平成３０年度　環境科学院　修士論文内容の要旨

Fish diversity and trophic interactions following overfishing in Mifimbo, Lake Mweru, Zambia
(ザンビア、ムエル湖ミフィンボ地区における過剰漁獲後の魚類多様性と栄養性相互作用)

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Overfishing of African freshwaters has become a major concern as it is largely unrecognized due to negligible reporting. In addition, the ecosystem consequences of changes to the species, size and trophic composition of fish assemblages are poorly understood, given that few stable isotope studies have been conducted in these systems. This study aims to investigate the effects of overfishing on the structure of the fish ecosystem in Lake Mweru's largest breeding area; Mifimbo. We hypothesized an inverse relationship between mesh size of fishing nets and fish species diversity and abundance; an increase in fishing effort in the breeding area; and size-structured communities, with large fishes occupying the highest trophic levels.

Sampling was conducted in August 2017 and August 2018 where gill net fishing was conducted using small and big mesh sizes; extra fish samples were collected from fishermen; invertebrates and primary producers were collected; and semi-structured interviews were conducted in three (3) fishing villages. Fish species diversity and abundances were analyzed using PASGEAR II; stable isotopes ratios of carbon ($\delta^{13}C$) and nitrogen ($\delta^{15}N$) were used to identify the major sources of carbon in the food web and to estimate body size-trophic position relationships; and gut content analyses were used to assess ontogenetic dietary shifts in major piscivorous fish.

Mesh size analyses revealed that species diversity and abundances decreased with increasing mesh size resulting in low abundance of large-sized fish catches, a result which was concurrent with the interview data which confirmed that most fish catches contain small sized (juvenile) fishes because more than 90% of fishermen are using illegal fishing gear in the breeding area. Regression analysis yielded weak correlations between body size and $\delta^{15}N$ signatures, suggesting that the variations in trophic positions of fishes in is not influenced by body size. Although $\delta^{13}C$ signatures revealed that the major carbon source to higher food web consumers in Mifimbo is phytoplankton, it was evident that fishes from some fishermen were collected in different locations, suggesting $\delta^{13}C$ as a powerful tool to infer fish habitat. Gut stomach content analyses demonstrated that although piscivores exhibit profound ontogenetic dietary shifts, body size feeding relationships exist only for specific predators and prey in Mifimbo. Our findings suggested a general removal of large fish from varied trophic positions in Mifimbo, which might affect major ecosystem links in the food web.