Geophysical Research Abstracts
Vol. 17, EGU2015-7610, 2015
EGU General Assembly 2015

Riparian vegetation structure under desertification scenarios

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Riparian areas are responsible for many ecological and ecosystems services, including the filtering function, that are considered crucial to the preservation of water quality and social benefits. The main goal of this study is to quantify and understand the riparian variability under desertification scenario(s) and identify the optimal riparian indicators for water scarcity and droughts (WS&D), henceforth improving river basin management.

This study was performed in the Iberian Tâmega basin, using riparian woody patches, mapped by visual interpretation on Google Earth imagery, along 130 Sampling Units of 250 m long river stretches. Eight riparian structural indicators, related with lateral dimension, weighted area and shape complexity of riparian patches were calculated using Patch Analyst extension for ArcGis 10. A set of 29 hydrological, climatic, and hydrogeomorphological variables were computed, by a water modelling system (MOHID), using monthly meteorological data between 2008 and 2014. Land-use classes were also calculated, in a 250m-buffer surrounding each sampling unit, using a classification based system on Corine Land Cover.

Boosted Regression Trees identified Mean-width (MW) as the optimal riparian indicator for water scarcity and drought, followed by the Weighted Class Area (WCA) (classification accuracy =0.79 and 0.69 respectively). Average Flow and Strahler number were consistently selected, by all boosted models, as the most important explanatory variables. However, a combined effect of hidrogeomorphology and land-use can explain the high variability found in the riparian width mainly in Tâmega tributaries. Riparian patches are larger towards Tâmega river mouth although with lower shape complexity, probably related with more continuous and almost monospecific stands.

Climatic, hydrological and land use scenarios, singly and combined, were used to quantify the riparian variability responding to these changes, and to assess the loss of riparian functions such as nutrient incorporation and sediment flux alterations.