



A strategy for fine sediment retention with bioengineering works in eroded catchments in mountainous and Mediterranean type ecosystems

F. Rey (1)

(1) Cemagref, Mountain ecosystems Research unit, 2 rue de la Papeterie, BP 76, 38402 St Martin d'Hères cedex (Email: freddy.rey@cemagref.fr/Fax: +33476513803)

Soil erosion is a frequent problem where erodable grounds are submitted to aggressive climate or soil use around the world, especially in mountain areas and Mediterranean climate. One of the consequence of this erosion is high yields of fine sediment at the exit of catchments, which can cause different kind of damages such as silting of reservoirs or ecological pollutions. To avoid these sediment transports, restoration actions can be considered according to two major strategies: 1/ to control erosion on slopes by establishing the densest vegetation cover; 2/ to let erosion occur on slopes but to retain the eroded materials before they reach the catchment exit. The second solution is adapted for countries for which budgetary restrictions impose managers to consider 'minimal' actions for reducing sediment yield at the exit of catchments, i.e. guarantee low yields with fewer interventions as possible. This can be carried out with the use of bioengineering techniques within small gullies, where vegetation obstacles can play a very significant role in sustainable trapping and retention of fine sediment in gully floors. The application of such 'low-cost' ecological rehabilitation action requires to establish a specific strategy for the interventions. To do this, current research results can be used to propose the following rules for fine sediment retention with bioengineering works: 1/ the gully with a surface area less than 1 ha is the elementary scale for ecological rehabilitation activity; then bioengineered revegetation operations should be carried out on gully floors only, to reach a minimum plant cover rate of 20 % at the scale of the gully; 2/ the bioengineering works must be installed only in favourable ecological conditions for the established plants, e.g. not in southern exposure; 3/ these

works must be installed in the gully floors when slopes are less than 40 % to allow efficient sediment trapping; 4/ the choice of the appropriate bioengineered structure inside gullies is guided by the presence of vegetation on slopes. Therefore if vegetation is present, it is proposed to use “ brush layers on fascines ”: this intervention allows limiting the action to punctual installation of linear vegetation cover, waiting for natural colonization of bare soils to occur from surrounding vegetation. Otherwise it is proposed to use “ brush layers and brush mats on fascines ”: this intervention, more expensive than the first one, is necessary for directly installing a vegetation mat without waiting for natural colonization by vegetation, especially when the latter is too far away from rehabilitated sites. All these interventions in gullies are the only ones to make, to reach a sufficient cover that will be enough to trap all the materials eroded above. Such strategy for fine sediment retention with bioengineering works is currently applied on eroded marly torrential catchments in the French Southern Alps. Discussion should be carried out to consider an application in other situations and in different Mediterranean type ecosystems.