

# Identification of potential riparian forest planting areas along federal waterways

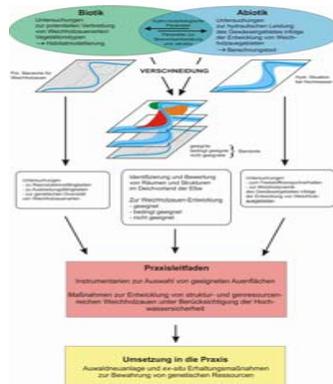
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## Aim of the Project

Intact riparian vegetation is of great value for an ecosystem; it stabilises stream banks, provides shade that prevents excessive water temperature fluctuations, performs a vital role in nutrient cycling and water quality, improves aesthetic and recreational benefits, and is immensely productive as wildlife habitat (Fischenich 2001).

The research project has the aim to develop and implement a practice suitable concept for an establishment of species-rich softwood forest near federal waterways.



## Potential softwood forest areas

The data basis is a digital terrain model which covers the area between the dykes from Elbe river reach 410 km until 470 km. First the digital terrain model is overlaid with the low water level (Q = 288 m³/s). The comparison of the discharge frequency along the Elbe foreland defines the potential softwood forest areas.

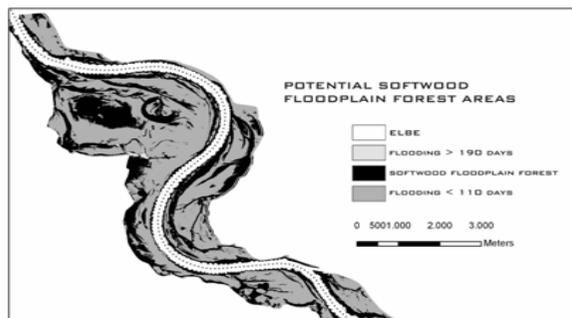


Fig.1: Potential softwood floodplain forest areas

## Research and analysis of vegetation parameters

According to Pasche (1984) a structure mapping has to be made, including the floodplain inventories along the river Elbe. Therefore the density of the limb distribution, the average of the limb and tree trunk thickness are measured within the reference areas. These averaged vegetation data are important input parameter for the hydraulic calculations.

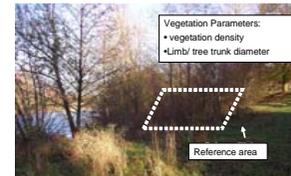


Fig.2: Reference area to determine the vegetation parameter

The selected reference areas represent the typical natural cover population for the river Elbe. Afterward these data are analyzed to identify typical natural cover parameters for softwood forest. These vegetation data forms the basis for the abstraction of vegetation and their arrangement in a physical model.



Fig.3: Young-willow in front of the raster frame

Additional the vegetation was photographed in order to optimize the vegetation survey. A white backcloth, fixed on a portable frame, is positioned behind the representative softwood forest elements. The following analysis of these pictures by image edition software delivers information about the vegetation density. The raster on the backcloth screen enables vegetation density analyses per m².

## Laboratory analyses

### Aim of the laboratory analyses

The precondition for an optimal river and floodplain management, in the means of a lasting flooding safety, is a reliable estimation of the hydraulic capacity. Therefore information about the resistances caused by the river itself as well as e.g vegetation are needed.

Up to now the vegetation in laboratory models are mainly abstracted as inflexible, uniformly distributed cylinders. But branchy and leafy trees are far from this abstraction.

The nature based vegetation data are incorporated in the laboratory model, the softwood forest vegetation is represented by living willow branches to simulate the natural flexibility under consideration of varied flow velocity conditions.

## Laboratory flume set-up

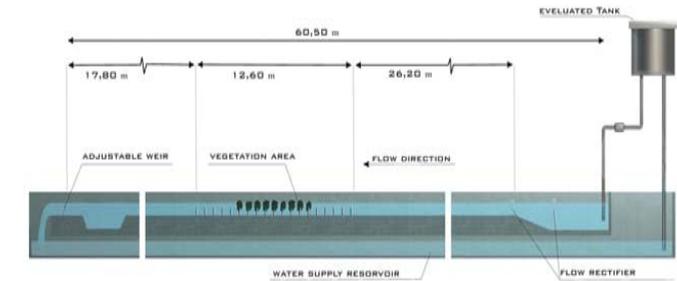


Fig.4: Longitudinal section of the flume with the installed measuring field

The big-scaled laboratory experiments are made in a channel 60 m long, 2,5 m wide and 0,7 m high. The 12 m long measuring filed is arranged in the middle section of the flume.



Fig.5: View over the sleeves



Fig.6: Flow characteristics of willow samplings

Over 1500 sleeves are screwed on a perforated steel plate. These sleeves serve as a fastener for the willows. This sleeves also simulates the bed roughness which is typically for natural vegetation arrangements.

Figure 6 shows the flow conditions with little ramification rate but high vegetation density without leaves with an discharge of 600 l/s.

The determination of the basic justification must be made very accurate because the following series of measurement are related. The aim is to determine the backwater effects caused by bending and vibration of softwood forest.