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Water trading in the face of climate change

Water trading is the buying and selling of access to water and can be an effective tool for water resource management, particularly in relation to the allocation of water among different users. A new tool that evaluates the long-term impacts of climate change on water trading has indicated that such a scheme could be effective in the future but will depend on factors including water demand and availability.

Water trading schemes exist in countries and regions, such as Australia, South Africa and the Canary Islands in Spain, where balancing limited water resources is crucial. In a non-trading system, water is constrained by allocating a volume of water to each user but when water rights are tradable, a user who wishes to consume more than their licensed volume can do so by purchasing credits. These schemes have proven to be effective in water-scarce countries, in moving water to more productive uses. However, their success could be affected by the impacts of climate change.

The study evaluated the impacts of a changing climate on the performance of a hypothetical water trading system in Canada. It designed an indicator of performance based on the difference in water consumption between a water trading scheme and a situation where no scheme exists. Water trading is effective when total supply is short and becomes unnecessary when supply is abundant. This indicator reflected this random nature of performance using a statistical method called 'stochastic programming'.

The research used data on water flow, temperature, precipitation and evaporation to estimate both current and future water consumption in the Swift Current watershed in Canada. Two future climate scenarios were used. They were both based on the Intergovernmental Panel on Climate Change SRES A2 scenario, but one scenario was much wetter than the other.

Under the non-trading mechanism, the study estimated that the current water consumed would be 9.52 million m^3 to produce a net benefit of $863,000 from growing crops. In comparison, a water trading scheme would consume 8.053 million m^3 of water to maintain the same economic target, saving 1.468 million m^3 of water.

The research estimated that in 2070 the trading system would consume 7.665 million m^3 of water in the first climate scenario and 8.258 million m^3 in the second climate scenario. This indicated that the trading system is still more beneficial than the non-trading alternative under future climate change, but that the size of the benefit depends upon the scenario. The performance depended on factors, such as water demand and total water availability. In very wet future climates the trading mechanism is unlikely to be beneficial but in future dry seasons it is likely to be efficient.

The researchers note that the model did not include the transaction costs of water trading programmes. These include the costs of creating, monitoring and enforcing water trading. In addition many factors could change over the next century, including irrigation technologies, institutions for water trading and the economic value of crops. Crop switching is another important issue which would affect the estimates.

Nevertheless, the method developed by the research could help reduce the risks in establishing a potential water trading system, evaluate existing systems and assess the potential of water trading as an adaptation option to climate change.

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