



Feedbacks between structures and processes during initial ecosystem development in an artificial catchment

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We studied the role of structures and processes and their feedbacks during initial ecosystem development in the artificial catchment Chicken Creek. During the first seven years, considerable changes within the catchment were observed. Both internal and external factors could be identified as driving forces for the formation of structures and patterns in the artificial catchment. Initial structures formed by the construction process and initial substrate characteristics were decisive for the distribution and flow of water. External factors like episodic events triggered erosion and dissection during this initial phase, promoted by the low vegetation cover and the unconsolidated sandy substrate.

The transformation of the initial geo-system into areas with evolving terrestrial or aquatic characteristics and from a very episodic to a more permanent stream network and discharge, together with the observed vegetation dynamics increased site diversity and heterogeneity with respect to water and nutrient availability and transformation processes compared to the more homogenous conditions at point zero.

The processes and feedback mechanisms in the initial development of a new landscape may deviate in rates, intensity and dominance from those known from mature ecosystems. It is therefore crucial to understand these early phases of ecosystem development and to disentangle the increasingly complex interactions between the evolving terrestrial and aquatic, biotic and abiotic compartments of the system. Artificially created catchments could be a suitable tool to study these initial developments at the landscape scale under known, designed and defined boundary conditions.