



AnnAGNPS model as a potential tool for seeking adequate agriculture land management in Navarre (Spain)

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Nowadays agricultural activities face two important challenges. They must be efficient from an economic point of view but with low environment impacts (soil erosion risk, nutrient/pesticide contamination, greenhouse gases emissions, etc.). In this context, hydrological and erosion models appear as remarkable tools when looking for the best management practices.

AnnAGNPS (Annualized Agricultural Non Point Source Pollution) is a continuous simulation watershed-scale model that estimates yield and transit of surface water, sediment, nutrients, and pesticides through a watershed. This model has been successfully evaluated –in terms of annual runoff and sediment yield- in a small (around 200 ha) agricultural watershed located in central eastern part of Navarre (Spain), named Latxaga. The watershed is under a humid Sub-Mediterranean climate. It is cultivated almost entirely with winter cereals (wheat and barley) following conventional soil and tillage management practices. The remaining 15% of the watershed is covered by urban and shrub areas.

The aim of this work is to evaluate in Latxaga watershed the effect of potential and realistic changes in land use and management on surface runoff and sediment yield by using AnnAGNPS.

Six years (2003 - 2008) of daily climate data were considered in the simulation. This dataset is the same used in the model evaluation previously made. Six different scenarios regarding soil use and management were considered: i) 60% cereals 25% sunflower; ii) 60% cereals, 25% rapeseed; iii) 60% cereals, 25% legumes; iv) 60% cereals, 25% sunflower + rapeseed + legumes, in equal parts; v) cereals, and alternatively different amount of shrubs (from 20% to 100%); vi) only cereal but under different combinations of conventional tillage and no-tillage management.

Overall, no significant differences in runoff generation were observed with the exception of scenario iii (in which legume is the main alternative crops), with a slight increase in predicted runoff was. On the other hand, a significant increment (30%) on annual sediment yield was predicted when rapeseed is the alternative major crop. Besides, a large decrease in annual runoff (up to 41%) and sediment (up to 98%) was predicted as the watershed is gradually occupied by shrubs. Finally, no-tillage appears as an interesting management method for cereals, with an over 90% reduction of in sediment yield -but only 4% in runoff.

This is a first approach to evaluate AnnAGNPS as a management tool under local conditions. The above results may be then taken with caution especially in terms of absolute predicted values. However, AnnAGNPS can be considered as a promising tool for assessing the effect of the agricultural activities and implementing adequate land management alternatives in Mediterranean environment.