

ES trade-offs and synergies

Interactions between ecosystem services (ES) significantly influence the capacity of ES to contribute to human well-being. Therefore, it is of great importance to focus on and analyse these multiple interactions. Such interactions can be described as either trade-offs or synergies.

Ecosystem service trade-offs arise when the provision of one service is enhanced at the cost of reducing the provision of another service. On the contrary, ecosystem service synergies arise when multiple services are enhanced simultaneously. For example, reducing the amount of water for agriculture would cause a loss in feed and fodder production in dry regions, but increase the water availability for other users. Carbon sequestration, bird habitat provision, water conservation and the reduction of the wind effect are in the most cases positively correlated. Thereby, the quantification of trade-off and synergy has strong implications for ecosystem management.

Research has shown that changes in land use can significantly affect ecosystem services and processes. When decision-makers have to settle over a land use change or prioritise one land use over another, they need targeted information. For example, information about environmental functions and whether changes in land use composition have a positive or negative impact on human well-being are needed. Only through a better understanding of how the interactions work can the desired state be maximized by enhancing synergies or mitigating trade-offs. Consequently, ascertaining the trade-offs and synergies among ecosystem services might provide a valuable contribution to practices based on ecosystem management, and might help governments and companies to achieve their goals.



Mieminger Plateau: forestry and agriculture as landscape developer and producers of different ecosystem services

Additional Resources

Bennett E.M. et al. (2009): Understanding relationships among multiple ecosystem services. *Ecology letters* 12(12): 1394-1404.

Howe C. et al. (2014): Creating win-wins from trade-offs? Ecosystem services for human well-being: A meta-analysis of ecosystem service trade-offs and synergies in the real world. *Global Environmental Change* 28: 263-275.

Tomscha S. A., Gergel S. E. (2016.): Ecosystem service trade-offs and synergies misunderstood without landscape history. *Ecology and Society* 21(1):43. <http://dx.doi.org/10.5751/ES-08345-210143>.

Egarter Vigl, L., et al. (2017): Using land use/land cover trajectories to uncover ecosystem service patterns across the Alps. *Regional Environmental Change*. DOI 10.1007/s10113-017-1132-6.

Related Projects

OpenNESS (Operationalisation of natural capital and ecosystem services):

<http://www.openness-project.eu/>

CONNECT (Linking biodiversity conservation and ecosystem services: advancing insights in tradeoffs and synergies between biodiversity, ecosystem functioning and ecosystem service values for improved integrated biodiversity policy): <http://www.biodiversa.org/88>

TRUSTEE (Towards RUrAl Synergies and Trade-offs between Economic development and Ecosystem services): <https://www.trustee-project.eu/>

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