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# Industrial Forest Project

A synthesis after 24 years of accompanying ecological research on industrial brownfields in Ruhr area

Buch, C., Keil, P., Balke, O., Heinze, S., Hetzel, I., Leder, B., Scholz, T., Schmitt, T., Schulte, A., Witt, H., Späth, R.

The aim of the interdisciplinary basic research project is the investigation and documentation of processes of plant succession on industrial sites in the Ruhr metropolitan area as well as the prognosis of a possible climax community (Keil & Scholz 2016 a & b, Buch & Keil 2019).

The largest and fastest change in the composition of species occurs at the end of the pioneering phase (fig. 2 & 3). In contrast the early succession phases have been relatively stable over long periods of time (fig 2 & 5). However as soon as the succession progresses it reaches a considerable speed up to the stage of primary forest (fig. 3). In this process succession stages with persistent grass or herbaceous vegetation, as postulated in the classical succession sequence, can be skipped and trees settle directly on the open industrial soil.

There is a tipping point in species richness at the end of the pioneer settlement where the further direction of the succession process is defined (fig. 1). A climax state is not nearly reached even on the oldest industrial forest (fig. 6).

The crucial factors for the course and speed of succession are the physical and chemical properties of the substrate. In addition there are countless other factors that can influence the direction and speed of succession like weather an extreme events.

The basic research presented here does not only apply the field of succession research but also aspects of urban forest biodiversity as well as processes of speciation (e. g. neogenic taxa). Applications in practice relate to the maintenance of industrial brownfields where pioneer vegetation should be preserved. The spontaneous vegetation of industrial forests can be a role model regarding to climate adaptation on urban sites (resilience). The affected topics can also be found in social science and environmental educational.



Fig. 1: Tipping point at the end of the pioneer stage

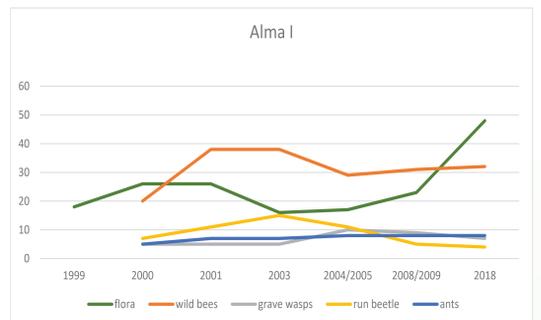


Fig. 2: Development of species richness on area Alma I

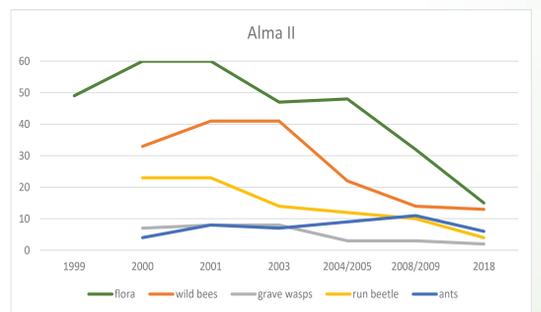


Fig. 3: Development of species richness on area Alma II

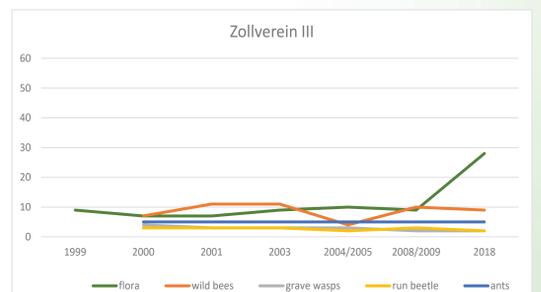


Fig. 4: Development of species richness on area Zollverein III



Fig. 5: Pioneering phase on the area Zollverein



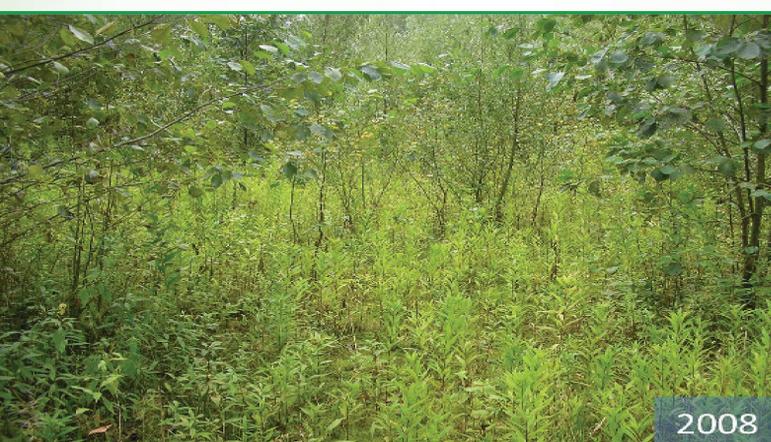
Fig. 6: Industrial forest on the area Rheinelbe

**Literature:**

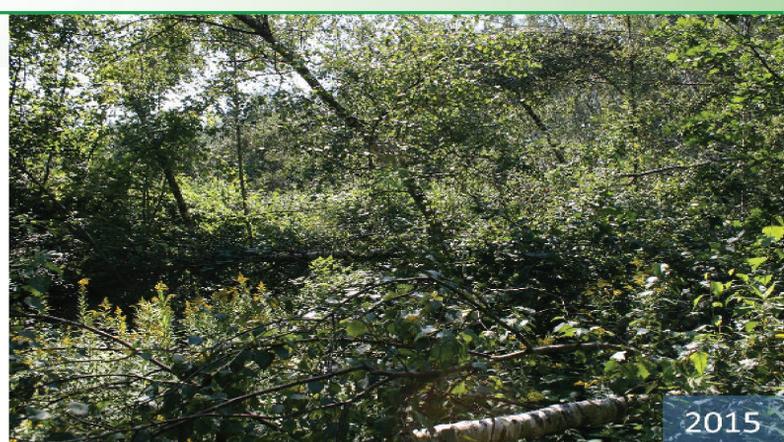
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**contact & information:**  
 Biologische Station  
 Westliches Ruhrgebiet e.V.  
 Ripshorster Straße 306  
 46117 Oberhausen  
 Tel. 0208 - 4686090  
 info@bswr.de  
 www.bswr.de



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