Application of the fuzzy approach for agricultural production planning in a watershed: a case study of the Atrak watershed, Iran

ABSTRACT

Watersheds are large-scale regions where the agricultural production planning is associated with multiple objectives, usually, including economic, social and environmental targets. Uncertainty plays an important role in all agricultural planning because some factors are not fully controllable while some input data or parameters such as demand, resources, costs and objective functions are imprecise. This paper applies fuzzy multi-objective mathematical programming model ton the Atrak watershed agricultural development plan. The model focuses on attaining three objectives simultaneously, namely, profit maximization, employment maximization and erosion minimization and these are subjected to 88 constraints. Results of the model indicate that, when compared with the current cropping structure, the implementation of the optimal cropping pattern could increase profit and employment and decrease soil erosion significantly.

Keyword: Agricultural planning; Sustainable development; Cropping pattern; Mathematical programming; Fuzzy programming; Watershed; Soil erosion; Economic, Social; Environmental objectives