The artificial catchment 'Chicken Creek' ('*Hühnerwasser*') as a tool for understanding the interactions of processes and structures of initial ecosystem development

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The analysis of water and element cycling plays a key role in drawing conclusions about functioning, stability, elasticity and resilience of the ecosystem. The definition of clearly outlined budget areas is inevitable therefore, which is typically approached by using natural surface and subsurface watersheds. Compared to natural catchments the boundaries and inner structures of artificial watersheds can be planned and defined in advance. Both local boundary conditions, e.g. the accordance of the surface and the groundwater catchment or the drainage pattern, as well as internal structures, e.g. discharge points and stratification, can be influenced and most of all precisely documented during the site construction.

The attempt to study patterns and processes of initial ecosystem development at an artificial catchment is a novel approach to disentangle the complex interactions and feedback mechanisms typically found in mature ecosystems and to understand the relevance and importance of initial conditions on further development and future state of an ecosystem. Beside these fundamental objectives and questions the approach aims to transform its result to more applied problems like improving hydrological models as well as restoration measures and management options for disturbed or degraded landscapes.

To allow the clear definition of as homogeneous as possible starting conditions at ´point zero´ and to be able to integrate spatially distributed processes and patterns to larger units, an artificial catchment was constructed in the mining area of Lusatia, Germany. This artificial catchment ´Chicken Creek´ with an area of about 6 ha was constructed as a 2–4 m layer of post-glacial sandy to loamy sediments overlying a 1–2 m layer of Tertiary clay that forms a shallow pan and seals the whole catchment at the base (Fig. 1). No further measures of restoration like planting, amelioration or fertilization were carried out to allow natural succession and undisturbed development. The construction plan allowed the establishment of a small lake with a diameter of around 70 m and a maximum depth of 3 m in the lower part of the catchment. The site was fenced in completely to avoid disturbances and vandalism particularly by human visitors but also by abundant game animals in the area. The construction operations were completed in September 2005 which can be defined as the 'point zero' of the ongoing development of the site.

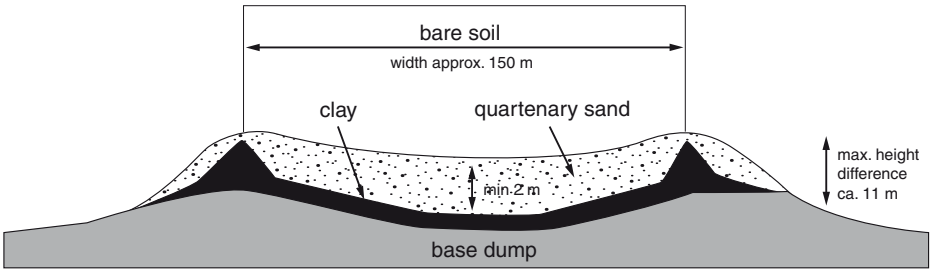

Fig. 1. Schematic cross-section of the artificial catchment ´Chicken Creek´