Measures to protect biodiversity can also improve carbon storage and water flow regulation, research indicates. In a Spanish protected area, researchers mapped biodiversity, carbon storage and water flow regulation, and found there was substantial overlap between the three.

Does preservation of biodiversity also protect ecosystem services?

The link between biodiversity and ecosystem services is not well understood, and different studies have found varying levels of ecosystem services in relation to biodiversity in different habitats. Although recent research has confirmed that both biodiversity and the provision of ecosystem services declines with land use intensification, there is still much discussion among the scientific community about the different strategies that may be required to protect both biodiversity and services.

This study, in Spain’s Urdaibai Biosphere Reserve, examined the relationship between biodiversity and two ecosystem services vital to climate change adaptation and mitigation: carbon storage and water flow regulation. As well as being a highly biodiverse area the reserve also supports commercial pine and eucalyptus plantations for timber production. There is, therefore, a need to develop a conservation management plan for the reserve which maintains biodiversity and ecosystem services, while also supporting commercial activity.

Researchers identified ‘hotspots’ of biodiversity, carbon storage or water flow regulation as well as areas with medium scores for these three attributes, called ‘ranges’. They also determined the extent to which hotspots and ranges for the different attributes overlap. The habitats surveyed were natural evergreen oak forest, natural mixed forest, and pine and eucalyptus plantations.

Most biodiversity hotspots (53%) were found within natural oak forests, with natural mixed forest contributing 41%. Plantations contained no biodiversity hotspots. Per unit area, natural forest was also found to have the highest levels of stored carbon, although 90% of the plantation forest surveyed was included in the ‘range’ of this service.

Pine plantations contained 67% of hotspots for water flow regulation and 25% of carbon storage hotspots. Overall, biodiversity, carbon storage and water flow regulation overlapped by 45%, which is 4% of the study area. All overlaps fell within natural forest areas.

The authors conclude that measures to protect biodiversity will strengthen these vital ecosystem services and vice-versa. However, they caution that the relationship between the two is likely to vary under different conditions in different areas and ecosystems, so research is needed at a local level to better understand the relationships and possibly adapt and improve conservation measures.

They also warn that although plantation forest can play a role in providing ecosystem services, it has significant negative environmental impacts, including soil acidification and loss of biodiversity.