SOIL AND WATER BIOENGINEERING

LIVE STAKING

SWB5

NATURE-DEMO

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ADDRESSED HAZARDS

PROTECTED CRITICAL INFRASTRUCTURE

Main components

- Dormant hardwood stem cuttings (stakes) from quickly rooting woody plants like poplars or willows are inserted in a 90° angle to the slope into the moist soil.
- Can be combined with other NbS, such as greening techniques, natural fibre supported erosion control or block stone installation.

Primary functions and key services

- **Upper soil layer reinforcement**
- **Riverbank and streambanks stabilisation and protection:** placed along water bodies, live stakes prevent undercutting, therefore mitigate the collapse of riverbanks.
- **Quick re-afforestation** of riparian forests or deciduous forests on slopes.
- **Quick bushy growth and surface protection**
- **Natural landscape integration**

Ecosystem services

- **Ecosystem restoration**
- **Habitat creation:** Diversity of aquatic and terrestrial habitats for bird, insect and small mammal species
- **Biodiversity enhancement**
- **Carbon sequestration:** significantly increased carbon storage in above and below ground biomass and soil.
- **Water filtration and water quality improvement**
- **Floodwater protection**
- **Enhancement of soil** fertility, soil structure, moisture and nutrient retention
- **Pollination**

What is it?

Live staking
(live stakes, live cutting, live poles, joint planting)

Live staking uses live hardwood stem cuttings and stakes to stabilise soil layers, reduce erosion and have beneficial ecological effects. They provide reinforcing support if inserted inclined and better root growth as more regular rooting along the buried stem sections is achieved. Live poles are live stakes with lengths > 1m, providing instant soil reinforcement. Live staking can be combined with any SWB technique. (Florineth 2012, Eubanks et al. 2002)

1. Live staking combined with natural fibre net protection, river Wienfluss, Vienna;
Image Credit: [Florin Florineth, archive BOKU-IBLB], [1997], Used with permission.
2. Bushy growth from live staking, 1 year after plantation;
Image Credit: [Florin Florineth, archive BOKU-IBLB], [1997], Used with permission.

Challenges this NbS addresses

- **Surface and gully erosion**
- **Slope instabilities and shallow landslides**
- **Riverbank and streambank collapse**
- **Sediment runoff**
- **Flooding**
- **Loss of vegetation cover and ecosystems**

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.**

References

Eubanks, C., Meadows, D., Technology & Development Program (U.S.). (2002). A soil bioengineering guide for streambank and lakeshore stabilisation. San Dimas, CA: U.S. Dept. of Agriculture Forest Service, Technology and Development Program (Eds.).

Florineth, F. (2004). Pflanzen statt Beton – Handbuch zur Ingenieurbiologie und Vegetationstechnik. Berlin – Hannover: Patzer Verlag.

Sotir, R. B. Sotir, Fischenich, J.C. (2007): Live Stake and Joint Planting for Streambank Erosion Control. ERDC TN-EMRRP-SR-35 Ecosystem Management and Restoration Research Program. Retrieved from: https://apps.dtic.mil/sti/tr/pdf/ADA474067.pdf (accessed 25.03.2025)

Schiechtl, H. M., Stern, R. (1996). Ground Bioengineering Techniques for Slope Protection and Erosion Control. Blackwell Science. London, England.

Zeh, H. (2007): Soil bioengineering Construction type manual. Eds. European Federation of Soil and Water Bioengineering, Verein für Ingenieurbiologie. Vdf Hochschulverlag AG: ETH Zürich.