

**CATCH ASSESSMENT ON THE ARTISANAL
FISHERIES OF MPUNGUTI MARINE RESERVE,
SHIMONI AND FUNZI BAY, SOUTH COAST, KENYA.**

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ABSTRACT

This study describes the results of a catch assessment survey on the artisanal fisheries of Mpunguti Marine Reserve, Shimoni and Funzi Bay in South coast, Kenya. The results are based on 1,596 specimens of fish collected from both areas. Eight teleost families, namely: Scariidae, Siganidae, Lethrinidae, Labridae, Acanthuridae, Chetodontidae, Pomacentridae and Balistidae predominated the catch from experimental fishing. Although landings were variable from month to month, there was no significant seasonal pattern ($t = 1.31 < t_{0.05, 15} = 2.131$). On an annual time scale, an extrapolation of the results showed that, total catch per landing site was reducing at the rate of 5.5 kg/day and the catch per fisherman at 0.35kg/day. There was a significantly higher abundance in most fish families in Shimoni compared to Funzi Bay ($t = 2.311 > t_{0.05, 30} = 2.048$).

There was no significant difference in size (total length) of fish caught from Mpunguti Reserve and those from the general Shimoni area ($t = 1.31 < t_{0.05, 385} = 1.65$). A significant difference was however, observed in the allometric co-efficient between fish in Shimoni and fish in Funzi Bay ($t = 1.53 < t_{0.05, 1596} = 1.65$). Isometric growth was observed in all selected fish species from both study areas. The slopes of the Length-weight growth for different species were tested on ANCOVA and found to be significantly different ($F_y = 5.26, F_{0.05} (1) 1,596 = 3.94, p < 0.05$). There was, however, no significant difference in relative condition factors (Kn) for commercial fish species in the two areas ($F = 3.12, F_{0.05} (1) 1,596 = 4.97$).

Fishing grounds in Shimoni were located outside the Marine Park. Observations from the fishing patterns showed that there was a significantly higher concentration of fishermen in Shimoni than in the Funzi Bay. The dry season was characterised by higher densities of fish and a higher

diversity of fish than the wet season ($t_{0.05, 57} = 1.842$, $p > 0.05$). There was also a significant difference in almost all the commercially exploited fish species diversity between the two study areas ($t_{0.05, 57} = 1.687$, $p > 0.05$).

The seasonalised coefficients of the von Bertalanffy growth function (VBGF) L_{∞} , K (year^{-1}) and ϕ' for fish in Shimoni area were 43.58, 0.85 and 3.21, respectively for *Siganus sutor* (Siganidae); 37.28, 0.89 and 3.092 for *Lethrinus harak* (Lethrinidae) and 34.13, 1.31 and 3.18 for *Leptoscarus vaigiensis* (Scaridae). The same parameters (L_{∞} , K (year^{-1}) and ϕ') for fish collected from Funzi Bay were significantly lower compared to fish from Shimoni ($P < 0.05$) i.e 39.38, 0.29 and 2.65, respectively for *Siganus sutor*; 37.28, 0.65 and 2.96 for *Lethrinus harak*; 33.08, 0.32 and 2.54 for *Leptoscarus vaigiensis*. The resultant coefficient of instantaneous fishing mortality (F) ranged between 0.08 and 0.86 year^{-1} , while the exploitation rate (E) for the species ranged between 0.010 and 0.311. Length at first capture (L_c) for *Siganus sutor*, *Lethrinus harak* and *Leptoscarus vaigiensis* was 20, 16.3 and 13.8 cm, respectively for Shimoni and 18.4, 15.2 and 12.75 cm respectively for Funzi Bay. Using the Beverton and Holt yield per recruit model, E_{max} was estimated at 0.689, 0.608 and 0.688 for *Siganus sutor*, *Leptoscarus vaigiensis* and *Lethrinus harak*, respectively for Shimoni. E_{10} was 0.551, 0.521 and 0.570, respectively, and E_{50} was 0.351, 0.333 and 0.345, respectively also for Shimoni. Two recruitment pulses, one major and one minor were evidently projected on a one-year time-scale for most fish species in Shimoni and Funzi Bay.

Catch rates per standard fished area were found to have increased from 0.72 tonnes/ km^2 month^{-1} in the 1980's to 0.87 tonnes / km^2 month^{-1} in the 1990's in the Shimoni area. Yield from the Funzi

Bay fishery was, however, estimated at 0.39 tonnes / km² month⁻¹. The multispecies yield was estimated at between 0.223 and 1.448 tonnes km⁻² month⁻¹. Estimated annual decline in catch biomass was estimated at 0.35kg/day. Prices of fish in Shimoni and Funzi Bay were not different ($p>0.05$), except it was lower during the Southeast Monsoon than in the Northeast monsoon.

Fishing effort as was measured through interviews was overly exaggerated. The population density of the entire study area ranged between 20 - 40 people/km². It was, however, established that an average rate of 30 - 40 fishermen accounted for 50 - 70% of the daily catch. Larger traps and small traps had higher CPUE ($p<0.05$). Shimoni recorded the highest CPUE in the month of July i.e. >90 Kg/boat/week. The lowest CPUE was recorded in Funzi Bay at <50 Kg/boat/week. Fish traps recorded the highest percentage gear contribution (45% in February) and Hand/longlines (26% in February) during the Northeast monsoon. Barricade traps dominated during the Southeast monsoon, peaking in August by 45%.

Key words: *Artisanal fisheries; Marine Protected Areas; Fishing gear; Fish families; Growth parameters, Exploitation levels, Soci-oconomics.*