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WINS Seminar

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Title of presentation: Identifying solutions to balance the conservation of biodiversity and human development using participatory decision support tools

Note: this presentation is the second part of the research carried out in the Bolivian and Brazilian Amazon region developed in the EU project ROBIN. The first part was presented in the IRI-Thesys Colloquium on May 20th 2016

Abstract
In recent decades, the Amazon Basin has been subject to extensive deforestation, being responsible of most of greenhouse gas emissions on Earth. The causes behind such deforestation are complex, but can be attributed mostly to agricultural expansion, infrastructure development and timber extraction. Numerous strategies and initiatives have been designed to preserve and restore tropical forests. However, the success of such strategies are determined by the context of countries in which they are developed, the causes of deforestation in those countries and the response at local level.
This research studies the future of social-ecological systems in two case studies of the Amazonian region, the Bolivia lowlands of Guarayos and the Brazil Tapajos National forest. Social-ecological systems are linked complex systems that pose substantial challenges for modeling. In this regard, Fuzzy Cognitive Maps (FCMs) have proven to be a useful method for capturing the functioning of this type of systems and for simulating the effects of changes in the system, such as policy interventions. The research is carried out in the context of the EU project ROBIN (The Role of Biodiversity in Climate Change Mitigation) and it is based in the carrying out of a series of stakeholder workshops to develop locally-perceived future scenarios on the evolution of the ecological and human systems using FCMs. To capture the local stakeholder visions, we started by using the general IPCC-Shared Socio-Economic Pathways (SSP) that were downscaled using FCMs. We used complex networks concepts, such as the adjacency matrix and centrality properties to calibrate the FCMs. In the two case studies, the downscaled SSP1 scenario represented the stakeholders' sustainable future, where control of deforestation, improved people livelihoods and sustainable agriculture were the most important goals. Main policy actions to attain these goals differed across case studies. In Bolivia, key actions include alternatives to local economy trough new infrastructures, access to credit or technical capacities. In Brazil, social and political actions, such as enhanced social participation, greater social awareness and improved institutional settings were predominant. In order to prioritize the policies that would achieve sustainability in the two Amazonian case studies, we developed a DSS using the Analytic Network Process (ANP). This multi-criteria assessment tool can assist in considering real world decision problems represented as a network of interconnected elements such as those included in the FCMs. Stakeholders in Bolivia prioritized the following three options: technical training, programs to assist subsistence farmers and improving the implementation of land use zoning; whereas in Brazil, governmental coordination, investment in health and education and programs to aid integration of agricultural and forestry activities were the most preferred. These options were found in general to have considerably high social acceptance, with high levels of associated implementation costs and widespread compatibility with present legislation. With respect to the methodology, this study shows that a coupled application of FCMs and ANP highlights some mutual benefits of both approaches, with FCM facilitating problem-structuring and supporting scenario building, whereas ANP supporting multi-criteria evaluation and capturing and prioritizing stakeholder preferences.

Short bio

Prof. Dr. Consuelo Varela-Ortega is a Full Professor of Agricultural Economics at the Universidad Politécnica de Madrid (UPM), Spain, specializing in agricultural and water economics and climate and policy interactions of social and natural systems. She has directed more than 25 research projects, taken part in advisory panels of international institutions (IFPRI, CGIAR, CIRAD, FAO), and has been panel expert of research projects and programs with the EU Commission and a member of the Advisory group in DGRTD for Environment