Trees and the restoration of waterways in the Spreewald floodplain

Maintaining the benefits of historical land use

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Small-scale mosaic fragment retained in the Filow area in the Spreewald Biosphere Reserve. *Ref: Tsonkova 2015*

Why restore ancient waterways?

In the past, flood-prone lowlands in Germany were adapted for agricultural land use through the installation of small waterways to improve drainage. The excess sediment from the waterways was used to develop raised areas. Planting trees on these elevated areas resulted in the development of a small-scale mosaic agroforestry system, rich in biodiversity.

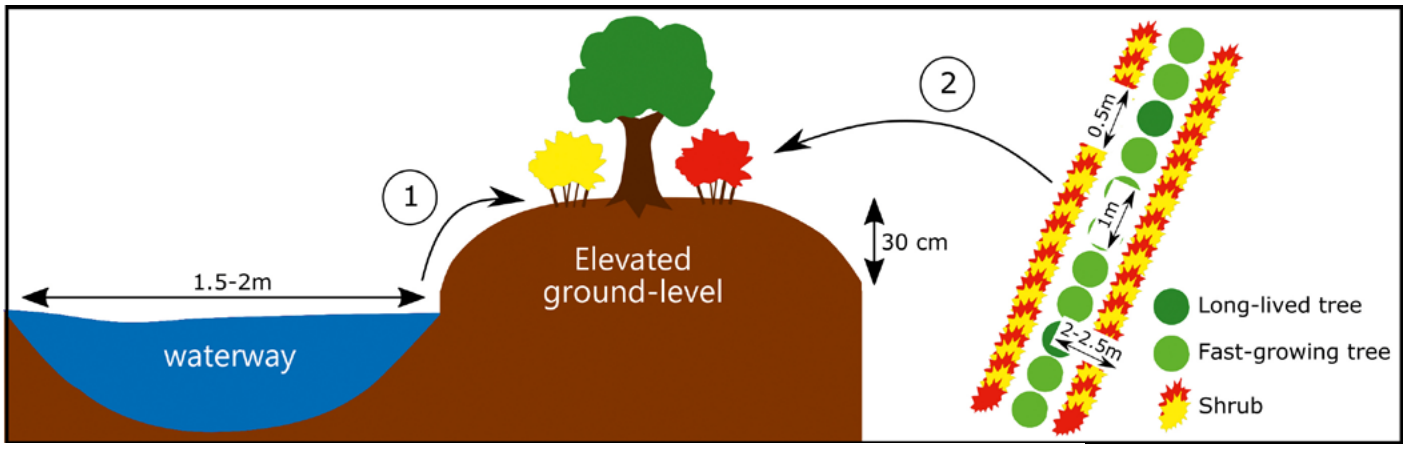
During the last 30 years, these historical waterways have become degraded, resulting in the return of flooding events and the occurrence of slack water. Slack water, unlike flood water, is alkaline and has very low oxygen levels. This can impede the vitality and growth of alder trees *(Alnus glutinosa)*, the main tree species in the area. Consequently, tree growth and regeneration in the area have been inhibited.

Where and how to plant

Trees should be established in the area exhibiting the highest degradation rates. Small waterways with widths of between 1.5 m and 2 m should be created by digging out the soil along the hedgerow. The excess soil material should be used to raise the ground level up to 30 cm. The new hedgerow should be established on this elevated area. The hedgerow should shade the waterway in order to reduce the growth of water plants. The hedgerow design is shown below.

The main tree species used should be black alder *(Alnus glutinosa)*. Blackberry *(Rubus spp.)* is the main shrub species found in the research area. Both replanting and natural seed dispersal should be used as reestablishment methods. For the replanting, local material should be used and the regulations for nature protected areas should be followed. A combination of long-lived and fast growing tree species, as well as shrubs, should be planted. Newly planted trees should be fenced during the first five years to ensure their protection from livestock and game.

Neglected waterways in the Filow area. *Ref: Mirck 2016*



A waterway is created by digging out the soil and using it to raise the ground-level (1), where a new hedgerow is planted (2).

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Advantages

- Planting trees on elevated areas improves their chance of survival.
- The created waterways hasten the drainage of water after flooding events and reduce the occurrence of slack water.
- The pasture can be grazed by cattle or mown.
- The nature protection function and the cultural value of the landscape will increase as the historic appearance and the unique character of the area is preserved.

A waterway in the Spreewald. *Ref: Tsonkova 2015*

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Heterogeneous habitat in the Spreewald. *Ref: Mirck 2016*

System benefits

In this area of nature protection, deriving economic benefits from the harvest of trees not the main priority. The main benefits of the system are related to ecological functions, such as habitat protection and increased biodiversity.

The combination of an open landscape, hedgerows and waterways creates a unique habitat with heterogeneous microclimatic conditions, and this preserves the high biodiversity levels in the area, including rare species. According to the environmental monitoring programme carried out in Spreewald, Red List species in the woodland area near the research site included Lindberg's hypnum moss *(Hypnum lindbergii*), tufted loosestrife *(Lysimachia thyrsiflora)*, greater spearwort *(Ranunculus lingua*), and marsh fern (*Thelypteris palustris*). Red List species found in the grassland area included Greenland buttercup *(Ranunculus auricomus agg*.), marsh stitchwort *(Stellaria palustris)* and fen violet *(Viola persicifolia*). (Luthardt et al. 2016)

The maintenance of the cultural landscape also benefits tourism. The Spreewald Region is an important tourist area and receives more than 2 million visitors between May and September each year. (Grossmann 2011)

Pests and disease

The degradation of hedgerow structures has increased because the dominant tree species, black alder *(Alnus glutinosa)*, has become more susceptible to the root rot pathogen *(Phytophthora alni).* (Riek and Strohbach 2004) The susceptibility of black alder to root rot is particularly high during summer flooding events. Furthermore, since 2006, the European ash (*Fraxinus excelsior*) has also become a victim of the fungal disease *Hymenoscyphus fraxineus* in the Spreewald. Planting the hedgerows on elevated areas is expected to reduce the occurrence of this pathogen as the trees will be inundated less often. (Alsop 2014)

Further information

Alsop J (2014). Woodland and tree management in the wake of Ash Dieback (*Hymenoscyphus fraxineus*): Experience from Continental Europe. Report for the Winston Churchill Memorial Trust, p. 70.

Grossmann M (2011). Impacts of boating trip limitations on recreational value of the Spreewald wetland: a pooled revealed/contingent behavior application of the travel cost method. Journal of Environmental Planning and Management 54: 211–226.

Luthardt et al. (2016). Lebensräumeim Wandel. Umfassender Forschungsberichtzuallen Beobachtungsflächen der ökosystemaren Umweltbeobachtungim Zeitraum 1999-2014. HNE Eberswalde. Unveröffentlichter Forschungsbericht.

Riek W, Strohbach B (2004). Einfluss der Forstwirtschaft auf Böden und Wasserhaushaltim Spreewald. Beitr. Forstwirtsch. u. Landsch.ökol. 38(1): 19–23.