Comparing stressor-specific indices and general meaures of taxonomic composition for assessing the status of boreal lacustrine macrophyte communities (Kanninen et al 2013) [1]

Biotic communities are increasingly used to assess and monitor aquatic ecosystems with two fundamentally contrasting approaches: (i) responses sensitive to, and indicative of specific stressors; and (ii) general measures of community change.

For assessment of lacustrine macrophyte communities, we compared three trophy-related and one water level fluctuation-related stressor-specific indices (SSIs) with three general measures of taxonomic composition (MTC), using data from 48 reference, 33 eutrophicated and 24 water level regulated boreal lakes. Our hypothesis was that MTCs would yield robust ecological quality estimates across these differing stress-gradients, while the SSIs would only react to the specific pressures they are calibrated against. Judged by the criteria of accuracy, precision and sensitivity, most trophy-specific SSIs performed well with respect to eutrophication and even showed some sensitivity to regulation, whereas the water-level fluctuation index reacted only to heavy regulation amplitude. Metric performance was not significantly affected by inclusion or exclusion of emergent taxa or by the use of abundance instead of occurrence alone. As expected, MTCs responded to both eutrophication and regulation and the best performing MTC – incorporating both taxa loss and gain – indicated impairment almost as often as any one (minimum) of the SSIs. We argue that non-stressor-specific MTCs – with the demonstrated unifying response of biotic community to different stressors – should primarily be used in the assessment of changes in the status of aquatic biota, whereas using SSIs a posteriori might help in identifying the likely causes of these changes.

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