Submitted Abstract

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Title	Evaluation Of Land-Use Scenarios Based On Socio-Ecological Variables Using A Bayesian Belief Network Model To Guide Decision-Making In Mountain Protected Areas.
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Abstract

Sierra Nevada (Spain) is a Mediterranean mountain massif where the interaction between ecosystems, abiotic factors and population over hundreds and thousands of years has configured the land use and the resulting landscape. The protection of this area, initially as a natural park and later as a national park, is a further factor conditioning these relationships. In this way, a socio-ecological system integrated by ecological, social, biophysical, and environmental management variables, determines current and future land use changes and landscapes. A Bayesian Belief Network (BBN) model was developed to assess land-use management in Protected Areas (PAs). The BBN was designed to develop future land-use scenarios for the Sierra Nevada under different socioecological and management conditions. The process to develop the BBN began with a literature review of several models of land use change with a special emphasis on the actors who make the decision to change land use. Once a preliminary set of drivers of land use change was defined, we used an iterative process of consultation with experts and workshops with stakeholders to build the model structure. Interviews were initially carried out with expert researchers on land use change and agricultural activity, where the drivers relevant for the Sierra Nevada were discussed. Afterwards, several workshops were carried out with experts and stakeholders, one in each differentiated zone of Sierra Nevada: north-west, south, and east to validate the nodes of the network, the variables categories, the causal relationships between variables and the parametrization of the BBN. The BBN is useful for assessing future land use scenarios in a spatial way with a temporal dynamic approach, based on different climate/water, socioeconomical, ecological and management conditions. The BBN model includes environmental and agricultural management variables (e.g. conservation policies, agricultural payments), as well as socio-economic (e.g. old population, training of farmers, part time business), ecological (e.g. vegetations and land uses), and biophysical variables (e.g. slope, altitude) that are used to feed a distributed eco-hydrological model (WiMMed), integrated with the Bayesian model, to predict water flow and runoff, as well as several soil erosion processes in Sierra Nevada catchments. This combination of models allows managers to assess how changes in any of the BBN model's input conditions, individually or in combination, may determine future land use changes and related ecosystem services.

This work is part of Smart EcoMountains, the Thematic Center on Mountain Ecosystems of LifeWatch-ERIC.