Geophysical Research Abstracts
Vol. 13, EGU2011-9911, 2011
EGU General Assembly 2011

Restoration of hydrological services through exotic plantations and natural revegetation on abandoned badlands

Armando Molina (1), Gerard Govers (1), and Veerle Vanacker (2)

(1) Department of Earth and Environmental Sciences, KULeuven, Belgium , (2) Georges Lemaître Centre for Earth and Climate Research, Earth and Life Institute, Université Catholique de Louvain, Louvain-la-Neuve, Belgium

The Andean headwater basins function as important regulators of the water and nutrient supply to the downstream reaches of the Amazon River. Since colonial times, deforestation has been a common practise in the Inter-Andean basins. Today, as the economic growth continues and cities grow larger, rapid deforestation has given way to forest restoration. The establishment of fast-growing forest plantations (Eucalyptus globulus and Pinus radiata) for commercial and restoration purposes, soil recovery for agricultural activities and natural regeneration on former agricultural land have resulted in restoration of highly degraded land.

Assessing the effects of forest cover change on hydrological services is vital to quantify the benefits and costs of forest conservation and restoration. While the hydrological impacts of changes in land use from natural or farming land to exotic forest plantations are relatively well documented, little is known about the consequences of badland restoration through afforestation and natural revegetation.

In this paper, we analyse daily streamflow records of two time series (1979-1982 and 2005-2007) to examine the effect of changes in streamflow for a highly degraded Andean catchment. Changes in land use are documented based on spatial analyses of sequential aerial photographs (1963-1995). The impact of land restoration on annual and seasonal streamflow is analyzed by separating baseflow and stormflow, and flow duration curves are used to compare flow regimes. The observed changes in streamflow records are then analysed in combination with the observed changes in land use so that the effect of land use change on variations in water quantity can be quantified. Our results indicate that the conversion of degraded land into exotic forest plantations and agriculture has resulted in (i) a consistent and substantial decrease in peak flows, (ii) an increase in baseflow and (iii) a significant reduction in sediment yield at the outlet of the catchment.