

**Recueil d'expérience sur le génie végétal  
en rivière de montagne**



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## **RESUME**

### *Recueil d'expérience sur le génie végétal en rivière de montagne*

Les techniques de génie végétal sont peu utilisées pour la protection des berges de rivières de montagne françaises et suisses contrairement à ce qui est observé dans d'autres pays de l'Arc Alpin. La conception de ces ouvrages est généralement construite sur une approche empirique parfois appuyée par un calcul de résistance mécanique. Une étude bibliographique approfondie sur la résistance mécanique des ouvrages et un retour d'expérience sur 13 sites en rivières de montagne ont été réalisés. Cette étude met en évidence les potentialités du génie végétal comme alternative au génie civil sur les rivières possédant jusqu'à 2,5% de pente.

## **ABSTRACT**

### *Experience feedback on bioengineering works in mountain river*

In the Alps, mountain riverbanks often face erosion issues. The various mechanisms explaining the evolution of the morphology of riverbanks depend on soil, river and vegetation. Vegetation generally has a positive role on stability of riverbanks. Mimic these natural models, several bioengineering techniques have been developed to counter riverbank erosion. The bioengineering works are built with living vegetative material. These alternative techniques to manage riverbanks differ from the civil engineering techniques which follows the classic civil engineering strategy (use of rip-rap or concrete). Concerning mountain riverbanks, the civil engineering option is often preferred in France and Swiss. However other alpine countries have shown a stronger interest in bioengineering works as tools to manage mountain rivers. The development of the bioengineering techniques in France and in Swiss is impaired by a lack of knowledge and experience sharing about these techniques between river managers. The aim of this study is to assess the mechanical resistance of bioengineering works in mountain rivers to provide river managers with a technical guide linking the types of bioengineering works with the rivers' characteristics where such techniques can be used. The overall goal is to promote bioengineering techniques.

This study reviews the literature about mountain riverbanks constraints and especially focuses on mechanical constraints due to the mountainous climate and hilly landscape. We found that several scientific articles have been focusing on the evaluation of the resistance of bioengineering techniques. These articles provided us with shear stress resistance values for various bioengineering works. Besides, we noticed that, most often, riverbank managers select bioengineering techniques on the basis of their experience. Sometimes, for project flood, they calculate river shear stress and compare these values to those found in the scientific articles. These references values have to be considered carefully because of the variability of the methods of calculation. It remains very difficult to assess the resistance of a bioengineering work because of the wide range of parameters to take into account. We noticed that the French literature mostly shows experimental feedbacks about plain rivers and very few about mountain rivers.

To improve the knowledge about bioengineering options to manage mountain riverbanks, we evaluated the resistance of 13 French and Italian bioengineering works built on mountain rivers. This study highlights the potential of bioengineering works as an alternative to civil engineering works in rivers with slopes until 2.5%.