

The use of biological indicators for monitoring fisheries exploitation: Application to man-made reservoirs in Mali



A comparative study, using biological indicators, was conducted in Mali where two man-made reservoirs (Selengue and Manantali) are particularly suited for investigating the impact of fishing effort on the fish assemblage: these two ecosystems have relatively similar morphological, edaphic and environmental properties but are subjected to radically different levels of fishing exploitation (low at Manantali, high at Selengue). The comparison is based on a three-month survey of commercial fisheries, focusing on fishing activities and catches on the two reservoirs. The results show that some indicators are useful for evaluating fishing impacts. Among these indicators are: fishing effort which is much higher at Selengue (22 800 fishing trips per month) than at Manantali (3000), catches per unit effort (lower at Selengue than at Manantali following a ratio ranging from 1.5 to 4 according to the gears used), annual yields per ha higher at Selengue (100 kg ha⁻¹) than at Manantali (27 kg ha⁻¹), the average fish lengths in the catches (16.2 cm at Selengue compared to 23.6 cm at Manantali) and the maximum lengths of the targeted species generally smaller at Selengue (10

to 30 cm) than at Manantali (30 to 50 cm). By contrast, a second class of indicators exhibit values that are contrary to expectations: the species richness (52 compared to 36), the species diversity ($H' = 4.02$ compared to 3.24) and evenness (0.76 compared to 0.69) were higher at Selengue where 4 species accounted for 50% of the landings compared to only 2 species at Manantali (9 species compared to 7 for 80% of the landings). The trophic structure of the landings is higher (37% primary consumers compared to 49% at Manantali) as well as the mean trophic level (2.74 compared to 2.54 at Manantali). Even if a good understanding of the two fisheries can explain the unexpected trends of the second class of indicators which increase with fishing effort, it clearly appears from this study that only the first class of indicators is robust and can be used for comparative studies across ecosystems.

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Obtenir le document : EDP Sciences

Mots clés : Fish populations, Fishing effort, Diversity, Yield, Mean length, Trophic level, West Africa

Thème (issu du Text Mining) : MILIEU NATUREL

Date : 2004-06-15

Format : text/xml

Source : <https://doi.org/10.1051/alr:2004014>

Langue : Anglais

Télécharger les documents : <https://www.alr-journal.org/10.1051/alr:2004014/pdf>

Permalien : <https://www.documentation.eauetbiodiversite.fr/notice/the-use-of-biological-indicators-for-monitoring-fisheries-exploitation-application-to-man-made-reser0>

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