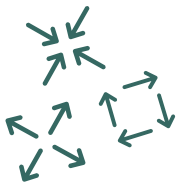


INTELLIGENT USE OF TRANSITION ZONES IN AGRICULTURAL LANDSCAPES

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Kettle hole in the AgroScapeLab Quillow © Marlene Pätzig / ZALF



Agricultural management in agricultural landscapes must adapt to spatial and temporal heterogeneities in order to achieve high yields and to use resources efficiently. Heterogeneities, site gradients and semi-natural habitats on and adjacent to arable land are important drivers of individual ecosystem services, such as regulatory functions. This is especially important for the intensively used agricultural landscapes which are characterized by numerous kettle holes. Kettle holes are temporarily or permanently water-filled depressions in the ground and hotspots of biodiversity and biogeochemistry. They provide high aesthetic value and function as botanical and zoological refuges.

In the past, from an agricultural management perspective, kettle holes in agricultural fields were often seen as a hindrance or as a source of pests or pathogens. Microclimatic peculiarities (oasis effects) could increase the spread of microbes and phytopathogenic fungi. Spring floods can indeed hinder the cultivation of adjacent areas and lead to crop failures. On the other hand, kettle holes also offer habitats for insect species that can play an active role as beneficial insects on arable land. Beyond agricultural productivity, kettle holes benefit society as a whole, particularly by providing habitats for endangered species groups such as amphibians.

The SWBTrans project empirically investigates individual ecosystem functions in the ZALF's AgroScapeLab Quillow. In the project, hydrological studies of the water and moisture dynamics of kettle holes and their transition zones are carried out. These are extended by microbiological investigations about the

What applies to systems in general is also true for agricultural landscapes: the whole is more than the sum of its parts. Numerous ecosystem services (ESS) benefit from interactions between cultivated areas and semi-natural habitats, located on or adjacent to arable land, as well as from small-scale heterogeneities within agricultural fields. In addition to other local factors, the high number of kettle holes (small water bodies) in northern Germany creates moisture gradients on arable land. The IPP project "Small Water Bodies in an agricultural landscape: Ecosystem services of spatial and temporal within-field transition zones (SWBTrans)" examines how to make better use of these heterogeneities in agricultural landscapes.

possible spread of phytopathogenic fungi from weeds (intermediate hosts) established on kettle hole edges into the field, as well as investigations about biodiversity-related ecosystem services (measured with "Rapid ecosystem function assessment" methods (REFA)). The field surveys are accompanied by an impact assessment, which synthesizes the results for the different ecosystem services into a comprehensive view, discusses them in light of recent literature on ecosystem services and highlights synergies and trade-offs. The project generates knowledge about the functional importance of aquatic-terrestrial transition zones between kettle holes and arable land, thereby contributing to sustainable ecosystem and land use management.

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