



## **Interactions in anthropogenic influenced catchments - an overview with special attention on sewer infiltration water**

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Catchments influenced by anthropogenic impacts are complex systems. They are characterized by many interactions between different parts of the hydrosphere and the lithosphere. As the complex interactions in such catchments can affect both quantity and quality in the system as well as the quality of the environments, an integrated management approach becomes more and more important which is also reflected in current legislation (EU Water Framework Directive).

A major problem in many german catchments located in the sub-alpine mountain range is a high amount of sewer infiltration water. The entry of extraneous water into the sewer system has effects on the quantity and quality of the sewage. Extraneous water will dilute the sewage. Under unfavorable conditions pollutants from the soil body could be washed into the sewer system. The dilution of the sewage combined with the increase of discharge can significantly reduce the efficiency of waste water treatment plants. Furthermore, the duration of overflow events of sewer overflows can increase substantially, leading to additional negative impacts on the receiving water body. A detailed understanding of the processes of sewer infiltration, the influencing parameters, and the impacts on the environment are still a major research area.

Often, only parts of this complex system are analyzed, investigated and modeled in order to find solutions for specific problems. To obtain a holistic view of urbanized catchments a systematic overview of the different components of the system, e.g. surface water, river flow, sewer system, subsurface flow, waste water treatment plant will be given. In a second step the processes between the different parts, e.g. infiltra-

tion/exfiltration, combined sewer overflows, etc. will be presented. The most important components and processes related to the problem of sewer infiltration water will be identified.

Finally, modeling approaches for the concerned processes will be discussed. These approaches will be divided into detailed micro scale model approaches and model approaches for the meso scale. The detailed model approaches are proposed to investigate the processes of interaction between sewer pipes as well as house drains and their respective surrounding soils (including actual groundwater level and flow processes in the unsaturated zone). Meso scale approaches are proposed for the integrated modeling of the sewer infiltration water problem for a complete urbanized catchment. Proposals of linking the results of the micro scale model approaches to meso scale model approaches will be presented.