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# Integrative Negotiation Model to Support Water Resources Management

Daysan F. K. Leal Medeiros<sup>1</sup>; Marcella Maia Urtiga<sup>1\*</sup>; Danielle Costa Morais<sup>1</sup>

<sup>1</sup>Department of Production Engineering, Universidade Federal de Pernambuco, Av. Professor Moraes Rego, 1235, Recife - PE,

50670-901, Brazil

\*Corresponding author

(daysanmedeiros@hotmail.com, maia.urtiga@gmail.com\*, dcmorais@cdsid.org.br)

## ABSTRACT

By following the steps of the Integrated Water Management (IWM) approach in the European Union, Brazil has moved from a top-down approach to water management to a participatory one that involves different segments of society. Since decisions regarding water affect all economic activities, the environment and life in communities, it is important that society takes an active part in opportunities to discuss and collectively decide on water issues. When this is done, multiple perspectives can be taken into consideration such that the sustainability of water management and planning is more likely to be maintained. Nevertheless, many conflicts arise from society having to share water, a limited resource, for multiple uses. The volume of water needed and the way it is used for certain activities, such as by agriculture and industry, can negatively impact its availability and quality for other uses. This paper proposes an integrative negotiation model to assist watershed committees (WSCs) to deal with conflicts regarding water pollution. In a pre-negotiation phase the decision-makers (DMs) use the Strategic Options Development Analysis (SODA) method to structure the problem and to identify the relevant factors of the decision problem. DMs evaluate the problem from a multi-attribute perspective. Additionally, a post-negotiation phase is proposed with evaluation criteria to monitor how the compromise solution chosen is affecting the quality of water and if the actors are fulfilling their parts of the agreement. A virtual case study is presented to illustrate the applicability of the model, where three DMs are considered as part of a WSC, namely a representative of civil society, a representative of the public sector, and a representative of water users. The WSC has used social, economic and environmental attributes to evaluate proposals and counter proposals. They have arrived at a balanced agreement, taking into consideration their interests. The model helps reduce conflicts between the DMs and it is flexible in the sense that it can be applied in different conflicts and contexts. It is also easy to implement in most WSCs.

**Keywords:** water resources, integrative negotiation, cognitive maps, participatory decision-making

## 1. Introduction

An Integrated Water Management (IWM) approach takes into consideration that the uses of water resources are interdependent. Water resources serve multiple competing uses. The most important sectors involved are usually those that meet urban household needs, and industry, agriculture and the energy sector (particularly with regard to cooling in power plants) (Romano et al., 2015). The way that water is used by one segment of society will impact its quality and availability for other uses. This is what

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