Spatio-temporal variation of sharks and rays in Zavora, Mozambique: Evaluating distribution patterns and conservation needs

Nakia Cullain, Michelle Carpenter, Alexandra Hanusch, Michiel Hamelinck

Zavora is a remote fishing village located on the southern coast of Mozambique. Since 2009, the Zavora Marine Lab has been collecting baseline data on the presence/absence of fish species in the region. Using our personalized manta ID software, photo-identification has been a useful tool in determining the population structure of Zavora’s manta rays, and has allowed for long-term monitoring of both species (Mobula birostris and Mobula alfredi). More recently, we have furthered our research by collecting data using baited remote underwater videos (BRUVs) to determine the abundance and diversity of elasmobranch species found in Zavora Bay. Our overall goal is to determine the occurrence, abundance, and diversity of elasmobranchs in the region and highlight key aggregation areas that need protection and proper management.

While Mozambique is considered a hotspot for threatened sharks and rays, there is a paucity of information on their seasonal and spatial distributions, the relative impact of human activities, or the effectiveness of marine protected areas (MPAs) for shark and ray populations – each of which are essential for developing and implementing sustainable use practices.

Despite the known manta aggregation zone in Mozambique which extends from Bazaruto archipelago in the north to Zavora in the south, recent studies have identified a drastic decline in abundance through sightings records: 90% decline of Mobula birostris and 98% of Mobula alfredi. This sampling, however, was focused primarily in Tofo, 100 km north of Zavora. Our research shows that Zavora still has a consistent seasonal manta ray aggregation between July and November, indicating that Zavora’s manta population may not be undergoing the same drastic decline as seen in Tofo. Despite facing numerous threats including Chinese harvesting of the gill rakers, bycatch from gill net fishing, and coastal development leading to increased boat strikes, habitat loss, and pollution; manta rays still remain unprotected in Mozambique. This highlights the urgency for protection of the species and their habitat, especially in Zavora where abundance is still relatively high.

Further, our BRUV project aims to solve numerous data and knowledge gaps with regards to elasmobranch communities in south-eastern Africa. While Zavora can be considered a hotspot for sharks and rays, there is limited scientific data on the variation of their community structure, how this can be linked to different environmental factors, and the rational for and potential effectiveness of an MPA. Many of the species seen here by divers or by fishers are listed as vulnerable, threatened or endangered, and require conservation of functional habitats to prevent further population loss. Zavora maintains relatively un-impacted shallow and deep reefs, and as such provides a unique opportunity to monitor elasmobranch assemblages in healthy reef habitats. Our first deployment was in January 2019 and to date, we have deployed a total of 21 BRUVs. Interestingly, no sharks have been recorded, however various ray species such as Rhynchobatus djiddensis, Neotrygon kuhlii, Taeniura meyeni, and Mobula kuhlii have been sighted. Although we are at the beginning stages of the project, we will continue to sample over the upcoming the months/years to assess long term and seasonal changes. This project will provide key insights into the spatio-temporal patterns of elasmobranchs in Southern Africa and help us to better manage and monitor their populations in the future.