
The challenge of protecting biodiversity's multiple facets and ecosystem service supply: a case study on European Tetrapods.

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Abstract

Managing ecosystem services (ES) while protecting biodiversity has become central within global conservation actions. Whether multiple ES overlap with important biodiversity features is an enduring question. However, studies analysing how ES and biodiversity spatially converge have so far mostly focused on a limited number of ES and on species richness as an indicator of biodiversity. Yet, biodiversity is not defined solely by species counts and ecological and evolutionary characteristics should also be taken into account. Using the European Union as a case study, we first identified trade-offs and synergies among i) ES (two provisioning services, six regulating services, one service of pollination and one service of recreation) and ii) ES and biodiversity, the latter being captured by functionally and evolutionarily distinct tetrapods (mammals, birds, amphibians and squamates). Second, using alternative conservation scenarios, we tested how well a given scenario based on ES maximization was able to represent functionally and evolutionarily distinct species, and vice versa. We found little synergy among ES and between ES and the distribution of functionally and evolutionarily distinct species. Interestingly, both scenarios were on average better than the random scenario (i.e. a scenario where protected areas will be randomly distributed) to represent ES and biodiversity. This means that in average, a scenario based on biodiversity criteria is to some extent able to also capture ES and reciprocally. However, when looking at the individual representation (i.e. each ES and each taxonomic group separately), the results differed highly depending on which criteria we looked at. Indeed, when looking at individual representations of ES within the biodiversity scenario, some appeared to be very well captured while others were almost not better represented than random. Additionally, birds and mammals tended to be under-represented within the ES scenario compared to squamates and amphibians ES scenario. In a context where European Union explicitly ask for the integration of ES within conservation actions, our approach offered an evaluation of the compromise conservationists will face when aiming at simultaneously protect ES and biodiversity.

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