Nonetheless, the degradation of the coral reef habitat can affect all species including sharks.

The complexity and variance of cover of the coral reefs provides for a preferable habitat for sharks. This unique cover allows for separation of different shark species that may be a threat to one another. For example, smaller sharks like the blacktip reef sharks “prefer shallow sand flats” where their predators aren’t present (Roff, Doropoulos, Rogers, Bozec, Kureck, Aurellado, Priest, Birrell & Mumby, 2016, p. 403). In comparison, larger sharks that are predators to smaller sharks often prefer to stay along more structurally complex reef systems. This difference of preference to unique reef systems helps smaller sharks in staying alive. This is a major element for sharks to mature and survive. Without these dividing borders, young or smaller sharks are at a risk of being preyed upon by larger sharks before they’ve matured enough to defend themselves. Another helpful aspect of the structures of coral reefs is that it supports sharks against especially strong currents. At other locations of coral reef systems, the structure allows for a continuous medium strength current that can be used by sharks to lower their energetic cost (Roff et al., 2016, p. 402). Less energy expended means that sharks can consume less food and still be entirely healthy. Moreover, certain systems within reefs provide juvenile sharks with sources of food that aren’t a primary source for larger sharks (Roff et al., 2016, p. 400). Thus, smaller sharks can survive with this source and without interruption by larger predator sharks.

Humans play a critical role in the degradation of the habitat of sharks. Dr. Kroon and Dr. Thorburn discovered various factors of pollution that immensely affected the Great Barrier Reef and other coral reef systems that sharks rely on. One of the three major factors Dr. Kroon stated was subsurface erosion (Kroon, ThorBurn, Schaffelke & Whitten, 2016, p. 1987). This type of pollution refers to when soil, byproducts of cattle grazing, and farming is drained down to large bodies of water through the process of erosion by rainfall (Kroon et al., 2016, p. 1987). This erosion happens naturally but the products transferred through the erosion are controlled by humans. Such a controlled element is the pesticides used in farming. The use of these pesticides and fertilizers for crops is sometimes unintentionally drained into the oceans (Kroon et al., 2016, p. 1987). Levels if pesticides and fertilizers caught in these river loads are highly dependent on the amount used in farming practices. Dr. Kroon emphasized that the increases of biomass of phytoplankton due to increased availability of nitrogen as another major contributor to the disruptions of the coral reef habitats (Kroon et al., 2016, p.1989). This combined with the additionally introduced fine sediment “reduces light availability for photosynthesis” (Kroon et al., 2016, p. 1989). The reduces light and energy degrades the coral reefs. Through these various forms of pollution to the oceans the habitats of sharks are being severely damaged and degraded. Although humans do play a critical role in inflicting damage to the shark population indirectly, they play an even significant role in directly reducing the shark population.

Another major contributing factor to the decline in the shark species is shark fishing and shark finning. Dr. Po-Shun Chuang used the “DNA barcoding method to identify the species of sharks entering through fishing ports” throughout Asia (Chuang, Hung, Chang, Huang & Shiao, 2016, p. 1). Through this study, Dr. Chuang concluded that “Asia imports 10,000-20,000 tons of shark fins per year” (Chuang et al., 2016, p. 2). These insane amounts of shark fins were imported to satisfy the increasing demand for an item served all across Asia called shark fin soup. Through further analysis Dr. Chuang and his colleagues have identified 23 different shark species from the 231 port landings and 24 shark species from the 316 shark fin products (Chuang et al., 2016, p. 6). In fact, this act of shark finning is illegal in many places such as Taiwan, Argentina, and Fiji. This is a global issue that are proving to cause drastic changes to the shark populations as people disregard these bans (Morgan et al., 2010, p. 41). The immense amount of shark finning and shark fishing happening throughout the world is decreasing the already vulnerable populations of this species.

These vulnerable populations are put at risk of further dangers as these fisheries continue to indiscriminately catch and kill sharks without regard to their threat of endangerment (Morgan, Whitty & Phillips, 2010, p. 21). Moreover, Dr. Chuang and his colleagues found in their samplings that there were 12 near threatened species, 13 vulnerable species, and only nine least concerned species (Chuang et al., 2016, p. 10). These samples suggest that the sharks caught by the fisheries are more likely to be threatened or vulnerable rather than a safe species to hunt. Dr. Chuang concluded that 22.1% of all samples found on ports were categorized as threatened (Chuang et al., 2016. p. 4). Surely the more abundant species should be the ones that are fished more often. The reason for these alarmingly high numbers of threatened species found in the ports is the result of bycatching. This is when fish or sharks as in this case are caught unintentionally with intended targets. So, threatened species are put at risk even though the less threatened one are the ones being targeted. A reason for bycatching is due to the lack of reliable equipment. Nonetheless, some of these fisheries have little regards to the conservation efforts for sharks. So, they’d have no intention of changing equipment since only yields more profit for them. This line of thought further depletes the already vulnerable shark populations. The declining shark populations through shark finning and habitat degradation can cause severe impacts.

One of these drastic impacts consists of the overwhelming influence of lionfish on the ecological state of many coral reef communities. Lionfish are an invasive species that have caused severe damages and continue to increase their threat by each year. The female lionfish lays nearly two million eggs every year (Albins & Hixon, 2011, p. 2). This suggests that these fish expand their communities rather rapidly throughout the oceans. This constantly growing population means that the lionfish’s demand for food increases as well. Some observations in the Bahamas concluded that a single lionfish consumed over 20 juvenile reed fish in just 30 minutes (Albins et al., 2011, p. 4). This amount of predation grouped with the total population of lionfish spreading throughout the ocean can be catastrophic. Dr. Mark A Albins uncovered through an experiment that after two months of their introduction, the native coney grouper reduced the abundance of small fish by 35%, “whereas invasive lionfish alone had reduced prey fish by 90%” ( Albins et al., 2011, p. 4). This drastic difference definitely provides evidence for the complete invasive intent of lionfish. These fish are very competitive and conquer habitats and kill many other species.

Lionfish are a serious threat to the coral reef systems of the Atlantic and Caribbean coral-reef communities. They have a cryptic form with extending spines that prevent smaller fish from either recognizing the threat or being able to swim away before being eaten. This intense competitiveness exterminates whole populations of smaller fish. Moreover, these smaller fish were meant to serve as a crucial element in terms of trophic levels and food supply. These smaller fish were supposed to be food supply for smaller predators. “Otherwise, they were destined to grow and feed higher trophic levels” (Albins et al., 2011, p. 5). Undoubtedly, humans consist of a major portion of that higher trophic level. This invasive species ultimately depletes food sources for other fish and humans. In some areas and cities, fish is a primary source of food. Thus, depleting this food source would directly harm many other fish populations and a significant amount of human populations. Although, traps were set to capture lionfish and scuba divers’ attempts proved to be slightly helpful, it isn’t enough. Sharks play a major role in controlling invasive species like lionfish. The 50 centimeter fish is easily intimidated by the larger predators. Reducing populations of sharks would directly assist in the increase of these harmful, competitive, and destructive invasive species. Sharks also prevent the destructive consequences of disease outbreaks in the oceans.

Sharks play a critical role in maintaining the populations of other species so as to reduce the risk of disease. Dr. Lucifora discovered in his study that the larger and more mature a shark becomes they are more likely to consume other older species (Lucifora, Garcia, Menni, Escalante & Hozbor, 2009, p. 109). This is a matter of surviving by killing other strong species within the ocean. Moreover, these older species are more likely to be diseased. If these fish were to live with their disease, they could cause a potential outbreak. This outbreak could affect other smaller fish along with spreading from one school of fish to another. This potential outbreak could be catastrophic as disease spreads throughout the ocean and through all the species in it. Rapid spread of disease can quickly deplete large populations of fish and the diseased fish captured for consumption can spread the dangers of contamination onto land as well. In his study, Dr. Lucifora emphasized that the older and more mature a shark becomes the more likely they’ll be able to consume the older and diseased species to keep the oceans clean (Lucifora et al., 2009, p. 112). However, at the rate at which sharks are being fished and killed without conservation efforts in mind, the maturity of the remaining sharks reduces and less sharks will be able to mature to their optimal age. Sharks are being killed before they can even age to their optimal maturity and contribute to cleaning the oceans of disease. Furthermore, this disease can reach the land and severely impact human health as well. This food source would be entirely depleted. The majority of the Earth will become contaminated with disease if sharks won’t be alive and mature enough to rid of these diseases.

The drastic decline of the species richness and populations of sharks is of great concern. These population losses can be prevented with more thought and caution from humans. Through the process of habitat degradation humans have been gradually destroying the preferred habitat of sharks that are used for their survival. Pesticide and byproducts of cattle grazing and farming get washed down rivers and into the oceans as a major contributor to pollution. Furthermore, excess availability of nitrogen allows for accumulation of biomass such as phytoplankton. Both of these factors cover oceans or pollute them so that coral reef species can’t get enough light and energy to survive. This coupled with tourists taking pieces of coral reefs as souvenirs only further threatens the habitat for sharks. Humans play a crucial role in degrading the structural complexity of coral reefs. Sharks rely on this complexity as a defense mechanism. Humans also take part in depleting the population by directly fishing and finning sharks. Such acts have been blatantly ignoring conservation efforts. Humans have been killing sharks faster than they can mature. A better outlook on the conservation efforts of sharks and their crucial ecological importance can reduce these hazardous acts. Sharks need to stop being fished and conservation efforts need to be put in place to raise their populations again.

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