



Predicting future scenarios for land use in a megacity by using a model based on neural networks: the case study of the Bogotá River basin -Colombia

Claudia Romero Hernandez and Felix Francés García

Research Institute of Water and Environmental Engineering, Universitat Politècnica de València (UPV), Valencia, Spain.
(rhclaudiapatri@hotmail.com)

According to the United Nations, it is expected that by 2050 most of the world's population will live in cities. In particular, Latin America is one of the most urbanized continents with about 84% of its inhabitants living in urban areas, and this percentage will continue to increase in the coming years. Such is the case of Bogotá, with a current population for the metropolitan area of 10 million inhabitants, where according to the projections this megacity will have a population of 14 million inhabitants by 2050.

Development of megacities drives important changes in the land uses and in the demand of natural resources: i.e. in these situations, the planning and management of the basin's resources can be a challenge. Therefore, a greater knowledge about the evolution and distribution of land uses in the past, will allow predicting the possible future scenarios, facilitating the planning strategy.

The objective of this study was to predict future land use scenarios for the Bogotá River basin in Colombia, using the model based on neural networks called Land Change Modeler (LCM). The model was implemented for the period 2005 – 2012, including the influence of some physical variables. The model was validated with the land use map for 2014. From these results, the model predicted future scenarios at 2030 and 2050.

The reliability obtained in the validation of the model is good, both spatially and temporally, with a prediction rate of 85% for urban uses. The model has shown a good performance correctly describing the historical behavior of the main changes of land uses in the basin and properly identifying the influence of the main driving variables. Future scenarios show a clear transition from agricultural and pastures to urban uses, mainly in areas near urban centers. In addition, the growing of the megacity of Bogotá could lead to the integration of some nearby districts into a larger urban unit.