Singapore-Delft Water Alliance

Presents

A Proposed Model for Multi-Criteria Decision Making and Its Applicability in Evaluating the Sustainability of Water Management Plans

by

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Abstract

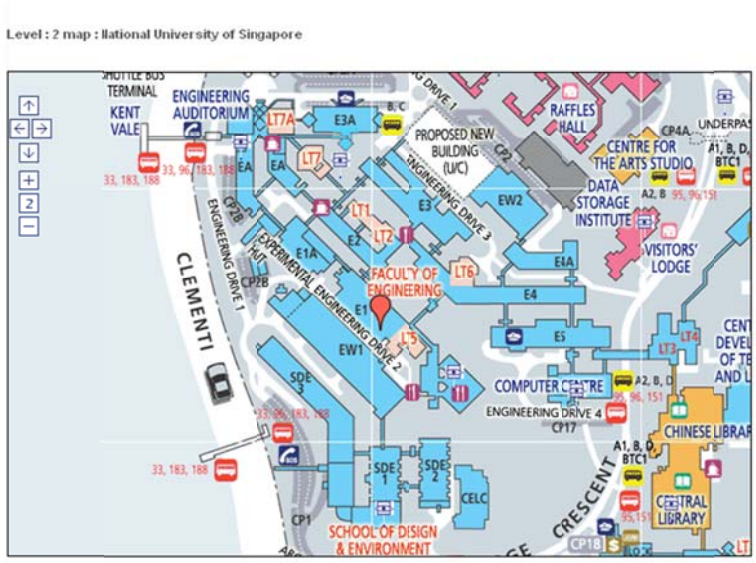
Multi-Criteria Decision Analysis (MCDA) is becoming a widely-used approach for evaluating sustainability of widespread areas including political, economic, social and environmental sectors. Among MCDA methods, the Analytic Hierarchy Process (AHP) has been proven as an excellent one as it provides a comprehensive and rational framework for structuring a decision process, for representing and quantifying its elements, for relating those elements to overall goals, and for evaluating alternative solutions. However, the AHP is based on crisp judgments and thus requires extract data pertaining to measurement factors which are very difficult to obtain in practice since all human preferences are lying face-down to a degree of uncertainty. Therefore, this study aims at proposing a Fuzzy multi-criteria decision model by integrating classical AHP with the Fuzzy logic which deals with reasoning by approximate rather than fixed and exact numbers. The proposed Fuzzy AHP model allows numbers having the "soft" boundary, and thus effectively resembles human thoughts and perceptions. Within the framework of "Sustainable development of mining sector in the Asian Pacific Economic Corporation (APEC) Region" project, the proposed model was utilized to evaluate national-scale sustainability of mining sectors for 8 selected APEC member countries in which economic, social and environmental dimensions were taken together into account. The results revealed that the economic and social performances of mining sectors in the selected countries have been generally toward sustainable development, while almost the environmental performances

have been slightly backward. The well reflections of the results to the real situations of mining sectors of eight APEC economies have demonstrated the robustness of the proposed model. Additionally, in this presentation we preliminarily extended the applicability of this model in evaluating the sustainability of water management plans as well as assisting water resource managers in making their best decisions. Initial results indicate that the Fuzzy AHP model would be a good multi-criteria decision-making tool for water management sector, though further comprehensive studies need to be implemented.

About the speaker

Ms. Nuong has a background in mathematics and strong research interests in environmental sciences. She received her Master Degree in Environmental Science and Engineering from Gwangju Institute of Science and Technology (GIST), Korea. She now is a lecturer and vice-chair of Youth Union at the Faculty of Environment, Hanoi University of Natural Resources and Environment (HUNRE), Vietnam. During the course of her studies she has received some research awards and authored several peer-reviewed papers published both in Vietnam and internationally. Her research and teaching experience has been covered in several areas including Applied Mathematics, Data Mining, Statistics for Environmental Science and Management, Sustainable Development Evaluation, Multi-Criteria Decision Analysis, and equivalent fields. Ms. Nuong has been also actively engaged in non-professional singing activities– an interest zone that keeps her enthused when free.

Map



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