BEING SMART IN A MULTI-STRESSED WORLD - PREDICTING THE STRESS IMPACT ON *Lemna minor* L., *Ceratophyllum demersum* L. AND *Mentha aquatica* L. ALONG THE DANUBE RIVER USING ANN TRAINED ALGORITHMS

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Macrophytes play an inevitable role in the ecological monitoring since changes in the composition of aquatic vegetation are reliable and stable indicators of the quality of water and littoral zone of aquatic ecosystems. The most used methods to indicate this role are Cocktail, TWINSPAN method, DCA, CA, CCA, DCCA, PCA and non-metric multidimensional scaling NMDS. Although widely used, they still can not accomplish the task of determing ecological dinamic of riverine biota, not without including fuzzy logic and weighting connections between multi-stress parameters in real time. Recording and assessment of aquatic macrophytes was a request for the Joint Danube Survey 2 (JDS2&JDS3), with a new insight regarding occurrence, abundance and specific distribution of macrophytes, based on methodological adaptations adjusted better to the size of the river and permitted more appropriate statistical interpretation. An ad-hoc data base used in this study was compiled using JDS2 data set (ICPDR).

From practical standpoint, ANNs are a parallel processing systems that consists of simple processing units, neurons, and directed, weighted connections between them. Artificial neural networks (ANNs) can be characterized as computational models, inspired by information processing capabilities of biological neural networks. They can be used for modeling complex interactions in natural systems. In this study a feed - forward artificial neural network with backpropagation training algorithm is used to extract relationships between land use and three selected aquatic *Lemna minor* L. and *Ceratophyllum demersum* and semiaquatic *Mentha aquatica* L species.

The network consists of three layers: an input layer, a hidden layer, and an output layer. Sigmoid function is used as the activation function. Under the assumption that high dimensionality of input data increases the error of the backpropagation algorithm and that dimension reduction will result in a decreased error, PCA has been used for dimension reduction of input data. PCA has resulted in reduction of the input data columns from 134 to 17. Neural network has been modified to have 17 neurons in the input layer, 5 in the hidden layer and 1 in the output layer. Results before and after PCA have been compared.

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