Fish as Bioindicators of Habitat Degradation in Coastal Lagoons

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ABSTRACT

Lagoons and their wetlands are some of the most biologically and ecologically important ecosystems. The lagoon habitat also forms an integral part of the marine fishing industry and provides important spawning and nursery grounds for many fishes. Aquatic communities including fish and other species act as biological indicators of water quality and alterations by summarizing information about their environment. Two lagoons, Laloi and Oyibi in the and Greater Accra and Central Regions of Ghana were studied from January to May to determine the ecological status using the Estuarine Fish Community Index (EFCI). Metrics assigned were the species diversity, trophic integrity, nursery function and species abundance and composition. At each site, water samples were taken at the riverine, middle and seaward portions during both high and low tides. Fisher folks were hired to fish at each of the sites. Uni-variate analyses (diversity) indices showed no significant differences between sites. Multi-variate analysis (Bray-Curtis similarity) showed a significant similarity between sites in relation to species composition. Eighteen species including both finfish and shellfish were identified. The flat head grey mullet (Mugil cephalus) and the black-chinned tilapia (Sarotherodon melanotheron) were the two most abundant species during the study. Mugil cephalus dominated catches in the Laloi lagoon and Sarotherodon melanotheron dominated catches in the Oyibi Lagoon. S. melanotheron, Lutjanus fulgens and Eucinostomus melanopterus were the most abundant species collected for the Laloi lagoon. Caranx hippos, L. fulgens, and M cephalus constituted a major part of fishes caught in the Oyibi lagoon. The carangid, Caranx hippos contributed much of the biomass of fishes collected for both lagoons. Total fish abundance was greatest in the rainy season than the dry season. Chloropyll a concentrations and condition factor of S. melanotheron where highest at Oyibi Lagoon than Laloi Lagoon. Total organic carbon was observed to be high in the Oyibi lagoon hence the high numbers of S. melanotheron recorded. Tides were important factor affecting physico-chemical parameters. From the metrics assigned, Oyibi had a moderate site rating, suggesting that it was under moderate stress. The main stress factors identified were garbage dumping, defecation, land use changes and increased human pressure. Laloi Lagoon had a poor site rating, suggesting that it was under severe stress. The main stresses identified were
overfishing, mangrove degradation, and garbage dumping and increased human settlements along the sides of the lagoon. The multi-metric index described is an effective method that reflects the status of lagoon fish communities and the overall ecosystem conditions.

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