

EGU2020-7216

<https://doi.org/10.5194/egusphere-egu2020-7216>

EGU General Assembly 2020

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Abiotic and biotic drivers of ecosystem development – results from Chicken Creek Catchment

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15 years of initial ecosystem development have been observed in the artificial Chicken Creek Catchment in Eastern Germany (State of Brandenburg). The 6 ha site was constructed in 2004/05 as a watershed within a post-mining landscape and was left for an unmanaged primary succession. The number of plant species increased quickly during the first years parallel to an increasing groundwater table within the catchment. In 2014 a total of about 180 vascular plants were identified in this young ecosystem.

During its development vegetation differentiated according to morphological and soil related conditions. The semiaquatic part around a small pond developed differently compared to the upper, terrestrial part. In this terrestrial part *Robinia pseudoacacia* L. early occurred as a pioneer tree species. Large surface areas, however, remained open land areas without tree or shrub vegetation. *Robinia* as a N-fixing tree species accumulates nitrogen in its litter layer at the soil surface which influences the further vegetation development in these parts of the catchment.

Furthermore, *Robinia* together with other tree species contributed obviously to a significant groundwater lowering in the constructed catchment area. This decrease of the groundwater tables in the study area was intensified by two extremely dry summer seasons (2018 and 2019). As a result, the overall composition of the vegetation in the terrestrial part of the catchment changed slightly indicating dryer conditions particularly for herbaceous plants.

Initial abiotic site conditions (geomorphology and soil conditions) in combination with external abiotic drivers (amount of precipitation) shaped the development of plant communities. Vice versa, the occurrence of plant species with specific functionality (N-fixation and high water consumption) contributes to a further spatial differentiation of the vegetation composition. The constructed Chicken Creek catchment as an artificial landscape unit allows for detailed insights into these ecological differentiation processes of the initial developmental ecosystem phase.