



Hydrological observation of the artificial catchment ‘Chicken Creek’

K. Mazur, D. Biemelt, D. Schoenheinz, and U. Grünewald

Brandenburg University of Technology Cottbus, Chair of Hydrology and Water Resources Management., Cottbus, Germany
(kai.mazur@tu-cottbus.de, 0049355694235)

In Lusatia, eastern Germany, an artificial catchment called ‘Chicken Creek’ was developed. The catchment with an area of 6 ha was designed as hillside on the top of a refilled open mining pit. The bottom boundary was created by a 1 to 2 m thick clay layer acting as aquiclude. The catchment body consists of a 2 to 4 m mighty layer of sandy to loamy sediments acting as aquifer.

The catchment ‘Chicken Creek’ is the central investigation site of the German-Swiss Collaborative Research Centre SFB/TRR 38. The aim of the research is to characterise various ecosystem development phases with respect to the occurring relevant structures and processes. Therefore, structures and processes as well as interactions being dominant within the initial ecosystem development phase are investigated and will be compared to those occurring in the later stages of ecosystem development.

In this context, one important part of the investigations is the detailed observation of hydrological processes and the determination of the water balance components. To achieve these objectives, a comprehensive monitoring programme was planned considering the following questions:

- Which parameters/data are required?
- Which parameters/data can be measured?
- Which spatial and temporal resolution of observations is required?

The catchment was accordingly equipped with weirs, flumes, observation wells, probes and meteorological observation stations. First results were obtained and will be presented. The gathered data provide parameters and boundary conditions for the ensuing hydro(geo)logical modeling. Conclusions e.g. from groundwater flow simulations shall allow to improve theses about the dynamic in the saturated zone and support the quantification of the groundwater discharge as component of the water balance.

First research results show that precipitation related surface runoff proves to be much more dominant in the hydrological system than initially expected. Therefore, the monitoring concept had to be redesigned. Likewise, first simulations of hydrological models were not able to reproduce the high surface runoff due to an overestimation of infiltration by the models. This is assumed to be due to the application of the parameters porosity and hydraulic conductivity only, while properties and processes, e.g. as hydrophobicity or the formation of crusts, were neglected in the models so far. Such properties and processes might be significant for the formation of surface runoff. These aspects have to be considered for the adjustment of the measure concept.

Generally, a continuous adjustment of both the monitoring programme and the experimental set-up turns out to be necessary due to

- the improved process understanding (e.g. runoff behaviour, soil surface structures),
- the gradual development of the catchment (e.g. formation of gullies, vegetation),
- the technical demands (e.g. unsuitable working range of probes).