BayCEER Kolloquium

Lectures in Ecology and Environmental Research

Summer 2025

UNIVERSITÄT BAYREUTH

Donnerstag/Thursday

10.07.2025

12:30 in H6, GEO

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Data-driven approaches to the environmental risk assessment of chemicals and microplastic particles

Data-driven methods are playing a growing role in environmental risk assessment of pollutants. Traditional lab-based approaches, using few surrogate species, are now complemented by computational methods that better extrapolate across species, pollutants, and test systems aiming at reducing animal testing and enabling earlier identification of problematic substances. While advanced regulatory processes exist for pesticides and some chemicals, new pollutant classes like micro- and nanoplastics lack both a regulatory framework and sufficient data for predictive modeling. In addition to these novel computational implementations, regulatory ecotoxicology is currently undergoing a shift in statistical methods used for data analysis, with global initiatives to improve statistical guidance and decision-making.

In this talk, I will introduce trait-based approaches for assessing the risks of micro- and nanoplastics, highlighting the need for accessible, standardized effect databases. I will present our work in developing such resources and show how machine learning can speed up ecotoxicity testing, improve data coverage, and thus accelerate risk prediction. In addition, I will demonstrate how statistical research can create direct policy impact on a regulatory level and discuss novel developments in this field.

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