

## **THE INFLUENCE OF LAND USE VARIABILITY ON THE WATER QUALITY OF A SMALL RIVER**

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Although low flow is defined as a mixture of soil water and ground water, the water quality is strongly influenced by settlement structure and the location of waste water plants. Especially under low flow conditions in summer, soil water can not contribute to the dry weather flow generation in a significant way.

The area under investigation is situated in the southern Eifel mountains in Western Germany and covers about 2.5 km<sup>2</sup>. Since 1992, the river is observed by taking longitudinal profiles of electric conductivity, taking samples and analyzing them for major ions, nutrients and heavy metals. The heterogeneity of the Kartelbornsbach catchment is an opportunity for a multi-parameter approach. If the recording of processes is successful, the obtained results can be transferred to other heterogeneous catchment areas.

A first step in understanding the low flow composition was the identification of the most important flow components and their location along the Kartelbornsbach. After the analysis of spatial distribution, the temporal behavior of these components was investigated by measuring discharge from tile drains and tributaries.

As a result, the influence of waste water components can be considered an important part of runoff generation process during low flow conditions. Especially the sewage water from a waste water treatment plant leads to a high variability of water quality because neither soil water components nor ground water enters the river on a certain distance after the waste water plant outlet. Therefore, the longitudinal profile showed characteristic patterns of electric conductivity and nutrients.

In addition, the location and the temporal behavior of tile drains influence the water quality of the river. The distribution of tile drains depends on both land use and settlement structure in the catchment area. In pasture land, tile drains deliver water with predominantly geogenic ions, e.g. SO<sub>4</sub><sup>2-</sup> and Ca<sup>2+</sup>, whereas tile drains with waste water components especially deliver nutrients.

The longitudinal profiles of both electric conductivity and major ions show a dependence on land use patterns, especially on distribution of tile drains and sewage water outlets. So it can be summarized that not only soil water and ground water components lead to the variability in longitudinal profiles, but also waste water components have a major influence.