Macroinvertebrate taxonomic richness, community structure and nestedness in Swedish streams

Björn Malmqvist and Per-Ola Hoffsten

Department of Ecology and Environmental Science, Umeå University, Sweden

Abstract: Taxonomic richness and community composition were related to environmental variables in 88 streams in an area of 60,000 km² in central Sweden. In all, 247 macroinvertebrate taxa were recorded and taxonomic richness observed per site ranged from 21 to 77. Partial least squares regression analysis suggested that taxonomic richness was positively and most strongly correlated with channel width and catchment size. Correlations were also positive, but weaker, with the percentage of lakes in the catchment, temperature and macrophyte abundance, whereas the degree of shading, moss coverage and distance to upstream lakes showed negative associations with species richness. The number of ‘rare’ (found at <25 % of the sites) and ‘very rare’ (found at <10 % of the sites) taxa, showed similar trends although the correlation with distance below upstream lakes was positive rather than negative in the ‘very rare’ taxa category. The most taxa-rich sites were found in streams of intermediate size leading to a significant quadratic relationship between catchment size and taxonomic richness. Canonical correspondence analysis indicated that catchment area, distance from upstream lakes, substratum, temperature, altitude, amount of macrophytes, pH, colour, and Fontinalis spp. were the variables explaining most variation in community composition. Ephemeroptera, Plecoptera, Trichoptera and Diptera: Simuliidae showed nested distribution patterns, i.e. species-rich sites tended to be inhabited by species present also at species-poor sites. Some taxa, however, deviated from expected distributions possibly because they are sensitive to biotic interactions, restricted to small streams, or specialised with respect to some habitat features. In comparisons with other studies of Swedish macroinvertebrates, we observed differences suggesting that the design of studies, including the selection of geographical regions and limited range of stream sizes, can importantly influence the results.

Key words: Environmental variables, riverine biodiversity, protection of species.

1 Authors’ address: Department of Ecology and Environmental Science, Umeå University SE-90187 Umeå, Sweden. E-mail: bjorn.malmqvist@eg.umu.se

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