



“Gheorghe Asachi” Technical University of Iasi, Romania



SOLVING WATER RESOURCES ALLOCATION PROBLEMS USING HEURISTIC-BASED METHODS

Yanan Jiang^{1,2*}, Adrian T. McDonald², Martin Clarke², Linda See³

¹ Northwest A&F University, College of Water Resources and Architectural Engineering, Yangling 712100, P.R. China

² University of Leeds, School of Geography, Leeds, LS2 9JT, UK

³ IIASA, Schlossplatz 1, Laxenburg A-2361, Austria

Abstract

Due to rapid growth in both population and economic development in China, water demand is increasing dramatically and China is facing more and more severe water scarcity problems. Thus competitions for water (between uses, users and regions) are increasing which make water use efficiency an important issue in China, together with the uneven spatial and temporal distribution of water, all of which drive the Chinese government and water planners to find the optimal water resource allocation plan. Optimal water resource allocation plan with consideration of social benefit, economic benefit and environmental benefit can provide valuable information to the decision makers, thus improve the water use efficiency and promote better water resource management. With better understanding of real world problems and improved data availability and reliability, modern WRA models often involve nonlinear optimization with high dimensionality and a large number of constraints, thus they could be very complicated, which make the conventional optimization techniques incredible difficult or unable to find the optimal solutions, so heuristic-based methods were adopted in this paper and three of the most popular one will be adopted to solve three typical WRA problems. The procedures to solve those models using heuristic-based methods were presented and many design issues were discussed, such as the formulation of the fitness functions, constraints handling techniques etc. By solving three typical WRA problems with heuristic-based methods, it concluded that heuristic-based methods can be easily adapted to solve WRA problems and in future with further research they will play a significant role in optimal WRA problems.

Key words: heuristic based methods, optimization, water efficiency, water resource allocation

Received: November 2012; Revised final: May, 2013; Accepted: June 2013

* Author to whom all correspondence should be addressed: E-mail: yananjiang@nwsuaf.edu.cn