

Collaborative Community-Based Conservation Work and Scientific Research: Understanding Fibropapillomatosis Disease Affecting Sea Turtles

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Local Ocean Conservation (LOC) is a Kenyan grassroots marine conservation organisation based in Watamu, which uses sea turtles as a flagship indicator species of marine health. Kenya is home to five species of sea turtles: green (*Chelonia mydas*), loggerhead (*Caretta caretta*), hawksbill (*Eretmochelys imbricata*), olive ridley (*Lepidochelys olivacea*), and leatherback (*Dermochelys coriacea*). According to the IUCN Red List, two of the species found in Kenya are classified as either Endangered (green) or Critically Endangered (hawksbill), with the remaining three species being classified as Vulnerable. Globally, sea turtles face a number of threats, some of the most severe being bycatch in fisheries (Wallace *et al.* 2010), habitat destruction (Biddiscombe *et al.* 2020), and marine pollution (Duncan *et al.* 2019). Along the Kenya coast, these anthropogenic pressures are correlated with a growing human population, particularly within fishing communities such as Watamu.

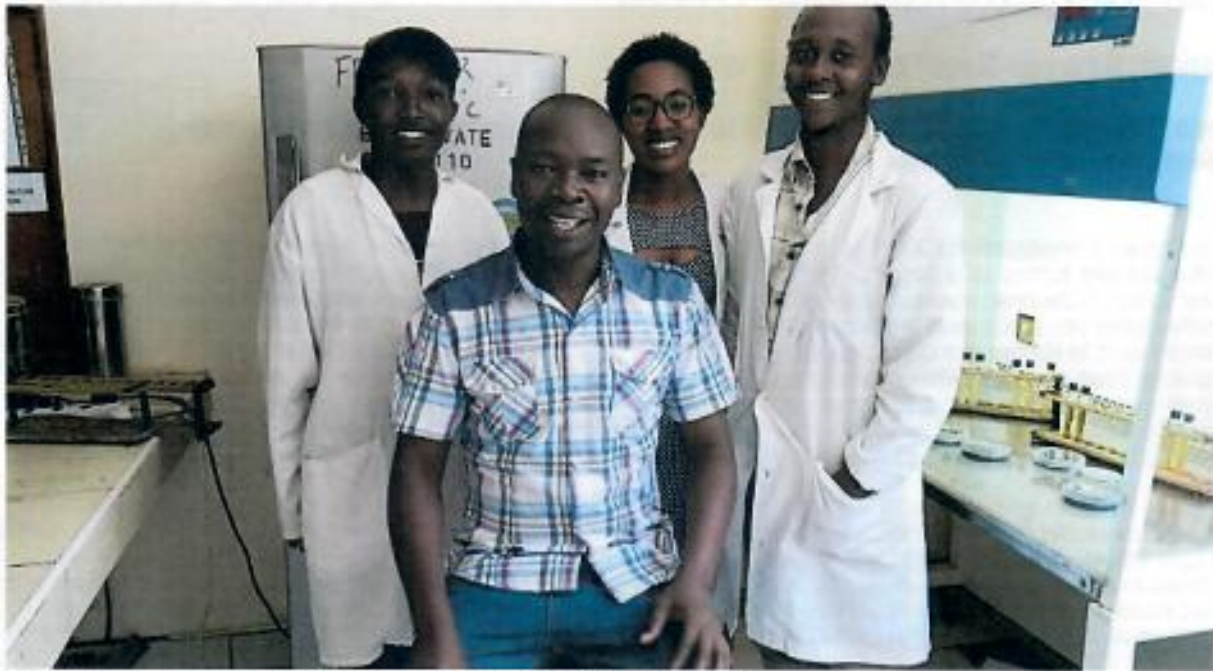
Alongside bycatch and other anthropogenic pressures, an emerging threat to sea turtles is the disease fibropapillomatosis (FP), a condition characterised by benign but ultimately debilitating epithelial tumours (Aguirre and Lutz 2004). Whilst predominately found in green turtles (Jones *et al.* 2016), FP has subsequently been identified in all seven species of sea turtles in all major oceans (Alfaro-Núñez *et al.* 2014). However, there is a limited number of published studies describing the prevalence of FP amongst sea turtles in African waters (Formia *et al.* 2007; Mint Hama and Fretey 2014; Jones 2021; van de Geer *et al.* 2022). Although very little is known about the exact cause of FP, herpesvirus (Jones *et al.* 2020) and papillomavirus (Mashkour *et al.* 2021) are implicated in a growing body of evidence. Increased FP incidences have been observed at watersheds with elevated nitrogen-footprints (van Houtan *et al.* 2010), suggesting influence of natural and anthropogenic factors that cause coastal eutrophication.

FP predominantly afflicts green turtles, and hence, there is reason to suspect a genetic role in the species' susceptibility. To investigate potential genetic and environmental drivers of FP, LOC has partnered with a conservation genomics research team at Pwani University's Bioscience Research Centre (PUBReC). Using DNA sequencing technology, the research team is comparing immune genes of tumoured with non-tumoured turtles brought to LOC's Turtle Rehabilitation Centre (TRC) through their 'Bycatch Rescue and Release' program. LOC collaborates with a network of over 500 fishermen who report bycaught turtles to LOC's rescue team. Healthy turtles are immediately released back to the ocean, while sick and/or injured turtles are taken to the TRC for veterinary care. The research aims to identify any genetic differences that might predispose certain individuals to FP. Moreover, various physico-chemical parameters are being tested at sites of varying FP prevalence to determine if any parameters predict prevalence patterns.



Left: Vet preparing to cauterise tumours from FP patient at the LOC TRC; Right: Skin sample being taken from rescued turtle (Photos: LOC).

This research is crucial to enhance a global understanding of the rise and causes of the FP disease affecting sea turtles, and links to the detrimental impact of pollution on the productivity of marine ecosystems. Preliminary analyses of the sequence data show exciting patterns. Once finalised, the findings will be shared internationally through peer-reviewed publications and communicated to the local fishing communities in Watamu and Mida Creek where the FP turtles are rescued from.



Sammy Wambua and researchers at PUBReC (Photo: PUBReC).

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São Toméan artisanal fisherman, Misson, received a sail designed by artist Victor Jimenez and a "Mem di Omali" (sea turtle, the mother of our seas) t-shirt, for volunteering in Programa Tatô's fisheries and sea turtle interaction project.

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