



# WATTLE FENCE (FOR WATER ENGINEERING)

SWB11



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ADDRESSED  
HAZARDSPROTECTED CRITICAL  
INFRASTRUCTURE

## Primary functions and key services

(Babur et al., 2021; Polster, 2002, 2016).

- **Bank stabilisation:** prevent sliding or slippage of low banks, protecting the integrity of water grey infrastructure and other water receiving bodies.
- **Sediment management:** helps to retain soil and mitigates washing out of sediment, which can help to reduce efforts to keep roads and infrastructure for water collection clean from sediment accumulation.
- **Channel alignment**
- **Flood protection:** slows down water flow, woven structure and roughness slows down water flow, which helps to protect the good functioning of **infrastructure for water collection**.
- **Water runoff regulation:** allows water to infiltrate into soil and prevents surface water runoff.

## Challenges this NbS addresses

- Soil erosion
- Sediment loss
- Flooding
- Shallow and surface landslides



Detail of wattle fence two years after installation, Alsbach Vienna (Austria);  
Image Credit: [Florin Florineth, BOKU-IBLB archive], [1995]. Used with permission;

## Site suitability, scale and coverage

Floodplains characterised by minor flooding, debris flow or minor erosion processes/ challenges, and recommended by the below reasons:

- Durable NbS solution that promotes a continuous cycle of regeneration as it becomes incorporated into the soil;
- Can be combined with other NbS, such as greening techniques or natural textiles to prevent erosion from above bank failure.

## What is it?

### Wattle fence

*live wattle, living willow fence, willow spiling, willow spiling wall*

**Wattle fencing** is an ancient Soil and Water Bioengineering (SWB) technique for retaining steep river banks low in height, having the narrowest and slenderest width of all techniques. As a wattle fence is a vertical construction with linear effect, it is characterised by low flow roughness. It is a fence-like low wall structure easy to execute, and requires only a small amount of living willow branches. Branch budding results in growing to a row of willow trees. Wattle fences can also be applied in slope sites as short retaining walls, however, need backfill and integration in upper soil layers (Florineth 2012).



Wattle fence at Veitschbach, Styria (Austria);  
Image Credit: [Tina Vorstandlechner], [2024]. Used with permission;

## Ecosystem services

- ▶ **Habitat provision:** offers diversity of aquatic and terrestrial habitats for bird, insect and small mammal species, indirectly linked to protecting the livelihood of the nearby rural and urban settings.
- ▶ Increases **biodiversity of aquatic ecosystems**, which helps to protect crucial services for food production in the surroundings.
- ▶ **Carbon sequestration:** significantly increased CO<sub>2</sub> capture and carbon storage in above- and below-ground biomass.
- ▶ **Soil fertility:** natural degradation of plants enriches soil with organic matter and improves soil structure.
- ▶ **Water quality:** improves downstream water quality by reducing sedimentation.
- ▶ **Pollination:** beyond covering purely aesthetic questions, adding climbing plants in wattle fences can attract pollinators. Moreover, willow pollination itself is of high pollination value.



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### ▼ Cost-benefit profile

The implementation of wattle fences is generally considered **cost-effective**, primarily due to the utilisation of **locally sourced, natural materials** such as live willow cuttings and wooden stakes. The primary costs associated with this technique include **labour for installation** and low **maintenance**, as well as the procurement or harvesting of suitable plant materials. Soil bioengineering methods like wattle fences are effective for slope stabilisation and site restoration, offering a sustainable alternative to traditional engineering approaches (Polster, 2002, 2003).

In terms of benefits, wattle fences provide immediate physical stabilisation to vulnerable slopes and banks, reducing soil erosion and the risk of shallow landslides. As the live branches establish and grow, they develop extensive root systems that reinforce the soil structure, enhance drainage, and improve overall slope stability. Additionally, the vegetative growth contributes to habitat creation, biodiversity enhancement, and improved aesthetic value of the landscape (Gray and Leiser, 1982).

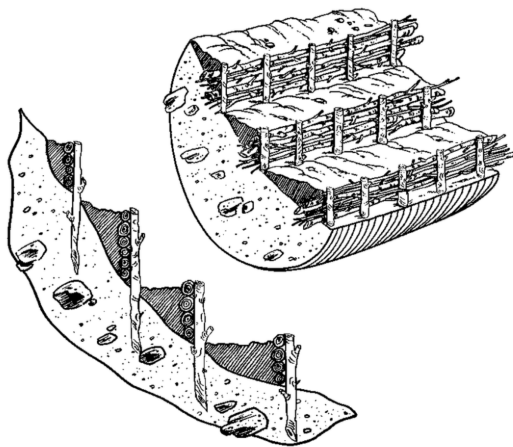
### ▼ Main components

(Polster, 2002, 2003; Zeh, 2007)

- **Flexible willow branches:** Made from living flexible willow branches, woven around woody poles.
- **Woody poles:** to enhance fixation of willow branches. Adventitious root and shoot bud: system is shooting from their buds;
- If used in **slope sites** as short retaining walls, backfill and integration in upper soil layers needs to be guaranteed, otherwise risk of dry out is most likely to restrict growth success (Florineth 2012).

**Wattle fences as short retaining walls constructed of live poles and long willow branches woven around, used to provide decrease slopes slope steepness that support plant growth.**

Image Credit: [Polster Environmental Services Ltd., [2001]. Used with permission.



### Environmental impacts (EU taxonomy)

- Climate change mitigation
- Climate change adaptation
- Sustainable use and protection of water and marine resources
- Transition to a circular economy
- Pollution prevention and control
- Protection and restoration of biodiversity and ecosystems.



**Wattle fencing under construction for upper soil layer retainment. At dry hillside locations, the fence needs to be integrated below soil surface, backfill remains to be done here; Groß Enzersdorf (A).**

Image Credit: [Rosemarie Stangl, 2020] [date] Used with permission

### Example of installation

- ▶ **Wattlefence**
- ▶ **Implemented by:** "Cascade Geosynthetics", based in Portland, (Oregon, United States) and Salt Lake City, (Utah, United States)
- ▶ **Description and results:** The solution guaranteed innovation in sediment control, combining wattles and silt fences, made of biodegradable material, to evolve treatment of sediment-laden flows, replacing more traditional technologies for perimeter control. The solution provides simple implementation, without trenching, leave-behind biodegradability, and flexible installation arrangements. Entails a two-stage filtration, enabling the performance of the system at first flush and high flow.

### References

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