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博弈论模型在解决水资源管理中利益冲突的运用

Application of game theoretic models to solve the benefit conflicts in water resources management

中文关键词:水资源管理 冲突 博弈论 模拟 南水北调 成本效益分析

英文关键词:water resources management benefit conflict game theory simulation cost benefit analysis South to North Water Transfer Project

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中文摘要:

本文运用非合作与合作博弈的方法，对南水北调中线工程水资源管理中的有关利益冲突进行模拟和分析。其中，以统计学和经济计量学的回归分析法构建博弈各方的效益函数，以经济价值评估法折算水资源的价值和水污染的损失，用成本效益分析法比较不同战略下的博弈结果。模拟结果显示，若以北京为博弈的甲方，则非合作结果使局中的乙方、丙方和丁方分别获得0.15～0.32亿元、0.59～0.364亿元和0.08～0.29亿元的利益，但整体却遭受662.01～1218.33亿元的损失，而合作的结果恰恰相反。因此，如果能够把合作所带来的部分净收益从赢利方转向损失方，以补足损失方的损失，博弈各方均能受益。此模拟方法及结果不仅有利于博弈各方，而且也为水资源管理部门提供决策支持。

英文摘要:

The non cooperative and cooperative game methods were applied to simulate and analyze the benefit conflicts among multiple water stakeholders involved in water management of the South to North Transfer Project in China. The statistical and economic regression models were used to formulate the payoff functions of different payers. The cost benefit analysis and the demand supply principle were applied to compare the game outcomes. The results of the game simulations showed that if the non cooperative gaming is adopted and regarding the Beijing City as the first player, the second, third and fourth player would obtain benefits of 0.15×10^8～0.32×10^8 Yuan, 0.59×10^8～0.36×10^8 Yuan and 0.08×10^8～0.29×10^8 Yuan, respectively. But the society had to pay the loss of 662.01×10^8～1218.33×10^8 Yuan. On the contrary, if the cooperative gaming was adopted the result would be totally opposite. The best solution is to transfer a part of the net benefits of the winners in cooperative game to whoever pays the loss. In this case, both players in opposite sides will be the profit winners. The feasibility of this method was verified by the practice calculation result.

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