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## Issues of Coupling Physical/Hydrological Economic Models in Water Resources

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## **ISSUES OF COUPLING PHYSICAL/HYDROLOGICAL ECONOMIC MODELS IN WATER RESOURCES**

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To understand and model the movement and use of water in a human dominated landscape, the physical laws governing water behavior must be integrated with an understanding of human infrastructure and behavior. Physical laws that predict the rate at which a reservoir or aquifer will be replenished must be combined with behavioral models to predict how and when water might be released or extracted for use. The intersection of physical and behavior models is mediated by a combination of institutional rules, including property rights and market structures. Integration of the best available physical and behavioral models currently represents the cutting edge of water transfer modeling. Ignoring the issues faced by each type of model alone, the significant challenges to this interdisciplinary modeling effort can be broadly grouped into three areas: the modeling platform, trading feasibility, and model components. The modeling platform issue relates to the level of integration between models. Physical and behavioral models can be run independently, or they can be tightly integrated on a common platform. The trading feasibility issue relates to deciding if a proposed transfer or series of transfers is feasible. If the behavioral model suggests a water transfer that is not feasible, should the physical model simply deny the transfer, or should an alternate transfer be provided? Model components are an issue to each type of modeling independently, and become especially significant to the coupled model in the context of third party effects. Existing basin-scale physical models may not have the resolution to evaluate current legal definitions of third party effects.

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