

sDiv Workshop Summary " Land Use–BioDiversity–Ecosystem Services trade-offs (LUBDES)"

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Project summary: During the last decades, there have been parallel scientific debates regarding the effects of land use on the trade-off between biodiversity conservation and provisioning ecosystem services (ESS). As society strives to achieve food and energy security alongside biodiversity conservation goals, these debates assume global significance. Yet, to date, they have failed to produce a robust and generally applicable framework on how this trade-off can be described outside a set of confined conditions. Moreover, these approaches have often adopted a dichotomous perspective (e.g., land sharing vs. sparing), thereby falling short of yielding results that can be used for environmental management. The use of land has so many facets and dimensions that when trying to answer the question "What are the best strategies to maximize provisioning ESS at the least harm to biodiversity?" we have to move away from an either-or perspective, as this overly simplifies a complex problem.

In this project, we first seek a conceptual synthesis that acknowledges the multidimensional complexity captured in the label 'land use' in relation to biodiversity and ESS. Secondly, we seek synthesis of data from studies on biodiversity and/or provisioning ESS that explicitly report on land use conditions. Although studies that addressed the various facets and dimensions of land use are relatively limited, their combination will provide a more comprehensive overall picture and will allow for quantifying the effects of land use on the trade-off between biodiversity and provisioning ESS. Finally, results will be compiled to inform land use practice and policy such as IPBES.

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Participant list:

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Feedback of applicants:

1. focal areas of discussion + main results/conclusions + open questions
 - a. **LUBDES Meta-Analysis:** Human societies depend on the use of ecosystem products, which has led to a major modification of the terrestrial earth surface, mainly through land conversion or intensification of land management. Currently the largest contribution to meet increasing human demand for production are being met through intensification rather than conversion. The production of food, timber, fibre and fodder (provisioning ecosystem services) depends to varying extents on the intensity (amount of energy- and matter inputs) of land use. The intensification of land management can also have negative consequences for biodiversity. However, no previous study has attempted simultaneously to understand global general relationships between land-use intensity, production for human use and changes in biodiversity, and to understand how these relationships moderate one another (i.e. what are the trade-offs between production and biodiversity). We comprehensively synthesize available data using meta-analysis to obtain a global perspective on how changes in land use intensity affect both production and biodiversity, and their trade-off.
 - b. Discussing model outputs and first results of functional and phylogenetic vertebrate diversity in Europe and its relationships to Land use features
 - c. **LUBDES policy brief:** We see that current political agendas are considerably distracted from the core challenge humanity is faced within the anthropocene. We are faced with the limitation of the resource land, and the ecosystem services provided. How intense we manage land and utilize services obtained from nature will be crucial and is captured in the sustainable developments goal (SDG) 15 but also 2,6 and 7. The core question is: How is the space between the two

- extremes of high intensity or low intensity land management characterized and how is the trade-off determined by various moderators? Gaining knowledge on this is key to identify options for optimization of land use, which captures to increase yields while minimizing harm to biodiversity alternatives maintain biodiversity minimizing loss of yields.
2. content of presentations
 - a. Since this has been the 4th of a series of 5 workshops there have only been presentations on the progress on the above listed tasks.
 3. which outputs were discussed and which steps were undertaken (e.g. journal article in Journal XYZ, presentation on conference XXZ, follow-up workshop ...)
 - a. The meta-analysis paper has been drafted (to be submitted in the end of 2015) and the preliminary results have been extensively discussed. We have decided on a format on how to present the results and a general structure of the paper has been created.
 - b. A draft for a policy brief has been created. It will be further developed based on the outcomes of the meta-analysis and it may as well be submitted as an accompanying piece for the meta-analysis paper.
 - c. Functional and phylogenetic diversity of European vertebrates analysis & paper has been drafted
 4. balance between work on outputs, general brainstorming/ information exchange and participants presentations in %
 - a. Since this has been the 4th of a series of 5 workshops there has only been little brainstorming and the time has mainly been spent to work on the progress on the above listed tasks and outputs.
 - b. Brainstorming 5%, work on outputs 95%
 5. inspiration for own work and/or further cooperation (?)
 - a. Two spin-off paper ideas were generated, one on the meta-analysis methodology developed at the workshops and another one has already been submitted to the Annals of Improbable Research
 - b. Furthermore, collaborations of the group with leading meta-analysis and data-mining experts have been established.
 - c. Several more spin-off ideas for papers/or projects are currently being discussed among the group.
 6. general working atmosphere and feedback on sDiv support (?)
 - a. The workshop was well organized by sDiv staff and there were no major problems.
 - b. The working environment provided a productive atmosphere and all necessary tools were available.

- c. At some times we would have liked more whiteboard space but this is probably a group-specific demand.
7. next steps (?)
- a. Our next (5/5) workshop will be Dec. 7 to 11 2015 at SESYNC in Annapolis
 - b. Until then the meta-analysis and the functional diversity analysis will be finished and the papers will be in submittable form so they can be submitted shortly after LUBDES WS#5.