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An innovative cross-sectoral method for implementation of trade-off adaptation strategy assessment under climate change

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Climate change will increase sharp risks to the water and food supply in coming decades. Although impact assessment and adaptation evaluation has been discussed a lot in recent years, the importance of adaptation implement should not be ignored. In Taiwan, and elsewhere, fallow is an option of adaptation strategy under climate change. Fallow would improve the water scarcity of domestic use, but the food security might be threatened. The trade-off effects of adaptation actions are just like the side effects of medicine which cannot be avoided. Thus, managing water resources with an integrated approach will be urgent.

This study aims to establish a cross-sectoral framework for implementation the trade-off adaptation strategy. Not only fallow, but also other trade-off strategy like increasing the percentage of national grain self-sufficiency would be analyzed by a rational decision process. The recent percentage of grain self-sufficiency in Taiwan is around 32, which was decreasing from 53 thirty years ago. Yet, the goal of increasing grain self-sufficiency means much more water must be used in agriculture. In that way, domestic users may face the water shortage situation. Considering the conflicts between water supply and food security, the concepts from integrative negotiation are appropriate to apply. The implementation of trade-off adaptation strategies needs to start by quantifying the utility of water supply and food security were be quantified. Next, each side's bottom line can be found by BATNA (Best Alternative to a Negotiated Agreement) and ZOPA (Zone of Possible Agreement). ZOPA provides the entire possible outcomes, and BATNA ensures the efficiency of adaptation actions by moving along with Pareto frontier.

Therefore, the optimal percentage of fallow and grain self-sufficiency can be determined. Furthermore, BATNA also provides the pathway step by step which can be a guideline of adaptation strategies. This framework allows analysts and stakeholder to systematically evaluate trade-off adaptation strategies and indicate the priority to implement.