Accepted Manuscript

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PII:	S0043-1354(18)30300-2
DOI:	10.1016/j.watres.2018.04.016
Reference:	WR 13713
To appear in:	*Water Research*
Received Date:	30 December 2017
Revised Date:	06 April 2018
Accepted Date:	07 April 2018

Please cite this article as: Daniel Gebler, Gerhard Wiegleb, Krzysztof Szoszkiewicz, Integrating river hydromorphology and water quality into ecological status modelling by artificial neural networks, *Water Research* (2018), doi: 10.1016/j.watres.2018.04.016

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ACCEPTED MANUSCRIPT

Integrating river hydromorphology and water quality into ecological status modelling by artificial neural networks

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Abstract

The aim of the study was to develop predictive models of the ecological status of rivers by using artificial neural networks. The relationships between five macrophyte indices and the combined impact of water pollution as well as hydromorphological degradation were examined. The dataset consisted of hydromorphologically modified rivers representing a wide water quality gradient. Three ecological status indices, namely the Macrophyte Index for Rivers (MIR), the Macrophyte Biological Index for Rivers (IBMR) and the River Macrophyte Nutrient Index (RMNI), were tested. Moreover two diversity indices, species richness (N) and the Simpson index (D) were tested. Physico-chemical parameters reflecting both water quality and hydromorphological status were utilized as explanatory variables for the artificial neural networks. The best modelling quality in terms of high values of coefficients of determination and low values of the normalised root mean square error was obtained for the RMNI and the MIR networks. The networks constructed for IBMR, species richness and the Simpson index

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