

Research Area Lignocellulose

Introduction and goals

Bioeconomy aims to substitute fossil resources for material and energetic uses by renewable organic matter. However, this requires additional land resources which are already scarce due to increasing food production and losses of fertile surface at large quantities due to over-exploitation and global change impacts. The consideration and assessment of land use impacts on soil functions and biodiversity is therefore essential in the evaluation of processes caused by human activity.

The goal of the project is to enhance expertise and to develop globally applicable approaches for regionalized land use and biodiversity assessment in the product life cycle. Main outcome of this research project is an evidence based concept of how land use related impacts can be better considered and integrated into the environmental assessment of products, processes and services as with existing approaches and methods.

Methods and approach

The LANCA[®] tool, developed at the University of Stuttgart, LBP-GaBi, is used to calculate the quality change of various ecosystem service indicators caused by the use of a patch of land.

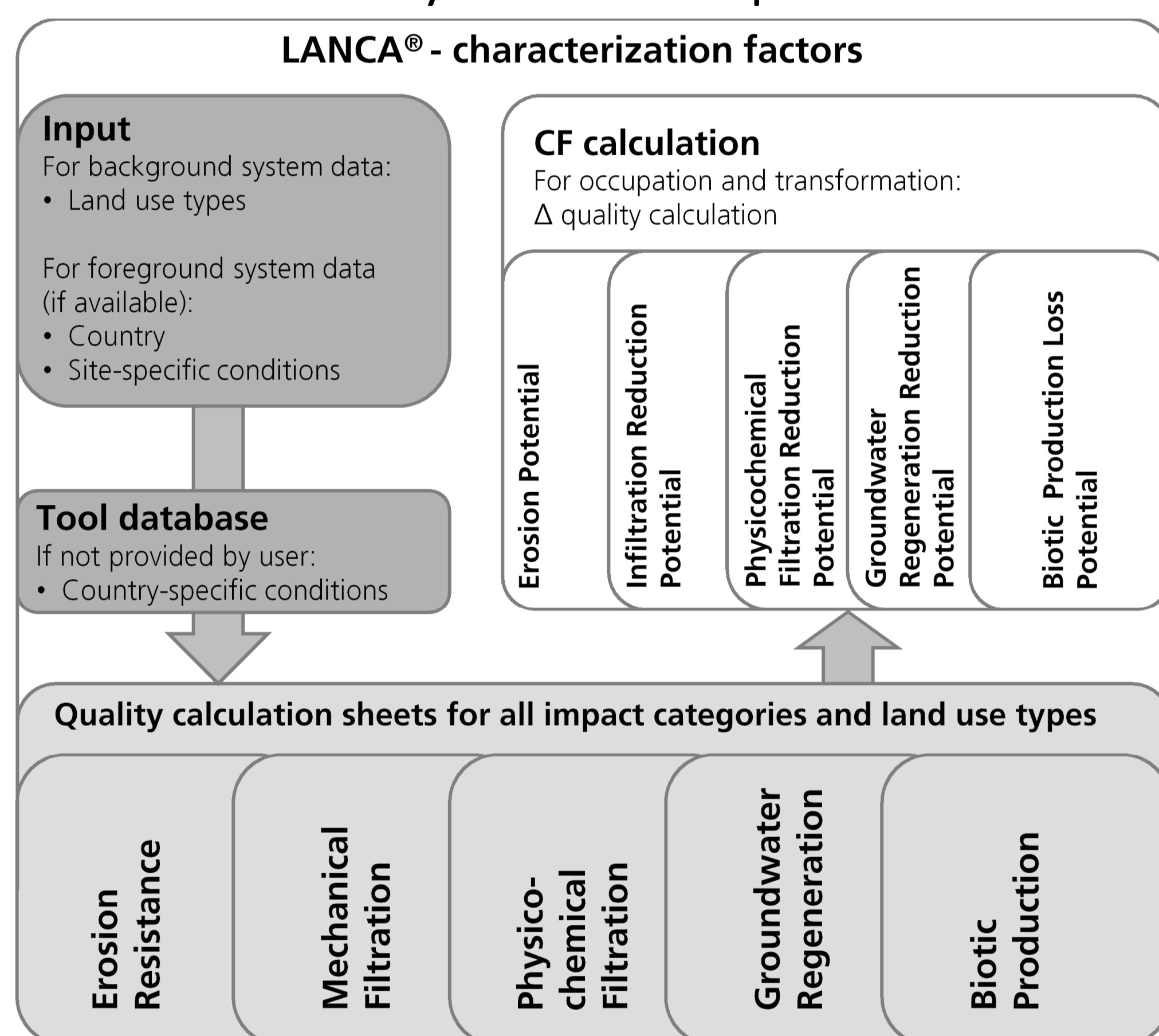


Fig. 1: LANCA[®] structure (Bos et al. 2016)

Figure 1 shows the structure of the LANCA[®] tool: Using a country specific tool database, generated with the support of GIS, the quality indicators are calculated for the respective patches of land. In the second step the characterization factors are calculated using the reference land use of the respective patch of land. These characterization factors are recommended to be used in the Product Environmental Footprint (PEF).

The Biodiversity Impact Assessment approach is developed by the project partner Fraunhofer IBP-GaBi. It builds on previous work and provides a quantification scheme for biodiversity based on various factors.

Each factor contributes to the biodiversity of a given region in a specific way. All factor contributions are aggregated depending on how they interact in that specific region.

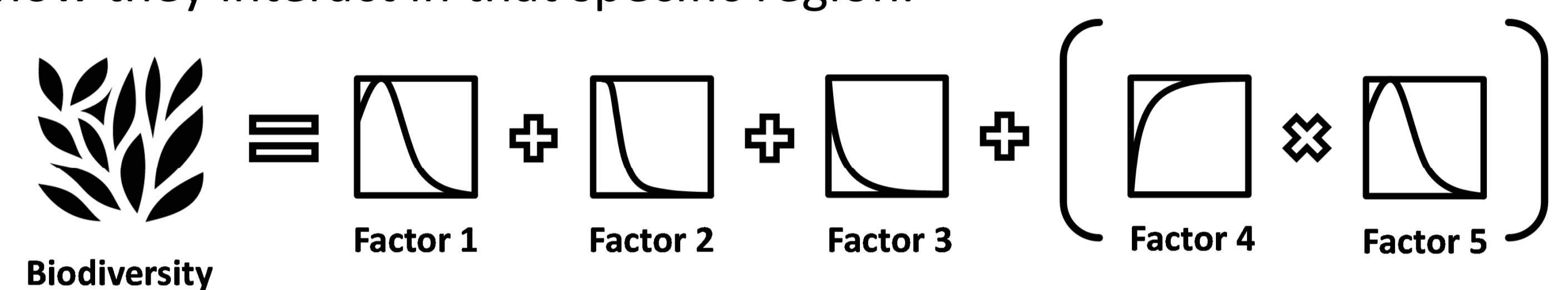


Fig. 2: exemplary Biodiversity Impact Assessment structure (Lindner 2014)

A case study is ongoing together with partners from the projects 7533-10-5-79, 7533-10-5-114, 7533-10-5-114 and 7533-10-5-116 in order to apply the developed models for the land use and biodiversity impact assessment. There is a strong scientific exchange with several projects within the lignocellulose area (e.g. 7533-10-5-70) as well as the modelling network.

Results

LANCA[®] is adapted to the specific regional conditions of Baden-Württemberg: Spatially resolved data and land use types like intensive and extensive arable land are included in LANCA[®]. These enhanced calculations result in site specific quality indicators for Baden-Württemberg.

The last part of the work is the finalization of the presentation of the impact density: The absolute impact of the use of a patch of land is related to the impact of the reference land use situation and to the vulnerability of the soil.

Conclusion

With the adapted and further developed methods of the land use and biodiversity impact assessment the site specific conditions in Baden-Württemberg can be calculated and impacts can be assessed regarding their local severity. This allows an adequate assessment of BW-specific land use impacts in LCA.

References

Bos, U. et al.: LANCA[®] - Characterization Factors for Life Cycle Impact Assessment, Version 2.0, ISBN: 978-3-8396-0953-8, Fraunhofer Verlag, Stuttgart (2016).

Beck, T., Bos, U., Wittstock, B., Baitz, M., Fischer, M. and Sedlbauer, K.: LANCA[®] - land use indicator value calculation in life cycle assessment, ISBN: 978-3-8396-0170-9, Fraunhofer, Stuttgart (2010).

Lindner, J.P.: Biologische Vielfalt in Ökobilanzen verankern.

Ökologisches Wirtschaften Nr. 3/2014, DOI 10.14512/OEW290308 (2014).

Project Team

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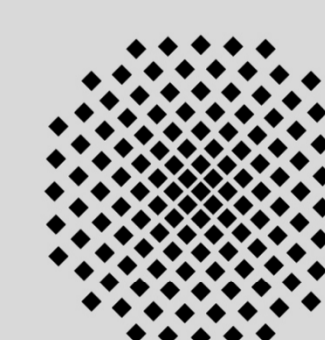
Baden-Württemberg

MINISTERIUM FÜR WISSENSCHAFT, FORSCHUNG UND KUNST



Hochschule für Forstwirtschaft
Rottenburg

Hochschule für Angewandte Wissenschaften



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