

From Responses of Macroinvertebrate Metrics to the Definition of Reference Thresholds

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Abstract : The present study focused on the use of benthic macrofauna to define the reference state of an anthropized lagoon (Nokoué-Benin) from the responses of relevant metrics to proxies. The approach used is a combination of a joint species distribution model and Bayesian networks. The joint species distribution model was used to select the relevant metrics and generate posterior probabilities that were then converted into posterior response probabilities for each of the quality classes (pressure levels), which will constitute the conditional probability tables allowing the establishment of the probabilistic graph representing the different causal relationships between metrics and pressure proxies. For the definition of the reference thresholds, the predicted responses for low-pressure levels were read via probability density diagrams. Observations collected during high and low water periods spanning 03 consecutive years (2004-2006), sampling 33 macroinvertebrate taxa present at all seasons and sampling points, and measurements of 14 environmental parameters were used as application data. The study demonstrated reliable inferences, selection of 07 relevant metrics and definition of quality thresholds for each environmental parameter. The relevance of the metrics as well as the reference thresholds for ecological assessment despite the small sample size, suggests the potential for wider applicability of the approach for aquatic ecosystem monitoring and assessment programs in developing countries generally characterized by a lack of monitoring data.

Keywords : pressure proxies, bayesian inference, bioindicators, acadjas, functional traits

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