

Decision Support System Based On GIS and MCDM to Identify Land Suitability for Agriculture

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Abstract : The integration of MultiCriteria Decision Making (MCDM) approaches in a Geographical Information System (GIS) provides a powerful spatial decision support system which offers the opportunity to efficiently produce the land suitability maps for agriculture. Indeed, GIS is a powerful tool for analyzing spatial data and establishing a process for decision support. Because of their spatial aggregation functions, MCDM methods can facilitate decision making in situations where several solutions are available, various criteria have to be taken into account and decision-makers are in conflict. The parameters and the classification system used in this work are inspired from the FAO (Food and Agriculture Organization) approach dedicated to a sustainable agriculture. A spatial decision support system has been developed for establishing the land suitability map for agriculture. It incorporates the multicriteria analysis method ELECTRE Tri (ELimitation Et Choix Traduisant la REalité) in a GIS within the GIS program package environment. The main purpose of this research is to propose a conceptual and methodological framework for the combination of GIS and multicriteria methods in a single coherent system that takes into account the whole process from the acquisition of spatially referenced data to decision-making. In this context, a spatial decision support system for developing land suitability maps for agriculture has been developed. The algorithm of ELECTRE Tri is incorporated into a GIS environment and added to the other analysis functions of GIS. This approach has been tested on an area in Algeria. A land suitability map for durum wheat has been produced. Through the obtained results, it appears that ELECTRE Tri method, integrated into a GIS, is better suited to the problem of land suitability for agriculture. The coherence of the obtained maps confirms the system effectiveness.

Keywords : multicriteria decision analysis, decision support system, geographical information system, land suitability for agriculture

Conference Title : ICGIS 2015 : International Conference on Geographic Information Systems

Conference Location : Paris, France

Conference Dates : May 18-19, 2015