



**Summary of the RUBICODE Review on:
“Characteristics of Biodiversity that Provide
Humankind with Services”**

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RUBICODE aims to provide a framework for aiding decision making for nature conservation, taking account of the dynamic nature of ecosystems, and the constraints due to limited land and finance. One approach is to identify the importance of biodiversity to the provision of ecosystem services used by humankind. This may help to bring the importance of conservation to the attention of those who are not sufficiently motivated by biodiversity conservation *per se*, and also to justify nature protection over and above the minimum required to avoid species loss.

Most services that biodiversity provides to humankind can potentially be supplied by a variety of organisms. For example, a range of bee species may be capable of pollinating a particular crop, and a range of plant species may be able to filter pollutants and prevent their entry into water-courses. In different years and in different places, under different conditions, the composition of the community providing the service is likely to vary, perhaps substantially.

In order to maintain ecosystem services, therefore, conservation should be directed at the whole range of species that possess the characteristics (‘traits’) necessary to provide the services. The wider the range of species involved, the more likely it is that at least some of them will possess the traits necessary to survive disturbances such as changing land-use or changing climate. To adopt such an approach effectively, we need a good understanding of how organisms' traits are linked to the services they provide. We reviewed and analysed quantitative evidence for such links: more than 500 examples of links between traits and service provision were found in 247 journal articles. Most of the studies centred on plants and soil invertebrates in grassland, soil or freshwater ecosystems, and considered services resulting from decomposition, productivity, nutrient acquisition and retention, sedimentation and herbivory.

Analysis of the examples showed that particular traits were often associated with the provision of more than one service. Also, particular services were often associated with several traits. Links were identified from groups of traits to groups of services, suggesting that it should be possible to assess the implications for multiple services of conservation strategies aimed at one particular service.

The review highlighted types of ecosystem, service and organism for which relationships between traits and service provision have not been adequately studied. It did not look at the impact on services of interactions between organisms, nor at the links between traits, environmental changes and service provision: these will be topics of further reviews.

A traits-based approach can help to take account of trade-offs, where traits that are beneficial to provision of some services may be detrimental to others. But the traits and services approach must be seen as complementary to more traditional species-based approaches to conservation, not as an alternative.

Full report: “Functional traits underlie the delivery of ecosystem services across different trophic levels”.