FIGURE 1. Pole and line fishing locations (red dots) for tuna overlaid on data from AVHRR, SeaWiFS, and AVISO of (a) sea surface temperature, (b) chlorophyll-a, and (c) mean sea level anomaly from August 2007. The effect of the East Africa Coastal Current is evident. Images produced by the late Dr. Nguli
the Advanced Very High Resolution Radiometer (AVHRR), the Sea-viewing Wide Field-of-view Sensor (SeaWiFS), and the Archiving, Validation and Interpretation of Satellite Oceanographic (AVISO) data sets, respectively, were compiled monthly into a database at Kenya Marine and Fisheries Research Institute’s African Monitoring of the Environment for Sustainable Development (e-station).

At the same time, data on yellow fin tuna catches were obtained from artisanal fishers and recreational fishing vessels operating along the Kenyan coast at selected landing sites in Kilifi, Wesa, and Watamu. The captain of each fishing boat was issued a GPS unit and crew members were trained on its use and general maintenance. The fishers were required to switch on their GPS units every time they went out fishing and to record a point each time they caught fish. These data helped to identify the peak fishing season and target areas for fishers. Data from tuna tagging vessels were also used to determine areas where schools of tuna occurred. We obtained these data from the Indian Ocean Tuna Commission (IOTC) for Kenyan and Tanzanian waters during a 2005–2007 tuna tagging exercise. Using GIS techniques, we integrated the satellite data with the fishers’ data and showed that fishing occurred in waters above 25°C where Chl-a concentrations ranged from 0.1 mg/L to 0.2 mg/L (Figure 1). The mean sea level anomaly values indicated that more fishing occurred in waters with positive anomalies.

In Tanzania, the latest technology was used to find and delineate fishing grounds to enable profitable and sustainable fishery exploitation. A total of 87 ring net fishers from 14 coastal districts of the Tanzania mainland and Zanzibar were identified, supplied with and trained to use GPS units, and then asked to mark and record the positions of fish occurrence along with catch- and effort-related data (Figure 2). The data were entered into a database (eCAS) through a mobile phone application for a period of one year (January to December 2020) and then analyzed for temporal and spatial variation in fishing effort and catch rates.

Results showed that ring net fishing catches during the southeast monsoon season were higher (n = 301) compared to the northeast monsoon season (n = 269) and significant ($\chi^2_{876} = 34.72, p < 0.05$) at 95% confidence interval (0.15, 0.35). Although the median catch rate of 28.47 kg/hr during the northeast monsoon season was higher than during the southeast monsoon season (32.24.84 kg/hr), the difference in catch rate was insignificant ($U_{877} = 0.64, p = 0.47$) at 95% confidence interval (–0.05, 0.10). This study provided data that are useful for sustainable fishery management to ensure a vibrant Blue Economy capable of sustaining livelihoods. Importantly, this study contributes baseline information on fishery locations that can be used by managers to measure the “ecological footprint,” that is, human/fishers’ impact on the fishing environment.

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