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Stakeholder perceptions of soil managements in the Canyoles watershed. A Bayesian Belief Network approach

Maria Burguet Marimón (1), Claire Quinn (2), Lindsay Stringer (2), and Artemi Cerdà (1)

(1) Department of Geography, University of Valencia (Spain), (2) Sustainability Research Institute, School of Earth and Environment, University of Leeds (UK)

The fate of the management and use of land is the result of economic, social and political factors (Tengberg et al., 2016). Stakeholder perceptions are relevant in understanding land management (Marques et al., 2015; Teshome et al., 2016) as perceptions can shape behaviours and actions. In the Canyoles River watershed (Eastern Spain), rainfed agriculture has been replaced by traditional irrigation systems at its valley bottom, and by drip irrigation on its slopes. The new irrigation systems in hilly citrus orchards, along with intensive farming, use of herbicides and high fertilization, are causing high erosion and land degradation rates due to the lack of vegetation cover, soil compaction and the loss of organic matter. Bayesian Belief Networks (BBN) are defined as a 'graphical tool for building decision support systems to help make decisions under uncertain conditions' (Cain, 2001). In this work, BBNs were used to incorporate the issues and objectives identified by stakeholders during interviews about their perceptions of different soil management practices in the Canyoles watershed. BBNs are appropriate for the modeling of geospatial data which can contain different kinds of uncertainties due to positional error, feature classification error, resolution, attribute error, data completeness, currency, and logical consistency, and can integrate qualitative and quantitative data. Our stakeholders were farmers, politicians (especially the mayors of the nearby towns), managers, farm employees and technicians. The questions asked to the stakeholders were related to their concern in keeping the farm active and profitable, the changes in the price of the farm products, the price of the fertilizers and tractors and if soil erosion is a key issue in their farms
Preliminary results from the interviews performed with the stakeholders suggest that there is still a strong refusal to the use of different cover crops, as well as to the change in the tillage systems. Farmers do not fight against these problems as, on the one hand, they do not realize that non-sustainable soil erosion rates reduce soil fertility, and, on the other hand, there are several cultural issues that guide them towards bare soil as they find this as a tidy way to keep their properties. However, more research needs to be done on the BBN approach in order to be able to have a holistic approach regarding the vision of the farmers concerning the use of the different soil conservation strategies.

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