Title: Social behaviour as a neglected aspect of wild bee communities α-diversity with potential impact on its estimation

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Text

Bees (Hymenoptera: Apoidea), through pollination, provide important ecosystem services, albeit currently being strongly affected by anthropogenic habitat alterations. Wild bee communities α-diversity is generally calculated with indices that integrate the number of species with their abundances, while genetic variation among individuals and behavioural traits are largely neglected. We took advantage of available literature to propose a simple method to show how sociality may affect common diversity indices. This by weighting of the number of sampled females (*N*) to obtain new abundance values (N_W) based on different biological traits of wild bees. The conversion of *N* to N_W is based on the number of (natal) nests which produced the sampled females. In turn, this number depends on brood productivity or number of workers *per* nest of social species, sex ratio, and genetic relatedness. As expected, N_W is positive correlated with N. However, solitary species tend to have greater N_W than social ones at identical sample sizes. Such picture is largely kept even considering observed extreme values of those parameters. By using published data for 121 wild bee communities, Shannon-Wiener diversity, and Taxonomic Distinctness (but not Gini-Simpson dominance) were significantly greater when based on N_W than *N* especially at large values of individuals from social species out of the total individuals sampled (but not more social species than solitary species). While the method has no empirical confirmation, the resulting outputs suggest that considering the social organization of wild bees may have important consequences in the analysis the community diversity. For example, any stressor affecting more strongly solitary bees than social bees would lead to much impoverished communities than expected by commonly used calculations. Empirical studies on such biological traits will increase the precision of our proposed abundance correction