Application of Stochastic Cooperative Games in Water Resources

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ABSTRACT

Traditionally, cooperative game theory has been applied to a variety of water resource problems assuming a deterministic pattern of supply. On the other hand, in view of the important role that water plays in regional and local projects, and taking into account that with climate change affecting the water cycle, the world is expected to face more stochastic and extreme events of water supply, incorporating stochastic consideration of water supply becomes more acute in designing water facilities. Moreover, various water users may have different attitudes toward risk, depending on their economic, managerial, and institutional capacity. Therefore, the combination of stochastic events and players' risk attitude become increasingly an important issue in designing water related economic activities that depend on cooperation among the users.

In this paper we will apply a Stochastic GT framework, based on the work of Suijs and Borm (1996). We will use an example of a water treatment plant to illustrate the approach, although the principles hold also for cases of other water-related joint cost, such as for storage, etc. Our goal will be to offer, in the most simplified setting, some instances of problems which appear whenever one tries to take into account the stochastic aspects of the problem which is being modelled.

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