



Prediction of riparian vegetation characteristics by statistical models in Mediterranean mountain torrents regulated by check dams

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In mountainous torrents of the Mediterranean environment the riparian vegetation is strongly influenced by the presence of engineering control works, since these structures bring heavy modifications in channel geometry, hydraulic regime and bed sediment size. Previous investigations have shown high linear correlations between physical (section shape, profile slope, specific discharge, surface and subsurface size of the channel bed) and vegetation (development, structure and biodiversity) indicators in headwater channels with check dams of Calabrian (Southern Italy) torrents. Based on these findings, this study applies multivariate statistical techniques (Principal Component Analysis and Partial Least Square Regression) to identify in the same study headwaters new synthetic explanatory variables, representative of the different transects (upstream, downstream or intermediate, compared to the check dam location) and develop predictive models of riparian vegetation characteristics.

The Principal Component Analysis has provided a simple parameter (the first Principal Component, explaining about 60% of the total variance), which is able to discriminate the physical and vegetal characteristics of the different transects close to check dams, thus reducing the large number of factors influencing the fluvial processes. Moreover, cover, height and transversal variability of riparian vegetation have a very high influence (loadings over 0.73) on this component, while its biodiversity is correlated to the second Principal Component (loadings over 0.63). The Partial Least Square Regression has shown that it is possible to estimate with fair accuracy (minimum r^2 of 0.70) the development, structure as well as transversal variability of the riparian vegetation, starting from the physical features of the channel. These models may be important in the planning steps of new check dams, since their effects on the development and growth of vegetation upstream and downstream can be forecasted before their installation, at least for the quantification of the order of magnitude of the check dam impacts on torrent ecology.