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Carbon, biodiversity, and ecosystem services: exploring co-benefits in Jiangxi Province, China

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The maintenance and enhancement of natural carbon stocks is considered as a key climate change mitigation measure. Depending on where actions are taken to maintain or enhance natural carbon, other assets, such as biodiversity, ecosystem goods and services, can benefit at the same time, which is referred here as 'co-benefits'. Simple spatial analyses and mapping tools can help identify how carbon, biodiversity and other ecosystem services are distributed across the landscape and relate to each other, thus have the potential to be used in decision-making processes on climate change adaptation and mitigation.

A pilot study was initiated in Jiangxi Province, China to explore the co-benefits of carbon, biodiversity and ecosystem services. A carbon map was combined with distributions of biodiversity, forest products, honey production to identify areas important for carbon and biodiversity or other ecosystem services. Reduction of soil erosion was quantified as well within forested areas to evaluate the contribution of forest cover in soil stabilisation. Further, overlaps between protected areas, carbon distributions and areas of high biodiversity were identified to reveal the proportion of areas important for both carbon and biodiversity formally protected. Finally, forest carbon sequestration potential was estimated and areas that are likely to play a major role in sequestering carbon by forests were highlighted.

Analyses show that the different values and services under consideration all have different relationships with the distribution of current carbon stock, and that some areas or counties are especially important for the provision of particular services that are likely to be affected by carbon management decisions. The information provided by these analyses should help to identify areas where trade-offs between the enhancement of carbon and biodiversity and/or ecosystem services should be considered. It will be important for future analyses to employ more quantitative assessment and comparison of services, and possibly towards their economic valuation. Future work is also needed to elucidate how different carbon management practices would affect biodiversity and ecosystem services. This work provides a baseline for discussion among stakeholders and planning for co-benefits from carbon management in Jiangxi Province, China, thus taking economic development targets into account and involving decision-makers and other stakeholders could further promote its application in climate change adaptation and mitigation.