

Critical source areas - empirical evidence and consequences for implementation

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The concept of Critical Source Areas (CSAs) has received considerable attention over the last years in the context of mitigating diffuse pollution. It is an attractive concept because it is conceptually plausible and offers a way of minimizing conflicts between agricultural production and water protection. In order to convince practitioners to implement this concept, its effectiveness needs to be demonstrated. This entails two aspects: firstly, it needs to be shown that CSAs cover only a limited fraction of catchments. Secondly, CSAs have to be localized reliably in space. In this presentation, we review the empirical basis underpinning the CSA concept for P- and pesticide losses as well as erosion (and hence total P transport). We use ROC (Receiver operation characteristics) analysis to assess the quality of spatial predictions of CSAs by common tools like variants of the P index and the USLE.

Mass flow analysis for P, herbicides and soil material (erosion) suggest that CSAs covering 15 - 30% of the catchment area often contribute 60 to 70% of the load to surface waters. This is supported by hydrological studies investigating the spatial extend of saturated areas generating fast flow processes. However, the number of independent empirical studies is fairly limited. Hence, the models for delineating CSAs are still highly uncertain. This seems to hold especially for the prediction of soluble P losses in contrast to particulate losses. Due to a much broader empirical database on erosion and the availability of high resolution digital elevation models (DEMs), predictive tools for erosion - and hence total P - are more advanced. This will be illustrated by contrasting a recent comparison of modeled and observed erosion in test catchments in Switzerland with the tools and data available for soluble P.

These different levels of empirical support and predictive power of tools for particulate and soluble P have consequences for the implementation process. We will report on the status of CSA implementation in Switzerland, which is currently discussed by the federal authorities.