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**Abstract** The goal of this paper is to resolve the strategic long-term dispute for the Sacramento-San Joaquin Delta California using the Graph Model approach for conflict resolution. To facilitate the analysis, a Decision Support System (DSS) has been developed, incorporating multiple-criteria decision analysis, stability and equilibrium analysis, and uncertainty analysis using the info-gap technique. The DSS has been used on the Sacramento-San Joaquin Delta conflict. After specifying the stakeholders with their preferences and possible decisions, the DSS identified the most robust solution, considering the possible actions and counteractions of all stakeholders. Solution robustness was then tested under the uncertainty associated with stakeholders' perspectives, and under cooperative and non-cooperative attitudes. The model results suggest the following: (1) with cooperation between the decision makers, building the tunnel is the most likely solution to replace the existing water export; (2) the second reliable solution is to have a dual conveyance "tunnel"; (3) when decision makers do not cooperate, no-export water is the best solution. Furthermore, no-export solution is impossible and unlikely for this problem since the agriculture production in the Sacramento-San Joaquin Delta is a multi-billion industry.

**Keywords** Water disputes; conflict resolution; graph model; decision support systems; multiple criteria decision analysis; Sacramento-San Joaquin Delta; computer applications.