Proceedings of the 8th International Conference on Environmental Science and Technology
Lemnos Island, Greece, 8 – 10 September 2003
Full paper Vol. B, pp. 667 - 674

EVALUATION OF THREE MULTI-CRITERIA DECISION-MAKING METHODS IN ECOSYSTEM MANAGEMENT

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EXTENDED ABSTRACT

Ecosystem Management (EM) is the holistic procedure of management of regions and natural resources, which is ecosystem-based and focuses on the principles of sustainable development. In the framework of EM, alternative management solutions are investigated, which should be socially acceptable and safeguard the functionality and productivity of the ecosystems. EM is a complex multi-criteria decision-making problem, in which the support and participation of the public are main elements.

Three multi-criteria decision-making methods (MCDM), namely the Analytic Hierarchy Process (AHP), the Expected Utility Method (EUM) and Compromise Programming (CP) were used, after a survey of the preferences of the public, in management decisions of the Eastern Macedonia and Thrace National Park in Greece. The aim was the selection of the most acceptable alternative among all feasible management alternatives. From the use of these methods, questions arise regarding the influence of the following factors on the final results: (1) the opinion of the interest groups; (2) the objectivity and impartiality of the decision makers; (3) their ability and experience; and (4) the MCDM method used.

In this paper, the sensitivity of the results of the three methods, regarding the above-mentioned factors, is examined. In the AHP, ranking the interest groups relatively to their importance is an additional step proposed here. In the EUM, the form of the utility function is discussed. In CP, the ability, experience and impartiality of the decision maker is expressed by an appropriate parameter, and the results are examined with regards to this parameter. The rank of the management solutions depends upon the importance that have for the public the assets provided by the ecosystem. The Spearman correlation coefficient is used for the comparison of the ranks obtained by the three methods. The evaluation of the methods forms a new complex multi-criteria decision-making problem. Four criteria are discussed: (1) the consistency; (2) the robustness; (3) the strength; and (4) the confidence of the results.

It was found that: (1) the final ranking of the alternative management solutions was stable regarding the variation of the relative importance of the interest groups; and (2) even though CP seems to be a good method in decision-making, the selection of the most appropriate method constitutes by itself a multi-criteria decision-making problem containing a large number of possible criteria. Furthermore, perspectives of future research on this subject are also presented.

Key words: Ecosystem management, decision-making, multi-criteria methods, evaluation, sensitivity analysis, sustainability.