

Decision Support System (DSS) for Sustainable Watershed Management in Dong Nai Watershed – Vietnam

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Decision makers today need to be able to rapidly find good solutions to increasingly complex problems. Optimization based on decision support system (DSS) can help decision makers to meet this challenge. Building such systems, however, is expensive and time consuming. The conflict between environmental protection and the economic development by different uses of land within a watershed is a problem that constantly confronts public officials in regional planning, as experienced in many developing countries. In this study, DSS was developed using linear programming (LP), goal programming (GP), and geographic information system (GIS) for sustainable watershed management in Dong Nai watershed, Vietnam. A case study approach is undertaken using 'what-if' planning scenarios. The multi-objective linear programming (MOLP) techniques and GIS have been applied to display the optimum land resource allocation in different scenario, in order to evaluate the sustainable strategy of land development in a watershed. The information incorporated into the optimization objectives include economic benefits characterized by net income, sediment yield, and water discharge. The constraint set thereby consists of the limitations of carrying capacity of various land-use programs and assimilative capacity corresponding to different impacts on water quantity, sediment yield. The type of spatial planning problems described in this paper allocates different land uses across a geographical region, subject to a variety of constraints and conflicting management objectives. This complex land use planning decisions were made not only on what to do (selection of activities) but also on where to do it (i.e., relocate a new set of suitable land use for different scenarios), adding a whole extra class of decision variables to the problem. The new location of suitable land use has been manipulated using the given criteria in term of slope, soil depth, and rainfall. The algorithm was developed in ArcView GIS software to relocate land use map in Dong Nai watershed. The developed DSS performed very well in Dong Nai watershed (589,078 ha), and applicable to any watershed in Vietnam.