

Cooperative framework for hydropower development in an international river

Seemanta Bhagabati, Akiyuki Kawasaki

Department of Civil Engineering, The University of Tokyo, 7-3-1 Hongo, Bunkyo-ku, Tokyo 113-8654, Japan; E-mail: seemanta0605@gmail.com

Abstract. In any problem where there are more than one players involved, rivalry arises. Literature suggests that cooperation among the players can minimize such issues and lead to greater mutual benefits for all. When the players are individuals or companies trying to maximize their benefits, statistical data is adequate for solving the problem. However when the players are nations thriving for power generation such as by developing hydropower, it becomes very difficult to visualize and access the problem. Statistical data, by itself, is not enough to visualize, formulate and solve such issues. Past researches, although provided the solution, are unable to get much attention as the stakeholders found it difficult to understand the problem and solution well enough. This study developed a cooperative framework, by integrating spatial information and optimization, for hydropower development in the Lower Mekong Basin. The study area is the Sesan, Sekong and Srepok (commonly known as the 3S) sub-basins shared among Laos, Cambodia and Vietnam. Here we integrated the statistical data with local information from GIS datasets. The framework used the cooperative game theoretic concepts such as core stability and incentive compatibility. A broad range of factors at different levels of cooperation between the three nations has been used. With the use of GIS data, the problem could be easily visualized and analyzed. The results show that higher levels of cooperation lead to greater total net benefits as well as greater benefits to individual nations, as compared to the benefits from the development of hydropower by individual nations. With the upcoming ASEAN Economic Community in 2015, the cooperative framework developed in this study can be used by the regional policy makers as a basis for equitable economic development for the region in the context of hydropower development.

Keywords. GIS, Game Theory, Optimization, Cooperation, Hydropower development