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Enhancing fascine techniques for slopes erosion control: A comprehensive technical guide

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Fascines are Soil and Water Bioengineering techniques for erosion control and slopes stabilisation. As Nature-based solutions, these age-old and highly adaptable techniques generally rely on the installation of living willow bundles fixed to either dead or living stakes. Fascines are the most widely used techniques to protect riverbanks toe in France; they are also implemented on slopes, and gullies making wide their possible use. They are often employed as part of a combination of techniques to meet specific local needs. Despite the common implementation of fascines, no guidelines cover the entire diversity of fascines. The technical guideline proposed describes the full scope of possibilities fascines offer, their advantages and disadvantages and technical details and specifications of implementation. Drawing on a foundation of technical literature, historical documentation, research experiments, and empirical knowledge, the guide delves into no fewer than 112 references. The objective is to enhance the use, success, and overall confidence in fascine-based techniques.

This guide presents comprehensive information on no fewer than 12 fascine techniques that have transcended through the ages, originating from structures dating back over 2,000 years in China and continuing to be relevant in the contemporary world. Although fascines may seem simple and are known for their high mechanical strength, these techniques require high expertise to ensure lasting resistance and satisfactory plant growth. Several critical factors contribute to the success and durability of these structures, including the choice of plant species, the quality of planting materials, the nature of soil contact, and the positioning of the bundle relative to infiltration or groundwater levels. Application methods vary based on the specific technique and context: Fascines can be alive or inert; placed parallel or perpendicular to the slope; they come in different diameters with one or multiple bundles and can be used as barriers or drains. The most illustrative example is the implementation of fascines along the toe of the bank, which stands as the most widely used technique. For this approach, bundles should measure between 100 and 300

cm in length, with a diameter ranging from 15 to 50 cm. Branches should have a minimum diameter of 2 cm and a length of approximately one meter.

This technical support is intended for designers, river managers, technicians, and the general public, providing precise technical recommendations for the successful creation of fascines, from materials to maintenance, as well as implementation methods and environmental conditions appropriate to this type of structures.