Protocols for the ASsessment and Conservation of Aquatic Life In the Subsurface

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Programme and abstracts

BIODIVERSITY INDICATORS

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Species richness is a simple measure of biodiversity and a widely used criterion for conservation planning. Unfortunately, estimates of species richness obtained from exhaustive field inventories over large spatial scales are expensive and time-consuming. For this reason, ecologists as well as natural resource managers need to develop predictive models of species richness using indicators. Environmental parameters, sets of indicator species as well as sets of higher taxa were used to develop successful regression models to predict groundwater biodiversity at the habitat level. The selection of indicators was performed using a model based on multiple regression analysis of any combinatorial set of indicators versus total species richness and selecting the most efficient model on the basis of information criteria. The most statistically efficient model is defined herein as the model that optimizes fitting error against model complexity (i.e. number of indicators retained).
Species richness of stygobionts was a significant function of latitude, pH, nitrates and dissolved oxygen. The most efficient model selected explained over 60% of the total variance of species richness; no area effect on biodiversity was detected, and habitat structure showed a low influence as well.
Sets of indicator species and higher level taxa were selected using statistically sound information criteria in multiple regression and Spearman's rank correlation of sets of indicators versus residual biodiversity (e.g. species richness excluding indicators). In this initial case study, we found that a model based on the occurrence of five indicator species explained between 82-93% of the variance of species richness at a regional scale. Each indicator selected in a region belong to a different taxonomic group. At an European scale, a set of three indicator groups (Gastropoda, Harpacticoida, and Amphipoda) was detected; this model explained more than 80% of the variance of species richness at the habitat level. The inclusion of this set of indicators in large scale assessments of stygobitic biodiversity in groundwaters is highly recommended.